

TENTATIVETOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (HIGH SPEED U-MOSII)

# TPC8007-H

LITHIUM ION BATTERY APPLICATIONS

NOTE BOOK PC, PORTABLE EQUIPMENTS APPLICATIONS

HIGH SPEED AND HIGH EFFICIENCY DC-DC CONVERTERS

INDUSTRIAL APPLICATIONS

Unit in mm

- High Speed Switching
- Small Gate Charge :  $Q_g = 44 \text{ nC}$  (Typ.)
- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 8 \text{ m}\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 20 \text{ S}$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 10 \mu\text{A}$  (Max.) ( $V_{DS} = 30 \text{ V}$ )
- Enhancement-Mode :  $V_{th} = 1.3 \sim 2.5 \text{ V}$   
( $V_{DS} = 10 \text{ V}$ ,  $I_D = 1 \text{ mA}$ )

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	$I_D$	13	A
	Pulse	$I_{DP}$	52	A
Drain Power Dissipation*** ( $T_a = 25^\circ\text{C}$ )		$P_D$	2.4	W
Single Pulse Avalanche Energy**		$E_{AS}$	219	mJ
Avalanche Current		$I_{AR}$	13	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	$^\circ\text{C}/\text{W}$

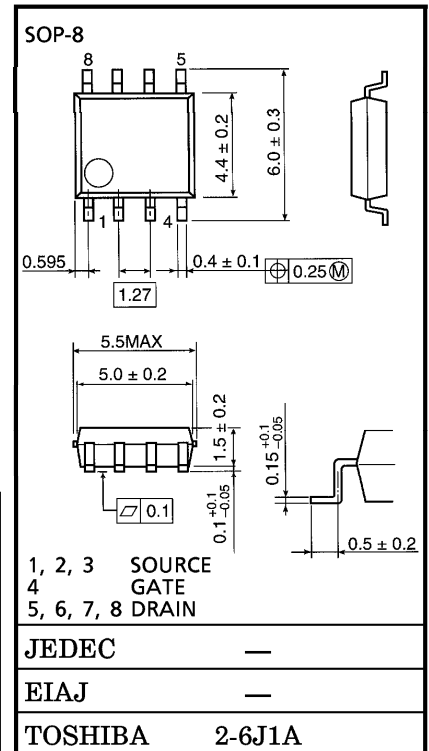
Note ;

- \* Repetitive rating ; Pulse Width Limited by Max. Junction Temperature.
- \*\*  $V_{DD} = 24 \text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 1.0 \text{ mH}$ ,  $R_G = 25 \Omega$ ,  $I_{AR} = 13 \text{ A}$
- \*\*\* Drive operation ; Mount on glass epoxy board [ $1 \text{ inch}^2 \times 0.8 \text{ t}$ ] ( $t = 10 \text{ s}$ )

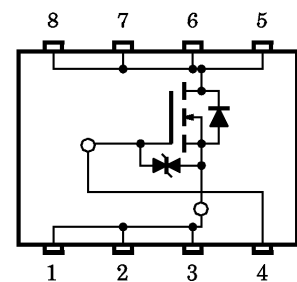
**This transistor is an electrostatic sensitive device. Please handle with caution.**

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CIRCUIT CONFIGURATION



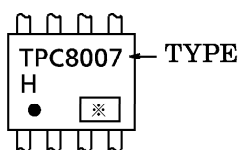
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±16 V, V <sub>DS</sub> = 0 V	—	—	±10	μA	
Drain Cut-Off Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V	—	—	10	μA	
Drain-Source Breakdown Voltage	V <sub>(BR) DSS</sub>	I <sub>D</sub> = 10 mA, V <sub>GS</sub> = 0 V	30	—	—	V	
	V <sub>(BR) DSX</sub>	I <sub>D</sub> = 10 mA, V <sub>GS</sub> = -20 V	15	—	—	V	
Gate Threshold Voltage	V <sub>th</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	1.3	—	2.5	V	
Drain-Source ON Resistance	R <sub>DS (ON)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 6.5 A	—	12	17	mΩ	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 6.5 A	—	8	10		
Forward Transfer Admittance	Y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 6.5 A	10	20	—	S	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V, f = 1 MHz	—	2040	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>		—	520	—		
Output Capacitance	C <sub>oss</sub>		—	750	—		
Switching Time	Rise Time	t <sub>r</sub>		—	7	—	ns
	Turn-On Time	t <sub>on</sub>		—	19	—	
	Fall Time	t <sub>f</sub>		—	15	—	
	Turn-Off Time	t <sub>off</sub>		V <sub>IN</sub> : t <sub>r</sub> , t <sub>f</sub> < 5 ns Duty ≤ 1%, t <sub>w</sub> = 10 μs	—	61	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q <sub>g</sub>	V <sub>DD</sub> ≐ 24 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 13 A	—	44	—	nC	
Gate-Source Charge	Q <sub>gs</sub>		—	35	—		
Gate-Drain ("Miller") Charge	Q <sub>gd</sub>		—	10	—		

