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

TPC8006-H

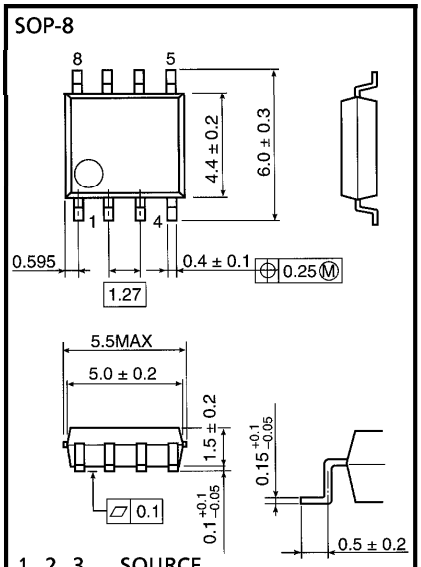
LITHIUM ION BATTERY APPLICATIONS

NOTE BOOK PC, PORTABLE EQUIPMENTS APPLICATIONS

HIGH SPEED AND HIGH EFFICIENCY DC-DC CONVERTERS

INDUSTRIAL APPLICATIONS

Unit in mm



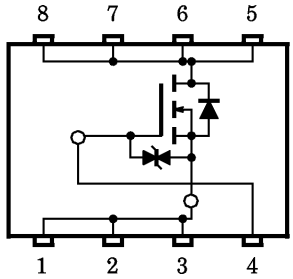
JEDEC	—
EIAJ	—
TOSHIBA	2-6J1A

- High Speed Switching : 60% speed up (compare with current type)
- Small Gate Charge : Q_g = 16 nC (Typ.)
- Low Drain-Source ON Resistance : $R_{DS\,(ON)}$ = 19 mΩ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}|$ = 8.8 S (Typ.)
- Low Leakage Current : I_{DSS} = 10 μA (Max.) (V_{DS} = 30 V)
- Enhancement-Mode : V_{th} = 1.3~2.5 V (V_{DS} = 10 V, I_D = 1 mA)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	30	V
Drain-Gate Voltage (R_{GS} = 20kΩ)		V_{DGR}	30	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	DC	I_D	7	A
	Pulse	I_{DP}	28	A
Drain Power Dissipation*** (Ta = 25°C)		P_D	2.4	W
Single Pulse Avalanche Energy**		E_{AS}	63.7	mJ
Avalanche Current		I_{AR}	7	A
Repetitive Avalanche Energy*		E_{AR}	0.24	mJ
Channel Temperature		T_{ch}	150	°C
Storage Temperature Range		T_{stg}	−55~150	°C

CIRCUIT CONFIGURATION



THERMAL CHARACTERISTICS

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

Note ;

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

** V_{DD} = 24 V, T_{ch} = 25°C (initial), L = 1.0 mH, R_G = 25 Ω, I_{AR} = 7 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.

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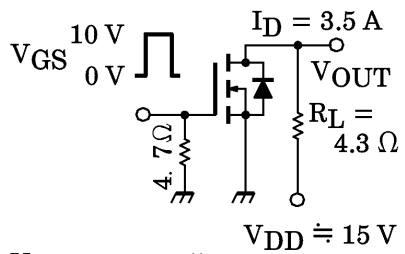
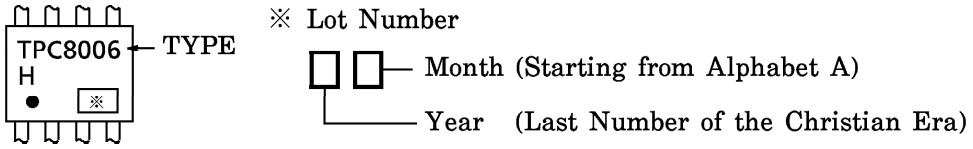
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	V_{GS} = ±16 V, V_{DS} = 0 V	—	—	±10	μA
Drain Cut-Off Current		I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V	—	—	10	μA
Drain-Source Breakdown Voltage		$V_{(BR)\ DSS}$	I_D = 10 mA, V_{GS} = 0 V	30	—	—	V
		$V_{(BR)\ DSX}$	I_D = 10 mA, V_{GS} = −20 V	15	—	—	
Gate Threshold Voltage		V_{th}	V_{DS} = 10 V, I_D = 1 mA	1.3	—	2.5	V
Drain-Source ON Resistance		$R_{DS\ (ON)}$	V_{GS} = 4.5 V, I_D = 3.5 A	—	29	40	mΩ
			V_{GS} = 10 V, I_D = 3.5 A	—	19	27	
Forward Transfer Admittance		$\|Y_{fs}\|$	V_{DS} = 10 V, I_D = 3.5 A	4.4	8.8	—	S
Input Capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	—	790	—	pF
Reverse Transfer Capacitance		C_{rss}		—	110	—	
Output Capacitance		C_{oss}		—	290	—	
Switching Time	Rise Time	t_r	 V_{IN} : t_r, t_f < 5 ns Duty ≦ 1%, t_w = 10 μs	—	5	—	ns
	Turn-On Time	t_{on}		—	13	—	
	Fall Time	t_f		—	8	—	
	Turn-Off Time	t_{off}		—	36	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	V_{DD} ≒ 24 V, V_{GS} = 10 V, I_D = 7 A	—	16	—	nC
Gate-Source Charge		Q_{gs}		—	12	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	4	—	

