

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

TPCS8102

LITHIUM ION BATTERY APPLICATIONS

NOTE BOOK PC, PORTABLE EQUIPMENTS APPLICATIONS

HIGH SPEED AND HIGH EFFICIENCY DC-DC CONVERTERS

- High Speed Switching
- Small Gate Charge : $Q_g = 37 \text{ nC}$ (Typ.)
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 16 \text{ m}\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 17 \text{ S}$ (Typ.)
- Low Leakage Current : $I_{DSS} = -10 \mu\text{A}$ (Max.) ($V_{DS} = -20 \text{ V}$)
- Enhancement-Mode : $V_{th} = -0.5 \sim -1.2 \text{ V}$
($V_{DS} = -10 \text{ V}$, $I_D = -200 \mu\text{A}$)

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

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	-20	V
Drain-Gate Voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	-20	V
Gate-Source Voltage		V_{GSS}	± 12	V
Drain Current	DC	I_D	-6	A
	Pulse	I_{DP}	-24	A
Drain Power Dissipation*** ($T_a = 25^\circ\text{C}$)		P_D	1.5	W
Single Pulse Avalanche Energy**		E_{AS}	46.8	mJ
Avalanche Current		I_{AR}	-6	A
Repetitive Avalanche Energy*		E_{AR}	0.15	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***	$R_{th(ch-a)}$	83.3	$^\circ\text{C/W}$

Note ;

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

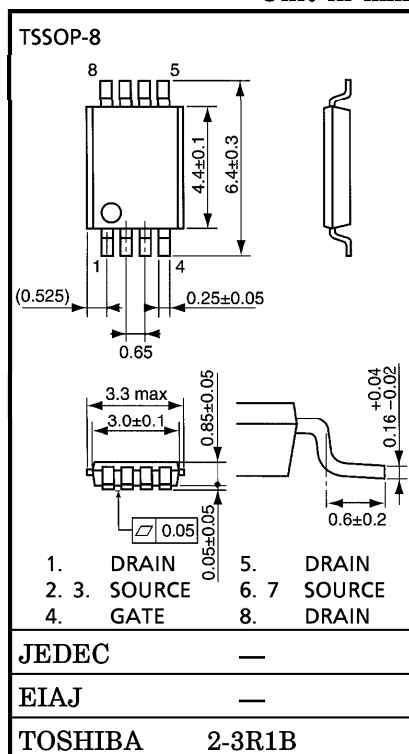
** $V_{DD} = -16 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 1.0 \text{ mH}$,
 $I_{AR} = -6 \text{ A}$, $R_G = 25 \Omega$ *** Drive operation ; Mount on glass epoxy board [$1 \text{ inch}^2 \times 0.8 \text{ t}$]
($t = 10 \text{ s}$)

This transistor is an electrostatic sensitive device.

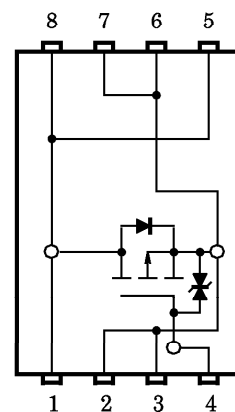
Please handle with caution.

