

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (U-MOS II)

TPC8003

LITHIUM ION BATTERY

NOTE BOOK PC

PORTABLE MACHINES AND TOOLS

INDUSTRIAL APPLICATIONS

Unit in mm

- Supplied in Compact and Thin Package Requires Only a Small Mounting Area.
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 5.4 \text{ m}\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 21 \text{ S}$ (Typ.)
- Low Leakage Current : $I_{DSS} = 10 \text{ }\mu\text{A}$ (Max.) ($V_{DS} = 30 \text{ V}$)
- Enhancement-Mode : $V_{th} = 0.8 \sim 2.5 \text{ V}$
($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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}	± 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}	220	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	$^\circ\text{C/W}$

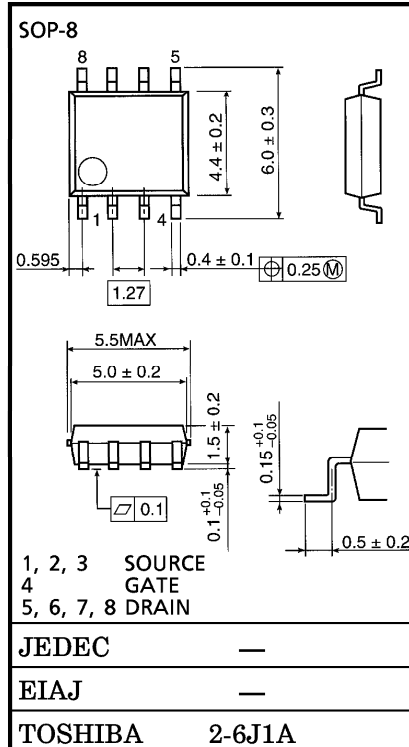
Note ;

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

** $V_{DD} = 24 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 1.0 \text{ mH}$, $R_G = 25 \text{ }\Omega$, $I_{AR} = 13 \text{ A}$ *** 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.**

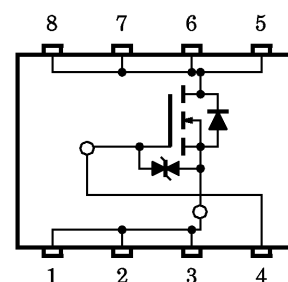
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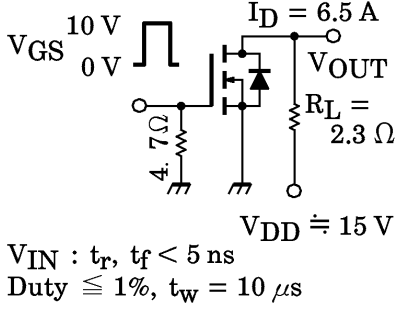


Weight : 0.08 g (Typ.)

CIRCUIT CONFIGURATION



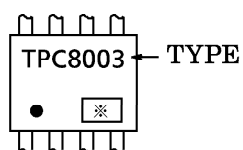
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Drain Cut-Off Current		I_{DSS}	$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	10	μA
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	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	0.8	—	2.5	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = 4 \text{ V}, I_D = 6.5 \text{ A}$	—	8.3	13	$\text{m}\Omega$
		$R_{DS(ON)}$	$V_{GS} = 10 \text{ V}, I_D = 6.5 \text{ A}$	—	5.4	7	$\text{m}\Omega$
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 6.5 \text{ A}$	10	21	—	S
Input Capacitance		C_{iss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V},$ $f = 1 \text{ MHz}$	—	4380	—	pF
Reverse Transfer Capacitance		C_{rss}		—	500	—	
Output Capacitance		C_{oss}		—	890	—	
Switching Time	Rise Time	t_r		—	14	—	ns
	Turn-On Time	t_{on}		—	27	—	
	Fall Time	t_f		—	72	—	
	Turn-Off Time	t_{off}		—	235	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \doteq 24 \text{ V}, V_{GS} = 10 \text{ V}$ $I_D = 13 \text{ A}$	—	90	—	nC
Gate-Source Charge		Q_{gs}		—	60	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	30	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	13	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	52	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 13 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.2	V