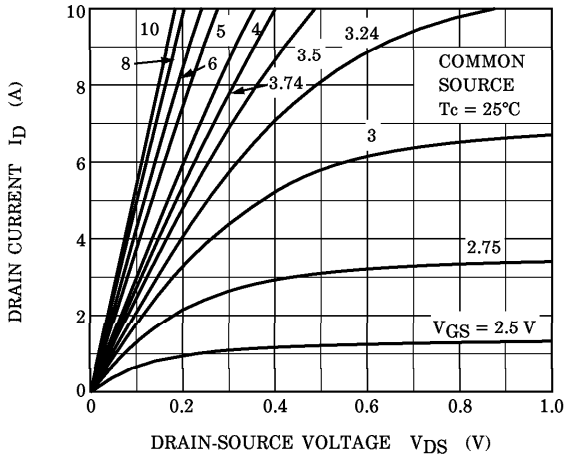
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	7	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	28	A
Diode Forward Voltage	V_{DSF}	I_{DR} = 7 A, V_{GS} = 0 V	—	—	−1.2	V

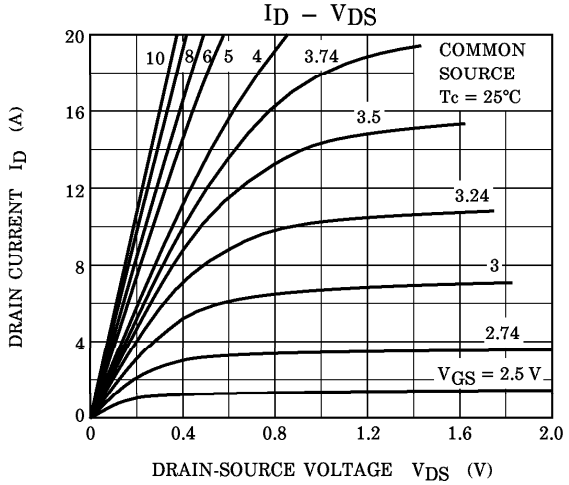
MARKING



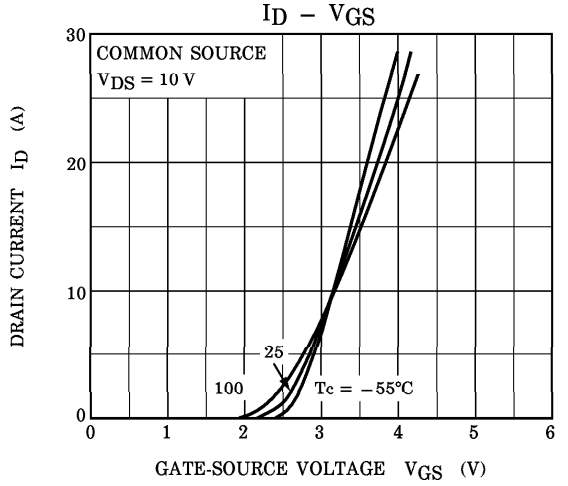
