

TOSHIBA Field Effect Transistor Silicon P Channel MOS Type (L²-π-MOSV)

2SJ512

Chopper Regulator, DC-DC Converter and Motor Drive Applications

- Low drain-source ON resistance : $R_{DS(ON)} = 1.0 \Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 3.7 S$ (typ.)
- Low leakage current : $I_{DSS} = -100 \mu A$ (max) ($V_{DS} = -250 V$)
- Enhancement mode : $V_{th} = -1.5 \sim -3.5 V$ ($V_{DS} = -10 V, I_D = -1 mA$)

Absolute Maximum Ratings (Ta = 25°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}	± 20	V
Drain current	DC (Note 1)	I_D	-5 A
	Pulse (Note 1)	I_{DP}	-20 A
Drain power dissipation ($T_c = 25^\circ C$)	P_D	30	W
Single pulse avalanche energy (Note 2)	E_{AS}	155	mJ
Avalanche current	I_{AR}	-5	A
Repetitive avalanche energy (Note 3)	E_{AR}	3.0	mJ
Channel temperature	T_{ch}	150	°C
Storage temperature range	T_{stg}	-55~150	°C

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	$R_{th(ch-c)}$	4.16	°C / W
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	62.5	°C / W

Note 1: Ensure that the channel temperature does not exceed 150°C.

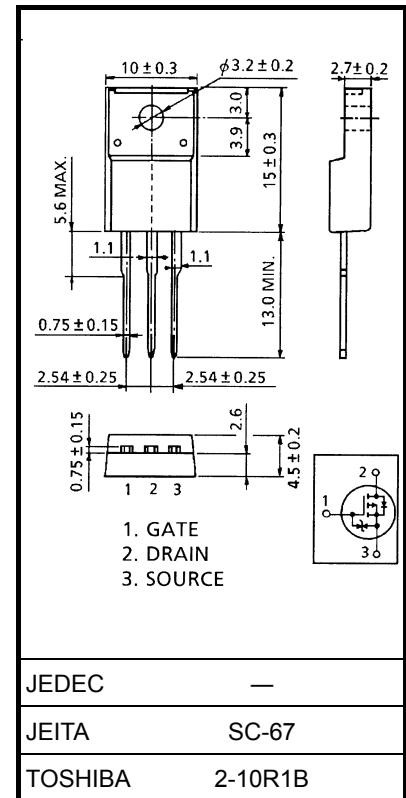
Note 2: $V_{DD} = -50 V, T_{ch} = 25^\circ C$ (initial), $L = 10.5 mH, R_G = 25 \Omega, I_{AR} = -5 A$

Note 3: Repetitive rating: pulse width limited by maximum channel temperature

This transistor is an electrostatic-sensitive device.

Please handle with caution.

Unit: mm



Weight: 1.9 g (typ.)

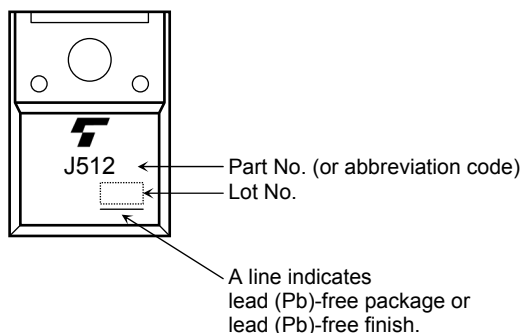
Electrical Characteristics (Ta = 25°C)

