

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

2SK3399

Switching Regulator Applications

- Low drain-source ON resistance: $R_{DS(ON)} = 0.54 \Omega$ (typ)
- High forward transfer admittance: $|Y_{fs}| = 5.2 S$ (typ)
- Low leakage current: $I_{DSS} = 100 \mu A$ (max) ($V_{DSS} = 600 V$)
- Enhancement-model: $V_{th} = 3.0 \sim 5.0 V$ ($V_{DS} = 10 V, I_D = 1 mA$)

Maximum Ratings ($T_a = 25^\circ C$)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	600	V
Drain-gate voltage ($R_{GS} = 20 k\Omega$)		V_{DGR}	600	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 ($T_c = 25^\circ C$)		P_D	100	W
Single pulse avalanche energy (Note 2)		E_{AS}	363	mJ
Avalanche current		I_{AR}	10	A
Repetitive avalanche energy (Note 3)		E_{AR}	10	mJ
Channel temperature		T_{ch}	150	$^\circ C$
Storage temperature range		T_{stg}	$-55 \sim 150$	$^\circ C$

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	1.25	$^\circ C/W$
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	83.3	$^\circ C/W$

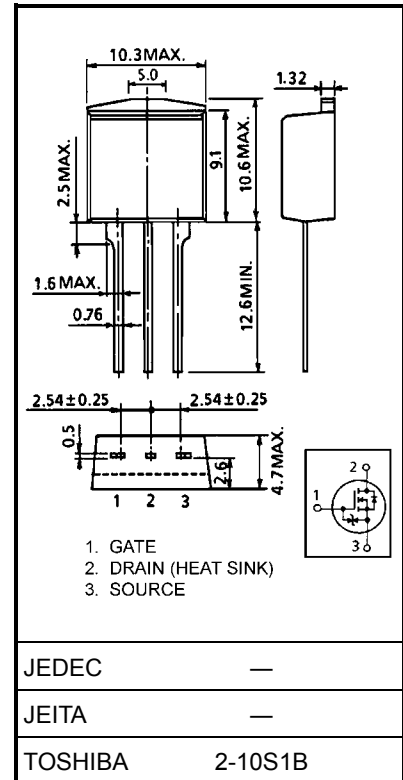
Note 1: Please use device on condition that the channel temperature is below $150^\circ C$.

Note 2: $V_{DD} = 90 V, T_{ch} = 25^\circ C$ (initial), $L = 6.36 mH, R_G = 25 \Omega, I_{AR} = 10 A$

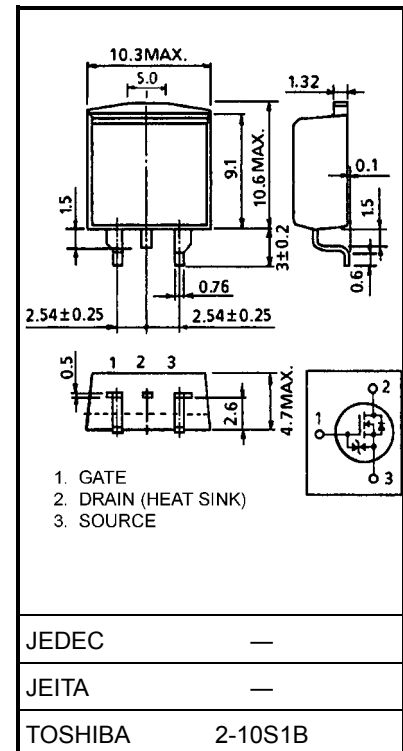
Note 3: Repetitive rating: Pulse width limited by maximum channel temperature

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

Unit: mm



Weight: 1.5 g (typ.)



