



Package Style: QFN, 16-pin, 3.0mmx3.0mmx0.5mm

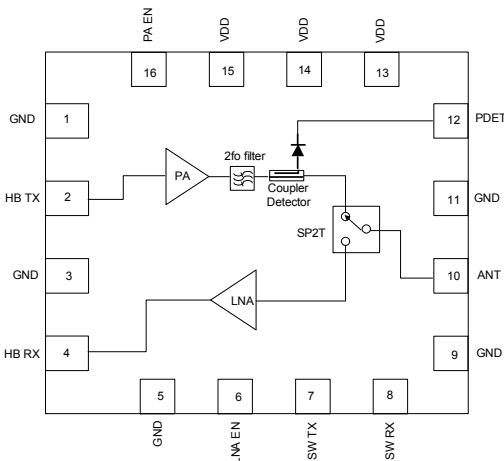


Features

- Single Supply Voltage 3.0V to 4.8V
- Integrated 5GHz Amplifier, LNA, and SPT2T TX/RX Switch
- $P_{OUT} = 15.5\text{ dBm}$, 11a, OFDM at 2.5% EVM
- Low Height Package, Suited for SiP and CoB Designs

Applications

- Cellular handsets
- Mobile devices
- Tablets
- Consumer electronics
- Gaming
- Netbooks/Notebooks
- TV/monitors/video



Functional Block Diagram

Product Description

The RF5506 provides a complete integrated solution in a single Front-End Module (FEM) for WiFi 802.11a systems. The ultra small form factor and integrated matching minimizes the layout in the customer's application and greatly reduces the number of external components to only one bypass capacitor for supply decoupling. This simplifies the total Front End solution by reducing the bill of materials, system footprint, and manufacturability cost. The RF5506 integrates Power Amplifier (PA), Low Noise Amplifier (LNA), and a power detector coupler for improved accuracy. The device is provided in a 3mmx3mmx0.5mm, 16-pin package. This module meets or exceeds the RF Front End needs of IEEE 802.11a WiFi RF systems.

Ordering Information

RF5506SB	Standard 5 Piece Bag
RF5506	Standard 25 Piece Bag
RF5506SR	Standard 100 Piece Bag
RF5506TR7	Standard 2500 Piece Reel
RF5506PCK-410	Fully Assembled Evaluation Board and 5 Loose Sample Pieces

Optimum Technology Matching® Applied

☐ GaAs HBT	☐ SiGe BiCMOS	☒ GaAs pHEMT	☐ GaN HEMT
☐ GaAs MESFET	☐ Si BiCMOS	☐ Si CMOS	
☐ InGaP HBT	☐ SiGe HBT	☐ Si BJT	

Absolute Maximum Ratings

Parameter	Rating	Unit
DC Supply Voltage	5.5	V _{DC}
Maximum TX and RX Input Power (No Damage)	5	dBm
Operating Temperature	-10 to +70	°C
Extreme Operating Temperature	-30 to +85	°C
Storage Temperature	-40 to 150	°C
Moisture Sensitivity	MSL2	

**Caution!** ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RoHS status based on EUDirective2002/95/EC (at time of this document revision).

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Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Transmit Parameters					Nominal conditions: T=25 °C; V _{DD} =3.3V; PA_EN=3.0V; Freq=5.5GHz; 802.11a 54Mbps; pulsed at 1 to 99% duty cycle unless otherwise noted.
Compliance					IEEE802.11a/n; FCC CFR 15.45, .205, .209
Nominal Operating Frequency Range	5.15		5.85	GHz	
DC Supply Voltage	3.0	3.3	4.8	V	Nominal operating range 3.3V to 4.2V
PA Enable Voltage	2.80	3.0	3.6	V	max sink current 3.5mA
Output Power	14.5	15.5		dBm	Nominal conditions (Temp=25°C; V _{DD} =3.3V; PA_EN=3.0V; Freq=5.5GHz)
	13	14		dBm	Over all conditions (Temp=-10°C to +70°C; V _{DD} =3.3V to 4.2V; PA_EN=2.8V to 3.6V; Freq=5.15GHz to 5.85GHz)
Operating Current		175	225	mA	P _{OUT} =15.5dBm 802.11a 54Mbps
Supply Leakage Current		10	50	μA	V _{DD} =3.6V; Control voltage LOW; PA_EN LOW
Error Vector Magnitude at Rated Power		2.5	3	%	At rated power; 802.11a 54Mbps
Thermal Resistance		33			V _{CC} =6, I _{CC} =140mA, T _{REF} =85 °C
Harmonics					
2fo		-45	-42	dBm	P _{OUT} =15.5dBm with 11a 6Mbps signal.
3fo		-45	-42	dBm	P _{OUT} =15.5dBm with 11a 6Mbps signal.
Gain	28	32	34	dB	Temp=25°C; V _{DD} =3.3V; PA_EN=3.0V
	26	32	35.5	dB	Over all conditions (Temp=-10°C to +70°C; V _{DD} =3.3V to 4.2V; PA_EN=2.8V to 3.6V; Freq=5.15GHz to 5.85GHz)
Gain Variation	-2		2	dB	Over frequency per 100MHz band
Ripple across band	-1		1	dB	Over frequency per 20MHz band
Power Detector Voltage	0.2		1.3	V	P _{OUT} =0 to 18dBm; 64 QAM 54Mbps