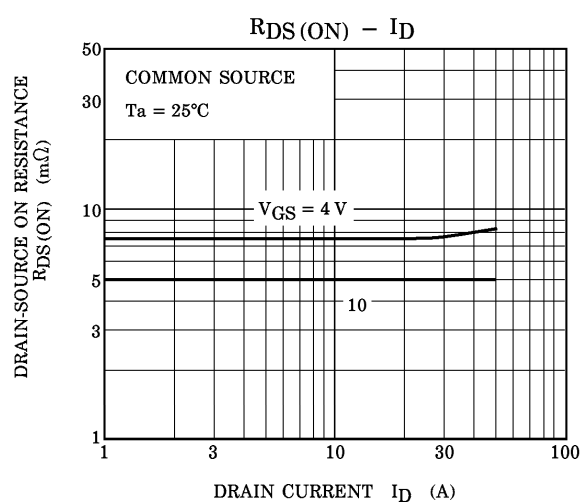
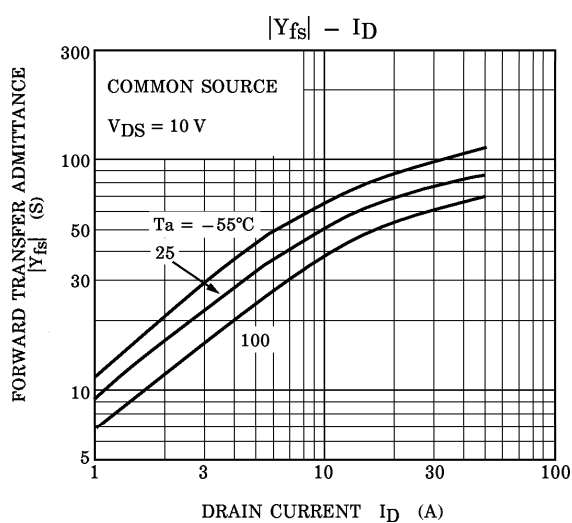
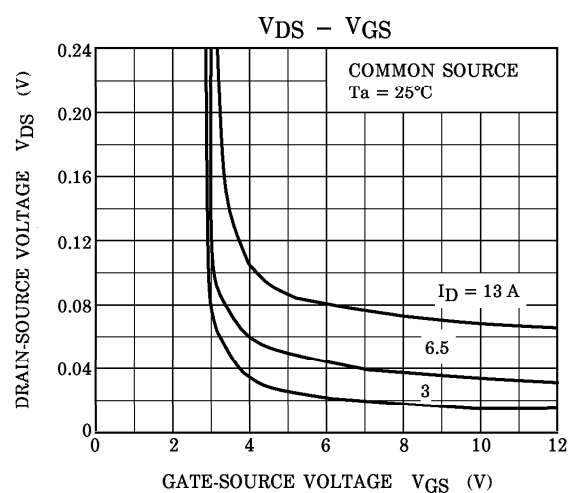
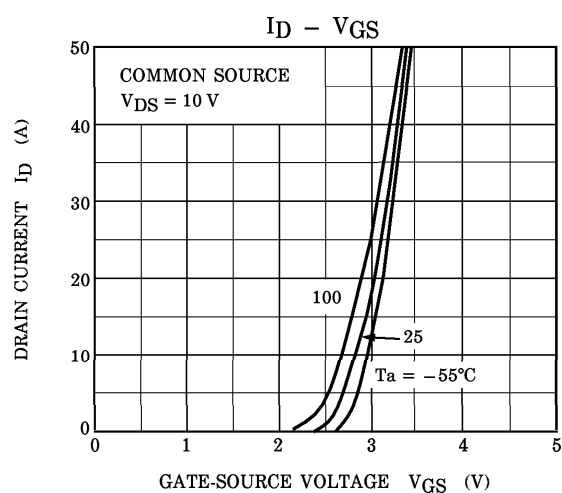
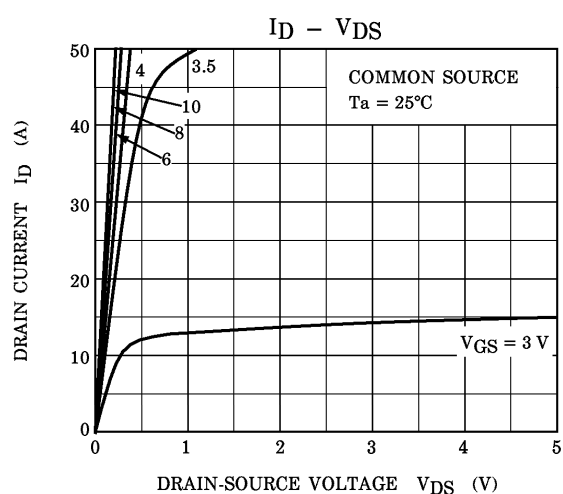
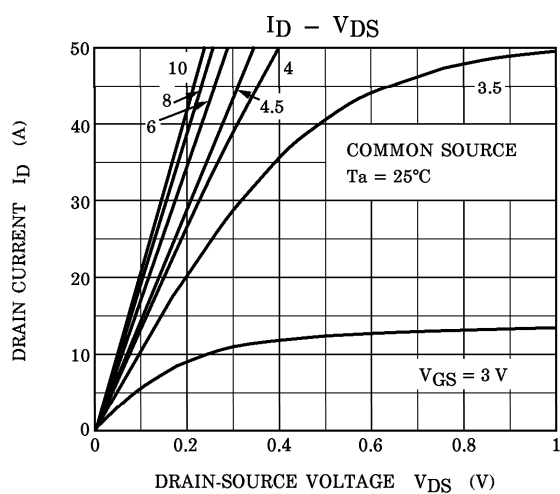
MARKING

