

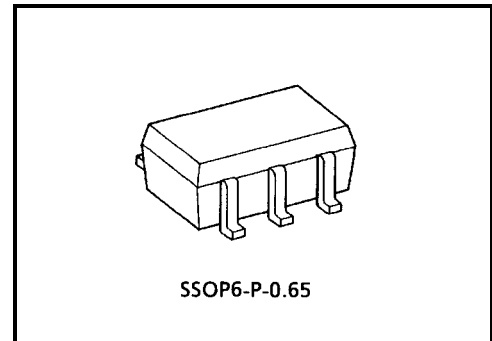
# TG2211FT

## RF SPDT Switch

- Antenna switches for Bluetooth class 2 and 3
- Switch the diversity antenna
- Switch the receive filter for mobile communication
- Switch the local signal

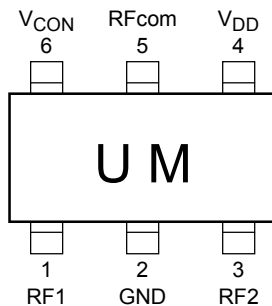
### Features

- Fewer external parts: On-chip inverter circuit
- Low insertion Loss: LOSS = 0.45dB (typ.) @1.0 GHz  
= 0.55dB (typ.) @2.5 GHz
- High isolation: ISL = 25dB (typ.) @1.0 GHz  
= 24dB (typ.) @2.5 GHz
- Low voltage operation:  $V_{CON} = 0\text{ V}/2.7\text{ V}$
- Small package: TU6 package (mold size =  $2.0 \times 1.25 \times 0.6\text{ mm}$ )

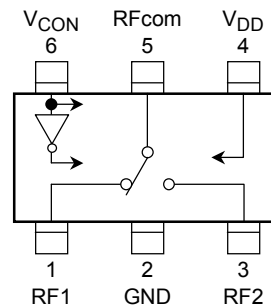


Weight: 0.008 g (typ.)

### Pin Connection and Marking (top view)



### Equivalent Circuit



### Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Supply voltage	V <sub>DD</sub>	6	V
Control voltage	V <sub>CON</sub>	6	V
Input power	P <sub>i</sub>	350	mW
Operating temperature range	T <sub>opr</sub>	-40~85	°C
Storage temperature range	T <sub>stg</sub>	-55~125	°C

## Electrical Characteristics

( $V_{DD} = 2.7\text{ V}$ ,  $V_{CON(Hi)} = 2.7\text{ V}$ ,  $V_{CON(LO)} = 0\text{ V}$ ,  $T_a = 25^\circ\text{C}$ ,  $Z_g = Z_l = 50\ \Omega$ )

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Insertion loss		LOSS (1)	1	$f = 1.0\text{ GHz}$ , $P_i = 0\text{ dBmW}$	—	0.45	0.75	dB
		LOSS (2)	1	$f = 2.0\text{ GHz}$ , $P_i = 0\text{ dBmW}$	—	0.5	0.8	dB
		LOSS (3)	1	$f = 2.5\text{ GHz}$ , $P_i = 0\text{ dBmW}$	—	0.55	0.85	dB
Isolation	between RFcom to RF1 between RFcom to RF2	ISL (1)	1	$f = 1.0\text{ GHz}$ , $P_i = 0\text{ dBmW}$	20	25	—	dB
		ISL (2)	1	$f = 2.0\text{ GHz}$ , $P_i = 0\text{ dBmW}$	20	25	—	dB
		ISL (3)	1	$f = 2.5\text{ GHz}$ , $P_i = 0\text{ dBmW}$	20	24	—	dB
	between RF1 to RF2	ISL (4)	1	$f = 1.0\text{ GHz}$ , $P_i = 0\text{ dBmW}$	20	25	—	dB
		ISL (5)	1	$f = 2.0\text{ GHz}$ , $P_i = 0\text{ dBmW}$	17	20	—	dB
		ISL (6)	1	$f = 2.5\text{ GHz}$ , $P_i = 0\text{ dBmW}$	14	17	—	dB
Input power at 1dB gain compression		$P_{i1dB}$ (1)	1	$f = 1\text{ GHz}$	17	23	—	dBmW
		$P_{i1dB}$ (2)	1	$f = 2\text{ GHz}$	17	23	—	
		$P_{i1dB}$ (3)	1	$f = 2.5\text{ GHz}$	16	22	—	
Supply current		$I_{DD}$	—	When no signal	—	0.20	0.35	mA
Control current		$I_{CON}$	—	When no signal	—	0.03	0.05	mA
Switching time		$t_{sw}$	1	$f = 100\text{ MHz}$ , $P_i = 0\text{ dBmW}$	—	80	200	ns