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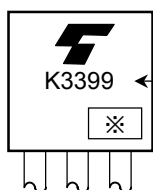
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 25\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Gate-source breakdown voltage		$V_{(BR)GSS}$	$I_G = \pm 10\ \mu\text{A}, V_{DS} = 0\text{ V}$	± 30 550	—	—	V
Drain cut-off current		I_{DSS}	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	600 550	—	—	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		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 5\text{ A}$	—	0.54	0.75	Ω
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 5\text{ A}$	2.0	5.2	—	S
Input capacitance		C_{iss}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	1750	—	pF
Reverse transfer capacitance		C_{rss}		—	11	—	
Output capacitance		C_{oss}		—	170	—	
Switching time	Rise time	t_r	<p>V_{IN}: $t_r, t_f < 5\text{ ns}$ Duty $\leq 1\%$, $t_w = 10\ \mu\text{s}$ $V_{DD} \approx 200\text{ V}$</p>	—	15	—	ns
	Turn-on time	t_{on}		—	40	—	
	Fall time	t_f		—	8	—	
	Turn-off time	t_{off}		—	35	—	
Total gate charge (Gate-source plus gate-drain)		Q_g	$V_{DD} \approx 400\text{ V}, V_{GS} = 10\text{ V}, I_D = 10\text{ A}$	—	35	—	nC
Gate-source charge		Q_{gs}		—	15	—	
Gate-drain ("Miller") charge		Q_{gd}		—	20	—	

Source-Drain Ratings and Characteristics (Ta = 25°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}	$I_{DR} = 10\text{ A}, V_{GS} = 0\text{ V},$	—	1300	—	ns
Reverse recovery charge	Q_{rr}	$dI_{DR}/dt = 100\text{ A}/\mu\text{s}$	—	16	—	μC

