

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

# 2SJ516

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

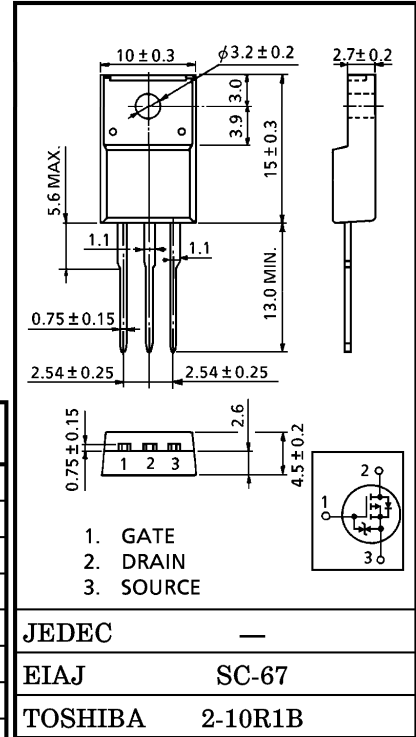
INDUSTRIAL APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 0.6 \Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 5.3 S$  (Typ.)
- Low Leakage Current :  $I_{DSS} = -100 \mu A$  ( $V_{DS} = -250 V$ )
- Enhancement-Mode :  $V_{th} = -1.5 \sim -3.5 V$   
( $V_{DS} = -10 V, I_D = -1 mA$ )

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

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	$V_{DSS}$	-250	V
Drain-Gate Voltage ( $R_{GS} = 20 k\Omega$ )	$V_{DGR}$	-250	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current	DC	$I_D$	-6.5 A
	Pulse	$I_{DP}$	-13 A
Drain Power Dissipation ( $T_c = 25^\circ C$ )	$P_D$	35	W
Single Pulse Avalanche Energy**	$E_{AS}$	157	mJ
Avalanche Current	$I_{AR}$	-6.5	A
Repetitive Avalanche Energy*	$E_{AR}$	3.5	mJ
Chanel Temperature	$T_{ch}$	150	$^\circ C$
Storage Temperature Range	$T_{stg}$	-55~150	$^\circ C$



THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Chanel To Case	$R_{th(ch-c)}$	3.57	$^\circ C / W$
Thermal Resistance, Chanel to Ambient	$R_{th(ch-a)}$	62.5	$^\circ C / W$

Note ;

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

\*\*  $V_{DD} = -50 V$ , Starting  $T_{ch} = 25^\circ C$ ,  $L = 6.3 mH$ ,  $R_G = 25 \Omega$ ,  $I_{AR} = -6.5 A$

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

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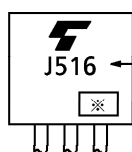
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		$I_{GSS}$	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain Cut-off Current		$I_{DSS}$	$V_{DS} = -250\text{ V}, V_{GS} = 0\text{ V}$	—	—	-100	$\mu\text{A}$
Drain-Source Breakdown Voltage		$V_{(BR) DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-250	—	—	V
Gate Threshold Voltage		$V_{th}$	$V_{DS} = -10\text{ V}, I_D = -1\text{ mA}$	-1.5	—	-3.5	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = -10\text{ V}, I_D = -3\text{ A}$	—	0.6	0.8	$\Omega$
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -3\text{ A}$	2.5	5.3	—	S
Input Capacitance		$C_{iss}$	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$	—	1120	—	pF
Reverse Transfer Capacitance		$C_{rss}$		—	110	—	
Output Capacitance		$C_{oss}$		—	320	—	
Switching Time	Rise Time	$t_r$	<p><math>I_D = -3\text{ A}</math> <math>V_{GS} = 0\text{ V}</math> <math>V_{GS} = -10\text{ V}</math> <math>R_L = 33.3\ \Omega</math> <math>V_{DD} \doteq -100\text{ V}</math></p>	—	17	—	ns
	Turn-on Time	$t_{on}$		—	34	—	
	Fall Time	$t_f$		—	6	—	
	Turn-off Time	$t_{off}$		$V_{IN} : t_r, t_f < 5\text{ ns},$ $Duty \leq 1\%, t_w = 10\ \mu\text{s}$	—	71	
Total Gate Charge (Gate-Source Plus Gate-Drain)		$Q_g$	$V_{DD} \doteq -200\text{ V}, V_{GS} = -10\text{ V}$ $I_D = -6.5\text{ A}$	—	29	—	nC
Gate-Source Charge		$Q_{gs}$		—	19	—	
Gate-Drain ("Miller") Charge		$Q_{gd}$		—	10	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	$I_{DR}$	—	—	—	-6.5	A
Pulse Drain Reverse Current	$I_{DRP}$	—	—	—	-13	A
Diode Forward Voltage	$V_{DSF}$	$I_{DR} = -6.5\text{ A}, V_{GS} = 0\text{ V}$	—	—	2.0	V
Reverse Recovery Time	$t_{rr}$	$I_{DR} = -6.5\text{ A}, V_{GS} = 0\text{ V}$	—	190	—	ns
Reverse Recovery Charge	$Q_{rr}$	$dI_{DR}/dt = 100\text{ A}/\mu\text{s}$	—	2.1	—	$\mu\text{C}$