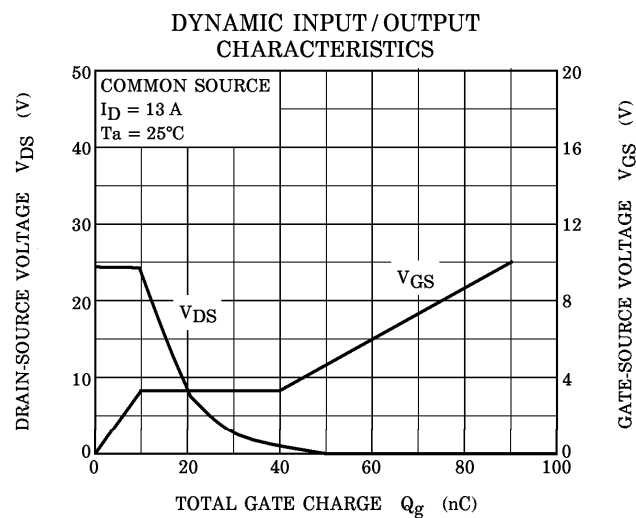
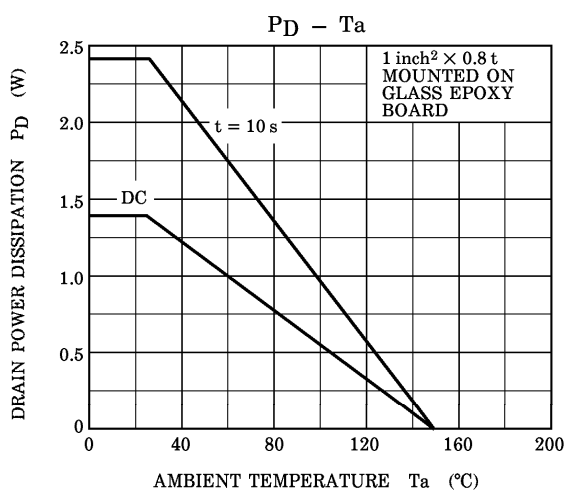
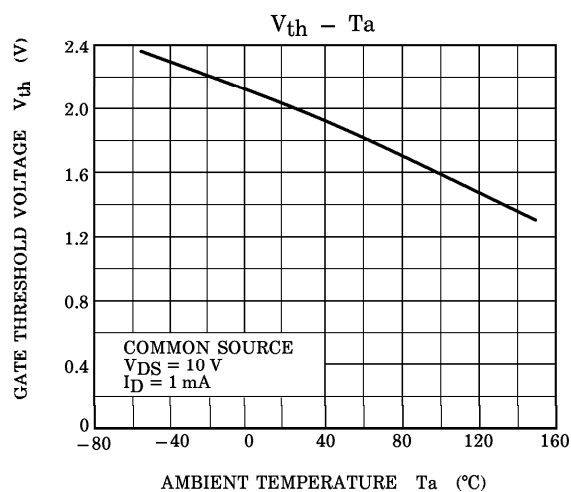
