

2SJ511

Chopper Regulator, DC-DC Converter and Motor Drive Applications

- 4-V gate drive
- Low drain-source ON resistance : $R_{DS(ON)} = 0.32 \Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 1.4 \text{ S}$ (typ.)
- Low leakage current : $I_{DSS} = -100 \mu\text{A}$ (max) ($V_{DS} = -30 \text{ V}$)
- Enhancement mode : $V_{th} = -0.8$ to -2.0 V ($V_{DS} = -10 \text{ V}$, $I_D = -1 \text{ mA}$)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	-30	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	-30	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	-2	A
	Pulse (Note 1)	I_{DP}	-6	A
Drain power dissipation		P_D	0.5	W
Drain power dissipation (Note 2)		P_D	1.5	W
Single pulse avalanche energy (Note 3)		E_{AS}	55	mJ
Avalanche current		I_{AR}	-2	A
Repetitive avalanche energy (Note 4)		E_{AR}	0.05	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 ambient	$R_{th(ch-a)}$	250	°C / W

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

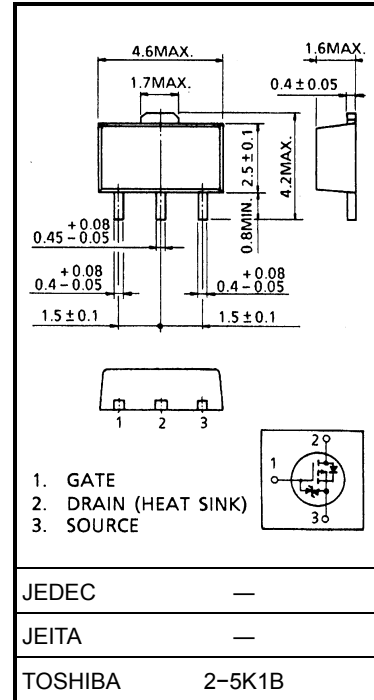
Note 2: Mounted on a ceramic substrate (25.4 mm × 25.4 mm × 0.8 mm)

Note 3: $V_{DD} = -25 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 10 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = -2 \text{ A}$

Note 4: Repetitive rating: pulse width limited by maximum channel temperature

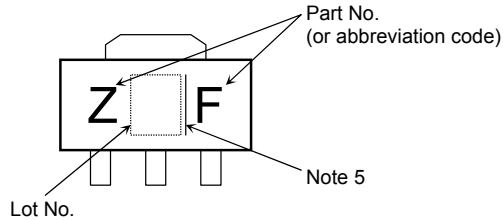
This transistor is an electrostatic-sensitive device.
Please handle with caution.

Unit: mm



Weight: 0.05 g (typ.)

Marking



Note 5: A line to the right of a Lot No. identifies the indication of product Labels.