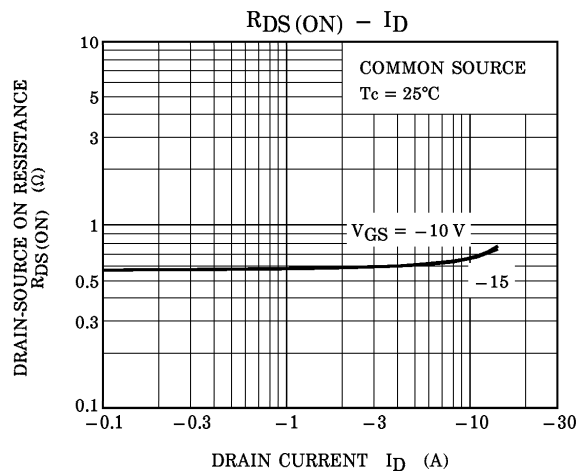
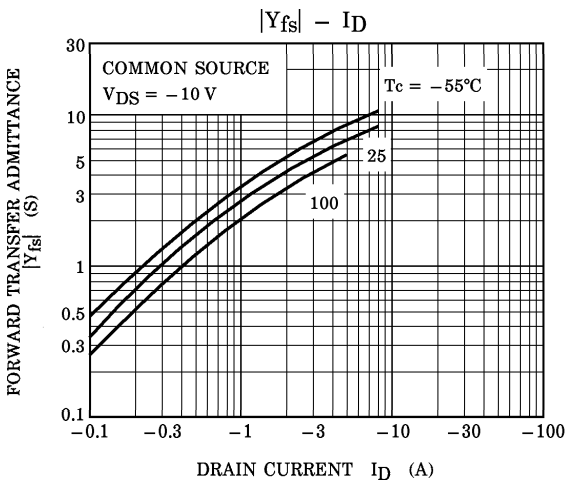
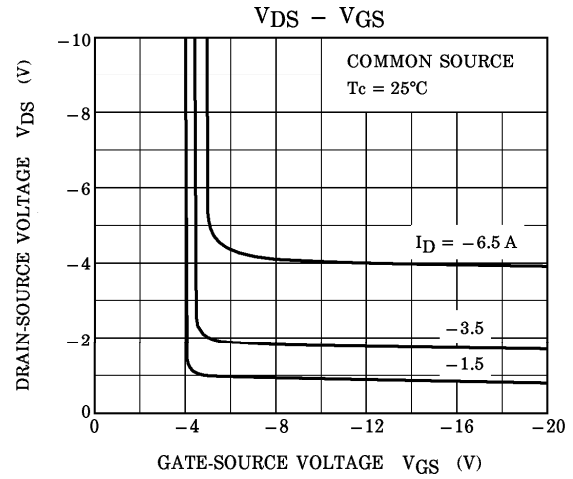
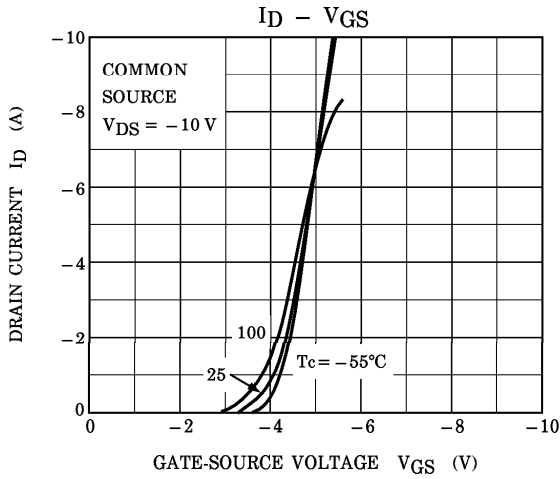
