

TOSHIBA Field Effect Transistor Silicon P Channel MOS Type (U-MOSIII)

TPC6104

Notebook PC Applications

Portable Equipment Applications

- Low drain-source ON resistance: $R_{DS(ON)} = 33 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 12 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = -10 \text{ }\mu\text{A}$ (max) ($V_{DS} = -20 \text{ V}$)
- Enhancement mode: $V_{th} = -0.5 \text{ to } -1.2 \text{ V}$
($V_{DS} = -10 \text{ V}$, $I_D = -200 \text{ }\mu\text{A}$)

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

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	-20	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	-20	V
Gate-source voltage		V_{GSS}	± 8	V
Drain current	DC (Note 1)	I_D	-5.5	A
	Pulse (Note 1)	I_{DP}	-22	
Drain power dissipation ($t = 5 \text{ s}$) (Note 2a)		P_D	2.2	W
Drain power dissipation ($t = 5 \text{ s}$) (Note 2b)		P_D	0.7	W
Single pulse avalanche energy (Note 3)		E_{AS}	4.9	mJ
Avalanche current		I_{AR}	-2.75	A
Repetitive avalanche energy (Note 4)		E_{AR}	0.22	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55~150	$^\circ\text{C}$

Note: 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.).

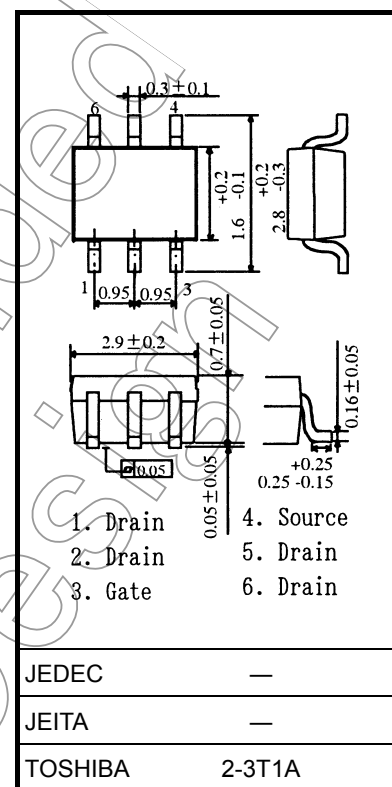
Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient ($t = 5 \text{ s}$) (Note 2a)	$R_{th(ch-a)}$	56.8	$^\circ\text{C/W}$
Thermal resistance, channel to ambient ($t = 5 \text{ s}$) (Note 2b)	$R_{th(ch-a)}$	178.5	$^\circ\text{C/W}$

Note: (Note 1), (Note 2), (Note 3) and (Note 4): See the third page.

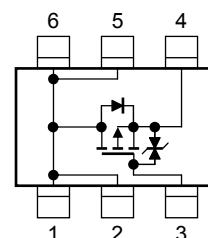
This transistor is an electrostatic-sensitive device. Please handle with caution.

Unit: mm

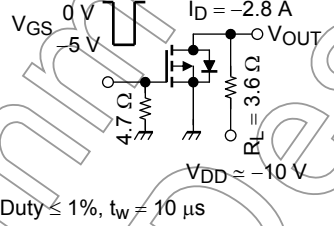


Weight: 0.011 g (typ.)

