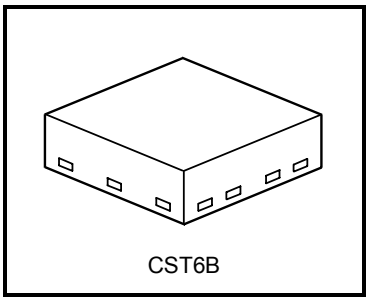
TOSHIBA GaAs Linear Integrated Circuit GaAs Monolithic

TG2217CTB

RF SPDT Switch

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

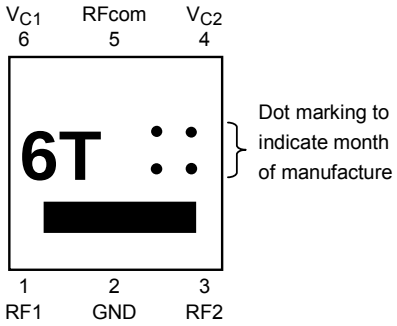


Weight: 0.0012 g (typ.)

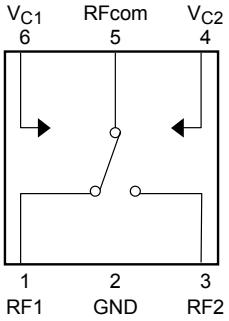
Features

- Low insertion loss: Loss = 0.35 dB (typ) @1.0 GHz
  = 0.45 dB (typ) @2.5 GHz
- High isolation: ISL = 24 dB (typ) @1.0 GHz
  = 22 dB (typ) @2.5 GHz
- Low-voltage operation: V_C = 0 V / 2.6 V
- Ultra-small package: CST6B package (1.0 × 1.0 × 0.38 mm)

Pin Assignment, Marking (top view)



Block Diagram



Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Control voltage	V_C (max)	6	V
	V_C (min)	−0.5	
Control voltage difference	ΔV_C (Note 1)	6	V
Input power	P_i	200	mW
Total power dissipation	P_D (Note 2)	100	mW
Operating temperature range	T_{opr}	−40 to 85	°C
Storage temperature range	T_{stg}	−55 to 150	°C

Note 1: $\Delta V_C = | V_{C1} - V_{C2} |$

Note 2: When mounted on a 2.5 cm^2 × 1.6 mm t glass-epoxy PCB.

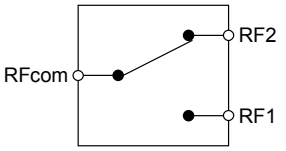
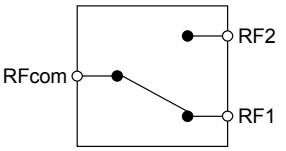
Electrical Characteristics (V_C (H) = 2.6 V, V_C (L) = 0 V, Ta = 25°C, Zg = Zl = 50 Ω)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Insertion loss	Loss (1)	f = 1.0 GHz, Pi = 0 dBmW	—	0.35	0.65	dB
	Loss (2)	f = 2.0 GHz, Pi = 0 dBmW	—	0.40	0.70	
	Loss (3)	f = 2.5 GHz, Pi = 0 dBmW	—	0.45	0.75	
Isolation	ISL (1)	f = 1.0 GHz, Pi = 0 dBmW	20	24	—	dB
	ISL (2)	f = 2.0 GHz, Pi = 0 dBmW	20	24	—	
	ISL (3)	f = 2.5 GHz, Pi = 0 dBmW	18	22	—	
Input power at 1 dB gain compression	P_{i1dB}	f = 2.5 GHz	14	17	—	dBmW
Control current	I_C	No RF signal input	—	—	0.01	mA
Switching time	t_{sw}		—	50	200	ns

Recommended Voltage Range (Ta = 25°C)

Characteristic	Symbol	Min	Typ.	Max	Unit
Control voltage	V_C (H)	2.4	2.6	2.8	V
	V_C (L)	-0.2	0	0.2	V
Control voltage difference	ΔV_C	2.4	2.6	2.8	V

Switch Connection

V_{C1}	V_{C2}	Switch Condition	Rfcom – RF1	Rfcom – RF2
High	Low		OFF	ON
Low	High		ON	OFF

This is a lead-free (Pb-free) product.

