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

TPC8005-H

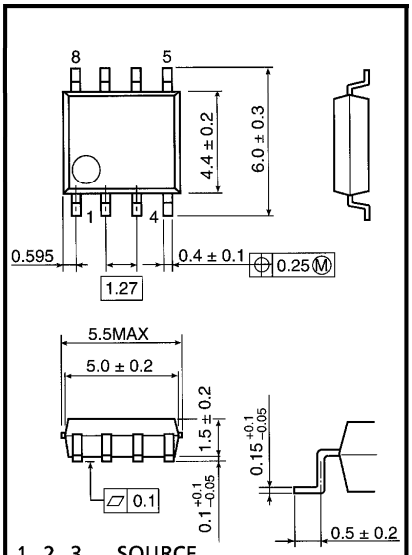
HIGH SPEED AND HIGH EFFICIENCY DC-DC CONVERTERS

LITHIUM ION BATTERY APPLICATIONS

NOTE BOOK PC, PORTABLE EQUIPMENTS APPLICATIONS

INDUSTRIAL APPLICATIONS

Unit in mm



1, 2, 3 SOURCE
4 GATE
5, 6, 7, 8 DRAIN

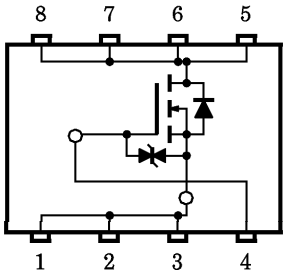
JEDEC	—
EIAJ	—
TOSHIBA	2-6J1A

- High Speed Switching : 60% speed up (compare with current type)
- Small Gate Charge : Q_g = 20nC (Typ.)
- Low Drain-Source ON Resistance : $R_{DS\,(ON)}$ = 13mΩ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}|$ = 16S (Typ.)
- Low Leakage Current : I_{DSS} = 10μA (Max.) (V_{DS} = 30V)
- Enhancement-Mode : V_{th} = 1.3~2.5V (V_{DS} = 10V, I_D = 1mA)

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	11	A
	Pulse	I_{DP}	44	A
Drain Power Dissipation (t = 10s)		P_D***	2.4	W
Single Pulse Avalanche Energy**		E_{AS}	157	mJ
Avalanche Current		I_{AR}	11	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.

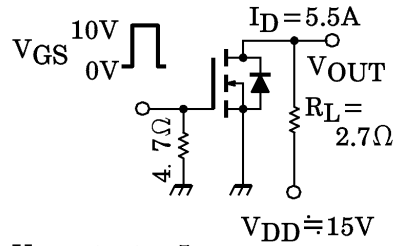
** V_{DD} = 24V, Starting T_{ch} = 25°C, L = 1.0mH, R_G = 25Ω, I_{AR} = 11A

*** Drive operation : Mount on glass epoxy board [1inch² × 0.8t]

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

961001EAA1

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

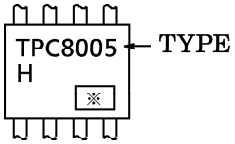
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS}=\pm16V$, $V_{DS}=0V$	—	—	±10	μA
Drain Cut-Off Current		I_{DSS}	$V_{DS}=30V$, $V_{GS}=0V$	—	—	10	μA
Drain-Source Breakdown Voltage		$V_{(BR)\ DSS}$	$I_D=10mA$, $V_{GS}=0V$	30	—	—	V
		$V_{(BR)\ DSX}$	$I_D=10mA$, $V_{GS}=-20V$	15	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS}=10V$, $I_D=1mA$	1.3	—	2.5	V
Drain-Source ON Resistance		$R_{DS\ (ON)}$	$V_{GS}=4.5V$, $I_D=5.5A$	—	23	27	mΩ
		$R_{DS\ (ON)}$	$V_{GS}=10V$, $I_D=5.5A$	—	13	16	mΩ
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS}=10V$, $I_D=5.5A$	8	16	—	S
Input Capacitance		C_{iss}	$V_{DS}=10V$, $V_{GS}=0V$, f=1MHz	—	1150	—	pF
Reverse Transfer Capacitance		C_{rss}		—	140	—	
Output Capacitance		C_{oss}		—	400	—	
Switching Time	Rise Time	t_r		—	4	—	ns
	Turn-On Time	t_{on}		—	12	—	
	Fall Time	t_f		—	8	—	
	Turn-Off Time	t_{off}		—	40	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD}\fallingdotseq24V$, $V_{GS}=10V$, $I_D=11A$	—	20	—	nC
Gate-Source Charge		Q_{gs}		—	15	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	5	—	

