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

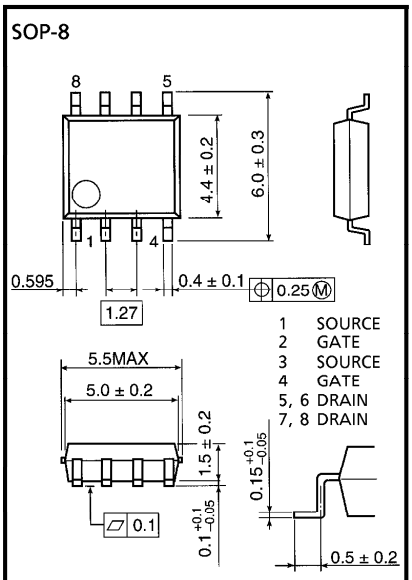
TPC8403

MOTOR DRIVE
NOTE BOOK PC
PORTABLE DEVICES

INDUSTRIAL APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance
  : P CHANNEL $R_{DS\,(ON)}$ = 45 mΩ (Typ.)
  N CHANNEL $R_{DS\,(ON)}$ = 25 mΩ (Typ.)
- High Forward Transfer Admittance
  : P CHANNEL $|Y_{fs}|$ = 6.2 S (Typ.)
  N CHANNEL $|Y_{fs}|$ = 7.8 S (Typ.)
- Low Leakage Current
  : P CHANNEL I_{DSS} = −10 μA (V_{DS} = −30 V)
  N CHANNEL I_{DSS} = 10 μA (V_{DS} = 30 V)
- Enhancement-Mode
  : P CHANNEL V_{th} = −1.0~−2.2 V (V_{DS} = −10 V, I_D = −1 mA)
  N CHANNEL V_{th} = 1.3~2.5 V (V_{DS} = 10 V, I_D = 1 mA)



JEDEC	—
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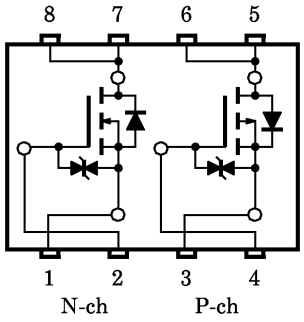
TOSHIBA	2-6J1A

CIRCUIT CONFIGURATION



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING		UNIT
			P CHANNEL	N CHANNEL	
Drain-Source Voltage		V_{DSS}	−30	30	V
Drain-Gate Voltage (R_{GS} = 20 kΩ)		V_{DGR}	−30	30	V
Gate-Source Voltage		V_{GSS}	±20	±20	V
Drain Current	DC	I_D	−4.5	6	A
	Pulse	I_{DP}	−18	24	A
Drain Power Dissipation (Ta = 25°C)		P_D 1)	2.0		W
Single Pulse Avalanche Energy		E_{AS}	26.3**	46.8***	mJ
Avalanche Current		I_{AR}	−4.5	6	A
Repetitive Avalanche Energy*		E_{AR}	0.2		mJ
Channel Temperature		T_{ch}	150		°C
Storage Temperature Range		T_{stg}	−55~150		°C

1) Mount on glass epoxy board [1 inch² × 0.8 t]

Note ;
* Repetitive rating ; Pulse Width Limited by Max. Junction temperature.
** V_{DD} = −24 V, Starting T_{ch} = 25°C, L = 1.0 mH, R_G = 25 Ω, I_{AR} = −4.5 A
*** V_{DD} = 24 V, Starting T_{ch} = 25°C, L = 1.0 mH, R_G = 25 Ω, I_{AR} = 6.0 A

THERMAL CHARACTERISTICS

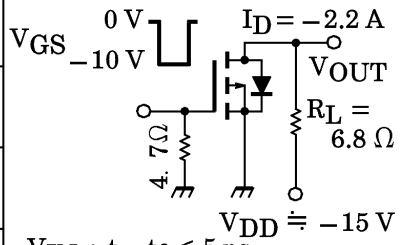
CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Ambient	$R_{th\,(ch\text{-}a)}$ 1)	62.5	°C / W

