

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

TPCS8205

LITHIUM ION BATTERY
NOTE BOOK PC
PORTABLE MACHINES AND TOOLS

INDUSTRIAL APPLICATIONS
Unit in mm

- Low Drain-Source ON Resistance : $R_{DS(ON)} = 30\text{ m}\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 10\text{ S}$ (Typ.)
- Low Leakage Current : $I_{DSS} = 10\text{ }\mu\text{A}$ (Max) ($V_{DS} = 20\text{ V}$)
- Enhancement-Mode : $V_{th} = 0.5\sim 1.2\text{ V}$ ($V_{DS} = 10\text{ V}$, $I_D = 200\text{ }\mu\text{A}$)

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	5	A
	Pulse	I_{DP}	20	A
Drain Power Dissipation*** ($T_a = 25^\circ\text{C}$)		P_D	1.0	W
Single Pulse Avalanche Energy*		E_{AS}	32.5	mJ
Avalanche Current		I_{AR}	5	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	$^\circ\text{C/W}$

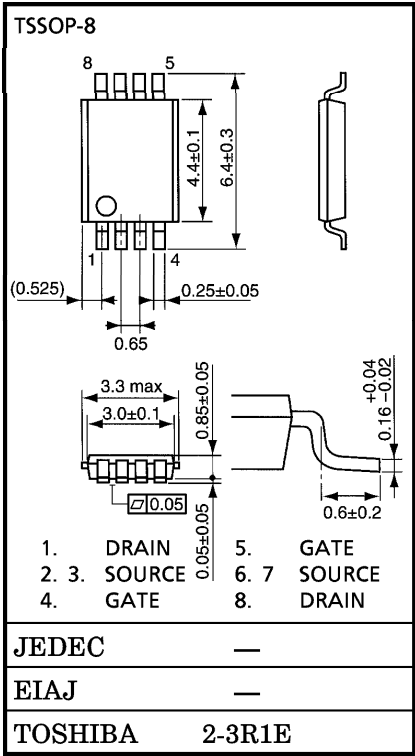
Note ;

* $V_{DD} = 16\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 1.0\text{ mH}$, $I_{AR} = 5\text{ A}$, $R_G = 25\text{ }\Omega$

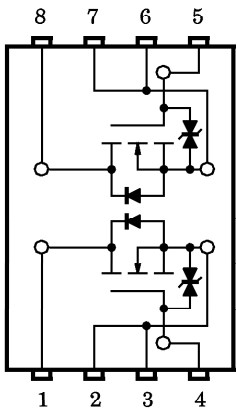
** Repetitive rating ; Pulse Width Limited by Max. junction temperature.

*** 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.



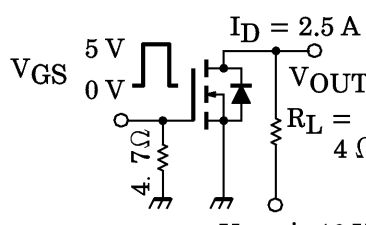
CIRCUIT CONFIGURATION



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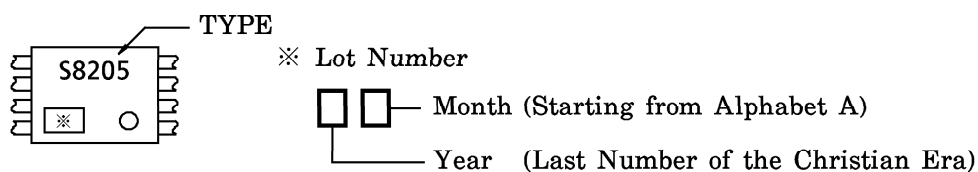
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

