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

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 mΩ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}|$ = 10 S (Typ.)
- Low Leakage Current : I_{DSS} = 10 μA (Max) (V_{DS} = 20 V)
- Enhancement-Mode : V_{th} = 0.5~1.2 V (V_{DS} = 10 V, I_D = 200 μA)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	20	V
Drain-Gate Voltage (R_{GS} = 20 kΩ)		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*** (Ta = 25°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	°C
Storage Temperature Range		T_{stg}	−55~150	°C

THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Ambient***	$R_{th\,(ch\text{-}a)}$	125	°C / W

Note ;

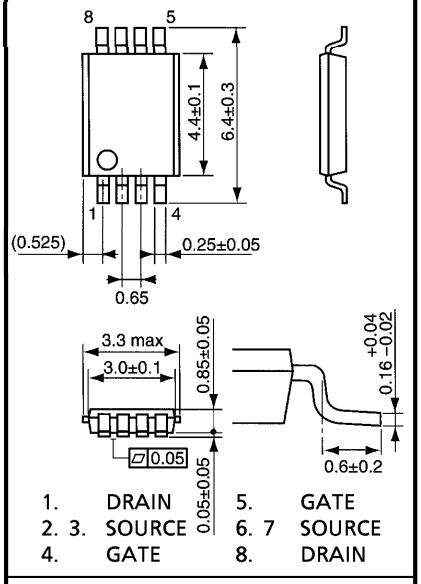
* V_{DD} = 16 V, T_{ch} = 25°C (initial), L = 1.0 mH, I_{AR} = 5 A, R_G = 25 Ω

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

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

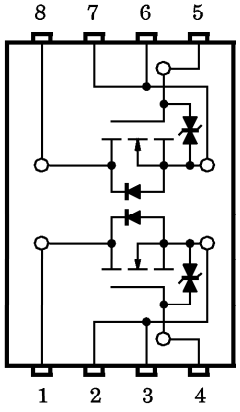
This transistor is an electrostatic sensitive device. Please handle with caution.

TSSOP-8



JEDEC	—
EIAJ	—
TOSHIBA	2-3R1E

CIRCUIT CONFIGURATION



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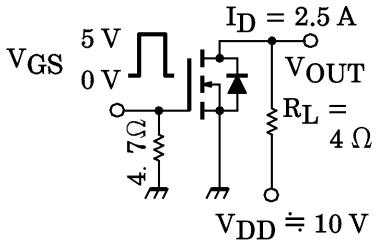
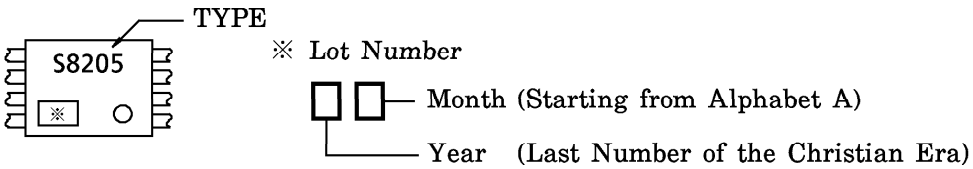
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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_{IN} : t_r, t_f < 5 ns Duty ≦ 1%, t_w = 10 μs	—	7	—	ns
	Turn-On Time	t_{on}		—	13	—	
	Fall Time	t_f		—	13	—	
	Turn-Off Time	t_{off}		—	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	—	

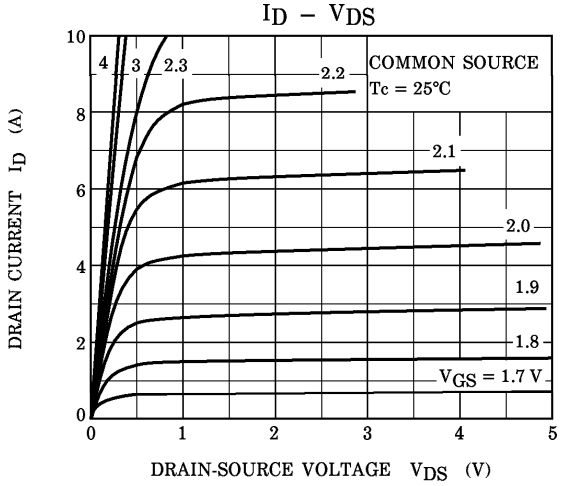
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

