

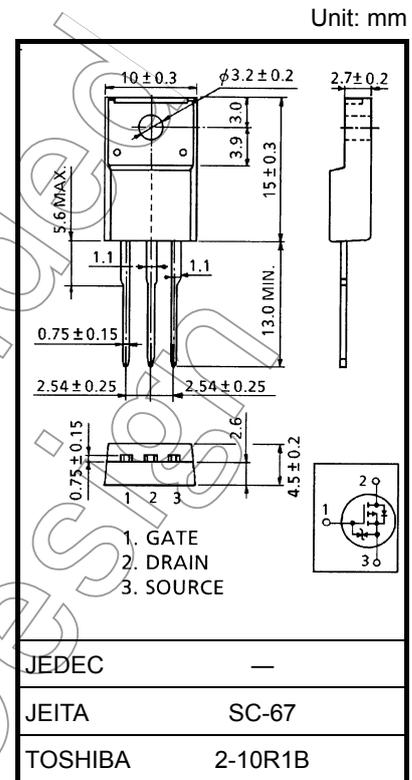
# 2SJ516

Chopper Regulator, DC-DC Converter and Motor Drive Applications

- 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 :  $I_{DSS} = -100 \mu A$  (max) ( $V_{DS} = -250 V$ )
- Enhancement mode :  $V_{th} = -1.5$  to  $-3.5 V$  ( $V_{DS} = -10 V, I_D = -1 mA$ )

### Absolute Maximum Ratings ( $T_a = 25^\circ C$ )

Characteristics	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 (Note 1)	$I_D$	-6.5	A
	Pulse (Note 1)	$I_{DP}$	-13	A
Drain power dissipation ( $T_c = 25^\circ C$ )	$P_D$	35	W	
Single pulse avalanche energy (Note 2)	$E_{AS}$	157	mJ	
Avalanche current	$I_{AR}$	-6.5	A	
Repetitive avalanche energy (Note 3)	$E_{AR}$	3.5	mJ	
Channel temperature	$T_{ch}$	150	$^\circ C$	
Storage temperature range	$T_{stg}$	-55 to 150	$^\circ C$	



JEDEC	—
JEITA	SC-67
TOSHIBA	2-10R1B

Weight: 1.9 g (typ.)

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

### Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	3.57	$^\circ C / W$
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	62.5	$^\circ C / W$

Note 1: Please use devices on condition that the channel temperature is below  $150^\circ C$ .

Note 2:  $V_{DD} = -50 V, T_{ch} = 25^\circ C$  (initial),  $L = 6.3 mH, R_G = 25 \Omega, I_{AR} = -6.5 A$

Note 3: Repetitive rating; Pulse width limited by maximum channel temperature.

This transistor is an electrostatic sensitive device.

Please handle with caution.

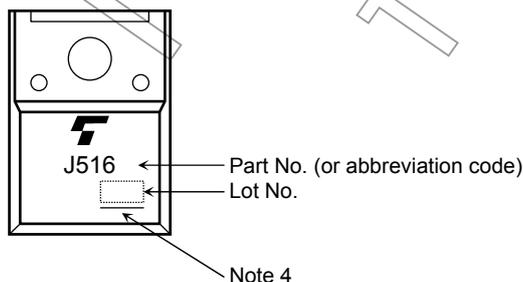
## Electrical Characteristics (Ta = 25°C)

Characteristics		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	$t_r$		—	17	—	ns
	Turn-on time	$t_{on}$		—	34	—	
	Fall time	$t_f$		—	6	—	
	Turn-off time	$t_{off}$		—	71	—	
Total gate charge (Gate-source plus gate-drain)		$Q_g$	$V_{DD} \approx -200\text{ V}, V_{GS} = -10\text{ V}, I_D = -6.5\text{ A}$	—	29	—	nC
Gate-source charge		$Q_{gs}$		—	19	—	
Gate-drain ("miller") charge		$Q_{gd}$		—	10	—	

