

RTC6655F : 2.4/5 GHz Dual Band Antenna Switch Module

Description

The RTC6655F is an integrated antenna switch module designed for 802.11a/b/g/n WLAN applications. This device consists of a SPDT switch (SW) and two diplexers (DIPXs). The module is designed to operate in 2.4 and 5 GHz ISM band, compatible with 802.11a/b/g/n wireless LAN system with low loss, high isolation and high out-band suppression. The diplexer consists of two pass band responses in both transmitting and receiving paths with 50 ohm impedance matching. For transmit path, the in-band insertion loss is smaller than 1.6 dB at 2.4 GHz-band and 1.9 dB at 5GHz-band while keeping return loss higher than 11 dB. For receive path, the in-band insertion loss is smaller than 1.5 dB at 2.4 GHz-band and 1.8 dB at 5 GHz-band while keeping return loss higher than 10 dB. The isolation between transmit and receive path is typically higher than 22 dB.

The RTC6655F is packaged in a tiny industry-standard 16-lead surface mount package QFN 3 mm X 3 mm with lead-free RoHS/Halogen Free compliant.

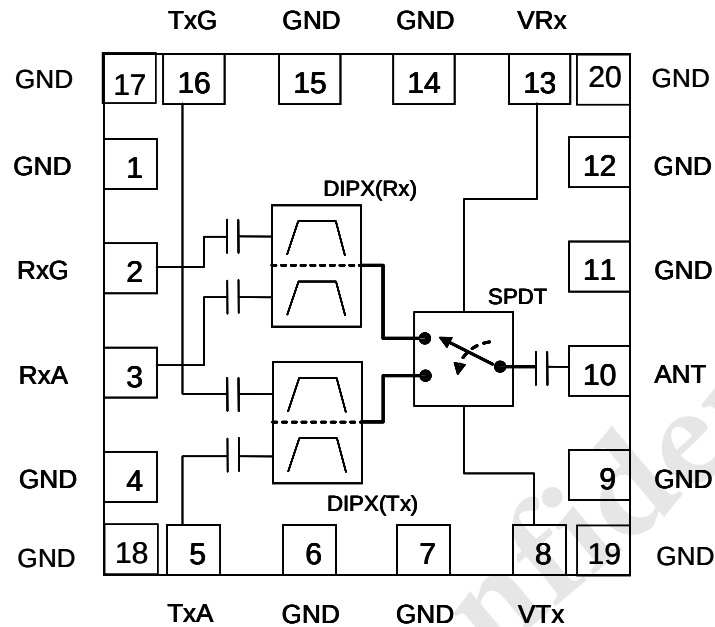
Feature

- ◆ Integrated switch and 2.4/5 GHz dual band Tx/Rx diplexer
- ◆ In/out port impedance 50 ohm matching
- ◆ Supply voltage 3.0 to 3.6 V
- ◆ Low in-band insertion loss :
 - ◆ 1.6 dB/1.5 dB for Tx/Rx at 2.4 GHz band
 - ◆ 1.9 dB/1.8 dB for Tx/Rx at 5 GHz band
- ◆ High out-band suppression
- ◆ Small, thin package 16L QFN-3 X 3 X 0.9 mm
- ◆ RoHS / Halogen Free Compliant
- ◆ Moisture Sensitivity Level : MSL-3

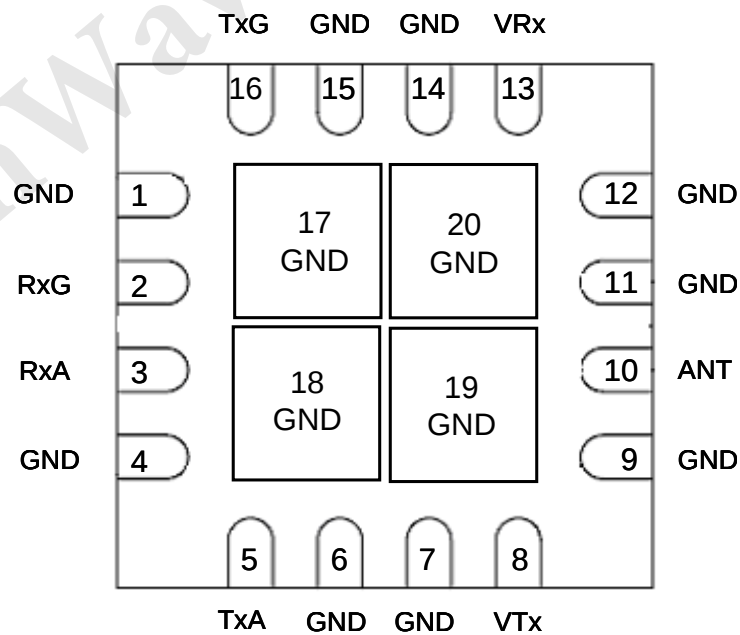
Application

- ◆ IEEE 802.11a/b/g/n Wireless LAN System
- ◆ 2.4/5 GHz ISM Band Application
- ◆ USB, Cardbus, miniPCI, PCIe, AP Application