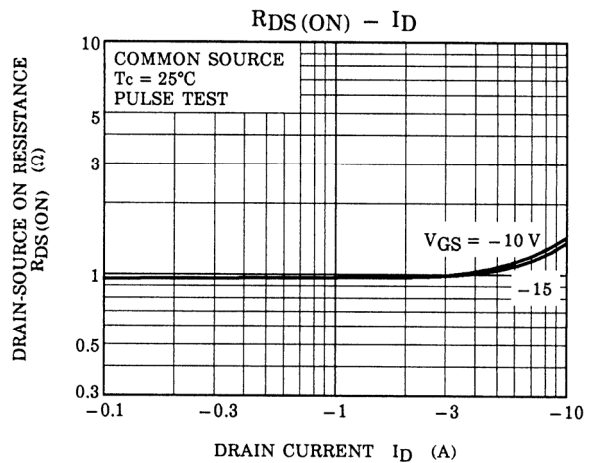
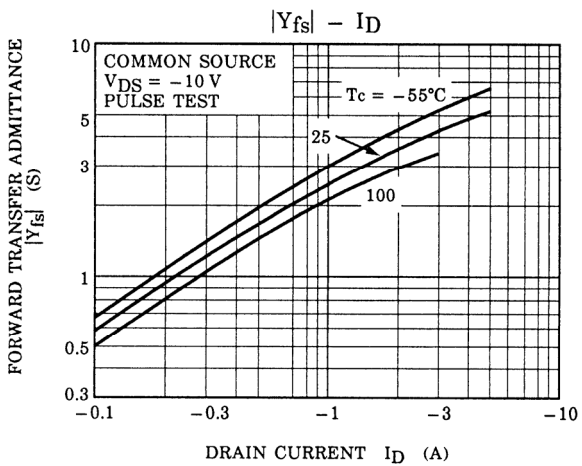
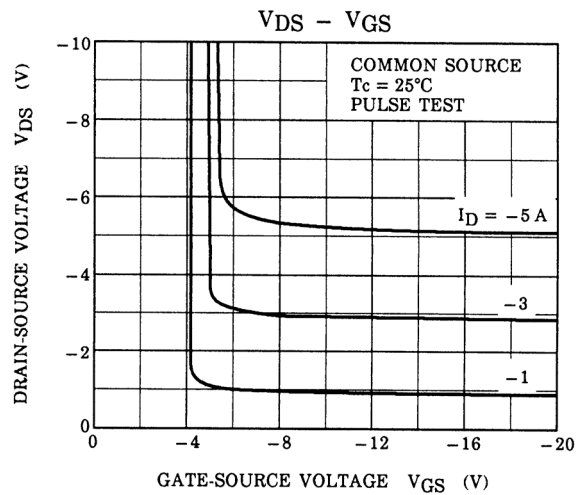
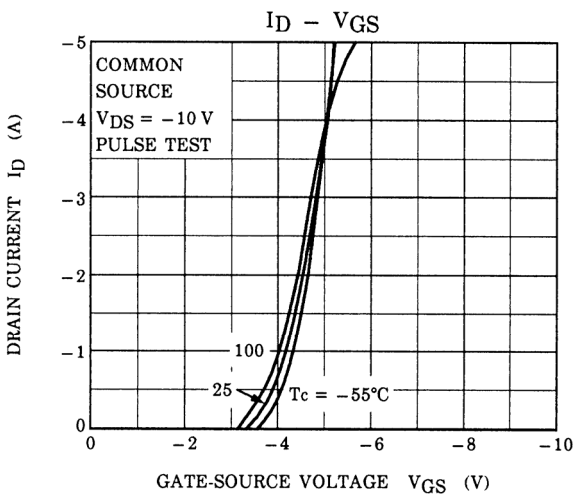
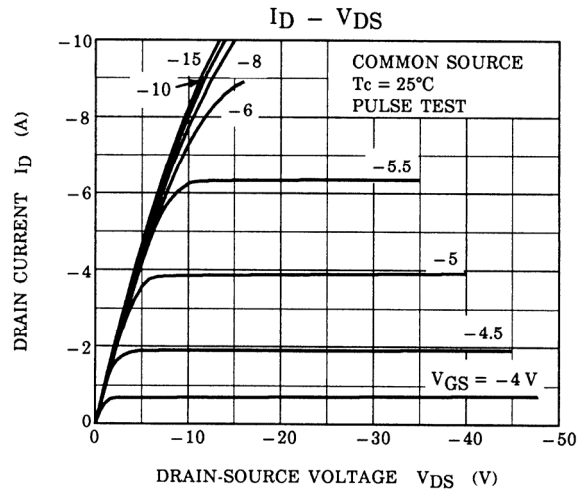
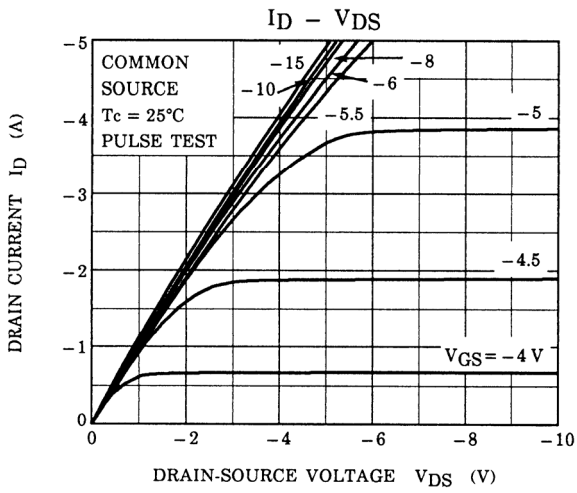
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = -250\text{ V}, V_{GS} = 0\text{ V}$	—	—	-100	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-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		$R_{DS(ON)}$	$V_{GS} = -10\text{ V}, I_D = -2.5\text{ A}$	—	1.0	1.25	Ω
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -2.5\text{ A}$	1.8	3.7	—	S
Input capacitance		C_{iss}	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	800	—	pF
Reverse transfer capacitance		C_{rss}		—	80	—	
Output capacitance		C_{oss}		—	250	—	
Switching time	Rise time	t_r	<p>$I_D = -2.5\text{ A}$ $V_{GS} = 0\text{ V}, -10\text{ V}$ $R_L = 40\Omega$ $V_{DD} = -100\text{ V}$ Duty $\leq 1\%$, $t_W = 10\mu\text{s}$</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	$V_{DD} \approx -200\text{ V}, V_{GS} = -10\text{ V}, I_D = -5\text{ A}$	—	22	—	nC
Gate-source charge		Q_{gs}		—	14	—	
Gate-drain ("miller") charge		Q_{gd}		—	8	—	