Marking



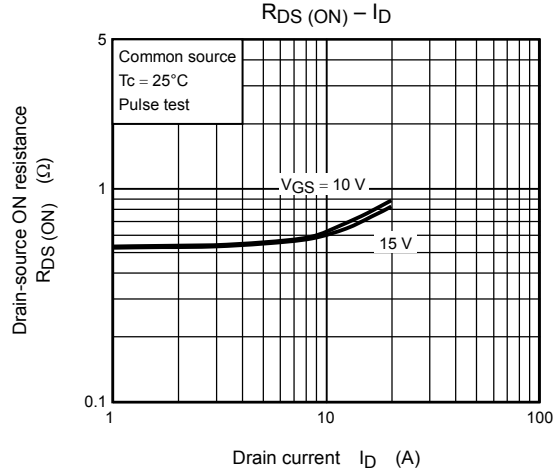
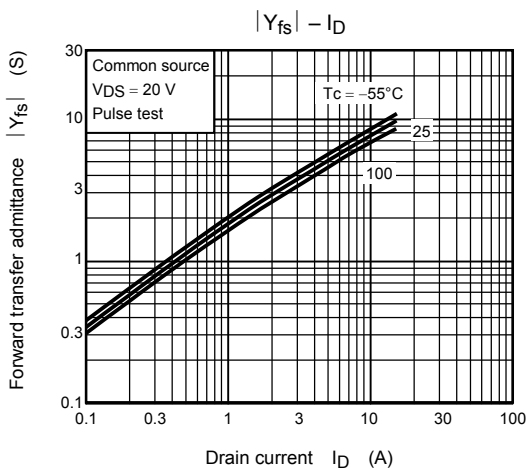
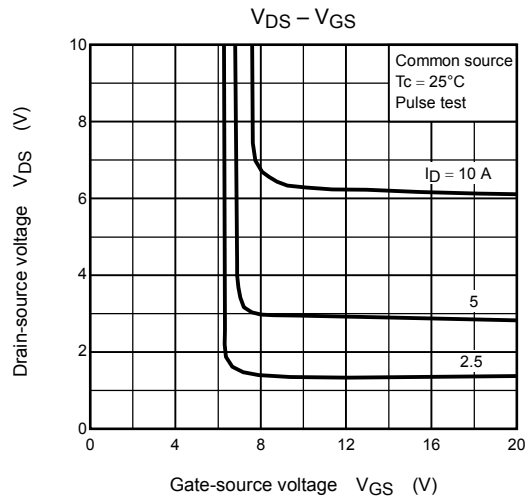
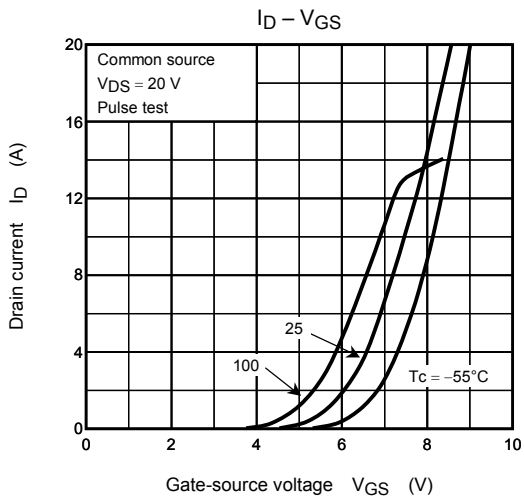
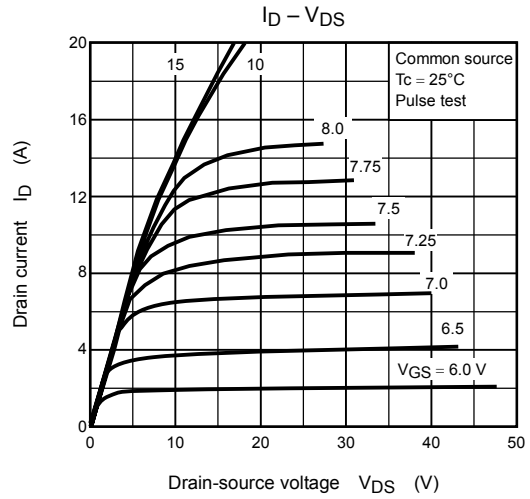
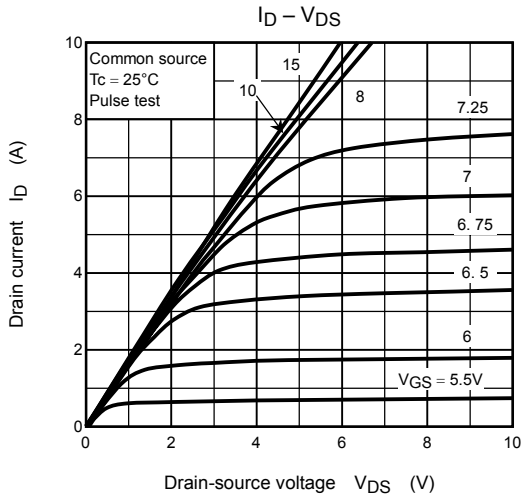
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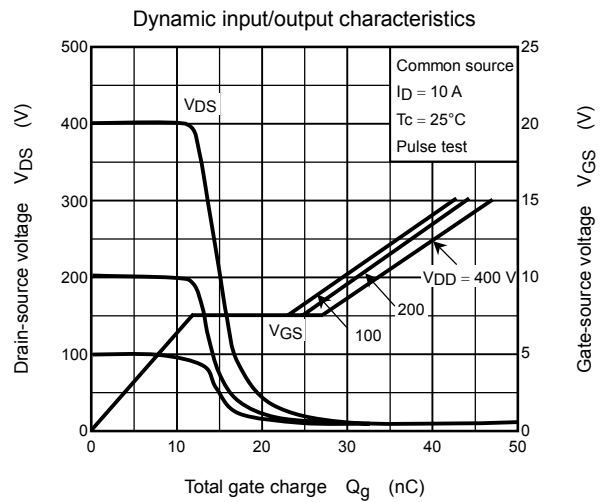
