

2SK3499

Switching Regulator and DC-DC Converter Applications

Motor Drive Applications

- Low drain-source ON-resistance: $R_{DS(ON)} = 0.4 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 8.0 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100 \mu\text{A}$ (max) ($V_{DS} = 400 \text{ V}$)
- Enhancement mode: $V_{th} = 2.0 \text{ to } 4.0 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Drain-source voltage	V _{DSS}	400	V
Drain-gate voltage ($R_{GS} = 20\text{ k}\Omega$)	V _{DGR}	400	V
Gate-source voltage	V _{GSS}	±30	V
Drain current	DC (Note 1)	I _D	10
	Pulse (Note 1)	I _{DP}	40
Drain power dissipation ($T_c = 25^\circ\text{C}$)	P _D	80	W
Single pulse avalanche energy (Note 2)	E _{AS}	360	mJ
Avalanche current	I _{AR}	10	A
Repetitive avalanche energy (Note 3)	E _{AR}	8	mJ
Channel temperature	T _{ch}	150	°C
Storage temperature range	T _{stg}	-55 to 150	°C

Unit: mm

Technical drawing of a TOSHIBA MOSFET package showing dimensions and lead identification. The drawing includes a top view of the package with lead numbers 1, 2, 3, and 4, and a side view. Dimensions are as follows:

- Top view: Total width 9.2 max, lead spacing 7.0 ± 0.2, lead thickness 4, lead height 0.8 max, side height 0.4 ± 0.1.
- Side view: Total height 9.2 max, side thickness 0.7 max, side height 3.0 max.
- Bottom view (lead identification): Lead 1 is GATE, Lead 2 is N.C., Lead 3 is SOURCE, and Lead 4 is DRAIN.

JEDEC

JEITA

TOSHIBA

2.9E1C

Weight: 0.74 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

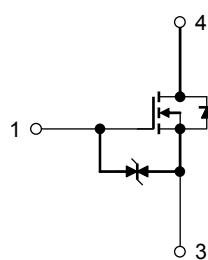
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	R_{th} (ch-c)	1.56	°C/W

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), $L = 5.85 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = 10 \text{ A}$

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

This transistor is an electrostatic-sensitive device. Handle with care.



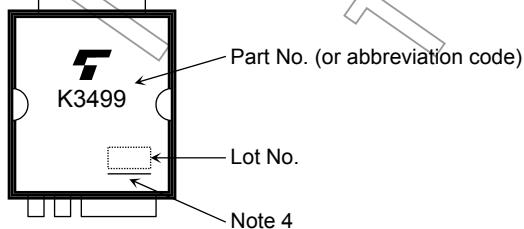
Electrical Characteristics ($T_a = 25^\circ C$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GSS}	$V_{GS} = \pm 25 V, V_{DS} = 0 V$	—	—	± 10	μA
Gate-source breakdown voltage	$V_{(BR) GSS}$	$I_G = \pm 10 \mu A, V_{DS} = 0 V$	± 30	—	—	V
Drain cut-off current	I_{DSS}	$V_{DS} = 400 V, V_{GS} = 0 V$	—	—	100	μA
Drain-source breakdown voltage	$V_{(BR) DSS}$	$I_D = 10 mA, V_{GS} = 0 V$	400	—	—	V
Gate threshold voltage	V_{th}	$V_{DS} = 10 V, I_D = 1 mA$	2.0	—	4.0	V
Drain-source ON-resistance	$R_{DS (\text{ON})}$	$V_{GS} = 10 V, I_D = 5.0 A$	—	0.4	0.55	Ω
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10 V, I_D = 5.0 A$	4.0	8.0	—	S
Input capacitance	C_{iss}	$V_{DS} = 10 V, V_{GS} = 0 V, f = 1 \text{ MHz}$	—	1340	—	pF
Reverse transfer capacitance	C_{rss}		—	160	—	
Output capacitance	C_{oss}		—	490	—	
Switching time	Rise time	t_r		—	22	—
	Turn-on time	t_{on}		—	60	—
	Fall time	t_f		—	32	—
	Turn-off time	t_{off}		—	140	—
Total gate charge (gate-source plus gate-drain)	Q_g		—	34	—	nC
Gate-source charge	Q_{gs}		—	18	—	
Gate-drain ('miller') charge	Q_{gd}		—	16	—	

