

TOSHIBA Field Effect Transistor Silicon P Channel MOS Type ( $\pi$ -MOSVI)

## TPC8102

Lithium Ion Battery Applications  
 Notebook PCs  
 Portable Equipment Applications

- Small footprint due to small and thin package
- Low drain-source ON resistance :  $R_{DS(ON)} = 34 \text{ m}\Omega$  (typ.)
- High forward transfer admittance :  $|Y_{fs}| = 9 \text{ S}$  (typ.)
- Low leakage current :  $I_{DSS} = -10 \text{ }\mu\text{A}$  (max) ( $V_{DS} = -30 \text{ V}$ )
- Enhancement-mode :  $V_{th} = -0.8 \sim -2.0 \text{ V}$  ( $V_{DS} = -10 \text{ V}$ ,  $I_D = -1 \text{ mA}$ )

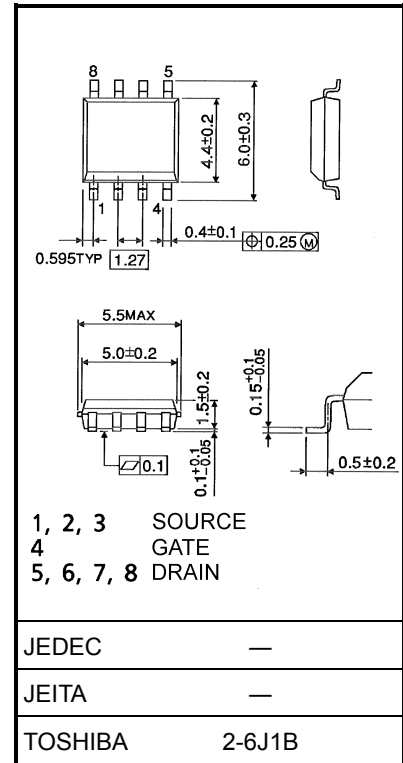
### Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

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		$V_{GSS}$	$\pm 20$	V
Drain current	DC (Note 1)	$I_D$	-6	A
	Pulse (Note 1)	$I_{DP}$	-24	
Drain power dissipation ( $t = 10 \text{ s}$ ) (Note 2a)		$P_D$	2.4	W
Drain power dissipation ( $t = 10 \text{ s}$ ) (Note 2b)		$P_D$	1.0	W
Single pulse avalanche energy (Note 3)		$E_{AS}$	47	mJ
Avalanche current		$I_{AR}$	-6	A
Repetitive avalanche energy (Note 2a) (Note 4)		$E_{AR}$	0.24	mJ
Channel temperature		$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55 to 150	$^\circ\text{C}$

Note: For (Note 1), (Note 2), (Note 3) and (Note 4), please refer to the next page.

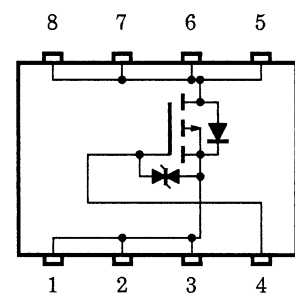
This transistor is an electrostatic sensitive device. Please handle with caution.

Unit: mm



Weight: 0.080 g (typ.)

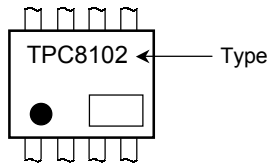
### Circuit Configuration



## Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10 s) (Note 2a)	$R_{th(ch-a)}$	52.1	°C/W
Thermal resistance, channel to ambient (t = 10 s) (Note 2b)	$R_{th(ch-a)}$	125	°C/W

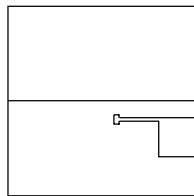
## Marking (Note 5)



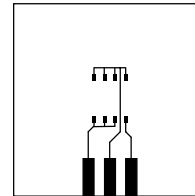
Note 1: Please use devices on condition that the channel temperature is below 150°C.

Note 2: (a) Device mounted on a glass-epoxy board (a)

(b) Device mounted on a glass-epoxy board (b)



(a)



(b)

Note 3:  $V_{DD} = -24\text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 1.0\text{ mH}$ ,  $R_G = 25\ \Omega$ ,  $I_{AR} = -6\text{ A}$

Note 4: Reptitive rating; pulse width limited by maximum channel temperature.

