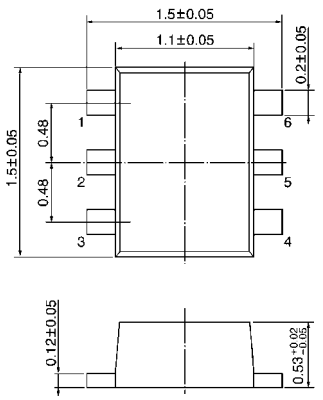
TOSHIBA GaAs Linear Integrated Circuit GaAs Monolithic

TG2214S

RF SPDT Switch

Antenna switch for Bluetooth class 2, 3
Diversity antenna switching
Filter switching for mobile communication
Local signal switching

Unit: mm



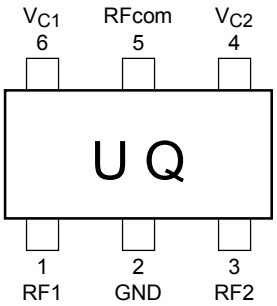
JEDEC	—
JEITA	—
TOSHIBA	2-2Q1A

Weight: 2.1 mg (typ.)

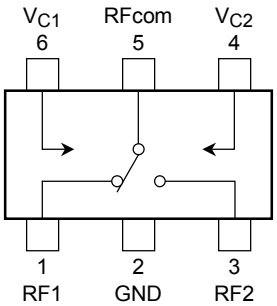
Features

- Low insertion Loss: L_{OSS} = 0.35dB (typ.) @1.0 GHz
  = 0.45dB (typ.) @2.5 GHz
- High isolation: ISL = 24dB (typ.) @1.0 GHz
  = 22dB (typ.) @2.5 GHz
- Low voltage operation: V_{CON} = 0 V/2.7 V
- Small package: sES6 package (1.5 × 1.5 × 0.52 mm)

Pin Assignment, Marking (top view)



Block Diagram



Maximum Ratings (Ta = 25°C)

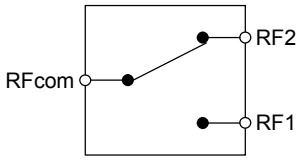
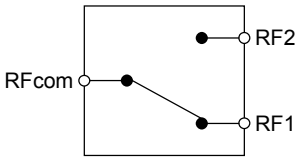
Characteristics	Symbol	Rating	Unit
Control voltage	V_{C1}	6	V
	V_{C2}	6	
Input power	P_i	200	mW
Total power dissipation	P_D (Note)	100	mW
Operating temperature range	T_{opr}	−40 to 85	°C
Storage temperature range	T_{stg}	−55 to 125	°C

Note: When mounted on the glass epoxy of 2.5 cm^2 × 1.6 t

Electrical Characteristics ($V_{CON(Hi)}$ = 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	—	0.35	0.65	dB
	L_{OSS} (2)	1	f = 2.0 GHz, P_i = 0dBmW	—	0.40	0.70	
	L_{OSS} (3)	1	f = 2.5 GHz, P_i = 0dBmW	—	0.45	0.75	
Isolation	ISL (1)	1	f = 1.0 GHz, P_i = 0dBmW	20	24	—	dB
	ISL (2)	1	f = 2.0 GHz, P_i = 0dBmW	20	24	—	
	ISL (3)	1	f = 2.5 GHz, P_i = 0dBmW	18	22	—	
Input power at 1dB gain compression	P_{i1dB}	1	f = 2.5 GHz	12	17	—	dBmW
Control current	I_{CON}	—	no RF signal input	—	—	0.01	mA
Switching time	t_{sw}	1		—	50	200	ns

Switch Connection

V_{C1}	V_{C2}	Switch Condition	RFcom – RF1	RFcom – RF2
Hi	Low		OFF	ON
Low	Hi		ON	OFF

