

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

2SK2699

Chopper Regulator, DC-DC Converter and Motor Drive Applications

- Low drain-source ON resistance : $R_{DS}(\text{ON}) = 0.5 \, \Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 11 \, \text{S}$ (typ.)
- Low leakage current : $I_{DSS} = 100 \, \mu\text{A}$ (max) ($V_{DS} = 600 \, \text{V}$)
- Enhancement mode : $V_{th} = 2.0$ to $4.0 \, \text{V}$ ($V_{DS} = 10 \, \text{V}$, $I_D = 1 \, \text{mA}$)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain–source voltage		V_{DSS}	600	V
Drain–gate voltage ($R_{GS} = 20\text{ k}\Omega$)		V_{DGR}	600	V
Gate–source voltage		V_{GSS}	± 30	V
Drain current	DC (Note 1)	I_D	12	A
	Pulse (Note 1)	I_{DP}	48	A
Drain power dissipation ($T_c = 25^\circ\text{C}$)		P_D	150	W
Single pulse avalanche energy (Note 2)		E_{AS}	605	mJ
Avalanche current		I_{AR}	12	A
Repetitive avalanche energy (Note 3)		E_{AR}	15	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$

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	$R_{th(ch-c)}$	0.833	$^{\circ}C/W$
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	50	$^{\circ}C/W$

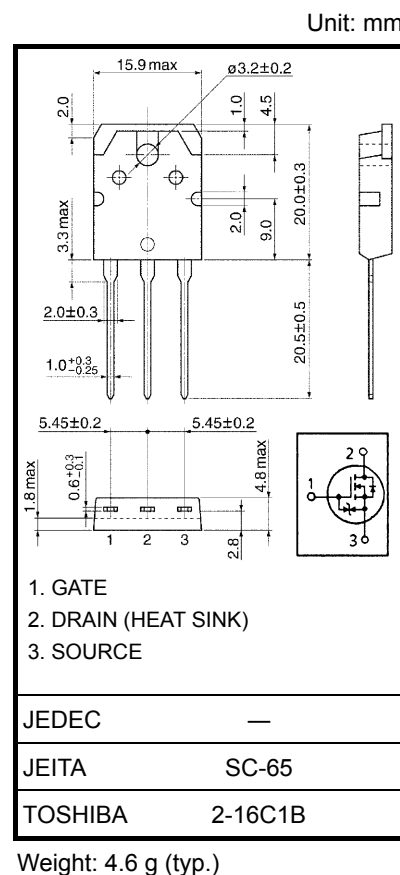
Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2: $V_{DD} = 90 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 7.35 \text{ mH}$, $R_G = 25 \text{ }\Omega$, $I_{AB} = 12 \text{ A}$

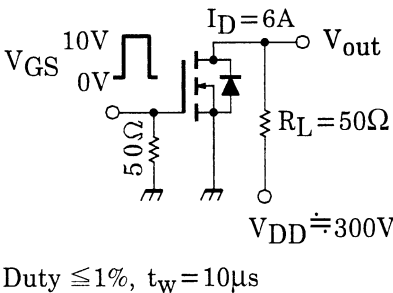
Note 3: Repetitive rating: pulse width limited by maximum channel temperature

This transistor is an electrostatic-sensitive device.

Please handle with caution.



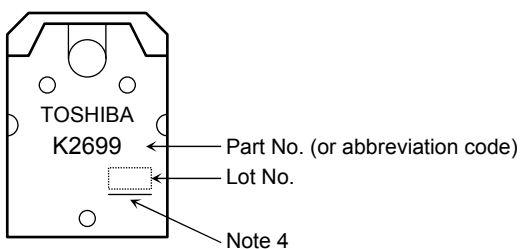
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 25 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Gate-source breakdown voltage		$V_{(BR) GSS}$	$I_G = \pm 10 \mu\text{A}, V_{DS} = 0 \text{ V}$	± 30	—	—	V
Drain cut-off current		I_{DSS}	$V_{DS} = 600 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR) DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	600	—	—	V
Gate threshold voltage		V_{th}	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	2.0	—	4.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 10 \text{ V}, I_D = 6 \text{ A}$	—	0.5	0.65	Ω
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 6 \text{ A}$	6.0	11.0	—	S
Input capacitance		C_{iss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	2600	—	pF
Reverse transfer capacitance		C_{rss}		—	270	—	
Output capacitance		C_{oss}		—	820	—	
Switching time	Rise time	t_r		—	45	—	ns
	Turn-on time	t_{on}		—	75	—	
	Fall time	t_f		—	65	—	
	Turn-off time	t_{off}		—	270	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx 480 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 12 \text{ A}$	—	58	—	nC
Gate-source charge		Q_{gs}		—	37	—	
Gate-drain ("miller") Charge		Q_{gd}		—	21	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	12	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	48	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 12 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 12 \text{ A}, V_{GS} = 0 \text{ V}$	—	460	—	ns
Reverse recovery charge	Q_{rr}	$dI_{DR} / dt = 100 \text{ A} / \mu\text{s}$	—	4.8	—	μC

