

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (L<sup>2</sup>-π-MOSV)

# 2SK2399

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL APPLICATIONS

Unit in mm

- 4V Gate Drive
- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 0.17\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 4.5S$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 100\mu A$  (Max.) ( $V_{DS} = 100V$ )
- Enhancement-Mode :  $V_{th} = 0.8 \sim 2.0V$  ( $V_{DS} = 10V, I_D = 1mA$ )

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	$V_{DSS}$	100	V
Drain-Gate Voltage ( $R_{GS} = 20k\Omega$ )	$V_{DGR}$	100	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current	DC	$I_D$	5 A
	Pulse	$I_{DP}$	20 A
Drain Power Dissipation (Tc = 25°C)	$P_D$	20	W
Single Pulse Avalanche Energy**	$E_{AS}$	180	mJ
Avalanche Current	$I_{AR}$	5	A
Repetitive Avalanche Energy*	$E_{AR}$	2	mJ
Channel Temperature	$T_{ch}$	150	°C
Storage Temperature Range	$T_{stg}$	-55~150	°C

THERMAL CHARACTERISTICS

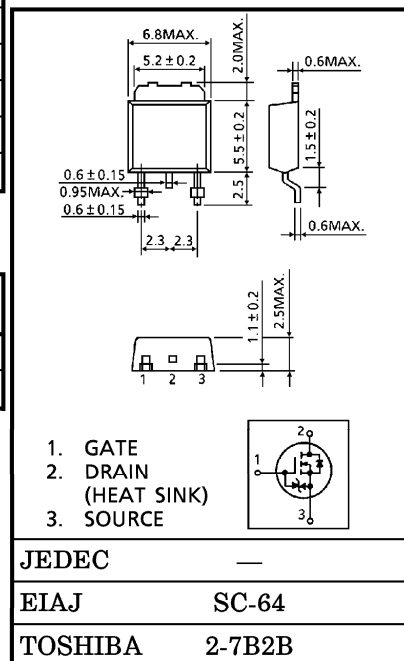
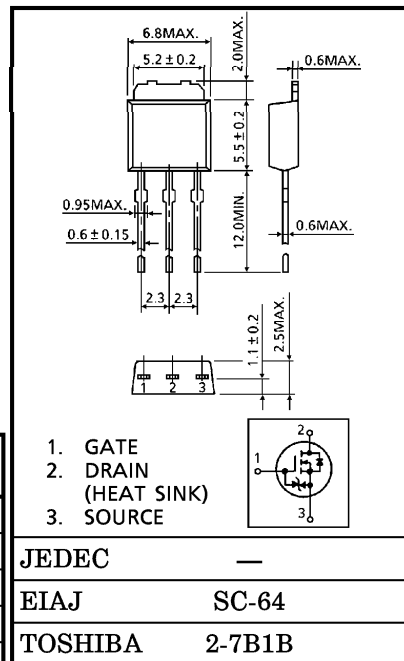
CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th(ch-c)}$	6.25	°C/W
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	125	°C/W

Note ;

\* Repetitive rating ; Pulse Width Limited by Max. junction temperature.

\*\*  $V_{DD} = 25V$ , Starting  $T_{ch} = 25°C$ ,  $L = 11.6mH$ ,  $R_G = 25\Omega$ ,  $I_{AR} = 5A$

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



Weight : 0.36g

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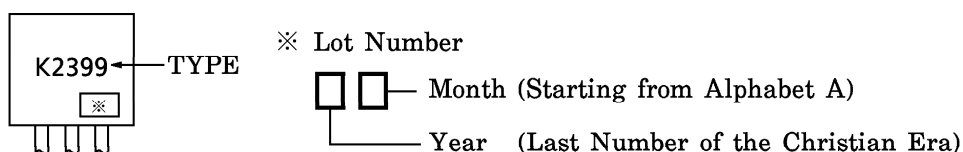
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

