Data Sheet

RTC7626HE

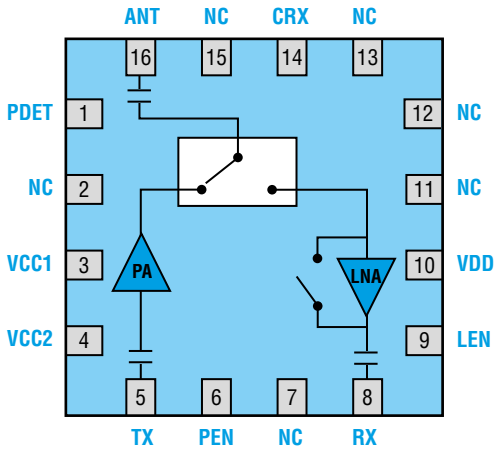
2.4 – 2.5 GHz Front End Module for 802.11b/g/n/ac

APR 2019 - Ver. 0.5

Description

The RTC7626HE is a complete 802.11 b/g/n/ac WLAN RF front-end module. The module provides all the functionality of the power amplifier, power detector, filter, switch, and low noise amplifier. With all the critical matching, and a 50 Ω interface to the antenna, the module is easy to be used in WLAN applications. The device is packaged in a thin 16L QFN 2.5mm x 2.5mm x 0.8mm (max).

Functional Block Diagram



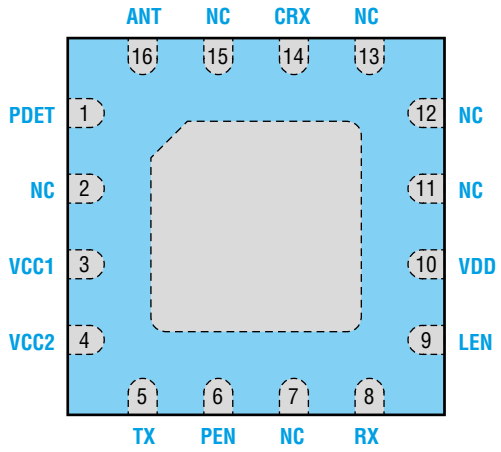
Features

- Frequency range: 2.4 – 2.5 GHz
- 3.3 V or 5 V single supply voltage
- Output power: +21.5 dBm @ –35 dB DEVM, VHT40, MCS9, 5 V
- Output power: +23 dBm @ –30 dB DEVM, HT20, MCS7, 5 V
- Transmit gain: 25 dB @ 5 V
- Receive gain: 13 dB @ 5 V
- Noise Figure : 2 dB @ 5V
- Integrated high performance PA, LNA with bypass function, and SP3T switch
- Small 16L QFN 2.5mm x 2.5mm x 0.8 mm (max) package
- RoHS Compliant, Pb-Free, Halogen Free
- Moisture Sensitivity Level : MSL 3

Applications

- IEEE 802.11b/g/n/ac Wi-Fi Applications
- 2.4 GHz to 2.5 GHz 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	PDET	PA detector output
2	NC	Not connected inside the package
3	VCC1	PA supply voltage
4	VCC2	PA supply voltage
5	TX	RF input port for PA
6	PEN	Control voltage for PA and TX switch
7	NC	Not connected inside the package
8	RX	RF output port for LNA
9	LEN	Control voltage for LNA
10	VDD	LNA supply voltage
11	NC	Not connected inside the package
12	NC	Not connected inside the package
13	NC	Not connected inside the package
14	CRX	Control voltage for RX switch
15	NC	Not connected inside the package
16	ANT	Antenna output
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, VDD	6	V
Switch Control Voltage	PEN, LEN, CRX	4	V
TX Input Power with 50Ω load(*)	P_{IN}	+15	dBm
RX Input Power with 50Ω load(*)	P_{IN}	+15	dBm
Operating Temperature	T_A	-40 to +85	°C
Storage Temperature	T_{ST}	-40 to +150	°C

(*) Measurement is made with continuous wave (CW) and 802.11b CCK, 1Mbps signals

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
Supply Voltage	VCC, VDD	3	3.3 or 5	5.5	V
PA Control Voltage (High)	PEN(H)	2.7	2.9	3.3	V
PA Control Voltage (Low)	PEN(L)	-0.2	0	0.2	V
LNA Control Voltage (High)	LEN(H)	1.8	2.9	3.3	V
LNA Control Voltage (Low)	LEN(L)	-0.2	0	0.2	V
Switch Control Voltage (High)	CRX(H)	1.8	2.9	3.3	V
Switch Control Voltage (Low)	CRX(L)	-0.2	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

