

## ABSTRACT OF THE DISCLOSURE

Apparatus and methods for biasing a power amplifier are disclosed. In one embodiment, a method of biasing a power amplifier includes shaping an enable signal using a time-dependent signal generator to generate a control current, amplifying the control current using a current amplifier to generate a correction current, and generating a bias current for a power amplifier using a primary biasing circuit. The primary biasing circuit is configured to use the correction current to correct for a variation in gain of the power amplifier when the power amplifier is enabled.

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<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	SKYWRKS.280A
		Application Number	
Title of Invention	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS		
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Attorney Docket Number	SKYWRKS.280A	Small Entity Status Claimed	<input type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	7	Suggested Figure for Publication (if any)	4

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	non provisional of	61486186	2011-05-13
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<b>Application Data Sheet 37 CFR 1.76</b>	Attorney Docket Number	SKYWRKS.280A
	Application Number	
Title of Invention	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS	

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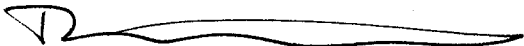
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**APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS****CROSS-REFERENCE TO RELATED APPLICATIONS**

**[0001]** This application claims the benefit of priority under 35 U.S.C. § 119(e) of U.S. Provisional Patent Application No. 61/486,186, filed May 13, 2011 entitled “APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS”, which is herein incorporated by reference in its entirety.

**BACKGROUND**Field

**[0002]** Embodiments of the invention relate to electronic systems, and in particular, to radio frequency (RF) electronics.

Description of the Related Technology

**[0003]** RF power amplifiers can be used to boost the power of a RF signal having a relatively low power. Thereafter, the boosted RF signal can be used for a variety of purposes, included driving the antenna of a transmitter.

**[0004]** Power amplifiers can be included in mobile phones to amplify a RF signal for transmission. For example, in mobile phones that communicate using a wireless local area network (WLAN) protocol and/or any other suitable communication standard, a power amplifier can be used to amplify the RF signal. It can be important manage the amplification of a RF signal, as amplifying the RF signal to an incorrect power level can cause a wireless device to transmit out of band.

**[0005]** There is a need for improved power amplifier systems. Furthermore, there is a need for improving power amplifier biasing.

**SUMMARY**

**[0006]** In certain embodiments, the present disclosure relates to a power amplifier system including a power amplifier configured to amplify a radio frequency (RF) signal and a bias block for biasing the power amplifier. The bias block includes a time dependent signal

generator configured to shape an enable signal of the power amplifier to generate a control current, a current amplifier configured to amplify the control current to generate a correction current, and a primary biasing circuit configured to generate a bias current for the power amplifier based at least partly on the correction current. The bias current is configured to correct for a variation in gain of the power amplifier when the power amplifier is enabled.

**[0007]** In several embodiments, the time dependent signal generator includes a resistor-capacitor (RC) network. In accordance with a number of embodiments, the RC network includes a first resistor and a first capacitor electrically connected in series between the current amplifier and an input of the bias circuit configured to receive the enable signal. In several embodiments, the RC network further includes a second resistor having a first end electrically connected to the input of the current mirror and a second end electrically connected to the input of the bias circuit configured to receive the enable signal.

**[0008]** According to certain embodiments, the second resistor has a resistance ranging between about 10 k $\Omega$  and about 100 k $\Omega$ ., the first capacitor has a capacitance ranging between about 10 pF and about 100 pF, and the first resistor has a resistance ranging between about 10 k $\Omega$  and about 100 k $\Omega$ .

**[0009]** In a number of embodiments, the current amplifier includes a current mirror. In several embodiments, the current mirror includes a first bipolar transistor and a second bipolar transistor, the first bipolar transistor including an emitter electrically connected to an emitter of the second bipolar transistor and to a power low voltage, and a collector electrically connected to a base of the first bipolar transistor and to a base of the second bipolar transistor, the collector of the first bipolar transistor configured to receive at least a portion of the control current. In certain embodiments, the current mirror further includes a resistor, a third bipolar transistor and a fourth bipolar transistor, the third bipolar transistor including an emitter electrically connected to an emitter of the fourth bipolar transistor and to the power low voltage, and a collector electrically connected to a first end of the resistor, to the collector of the second bipolar transistor, to a base of the third bipolar transistor, and to a base of the fourth bipolar transistor, the collector of the fourth bipolar transistor configured to generate the compensation current. In several embodiments, the resistor further includes a second end configured to receive the enable signal.

**[0010]** According to some embodiments, the power amplifier system further includes a transceiver for providing the RF signal to the power amplifier.

**[0011]** In a number of embodiments, the power amplifier includes a bipolar transistor having an emitter, a base and a collector, the base configured to receive the RF signal and the bias current. In certain embodiments, the emitter is electrically connected to a power low voltage and the collector is configured to generate an amplified version of the RF signal.

**[0012]** In several embodiments, the primary bias circuit includes a first resistor, a second resistor, a first bipolar transistor, and a second bipolar transistor, the first resistor including a first end electrically connected to the emitter of the first bipolar transistor at a node configured to receive the correction current, and a second end electrically connected to a first end of the second resistor at a node of the bias circuit configured to receive the enable signal, the second resistor including a second end electrically connected to a collector of the first bipolar transistor, a base of the first bipolar transistor, and to a base of the second bipolar transistor. According to certain embodiments, the second bipolar transistor includes a collector electrically connected to a battery voltage and an emitter configured to generate the bias current. In a number of embodiments, the primary bias circuit further includes a third bipolar transistor having an emitter electrically connected to the power low voltage and a base and a collector electrically connected to the emitter of the first bipolar transistor.

**[0013]** In certain embodiments, the present disclosure relates to a method of biasing a power amplifier. The method includes shaping an enable signal using a time-dependent signal generator to generate a control current, amplifying the control current using a current amplifier to generate a correction current, and generating a bias current for a power amplifier using a primary biasing circuit, the primary biasing circuit configured to use the correction current to correct for a variation in gain of the power amplifier when the power amplifier is enabled.

**[0014]** In a number of embodiments, shaping the enable signal includes using a resistor capacitor (RC) network of the time dependent signal generator. In some embodiments, the RC network includes a first resistor and a first capacitor electrically

connected in series, the RC network configured to receive the enable signal and to generate the control current.

**[0015]** In several embodiments, amplifying the control current further includes amplifying the control current using a current mirror of the current amplifier.

**[0016]** In accordance with a number of embodiments, generating the bias current includes shaping the bias current so as to compensate for a gain variation of a heterojunction bipolar transistor (HBT).

**[0017]** In certain embodiments, the present disclosure relates to a bias circuit for biasing a power amplifier. The bias circuit includes a time dependent signal generator configured to shape an enable signal of the power amplifier to generate a control current, a current amplifier configured to amplify the control current to generate a correction current, and a primary biasing block configured to generate a bias current for the power amplifier based at least partly on the correction current. The bias current is configured to correct for a variation in gain of the power amplifier when the power amplifier is enabled.

**[0018]** In several embodiments, the time dependent signal generator includes a resistor-capacitor (RC) network. In a number of embodiments, the RC network includes a first resistor and a first capacitor electrically connected in series between the current amplifier and an input of the bias circuit configured to receive the enable signal.

**[0019]** In accordance with certain embodiments, the current amplifier includes a current mirror.

**[0020]** In several embodiments, the primary bias block includes a first resistor, a second resistor, a first bipolar transistor, and a second bipolar transistor, the first resistor including a first end electrically connected to the emitter of the first bipolar transistor at a node configured to receive the correction current, and a second end electrically connected to a first end of the second resistor at a node of the bias circuit configured to receive the enable signal, the second resistor including a second end electrically connected to a collector of the first bipolar transistor, a base of the first bipolar transistor, and to a base of the second bipolar transistor. In a number of embodiments, the second bipolar transistor includes a collector electrically connected to a battery voltage and an emitter configured to generate the bias current.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0021]** Figure 1 is a schematic diagram of a power amplifier module for amplifying a radio frequency (RF) signal.

**[0022]** Figure 2 is a schematic block diagram of an example wireless device that can include one or more of the power amplifier modules of Figure 1.

**[0023]** Figure 3A is a schematic block diagram of one example of a power amplifier system.

**[0024]** Figure 3B is a schematic block diagram of another example of a power amplifier system.

**[0025]** Figure 4 is a schematic block diagram of one example of a power amplifier system including a power amplifier bias block according to one embodiment.

**[0026]** Figure 5 is a circuit diagram of a power amplifier bias block according to one embodiment.

**[0027]** Figure 6 is a graph of one example of collector current versus time.

**[0028]** Figure 7A is a graph of one example of dynamic error vector magnitude (EVM) versus output power.

**[0029]** Figure 7B is a graph of another example of dynamic EVM versus output power.

**[0030]** Figure 8 is a flow chart illustrating a method for biasing a power amplifier in accordance with one embodiment.

**[0031]** Figure 9 is a circuit diagram of a time-dependent signal generator in accordance with one embodiment.

**[0032]** Figure 10A is a schematic diagram of one example of a packaged power amplifier module.

**[0033]** Figure 10B is a schematic diagram of a cross-section of the packaged power amplifier module of Figure 10A taken along the lines 10B–10B.

## DETAILED DESCRIPTION OF EMBODIMENTS

**[0034]** The headings provided herein, if any, are for convenience only and do not necessarily affect the scope or meaning of the claimed invention.

**[0035]** Apparatus and methods for biasing power amplifiers are disclosed herein. In certain implementations, a power amplifier and a power amplifier bias block are provided. The power amplifier can be used to amplify a radio frequency (RF) signal for transmission, and the power amplifier bias block can be used to bias the power amplifier. The power amplifier bias block can receive an enable signal that can be used to enable or disable the power amplifier so as to pulse the power amplifier's output.

**[0036]** In certain implementations, the power amplifier bias block includes a primary biasing circuit and a gain correction block including a time-dependent signal generator and a current amplifier. The time-dependent signal generator or control block can be used to shape the enable signal so as to generate a control current, which can be amplified by the current amplifier to generate a correction current. The power amplifier bias block can generate a bias current for the power amplifier using the primary biasing circuit and the correction current. The correction current can be used to adjust the magnitude of the bias current so as to compensate for a variation in gain of the power amplifier over time when the power amplifier is transitioned from a disabled state to an enabled state. For example, shortly after a power amplifier is enabled, absent compensation the current of a primary biasing circuit can come up slow due to thermal effects, and the power amplifier's gain can be low. By including the time-dependent signal generator and the current amplifier, a current boost can be provided to the power amplifier so as to provide the power amplifier with a substantially flat gain response versus time. Correcting for gain variation in the power amplifier can improve the power amplifier's performance, including, for example, the power amplifier's dynamic error vector magnitude (EVM).

Overview of Power Amplifier Systems

**[0037]** Figure 1 is a schematic diagram of a power amplifier module 10 for amplifying a radio frequency (RF) signal. The illustrated power amplifier module (PAM) 10 can be configured to amplify an RF signal RF\_IN to generate an amplified RF signal

RF\_OUT. As described herein, the power amplifier module 10 can include one or more power amplifiers, including, for example, multi-stage power amplifiers.

**[0038]** Figure 2 is a schematic block diagram of an example wireless or mobile device 11 that can include one or more of the power amplifier modules of Figure 1. The wireless device 11 can include power amplifier bias circuits implementing one or more features of the present disclosure.

**[0039]** The example wireless device 11 depicted in Figure 2 can represent a multi-band and/or multi-mode device such as a multi-band/multi-mode mobile phone. In certain embodiments, the wireless device 11 can include switches 12, a transceiver 13, an antenna 14, power amplifiers 17, a control component 18, a computer readable medium 19, a processor 20, and a battery 21.

**[0040]** The transceiver 13 can generate RF signals for transmission via the antenna 14. Furthermore, the transceiver 13 can receive incoming RF signals from the antenna 14.

**[0041]** It will be understood that various functionalities associated with the transmission and receiving of RF signals can be achieved by one or more components that are collectively represented in Figure 2 as the transceiver 13. For example, a single component can be configured to provide both transmitting and receiving functionalities. In another example, transmitting and receiving functionalities can be provided by separate components.

**[0042]** Similarly, it will be understood that various antenna functionalities associated with the transmission and receiving of RF signals can be achieved by one or more components that are collectively represented in Figure 2 as the antenna 14. For example, a single antenna can be configured to provide both transmitting and receiving functionalities. In another example, transmitting and receiving functionalities can be provided by separate antennas. In yet another example, different bands associated with the wireless device 11 can be provided with different antennas.

**[0043]** In Figure 2, one or more output signals from the transceiver 13 are depicted as being provided to the antenna 14 via one or more transmission paths 15. In the example shown, different transmission paths 15 can represent output paths associated with different bands and/or different power outputs. For instance, the two example power amplifiers 17 shown can represent amplifications associated with different power output

configurations (e.g., low power output and high power output), and/or amplifications associated with different bands. Although Figure 2 illustrates a configuration using two transmission paths 15, the wireless device 11 can be adapted to include more or fewer transmission paths 15.

**[0044]** The power amplifiers 17 can be used to amplify a wide variety of RF signals. For example, one or more of the power amplifiers 17 can receive an enable signal that can be used to pulse the output of the power amplifier to aid in transmitting a wireless local area network (WLAN) signal or any other suitable pulsed signal. Each of the power amplifiers 17 need not amplify the same type of signal. For example, one power amplifier can amplify a WLAN signal, while another power amplifier can amplify, for example, a Global System for Mobile (GSM) signal, a code division multiple access (CDMA) signal, a W-CDMA signal, a Long Term Evolution (LTE) signal, or an EDGE signal.

**[0045]** One or more features of the present disclosure can be implemented in the foregoing example modes and/or bands, and in other communication standards.

**[0046]** In Figure 2, one or more detected signals from the antenna 14 are depicted as being provided to the transceiver 13 via one or more receiving paths 16. In the example shown, different receiving paths 16 can represent paths associated with different bands. Although Figure 2 illustrates a configuration using four receiving paths 16, the wireless device 11 can be adapted to include more or fewer receiving paths 16.

**[0047]** To facilitate switching between receive and transmit paths, the switches 12 can be configured to electrically connect the antenna 14 to a selected transmit or receive path. Thus, the switches 12 can provide a number of switching functionalities associated with an operation of the wireless device 11. In certain embodiments, the switches 12 can include a number of switches configured to provide functionalities associated with, for example, switching between different bands, switching between different power modes, switching between transmission and receiving modes, or some combination thereof. The switches 12 can also be configured to provide additional functionality, including filtering and/or duplexing of signals.

**[0048]** Figure 2 shows that in certain embodiments, a control component 18 can be provided for controlling various control functionalities associated with operations of the

switches 12, the power amplifiers 17, and/or other operating component(s). Non-limiting examples of the control component 18 are described herein in greater detail.

**[0049]** In certain embodiments, a processor 20 can be configured to facilitate implementation of various processes described herein. For the purpose of description, embodiments of the present disclosure may also be described with reference to flowchart illustrations and/or block diagrams of methods, apparatus (systems) and computer program products. It will be understood that each block of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart illustrations and/or block diagrams, may be implemented by computer program instructions. These computer program instructions may be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the acts specified in the flowchart and/or block diagram block or blocks.

**[0050]** In certain embodiments, these computer program instructions may also be stored in a computer-readable memory 19 that can direct a computer or other programmable data processing apparatus to operate in a particular manner, such that the instructions stored in the computer-readable memory produce an article of manufacture including instruction means which implement the acts specified in the flowchart and/or block diagram block or blocks. The computer program instructions may also be loaded onto a computer or other programmable data processing apparatus to cause a series of operations to be performed on the computer or other programmable apparatus to produce a computer implemented process such that the instructions that execute on the computer or other programmable apparatus provide steps for implementing the acts specified in the flowchart and/or block diagram block or blocks.

**[0051]** The battery 21 can be any suitable battery for use in the wireless device 11, including, for example, a lithium-ion battery.

**[0052]** Figure 3A is a schematic block diagram of one example of a power amplifier system 26. The illustrated power amplifier system 26 includes the switches 12, the antenna 14, the battery 21, a directional coupler 24, a power amplifier bias block 30, a power

amplifier 32, and a transceiver 33. The illustrated transceiver 33 includes a baseband processor 34, an I/Q modulator 37, a mixer 38, and an analog-to-digital converter (ADC) 39.

**[0053]** The baseband signal processor 34 can be used to generate an I signal and a Q signal, which can be used to represent a sinusoidal wave or signal of a desired amplitude, frequency, and phase. For example, the I signal can be used to represent an in-phase component of the sinusoidal wave and the Q signal can be used to represent a quadrature component of the sinusoidal wave, which can be an equivalent representation of the sinusoidal wave. In certain implementations, the I and Q signals can be provided to the I/Q modulator 37 in a digital format. The baseband processor 34 can be any suitable processor configured to process a baseband signal. For instance, the baseband processor 34 can include a digital signal processor, a microprocessor, a programmable core, or any combination thereof. Moreover, in some implementations, two or more baseband processors 34 can be included in the power amplifier system 26.

**[0054]** The I/Q modulator 37 can be configured to receive the I and Q signals from the baseband processor 34 and to process the I and Q signals to generate a RF signal. For example, the I/Q modulator 37 can include DACs configured to convert the I and Q signals into an analog format, mixers for upconverting the I and Q signals to radio frequency, and a signal combiner for combining the upconverted I and Q signals into a RF signal suitable for amplification by the power amplifier 32. In certain implementations, the I/Q modulator 37 can include one or more filters configured to filter frequency content of signals processed therein.

**[0055]** The power amplifier bias block 30 can receive an enable signal ENABLE from the baseband processor 34 and a battery or power high voltage  $V_{CC}$  from the battery 21, and can use the enable signal ENABLE to generate a bias current  $I_{BIAS}$  for the power amplifier 32. Although Figure 3A illustrates the battery 21 directly generating the power high voltage  $V_{CC}$ , in certain implementations the power high voltage  $V_{CC}$  can be a regulated voltage generated by a regulator that is electrically powered using the battery 21. The power amplifier 32 can receive the RF signal from the I/Q modulator 37 of the transceiver 33, and can provide an amplified RF signal to the antenna 14 through the switches 12.

**[0056]** The directional coupler 24 can be positioned between the output of the power amplifier 32 and the input of the switches 12, thereby allowing an output power measurement of the power amplifier 32 that does not include insertion loss of the switches 12. The sensed output signal from the directional coupler 24 can be provided to the mixer 38, which can multiply the sensed output signal by a reference signal of a controlled frequency so as to downshift the frequency content of the sensed output signal to generate a downshifted signal. The downshifted signal can be provided to the ADC 39, which can convert the downshifted signal to a digital format suitable for processing by the baseband processor 34. By including a feedback path between the output of the power amplifier 32 and the baseband processor 34, the baseband processor 34 can be configured to dynamically adjust the I and Q signals to optimize the operation of the power amplifier system 26. For example, configuring the power amplifier system 26 in this manner can aid in controlling the power added efficiency (PAE) and/or linearity of the power amplifier 32.

**[0057]** Figure 3B is a schematic block diagram of another example of a power amplifier system 60. The illustrated power amplifier system 60 includes a power amplifier bias block 40, the battery 21, the power amplifier 32, an inductor 62, a first capacitor 63, a second capacitor 42, an impedance matching block 64, the switches 12, and the antenna 14.

**[0058]** The illustrated power amplifier 32 includes a bipolar transistor 61 having an emitter, a base, and a collector. The emitter of the bipolar transistor 61 can be electrically connected to a first or power low voltage  $V_1$ , which can be, for example, ground, and a radio frequency input signal RF\_IN can be provided to the base of the bipolar transistor 61 through the first capacitor 42. The bipolar transistor 61 can amplify the RF input signal RF\_IN and provide the amplified RF signal at the collector. The bipolar transistor 61 can be any suitable device. In one implementation, the bipolar transistor 61 is a heterojunction bipolar transistor (HBT).

**[0059]** The power amplifier 32 can be configured to provide the amplified RF signal to the switches 12. The impedance matching block 64 can be used to aid in terminating the electrical connection between the power amplifier 32 and the switches 12. For example, the impedance matching block 64 can be used to increase power transfer and/or reduce reflections of the amplified RF signal.