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 A, V_{GS} = 0 V	—	—	−1.2	V

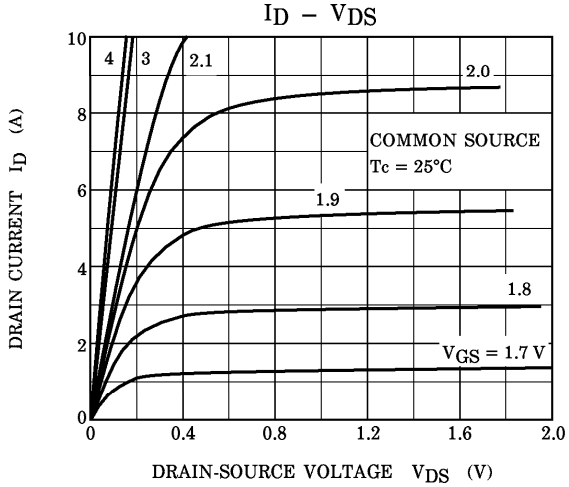
MARKING



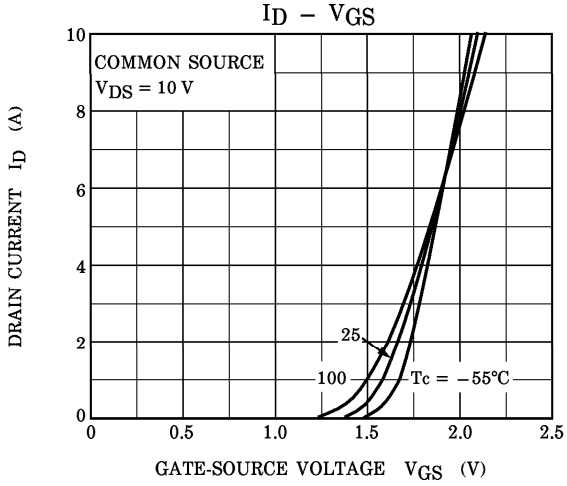
$I_D - V_{DS}$



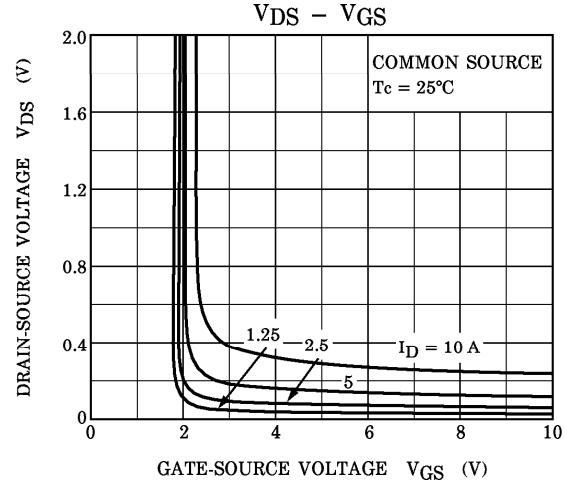
$I_D - V_{DS}$



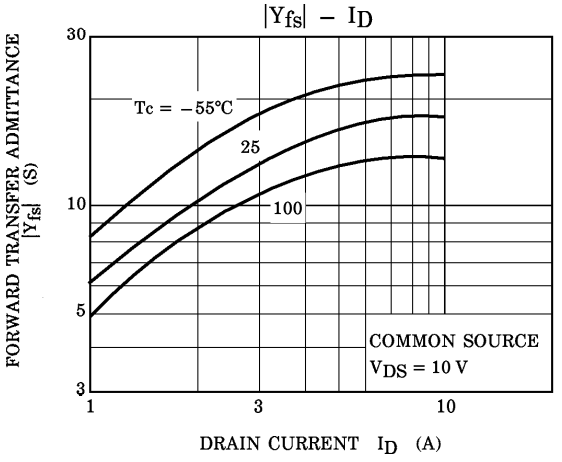
