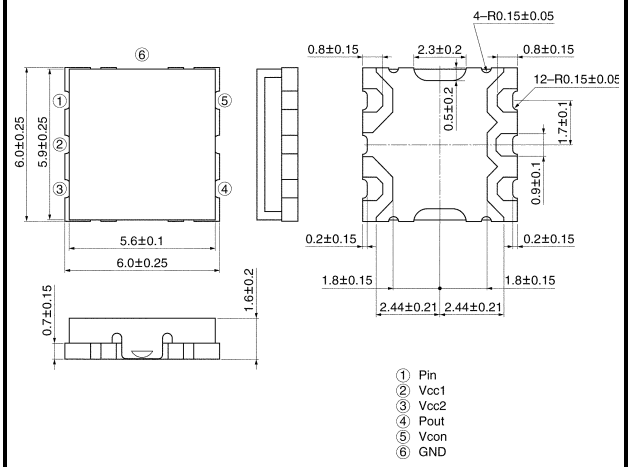
RF Power Amplifier Module

S-AU81

Power Amplifier Modules for Domestic cdmaOne

Unit: mm

- GaAs HBT Micro PA (on-chip bias circuit and matching circuit)
- Output power: P_O = 27.0dBmW (min)
- Gain: G_P = 28.0dB (typ.)
- Total current: I_t (1) = 385 mA (typ.)
  (@P_{out} = 27.0dBmW)
- Low-voltage operation: Operation at V_{CC} = 1.5 V is possible
  I_t (2) = 97 mA (typ) (@P_{out} = 14dBmW, V_{CC} = 1.5 V)
- This device features an output control pin which can be switched between low-power and high-power settings.
  I_t = 90 mA (typ.) (@P_{out} = 14dBmW, V_{CC} = 2.70 V)



JEDEC	—
JEITA	—
TOSHIBA	5-6A

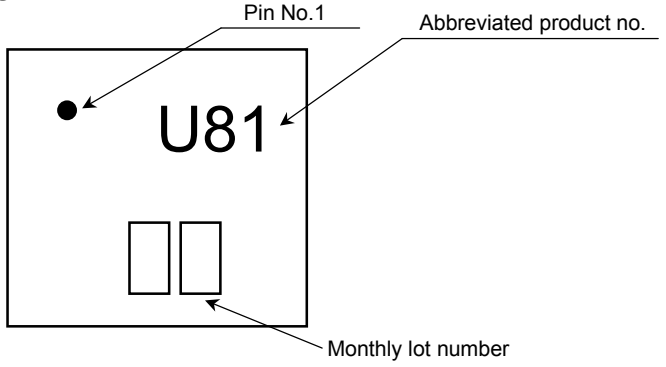
Weight: 0.0 g (typ.)

Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Supply voltage 1	V_{CC1}	5	V
Supply voltage 2	V_{CC2}	5	V
Control voltage	V_{con}	4	V
Collector current	I_{CC}	1	A
Power dissipation	P_D (Note 1)	2	W
Operating temperature	T_{op}	−20~+60	°C
Storage temperature range	T_{stg}	−30~+125	°C

Note 1: Ta = 25°C

Marking



Electrical Characteristics (Tc = 25°C)