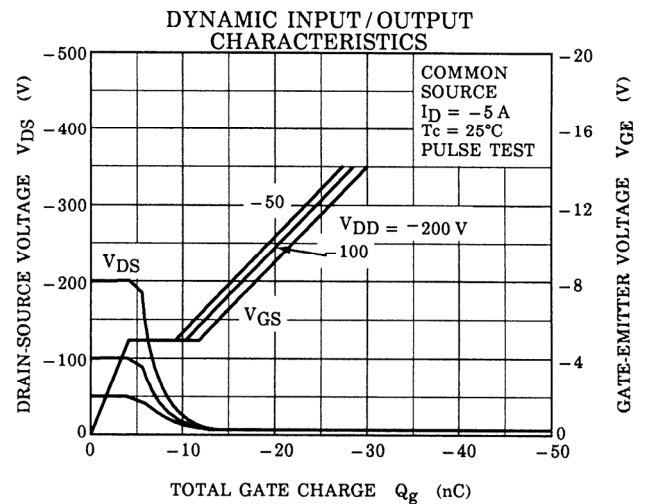
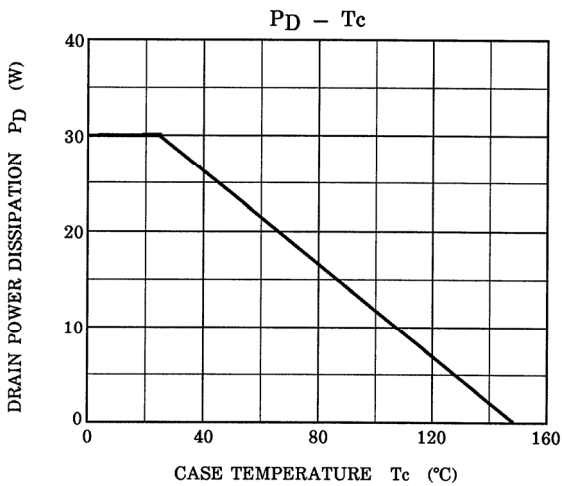
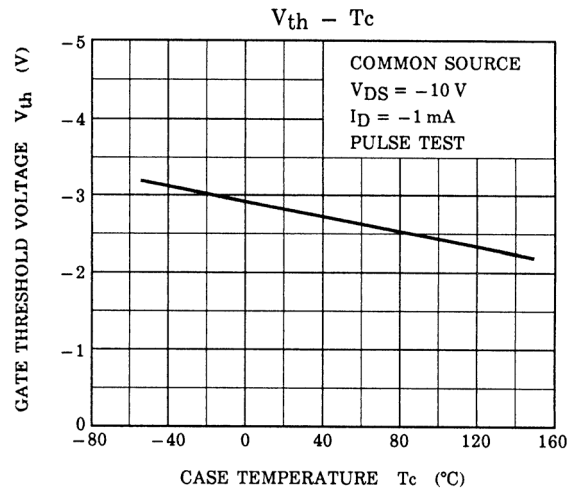
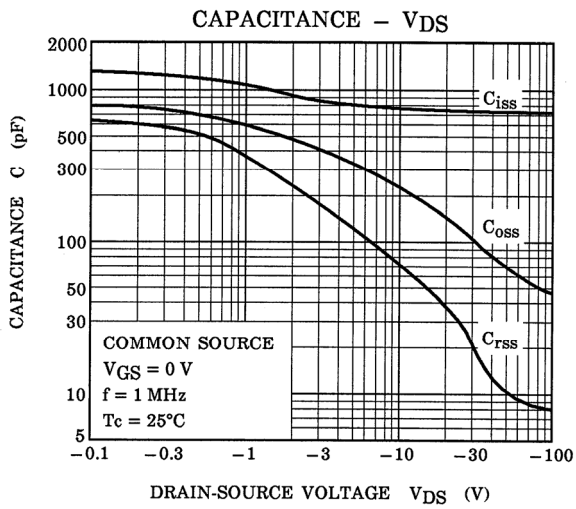
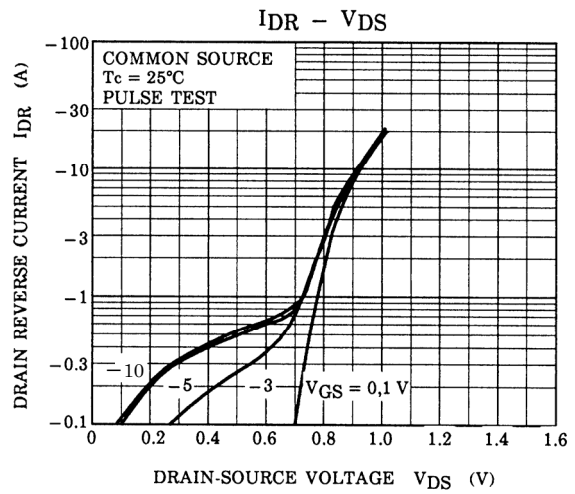
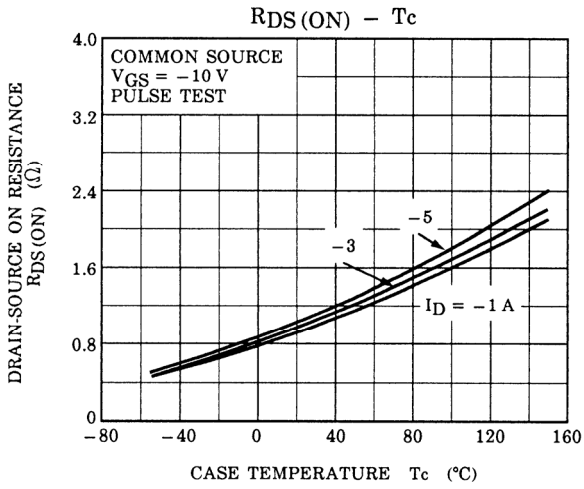
Source-Drain Ratings and Characteristics (Ta = 25°C)

