

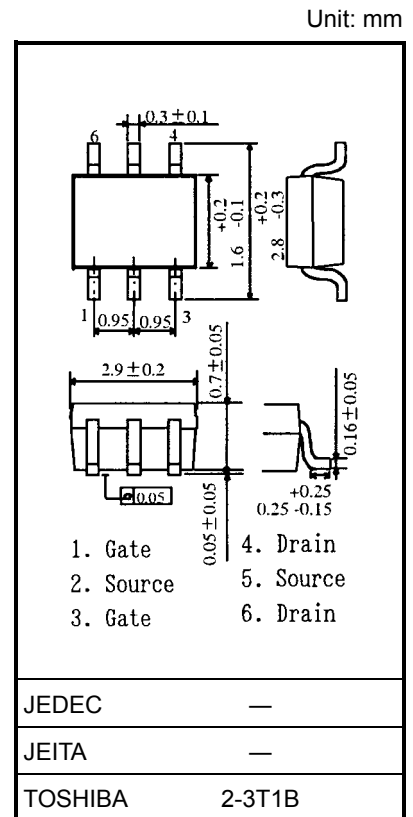
# TPC6201

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:  $V_{th} = 1.3\text{ to }2.5\text{ V}$  ( $V_{DS} = 10\text{ V}$ ,  $I_D = 1\text{ mA}$ )

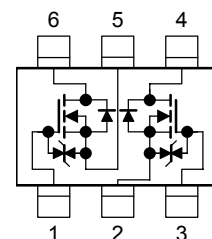
## Maximum Ratings (Ta = 25°C)

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		$V_{GSS}$	$\pm 20$	V
Drain current	DC (Note 1)	$I_D$	2.5	A
	Pulse (Note 1)	$I_{DP}$	10	
Drain power dissipation (t = 5 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 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	°C
Storage temperature range		$T_{stg}$	-55 to 150	°C



Weight: 0.011 g (typ.)

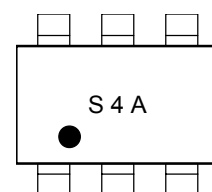
## Circuit Configuration



## Thermal Characteristics

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

## 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 (Ta = 25°C)

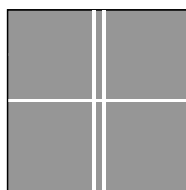
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-OFF current		$I_{DSS}$	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	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	$\text{m}\Omega$
		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 1.3\text{ A}$	—	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

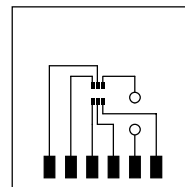
Note 1: Please use devices on condition that the channel temperature is below 150°C.

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  
 $25.4 \times 25.4 \times 0.8$   
 Unit: (mm)



(b)

