

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

TPCS8203

LITHIUM ION BATTERY APPLICATIONS

NOTE BOOK PC

PORTABLE MACHINES AND TOOLS

- Low Drain-Source ON Resistance : $R_{DS(ON)} = 17 \text{ m}\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 13 \text{ S}$ (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	1.0	W
Single Pulse Avalanche Energy**	E_{AS}	234	mJ
Avalanche Current	I_{AR}	6	A
Repetitive Avalanche Energy*	E_{AR}	0.1	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***	$R_{th(ch-a)}$	125	$^\circ\text{C}/\text{W}$

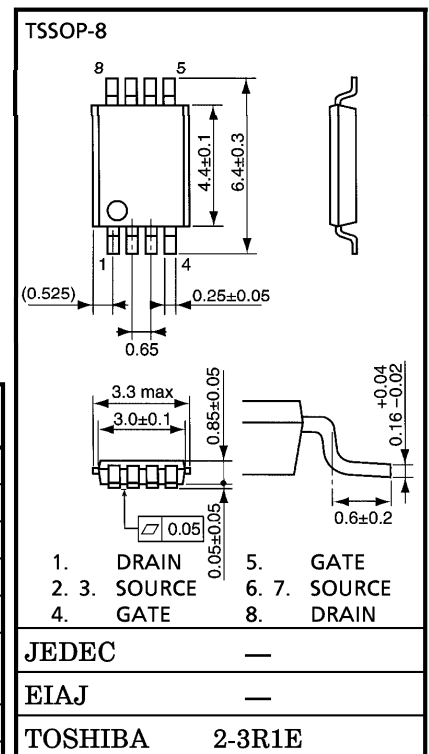
Note ;

- * Repetitive rating ; Pulse Width Limited by Max. Junction temperature.
- ** $V_{DD} = 16 \text{ V}, T_{ch} = 25^\circ\text{C}$ (initial), $L = 5.0 \text{ mH}, I_{AR} = 6 \text{ A}, R_G = 25 \Omega$
- *** Drive operation ; Mount on glass epoxy board [$1 \text{ inch}^2 \times 0.8 \text{ t}$] in the two devices driving ($t = 10 \text{ s}$)

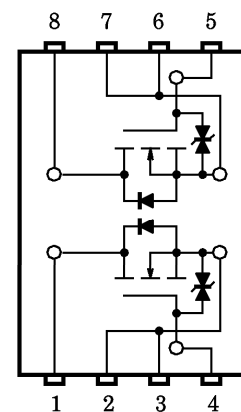
**This transistor is an electrostatic sensitive device.
Please handle with caution.**

INDUSTRIAL APPLICATIONS

Unit in mm



CIRCUIT CONFIGURATION



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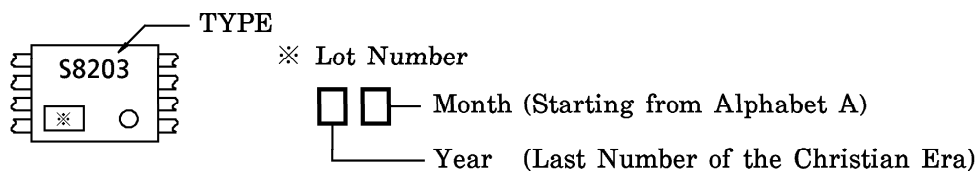
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