Marking

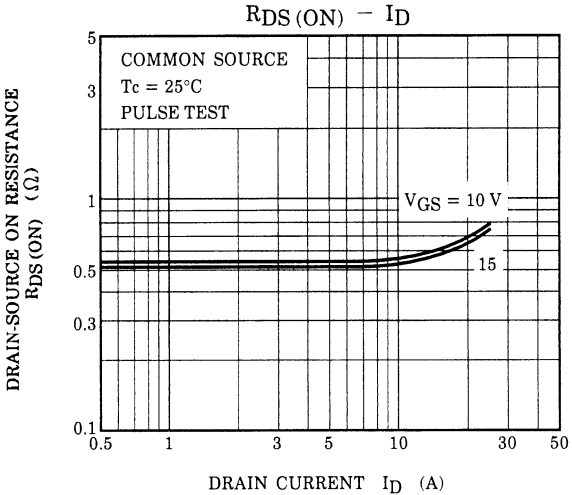
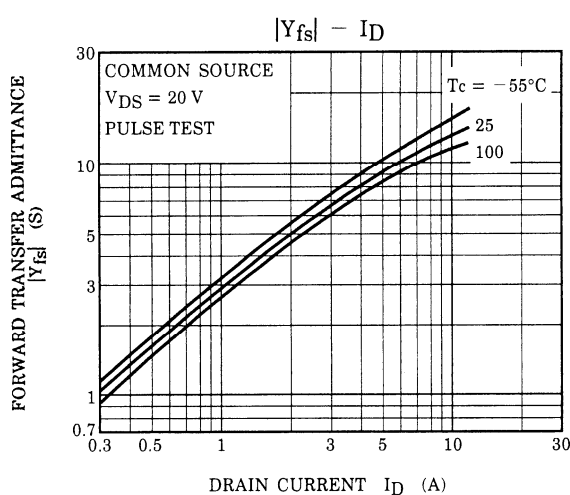
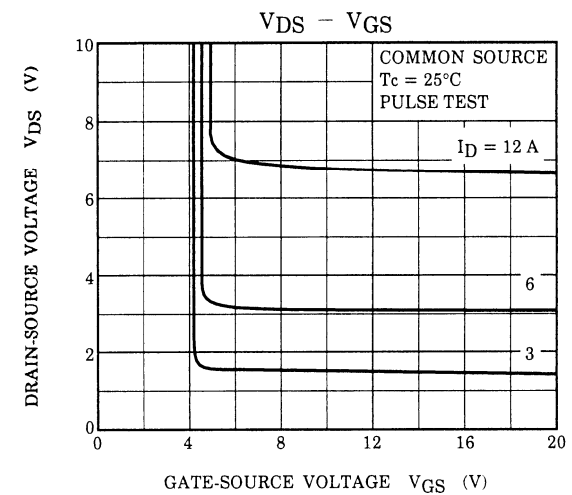
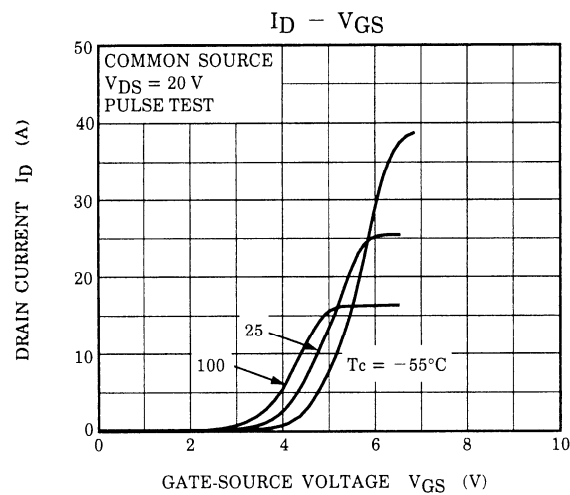
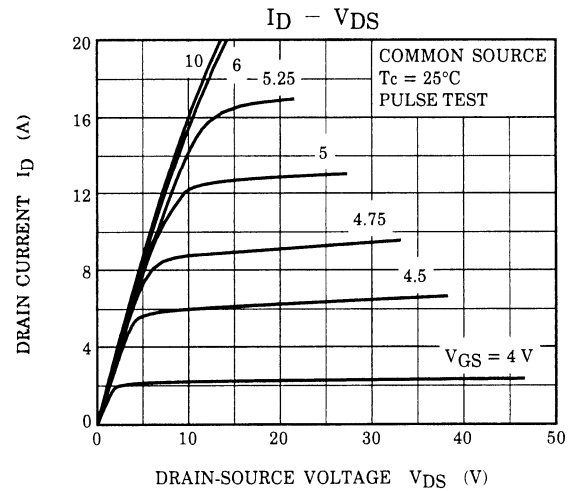
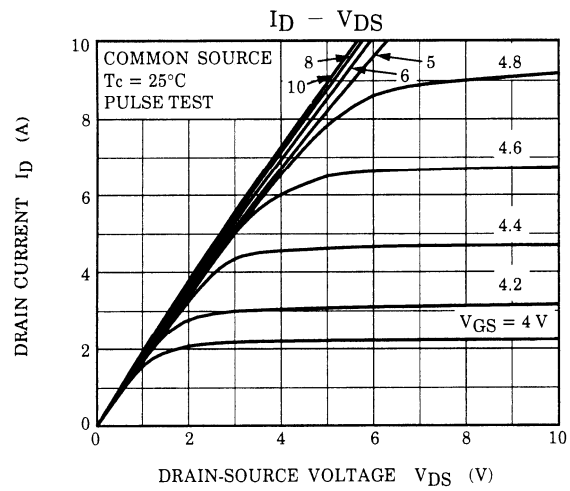