V_{IN} : t_r, $t_f<5ns$
Duty ≦ 1%, $t_w=10\mu s$

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	11	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	44	A
Diode Forward Voltage	V_{DSF}	$I_{DR}=11A$, $V_{GS}=0V$	—	—	−1.2	V

MARKING

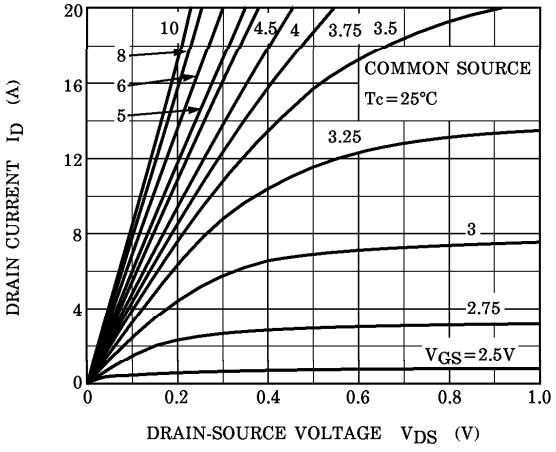


※ Lot Number

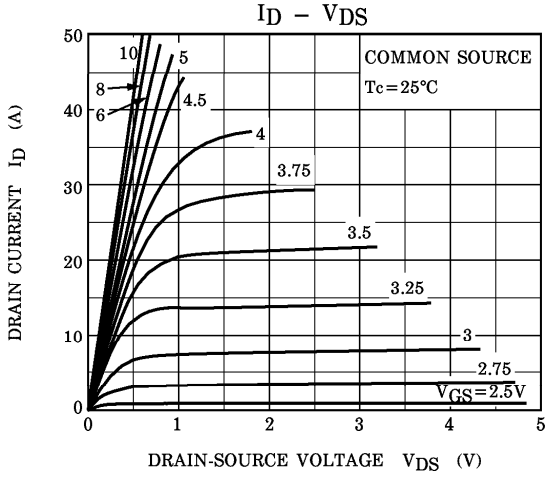
□□ — Month (Starting from Alphabet A)

Year (Last Number of the Christian Era)