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

961001EAA2

P-ch

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

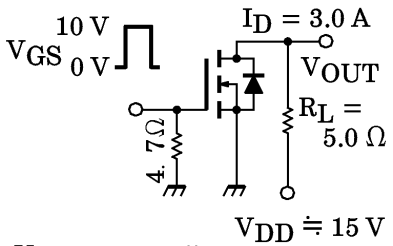
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 16$ V, $V_{DS} = 0$ V	—	—	±10	μA
Drain Cut-Off Current		I_{DSS}	$V_{DS} = -30$ V, $V_{GS} = 0$ V	—	—	−10	μA
Drain-Source Breakdown Voltage		$V_{(BR)\ DSS}$	$I_D = -10$ mA, $V_{GS} = 0$ V	−30	—	—	V
		$V_{(BR)\ DSX}$	$I_D = -10$ mA, $V_{GS} = 20$ V	−15	—	—	
Gate Threshold Voltage		V_{th}	$V_{DS} = -10$ V, $I_D = -1$ mA	−1.0	—	−2.2	V
Drain-Source ON Resistance		$R_{DS\ (ON)}$	$V_{GS} = -4.5$ V, $I_D = -2.2$ A	—	66	90	mΩ
		$R_{DS\ (ON)}$	$V_{GS} = -10$ V, $I_D = -2.2$ A	—	45	55	
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS} = -10$ V, $I_D = -2.2$ A	3.1	6.2	—	S
Input Capacitance		C_{iss}	$V_{DS} = -10$ V, $V_{GS} = 0$ V, f = 1 MHz	—	940	—	pF
Reverse Transfer Capacitance		C_{rss}		—	270	—	
Output Capacitance		C_{oss}		—	390	—	
Switching Time	Rise Time	t_r	 V_{IN} : t_r, $t_f < 5$ ns, Duty ≦ 1%, $t_w = 10$ μs	—	13	—	ns
	Turn-On Time	t_{on}		—	21	—	
	Fall Time	t_f		—	25	—	
	Turn-Off Time	t_{off}		—	73	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \fallingdotseq -24$ V, $V_{GS} = -10$ V, $I_D = -4.5$ A	—	18	—	nC
Gate-Source Charge		Q_{gs}		—	14	—	
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}	—	—	—	−4.5	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	−18	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = -4.5$ A, $V_{GS} = 0$ V	—	—	1.2	V

N-ch

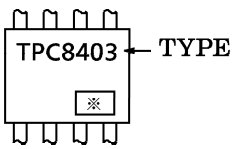
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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	—	—	V
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 A	—	38	46	mΩ
		$R_{DS\ (ON)}$	V_{GS} = 10 V, I_D = 3 A	—	25	33	mΩ
Forward Transfer Admittance		$\|Y_{fs}\|$	V_{DS} = 10 V, I_D = 3 A	3.9	7.8	—	S
Input Capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	—	850	—	pF
Reverse Transfer Capacitance		C_{rss}		—	180	—	
Output Capacitance		C_{oss}		—	270	—	
Switching Time	Rise Time	t_r	 V_{IN} : t_r, t_f < 5 ns Duty ≦ 1%, t_w = 10 μs	—	11	—	ns
	Turn-On Time	t_{on}		—	18	—	
	Fall Time	t_f		—	6.5	—	
	Turn-Off Time	t_{off}		—	27	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	V_{DD} ≒ 24 V, V_{GS} = 10 V, I_D = 6 A	—	17	—	nC
Gate-Source Charge		Q_{gs}		—	13	—	
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}	—	—	—	6	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	24	A
Diode Forward Voltage	V_{DSF}	I_{DR} = 6 A, V_{GS} = 0 V	—	—	−1.2	V

MARKING



※ Lot Number

□□ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)