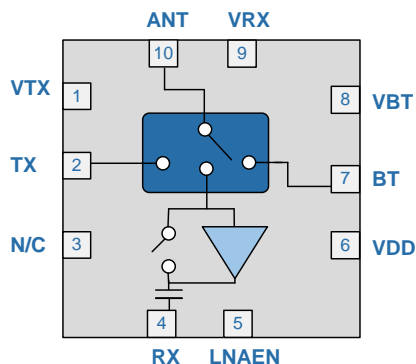


# RFFM8250

2.4GHz to 2.5GHz 802.11b/g/n/ac WiFi  
Switch + LNA Module

The RFFM8250 provides a complete integrated Switch + LNA solution in a single Front End Module (FEM) for WiFi 802.11b/g/n/ac and Bluetooth® systems. The ultra-small form factor and integrated matching greatly reduces the number of external components and layout area in the customer applications. This simplifies the total front end solution by reducing the bill of materials, system footprint, and manufacturing cost. The RFFM8250 integrates a Single Pole Three Throw (SP3T) Transmit/Receive (T/R) Switch and a 2.5GHz Low Noise Amplifier (LNA) with bypass mode. The device is provided in a 1.75mm x 1.75mm x 0.33mm 10-pin QFN package.



Functional Block Diagram



Package: QFN, 10-pin,  
1.75mm x 1.75mm x 0.33mm

## Features

- SP3T T/R Switch with Bluetooth Support
- LNA with Bypass Mode
- Input and Output Matched to 50Ω
- Wide Voltage Supply Range
- Supports WiFi chipsets with Integrated Power Amplifier (iPA)
- Low Profile Package for Module Designs

## Applications

- Cellular Handsets
- Mobile Devices
- Tablets
- Consumer Electronics
- Gaming
- Netbooks/Notebooks
- TV/Monitors/Video

## Ordering Information

RFFM8250SB	Standard 5-piece sample bag
RFFM8250SQ	Standard 25-piece sample bag
RFFM8250SR	Standard 100-piece reel
RFFM8250TR7	Standard 2500-piece reel
RFFM8250PCK-410	Fully assembled evaluation board w/ 5-piece bag

## Absolute Maximum Ratings

Parameter	Rating	Unit
DC Supply Voltage (No RF Applied)	-0.5 to 6	V
DC Supply Current	100	mA
Operating Case Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C
Maximum TX Input Power into 50Ω Load for 11b/g/n/ac (No Damage)	+30	dBm
Maximum RX Input Power (No Damage)	+10	dBm
Bypass Mode Maximum RX input power (No damage)	+23	dBm
Moisture Sensitivity	MSL2	



**Caution!** ESD sensitive device.



RFMD Green: RoHS status based on EU Directive 2011/65/EU (at time of this document revision), halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

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.

## Nominal Operating Parameters

Parameter	Specification			Unit	Condition
	Min	Typ	Max		
<b>Compliance</b>					<b>802.11b, 802.11g, 802.11n, 802.11ac</b>
Operating Frequency	2.412		2.484	GHz	
Operating Temperature	-40	25	85	°C	
Power Supply $V_{DD}$	3.0	3.6	5.0	V	
Control Voltage-High	2.8	3.1	$V_{DD}$	V	VTX, VRX, LNAEN, and VBT Should not exceed $V_{CC}$ voltage
Control Voltage-Low		0	0.2	V	
<b>Transmit (TX-ANT)</b>					<b><math>V_{DD} = 3.6V</math> over frequency, unless otherwise noted</b>
Insertion Loss		0.6	1.2	dB	$T = 25^{\circ}C$ , $V_{DD} = 3.6V$
TX Port Return Loss	12	20		dB	
ANT Port Return Loss	12	20		dB	
Input P1dB	27	30		dBm	$T = 25^{\circ}C$ , $V_{DD} = 3.6V$
ANT-Rx Isolation	28	35		dB	TX is enables and at Max power
<b>Receive (ANT-RX)-LNA On</b>					<b><math>V_{DD} = 3.6V</math>, over frequency, unless otherwise noted</b>
Gain (S21)	11	13	16	dB	$T = 25^{\circ}C$ , $V_{DD} = 3.6V$
	10	13	17	dB	$T = -40$ to $+85^{\circ}C$ , $V_{DD} = 3.0V$ to $5V$
Gain Flatness over any 20MHz BW	-0.25		+0.25	dB	
Gain Flatness across band	-0.5		+0.5	dB	
Noise Figure		2.3	2.7	dB	$T = 25^{\circ}C$ , $V_{DD} = 3.6V$
RX Port Return Loss		15	10	dB	
ANT Port Return Loss		5	3	dB	$T = 25^{\circ}C$ , $V_{DD} = 3.6V$
Input P1dB	-7	-5		dBm	
Current Consumption	6	9	13	mA	
LNA_EN Control Current		250	500	$\mu A$	
LNA Turn On Time		200	500	nS	

