★1.Product Features

- Operating frequency: 10 MHz ~ 6 GHz
- Low insertion loss: 0.6dB@2.0GHz
- Isolation: 52dB@2.0GHz
- Input 1 dB compression point: 34dBm@2.0GHz
- Input third-order intermodulation point: 48dBm@2.0GHz
- Switching time: 130 ns (ON)
  32 ns (OFF)
- +3.3V/+5V supply
- Positive control voltage: 0/+3V～+5V
- DC power consumption: 1mA
- Package: QFN16 (plastic package)

Functional Block Diagram

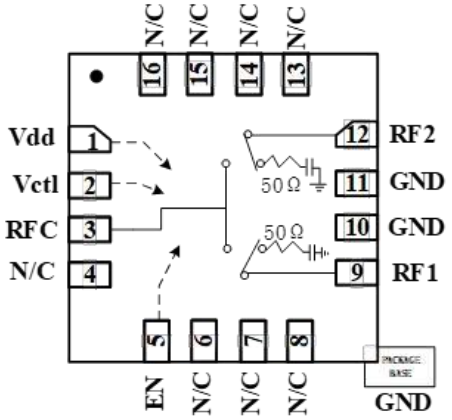


Figure 1 Functional block diagram (QFN16 package)

★2.Product Description

The TFSW0016TP is an absorption-type single-pole double-throw switch designed using GaAs technology. It operates from 10 MHz to 6 GHz and uses 0/+3V to +5V voltage to control the switching state, with control levels compatible with TTL/CMOS levels. The typical insertion loss is 0.6 dB, and the typical isolation is 52 dB. This product features small size, low insertion loss, high isolation, fast switching speed, and low DC power consumption.

★3.Application

- Microcell/3G/4G infrastructure
- Dedicated mobile wireless devices
- Test equipment
- Ultra-shortwave equipment

Ordering Information

Table 1 Ordering information

Device Model	Packaging	Describe
TFSW0016TP	QFN16	10MHz～6GHz Absorption-type Single-Pole Double-Throw Switch

★4.Technical Specifications

Table 2 Electrical performance parameters

Parameters		Min	Typ	Max	Unit
Insertion loss	0.01 GHz～3 GHz 3 GHz～4 GHz 4 GHz～6 GHz	- - -	-0.6 -0.7 -0.8	- - -	dB dB dB
Isolation	0.01GHz～2GHz 2GHz～6GHz	- -	-54 -40	- -	dB dB
Return loss (ON)	0.01 GHz～3 GHz 3 GHz～6 GHz	- -	- 18 - 12	- -	dB dB
Return loss (OFF)	0.01 GHz～6 GHz	-	- 15	-	dB
Input power 1 dB compression point	0.01 GHz～2.5 GHz	19	33	35	dBm
Input power third-order intermodulation point	0.03 GHz～4.2 GHz	43	44	-	dBm
Switching time characteristics tON (50% CTL-90% RF) tOFF (50% CTL-10% RF)	 200 MHz Pin = 0 dBm	 - -	 130 32	 - -	 ns ns
Test conditions: Vdd = +5V, Idd = 1mA, Vctl = 0/+5V, two-tone interval 1 MHz, Pin = 10 dBm/tone, Temp = +25℃					

★5.Absolute Maximum Rating

- Maximum operating voltage: +7V
- Maximum RF pass power: 36dBm@5V@2GHz, 34dBm@3V@2GHz
- Maximum RF absorb power: 36dBm@5V@2GHz, 34dBm@3V@2GHz
- Control voltage range: 0V～Vdd
- Maximum hot-switching power: 30dBm@2 GHz

Note:

The absolute maximum rating indicates the limit that the device can withstand. Exceeding the absolute maximum rating may cause permanent damage to the device. Long-term operation under absolute maximum rating conditions will affect the reliability of the device.