INDUSTRIAL APPLICATIONS

Unit in mm



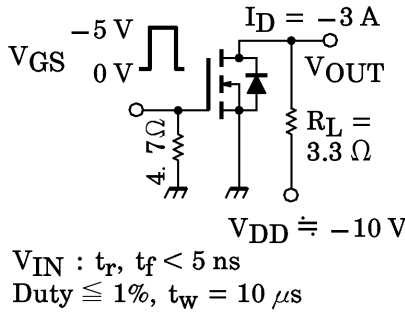
CIRCUIT CONFIGURATION



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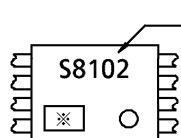
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 10\text{ V}$, $V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain Cut-Off Current		I_{DSS}	$V_{DS} = -20\text{ V}$, $V_{GS} = 0\text{ V}$	—	—	-10	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D = -10\text{ mA}$, $V_{GS} = 0\text{ V}$	-20	—	—	V
		$V_{(BR)DSX}$	$I_D = -10\text{ mA}$, $V_{GS} = 12\text{ V}$	-8	—	—	
Gate Threshold Voltage		V_{th}	$V_{DS} = -10\text{ V}$, $I_D = -200\text{ }\mu\text{A}$	-0.5	—	-1.2	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = -2.0\text{ V}$, $I_D = -3\text{ A}$	—	30	60	m Ω
			$V_{GS} = -2.5\text{ V}$, $I_D = -3\text{ A}$	—	23	38	
			$V_{GS} = -4\text{ V}$, $I_D = -3\text{ A}$	—	16	20	
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}$, $I_D = -3\text{ A}$	8.5	17	—	S