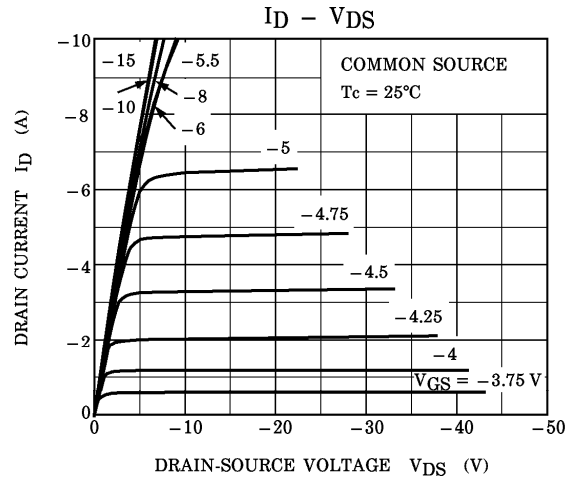
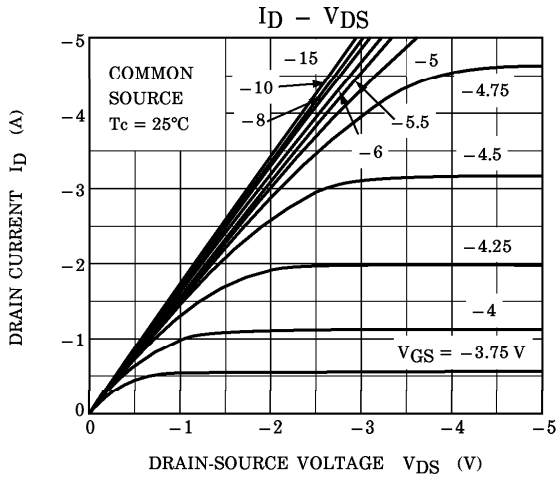
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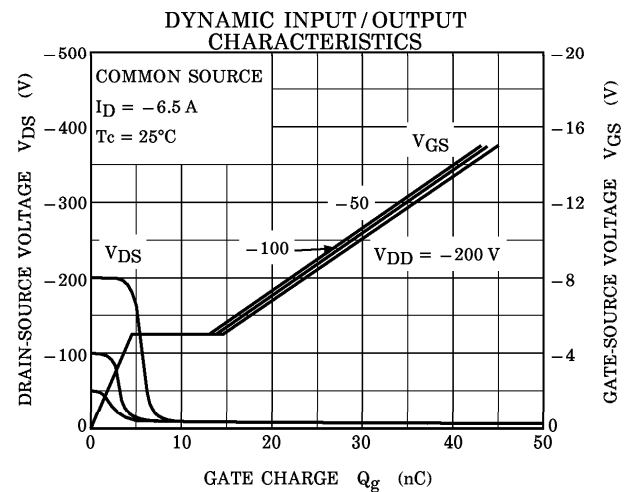
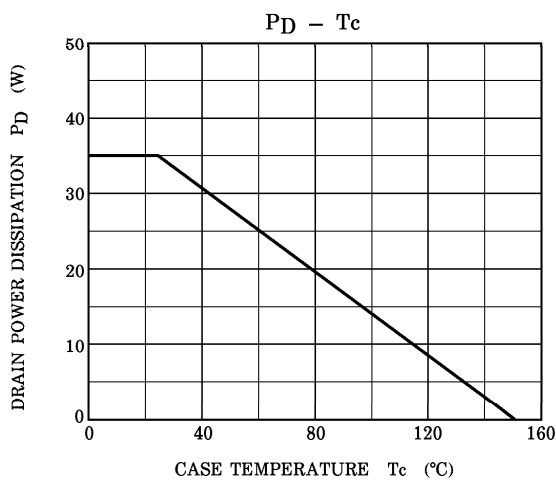