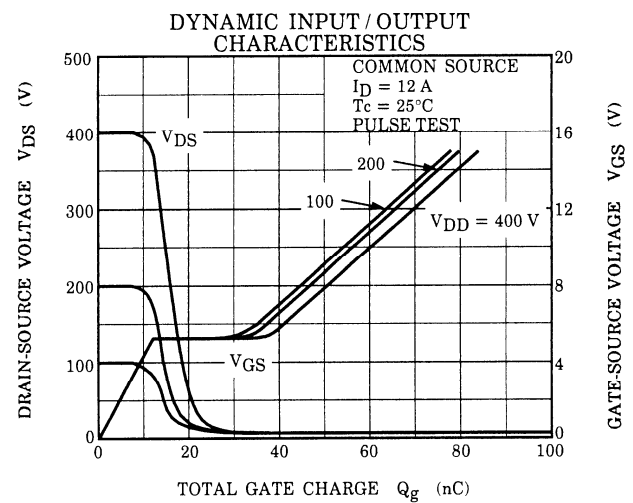
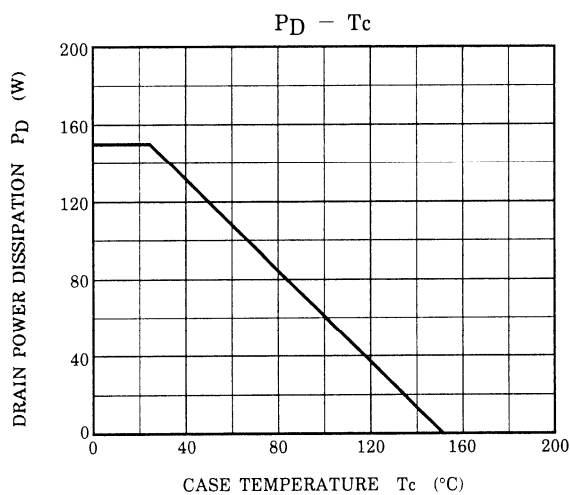
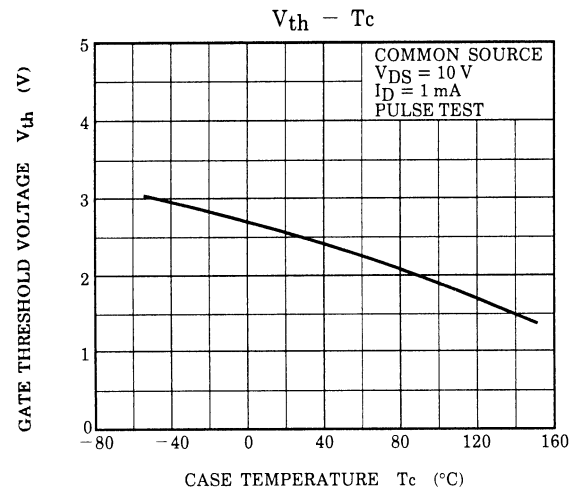
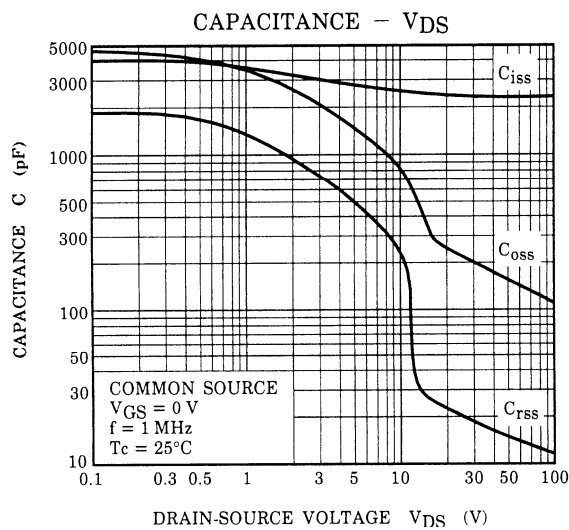
