

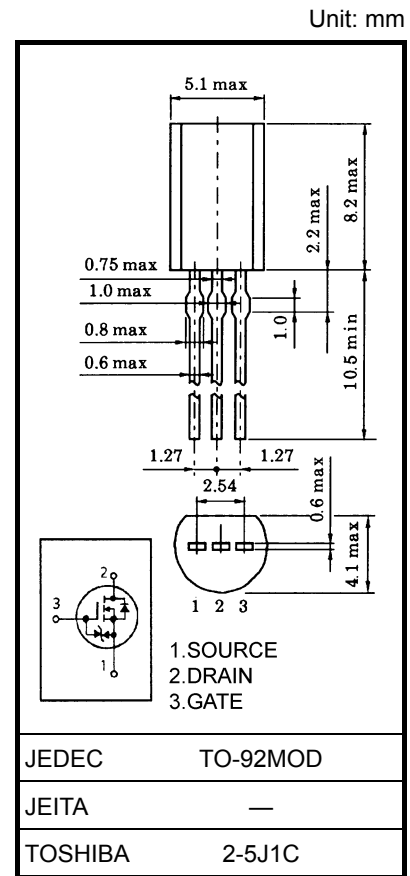
2SK2989

Chopper Regulator, DC-DC Converter and Motor Drive Applications

- Low drain-source ON resistance : $R_{DS(ON)} = 120 \text{ m}\Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 2.6 \text{ S}$ (typ.)
- Low leakage current : $I_{DSS} = 100 \text{ }\mu\text{A}$ (max) ($V_{DS} = 50 \text{ V}$)
- Enhancement-mode : $V_{th} = 1.0\sim 2.2 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	50	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	50	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	5	A
	Pulse (Note 1)	I_{DP}	15	
Drain power dissipation		P_D	0.9	W
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55~150	$^\circ\text{C}$



Weight: 0.36 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 ambient	$R_{th(ch-a)}$	138	$^\circ\text{C} / \text{W}$

Note 1: Please use devices on condition that the channel temperature is below 150°C .

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

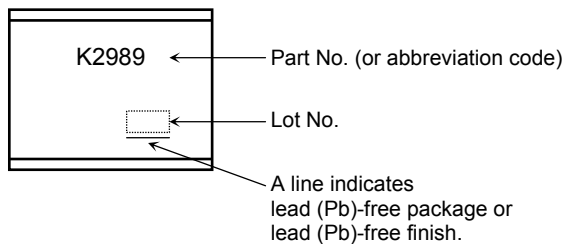
Electrical Characteristics (Ta = 25°C)