**[0060]** The inductor 62 can be included to aid in electrically powering the power amplifier 32 with the power high voltage  $V_{CC}$  from the battery 21 while choking or blocking high frequency RF signal components.. The inductor 62 can include a first end electrically connected to the power high voltage  $V_{CC}$  and a second end electrically connected to the collector of the bipolar transistor 61. The first or decoupling capacitor 63 is electrically connected between the power high voltage  $V_{CC}$  and the power low voltage  $V_1$  and can provide a low impedance path to high frequency signals, thereby reducing the noise of the power high voltage  $V_{CC}$ , improving power amplifier stability, and/or improving the performance of the inductor 62 as a RF choke.

**[0061]** The power amplifier bias block 40 is configured to receive an enable signal ENABLE and the battery or power high voltage  $V_{CC}$ . The power amplifier bias block 40 can use the enable signal ENABLE and the battery voltage  $V_{CC}$  to generate a bias current  $I_{BIAS}$  for biasing the power amplifier 32. For example, as illustrated in Figure 3B, the power amplifier bias block 40 can be used to generate a bias current  $I_{BIAS}$  that can be used to bias the base of the bipolar transistor 61 of the power amplifier 32. The power amplifier bias block 40 can use the enable signal ENABLE to control or vary a magnitude of the bias current  $I_{BIAS}$  so as to enable or disable the power amplifier and thereby pulse the power amplifier's output. For example, when the enable signal ENABLE indicates the power amplifier 32 should be activated, the power amplifier bias block 40 can change the amplitude of the bias current  $I_{BIAS}$  so as to achieve a desired gain of the power amplifier 32. Similarly, when the enable signal ENABLE indicates that the power amplifier 32 should be deactivated, the power amplifier bias block 40 can decrease the bias current  $I_{BIAS}$  such that the gain of the power amplifier 32 is equal to about 0.

**[0062]** Although Figure 3B illustrates one implementation of the power amplifier 32, skilled artisans will appreciate that the teachings described herein can be applied to a variety of power amplifier structures, including, for example, multi-stage power amplifier structures and/or power amplifiers employing other transistor structures.

Overview of Power Amplifier Bias Circuits

**[0063]** In certain implementations described herein, a power amplifier bias block includes a primary biasing circuit and a gain correction block including a time-dependent signal generator and a current amplifier. The time-dependent signal generator can be used to shape the enable signal of the power amplifier so as to generate a control current, which can be amplified by the current amplifier to generate a correction current. The primary biasing circuit can use the correction current to correct for a variation in gain of the power amplifier that can occur shortly after the power amplifier is enabled. Compensating for gain variation in the power amplifier can improve the power amplifier's performance, including, for example, the power amplifier's dynamic error vector magnitude (EVM).

**[0064]** Including both the current amplifier and the time-dependent signal generator can permit the power amplifier bias block to be included on-die with the power amplifier. For example, by amplifying the control current generated by the time-dependent signal generator, the magnitude of the components of the time-dependent signal generator can be reduced to a size suitable for on-chip integration. In certain implementations, the time-dependent signal generator can include a resistor-capacitor (RC) network, and the current amplifier can be used to amplify the control current so as to reduce a magnitude of the resistor and/or capacitor needed to generate a suitable correction current, thereby permitting the time-dependent signal generator to be integrated on-chip with the power amplifier.

**[0065]** Figure 4 is a schematic block diagram of one example of a power amplifier system 70 including a power amplifier bias block 50 according to one embodiment. The illustrated power amplifier system 70 includes the power amplifier bias block 50, the battery 21, and the power amplifier 32. The power amplifier 32 can be a single or multi-stage power amplifier, and in certain implementations can be similar to the power amplifier 32 described above with reference to Figure 3B. The battery 21 can be any suitable battery, such as a lithium-ion battery, and be used to provide the battery or power high voltage  $V_{CC}$  to the power amplifier bias block 50 and to the power amplifier 32. The power amplifier bias block 50 and the power amplifier 32 can be integrated on a single die with one or more other components to form a packaged power amplifier module, which can be, for example, mounted to a RF circuit board associated with the wireless device 11 of Figure 2.

**[0066]** The power amplifier bias block 50 includes a gain correction block 71 and a primary biasing circuit 74. The gain correction block 71 includes a time-dependent signal generator or control block 72 and a current amplifier 73. The power amplifier bias block 50 can receive an enable signal ENABLE, and use the enable signal ENABLE to generate a bias current  $I_{BIAS}$  using charge stored on the battery 21. The bias current  $I_{BIAS}$  can be provided to, for example, a base of a bipolar transistor of the power amplifier 32, as was described earlier.

**[0067]** The enable signal ENABLE can be used to control the power amplifier 32 so as to pulse the output of the power amplifier 32. For example, when the power amplifier 32 is configured to transmit a WLAN signal, the enable signal ENABLE can be selectively controlled so as to pulse the output of the power amplifier 32.

**[0068]** The power amplifier 32 can be configured to operate in a relatively noisy environment. For example, a die including the power amplifier 32 and the power amplifier bias block 50 can be provided in an electronic system that includes other electronic components including other power amplifiers, such as power amplifiers amplifying GSM and/or EDGE signals. These electronic components can cause noise on the power high voltage  $V_{CC}$ . Additionally, the power amplifier 32 can also be exposed to other non-ideal operation conditions. For example, the power amplifier 32 and the power amplifier bias block 50 can be exposed to a thermal gradient, and thus can be at different operating temperatures. Furthermore, the level of the power high voltage  $V_{CC}$  can vary depending on a charge of the device that the power amplifier 32 and the power amplifier bias block 50 are used in. The power amplifier bias block 50 can be used to compensate for a gain variation of the power amplifier 32 arising from these sources, as well as from other sources.

**[0069]** The power amplifier bias block 50 includes the time-dependent signal generator 72, which can be used to generate a control current  $I_{CONTROL}$  when the enable signal ENABLE is transitioned from a disabled state to an enabled state. The control current  $I_{CONTROL}$  can be provided to the current amplifier 73, which can amplify the control current  $I_{CONTROL}$  to generate a correction current  $I_{CORRECTION}$ . The correction current  $I_{CORRECTION}$  can be used by the primary biasing circuit 74 to correct for a variation in gain over time that can occur shortly after the power amplifier 32 is enabled. For example, shortly after the power amplifier 32 is enabled, absent compensation the current of the primary biasing circuit 74 can

come up slow due to thermal effects, and the gain of the power amplifier 32 can be low. By using the time-dependent signal generator 72 and the current amplifier 73 to provide a transient current boost to the power amplifier 32 after being enabled, the power amplifier 32 can be configured to have a substantially constant gain over time.

**[0070]** By including the current amplifier 73 to amplify the control current  $I_{\text{CONTROL}}$  generated by the time-dependent signal generator 72, the magnitude of the components of the time-dependent signal generator 72 can be reduced. For example, the current amplifier 73 can be used to amplify the control current  $I_{\text{CONTROL}}$  so as to reduce a size of a component of the time-dependent signal generator 72 needed to generate a correction current with correct time constant, thereby permitting the time-dependent signal generator to be integrated on-chip with the power amplifier 32.

**[0071]** The primary bias circuit 74 can be configured to generate a relatively constant bias current output that can be adjusted by the correction current  $I_{\text{CORRECTION}}$  to correct for a variation in gain of the power amplifier 32 that can occur shortly after the power amplifier 32 is enabled. In certain implementations, the primary bias circuit 74 can be a conventional bias circuit that is modified such that the output of the bias circuit is adjusted based on the amplitude of the correction current  $I_{\text{CORRECTION}}$ . Additional detail of the primary bias circuit 74 can be as described later below.

**[0072]** Figure 5 is a circuit diagram of a power amplifier bias block 80 according to one embodiment. The power amplifier bias block 80 includes a resistor-capacitor (RC) network 82, a current mirror 83, and a primary bias circuit 84. The RC network 82 operates as a time-dependent signal generator and the current mirror 83 operates as a current amplifier. The power amplifier bias block 80 is configured to receive an enable signal ENABLE and a battery or power high voltage  $V_{\text{CC}}$ , and to generate a bias current  $I_{\text{BIAS}}$ .

**[0073]** The RC network 82 includes a first resistor 91, a second resistor 92, and a capacitor 90. The first resistor 91 includes a first end electrically connected to a first end of the capacitor 90 at an input of the RC network 82 configured to receive the enable signal ENABLE. The first resistor 91 further includes a second end electrically connected to a first end of the second resistor 92 at an output of the RC network 82 configured to provide the

control current  $I_{\text{CONTROL}}$  to the current mirror 83. The second resistor 92 further includes a second end electrically connected to a second end of the capacitor 90.

**[0074]** The RC network 82 can be used to shape the enable signal ENABLE so as to generate the control current  $I_{\text{CONTROL}}$ . For example, the capacitor 90 and the second resistor 92 can have an RC time-constant selected to achieve the desired shape of the control current  $I_{\text{CONTROL}}$ . The RC time-constant can be selected based on a system parameter of the electronic system that the power amplifier bias block 80 is used in, including, for example, a transition time of the enable signal ENABLE. In certain implementations, the time-constant of the second resistor 92 and the capacitor 90 is in the range of about 0.1  $\mu\text{s}$  to about 10  $\mu\text{s}$ , for example, about 1  $\mu\text{s}$ .

**[0075]** In certain implementations, the capacitor 90 has a capacitance ranging between about 10 pF to about 50 pF, for example, about 25 pF. The second resistor 92 can have any suitable resistance, including, for example, a resistance in the range of about 10 k $\Omega$  to about 100 k $\Omega$ , for example, about 50 k $\Omega$ . Although one implementation of the capacitor 90 and the second resistor 92 is illustrated, other configurations are possible. For example, the order of the second resistor 92 and the capacitor 90 in the series combination of the second resistor 92 and the capacitor 90 can be reversed. The first resistor 91 can have any suitable value, including, for example, a resistance in the range of about 1 k $\Omega$  to about 20 k $\Omega$ , for example, about 10 k $\Omega$ . In certain implementations, such as the implementation shown in Figure 9, the first resistor 91 can be omitted.

**[0076]** To aid in reducing the area of the RC network 82, the current mirror 83 can be used to amplify the control current  $I_{\text{CONTROL}}$  to generate the correction current  $I_{\text{CORRECTION}}$ . Thus, the amplifier 83 can be used to obtain a correction current  $I_{\text{CORRECTION}}$  of a suitable magnitude, while reducing the size of the components of the RC network 82 relative to a scheme omitting a current amplifier. By amplifying the control current  $I_{\text{CONTROL}}$  in this manner, the power amplifier bias block 80 can be integrated on-chip with a power amplifier without having to use a relatively large resistor, which may not provide enough current variation to provide suitable gain compensation.

**[0077]** The illustrated current mirror 83 includes a first NPN bipolar transistor 85, a second NPN bipolar transistor 86, a third NPN bipolar transistor 87, a fourth NPN bipolar

transistor 88, and a resistor 89. The first NPN bipolar transistor 85 includes an emitter electrically connected to the first or power low voltage  $V_1$ , which can be, for example, ground, and a base and a collector electrically connected to a base of the second NPN bipolar transistor 86 at an input of the current mirror 83 configured to receive the control current  $I_{\text{CONTROL}}$ . The second NPN bipolar transistor 86 further includes an emitter electrically connected to the power low voltage  $V_1$ , and a collector electrically connected to a first end of the resistor 89, to a base of the fourth NPN bipolar transistor 88, and to a base and a collector of the third NPN bipolar transistor 87. The third and fourth NPN bipolar transistors 87, 88 each include an emitter electrically connected to the power low voltage  $V_1$ . The resistor 89 includes a second end configured to receive the enable signal ENABLE. The fourth NPN bipolar transistor 88 further includes a collector configured to generate the correction current  $I_{\text{CORRECTION}}$ .

**[0078]** The resistor 89 can have any suitable resistance, including, for example, a resistance selected based on the voltage level of power amplifier enable signal ENABLE and/or system requirements. In certain implementations, the resistor 89 has a resistance ranging between about 10 k $\Omega$  to about 50 k $\Omega$ , for example, about 20 k $\Omega$ . By electrically connected the second end of the resistor 89 to the enable signal ENABLE, the power consumption of the power amplifier bias block 80 can be reduced when the enable signal ENABLE is low. However, in other implementations, the current mirror 83 can be configured in other ways.

**[0079]** The current mirror 83 can have any suitable gain. In one implementation, the current mirror 83 is configured to amplify the control current  $I_{\text{CONTROL}}$  by a factor ranging between about 5 to about 50, for example, about 10. As used herein, the term current mirror can refer to current amplification circuits including a plurality of current mirrors combined (e.g., cascaded) to achieve a target gain.

**[0080]** The primary bias circuit 84 can be used to generate a bias current  $I_{\text{BIAS}}$  for a power amplifier, such as the power amplifier 32 of Figure 4. The illustrated primary bias circuit 84 includes a first resistor 96, a second resistor 97, a first NPN bipolar transistor 93, a second NPN bipolar transistor 94 and a third NPN bipolar transistor 95. The first resistor 96 includes a first end electrically connected to a first end of the second resistor 97 at an input of

the primary bias circuit 84 configured to receive the enable signal ENABLE. The first resistor 96 further includes a second end electrically connected to an emitter of the second NPN bipolar transistor 94 and to a base and a collector of the first NPN bipolar transistor 93 at an input of the primary bias circuit 84 configured to receive the correction current  $I_{\text{CORRECTION}}$ . The first NPN bipolar transistor 93 further includes an emitter electrically connected to the power low voltage  $V_1$ . The second resistor 97 further includes a second end electrically connected to a base and a collector of the second NPN bipolar transistor 94 and to a base of the third NPN bipolar transistor 95. The third NPN bipolar transistor 95 further includes a collector electrically connected to the power high voltage  $V_{\text{CC}}$  and an emitter configured to generate the bias current  $I_{\text{BIAS}}$ .

**[0081]** The first NPN bipolar transistor 93 can aid in level-shifting the voltage of the emitter of the second NPN bipolar transistor 94, which in turn can impact the emitter voltage of the third NPN bipolar transistor 95. Thus, inclusion of the first NPN bipolar transistor 93 can aid in establishing suitable DC operating voltage levels of the power amplifier bias block 80.

**[0082]** The first and second resistors 96, 97 can be tuned to control the steady-state amplitude of the bias current  $I_{\text{BIAS}}$  when the enable signal ENABLE is activated. For example, the current through the second NPN bipolar transistor 94 can be established using the first and second resistors 96, 97, and can be mirrored using the third NPN bipolar transistor 95 to generate the bias current  $I_{\text{BIAS}}$ .

**[0083]** After the enable signal ENABLE becomes activated, the RC network 82 can generate a control current  $I_{\text{CONTROL}}$  that can be amplified by the current mirror 83 to generate the correction current  $I_{\text{CORRECTION}}$ . As illustrated in Figure 5, the correction current  $I_{\text{CORRECTION}}$  can be used to vary or change the current through the second NPN bipolar transistor 94. For example, when the correction current  $I_{\text{CORRECTION}}$  decreases, the current through the second NPN bipolar transistor 94 can increase, which in turn can increase the bias current  $I_{\text{BIAS}}$  generated using the third NPN bipolar transistor 95. The second NPN bipolar transistor 94 can also aid in reversing the direction of the correction current  $I_{\text{CORRECTION}}$  so that it is suitable to be provided to the base of the fifth NPN bipolar transistor 95. Although one variation of a primary bias circuit is illustrated, other implementations can be used.

**[0084]** Figure 6 is a graph 100 of one example of collector current versus time. The graph 100 begins at a time zero that is associated with enabling a power amplifier. The graph 100 includes a first plot 101, a second plot 102, a third plot 103, a fourth plot 104 and a fifth plot 105, which correspond to different battery voltage values. In particular, the first, second, third, fourth, and fifth plots 101-105 correspond to battery voltage values of about 3.2 V, about 3.4 V, about 3.6 V, about 3.8 V, and about 4.0 V, respectively.

**[0085]** In certain implementations described herein, a time-dependent signal generator is used to generate a signal that can be used to adjust a power amplifier's bias current during a time period within about 8  $\mu$ s after the power amplifier is enabled. Thereafter the power amplifier's bias current can be substantially constant until the power amplifier's enable signal is deactivated. In certain implementations, the power amplifier's bias current can vary by more than about 50 % during the initial time period that the correction current is used to adjust the power amplifier's bias current.

**[0086]** Figure 7A is a graph 110 of one example of dynamic error vector magnitude (EVM) versus output power. The graph 110 is for one example of a power amplifier bias block that does not include a time-dependent signal generator and a current amplifier. The graph 110 includes plots of EVM versus output power for a variety of different battery voltage levels. For example, the graph 110 includes plots 111-119, which correspond to battery voltages ranging between about 3.2 V and about 4.2 V.

**[0087]** Figure 7B is a graph 120 of another example of dynamic EVM versus output power. The graph 120 is for one implementation of a power amplifier bias block that includes a time-dependent signal generator and a current amplifier. The graph 120 includes plots of EVM versus output power for a variety of different battery voltage levels. For example, the graph 120 includes plots 121-129, which correspond to battery voltages between about 3.2 V and about 4.2 V. The graph 120 shows that the EVM of the power amplifier system can be improved by including the time-dependent signal generator and the current amplifier.

**[0088]** Figure 8 is a flow chart illustrating a method 150 for biasing a power amplifier in accordance with one embodiment. It will be understood that the method 150 can

include greater or fewer operations and the operations may be performed in any order, as necessary.

**[0089]** The method 150 starts at a block 151, in which an enable signal of a power amplifier is shaped using a time-dependent signal generator to generate a control current. The power amplifier can be any suitable power amplifier, such as a power amplifier configured to amplify a WLAN signal. In certain implementations, the time-dependent signal generator includes a resistor-capacitor (RC) network configured to generate a transient control current that begins after an enable signal of the power amplifier is activated. In certain implementations, the transient control current reaches a steady-state value within about 8  $\mu$ s after the enable signal is activated. In certain implementations, the steady-state value of the transient control current can be about 0 mA.

**[0090]** In an ensuing block 152, the control current is amplified using the current amplifier to generate a correction current. In certain implementations, the current amplifier amplifies the correction circuit by a factor ranging between about 5 to about 50. The current amplifier can aid the time-dependent signal generator in shaping the enable signal by reducing the size of the circuit components of the time-dependent signal generator needed to achieve a desired time constant associated with gain compensation.

**[0091]** The method 150 continues at a block 153, in which a bias current for the power amplifier is generated using the primary biasing circuit. The primary biasing circuit is configured to use the correction current to generate a bias current for the power amplifier so as correct for a variation in gain of the power amplifier when the power amplifier is enabled. For example, the primary biasing circuit can be configured to adjust the amplitude of the bias current based on the correction current, such as by adding the correction current to a nominal bias current value.

**[0092]** Figure 9 is a circuit diagram of a time-dependent signal generator 170 in accordance with one embodiment. The time-dependent signal generator 170 includes a resistor 92 and a capacitor 90, which can be similar to the resistor 92 and the capacitor 90 of the time-dependent signal generator 82 of Figure 5. However, in contrast to the time-dependent signal generator 82 of Figure 5, the time-dependent signal generator 170 of Figure 9 does not include the resistor 91 of Figure 4. In certain implementations, the

time-constant of the resistor 92 and the capacitor 90 is in the range of about 0.1  $\mu\text{s}$  to about 10  $\mu\text{s}$ , for example, about 1  $\mu\text{s}$ .

**[0093]** Figure 10A is a schematic diagram of one example of a packaged power amplifier module 300. Figure 10B is a schematic diagram of a cross-section of the packaged power amplifier module 300 of Figure 10A taken along the lines 10B–10B.

**[0094]** The packaged power amplifier module 300 includes an IC or die 301, surface mount components 303, wirebonds 308, a package substrate 320, and encapsulation 340. The package substrate 320 includes pads 306 formed from conductors disposed therein. Additionally, the die 301 includes pads 304, and the wirebonds 308 have been used to electrically connect the pads 304 of the die 301 to the pads 306 of the package substrate 301.

**[0095]** As illustrated in Figures 10A and 10B, the die 301 includes the power amplifier 32 and the power amplifier bias block 50 formed therein. The power amplifier bias block 50 includes the time dependent signal generator 72, the current amplifier 73, and the primary biasing circuit 74. In certain implementations, the time-dependent signal generator 72 can include a resistor-capacitor (RC) network, and the current amplifier 73 can be used to amplify a control current from the RC network to generate a correction current, which can be used by the primary biasing circuit 74 to generate a bias current for the power amplifier 32 that corrects for a gain variation of the power amplifier 32 associated with transitioning the power amplifier from a disabled state to an enabled state. Using the current amplifier 73 to amplify the control current from the time-dependent signal generator 72 can reduce a magnitude of the resistor and/or capacitor needed to generate a suitable correction current, thereby permitting the time-dependent signal generator 72 to be integrated on-chip with the power amplifier 32, as shown in Figure 10A.