Caution

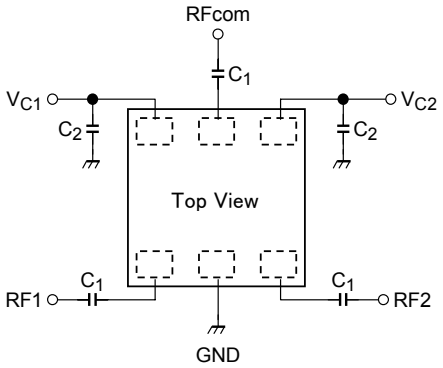
This device is sensitive to electrostatic discharge. When handling the device, ensure that the environment is protected against electrostatic discharge by using an earth strap, a conductive mat and an ionizer.

Do not apply DC voltage directly to the RF pin. Always connect a DC blocking capacitor.

Pin Description

Pin	Symbol	Description
1	RF1	RF port. When V_{C1} = Low and V_{C2} = High, this port is connected to RFcom. An external DC blocking capacitor is required for DC bias blocking.
2	GND	GND port. The distance between this pin and the ground pattern should be as short as possible for better RF performance.
3	RF2	RF port. When V_{C1} = High and V_{C2} = Low, this port is connected to RFcom. An external DC blocking capacitor is required for DC bias blocking.
4	V_{C2}	Control port. Switching operation is controlled by the voltage of this port. A bypass capacitor is required, and should be placed as close to the port as possible.
5	RFcom	Common RF port. Switching this port to RF1 or RF2 is controlled by the voltage of V_{C1} and V_{C2}. An external DC blocking capacitor is required for DC bias blocking.
6	V_{C1}	Control port. Switching operation is controlled by the voltage of this port. A bypass capacitor is required, and should be placed as close to the port as possible.
-	GND_Bed	Ground. This pin also works as a heat dissipation pin.

Test Circuit for RF Performance Evaluation

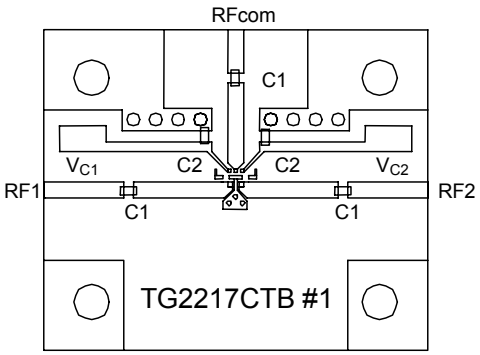


The values of external capacitors depend on the application frequency range and the board pattern layout. Consider this when designing the board.

Reference External Parts

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

Test Board



Notice

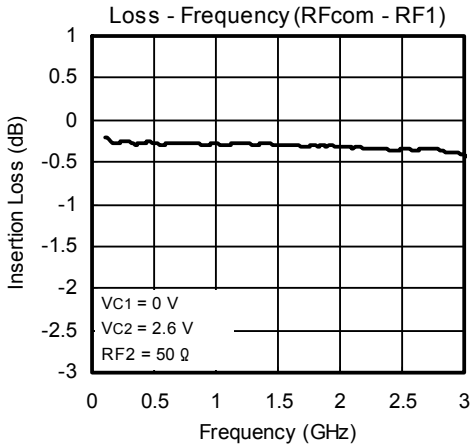
Circuits and measurements contained in this document illustrate example applications of the product and are for reference only.

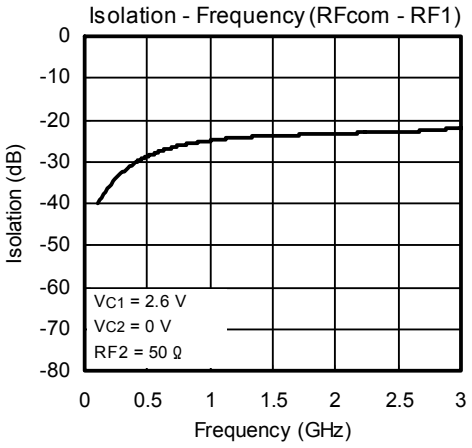
Moreover, these example application circuits are not intended for mass production since the high-frequency characteristics (the AC characteristics) of the devices will be affected by the external components the customer uses, by the design of the circuit and by various other conditions.