Mode	PEN	LEN	CRX
Standby	0	0	0
Transmit	1	0	0
Receive Gain	0	1	1
Receive Bypass	0	0	1

NOTE: 1 = High, 0 = Low

5 V Electrical Specifications

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Transmit Mode (TX – ANT) T_A = +25 °C, VCC = VDD = 5 V, PEN = 2.9 V, LEN = CRX = 0 V. All unused RF ports are terminated in a 50 Ω load, unless otherwise noted						
Operating Frequency	f		2.4		2.5	GHz
Output Power, High Linearity Mode	Pout	MCS9, VHT40, DEVM = -35 dB		21.5		dBm
		MCS7, HT20, DEVM = -30 dB		23		dBm
		802.11n, MCS0, mask compliant power		25		dBm
		802.11b, 1 Mbps, mask compliant power		26.5		dBm
Small Signal Gain	G			25		dB
Gain Flatness	ΔG	Gain variation over the full band		0.5		dB
1dB Output Compression Point	P1dB	1dB gain compression		29		dBm
Input Return Loss	|S11|			14		dB
Output Return Loss	|S22|			11		dB
Isolation	ISO	ANT – RX		55		dB
Power Detector Output	Vpd	Pout = 0 dBm		0.15		V
		Pout = 5 dBm		0.20		V
		Pout = 25 dBm		1.35		V
2nd/3rd Harmonics	2fo	802.11b, 1 Mbps Pout = +25 dBm (no external harmonic filter)		-14		dBm/ MHz
	3fo			-30		dBm/ MHz
PA Control Current	Ien	No RF		2		mA
Operating Current	Icc	Quiescent (no RF)		220		mA
		Pout = 21 dBm		285		mA
		Pout = 22 dBm		295		mA
		Pout = 25 dBm		330		mA

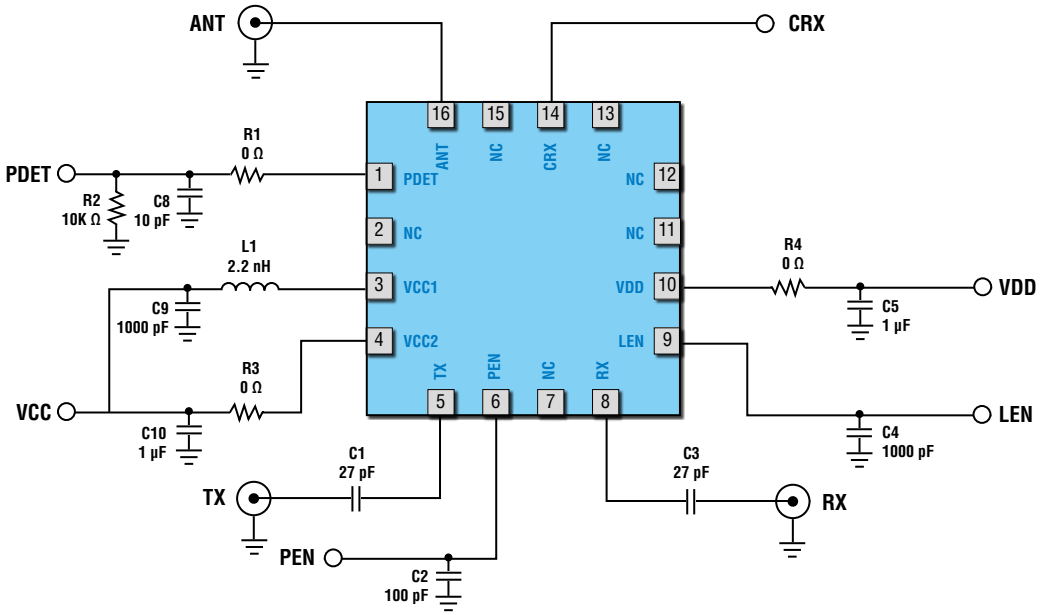
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Receive Gain Mode (ANT – RX) T_A = +25 °C, VCC = VDD = 5 V, PEN = 0 V, LEN = CRX = 2.9 V. All unused RF ports are terminated in a 50 Ω load, unless otherwise noted						
Operating Frequency	f		2.4		2.5	GHz
RX Gain	G			13		dB
Output Return Loss	|S22|			12		dB
Isolation	ISO	ANT – TX		25		dB
Noise Figure	NF	from ANT to RX port		2		dB
Input P1dB	IP1dB	1dB Gain Compression		-2		dBm
Supply Current	I_{DD}	RX Gain Mode		15		mA
Receive Bypass Mode (ANT – RX) T_A = +25 °C, VCC = VDD = 5 V, PEN = 0 V, CRX = 2.9 V. LEN = 0 V. All unused RF ports are terminated in a 50 Ω load, unless otherwise noted						
Operating Frequency	f		2.4		2.5	GHz
Bypass Gain	G			-7		dB
Input Return Loss	|S11|			5		dB
Output Return Loss	|S22|			6		dB

