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

TENTATIVE

2SK3399

Switching Regulator Applications

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

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	600	V
Drain-gate voltage (R_{GS} = 20 kΩ)		V_{DGR}	600	V
Gate-source voltage		V_{GSS}	±30	V
Drain current	DC	I_D	10	A
	Pulse	I_{DP}	40	
Drain power dissipation (Tc = 25°C)		P_D	100	W
Single pulse avalanche energy (Note2)		E_{AS}	363	mJ
Avalanche current		I_{AR}	10	A
Repetitive avalanche energy (Note1)		E_{AR}	10	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55~150	°C

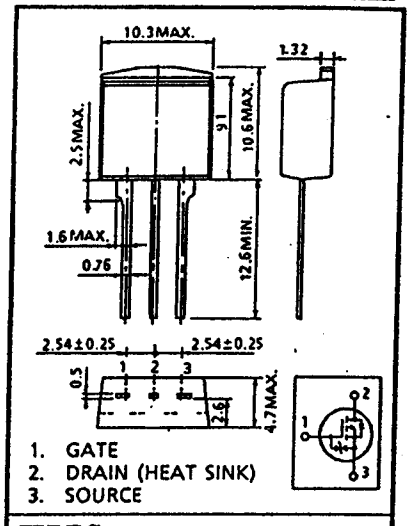
Thermal Characteristics

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

Note1: Repetitive rating; pulse width limited by max junction temperature.
Note2: V_{DD} = 90 V, T_{ch} = 25°C (initial), L = 6.36 mH,
R_G = 25 Ω, I_{AR} = 10 A

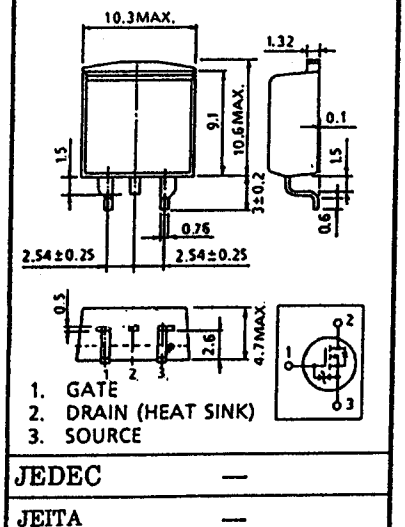
This transistor is an electrostatic sensitive device.
Please handle with caution.

Unit in mm



JEDEC	—
JEITA	—
TOSHIBA	2-10S1B

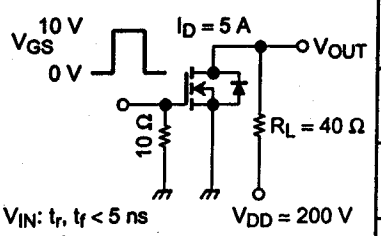
TO-220SM Unit in mm



JEDEC	—
JEITA	—
TOSHIBA	2-10S2B

Weight : 1.5 g

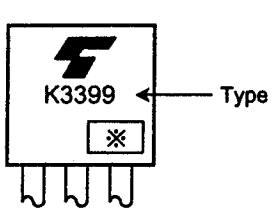
Electrical Characteristics (Ta = 25°C) TENTATIVE

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±25 V, V_{DS} = 0 V	—	—	±10	μA
Gate-source breakdown voltage		$V_{(BR)\ GSS}$	I_G = ±10 μA, V_{DS} = 0 V	±30	—	—	V
Drain cut-off current		I_{DSS}	V_{DS} = 600 V, V_{GS} = 0 V	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 10 mA, V_{GS} = 0 V	600	—	—	V
Gate threshold voltage		V_{th}	V_{DS} = 10 V, I_D = 1 mA	3.0	—	5.0	V
Drain-source ON resistance		$R_{DS\ (ON)}$	V_{GS} = 10 V, I_D = 5 A	—	0.54	0.75	Ω
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 10 V, I_D = 5 A	2.0	5.2	—	S
Input capacitance		C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz	—	1750	—	pF
Reverse transfer capacitance		C_{rss}		—	11	—	
Output capacitance		C_{oss}		—	170	—	
Switching time	Rise time	t_r		—	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} = 400 V, V_{GS} = 10 V, I_D = 10 A	—	35	—	nC
Gate-source charge		Q_{gs}		—	15	—	
Gate-drain ("Miller") charge		Q_{gd}		—	20	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current	I_{DR}	—	—	—	10	A
Pulse drain reverse current	I_{DRP}	—	—	—	40	A
Diode forward voltage	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,	—	1300	—	ns
Reverse recovery charge	Q_{rr}	dI_{DR}/dt = 100 A/μs	—	16	—	μC

