

TOSHIBA FIELD EFFECT TRANSISTOR SILICON P CHANNEL MOS TYPE (L<sup>2</sup>-π-MOSV)

# 2SJ378

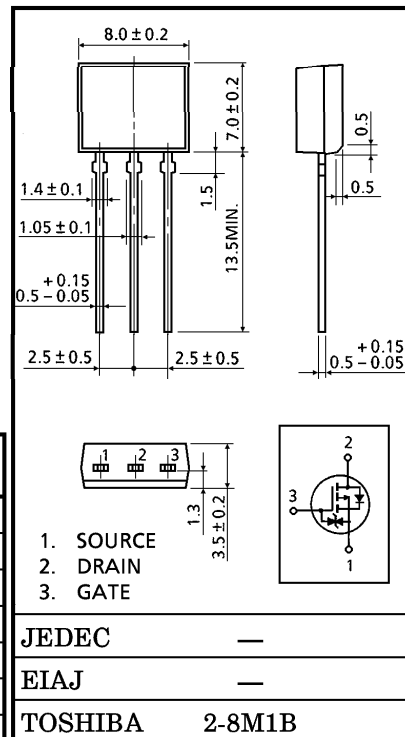
HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS  
 RELAY DRIVE, DC-DC CONVERTER AND MOTOR DRIVE  
 APPLICATIONS

INDUSTRIAL APPLICATIONS  
 Unit in mm

- 4V Gate Drive
- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 0.16\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 4.0S$  (Typ.)
- Low Leakage Current :  $I_{DSS} = -100\mu A$  (Max.) ( $V_{DS} = -60V$ )
- Enhancement-Mode :  $V_{th} = -0.8 \sim -2.0V$   
 ( $V_{DS} = -10V, I_D = -1mA$ )

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	$V_{DSS}$	-60	V
Drain-Gate Voltage ( $R_{GS} = 20k\Omega$ )	$V_{DGR}$	-60	V
Gate-Source Voltage	$V_{GSS}$	±20	V
Drain Current	DC	$I_D$	-5 A
	Pulse	$I_{DP}$	-20 A
Drain Power Dissipation (Ta = 25°C)	$P_D$	1.3	W
Single Pulse Avalanche Energy**	$E_{AS}$	273	mJ
Avalanche Current	$I_{AR}$	-5	A
Repetitive Avalanche Energy*	$E_{AR}$	0.13	mJ
Channel Temperature	$T_{ch}$	150	°C
Storage Temperature Range	$T_{stg}$	-55~150	°C



Weight : 0.54g

HERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	96.1	°C/W

Note ;

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

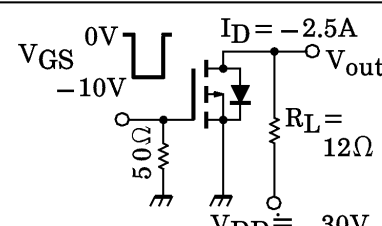
\*\*  $V_{DD} = -25V$ , Starting  $T_{ch} = 25°C$ ,  $L = 14.84mH$ ,  $R_G = 25\Omega$ ,  $I_{AR} = -5A$

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

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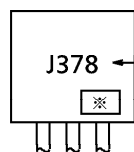
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		$I_{GSS}$	$V_{GS} = \pm 16V, V_{DS} = 0V$	—	—	$\pm 10$	$\mu A$
Drain Cut-off Current		$I_{DSS}$	$V_{DS} = -60V, V_{GS} = 0V$	—	—	-100	$\mu A$
Drain-Source Breakdown Voltage		$V(BR)_{DSS}$	$I_D = -10mA, V_{GS} = 0V$	-60	—	—	V
Gate Threshold Voltage		$V_{th}$	$V_{DS} = -10V, I_D = -1mA$	-0.8	—	-2.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = -4V, I_D = -2.5A$	—	0.24	0.28	$\Omega$
			$V_{GS} = -10V, I_D = -2.5A$	—	0.16	0.19	
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = -10V, I_D = -2.5A$	2.0	4.0	—	S
Input Capacitance		$C_{iss}$	$V_{DS} = -10V, V_{GS} = 0V$ $f = 1MHz$	—	630	—	pF
Reverse Transfer Capacitance		$C_{rss}$		—	95	—	
Output Capacitance		$C_{oss}$		—	290	—	
Switching Time	Rise Time	$t_r$		—	25	—	ns
	Turn-on Time	$t_{on}$		—	45	—	
	Fall Time	$t_f$		—	55	—	
	Turn-off Time	$t_{off}$		$V_{IN} : t_r, t_f < 5ns$ $Duty \leq 1\%, t_w = 10\mu s$	—	200	
Total Gate Charge (Gate-Source Plus Gate-Drain)		$Q_g$	$V_{DD} = -48V, V_{GS} = -10V$ $I_D = -5A$	—	22	—	nC
Gate-Source Charge		$Q_{gs}$		—	16	—	
Gate-Drain ("Miller") Charge		$Q_{gd}$		—	6	—	

