

2SK3309

Switching Regulator Applications

Unit: mm

- Low drain-source ON resistance: $R_{DS\text{ (ON)}} = 0.48 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 4.3 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100 \mu\text{A}$ (max) ($V_{DSS} = 450 \text{ V}$)
- Enhancement-mode: $V_{th} = 3.0\text{--}5.0 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V _{DSS}	450	V
Drain-gate voltage ($R_{GS} = 20\text{ k}\Omega$)		V _{DGR}	450	V
Gate-source voltage		V _{GSS}	± 30	V
Drain current	DC (Note 1)	I _D	10	A
	Pulse (Note 1)	I _{DP}	40	
Drain power dissipation ($T_c = 25^\circ\text{C}$)		P _D	65	W
Single pulse avalanche energy (Note 2)		E _{AS}	222	mJ
Avalanche current		I _{AR}	10	A
Repetitive avalanche energy (Note 3)		E _{AR}	6.5	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

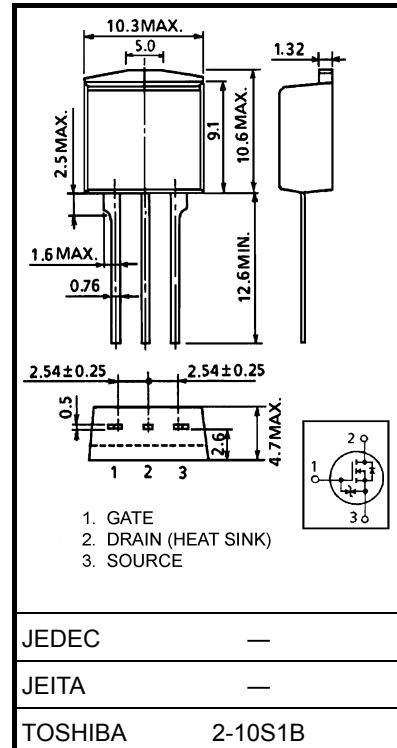
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	R_{th} (ch-c)	1.92	°C/W
Thermal resistance, channel to ambient	R_{th} (ch-a)	83.3	°C/W

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

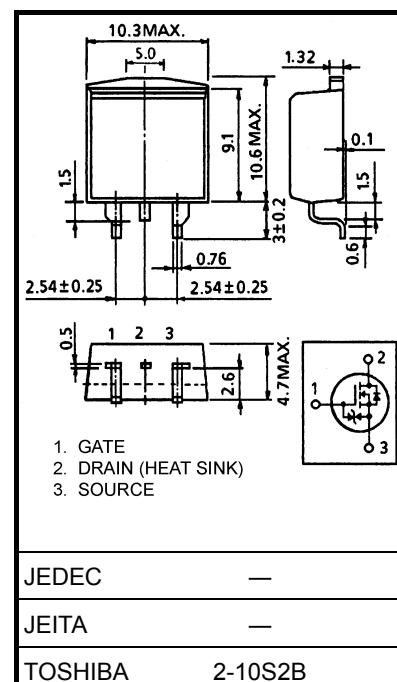
Note 2: $V_{DD} = 90 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 3.7 \text{ mH}$, $R_G = 25 \Omega$, $I_{AB} = 10 \text{ A}$

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

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



Weight: 1.5 g (typ.)



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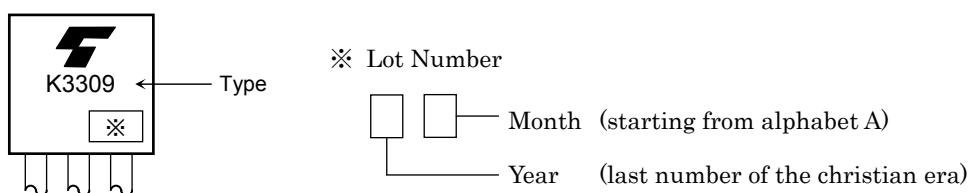
Electrical Characteristics ($T_a = 25^\circ\text{C}$)

