

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

TPC6201

HDD Motor Drive Applications

Notebook PC Applications

Portable Equipment Applications

- Low drain-source ON resistance: $R_{DS(ON)} = 80 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 3.8 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 10 \text{ }\mu\text{A}$ (max) ($V_{DS} = 30 \text{ V}$)
- Enhancement-model: $V_{th} = 1.3 \text{ to } 2.5 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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	2.5	A
	Pulse (Note 1)	I_{DP}	10	
Drain power dissipation ($t = 5 \text{ s}$) (Note 2a)	Single-device operation (Note 3a)	$P_D (1)$	0.9	W
	Single device value at dual operation (Note 3b)	$P_D (2)$	0.76	
Drain power dissipation ($t = 5 \text{ s}$) (Note 2b)	Single-device operation (Note 3a)	$P_D (1)$	0.4	W
	Single device value at dual operation (Note 3b)	$P_D (2)$	0.31	
Single pulse avalanche energy (Note 4)		E_{AS}	1.0	mJ
Avalanche current		I_{AR}	1.25	A
Repetitive avalanche energy (Note 5)		E_{AR}	0.16	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$

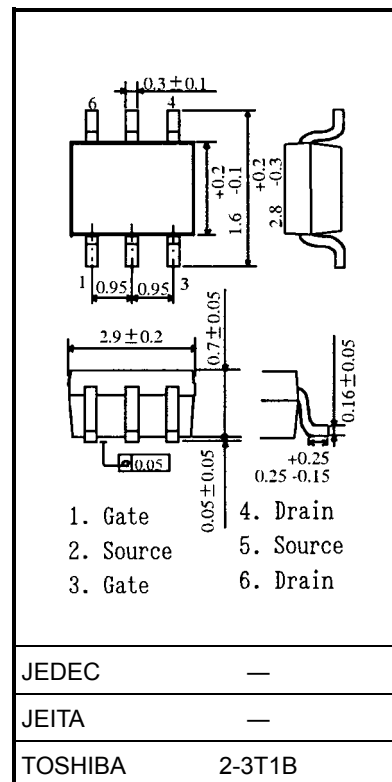
Thermal Characteristics

Characteristics		Symbol	Max	Unit
Thermal Resistance (channel-to-ambient) ($t = 5 \text{ s}$) (Note 2a)	Single-device operation (Note 3a)	$R_{th(ch-a)} (2)$	139	$^\circ\text{C/W}$
	Single device value at dual operation (Note 3b)	$R_{th(ch-a)} (2)$	165	
Thermal Resistance (channel-to-ambient) ($t = 5 \text{ s}$) (Note 2b)	Single-device operation (Note 3a)	$R_{th(ch-a)} (2)$	310	$^\circ\text{C/W}$
	Single device value at dual operation (Note 3b)	$R_{th(ch-a)} (2)$	400	

Note: (Note 1), (Note 2), (Note 3), (Note 4), (Note 5), (Note 6) Please see next page.

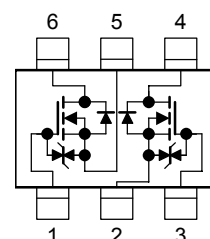
This transistor is an electrostatically sensitive device. Please handle it with caution.

Unit: mm

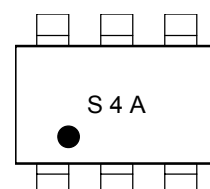


Weight: 0.011 g (typ.)

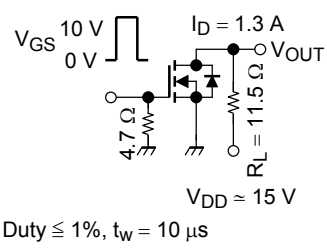
Circuit Configuration



Marking (Note 6)



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}	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	1.3	—	2.5	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 4.5 \text{ V}, I_D = 1.3 \text{ A}$	—	128	145	m Ω
		$R_{DS(ON)}$	$V_{GS} = 10 \text{ V}, I_D = 1.3 \text{ A}$	—	80	95	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 1.3 \text{ A}$	1.25	3.8	—	S
Input capacitance		C_{iss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	170	—	pF
Reverse transfer capacitance		C_{rss}		—	25	—	
Output capacitance		C_{oss}		—	40	—	
Switching time	Rise time	t_r		—	2.4	—	ns
	Turn-ON time	t_{on}		—	8	—	
	Fall time	t_f		—	2	—	
	Turn-OFF time	t_{off}		—	11	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx 24 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 2.5 \text{ A}$	—	4.7	—	nC
Gate-source charge		Q_{gs}		—	3.4	—	
Gate-drain (“miller”) charge		Q_{gd}		—	1.3	—	

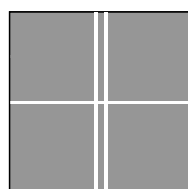
Source-Drain Ratings and Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	10	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 2.5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.2	V

Note 1: Please use devices on condition that the channel temperature is below 150°C.