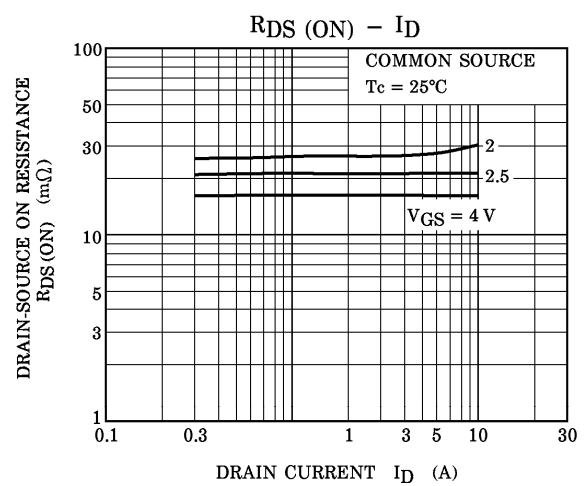
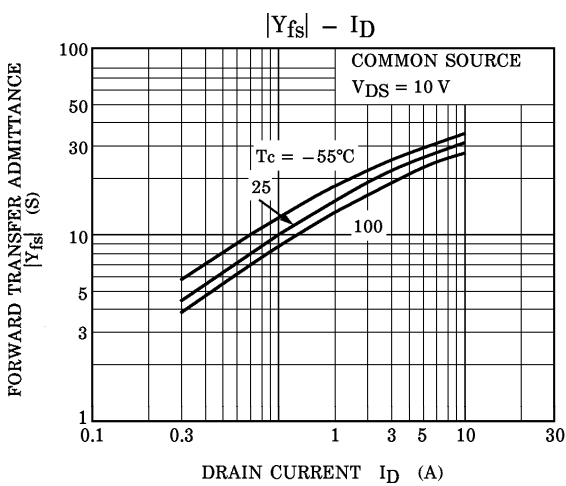
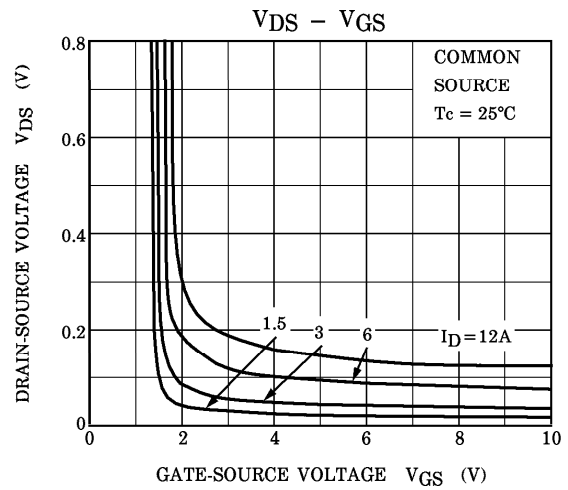
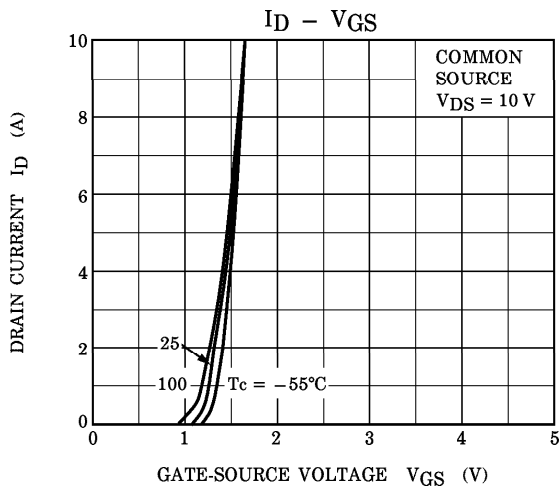
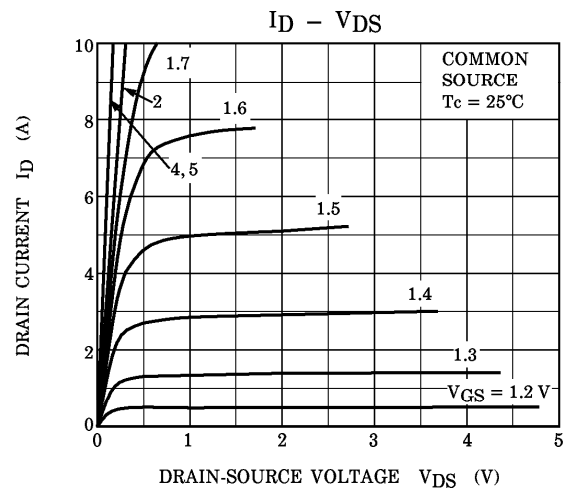
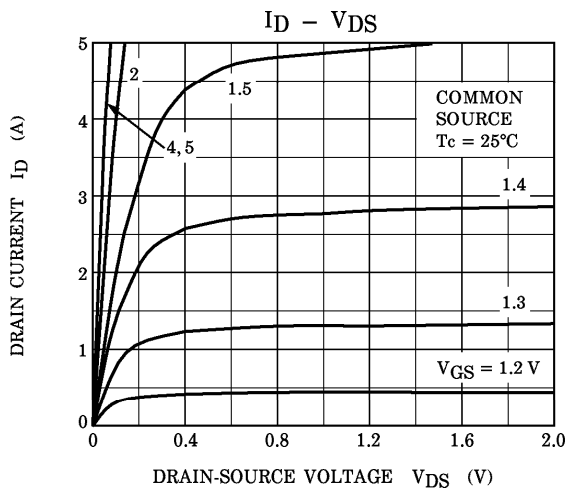
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 10\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA	
Drain Cut-Off Current	I_{DSS}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	μA	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	20	—	—	V	
	$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -12\text{ V}$	8	—	—		
Gate Threshold Voltage	V_{th}	$V_{DS} = 10\text{ V}, I_D = 200\ \mu\text{A}$	0.5	—	1.2	V	
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS} = 2.0\text{ V}, I_D = 4.2\text{ A}$	—	27	45	m Ω	
		$V_{GS} = 2.5\text{ V}, I_D = 4.2\text{ A}$	—	22	29		
		$V_{GS} = 4\text{ V}, I_D = 4.8\text{ A}$	—	17	24		
Forward Transfer Admittance	$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 3\text{ A}$	6.5	13	—	S	
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$	—	1160	—	pF	
Reverse Transfer Capacitance	C_{rss}		—	190	—		
Output Capacitance	C_{oss}		—	270	—		
Switching Time	Rise Time	t_r		—	6.9	—	ns
	Turn-On Time	t_{on}		—	13	—	
	Fall Time	t_f		—	18	—	
	Turn-Off Time	t_{off}		$V_{IN} : t_r, t_f < 5\text{ ns}$ $\text{Duty} \leq 1\%, t_w = 10\ \mu\text{s}$	—	62	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q_g	$V_{DD} \doteq 16\text{ V}, V_{GS} = 5\text{ V}$ $I_D = 6\text{ A}$	—	18	—	nC	
Gate-Source Charge	Q_{gs}		—	12	—		
Gate-Drain (“Miller”) Charge	Q_{gd}		—	6	—		