## Switch Condition ( $V_{DD} = Hi$ )

Vcon potential	Internal connection	Rfcom – RF1	Rfcom – RF2
Hi		ON	OFF
Low		OFF	ON

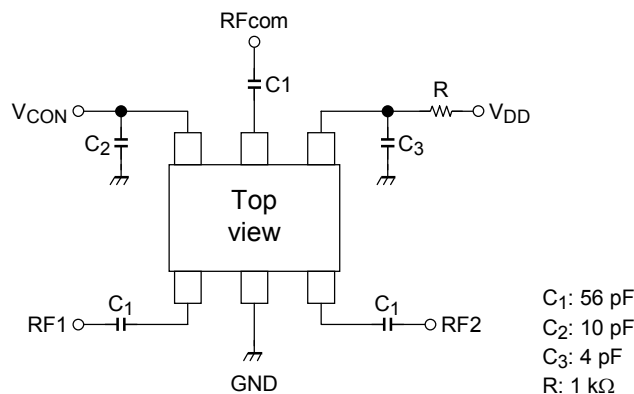
## Pin Description

Pin No.	Pin Symbol	Description
1	RF1	RF pin. Connect to RFcom when $V_{CON}$ goes High. Connect a capacitor ( $C_1$ ) for blocking the internal DC voltage of the IC.
2	GND	GND pin. Ground in the vicinity of this pin.
3	RF2	RF pin. Connect to RFcom when $V_{CON}$ goes Low. Connect a capacitor ( $C_1$ ) for blocking the internal DC voltage of the IC.
4	$V_{DD}$	Power supply pin and RF GND pin. When the device is operating, always apply the voltage of "High level" to this pin. This pin should be grounded by a capacitor ( $C_3$ ) as close as possible for RF performance. The value of this capacitor affects the isolation. To protect RF signal leakage, connect a 1-k $\Omega$ resistor ( $R$ ).
5	RFcom	RF pin. Connection can be switched to RF1 or RF2 by varying the level of the voltage applied to the $V_{CON}$ pin. Connect a capacitor ( $C_1$ ) for blocking the internal DC voltage of the IC.
6	$V_{CON}$	Voltage control pin. The switch connections can be controlled by varying the level of the voltage to this pin. Connect a bypass capacitor ( $C_2$ ) to this pin.

## Caution

This device is sensitive to electrostatic discharge. When using this device, please ensure that all tools and equipment are earthed.

## Test Circuit 1 (RF Test Circuit)

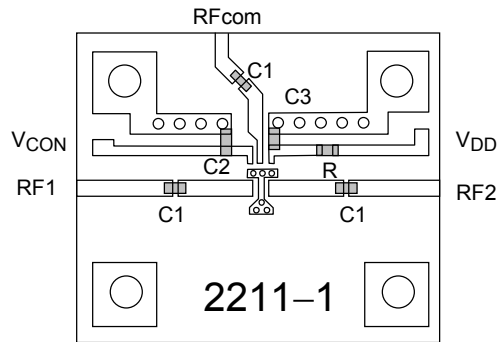


Please fix the value of each capacity for using frequency and circuit.

## Reference Value of External Parts

	50~300 MHz	300~500 MHz	0.5~2.5 GHz
$C_1$	1000 pF	100 pF	56 pF
$C_2$	100 pF	10 pF	10 pF
$C_3$	100 pF	100 pF	4 pF
$R$	1 k $\Omega$	1 k $\Omega$	1 k $\Omega$

