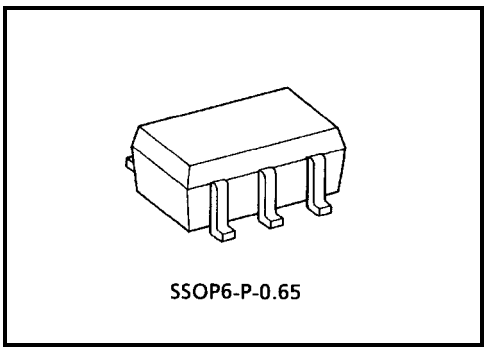
TOSHIBA GaAs Linear Integrated Circuit GaAs Monolithic

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

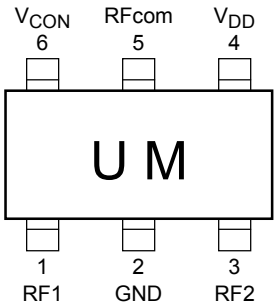


Weight: 0.008 g (typ.)

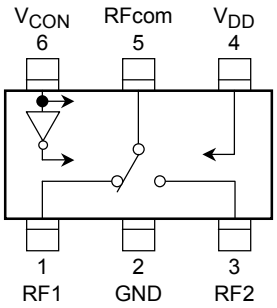
Features

- Fewer external parts: On-chip inverter circuit
- Low insertion Loss: L_{OSS} = 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 V/2.7 V
- Small package: TU6 package (mold size = 2.0 × 1.25 × 0.6 mm)

Pin Connection and Marking (top view)



Equivalent Circuit



Maximum Ratings (Ta = 25°C)

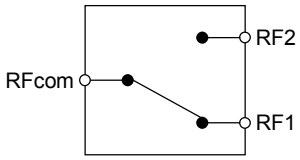
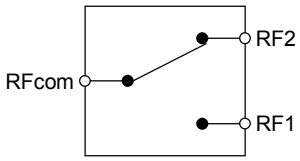
Characteristics	Symbol	Rating	Unit
Supply voltage	V_{DD}	6	V
Control voltage	V_{CON}	6	V
Input power	P_i	350	mW
Operating temperature range	T_{opr}	−40~85	°C
Storage temperature range	T_{stg}	−55~125	°C

Electrical Characteristics

(V_{DD} = 2.7 V, $V_{CON(Hi)}$ = 2.7 V, $V_{CON(LO)}$ = 0 V, Ta = 25°C, Zg = Zl = 50 Ω)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Insertion loss		L_{OSS} (1)	1	f = 1.0 GHz, P_i = 0dBmW	—	0.45	0.75	dB
		L_{OSS} (2)	1	f = 2.0 GHz, P_i = 0dBmW	—	0.5	0.8	dB
		L_{OSS} (3)	1	f = 2.5 GHz, P_i = 0dBmW	—	0.55	0.85	dB
Isolation	between RFcom to RF1 between RFcom to RF2	ISL (1)	1	f = 1.0 GHz, P_i = 0dBmW	20	25	—	dB
		ISL (2)	1	f = 2.0 GHz, P_i = 0dBmW	20	25	—	dB
		ISL (3)	1	f = 2.5 GHz, P_i = 0dBmW	20	24	—	dB
	between RF1 to RF2	ISL (4)	1	f = 1.0 GHz, P_i = 0dBmW	20	25	—	dB
		ISL (5)	1	f = 2.0 GHz, P_i = 0dBmW	17	20	—	dB
		ISL (6)	1	f = 2.5 GHz, P_i = 0dBmW	14	17	—	dB
Input power at 1dB gain compression		P_{i1dB} (1)	1	f = 1 GHz	17	23	—	dBmW
		P_{i1dB} (2)	1	f = 2 GHz	17	23	—	
		P_{i1dB} (3)	1	f = 2.5 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 MHz, P_i = 0dBmW	—	80	200	ns

Switch Condition (V_{DD} = Hi)

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

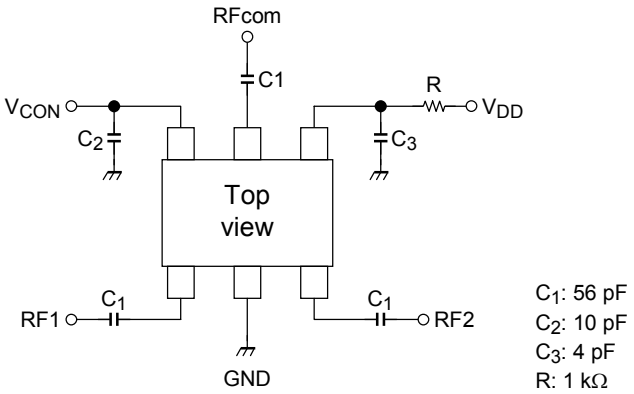
Pin Description

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 (C3) as close as possible for RF performance. The value of this capacitor affects the isolation. To protect RF signal leakage, connect a 1-kΩ 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)