$I_D - V_{GS}$



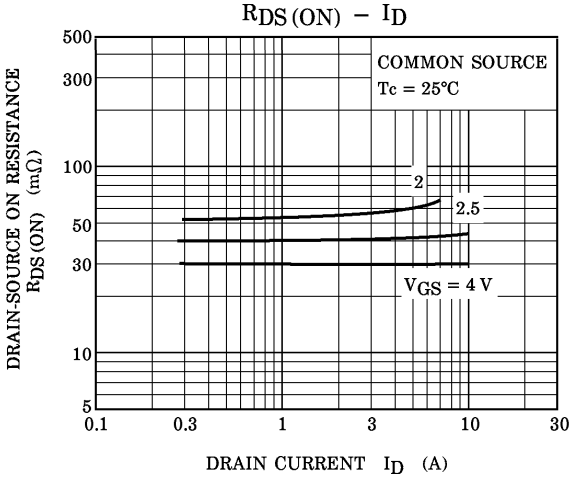
$V_{DS} - V_{GS}$



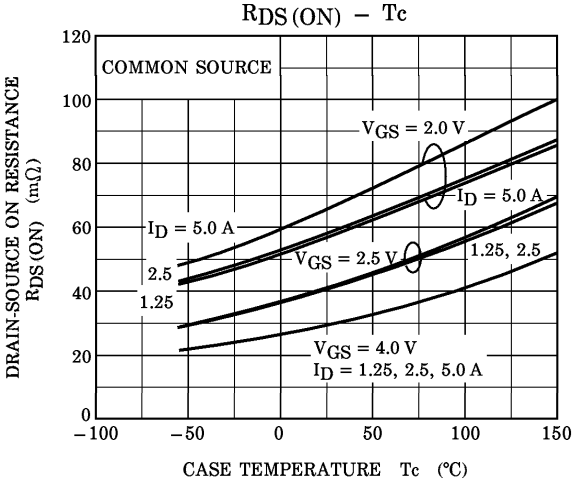
$|Y_{fs}| - I_D$



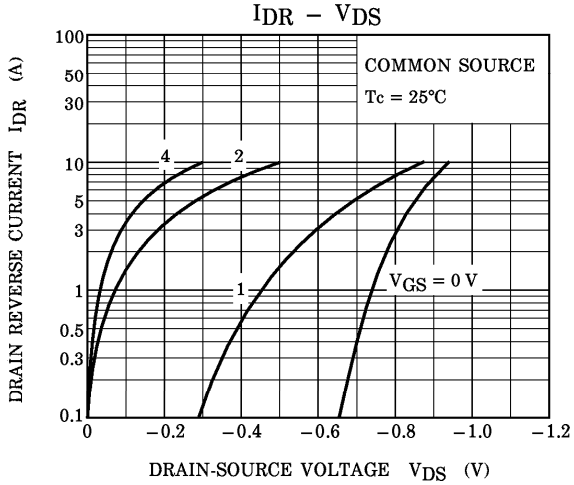
$R_{DS\,(ON)} - I_D$



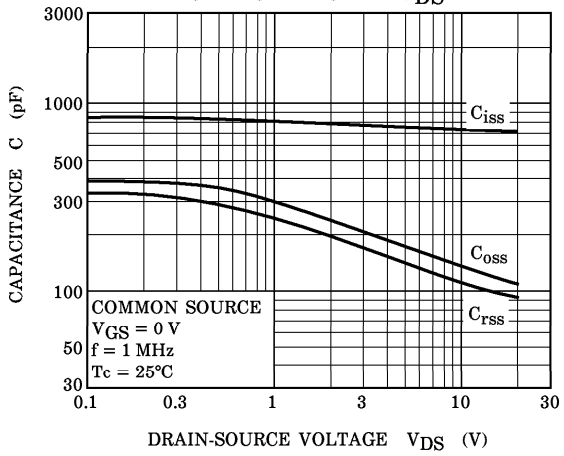
$R_{DS\,(ON)}$ – Tc