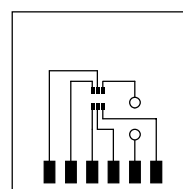
Note 2: (a) Device mounted on a glass-epoxy board (a) (t = 5 s)

(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)

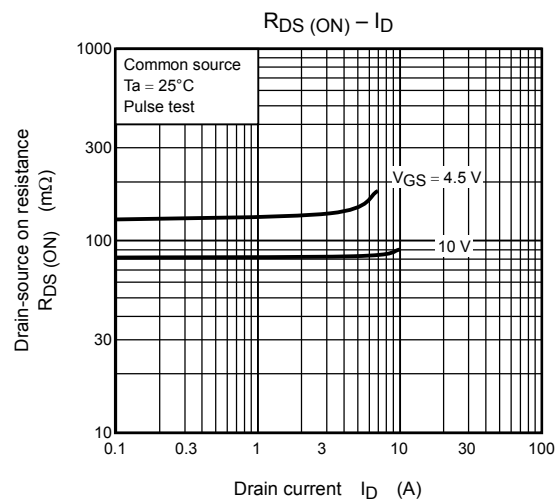
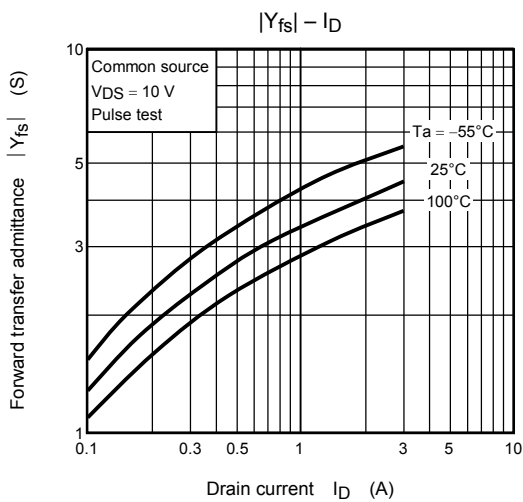
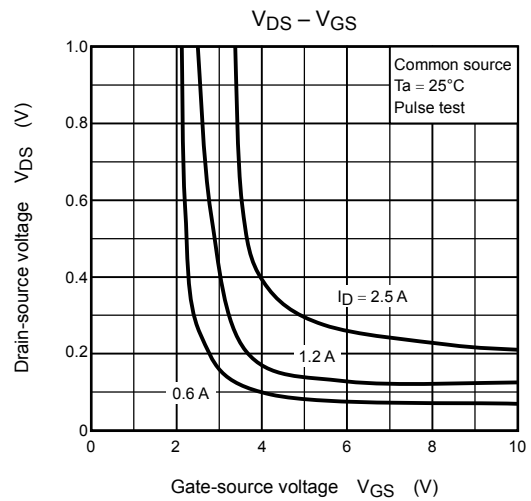
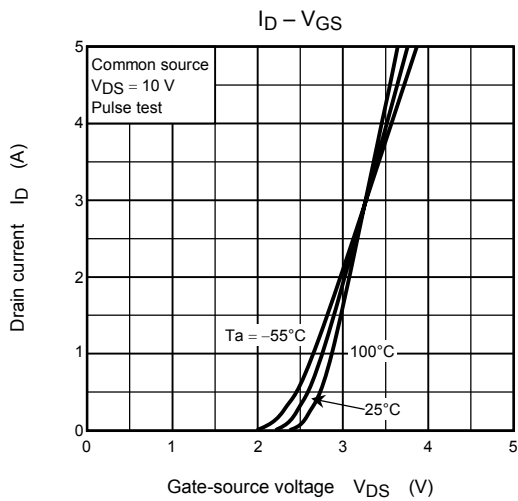
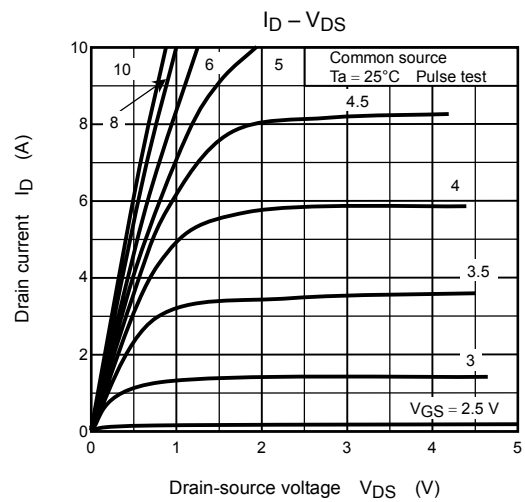
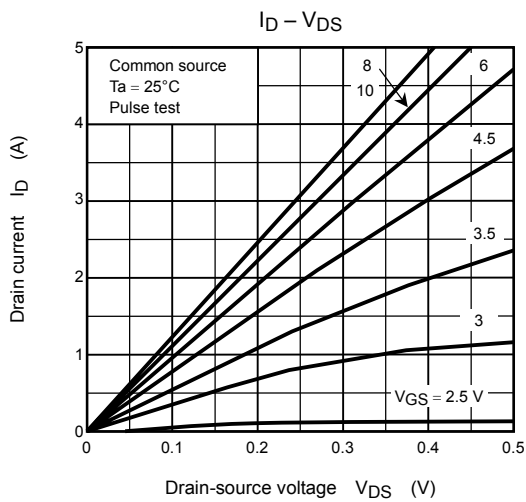
Note 3: (a) Single-device operation; values of P_D (1) and $R_{th(ch-a)}$ (1) for a single device during single-device operation

