

TOSHIBA FIELD EFFECT TRANSISTOR SILICON P CHANNEL MOS TYPE (HIGH SPEED U-MOSII)

TPC8104-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 : $Q_g = 17 \text{ nC (Typ.)}$
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 38 \text{ m}\Omega \text{ (Typ.)}$
- High Forward Transfer Admittance : $|Y_{fs}| = 7.0 \text{ S (Typ.)}$
- 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 ($T_a = 25^\circ\text{C}$)

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}	-55~150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

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

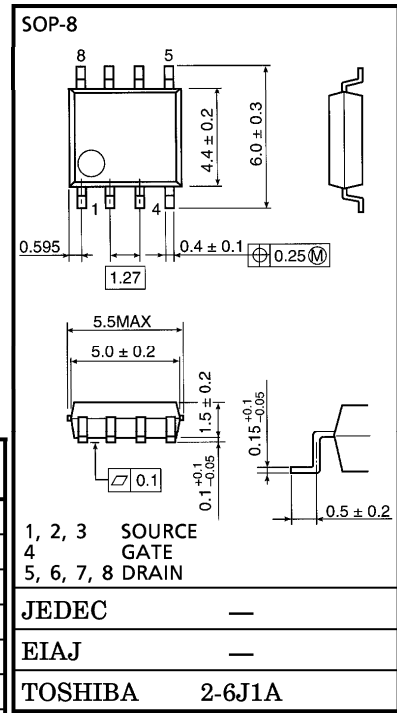
Note ;

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

** $V_{DD} = -24 \text{ V, } T_{ch} = 25^\circ\text{C (initial), } L = 1.0 \text{ mH, } R_G = 25 \Omega, I_{AR} = -5 \text{ A}$

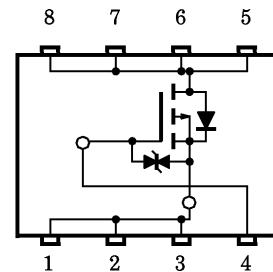
*** Drive operation ; Mount on glass epoxy board [1 inch² × 0.8 t] (t = 10 s)

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



Weight : 0.08 g

CIRCUIT CONFIGURATION



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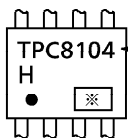
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 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	—	—		
Gate Threshold Voltage		V_{th}	$V_{DS} = -10\text{ V}, I_D = -1\text{ mA}$	-0.8	—	-2.0	V
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS} = -4\text{ V}, I_D = -2.5\text{ A}$	—	68	120	m Ω	
	$R_{DS(ON)}$	$V_{GS} = -10\text{ V}, I_D = -2.5\text{ A}$	—	38	65		
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -2.5\text{ A}$	3.5	7.0	—	S
Input Capacitance		C_{iss}	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$	—	730	—	pF
Reverse Transfer Capacitance		C_{rss}		—	190	—	
Output Capacitance		C_{oss}		—	270	—	
Switching Time	Rise Time	t_r		—	8	—	ns
	Turn-On Time	t_{on}		—	15	—	
	Fall Time	t_f		—	26	—	
	Turn-Off Time	t_{off}		$V_{IN} : t_r, t_f < 5\text{ ns},$ $Duty \leq 1\%, t_w = 10\ \mu\text{s}$	—	76	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \cong -24\text{ V}, V_{GS} = -10\text{ V},$ $I_D = -5\text{ A}$	—	17	—	nC
Gate-Source Charge		Q_{gs}		—	13	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	4	—	