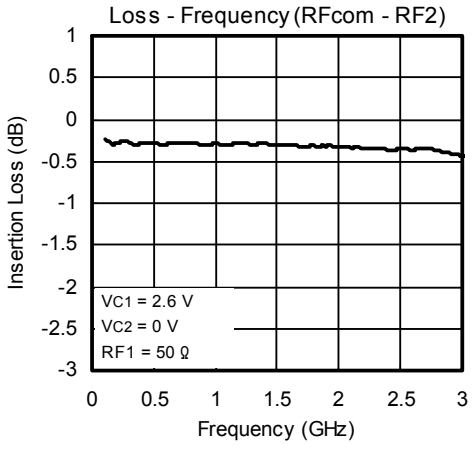
It is the responsibility of the customer to design external circuits that correctly implement the intended application and to check the characteristics of the design.

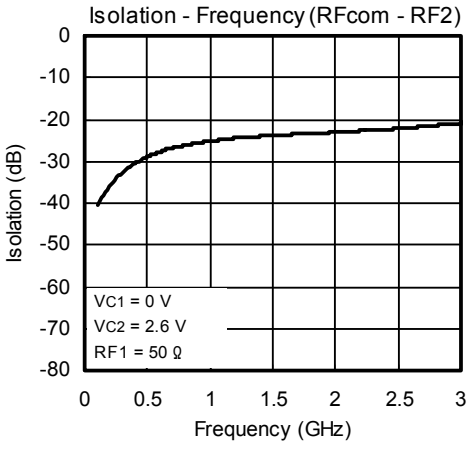
Toshiba assumes no responsibility for the integrity of customer circuit designs or applications.

