RTC7626H : 2.4 – 2.5 GHz Front End Module for 802.11b/g/n/ac

Description

The RTC7626H is a complete 802.11 b/g/n/ac WLAN RF front-end module with a Bluetooth port. The module provides all the functionality of the power amplifier, power detector, filter, switch, and low noise amplifier. With all the critical matching, a 50 Ω interface to the antenna, the module is easy to be used in WLAN and Bluetooth applications. The device is packaged in a thin 16L QFN 2.5x2.5x0.75 mm^3.

Feature

- Frequency range: 2.4 – 2.5 GHz
- 3 V to 5 V single supply voltage
- Integrated high performance PA, LNA with bypass function, and SP3T switch
- Input & output fully 50 ohm matching
- Integrated positive slope power detector
- +21 dBm linear output power at 3% EVM, 802.11g 64 QAM, 54 Mbps, 5 V
- Small 16L QFN 2.5x2.5x0.75 mm^3 package
- RoHS / Halogen Free Compliant
- Moisture Sensitivity Level : MSL 3

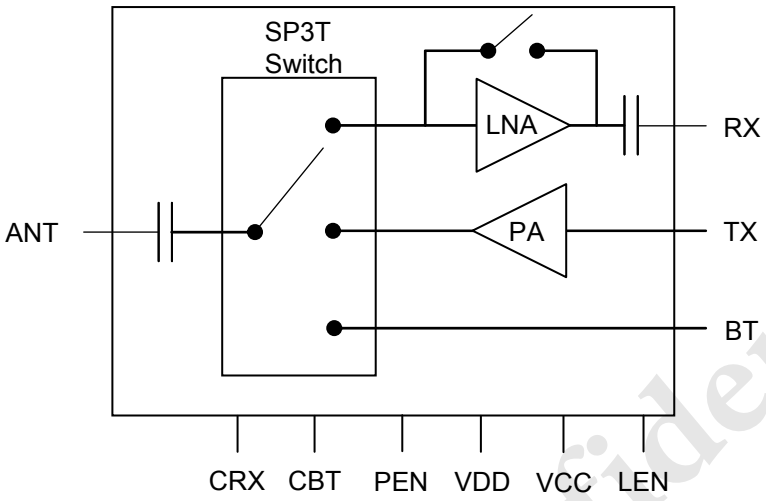
Application

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

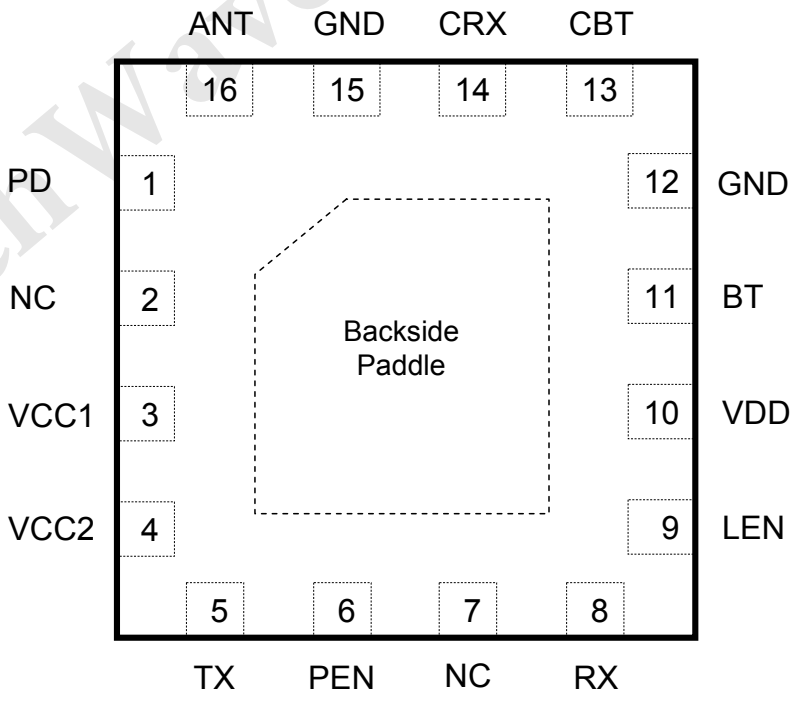
RichWave Confidential

Specifications subject to change without notice
RichWave Technology Corp. 3F, No. 1, Alley 20, Lane 407, Sec.2, Tiding Blvd., Taipei 114, Taiwan, R.O.C.
• Phone : +886-2-8751-1358 • Fax : +886-2-6600-6887 • Info@www.richwave.com.tw

Functional Block Diagram



Pin Out (top view through package)



RichWave Confidential

Specifications subject to change without notice
RichWave Technology Corp. 3F, No. 1, Alley 20, Lane 407, Sec.2, Tiding Blvd., Taipei 114, Taiwan, R.O.C.
• Phone : +886-2-8751-1358 • Fax : +886-2-6600-6887 • Info@www.richwave.com.tw

Pin Function Description

Pin	Function	Description
1	PD	PA detector output
2	NC	No connection
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	No connection
8	RX	RF output port for LNA
9	LEN	Control voltage for LNA
10	VDD	LNA supply voltage
11	BT	Bluetooth output
12	GND	Ground
13	CBT	Control voltage for BT switch
14	CRX	Control voltage for RX switch
15	GND	Ground
16	ANT	Antenna output
Backside Paddle		Must be connected to ground through PCB via for best performance

Truth Table

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

1 : High, 0 : Low

RichWave Confidential

Specifications subject to change without notice
RichWave Technology Corp. 3F, No. 1, Alley 20, Lane 407, Sec.2, Tiding Blvd., Taipei 114, Taiwan, R.O.C.
• Phone : +886-2-8751-1358 • Fax : +886-2-6600-6887 • Info@www.richwave.com.tw