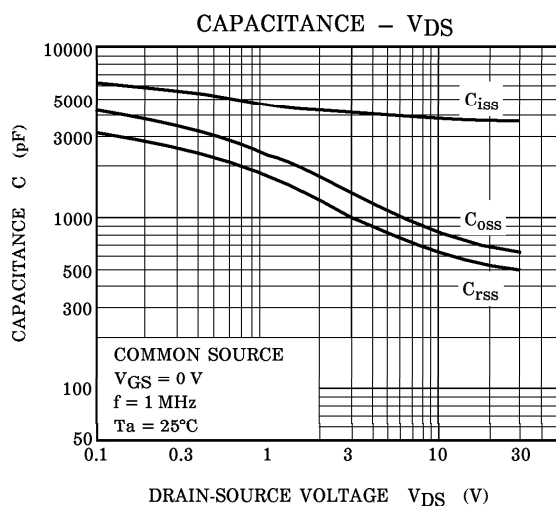
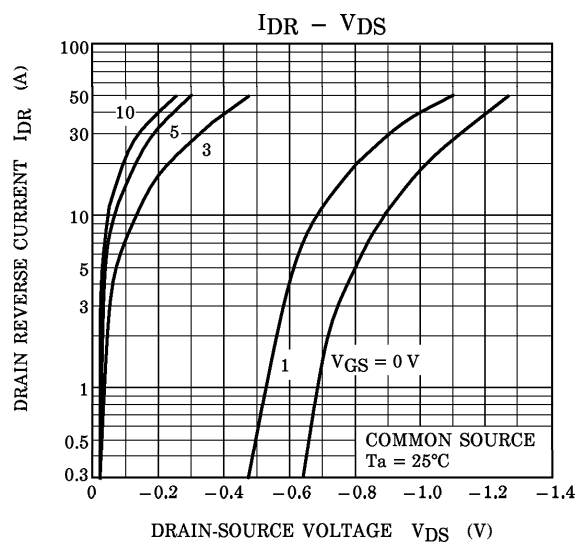
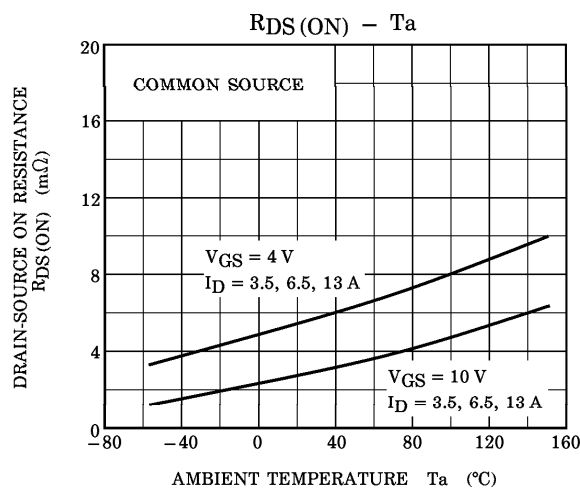