Input Capacitance		C_{iss}	$V_{DS} = -10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	—	2740	—	pF
Reverse Transfer Capacitance		C_{rss}		—	780	—	
Output Capacitance		C_{oss}		—	1030	—	
Switching Time	Rise Time	t_r		—	7.6	—	ns
	Turn-On Time	t_{on}		—	16	—	
	Fall Time	t_f		—	110	—	
	Turn-Off Time	t_{off}		—	230	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \doteq -16\text{ V}$, $V_{GS} = -5\text{ V}$ $I_D = -6\text{ A}$	—	37	—	nC
Gate-Source Charge		Q_{gs}		—	27	—	
Gate-Drain (“Miller”) Charge		Q_{gd}		—	10	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	-6	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	-24	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = -6 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	1.2	V

MARKING



TYPE

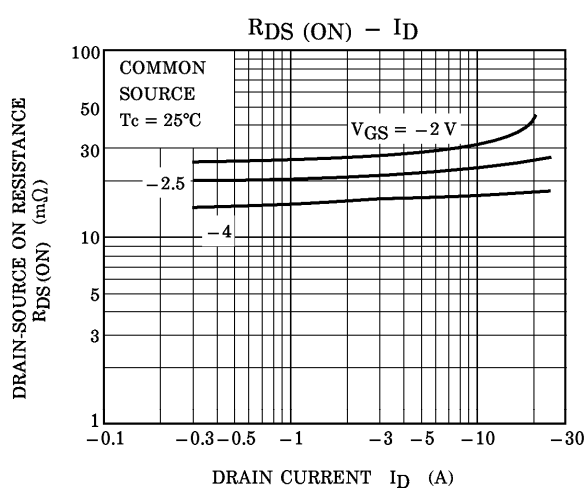
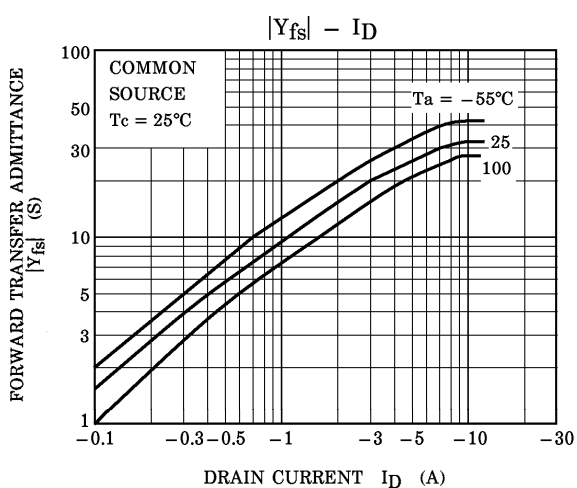
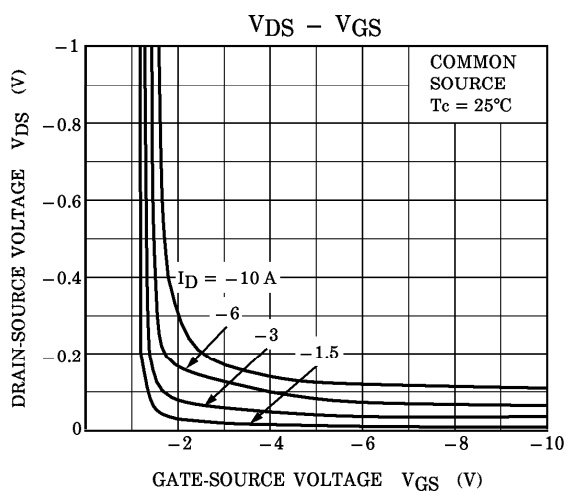
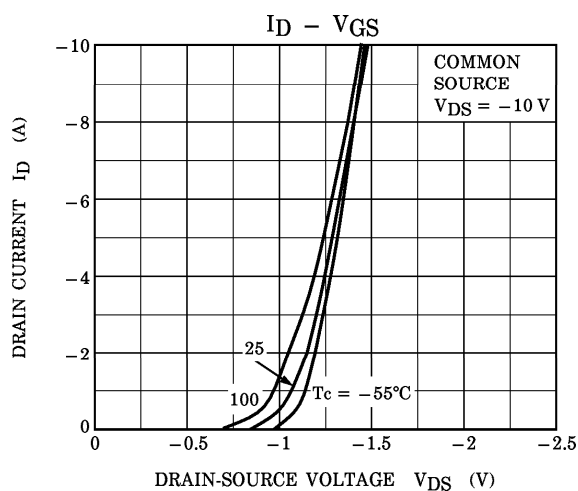
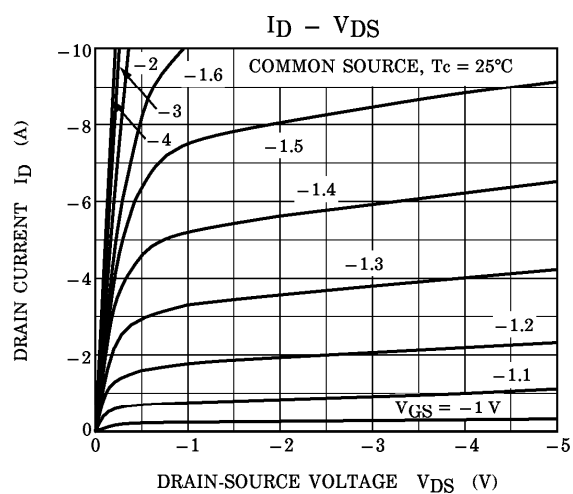
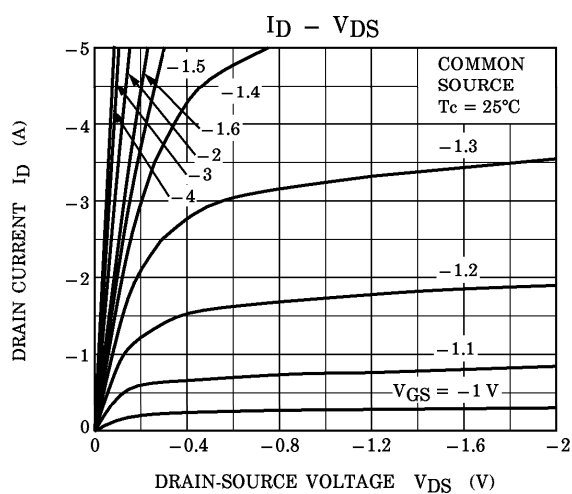
※ Lot Number

