

TOSHIBA FIELD EFFECT TRANSISTOR SILICON P CHANNEL MOS TYPE ( $\pi$ -MOSV)

# 2SJ512

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

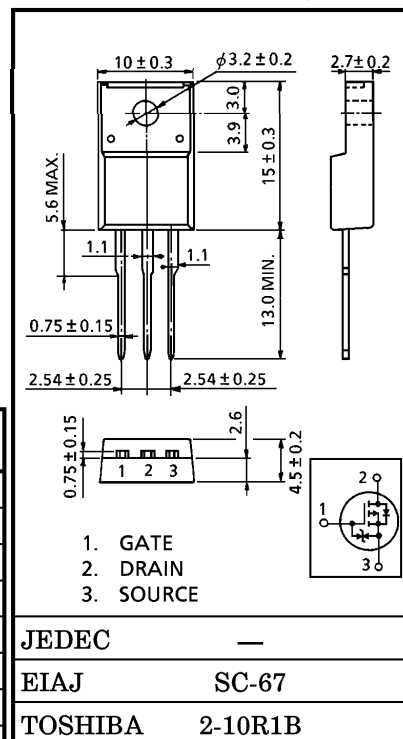
INDUSTRIAL APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 1.0\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 3.7S$  (Typ.)
- Low Leakage Current :  $I_{DSS} = -100\mu A$  (Max.) ( $V_{DS} = -250V$ )
- Enhancement-Mode :  $V_{th} = -1.5 \sim -3.5V$   
( $V_{DS} = -10V, I_D = -1mA$ )

MAXIMUM RATINGS ( $T_a = 25^\circ C$ )

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	$V_{DSS}$	-250	V
Drain-Gate Voltage ( $R_{GS} = 20k\Omega$ )	$V_{DGR}$	-250	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current	DC	$I_D$	-5 A
	Pulse	$I_{DP}$	-20 A
Drain Power Dissipation ( $T_c = 25^\circ C$ )	$P_D$	30	W
Single Pulse Avalanche Energy**	$E_{AS}$	155	mJ
Avalanche Current	$I_{AR}$	-5	A
Repetitive Avalanche Energy*	$E_{AR}$	3.0	mJ
Chanel Temperature	$T_{ch}$	150	$^\circ C$
Storage Temperature Range	$T_{stg}$	-55~150	$^\circ C$



JEDEC	—
EIAJ	SC-67
TOSHIBA	2-10R1B

THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Chanel To Case	$R_{th(ch-c)}$	4.16	$^\circ C / W$
Thermal Resistance, Chanel to Ambient	$R_{th(ch-a)}$	62.5	$^\circ C / W$

Note ;

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

\*\*  $V_{DD} = -50V$ , Starting  $T_{ch} = 25^\circ C$ ,  $L = 10.5mH$ ,  $R_G = 25\Omega$ ,  $I_{AR} = -5A$

**This transistor is an electrostatic sensitive device.**

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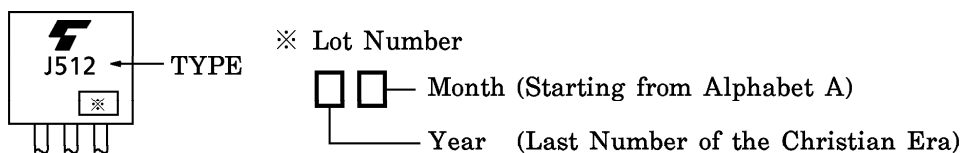
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