**[0096]** The packaging substrate 320 can be configured to receive a plurality of components such as the die 301 and the surface mount components 303, which can include, for example, surface mount capacitors and/or inductors.

**[0097]** As shown in Figure 10B, the packaged power amplifier module 300 is shown to include a plurality of contact pads 332 disposed on the side of the packaged power amplifier module 300 opposite the side used to mount the die 301. Configuring the packaged

power amplifier module 300 in this manner can aid in connecting the packaged power amplifier module 300 to a circuit board such as a phone board of a wireless device. The example contact pads 332 can be configured to provide RF signals, bias signals, power low voltage(s) and/or power high voltage(s) to the die 301 and/or the surface mount components 303. As shown in Figure 10B, the electrical connections between the contact pads 332 and the die 301 can be facilitated by connections 333 through the package substrate 320. The connections 333 can represent electrical paths formed through the package substrate 320, such as connections associated with vias and conductors of a multilayer laminated package substrate.

**[0098]** In some embodiments, the packaged power amplifier module 300 can also include one or more packaging structures to, for example, provide protection and/or to facilitate handling of the packaged power amplifier module 300. Such a packaging structure can include overmold or encapsulation 340 formed over the packaging substrate 320 and the components and die(s) disposed thereon.

**[0099]** It will be understood that although the packaged power amplifier module 300 is described in the context of wirebond-based electrical connections, one or more features of the present disclosure can also be implemented in other packaging configurations, including, for example flip-chip configurations.

### Applications

**[0100]** Some of the embodiments described above have provided examples in connection with mobile phones. However, the principles and advantages of the embodiments can be used for any other systems or apparatus that have needs for power amplifier systems.

**[0101]** Such power amplifier systems can be implemented in various electronic devices. Examples of the electronic devices can include, but are not limited to, consumer electronic products, parts of the consumer electronic products, electronic test equipment, etc. Examples of the electronic devices can also include, but are not limited to, memory chips, memory modules, circuits of optical networks or other communication networks, and disk driver circuits. The consumer electronic products can include, but are not limited to, a mobile phone, a telephone, a television, a computer monitor, a computer, a hand-held computer, a

personal digital assistant (PDA), a microwave, a refrigerator, an automobile, a stereo system, a cassette recorder or player, a DVD player, a CD player, a VCR, an MP3 player, a radio, a camcorder, a camera, a digital camera, a portable memory chip, a washer, a dryer, a washer/dryer, a copier, a facsimile machine, a scanner, a multi functional peripheral device, a wrist watch, a clock, etc. Further, the electronic devices can include unfinished products.

### Conclusion

**[0102]** Unless the context clearly requires otherwise, throughout the description and the claims, the words “comprise,” “comprising,” and the like are to be construed in an inclusive sense, as opposed to an exclusive or exhaustive sense; that is to say, in the sense of “including, but not limited to.” The word “coupled”, as generally used herein, refers to two or more elements that may be either directly connected, or connected by way of one or more intermediate elements. Likewise, the word “connected”, as generally used herein, refers to two or more elements that may be either directly connected, or connected by way of one or more intermediate elements. Additionally, the words “herein,” “above,” “below,” and words of similar import, when used in this application, shall refer to this application as a whole and not to any particular portions of this application. Where the context permits, words in the above Detailed Description using the singular or plural number may also include the plural or singular number respectively. The word “or” in reference to a list of two or more items, that word covers all of the following interpretations of the word: any of the items in the list, all of the items in the list, and any combination of the items in the list.

**[0103]** Moreover, conditional language used herein, such as, among others, "can," "could," "might," "can," "e.g.," “for example,” “such as” and the like, unless specifically stated otherwise, or otherwise understood within the context as used, is generally intended to convey that certain embodiments include, while other embodiments do not include, certain features, elements and/or states. Thus, such conditional language is not generally intended to imply that features, elements and/or states are in any way required for one or more embodiments or that one or more embodiments necessarily include logic for deciding, with or without author input or prompting, whether these features, elements and/or states are included or are to be performed in any particular embodiment.

**[0104]** The above detailed description of embodiments of the invention is not intended to be exhaustive or to limit the invention to the precise form disclosed above. While specific embodiments of, and examples for, the invention are described above for illustrative purposes, various equivalent modifications are possible within the scope of the invention, as those skilled in the relevant art will recognize. For example, while processes or blocks are presented in a given order, alternative embodiments may perform routines having steps, or employ systems having blocks, in a different order, and some processes or blocks may be deleted, moved, added, subdivided, combined, and/or modified. Each of these processes or blocks may be implemented in a variety of different ways. Also, while processes or blocks are at times shown as being performed in series, these processes or blocks may instead be performed in parallel, or may be performed at different times.

**[0105]** The teachings of the invention provided herein can be applied to other systems, not necessarily the system described above. The elements and acts of the various embodiments described above can be combined to provide further embodiments.

**[0106]** While certain embodiments of the inventions have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the disclosure. Indeed, the novel methods and systems described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the methods and systems described herein may be made without departing from the spirit of the disclosure. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the disclosure.

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	12750051
<b>Application Number:</b>	13468749
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	1497
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS
<b>First Named Inventor/Applicant Name:</b>	Ping Li
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Heide Young
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	SKYWRKS.280A
<b>Receipt Date:</b>	10-MAY-2012
<b>Filing Date:</b>	
<b>Time Stamp:</b>	17:07:35
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Drawings-only black and white line drawings	2012_05_10_Drawings_SKYWRKS_280A.pdf	99200 <small>d143971c5e88210cd536cd0fb934c84903b19209</small>	no	7

### Warnings:

### Information:

2		2012_05_10_Spec_SKYWRKS_280A.pdf	1450328 cdf5fe94f0526bf37ed664df10a9034f5cf224a7	yes	30
<b>Multipart Description/PDF files in .zip description</b>					
<b>Document Description</b>		<b>Start</b>	<b>End</b>		
Specification		1	24		
Claims		25	29		
Abstract		30	30		
<b>Warnings:</b>					
<b>Information:</b>					
3	Application Data Sheet	2012_05_10_ADS_SKYWRKS_280A.pdf	257434 e89b272354bdabe5f8709d11bd61adb3c8246a3	no	4
<b>Warnings:</b>					
<b>Information:</b>					
This is not an USPTO supplied ADS fillable form					
<b>Total Files Size (in bytes):</b>			1806962		
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

## WHAT IS CLAIMED IS:

1. A power amplifier system comprising:
  - a power amplifier configured to amplify a radio frequency (RF) signal; and
  - a bias block for biasing the power amplifier, the bias block including a time-dependent signal generator configured to shape an enable signal of the power amplifier to generate a control current, a current amplifier configured to amplify the control current to generate a correction current, and a primary biasing circuit configured to generate a bias current for the power amplifier based at least partly on the correction current, the bias current configured to correct for a variation in gain of the power amplifier when the power amplifier is enabled.
2. The power amplifier system of claim 1 wherein the time-dependent signal generator includes a resistor-capacitor (RC) network.
3. The power amplifier system of claim 2 wherein the RC network includes a first resistor and a first capacitor electrically connected in series between the current amplifier and an input of the bias circuit configured to receive the enable signal.
4. The power amplifier system of claim 3 wherein the RC network further includes a second resistor having a first end electrically connected to the input of the current mirror and a second end electrically connected to the input of the bias circuit configured to receive the enable signal.
5. The power amplifier system of claim 4 wherein the second resistor has a resistance ranging between about 10 k $\Omega$  and about 100 k $\Omega$ .
6. The power amplifier system of claim 3 wherein the first capacitor has a capacitance ranging between about 10 pF and about 100 pF.

7. The power amplifier system of claim 6 wherein the first resistor has a resistance ranging between about 10 k $\Omega$  and about 100 k $\Omega$ .

8. The power amplifier system of claim 1 wherein the current amplifier includes a current mirror.

9. The power amplifier system of claim 8 wherein the current mirror includes a first bipolar transistor and a second bipolar transistor, the first bipolar transistor including an emitter electrically connected to an emitter of the second bipolar transistor and to a power low voltage, and a collector electrically connected to a base of the first bipolar transistor and to a base of the second bipolar transistor, the collector of the first bipolar transistor configured to receive at least a portion of the control current.

10. The power amplifier system of claim 9 wherein the current mirror further includes a resistor, a third bipolar transistor and a fourth bipolar transistor, the third bipolar transistor including an emitter electrically connected to an emitter of the fourth bipolar transistor and to the power low voltage, and a collector electrically connected to a first end of the resistor, to the collector of the second bipolar transistor, to a base of the third bipolar transistor, and to a base of the fourth bipolar transistor, the collector of the fourth bipolar transistor configured to generate the compensation current.

11. The power amplifier system of claim 10 wherein the resistor further includes a second end configured to receive the enable signal.

12. The power amplifier system of claim 1 further comprising a transceiver for providing the RF signal to the power amplifier.

13. The power amplifier system of claim 1 wherein the power amplifier includes a bipolar transistor having an emitter, a base and a collector, the base configured to receive the RF signal and the bias current.

14. The power amplifier system of claim 13 wherein the emitter is electrically connected to a power low voltage and the collector is configured to generate an amplified version of the RF signal.

15. The power amplifier system of claim 1 wherein the primary bias circuit includes a first resistor, a second resistor, a first bipolar transistor, and a second bipolar transistor, the first resistor including a first end electrically connected to the emitter of the first bipolar transistor at a node configured to receive the correction current, and a second end electrically connected to a first end of the second resistor at a node of the bias circuit configured to receive the enable signal, the second resistor including a second end electrically connected to a collector of the first bipolar transistor, a base of the first bipolar transistor, and to a base of the second bipolar transistor.

16. The power amplifier system of claim 15 wherein the second bipolar transistor includes a collector electrically connected to a battery voltage and an emitter configured to generate the bias current.

17. The power amplifier system of claim 16 wherein the primary bias circuit further includes a third bipolar transistor having an emitter electrically connected to the power low voltage and a base and a collector electrically connected to the emitter of the first bipolar transistor.

18. A method of biasing a power amplifier, the method comprising:  
shaping an enable signal using a time-dependent signal generator to generate a control current;  
amplifying the control current using a current amplifier to generate a correction current; and

generating a bias current for a power amplifier using a primary biasing circuit, the primary biasing circuit configured to use the correction current to correct for a variation in gain of the power amplifier when the power amplifier is enabled.

19. The method of claim 18 wherein shaping the enable signal includes using a resistor-capacitor (RC) network of the time-dependent signal generator.

20. The method of claim 19 wherein the RC network includes a first resistor and a first capacitor electrically connected in series, the RC network configured to receive the enable signal and to generate the control current.

21. The method of claim 18 wherein amplifying the control current further includes amplifying the control current using a current mirror of the current amplifier.

22. The method of claim 18 wherein generating the bias current includes shaping the bias current so as to compensate for a gain variation of a heterojunction bipolar transistor (HBT).

23. A bias circuit for biasing a power amplifier, the bias circuit comprising:  
a time-dependent signal generator configured to shape an enable signal of the power amplifier to generate a control current;  
a current amplifier configured to amplify the control current to generate a correction current; and  
a primary biasing block configured to generate a bias current for the power amplifier based at least partly on the correction current, the bias current configured to correct for a variation in gain of the power amplifier when the power amplifier is enabled.

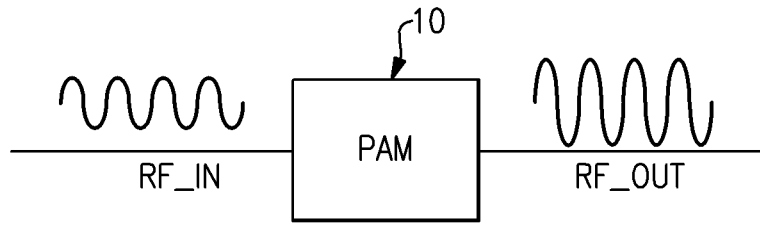
24. The bias circuit of claim 23 wherein the time-dependent signal generator includes a resistor-capacitor (RC) network.

25. The bias circuit of claim 24 wherein the RC network includes a first resistor and a first capacitor electrically connected in series between the current amplifier and an input of the bias circuit configured to receive the enable signal.

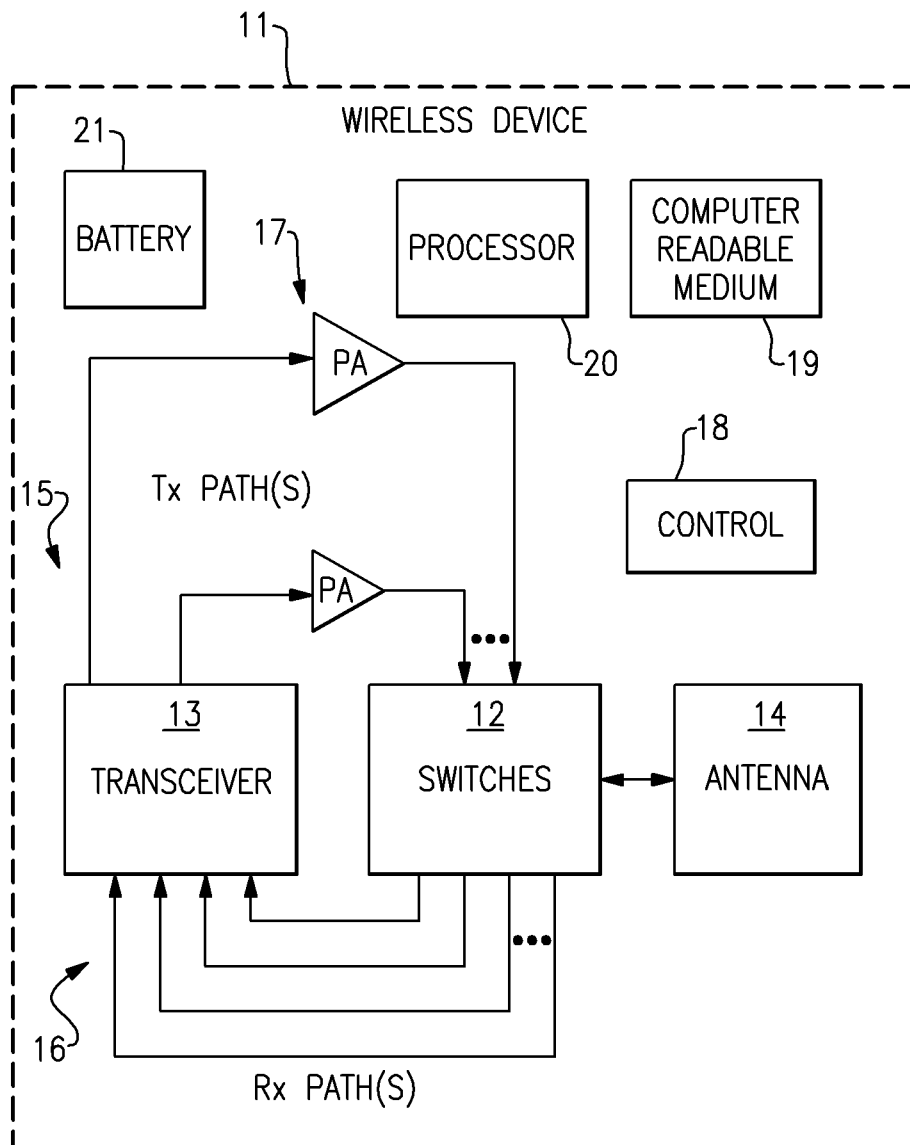
26. The bias circuit of claim 23 wherein the current amplifier includes a current mirror.

27. The bias circuit of claim 23 wherein the primary bias block includes a first resistor, a second resistor, a first bipolar transistor, and a second bipolar transistor, the first resistor including a first end electrically connected to the emitter of the first bipolar transistor at a node configured to receive the correction current, and a second end electrically connected to a first end of the second resistor at a node of the bias circuit configured to receive the enable signal, the second resistor including a second end electrically connected to a collector of the first bipolar transistor, a base of the first bipolar transistor, and to a base of the second bipolar transistor.

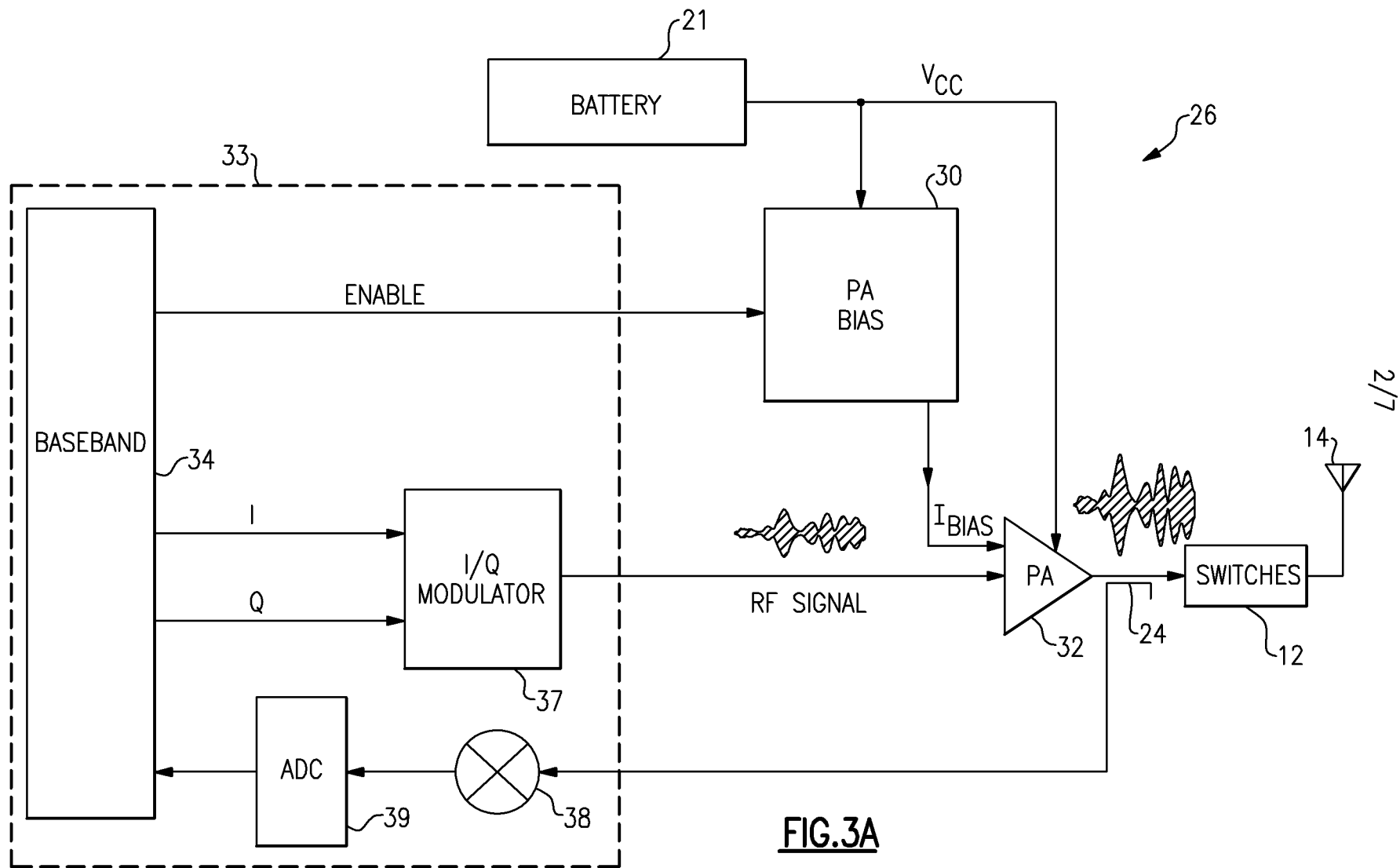
28. The bias circuit of claim 27 wherein the second bipolar transistor includes a collector electrically connected to a battery voltage and an emitter configured to generate the bias current.