Circuit Configuration



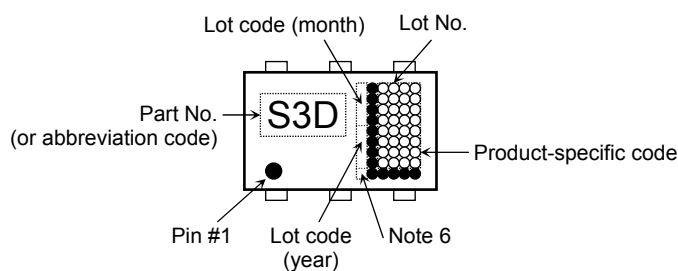
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 8 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = -20 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	-10	μA
Drain-source breakdown voltage	$V_{(BR) DSS}$		$I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$	-20	—	—	V
	$V_{(BR) DSX}$		$I_D = -10 \text{ mA}, V_{GS} = 8 \text{ V}$	-12	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = -10 \text{ V}, I_D = -200 \mu\text{A}$	-0.5	—	-1.2	V
Drain-source ON resistance	$R_{DS(ON)}$		$V_{GS} = -1.8 \text{ V}, I_D = -1.4 \text{ A}$	—	78	120	m Ω
	$R_{DS(ON)}$		$V_{GS} = -2.5 \text{ V}, I_D = -2.8 \text{ A}$	—	49	60	
	$R_{DS(ON)}$		$V_{GS} = -4.5 \text{ V}, I_D = -2.8 \text{ A}$	—	33	40	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10 \text{ V}, I_D = -2.8 \text{ A}$	6	12	—	S
Input capacitance		C_{iss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	1430	—	pF
Reverse transfer capacitance		C_{rss}		—	200	—	
Output capacitance		C_{oss}		—	240	—	
Switching time	Rise time	t_r		—	8.5	—	ns
	Turn-on time	t_{on}		—	15	—	
	Fall time	t_f		—	20	—	
	Turn-off time	t_{off}		—	66	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx -16 \text{ V}, V_{GS} = -5 \text{ V}, I_D = -5.5 \text{ A}$	—	19	—	nC
Gate-source charge		Q_{gs}		—	14	—	
Gate-drain ("miller") charge		Q_{gd}		—	5	—	

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

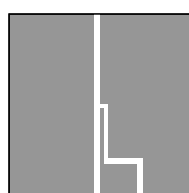
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	-22	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = -5.5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	1.2	V

Marking (Note 5)

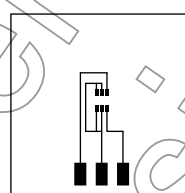


Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2: (a) Device mounted on a glass-epoxy board (a) (t = 5 s)
(b) Device mounted on a glass-epoxy board (b) (t = 5 s)



(a)



(b)