Marking



※ Lot Number

□□ — Month (starting from alphabet A)

— Year (last number of the christian era)

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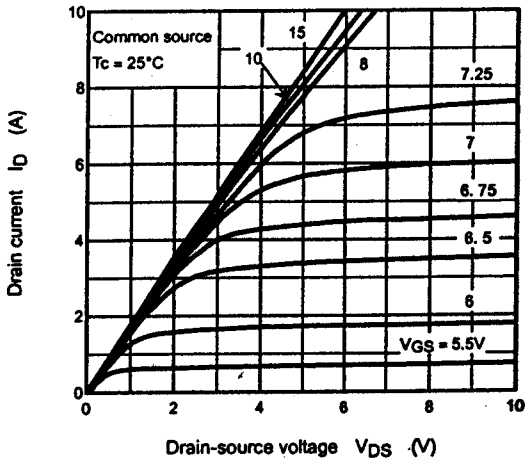
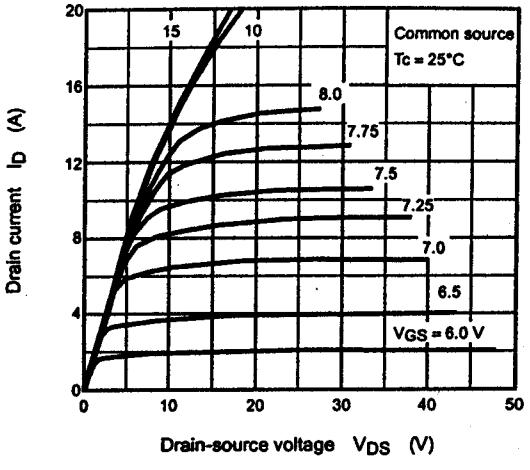
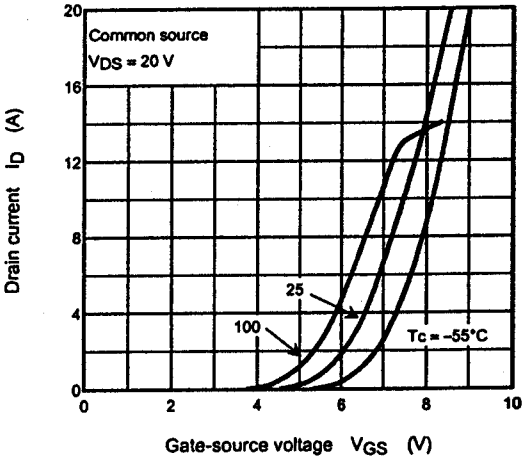
$I_D - V_{DS}$



