

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

TPC6102

Notebook PC Applications

Portable Equipment Applications

- Low drain-source ON resistance: $R_{DS(ON)} = 48 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 6 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = -10 \text{ }\mu\text{A}$ (max) ($V_{DS} = -30 \text{ V}$)
- Enhancement mode: $V_{th} = -0.8 \text{ to } -2.0 \text{ V}$ ($V_{DS} = -10 \text{ V}$, $I_D = -1 \text{ mA}$)

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

Characteristics		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	-4.5	A
	Pulse (Note 1)	I_{DP}	-18	
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}	3.3	mJ
Avalanche current		I_{AR}	-2.25	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 to 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.).

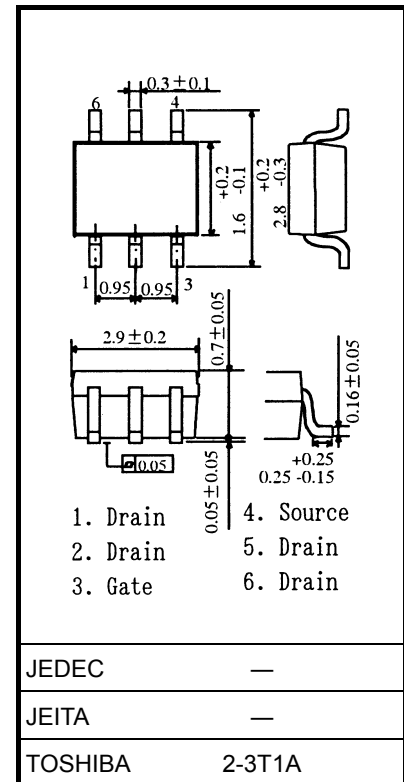
Thermal Characteristics

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), (Note 4) and (Note 5): See the next page.

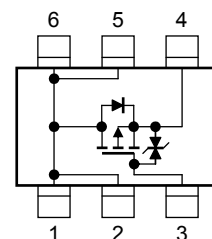
This transistor is an electrostatic-ensitive device. Please handle with caution.

Unit: mm



Weight: 0.011 g (typ.)

Circuit Configuration



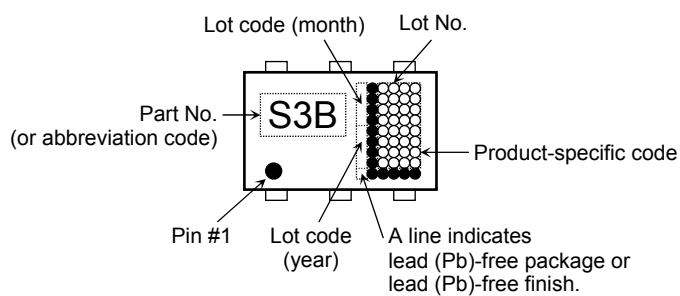
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Drain cut-OFF current		I_{DSS}	$V_{DS} = -30 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	-10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$	-30	—	—	V
		$V_{(BR)DSX}$	$I_D = -10 \text{ mA}, V_{GS} = 20 \text{ V}$	-15	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = -10 \text{ V}, I_D = -1 \text{ mA}$	-0.8	—	-2.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = -4.5 \text{ V}, I_D = -2.2 \text{ A}$	—	78	100	$\text{m}\Omega$
		$R_{DS(ON)}$	$V_{GS} = -10 \text{ V}, I_D = -2.2 \text{ A}$	—	48	60	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10 \text{ V}, I_D = -2.2 \text{ A}$	3.0	6.0	—	S
Input capacitance		C_{iss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	500	—	pF
Reverse transfer capacitance		C_{rss}		—	110	—	
Output capacitance		C_{oss}		—	150	—	
Switching time	Rise time	t_r	<p>$V_{GS} \begin{cases} 0 \text{ V} \\ -10 \text{ V} \end{cases}$ $I_D = -2.2 \text{ A}$ V_{OUT} 4.7Ω $R_L = 68 \Omega$ $V_{DD} \approx -15 \text{ V}$ Duty $\leq 1\%$, $t_w = 10 \mu\text{s}$</p>	—	3	—	ns
	Turn-ON time	t_{on}		—	7	—	
	Fall time	t_f		—	31	—	
	Turn-OFF time	t_{off}		—	79	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx -24 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -4.5 \text{ A}$	—	11	—	nC
Gate-source charge		Q_{gs}		—	8.5	—	
Gate-drain ("miller") charge		Q_{gd}		—	2.5	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Pulse drain reverse current	(Note 1)	I_{DRP}	—	—	—	-18	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = -4.5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	1.2	V

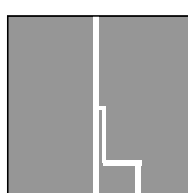
Marking (Note 5)