## Source-Drain Ratings and Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	$I_{DR}$	—	—	—	-6.5	A
Pulse drain reverse current (Note 1)	$I_{DRP}$	—	—	—	-13	A
Forward voltage (diode)	$V_{DSF}$	$I_{DR} = -6.5\text{ A}, V_{GS} = 0\text{ V}$	—	—	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	—	$\mu\text{C}$

## Marking

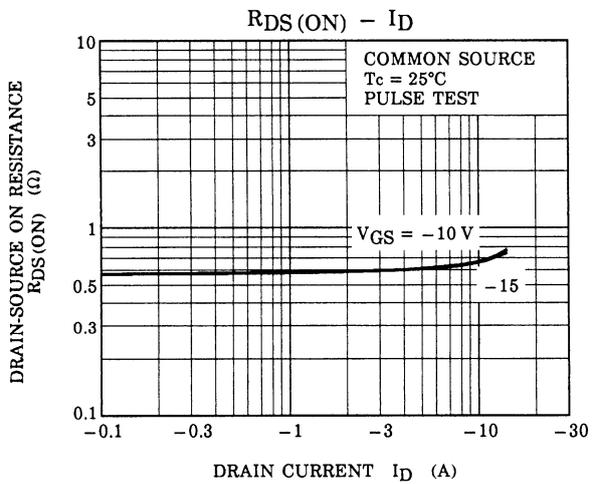
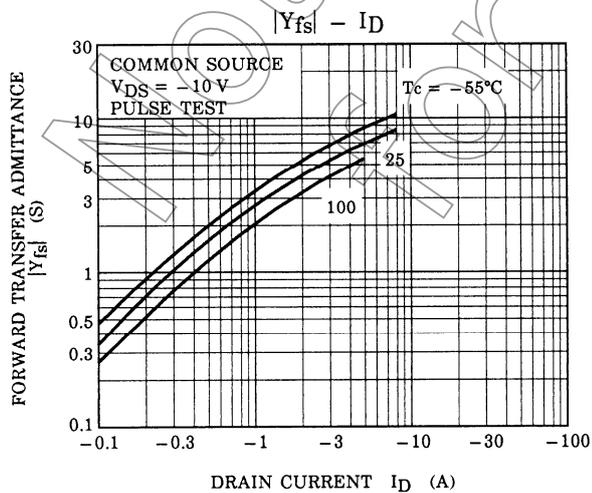
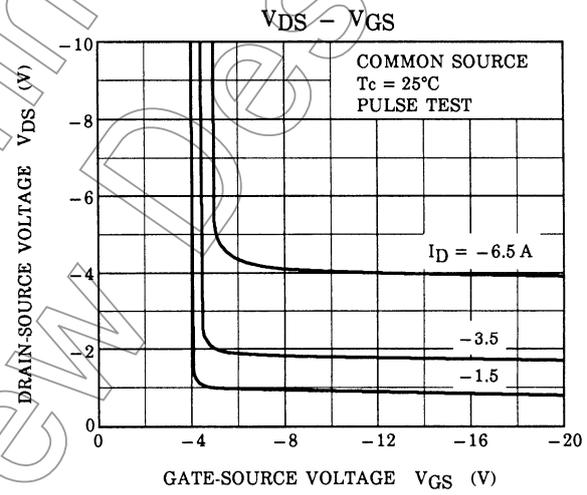
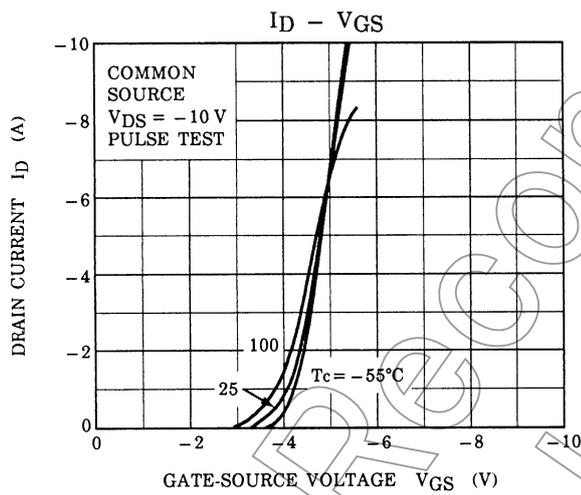
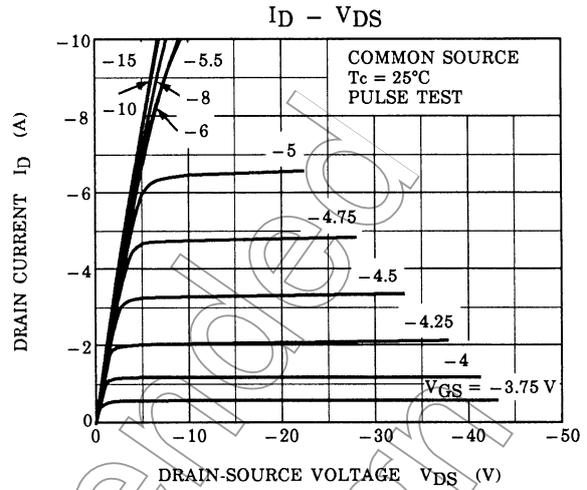
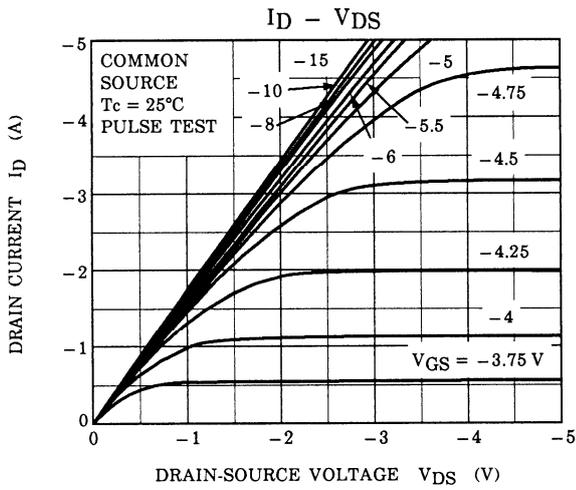