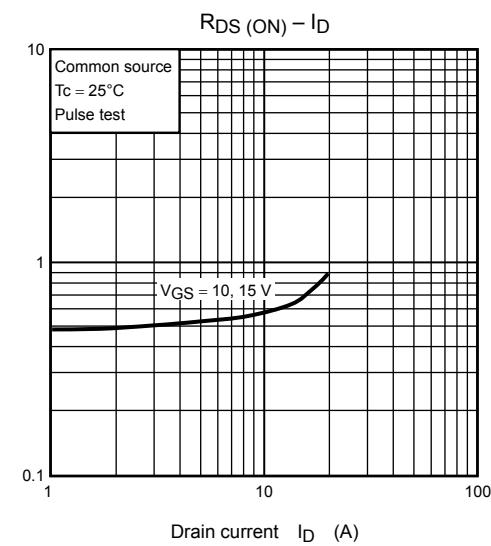
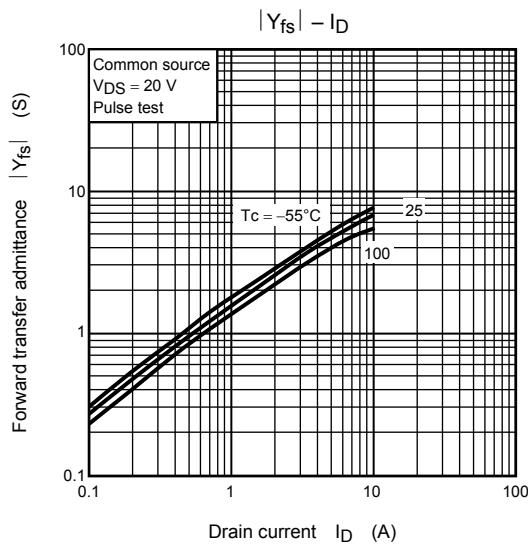
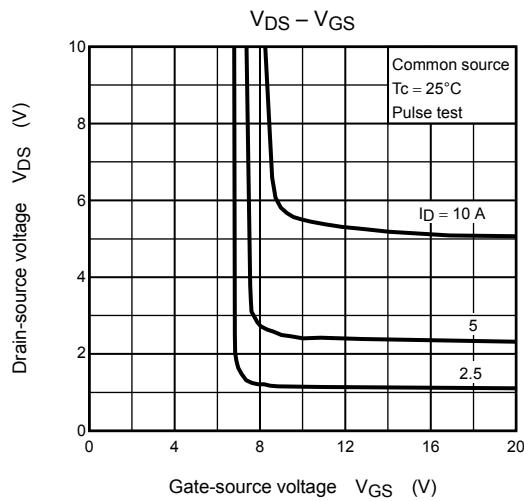
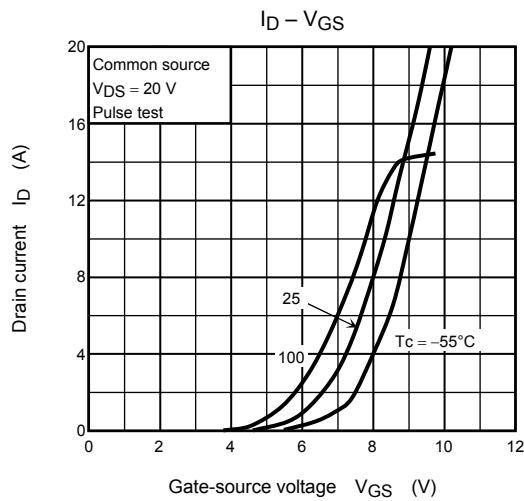
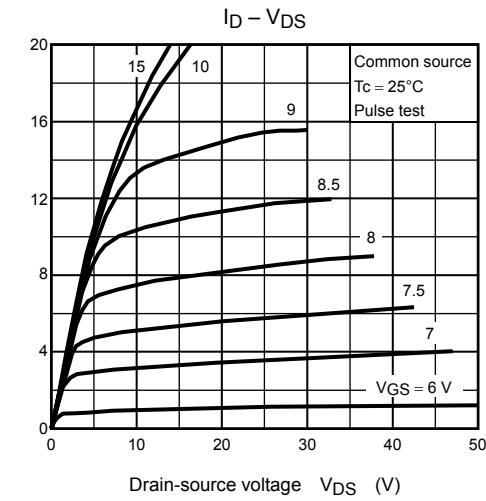
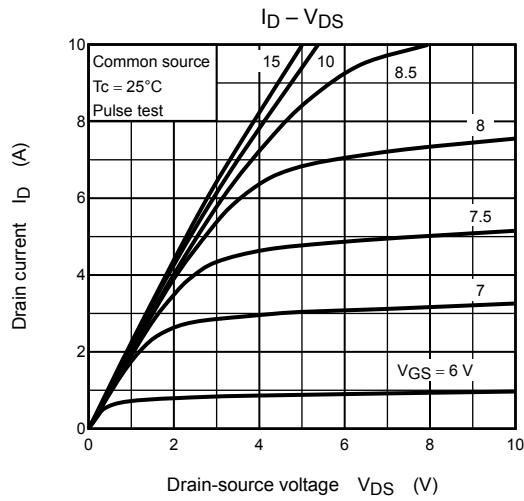
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GSS}	$V_{GS} = \pm 25\text{ V}$, $V_{DS} = 0\text{ V}$	—	—	± 10	μA
Gate -source breakdown voltage	$V_{(\text{BR})\text{GSS}}$	$I_G = \pm 10\text{ }\mu\text{A}$, $V_{DS} = 0\text{ V}$	± 30	—	—	V
Drain cut-off current	I_{DSS}	$V_{DS} = 450\text{ V}$, $V_{GS} = 0\text{ V}$	—	—	100	μA
Drain-source breakdown voltage	$V_{(\text{BR})\text{DSS}}$	$I_D = 10\text{ mA}$, $V_{GS} = 0\text{ V}$	450 550	—	—	V
Gate threshold voltage	V_{th}	$V_{DS} = 10\text{ V}$, $I_D = 1\text{ mA}$	3.0	—	5.0	V
Drain-source ON resistance	$R_{DS(\text{ON})}$	$V_{GS} = 10\text{ V}$, $I_D = 5\text{ A}$	—	0.48	0.65	Ω
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10\text{ V}$, $I_D = 5\text{ A}$	1.5	4.3	—	S
Input capacitance	C_{iss}	$V_{DS} = 10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	—	920	—	pF
Reverse transfer capacitance	C_{rss}		—	12	—	
Output capacitance	C_{oss}		—	140	—	
Switching time	Rise time	t_r		—	25	—
	Turn-on time	t_{on}		—	35	—
	Fall time	t_f		—	10	—
	Turn-off time	t_{off}		—	60	—
Total gate charge	Q_g	$V_{DD} \approx 360\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 10\text{ A}$	—	23	—	nC
Gate-source charge	Q_{gs}		—	9	—	
Gate-drain charge	Q_{gd}		—	14	—	