Source-Drain Ratings and Characteristics ($T_a = 25^\circ C$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	10	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	40	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 10 A, V_{GS} = 0 V$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 10 A, V_{GS} = 0 V$	—	330	—	ns
Reverse recovery charge	Q_{rr}	$dI_{DR}/dt = 100 A/\mu s$	—	3.2	—	μC

Marking

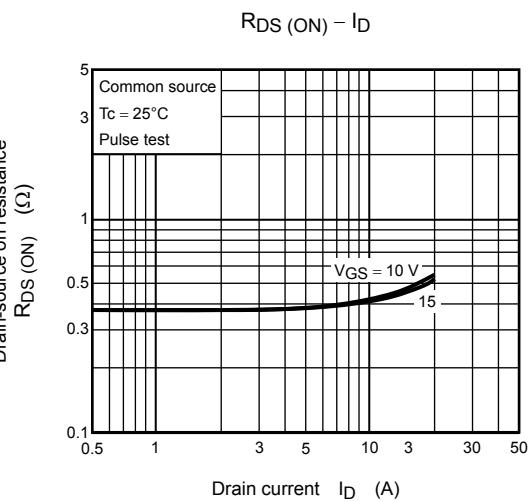
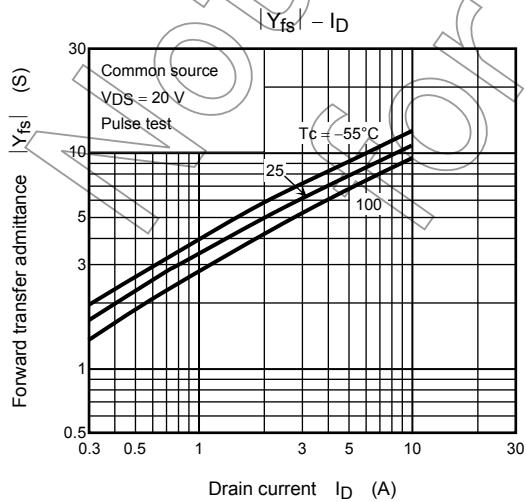
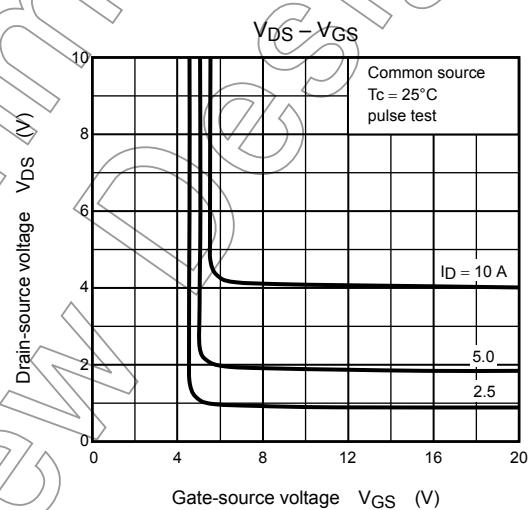
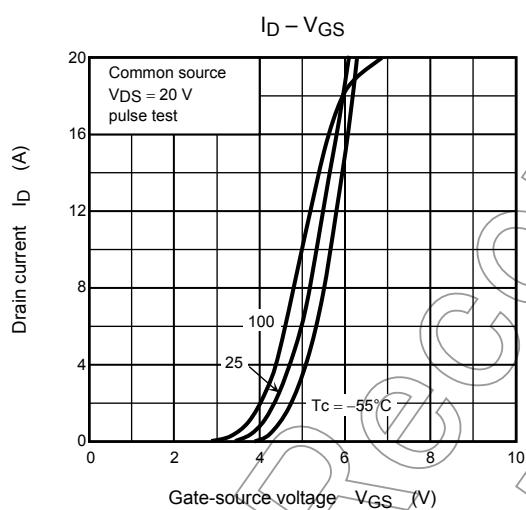
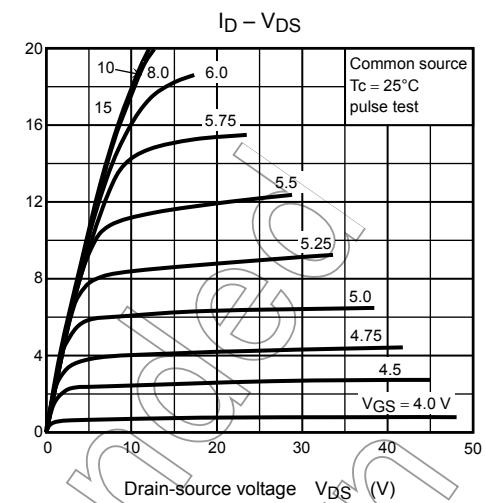
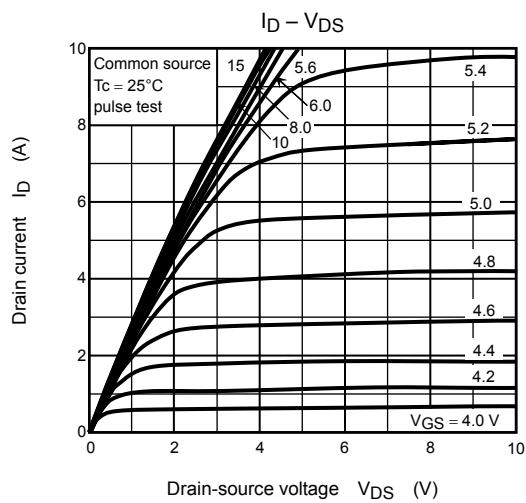