Parameter	Specification			Unit	Condition
	Min	Typ	Max		
<b>Receive (ANT-RX)-Bypass Mode</b>					<b>V<sub>DD</sub> = 3.6V, unless otherwise noted</b>
Insertion Loss	5	7	10	dB	T = 25°C, V <sub>DD</sub> = 3.6V
RX Port Return Loss		10	8	dB	
ANT Port Return Loss		10	8	dB	
Input P1dB	17	+21		dBm	
<b>Bluetooth TX/RX</b>					<b>V<sub>DD</sub> = 3.6, unless otherwise noted</b>
Input P1dB	25	+27		dBm	T = 25°C, V <sub>DD</sub> = 3.6V
Insertion Loss		0.6	1.3	dB	
BT Port Return Loss	12	20		dB	
ANT Port Return Loss	12	20		dB	
<b>General Specifications</b>					
Control Line Impedance - VTX		40		MΩ	
Control Line Impedance – LNAEN		65		KΩ	
Control Line Impedance - VRX		40		MΩ	
Control Line Impedance - VBT		40		MΩ	
V <sub>DD</sub> Leakage Current		1	10	μA	
Switch Control Current-High-Each Line		1	10	μA	
Switch Control Current-Low-Each Line		0.1	1	μA	
Switching Speed		100	500	ns	
ESD-Human Body Model		1000		V	
ESD-Charge Device Model		1000		V	