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	$V_{DSF}$	$I_{DR} = -5A, V_{GS} = 0V$	—	—	1.7	V
Reverse Recovery Time	$t_{rr}$	$I_{DR} = -5A, V_{GS} = 0V$ $dI_{DR}/dt = 50A/\mu s$	—	80	—	ns
Reverse Recovery Charge	$Q_{rr}$		—	0.1	—	$\mu C$

MARKING

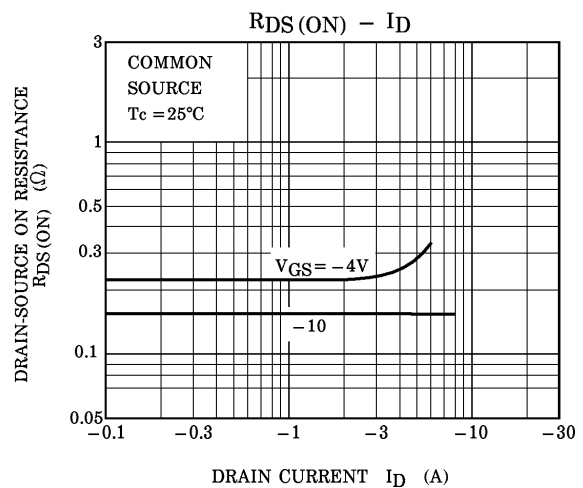
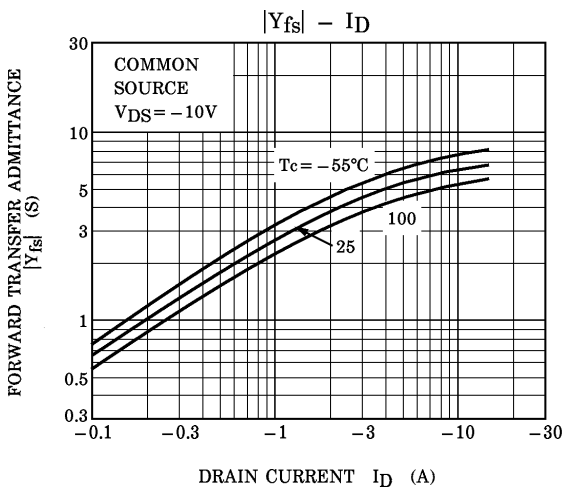
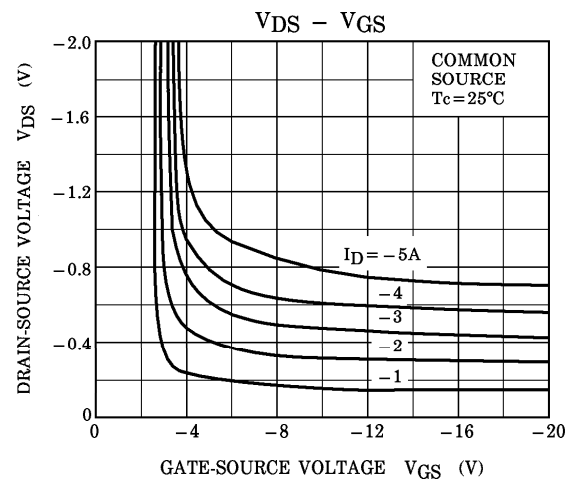
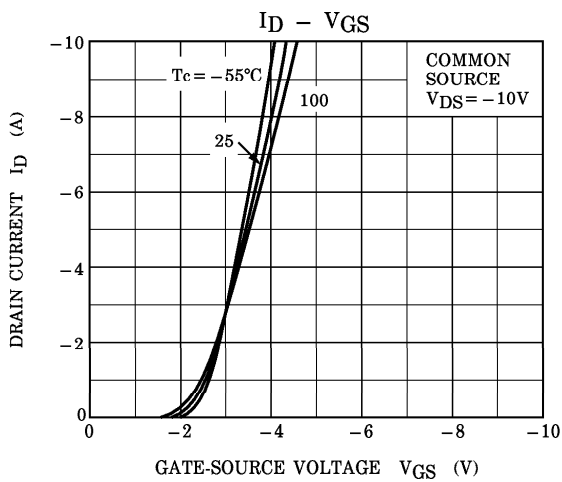
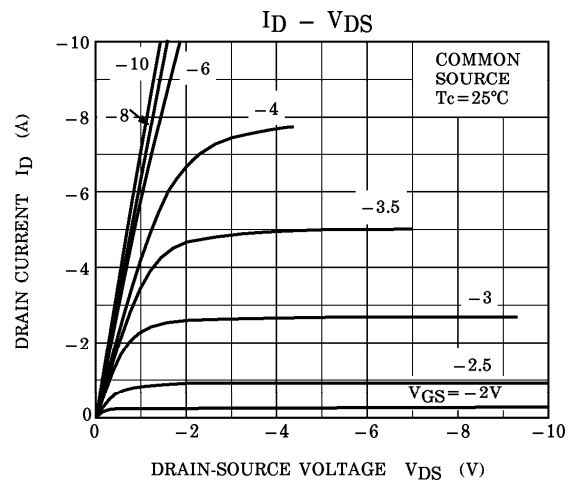
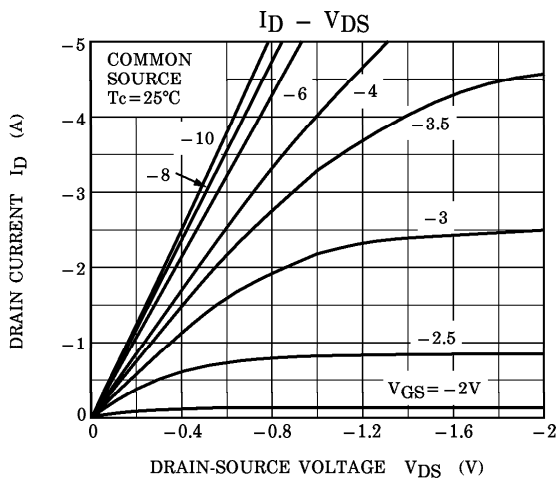


