

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE ( $\pi$ -MOSVI)

# TPC8004

LITHIUM ION BATTERY APPLICATIONS

NOTE BOOK PC, PORTABLE EQUIPMENTS APPLICATIONS

INDUSTRIAL APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 37\text{ m}\Omega$  (Typ.)
- High Forward Transfer Admittance:  $|Y_{fs}| = 6\text{ S}$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 10\ \mu\text{A}$  (Max.) ( $V_{DS} = 30\text{ V}$ )
- Enhancement-Model :  $V_{th} = 0.8\sim 2.0\text{ V}$   
( $V_{DS} = 10\text{ V}$ ,  $I_D = 1\text{ mA}$ )

MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

CHARACTERISTIC		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	$I_D$	5	A
	Pulse	$I_{DP}$	20	A
Drain Power Dissipation*** ( $T_a = 25^\circ\text{C}$ )		$P_D$	2.4	W
Single Pulse Avalanche Energy**		$E_{AS}$	32.5	mJ
Avalanche Current		$I_{AR}$	5	A
Repetitive Avalanche Energy*		$E_{AR}$	0.24	mJ
Channel Temperature		$T_{ch}$	150	$^\circ\text{C}$
Storage Temperature Range		$T_{stg}$	$-55\sim 150$	$^\circ\text{C}$

THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Ambient***	$R_{th(ch-a)}$	52.1	$^\circ\text{C}/\text{W}$

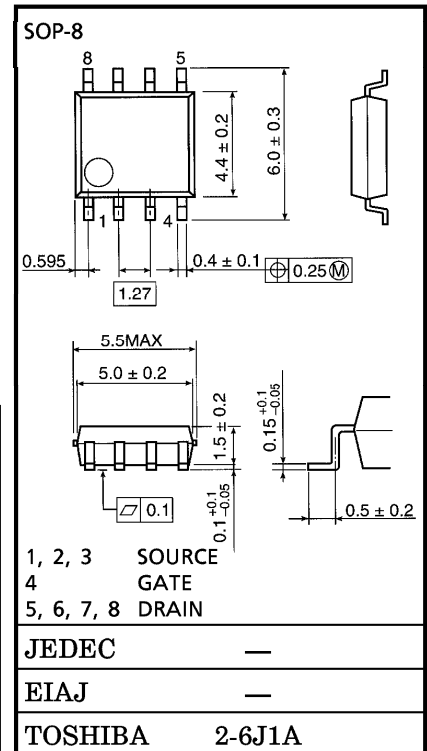
Note ;

\* Repetitive rating ; Pulse Width Limited by Max. Junction temperature.

\*\*  $V_{DD} = 24\text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 1.0\text{ mH}$ ,  $I_{AR} = 5.0\text{ A}$ ,  $R_G = 25\ \Omega$

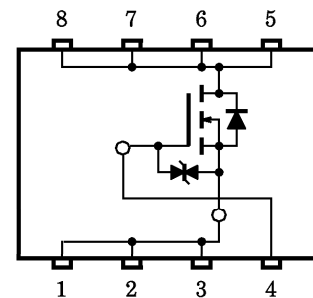
\*\*\* Drive operation ; Mount on glass epoxy board [ $1\text{ inch}^2 \times 0.8\text{ t}$ ] ( $t = 10\text{ s}$ )

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



Weight : 0.08 g

CIRCUIT CONFIGURATION



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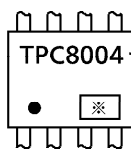
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	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	$R_{DS(ON)}$	$V_{GS} = 4\text{ V}, I_D = 2.5\text{ A}$	—	58	80	m $\Omega$	
		$V_{GS} = 10\text{ V}, I_D = 2.5\text{ A}$	—	37	50		
Forward Transfer Admittance	$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 2.5\text{ A}$	3	6	—	S	
Input Capacitance	$C_{iss}$	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$	—	475	—	pF	
Reverse Transfer Capacitance	$C_{rss}$		—	85	—		
Output Capacitance	$C_{oss}$		—	270	—		
Switching Time	Rise Time	$t_r$		—	10	—	ns
	Turn-On Time	$t_{on}$		—	16	—	
	Fall Time	$t_f$		—	13	—	
	Turn-Off Time	$t_{off}$		—	70	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)	$Q_g$	$V_{DD} = 24\text{ V}, V_{GS} = 10\text{ V}$ $I_D = 5\text{ A}$	—	16	—	nC	
Gate-Source Charge	$Q_{gs}$		—	11	—		
Gate-Drain ("Miller") Charge	$Q_{gd}$		—	5	—		

