

# TPCS8101

Lithium Ion Battery Applications  
 Portable Equipment Applications  
 Notebook PCs

- Small footprint due to small and thin package
- Low drain-source ON resistance:  $R_{DS(ON)} = 15\text{ m}\Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 12\text{ S}$  (typ.)
- Low leakage current:  $I_{DSS} = -10\text{ }\mu\text{A}$  (max) ( $V_{DS} = -30\text{ V}$ )
- Enhancement-mode:  $V_{th} = -0.8\sim -2.0\text{ V}$  ( $V_{DS} = -10\text{ V}$ ,  $I_D = -1\text{ mA}$ )

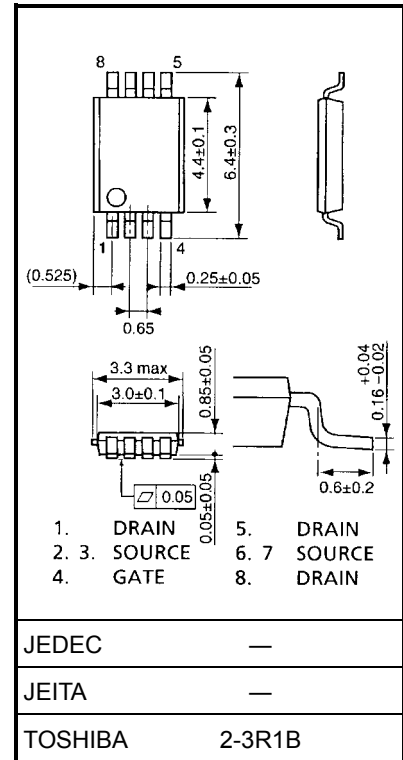
## Maximum Ratings (Ta = 25°C)

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)	$I_D$	-6	A
	Pulse (Note 1)	$I_{DP}$	-24	
Drain power dissipation (t = 10 s) (Note 2a)		$P_D$	1.5	W
Drain power dissipation (t = 10 s) (Note 2b)		$P_D$	0.6	W
Single pulse avalanche energy (Note 3)		$E_{AS}$	46.8	mJ
Avalanche current		$I_{AR}$	-6	A
Repetitive avalanche energy (Note 2a, Note 4)		$E_{AR}$	0.15	mJ
Channel temperature		$T_{ch}$	150	°C
Storage temperature range		$T_{stg}$	-55 to 150	°C

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

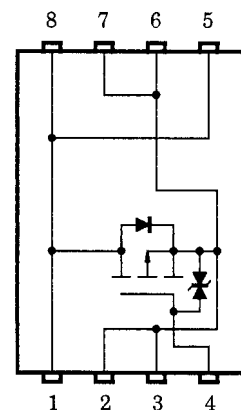
This transistor is an electrostatic sensitive device. Please handle with caution.

Unit: mm



Weight: 0.035 g (typ.)

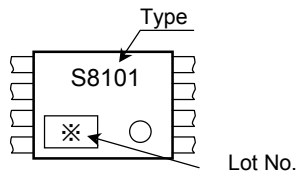
## Circuit Configuration



## Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10 s) (Note 2a)	$R_{th(ch-a)}$	83.3	°C/W
Thermal resistance, channel to ambient (t = 10 s) (Note 2b)	$R_{th(ch-a)}$	208	°C/W

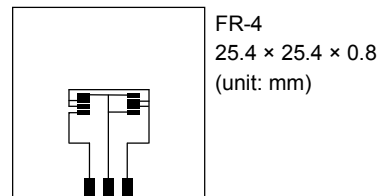
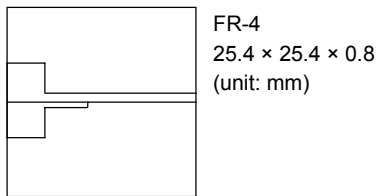
## Marking (Note 5)



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)

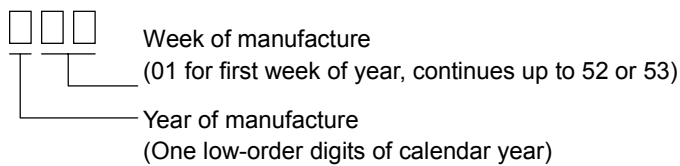


Note 3:  $V_{DD} = -24\text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 1.0\text{ mH}$ ,  $R_G = 25\ \Omega$ ,  $I_{AR} = -6.0\text{ A}$

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

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

※ Weekly code: (Three digits)