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

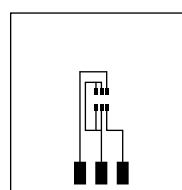
Note 2: (a) Device mounted on a glass-epoxy board (a) (t = 5 s)

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



(a)

FR-4
25.4 × 25.4 × 0.8
Unit: (mm)



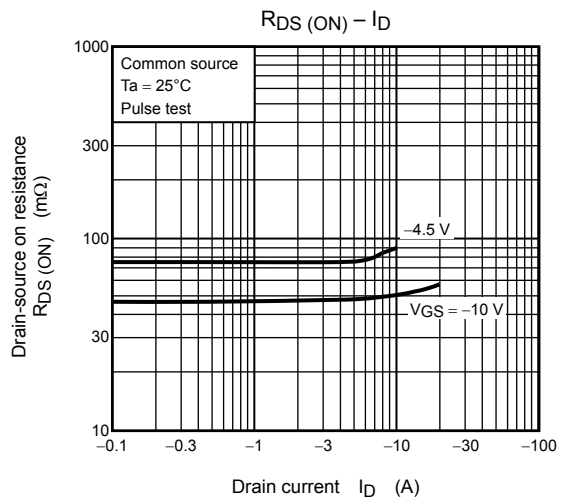
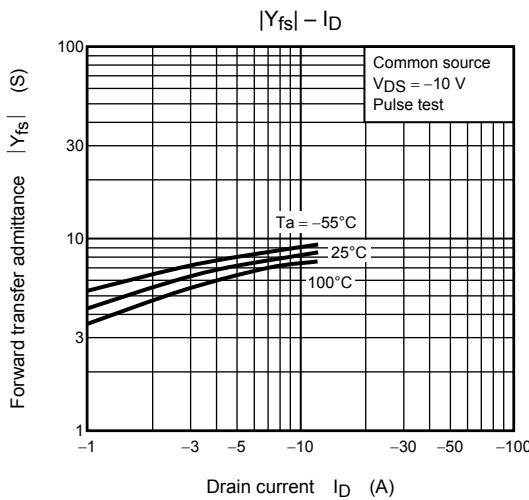
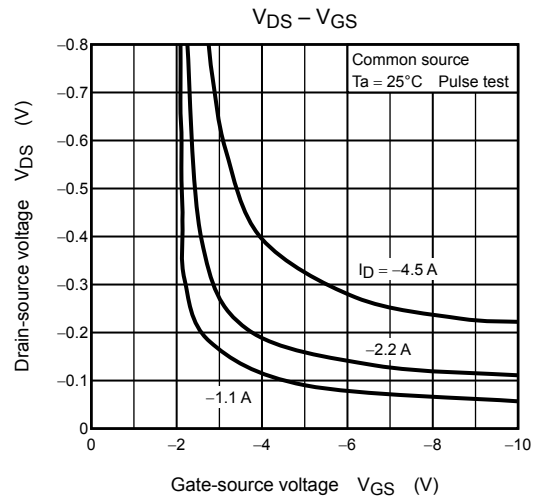
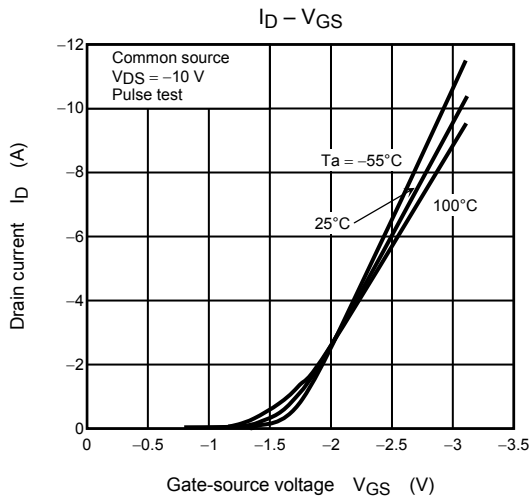
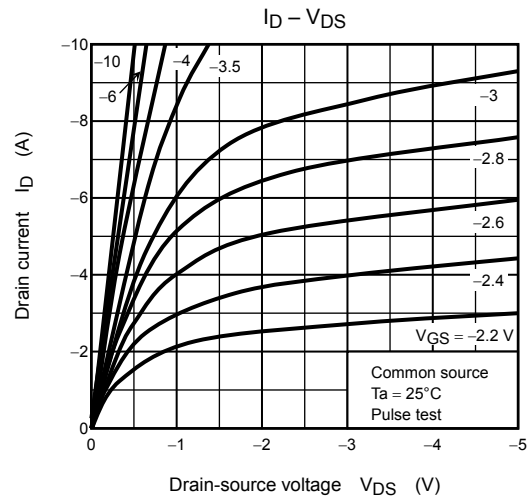
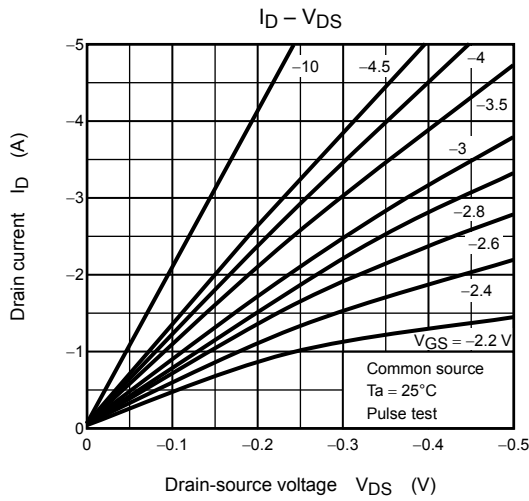
(b)

