

TOSHIBA Field Effect Transistor Silicon N-Channel MOS Type (U-MOS V -H)

TPC8037-H

High-Efficiency DC-DC Converter Applications

Notebook PC Applications

Portable Equipment Applications

- Small footprint due to a small and thin package
- High-speed switching
- Small gate charge: $Q_{SW} = 5.0 \text{ nC}$ (typ.)
- Low drain-source ON-resistance: $R_{DS(ON)} = 7.6 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 36 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 10 \text{ }\mu\text{A}$ (max) ($V_{DS} = 30 \text{ V}$)
- Enhancement mode: $V_{th} = 1.5 \text{ to } 2.5 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristic		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	30	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	30	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	12	A
	Pulsed (Note 1)	I_{DP}	48	
Drain power dissipation ($t = 10 \text{ s}$) (Note 2a)		P_D	1.9	W
Drain power dissipation ($t = 10 \text{ s}$) (Note 2b)		P_D	1.0	W
Single-pulse avalanche energy (Note 3)		E_{AS}	94	mJ
Avalanche current		I_{AR}	12	A
Repetitive avalanche energy (Note 2a) (Note 4)		E_{AR}	0.18	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$

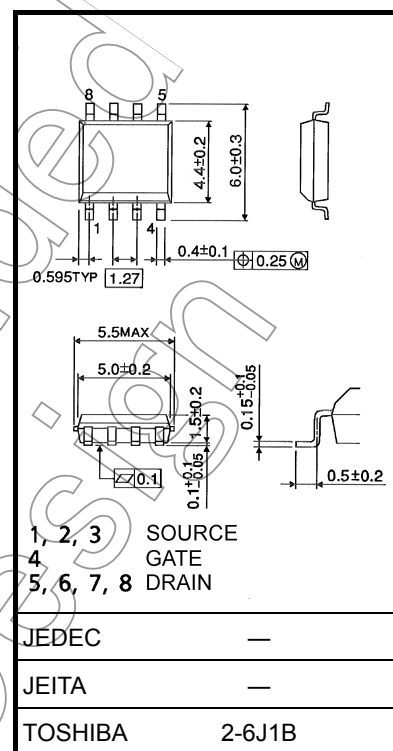
Note: For Notes 1 to 4, refer to the next page.

Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

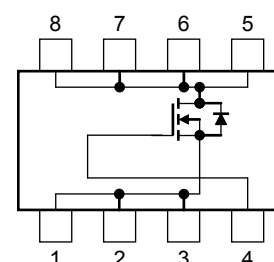
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm



Weight: 0.085 g (typ.)

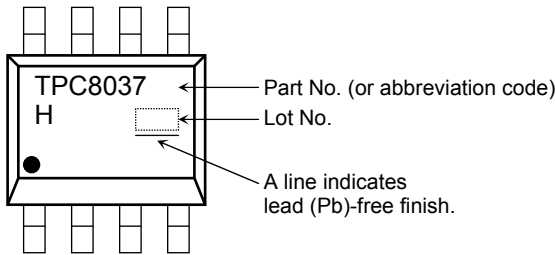
Circuit Configuration



Thermal Characteristics

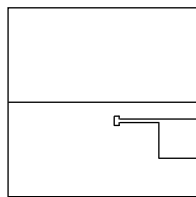
Characteristic	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10 s) (Note 2a)	$R_{th (ch-a)}$	65.8	°C/W
Thermal resistance, channel to ambient (t = 10 s) (Note 2b)	$R_{th (ch-a)}$	125	°C/W

Marking (Note 5)



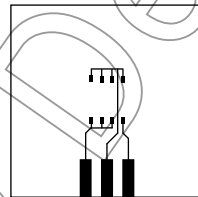
Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2: (a) Device mounted on a glass-epoxy board (a) (b) Device mounted on a glass-epoxy board (b)



(a)

FR-4
25.4 × 25.4 × 0.8
(Unit: mm)



(b)

FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

Note 3: $V_{DD} = 24\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 500\text{ }\mu\text{H}$, $R_G = 25\text{ }\Omega$, $I_{AR} = 12\text{ A}$

Note 4: Repetitive rating: pulse width limited by maximum channel temperature

Note 5: • on lower left of the marking indicates Pin 1.