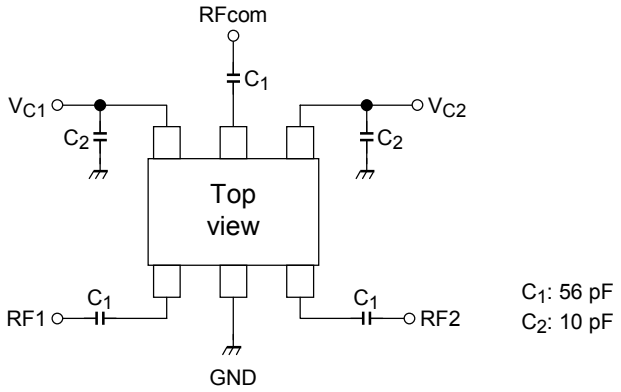
Caution

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

Pin Information

Pin	Symbol	Description
1	RF1	RF port. When V_{C1} = Lo and V_{C2} = Hi, this port is connected to RFcom. An external DC blocking capacitor (C_1) is required for internal DC bias blocking.
2	GND	GND port. The distance between this pin and ground pattern should be as short as possible for RF performance.
3	RF2	RF port. When V_{C1} = Hi and V_{C2} = Lo, this port is connected to RFcom. An external DC blocking capacitor (C_1) is required for internal DC bias blocking.
4	V_{C2}	Control port. Switching operation is controlled by the voltage of this port. The bypass capacitor (C_2) is required.
5	RFcom	Common RF port. Switching this port to RF1 or RF2 is controlled by "V_{C1}" and "V_{C2}" voltage. An external DC blocking capacitor (C_1) is required for internal DC bias blocking.
6	V_{C1}	Control port. Switching operation is controlled by the voltage of this port. The bypass capacitor (C_2) is required.

Test Circuit 1 (RF Test Circuit)

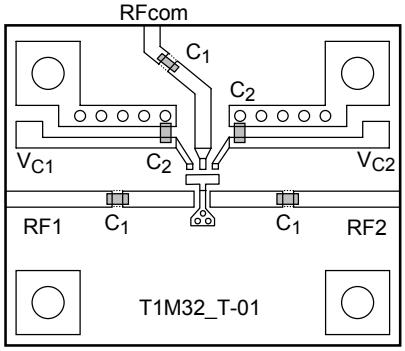


The values of capacitors depends on the application frequency range and the board pattern layout.
Board design and external components should be considered this.
Please refer to the Recommend External Parts Table below.

Reference External Parts

	50 MHz to 300 MHz	300 MHz to 500 MHz	0.5 GHz to 2.5 GHz
C_1	1000 pF	100 pF	56 pF
C_2	100 pF	10 pF	10 pF

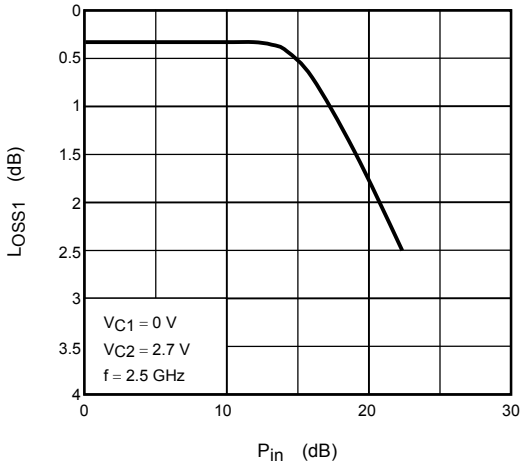
Test Board



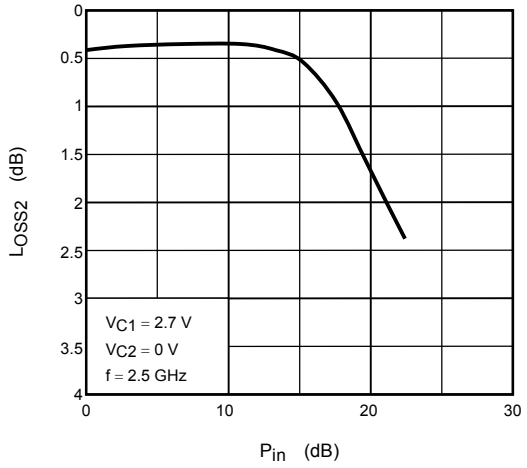
Notice

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.

