

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (π -MOSVI)

TPC8004

LITHIUM ION BATTERY APPLICATIONS

NOTE BOOK PC, PORTABLE EQUIPMENTS APPLICATIONS

- 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 : $I_{DSS} = 10\text{ }\mu\text{A}$ (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}	± 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	$^\circ\text{C/W}$

Note ;

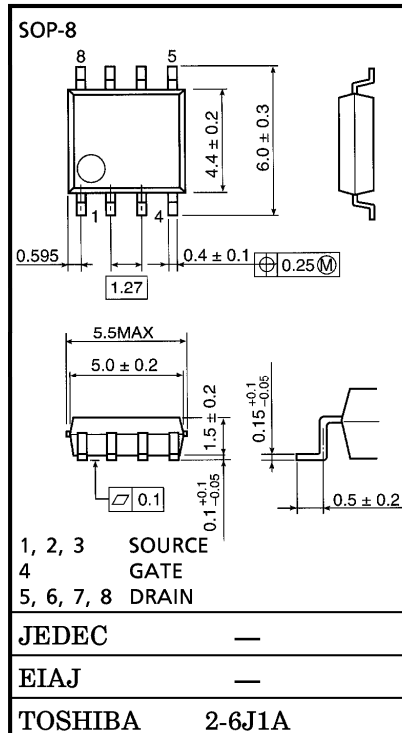
* $V_{DD} = 24\text{ V}$, $T_{ch} = 25^\circ\text{C}$, $L = 1.0\text{ mH}$, $I_{AR} = 5.0\text{ A}$,
 $R_G = 25\text{ }\Omega$