Recommended Operating Range

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	VCC, VDD	3	5	5.25	V
PA control voltage (High)	PEN	2.7	2.8	2.9	V
PA control voltage (Low)	PEN	0	0	0.4	V
LNA control voltage (High)	LEN	2	3	3.3	V
LNA control voltage (Low)	LEN	0	0	0.4	V
Switch control voltage (High)	CRX, CBT	2	3	3.3	V
Switch control voltage (Low)	CRX, CBT	0	0	0.4	V

Absolute Maximum Rating

Parameter	Symbol	Rating	Units
Supply voltage	VCC, VDD	5.5	V
PA Enable Voltage	PEN	3.3	V
LNA Enable Voltage	LEN	3.6	V
Switch Control Voltage	CRX, CBT	3.6	V
TX Input Power	Pin	+5	dBm
Operating Temperature	T_A	-40 to +85	℃
Storage Temperature	T_{ST}	-40 to +150	℃

Note : Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only, functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation between operation range maximum and absolute maximum for extended periods may affect device reliability.

RichWave Confidential

Specifications subject to change without notice
RichWave Technology Corp. 3F, No. 1, Alley 20, Lane 407, Sec.2, Tiding Blvd., Taipei 114, Taiwan, R.O.C.
• Phone : +886-2-8751-1358 • Fax : +886-2-6600-6887 • Info@www.richwave.com.tw

Electrical Specification

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Operating Frequency	f		2.4		2.5	GHz
Transmit Mode T = 25℃, VCC = VDD = 5 V, PEN = 2.8 V, LEN = CRX = CBT = 0 V all unused RF ports terminated in a 50Ω load, unless otherwise noted						
Output Power, High Linearity Mode	Pout	802.11g, 64QAM/54Mbps, EVM = 3.0%	19	21		dBm
		802.11g/ mask compliant power, OFDM 6 Mbps	23	24.5		dBm
		802.11b/ mask compliant power, CCK 1 Mbps	23	25		dBm
Small Signal Gain	S21	Pin = -30 dBm	25	27		dB
Gain Flatness	ΔG	Gain variation over band			1	dB
P1dB	P1dB	1dB gain compression		29		dBm
Input Return Loss	|S11|	Pin = -30 dBm		20		dB
Output Return Loss	|S22|	Pin = -30 dBm		13		dB
Isolation ANT – RX	ISO_1			42		dB
Isolation ANT – BT	ISO_2			40		dB
Isolation TX to BT	ISO_3			13		dB
Isolation RX – TX	ISO_4			43		dB
2^{nd} harmonics	2fo	802.11b, 1 Mbps P_{out} = 25 dBm		-27		dBm/MHz
3^{rd} harmonics	3fo	802.11b, 1 Mbps P_{out} = 25 dBm		-45		dBm/MHz
PA control current	I_{PEN}	PEN = 2.8 V, no RF		3		mA
Quiescent Current	Icq	Quiescent (no RF)		140	160	mA
Operating Current	Icc	802.11g, 64QAM, 54 Mbps 100% duty, P_{out} = 21 dBm		210	240	mA
Leakage current	I_{LEAK}	PEN = 0 V		22		nA

RichWave Confidential

Specifications subject to change without notice
RichWave Technology Corp. 3F, No. 1, Alley 20, Lane 407, Sec.2, Tiding Blvd., Taipei 114, Taiwan, R.O.C.
• Phone : +886-2-8751-1358 • Fax : +886-2-6600-6887 • Info@www.richwave.com.tw

Receive Gain Mode T = 25℃, VCC = VDD = 5 V, PEN = 0 V, LEN = CRX = 3.0 V, CBT = 0 V, all unused RF ports terminated in a 50Ω load, unless otherwise noted						
RX Gain	S21	Pin = -30 dBm	14	15.5		dB
Input Return Loss	|S11|	Pin = -30 dBm		8		dB
Output Return Loss	|S22|	Pin = -30 dBm		9.5		dB
Isolation ANT – TX	ISO_5			26		dB
Isolation ANT – BT	ISO_6			20		dB
Isolation RX – TX	ISO_7			46		dB
Isolation RX – BT	ISO_8			35		dB
Noise Figure	NF			2		dB
Input P1dB	IP1dB	1dB Gain Compression		-3		dBm
Supply Current	I_{DD}	RX Gain Mode		13	15	mA
Receive Bypass Mode T = 25℃, VCC = VDD = 5 V, PEN = 0 V, CRX = 3.0 V, LEN = CBT = 0 V all unused RF ports terminated in a 50Ω load, unless otherwise noted						
Bypass Gain	S21	Pin = -30 dBm		-6.7		dB
Input Return Loss	|S11|	Pin = -30 dBm		8		dB
Output Return Loss	|S22|	Pin = -30 dBm		27		dB
Bluetooth Mode T = 25℃, VCC = VDD = 5 V, PEN = 0 V, CRX = LEN = 0 V, CBT = 3.0 V all unused RF ports terminated in a 50Ω load, unless otherwise noted						
Insertion loss	IL	Pin = -30 dBm		-1.2		dB
Input Return Loss	|S11|	Pin = -30 dBm		11		dB
Output Return Loss	|S22|	Pin = -30 dBm		13		dB
Isolation ANT – TX	ISO_9			56		dB
Isolation ANT – RX	ISO_10			44		dB