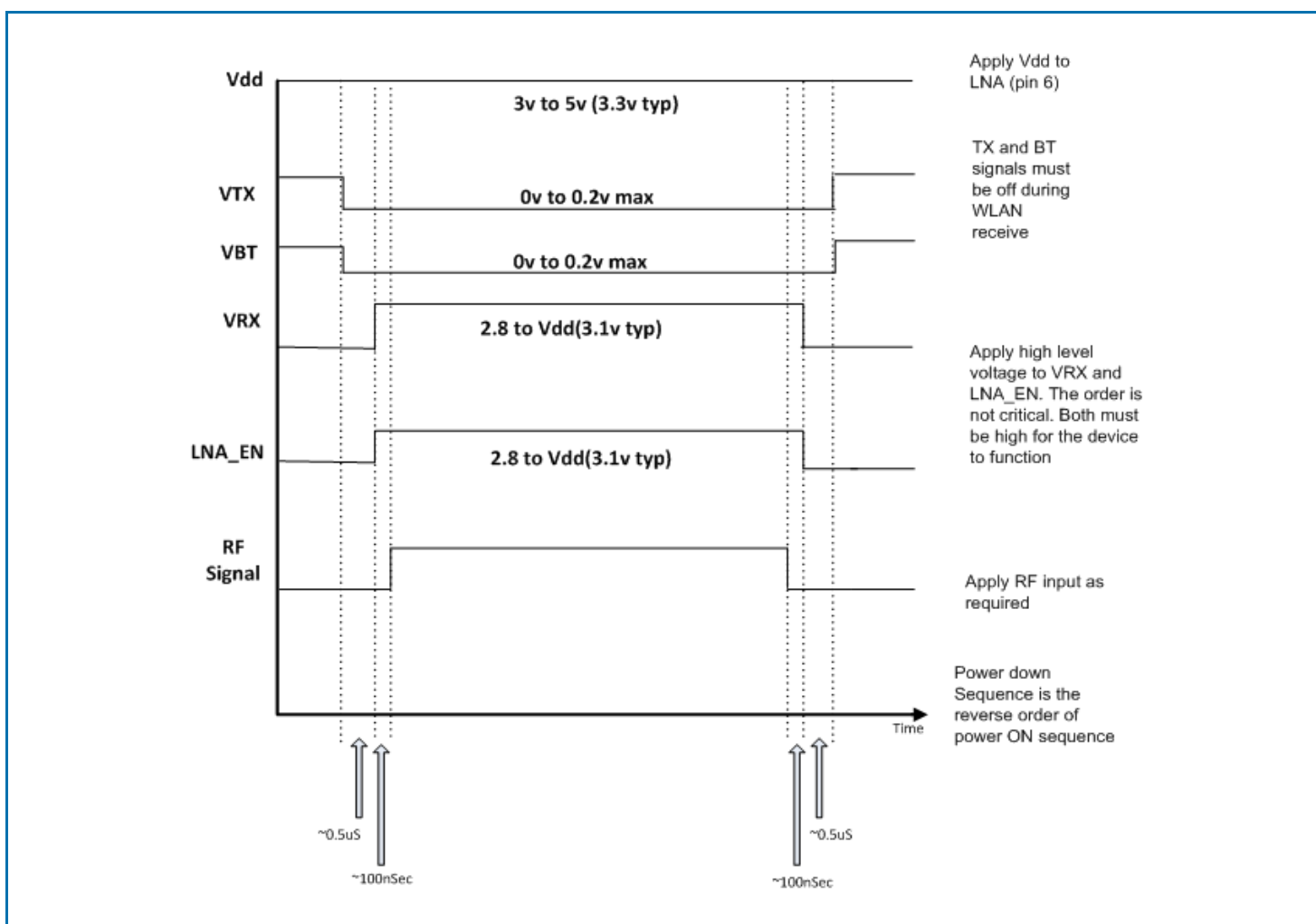
## Switch Control Logic Truth Table

Operating Mode	VTX	LNAEN	VRX	VBT
Standby	Low	Low	Low	Low
802.11b/g/n/ac TX Mode	High	Low	Low	Low
802.11b/g/n/ac RX Gain	Low	High	High	Low
802.11b/g/n/ac RX Bypass	Low	Low	High	Low
BT RX/TX	Low	Low	Low	High

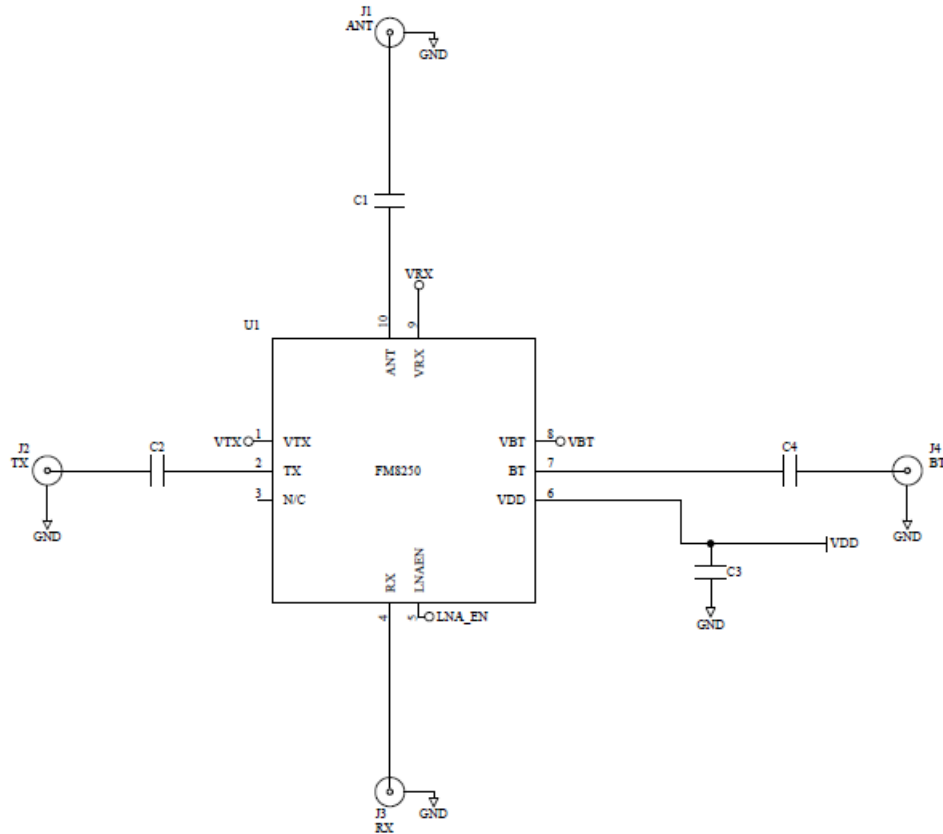
Notes:

- High = 2.8 to  $V_{CC}$ . Low = 0V to 0.2V.