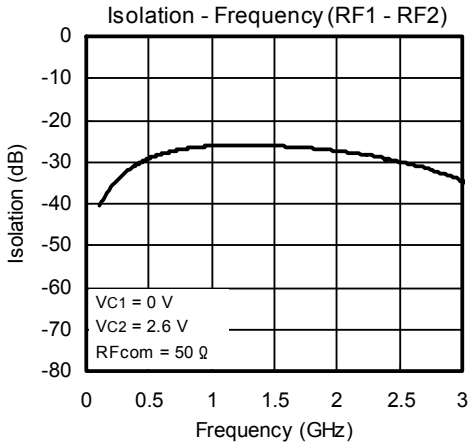
Typical Operating Characteristics

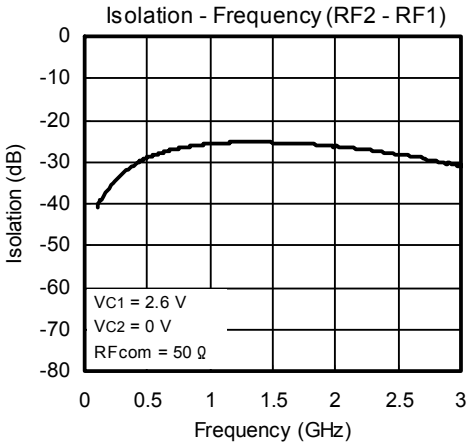






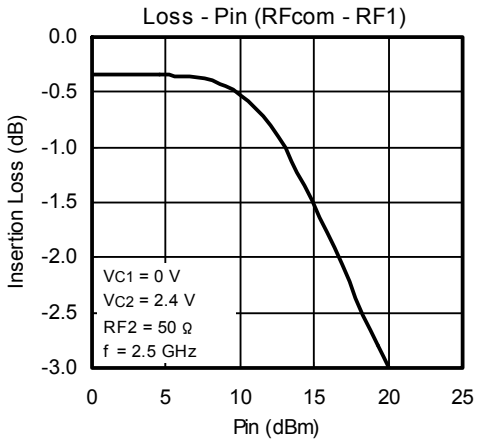


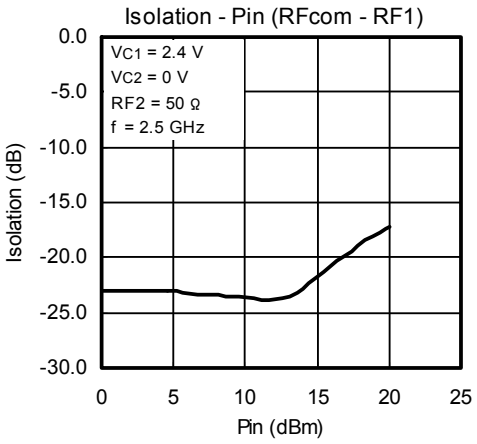


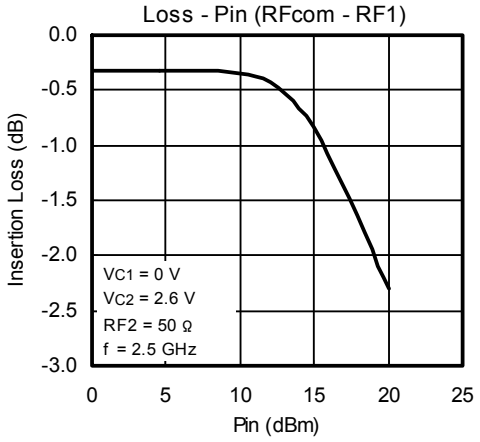


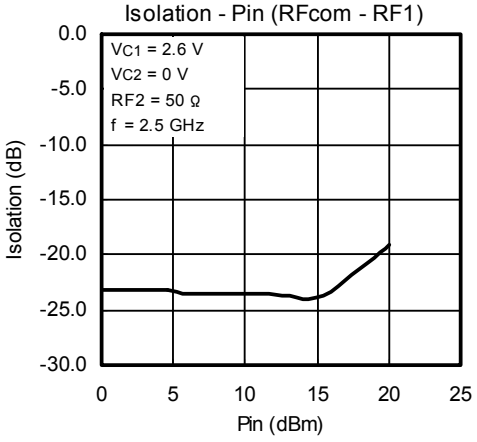
Note: All data on this page have been corrected for test board loss.

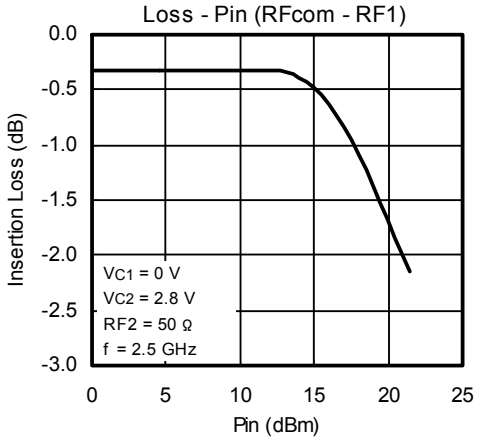
Typical Operating Characteristics (continued)

