TOSHIBA FIELD EFFECT TRANSISTOR SILICON P CHANNEL MOS TYPE (L^2-π-MOSV)

2SJ377

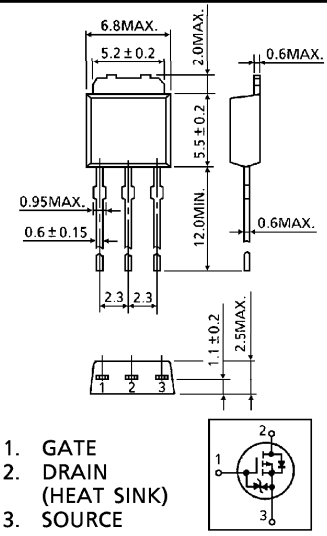
HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

RELAY DRIVE, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL APPLICATIONS

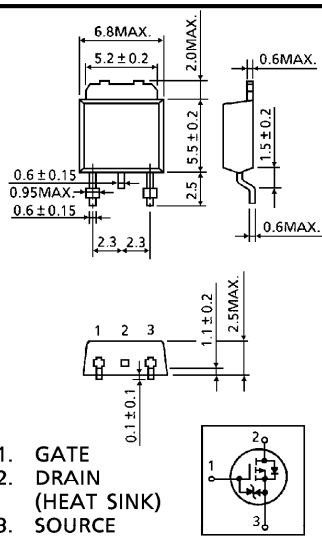
- 4V Gate Drive
- Low Drain-Source ON Resistance : $R_{DS\,(ON)} = 0.16\ \Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 4.0$ S (Typ.)
- Low Leakage Current : $I_{DSS} = -100\ \mu$A (Max.) ($V_{DS} = -60$ V)
- Enhancement-Mode : $V_{th} = -0.8 \sim 2.0$ V ($V_{DS} = -10$ V, $I_D = -1$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

Unit in mm



1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

JEDEC	—
EIAJ	SC-64
TOSHIBA	2-7B1B



1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

JEDEC	—
EIAJ	SC-64
TOSHIBA	2-7B2B

Weight : 0.35 g

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	−60	V
Drain-Gate Voltage ($R_{GS} = 20\ k\Omega$)		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 (Tc = 25°C)		P_D	20	W
Single Pulse Avalanche Energy**		E_{AS}	273	mJ
Avalanche Current		I_{AR}	−5	A
Repetitive Avalanche Energy*		E_{AR}	2	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 Case	$R_{th\,(ch\text{-}c)}$	6.25	°C / W
Thermal Resistance, Channel to Ambient	$R_{th\,(ch\text{-}a)}$	125	°C / W

Note ;

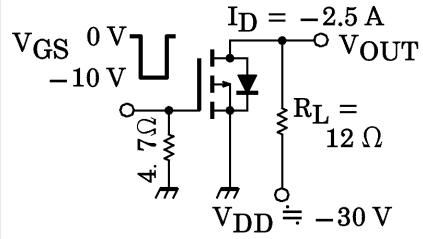
* Repetitive rating ; Pulse Width Limited by Max. junction temperature.

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

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

961001EAA2

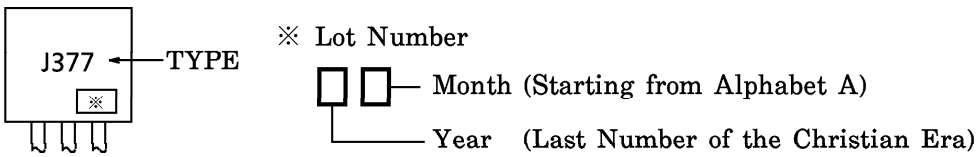
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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}	$V_{DS} = -60$ V, $V_{GS} = 0$ V	—	—	−100	μA
Drain-Source Breakdown Voltage		$V_{(BR)\,DSS}$	$I_D = -10$m A, $V_{GS} = 0$ V	−60	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS} = -10$ V, $I_D = -1$ mA	−0.8	—	−2.0	V
Drain-Source ON Resistance		$R_{DS\,(ON)}$	$V_{GS} = -4$ V, $I_D = -2.5$ A	—	0.24	0.28	Ω
			$V_{GS} = -10$ V, $I_D = -2.5$ A	—	0.16	0.19	
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS} = -10$ V, $I_D = -2.5$ A	2.0	4.0	—	S
Input Capacitance		C_{iss}	$V_{DS} = -10$ V, $V_{GS} = 0$ V, f = 1 MHz	—	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, $t_f < 5$ns Duty ≦ 1%, $t_w = 10$ μs	—	200	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \fallingdotseq -48$ V, $V_{GS} = -10$ V $I_D = -5$ A	—	22	—	nC
Gate-Source Charge		Q_{gs}		—	16	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	6	—	