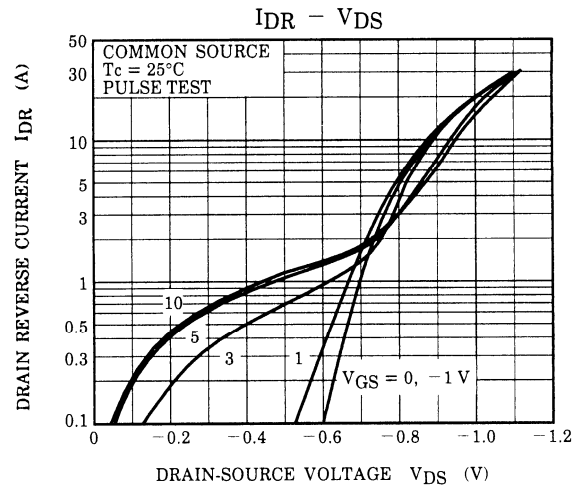
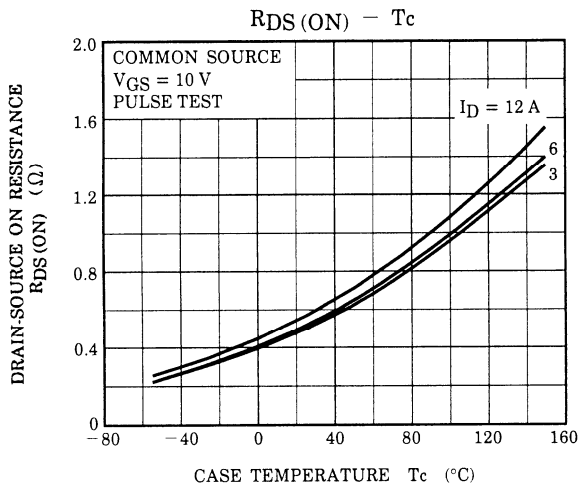
Note 4: A line under a Lot No. identifies the indication of product Labels.