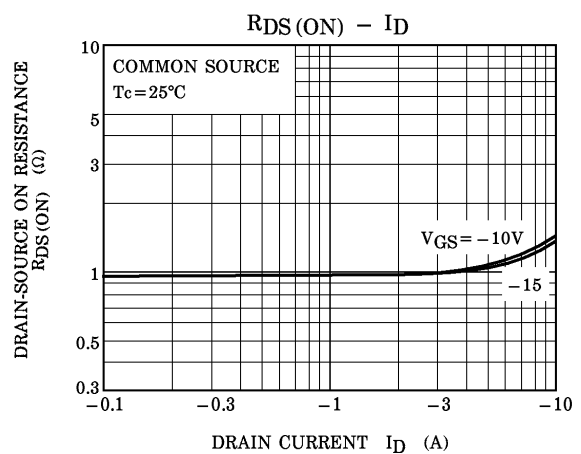
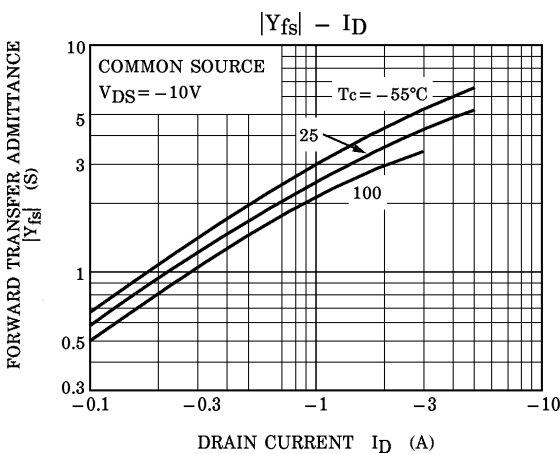
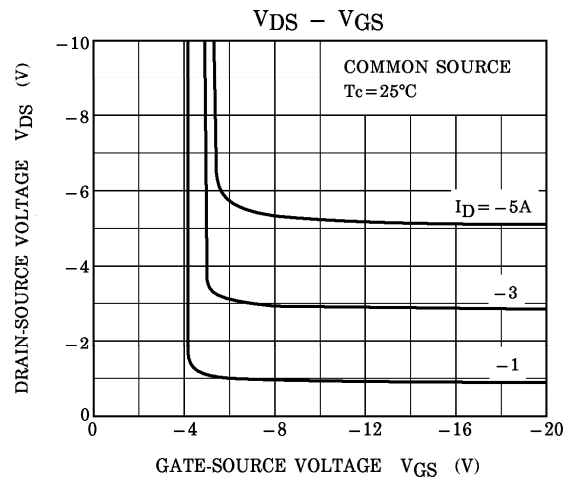
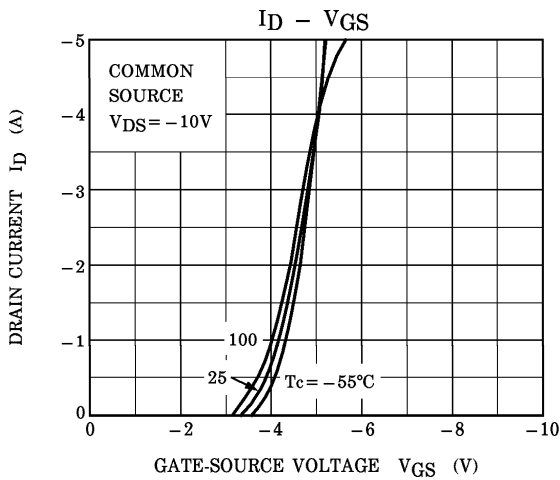
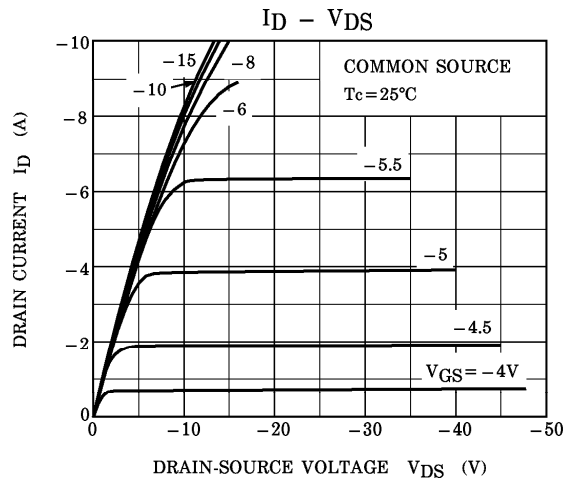
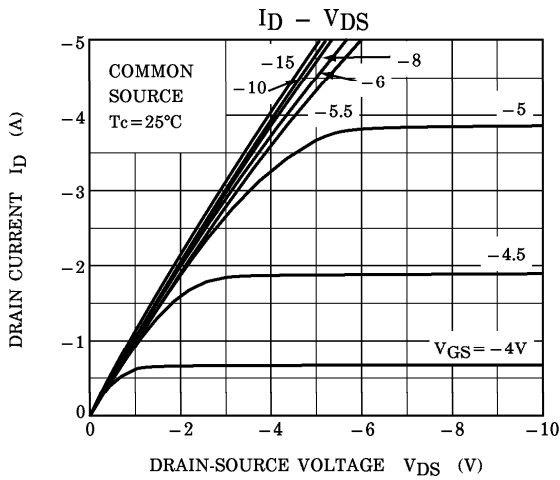
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		$I_{GSS}$	$V_{GS} = \pm 16V, V_{DS} = 0V$	—	—	$\pm 10$	$\mu A$
Drain Cut-off Current		$I_{DSS}$	$V_{DS} = -250V, V_{GS} = 0V$	—	—	-100	$\mu A$
Drain-Source Breakdown Voltage		$V(BR)_{DSS}$	$I_D = -10mA, V_{GS} = 0V$	-250	—	—	V
Gate Threshold Voltage		$V_{th}$	$V_{DS} = -10V, I_D = -1mA$	-1.5	—	-3.5	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = -10V, I_D = -2.5A$	—	1.0	1.25	$\Omega$
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = -10V, I_D = -2.5A$	1.8	3.7	—	S
Input Capacitance		$C_{iss}$	$V_{DS} = -10V, V_{GS} = 0V, f = 1MHz$	—	800	—	pF
Reverse Transfer Capacitance		$C_{rss}$		—	80	—	
Output Capacitance		$C_{oss}$		—	250	—	
Switching Time	Rise Time	$t_r$	<p> <math>I_D = -2.5A</math>  <math>V_{GS} = 0V, -10V</math>  <math>V_{OUT}</math>  <math>R_L = 40\Omega</math>  <math>V_{DD} = -100V</math>                      入力 : <math>t_r, t_f &lt; 5ns</math>,                      Duty <math>\leq 1\%</math>, <math>t_w = 10\mu s</math> </p>	—	16	—	ns
	Turn-on Time	$t_{on}$		—	35	—	
	Fall Time	$t_f$		—	9	—	
	Turn-off Time	$t_{off}$		—	70	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		$Q_g$	$V_{DD} = -200V, V_{GS} = -10V$ $I_D = -5A$	—	22	—	nC
Gate-Source Charge		$Q_{gs}$		—	14	—	
Gate-Drain ("Miller") Charge		$Q_{gd}$		—	8	—	