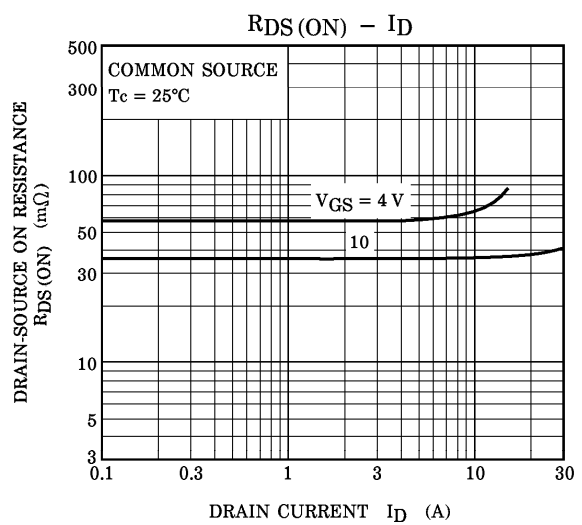
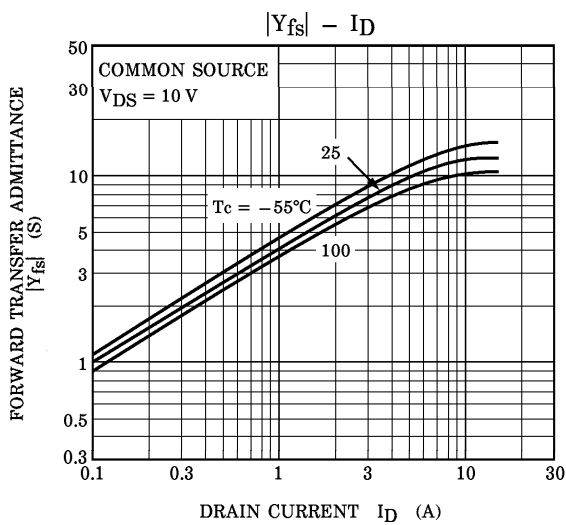
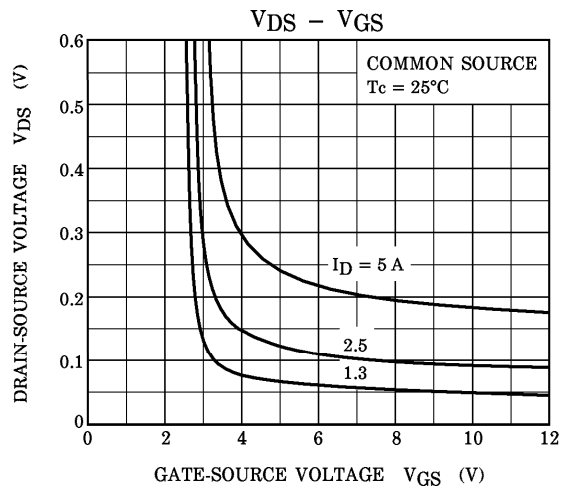
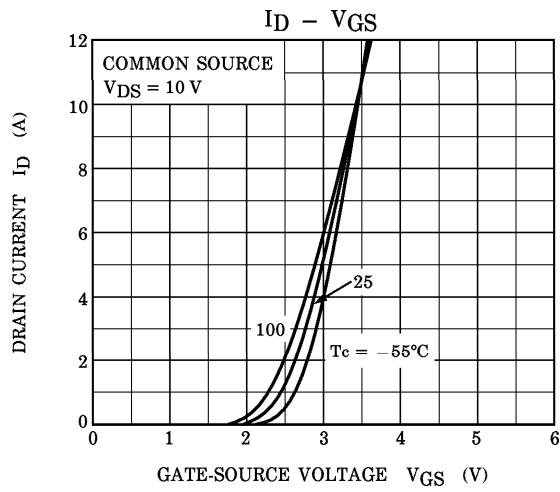
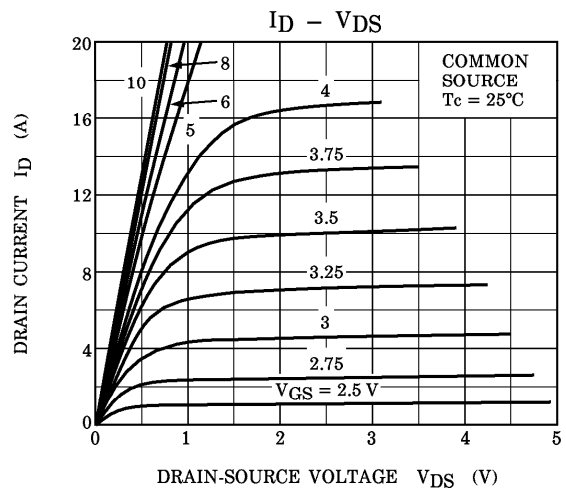
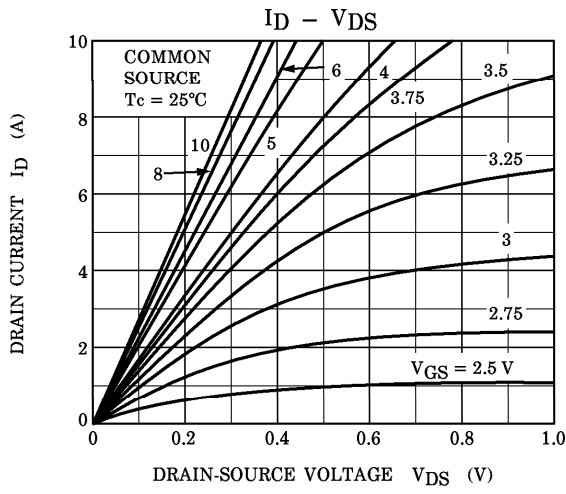
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