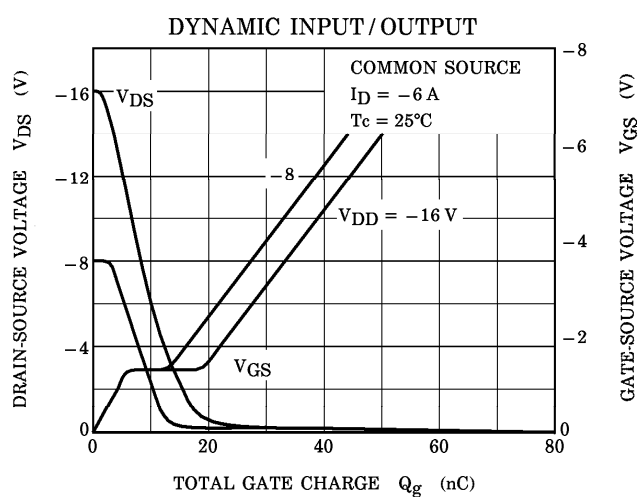
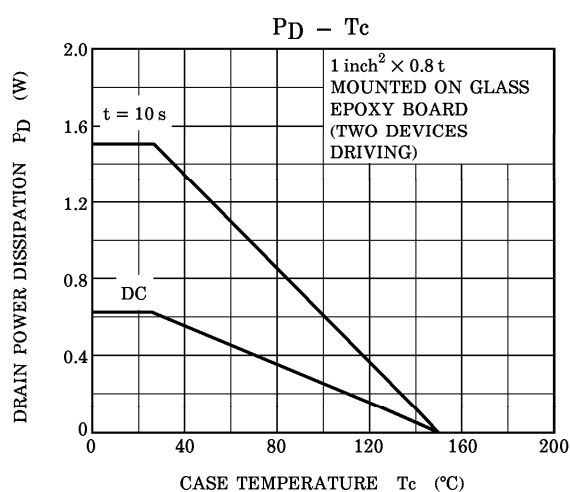
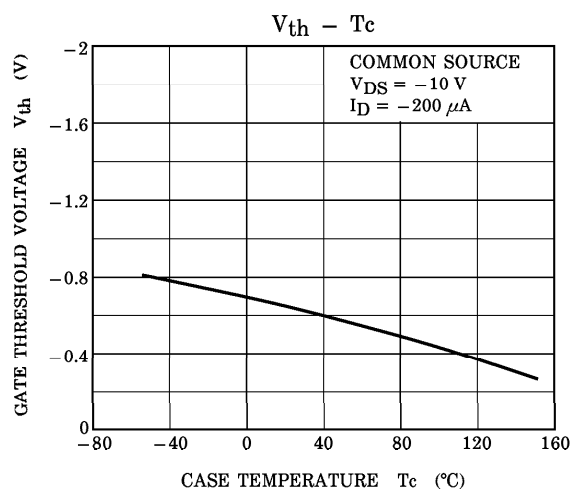
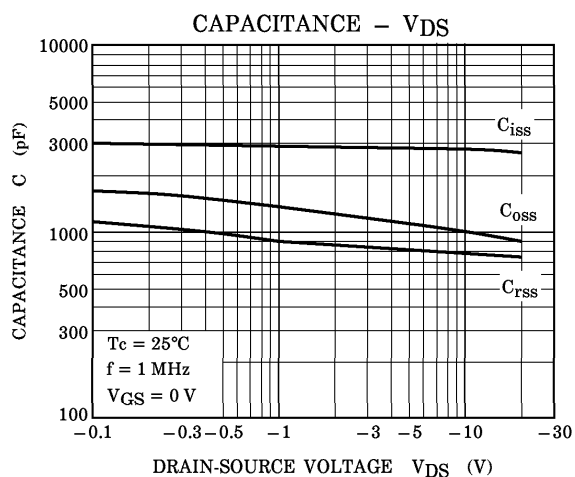
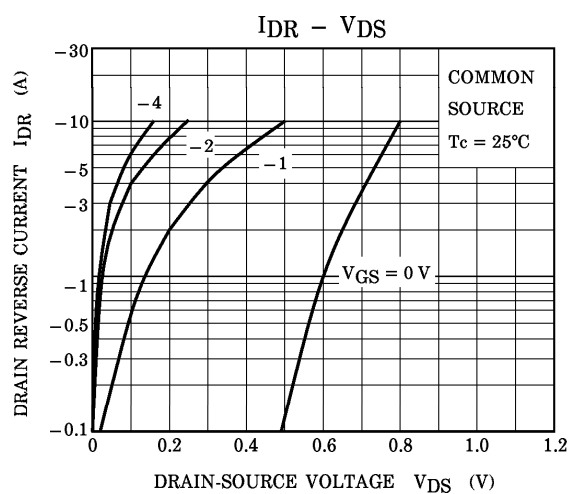
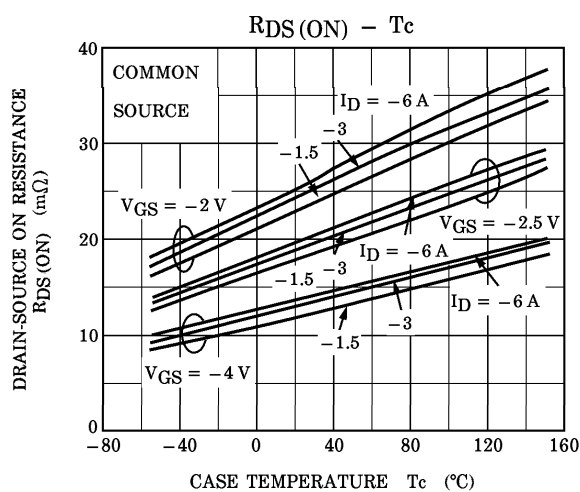


