Data Sheet

RTC7667

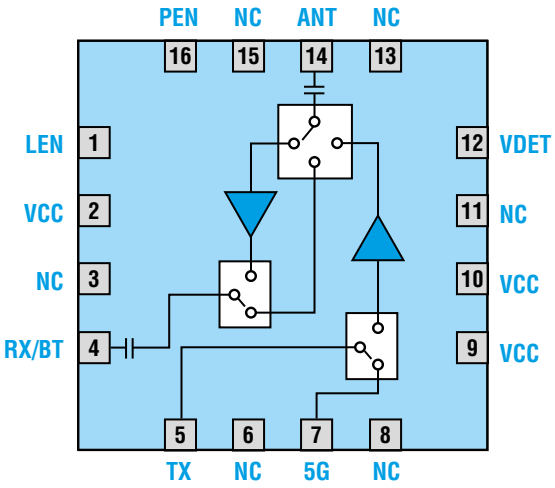
2.4 GHz Front End Module for 802.11b/g/n

JUN 2017 - Ver. 0.1

Description

The RTC7667 is a RF front End module (FEM) with transmit/receive chain for 802.11b/g/n WLAN applications. The device consists of a power amplifier (PA) with power detector, a low-pass filter (LPF) for harmonic rejection, RX/BT low-noise amplifier (LNA) with bypass mode, a single pole triple throw switch (SP3T), and single pole double throw (SPDT) switches. The RTC7667 is packaged in 16-lead surface mount package QFN 2.3mm x 2.3mm x 0.4mm (max) with lead-free RoHS compliant.

Functional Block Diagram



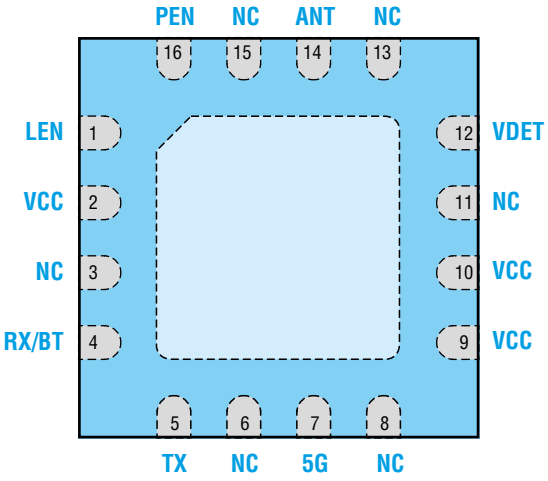
Features

- Frequency Range: 2.4 – 2.5 GHz
- Integrated 2.4GHz PA, LNA with bypass function, a SP3T switch, and SPDT switches, and integrated power detector
- Output Power +19.5 dBm @ 3.0% DEVM, 802.11n, HT20/40, MCS7, 64QAM
- 12 dB gain and 2 dB noise figure for RX path
- Package in 16L QFN 2.3mm x 2.3mm x 0.4mm (max)
- RoHS Compliant, Pb-free, Halogen Free
- Moisture Sensitivity Level : MSL 3

Applications

- IEEE 802.11b/g/n Wi-Fi Applications
- 2.4GHz to 2.5GHz ISM Band Solutions
- Portable Battery-Powered Equipment
- Wi-Fi Access Points, Gateways, and Set Top Boxes

Pin Assignments



Top View Through Package

Pin No.	Pin Name	Description
1	LEN	Control voltage for LNA
2	VCC	Supply Voltage for LNA
4	RX/BT	RF output port for LNA
5	TX	RF input port for PA
7	5G	5 GHz TX pass through output
9	VCC	PA Supply voltage
10	VCC	PA Supply voltage
12	VDET	PA detector output
14	ANT	Antenna output
16	PEN	Control voltage for PA and TX switch
3, 6, 8, 11, 13, 15	NC	Not connected inside the package For the best performance please connect these pins to ground on PCB
Exposed Paddle		It must be connected to a ground through PCB via for best performance

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Supply voltage	VCC	6	V
PA Enable Voltage	PEN	3.6	V
LNA Enable Voltage	LEN	3.6	V
TX Input Power (50Ω load)	P_{IN}	+10	dBm
Operating Temperature	T_A	-40 to +85	°C
Storage Temperature	T_{STG}	-40 to +150	°C

NOTE: Stresses above those conditions listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only. Functional operation of the device above those conditions indicated in the Absolute Maximum Ratings is not implied. The functional operation of the device at the conditions in between Recommended Operating Ranges and Absolute Maximum Ratings for extended periods may affect device reliability.