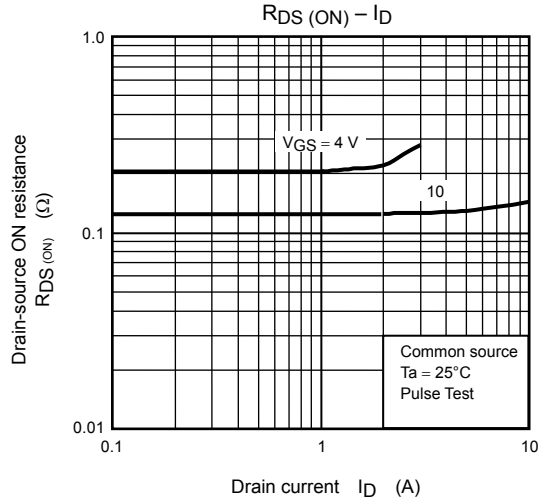
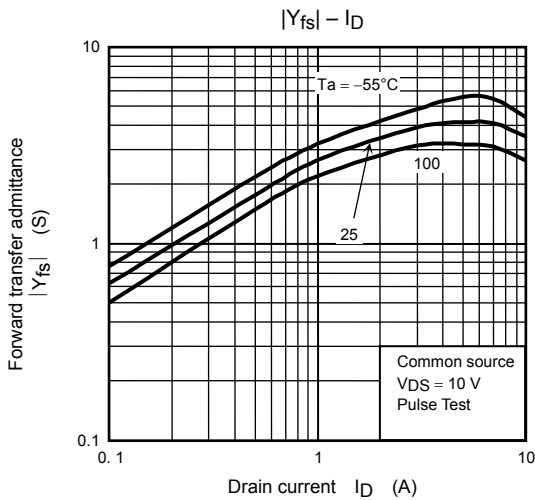
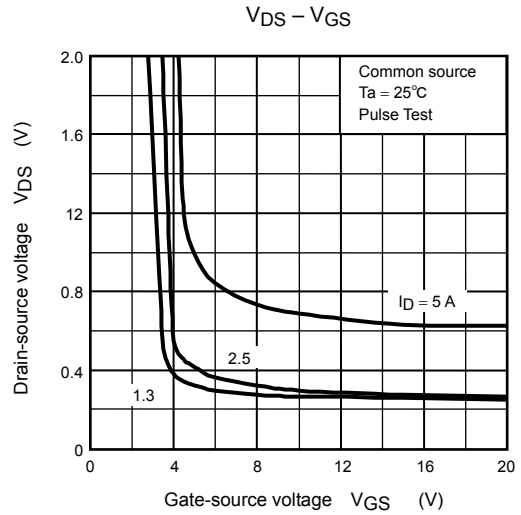
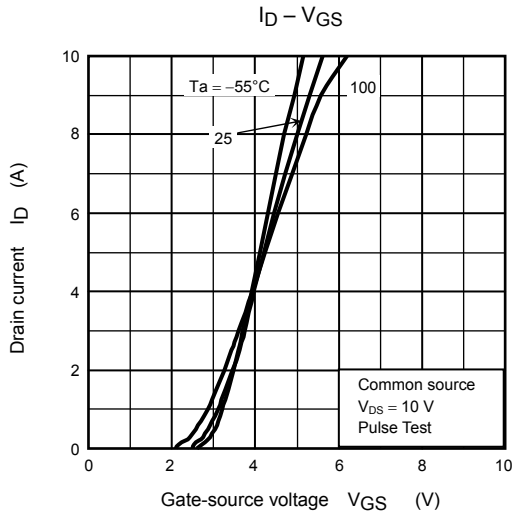
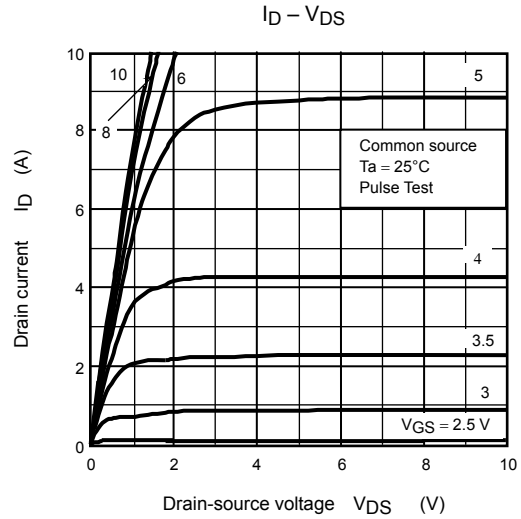
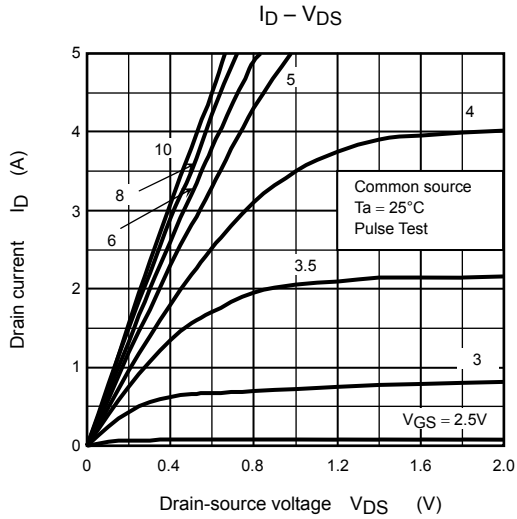
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}$	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	50	—	—	V
Gate threshold voltage		V_{th}	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.0	—	2.2	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 4\text{ V}, I_D = 1.3\text{ A}$	—	240	330	m Ω
			$V_{GS} = 10\text{ V}, I_D = 2.5\text{ A}$	—	120	150	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 2.5\text{ A}$	1.3	2.6	—	S
Input capacitance		C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	145	—	pF
Reverse transfer capacitance		C_{rss}		—	25	—	
Output capacitance		C_{oss}		—	75	—	
Switching time	Rise time	t_r	<p>$I_D = 2.5\text{ A}$ $V_{GS} = 10\text{ V}$ $V_{DS} = 25\text{ V}$ $R_L = 10\ \Omega$ $V_{DD} \approx 25\text{ V}$ Duty $\leq 1\%$, $t_w = 10\ \mu\text{s}$</p>	—	16	—	ns
	Turn-on time	t_{on}		—	23	—	
	Fall time	t_f		—	27	—	
	Turn-off time	t_{off}		—	110	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx 40\text{ V}, V_{GS} = 10\text{ V}, I_D = 5\text{ A}$	—	6.5	—	nC
Gate-source charge		Q_{gs}		—	5	—	
Gate-drain ("miller") Charge		Q_{gd}		—	1.5	—	