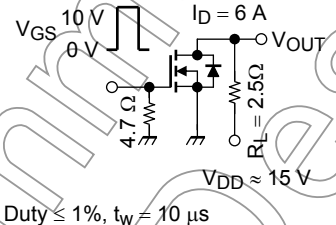
* Weekly code: (Three digits)



Week of manufacture
(01 for the first week of the year, continuing up to 52 or 53)

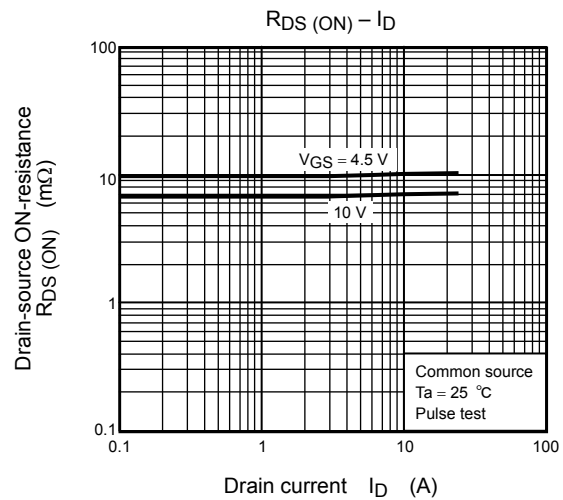
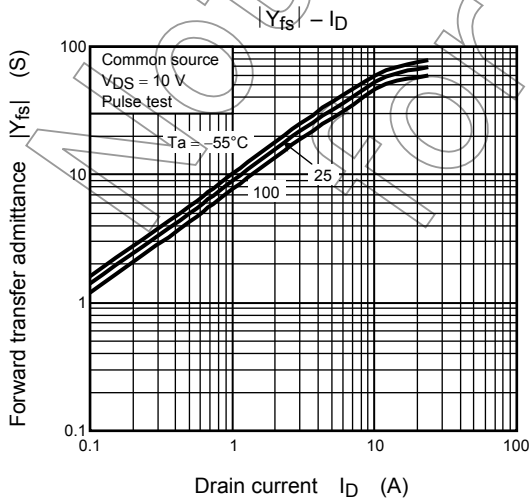
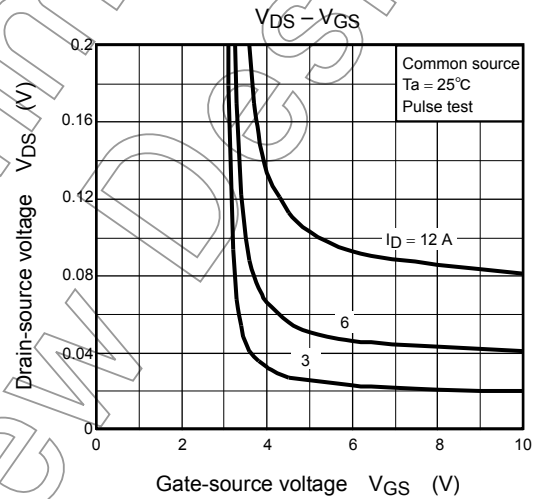
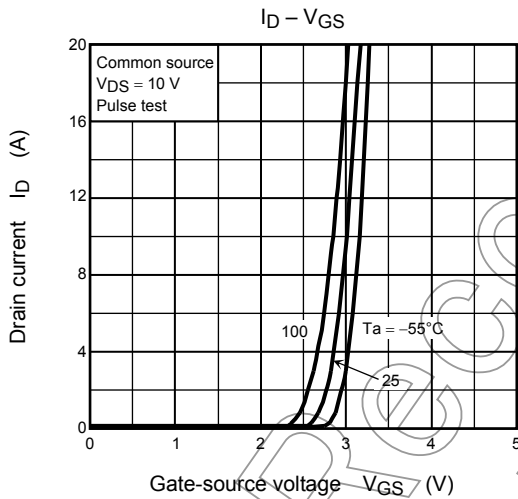
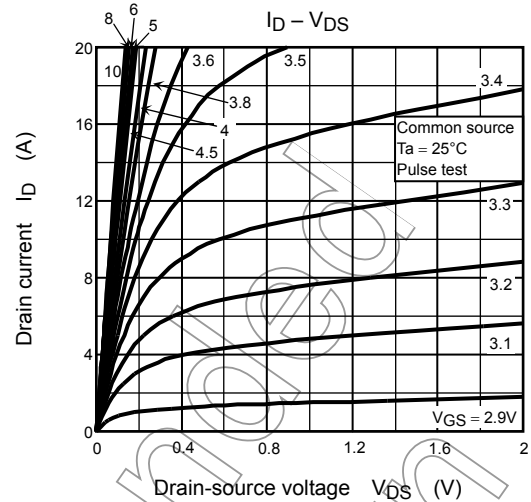
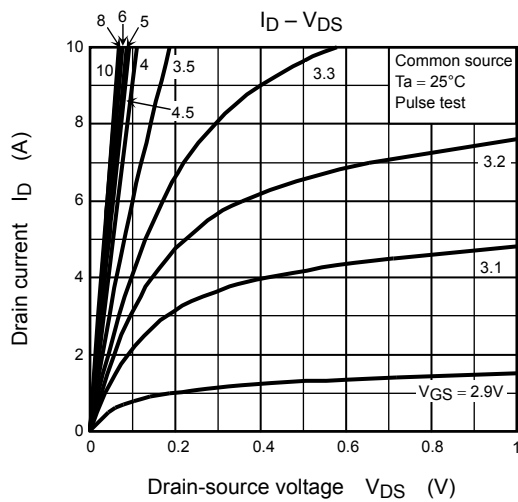
Year of manufacture
(The last digit of the year)