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

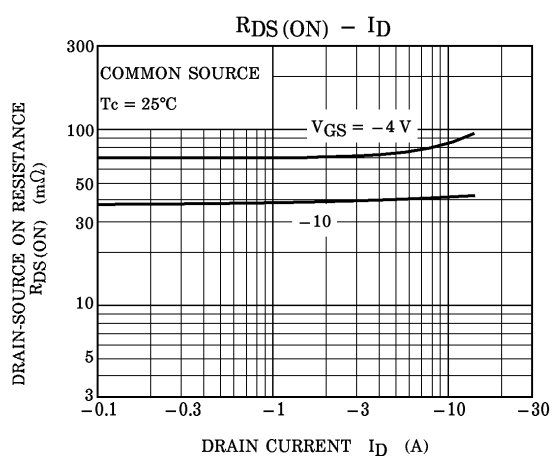
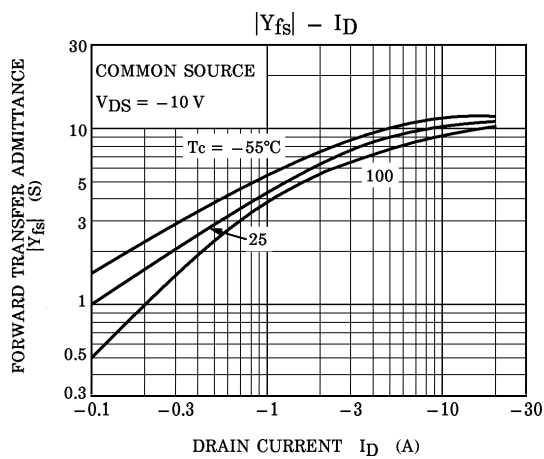
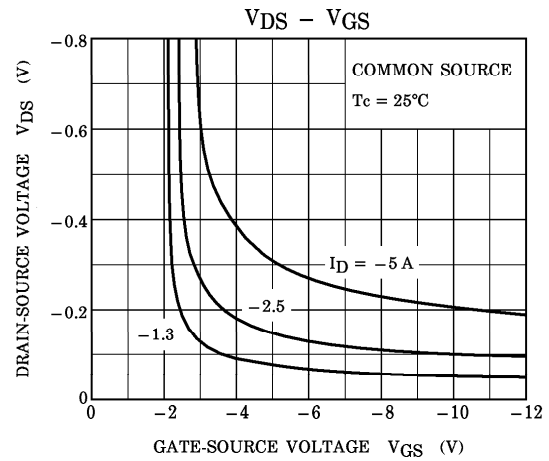
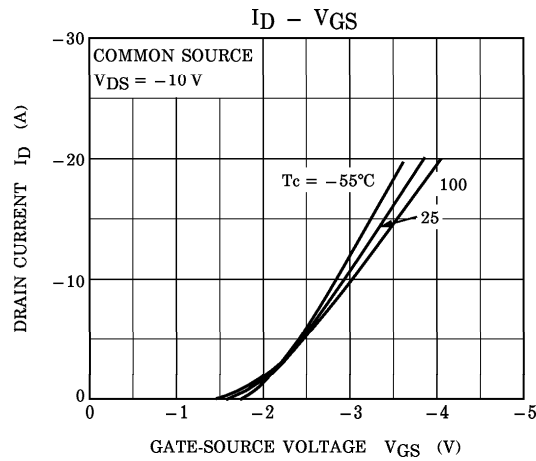
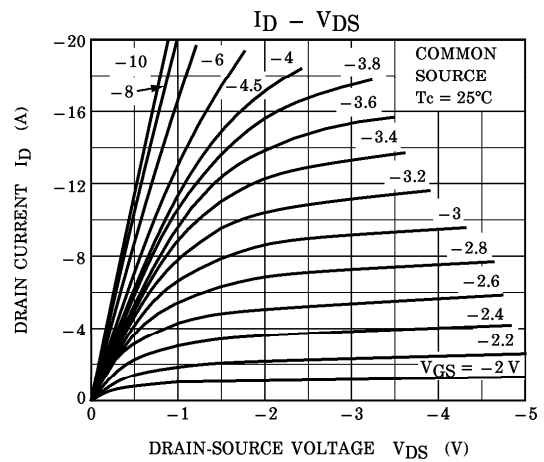
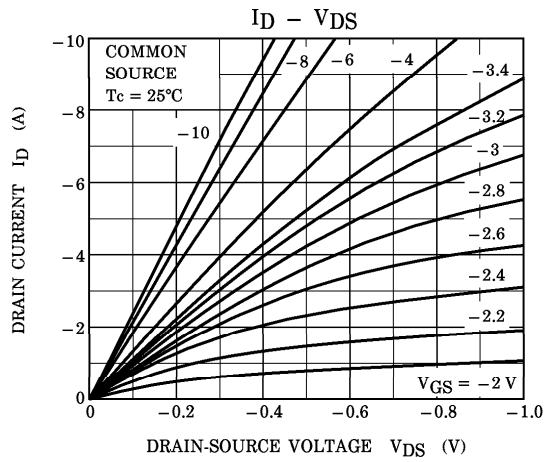