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

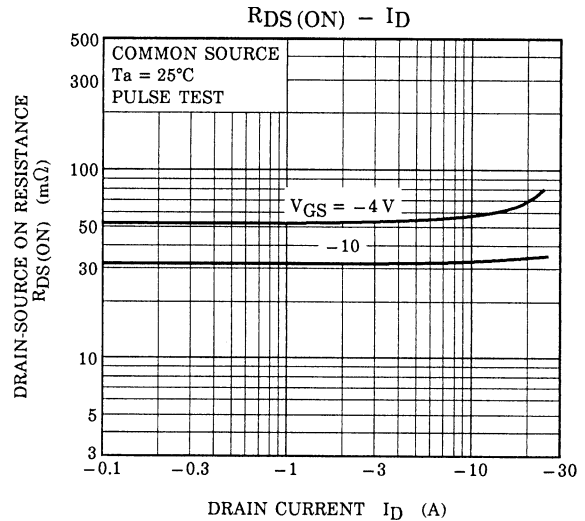
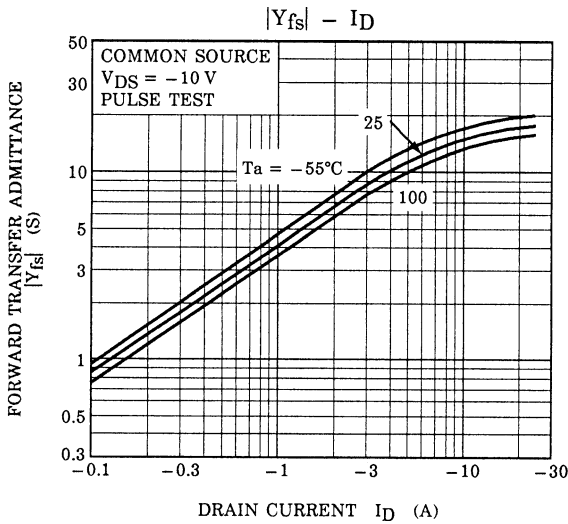
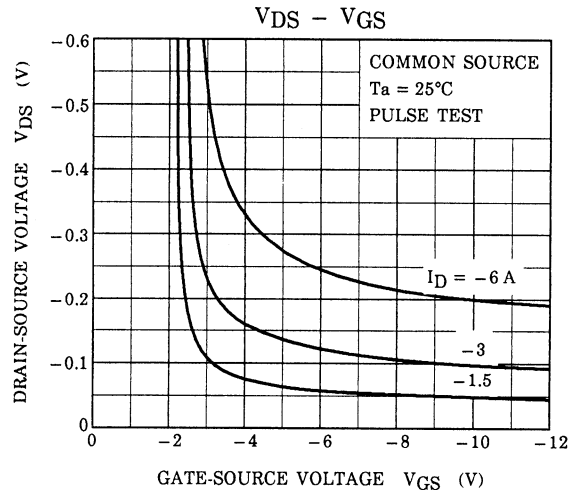
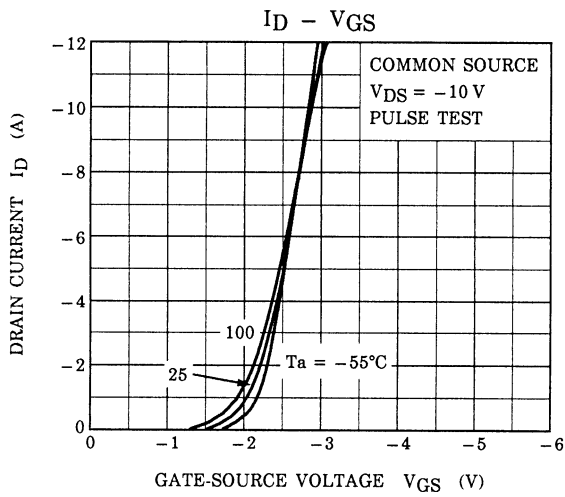
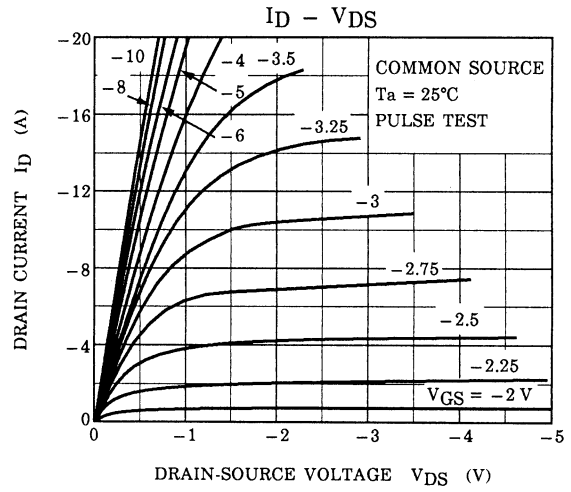
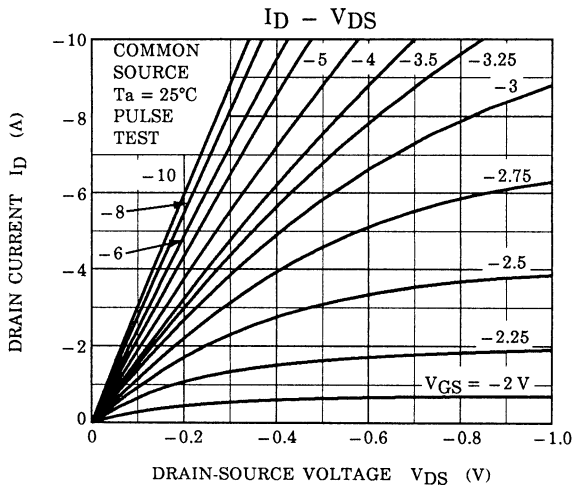
shows Lot number. (year of manufacture: last decimal digit of the year of manufacture, month of manufacture: january to december are denoted by letters A to L respectively)