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I <sub>DR</sub>	—	—	—	13	A
Pulse Drain Reverse Current	I <sub>DRP</sub>	—	—	—	52	A
Diode Forward Voltage	V <sub>DSF</sub>	I <sub>DR</sub> = 13 A, V <sub>GS</sub> = 0 V	—	—	-1.2	V

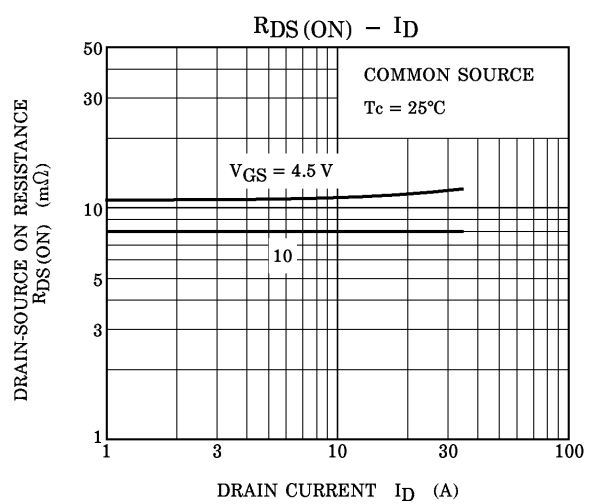