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

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

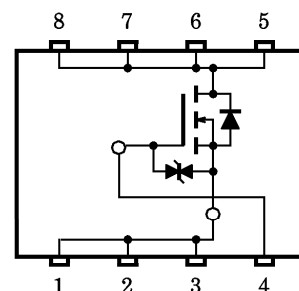
INDUSTRIAL APPLICATIONS

Unit in mm



Weight : 0.08g

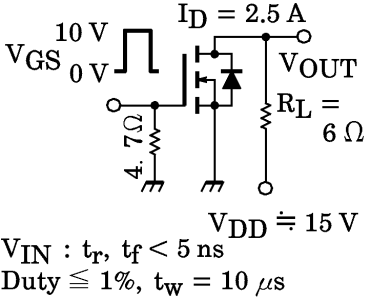
CIRCUIT CONFIGURATION



961001EAA1

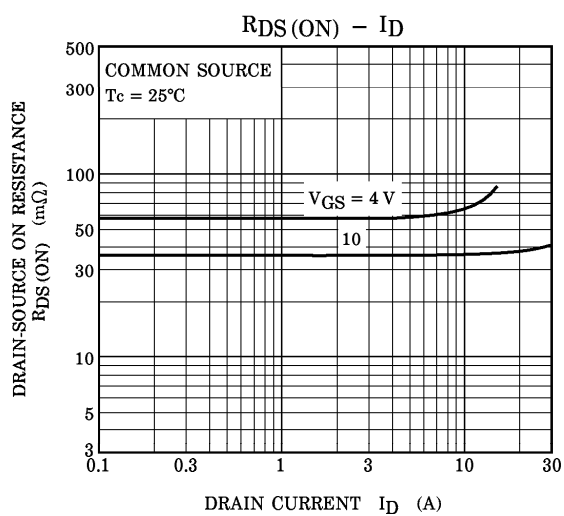
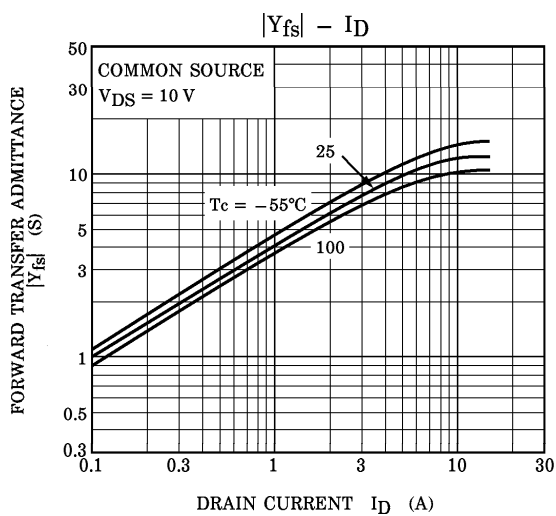
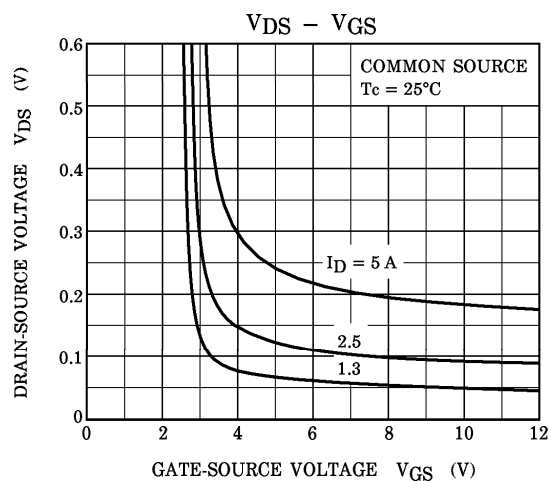
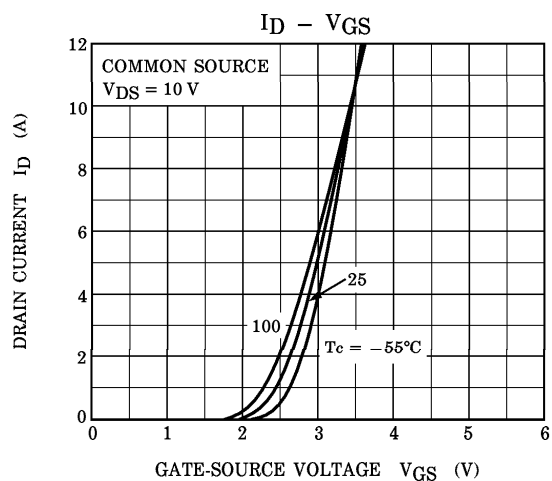