**Evaluation Board**



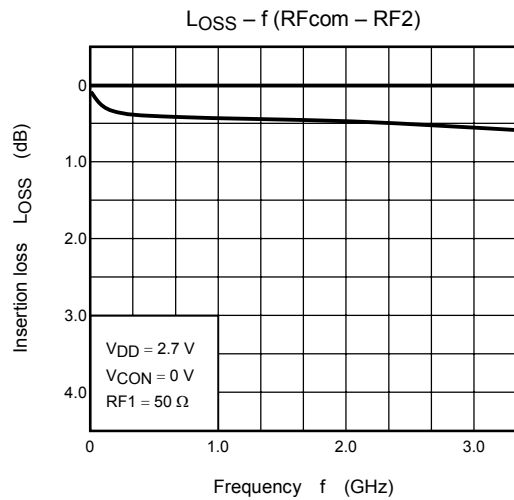
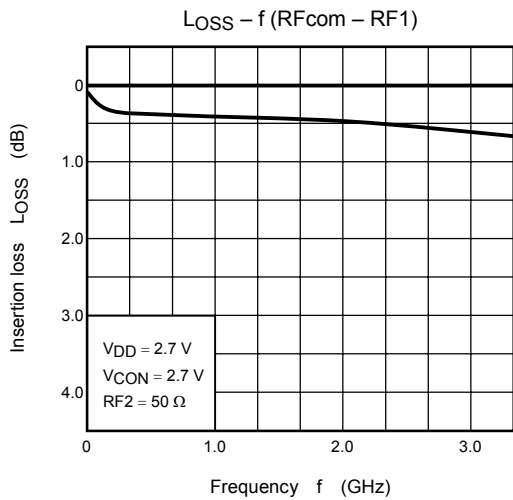
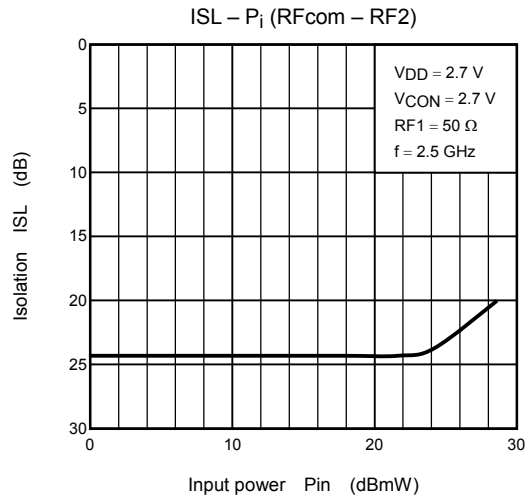
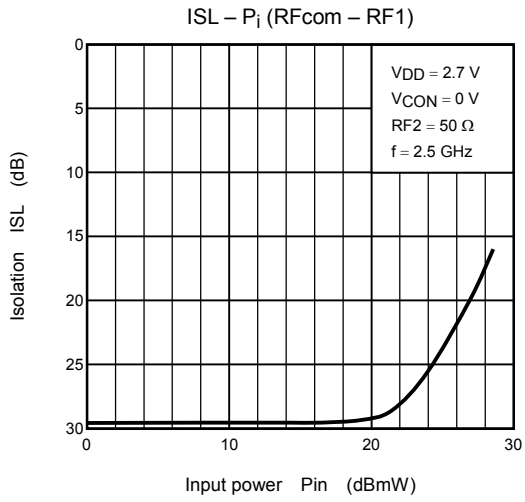
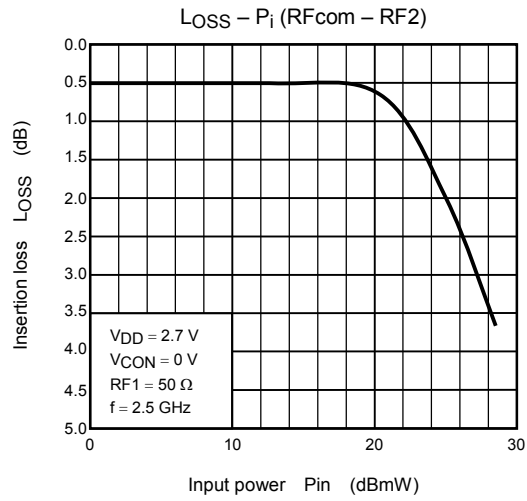
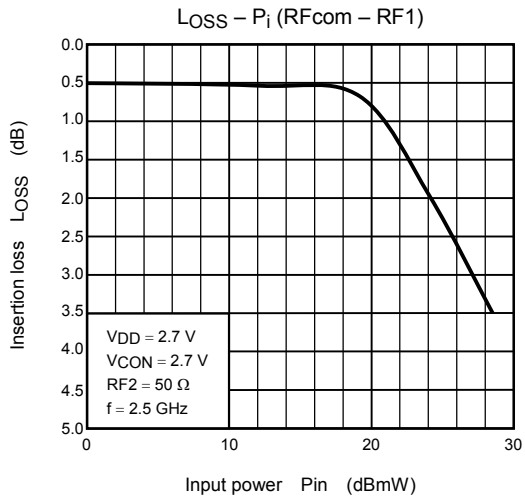
**Notice**

