DESCRIPTION

The RTC56151 is a symmetric, single-pole four-throw (SP4T) antenna switch module (ASM). All inputs and outputs are internally matched to 50Ω and the DC block capacitors at antenna and each RF ports are not necessary. This feature reduces the parts count, shrinks the circuit size, widens the operating bandwidth, and cuts down the manufacturing costs. Low-loss, high power and high linearity make the SP4T ASM suitable for multimode and multiband applications such as GSM/WCDMA/EDGE. A decoder with low current consumption is included in the device, which uses only two DC voltages to control switch operations. At each RF port to the antenna path, the typical insertion loss is 0.7 dB from 0.5 to 2.5 GHz. The isolation between each RF port is higher than 20 dB. The device can be operated at 1.8 to 3V wide supply range. These characteristics make RTC56151 SP4T ASM very useful in various applications, such as hand-held device and battery-powered equipment.

The RTC56151 is packaged in a very compact industry-standard 16-lead surface mount package QFN 3mm X 3 mm with lead-free RoHS compliant.

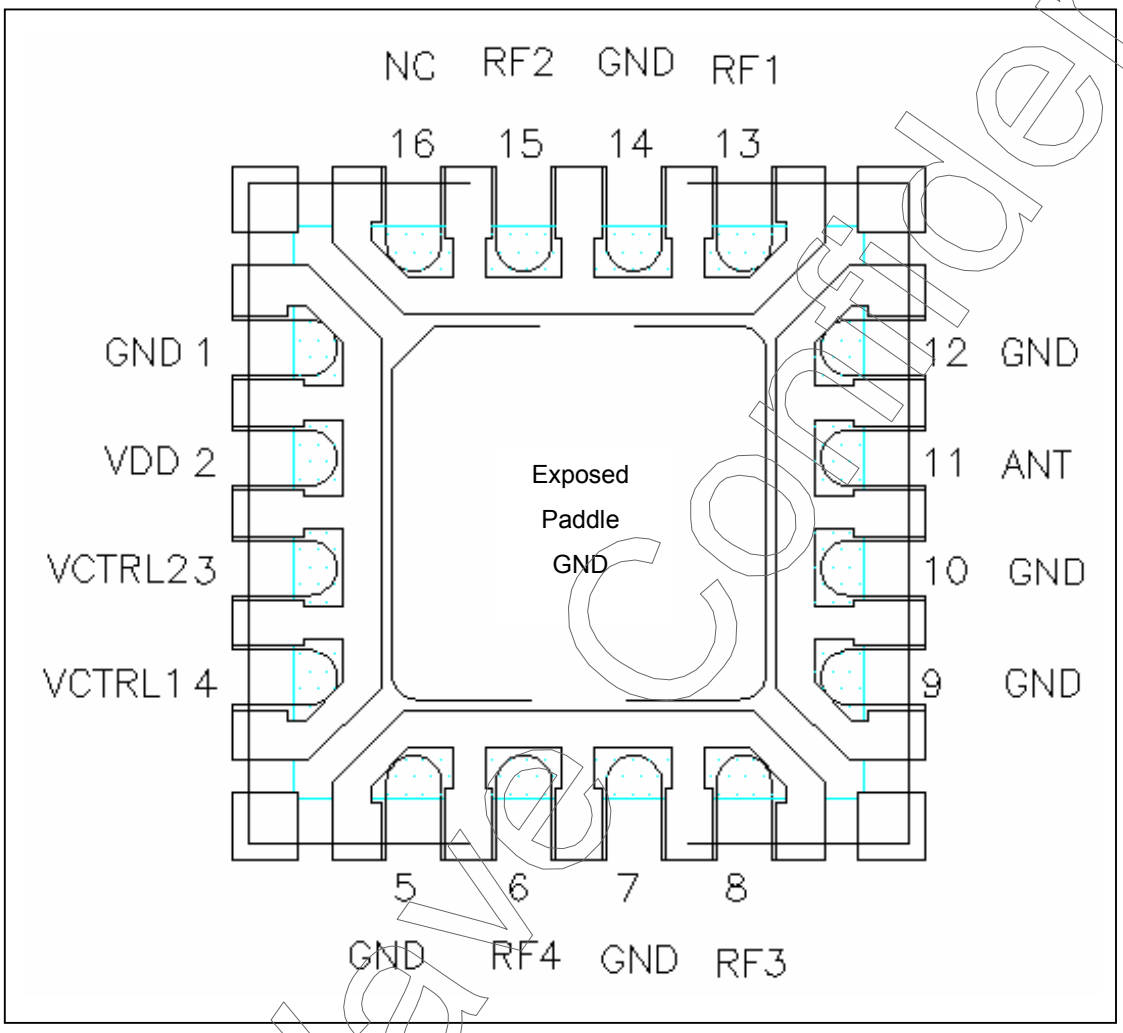
FEATURE

- Broadband frequency range (0.5-2.5GHz)