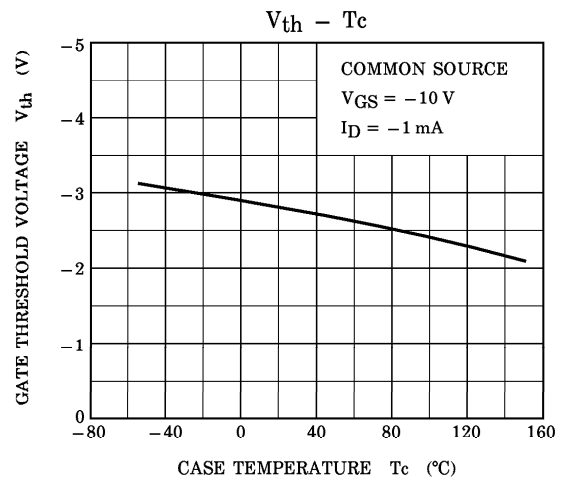
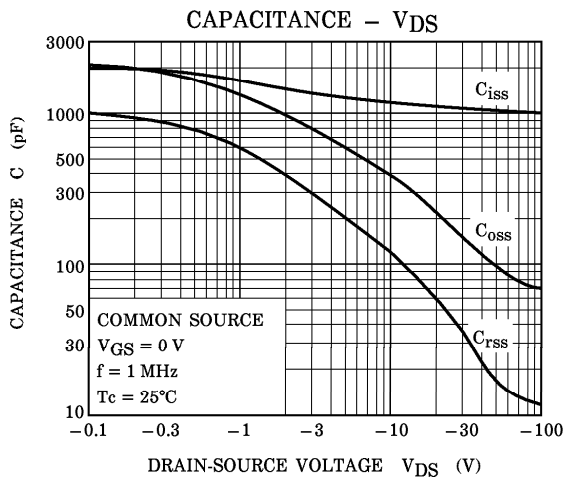
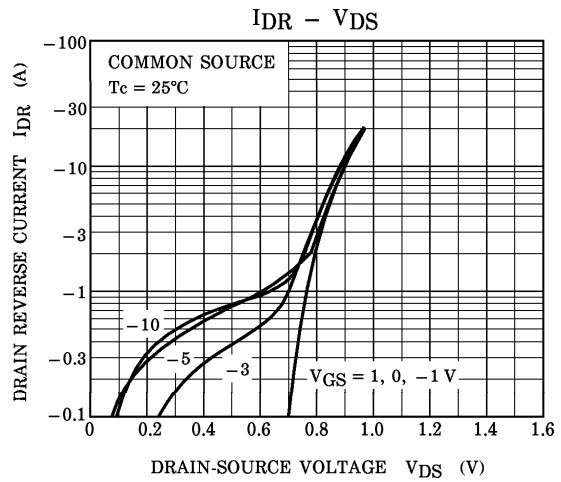
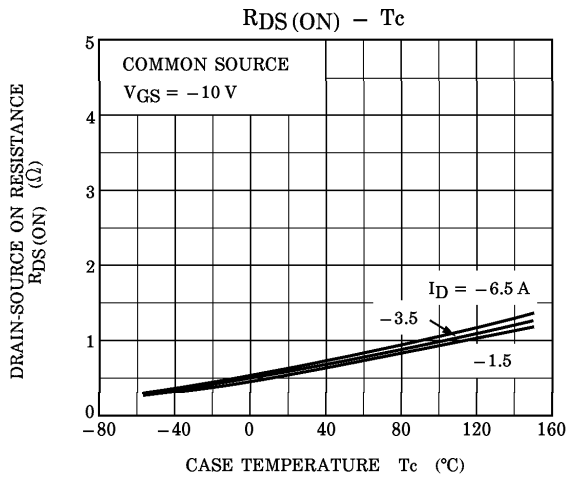


