

# TPC8109

Lithium Ion Battery Applications  
 Notebook PC Applications  
 Portable Equipment Applications

- Small footprint due to small and thin package
- Low drain-source ON resistance:  $R_{DS(ON)} = 14 \text{ m}\Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 19 \text{ S}$  (typ.)
- Low leakage current:  $I_{DSS} = -10 \text{ }\mu\text{A}$  (max) ( $V_{DS} = -30 \text{ V}$ )
- Enhancement-mode:  $V_{th} = -0.8$  to  $-2.0 \text{ V}$  ( $V_{DS} = -10 \text{ V}$ ,  $I_D = -1 \text{ mA}$ )

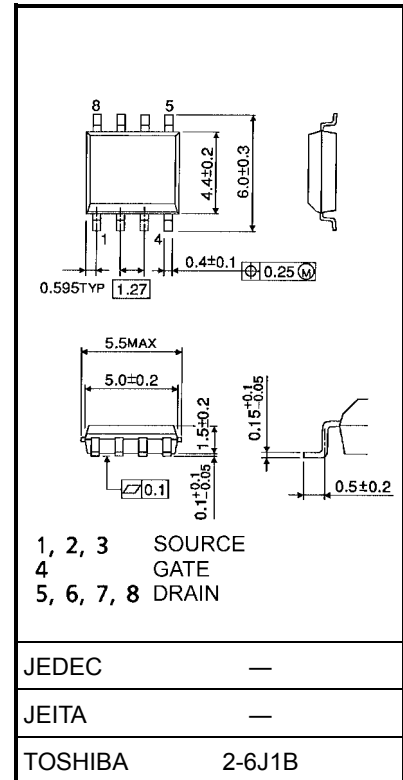
## Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

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)	$I_D$	-10
	Pulse (Note 1)	$I_{DP}$	-40
Drain power dissipation ( $t = 10 \text{ s}$ ) (Note 2a)	$P_D$	1.9	W
Drain power dissipation ( $t = 10 \text{ s}$ ) (Note 2b)	$P_D$	1.0	W
Single pulse avalanche energy (Note 3)	$E_{AS}$	130	mJ
Avalanche current	$I_{AR}$	-10	A
Repetitive avalanche energy (Note 2a) (Note 4)	$E_{AR}$	0.19	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.

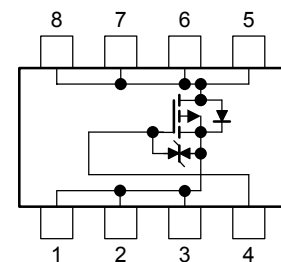
This transistor is an electrostatic sensitive device. Please handle with caution.

Unit: mm



Weight: 0.080 g (typ.)

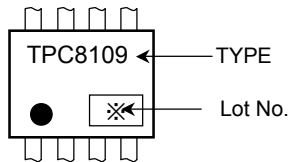
## Circuit Configuration



## Thermal Characteristics

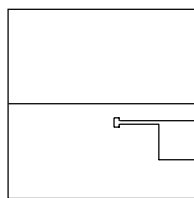
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10 s) (Note 2a)	$R_{th(ch-a)}$	65.8	$^{\circ}C/W$
Thermal resistance, channel to ambient (t = 10 s) (Note 2b)	$R_{th(ch-a)}$	125	$^{\circ}C/W$

## Marking (Note 5)



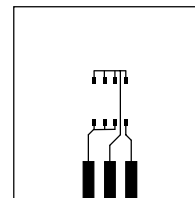
Note 1: Please use devices on condition that the channel temperature is below 150°C.