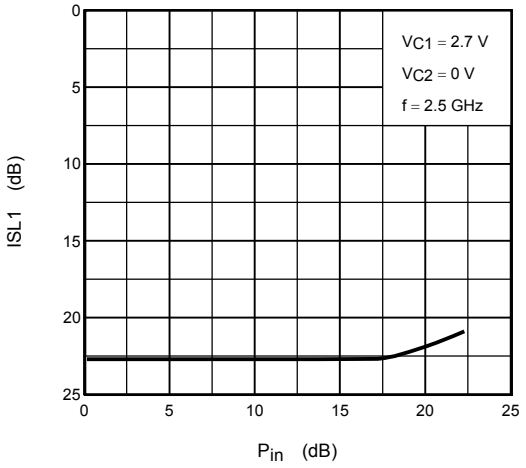
L_{OSS} – P_{in} (RFcom – RF1)



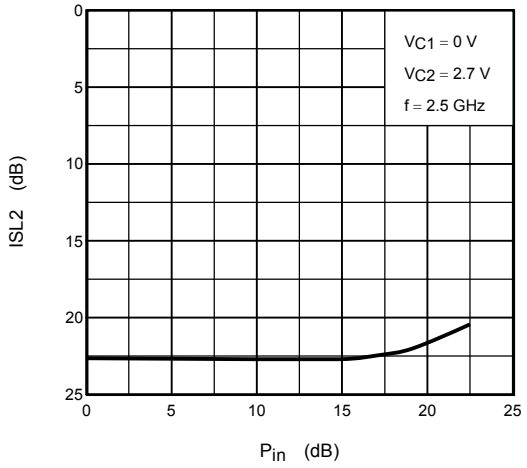
L_{OSS} – P_{in} (RFcom – RF2)



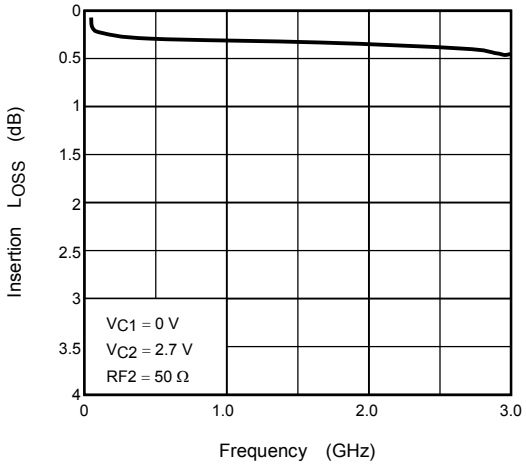
ISL – P_{in} (RFcom – RF1)



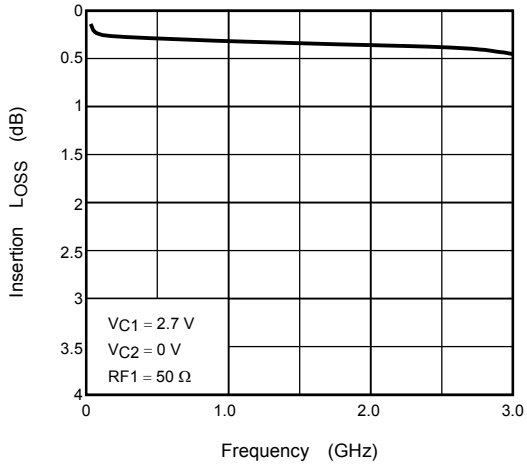
ISL – P_{in} (RFcom – RF2)



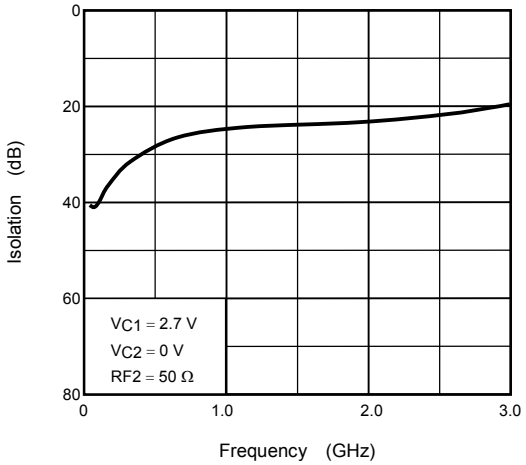
L_{OSS} – f (RFcom – RF1)