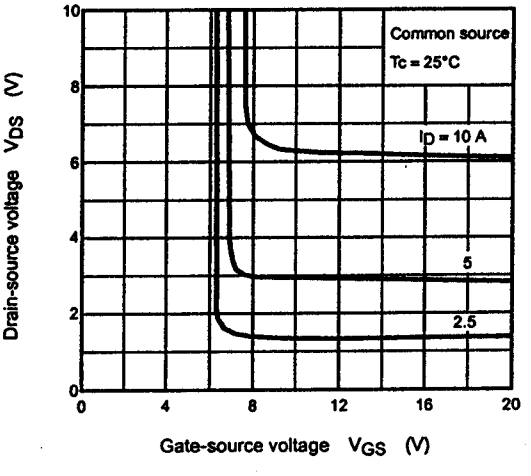
$I_D - V_{DS}$



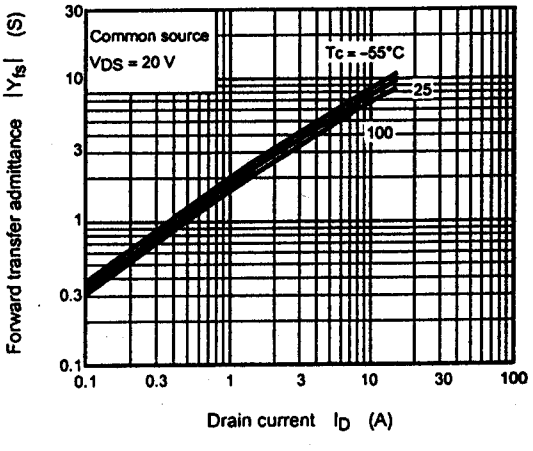
$I_D - V_{GS}$



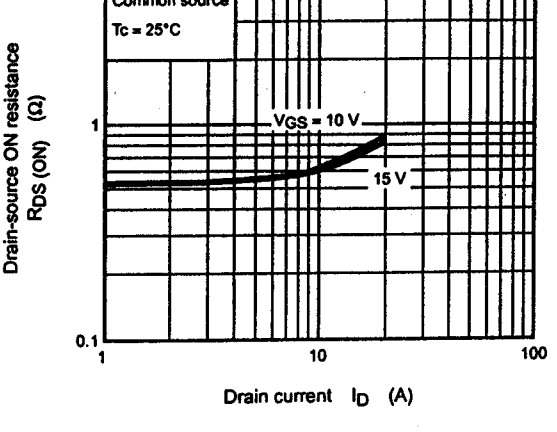
$V_{DS} - V_{GS}$



$|Y_{fs}| - I_D$



$R_{DS\ (ON)} - I_D$



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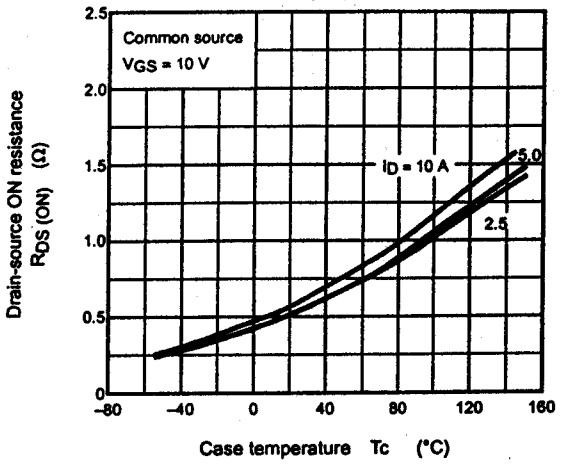
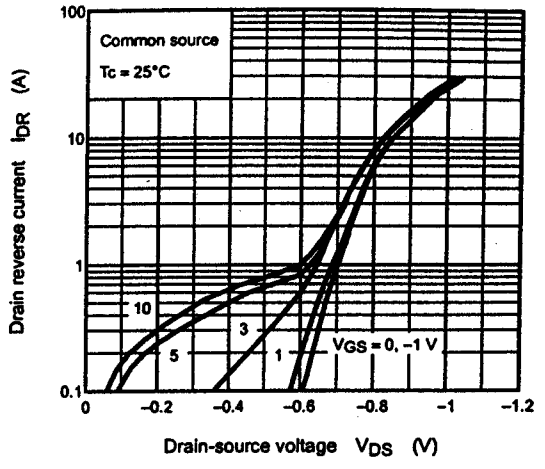
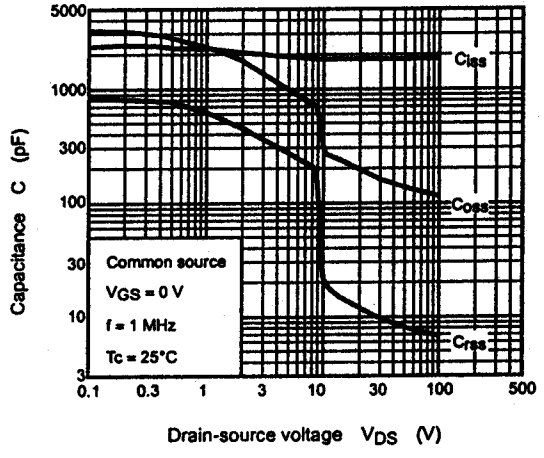
$R_{DS\ (ON)}$ – Tc