★6.Recommended Operating Conditions

- Operating voltage: 5V/3.3V
- Control threshold: 0V～0.8V (Low Level)
- 2.7V～Vdd (High Level)
- Operating current: <1 mA
- Operating temperature: -55℃~+125℃
- Storage temperature: -65℃~+150℃

ESD Warning

This product is an electrostatic sensitive device. Appropriate ESD precautions should be taken to avoid performance degradation or loss of function.

★7.Typical Operating Characteristics

Table 3 Demo Board Test Results

Test Items	Typical value								Unit
Frequency	10	200	1000	2000	3000	4000	5000	6000	MHz
Input RFC echo	-25	-25	- 17	-20	-20	- 13	- 11	- 10	dB
Output path echo	-24	-24	- 19	-24	-25	- 14	-20	- 19	dB
Output absorbed echo	-1	- 15	-22	-43	- 17	- 17	-21	-26	dB
Insertion loss	-0.7	-0.5	-0.4	-0.6	-0.6	-0.7	-0.9	-0.8	dB
Path isolation	-66	-67	-60	-52	-45	-44	-42	-40	dB
Port isolation	-71	-68	-51	-44	-40	-38	-35	-34	dB
Frequency	10	50	100	500	1000	1600	2000	2500	MHz
Input 1 dB compression point	19	24	27	32	33	34	34	33	dBm
Frequency	30	50	100	1000	2000	3000	4000	4200	MHz
Input third-order intermodulation	45	45	44	47	48	48	44	46	dBm
Switching Time	130ns rising switch					32ns descent switching			
Test conditions: Vdd = +5V, Idd = 1mA, Vctl = 0/+5V, two-tone interval 1 MHz, Pin = 10dBm/tone, Temp = +25℃									