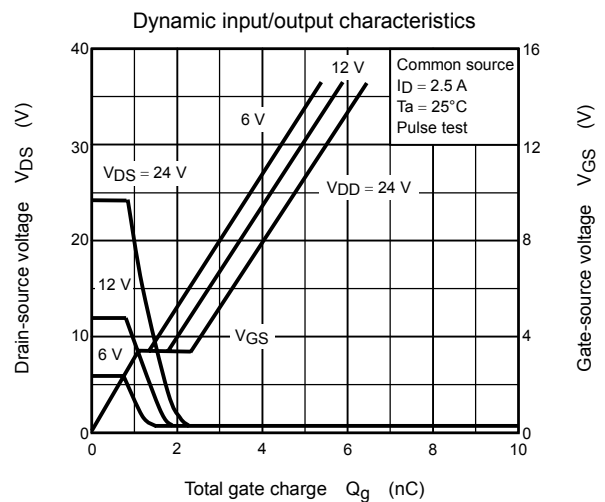
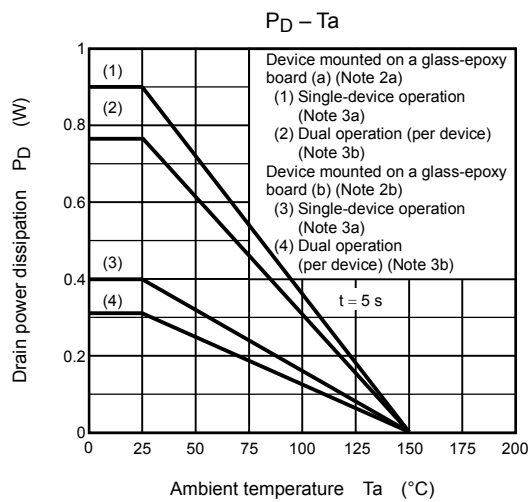
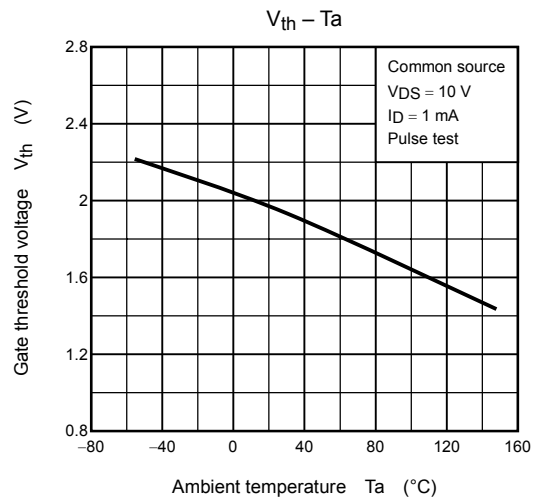
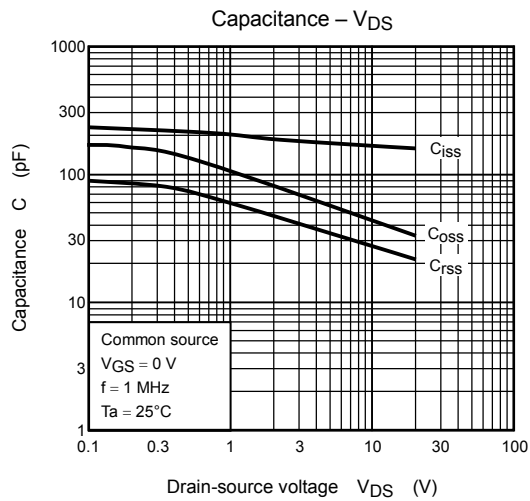
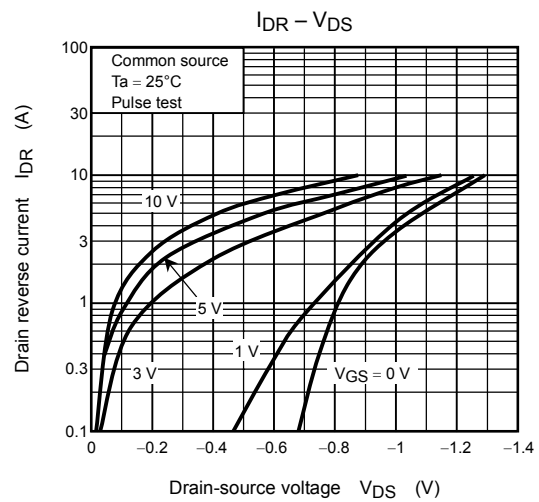
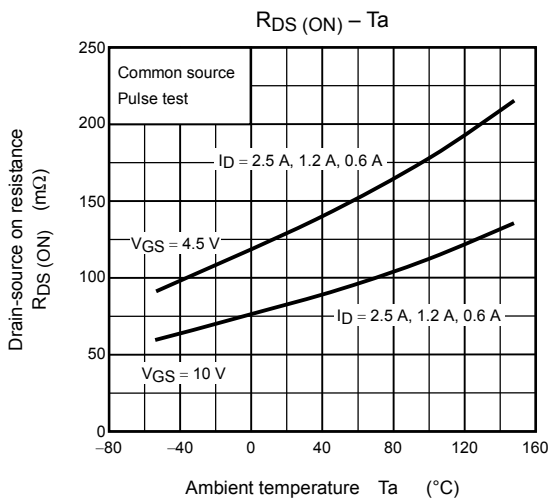
(b) Dual operation; values of P_D (2) and $R_{th(ch-a)}$ (2) for a single device during dual operation