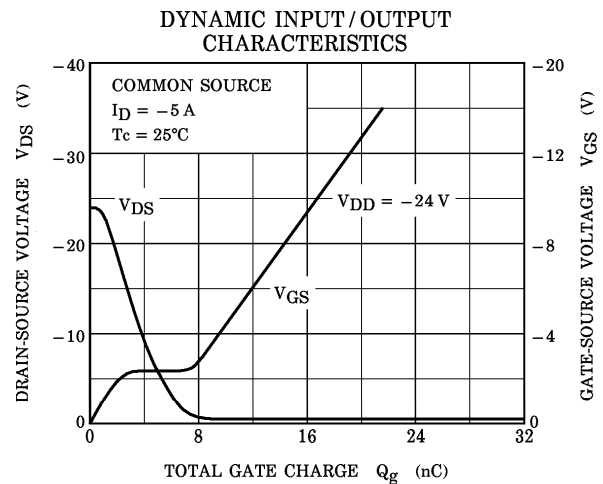
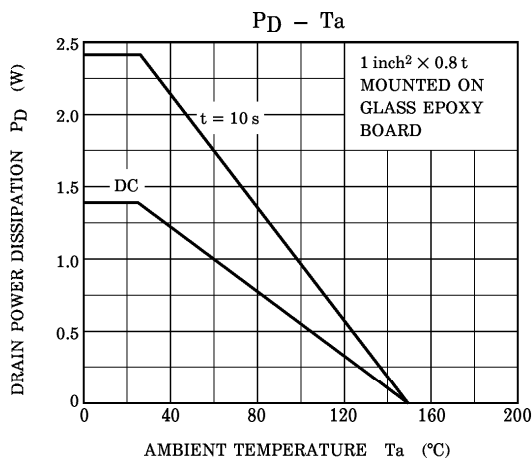
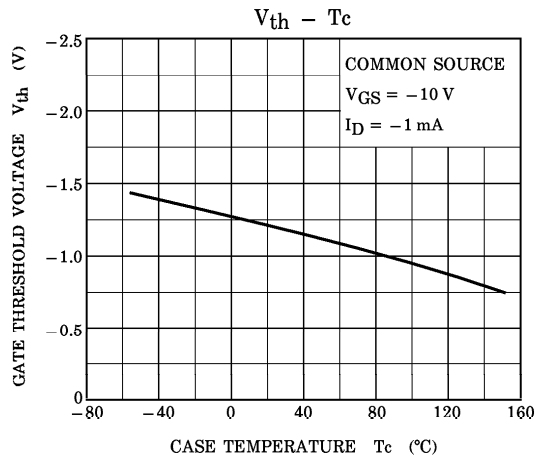
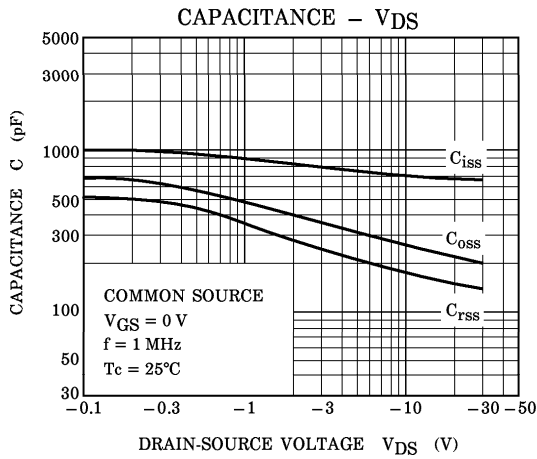
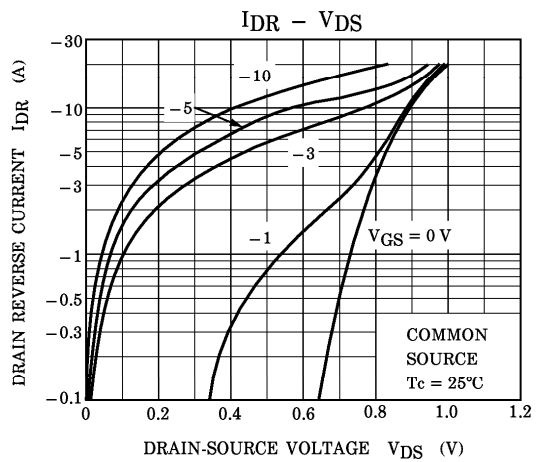
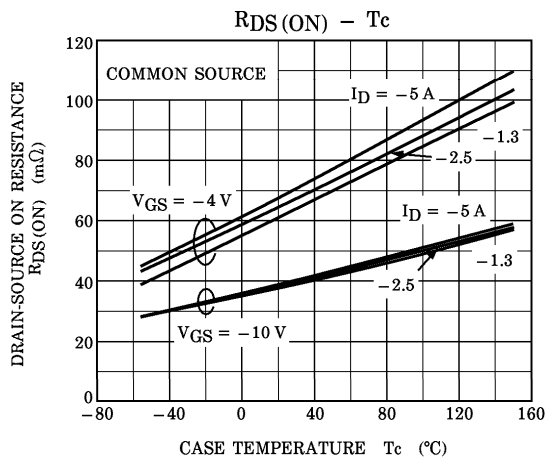
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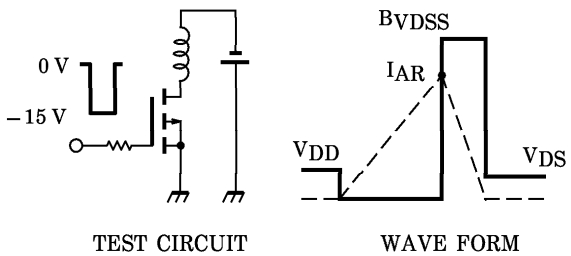