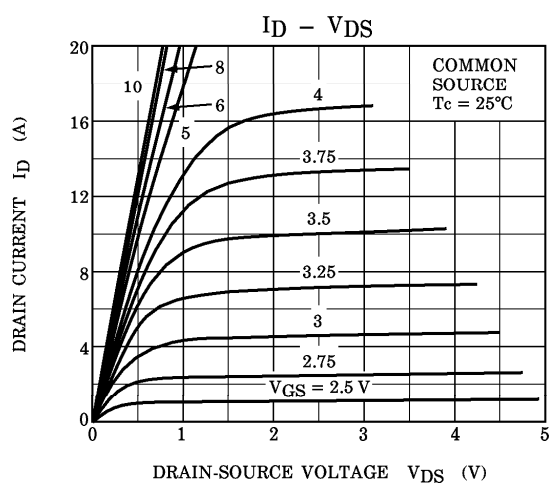
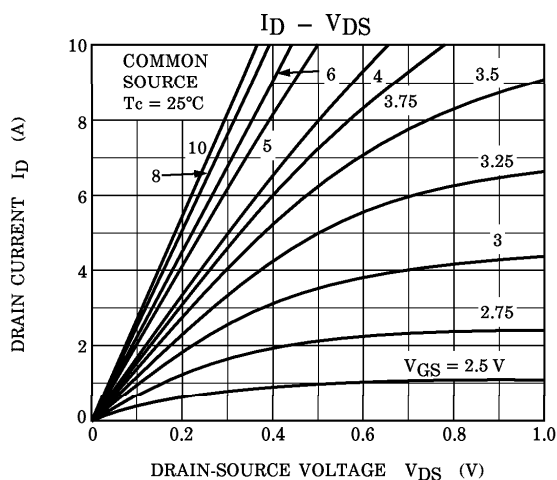
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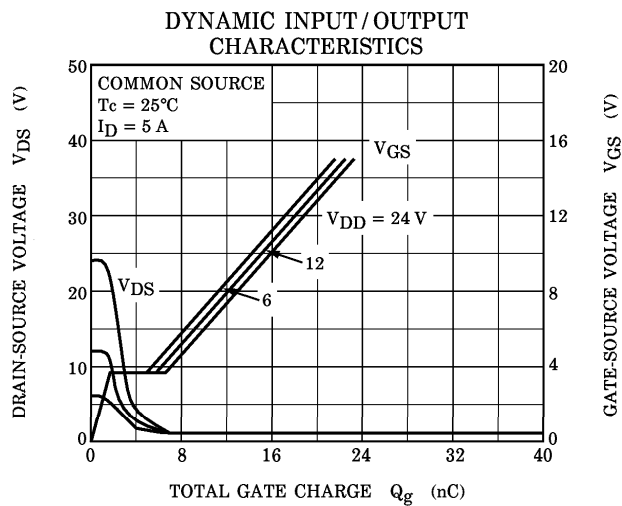
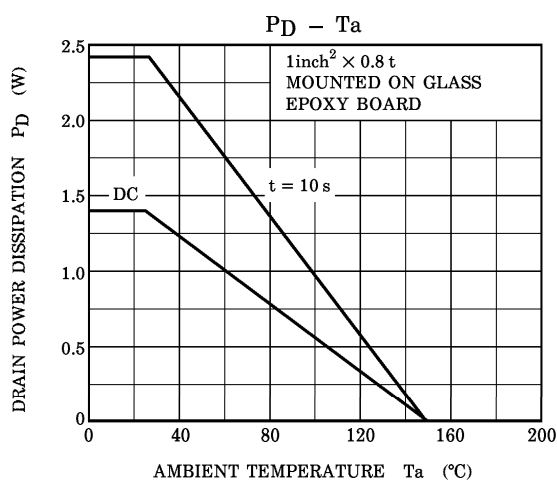
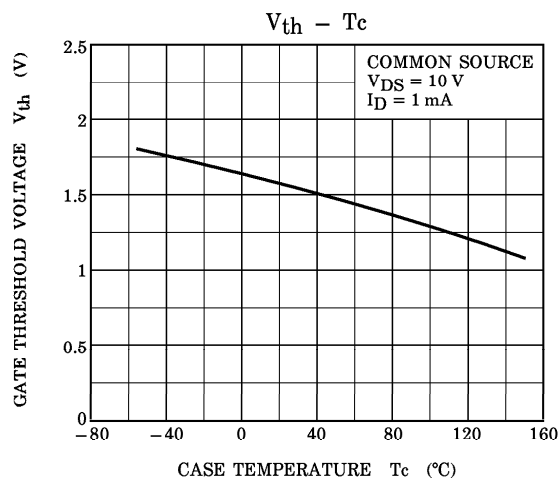
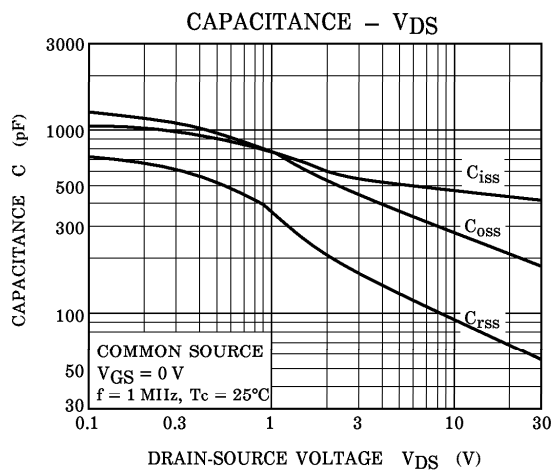
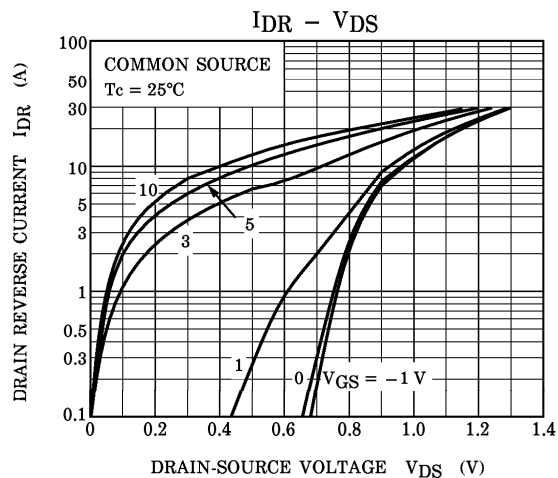
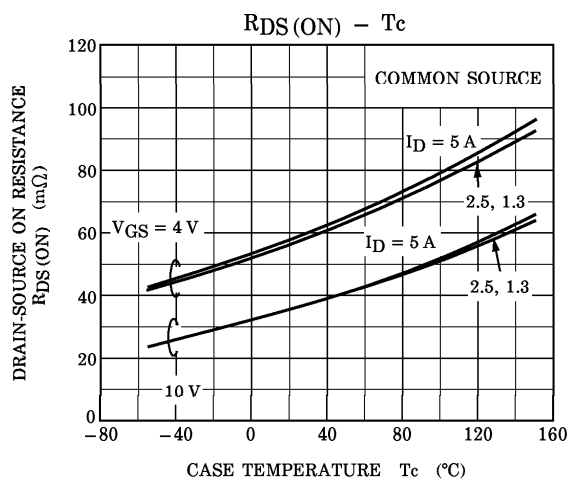
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