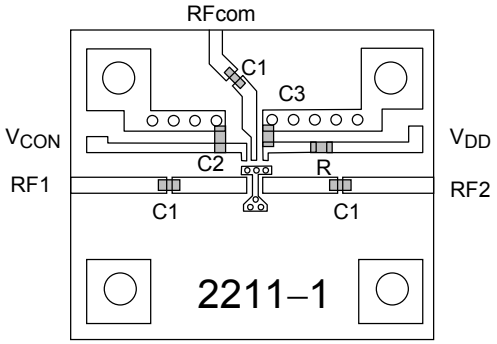


Please fix the value of each capacity for using frequency and circuit.

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 kΩ	1 kΩ	1 kΩ

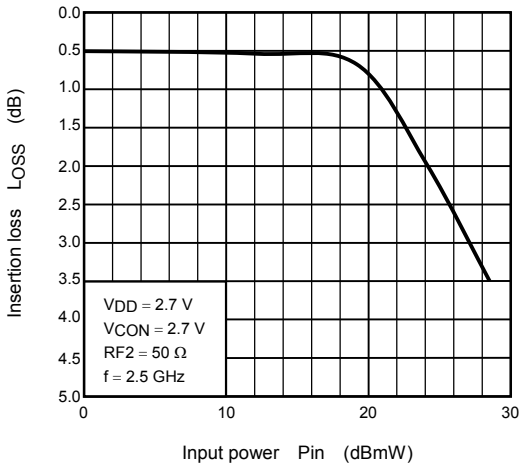
Evaluation Board



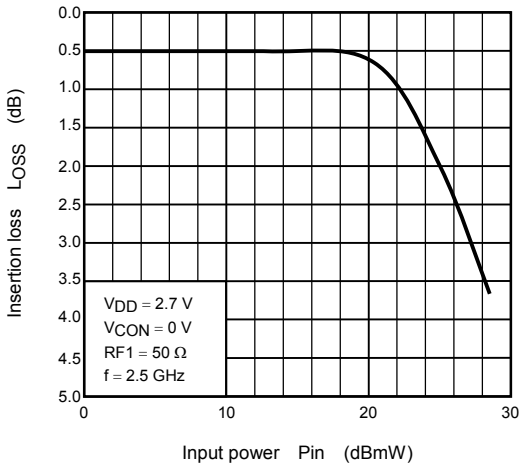
Notice

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.

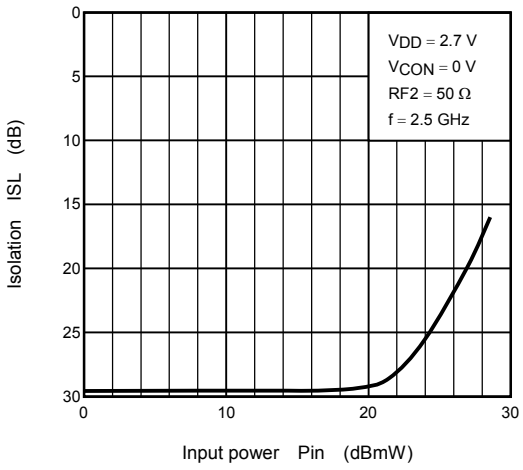
L_{OSS} – P_i (RFcom – RF1)



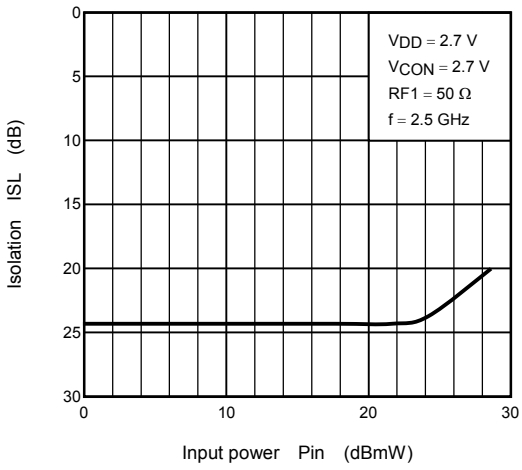
L_{OSS} – P_i (RFcom – RF2)