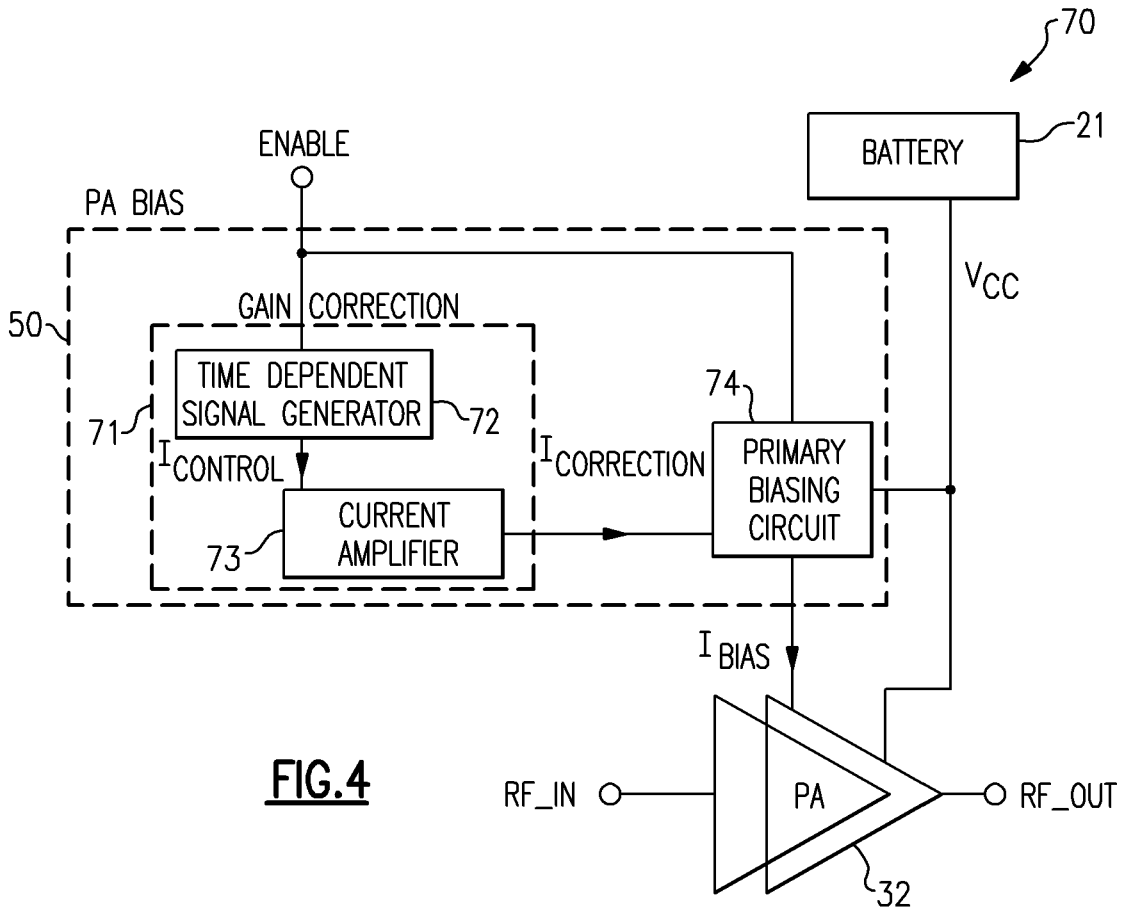
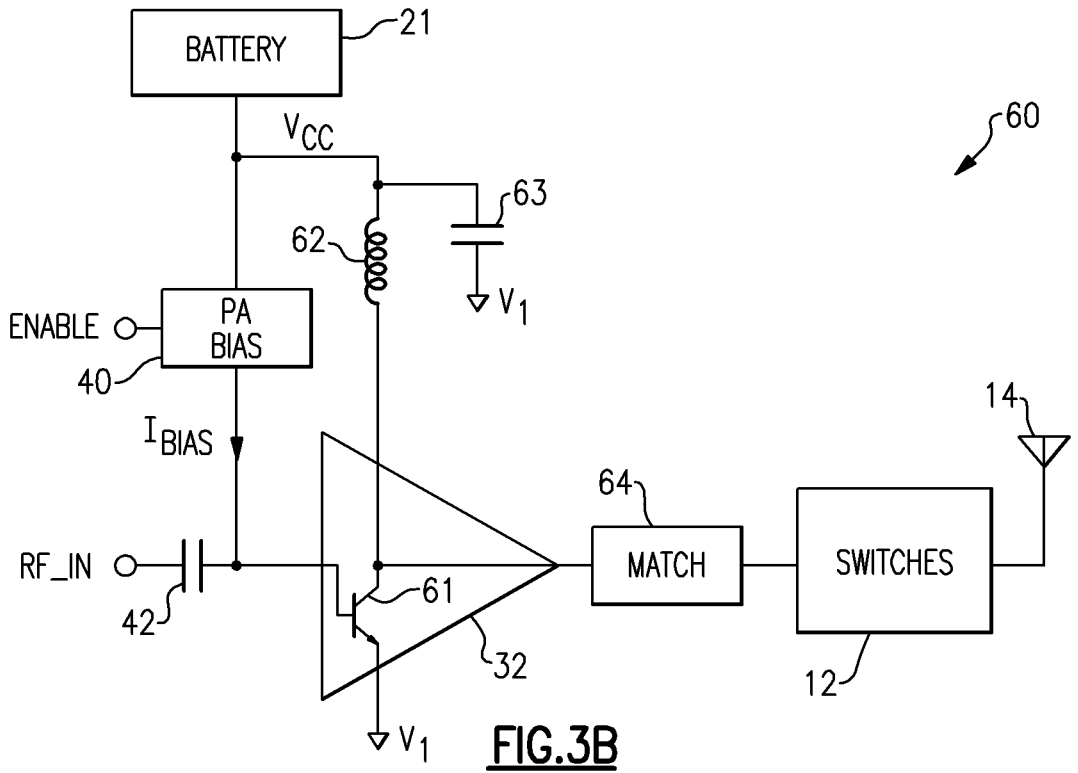
**FIG.1**

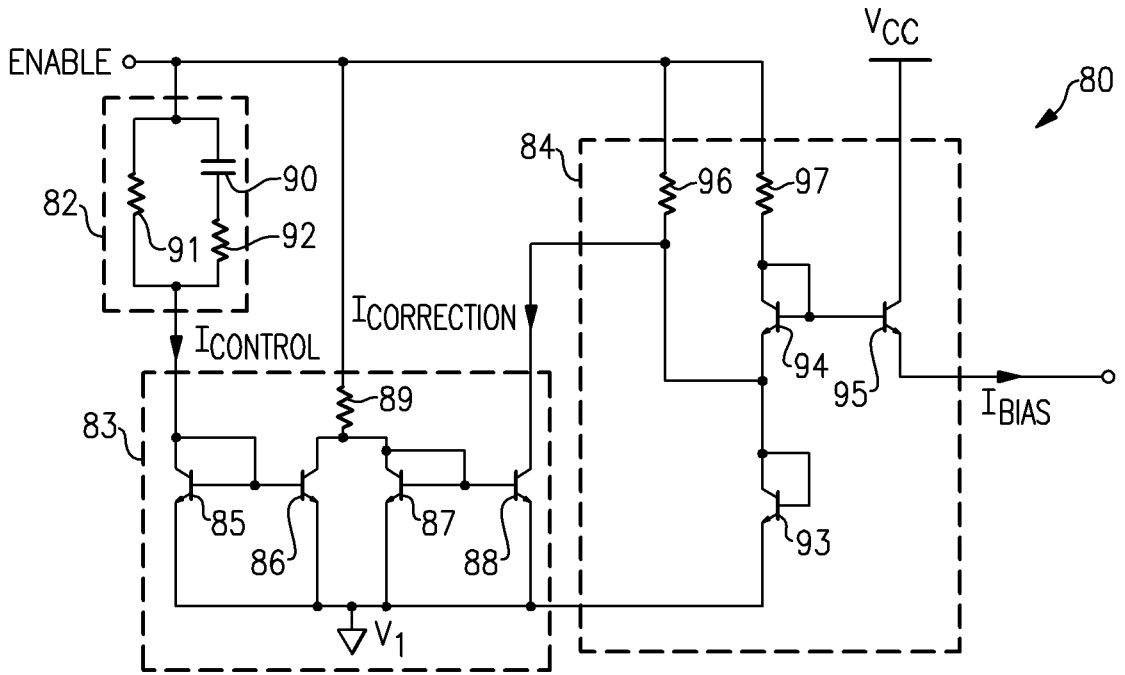


**FIG.2**

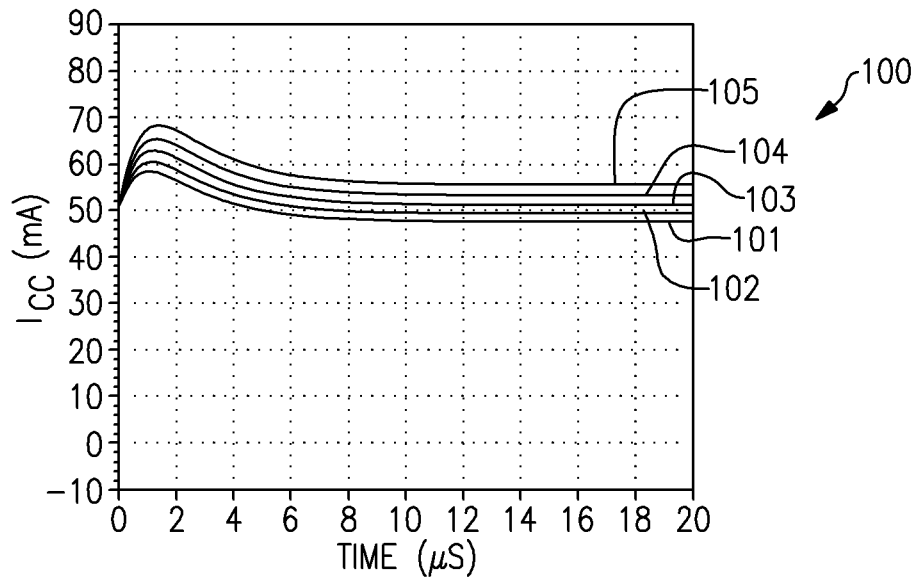


**FIG.3A**

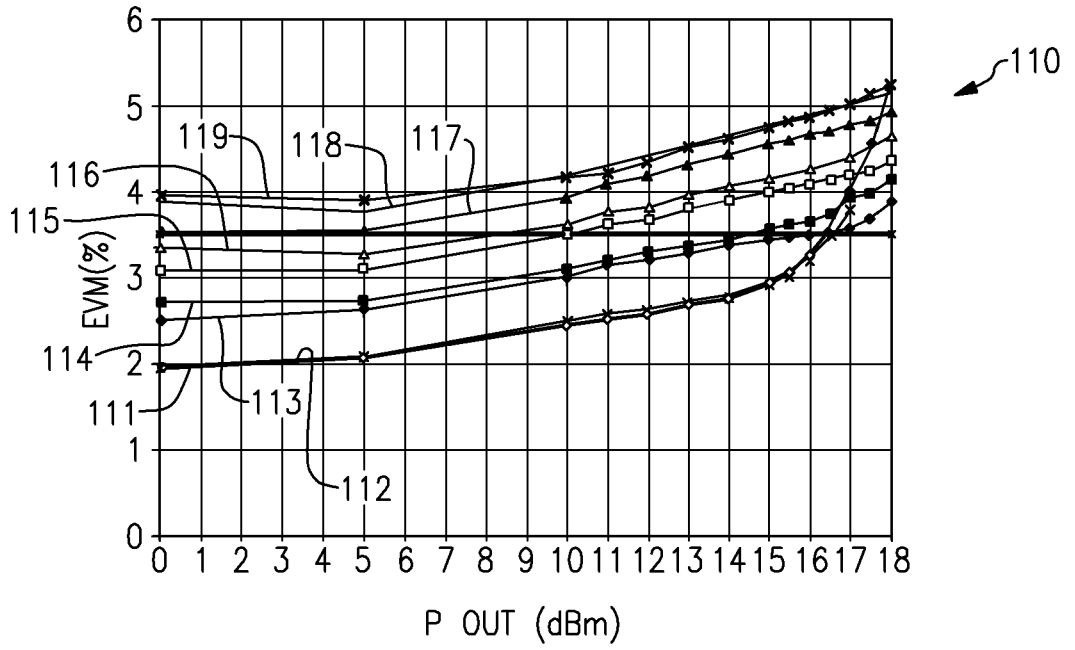




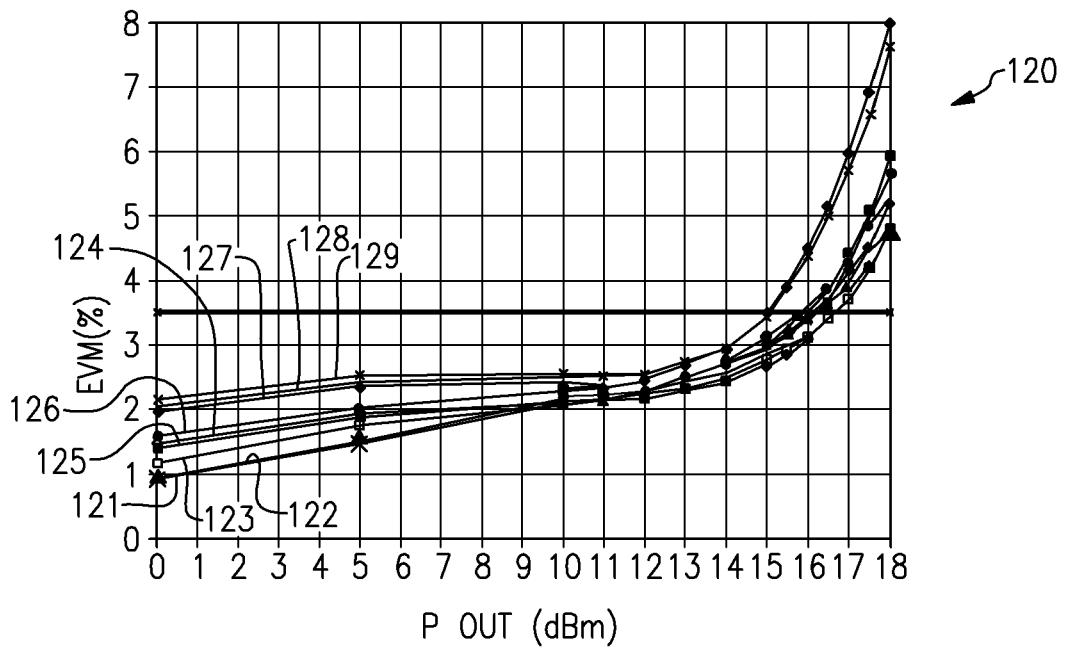
**FIG.5**



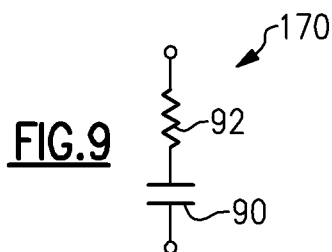
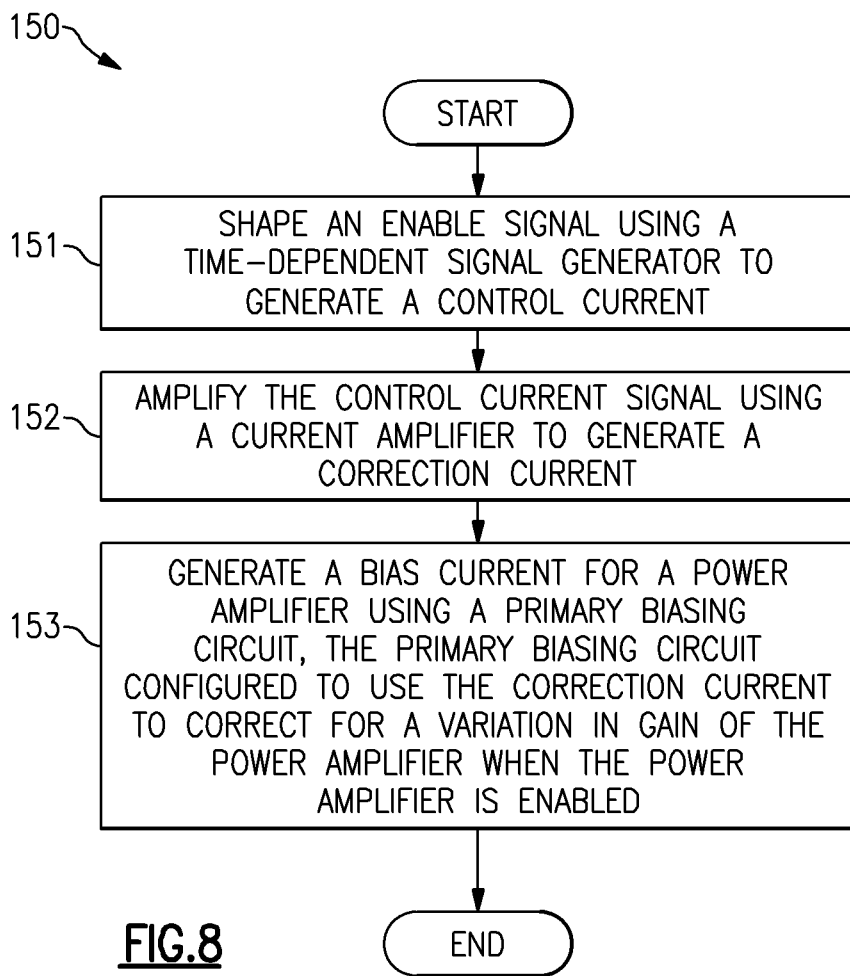
**FIG.6**

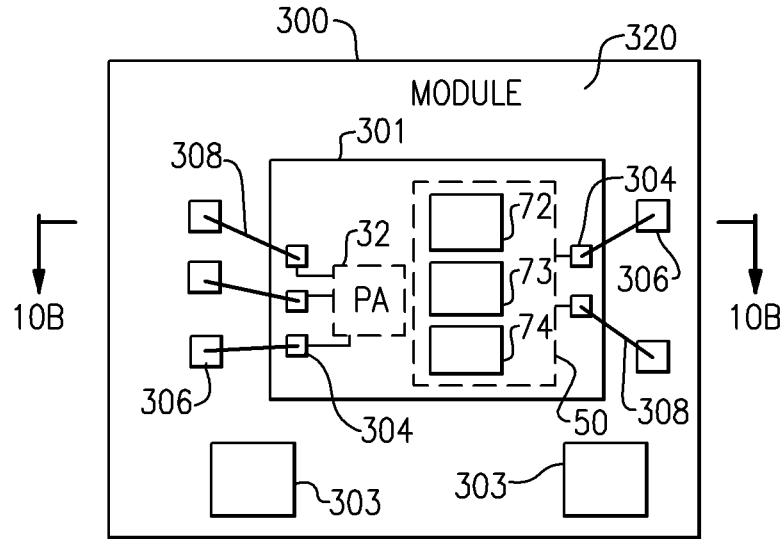


**FIG. 7A**

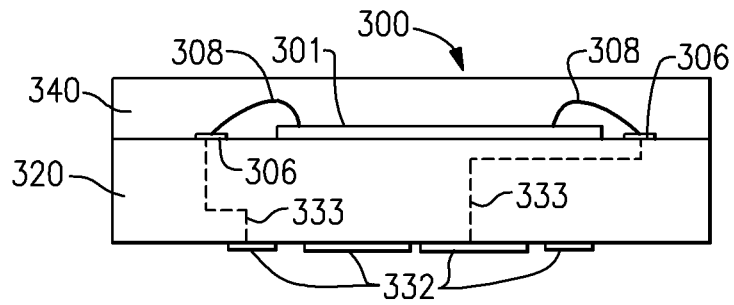


**FIG. 7B**





**FIG. 10A**



**FIG. 10B**

**PATENT APPLICATION FEE DETERMINATION RECORD**  
Substitute for Form PTO-875

Application or Docket Number  
13/468,749

**APPLICATION AS FILED - PART I**

	(Column 1)	(Column 2)
FOR	NUMBER FILED	NUMBER EXTRA
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A
TOTAL CLAIMS (37 CFR 1.16(i))	28 minus 20 = *	8
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 = *	
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).	
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))		

SMALL ENTITY	
RATE(\$)	FEE(\$)
N/A	
N/A	
N/A	
TOTAL	

OTHER THAN SMALL ENTITY	
RATE(\$)	FEE(\$)
N/A	380
N/A	620
N/A	250
x 60 =	480
x 250 =	0.00
	0.00
	0.00
TOTAL	1730

\* If the difference in column 1 is less than zero, enter "0" in column 2.