Without a line: [[Pb]]/INCLUDES > MCV

With a line: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

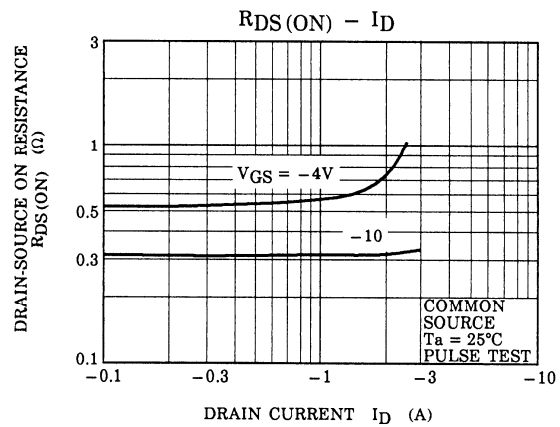
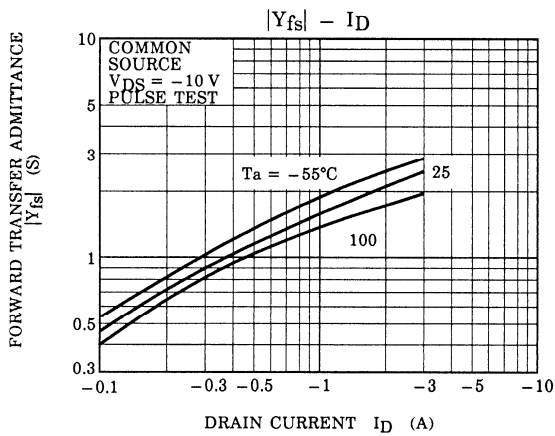
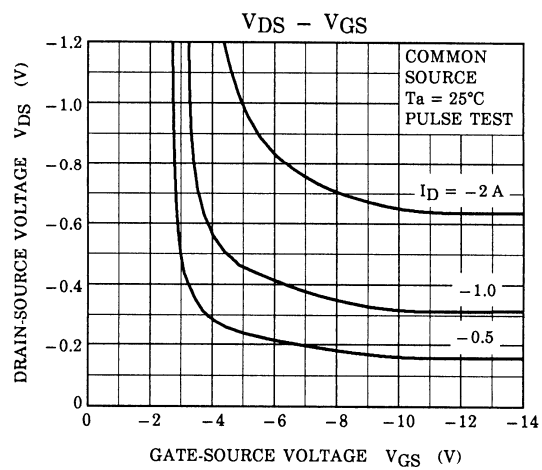
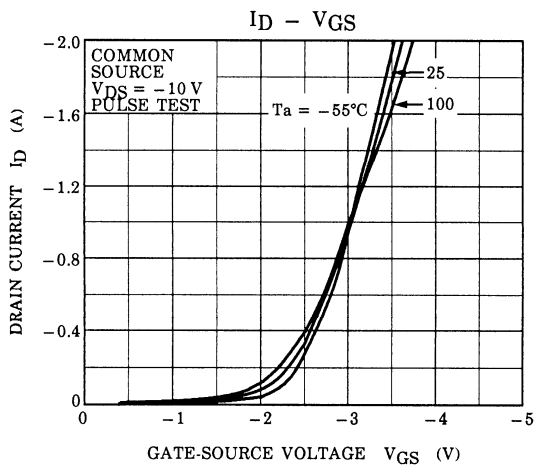
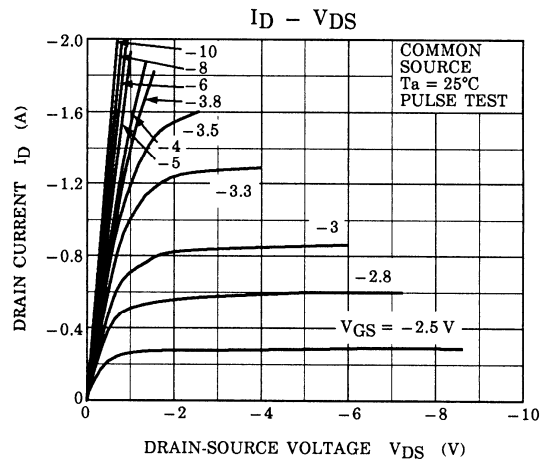
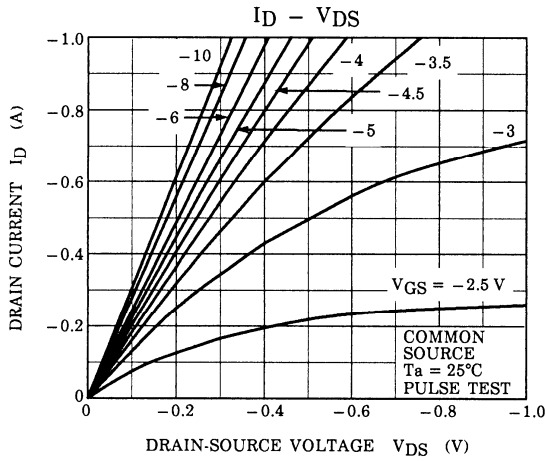