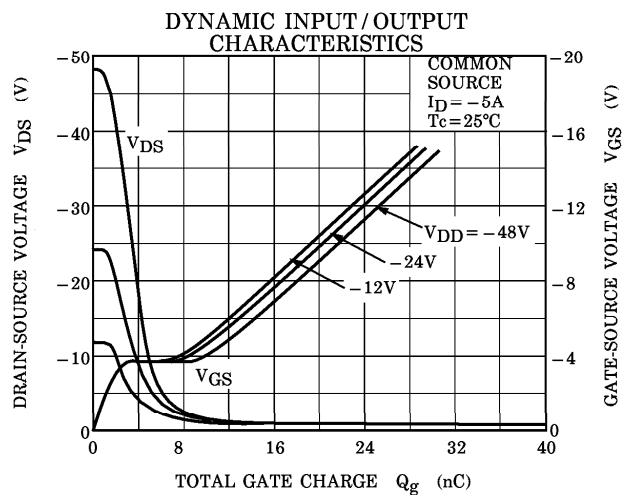
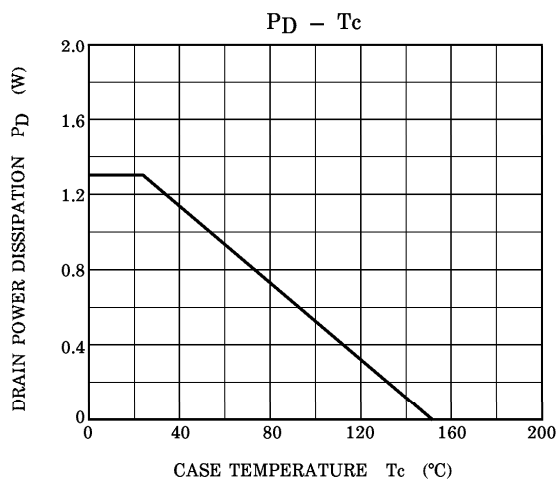
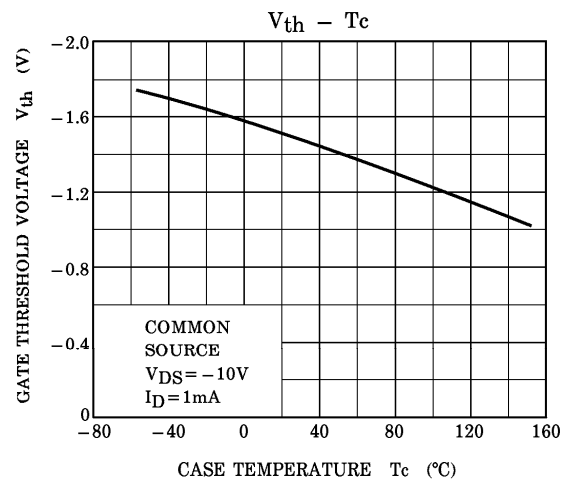
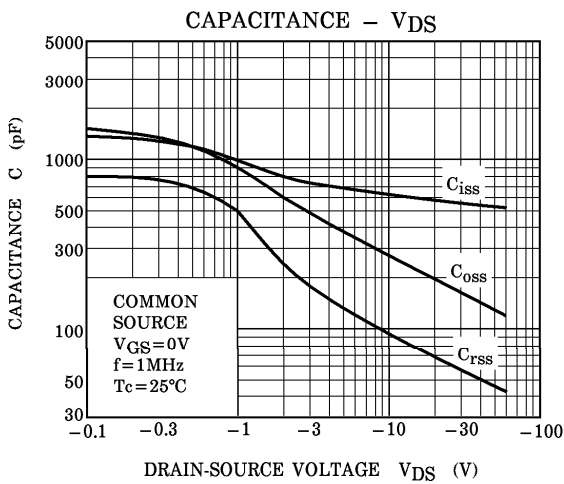
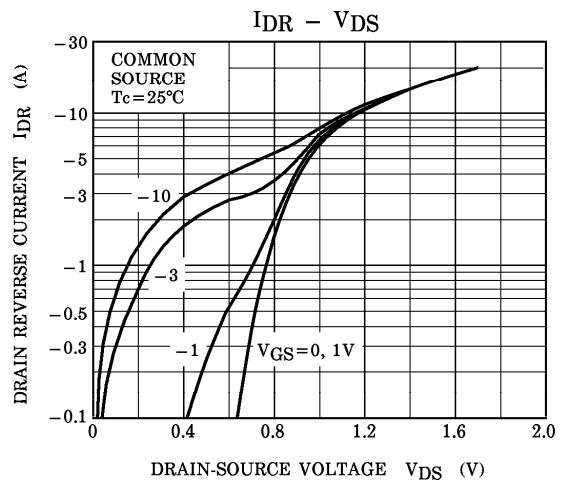
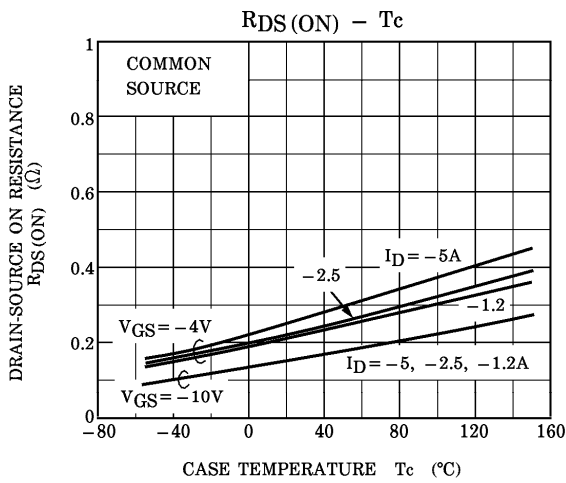
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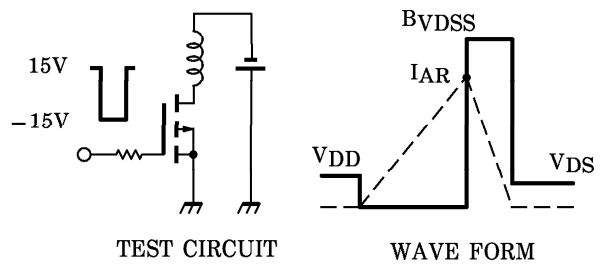