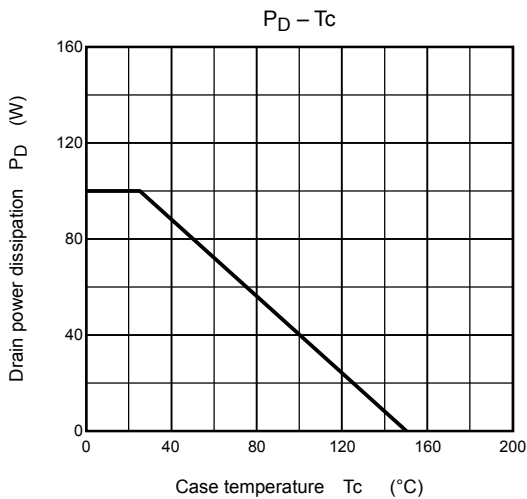
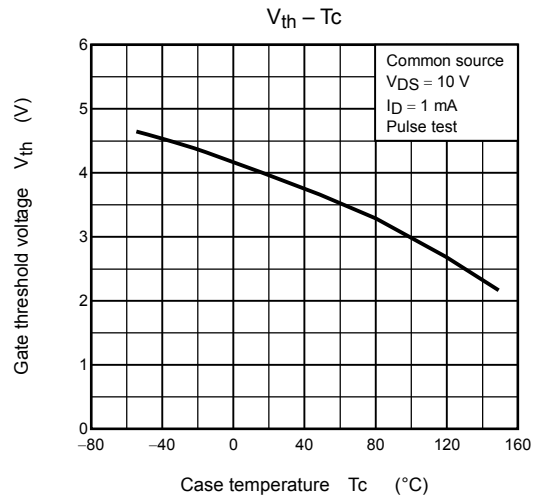
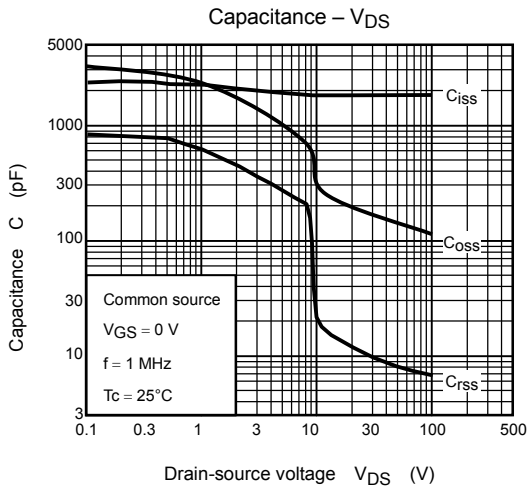
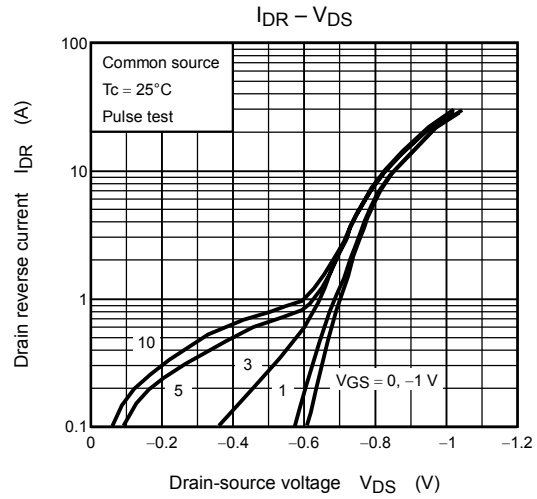
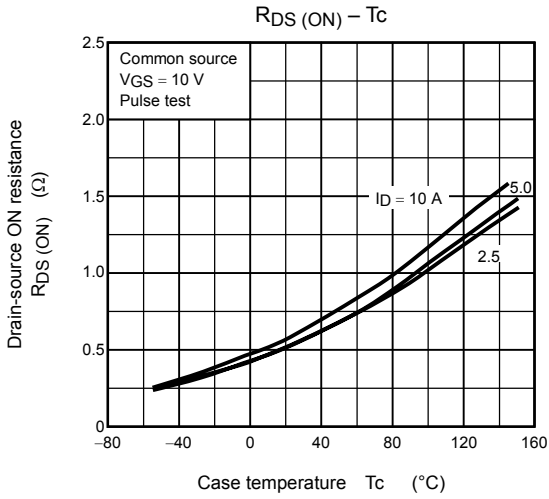
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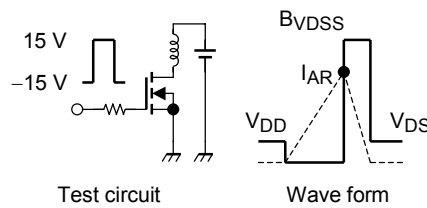
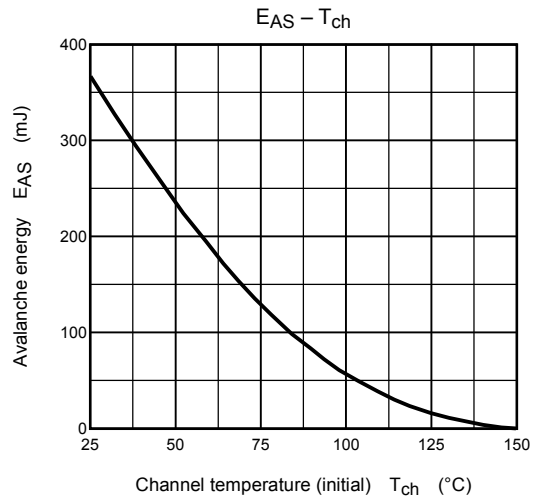