RichWave Confidential

Specifications subject to change without notice
RichWave Technology Corp. 3F, No. 1, Alley 20, Lane 407, Sec.2, Tiding Blvd., Taipei 114, Taiwan, R.O.C.
• Phone : +886-2-8751-1358 • Fax : +886-2-6600-6887 • Info@www.richwave.com.tw

Isolation BT – TX	ISO_11			58		dB
Isolation BT – RX	ISO_12			44		dB
Isolation RX– TX	ISO_13			39		dB
General Specifications						
Switch On/Off Time	ton, toff	On, Off (50% V to 90%/10% RF)		270		ns
Switch Control Current	Ictl	Control Voltage = 3.0 V		5		μA

RichWave Confidential

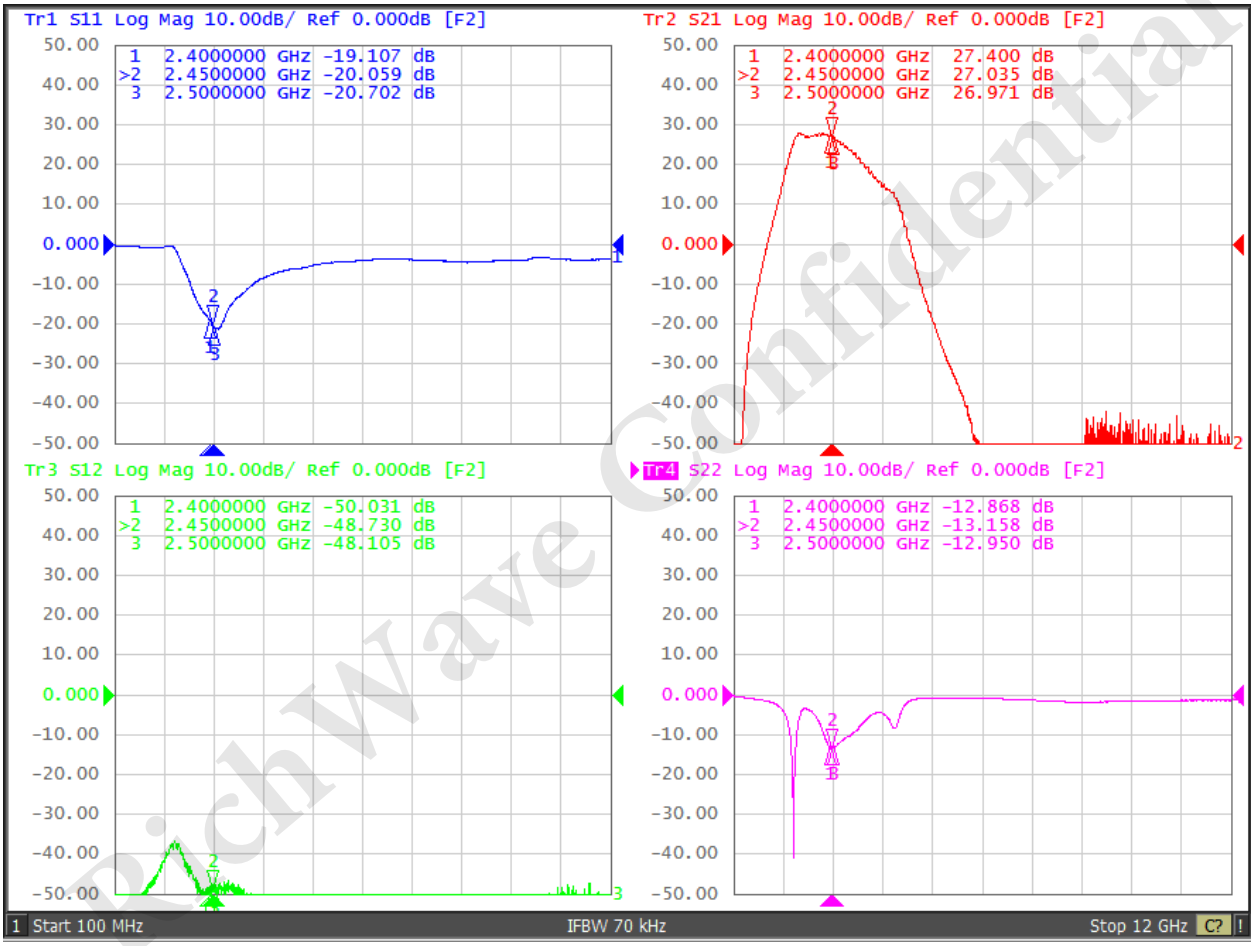
Specifications subject to change without notice
RichWave Technology Corp. 3F, No. 1, Alley 20, Lane 407, Sec.2, Tiding Blvd., Taipei 114, Taiwan, R.O.C.
• Phone : +886-2-8751-1358 • Fax : +886-2-6600-6887 • Info@www.richwave.com.tw