★8.Test Curve

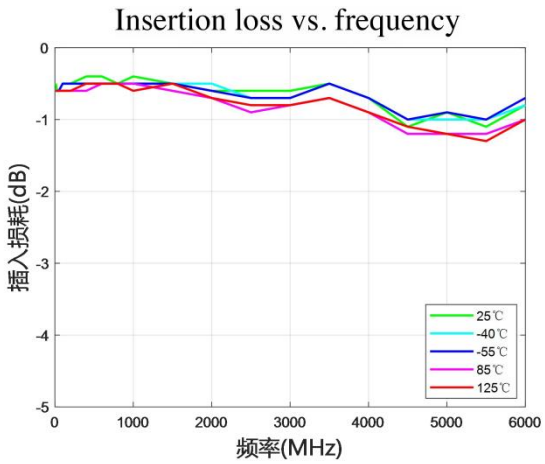


Figure 2 Insertion loss RFC and RF1/RF2

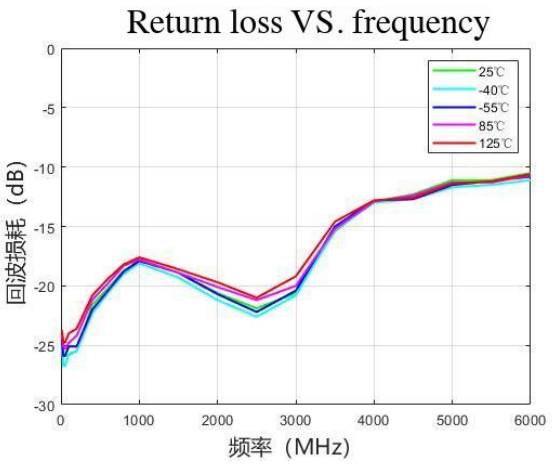


Figure 3 RFC return loss

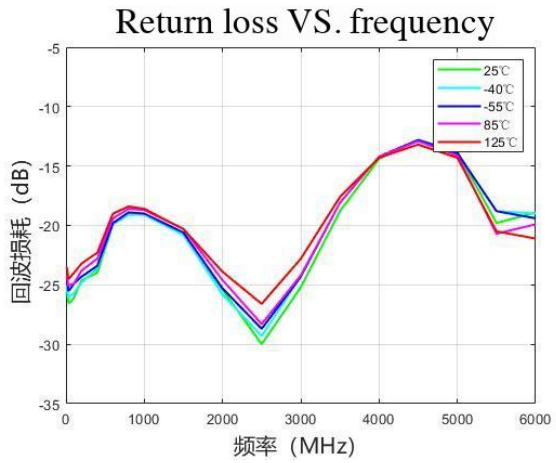


Figure 4 Return loss in RF1/RF2 on state

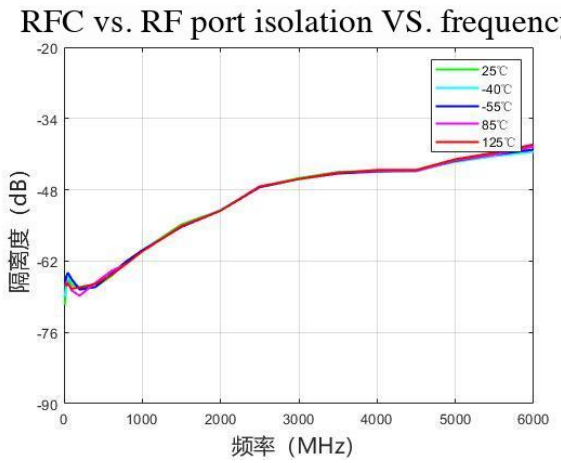


Figure 5 Isolation between RFC and RF1/RF2

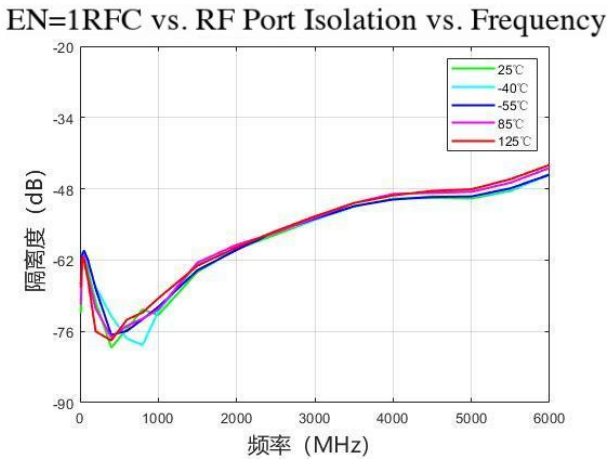


Figure 6 shows the isolation between the EN=1 RFC and RF ports.

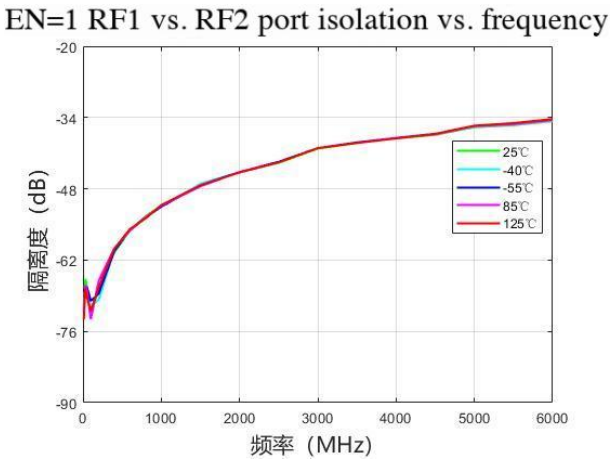


Figure 7 shows the isolation of the RF1 and RF2 ports

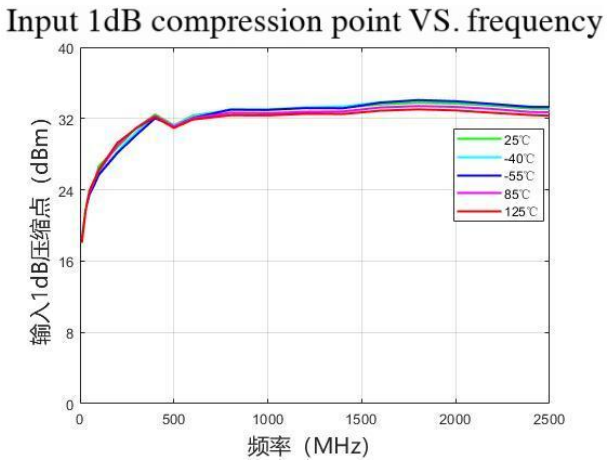


Figure 8 Input 1 dB compression point (+5V power supply)

