

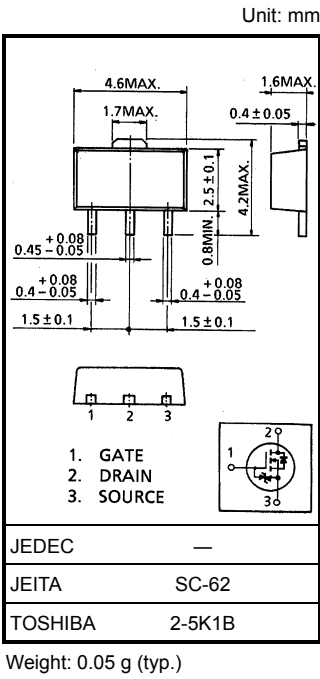
2SK2992

Chopper Regulator, DC-DC Converter and Motor Drive Applications

- Low drain-source ON resistance : $R_{DS(ON)} = 2.2\ \Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 0.9\ S$ (typ.)
- Low leakage current : $I_{DSS} = 100\ \mu A$ (max) ($V_{DS} = 200\ V$)
- Enhancement mode : $V_{th} = 2.0\sim 3.5\ V$ ($V_{DS} = 10\ V$, $I_D = 1\ mA$)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	200	V
Drain-gate voltage ($R_{GS} = 20\ k\Omega$)		V_{DGR}	200	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	1	A
	Pulse (Note 1)	I_{DP}	3	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}	36	mJ
Avalanche current		I_{AR}	1	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



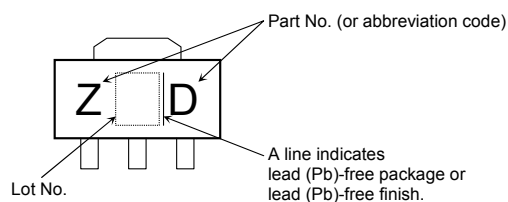
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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: $V_{DD} = 50\ V$, $T_{ch} = 25^\circ C$ (initial), $L = 56.7\ mH$, $R_G = 25\ \Omega$, $I_{AR} = 1\ A$
- Note 4: Repetitive rating: pulse width limited by maximum channel temperature
- This transistor is an electrostatic-sensitive device.
Please handle with caution.

Marking

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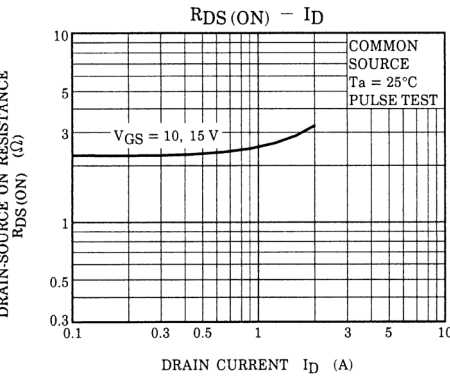
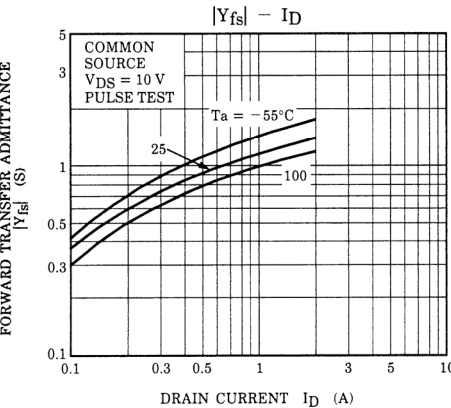
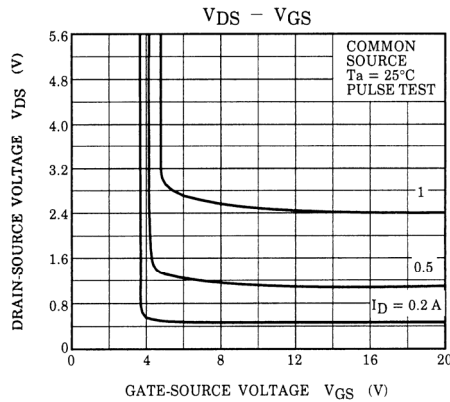
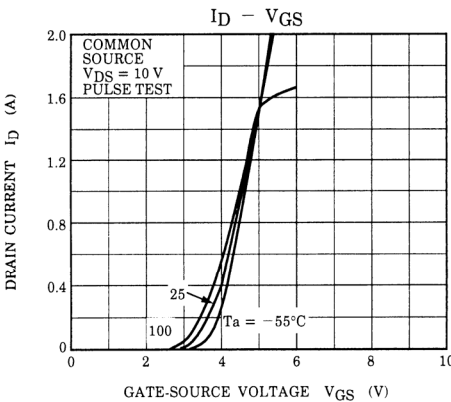
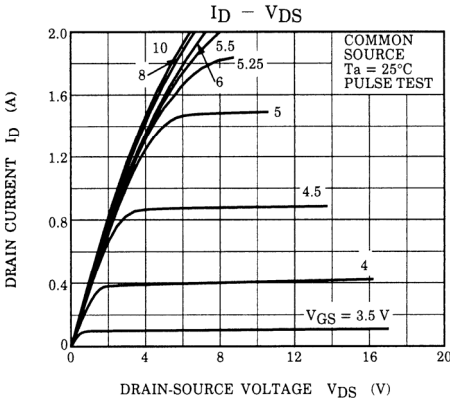
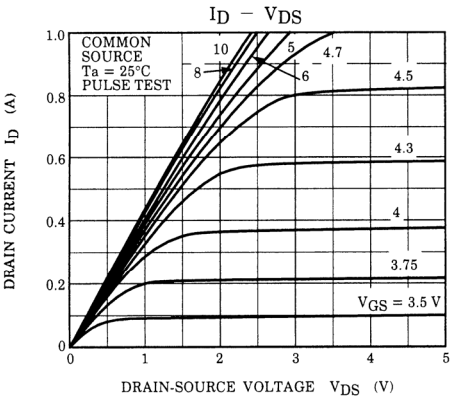
Electrical Characteristics (Ta = 25°C)