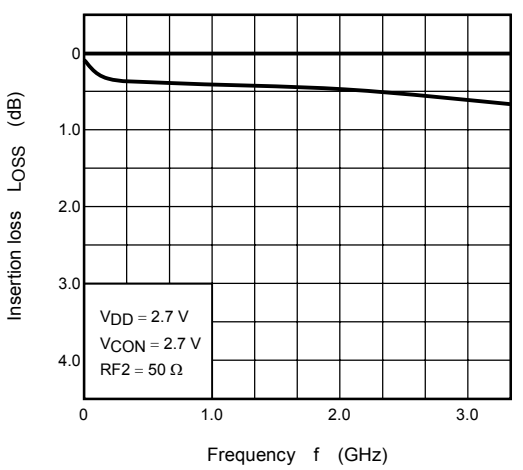
ISL – P_i (RFcom – RF1)



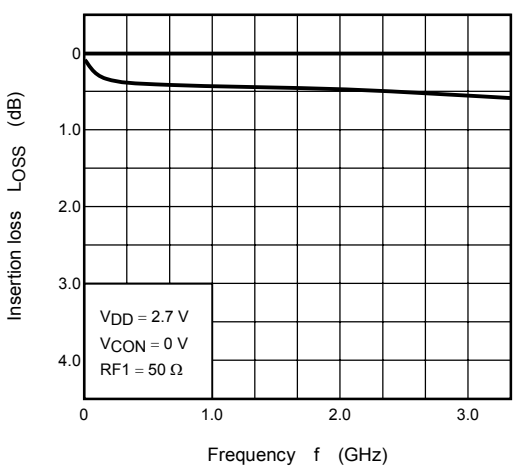
ISL – P_i (RFcom – RF2)



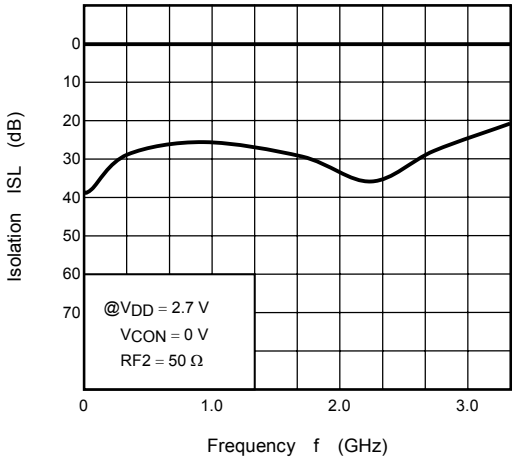
L_{OSS} – f (RFcom – RF1)



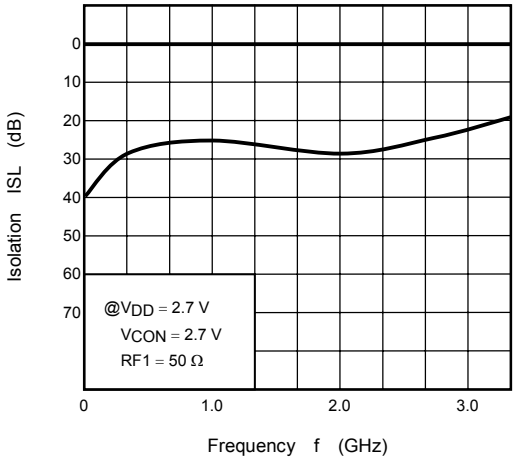
L_{OSS} – f (RFcom – RF2)



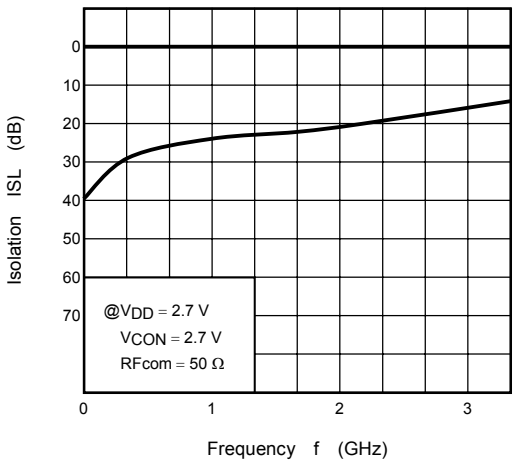
ISL – f (RFcom – RF1)



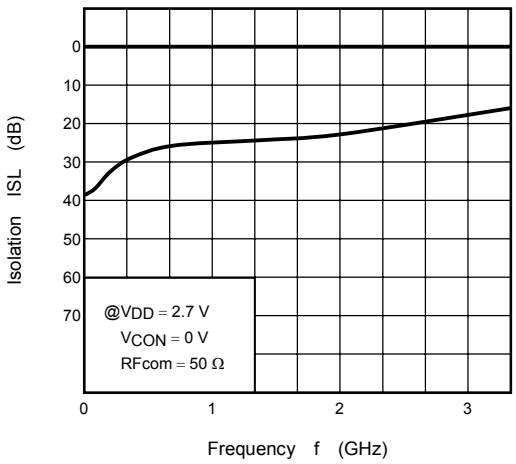
ISL – f (RFcom – RF2)