**APPLICATION AS AMENDED - PART II**

	(Column 1)	(Column 2)	(Column 3)	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	
	Total (37 CFR 1.16(i))	*	Minus	**
	Independent (37 CFR 1.16(h))	*	Minus	***
	Application Size Fee (37 CFR 1.16(s))			PRESENT EXTRA
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))			

SMALL ENTITY	
RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

OTHER THAN SMALL ENTITY	
RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

	(Column 1)	(Column 2)	(Column 3)	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	
	Total (37 CFR 1.16(i))	*	Minus	**
	Independent (37 CFR 1.16(h))	*	Minus	***
	Application Size Fee (37 CFR 1.16(s))			PRESENT EXTRA
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))			

SMALL ENTITY	
RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

OTHER THAN SMALL ENTITY	
RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".  
 The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.



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Table with 7 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY.DOCKET.NO, TOT CLAIMS, IND CLAIMS. Row 1: 13/468,749, 05/10/2012, 2817, 0.00, SKYWRS.280A, 28, 3

CONFIRMATION NO. 1497

FILING RECEIPT



20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

Date Mailed: 05/30/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections

Applicant(s)

Ping Li, Dunstable, MA;
Paul T. DiCarlo, Marlborough, MA;

Assignment For Published Patent Application

SKYWORKS SOLUTIONS, INC., Woburn, MA

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 61/486,186 05/13/2011

Foreign Applications (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.)

If Required, Foreign Filing License Granted: 05/23/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US 13/468,749

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

**Title**

APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS

**Preliminary Class**

330

**PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

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Table with 4 columns: APPLICATION NUMBER (13/468,749), FILING OR 371(C) DATE (05/10/2012), FIRST NAMED APPLICANT (Ping Li), ATTY. DOCKET NO./TITLE (SKYWRKS.280A)

CONFIRMATION NO. 1497

FORMALITIES LETTER



20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

Date Mailed: 05/30/2012

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given TWO MONTHS from the date of this Notice within which to file all required items below to avoid abandonment.

- The statutory basic filing fee is missing. Applicant must submit \$380 to complete the basic filing fee for a non-small entity.
The oath or declaration is missing. A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Additional claim fees of \$480 as a non-small entity, including any required multiple dependent claim fee, are required.
A surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of \$130 for a non-small entity, must be submitted.

SUMMARY OF FEES DUE:

Total fee(s) required within TWO MONTHS from the date of this Notice is \$1860 for a non-small entity

- \$380 Statutory basic filing fee.
\$130 Surcharge.
The application search fee has not been paid. Applicant must submit \$620 to complete the search fee.

- The application examination fee has not been paid. Applicant must submit **\$250** to complete the examination fee for a non-small entity.
- Total additional claim fee(s) for this application is **\$480**
  - **\$480** for **8** total claims over 20.

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Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

**DECLARATION FOR UTILITY OR DESIGN APPLICATION  
UNDER 37 CFR 1.63**

Docket No.: SKYWRKS.280A

Page 1 of 2

Title: APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS

Inventors: Ping Li and Paul T. DiCarlo

Please Direct All Correspondence to Customer Number 20995

This Declaration is directed to the invention described in the application that:

Was filed as Application No. 13/468,749 filed on May 10, 2012

As a below named inventor:

I believe the inventors named below to be the original and first inventors of the subject matter which is described and claimed and for which a patent is sought;

I have reviewed and understand the contents of the above-identified application, including the claims, and any amendment filed herewith or identified above;

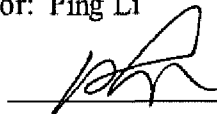
I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56;

The application was originally filed with an Application Data Sheet (ADS). The ADS sets forth any applicable Foreign Priority Claims under 35 USC § 119, and sets forth the full mailing address and residence of each inventor whose signature appears below as allowed under 37 CFR 1.63(c). The ADS also sets forth any Domestic Priority Claims under 35 USC §§ 119(e), 120, 121, and 365.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful, false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of first inventor: Ping Li

Signature:



Date:

5-10-2012

Citizenship:

U.S.

**DECLARATION FOR UTILITY OR DESIGN APPLICATION  
UNDER 37 CFR 1.63**

Docket No.: SKYWRKS.280A

Page 2 of 2

Title: APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS

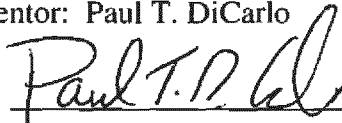
Inventors: Ping Li and Paul T. DiCarlo

Please Direct All Correspondence to Customer Number 20995

---

Full name of second inventor: Paul T. DiCarlo

Signature:



Date:

5/29/2012

Citizenship:

U.S.

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**Customer No. 20995**

13261597  
051012

Please Direct All Correspondence to Customer Number 20,995

**RESPONSE TO FORMALITIES NOTICE**

Applicant	:	Li et al.
App. No.	:	13/468,749
Filed	:	May 10, 2012
For	:	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS
Art Unit	:	2817
Conf No.	:	1497


**Mail Stop Missing Parts  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450**

Dear Sir:

The above-captioned application was filed without a Declaration and/or filing fees. Enclosed in compliance with 37 CFR 1.53(f) are the following.

- (X) A Declaration in 2 pages.
- (X) A Notice to File Missing Parts dated May 30, 2012.
- (X) Fees will be paid via EFS Web. Extension of time is requested by payment of any extension fee.

The Commissioner is hereby authorized to charge any additional fees which may be required, now or in the future, or credit any overpayment, to Account No. 11-1410.



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David R. Trossen  
Registration No. 59,406  
Attorney of Record  
Customer No. 20,995  
(415) 954-4114

13650548\_1  
071912



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 4 columns: APPLICATION NUMBER (13/468,749), FILING OR 371(C) DATE (05/10/2012), FIRST NAMED APPLICANT (Ping Li), ATTY. DOCKET NO./TITLE (SKYWRKS.280A)

CONFIRMATION NO. 1497

FORMALITIES LETTER



20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

Date Mailed: 05/30/2012

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given TWO MONTHS from the date of this Notice within which to file all required items below to avoid abandonment.

- The statutory basic filing fee is missing. Applicant must submit \$380 to complete the basic filing fee for a non-small entity.
The oath or declaration is missing. A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Additional claim fees of \$480 as a non-small entity, including any required multiple dependent claim fee, are required.
A surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of \$130 for a non-small entity, must be submitted.

SUMMARY OF FEES DUE:

Total fee(s) required within TWO MONTHS from the date of this Notice is \$1860 for a non-small entity

- \$380 Statutory basic filing fee.
\$130 Surcharge.
The application search fee has not been paid. Applicant must submit \$620 to complete the search fee.

- The application examination fee has not been paid. Applicant must submit **\$250** to complete the examination fee for a non-small entity.
- Total additional claim fee(s) for this application is **\$480**
  - **\$480** for **8** total claims over 20.

Replies should be mailed to:

Mail Stop Missing Parts  
Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.

<https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at <http://www.uspto.gov/ebc>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/mkanno/

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Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	13334615
<b>Application Number:</b>	13468749
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	1497
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS
<b>First Named Inventor/Applicant Name:</b>	Ping Li
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Garett Gomez
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	SKYWRKS.280A
<b>Receipt Date:</b>	25-JUL-2012
<b>Filing Date:</b>	10-MAY-2012
<b>Time Stamp:</b>	13:05:47
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 1860
RAM confirmation Number	10560
Deposit Account	111410
Authorized User	KNOBBE MARTENS OLSON AND BEAR

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

<b>File Listing:</b>					
<b>Document Number</b>	<b>Document Description</b>	<b>File Name</b>	<b>File Size(Bytes)/ Message Digest</b>	<b>Multi Part /.zip</b>	<b>Pages (if appl.)</b>
1	Applicant Response to Pre-Exam Formalities Notice	2012-07-25_MPARTS_SKYWRKS-280A.pdf	104884 cd4a66996abda5b329d09e51f37ab26467d6a255	no	3
<b>Warnings:</b>					
<b>Information:</b>					
2	Oath or Declaration filed	2012-07-25_Declaration_SKYW RKS-280A.PDF	99562 61510249ea3bb6f6a47a25b72ca52e2d9a89b053	no	2
<b>Warnings:</b>					
<b>Information:</b>					
3	Fee Worksheet (SB06)	fee-info.pdf	38648 f414be85c9436082960b55f1470724976a1c000b	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			243094		
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>					

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13468749			
<b>Filing Date:</b>	10-May-2012			
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS			
<b>First Named Inventor/Applicant Name:</b>	Ping Li			
<b>Filer:</b>	David R. Trossen/Jonathan Pan			
<b>Attorney Docket Number:</b>	SKYWRKS.280A			
Filed as Large Entity				
<b>Utility under 35 USC 111(a) Filing Fees</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
Utility application filing	1011	1	380	380
Utility Search Fee	1111	1	620	620
Utility Examination Fee	1311	1	250	250
<b>Pages:</b>				
<b>Claims:</b>				
Claims in excess of 20	1202	8	60	480
<b>Miscellaneous-Filing:</b>				
Late filing fee for oath or declaration	1051	1	130	130

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
			<b>Total in USD (\$)</b>	<b>1860</b>

**PATENT APPLICATION FEE DETERMINATION RECORD**  
Substitute for Form PTO-875

Application or Docket Number  
**13/468,749**

**APPLICATION AS FILED - PART I**

(Column 1) (Column 2)

FOR	NUMBER FILED	NUMBER EXTRA
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A
TOTAL CLAIMS (37 CFR 1.16(i))	28 minus 20 = *	8
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 = *	
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).	
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))		

**SMALL ENTITY**

RATE(\$)	FEE(\$)
N/A	
N/A	
N/A	
N/A	
N/A	
N/A	
N/A	
N/A	
N/A	
N/A	
N/A	
N/A	
TOTAL	

OR

**OTHER THAN SMALL ENTITY**

RATE(\$)	FEE(\$)
N/A	380
N/A	620
N/A	250
x 60 =	480
x 250 =	0.00
	0.00
	0.00
	0.00
TOTAL	1730

\* If the difference in column 1 is less than zero, enter "0" in column 2.

**APPLICATION AS AMENDED - PART II**

(Column 1) (Column 2) (Column 3)

AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total (37 CFR 1.16(i))	*	Minus	**	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=
Application Size Fee (37 CFR 1.16(s))					
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					

**SMALL ENTITY**

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

OR

**OTHER THAN SMALL ENTITY**

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

(Column 1) (Column 2) (Column 3)

AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total (37 CFR 1.16(i))	*	Minus	**	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=
Application Size Fee (37 CFR 1.16(s))					
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					

**SMALL ENTITY**

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

OR

**OTHER THAN SMALL ENTITY**

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".  
 The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.



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Table with 7 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY.DOCKET.NO, TOT CLAIMS, IND CLAIMS. Row 1: 13/468,749, 05/10/2012, 2817, 1860, SKYWRS.280A, 28, 3

CONFIRMATION NO. 1497

UPDATED FILING RECEIPT



20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

Date Mailed: 08/02/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections

Applicant(s)

Ping Li, Dunstable, MA;
Paul T. DiCarlo, Marlborough, MA;

Assignment For Published Patent Application

SKYWORCS SOLUTIONS, INC., Woburn, MA

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 61/486,186 05/13/2011

Foreign Applications (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.)

If Required, Foreign Filing License Granted: 05/23/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US 13/468,749

Projected Publication Date: 11/15/2012

Non-Publication Request: No

Early Publication Request: No

**Title**

APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS

**Preliminary Class**

330

**PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

**LICENSE FOR FOREIGN FILING UNDER****Title 35, United States Code, Section 184****Title 37, Code of Federal Regulations, 5.11 & 5.15****GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

#### **NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage, facilitate, and accelerate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit [SelectUSA.gov](http://SelectUSA.gov).

**KNOBBE MARTENS OLSON & BEAR LLP  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614**

**Notice of Erroneous Access to Certain Patent Application Information  
Between September 15 and September 19, 2012**

Between September 15, 2012 and September 19, 2012, registered users of the Private Patent Application Information Retrieval (PAIR) system were able to access certain data regarding unpublished applications other than their own. This unauthorized access was caused by a software error that was corrected on September 19, 2012, the day it was detected. The United States Patent and Trademark Office (USPTO) immediately fixed the problem, quickly identified and addressed its root cause, and is putting measures in place to prevent future occurrences and notifying the affected applicants. The USPTO takes the security of our IT systems very seriously, and this letter reports the results of our ongoing investigation.

Bibliographical and transactional history data regarding your application serial number 13468749 were accessed during this time period. However, USPTO has confirmed that the unauthorized individual who accessed your data has deleted the data and certified that it will not make use of it and that it was not shared with any third party. Your specification and claims were not part of the information made available, and were not accessed by any unauthorized viewer.

Bibliographic information consists of the application number, the filing date, the name of the first inventor and their residence city and state/country, the title of the invention, the examiner's name, the art unit, and classification information. The bibliographic data do not include the specification, claims, abstract, or drawings. The transaction history is a listing (but not the actual documents) of non-financial transactions by USPTO for that application, which includes event information such as the application scanned into the image file wrapper, filing receipt mailed, change in power of attorney, information disclosure statements filed, office actions mailed by USPTO and amendments received.

This improper access of the application information is not considered a publication of such applications under 35 U.S.C. 122(b). No rights in United States patents are affected by the access to unpublished applications. Although it is important to conduct your own research with respect to the laws of each country when filing in that country, we believe that it is extremely unlikely that the data accessed could disclose the invention in a way that would affect patentability in any other jurisdiction. Data will not constitute prior art against a U.S. applicant's subsequent foreign application so long as that applicant files the foreign application within one year of their U.S. filing date, thus preserving their rights under the Paris Convention. To the extent any issue is raised, the USPTO will assist applicants by confirming that the disclosure was erroneous and inadvertent.

Inquiries regarding this matter may be directed to a USPTO Help Line at 855-754-3305.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 4 columns: APPLICATION NUMBER (13/468,749), FILING OR 371(C) DATE (05/10/2012), FIRST NAMED APPLICANT (Ping Li), ATTY. DOCKET NO./TITLE (SKYWRKS.280A)

CONFIRMATION NO. 1497

PUBLICATION NOTICE

20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614



Title: APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS

Publication No. US-2012-0286873-A1

Publication Date: 11/15/2012

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

**INFORMATION DISCLOSURE STATEMENT**

Inventor	:	Ping Li, et al.
App. No.	:	13/468,749
Filed	:	May 10, 2012
For	:	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS
Examiner	:	MOTTOLA, STEVEN J.
Art Unit	:	2817
Conf. No.	:	1497

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**References and Listing**

Submitted herewith in the above-identified application is an Information Disclosure Statement listing 5 references for consideration. Copies of any listed foreign and non-patent literature references are being submitted.

For the cited Japanese patent reference, Applicant has an attached English abstract of the Japanese patent reference obtained from the Japanese Patent Office website. Applicant makes no representation as to the accuracy of the English abstract. If the Examiner would like additional information regarding these references or if anything is unclear, the Examiner is invited to request such information, and Applicant will attempt to comply with any such request.

**Co-Pending Application of Assignee**

Applicant wishes to call the Examiner's attention to the following co-pending applications of the present application's assignee.

Docket No.	Application No.	Title	Filed
SKYWRKS.280WO	US2012/037065	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS	05-19-2012
SKYWRKS.280TW	TW 101117000	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS	05-11-2012

**Application No.:** 13/468,749  
**Filing Date:** May 10, 2012

As the Examiner is aware, the files of these applications may contain office actions, attorney arguments, allowed claims or indications of allowable subject matter, and cited references which the Examiner may consider to be relevant and/or material to the present application. In addition, as some of these applications are still pending, future office actions, attorney arguments, allowed claims or indications of allowable subject matter, notices of allowances, and cited references may be included in these files. Applicant understands that the Examiner has access to these files on a continuing basis, including any present or future office actions, attorney arguments, allowed claims or indications of allowable subject matter, or cited references listed therein, for review if the Examiner feels these documents are in any way relevant or material to the examination of the present claims. If, however, the Examiner does not have access to these files or would like Applicant to provide copies of any office actions, attorney arguments, allowed claims or indication of allowable subject matter, or cited references, the Examiner is requested to contact the undersigned at the below-listed phone number or at the address of record.

**Timing of Disclosure**

This Information Disclosure Statement is being filed before the receipt of a first Office Action on the merits, and presumably no fee is required. If a first Office Action on the merits was mailed before the mailing date of this Statement, the Commissioner is authorized to charge the fee set forth in 37 CFR 1.17(p) to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: December 12, 2012

By: 

David Trossen  
Registration No. 59,406  
Attorney of Record  
Customer No. 20995  
(415) 954-4114

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	14453300
<b>Application Number:</b>	13468749
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	1497
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS
<b>First Named Inventor/Applicant Name:</b>	Ping Li
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Erica Van Sciver
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	SKYWRKS.280A
<b>Receipt Date:</b>	12-DEC-2012
<b>Filing Date:</b>	10-MAY-2012
<b>Time Stamp:</b>	19:23:53
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
------------------------	----

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		2012_12_12_IDS_SKYWRKS_280A.pdf	141100 9a57bd995a73b05b81993be465209e84286a0334	yes	3

Multipart Description/PDF files in .zip description			
	Document Description	Start	End
	Transmittal Letter	1	2
	Information Disclosure Statement (IDS) Form (SB08)	3	3

**Warnings:**

**Information:**

2	Foreign Reference	2012_12_12_Ref1_SKYWRKS_280A.pdf	71077 8471ffe26623af86f2e6eb14369ba6934826e7ed	no	1
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**Warnings:**

**Information:**

3	Non Patent Literature	2012_12_12_Ref2_SKYWRKS_280A.pdf	509256 4cc232ad5768c90fcb49a64991a4a87fe9db6712	no	10
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**Warnings:**

**Information:**

<b>Total Files Size (in bytes):</b>			721433
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**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-252766

(43)Date of publication of application : 14.09.2000

(51)Int.Cl. H03F 3/21  
H03F 1/02  
H03F 1/32

(21)Application number : 11-051772

(71)Applicant : FUJITSU QUANTUM DEVICE KK

(22)Date of filing : 26.02.1999

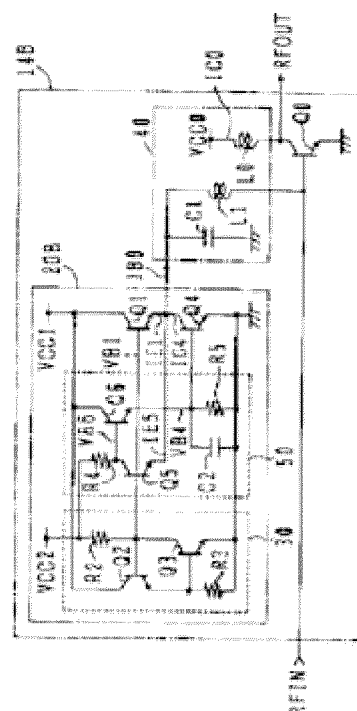
(72)Inventor : MIYAZAWA NAOYUKI

### (54) POWER AMPLIFIER CIRCUIT AND ITS BIAS CIRCUIT

#### (57)Abstract:

**PROBLEM TO BE SOLVED:** To prevent degradation in an efficiency or linearity of a power transistor(TR) due to amplitude fluctuation in an RF input power.

**SOLUTION:** A current source TR Q4 is connected in series with an emitter of an emitter follower TR Q1 in a Q0 bias circuit 20B, and a base level of the TR Q4 is adjusted by a current source control circuit 50 in a way that an emitter current IE1 of the TR Q1 is made nearly constant even when a base bias current IB0 of a power TR Q0 is changed. Or a resistor may be connected respectively between the emitter of the TR Q1 and a base of the power TR Q0 and between a collector of the TR Q4 and a base of the power TR Q0 in place of an RF signal cut coil L1. The connected position of a current source may be between the base of the TR Q1 and a ground level point.



## PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: CHRISTENSEN MICHAEL R.  KNOBBE MARTENS OLSON & BEAR, LLP 2040 MAIN STREET, 14TH FLOOR IRVINE CA 92614 USA		<b>PCT</b>  <b>NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION</b>  (PCT Rule 44.1)
Applicant's or agent's file reference SKYWRKS280WO		Date of mailing (day/month/year) 28 NOVEMBER 2012 (28.11.2012)
International application No. <b>PCT/US2012/037065</b>	International filing date (day/month/year) <b>09 MAY 2012 (09.05.2012)</b>	
Applicant <b>SKYWORKS SOLUTIONS, INC. et al</b>		

1.  The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

**Filing of amendments and statement under Article 19:**  
The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

**When?** The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

**Where?** Directly to the International Bureau of WIPO, 34 chemin des Colombettes  
1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

**For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 . 9.011.**

2.  The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3.  **With regard to any protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:**

the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.