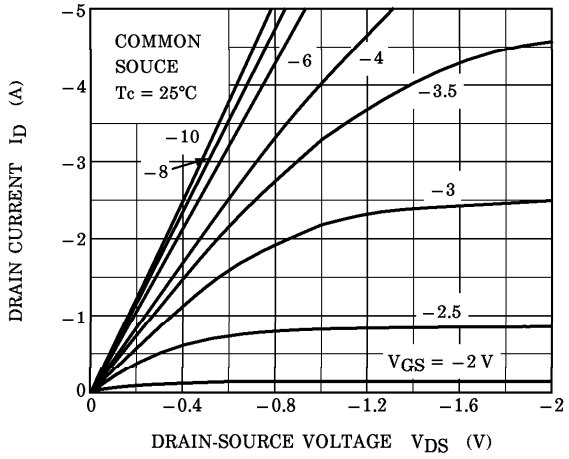
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

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

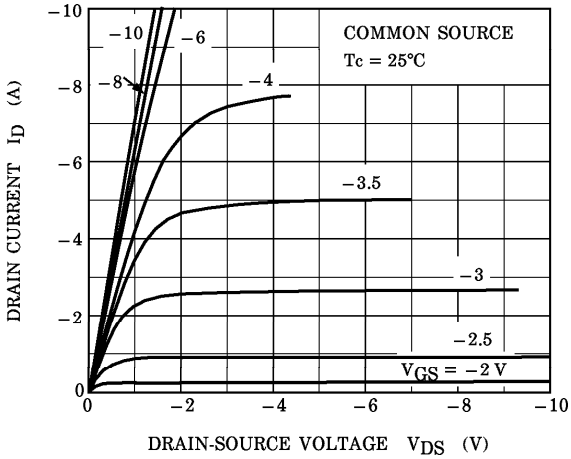
MARKING



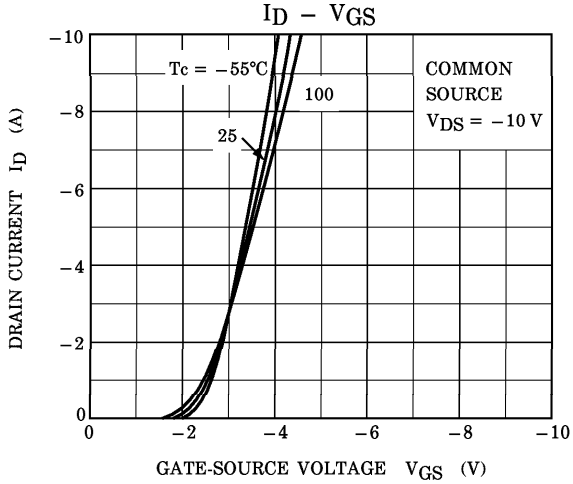
$I_D - V_{DS}$



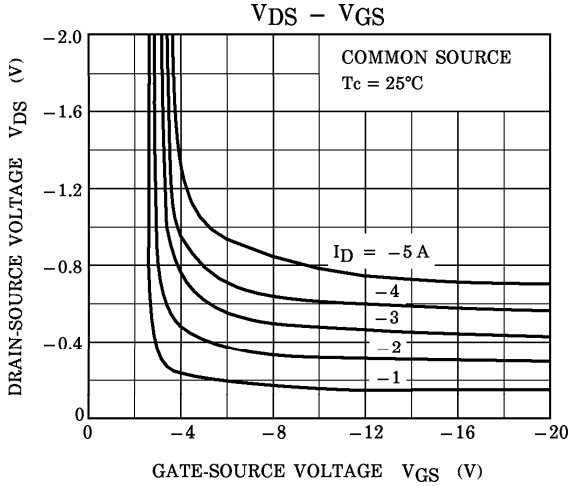