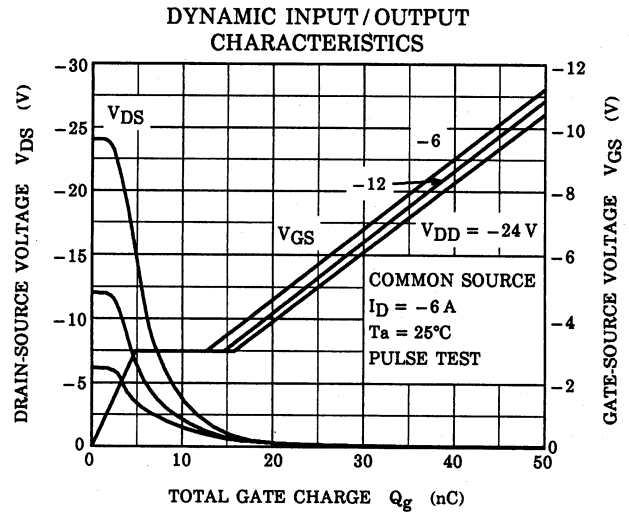
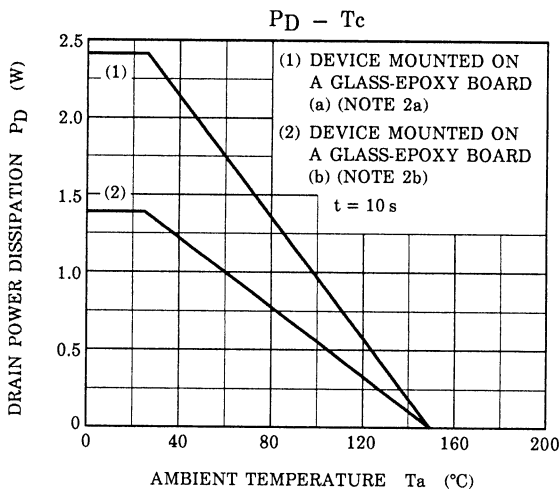
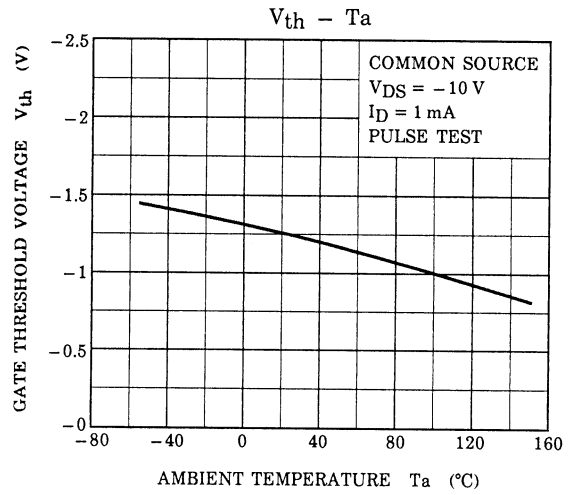
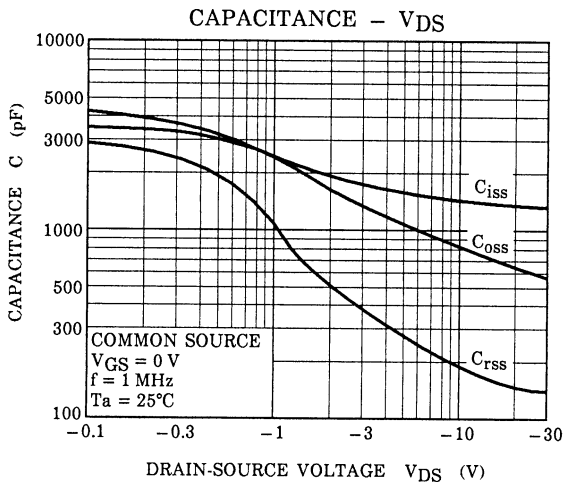
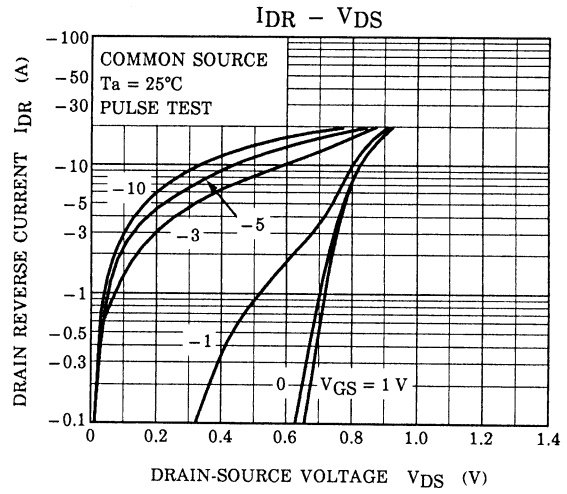
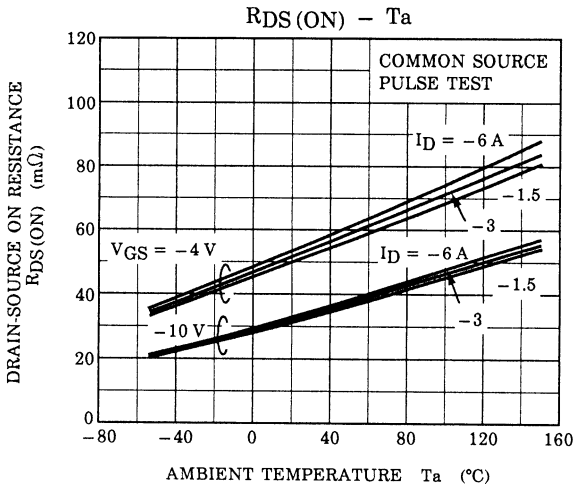
## Electrical Characteristics (Ta = 25°C)