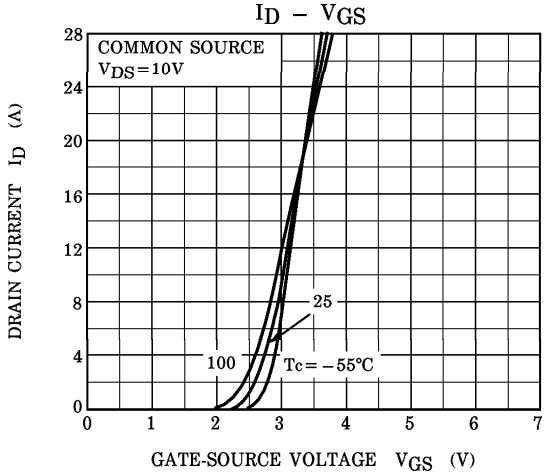
$I_D - V_{DS}$



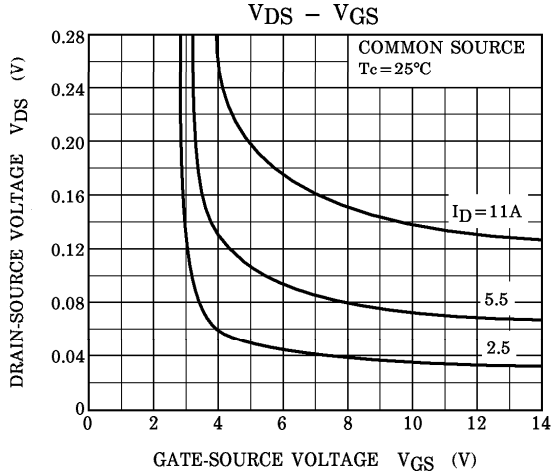
$I_D - V_{DS}$



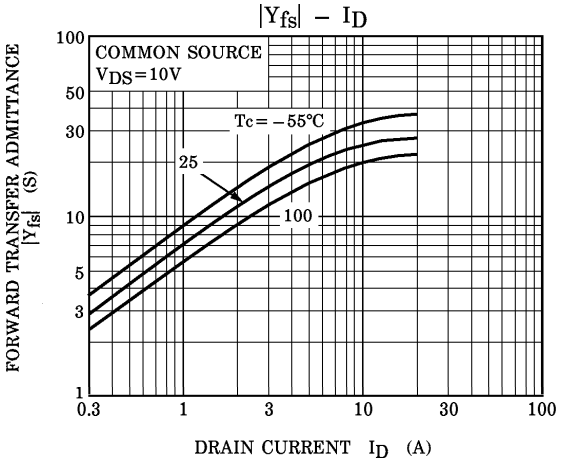
$I_D - V_{GS}$



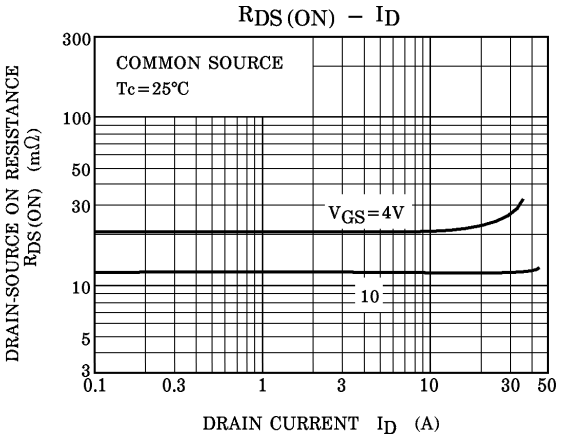
$V_{DS} - V_{GS}$



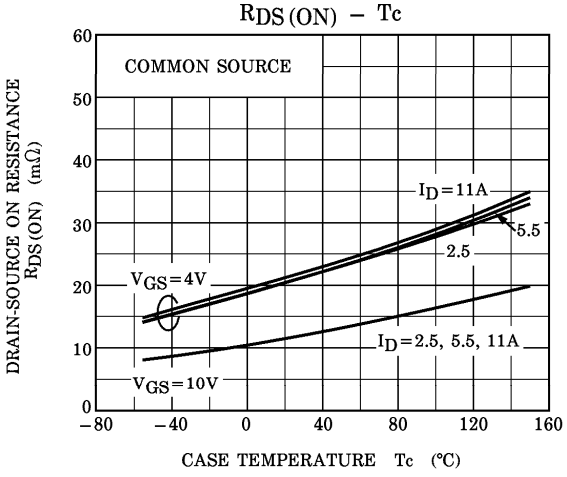
$|Y_{fs}| - I_D$



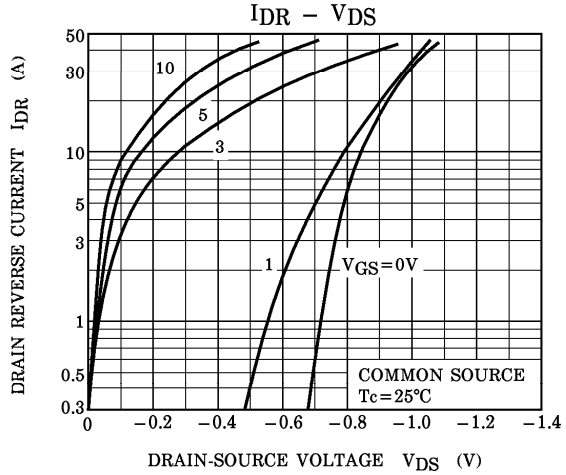