Note 3: VDD = 16 V, Tch = 25°C (initial), L = 0.5 mH, RG = 25 Ω, IAR = 2.75 A

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

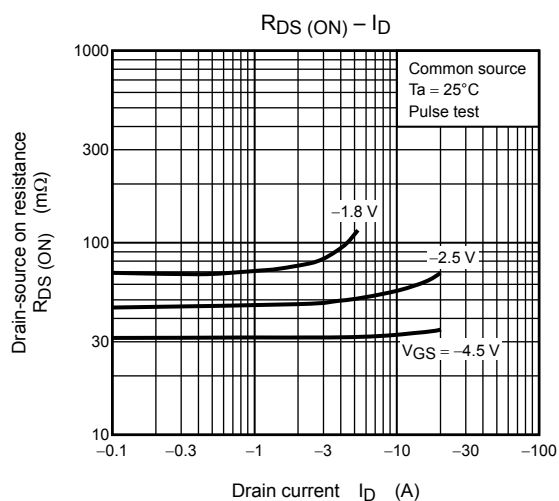
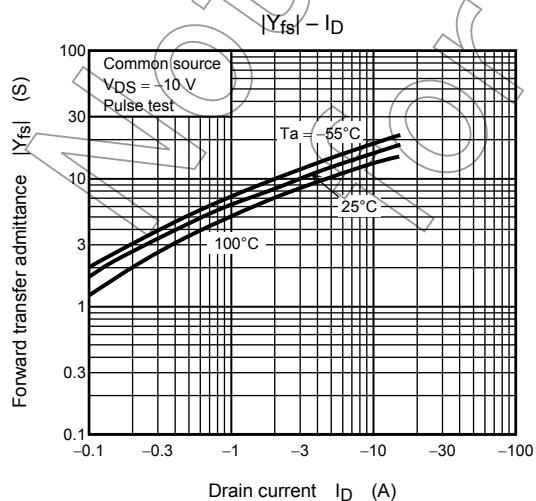
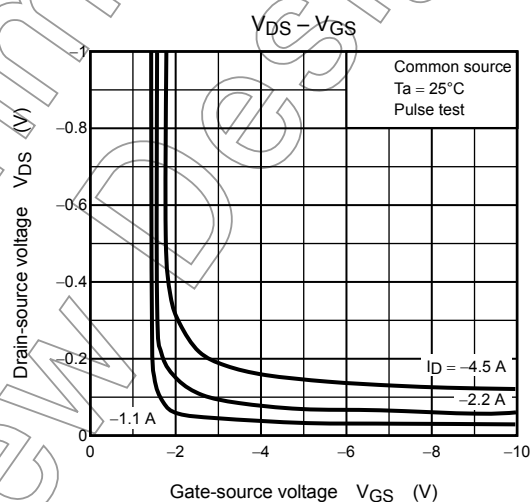
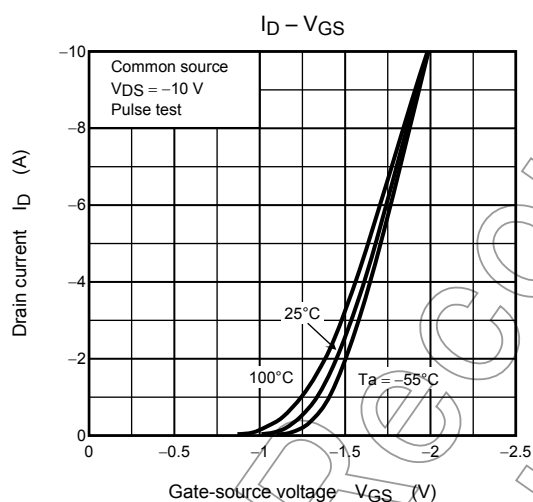
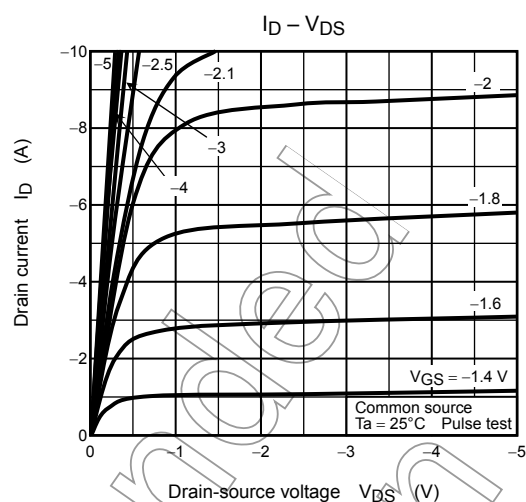
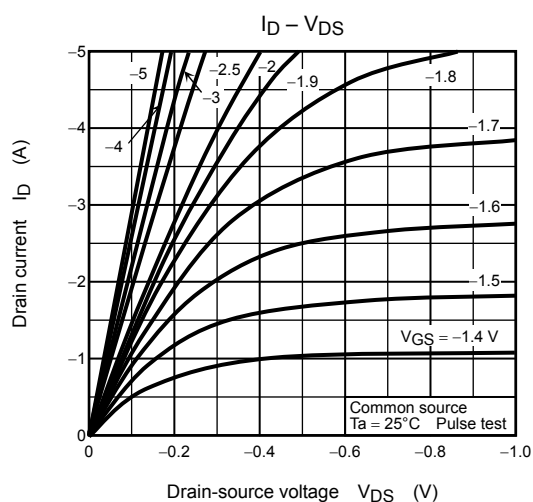
Note 5: • on lower left of the marking indicates Pin 1.