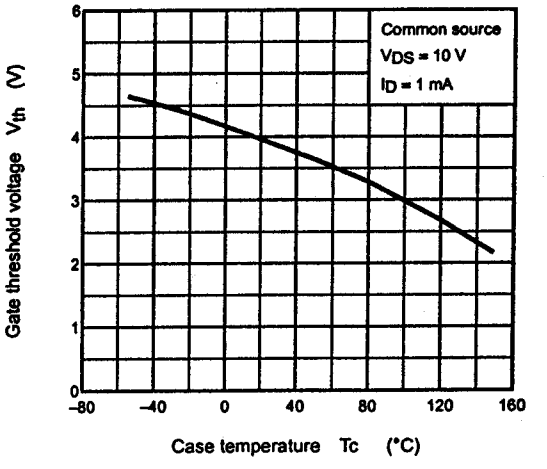
I_{DR} – V_{DS}



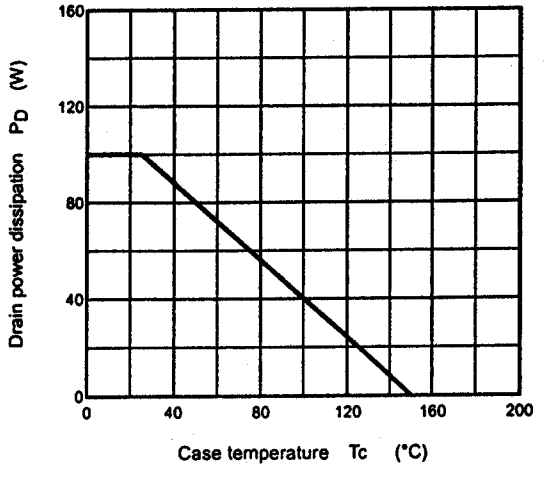
Capacitance – V_{DS}



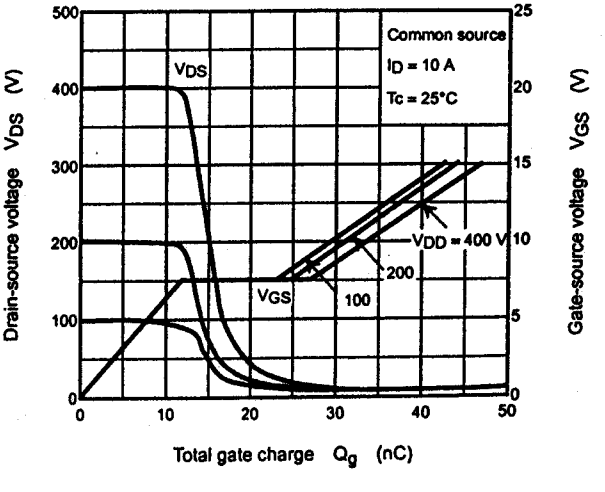
V_{th} – Tc



P_D – Tc



Dynamic input/output characteristics



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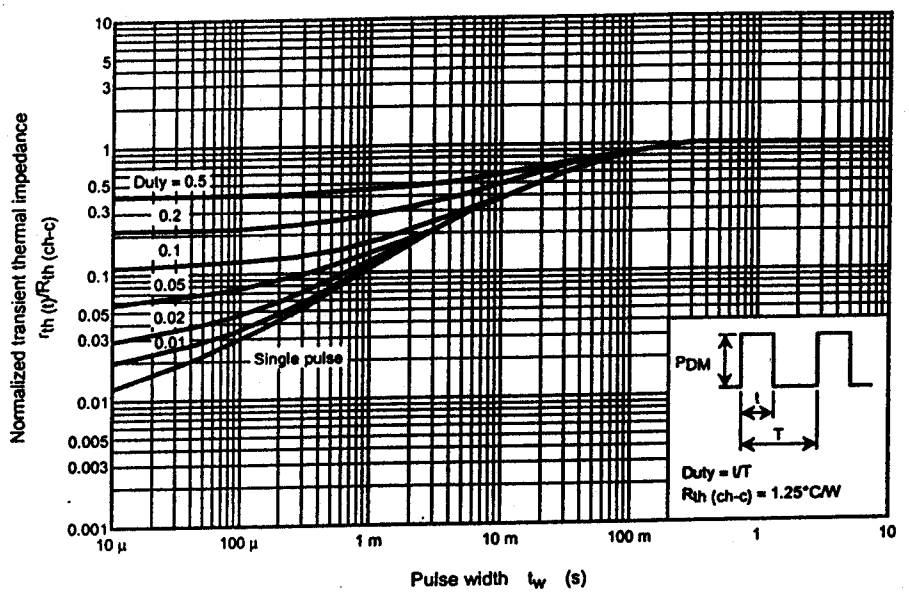