$R_{DS\,(ON)} - I_D$



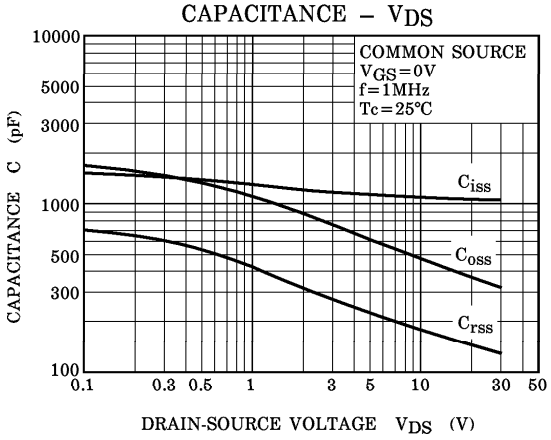
$R_{DS\,(ON)}$ – Tc



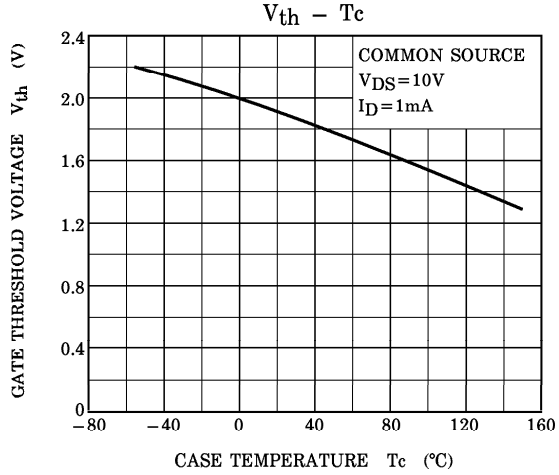
I_{DR} – V_{DS}



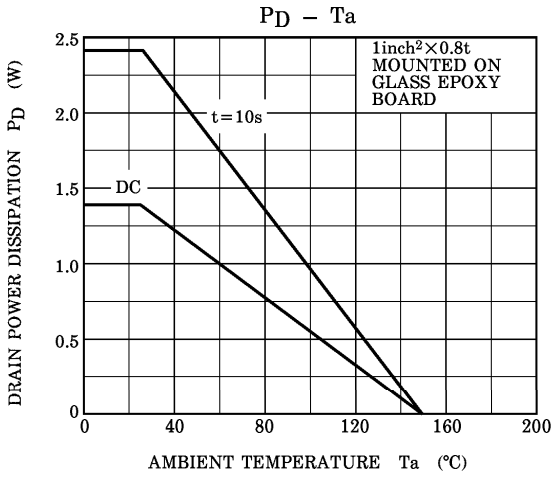
CAPACITANCE – V_{DS}



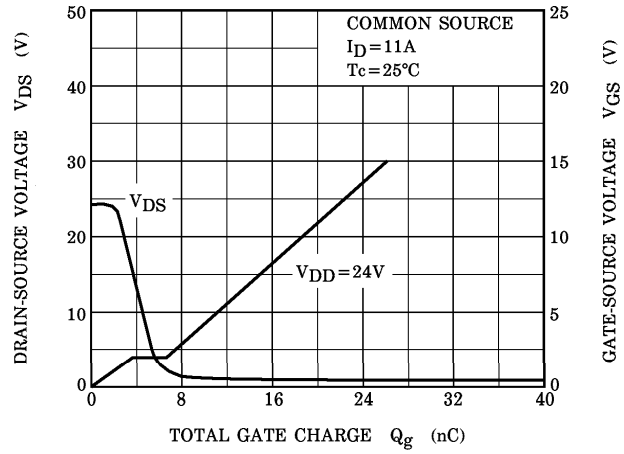
V_{th} – Tc



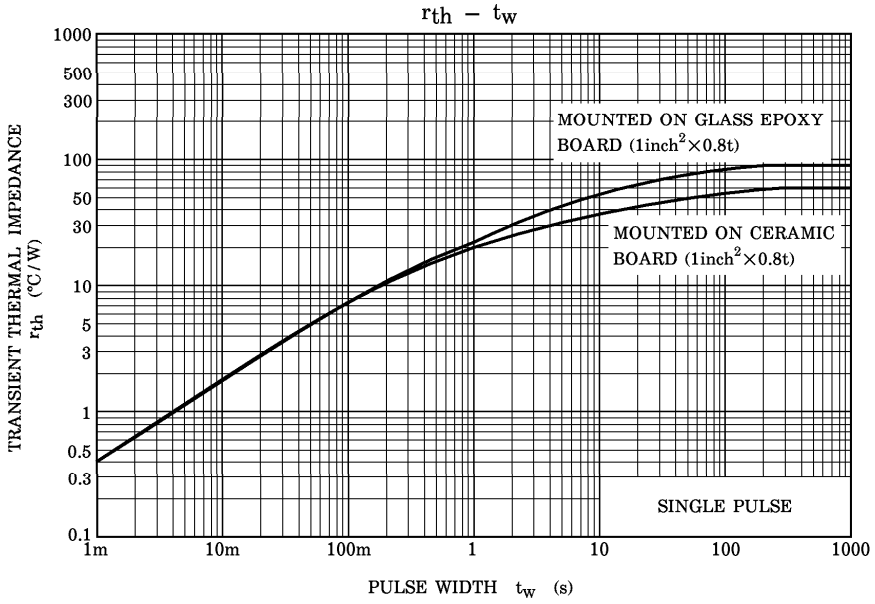
P_D – Ta