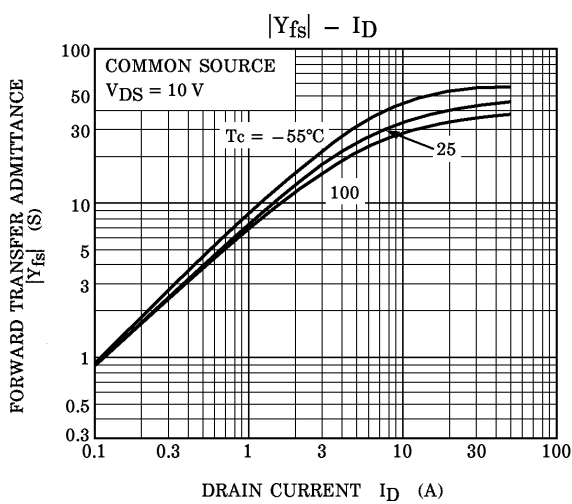
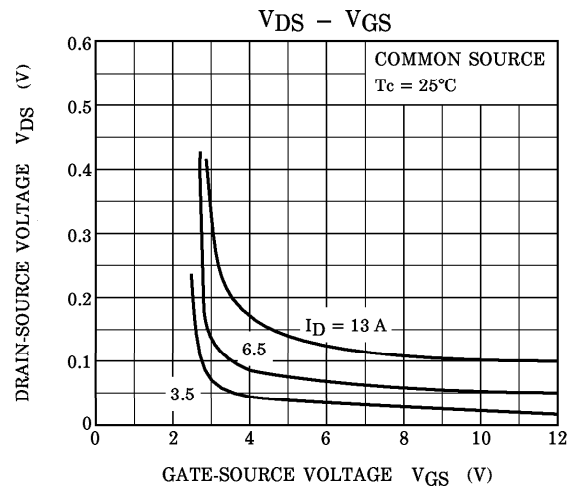
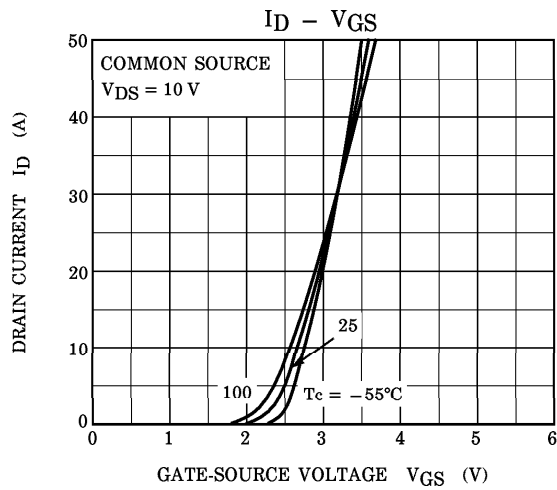
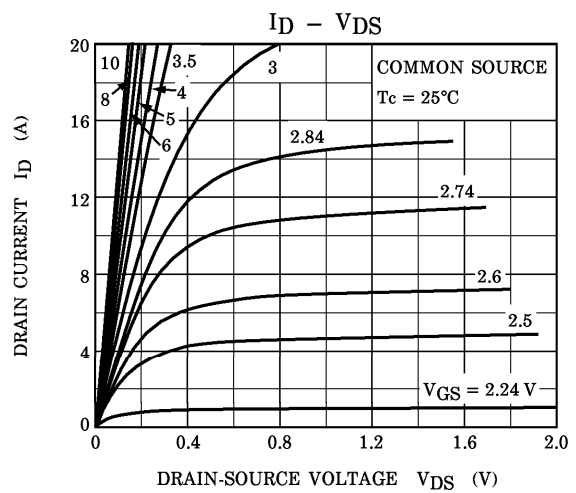
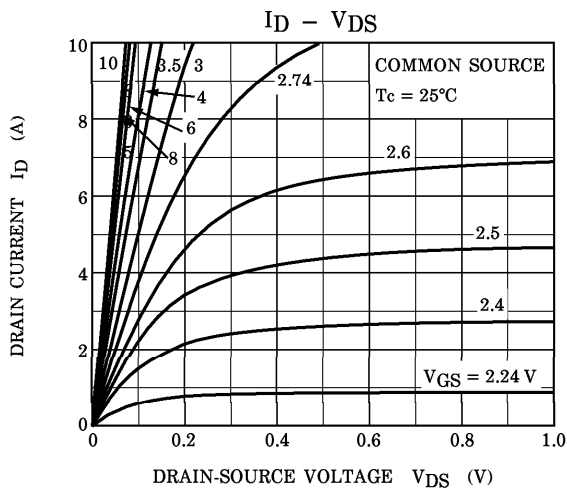
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