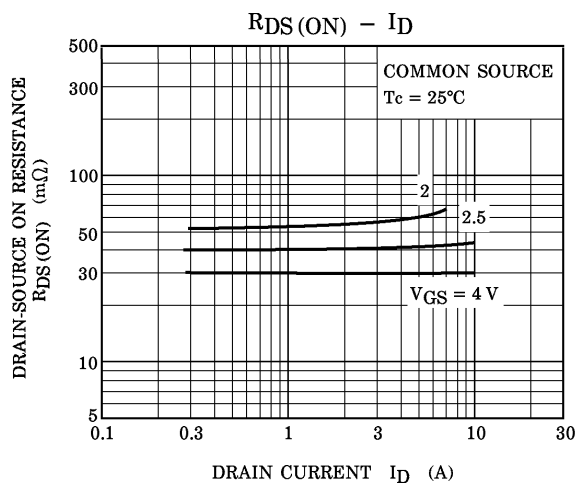
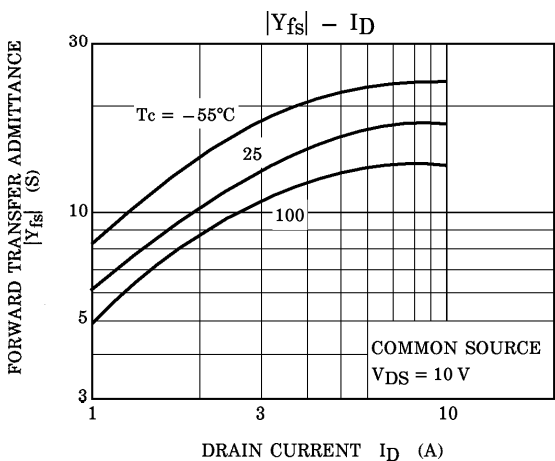
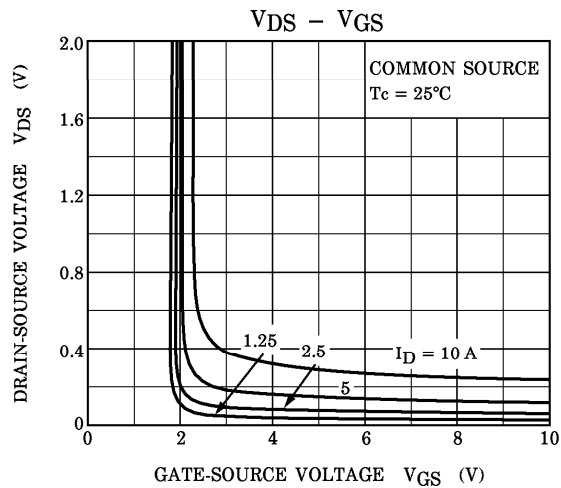
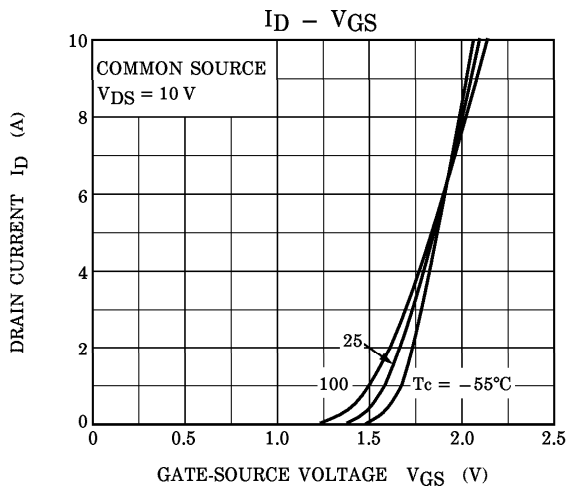
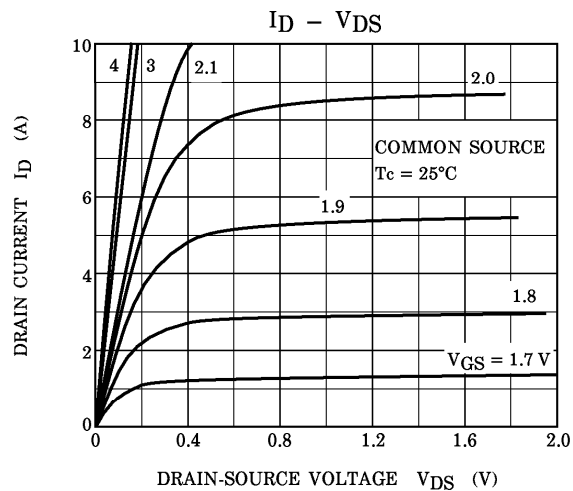
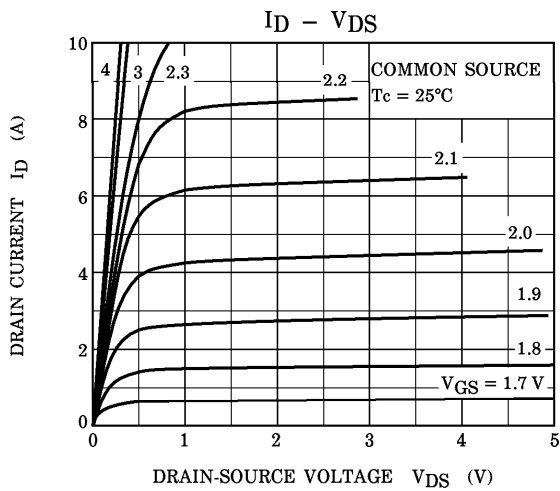
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I _{GSS}	V _{GS} = ±10 V, V _{DS} = 0 V	—	—	±10	μA
Drain Cut-Off Current		I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V	—	—	10	μA
Drain-Source Breakdown Voltage		V (BR) DSS	I _D = 10 mA, V _{GS} = 0 V	20	—	—	V
		V (BR) DSX	I _D = 10 mA, V _{GS} = −12 V	8	—	—	V
Gate Threshold Voltage		V _{th}	V _{DS} = 10 V, I _D = 200 μA	0.5	—	1.2	V
Drain-Source ON Resistance		R _{DS (ON)}	V _{GS} = 2.0 V, I _D = 3.5 A	—	60	90	mΩ
		R _{DS (ON)}	V _{GS} = 2.5 V, I _D = 3.5 A	—	40	60	mΩ
		R _{DS (ON)}	V _{GS} = 4 V, I _D = 4 A	—	30	45	mΩ
Forward Transfer Admittance		Y _{fs}	V _{DS} = 10 V, I _D = 2.5 A	5	10	—	S
Input Capacitance		C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	—	760	—	pF
Reverse Transfer Capacitance		C _{rss}		—	110	—	
Output Capacitance		C _{oss}		—	130	—	
Switching Time	Rise Time	t _r	 V_{GS} 5 V 0 V 4.7Ω ID = 2.5 A V_{OUT} RL = 4 Ω V_{DD} ≐ 10 V	—	7	—	ns
	Turn-On Time	t _{on}		—	13	—	
	Fall Time	t _f		—	13	—	
	Turn-Off Time	t _{off}		V _{IN} : t _r , t _f < 5 ns Duty ≤ 1%, t _w = 10 μs	—	49	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q _g	V _{DD} ≐ 16 V, V _{GS} = 5 V I _D = 5 A	—	11	—	nC
Gate-Source Charge		Q _{gs}		—	8	—	
Gate-Drain (“Miller”) Charge		Q _{gd}		—	3	—	