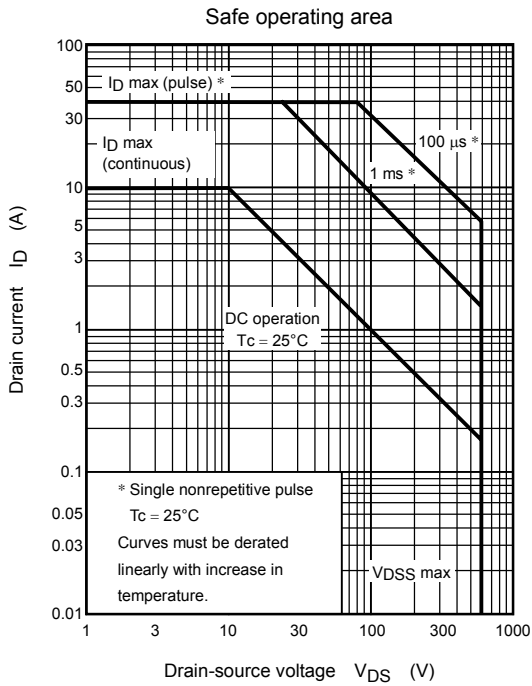
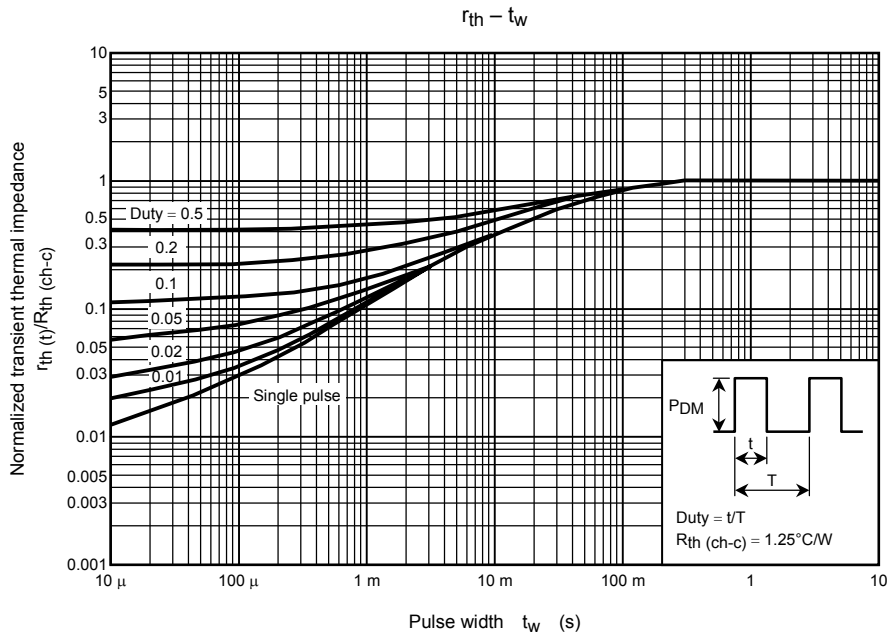


Month (starting from alphabet A)

Year (last number of the christian era)







$R_G = 25 \Omega$
 $V_{DD} = 90 \text{ V}, L = 6.36 \text{ mH}$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{B_{VDSS}}{B_{VDSS} - V_{DD}} \right)$$

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