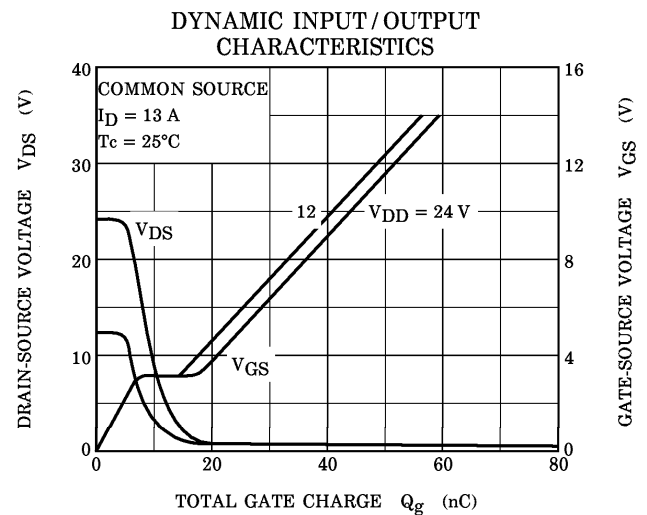
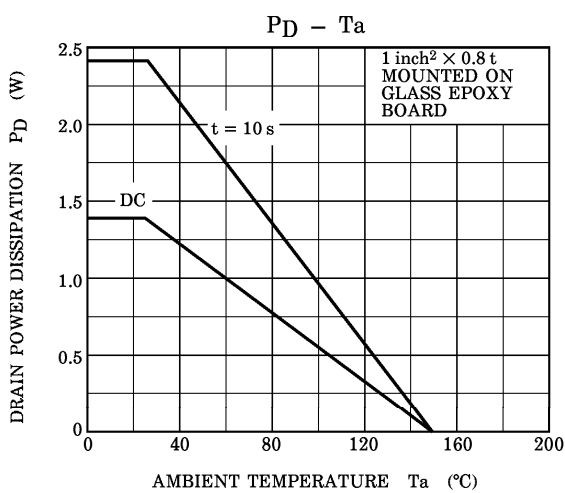
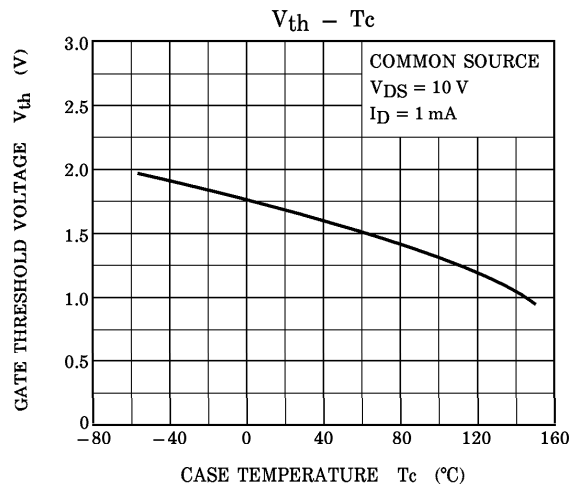
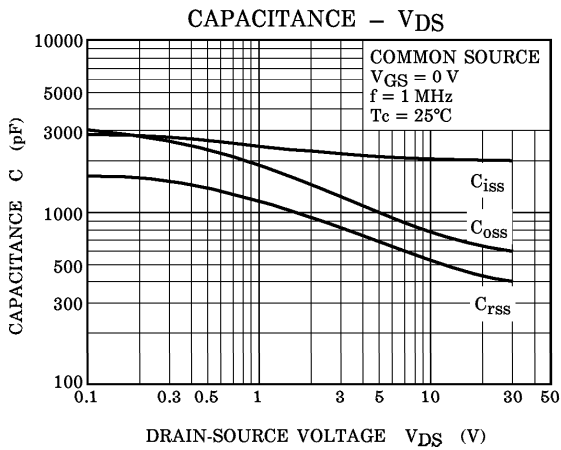
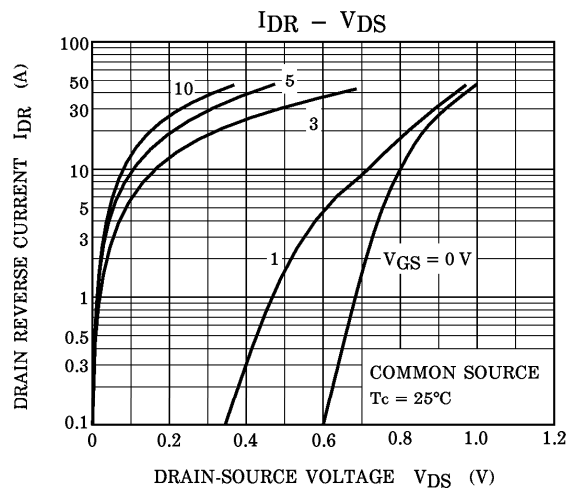
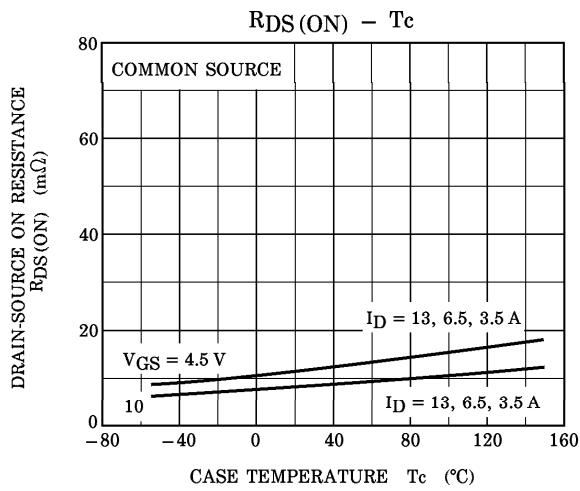