3.3 V Electrical Specifications

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Transmit Mode (TX – ANT) T_A = +25 °C, VCC = VDD = 3.3 V, PEN = 2.9 V, LEN = CRX = 0 V. All unused RF ports are terminated in a 50 Ω load, unless otherwise noted						
Operating Frequency	f		2.4		2.5	GHz
Output Power, High Linearity Mode	Pout	MCS9, VHT40, DEVM = -35 dB		18.5		dBm
		MCS7, HT20, DEVM = -30 dB		19.5		dBm
		802.11n, MCS0, mask compliant power		22.5		dBm
		802.11b, 1 Mbps, mask compliant power		24		dBm
Small Signal Gain	G			24		dB
Gain Flatness	ΔG	Gain variation over the full band		0.5		dB
1dB Output Compression Point	P1dB	1dB gain compression		26		dBm
Input Return Loss	|S11|			14		dB
Output Return Loss	|S22|			15		dB
Isolation	ISO	ANT – RX		55		dB
Power Detector Output	Vpd	Pout = 0 dBm		0.15		V
		Pout = 5 dBm		0.20		V
		Pout = 24 dBm		1.34		V
2nd/3rd Harmonics	2fo	802.11b, 1 Mbps Pout = +23 dBm (no external harmonic filter)		-22		dBm/ MHz
	3fo			-38		dBm/ MHz
PA Control Current	Ien	No RF		2		mA
Operating Current	Icc	Quiescent (no RF)		210		mA
		Pout = 18 dBm		232		mA
		Pout = 22 dBm		264		mA
		Pout = 24 dBm		300		mA

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Receive Gain Mode (ANT – RX) T_A = +25 °C, VCC = VDD = 3.3 V, PEN = 0 V, LEN = CRX = 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			12		dB
Output Return Loss	|S22|			14		dB
Isolation	ISO	ANT – TX		25		dB
Noise Figure	NF	from ANT to RX port		2.1		dB
Input P1dB	IP1dB	1dB Gain Compression		-4		dBm
Supply Current	I_{DD}	RX Gain Mode		8		mA
Receive Bypass Mode (ANT – RX) T_A = +25 °C, VCC = VDD = 3.3 V, PEN = 0 V, CRX = 2.9 V. LEN = 0 V. All unused RF ports are terminated in a 50 Ω load, unless otherwise noted						
Operating Frequency	f		2.4		2.5	GHz
Bypass Gain	G			-7		dB
Input Return Loss	|S11|			5		dB
Output Return Loss	|S22|			6		dB

Application Circuits

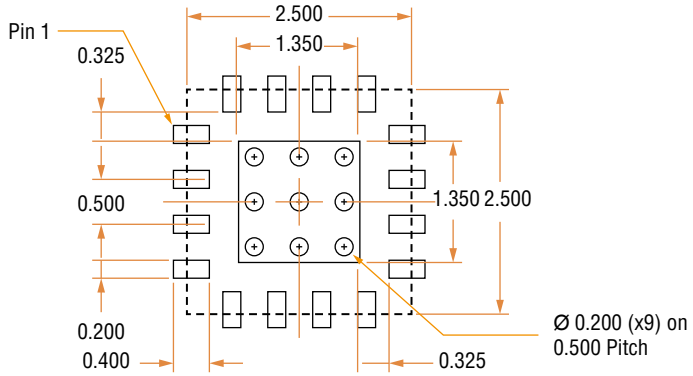


NOTE: Information in the above application is for reference only, and does not guarantee the mass production design of the device.