Characteristics		Symbol	Test Condition		Min	Typ.	Max	Unit
Power gain (1)		G_p (1)	V_{CC1}, $V_{CC\ 2}$ = 3.6 V, V_{con} = 2.85 V (Note 2), P_o = 27dBmW f = 887~925 MHz, P_{in} = adjust, Z_G = Z_L = 50 Ω		25.0	28.0	—	dB
Control current		I_{con}				—	3	5	mA
Total current (1)		I_t (1)				—	385	—	mA
Adjacent-channel power ratio (1)		ACPR1 (1)	V_{CC1}, $V_{CC\ 2}$ = 3.6 V, V_{con} = 2.85 V (Note 2), P_o = 27dBmW, f = 887~925 MHz, Z_G = Z_L = 50 Ω (Note 3)	900 kHz	—	−50	−45	dB
		ACPR2 (2)		1.98 MHz	—	−60	−56	dB
Power gain (2)		G_p (2)	V_{CC1}, $V_{CC\ 2}$ = 1.5 V, V_{con} = 2.85 V (Note 2), P_o = 14dBmW, f = 887~925 MHz, P_{in} = adjust, Z_G = Z_L = 50 Ω		21.0	24.0	—	dB
Total current (2)		I_t (2)			—	97	—	mA
Adjacent-channel power ratio (2)		ACPR1 (2)	V_{CC1}, $V_{CC\ 2}$ = 1.5 V, V_{con} = 2.85 V (Note 2), P_o = 14dBmW, f = 887~925 MHz, Z_G = Z_L = 50 Ω (Note 3)	900 kHz	—	−50	−45	dB
		ACPR2 (2)		1.98 MHz	—	−60	−56	dB
Power gain (3)		G_p (3)	V_{CC1}, $V_{CC\ 2}$ = 3.6 V, V_{con} = 2.85 V (Note 2), P_o = 27dBmW, f = 887~925 MHz, P_{in} = adjust, Z_G = Z_L = 50 Ω), Tc = −20~+60°C		24.0	27.0	—	dB
Adjacent-channel power ratio (3)		ACPR1 (3)	V_{CC1}, $V_{CC\ 2}$ = 3.6 V, V_{con} = 2.85 V (Note 2), P_o = 27dBmW, f = 887~925 MHz, Z_G = Z_L = 50 Ω, Tc = −20~+60°C (Note 3)	900 kHz	—	−48	−43	dB
		ACPR2 (3)		1.98 MHz	—	−58	−55	dB
VSWRin		VSWRin	V_{CC1}, $V_{CC\ 2}$ = 3.6 V, V_{con} = 2.85 V (Note 3), P_o = 27dBmW, f = 887~925 MHz, P_{in} = adjust, Z_G = Z_L = 50 Ω		—	2	3	—
Harmonics	2fo	HRM (1)			—	—	−30	dB
	3fo	HRM (2)			—	—	−45	dB
Stability		SPR	V_{CC1}, $V_{CC\ 2}$ = 1.5 V, 2.5 V, 3.6 V, 4.2 V, V_{con} = 2.85 V (Note 3), P_o ≦ 27dBmW, f = 887~925 MHz, P_{in} = adjust, Z_G = 50 Ω, VSWR LOAD = 3:1 all phase		—	—	−60	dB
Receiving band noise		NRB	V_{CC1}, $V_{CC\ 2}$ = 3.6 V, V_{con} = 2.85 V (Note 2), P_o ≦ 27dBmW, f = 887~925 MHz, P_{in} = adjust, Z_G = Z_L = 50 Ω		—	−135	—	dBmW/ Hz
Load mismatch		—	V_{CC1}, $V_{CC\ 2}$ = 1.5 V~4.2 V, V_{con} = 2.85 V (Note 2), P_o ≦ 27dBmW, f = 887~925 MHz, P_{in} = adjust, Z_G = 50 Ω, VSWR LOAD = 3:1 all phase		No degradation			—

Caution: This RF power amplifier is the electrostatic sensitive device. Please handle with caution.