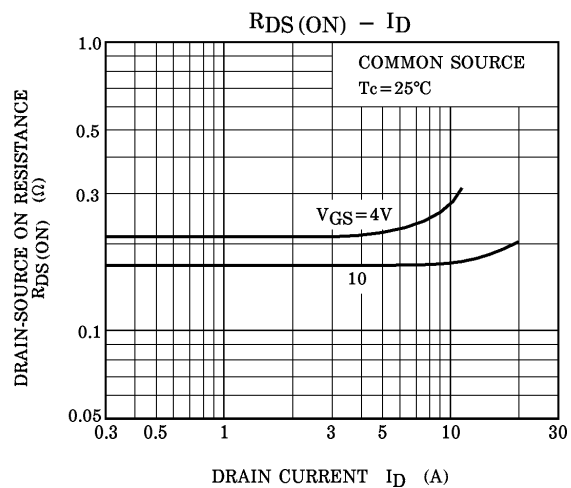
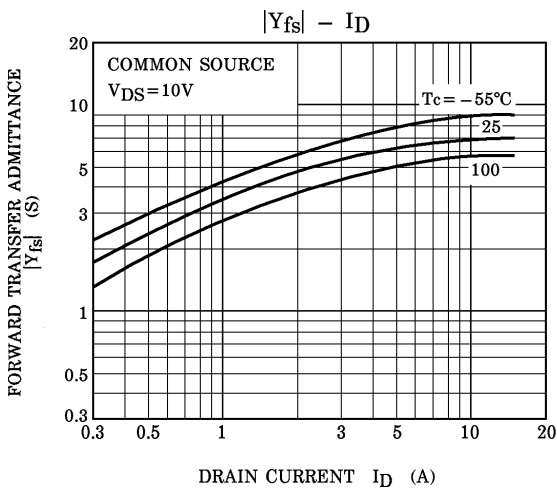
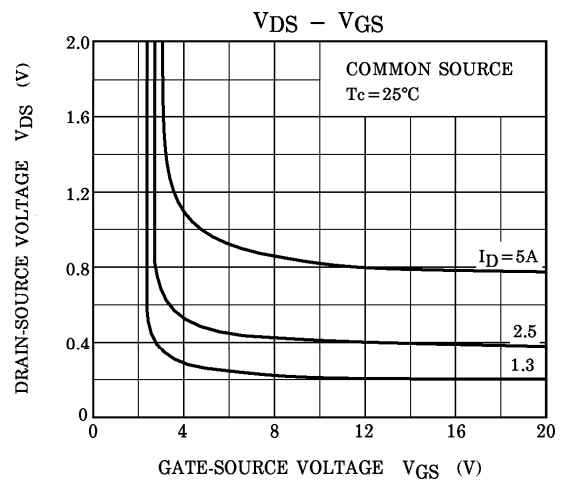
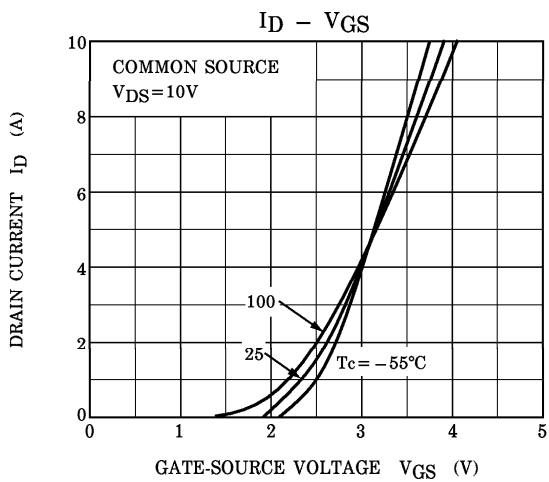
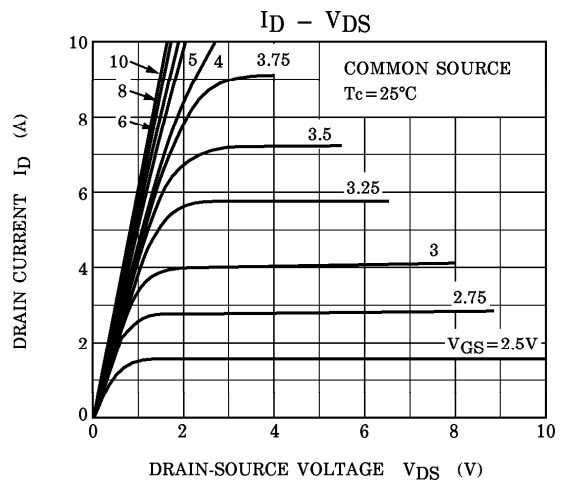
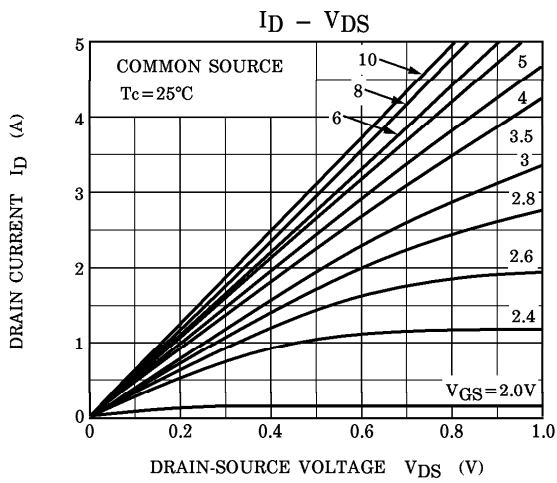
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		IGSS	VGS = ±16V, VDS = 0V	—	—	±10	μA
Drain Cut-off Current		IDSS	VDS = 100V, VGS = 0V	—	—	100	μA
Drain-Source Breakdown Voltage		V (BR) DSS	ID = 10mA, VGS = 0V	100	—	—	V
Gate Threshold Voltage		Vth	VDS = 10V, ID = 1mA	0.8	—	2.0	V
Drain-Source ON Resistance		RDS (ON)	VGS = 4V, ID = 2.5A	—	0.22	0.30	Ω
			VGS = 10V, ID = 2.5A	—	0.17	0.23	
Forward Transfer Admittance		Yfs	VDS = 10V, ID = 2.5A	2.0	4.5	—	S
Input Capacitance		Ciss	VDS = 10V, VGS = 0V, f = 1MHz	—	500	—	pF
Reverse Transfer Capacitance		Crss		—	80	—	
Output Capacitance		Coss		—	190	—	
Switching Time	Rise Time	tr		—	17	—	ns
	Turn-on Time	ton		—	25	—	
	Fall Time	tf		—	50	—	
	Turn-off Time	toff		VIN : tr, tf < 5ns, Duty ≤ 1%, tw = 10μs	—	195	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Qg	VDD ≐ 80V, VGS = 10V, ID = 5A	—	22	—	nC
Gate-Source Charge		Qgs		—	15	—	
Gate-Drain ("Miller") Charge		Qgd		—	7	—	