Typical Performance Characteristics

(1) Transmit Mode

S Parameter

T = 25℃, VCC = VDD = 5 V, PEN = 2.8 V, LEN = CRX = CBT = 0 V

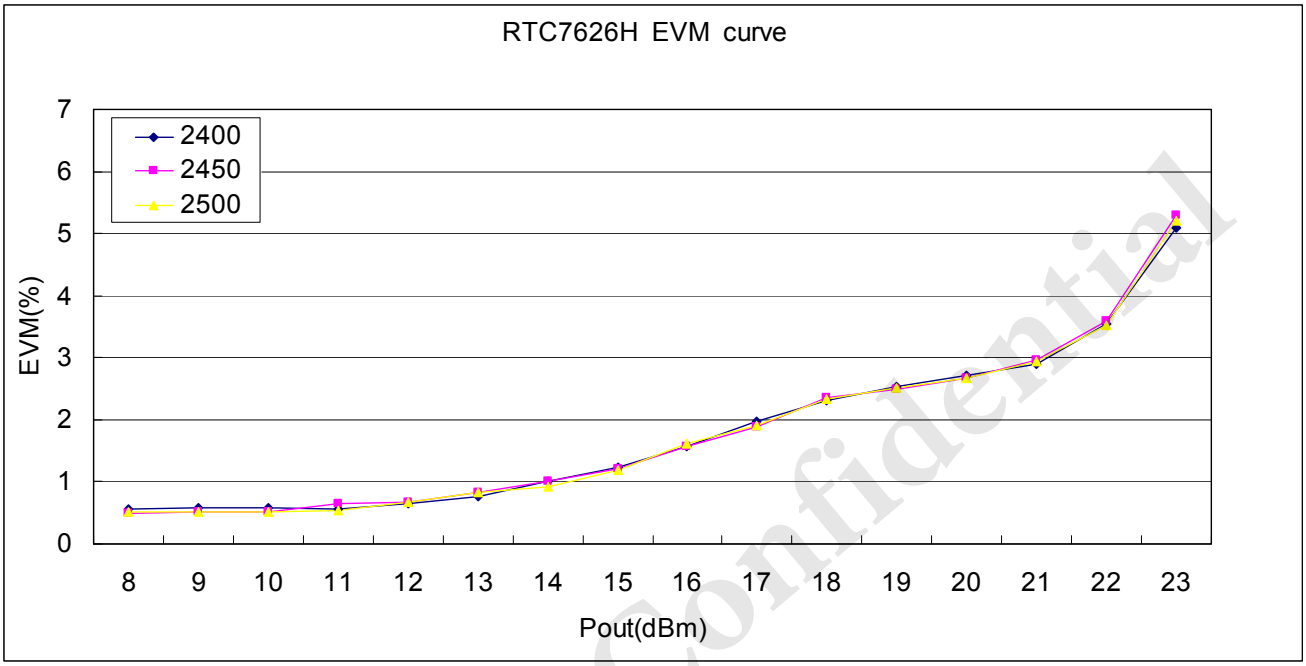


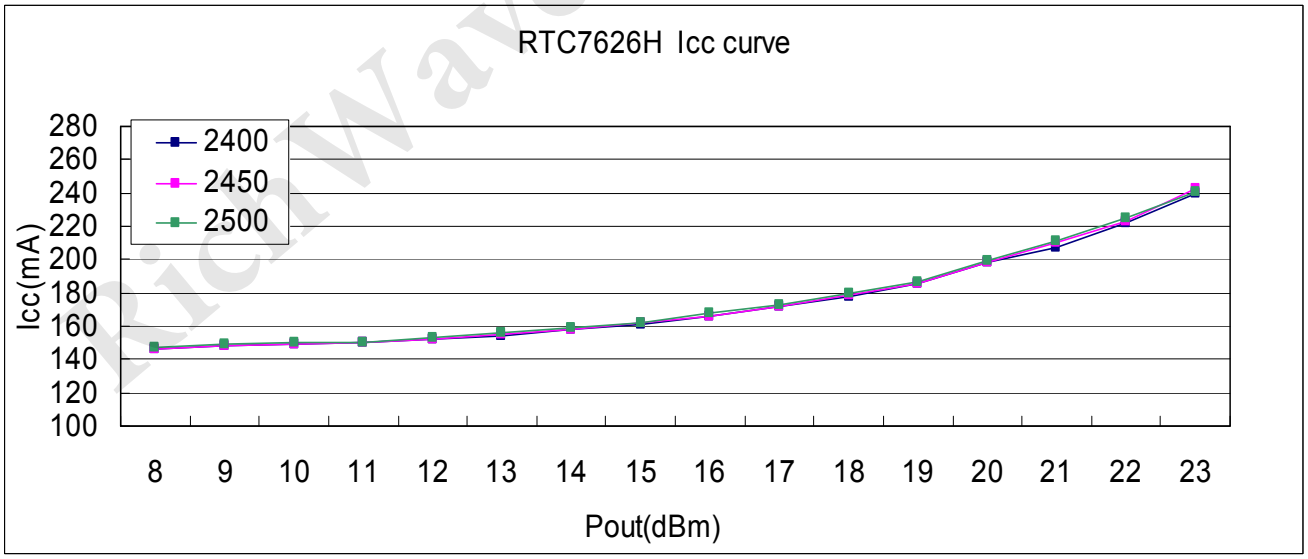
RichWave Confidential

Specifications subject to change without notice
RichWave Technology Corp. 3F, No. 1, Alley 20, Lane 407, Sec.2, Tiding Blvd., Taipei 114, Taiwan, R.O.C.
• Phone : +886-2-8751-1358 • Fax : +886-2-6600-6887 • Info@www.richwave.com.tw