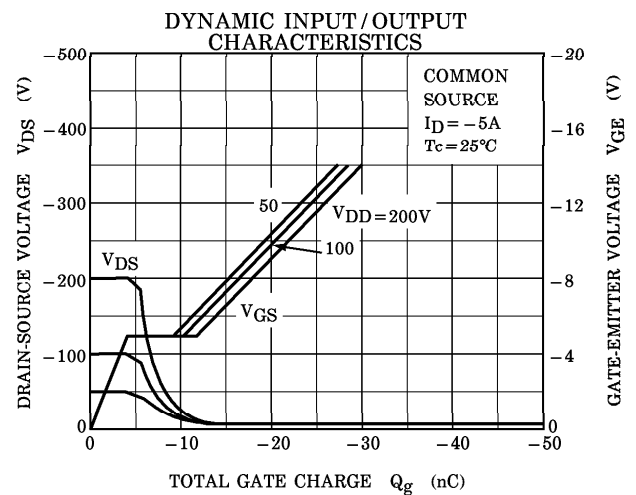
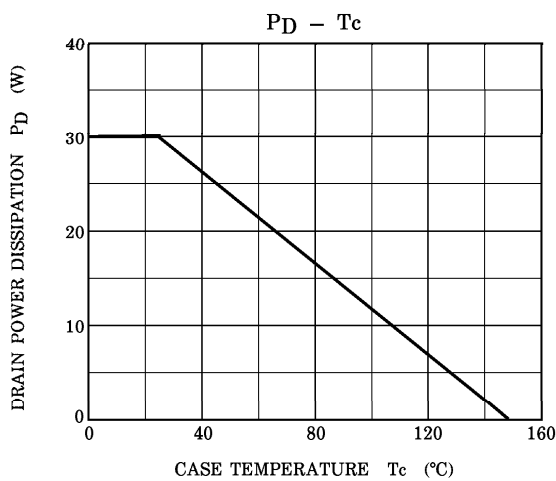
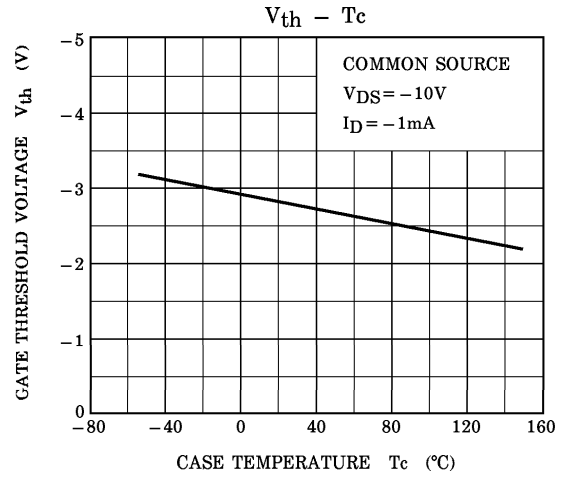
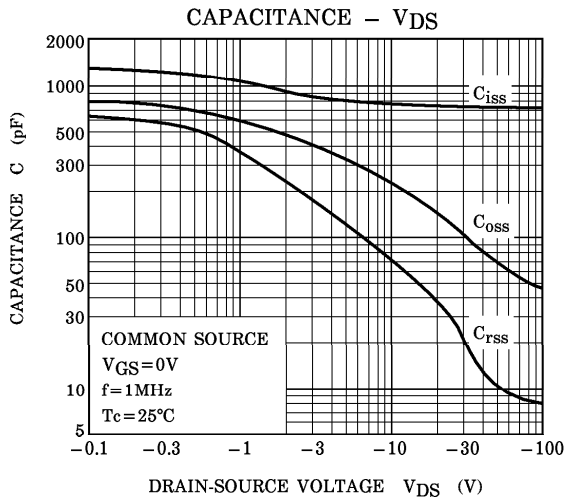
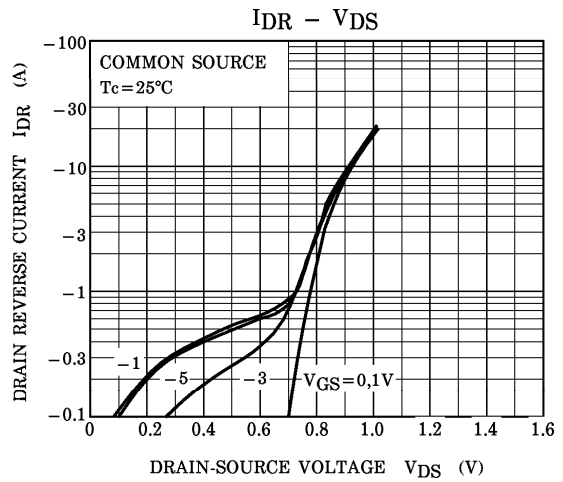
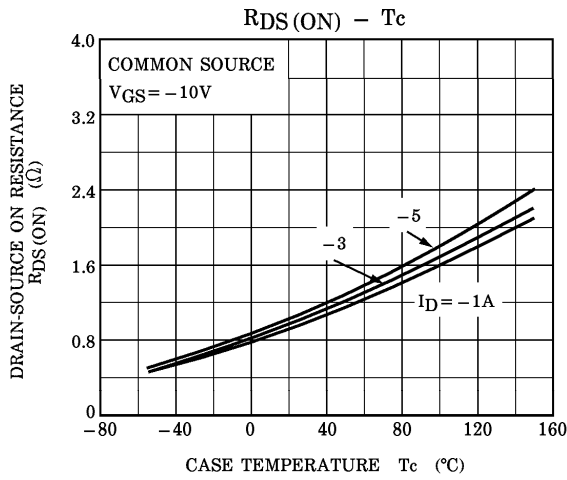
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