- Low insertion loss(0.4dB@1GHz, 0.5dB@2GHz) & high isolation(28.5dB@1GHz)
- Wide supply range V_{DD} =1.8 to 3 V
- High linearity IMD3 < -105dBm
- Good spurious harmonic performance -70dBc @900MHz, +34.5dBm input power
- Low logic control voltage V_{CTRL} down to 1.8V
- 16L QFN3 X 3 X 0.75 mm package
- Lead(Pb) free, RoHS compliant

APPLICATION

- Mobile Handset System Application
- Data Card Application
- Multi-Mode GSM/GPRS/WCDMA Application

PIN OUT (top view)



PIN FUNCTION DESCRIPTION

Pin	Function	Description
1,5,7,9,10,12,14	GND	Ground connection
2	V_{DD}	Supply voltage for switch operation
3	V_{CTRL2}	Control voltage 2.
4	V_{CTRL1}	Control voltage 1
6	RF4	RF output 4
8	RF3	RF output 3
11	ANT	Antenna port
13	RF1	RF output 1
15	RF2	RF output 2
16	NC	No connection

ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Units
Supply Voltage (V_{DD})	5	V
TX Input Power	36	dBm
Control Voltage (V_{CTRL})	5	V
Operating Temperature	-30 to +85	℃
Storage Temperature	-50 to +100	℃

Note : Exceeding these ranges might cause damage to the device

LOGIC TABLE

State	V_{CTRL1}	V_{CTRL2}	RF Path
1	0	0	ANT to RF1
2	0	1	ANT to RF2
3	1	0	ANT to RF3
4	1	1	ANT to RF4