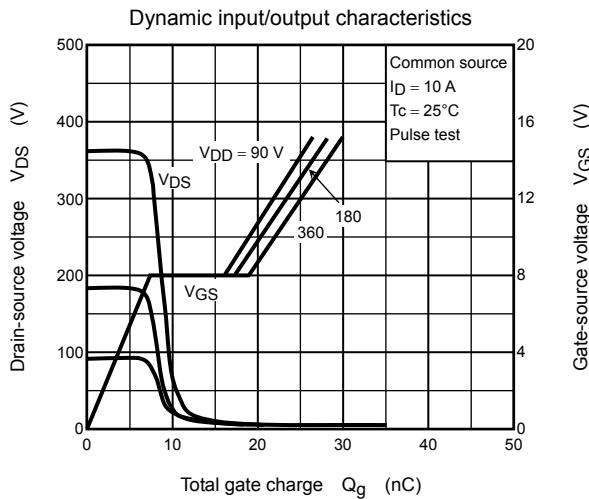
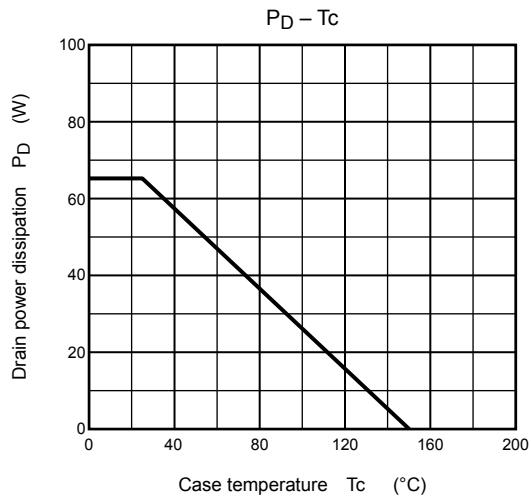
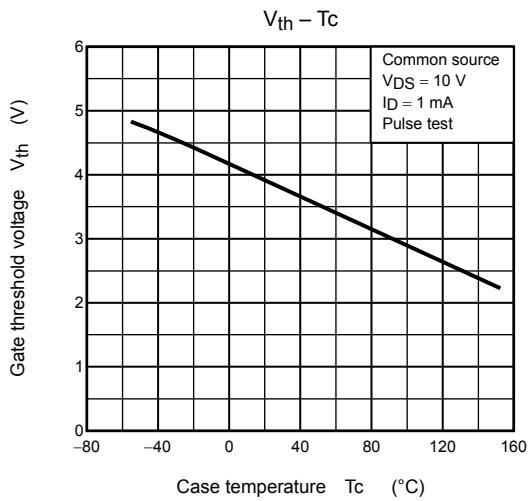
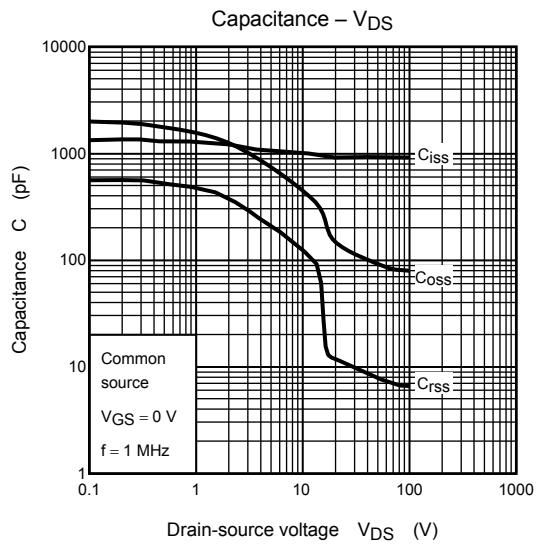
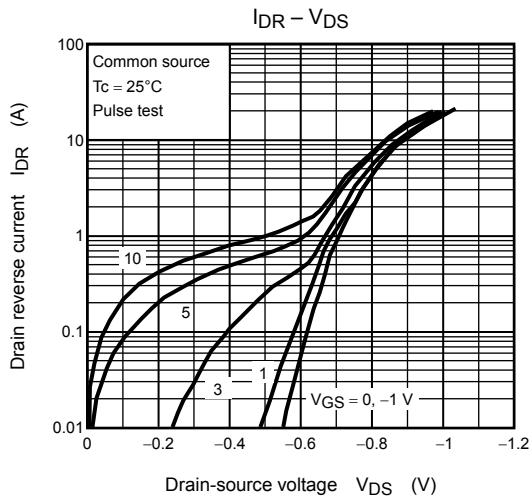
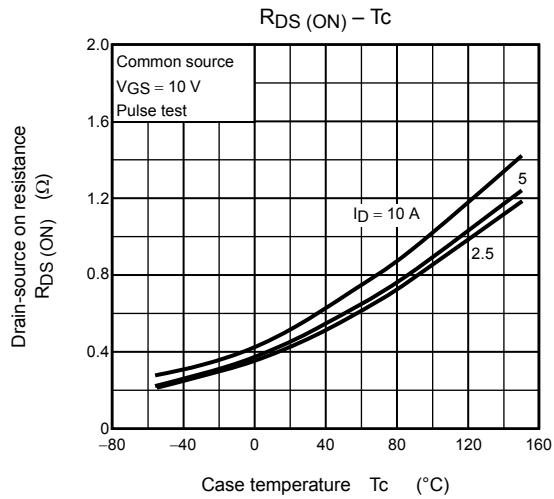
Source-Drain Ratings and Characteristics ($T_a = 25^\circ\text{C}$)