EVM, Icc & Power Detector

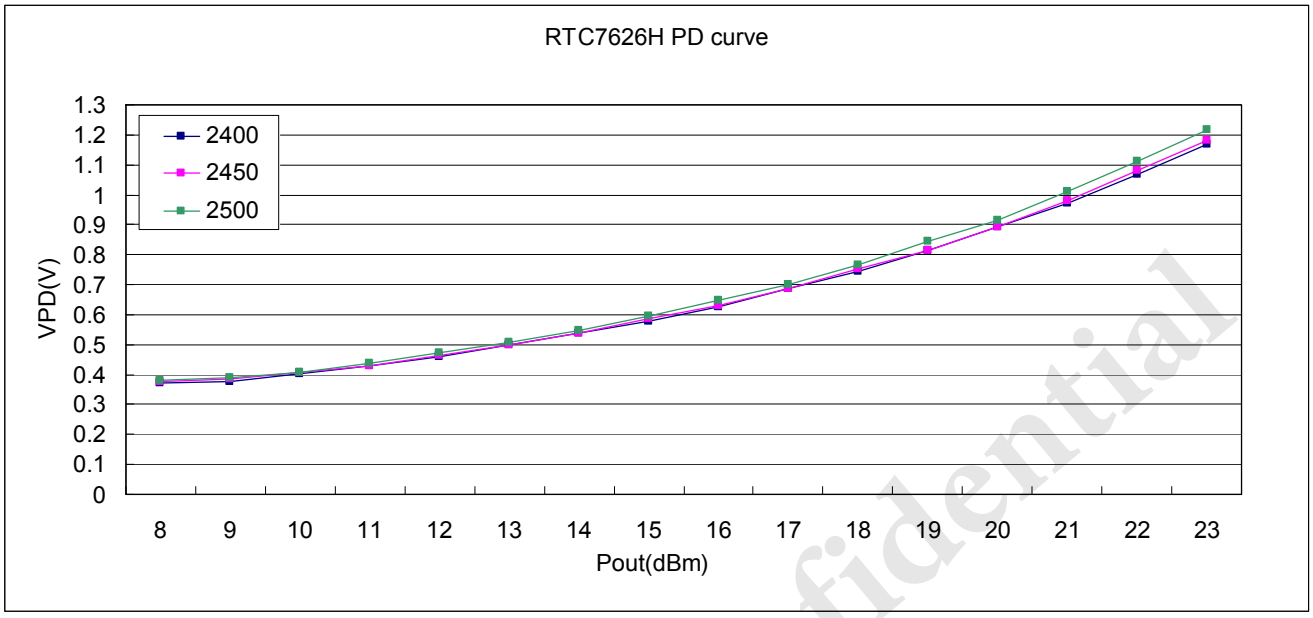
T = 25℃, VCC = VDD =5 V, PEN = 2.8 V, LEN = CRX = CBT = 0 V





RichWave Confidential

Specifications subject to change without notice
RichWave Technology Corp. 3F, No. 1, Alley 20, Lane 407, Sec.2, Tiding Blvd., Taipei 114, Taiwan, R.O.C.
• Phone : +886-2-8751-1358 • Fax : +886-2-6600-6887 • Info@www.richwave.com.tw