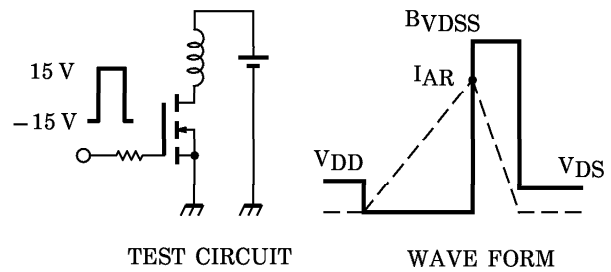
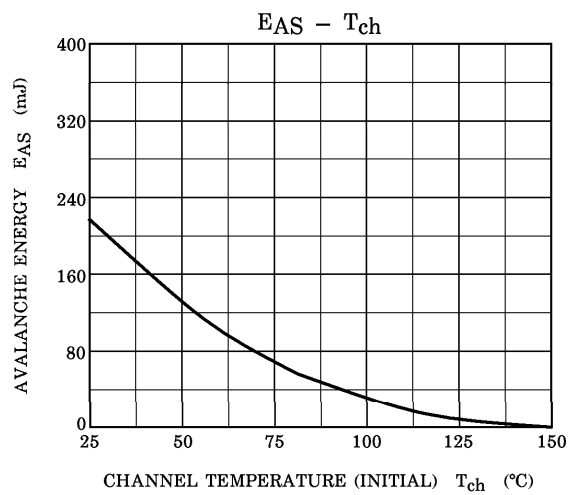
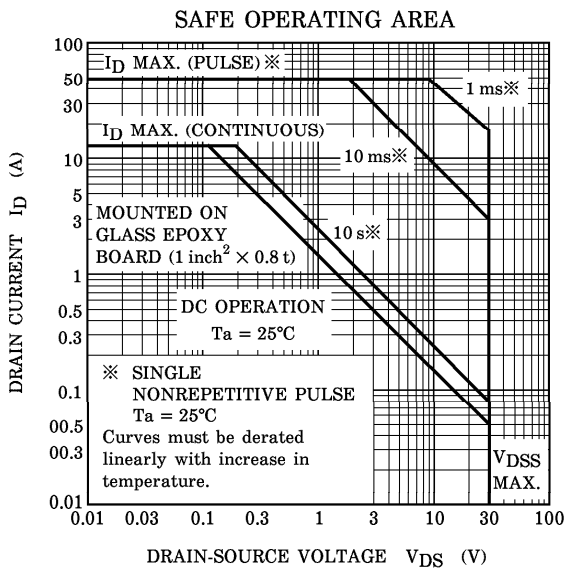
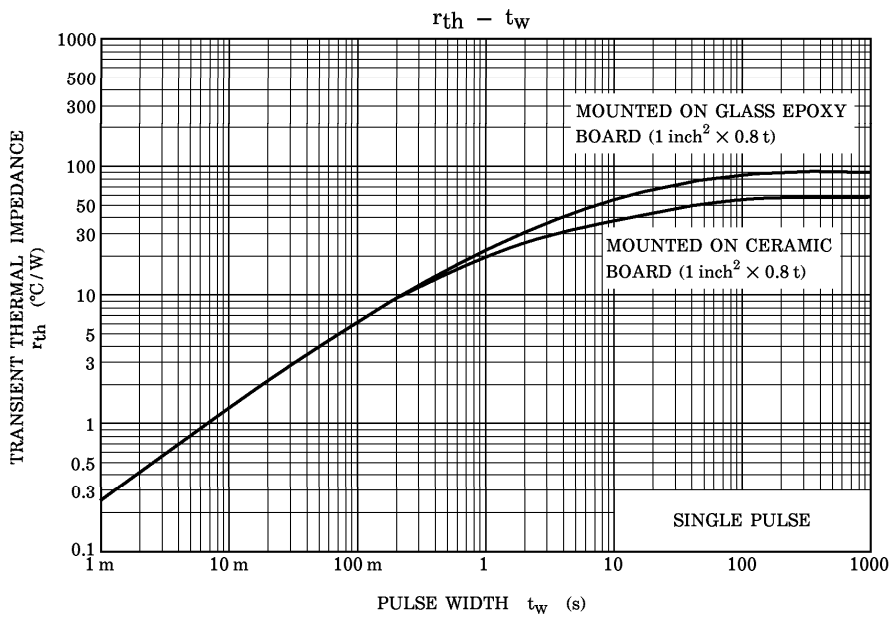
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







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

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