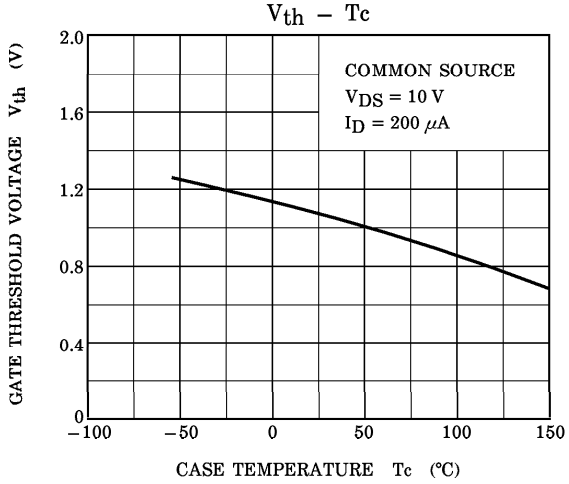
I_{DR} – V_{DS}



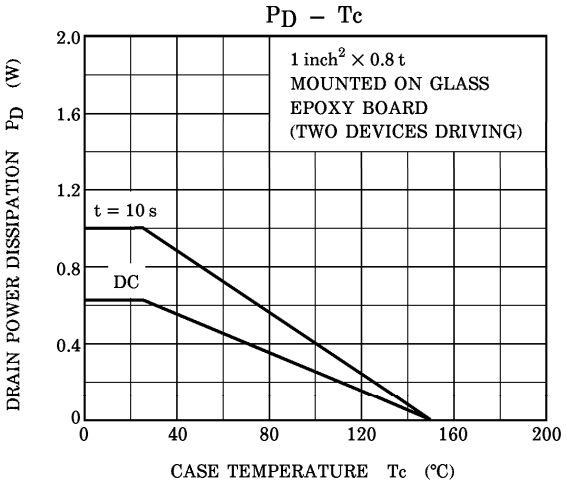
CAPACITANCE – V_{DS}



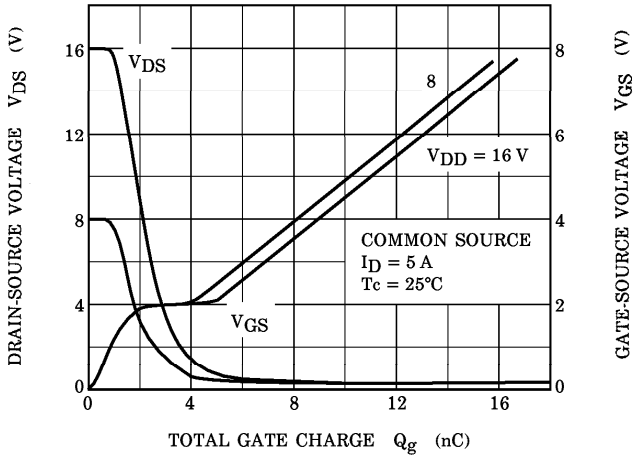
V_{th} – Tc



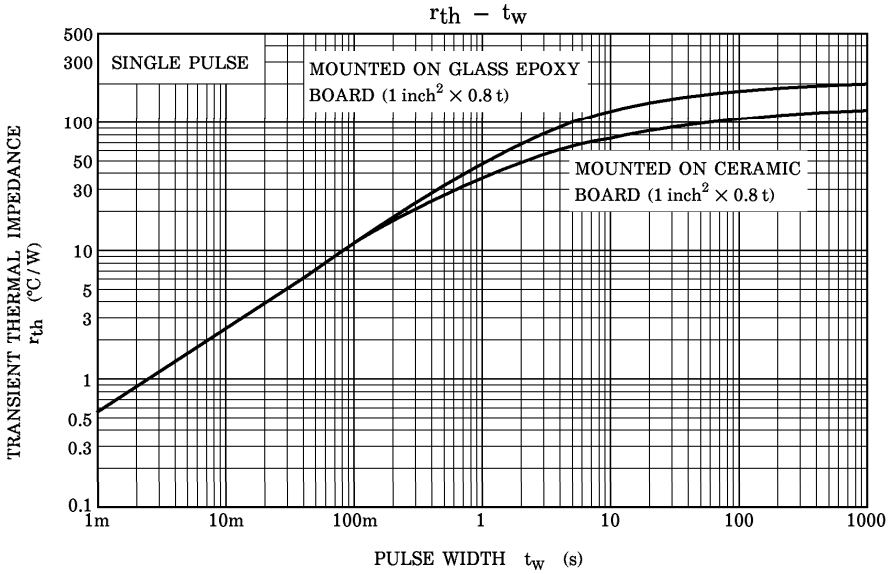
P_D – Tc



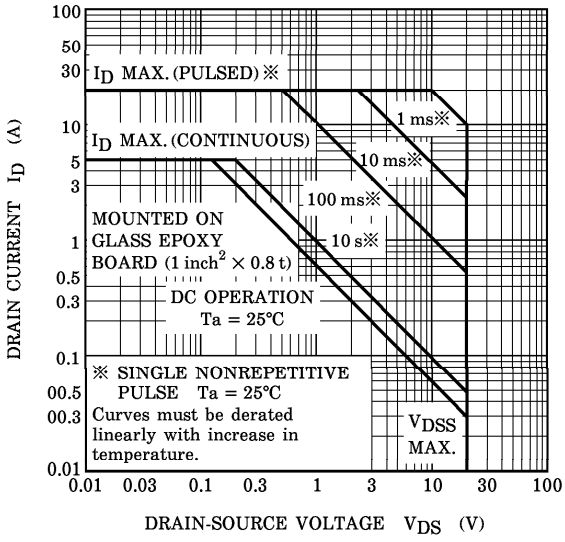
DYNAMIC INPUT / OUTPUT CHARACTERISTICS