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

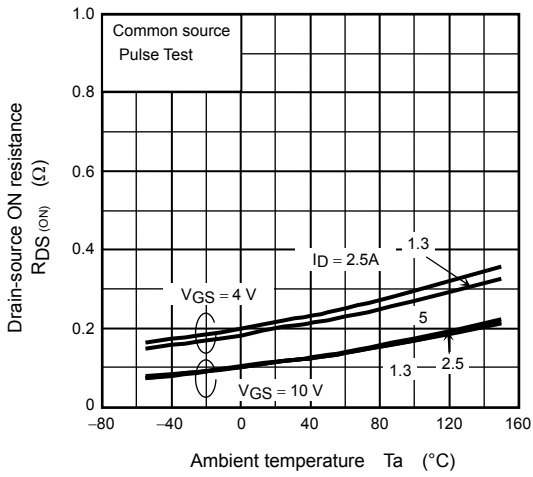
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	5	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	15	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 5\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.5	V

Marking

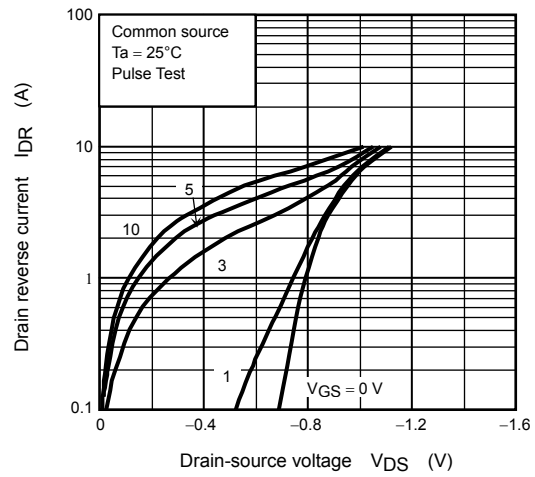




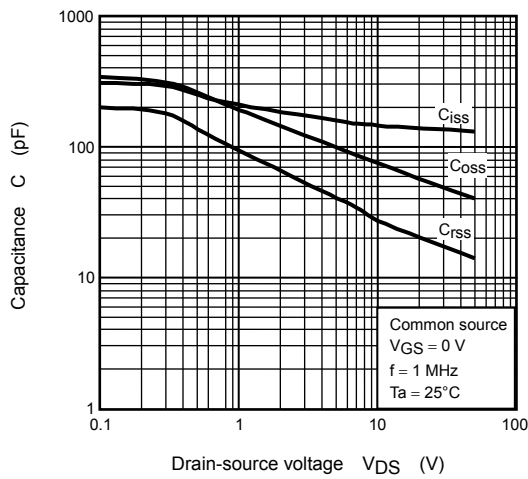
