

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

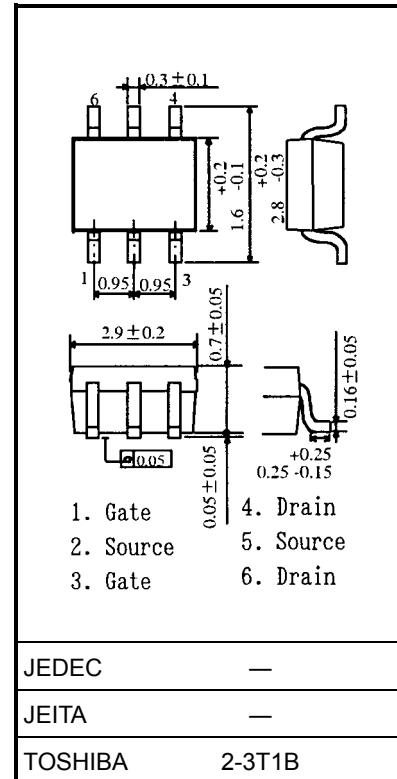
# TPC6201

HDD Motor Drive Applications

Notebook PC Applications

Portable Equipment Applications

Unit: mm



Weight: 0.011 g (typ.)

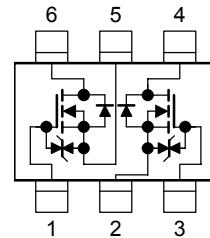
## Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V <sub>DSS</sub>	30	V
Drain-gate voltage (R <sub>GS</sub> = 20 kΩ)		V <sub>DGR</sub>	30	V
Gate-source voltage		V <sub>GSS</sub>	±20	V
Drain current	DC (Note 1)	I <sub>D</sub>	2.5	A
	Pulse (Note 1)	I <sub>DP</sub>	10	
Drain power dissipation (t = 5 s) (Note 2a)	Single-device operation (Note 3a)	P <sub>D</sub> (1)	0.9	W
	Single device value at dual operation (Note 3b)	P <sub>D</sub> (2)	0.76	
Drain power dissipation (t = 5 s) (Note 2b)	Single-device operation (Note 3a)	P <sub>D</sub> (1)	0.4	W
	Single device value at dual operation (Note 3b)	P <sub>D</sub> (2)	0.31	
Single pulse avalanche energy (Note 4)		E <sub>AS</sub>	1.0	mJ
Avalanche current		I <sub>AR</sub>	1.25	A
Repetitive avalanche energy (Note 5)		E <sub>AR</sub>	0.16	mJ
Channel temperature		T <sub>ch</sub>	150	°C
Storage temperature range		T <sub>stg</sub>	-55 to 150	°C

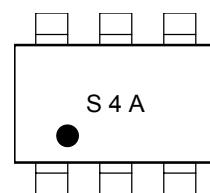
## Thermal Characteristics

Characteristics		Symbol	Max	Unit
Thermal Resistance (channel-to-ambient) (t = 5 s) (Note 2a)	Single-device operation (Note 3a)	R <sub>th</sub> (ch-a) (2)	139	°C/W
	Single device value at dual operation (Note 3b)	R <sub>th</sub> (ch-a) (2)	165	
Thermal Resistance (channel-to-ambient) (t = 5 s) (Note 2b)	Single-device operation (Note 3a)	R <sub>th</sub> (ch-a) (2)	310	°C/W
	Single device value at dual operation (Note 3b)	R <sub>th</sub> (ch-a) (2)	400	

## Circuit Configuration



## Marking (Note 6)



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.

Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

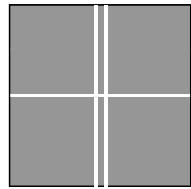
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	$I_{GSS}$	$V_{GS} = \pm 16\text{ V}$ , $V_{DS} = 0\text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-OFF current	$I_{DSS}$	$V_{DS} = 30\text{ V}$ , $V_{GS} = 0\text{ V}$	—	—	10	$\mu\text{A}$
Drain-source breakdown voltage	$V_{(\text{BR})\text{DSS}}$	$I_D = 10\text{ mA}$ , $V_{GS} = 0\text{ V}$	30	—	—	$\text{V}$
	$V_{(\text{BR})\text{DSX}}$	$I_D = 10\text{ mA}$ , $V_{GS} = -20\text{ V}$	15	—	—	
Gate threshold voltage	$V_{th}$	$V_{DS} = 10\text{ V}$ , $I_D = 1\text{ mA}$	1.3	—	2.5	$\text{V}$
Drain-source ON resistance	$R_{DS(\text{ON})}$	$V_{GS} = 4.5\text{ V}$ , $I_D = 1.3\text{ A}$	—	128	145	$\text{m}\Omega$
	$R_{DS(\text{ON})}$	$V_{GS} = 10\text{ V}$ , $I_D = 1.3\text{ A}$	—	80	95	
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10\text{ V}$ , $I_D = 1.3\text{ A}$	1.25	3.8	—	$\text{S}$
Input capacitance	$C_{iss}$	$V_{DS} = 10\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$	—	170	—	$\text{pF}$
Reverse transfer capacitance	$C_{rss}$		—	25	—	
Output capacitance	$C_{oss}$		—	40	—	
Switching time	Rise time	$t_r$		—	2.4	—
	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	—	$\text{nC}$
Gate-source charge	$Q_{gs}$		—	3.4	—	
Gate-drain ("miller") charge	$Q_{gd}$		—	1.3	—	

Source-Drain Ratings and Characteristics ( $T_a = 25^\circ\text{C}$ )

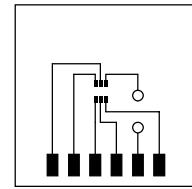
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Pulse drain reverse current (Note 1)	$I_{DRP}$	—	—	—	10	$\text{A}$
Forward voltage (diode)	$V_{DSF}$	$I_{DR} = 2.5\text{ A}$ , $V_{GS} = 0\text{ V}$	—	—	-1.2	$\text{V}$

Note 1: Please use devices on condition that the channel temperature is below  $150^\circ\text{C}$ .

Note 2: (a) Device mounted on a glass-epoxy board (a) ( $t = 5\text{ s}$ )  
 (b) Device mounted on a glass-epoxy board (b) ( $t = 5\text{ s}$ )



FR-4  
 $25.4 \times 25.4 \times 0.8$   
 Unit: (mm)



FR-4  
 $25.4 \times 25.4 \times 0.8$   
 Unit: (mm)