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

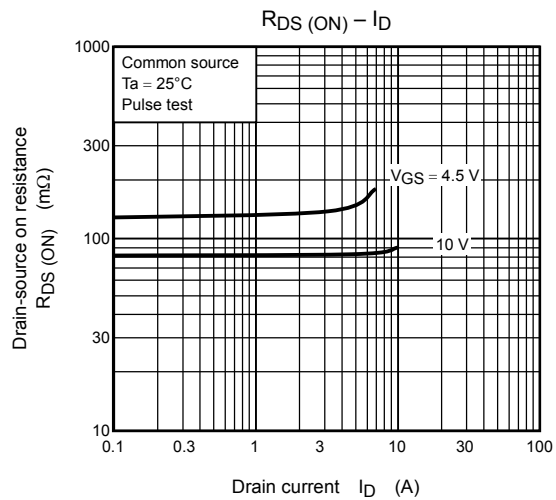
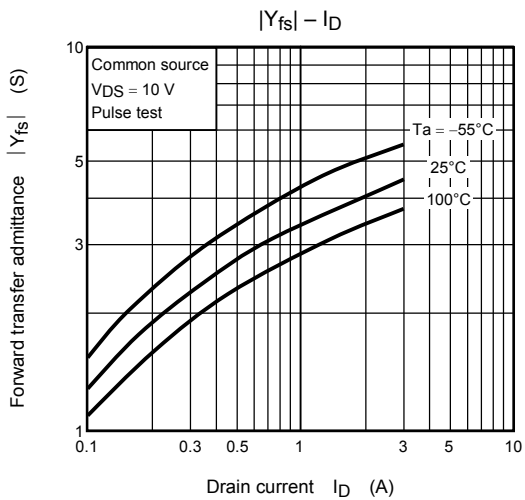
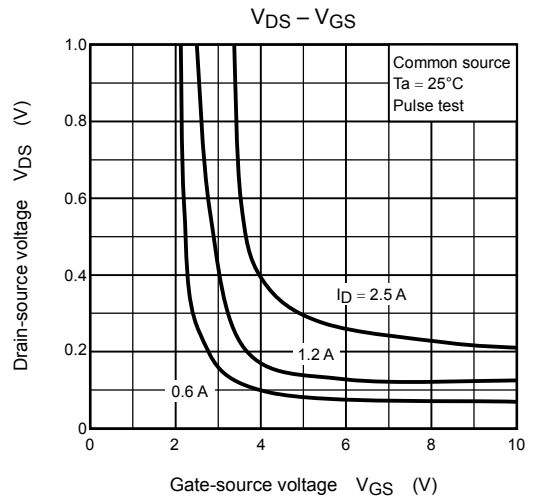
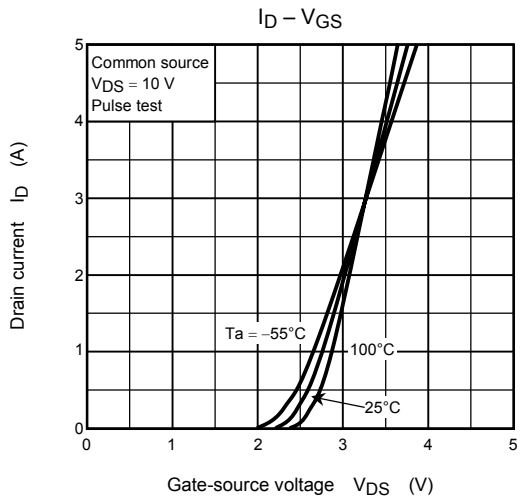
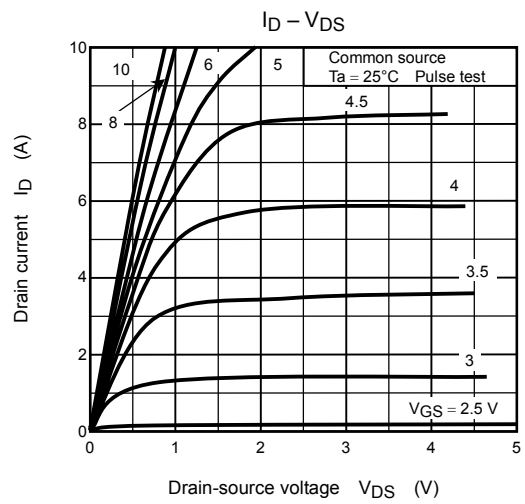
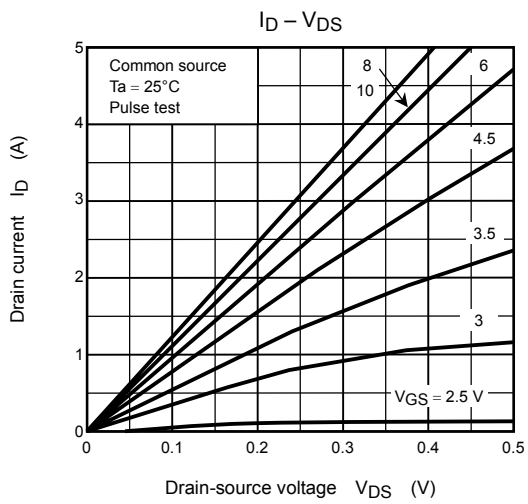
Note 3: (a) Single-device operation; values of  $P_D$  (1) and  $R_{th(ch-a)}$  (1) for a single device during single-device operation

