RF3300-3

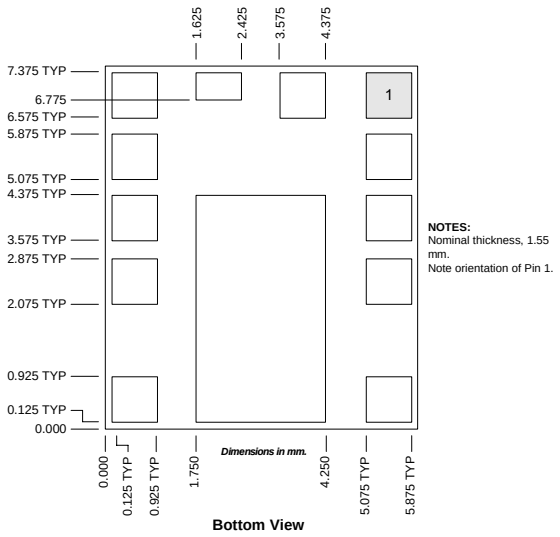
3V 1900MHz LINEAR AMPLIFIER MODULE

Typical Applications

- 3V CDMA US-PCS Handsets
- 3V CDMA2000/1X PCS Handsets
- Spread-Spectrum Systems
- Designed for Compatibility with Qualcomm Chipsets

Product Description

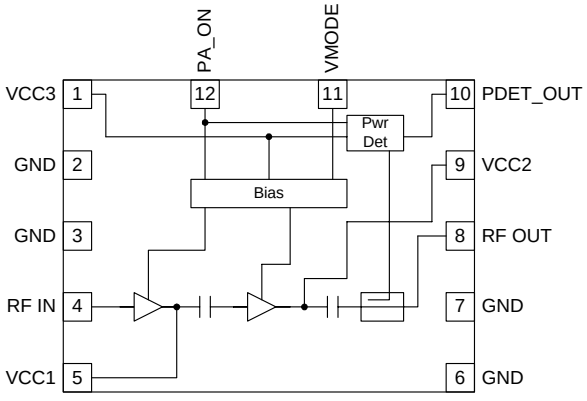
The RF3300-3 is a high-power, high-efficiency linear amplifier IC targeting 3V handheld systems. The device is manufactured on an advanced Gallium Arsenide Heterojunction Bipolar Transistor (HBT) process, and has been designed for use as the final RF amplifier in dual-mode 3V CDMA handheld digital cellular equipment, spread-spectrum systems, and other applications in the 1850MHz to 1910MHz band. The RF3300-3 has a digital control line for low power application to reduce the current drain. The device is self-contained with 50Ω input and output that is matched to obtain optimum power, efficiency, and linearity characteristics. This amplifier contains a temperature compensating bias circuit for improved performance over temperature.



Package Style: Module (6mmx7.5mm)

Optimum Technology Matching® Applied

- ☐ Si BJT
- ☑ GaAs HBT
- ☐ GaAs MESFET
- ☐ Si Bi-CMOS
- ☐ SiGe HBT
- ☐ Si CMOS
- ☐ InGaP/HBT
- ☐ GaN HEMT
- ☑ SiGe Bi-CMOS



Functional Block Diagram

Features

- Single 3V Supply with Internal V_{REF}
- Integrated Power Detector
- 25dB Linear Gain
- 40mA Idle Current (Low Power Mode)
- Temperature Compensating Bias Circuit
- Integrated PA Enable Switch

Ordering Information

RF3300-3	3V 1900MHz Linear Amplifier Module
RF3300-3 PCBA	Fully Assembled Evaluation Board

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Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage (RF off)	+8.0	V_{DC}
Supply Voltage ($P_{OUT} \leq 28$dBm)	+5.2	V_{DC}
Control Voltage (PA_ON)	+3.6	V_{DC}
Mode Voltage (V_{MODE})	+3.6	V_{DC}
Input RF Power	+10	dBm
Operating Case Temperature	-30 to +100	℃
Storage Temperature	-30 to +150	℃

Caution! ESD sensitive device.

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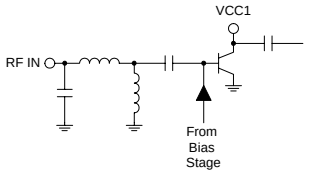
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
High Power State (V_{MODE} Low)					Typical Performance at V_{CC}=3.2V, PA_ON=High, T_{AMB}=25°C, Frequency=1850MHz to 1910MHz (unless otherwise specified)
Frequency Range	1850		1910	MHz	
Linear Gain	24	25		dB	
Second Harmonic		-45		dBc	
Third Harmonic		-45		dBc	
Maximum Linear Output Power (CDMA Modulation)	28			dBm	
Total Linear Efficiency		35		%	P_{OUT}=28dBm
Adjacent Channel Power Rejection		-47	-46	dBc	ACPR@1.25MHz, P_{OUT}=28dBm
		-61	-58	dBc	ACPR@2.25MHz, P_{OUT}=28dBm
Input VSWR		1.5:1			
Output VSWR			10:1		No damage.
			6:1		No oscillations. >-70dBc
Noise Power		-141		dBm/Hz	At 80MHz offset.
Low Power State (V_{MODE} High)					Typical Performance at V_{CC}=3.2V, PA_ON=High, T_{AMB}=25°C, Frequency=1850MHz to 1910MHz (unless otherwise specified)
Frequency Range	1850		1910	MHz	
Linear Gain	17	20		dB	
Second Harmonic		-45		dBc	
Third Harmonic		-45		dBc	
Maximum Linear Output Power (CDMA Modulation)	16			dBm	
Adjacent Channel Power Rejection		-49	-47	dBc	ACPR@1.25MHz, P_{OUT}=16dBm
		-64	-59	dBc	ACPR@2.25MHz, P_{OUT}=16dBm
Input VSWR		2:1			
Output VSWR			10:1		No damage.
			6:1		No oscillations. >-70dBc