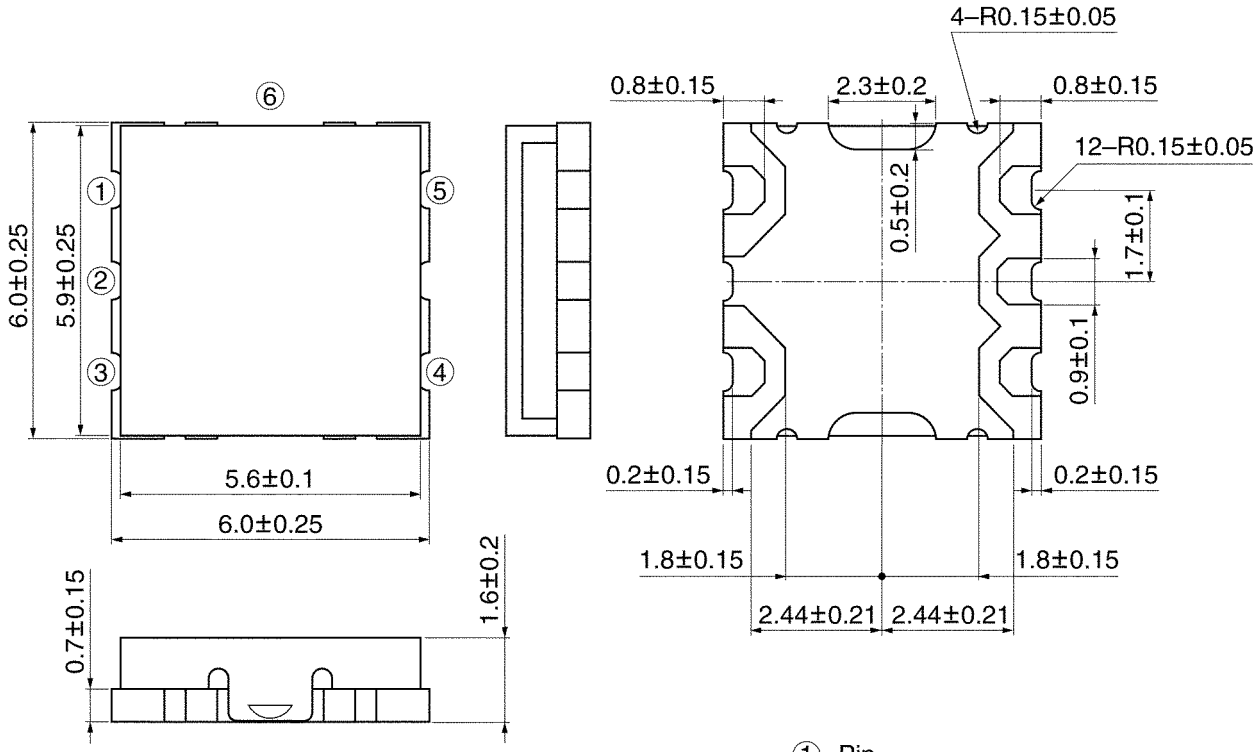
Note 2: V_{con} = 2.85 V is set to obtain Iidle ≃ 75 mA when V_{CC1}, V_{CC2} = 3.6 V

Note 3: ACPR
a) Pc (1.23 MHz) is average power measured for 1.23 MHz bandwidth with CDMA signal.
b) P (30 kHz) is average power measured for 30 kHz bandwidth with 900 kHz/1.98 MHz offset.
c) ACPR1 (or ACPR2) = P (30 kHz) − P_C (1.23 MHz) dB

Note 4: These electrical characteristics are measured using Toshiba recommended test board.