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



(a)

FR-4  
25.4 × 25.4 × 0.8  
(unit: mm)



(b)

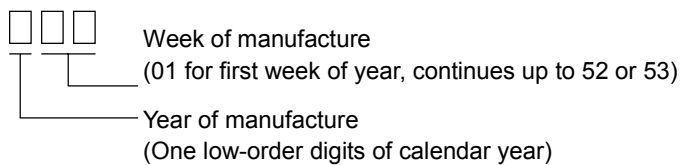
FR-4  
25.4 × 25.4 × 0.8  
(unit: mm)

Note 3:  $V_{DD} = -24 V$ ,  $T_{ch} = 25^{\circ}C$  (initial),  $L = 1.0 mH$ ,  $R_G = 25 \Omega$ ,  $I_{AR} = -10 A$

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

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

※ Weekly code: (Three digits)

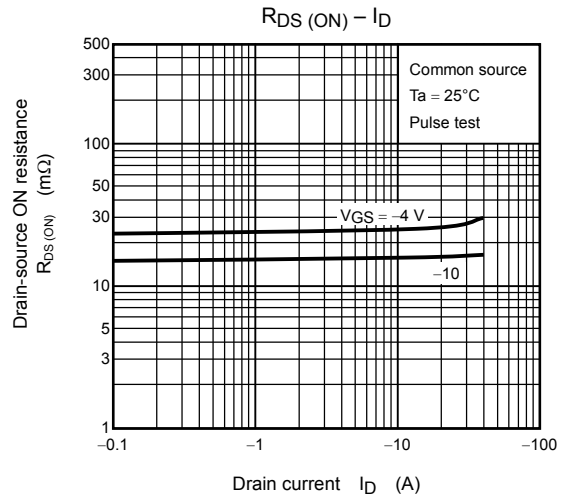
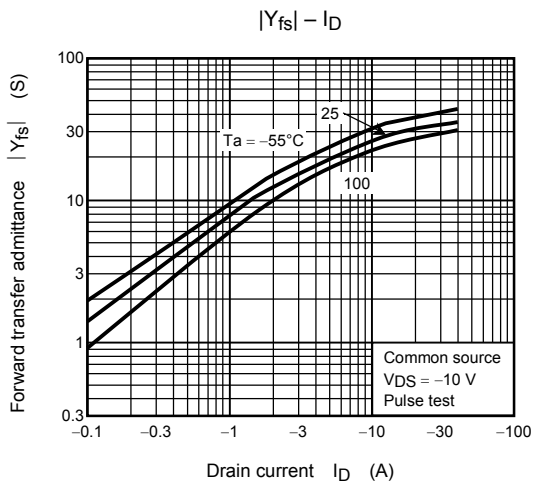
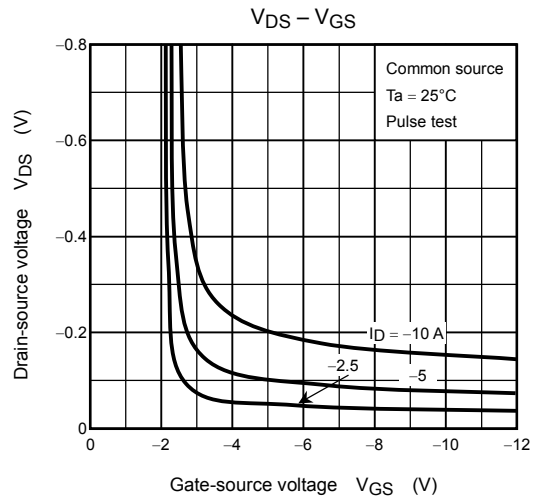
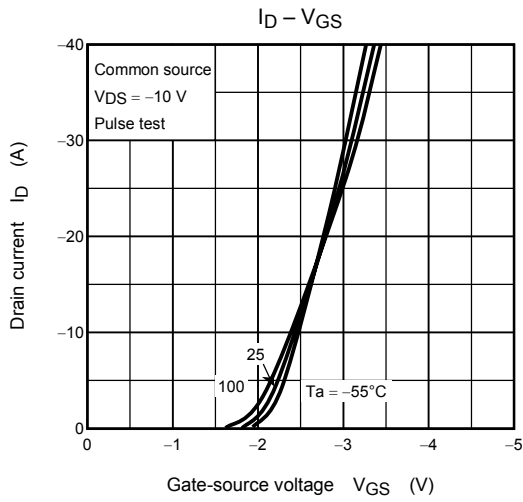
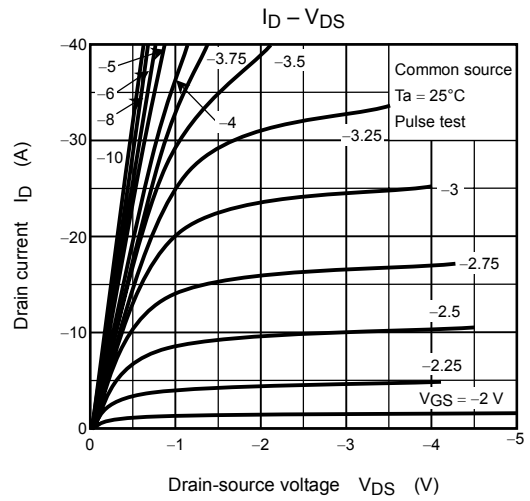
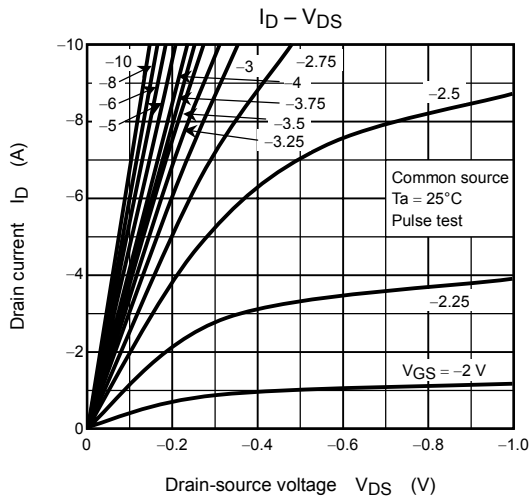