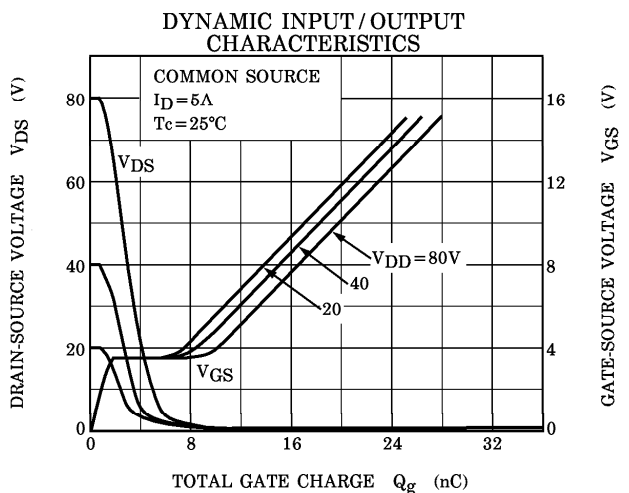
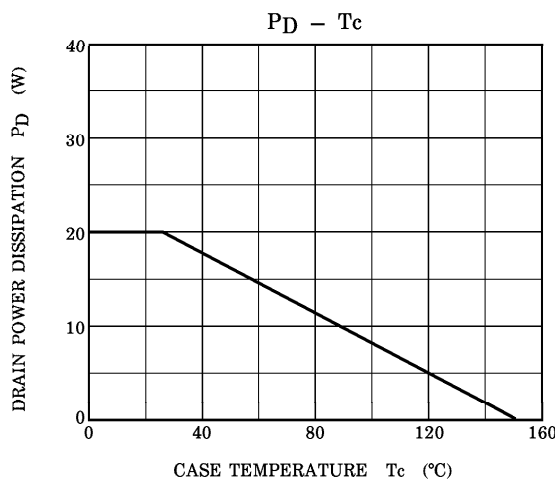
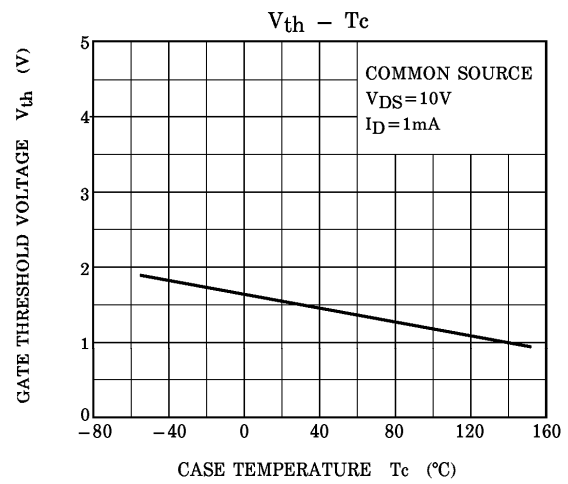
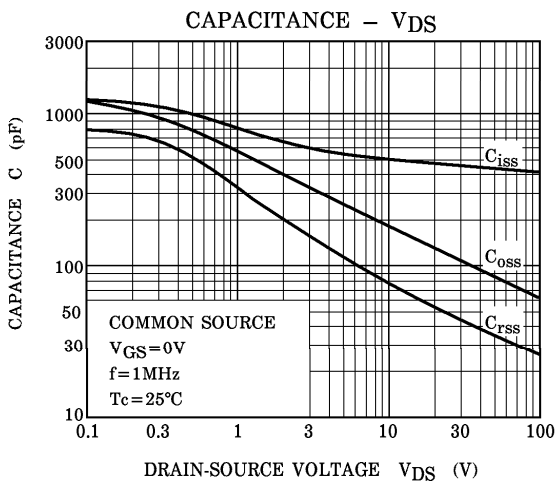
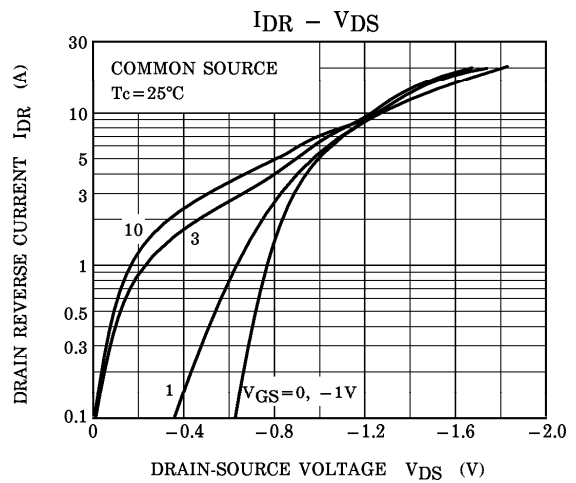
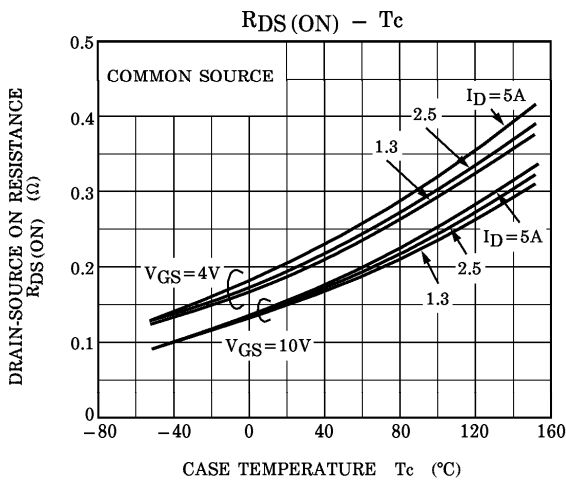
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