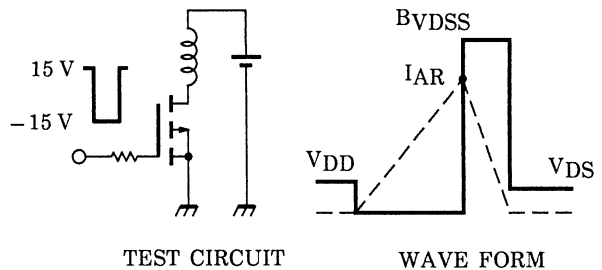
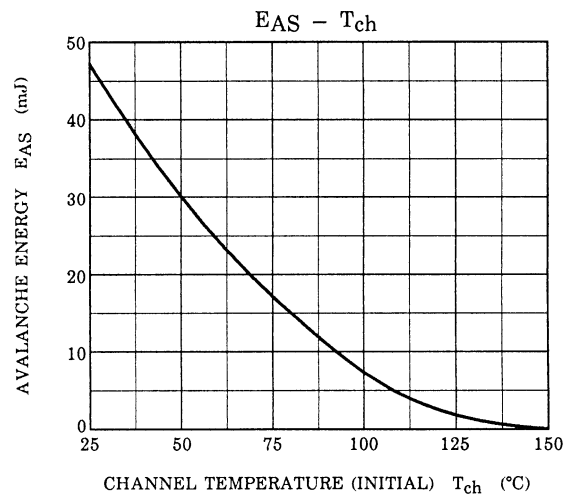
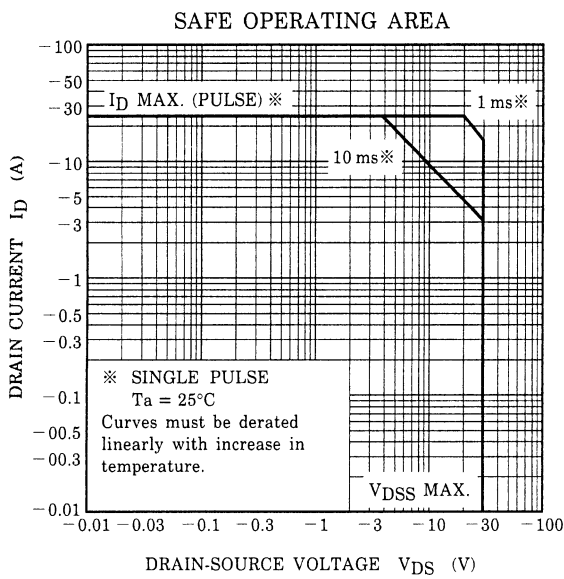
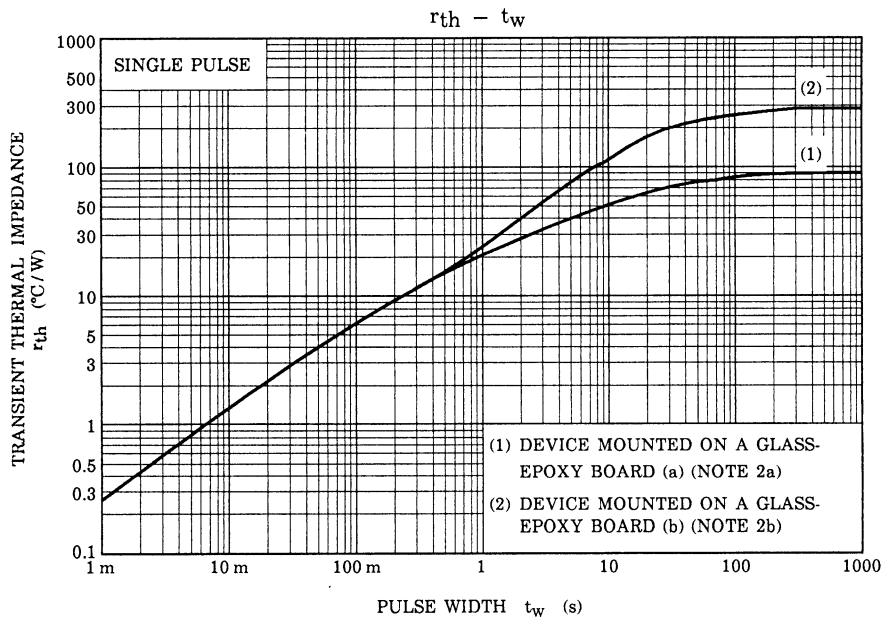
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-off current		$I_{DSS}$	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$	—	—	-10	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-30	—	—	V
Gate threshold voltage		$V_{th}$	$V_{DS} = -10\text{ V}, I_D = -1\text{ mA}$	-0.8	—	-2.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = -4\text{ V}, I_D = -3\text{ A}$	—	56	70	$\text{m}\Omega$
		$R_{DS(ON)}$	$V_{GS} = -10\text{ V}, I_D = -3\text{ A}$	—	34	40	$\text{m}\Omega$
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -3\text{ A}$	4.5	9	—	S
Input capacitance		$C_{iss}$	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	1380	—	pF
Reverse transfer capacitance		$C_{rss}$		—	220	—	
Output capacitance		$C_{oss}$		—	560	—	