$I_D - V_{DS}$



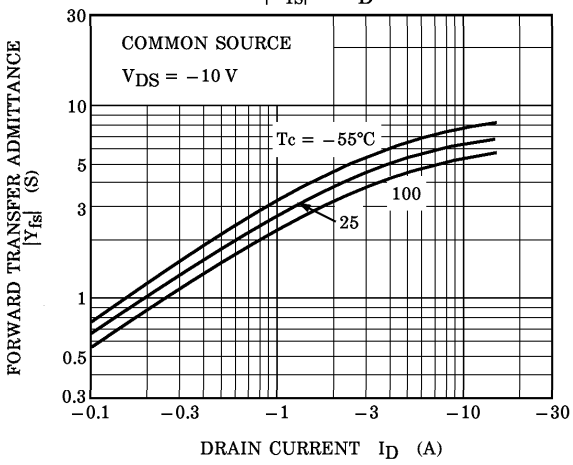
$I_D - V_{GS}$



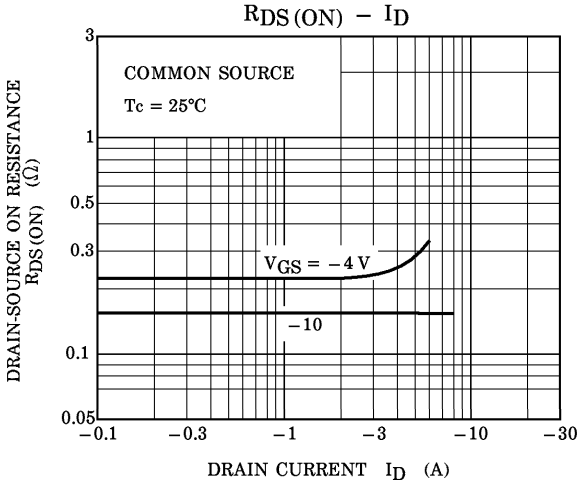
$V_{DS} - V_{GS}$



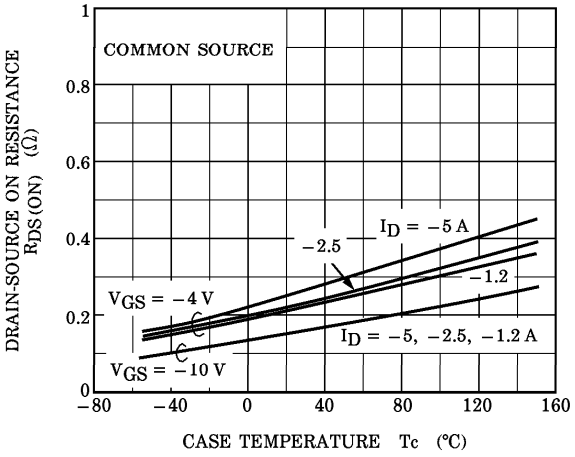
$|Y_{fs}| - I_D$



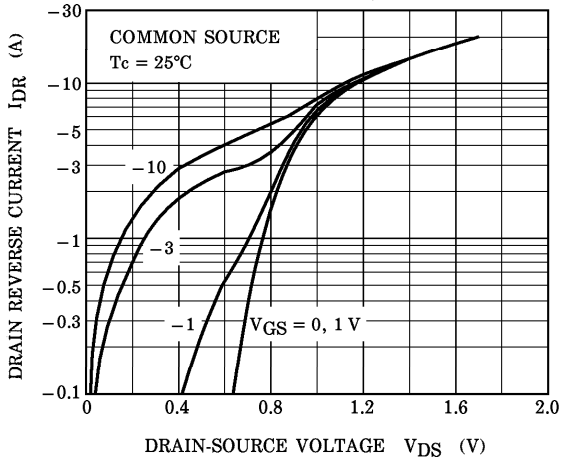
$R_{DS(ON)} - I_D$



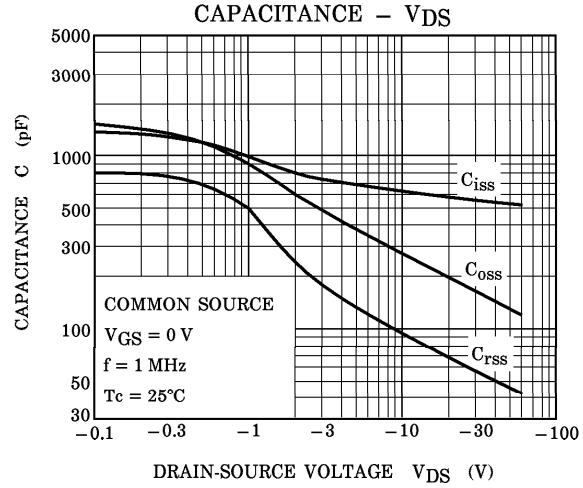