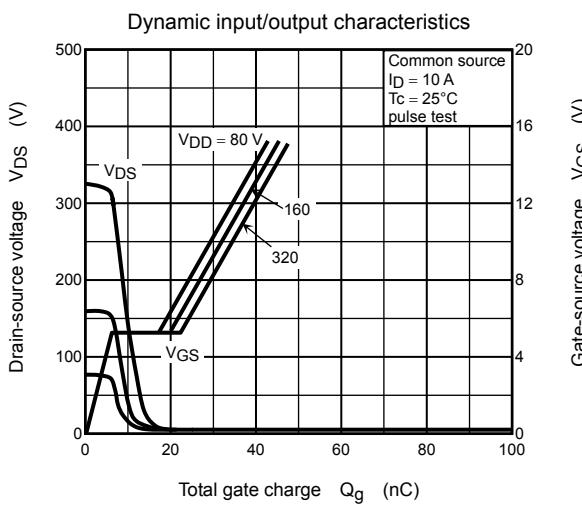
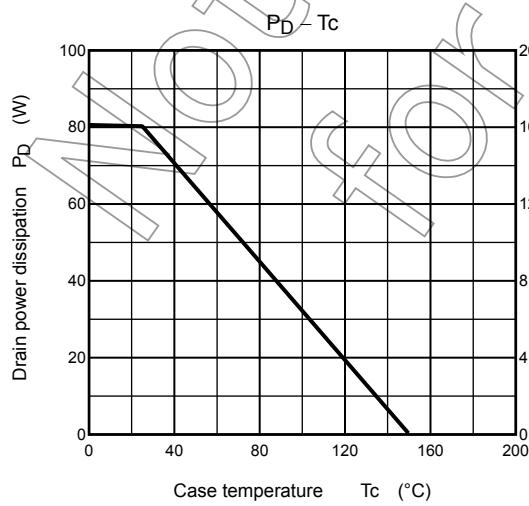
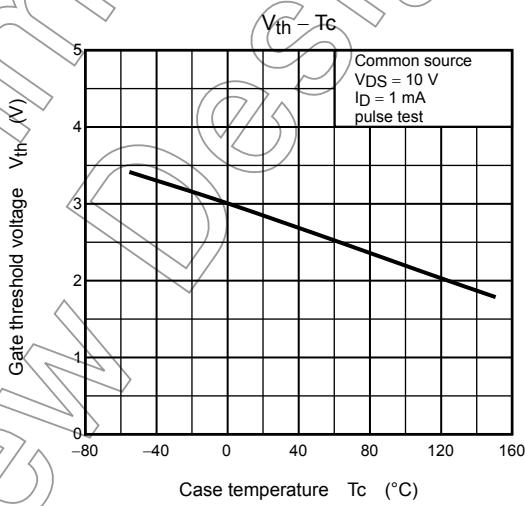
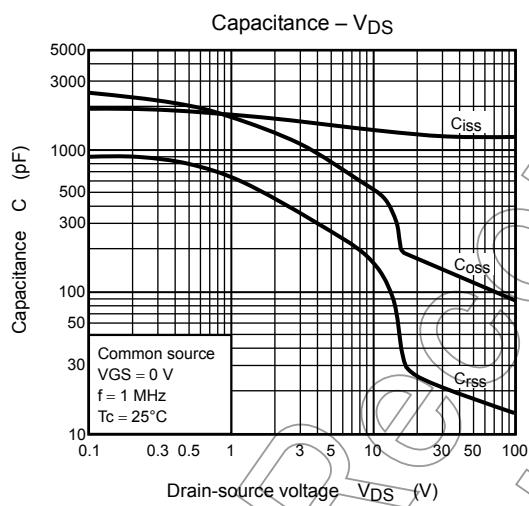
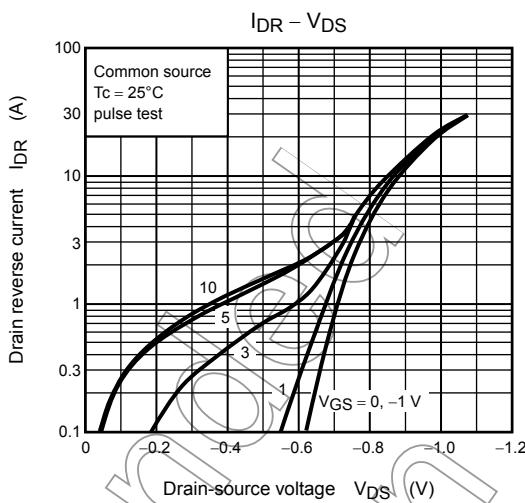
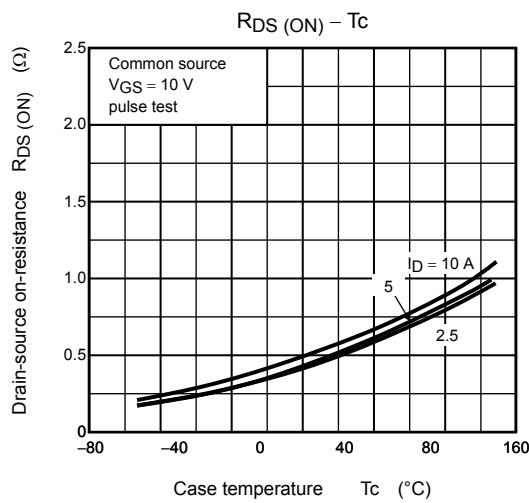
Note 4: A line under a Lot No. identifies the indication of product Labels.