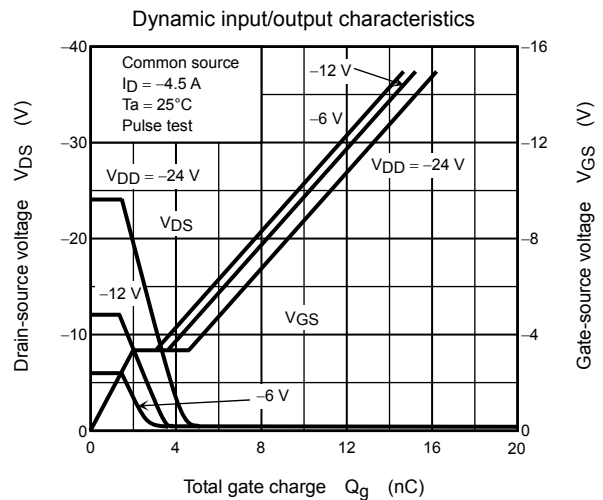
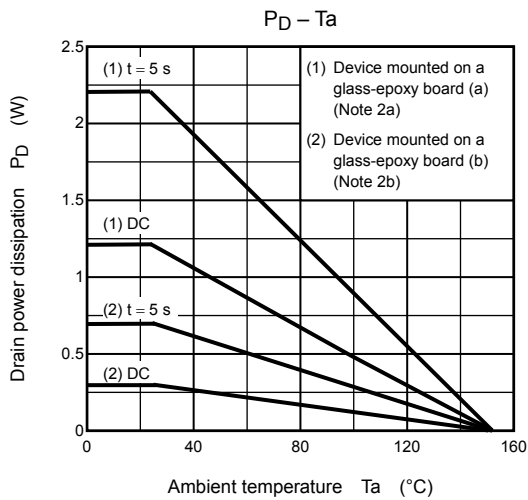
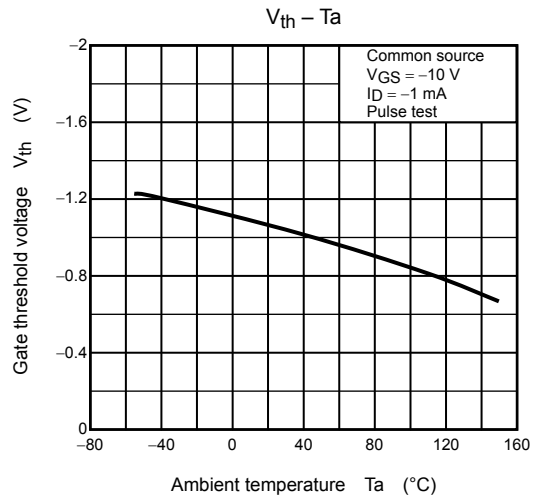
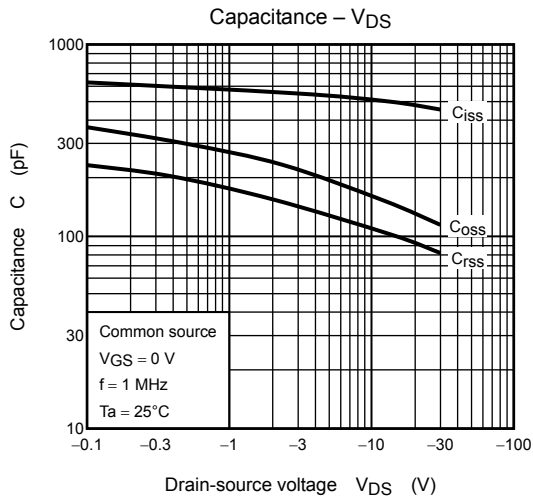
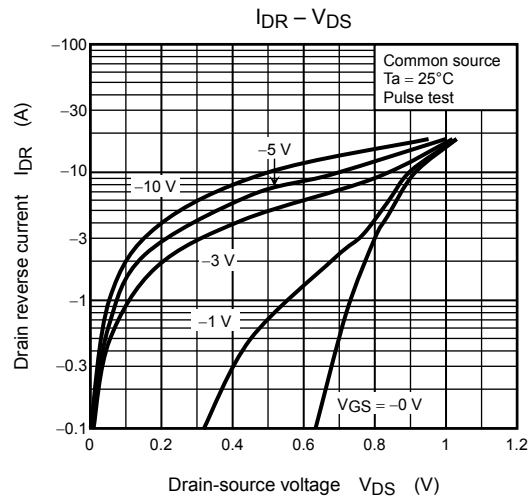
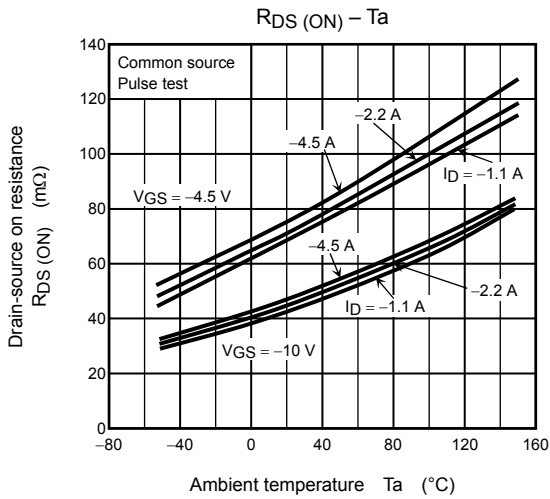
FR-4
25.4 × 25.4 × 0.8
Unit: (mm)