"1" = +1.8V to +V_{DD} "0" = 0V to +0.3V

DC/CONTROL SPECIFICATIONS

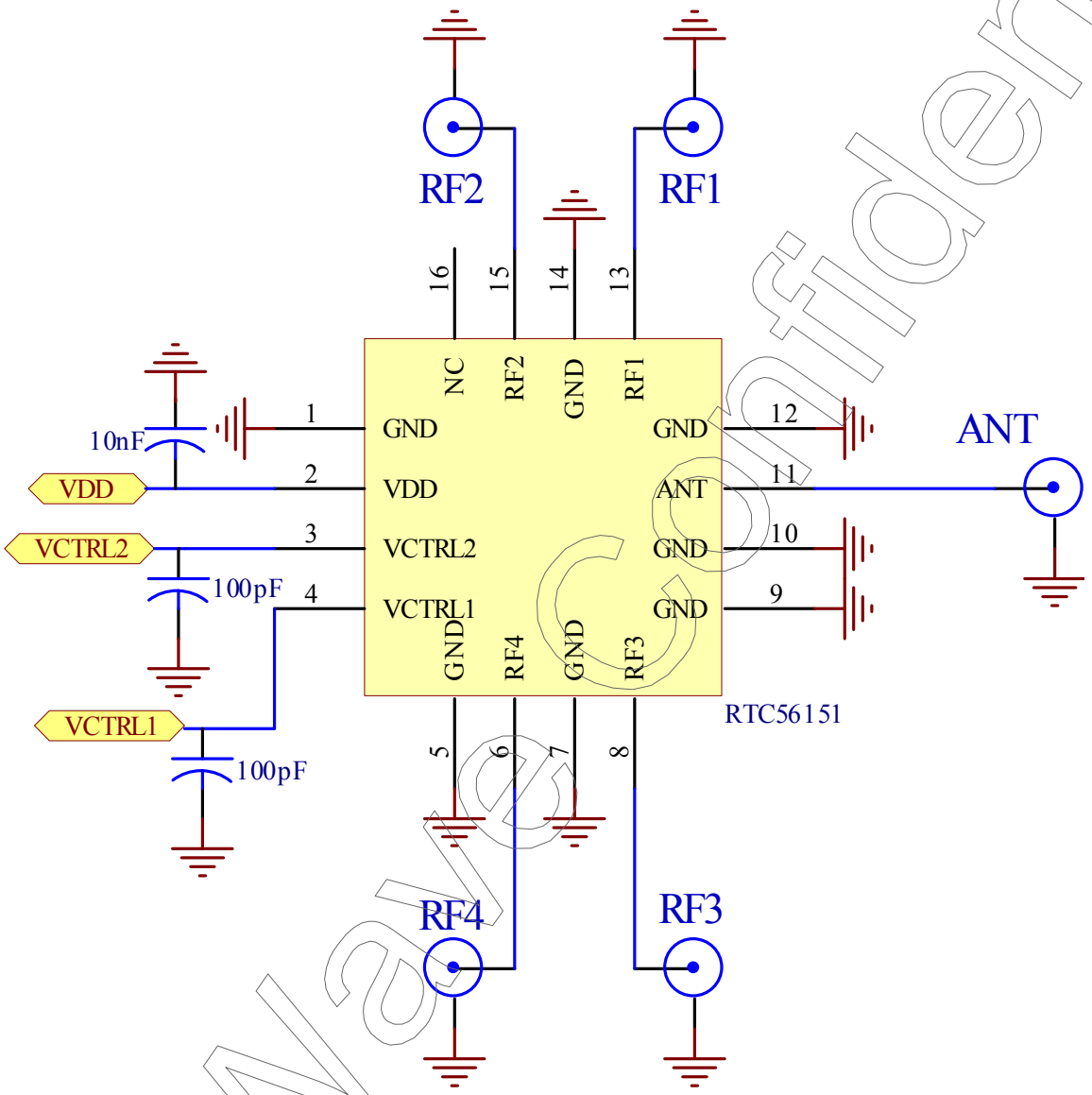
State	Conditions	Min	Typ	Max	Unit
Switched supply voltage(V_{DD})		1.8		3	V
Switched supply current(I_{DD})			0.3		mA
Control voltage	V_{HIGH} V_{LOW}	1.8	2.65 0	3 0.3	V V
Control current	I_{HIGH} I_{LOW}		0.1 0.1		μA μA

AC ELECTRICAL CHRACTERISTICS

T_A = 25 ^{0}C, V_{DD} = 2.65 V, V_{CTRL1} =V_{CTRL2} = V_{DD}, all unused RF ports are terminated in a 50 Ω load, unless otherwise noted