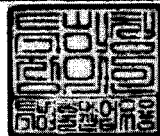
4. **Reminders**  
The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

For details about the applicable time limits, Office by Office, see [www.wipo.int/pct/en/texts/time\\_limits.html](http://www.wipo.int/pct/en/texts/time_limits.html) and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR  Korean Intellectual Property Office 189 Cheongsu-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer  COMMISSIONER  Telephone No. 82-42-481-8755	
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Form PCT/ISA/220 (July 2010)

\* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

<http://www.kipo.go.kr/en/> => PCT Services => PCT Services

ID : PCT international application number

PW : **5BLY7NK2**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: <http://www.ipkcenter.com>

Email: [ipkc@ipkcenter.com](mailto:ipkc@ipkcenter.com)

Phone: +1 703 388 1066

Fax: +1 703 388 1084

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference SKYWRKS280WO	<b>FOR FURTHER ACTION</b> see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. <b>PCT/US2012/037065</b>	International filing date ( <i>day/month/year</i> ) <b>09 MAY 2012 (09.05.2012)</b>	(Earliest) Priority Date ( <i>day/month/year</i> ) <b>13 MAY 2011 (13.05.2011)</b>
Applicant <b>SKYWORKS SOLUTIONS, INC. et al</b>		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

## 1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

the international application in the language in which it was filed

a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b.  This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c.  With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2.  Certain claims were found unsearchable (See Box No. II)

3.  Unity of invention is lacking (See Box No. III)

4. With regard to the title,

the text is approved as submitted by the applicant.

the text has been established by this Authority to read as follows:

5. With regard to the abstract,

the text is approved as submitted by the applicant.

the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

a. the figure of the drawings to be published with the abstract is Figure No. 4

as suggested by the applicant.

as selected by this Authority, because the applicant failed to suggest a figure.

as selected by this Authority, because this figure better characterizes the invention.

b.  none of the figure is to be published with the abstract.

## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/US2012/037065****A. CLASSIFICATION OF SUBJECT MATTER****H03F 1/30(2006.01)i, H03F 3/24(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

H03F 1/30; G05F 3/02; H03F 1/36; H03F 3/21; H03F 1/02; H03F 3/04; H03F 1/24

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models  
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) &amp; Keywords: amplifier, time dependent, RC, bias

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 7821335 B2 (SHIRAMIZU NOBUHIRO et al.) 26 October 2010 See column 10, line 66 - column 11, line 3; and figure 1.	1-28
A	US 2009-0195318 A1 (KANG LI-HUNG et al.) 06 August 2009 See paragraphs [0013]-[0034]; and figures 1-5.	1-28
A	US 2005-0134374 A1 (HENCH JOHN J. et al.) 23 June 2005 See paragraphs [0117]-[0118]; and figures 13A.	1-28
A	JP 2000-252766 A (FUJITSU QUANTUM DEVICE KK) 14 September 2000 See abstract; paragraphs [0046]-[0049]; and figure 1.	1-28

 Further documents are listed in the continuation of Box C. See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

23 NOVEMBER 2012 (23.11.2012)

Date of mailing of the international search report

**28 NOVEMBER 2012 (28.11.2012)**

Name and mailing address of the ISA/KR

Korean Intellectual Property Office  
189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan  
City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KIM, Sang Keol

Telephone No. 82-42-481-5742



Form PCT/ISA/210 (second sheet) (July 2009)

EX-1002 0073

Kangxi Communication Technologies (Shanghai) Co., Ltd. v. Skyworks Solutions, Inc.

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2012/037065**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7821335 B2	26.10.2010	CN 101414805 A	22.04.2009
		CN 101414805 B	18.05.2011
		JP 2009-100337 A	07.05.2009
		US 2009-0102552 A1	23.04.2009
US 2009-0195318 A1	06.08.2009	US 7612613 B2	03.11.2009
US 2005-0134374 A1	23.06.2005	US 7053705 B2	30.05.2006
JP 2000-252766 A	14.09.2000	JP 03471648 B2	12.09.2003
		JP 3471648 B2	02.12.2003
		US 6331799 B1	18.12.2001

Form PCT/ISA/210 (patent family annex) (July 2009)

EX-1002 0074

Kangxi Communication Technologies (Shanghai) Co., Ltd. v. Skyworks Solutions, Inc.

## PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:

CHRISTENSEN MICHAEL R.

KNOBBE MARTENS OLSON & BEAR, LLP 2040 MAIN  
STREET, 14TH FLOOR IRVINE CA 92614 USA

**PCT**

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

(PCT Rule 43bis.1)

Date of mailing  
(day/month/year) **28 NOVEMBER 2012 (28.11.2012)**

Applicant's or agent's file reference  
SKYWRKS280WO

**FOR FURTHER ACTION**

See paragraph 2 below

International application No.

**PCT/US2012/037065**

International filing date (day/month/year)

**09 MAY 2012 (09.05.2012)**

Priority date(day/month/year)

13 MAY 2011 (13.05.2011)

International Patent Classification (IPC) or both national classification and IPC

**H03F 1/30(2006.01)i, H03F 3/24(2006.01)i**

Applicant

**SKYWORKS SOLUTIONS, INC. et al**

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

**2. FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR  
Korean Intellectual Property Office  
189 Cheongsa-ro, Seo-gu, Daejeon  
Metropolitan City, 302-701,  
Republic of Korea  
Facsimile No. 82-42-472-7140



Date of completion of this opinion

23 NOVEMBER 2012 (23.11.2012)

Authorized officer

KIM, Sang Keol

Telephone No.82-42-481-5742



Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2012/037065

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:

- the international application in the language in which it was filed
- a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2.  This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established on the basis of:

a. a sequence listing filed or furnished

- on paper
- in electronic form

b. time of filing or furnishing

- contained in the international application as filed.
- filed together with the international application in electronic form.
- furnished subsequently to this Authority for the purposes of search.

4.  In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2012/037065

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-28	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-28	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-28	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 7821335 B2 (SHIRAMIZU NOBUHIRO et al.) 26 October 2010

D2: US 2009-0195318 A1 (KANG LI-HUNG et al.) 06 August 2009

D3: US 2005-0134374 A1 (HENCH JOHN J. et al.) 23 June 2005

D4: JP 2000-252766 A (FUJITSU QUANTUM DEVICE KK) 14 September 2000

1. Novelty and Inventive Step

1.1. Independent claim [1]

The subject matter of claim [1] differs from these prior art documents in that a power amplifier system comprising: a bias block for biasing the power amplifier, the bias block including a time-dependent signal generator configured to shape an enable signal of power amplifier to generate a control current, and a primary biasing circuit configured to generate a bias current for the power amplifier based at least partly on the correction current. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim [1] meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

1.2. Dependent claims [2-17]

Claims [2-17] are dependent on claim [1] and therefore meet the requirements of PCT Article 33(2) and (3).

Continued on Supplemental Box

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

**PCT/US2012/037065**

**Box No. VIII Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

In claim 15, line 1, 'the primary bias circuit' lacks proper antecedent basis.

In claim 17, line 1, 'the primary bias circuit' lacks proper antecedent basis.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.  
Continuation of:

Box V

**1.3. Independent claim [18]**

The subject matter of claim [18] differs from these prior art documents in that a method of biasing a power amplifier comprising: the step of shaping an enable signal using a time-dependent signal generator to generate a control current; the step of generating a bias current for a power amplifier using a primary biasing circuit, the primary biasing circuit configured to use the correction current to correct for a variation in gain the power amplifier when the power amplifier is enable. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim [18] meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

**1.4. Dependent claims [19-22]**

Claims [19-22] are dependent on claim [18] and therefore meet the requirements of PCT Article 33(2) and (3).

**1.5. Independent claim [23]**

The subject matter of claim [23] differs from these prior art documents in that a bias circuit for biasing a power amplifier comprising: a time-dependent signal generator configured to shape an enable signal of the power amplifier to generate a control current; a primary biasing block configured to generate a bias current for the power amplifier based at least partly on the correction current. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim [23] meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

**1.6. Dependent claims [24-28]**

Claims [24-28] are dependent on claim [23] and therefore meet the requirements of PCT Article 33(2) and (3).

**2. Industrial Applicability**

Claims [1-28] are industrially applicable under PCT Article 33(4).

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	13/468,749	
	Filing Date	May 10, 2012	
	First Named Inventor	Li, Ping et al.	
	Art Unit	2817	
<i>(Multiple sheets used when necessary)</i>		Examiner	MOTOLA, STEVEN J.
SHEET 1 OF 1		Attorney Docket No.	SKYWRKS.280A


U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	7,821,335	10-26-2010	Shiramizu et al.	
	2	2005-0134374	06-23-2005	Hench et al.	
	3	2009-0195318	08-06-2009	Kang et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document Country Code-Number-Kind Code Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>
	4	JP 2000-252766	09-14-2000	FUJITSU QUANTUM DEVICE KK		Abstract Only

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>
	5	SEARCH REPORT AND WRITTEN OPINION of November 28, 2012 for International Application No. PCT/US2012/037065. Attorney Docket No. SKYWRKS.280WO. 11 pages.	

Examiner Signature	Date Considered
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

T<sup>1</sup> - Place a check mark in this area when an English language Translation is attached.

<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b> 13468749	<b>Applicant(s)/Patent Under Reexamination</b> LI ET AL.
	<b>Examiner</b> HIEU NGUYEN	<b>Art Unit</b> 2817

✓	<b>Rejected</b>
=	<b>Allowed</b>


-	<b>Cancelled</b>
÷	<b>Restricted</b>

N	<b>Non-Elected</b>
I	<b>Interference</b>

A	<b>Appeal</b>
O	<b>Objected</b>

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

CLAIM		DATE									
Final	Original	07/26/2013									
	1	✓									
	2	✓									
	3	✓									
	4	○									
	5	○									
	6	✓									
	7	✓									
	8	○									
	9	○									
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	18	✓									
	19	✓									
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	21	○									
	22	✓									
	23	✓									
	24	✓									
	25	✓									
	26	○									
	27	○									
	28	○									

<b>Search Notes</b>  	<b>Application/Control No.</b>  13468749	<b>Applicant(s)/Patent Under Reexamination</b>  LI ET AL.
	<b>Examiner</b>  HIEU NGUYEN	<b>Art Unit</b>  2817

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
330	285	07/26/2013	hn
330	296	07/26/2013	hn
330	278	07/26/2013	hn
330	298	07/26/2013	hn
330	288	07/26/2013	hn

SEARCH NOTES		
Search Notes	Date	Examiner
EAST	07/26/2013	hn

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

	/Hieu P Nguyen/ Primary Examiner, Art Unit 2817
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<b>Notice of References Cited</b>	Application/Control No. 13/468,749	Applicant(s)/Patent Under Reexamination LI ET AL.	
	Examiner HIEU NGUYEN	Art Unit 2817	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A US-7,869,775	01-2011	Alon et al.	455/127.1
	B US-			
	C US-			
	D US-			
	E US-			
	F US-			
	G US-			
	H US-			
	I US-			
	J US-			
	K US-			
	L US-			
	M US-			

**FOREIGN PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N				
	O				
	P				
	Q				
	R				
	S				
	T				

**NON-PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)				
	U				
	V				
	W				
	X				

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>	Application No.	13/468,749	
	Filing Date	May 10, 2012	
	First Named Inventor	Li, Ping et al.	
	Art Unit	2817	
<i>(Multiple sheets used when necessary)</i>		Examiner	MOTOLA, STEVEN J.
SHEET 1 OF 1		Attorney Docket No.	SKYWRKS.280A

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number Number - Kind Code (if known) Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
/HN/	1	7,821,335	10-26-2010	Shiramizu et al.	
/HN/	2	2005-0134374	06-23-2005	Hench et al.	
/HN/	3	2009-0195318	08-06-2009	Kang et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document Country Code-Number-Kind Code Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T <sup>1</sup>
/HN/	4	JP 2000-252766	09-14-2000	FUJITSU QUANTUM DEVICE KK		Abstract Only

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>1</sup>
/HN/	5	SEARCH REPORT AND WRITTEN OPINION of November 28, 2012 for International Application No. PCT/US2012/037065. Attorney Docket No. SKYWRKS.280WO. 11 pages.	

Examiner Signature	/Hieu Nguyen/	Date Considered	07/26/2013
*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

T<sup>1</sup> - Place a check mark in this field when an English language translation is attached. **ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /HN**



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BIB DATA SHEET

CONFIRMATION NO. 1497

<b>SERIAL NUMBER</b> 13/468,749	<b>FILING or 371(c) DATE</b> 05/10/2012 <b>RULE</b>	<b>CLASS</b> 330	<b>GROUP ART UNIT</b> 2817	<b>ATTORNEY DOCKET NO.</b> SKYWRKS.280A	
<b>APPLICANTS</b> Ping Li, Dunstable, MA; Paul T. DiCarlo, Marlborough, MA; <b>** CONTINUING DATA *****</b> This appln claims benefit of 61/486,186 05/13/2011 <b>** FOREIGN APPLICATIONS *****</b> <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 05/23/2012					
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Verified and Acknowledged <u>/HIEU P NGUYEN/</u> Examiner's Signature	<input type="checkbox"/> Met after Allowance Initials _____	<b>STATE OR COUNTRY</b> MA	<b>SHEETS DRAWINGS</b> 7	<b>TOTAL CLAIMS</b> 28	<b>INDEPENDENT CLAIMS</b> 3
<b>ADDRESS</b> KNOBBE MARTENS OLSON & BEAR LLP 2040 MAIN STREET FOURTEENTH FLOOR IRVINE, CA 92614 UNITED STATES					
<b>TITLE</b> APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS					
<b>FILING FEE RECEIVED</b> 1860	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		



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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 13/468,749, 05/10/2012, Ping Li, SKYWRKS.280A, 1497
Row 2: 20995, 7590, 08/02/2013, KNOBBE MARTENS OLSON & BEAR LLP, 2040 MAIN STREET, FOURTEENTH FLOOR, IRVINE, CA 92614, EXAMINER NGUYEN, HIEU P
Row 3: ART UNIT 2817, PAPER NUMBER
Row 4: NOTIFICATION DATE 08/02/2013, DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jayna.cartee@knobbe.com
efiling@knobbe.com

<b>Office Action Summary</b>	<b>Application No.</b> 13/468,749	<b>Applicant(s)</b> LI ET AL.	
	<b>Examiner</b> HIEU NGUYEN	<b>Art Unit</b> 2817	<b>AIA (First Inventor to File) Status</b> No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1)  Responsive to communication(s) filed on \_\_\_\_\_.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 5)  Claim(s) 1-28 is/are pending in the application.  
5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 6)  Claim(s) \_\_\_\_\_ is/are allowed.
- 7)  Claim(s) 1-3, 6-7, 12-14, 18-20 and 22-25 is/are rejected.
- 8)  Claim(s) 4-5, 8-11, 15-17, 21 and 26-28 is/are objected to.
- 9)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

### Application Papers

- 10)  The specification is objected to by the Examiner.
- 11)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

### Priority under 35 U.S.C. § 119

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

#### Certified copies:

- a)  All    b)  Some \*    c)  None of the:
1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 3) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/12/2012</u> . | 4) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Specification*

The specification has not been checked to the extent necessary to determine the presence to all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 12-14, 18-20, 22 and 23-25 are rejected under 35 U.S.C. 102(b) as being anticipated by **Alon et al.** (U.S. 7,869,775).

Regarding claims 1, 12-14, 18 and 22, Alon et al. (hereinafter **Ref~775**) discloses (see Fig. 2 and related text for detail) a power amplifier/transceiver system as well as a method of biasing a power amplifier comprising:

a power amplifier (BJT 282) configured to amplify a radio frequency (RFIN) signal; and  
a bias block (see block 210/220/230 of Fig. 2) for biasing the power amplifier, the bias block including a time-dependent signal generator (208/214 can be read as the claimed time-

Art Unit: 2817

dependent signal generator *at least* due to the time constant from the RC circuit, namely capacitor 214 with resistor 208) configured to shape an enable signal (e.g., signal 219 can be read as the claimed enable signal since it is being generated from enable circuit 220) of the power amplifier to generate a control current (current 207 can be read as the claimed control current), a current amplifier (device 204 can be read as the claimed current amplifier as expected) configured to amplify the control current to generate a correction current (206), and a primary biasing circuit (FET bias 230 can be read as the claimed primary biasing circuit) configured to generate a bias current (the current disposed at node 281 can be read as the claimed bias current as expected) for the power amplifier based at least partly on the correction current, the bias current configured to correct for a variation in gain of the power amplifier when the power amplifier is enabled as described throughout the disclosure, **meeting claims 1, 12-14, 18 and 22.**

Regarding claims 2 and 19, Ref~775 discloses the power amplifier system of claim 1 wherein the time-dependent signal generator includes a resistor-capacitor (RC) network as seen from the Figure, **meeting claims 2 and 19.**

Regarding claims 3 and 20, Ref~775 discloses the power amplifier system of claim 2 wherein the RC network includes a first resistor (208) and a first capacitor (214) electrically connected in series between the current amplifier and an input of the bias circuit configured to receive the enable signal as seen from the Figure, **meeting claims 3 and 20.**

Regarding claims 23-25, these claims contain limitations similar to those of claims 1-3 and 18-20 and are therefore rejected for at least the same reasons, **meeting claims 23-25.**

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a)

Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ref~775**.

Regarding claims 6-7, the reference does not expressly disclose “wherein the first capacitor has a capacitance ranging between about 10 pF and about 100 pF” OR “wherein the first resistor has a resistance ranging between about 10 k $\Omega$  and about 100 k $\Omega$ ”. However these are normal design parameters chosen by circuit designers to at least meet design specifications of an intended system, **meeting claims 6-7**.