Functional Block Diagram



Pin out (top view through package)



Pin Function Description

Pin	Function	Description
1	GND	Ground connection
2	RxG	Receiving path at 2.4GHz
3	RxA	Receiving path at 5GHz
4	GND	Ground connection
5	TxA	Transmitting path at 5GHz
6	GND	Ground connection
7	GND	Ground connection
8	VTx	SW control voltage, "high" for Tx channel
9	GND	Ground connection
10	ANT	Antenna termination
11	GND	Ground connection
12	GND	Ground connection
13	VRx	SW control voltage, "high" for Rx channel
14	GND	Ground connection
15	GND	Ground connection
16	TxG	Transmitting path at 2.4GHz
17	GND	Ground connection
18	GND	Ground connection
19	GND	Ground connection
20	GND	Ground connection

Recommended Operating Range ($T_A = +25^{\circ}\text{C}$, unless otherwise noted)

Parameter	Min	Typ	Max	Unit
Operating Frequency(2.4GHz band)	2.4		2.5	GHz
Operating Frequency(5GHz band)	4.9		5.875	GHz
Switch Control Voltage(VTx, VRx) High	3.0	3.3	3.6	V
Switch Control Voltage(VTx, VRx) Low	0	0	0.2	V
Switch Control Current		5	100	uA
Switching Time		30		nsec

Absolute Maximum Rating ($T_A = +25^{\circ}\text{C}$, unless otherwise noted)

Parameter	Min	Typ	Max	Unit
Switch Control Voltage			+6	V
Input Power			+31	dBm
Operating Temperature	-10		+85	$^{\circ}\text{C}$
Storage Temperature	-40		+150	$^{\circ}\text{C}$

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.