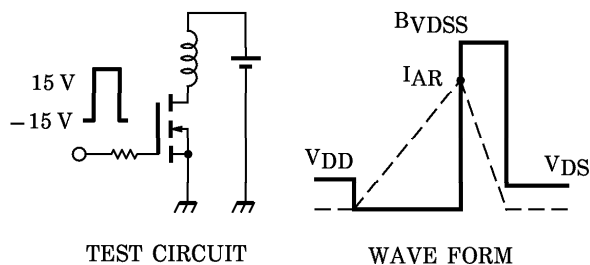
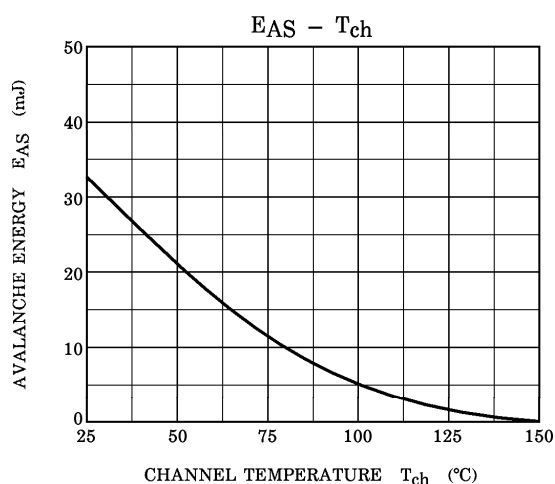
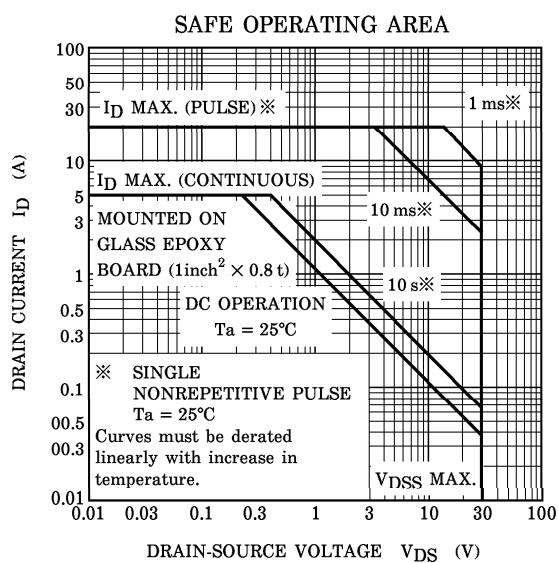
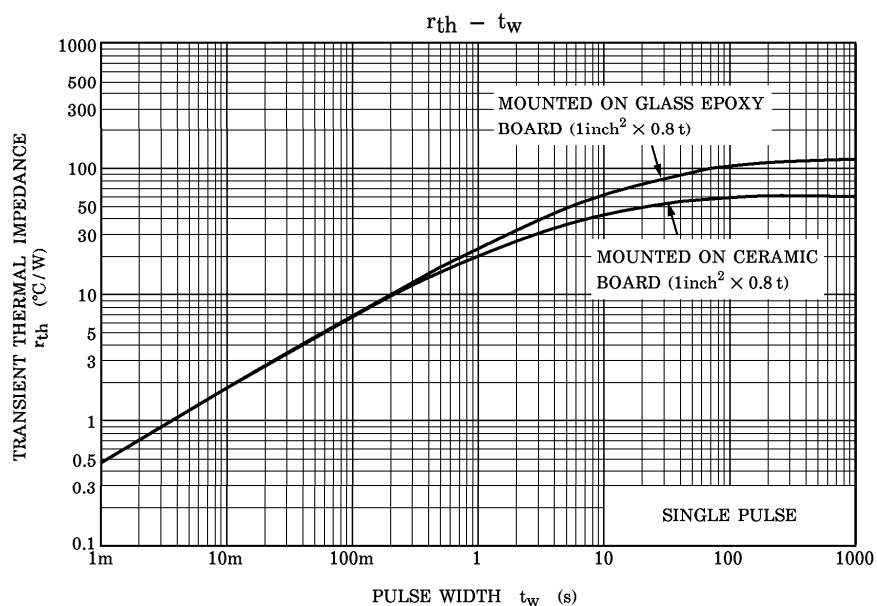
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Drain Cut-Off Current		I_{DSS}	$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	10	μA
Drain-Source Breakdown Voltage		$V_{(BR) DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	30	—	—	V
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	$\text{m}\Omega$
			$V_{GS} = 10 \text{ V}, I_D = 2.5 \text{ A}$	—	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	 $I_D = 2.5 \text{ A}$ $V_{GS} = 10 \text{ V}, 0 \text{ V}$ V_{OUT} $R_L = 6 \Omega$ $V_{DD} \doteq 15 \text{ V}$ $V_{IN} : t_r, t_f < 5 \text{ ns}$ $\text{Duty} \leq 1\%, t_w = 10 \mu\text{s}$	—	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	$V_{DD} \doteq 24 \text{ V}, V_{GS} = 10 \text{ V}$ $I_D = 5 \text{ A}$	—	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







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

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