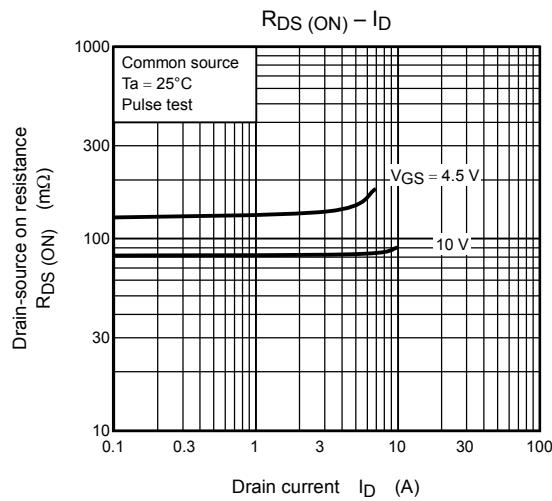
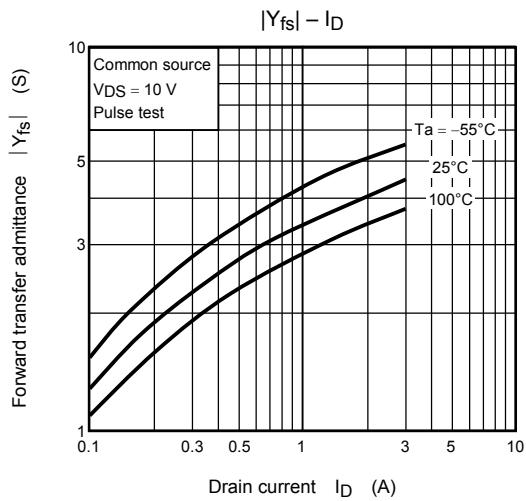
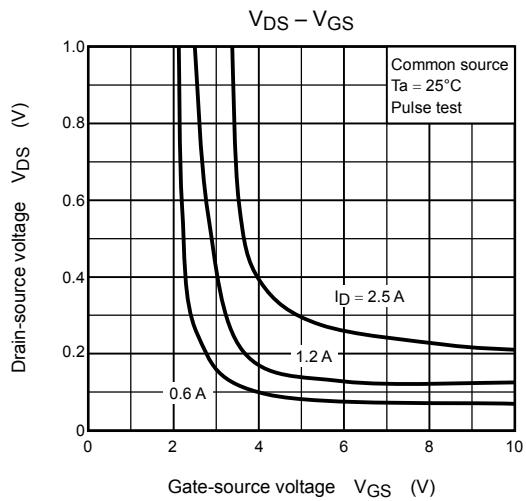
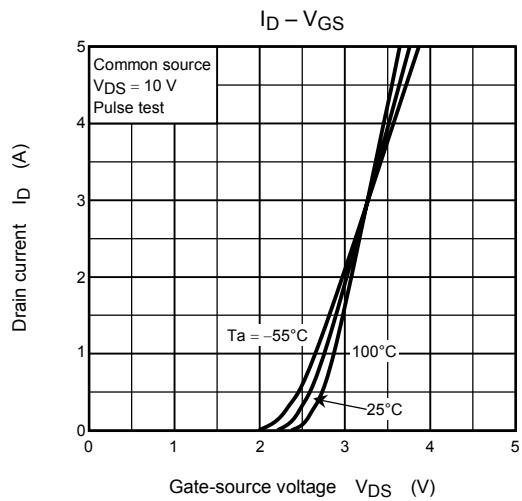
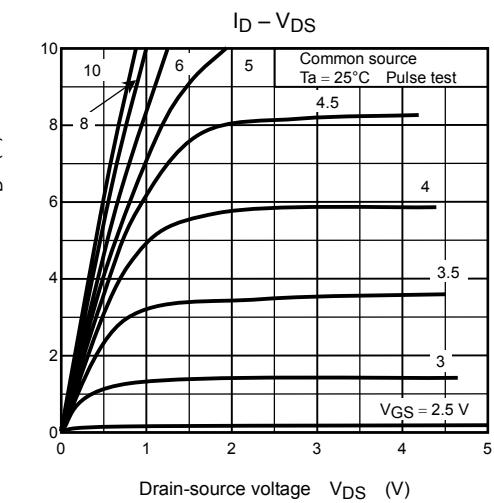
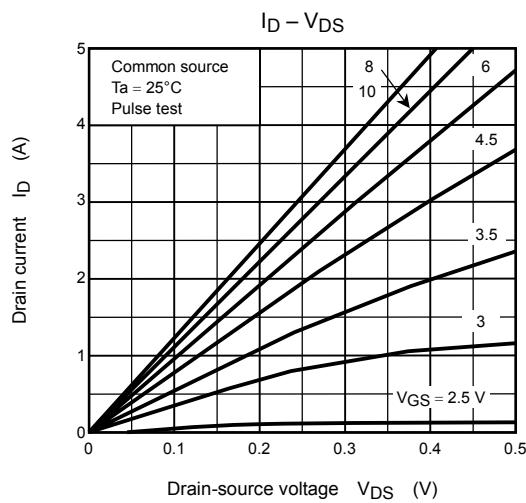
Note 3: (a) Single-device operation; values of  $P_D$  (1) and  $R_{th}$  (ch-a) (1) for a single device during single-device operation