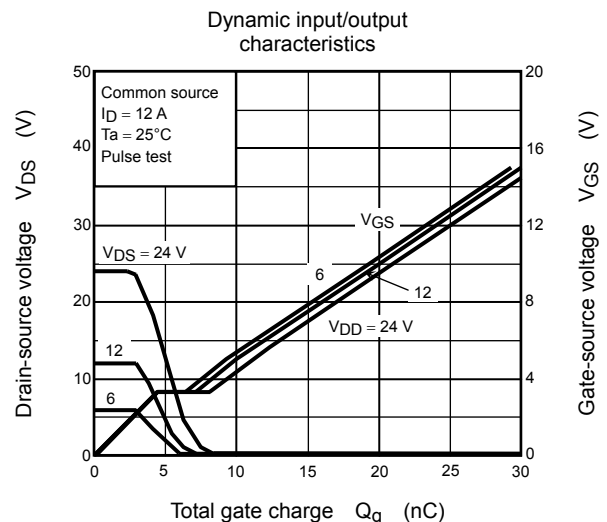
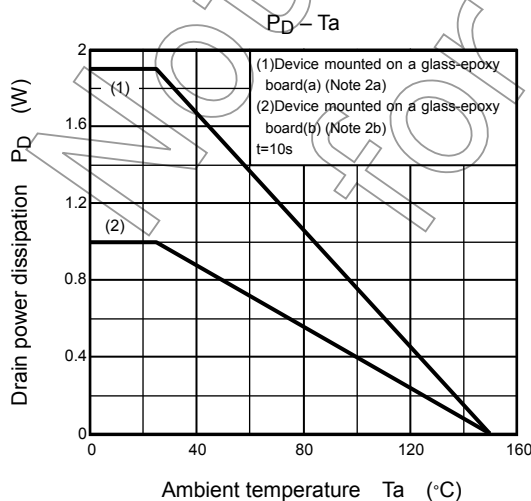
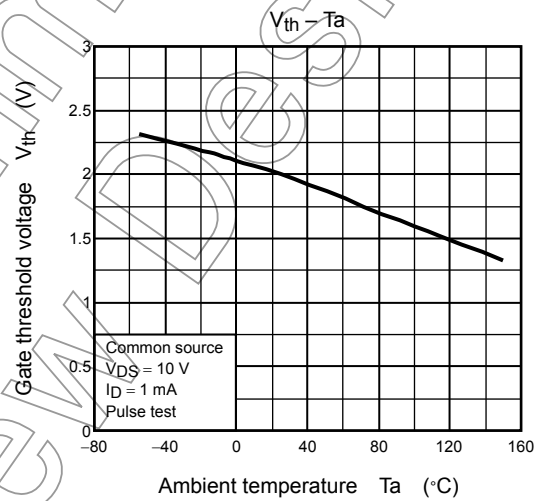
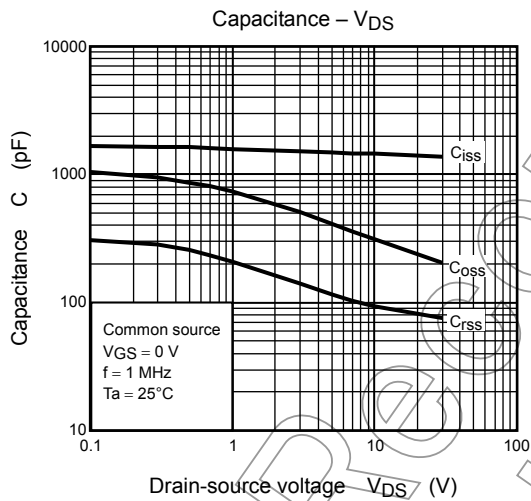
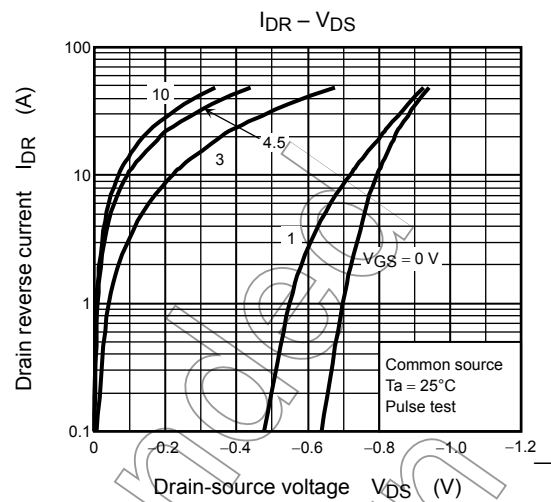
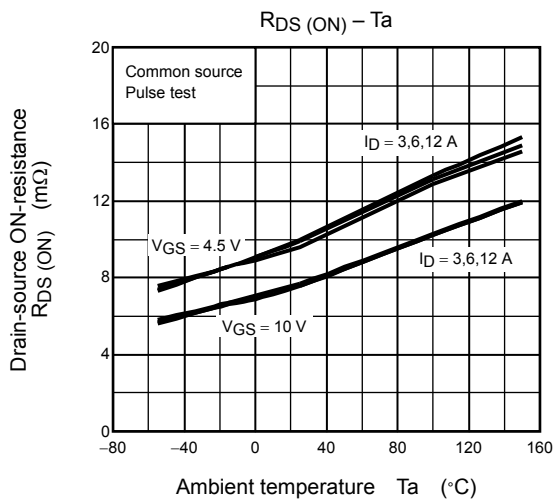
Electrical Characteristics (Ta = 25°C)