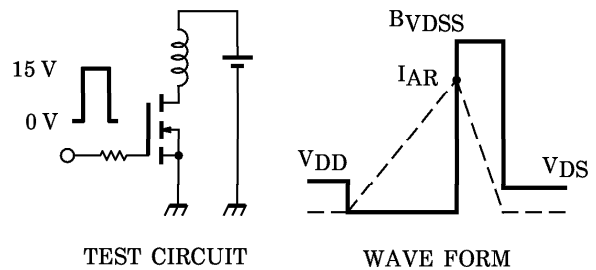
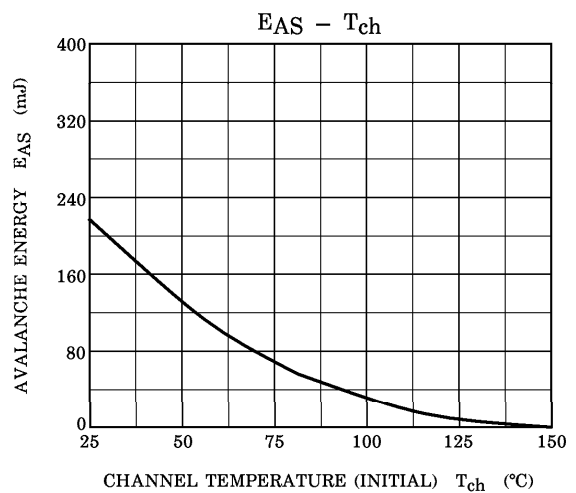
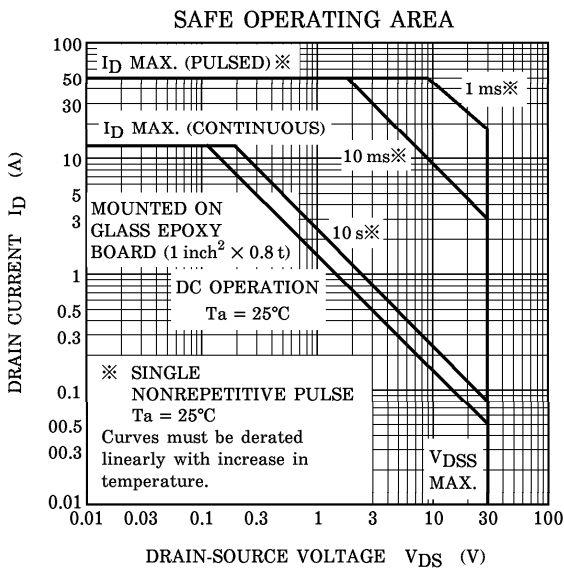
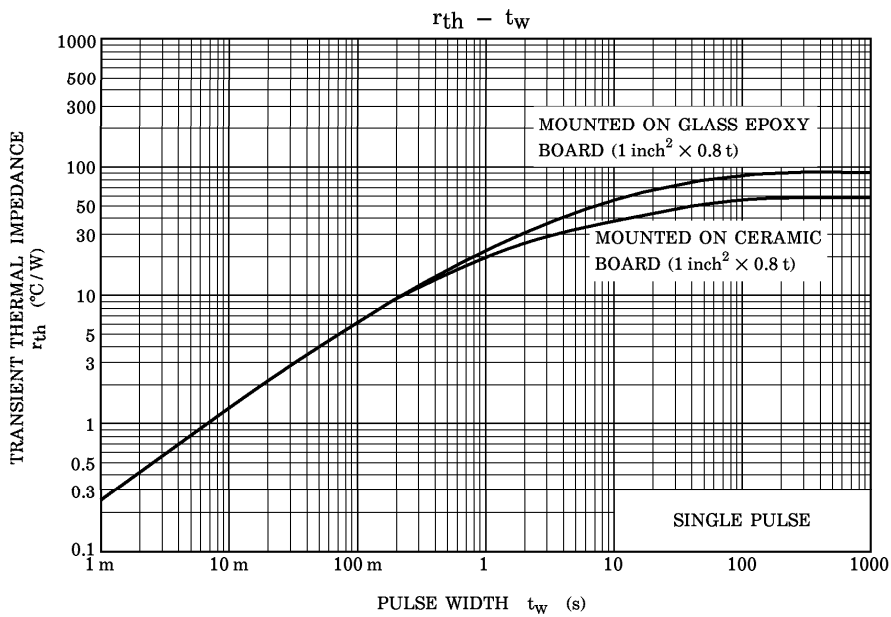
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







Peak  $I_{AR} = 13 \text{ A}$ ,  $R_G = 25 \Omega$   
 $V_{DD} = 24 \text{ V}$ ,  $L = 1.0 \text{ mH}$

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