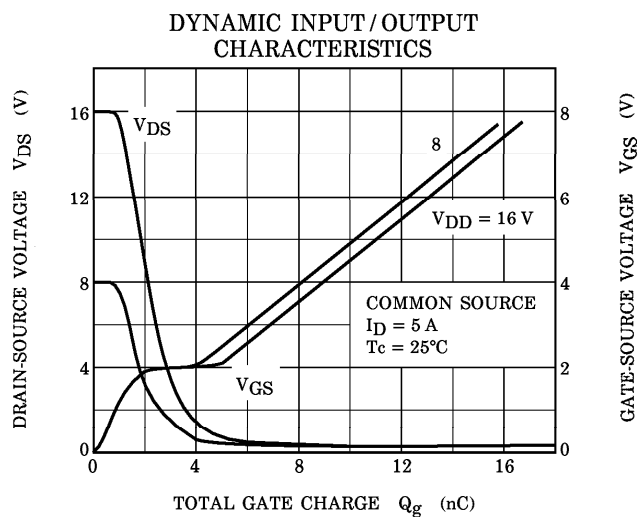
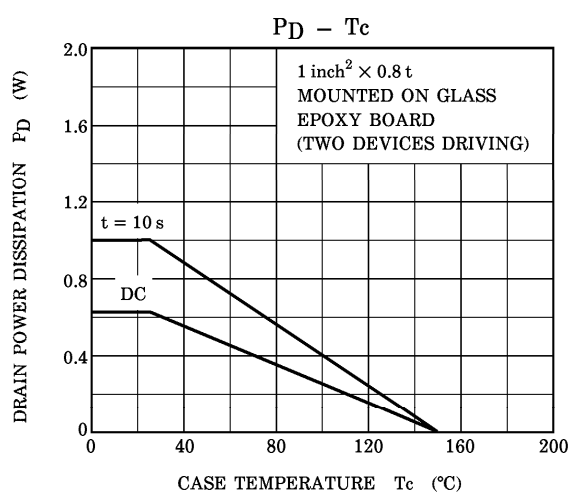
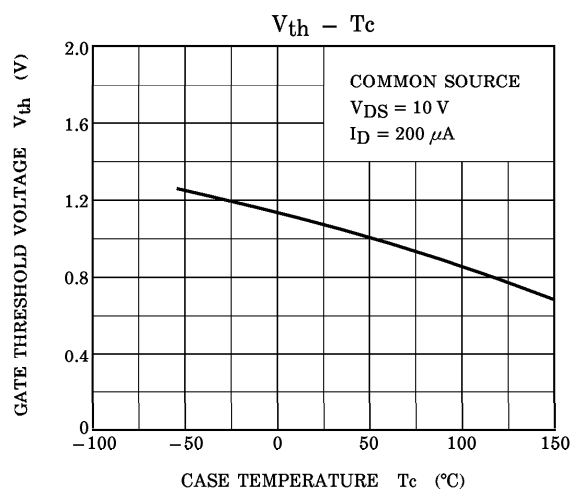
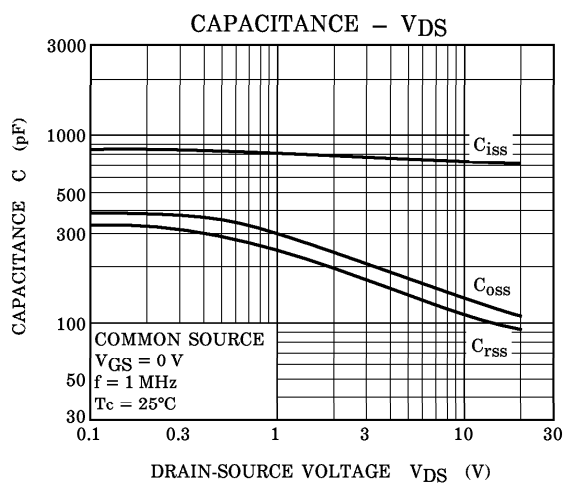
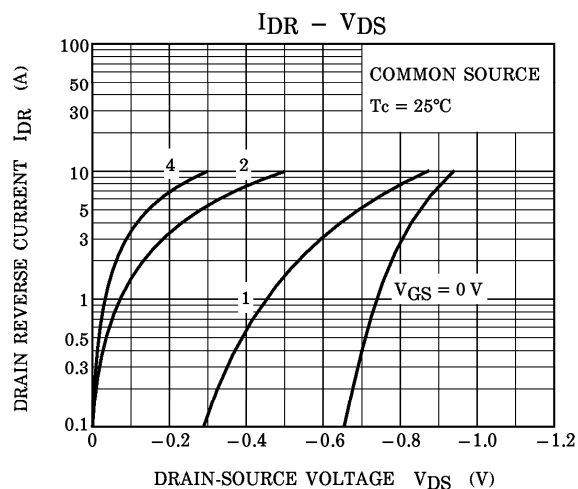
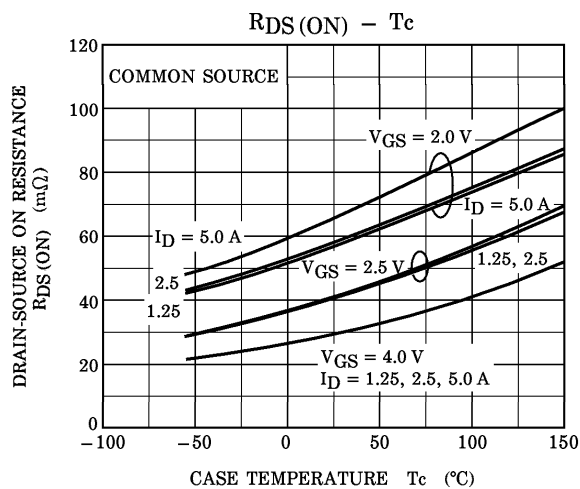
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