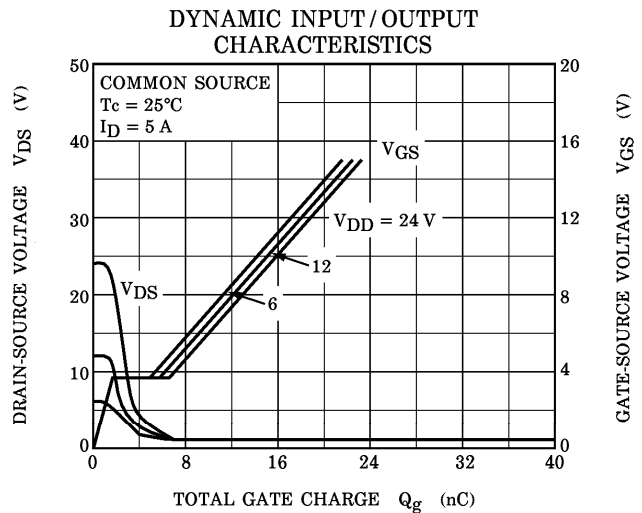
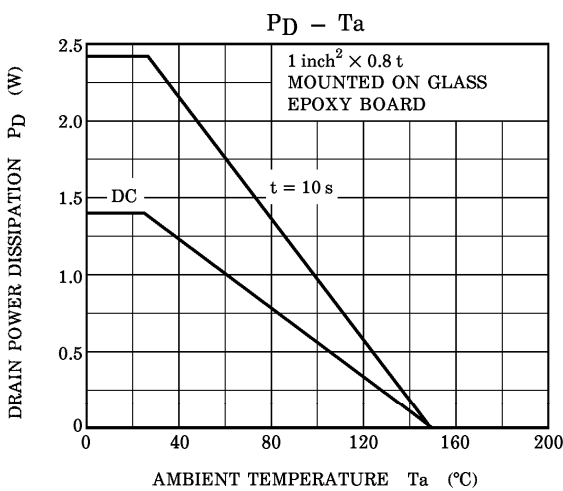
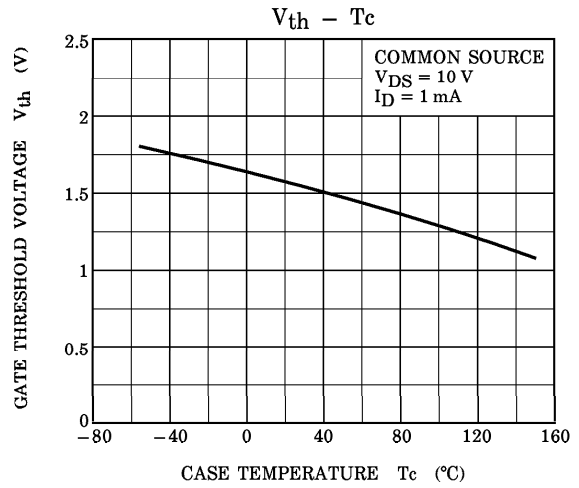
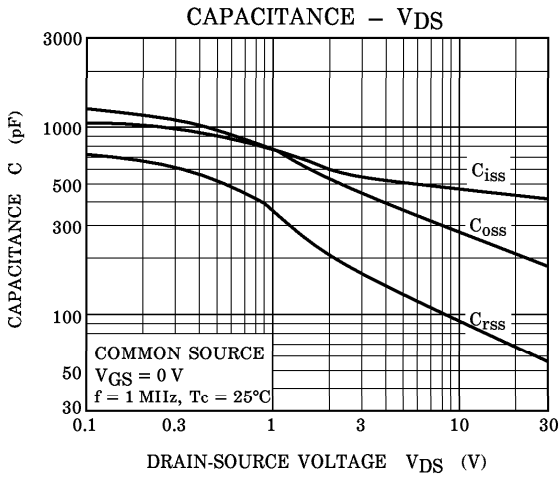
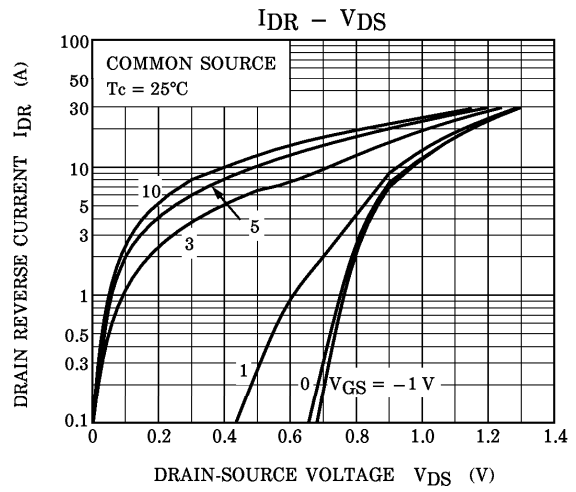
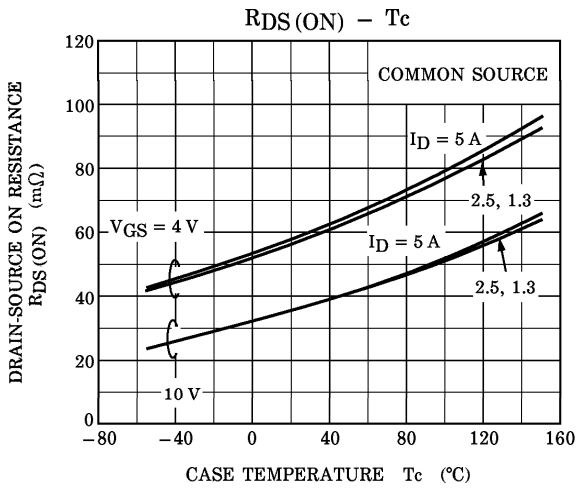
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	$I_{DR}$	—	—	—	5	A
Pulse Drain Reverse Current	$I_{DRP}$	—	—	—	20	A
Diode Forward Voltage	$V_{DSF}$	$I_{DR} = 5\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.2	V