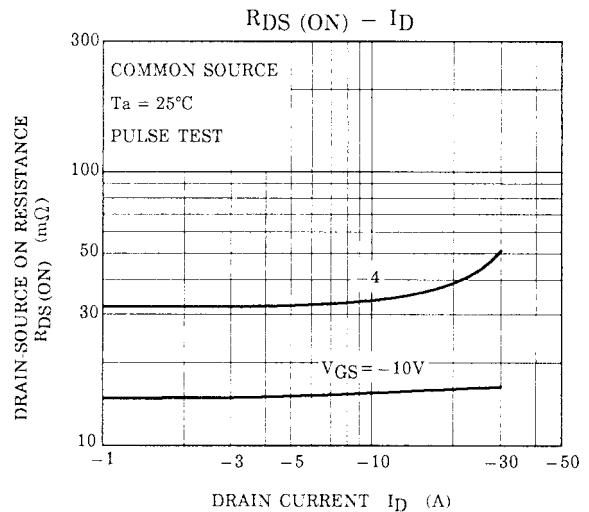
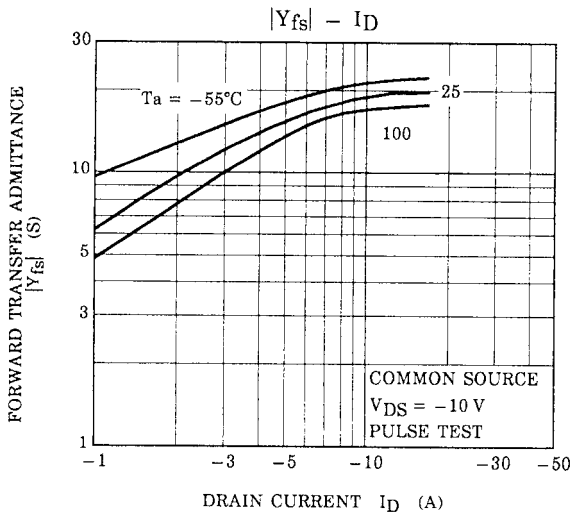
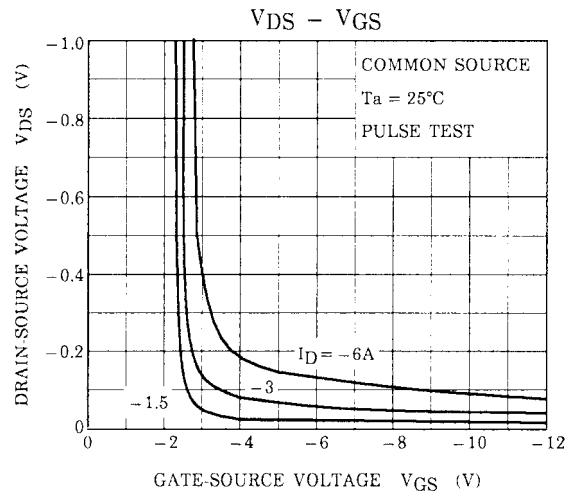
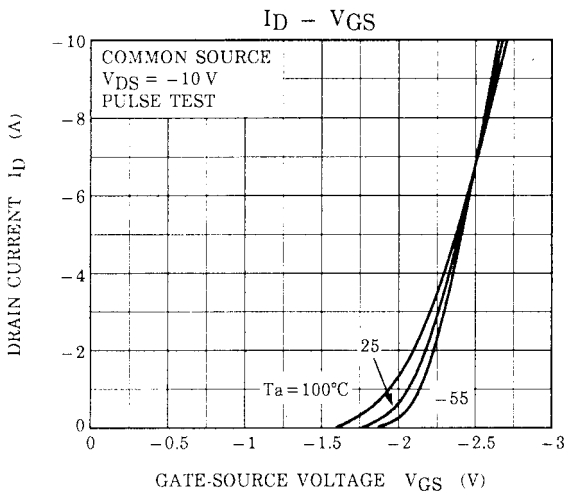
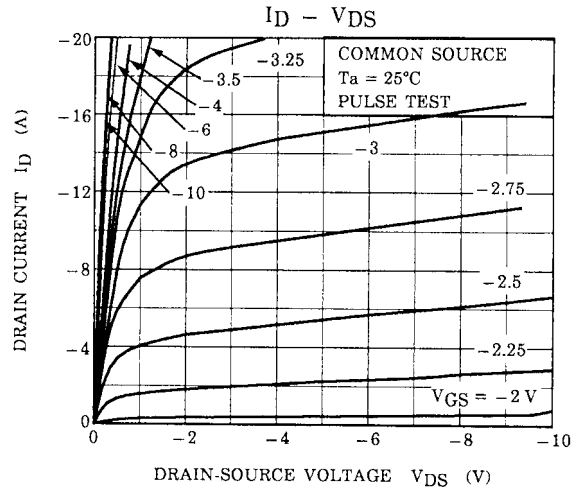
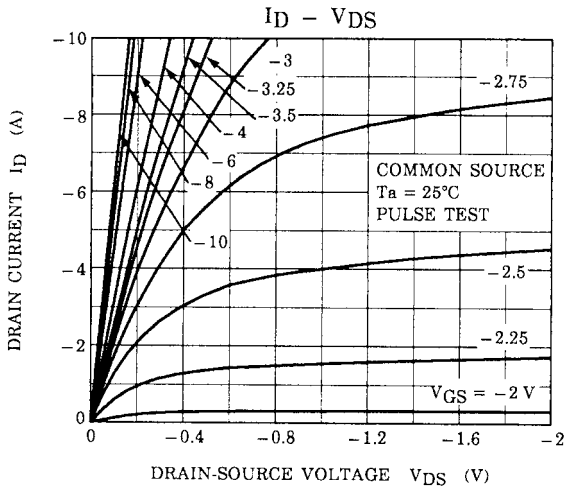