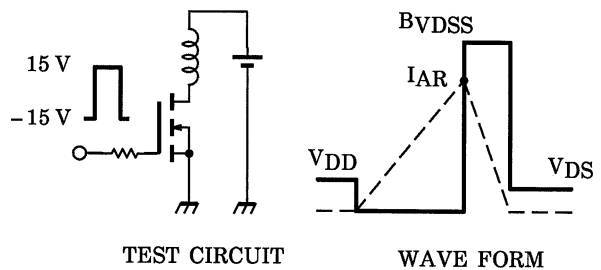
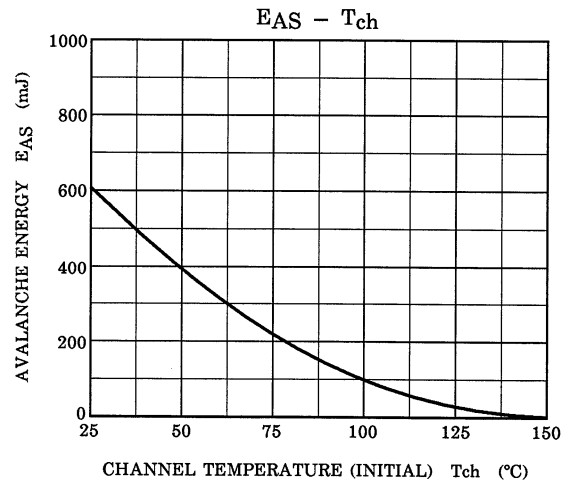
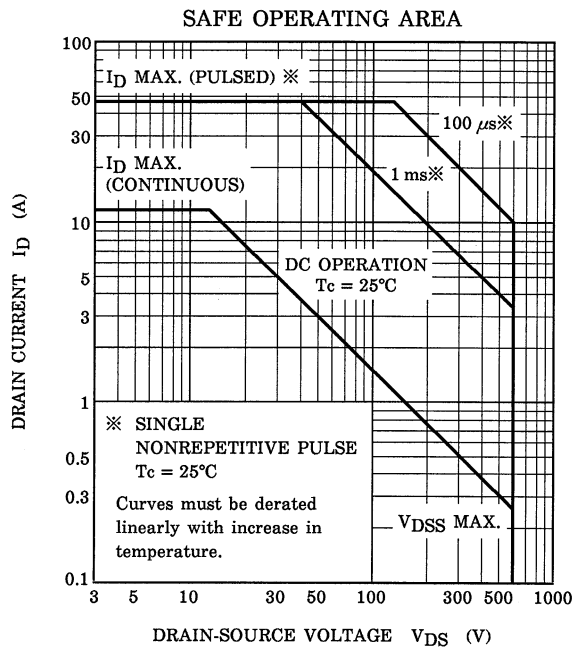
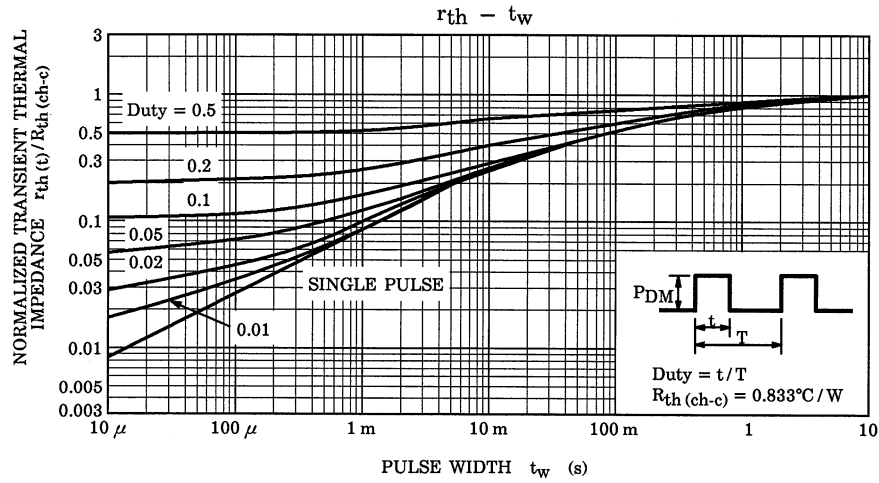
Not underlined: $[[Pb]]/INCLUDES > MCV$

Underlined: $[[G]]/RoHS \text{ COMPATIBLE}$ or $[[G]]/RoHS [[Pb]]$

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$$R_G = 25 \, \Omega \quad V_{DD} = 90 \, V, L = 7.35 \, mH \quad EAS = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{BVDSS}{BVDSS - V_{DD}} \right)$$

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