Package Dimensions

unit : mm

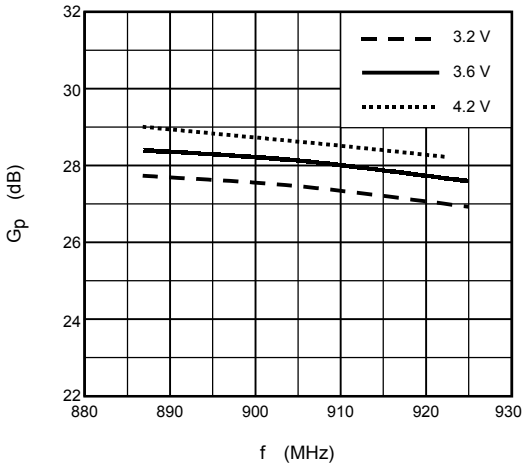


Typical Characteristic Curves

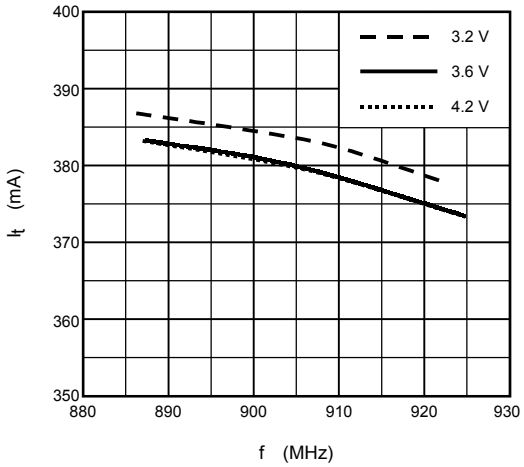
(1) Frequency Characteristics

P_O = 27dBmW, V_{con} = 2.85 V, V_{CC1}, V_{CC2} = 3.6 V

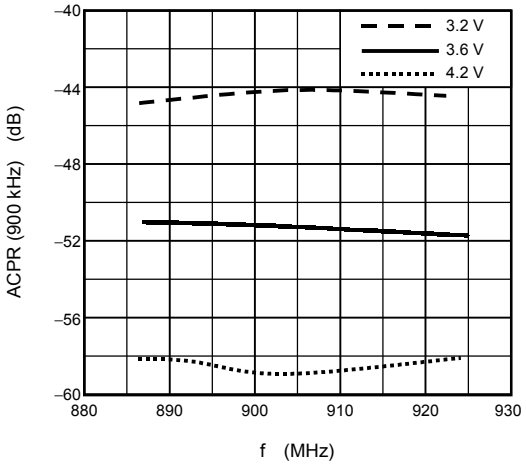
G_p – f



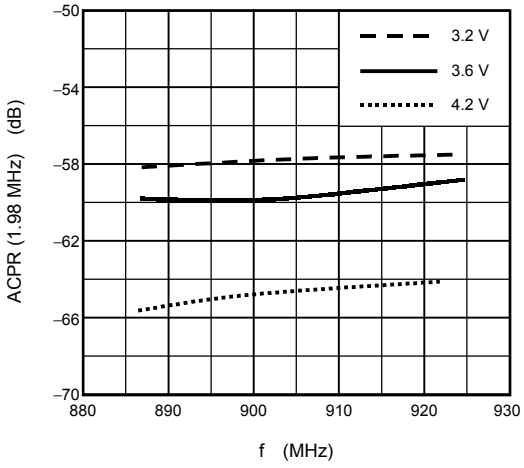
I_t – f



ACPR (900 kHz) – f

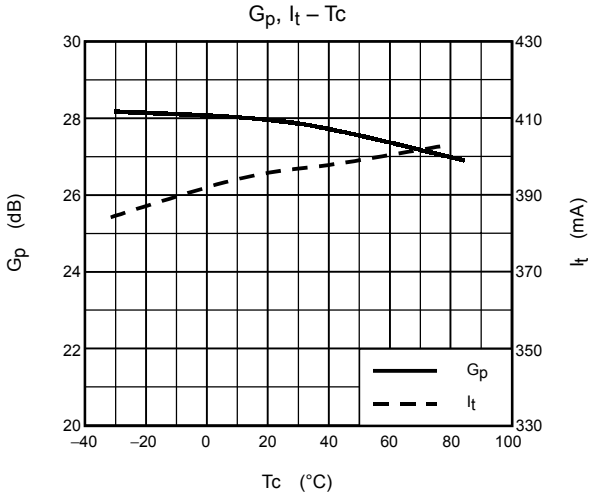