Truth Table

State	VTx	VRx
TxG or TxA Channel Active	1	0
RxG or RxA Channel Active	0	1

“1” = +3.0V to +3.6V

“0” = 0V to +0.2V

Electrical Specification

Transmit/Receive – 802.11b/g

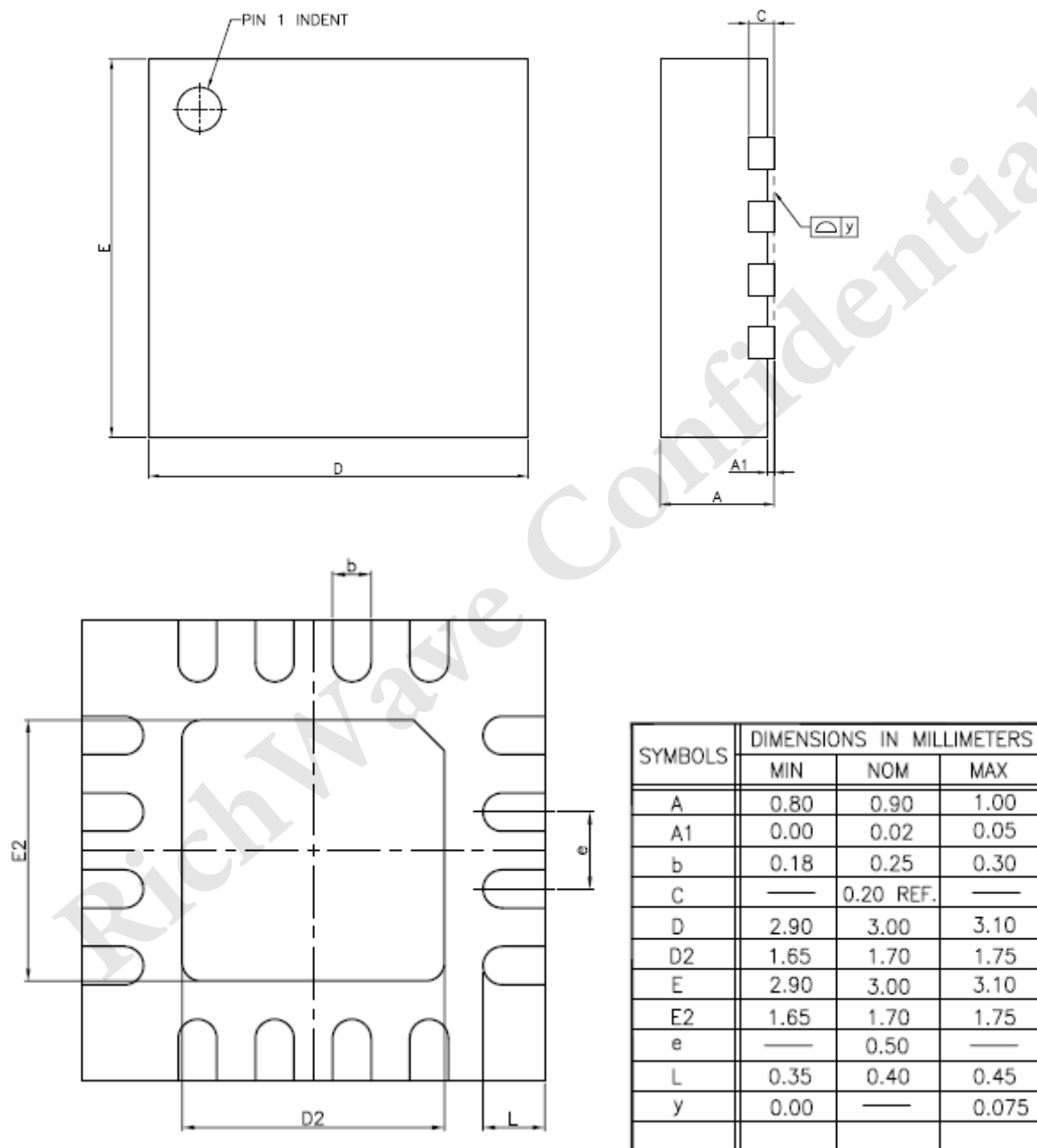
Parameter	Conditions	Min	Typ	Max	Unit
Operating Frequency		2.4		2.5	GHz
TxG Insertion Loss	TxG – ANT			1.8	dB
RxG Insertion Loss	ANT – RxG			1.7	dB
Input Return Loss	ANT (ANT – RxG)	17			dB
	TxG (TxG – ANT)	15			dB
Output Return Loss	RxG (ANT – RxG)	25			dB
	ANT (TxG – ANT)	15			dB
P1dB			31		dBm
2 nd Harmonic Suppression	TxG – ANT (4.8 – 5.0 GHz)	38			dB
Output 2 nd Harmonic Power with Pin=22dBm	TxG – ANT (4.8 – 5.0 GHz)			-50	dBm/MHz
3 rd Harmonic Suppression	TxG – ANT (7.2 – 7.5 GHz)	27			dB
Output 3 rd Harmonic Power with Pin=22dBm	TxG – ANT (7.2 – 7.5 GHz)			-50	dBm/MHz
5GHz to 2GHz Isolation (TxG-ANT path is connected)	RxA – TxG (4.8 – 5.0 GHz)	30			dB
	RxA – TxG (6.9 – 7.5 GHz)	34			dB
	TxA – TxG (4.8 – 5.0 GHz)	40			dB
	TxA – TxG (6.9 – 7.5 GHz)	26			dB
RxG to TxG Isolation (TxGANT path is connected)	RxG – TxG (2.4 – 2.5 GHz)	23			dB
RxG to ANT Isolation (TxG-ANT path is connected)	RxG – ANT (2.4 – 2.5 GHz)	22			dB
RF to non-RF Isolation		35			dB

Transmit/Receive – 802.11a

Parameter	Conditions	Min	Typ	Max	Unit
Operating Frequency		4.9		5.875	GHz
TxA Insertion Loss	TxA – ANT			2.1	dB
RxA Insertion Loss	ANT – RxA			2.0	dB
Input Return Loss	ANT (ANT – RxA)	10			dB
	TxA (TxA – ANT)	13			dB
Output Return Loss	RxA (ANT – RxA)	16			dB
	ANT (TxA – ANT)	11			dB
P1dB			29		dBm
2 nd Harmonic Suppression	TxA – ANT (9.8 – 11.7 GHz)	32			dB
Output 2 nd Harmonic Power with Pin=21dBm	TxA – ANT (9.8 – 11.7 GHz)			-50	dBm/MHz
3 rd Harmonic Suppression	TxA – ANT (14.7 – 17.625 GHz)	24			dB
Output 3 rd Harmonic Power with Pin=21dBm	TxA – ANT (14.7 – 17.625 GHz)			-50	dBm/MHz
2GHz to 5GHz Isolation (TxA-ANT path is connected)	RxG – TxA (2.4 – 2.5 GHz)	50			dB
	TxG – TxA (2.4 – 2.5 GHz)	45			dB
RxA to TxA Isolation (TxA-ANT path is connected)	RxA – TxA (4.9 – 5.875 GHz)	29			dB
RxA to ANT Isolation (TxA-ANT path is connected)	RxA – ANT (4.9 – 5.875 GHz)	24			dB
RF to non-RF Isolation		35			dB

Package Outline Dimension

16L QFN - 3mm x 3mm x 0.9mm



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