$R_{DS(ON)}$ – Tc



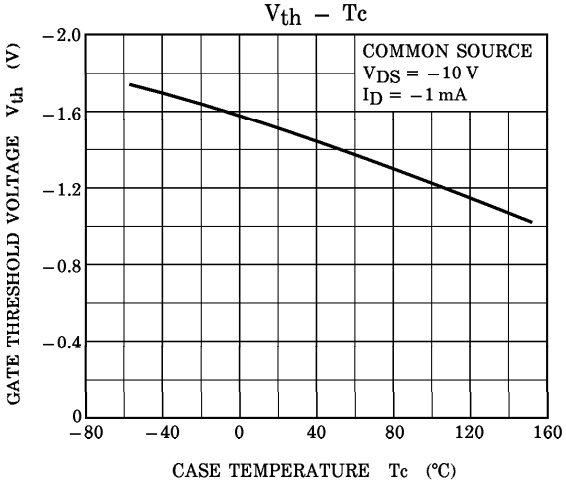
I_{DR} – V_{DS}



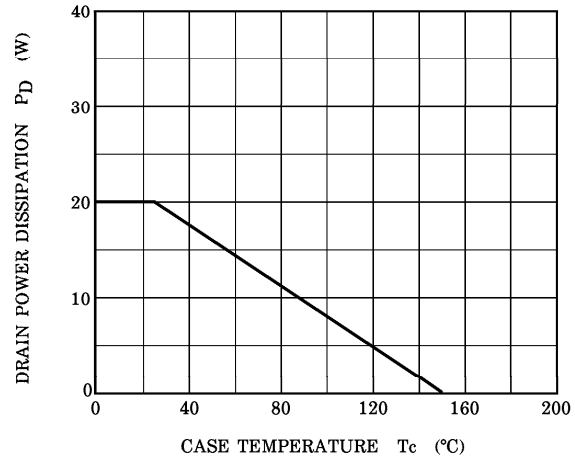
CAPACITANCE – V_{DS}



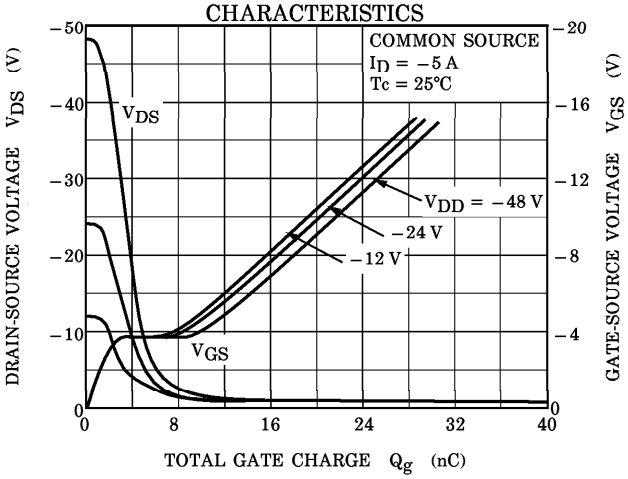
V_{th} – Tc



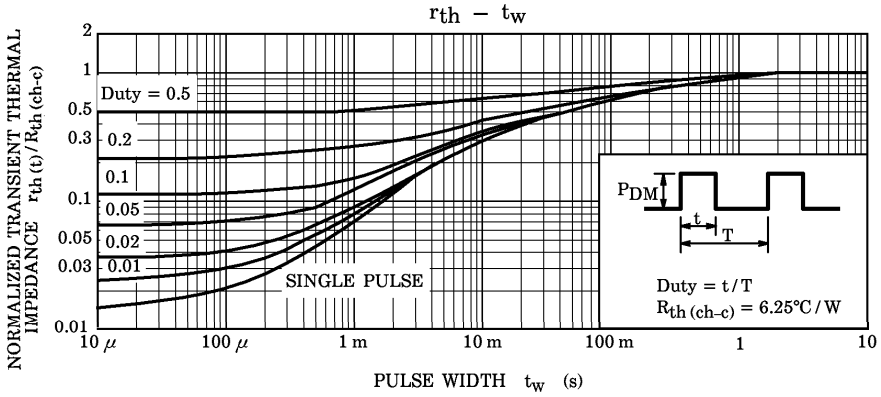
P_D – Tc



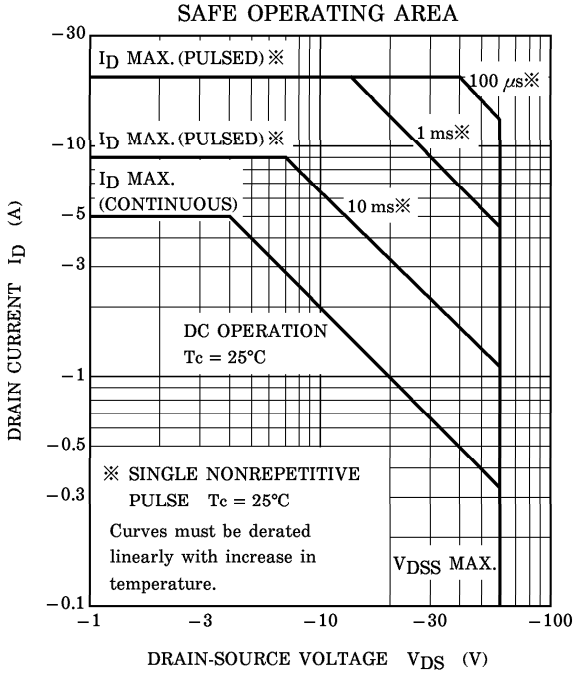