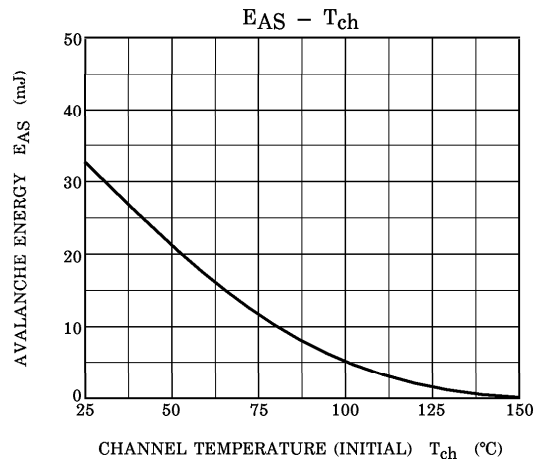
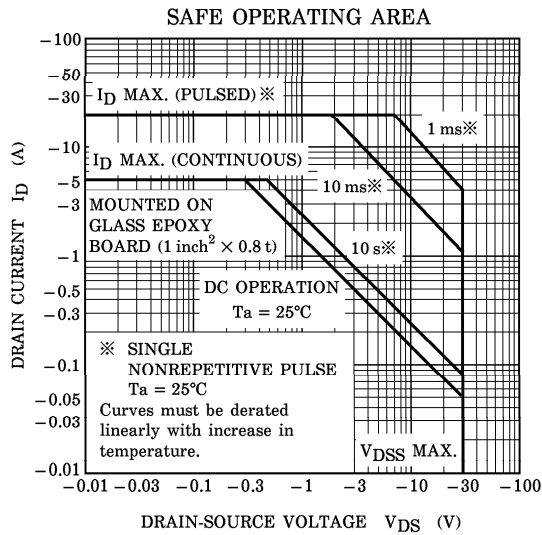
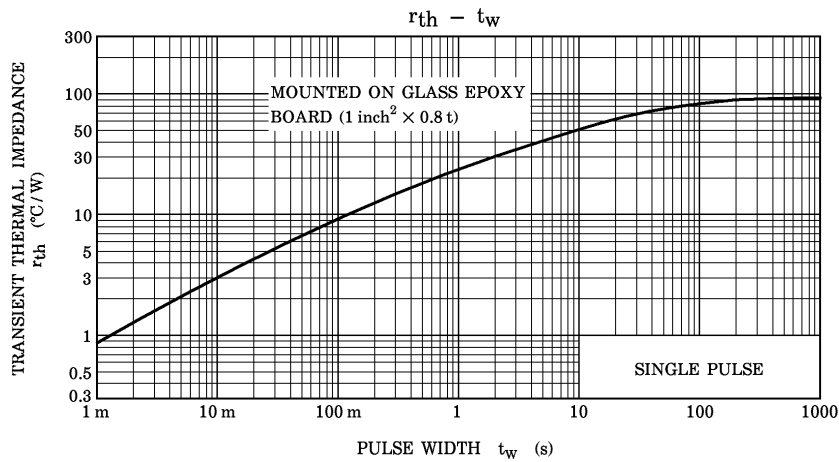
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







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

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