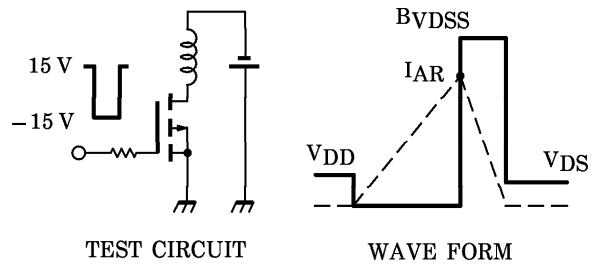
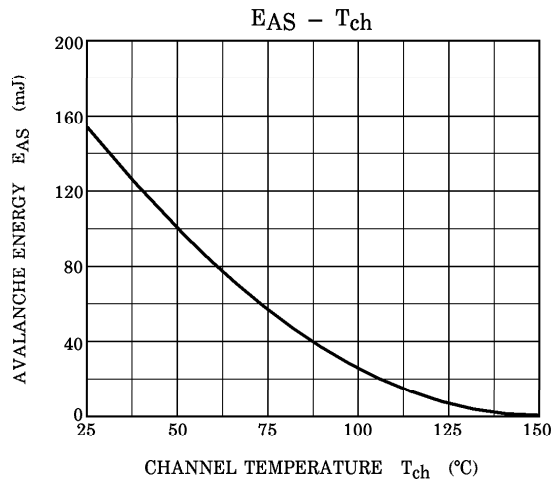
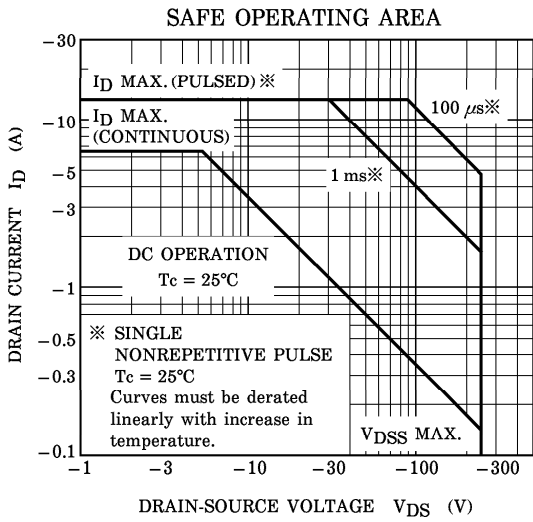
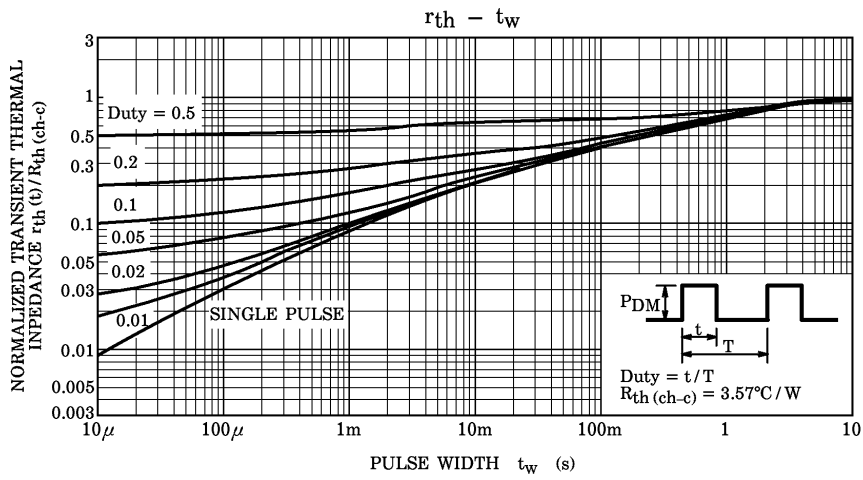
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







Peak  $I_{AR} = -6.5\text{ A}$ ,  $R_G = 25\ \Omega$ ,  $V_{DD} = -50\text{ V}$ ,  $L = 6.3\text{ mH}$

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