DYNAMIC INPUT / OUTPUT CHARACTERISTICS



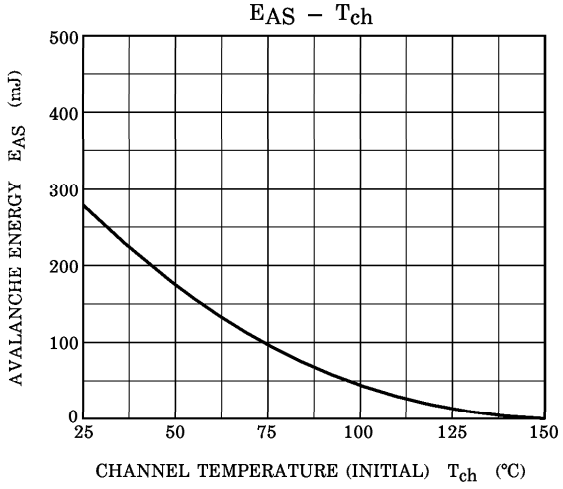
r_{th} – t_w

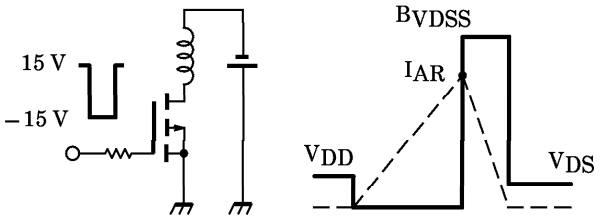


SAFE OPERATING AREA



E_{AS} – T_{ch}





TEST CIRCUIT WAVE FORM

Peak I_{AR} = −5 A, R_G = 25 Ω
V_{DD} = −25 V, L = 14.84 mH

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