Switching time	Rise time	$t_r$	<p><math>I_D = -3\text{ A}</math> <math>V_{GS} = -10\text{ V}</math> <math>V_{OUT}</math> <math>R_L = 5\ \Omega</math> <math>V_{DD} = -15\text{ V}</math> <math>4.7\ \Omega</math> <math>Duty \leq 1\%, t_w = 10\ \mu s</math></p>	—	12	—	ns
	Turn-on time	$t_{on}$		—	20	—	
	Fall time	$t_f$		—	22	—	
	Turn-off time	$t_{off}$		—	90	—	
Total gate charge (Gate-source plus gate-drain)		$Q_g$	$V_{DD} \approx -24\text{ V}, V_{GS} = -10\text{ V}, I_D = -6\text{ A}$	—	43	—	nC
Gate-source charge		$Q_{gs}$		—	30	—	
Gate-drain ("miller") charge		$Q_{gd}$		—	13	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	$I_{DRP}$	—	—	—	-24	A
Forward voltage (diode)		$V_{DSF}$	$I_{DR} = -6\text{ A}, V_{GS} = 0\text{ V}$	—	—	1.2	V







$T_{ch} = 25^\circ\text{C}$  (Initial)  
 Peak  $I_{AR} = -6\text{ A}$ ,  $R_G = 25\ \Omega$   $E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left( \frac{BVDSS}{BVDSS - V_{DD}} \right)$   
 $V_{DD} = -24\text{ V}$ ,  $L = 1.0\text{ mH}$

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