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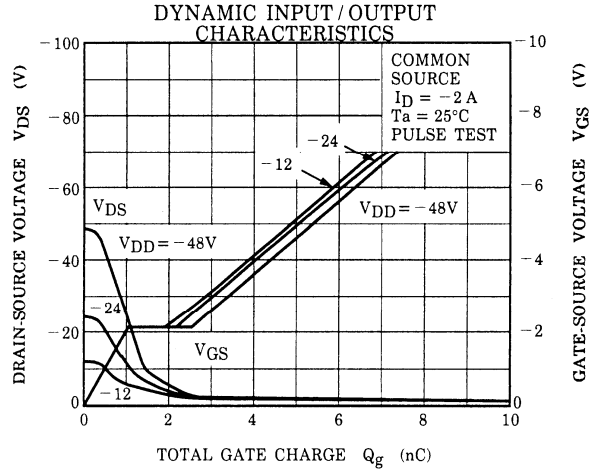
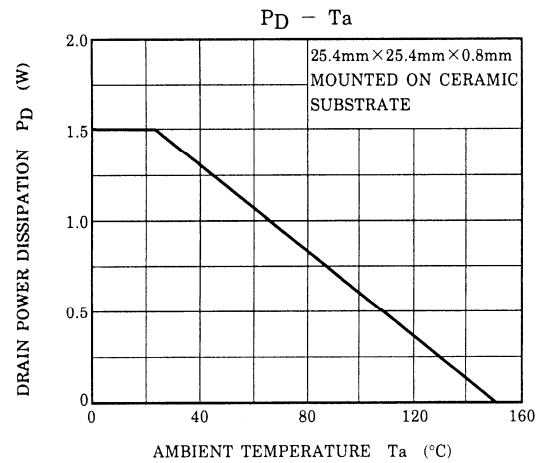
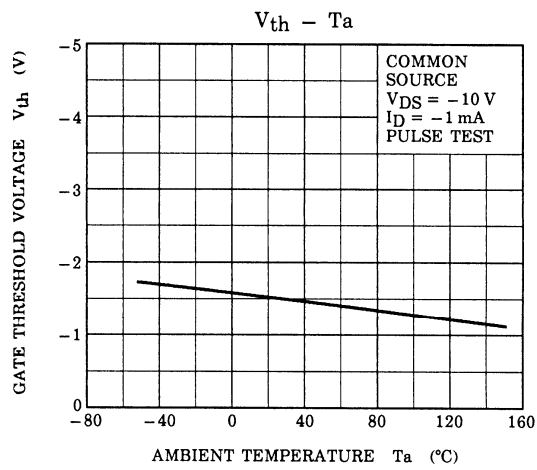
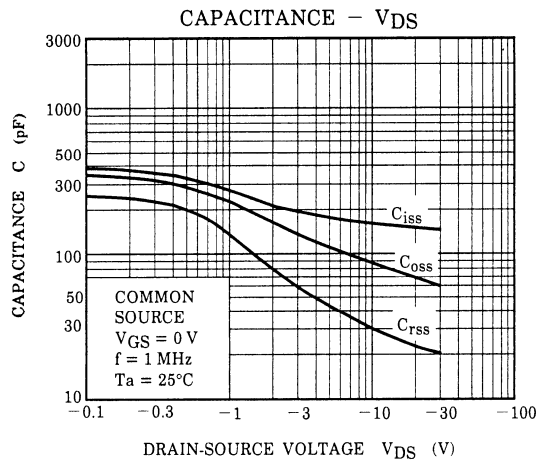
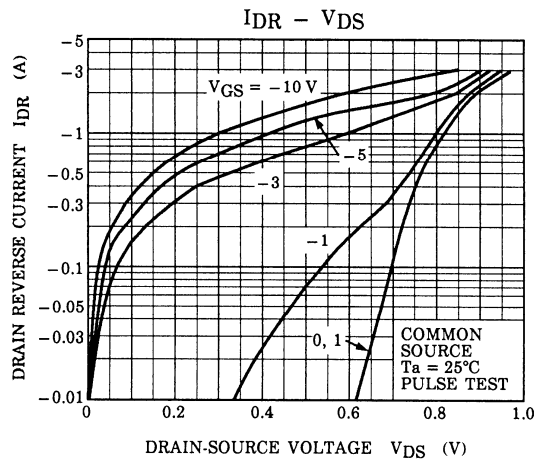
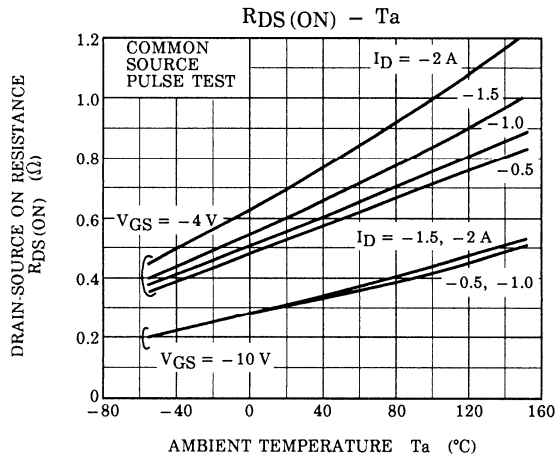
Electrical Characteristics (Ta = 25°C)