Recommended Operating Ranges

Parameter	Symbol	Min	Typ	Max	Unit
Operating Frequency	f	2.4		2.5	GHz
Supply voltage	VCC	3.5	3.7	5	V
PA Enable Voltage (High)	PEN(H)	2.8	2.9	3.3	V
PA Enable Voltage (Low)	PEN(L)	-0.3	0	0.2	V
LNA Enable Voltage (High)	LEN(H)	2	2.9	3.0	V
LNA Enable Voltage (Low)	LEN(L)	-0.3	0	0.2	V

NOTE: Recommended Operating Ranges indicate conditions for which the device is intended to be functional, but does not guarantee specific performance limits.

Truth Table

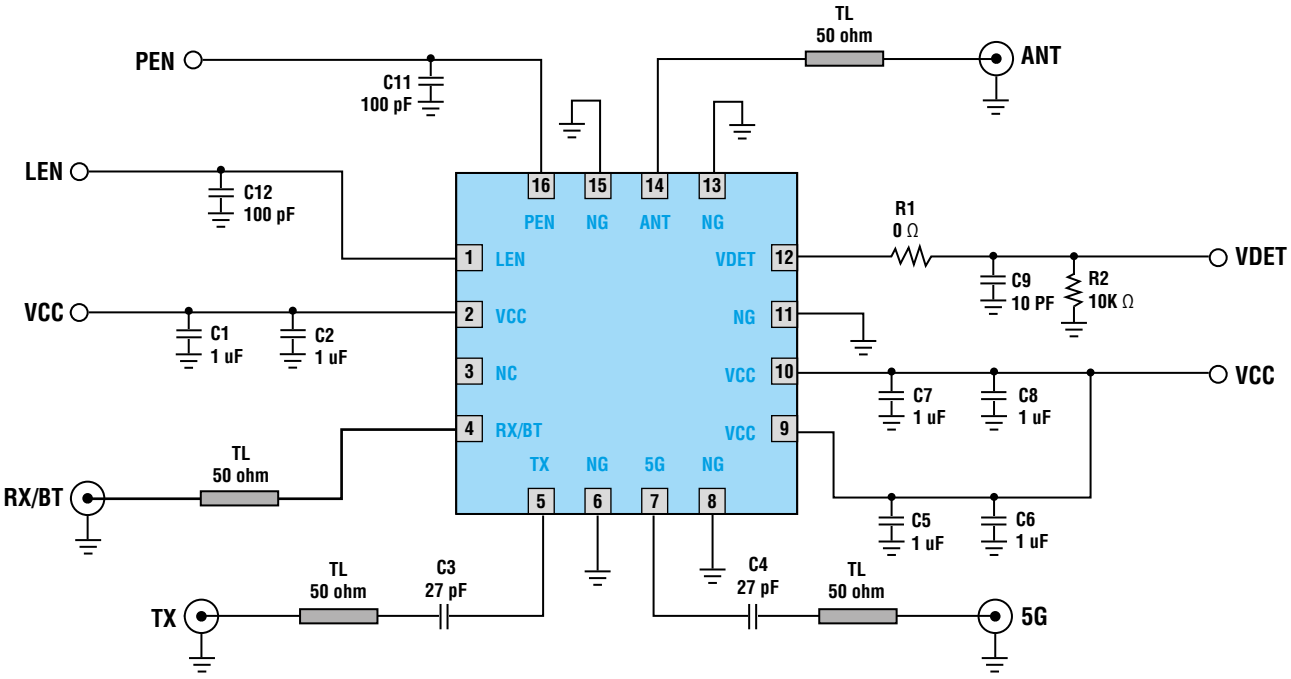
PEN	LEN	Mode
High	Low	TX
Low	High	RX High Gain
Low	Low	RX Bypass/BT
Low	Low	5G pass through
High	High	Not supported