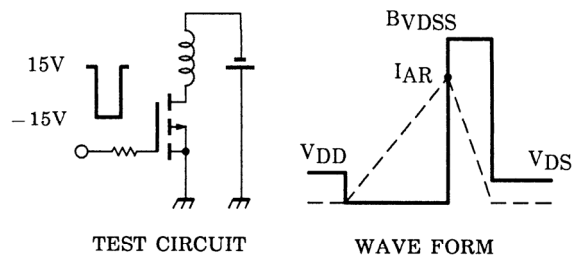
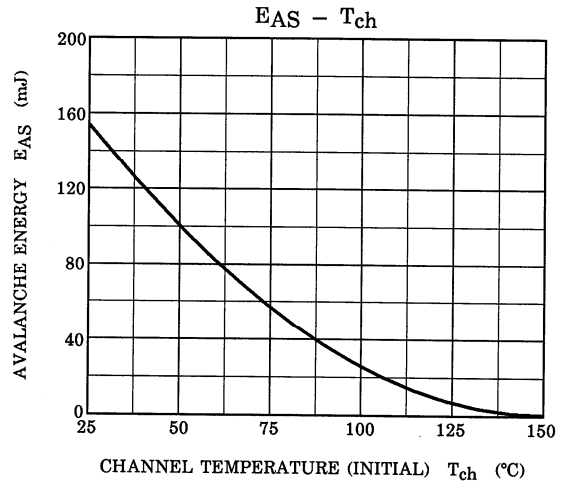
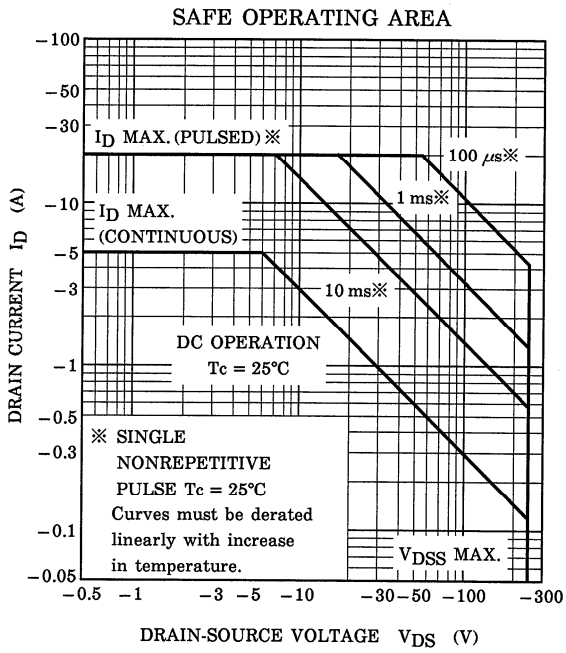
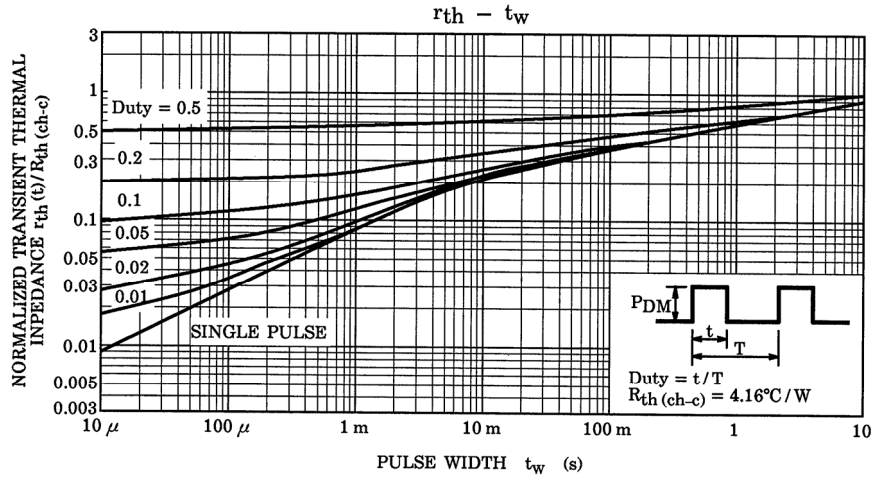
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	-5	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	-20	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = -5\text{ A}, V_{GS} = 0\text{ V}$	—	—	2.0	V
Reverse recovery time	t_{rr}	$I_{DR} = -5\text{ A}, V_{GS} = 0\text{ V}$	—	205	—	ns
Reverse recovery charge	Q_{rr}	$dI_{DR} / dt = 100\text{ A} / \mu\text{s}$	—	2.1	—	μC

Marking









$R_G = 25\Omega$
 $V_{DD} = -50V, L = 10.5mH$

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

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