$R_{DS(ON)} - T_a$



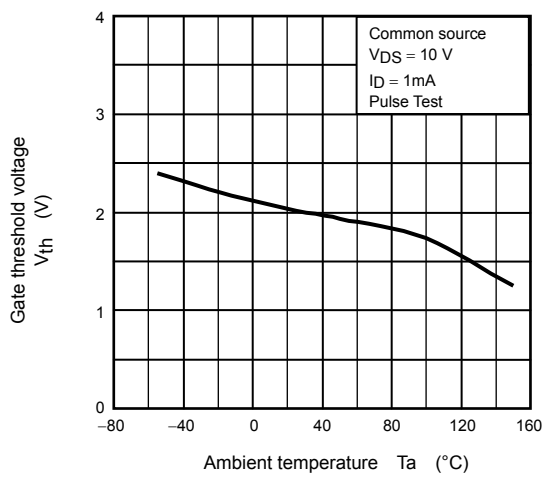
$I_{DR} - V_{DS}$



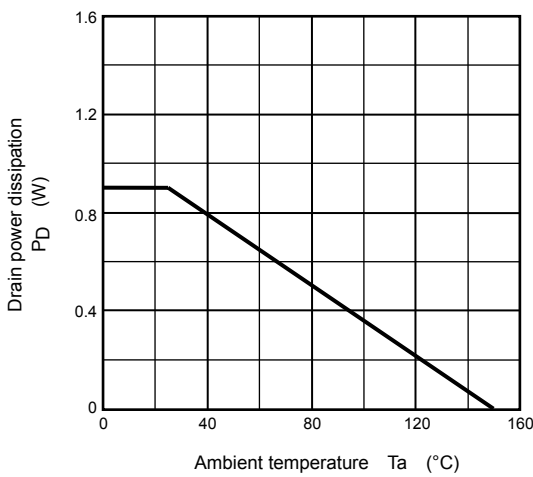
Capacitance - V_{DS}



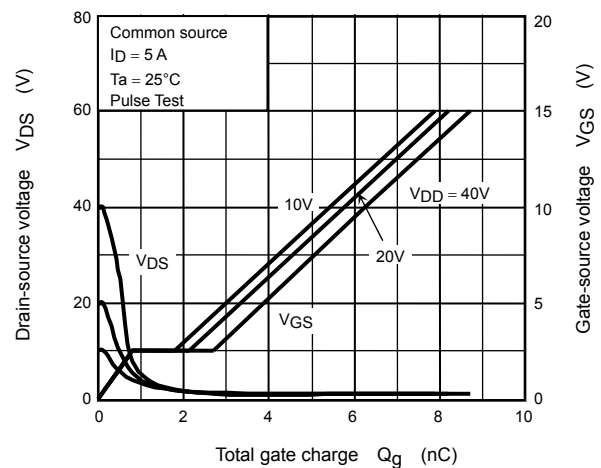
$V_{th} - T_a$

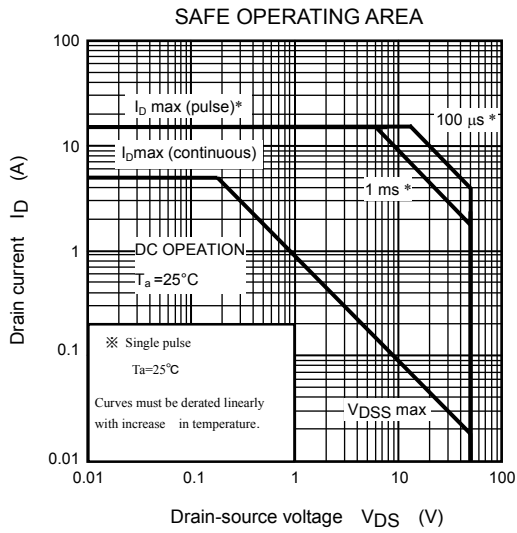
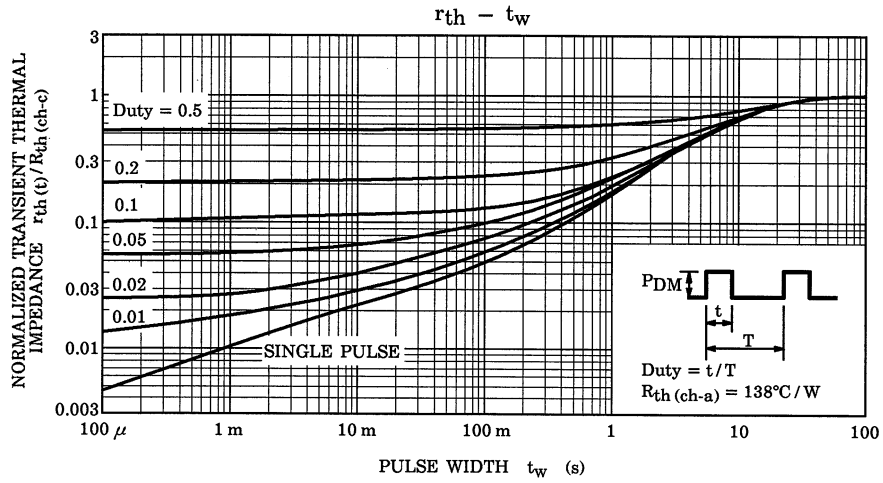


$P_D - T_a$



Dynamic input / output characteristics





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