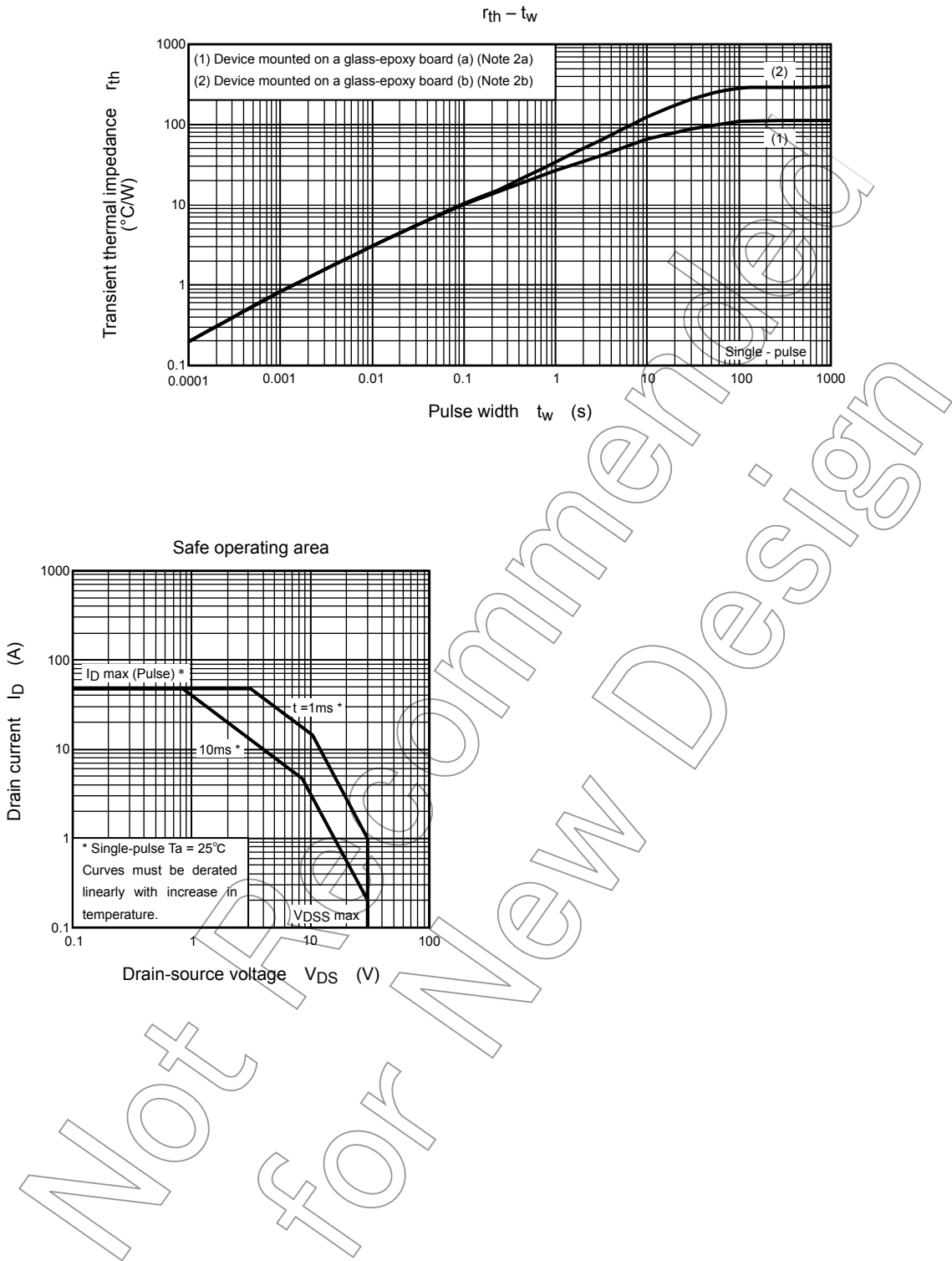
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V	—	—	±100	nA
Drain cutoff current		I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V	—	—	10	μA
Drain-source breakdown voltage		V _(BR) DSS	I _D = 10 mA, V _{GS} = 0 V	30	—	—	V
		V _(BR) DSX	I _D = 10 mA, V _{GS} = -20 V	15	—	—	
Gate threshold voltage		V _{th}	V _{DS} = 10 V, I _D = 1 mA	1.5	—	2.5	V
Drain-source ON-resistance		R _{DS} (ON)	V _{GS} = 4.5 V, I _D = 6 A	—	9.9	13.9	mΩ
			V _{GS} = 10 V, I _D = 6 A	—	7.6	11.4	
Forward transfer admittance		Y _{fs}	V _{DS} = 10 V, I _D = 6 A	18	36	—	S
Input capacitance		C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	—	1433	2150	pF
Reverse transfer capacitance		C _{rss}		—	83	125	
Output capacitance		C _{oss}		—	303	—	
Gate resistance		R _g	V _{DS} = 10 V, V _{GS} = 0 V, f = 5 MHz	—	1.0	1.5	Ω
Switching time	Rise time	t _r		—	3	—	ns
	Turn-on time	t _{on}		—	10	—	
	Fall time	t _f		—	3.9	—	
	Turn-off time	t _{off}		Duty ≤ 1%, t _w = 10 μs	—	23	
Total gate charge (gate-source plus gate-drain)		Q _g	V _{DD} ≈ 24 V, V _{GS} = 10 V, I _D = 12 A	—	21	—	nC
			V _{DD} ≈ 24 V, V _{GS} = 5 V, I _D = 12 A	—	11	—	
Gate-source charge 1		Q _{gs1}	V _{DD} ≈ 24 V, V _{GS} = 10 V, I _D = 12 A	—	4.4	—	
Gate-drain ("Miller") charge		Q _{gd}		—	3.7	—	
Gate switch charge		Q _{sw}		—	5.0	—	

Source-Drain Ratings and Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I _{DRP}	—	—	—	48	A
Forward voltage (diode)		V _{DSF}	I _{DR} = 12 A, V _{GS} = 0 V	—	—	-1.2	V







RESTRICTIONS ON PRODUCT USE

20070701-EN GENERAL

- The information contained herein is subject to change without notice.
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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.
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