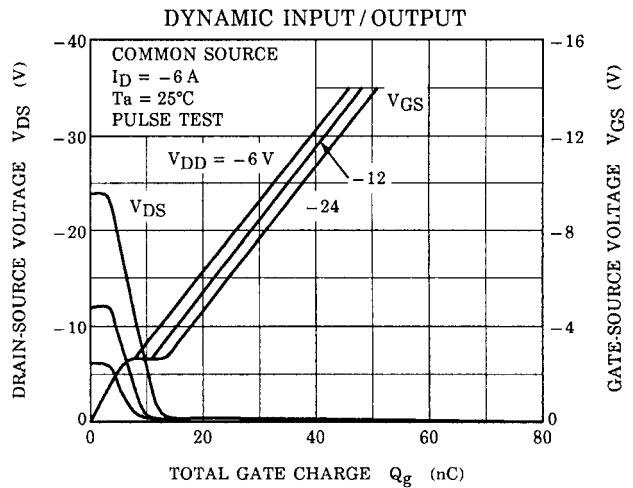
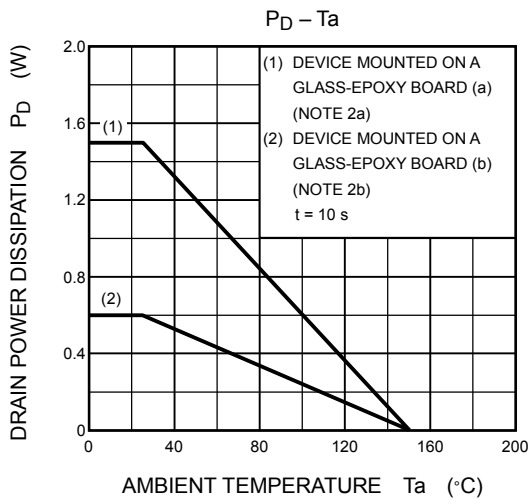
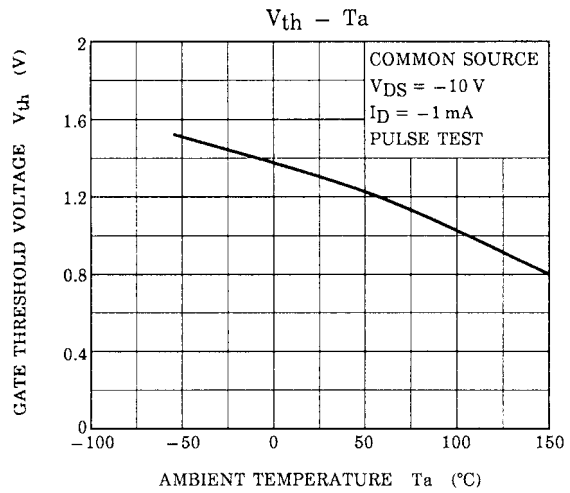
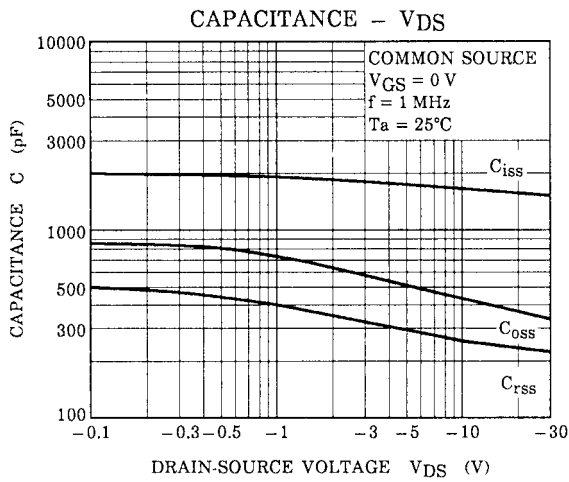
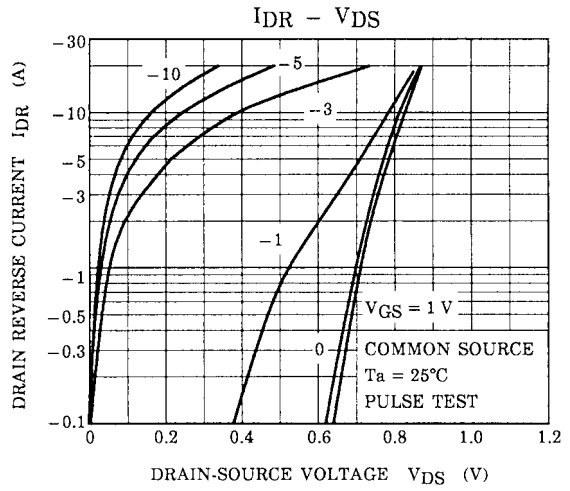
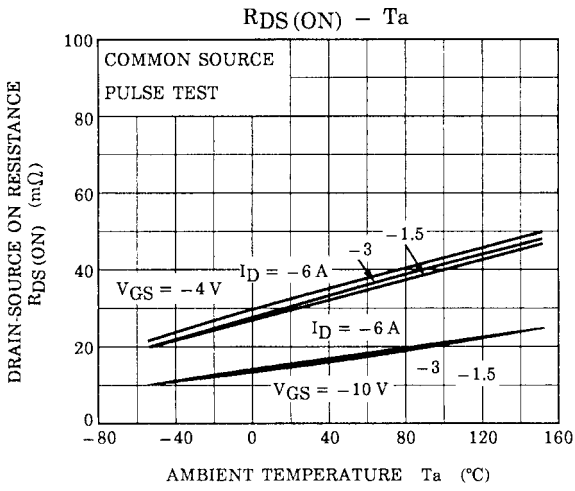
## Electrical Characteristics (Ta = 25°C)