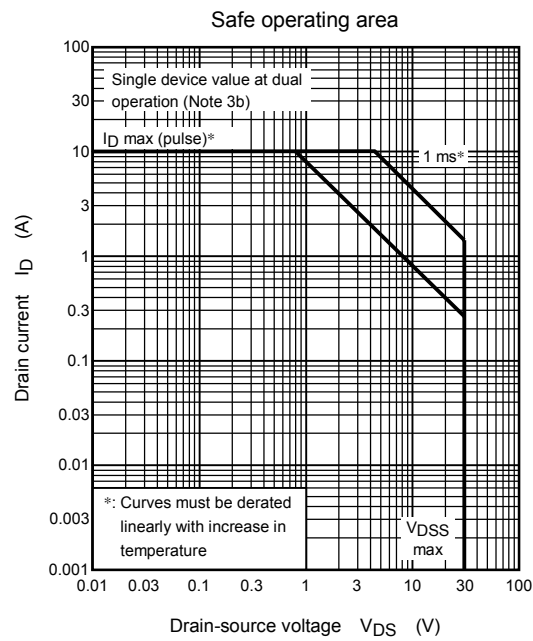
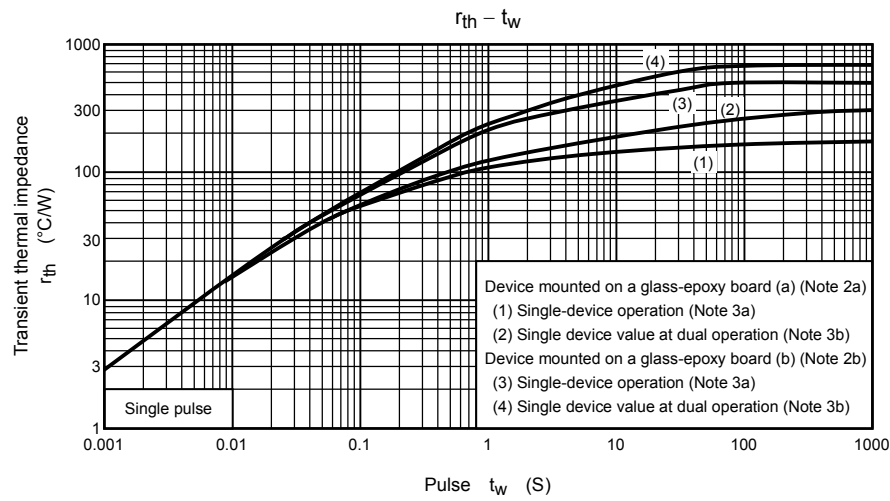
Note 4: $V_{DD} = 24 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.5 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = 1.25 \text{ A}$

Note 5: Repetitive rating; pulse width limited by maximum channel temperature

Note 6: Black round marking "●" locates on the left lower side of parts number marking "S4A" indicates terminal No.1.







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