***Allowable Subject Matter***

Claims 4-5, 8-11, 15-17, 21 and 26-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hieu Nguyen whose telephone number is 571-272-8577. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Pascal can be reached on 571-272-1769. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Hieu Nguyen/  
Primary Examiner  
Group Art Unit: 2817

## EAST Search History

## EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	744	330/285,296,278,298,288.ccls. and (mirror same bias\$4) and control\$4 and gain	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/26; 21:33
L2	356	330/285,296,278,298,288.ccls. and (mirror same bias\$4) and control\$4 and (gain same (variation compensat\$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/26; 21:34
S1	383	330/285,296,278.ccls. and (mirror same bias\$4) and control\$4	USPAT	OR	OFF	2013/07/26; 09:58
S2	498	330/285,296,278.ccls. and (mirror same bias\$4) and control\$4 and gain	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/26; 09:59
S3	327	330/285,296,278.ccls. and (mirror same bias\$4) and control\$4 and gain and (capacit\$4 same resist\$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/26; 09:59
S5	31	330/285,296,278.ccls. and (mirror same bias\$4) and control\$4 and gain and (capacit\$4 same resist\$4) and (time near constant)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/26; 10:34
S7	175	330/285,296,278.ccls. and (mirror same bias\$4) and control\$4 and gain and enable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/26; 10:42
S8	6	330/285,296,278.ccls. and (mirror same bias\$4) and control\$4 and (gain with correct\$4) and enable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	2013/07/26; 10:42

			IBM_TDB			
S9	52	330/285,296,278.ccls. and (mirror same bias\$4) and control\$4 and (gain with variation) and enable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/26 10:44
S10	144	330/285,296,278.ccls. and (mirror same bias\$4) and control\$4 and (gain with variation)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/26 10:44
S16	104	330/285,296,278.ccls. and (enable adj signal)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/26 11:18
S19	26	330/285,296,278.ccls. and (enable adj signal) and mirror	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/26 11:53
S21	58	("6037832"   "5590419"   "6242986"   "7417507"   "20040222827"   "6437647"   "6636118"   "7768353"   "5621620"   "6242986"   "7400202"   "6333677"   "6314028"   "20060018696"   "4320352"   "6043714"   "6617928"   "7304539"   "7656233"   "8036301"   "8014719"   "6486724"   "7522001"   "5297097"   "6259324"   "6486724"   "6882227"   "7691476").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/26 11:56
S24	191	330/285,296.ccls. and mirror and bias\$4 and control\$4 and (gain with (variation compensat\$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/26 14:42
S25	162	330/285,296.ccls. and mirror and bias\$4 and control\$4 and (gain with (variation compensat\$4)) and capacit\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/26 14:43
S31	304	330/285,296,278.ccls. and mirror and enable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/07/26 16:00
S32	30	330/285,296,278.ccls. and mirror and	US-PGPUB;	OR	ON	2013/07/26;

enable and (time adj constant)	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	16:01
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**EAST Search History (Interference)**

<This search history is empty>

**7/26/2013 9:37:09 PM**

**C:\Users\hnguyen35\Documents\EAST\Workspaces\13468749.wsp**

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875	Application or Docket Number <b>13/468,749</b>	Filing Date <b>05/10/2012</b>	<input type="checkbox"/> To be Mailed
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ENTITY:  LARGE  SMALL  MICRO

**APPLICATION AS FILED – PART I**

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (j), or (m))	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

**APPLICATION AS AMENDED – PART II**

	(Column 1)	(Column 2)	(Column 3)	(Column 3)	RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>	<b>10/31/2013</b>	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		
	Total (37 CFR 1.16(i))	+ 25	Minus	** 28	= 0	X \$80 = 0
	Independent (37 CFR 1.16(h))	* 6	Minus	***3	= 3	X \$420 = 1260
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))					
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	<b>1260</b>

	(Column 1)	(Column 2)	(Column 3)	(Column 3)	RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))					
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE  
/PAULA MCCRAY STANLEY/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13468749			
<b>Filing Date:</b>	10-May-2012			
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS			
<b>First Named Inventor/Applicant Name:</b>	Ping Li			
<b>Filer:</b>	David R. Trossen/Debbie Fonseca			
<b>Attorney Docket Number:</b>	SKYWRKS.280A			
Filed as Large Entity				
<b>Utility under 35 USC 111(a) Filing Fees</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
Independent claims in excess of 3	1201	3	420	1260
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>1260</b>

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor	:	Ping Li, et al.
App. No.	:	13/468,749
Filed	:	May 10, 2012
For	:	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS
Examiner	:	Nguyen, Hieu P.
Art Unit	:	2817
Conf No.	:	1497

## AMENDMENT AND RESPONSE TO OFFICE ACTION

**Mail Stop Amendment**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

In response to the non-final Office Action dated August 2, 2013, please consider the following remarks:

**Amendments to the Claims** are reflected in the listing of claims which begins on page 2 of this paper.

**Remarks** begin on page 8 of this paper.

### AMENDMENTS TO THE CLAIMS

Please amend claims 1, 4, 9, 15, 18, 23, and 27. Please cancel claims 8, 21, and 26.

1. (Currently Amended) A power amplifier system comprising:  
a power amplifier configured to amplify a radio frequency (RF) signal; and  
a bias block for biasing the power amplifier, the bias block including a time-dependent signal generator configured to shape an enable signal of the power amplifier to generate a control current, a current amplifier configured to amplify the control current to generate a correction current, and a primary biasing circuit configured to generate a bias current for the power amplifier based at least partly on the correction current, the bias current configured to correct for a variation in gain of the power amplifier when the power amplifier is enabled, the current amplifier including a current mirror.

2. (Original) The power amplifier system of claim 1 wherein the time-dependent signal generator includes a resistor-capacitor (RC) network.

3. (Original) The power amplifier system of claim 2 wherein the RC network includes a first resistor and a first capacitor electrically connected in series between the current amplifier and an input of the bias circuit configured to receive the enable signal.

4. (Currently Amended) A power amplifier system comprising: The power amplifier system of claim 3 wherein.

a power amplifier configured to amplify a radio frequency (RF) signal; and  
a bias block for biasing the power amplifier, the bias block including a time-dependent signal generator configured to shape an enable signal of the power amplifier to generate a control current, a current amplifier configured to amplify the control current to generate a correction current, and a primary biasing circuit configured to generate a bias current for the power amplifier based at least partly on the correction current, the bias current configured to correct for a variation in gain of the power amplifier when the power amplifier is enabled, the time-dependent signal generator including a resistor-capacitor (RC) network, the RC network including a first resistor and a first capacitor electrically connected in series between the current amplifier and an input of the bias circuit configured to receive the enable signal, the RC network

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further ~~including~~ ~~includes~~ a second resistor having a first end electrically connected to the input of the current mirror and a second end electrically connected to the input of the bias circuit configured to receive the enable signal.

5. (Original) The power amplifier system of claim 4 wherein the second resistor has a resistance ranging between about 10 k $\Omega$  and about 100 k $\Omega$ .

6. (Original) The power amplifier system of claim 3 wherein the first capacitor has a capacitance ranging between about 10 pF and about 100 pF.

7. (Original) The power amplifier system of claim 6 wherein the first resistor has a resistance ranging between about 10 k $\Omega$  and about 100 k $\Omega$ .

8. (Canceled)

9. (Currently Amended) The power amplifier system of claim 1 [[8]] wherein the current mirror includes a first bipolar transistor and a second bipolar transistor, the first bipolar transistor including an emitter electrically connected to an emitter of the second bipolar transistor and to a power low voltage, and a collector electrically connected to a base of the first bipolar transistor and to a base of the second bipolar transistor, the collector of the first bipolar transistor configured to receive at least a portion of the control current.

10. (Original) The power amplifier system of claim 9 wherein the current mirror further includes a resistor, a third bipolar transistor and a fourth bipolar transistor, the third bipolar transistor including an emitter electrically connected to an emitter of the fourth bipolar transistor and to the power low voltage, and a collector electrically connected to a first end of the resistor, to the collector of the second bipolar transistor, to a base of the third bipolar transistor, and to a base of the fourth bipolar transistor, the collector of the fourth bipolar transistor configured to generate the compensation current.

11. (Original) The power amplifier system of claim 10 wherein the resistor further includes a second end configured to receive the enable signal.

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12. (Original) The power amplifier system of claim 1 further comprising a transceiver for providing the RF signal to the power amplifier.

13. (Original) The power amplifier system of claim 1 wherein the power amplifier includes a bipolar transistor having an emitter, a base and a collector, the base configured to receive the RF signal and the bias current.

14. (Original) The power amplifier system of claim 13 wherein the emitter is electrically connected to a power low voltage and the collector is configured to generate an amplified version of the RF signal.

15. (Currently Amended) A power amplifier system comprising: The power amplifier system of claim 1 wherein

a power amplifier configured to amplify a radio frequency (RF) signal; and

a bias block for biasing the power amplifier, the bias block including a time-dependent signal generator configured to shape an enable signal of the power amplifier to generate a control current, a current amplifier configured to amplify the control current to generate a correction current, and a primary biasing circuit configured to generate a bias current for the power amplifier based at least partly on the correction current, the bias current configured to correct for a variation in gain of the power amplifier when the power amplifier is enabled, the primary bias circuit including includes a first resistor, a second resistor, a first bipolar transistor, and a second bipolar transistor, the first resistor including a first end electrically connected to the emitter of the first bipolar transistor at a node configured to receive the correction current, and a second end electrically connected to a first end of the second resistor at a node of the bias circuit configured to receive the enable signal, the second resistor including a second end electrically connected to a collector of the first bipolar transistor, a base of the first bipolar transistor, and to a base of the second bipolar transistor.

16. (Original) The power amplifier system of claim 15 wherein the second bipolar transistor includes a collector electrically connected to a battery voltage and an emitter configured to generate the bias current.

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17. (Original) The power amplifier system of claim 16 wherein the primary bias circuit further includes a third bipolar transistor having an emitter electrically connected to the power low voltage and a base and a collector electrically connected to the emitter of the first bipolar transistor.

18. (Currently Amended) A method of biasing a power amplifier, the method comprising:

shaping an enable signal using a time-dependent signal generator to generate a control current;

amplifying the control current using a current mirror of a current amplifier to generate a correction current; and

generating a bias current for a power amplifier using a primary biasing circuit, the primary biasing circuit configured to use the correction current to correct for a variation in gain of the power amplifier when the power amplifier is enabled.

19. (Original) The method of claim 18 wherein shaping the enable signal includes using a resistor-capacitor (RC) network of the time-dependent signal generator.

20. (Original) The method of claim 19 wherein the RC network includes a first resistor and a first capacitor electrically connected in series, the RC network configured to receive the enable signal and to generate the control current.

21. (Canceled)

22. (Original) The method of claim 18 wherein generating the bias current includes shaping the bias current so as to compensate for a gain variation of a heterojunction bipolar transistor (HBT).

23. (Currently Amended) A bias circuit for biasing a power amplifier, the bias circuit comprising:

a time-dependent signal generator configured to shape an enable signal of the power amplifier to generate a control current;

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a current amplifier configured to amplify the control current to generate a correction current, the current amplifier including a current mirror; and

a primary biasing block configured to generate a bias current for the power amplifier based at least partly on the correction current, the bias current configured to correct for a variation in gain of the power amplifier when the power amplifier is enabled.

24. (Original) The bias circuit of claim 23 wherein the time-dependent signal generator includes a resistor-capacitor (RC) network.

25. (Original) The bias circuit of claim 24 wherein the RC network includes a first resistor and a first capacitor electrically connected in series between the current amplifier and an input of the bias circuit configured to receive the enable signal.

26. (Canceled)

27. (Currently Amended) A bias circuit for biasing a power amplifier, the bias circuit comprising: The bias circuit of claim 23 wherein

a time-dependent signal generator configured to shape an enable signal of the power amplifier to generate a control current;

a current amplifier configured to amplify the control current to generate a correction current; and

a primary biasing block configured to generate a bias current for the power amplifier based at least partly on the correction current, the bias current configured to correct for a variation in gain of the power amplifier when the power amplifier is enabled, the primary bias block including includes a first resistor, a second resistor, a first bipolar transistor, and a second bipolar transistor, the first resistor including a first end electrically connected to the emitter of the first bipolar transistor at a node configured to receive the correction current, and a second end electrically connected to a first end of the second resistor at a node of the bias circuit configured to receive the enable signal, the second resistor including a second end electrically connected to a collector of the first bipolar transistor, a base of the first bipolar transistor, and to a base of the second bipolar transistor.

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28. (Original) The bias circuit of claim 27 wherein the second bipolar transistor includes a collector electrically connected to a battery voltage and an emitter configured to generate the bias current.

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### **REMARKS**

This paper is filed in response to the non-final Office Action dated August 2, 2013. The Office Action rejects claims 1-3, 12-14, 18-20, 22, and 23-25 under 35 U.S.C. §102(b), rejects claims 6 and 7 under 35 U.S.C. §103(a), and indicates that claims 4, 5, 8-11, 15-17, 21, and 26-28 would be allowable if rewritten in independent form including all limitations of the base claim and any intervening claims. Claims 1, 4, 9, 15, 18, 23, and 27 have been amended as set forth above, and claims 8, 21, and 26 have been canceled. Applicants respectfully request the entry of the amendments and reconsideration of the application in view of the above identified amendments and the following remarks.

#### ***Discussion of Claim Amendments***

Claim 1 has been amended to incorporate the limitations of original claim 8.

Claim 4 has been rewritten in independent form.

Claim 8 has been canceled.

Claim 9 has been amended to depend from claim 1 rather than from claim 8.

Claim 15 has been rewritten in independent form.

Claim 18 has been amended to incorporate the limitations of original claim 21.

Claim 21 has been canceled.

Claim 23 has been amended to incorporate the limitations of original claim 26.

Claim 26 has been canceled.

Claim 27 has been rewritten in independent form.

Applicants respectfully submit that no new matter is being added and respectfully request entry of the foregoing amendments.

#### **Discussion of Allowable Subject Matter**

Applicants note with appreciation the Examiner's indication that claims 4, 5, 8-11, 15-17, 21, and 26-28 would be allowable if rewritten in independent form. As set forth above, claims 4, 15, and 27 have been rewritten in independent form. Additionally, claim 1 has been amended to include the limitations of allowable claim 8, claim 18 has been amended to include the limitations of allowable claim 21, and claim 23 has been amended to include the limitations of

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allowable claim 26. As such, Applicants respectfully submit that independent claims 1, 4, 15, 18, 23, and 27 are now allowable. Additionally, claims 2, 3, 5-7, 9-14, 16, 17, 19, 20, 22, 24, 25, and 28 are also allowable at least because of their dependency from allowable claims and for reciting further distinguishing features and combinations of particular utility.

**Discussion of Rejections of Claims 1-3, 12-14, 18-20, 22, and 23-25 under 35 U.S.C. §102(b)**

The Office Action rejected claims 1-3, 12-14, 18-20, 22, and 23-25 under 35 U.S.C § 102(b) as being anticipated by Alon (U.S. Pat. No. 7,869,775).

Without acquiescing to the rejections, Applicants have amended independent claim 1 to include the limitations of claim 8, which the Examiner indicated is allowable over the cited art. Therefore, claim 1 is not anticipated nor rendered obvious by the cited art.

Additionally, without acquiescing to the rejections, Applicants have amended independent claim 18 to include the limitations of claim 21, which the Examiner indicated is allowable over the cited art. Therefore, claim 18 is not anticipated nor rendered obvious by the cited art.

Furthermore, without acquiescing to the rejections, Applicants have amended independent claim 23 to include the limitations of claim 26, which the Examiner indicated is allowable over the cited art. Therefore, claim 23 is not anticipated nor rendered obvious by the cited art.

Additionally, claims 2, 3, 12-14, 19, 20, 22, 24, and 25 are also allowable at least because of their dependency from allowable claims and for reciting further distinguishing features and combinations of particular utility.

Accordingly, Applicants respectfully request withdrawal of the rejections of claims 1-3, 12-14, 18-20, 22, and 23-25.

**Discussion of Rejections of Claims 6 and 7 under 35 U.S.C. §103(a)**

The Office Action rejected claims 6 and 7 under 35 U.S.C § 103(a) as being obvious over Alon.

Without acquiescing to the rejections, Applicants have amended independent claim 1 to include the limitations of claim 8, which the Examiner indicated is allowable over the cited art.

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Therefore, claim 1 is not anticipated nor rendered obvious by the cited art. Claims 6 and 7 are also allowable at least because of their dependency from allowable claims and for reciting further distinguishing features and combinations of particular utility.

Accordingly, Applicants respectfully request withdrawal of the rejections of claims 6 and 7.

No Disclaimers or Disavowals

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, Applicants are not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. Applicants reserve the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that Applicants have made any disclaimers or disavowals of any subject matter supported by the present application.

Co-Pending Applications and Issued Patents of Assignee

Applicants wish to draw the Examiner's attention to the following co-pending applications and issued patents of the present application's assignee.

Docket No.	Application No.	Title	Filed
SKYWRKS.280WO	US2012/037065	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS	05-19-2012
SKYWRKS.280TW	TW 101117000	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS	05-11-2012

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**Filing Date:** May 10, 2012

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: October 31, 2013

By: 

David Trossen  
Registration No. 59,406  
Attorney of Record  
Customer No. 20995  
(415) 954-4114

AMEND

16516329  
102213

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	17277826
<b>Application Number:</b>	13468749
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	1497
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS
<b>First Named Inventor/Applicant Name:</b>	Ping Li
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Heide Young
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	SKYWRKS.280A
<b>Receipt Date:</b>	31-OCT-2013
<b>Filing Date:</b>	10-MAY-2012
<b>Time Stamp:</b>	12:58:11
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$1260
RAM confirmation Number	15470
Deposit Account	111410
Authorized User	KNOBBE MARTENS OLSON AND BEAR

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

<b>File Listing:</b>					
<b>Document Number</b>	<b>Document Description</b>	<b>File Name</b>	<b>File Size(Bytes)/ Message Digest</b>	<b>Multi Part /.zip</b>	<b>Pages (if appl.)</b>
1		SKYWRKS_280A-OAR.pdf	467316 89a6a3387e6dc96258a219bcfe5b3e07a6db24ef	yes	11
<b>Multipart Description/PDF files in .zip description</b>					
		<b>Document Description</b>	<b>Start</b>	<b>End</b>	
		Amendment/Req. Reconsideration-After Non-Final Reject	1	1	
		Claims	2	7	
		Applicant Arguments/Remarks Made in an Amendment	8	11	
<b>Warnings:</b>					
<b>Information:</b>					
2	Fee Worksheet (SB06)	fee-info.pdf	30605 abe50b75879875e25a8276224eb4d49e7cd01110	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			497921		
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>					

## EAST Search History

## EAST Search History (Prior Art)


Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	390	330/285,296,278.ccls. and (mirror same bias\$4) and control\$4	USPAT	OR	OFF	2013/12/14: 11:11
L2	508	330/285,296,278.ccls. and (mirror same bias\$4) and control\$4 and gain	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/12/14: 11:16
L3	335	330/285,296,278.ccls. and (mirror same bias\$4) and control\$4 and gain and (capacit\$4 same resist\$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/12/14: 11:17
L4	35	330/285,296,278.ccls. and (mirror same bias\$4) and control\$4 and gain and (capacit\$4 same resist\$4) and (time near constant)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/12/14: 11:18
L5	178	330/285,296,278.ccls. and (mirror same bias\$4) and control\$4 and gain and enable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/12/14: 11:18
L6	146	330/285,296,278.ccls. and (mirror same bias\$4) and control\$4 and (gain with variation)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/12/14: 11:19
L7	195	330/285,296.ccls. and mirror and bias\$4 and control\$4 and (gain with (variation compensat\$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/12/14: 11:19
L8	165	330/285,296.ccls. and mirror and bias\$4 and control\$4 and (gain with (variation compensat\$4)) and capacit\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/12/14: 11:19
L9	755	330/285,296,278,298,288.ccls. and (mirror same bias\$4) and control\$4 and gain	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/12/14: 11:19
L10	362	330/285,296,278,298,288.ccls. and (mirror same bias\$4) and control\$4 and (gain same (variation compensat\$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/12/14: 11:20

## EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L11	1	(bias adj block) with (time-dependent adj signal adj generator).dcm.	US-PGPUB; USPAT; UPAD	OR	ON	2013/12/14 11:21

**12/ 14/ 2013 11:21:55 AM**

**C:\Users\hnguyen35\Documents\EAST\Workspaces\13468749.wsp**

<b>Search Notes</b>  	<b>Application/Control No.</b>  13468749	<b>Applicant(s)/Patent Under Reexamination</b>  LI ET AL.
	<b>Examiner</b>  HIEU NGUYEN	<b>Art Unit</b>  2817

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
330	285	07/26/2013	hn
330	296	07/26/2013	hn
330	278	07/26/2013	hn
330	298	07/26/2013	hn
330	288	07/26/2013	hn


SEARCH NOTES		
Search Notes	Date	Examiner
EAST	07/26/2013	hn
EAST UPDATE SEARCH	12/14/2013	hn

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
US-PGPUB		12/14/2013	hn

	/HIEU NGUYEN/ Primary Examiner, Art Unit 2843
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<b>Issue Classification</b> 	<b>Application/Control No.</b> 13468749	<b>Applicant(s)/Patent Under Reexamination</b> LI ET AL.
	<b>Examiner</b> HIEU NGUYEN	<b>Art Unit</b> 2843

<input type="checkbox"/> <b>Claims renumbered in the same order as presented by applicant</b>																<input type="checkbox"/> <b>CPA</b>		<input type="checkbox"/> <b>T.D.</b>		<input type="checkbox"/> <b>R.1.47</b>	
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original						
1	1	16	17																		
2	2	17	18																		
3	3	18	19																		
12	4	19	20																		
13	5		21																		
4	6	20	22																		
6	7	21	23																		
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6	9	23	25																		
7	10		26																		
8	11	24	27																		
9	12	25	28																		
10	13																				
11	14																				
14	15																				
15	16																				

NONE		<b>Total Claims Allowed:</b>	
		25	
(Assistant Examiner)	(Date)	O.G. Print Claim(s)	O.G. Print Figure
/HIEU NGUYEN/ Primary Examiner. Art Unit 2843	12/14/2013	1	3B & 5
(Primary Examiner)	(Date)		



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BIB DATA SHEET

CONFIRMATION NO. 1497

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
13/468,749	05/10/2012	330	2843	SKYWRKS.280A		
<b>APPLICANTS</b> <b>INVENTORS</b> Ping Li, Dunstable, MA; Paul T. DiCarlo, Marlborough, MA; ** CONTINUING DATA ***** This appln claims benefit of 61/486,186 05/13/2011 ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 05/23/2012						
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Verified and Acknowledged <u>/HIEU P NGUYEN/</u> Examiner's Signature		<input type="checkbox"/> Met after Allowance Initials _____	<b>STATE OR COUNTRY</b> MA	<b>SHEETS DRAWINGS</b> 7	<b>TOTAL CLAIMS</b> 28	<b>INDEPENDENT CLAIMS</b> 3
<b>ADDRESS</b> KNOBBE MARTENS OLSON & BEAR LLP 2040 MAIN STREET FOURTEENTH FLOOR IRVINE, CA 92614 UNITED STATES						
<b>TITLE</b> APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS						
<b>FILING FEE RECEIVED</b> 3120	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit			



NOTICE OF ALLOWANCE AND FEE(S) DUE

20995 7590 12/24/2013
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

EXAMINER: NGUYEN, HIEU P
ART UNIT: 2843 PAPER NUMBER:
DATE MAILED: 12/24/2013

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/468,749 05/10/2012 Ping Li SKYWRS.280A 1497
TITLE OF INVENTION: APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS

Table with 7 columns: APPLN. TYPE, ENTITY STATUS, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE
nonprovisional UNDISCOUNTED \$1780 \$300 \$0 \$2080 03/24/2014

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

- I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.
If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.
If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".
For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

**PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 or Fax (571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

20995                      7590                      12/24/2013  
**KNOBBE MARTENS OLSON & BEAR LLP**  
 2040 MAIN STREET  
 FOURTEENTH FLOOR  
 IRVINE, CA 92614

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/468,749	05/10/2012	Ping Li	SKYWRKS.280A	1497

TITLE OF INVENTION: APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1780	\$300	\$0	\$2080	03/24/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, HIEU P	2843	330-285000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. <b>Use of a Customer Number is required.</b></p>	<p>2. For printing on the patent front page, list</p> <p>(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,</p> <p>(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.</p> <p>1 _____</p> <p>2 _____</p> <p>3 _____</p>
---	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE \_\_\_\_\_ (B) RESIDENCE: (CITY and STATE OR COUNTRY) \_\_\_\_\_

Please check the appropriate assignee category or categories (will not be printed on the patent) :  Individual  Corporation or other private group entity  Government

<p>4a. The following fee(s) are submitted:</p> <p><input type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (<b>Please first reapply any previously paid issue fee shown above</b>)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).</p>
---	--

5. **Change in Entity Status** (from status indicated above)

Applicant certifying micro entity status. See 37 CFR 1.29

Applicant asserting small entity status. See 37 CFR 1.27

Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

**NOTE:** This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____	Date _____
Typed or printed name _____	Registration No. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/468,749 05/10/2012 Ping Li SKYWRKS.280A 1497

20995 7590 12/24/2013
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

EXAMINER

NGUYEN, HIEU P

ART UNIT PAPER NUMBER

2843

DATE MAILED: 12/24/2013

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 23 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 23 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

### Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

**Notices of Allowance and Fee(s) Due mailed between October 1, 2013 and  
December 31, 2013**

(Addendum to PTOL-85)

If the "Notice of Allowance and Fee(s) Due" has a mailing date on or after October 1, 2013 and before January 1, 2014, the following information is applicable to this application.