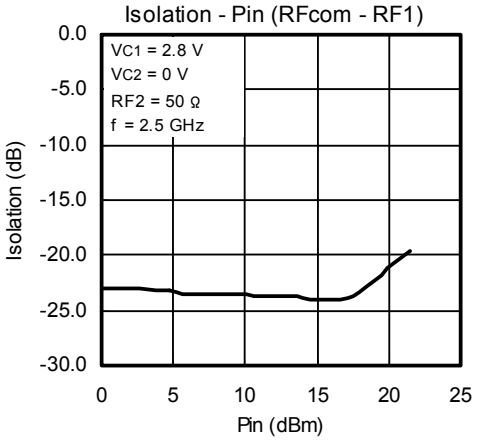






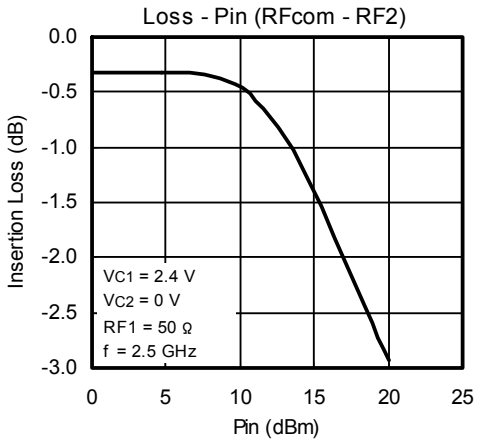


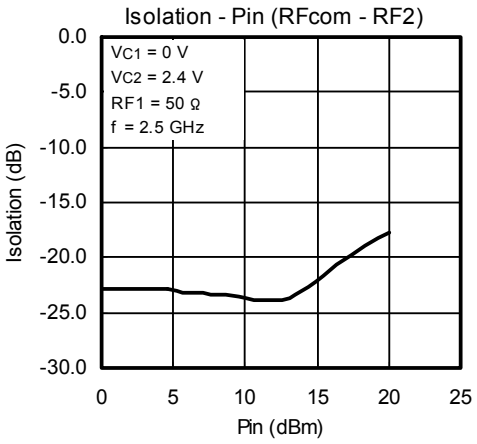


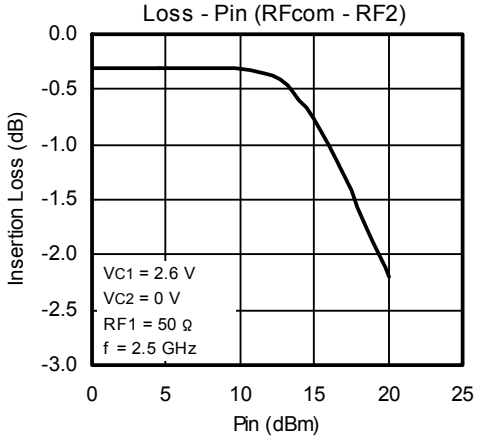


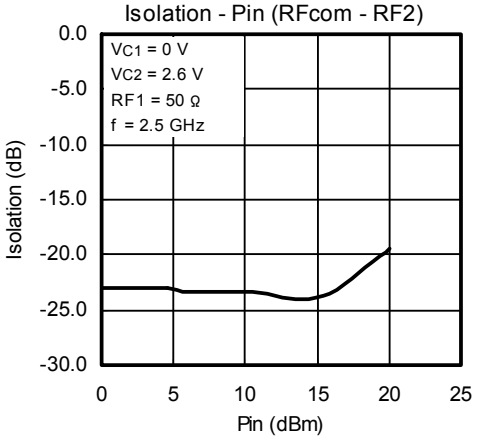
Note: All data on this page have been corrected for test board loss.

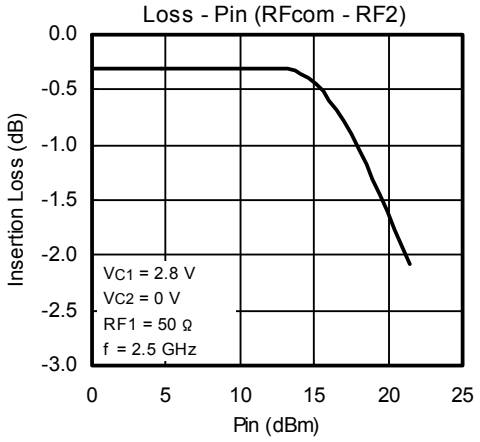
Typical Operating Characteristics (continued)