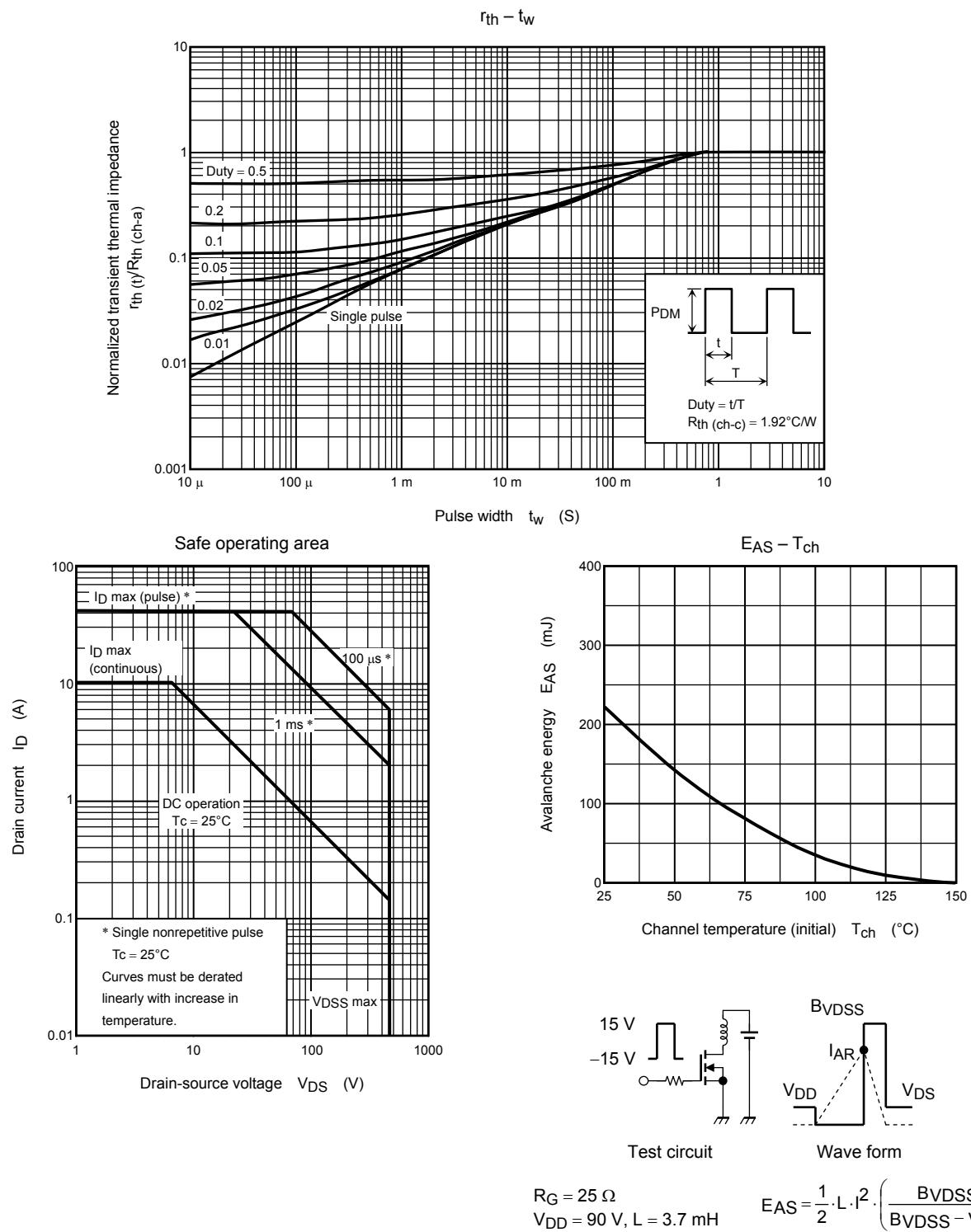
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	10	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	40	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 10\text{ A}$, $V_{GS} = 0\text{ V}$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 10\text{ A}$, $V_{GS} = 0\text{ V}$, $dI_{DR}/dt = 100\text{ A}/\mu\text{s}$	—	280	—	ns
Reverse recovery charge	Q_{rr}		—	2.7	—	μC

Marking









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