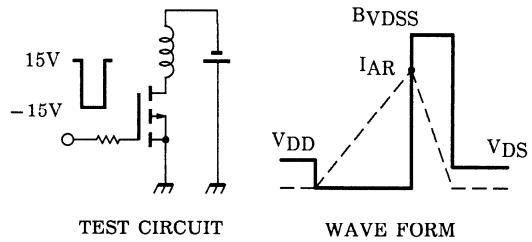
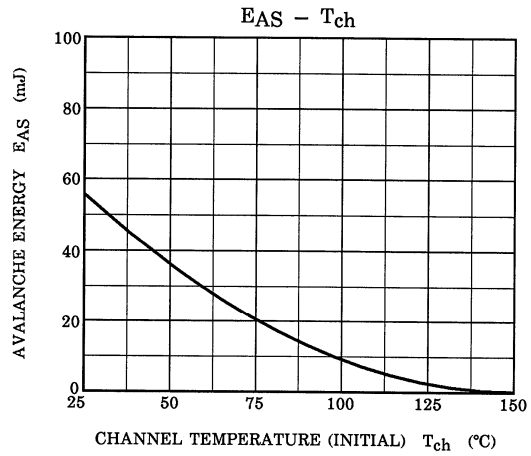
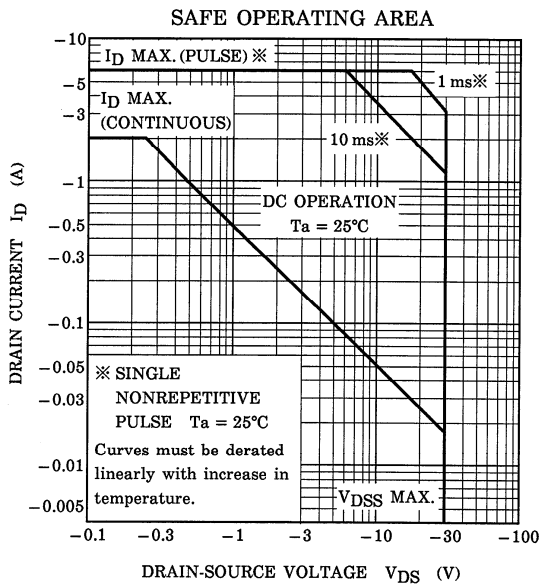
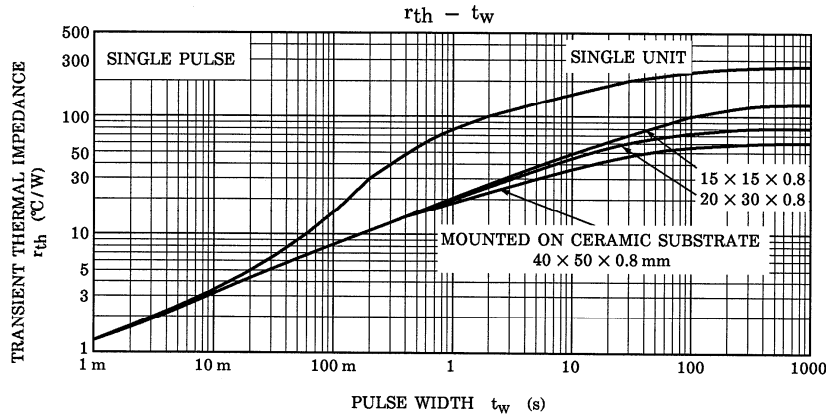
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$	—	—	-100	μA
Drain-source breakdown voltage		$V_{(BR) DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-30	—	—	V
Gate threshold voltage		V_{th}	$V_{DS} = -10\text{ V}, I_D = -1\text{ mA}$	-0.8	—	-2.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = -4\text{ V}, I_D = -1\text{ A}$	—	0.55	0.76	Ω
			$V_{GS} = -10\text{ V}, I_D = -1\text{ A}$	—	0.32	0.45	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -1\text{ A}$	0.7	1.4	—	S
Input capacitance		C_{iss}	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	160	—	pF
Reverse transfer capacitance		C_{rss}		—	30	—	
Output capacitance		C_{oss}		—	85	—	
Switching time	Rise time	t_r		—	30	—	ns
	Turn-on time	t_{on}		—	45	—	
	Fall time	t_f		—	30	—	
	Turn-off time	t_{off}		—	120	—	
Total gate charge (Gate-source plus gate-drain)		Q_g	$V_{DD} \approx -24\text{ V}, V_{GS} = -10\text{ V}, I_D = -2\text{ A}$	—	5.5	—	nC
Gate-source charge		Q_{gs}		—	4.3	—	
Gate-drain ("miller") charge		Q_{gd}		—	1.2	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR} (Note 1)	—	—	—	-2	A
Pulse drain reverse current (Note 1)	I_{DRP} (Note 1)	—	—	—	-6	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = -2\text{ A}, V_{GS} = 0\text{ V}$	—	—	1.5	V
Reverse recovery time	t_{rr}	$I_{DR} = -2\text{ A}, V_{GS} = 0\text{ V}$ $dI_{DR} / dt = 50\text{ A} / \mu\text{s}$	—	40	—	ns
Reverse recovery charge	Q_{rr}		—	18	—	nC







$R_G = 25\Omega$
 $V_{DD} = -25V, L = 10mH$

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

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