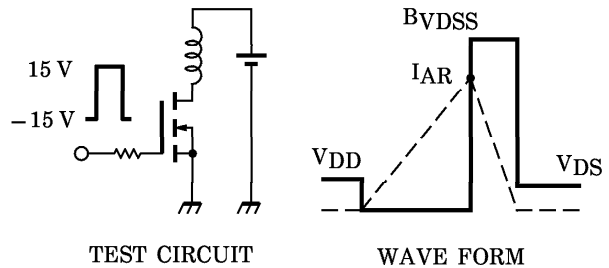
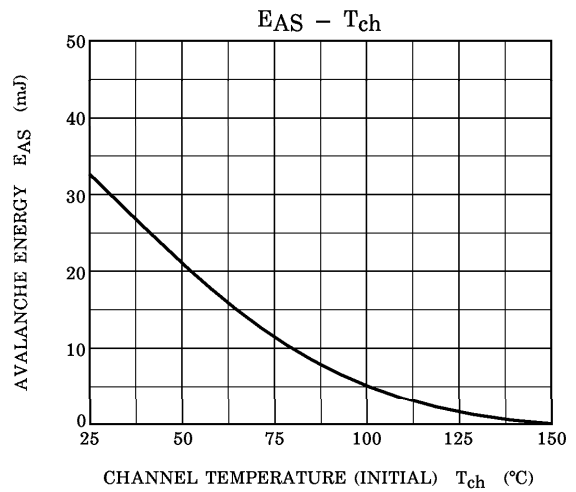
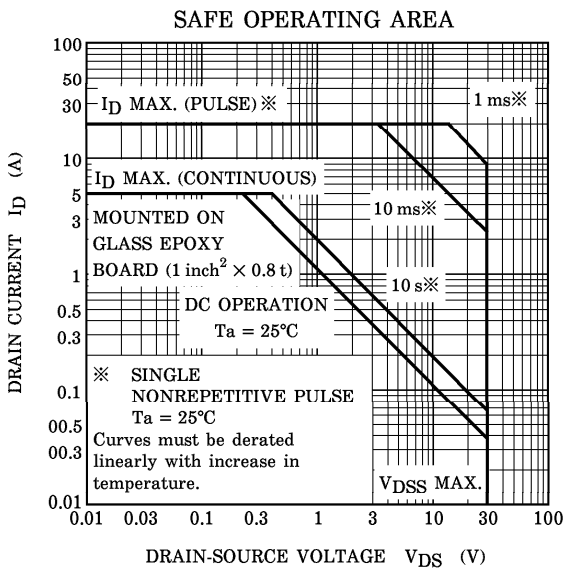
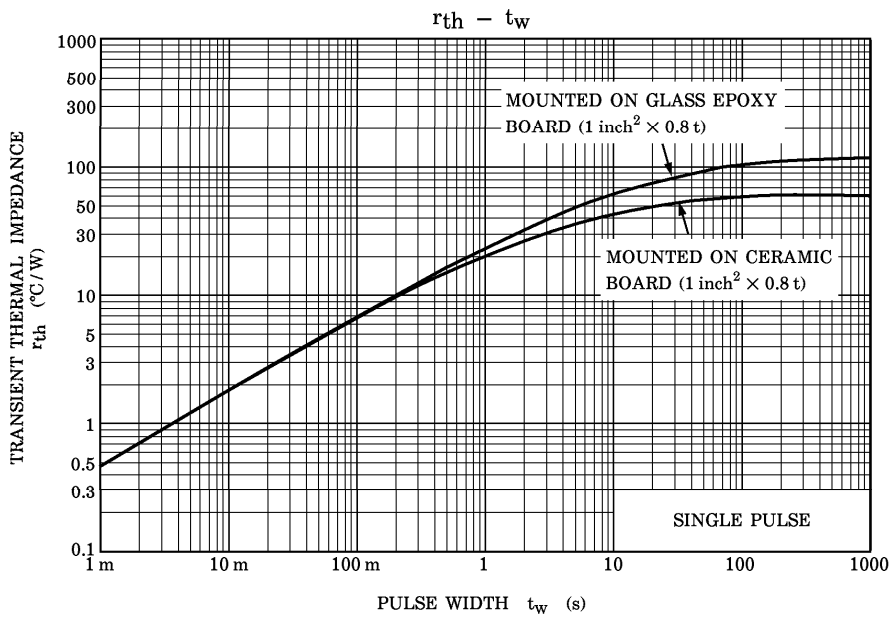
MARKING



TYPE  
 ※ Lot Number  
 □ □ — Month (Starting from Alphabet A)  
 — Year (Last Number of the Christian Era)







Peak  $I_{AR} = 5 \text{ A}$ ,  $R_G = 25 \Omega$   
 $V_{DD} = 24 \text{ V}$ ,  $L = 1.0 \text{ mH}$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left( \frac{BV_{DSS}}{BV_{DSS} - V_{DD}} \right)$$