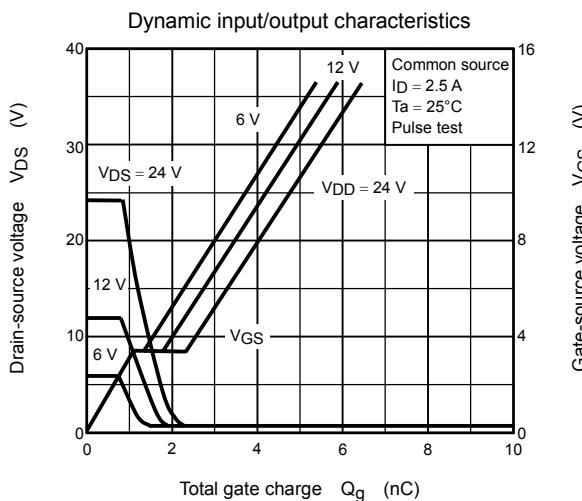
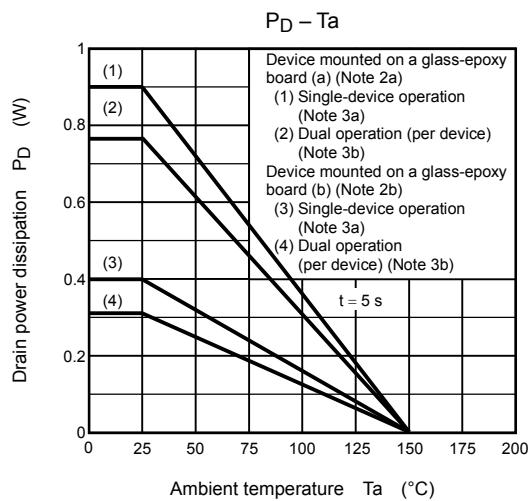
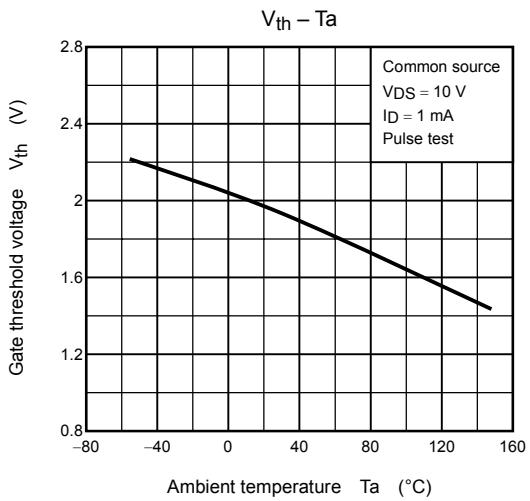
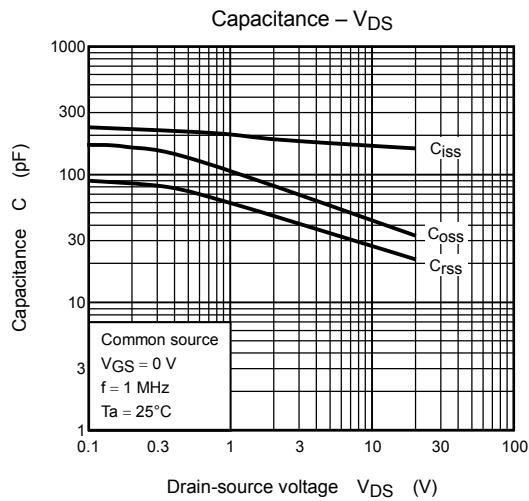
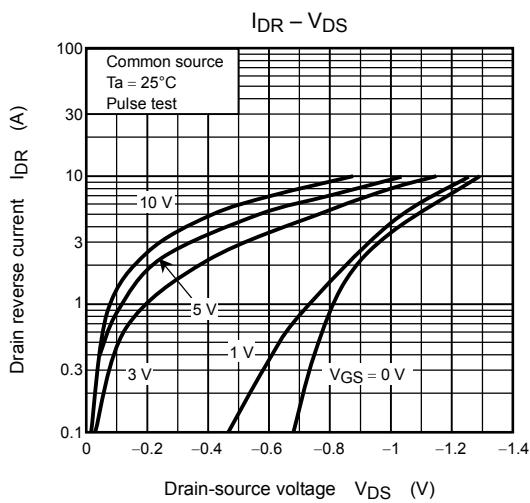
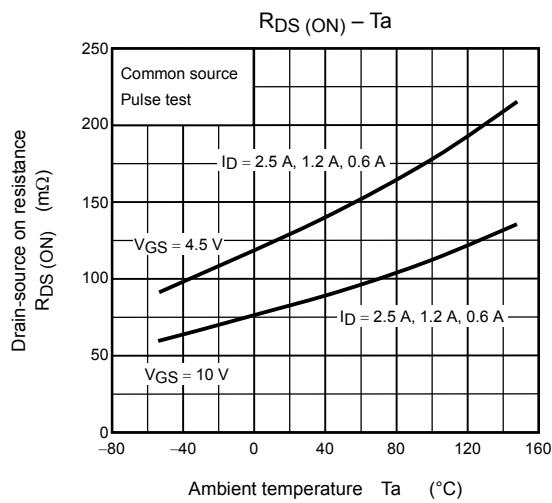
(b) Dual operation; values of  $P_D$  (2) and  $R_{th}$  (ch-a) (2) for a single device during dual operation