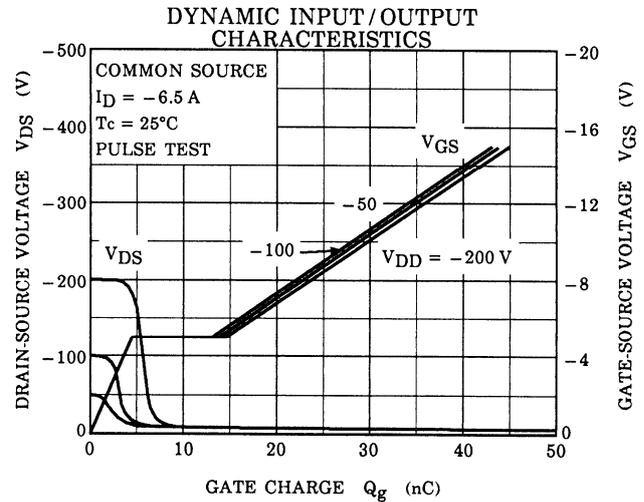
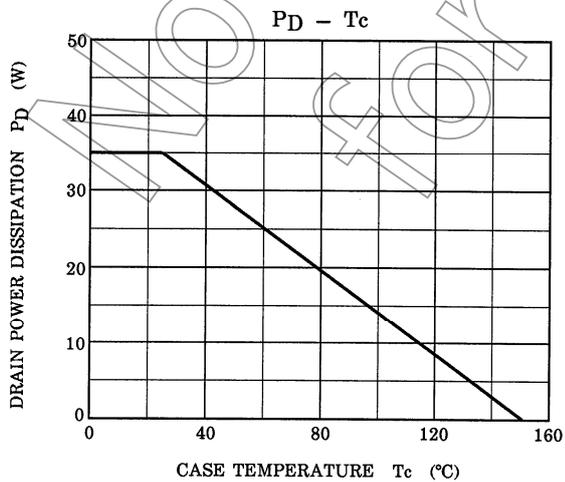
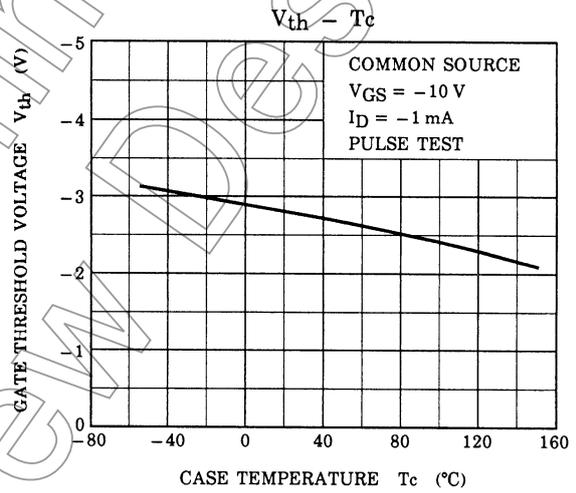
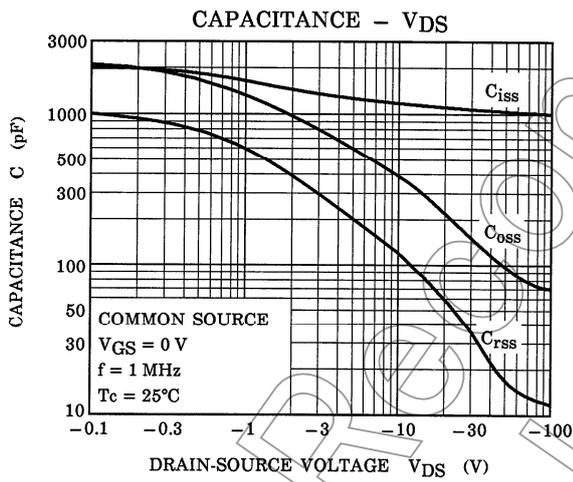
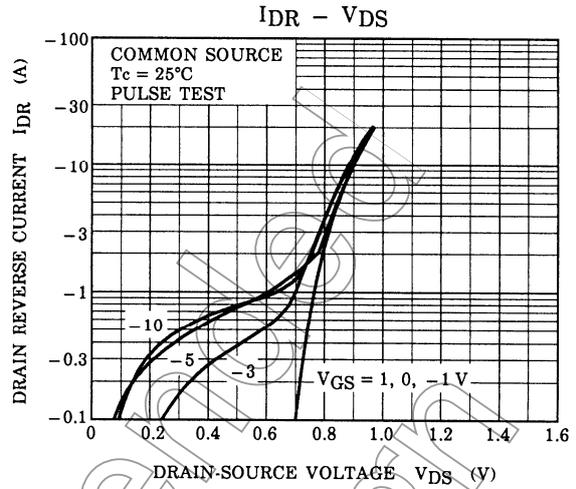
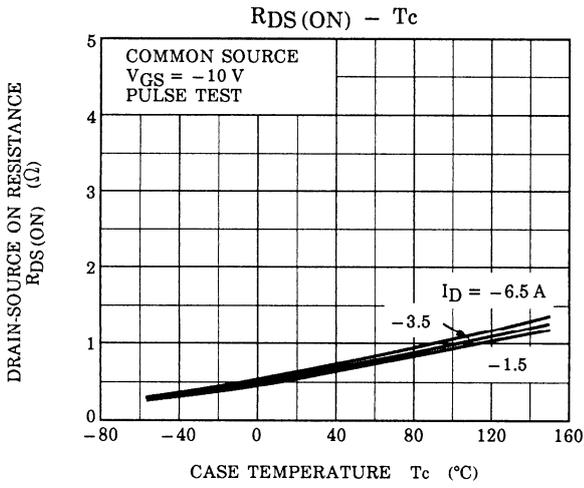
Note 4: A line under a Lot No. identifies the indication of product Labels.