$I_D - V_{DS}$



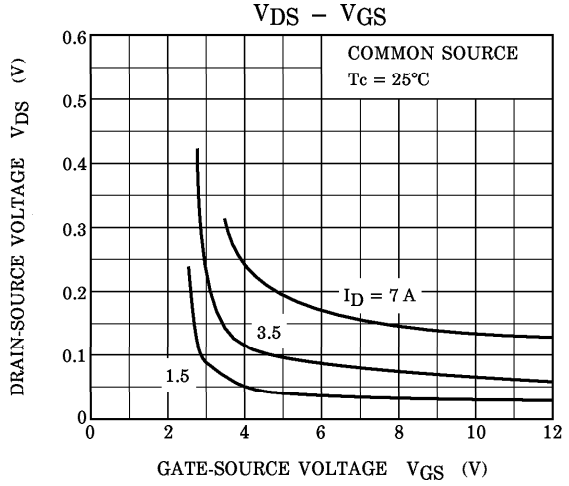
$I_D - V_{DS}$



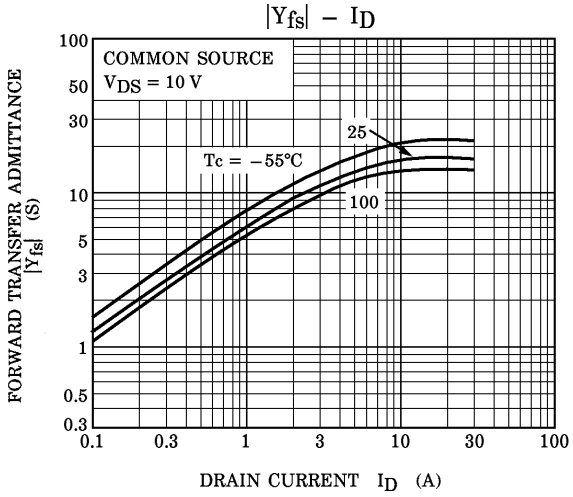
$I_D - V_{GS}$



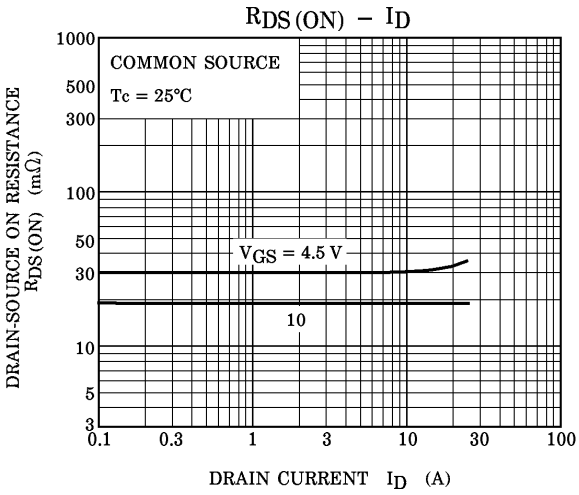
$V_{DS} - V_{GS}$



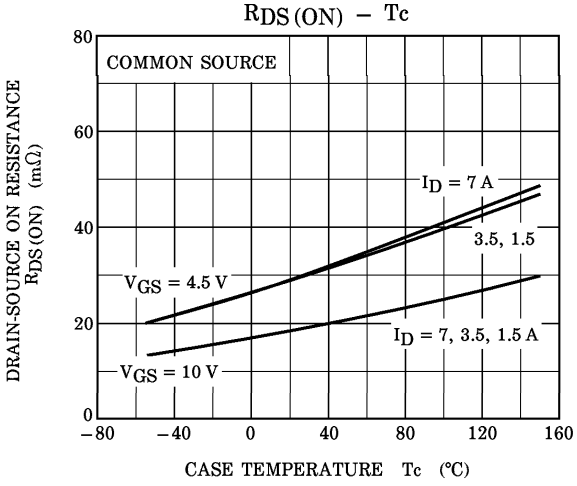
$|Y_{fs}| - I_D$



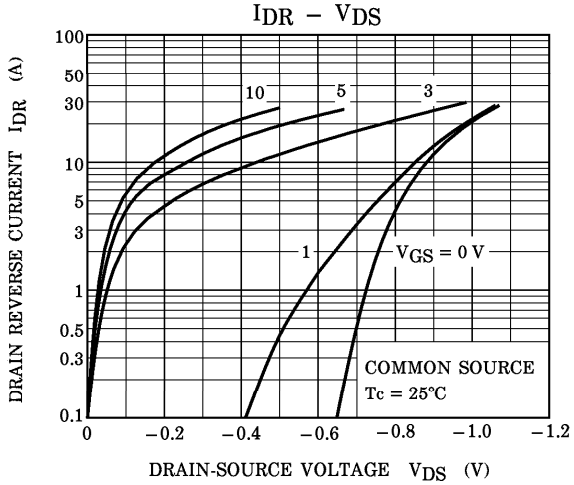
$R_{DS(ON)} - I_D$