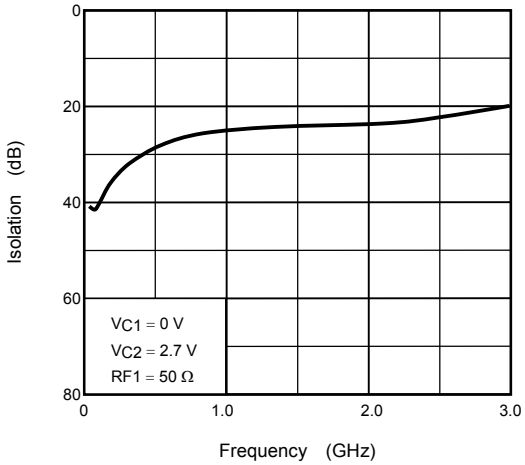
L_{OSS} – f (RFcom – RF2)



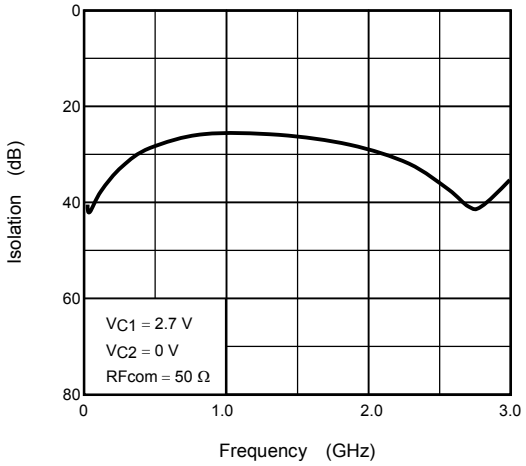
ISL – f (RFcom – RF1)



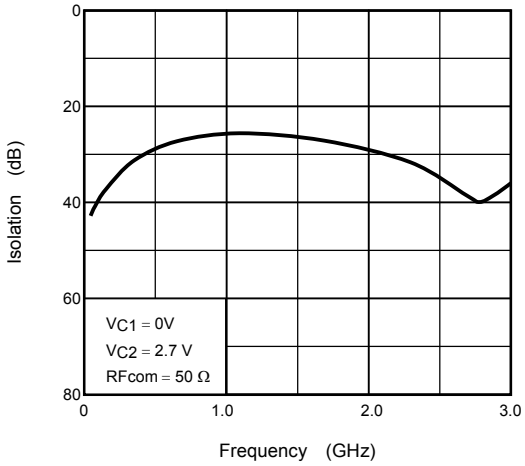
ISL – f (RFcom – RF2)



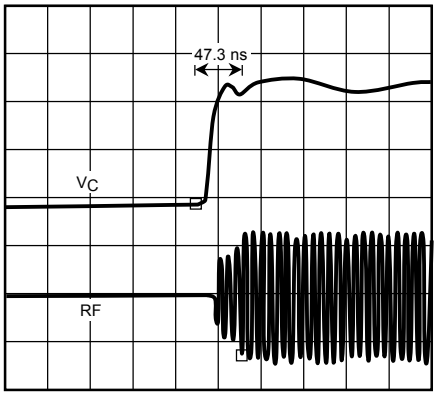
ISL – f (RF1 – RF2)



ISL – f (RF1 – RF2)

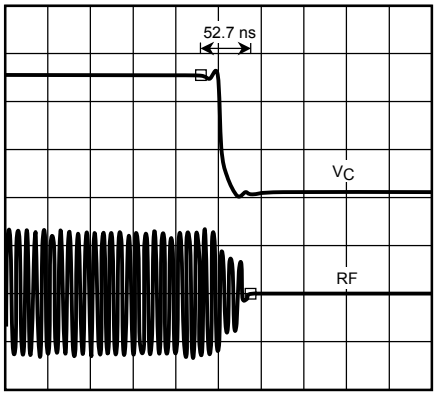


Switching time (RAISE)



Time (50 ns/div)

Switching time (FALL)



Time (50 ns/div)

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020704EAC

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