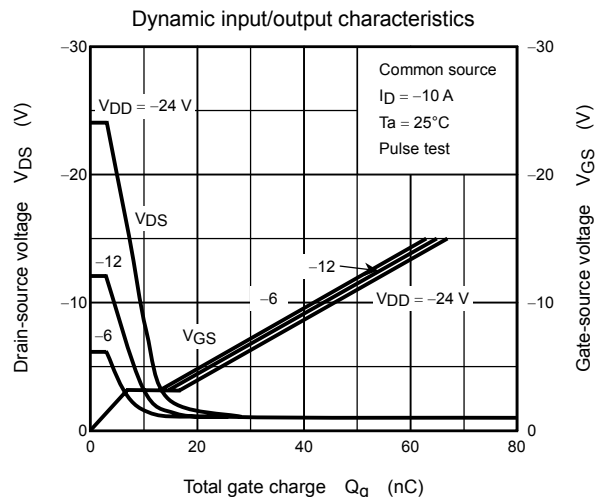
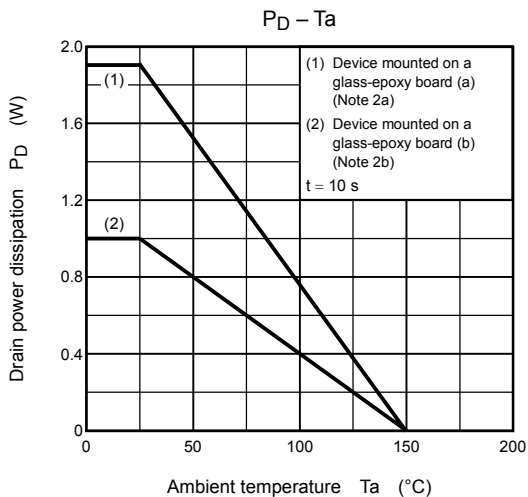
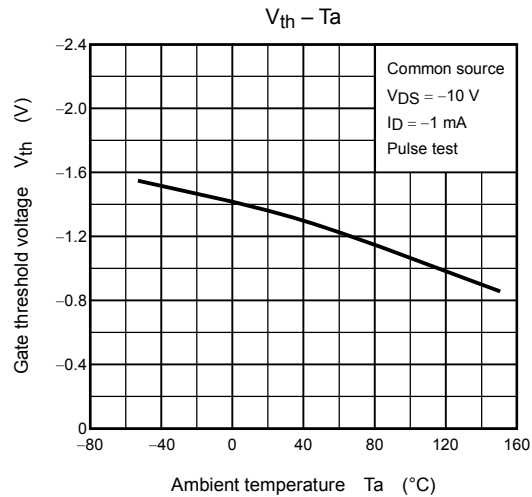
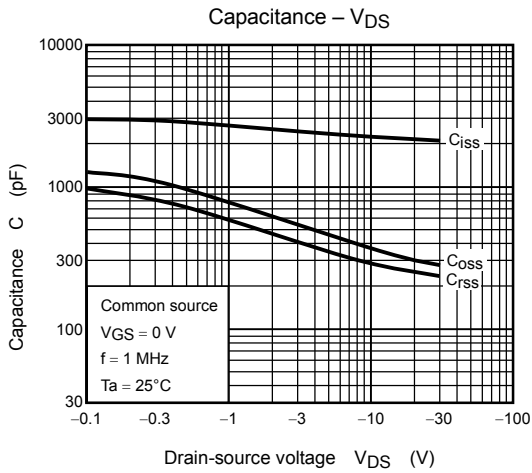
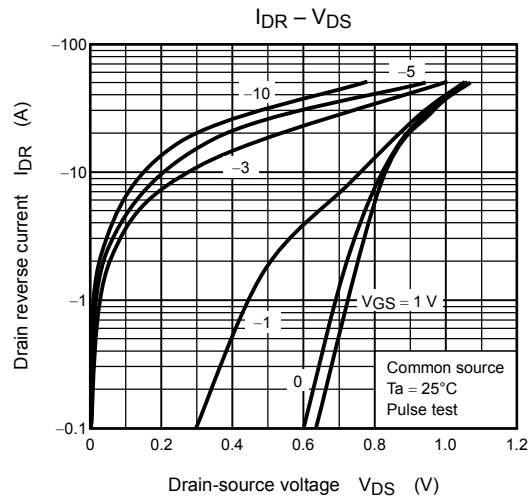
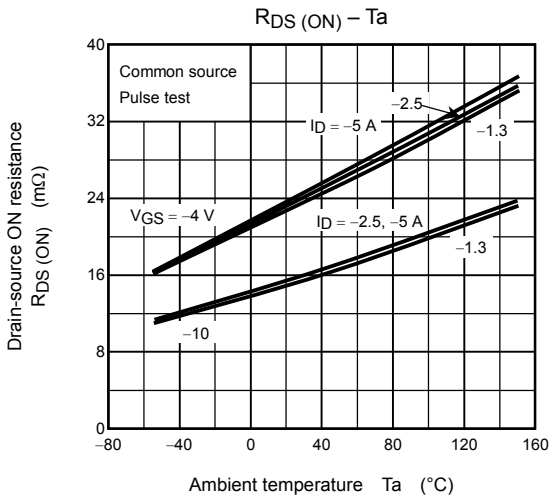
## Electrical Characteristics (Ta = 25°C)