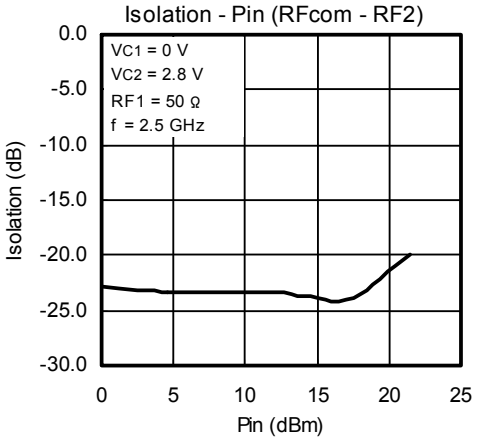








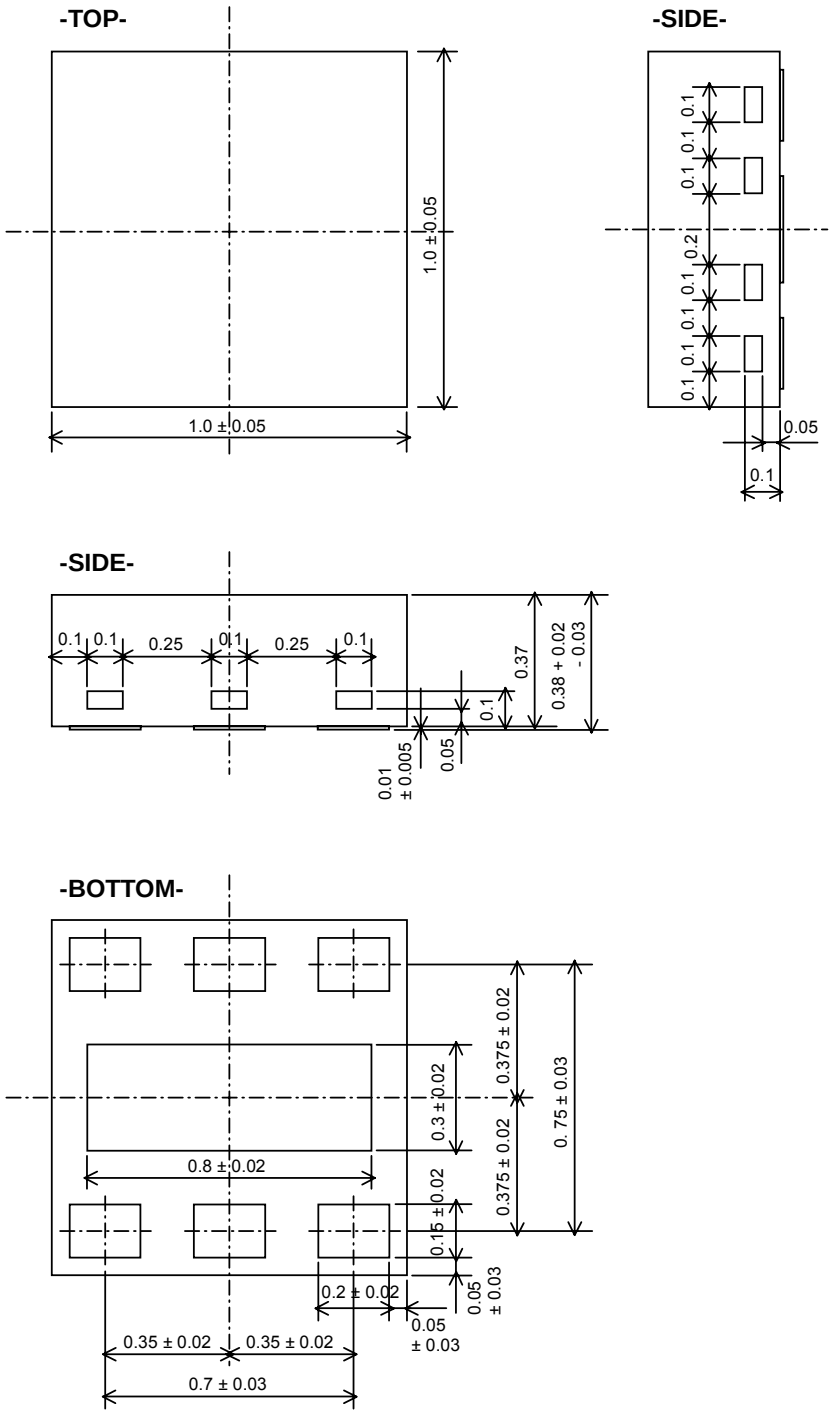




Note: All data on this page have been corrected for test board loss.

Package Physical Dimensions

Unit: mm



RESTRICTIONS ON PRODUCT USE

030619EAC

- The information contained herein is subject to change without notice.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of TOSHIBA or others.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
  In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the “Handling Guide for Semiconductor Devices,” or “TOSHIBA Semiconductor Reliability Handbook” etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury (“Unintended Usage”). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer’s own risk.
- TOSHIBA products should not be embedded to the downstream products which are prohibited to be produced and sold, under any law and regulations.
- GaAs(Gallium Arsenide) is used in this product. The dust or vapor is harmful to the human body. Do not break, cut, crush or dissolve chemically.