Electrical Specifications

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Transmit Mode (TX – ANT) T_A = +25 °C, VCC = 3.7 V, PEN = 2.9 V, LEN = Low. All unused RF ports are terminated in a 50 Ω load, unless otherwise noted						
Operating Frequency	f		2.4		2.5	GHz
		802.11n, MCS7, HT20/40 DEVM = 3%		+19.5		dBm
		802.11n, 20MHz, MCS0 Spectral Mask		+23		dBm
		802.11g mask compliant power, OFDM 6 Mbps		+22.5		dBm
		802.11b mask compliant power, CCK 1 Mbps		+23		dBm
Small Signal Gain	G	Pin = -30 dBm		26.5		dB
Gain Flatness	ΔG	Gain variation over the full band			0.5	dB
1 dB Output Compression Point	P1dB	1 dB gain compression		+28		dBm
Return Loss	RL	at TX port		14		dB
Power Detector Output	Vpd	Pout = 10 dBm		0.25		V
		Pout = 20 dBm		0.75		V
PA Enable Current	Ien	Quiescent (no RF)		2		mA
Supply Current, Transmit Mode	Icq	Quiescent (no RF)		200		mA
	Icc	Pout = 22 dBm, 802.11n, HT20, 100% duty cycle		270		mA
Receive High Gain Mode (RX – ANT) T_A = +25 °C, VCC = 3.7 V, PEN = 0 V, LEN = 2.9 V. All unused RF ports are terminated in a 50 Ω load, unless otherwise noted						
Operating Frequency	f		2.4		2.5	GHz
RX Gain	G	High Gain Mode		12		dB
Return Loss	RL	at RX port		7		dB
Noise Figure	NF	High Gain Mode		2		dB
Isolation	ISO	ANT – TX		27		dB
Input P1dB	IP1dB	1dB Gain Compression		-6		dBm
Supply Current	I_{DD}	RX ON		13		mA

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Receive Bypass Mode T_A = +25 °C, VCC = 3.7 V, PEN = 0 V, LEN = Low. All unused RF ports are terminated in a 50 Ω load, unless otherwise noted						
Operating Frequency	f		2.4		2.5	GHz
RX Gain	G	Bypass Mode		-1.4		dB
1 dB Input Compression Point	IP1dB	1dB Gain Compression		23		dBm
Isolation	ISO	ANT - TX		28		dB
Input Return Loss	RL			12		dB
5G Pass Through Mode (TX – 5G) T_A = +25 °C, VCC = 3.7 V, PEN = 0 V, LEN = Low. All unused RF ports are terminated in a 50 Ω load, unless otherwise noted						
Operating Frequency	f		2.4		2.5	GHz
Insertion Loss	IL			0.8		dB
Input Return Loss	RL			20		dB
Input P1dB	IP1dB	1dB Gain Compression		22		dBm

Application Circuits

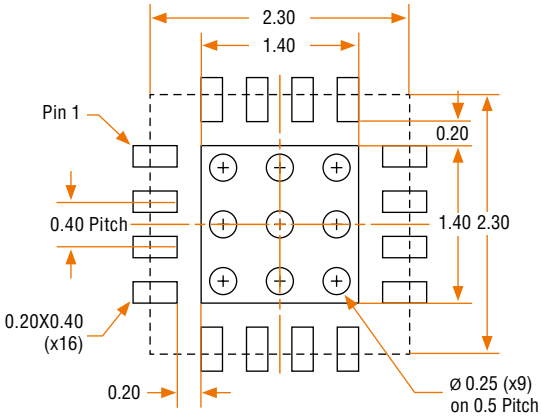


NOTE : Information in the above application is for reference only, and does not guarantee the mass production design of the device.

Evaluation Board Bill of Material

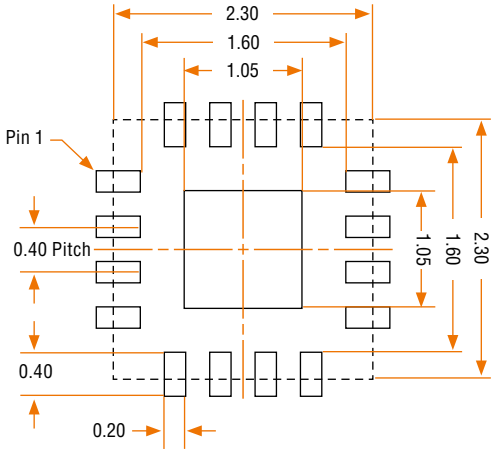
Component	Value	Description	Supplier	Part Number
IC		RTC7667	RichWave	
C1, C2, C5, C6, C7, C8	1 uF	De-coupling capacitor	Walsin	0402X105K6R3CT
C3, C4	27 pF	DC blocking capacitor	Walsin	0402N270J500LT
C9	10 pF	De-coupling capacitor	Walsin	0402N100J500LT
C11, C12	100 pF	De-coupling capacitor	Walsin	0402N101J500LT
R1	0 Ω		Walsin	WR04X00R0PTL
R2	10K Ω		Walsin	WR04X1002FTL