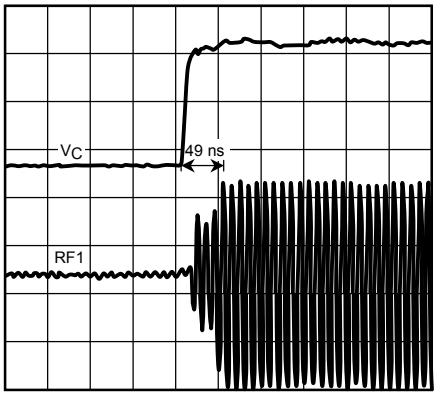
ISL – f (RF1 – RF2)



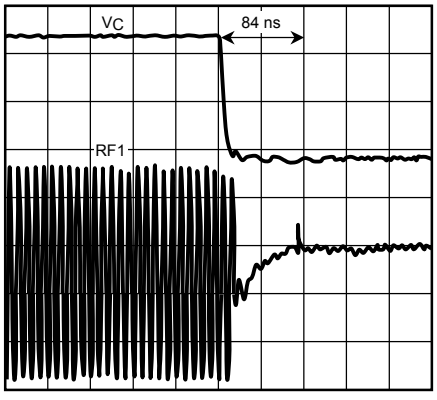
ISL – f (RF1 – RF2)



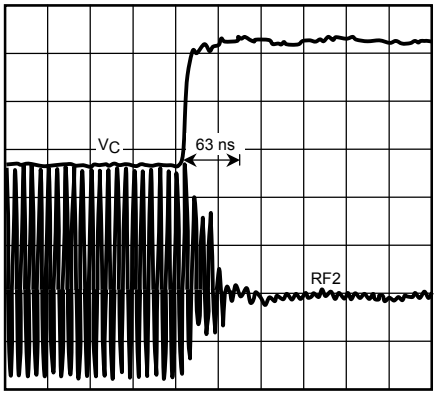
Switching Time (RF1: RAISE)



Switching Time (RF1: FALL)

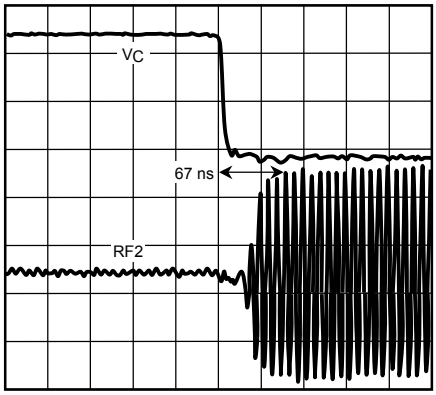


Switching Time (RF2: RAISE)



Time (50 ns/div)

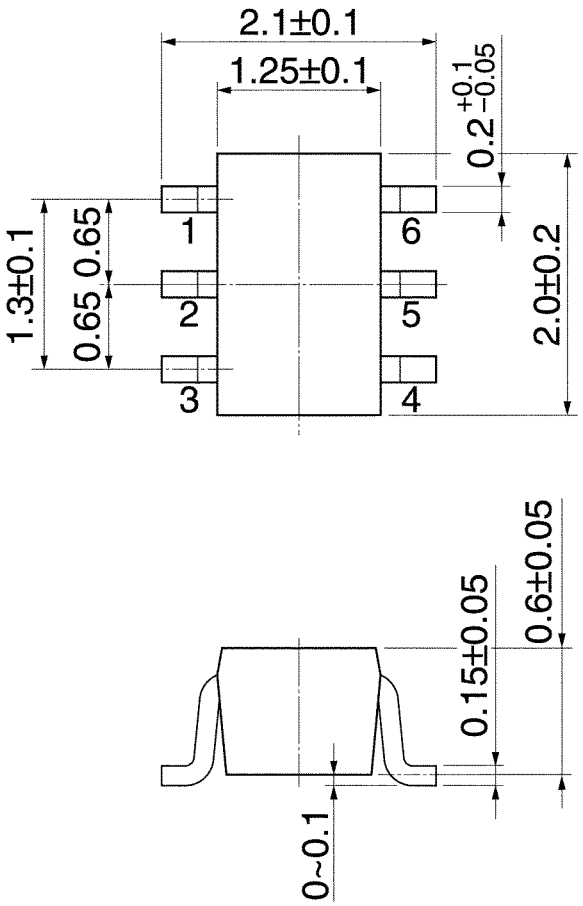
Switching Time (RF2: FALL)



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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