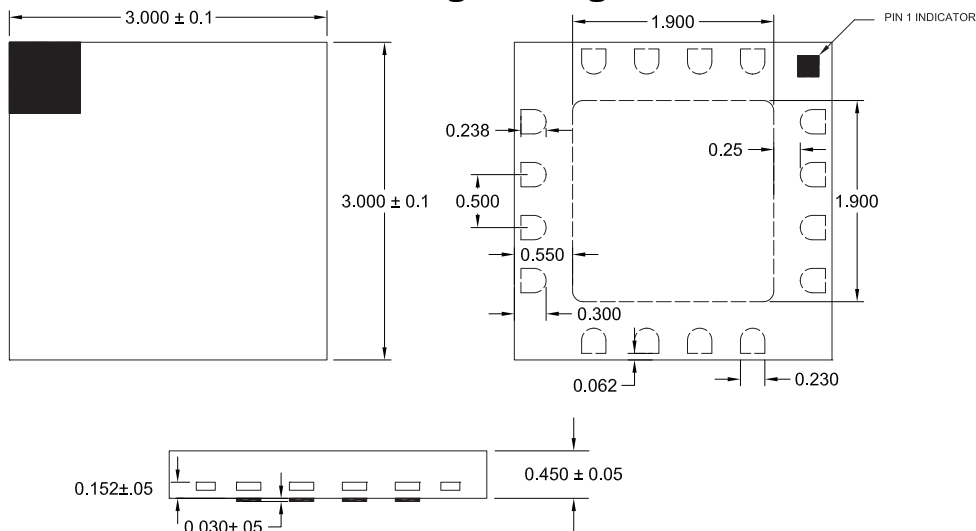
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Receive Parameters					Nominal operating conditions: T=25 °C, V _{DD} =3.3V, PAEN=0V, SWTX=0V, LNA_EN=3.0V, and SWRX=3.0V unless otherwise noted.
Compliance					IEEE802.11a/n; FCC CFR 15.45, .205, .209
Nominal Frequency	5.15		5.85	GHz	
LNA Voltage Supply (V _{DD})	3.0		4.8	V	
Gain	8.5	11	14	dB	Over all nominal operating conditions
Noise Figure		2.8	3.7	dB	Over all nominal operating conditions
Input IP3	+3	+5		dBm	Over all nominal operating conditions
Input 1dB Compression	-5	-2.5		dBm	
Return Loss					
Input	3	5		dB	Freq = 5.15GHz to 5.85GHz; over temp and supply voltage
Output	8	10		dB	Freq = 5.15GHz to 5.85GHz; over temp and supply voltage
Passband Ripple	-0.5		+0.5	dB	Over 20MHz band
LNA Current	4.5	10	15	mA	Over all nominal operating conditions
RX to TX Isolation	20			dB	
Control Parameters					
Switch Control Logic HIGH	2.8		4.2	V	SWTX, SWRX
Switch Control Logic LOW			0.2	V	
I _{CTRL-H}			30	μA	
I _{CTRL-L}			30	μA	
PA _{EN-H}	2.8	3.0	3.6	V	
PA _{EN-L}			0.2	V	
I _{PAEN}		2	3.5	mA	
LNA Enable Voltage (LNA_EN)	2.8	3.0	3.6	V	LNA enabled
		0	0.2	V	LNA disabled
Switch Speed			500	ns	
ESD					
Human Body Model	400			V	Pin - ground
Charge Device Model	300			V	JESD22-C101