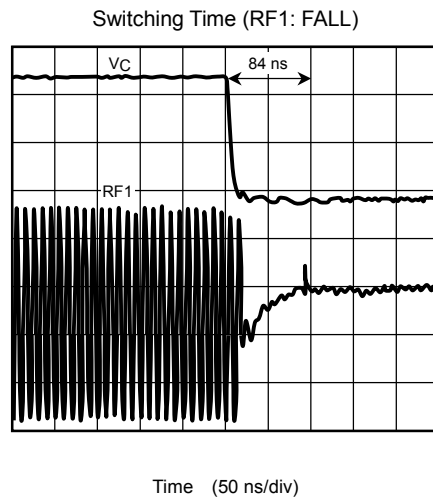
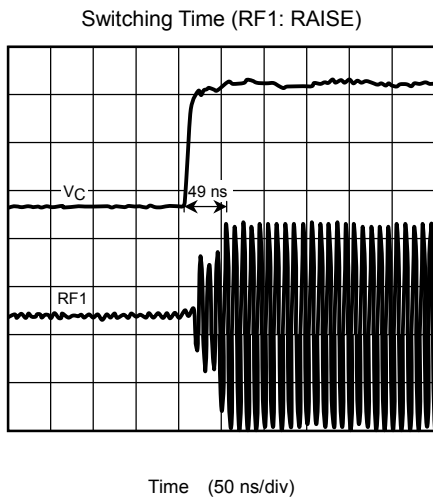
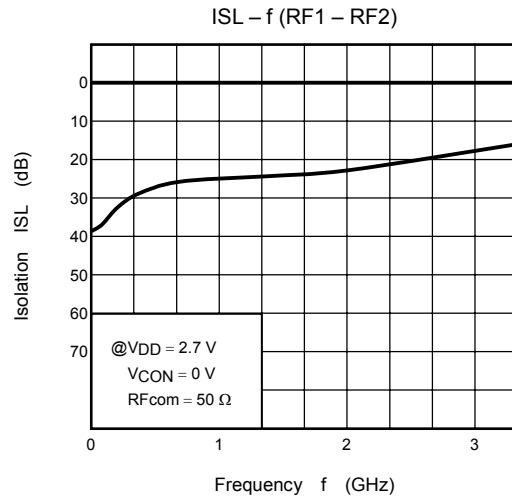
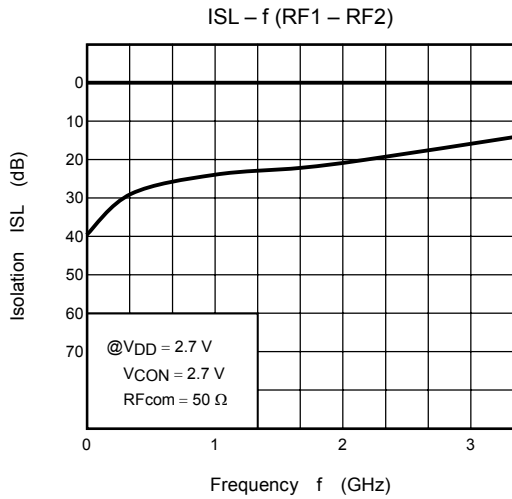
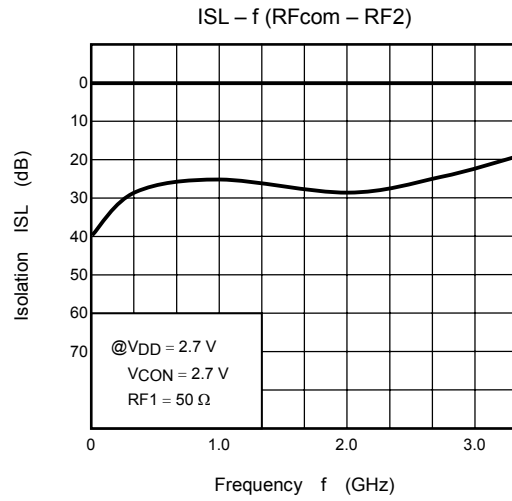
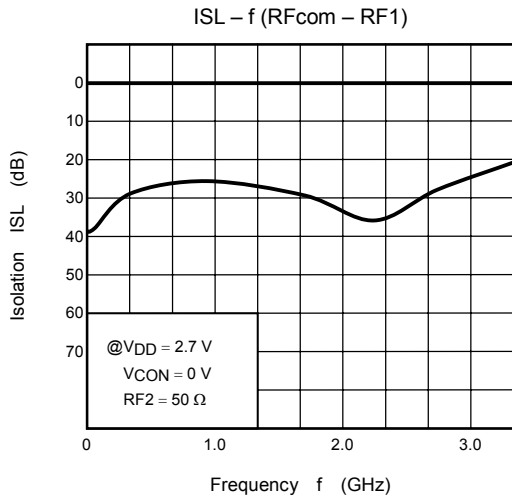
The circuits and measurements contained in this document are given only in the context of as examples of applications for these products.