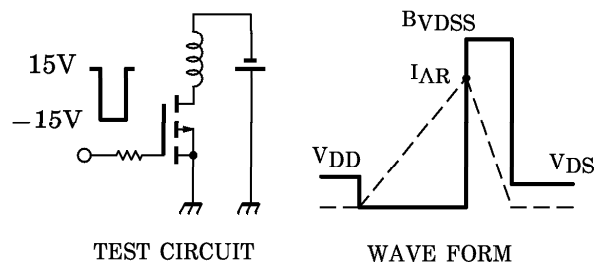
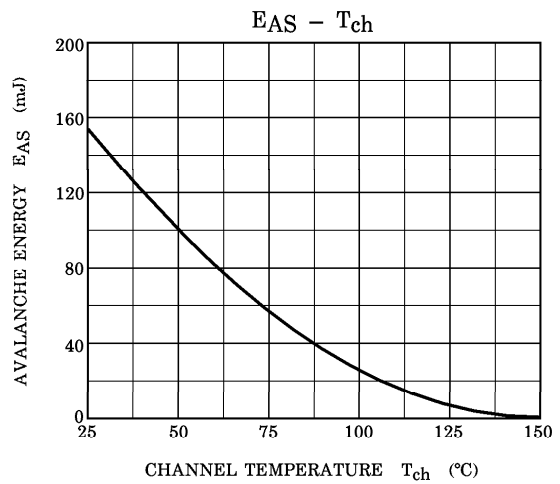
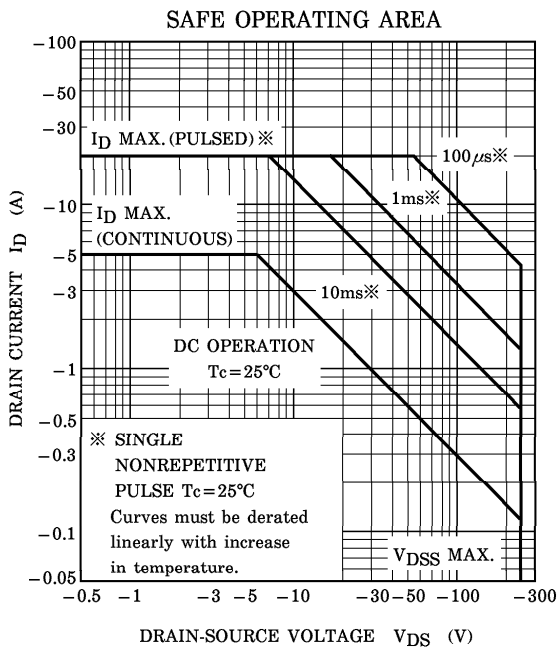
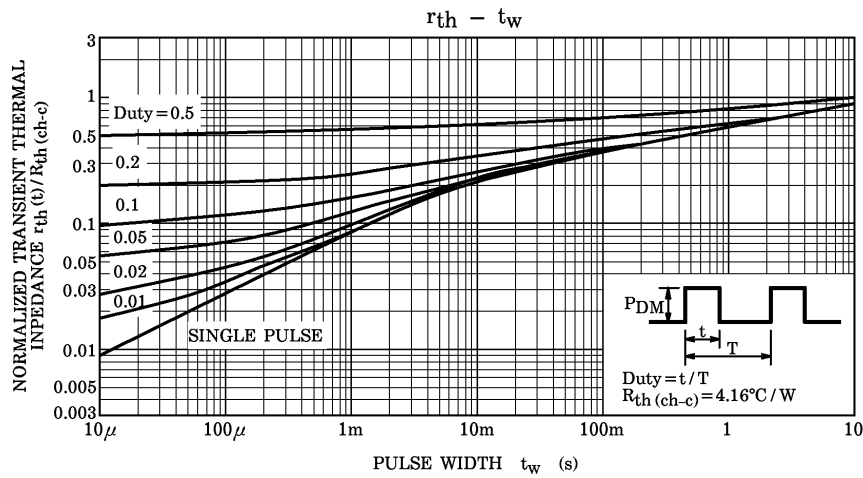
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	$I_{DR}$	—	—	—	-5	A
Pulse Drain Reverse Current	$I_{DRP}$	—	—	—	-20	A
Diode Forward Voltage	$V_{DSF}$	$I_{DR} = -5A, V_{GS} = 0V$	—	—	2.0	V
Reverse Recovery Time	$t_{rr}$	$I_{DR} = -5A, V_{GS} = 0V$	—	205	—	ns
Reverse Recovery Charge	$Q_{rr}$	$dI_{DR} / dt = 100A / \mu s$	—	2.1	—	$\mu C$

MARKING









$$\text{Peak } I_{AR} = -5\text{A}, R_G = 25\Omega, V_{DD} = -50\text{V}, L = 10.5\text{mH}$$

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