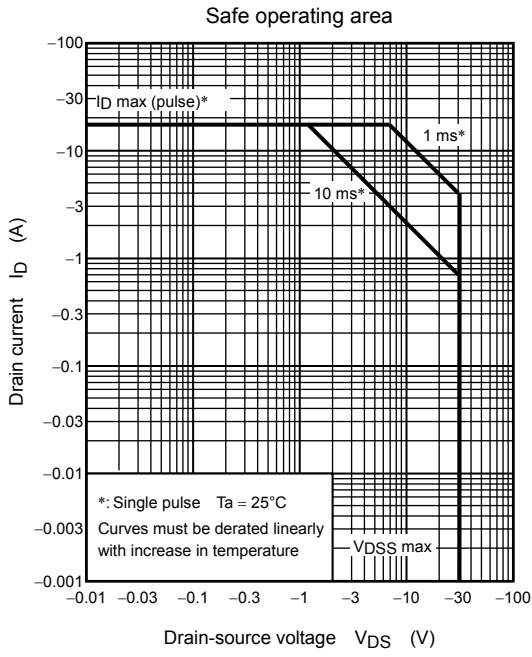
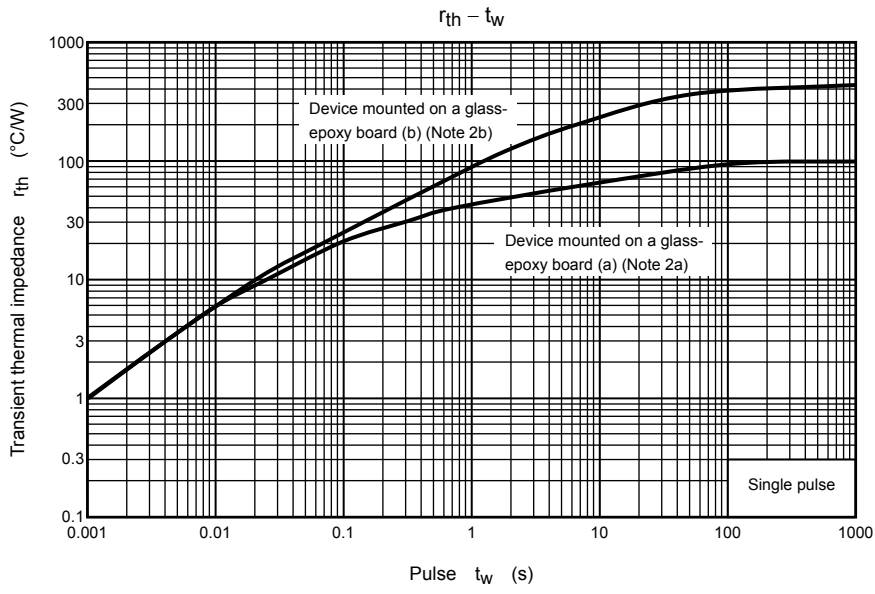
Note 3: $V_{DD} = -24\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.5\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = -2.25\text{ A}$

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

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







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20070701-EN

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