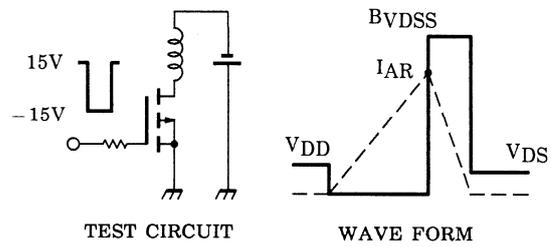
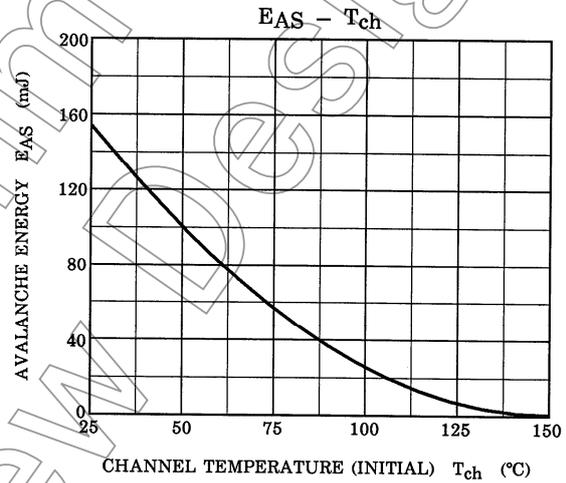
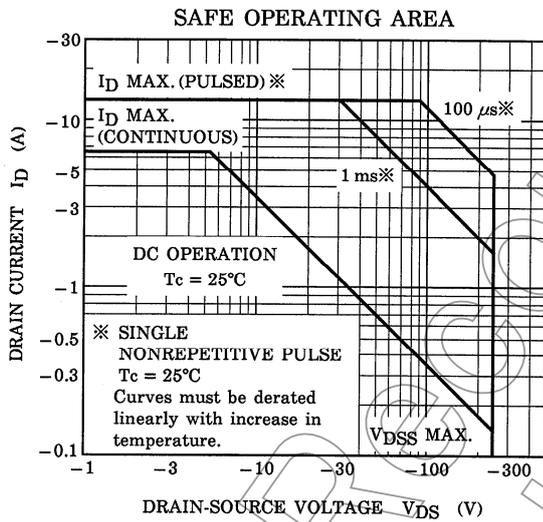
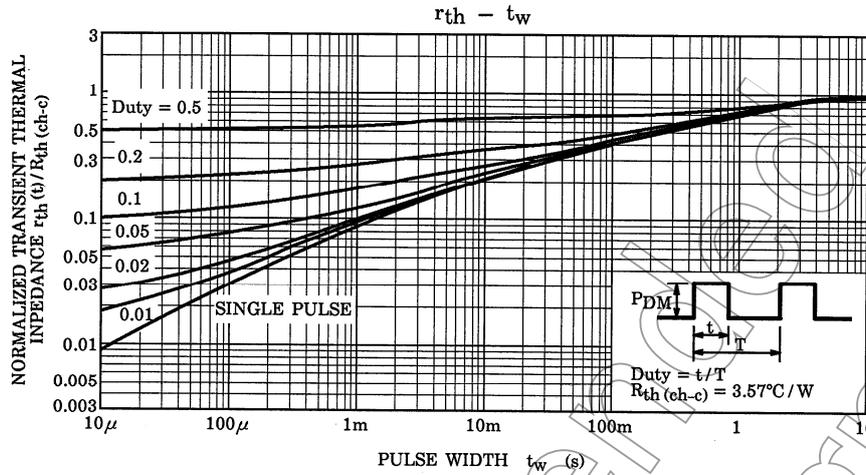
Not underlined: [[Pb]]/INCLUDES > MCV

Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

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$R_G = 25\Omega$   
 $V_{DD} = -50V, L = 6.3mH$

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

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