Moreover, these example application circuits are not intended for mass production, since the high-frequency characteristics (the AC characteristics) of these devices will be affected by the external components which the customer uses, by the design of the circuit and by various other conditions.

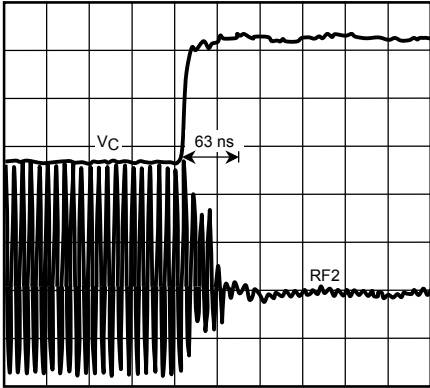
It is the responsibility of the customer to design external circuits which correctly implement the intended application, and to check the characteristics of the design.

TOSHIBA assume no responsibility for the integrity of customer circuit designs or applications.



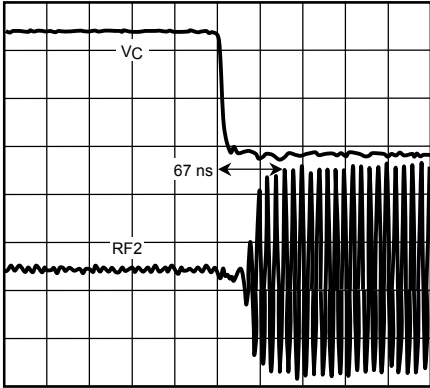


Switching Time (RF2: RAISE)



Time (50 ns/div)

Switching Time (RF2: FALL)

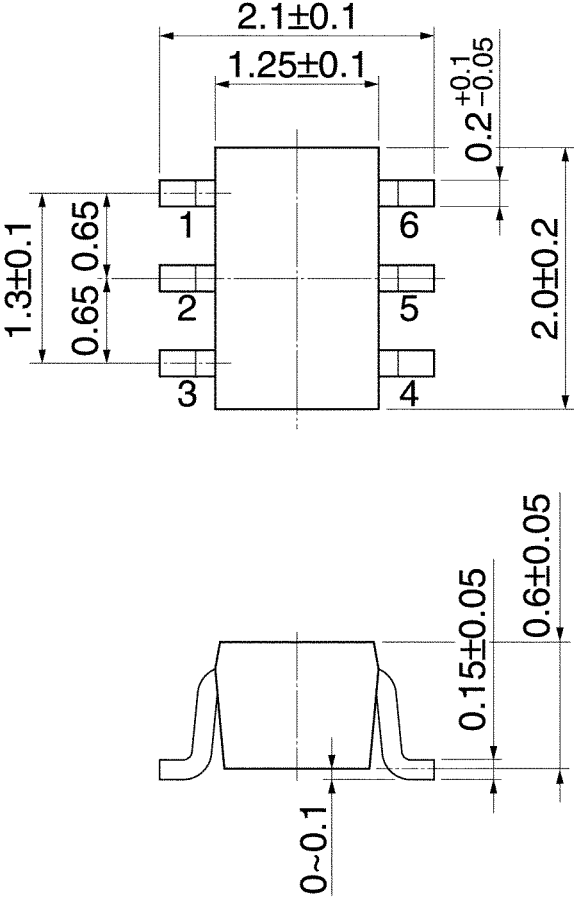


Time (50 ns/div)

Package Dimensions

SSOP6-P-0.65

Unit: mm



Weight: 0.008 g (typ.)



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020704EAC

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