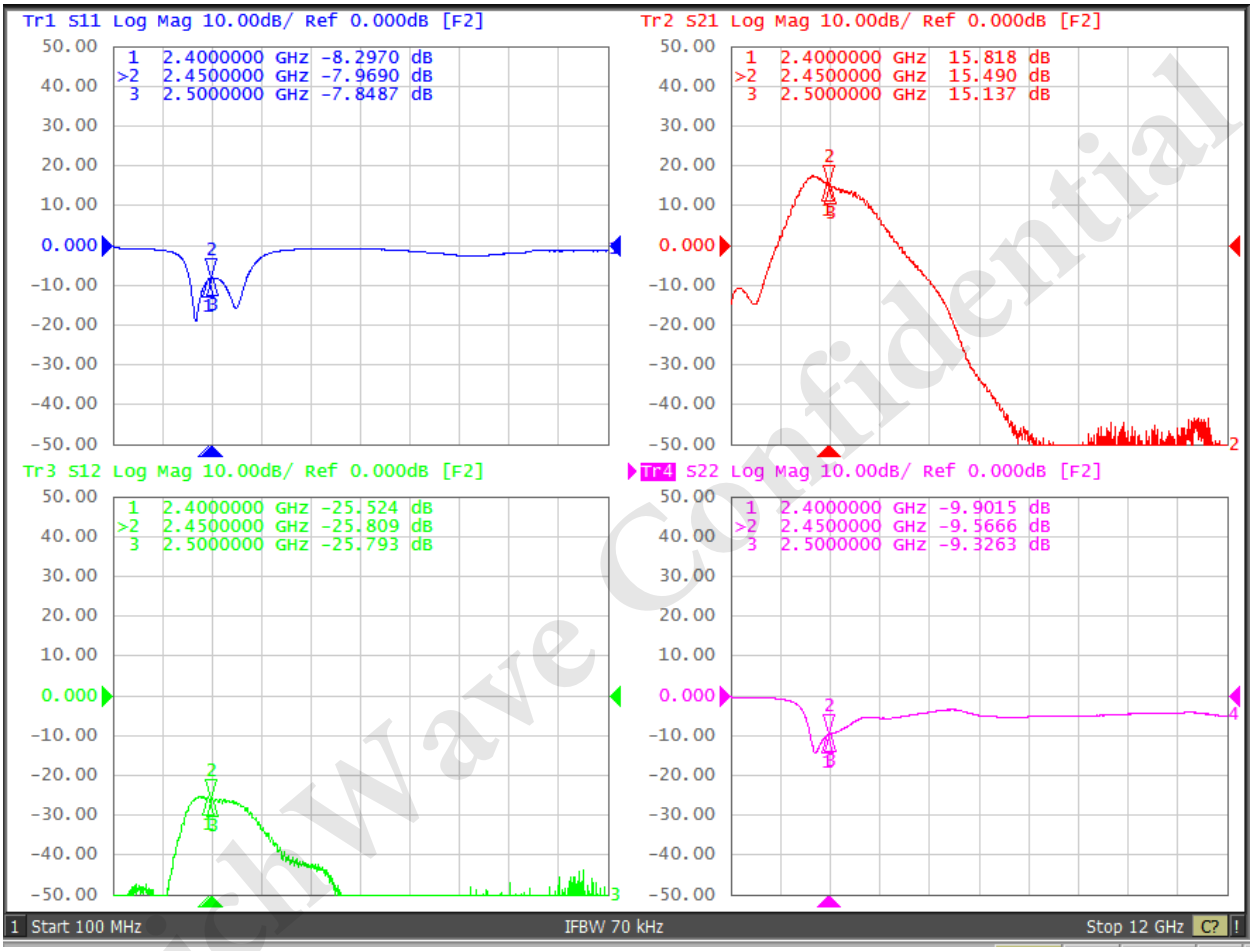
RichWave Confidential

Specifications subject to change without notice
RichWave Technology Corp. 3F, No. 1, Alley 20, Lane 407, Sec.2, Tiding Blvd., Taipei 114, Taiwan, R.O.C.
• Phone : +886-2-8751-1358 • Fax : +886-2-6600-6887 • Info@www.richwave.com.tw

(2) Receive Gain Mode

S Parameter

T = 25℃, VCC = VDD = 5 V, PEN = 0 V, LEN = CRX = 3 .0 V, CBT = 0 V

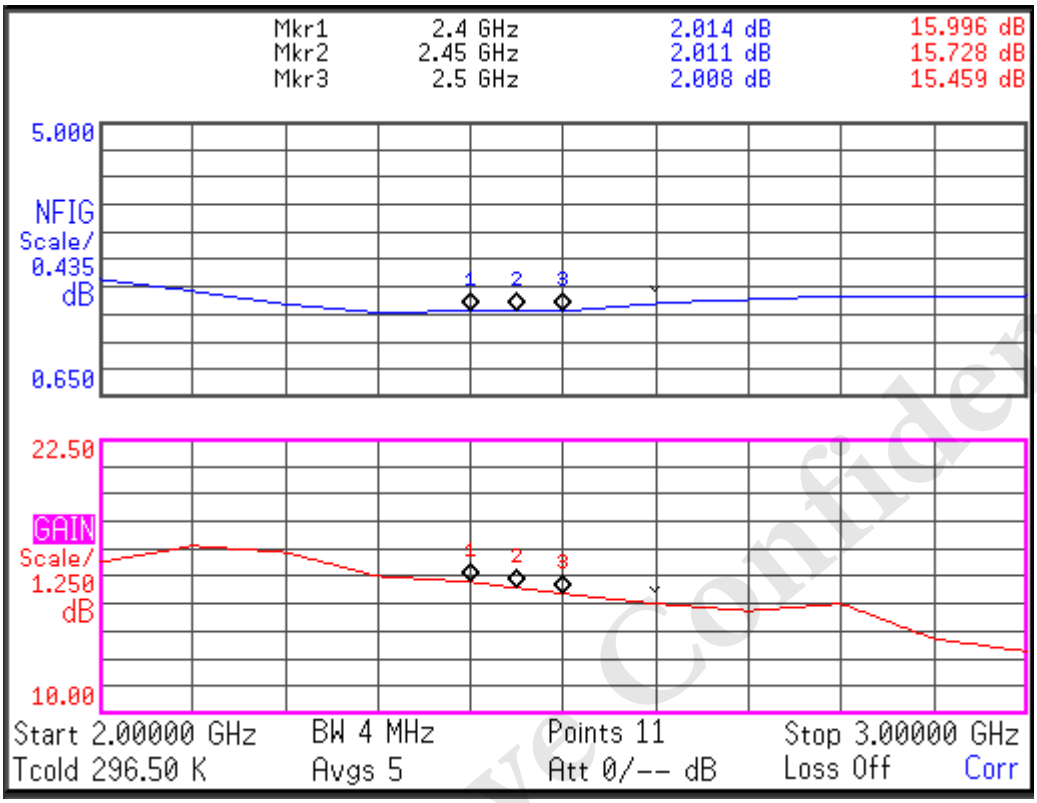


RichWave Confidential

Specifications subject to change without notice
RichWave Technology Corp. 3F, No. 1, Alley 20, Lane 407, Sec.2, Tiding Blvd., Taipei 114, Taiwan, R.O.C.
• Phone : +886-2-8751-1358 • Fax : +886-2-6600-6887 • Info@www.richwave.com.tw