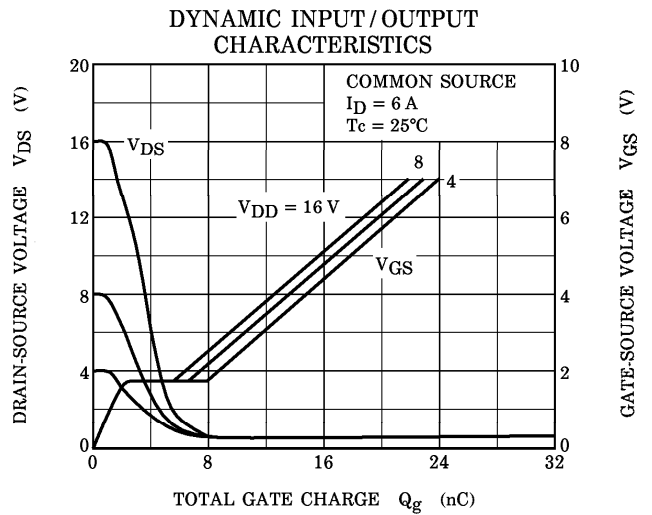
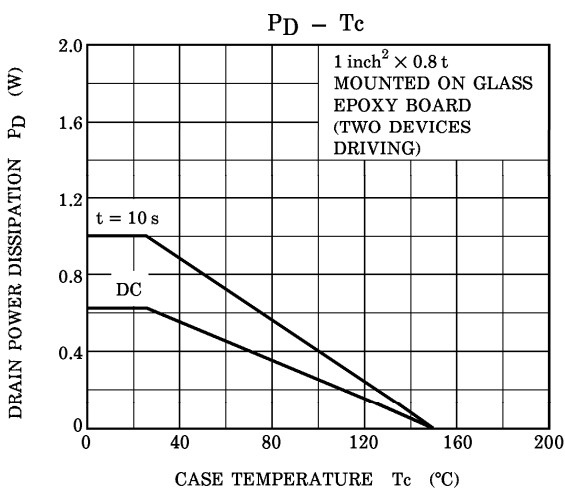
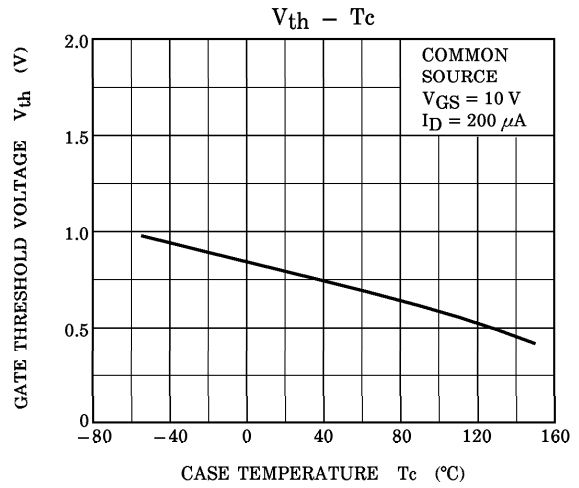
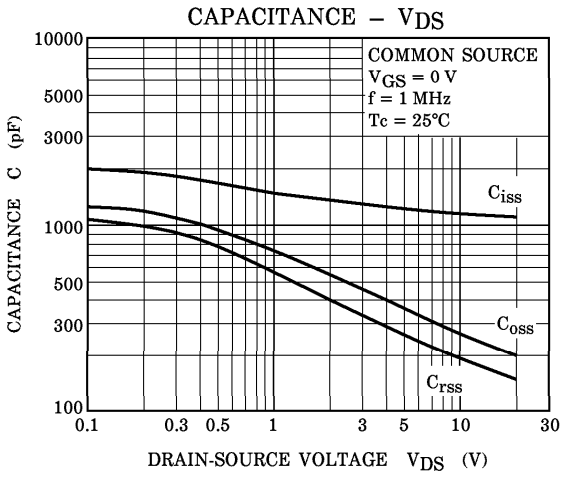
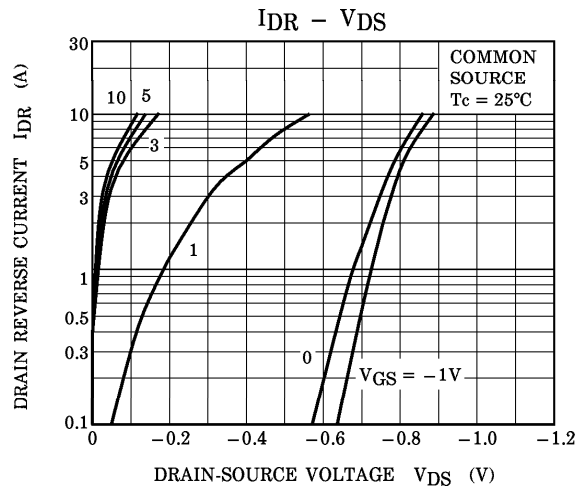
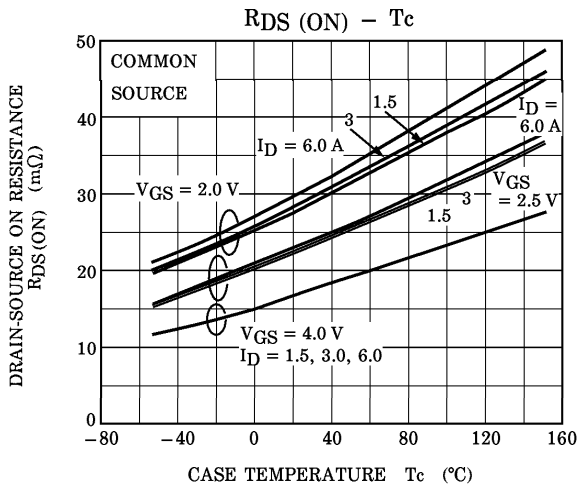
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

