

TOSHIBA FIELD EFFECT TRANSISTOR SILICON P CHANNEL MOS TYPE (U-MOSIII)

# TPC8109

**TENTATIVE**

LITHIUM ION BATTERY  
 PORTABLE MACHINES AND TOOLS  
 NOTE BOOK PC

- Compact and thin package, and a small mounting area
- 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 :  $I_{DSS} = -10 \mu\text{A}$  (max.) ( $V_{DS} = -30\text{V}$ )
- Enhancement mode :  $V_{th} = -0.8 \sim -2.0\text{V}$  ( $V_{DS} = -10\text{V}, I_D = -1\text{mA}$ )

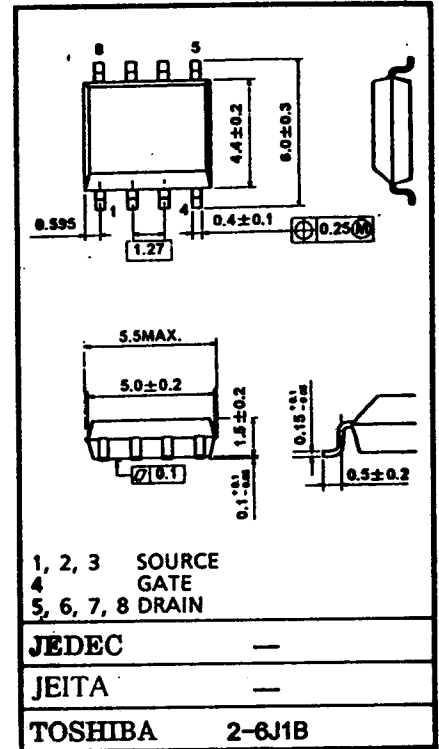
### Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

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)	$I_D$	-10	A
	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	
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 ~ 150	$^\circ\text{C}$

Note:(Note 1),(Note 2),(Note 3),(Note 4) Please see next page.

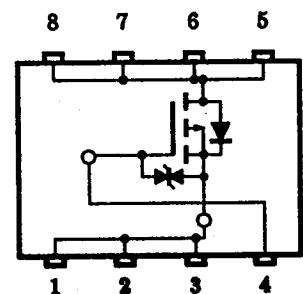
This transistor is an electrostatic sensitive device. Please handle with caution.

Unit in mm



Weight: 0.080g (typ.)

### CIRCUIT CONFIGURATION

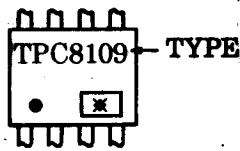


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**Thermal Characteristics**

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

**Marking(Note 5)**

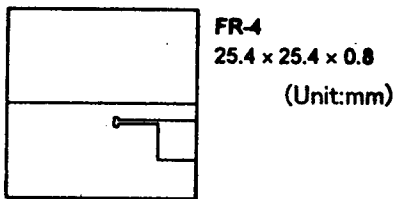


Note 1: Please use devices on condition that the channel temperature is below 150°C.

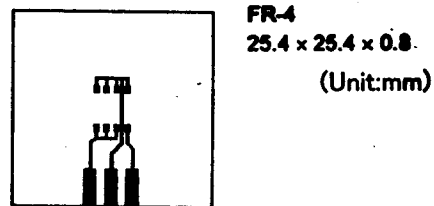
Note 2:

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

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



(a)



(b)

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

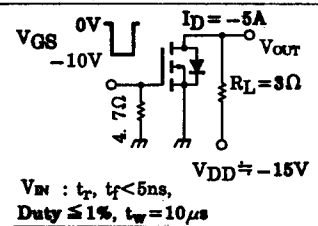
Note 4: Reptitive rating; pulse width limited by max channel temperature.

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)

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Electrical Characteristics (T<sub>a</sub>=25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I <sub>GSS</sub>	V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V	-	-	±10	μA
Drain cut-OFF current		I <sub>DSS</sub>	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V	-	-	-10	μA
Drain-source breakdown voltage		V <sub>(BR)DSS</sub>	I <sub>D</sub> =-10mA, V <sub>GS</sub> =0V	-30	-	-	V
		V <sub>(BR)DSX</sub>	I <sub>D</sub> =-10mA, V <sub>GS</sub> =20V	-15	-	-	
Gate threshold voltage		V <sub>th</sub>	V <sub>DS</sub> =-10V, I <sub>D</sub> =-1mA	-0.8	-	-2.0	V
Drain-source ON resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> =-4V, I <sub>D</sub> =-5A	-	24	30	mΩ
			V <sub>GS</sub> =-10V, I <sub>D</sub> =-5A	-	14	20	
Forward transfer admittance		Y <sub>fs</sub>	V <sub>DS</sub> =-10V, I <sub>D</sub> =-5A	9	19	-	S
Input capacitance		C <sub>iss</sub>	V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V, f=1MHz	-	2260	-	pF
Reverse transfer capacitance		C <sub>rss</sub>		-	290	-	
Output capacitance		C <sub>oss</sub>		-	350	-	
Switching time	Rise time	t <sub>r</sub>	 <p>V<sub>DS</sub> = -10V, V<sub>GS</sub> = 0V, f = 1MHz, V<sub>DD</sub> = -15V, I<sub>D</sub> = -5A, R<sub>L</sub> = 3Ω</p> <p>V<sub>IN</sub> : t<sub>r</sub>, t<sub>f</sub> &lt; 5ns, Duty ≤ 1%, t<sub>pw</sub> = 10μs</p>	-	5	-	ns
	Turn-ON time	t <sub>on</sub>		-	13	-	
	Fall time	t <sub>f</sub>		-	34	-	
	Turn-OFF time	t <sub>off</sub>		-	143	-	
Total gate charge (gate-source plus gate-drain)		Q <sub>g</sub>	V <sub>DD</sub> = -24V, V <sub>GS</sub> = -10V, I <sub>D</sub> = -10A	-	45	-	nC
Gate-source charge 1		Q <sub>gs1</sub>		-	6.5	-	
Gate-Drain("miller")charge		Q <sub>gd</sub>		-	10	-	

Source-Drain Diode Ratings and Characteristics (T<sub>a</sub>=25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I <sub>DRP</sub>	-	-	-	-40	A
Diode forward voltage		V <sub>DSF</sub>	I <sub>DR</sub> =-10A, V <sub>GS</sub> =0V	-	-	1.2	V

**TENTATIVE****RESTRICTIONS ON PRODUCT USE**

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