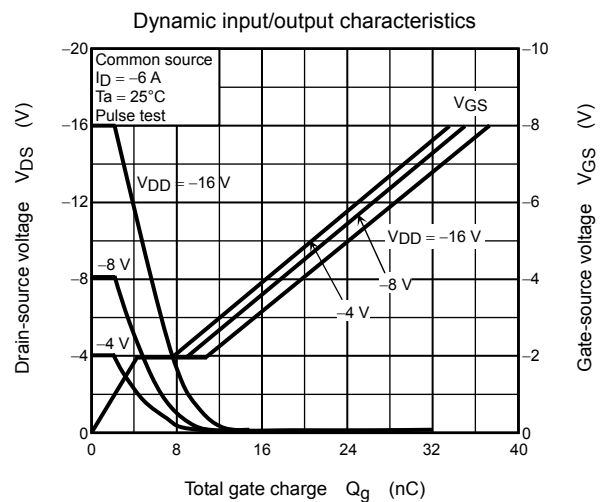
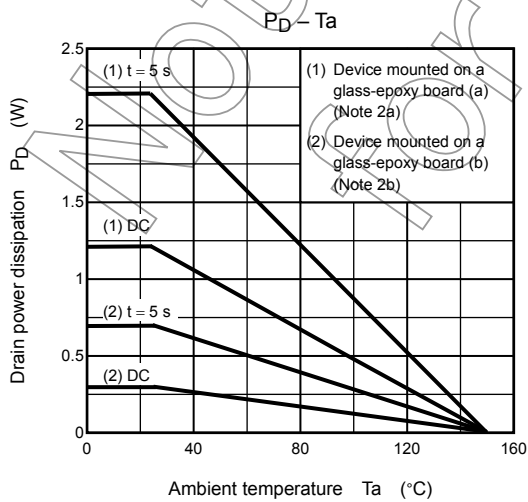
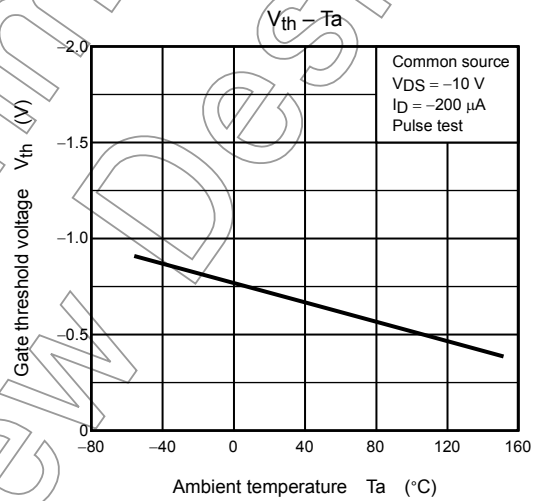
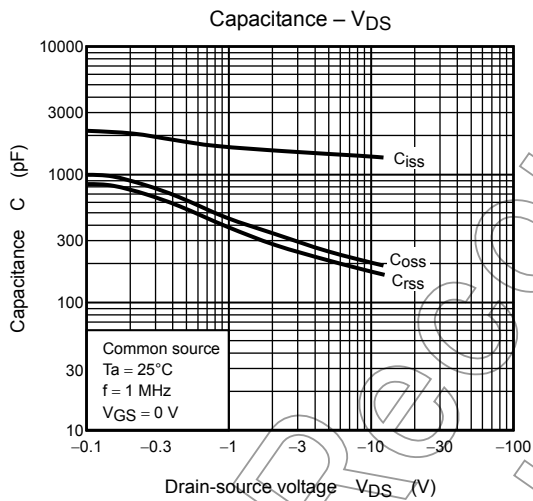
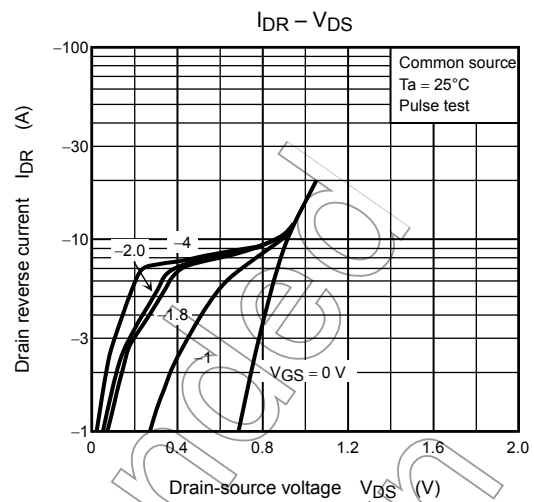
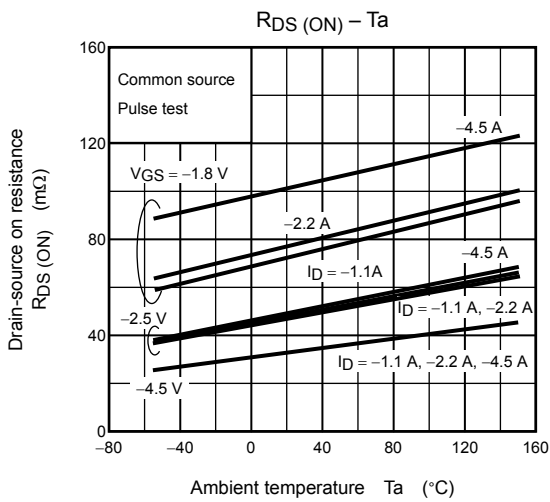
Note 6: A dot marking for identifying the indication of product Labels.