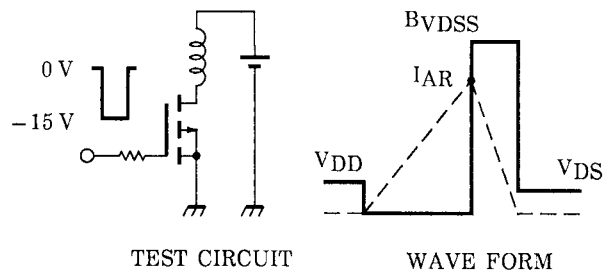
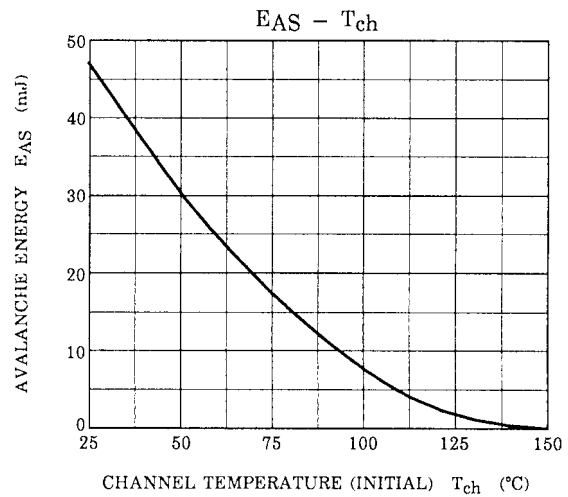
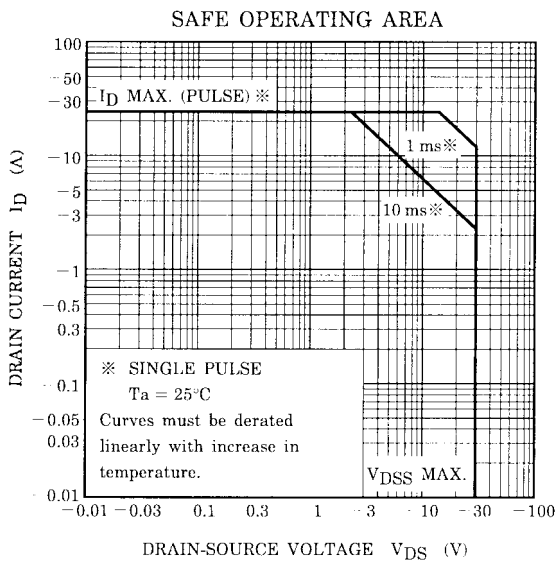
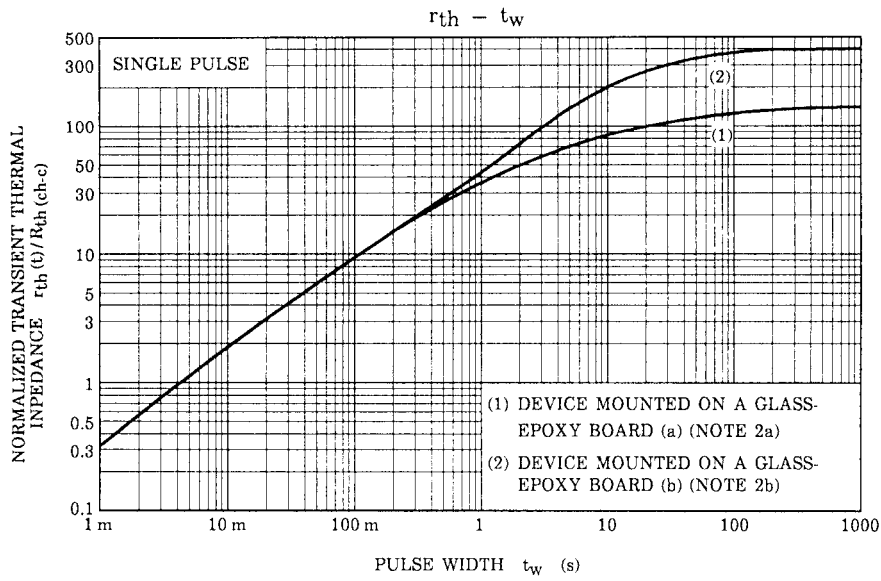
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-OFF current		$I_{DSS}$	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$	—	—	-10	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-30	—	—	V
		$V_{(BR)DSX}$	$I_D = -10\text{ mA}, V_{GS} = 20\text{ V}$	-15	—	—	
Gate threshold voltage		$V_{th}$	$V_{DS} = -10\text{ V}, I_D = -1\text{ mA}$	-0.8	—	-2.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = -4\text{ V}, I_D = -3\text{ A}$	—	32	40	m $\Omega$
		$R_{DS(ON)}$	$V_{GS} = -10\text{ V}, I_D = -3\text{ A}$	—	15	25	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -3\text{ A}$	6	12	—	S
Input capacitance		$C_{iss}$	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	1810	—	pF
Reverse transfer capacitance		$C_{rss}$		—	350	—	pF
Output capacitance		$C_{oss}$		—	610	—	pF
Switching time	Rise time	$t_r$	<p><math>I_D = -3\text{ A}</math>  <math>V_{GS} = 0\text{ V}, -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>                      Duty <math>\leq 1\%</math>, <math>t_w = 10\ \mu\text{s}</math></p>	—	9	—	ns
	Turn-ON time	$t_{on}$		—	15	—	
	Fall time	$t_f$		—	49	—	
	Turn-OFF time	$t_{off}$		—	135	—	
Total gate charge (gate-source plus gate-drain)		$Q_g$	$V_{DD} \approx -24\text{ V}, V_{GS} = -10\text{ V}, I_D = -6\text{ A}$	—	37	—	nC
Gate-source charge		$Q_{gs}$		—	30	—	nC
Gate-drain ("miller") charge		$Q_{gd}$		—	7	—	nC

## 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  $I_{AR} = -6\text{ A}$ ,  $R_G = 25\ \Omega$   $E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left( \frac{BVDSS}{BVDSS - V_{DD}} \right)$   
 $V_{DD} = -16\text{ V}$ ,  $L = 1.0\text{ mH}$

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