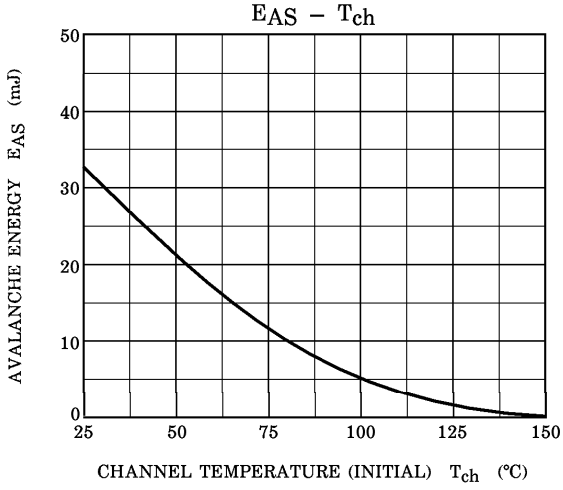
r_{th} – t_w

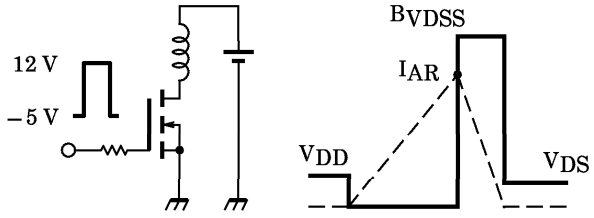


SAFE OPERATING AREA



E_{AS} – T_{ch}





TEST CIRCUIT WAVE FORM

Peak I_{AR} = 5 A, R_G = 25 Ω
V_{DD} = 16 V, L = 1.0 mH

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