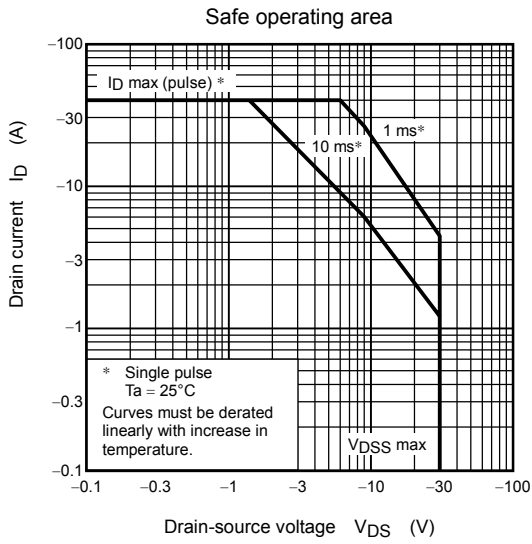
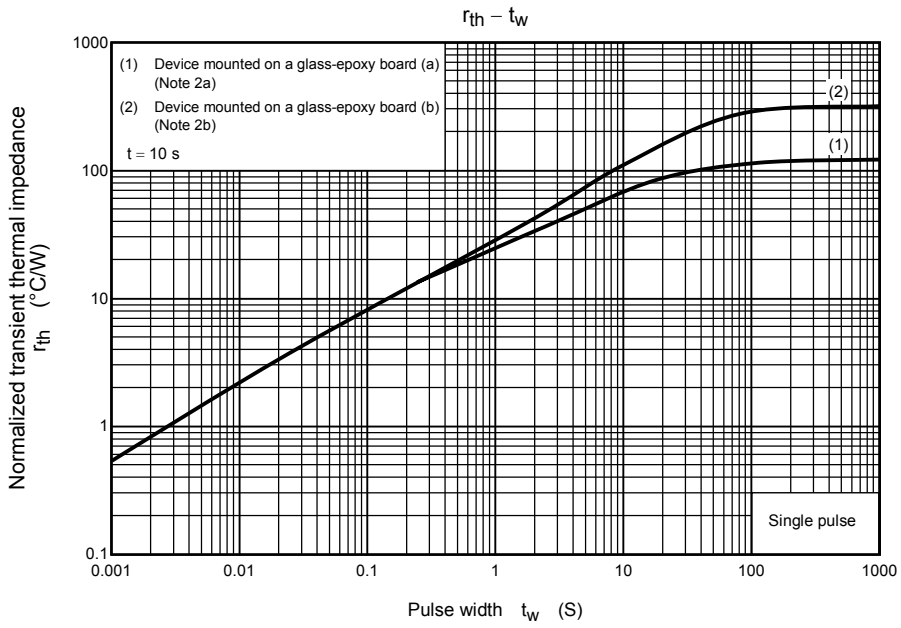
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-OFF current		$I_{DSS}$	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$	—	—	-10	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-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		$R_{DS(ON)}$	$V_{GS} = -4\text{ V}, I_D = -5\text{ A}$	—	24	30	m $\Omega$
			$V_{GS} = -10\text{ V}, I_D = -5\text{ A}$	—	14	20	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -5\text{ A}$	9	19	—	S
Input capacitance		$C_{iss}$	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	2260	—	pF
Reverse transfer capacitance		$C_{rss}$		—	290	—	
Output capacitance		$C_{oss}$		—	350	—	
Switching time	Rise time	$t_r$	<p><math>V_{GS} = 0\text{ V} \rightarrow -10\text{ V}</math>  <math>I_D = -5\text{ A}</math>  <math>R_L = 3.0\ \Omega</math>  <math>V_{DD} \approx -15\text{ V}</math>  <math>4.7\ \Omega</math>  <math>V_{OUT}</math>                      Duty <math>\leq 1\%</math>, <math>t_w = 10\ \mu\text{s}</math></p>	—	5	—	ns
	Turn-ON time	$t_{on}$		—	13	—	
	Fall time	$t_f$		—	34	—	
	Turn-OFF time	$t_{off}$		—	143	—	
Total gate charge (gate-source plus gate-drain)		$Q_g$	$V_{DD} \approx -24\text{ V}, V_{GS} = -10\text{ V}, I_D = -10\text{ A}$	—	45	—	nC
Gate-source charge 1		$Q_{gs1}$		—	6.5	—	
Gate-drain ("miller") charge		$Q_{gd}$		—	10	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	$I_{DRP}$	—	—	—	-40	A
Forward voltage (diode)		$V_{DSF}$	$I_{DR} = -11\text{ A}, V_{GS} = 0\text{ V}$	—	—	1.2	V







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