Logic Control Table

MODE	SWTX	SWRX	PA_EN	LNA_EN
TRANSMIT	HIGH	LOW	HIGH	LOW
RECEIVE	LOW	HIGH	LOW	HIGH

Pin	Function	Description
1	GND	Ground connection.
2	HBTX	Transmit RF input. This port is DC blocked internally and matched to 50Ω.
3	GND	Ground connection.
4	HBRX	Receiver output. This port is DC blocked internally and matched to 50Ω.
5	GND	Ground connection.
6	LNA EN	Bias voltage for the LNA. See logic control table for proper settings.
7	SWTX	Control switch for the transmit mode. See logic control table for proper settings.
8	SWRX	Control switch for the receive mode. See logic control table for proper settings.
9	GND	Ground connection.
10	ANT	Antenna port. Internally DC blocked and matched to 50Ω.
11	GND	Ground connection.
12	PDETECT	Power detector for the transmit path.
13	VDD	Supply voltage for the PA.
14	VDD	Same as pin 13.
15	VDD	Supply voltage for the LNA.
16	PA EN	Bias voltage for the PA. See logic table for proper settings.
Pkg Base	GND	The center metal base of the QFN package provides DC and RF ground as well as heat sink for the front-end module.

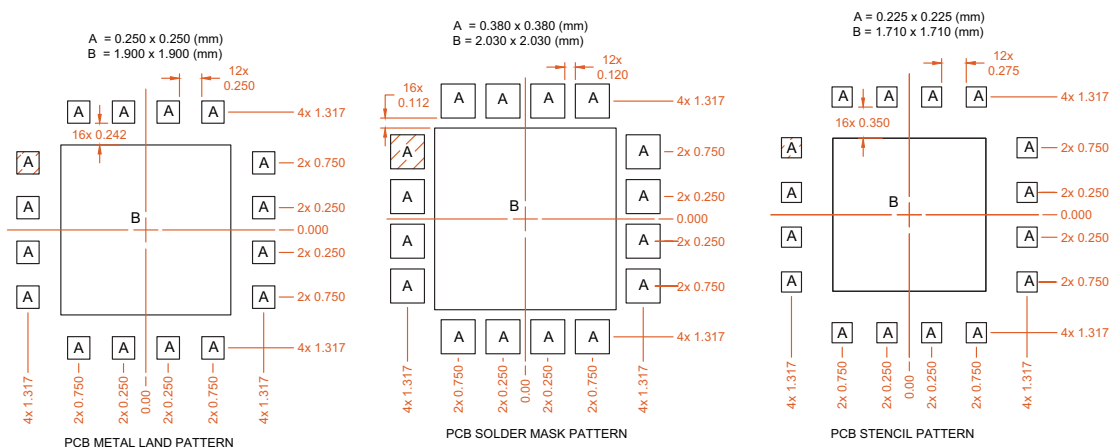
Package Drawing



NOTES:

- 1 Shaded Area is Pin 1 Indicator

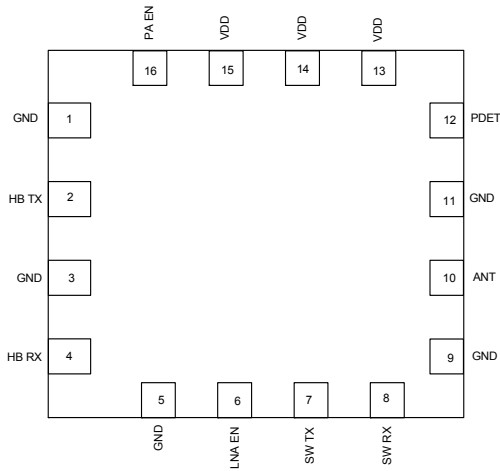
PCB Pattern



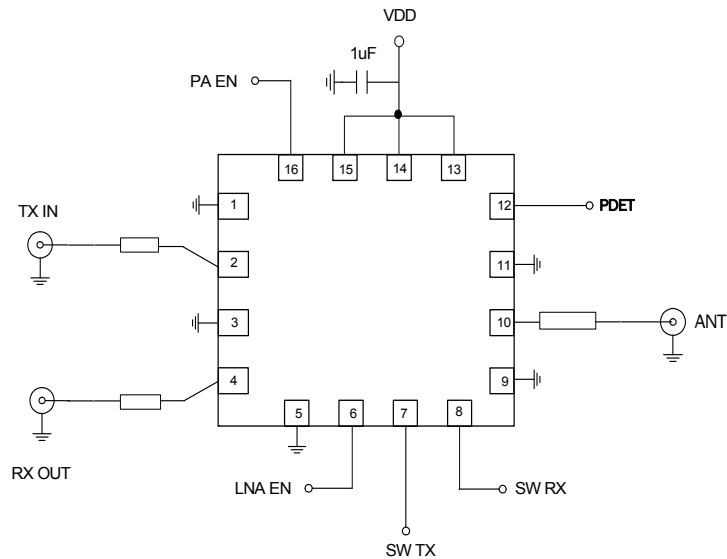
Thermal vias for center slug "B" should be incorporated into the PCB design. The number and size of thermal vias will depend on the application, the power dissipation, and the electrical requirements. Example of the number and size of vias can be found on the RFMD evaluation board layout.

Shaded area represents Pin 1 location.

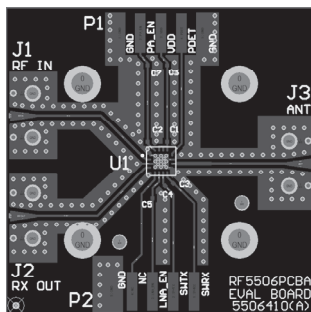
Pin Out



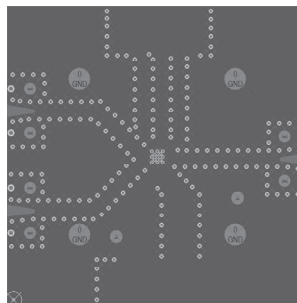
Application Schematic



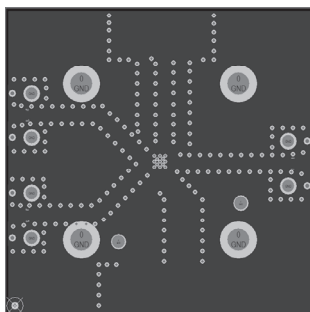
Evaluation Board Layout
Board Size 1.5" x 1.5"
Board Thickness 0.044", Board Material FR-4



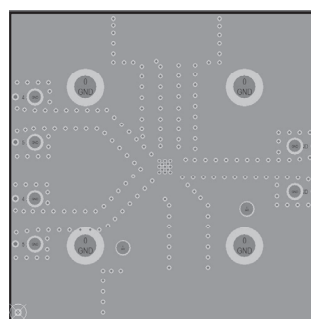
TOP



MID-1

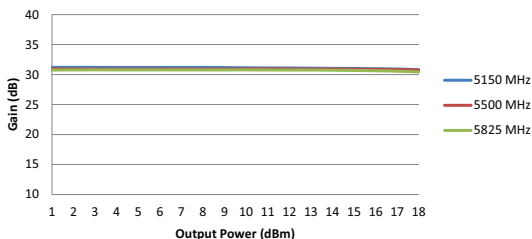


MID-2

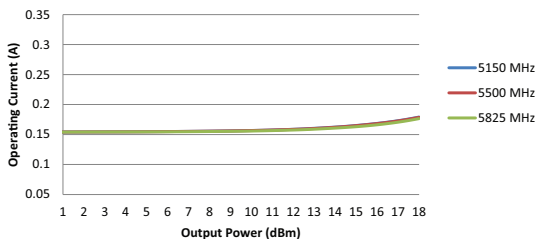


BOTTOM

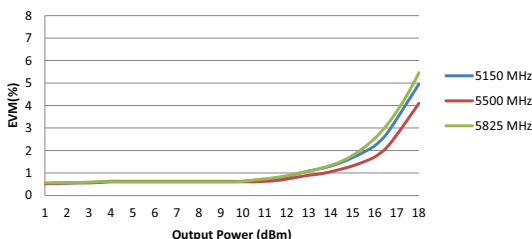
Gain versus Output Power
VDD = 3.3V PA_EN = 3.0V
Temperature = 25C



Operating Current versus Output Power
VDD = 3.3V PA_EN = 3.0V
Temperature = 25C



EVM versus Output Power
VDD = 3.3V PA_EN = 3.0V
Temperature = 25C



Power Detector versus Output Power
VDD = 3.3V PA_EN = 3.0V
Temperature = 25C