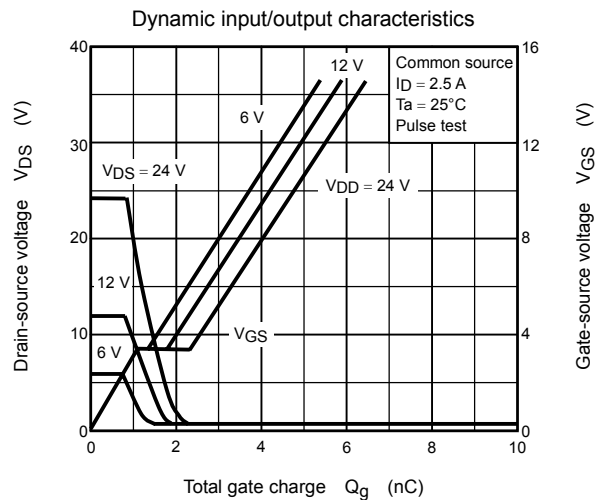
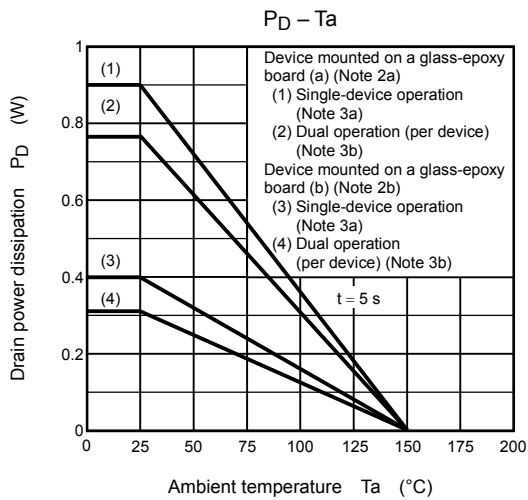
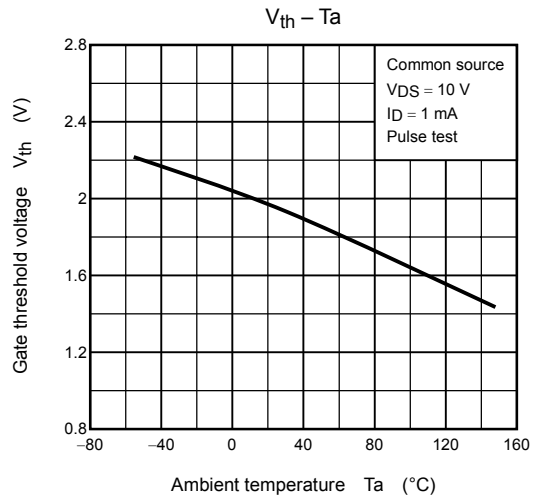
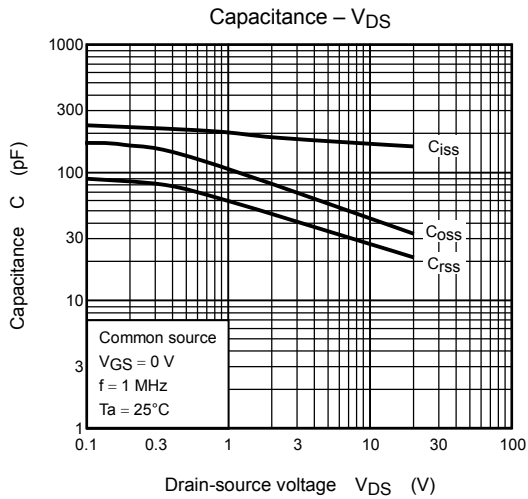
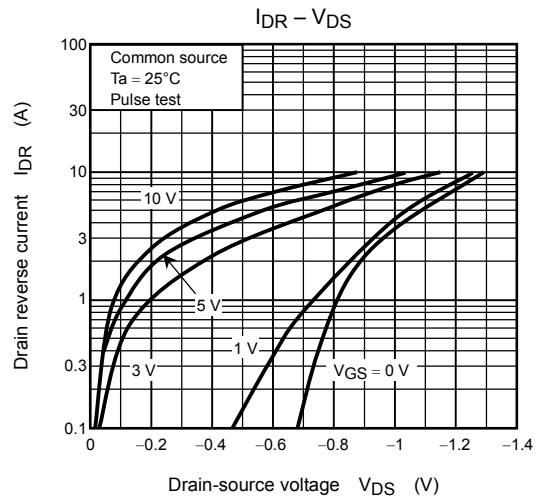
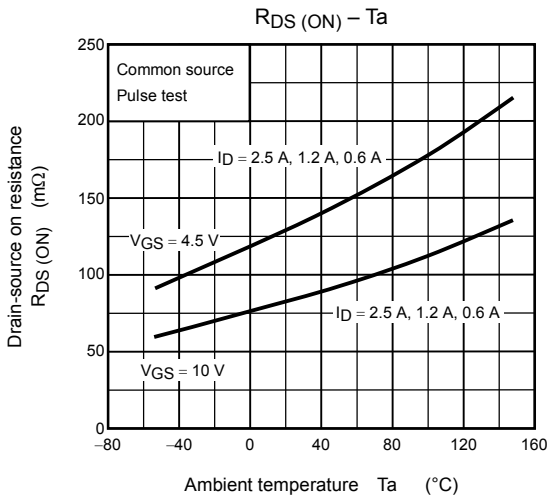
(b) Dual operation; values of  $P_D$  (2) and  $R_{th(ch-a)}$  (2) for a single device during dual operation