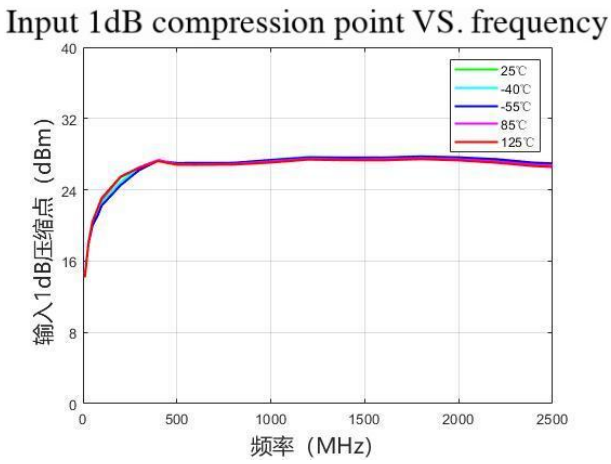


Figure 9 Input 1 dB compression point (+3V power supply)

★9.Typical Application Circuits

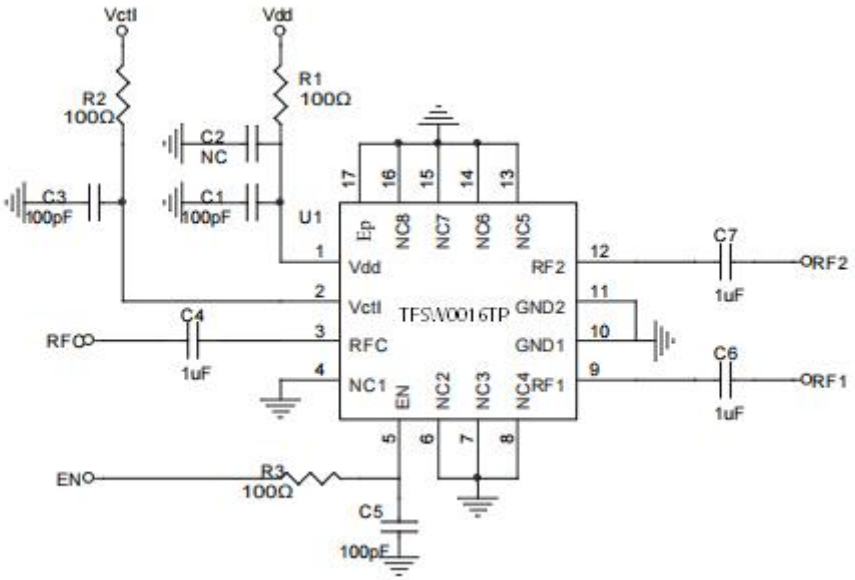
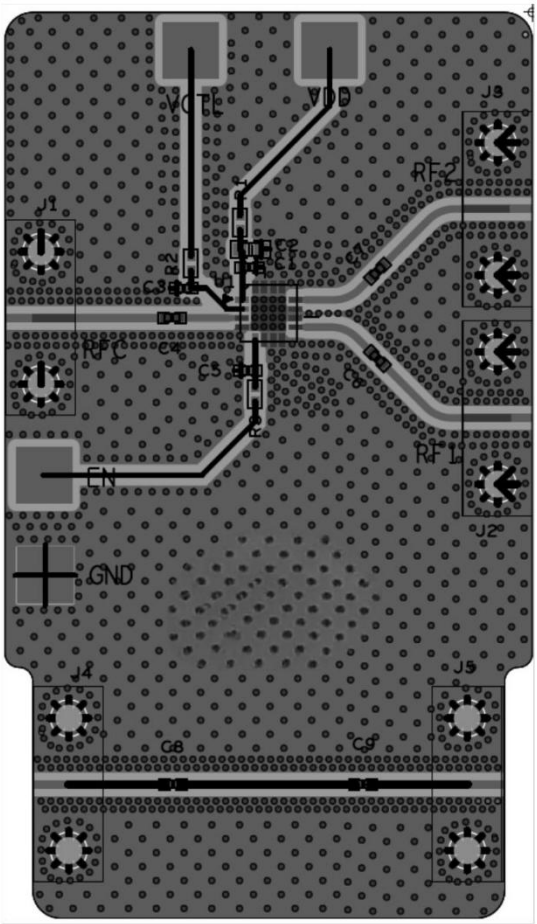