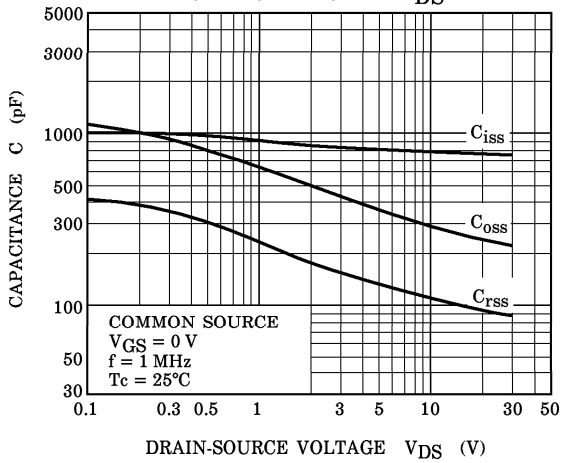
$R_{DS(ON)}$ – Tc



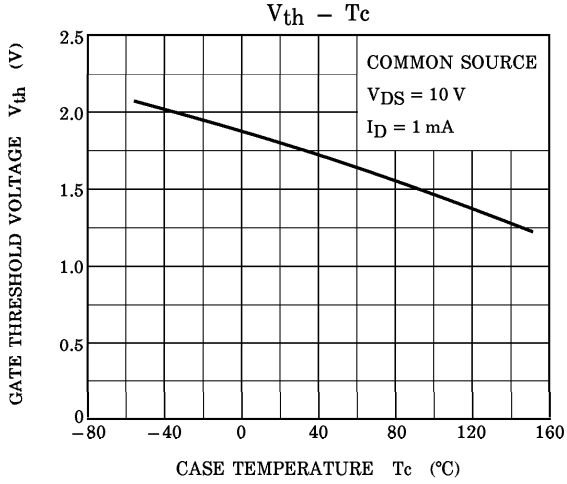
I_{DR} – V_{DS}



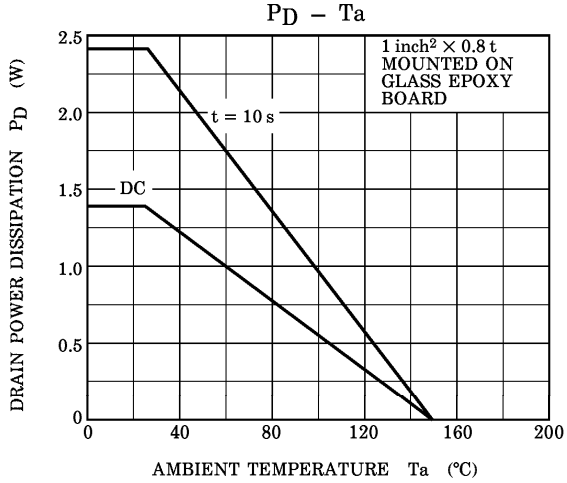
CAPACITANCE – V_{DS}



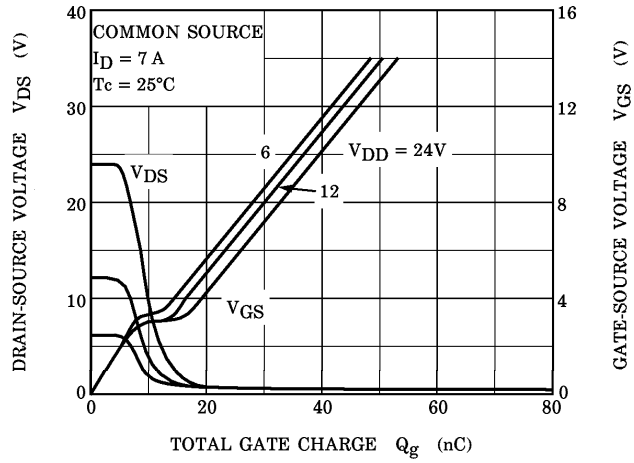
V_{th} – Tc



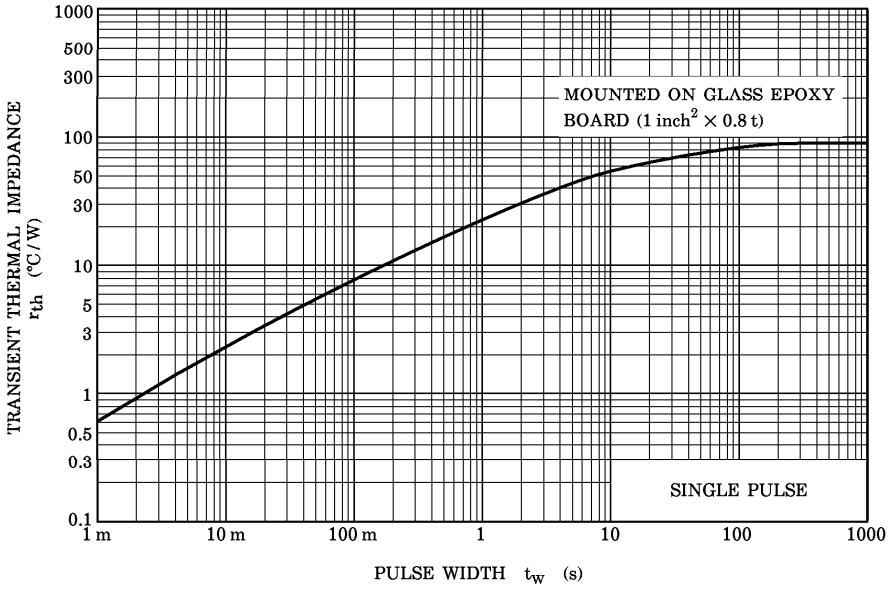
P_D – Ta



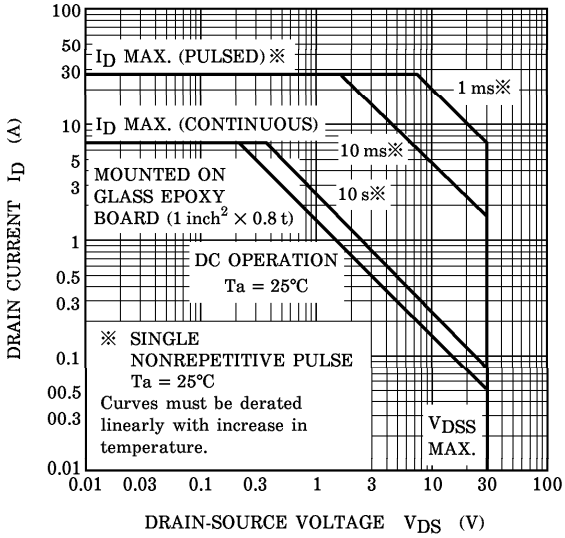