Evaluation Board Bill of Material

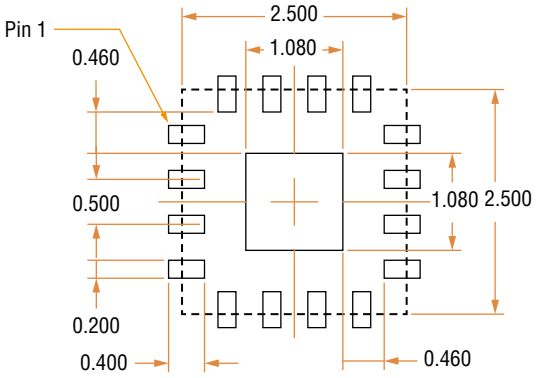
Component	Value	Description	Supplier	Part Number
IC		RTC7626HE	RichWave	
C1, C3	27 pF	DC blocking capacitor	Walsin	0402N270J500LT
C2	100 pF	De-coupling capacitor	Walsin	0402N101J500LT
C4, C9	1000 pF	De-coupling capacitor	Walsin	0402B102K500CT
C5, C10	1 µF	De-coupling capacitor	Walsin	0402X105K6R3CT
C8	10 pF	De-coupling capacitor	Walsin	0402N100J500LT
R2	10K Ω		Walsin	WR04X1002FTL
R1, R3, R4	0 Ω		Walsin	WR04X00R0PTL
L1	2.2 nH	Matching inductor	ACX	HI1005-1C2N2SMT

Recommended Footprint Patterns



PCB Board Metal & Via Pattern

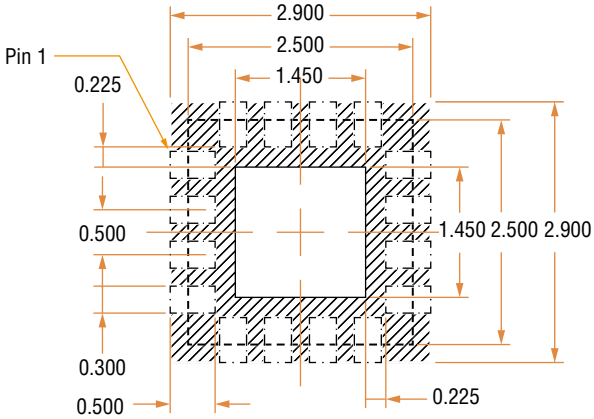
Top View



PCB Stencil Pattern

Top View

64% Solder Coverage on Pad



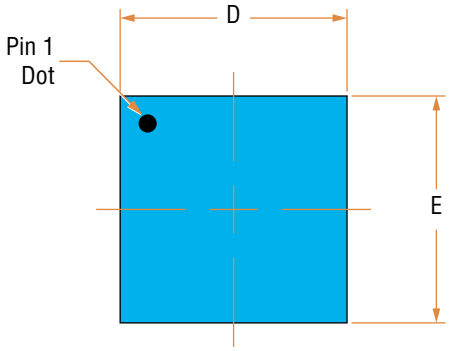
PCB Solder Mask Pattern

Top View

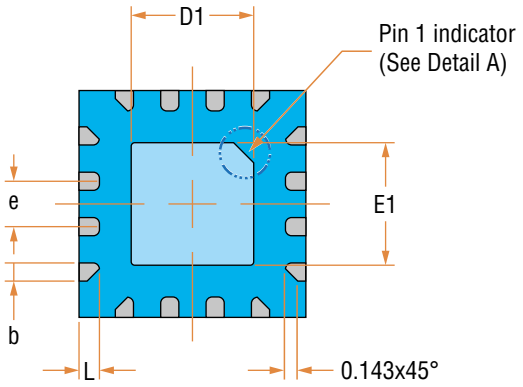
NOTE :

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

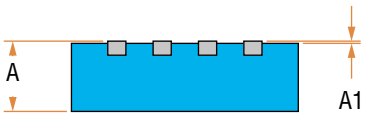
Package Dimensions



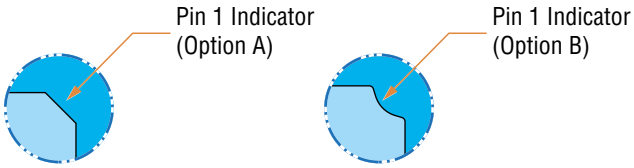
Top View



Bottom View



Side View



Detail A

16L QFN 2.5 X 2.5 X 0.8 - C		
SYMBOL	**MIN**	**MAX**
A	0.700	0.800
A1	0.000	0.050
b	0.150	0.250
D	2.400	2.600
D1	1.250	1.450
e	0.500 BSC	
E	2.400	2.600
E1	1.250	1.450
L	0.125	0.325

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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