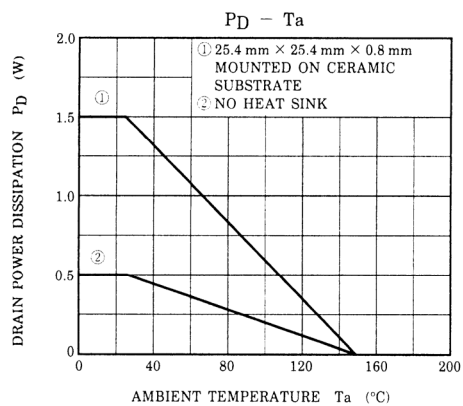
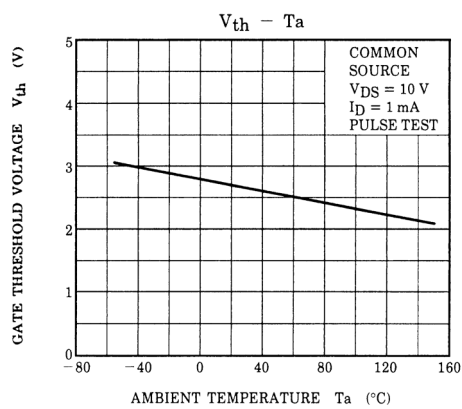
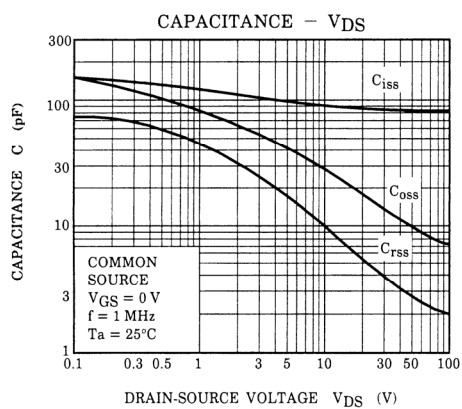
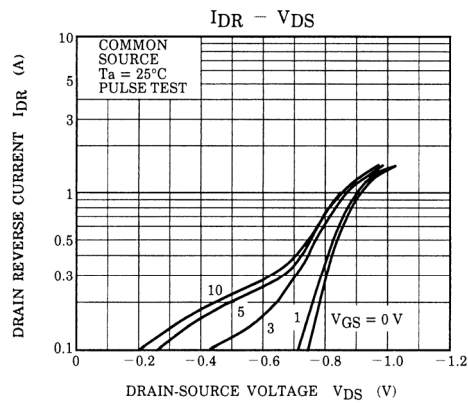
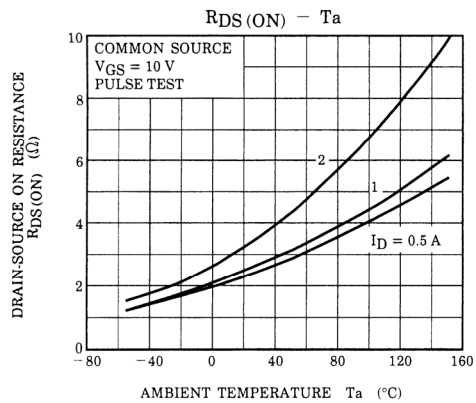
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GSS}	$V_{GS} = \pm 16\text{ V}$, $V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current	I_{DSS}	$V_{DS} = 200\text{ V}$, $V_{GS} = 0\text{ V}$	—	—	100	μA
Drain-source breakdown voltage	$V_{(BR) DSS}$	$I_D = 10\text{ mA}$, $V_{GS} = 0\text{ V}$	200	—	—	V
Gate threshold voltage	V_{th}	$V_{DS} = 10\text{ V}$, $I_D = 1\text{ mA}$	2.0	—	3.5	V
Drain-source ON resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}$, $I_D = 0.5\text{ A}$	—	2.2	3.5	Ω
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10\text{ V}$, $I_D = 0.5\text{ A}$	0.5	0.9	—	S
Input capacitance	C_{iss}	$V_{DS} = 10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	—	90	—	pF
Reverse transfer capacitance	C_{rss}		—	10	—	
Output capacitance	C_{oss}		—	30	—	
Switching time	Rise time	$I_D = 0.5\text{ A}$ $V_{GS} = 10\text{ V}$ $V_{DS} = 100\text{ V}$ $R_L = 200\Omega$ Duty $\leq 1\%$, $t_w = 10\mu\text{s}$	—	9	—	ns
	Turn-on time		—	17	—	
	Fall time		—	16	—	
	Turn-off time		—	45	—	
Total gate charge (gate-source plus gate-drain)	Q_g	$V_{DD} \approx 160\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 1\text{ A}$	—	3.0	—	nC
Gate-source charge	Q_{gs}		—	1.8	—	
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}	—	—	—	1	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	3	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 1\text{ A}$, $V_{GS} = 0\text{ V}$	—	—	-1.5	V
Reverse recovery time	t_{rr}	$I_{DR} = 1\text{ A}$, $V_{GS} = 0\text{ V}$, $dI_{DR}/dt = 100\text{ A}/\mu\text{s}$	—	85	—	ns
Reverse recovery charge	Q_{rr}		—	190	—	nC