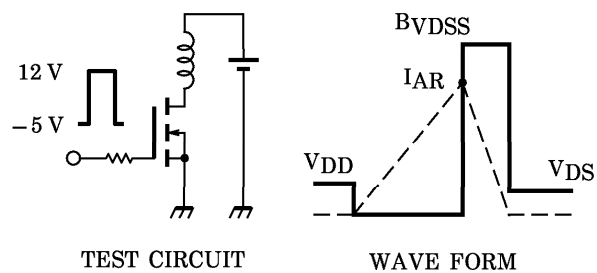
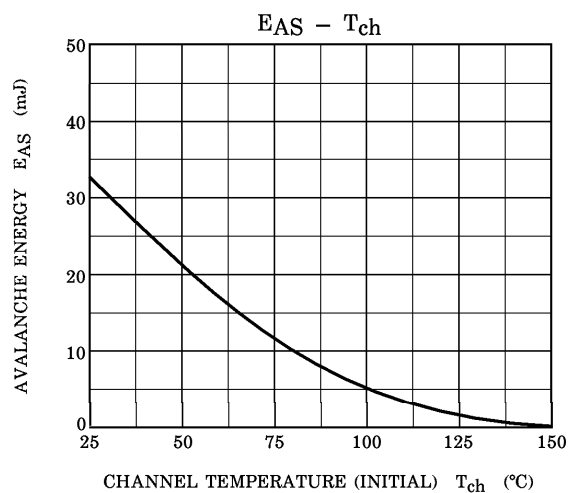
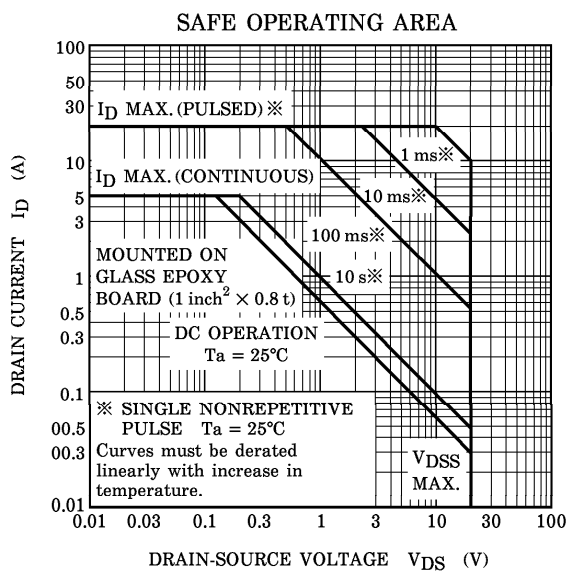
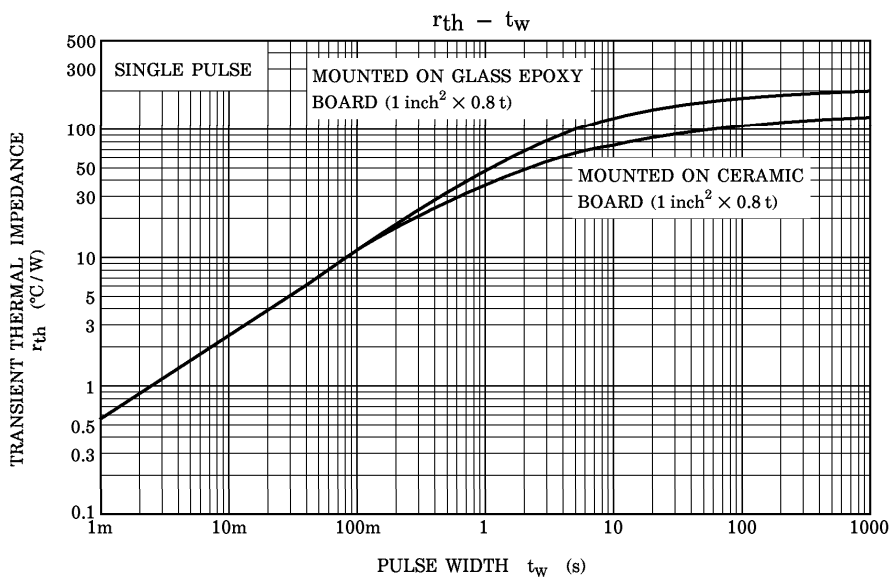
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	5	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	20	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.2	V

MARKING









Peak $I_{AR} = 5\text{ A}$, $R_G = 25\ \Omega$
 $V_{DD} = 16\text{ V}$, $L = 1.0\text{ mH}$

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