Noise Figure

T = 25℃, VCC = VDD = 5 V, PEN = 0 V, LEN = CRX = 3.0 V, CBT = 0 V

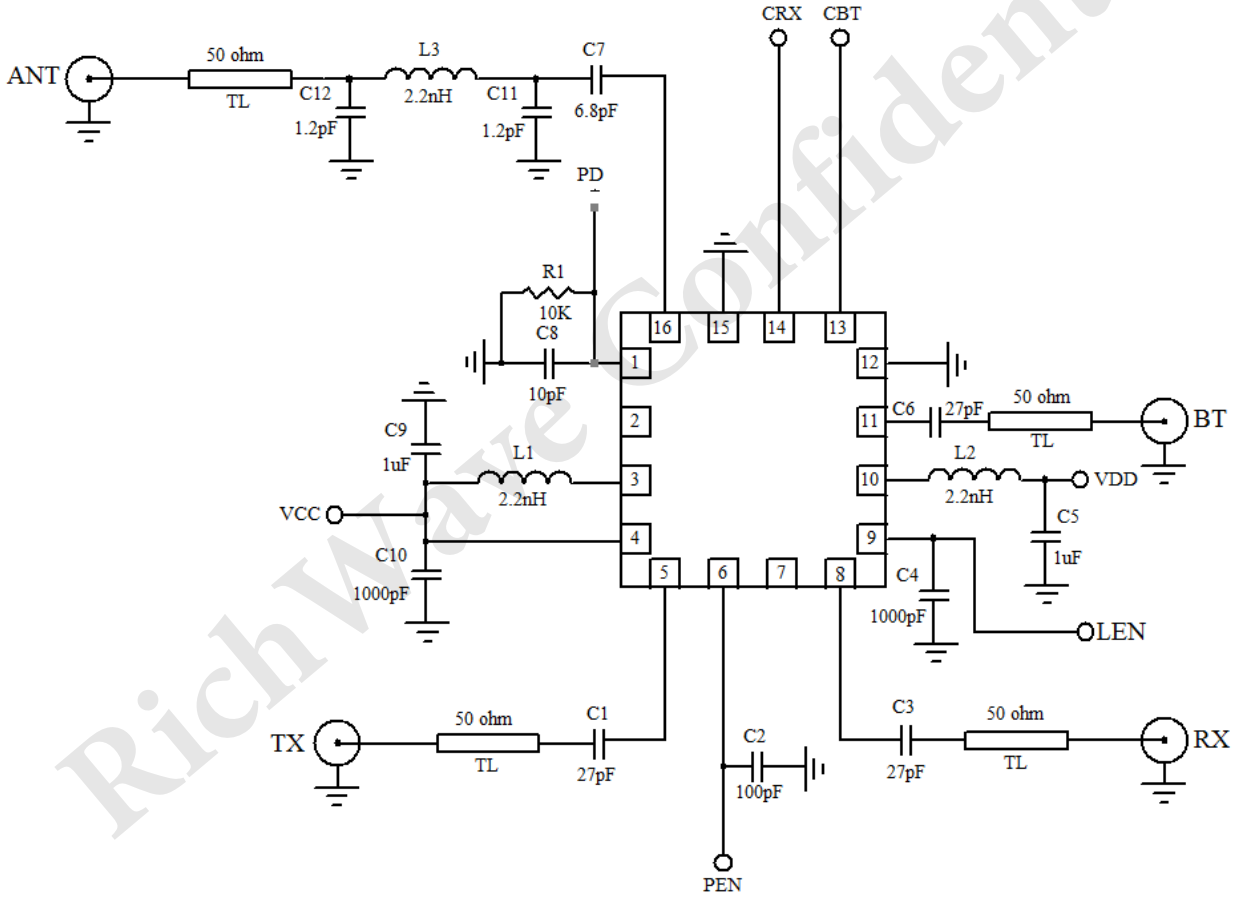


RichWave Confidential

Specifications subject to change without notice
RichWave Technology Corp. 3F, No. 1, Alley 20, Lane 407, Sec.2, Tiding Blvd., Taipei 114, Taiwan, R.O.C.
• Phone : +886-2-8751-1358 • Fax : +886-2-6600-6887 • Info@www.richwave.com.tw

Application Circuit

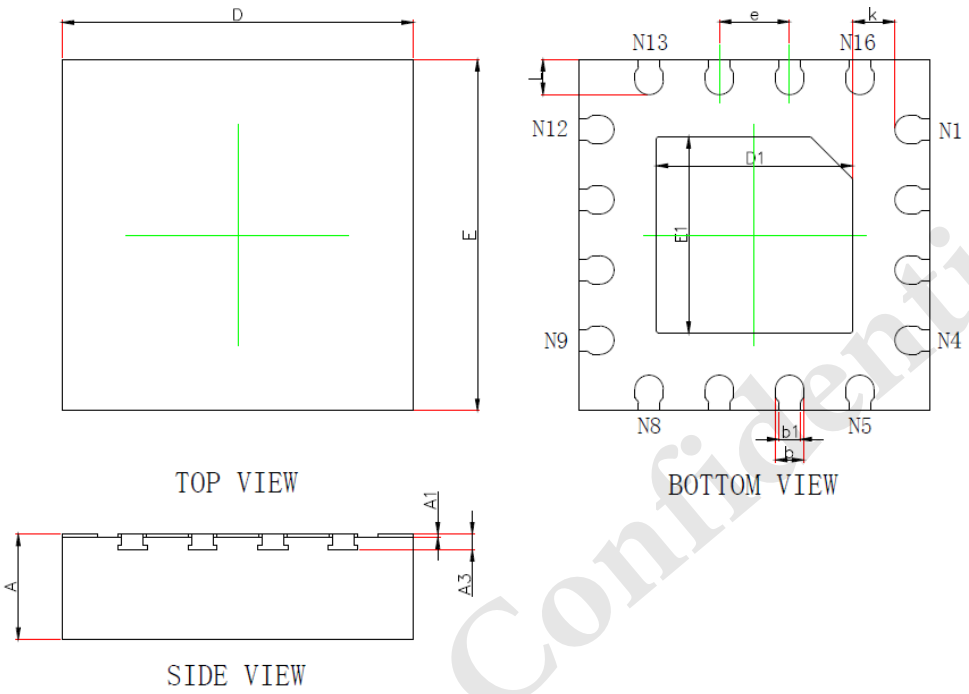
The application circuit and below evaluation board are used for the performance test of RTC7626H (2.4GHz WiFi FEM). The RF characteristics of RTC7626H shown in the specification table are measured by the evaluation board. Evaluation board setup procedure: (1) connect GND to PCB backside (2) Apply 5 V to VCC & VDD pad (3) Select test path according to control truth table.