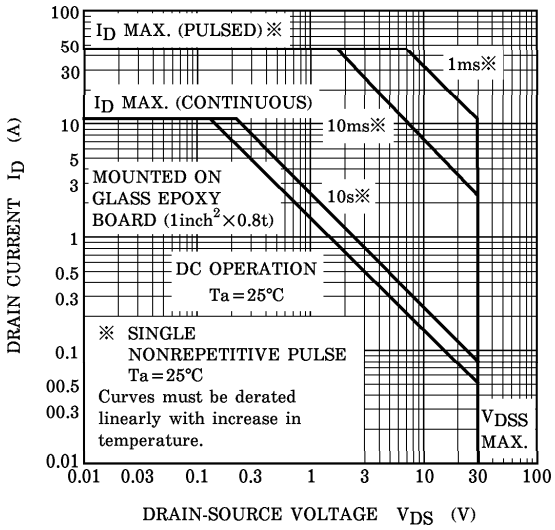
DYNAMIC INPUT / OUTPUT CHARACTERISTICS



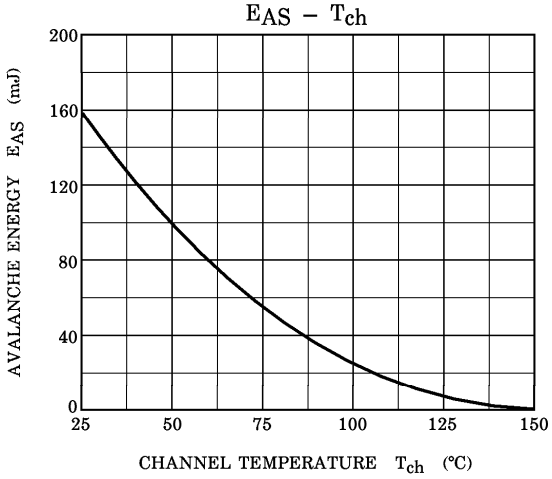
r_{th} – t_w

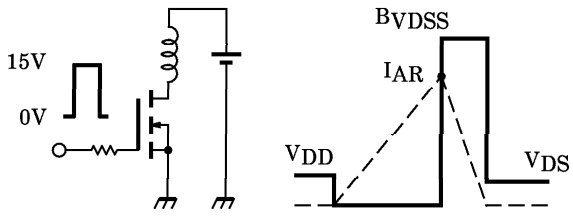


SAFE OPERATING AREA



E_{AS} – T_{ch}





TEST CIRCUIT WAVE FORM

Peak I_{AR}=11A, R_G=25Ω
V_{DD}=24V, L=1.0mH

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