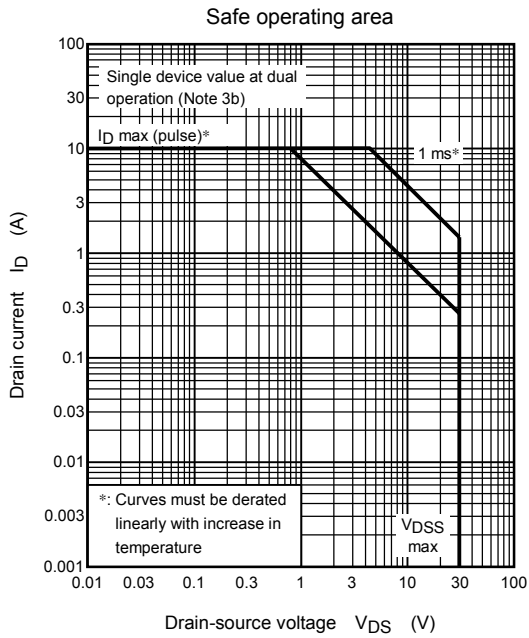
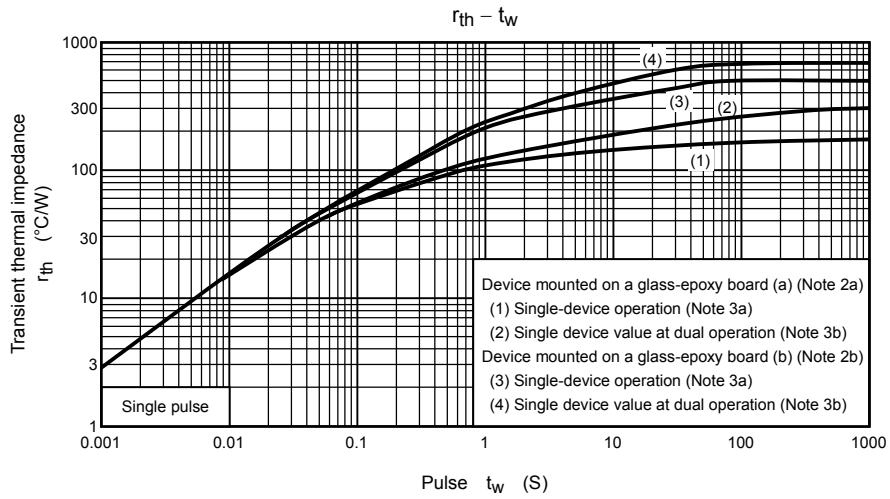
Note 4:  $V_{DD} = 24\text{ V}, T_{ch} = 25^\circ\text{C}$  (initial),  $L = 0.5\text{ mH}, R_G = 25\ \Omega, I_{AR} = 1.25\text{ A}$

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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