If the issue fee is being timely paid on or after January 1, 2014, the amount due is the issue fee and publication fee in effect January 1, 2014. On January 1, 2014, the issue fees set forth in 37 CFR 1.18 decrease significantly and the publication fee set forth in 37 CFR 1.18(d)(1) decreases to \$0.

If an issue fee or publication fee has been previously paid in this application, applicant is not entitled to a refund of the difference between the amount paid and the amount in effect on January 1, 2014.

<b>Notice of Allowability</b>	<b>Application No.</b> 13/468,749	<b>Applicant(s)</b> LI ET AL.	
	<b>Examiner</b> HIEU NGUYEN	<b>Art Unit</b> 2843	<b>AIA (First Inventor to File) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to 10/31/2013.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
2.  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
3.  The allowed claim(s) is/are 1-7,9-20,22-25,27 and 28. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).
4.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some    \*c)  None of the:
1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- \* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5.  CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.  
 including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. <input type="checkbox"/> Notice of References Cited (PTO-892)</li> <li>2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br/>Paper No./Mail Date _____</li> <li>3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material</li> <li>4. <input type="checkbox"/> Interview Summary (PTO-413),<br/>Paper No./Mail Date _____</li> </ol> | <ol style="list-style-type: none"> <li>5. <input type="checkbox"/> Examiner's Amendment/Comment</li> <li>6. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance</li> <li>7. <input type="checkbox"/> Other _____</li> </ol> |
|---|---|

/HIEU NGUYEN/  
Primary Examiner, Art Unit 2843

The present application is being examined under the pre-AIA first to invent provisions.

## DETAILED ACTION

### *Allowable Subject Matter*

Claims 1-7, 9-20, 22-25 and 27-28 are allowed.

The following is an examiner's statement of reasons for allowance:

Claims 1-3, 6-7, 9-14 are allowed over the prior art of record. The prior art of record considered individually or in combination, fails to fairly teach or suggest the claimed circuit comprising, among other limitations and unobvious limitations of “...the current amplifier including a current mirror” structurally and functionally interconnected with other limitations in the manner as cited in the claim.

Claims 4-5 are allowed over the prior art of record. The prior art of record considered individually or in combination, fails to fairly teach or suggest the claimed circuit comprising, among other limitations and unobvious limitations of “the RC network further including a second resistor having a first end electrically connected to the input of the current mirror and a second end electrically connected to the input of the bias circuit configured to receive the enable signal” structurally and functionally interconnected with other limitations in the manner as cited in the claim.

Claims 15-17 are allowed over the prior art of record. The prior art of record considered individually or in combination, fails to fairly teach or suggest the claimed circuit comprising, among other limitations and unobvious limitations of “the primary bias circuit including a first

Art Unit: 2843

resistor, a second resistor, a first bipolar transistor, and a second bipolar transistor, the first resistor including a first end electrically connected to the emitter of the first bipolar transistor at a node configured to receive the correction current, and a second end electrically connected to a first end of the second resistor at a node of the bias circuit configured to receive the enable signal, the second resistor including a second end electrically connected to a collector of the first bipolar transistor, a base of the first bipolar transistor, and to a base of the second bipolar transistor” structurally and functionally interconnected with other limitations in the manner as cited in the claim.

Claims 18-20 and 22 are allowed over the prior art of record. The prior art of record considered individually or in combination, fails to fairly teach or suggest the claimed method comprising, among other limitations and unobvious limitations of “amplifying the control current using a current mirror of a current amplifier to generate a correction current” structurally and functionally interconnected with other limitations in the manner as cited in the claim.

Claims 23-25 are allowed over the prior art of record. The prior art of record considered individually or in combination, fails to fairly teach or suggest the claimed circuit comprising, among other limitations and unobvious limitations of “a current amplifier configured to amplify the control current to generate a correction current, the current amplifier including a current mirror” structurally and functionally interconnected with other limitations in the manner as cited in the claim.

Claim 27 is allowed over the prior art of record. The prior art of record considered individually or in combination, fails to fairly teach or suggest the claimed circuit comprising, among other limitations and unobvious limitations of “the primary bias block including includes-

Art Unit: 2843

a first resistor, a second resistor, a first bipolar transistor, and a second bipolar transistor, the first resistor including a first end electrically connected to the emitter of the first bipolar transistor at a node configured to receive the correction current, and a second end electrically connected to a first end of the second resistor at a node of the bias circuit configured to receive the enable signal, the second resistor including a second end electrically connected to a collector of the first bipolar transistor, a base of the first bipolar transistor, and to a base of the second bipolar transistor” structurally and functionally interconnected with other limitations in the manner as cited in the claim.

### *Conclusion*


Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hieu P. Nguyen whose telephone number is 571-272-8577. The examiner can normally be reached on M-F: 8 A.M - 5P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Robert Pascal can be reached on 571-272-1769. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Hieu Nguyen/  
Primary Examiner  
Group Art Unit: 2843

<b>Index of Claims</b>  	<b>Application/Control No.</b> 13468749	<b>Applicant(s)/Patent Under Reexamination</b> LI ET AL.
	<b>Examiner</b> HIEU NGUYEN	<b>Art Unit</b> 2817

✓	<b>Rejected</b>
=	<b>Allowed</b>

-	<b>Cancelled</b>
÷	<b>Restricted</b>

N	<b>Non-Elected</b>
I	<b>Interference</b>

A	<b>Appeal</b>
O	<b>Objected</b>

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

CLAIM		DATE							
Final	Original	07/26/2013	12/14/2013						
1	1	✓	=						
2	2	✓	=						
3	3	✓	=						
12	4	○	=						
13	5	○	=						
4	6	✓	=						
5	7	✓	=						
	8	○	-						
6	9	○	=						
7	10	○	=						
8	11	○	=						
9	12	✓	=						
10	13	✓	=						
11	14	✓	=						
14	15	○	=						
15	16	○	=						
16	17	○	=						
17	18	✓	=						
18	19	✓	=						
19	20	✓	=						
	21	○	-						
20	22	✓	=						
21	23	✓	=						
22	24	✓	=						
23	25	✓	=						
	26	○	-						
24	27	○	=						
25	28	○	=						

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	18551896
<b>Application Number:</b>	13468749
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	1497
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS
<b>First Named Inventor/Applicant Name:</b>	Ping Li
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Gustavo Lopez
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	SKYWRKS.280A
<b>Receipt Date:</b>	21-MAR-2014
<b>Filing Date:</b>	10-MAY-2012
<b>Time Stamp:</b>	18:01:24
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 960
RAM confirmation Number	4497
Deposit Account	111410
Authorized User	KNOBBE MARTENS OLSON AND BEAR

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

<b>File Listing:</b>					
<b>Document Number</b>	<b>Document Description</b>	<b>File Name</b>	<b>File Size(Bytes)/ Message Digest</b>	<b>Multi Part /.zip</b>	<b>Pages (if appl.)</b>
1	Issue Fee Payment (PTO-85B)	2014-03-21_Issue_Fee_SKYWR KS-280A.pdf	93270 868884bb2eb11600c7ccf62b5451711edf3 a5f8e	no	1
<b>Warnings:</b>					
<b>Information:</b>					
2	Miscellaneous Incoming Letter	2014-03-21_Comments_SKYW RKS-280A.pdf	54178 0a1dd98a0681395bb433e0cc270d5d6e31 119211	no	2
<b>Warnings:</b>					
<b>Information:</b>					
3		2014-03-21_373_Stment_SKY WRKS-280A.pdf	180124 7014b43e6bad801a3e1b41bf9a59b9b9fce2 d0f2b	yes	3
	<b>Multipart Description/PDF files in .zip description</b>				
	<b>Document Description</b>	<b>Start</b>	<b>End</b>		
	Assignee showing of ownership per 37 CFR 3.73.	1	2		
	Power of Attorney	3	3		
<b>Warnings:</b>					
<b>Information:</b>					
4	Fee Worksheet (SB06)	fee-info.pdf	30503 e7987df690e172e3a41d474eccc21be786b d1b94	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			358075		

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

Docket No.: SKYWRKS.000GEN

Customer No. 20,995

**REVOCATION & GENERAL POWER OF ATTORNEY  
and  
CHANGE IN CORRESPONDENCE ADDRESS**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

The undersigned is an empowered representative of the Assignee and hereby appoints the registrants of Knobbe, Martens, Olson & Bear, LLP, Customer No. 20,995, as attorneys and agents to represent the Assignee before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned to the Assignee according to the USPTO assignment records or assignment documents supplied with an accompanying Statement Under 37 CFR § 3.73(b). This appointment is to be to the exclusion of the inventor(s) and his attorney(s) in accordance with the provisions of 37 CFR § 3.71.

Submission of this paper in connection with any matter of the below named assignee, together with a statement under 37 CFR 3.73(b), shall serve to revoke any previous powers of attorney in that matter.

Attached is a Statement Under 37 CFR § 3.73(b), signed by a registrant of Knobbe, Martens, Olson & Bear, LLP, setting forth a full chain of title for the subject application owned by the Assignee named below.

Please recognize or change the correspondence address for the application identified in the attached Statement to Customer No. 20,995.

By:  Date: July 14, 2010

Name: Donald Bollella Title: Chief IP Counsel

Assignee: Skyworks Solutions, Inc.

Address: 5221 California Ave., Irvine, CA 92617

GENFOA  
9334585

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13468749
<b>Filing Date:</b>	10-May-2012
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS
<b>First Named Inventor/Applicant Name:</b>	Ping Li
<b>Filer:</b>	David R. Trossen/Tyler Chin
<b>Attorney Docket Number:</b>	SKYWRKS.280A

Filed as Large Entity

### Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
Utility Appl Issue Fee	1501	1	960	960

**Extension-of-Time:**

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>960</b>

**PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 or Fax (571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

20995 7590 12/24/2013  
**KNOBBE MARTENS OLSON & BEAR LLP**  
 2040 MAIN STREET  
 FOURTEENTH FLOOR  
 IRVINE, CA 92614

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

	(Depositor's name)
	(Signature)
	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/468,749	05/10/2012	Ping Li	SKYWRS.280A	1497

TITLE OF INVENTION: APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	<del>\$1700</del> \$960	<del>\$300</del> \$0	\$0	<del>\$2000</del> \$960	03/24/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, HIEU P	2843	330-285000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. <b>Use of a Customer Number is required.</b></p>	<p>2. For printing on the patent front page, list</p> <p>(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,</p> <p>(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.</p>
	<p>1. <u>Knobbe, Martens,</u></p> <p>2. <u>Olson &amp; Bear, LLP</u></p> <p>3. _____</p>

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

**Skyworks Solutions, Inc.** **Woburn, MA**

Please check the appropriate assignee category or categories (will not be printed on the patent) :  Individual  Corporation or other private group entity  Government

<p>4a. The following fee(s) are submitted:</p> <p><input checked="" type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input checked="" type="checkbox"/> The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number <u>11-1410</u> (enclose an extra copy of this form).</p>
--	---

5. Change in Entity Status (from status indicated above)

Applicant certifying micro entity status. See 37 CFR 1.29

Applicant asserting small entity status. See 37 CFR 1.27


Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

**NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.**

Authorized Signature  Date March 21, 2014

Typed or printed name David Trossen Registration No. 59,406

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor	: Ping Li, et al.
App. No	: 13/468,749
Filed	: May 10, 2012
For	: APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS
Examiner	: Nguyen, Hieu P.
Art Unit	: 2843
Conf. No.	: 1497

**COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE**

**Mail Stop Issue Fee**  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

Applicant appreciates the finding of the pending claims to be allowable. In the Notice of Allowance dated December 24, 2013, the Examiner indicates on pages 2-4 various features of the claims that are not disclosed by the art of record.


Applicants assume that, pursuant to M.P.E.P. § 1302.14, the Examiner has stated some, but not all of the reasons for allowance of the claims. As a result, the statements noted above do not necessarily relate to or completely set out all the reasons for allowance of each and every claim. Furthermore, the patentability of the dependent claims does not solely depend upon the patentability of their respective base claims. Rather, each dependent claim recites further distinguishing features of particular utility.

To the extent that the Reasons for Allowance omit claim elements and explicitly discuss other elements or the Examiner's paraphrasing of the subject matter of the claims deviates from the actual language of the claims, Applicant respectfully notes that patentability of each claim is derived from the claim as a whole and the reasons for allowance are not limited to the features explicitly discussed by the Examiner.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: March 21, 2014

By:   
David R. Trossen  
Registration No. 59,406  
Attorney of Record  
Customer No. 20,995  
(415) 954-4114

17552528  
032114

**STATEMENT UNDER 37 CFR 3.73(b)**Applicant/Patent Owner: SKYWORKS SOLUTIONS, INC.Application No./Patent No.: 13/468,749Filed/Issue Date: May 10, 2012

Titled:

APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERSSKYWORKS SOLUTIONS, INC., a corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1.  the assignee of the entire right, title, and interest in;
2.  an assignee of less than the entire right, title, and interest in  
(The extent (by percentage) of its ownership interest is \_\_\_\_\_ %); or
3.  the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

- A.  An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 028855, Frame 0124, or for which a copy therefore is attached.

OR

- B.  A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at

Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

2. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at

Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

3. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at

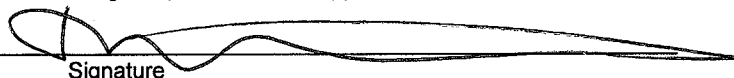
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

- Additional documents in the chain of title are listed on a supplemental sheet(s).

- As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.



Signature

March 21, 2014

Date

DAVID TROSSEN

Printed or Typed Name

ATTORNEY

Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/468,749	05/10/2012	Ping Li	SKYWRKS.000GEN

**CONFIRMATION NO. 1497**

**POA ACCEPTANCE LETTER**



20995  
KNOBBE MARTENS OLSON & BEAR LLP  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614

Date Mailed: 03/31/2014

**NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 03/21/2014.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/sleutchit/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/468,749	05/06/2014	8717101	SKYWWRKS.000GEN	1497

20995 7590 04/16/2014  
KNOBBE MARTENS OLSON & BEAR LLP  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614

### ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

#### Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 23 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Ping Li, Dunstable, MA;  
Paul T. DiCarlo, Marlborough, MA;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit [SelectUSA.gov](http://SelectUSA.gov).

Please Direct All Correspondence to Customer Number 20995

---

**REQUEST FOR CERTIFICATE OF CORRECTION**

Inventor	:	Ping Li, et al.
App. No.	:	13/468,749
Filed	:	May 10, 2012
Patent No.	:	8,717,101
Issue Date	:	May 6, 2014
Title	:	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS
Conf No.	:	1497

---

Commissioner for Patents  
Office of Data Management Attention: Certificates of Correction Branch  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

Enclosed for filing is a Certificate of Correction in connection with the above-identified patent.

Errors cited in the Certificate of Correction appear to have been incurred through the fault of the PTO (see 35 USC § 254, 37 CFR § 1.322, and MPEP § 1480). No fee is believed to be required. Charge to our Deposit Account No. 11-1410 is authorized for any additional or remaining fees.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: August 25, 2014\_\_\_\_\_

By: /David Trossen/\_\_\_\_\_

David Trossen  
Registration No. 59,406  
Attorney of Record  
Customer No. 20995  
(415) 954-4114

18657104  
081314

**UNITED STATES PATENT AND TRADEMARK OFFICE  
CERTIFICATE OF CORRECTION**

**PATENT NO.** : 8,717,101  
**APPLICATION NO.** : 13/468,749  
**ISSUE DATE** : May 6, 2014  
**INVENTORS** : Li, et al.

Page 1 of 1

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In column 17 at line 29, In Claim 13, change "10  $\Omega$ " to --10 k $\Omega$ --.

18657116  
081314

**MAILING ADDRESS OF SENDER:**

David Trossen  
KNOBBE, MARTENS, OLSON & BEAR, LLP  
2040 Main Street, 14<sup>th</sup> Floor  
Irvine, California 92614

DOCKET NO. SKYWRKS.280A

PTO/SB/44 Equivalent

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	19966434
<b>Application Number:</b>	13468749
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	1497
<b>Title of Invention:</b>	APPARATUS AND METHODS FOR BIASING POWER AMPLIFIERS
<b>First Named Inventor/Applicant Name:</b>	Ping Li
<b>Customer Number:</b>	20995
<b>Filer:</b>	David R. Trossen/Christina Graul
<b>Filer Authorized By:</b>	David R. Trossen
<b>Attorney Docket Number:</b>	SKYWRKS.000GEN
<b>Receipt Date:</b>	26-AUG-2014
<b>Filing Date:</b>	10-MAY-2012
<b>Time Stamp:</b>	14:10:53
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
------------------------	----

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Certificate of Correction	2014-08-26_Request_for_Certificate_of_Correction_SKYWRKS-280A.pdf	44965 <small>db7f9aacd88828f00ccd9229841c883ab098f013</small>	no	2

### Warnings:

### Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE  
**CERTIFICATE OF CORRECTION**

PATENT NO. : 8,717,101 B2  
APPLICATION NO. : 13/468749  
DATED : May 6, 2014  
INVENTOR(S) : Li et al.

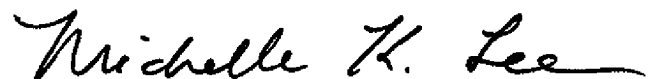
Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims

In column 17 at line 29, In Claim 13, change "10  $\Omega$ " to --10 k $\Omega$ --.

Signed and Sealed this  
Twenty-first Day of October, 2014



Michelle K. Lee  
*Deputy Director of the United States Patent and Trademark Office*