Recommended Footprint Patterns



PCB Board Metal & Via Pattern

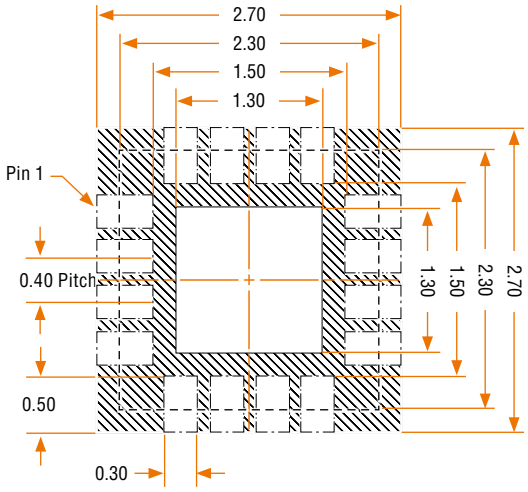
Top View



PCB Stencil Pattern

Top View

56% Solder Coverage on Pad



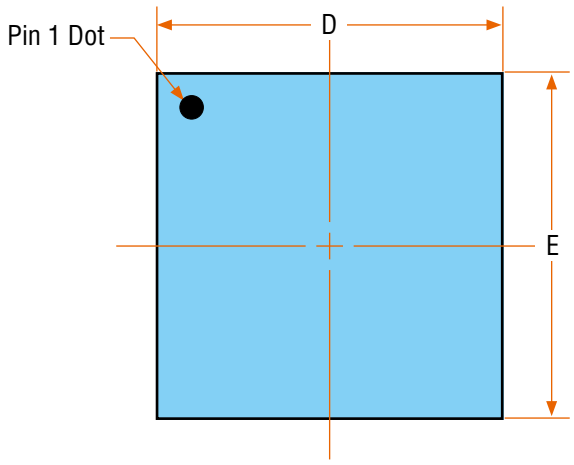
PCB Solder Mask Pattern

Top View

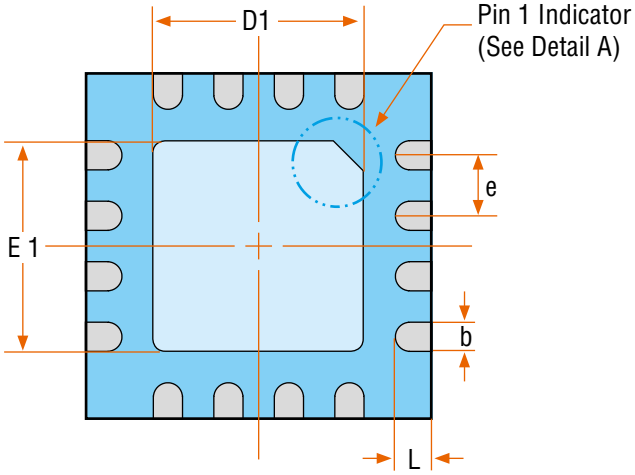
NOTE :

1. All dimensions are measured in millimeters.
2. Drawing is not to scale.

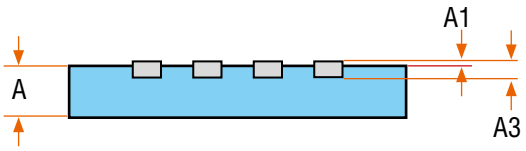
Package Dimensions



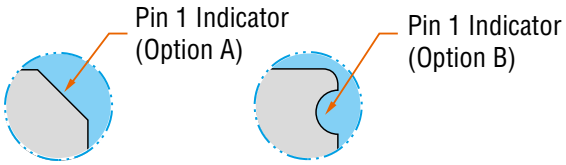
Top View



Bottom View



Side View



Detail A

16L QFN 2.3 X 2.3 X 0.4 - A		
SYMBOL	**MIN**	**MAX**
A	0.320	0.400
A1	0.000	0.050
A3	0.110	0.125
b	0.150	0.250
D	2.200	2.400
D1	1.300	1.500
e	0.400 BSC	
E	2.200	2.400
E1	1.300	1.500
L	0.150	0.250

NOTE :

1. All dimensions are measured in millimeters.
2. Drawing is not to scale.
3. The shape of the Pin 1 Indicator can be either Option A or Option B, but it must be located within the zone indicated.

Customer Service

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