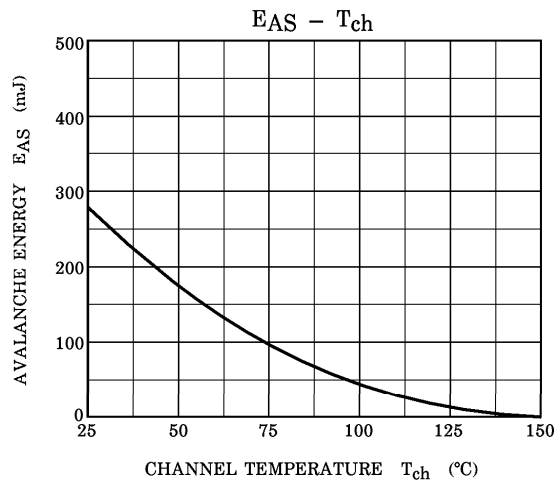
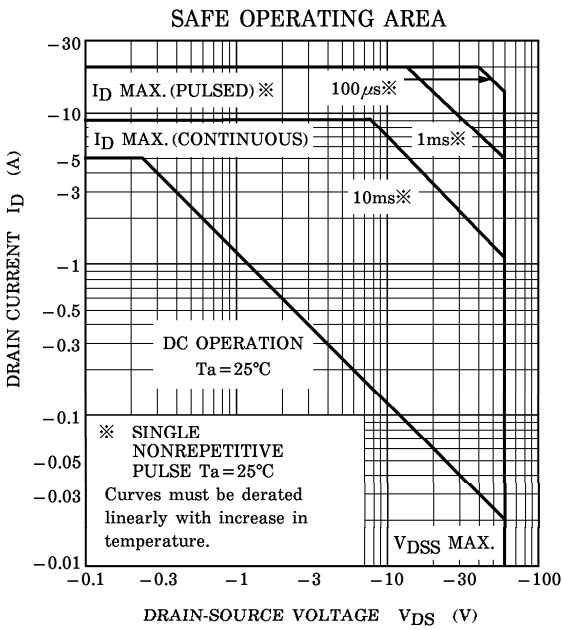
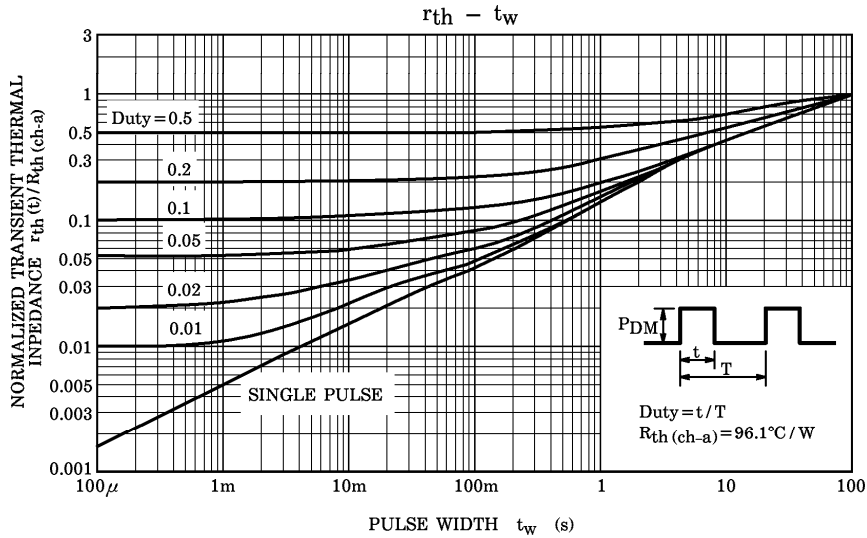
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







Peak  $I_{AR} = -5A$ ,  $R_G = 25\Omega$   
 $V_{DD} = -25V$ ,  $L = 14.84mH$

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