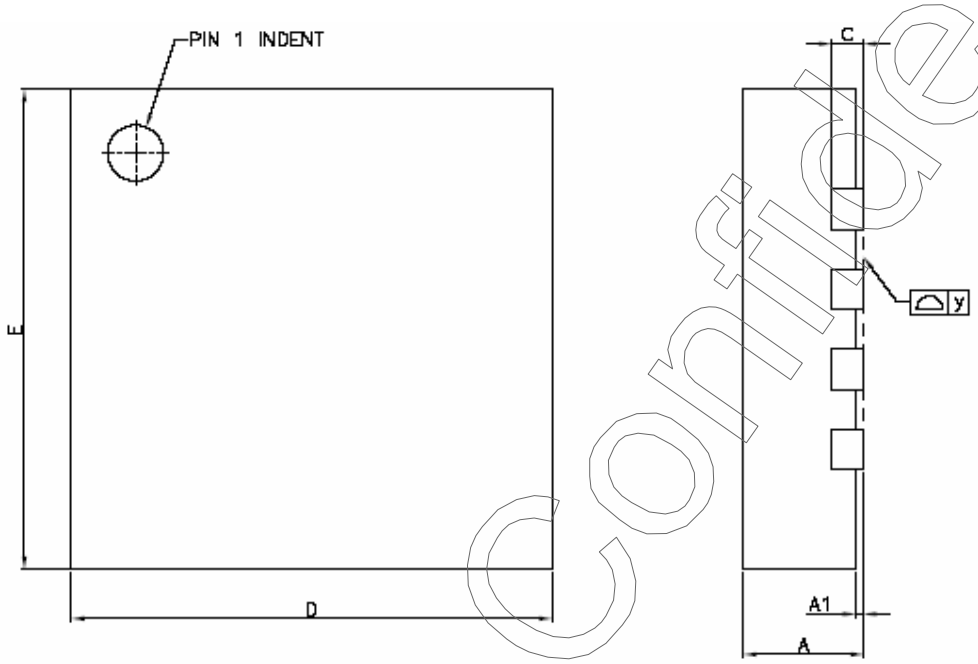
Parameter	Conditions	Min	Typ	Max	Unit
Insertion loss	0.5 to 1.0 GHz 1.0 to 2.0 GHz 2.0 to 2.1 GHz 2.5 GHz		0.40 0.50 0.50 0.7		dB dB dB dB
Isolation	0.5 to 1.0 GHz 1.0 to 2.0 GHz 2.0 to 2.1 GHz 2.5 GHz		28.5 22.0 21.5 19.0		dB dB dB dB
Return loss	0.50 to 2.5 GHz, all RF ports, insertion loss state		20		dB
Second harmonic($2f_0$)	Fundamental Frequency 900 MHz, P_{IN} = +34.5 dBm Fundamental Frequency 1.8 GHz, P_{IN} = +31.5 dBm		-75 -70		dBc dBc
Third harmonic($3f_0$)	Fundamental Frequency 900 MHz, P_{IN} = +34.5 dBm Fundamental Frequency 1.8 GHz, P_{IN} = +31.5 dBm		-70 -70		dBc dBc
Input 0.1 dB compression point($P_{0.1dB}$)	@ 900 MHz @ 1.8 GHz		35 35		dBm dBm
3rd Order Intermodulation Distortion(IMD3)	f_{FUND} = 1.95 GHz @ +20 dBm, f_{BLK} = 1.76 GHz @ –15 dBm, f_{RX} = 2.14 GHz, worst case over phase.		-105		dBm
Power handling under mismatch	@ 900 MHz, VSWR = 20:1 @ 1.8 GHz, VSWR = 20:1		34.5 31.5		dBm dBm
2nd Order Input Intercept Point	f_0 = 836.61 MHz @ +26 dBm, f_2 = 1718.22 MHz @ –20 dBm, measured @ 881.61 MHz		110		dBm
Switching speed	10%/90% RF rise/fall time		0.27		µs
Startup time	Wait time required when V_{DD} is applied until control voltage can be applied		25		µs

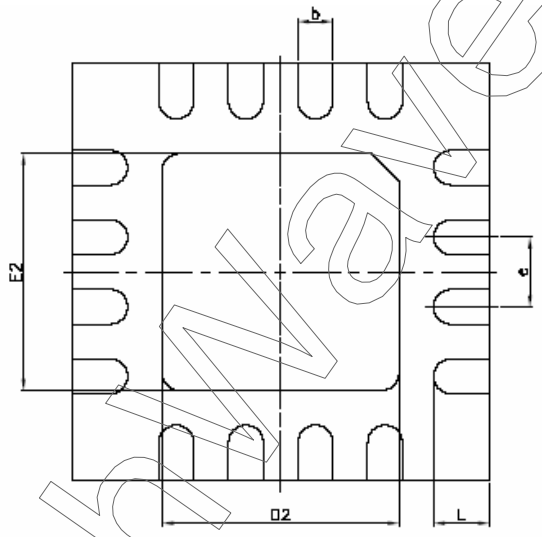
APPLICATION CIRCUIT :



PACKAGE DRAWING

16L QFN-3mm X 3mm X 0.75mm





SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
b	0.18	0.25	0.30
C	——	0.20 REF.	——
D	2.90	3.00	3.10
D2	1.65	1.70	1.75
E	2.90	3.00	3.10
E2	1.65	1.70	1.75
e	——	0.50	——
L	0.35	0.40	0.45
y	0.00	——	0.075