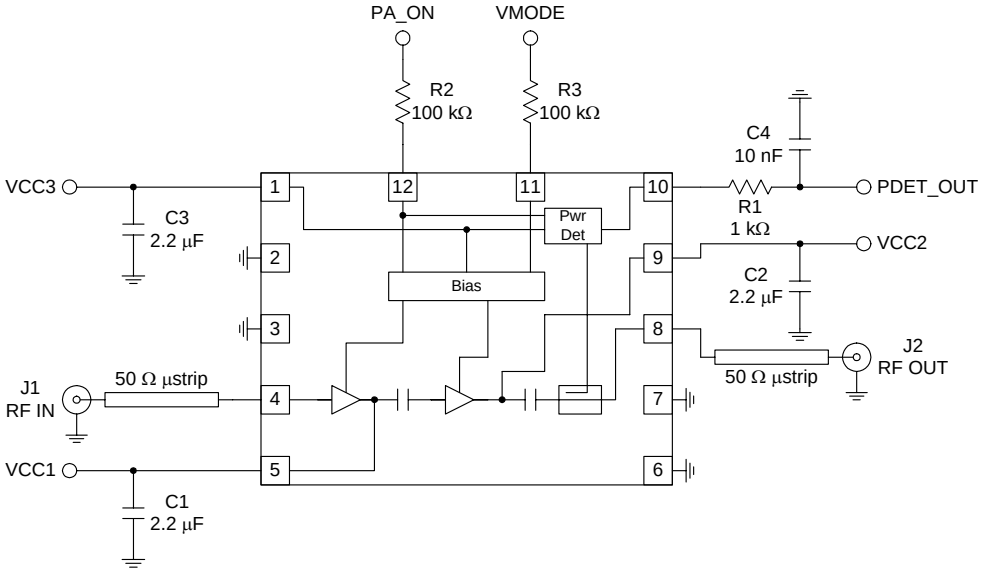
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
DC Supply					T_{AMB}=25°C
Supply Voltage	3.2	3.7	4.2	V	
Quiescent Current		150	180	mA	V_{MODE}=Low
		40	55	mA	V_{MODE}=High
PA_ON Current		0.1		µA	
V_{MODE} Current		0.1		µA	
Turn On/Off Time			<40	µs	PA_ON switched from low to high, I_{CC} to within 90% of the final value, P_{OUT} within 1dB of the final value.
Total Current (Power Down)		5		µA	PA_ON=Low
PA_ON "Low" Voltage Range	0		0.5	V	
PA_ON "High" Voltage Range	1.7	2.7	3.6	V	Must not exceed V_{CC}.
V_{MODE} "Low" Voltage Range	0		0.5	V	
V_{MODE} "High" Voltage Range	1.7	2.7	3.6	V	Must not exceed V_{CC}.
Gain Settling Time			6	µs	PA_ON switched from low to high, P_{OUT} within 1dB of the final value.
			6	µs	PA_ON switched from high to low, P_{OUT} within 1dB of the final value.
Internal Power Detector					
PDET Output Voltage		1.35		V	P_{OUT}=28dBm, V_{MODE}=Low
		0.6		V	P_{OUT}=16dBm, V_{MODE}=High

Pin	Function	Description	Interface Schematic
1	VCC3	Bias circuit and HDET power supply. A low frequency decoupling capacitor (2.2μF) is required. Type: P	
2	GND	Ground connection. Connect to the GND_SLUG pin. For best performance, keep traces physically short and connect immediately to ground plane. Type: P	
3	GND	Ground connection. Connect to the GND_SLUG pin. For best performance, keep traces physically short and connect immediately to ground plane. Type: P	
4	RF IN	RF input internally matched to 50Ω. This input is internally AC-coupled at the IC; however a shunt inductor used in the input matching network will provide a DC path to ground for components connected to the RF IN pin. A DC blocking capacitor may be required at this pin. Type: A, I	
5	VCC1	First stage power supply. A low frequency decoupling capacitor (2.2μF) is required. Type: P	
6	GND	Ground connection. Connect to the GND_SLUG pin. For best performance, keep traces physically short and connect immediately to ground plane. Type: P	
7	GND	Ground connection. Connect to the GND_SLUG pin. For best performance, keep traces physically short and connect immediately to ground plane. Type: P	
8	RF OUT	RF output internally matched to 50Ω. This input is internally AC-coupled. Type: A, O	
9	VCC2	Output stage power supply. A low frequency decoupling capacitor (2.2μF) is required. Type: P	
10	PDET_OUT	Power detector output. Type: A, O	
11	VMODE	Gain step control. When this pin is High, the module is in low power mode, and the amplifier's current is reduced. When this pin is Low, the module is in high power mode. Voltage should not be applied to this pin before VCC3 is applied. Type: D, I	
12	PA_ON	Device enable control. When this pin is High, the device is on. When this pin is Low, the device is off. Voltage should not be applied to this pin before VCC3 is applied. Type: D, I	
13	GND_SLUG	Ground connection. The backside of the package should be soldered to a top side ground pad which is connected to the ground plane with multiple vias. The pad should have a short thermal path to the ground plane. Type: P	

Note: Where Type code is: I=Input; O=Output; A=Analog; D=Digital; P=Power

Evaluation Board Schematic

(Download Bill of Materials from www.rfmd.com.)



NOTE:
Resistors R2 and R3 are provided on the evaluation board to protect against power sequencing issues. (Refer to pin descriptions 11 and 12.) These resistors are not needed when the VCC3 is connected to the handset battery.