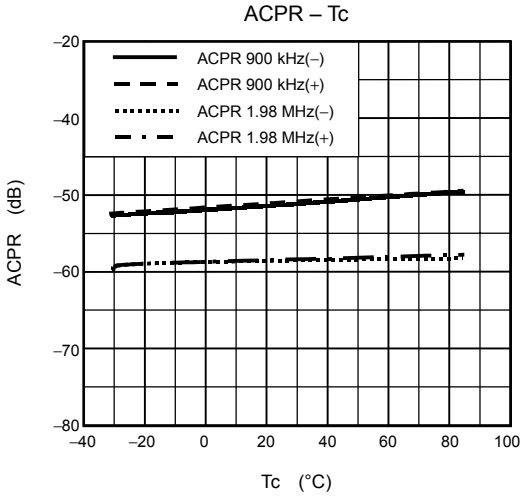
ACPR (1.98 MHz) – f



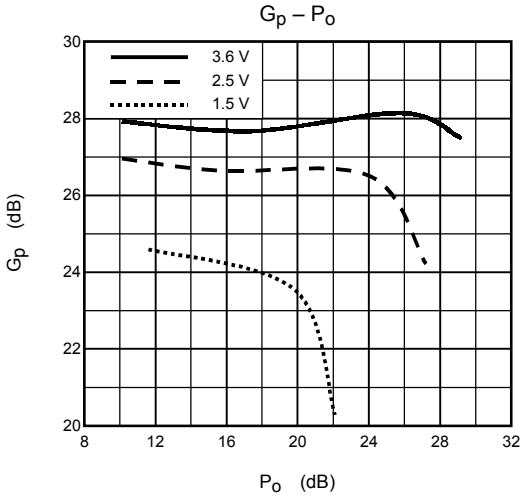
(2) Temperature Characteristics

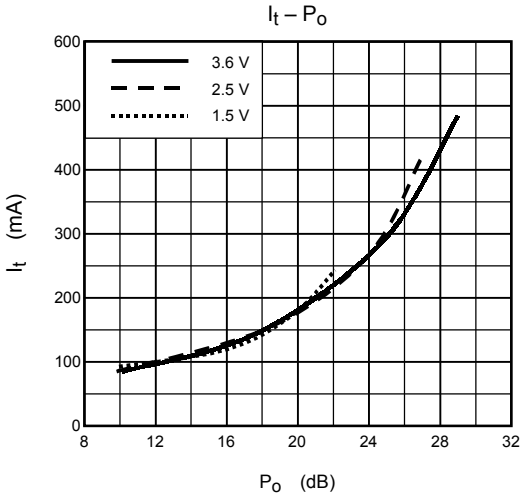
P_O = 27dBmW, V_{con} = 2.85 V, f = 906 MHz, V_{CC1}, V_{CC2} = 3.6 V

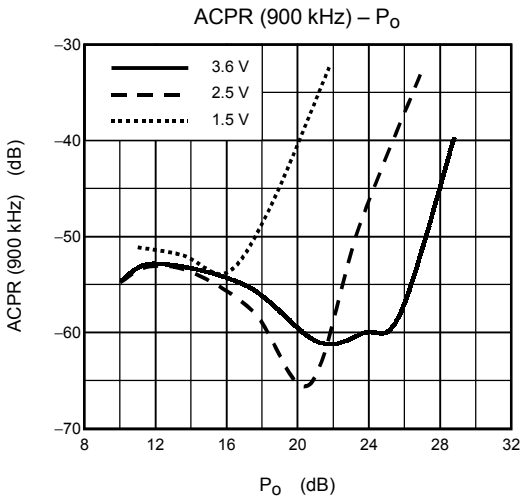


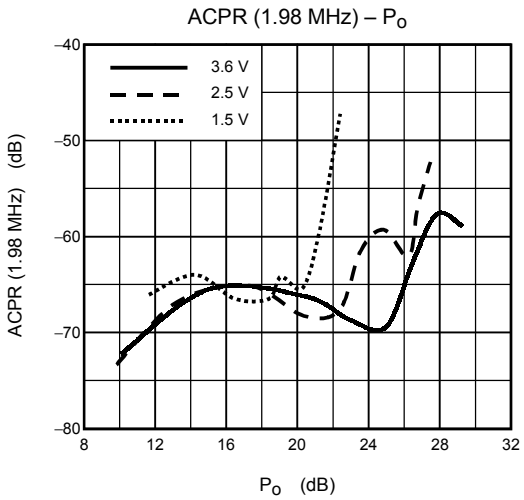


(3) Power Supply Voltage
V_{CC} Characteristics (f = 906 MHz, V_{con} = 2.85 V)