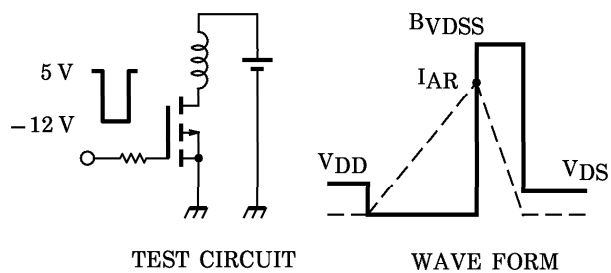
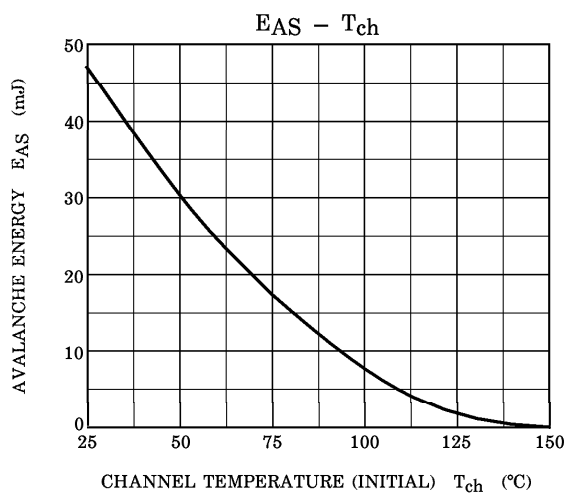
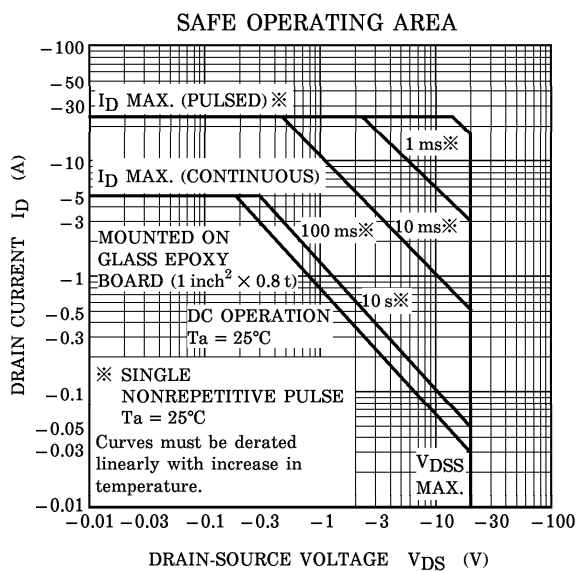
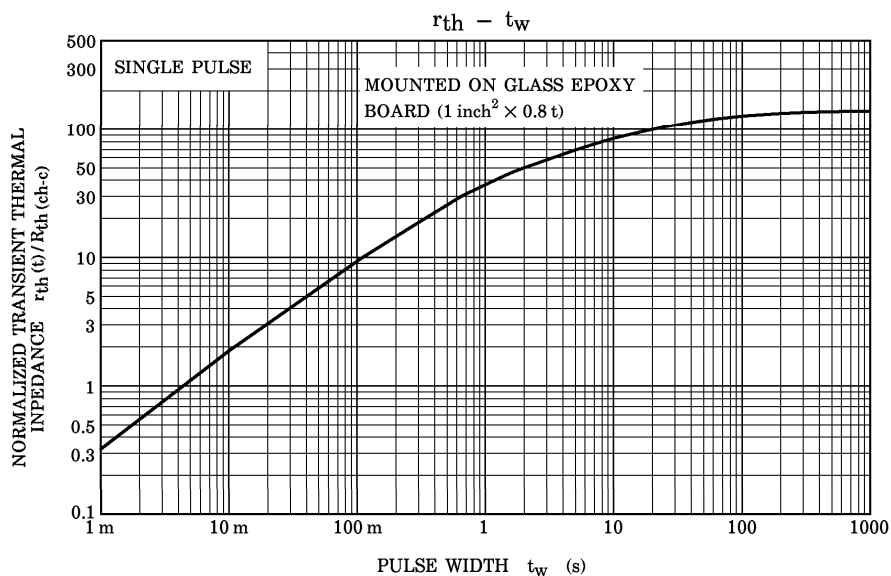
Month (Starting from Alphabet A)



Year (Last Number of the Christian Era)







$$\begin{aligned} \text{Peak } I_{AR} &= -6 \text{ A, } R_G = 25 \Omega \\ V_{DD} &= -16 \text{ V, } L = 1.0 \text{ mH} \end{aligned} \quad E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{BVDSS}{BVDSS - V_{DD}} \right)$$