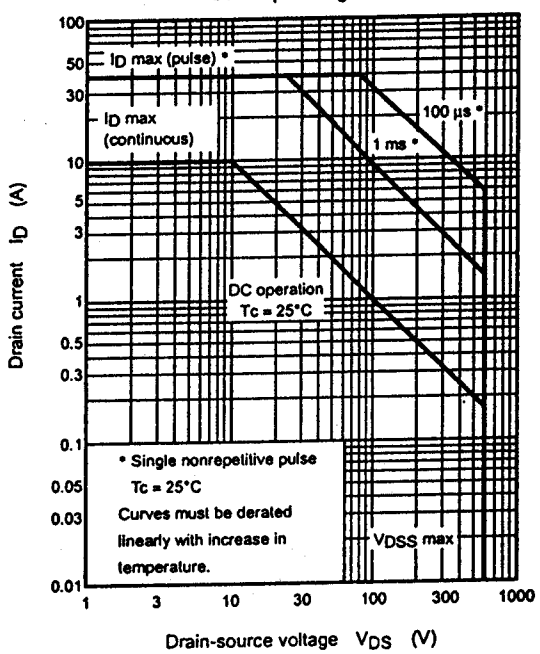
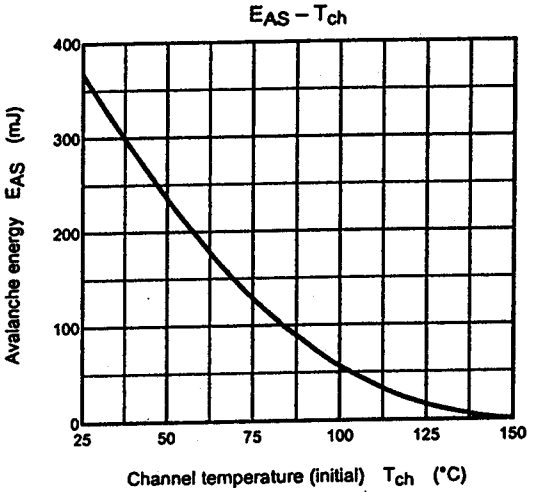
$r_{th} - t_w$

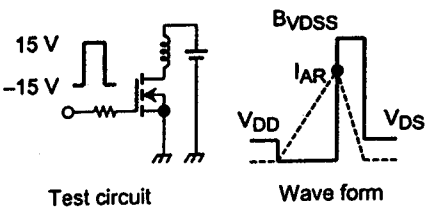


Safe operating area



$E_{AS} - T_{ch}$





Test circuit Wave form

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

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