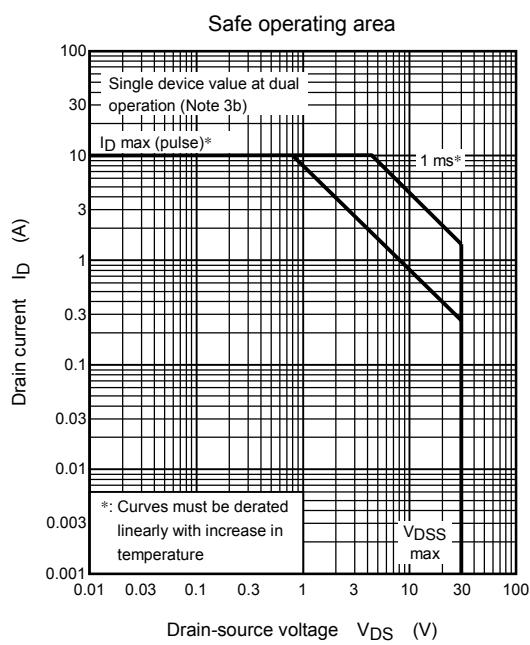
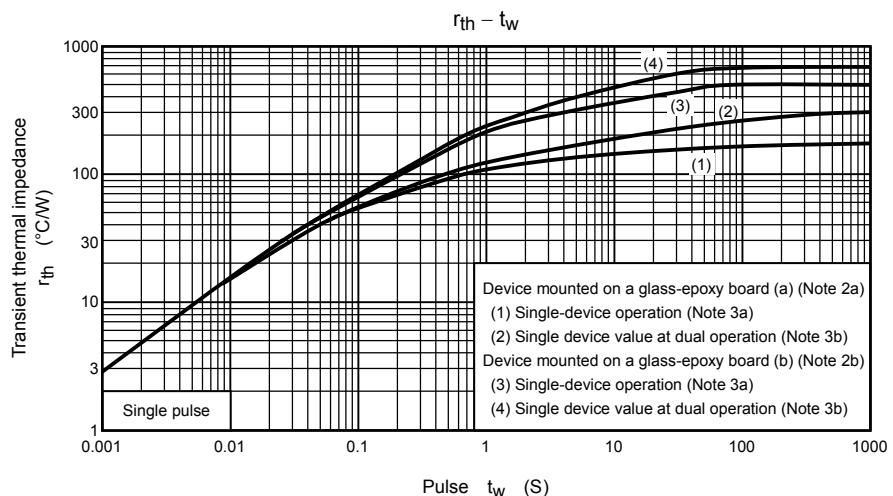
Note 4:  $V_{DD} = 24\text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 0.5\text{ mH}$ ,  $R_G = 25\text{ }\Omega$ ,  $I_{AR} = 1.25\text{ A}$

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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