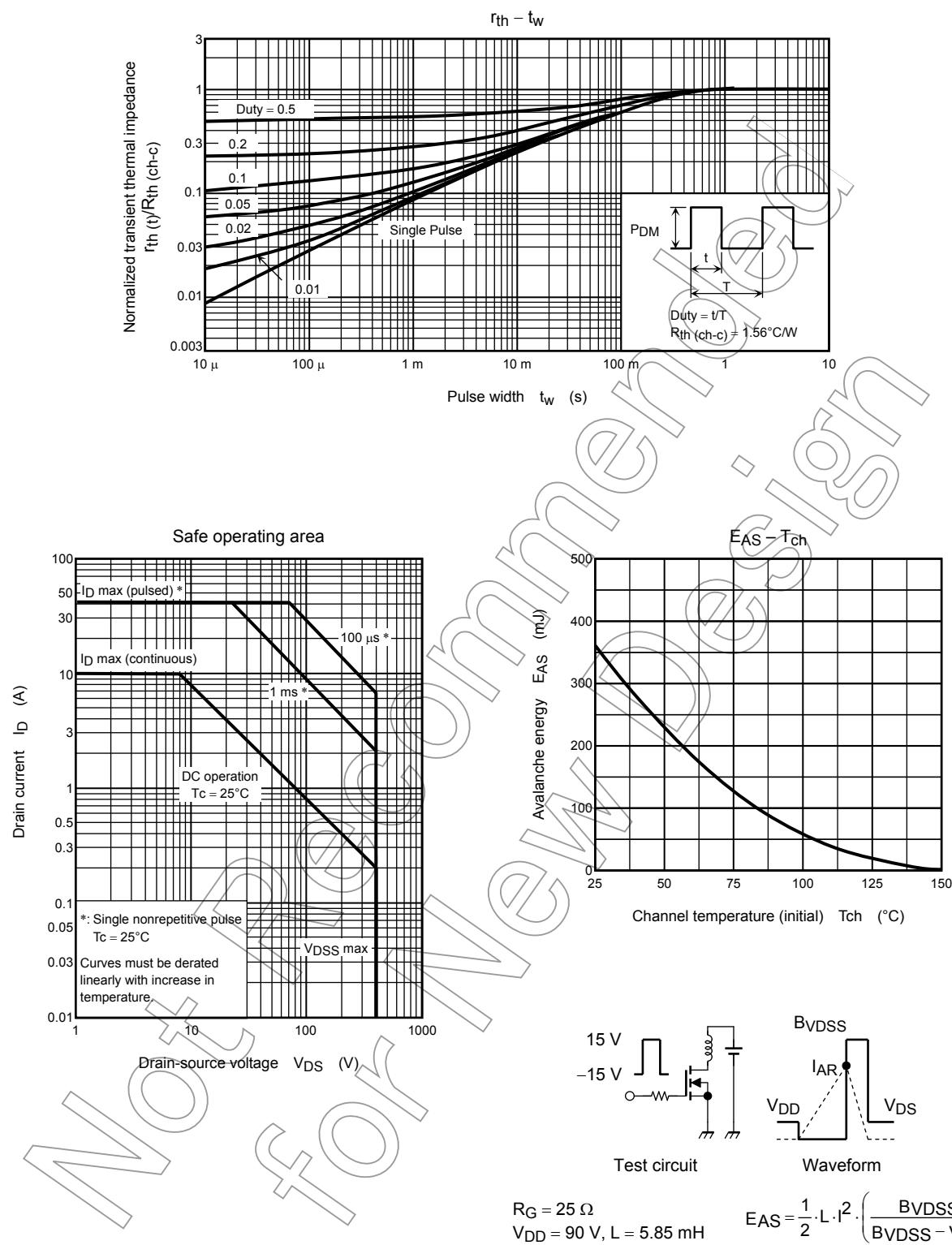
Not underlined: [[Pb]]/INCLUDES > MCV

Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

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