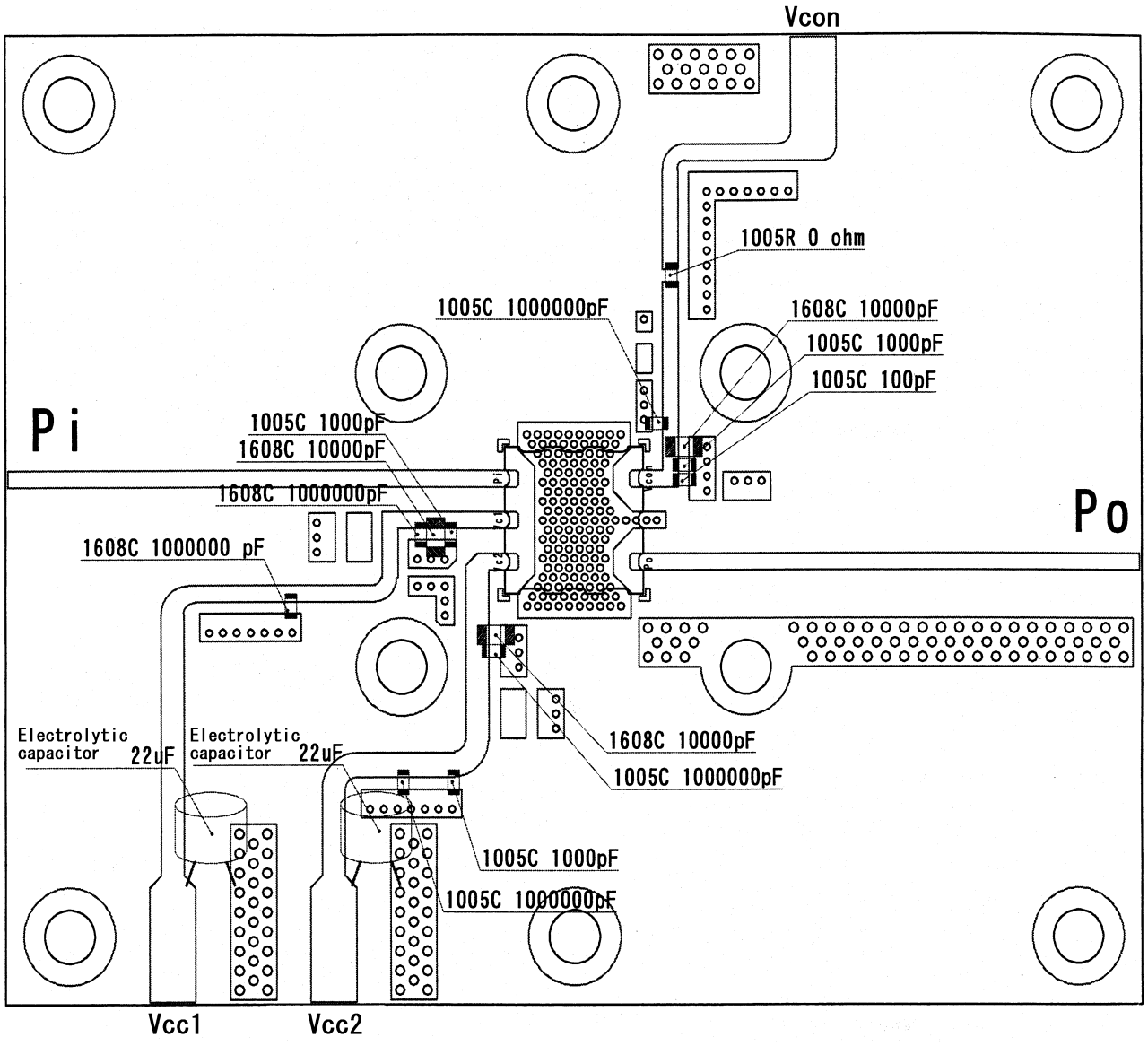






Note: These are only typical curves and devices are not necessarily guaranteed at these curves.

Test Board



Note for biasing procedure: Please follow this sequence when you measure a device bias sequence.

a) $V_{CC}1$, $V_{CC}2$ On 0 V to Supply Voltage
b) V_{con} On adjust idle current
c) RF on

RESTRICTIONS ON PRODUCT USE

000707EAA

- 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.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.