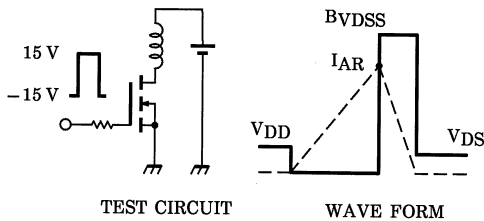
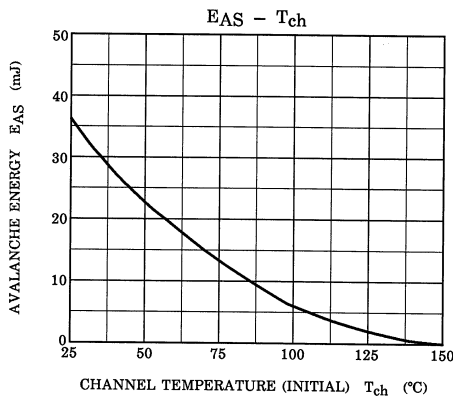
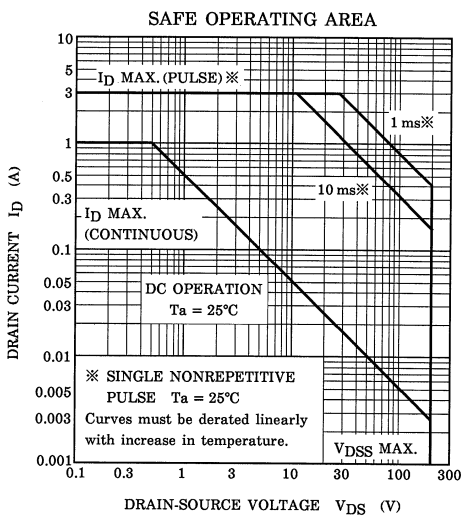
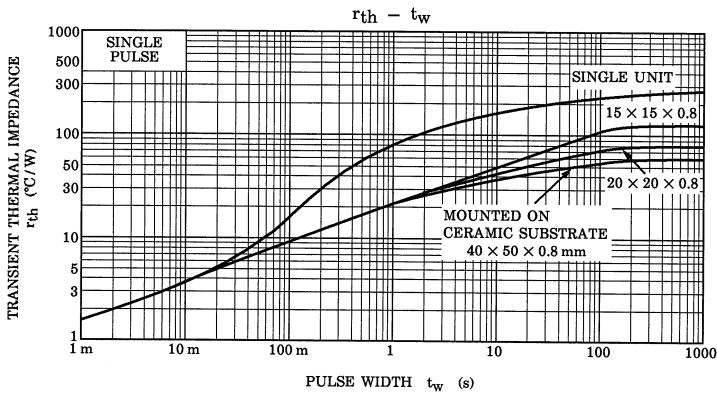
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$R_G = 25 \, \Omega$
 $V_{DD} = 50 \, \text{V}, L = 56.7 \, \text{mH}$
$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{B_{VDS}}{B_{VDS} - V_{DD}} \right)$$

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