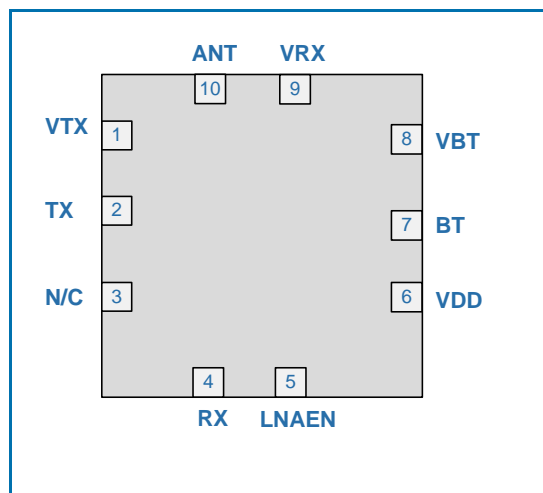
## Timing Diagram



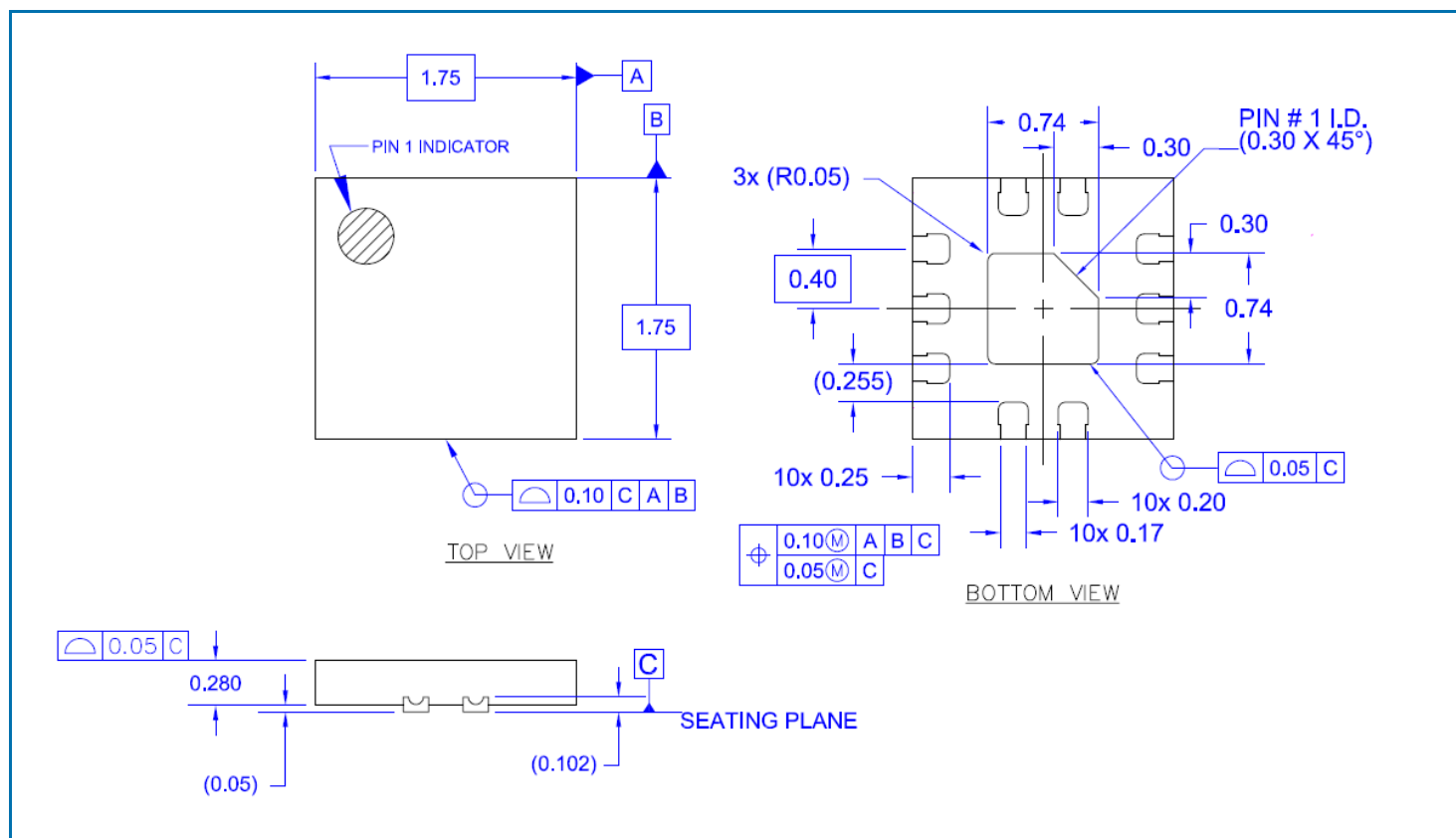
## Applications Schematic



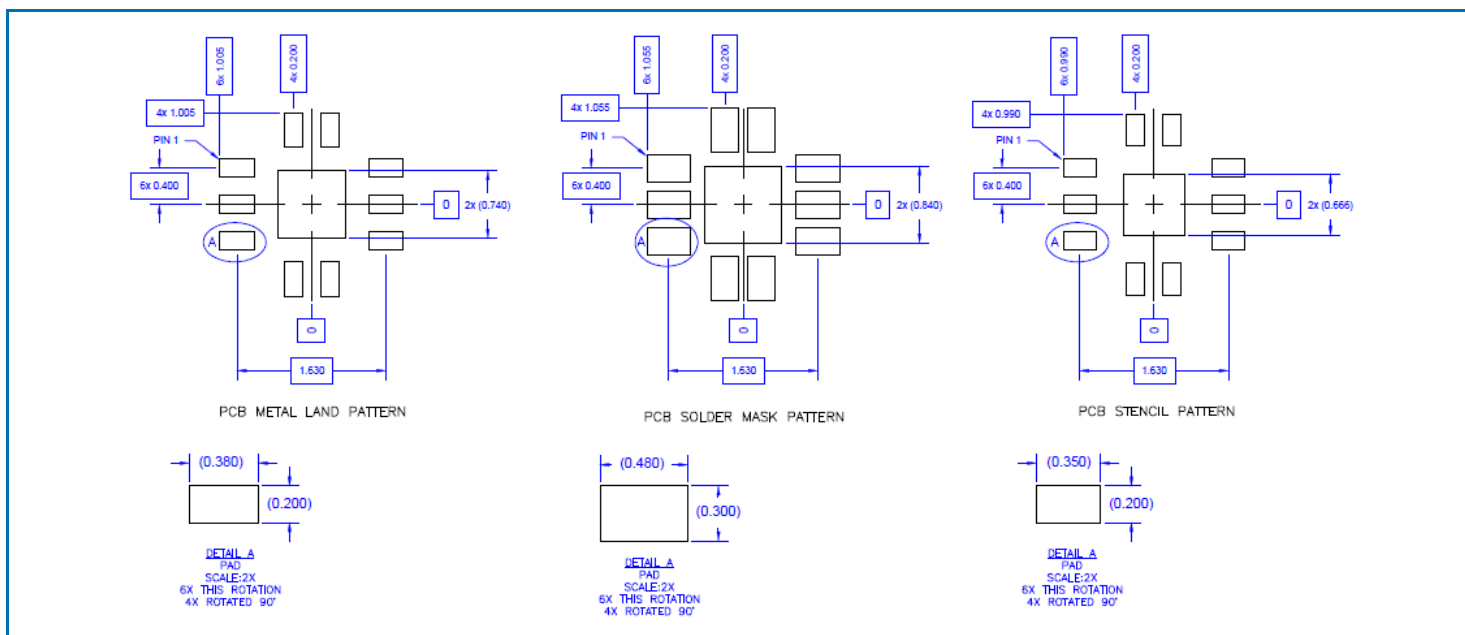
## Pin Out



## Package Drawing



## PCB Patterns



### Note:

Thermal vias for center slug "C" should be incorporated into the PCB design. The number and size of thermal vias will depend on the application, power, dissipation and electrical requirements. Example of the number and size of vias can be found on the RFMD evaluation board layout (gerber files are available upon request)

## Pin Names and Descriptions

Pin	Name	Description
1	VTX	Transmit switch control pin. See switch truth table for proper level.
2	TX	RF input port for the 802.11b/g/n PA. Input is matched to 50Ω. An external DC block is required.
3	N/C	No connect. This pin is not connected internally and can be left floating or connected to ground.
4	RX	RF output port for the 802.11b/g/n LNA. Port is matched to 50Ω. This pin is DC blocked internally.
5	LNAEN	Control voltage for the LNA. When this pin is set to a LOW logic state, the bypass mode is enabled.
6	VDD	Supply voltage for the LNA. See applications schematic for biasing and bypassing components.
7	BT	RF bidirectional port for Bluetooth®. Input is matched to 50Ω. An external DC block is required.
8	VBT	Bluetooth® switch control pin. See truth table for proper level.
9	VRX	Receive switch control pin. See switch truth table for proper level.
10	ANT	RF bidirectional antenna port matched to 50Ω. An external DC block is required.
Pkg Base	GND	Ground connection. The backside of the package should be connected to the ground plane through a short path, i.e., PCB vias under the device are recommended.