Figure 10 Typical application circuit

★10.Evaluation Board Information



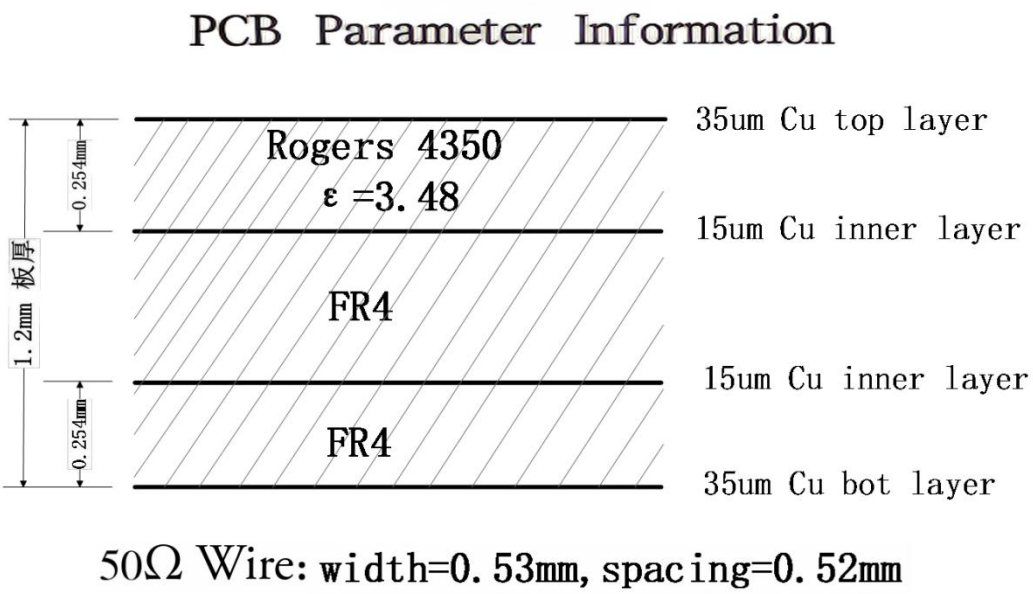


Figure 11 Evaluation Board Information

★11.Pin Function Description

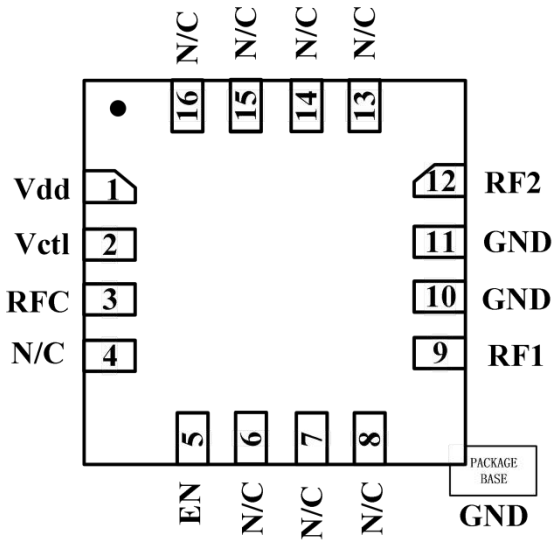


Figure 12 Pin Arrangement

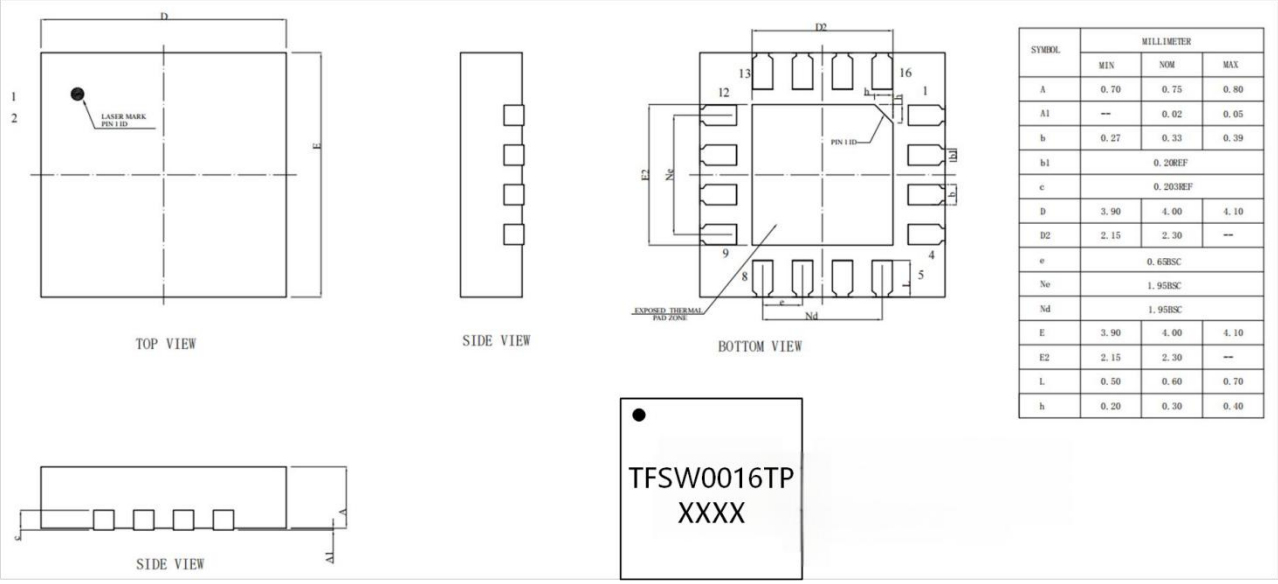
Table 4 Pin Description

Pin number	Pin Name	Describe
4,6,7,8, 13, 14, 15, 16	NC	The pin is not internally connected; it is recommended to connect this pin to RF/DC ground.
1	VDD	Power supply pin
2	Vctl	Control pin
5	EN	Enable pin.
10, 11	GND	Back ground pin; this pin must be connected to the RF ground of the PCB.
3,9, 12	RFC, RF1, RF2	The RF input/output pin, which is DC coupled and matched to 50 Ω, requires an off-chip DC blocking capacitor.
-	EP	Exposed solder pads, grounded.

Table 5 Control Voltage Truth Table

Control input		Signal flow direction	
EN	Vctrl	RFC/RF1	RFC/RF2
0	0	OFF	ON
0	1	ON	OFF
1	0	OFF	OFF
1	1	OFF	OFF

★12.Package Information (Unit: mm)



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	--	0.02	0.05
b	0.27	0.33	0.39
b1	0.20REF		
c	0.203REF		
D	3.90	4.00	4.10
D2	2.15	2.30	--
e	0.65BSC		
Ne	1.95BSC		
Nd	1.95BSC		
E	3.90	4.00	4.10
E2	2.15	2.30	--
L	0.50	0.60	0.70
h	0.20	0.30	0.40