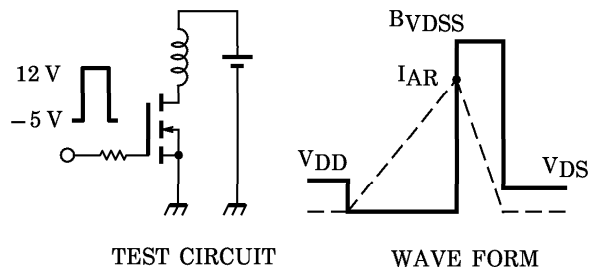
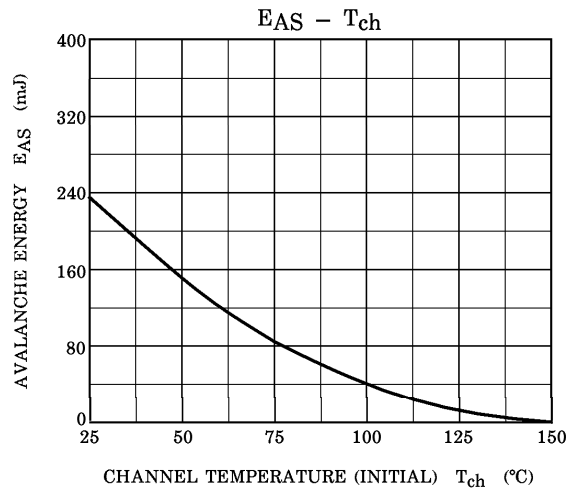
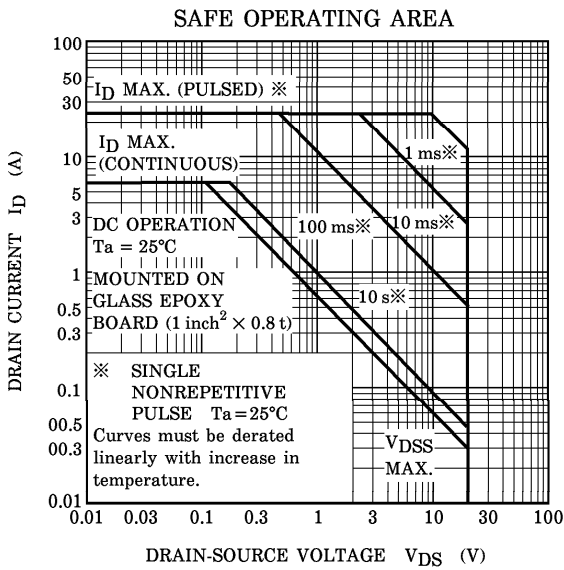
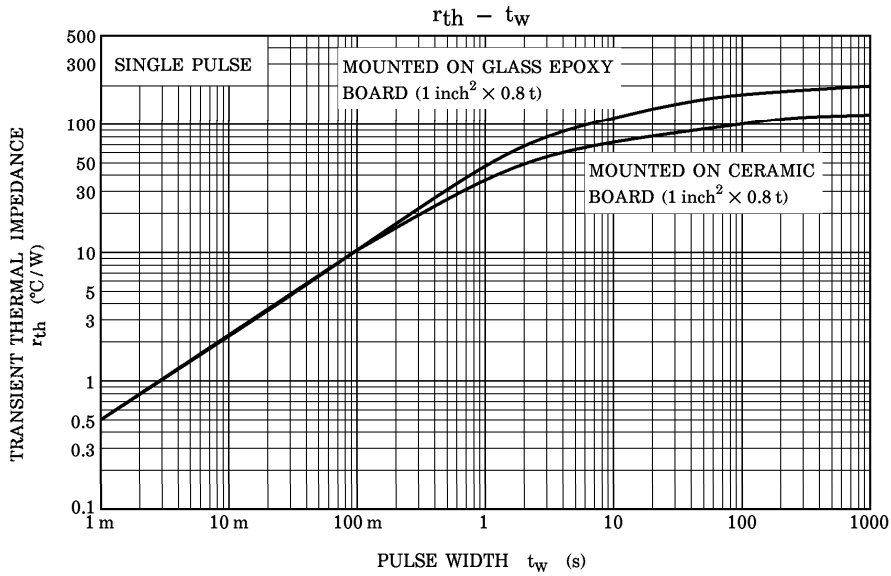
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	6	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	24	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 6\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.2	V

MARKING









Peak $I_{AR} = 6 \text{ A}$, $R_G = 25 \Omega$
 $V_{DD} = 16 \text{ V}$, $L = 5.0 \text{ mH}$

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