DYNAMIC INPUT / OUTPUT CHARACTERISTICS



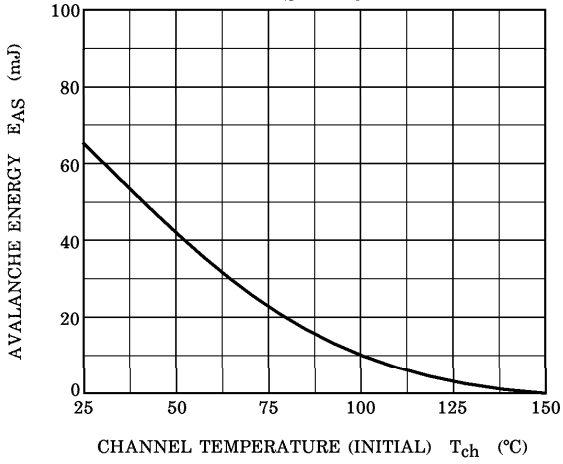
r_{th} – t_w

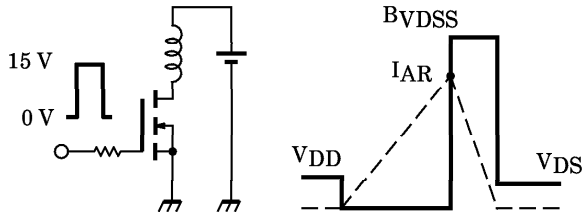


SAFE OPERATING AREA



E_{AS} – T_{ch}





TEST CIRCUIT WAVE FORM

Peak I_{AR} = 7 A, R_G = 25 Ω
V_{DD} = 24 V, L = 1.0 mH

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