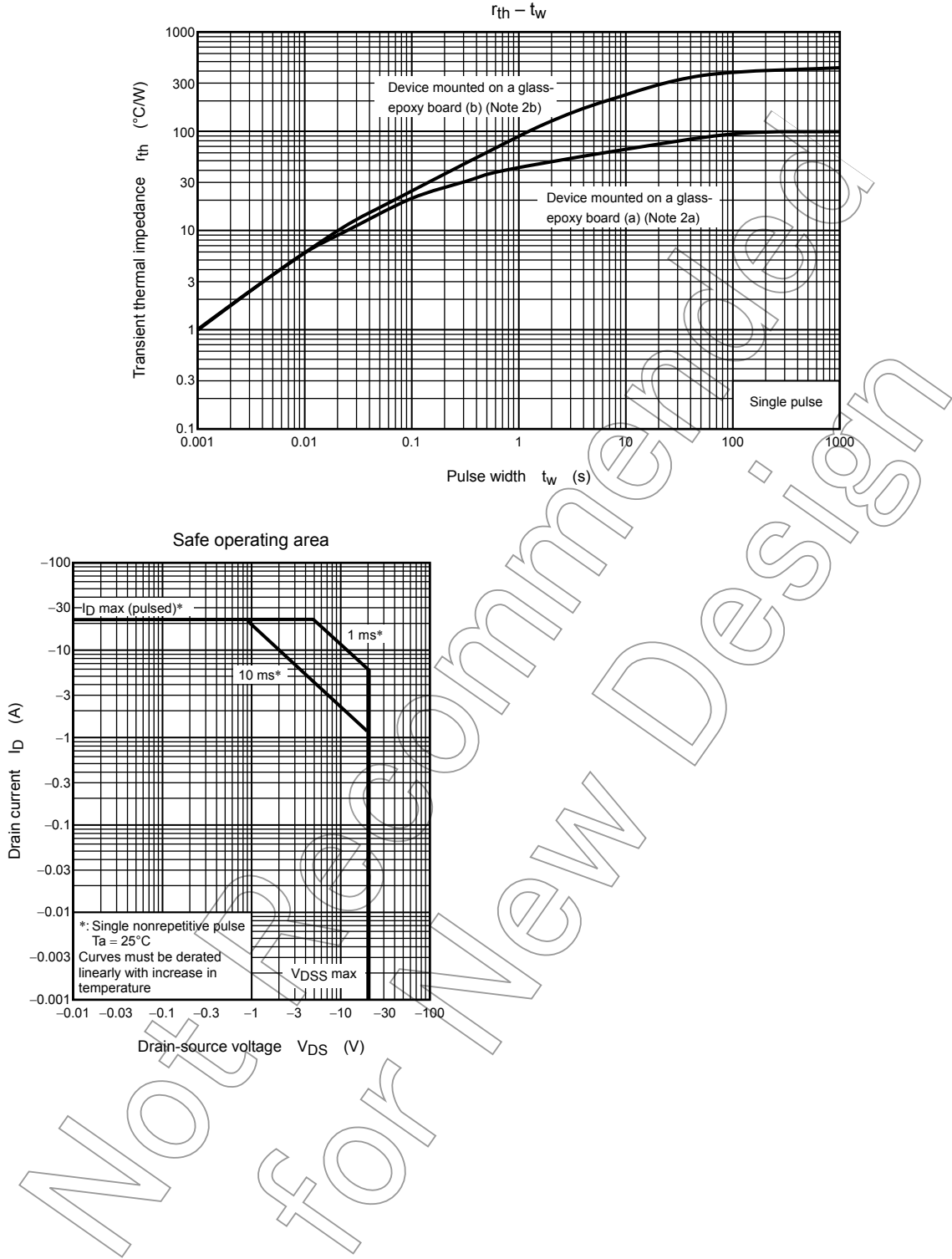
Without a dot: [[Pb]]/INCLUDES > MCV

With a dot: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

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