RichWave Confidential

Specifications subject to change without notice
RichWave Technology Corp. 3F, No. 1, Alley 20, Lane 407, Sec.2, Tiding Blvd., Taipei 114, Taiwan, R.O.C.
• Phone : +886-2-8751-1358 • Fax : +886-2-6600-6887 • Info@www.richwave.com.tw

Package Outline Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN.	MAX.	MIN.	MAX.
A	0.700	0.800	0.028	0.031
A1	-0.004	0.046	0.000	0.002
A3	0.110REF.		0.004REF.	
D	2.400	2.600	0.094	0.102
E	2.400	2.600	0.094	0.102
D1	1.300	1.500	0.051	0.059
E1	1.300	1.500	0.051	0.059
b	0.150	0.250	0.006	0.010
b1	0.100	0.200	0.004	0.008
e	0.500TYP.		0.020TYP.	
k	0.200MIN..		0.008MIN.	
L	0.200	0.300	0.008	0.012

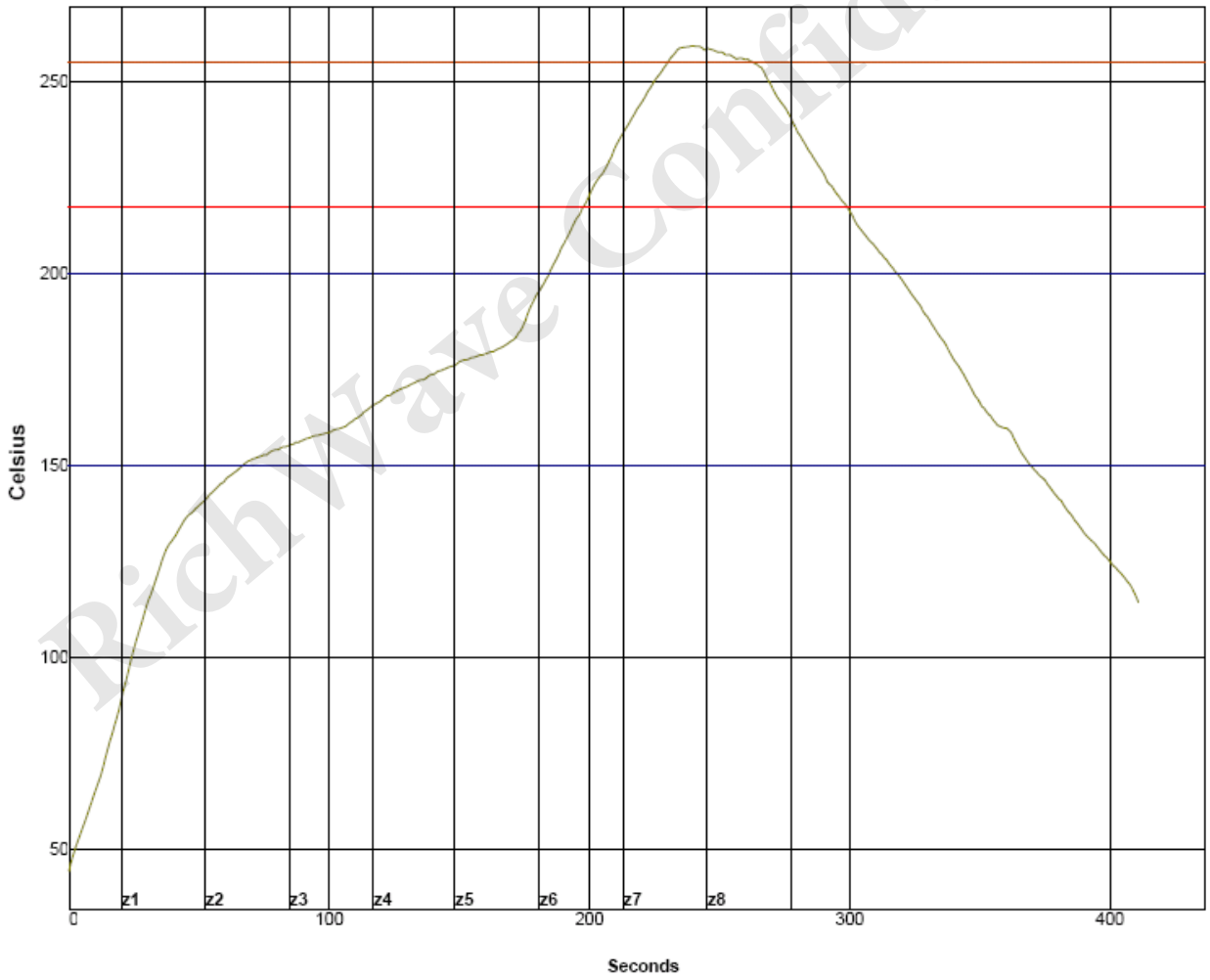
RichWave Confidential

Specifications subject to change without notice
RichWave Technology Corp. 3F, No. 1, Alley 20, Lane 407, Sec.2, Tiding Blvd., Taipei 114, Taiwan, R.O.C.
• Phone : +886-2-8751-1358 • Fax : +886-2-6600-6887 • Info@www.richwave.com.tw

Recommended Solder Reflow Profiles

Average ramp-up rate (200˚C to peak)	3˚C/second max.
Preheat temperature 175 (+/-25) ˚C	60~120secs
Temperature maintained above 217˚C	60~150secs
Time within 5˚C of actual peak temperature	30 seconds min.
Peak temperature range	(260 +2/-2)˚C
Ramp down rate	6˚C/second max.
Time 25˚C to peak temperature	8 minutes max.

* Follow JEDEC spec J-STD-020D



RichWave Confidential

Specifications subject to change without notice
RichWave Technology Corp. 3F, No. 1, Alley 20, Lane 407, Sec.2, Tiding Blvd., Taipei 114, Taiwan, R.O.C.
• Phone : +886-2-8751-1358 • Fax : +886-2-6600-6887 • Info@www.richwave.com.tw