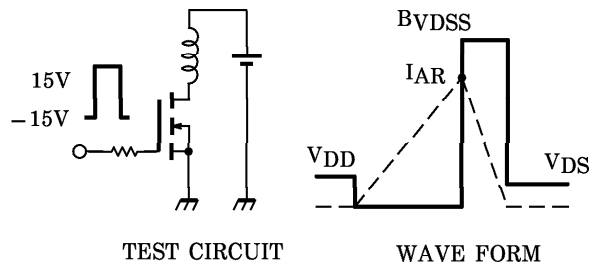
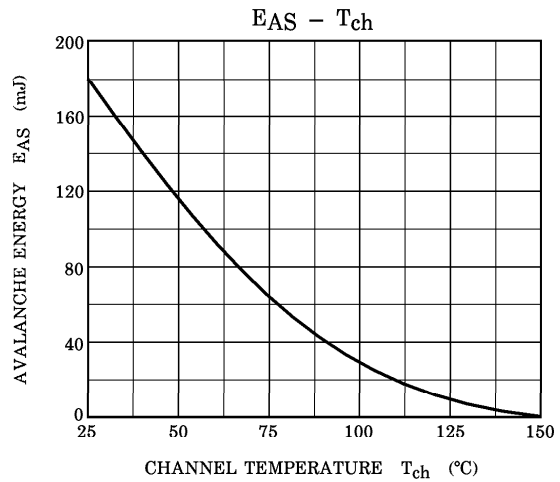
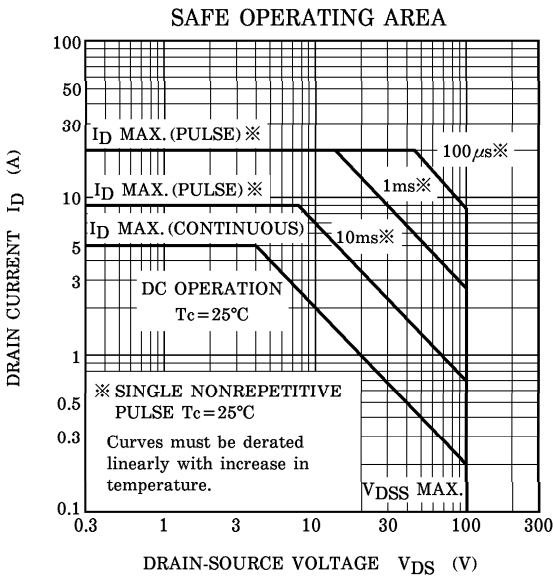
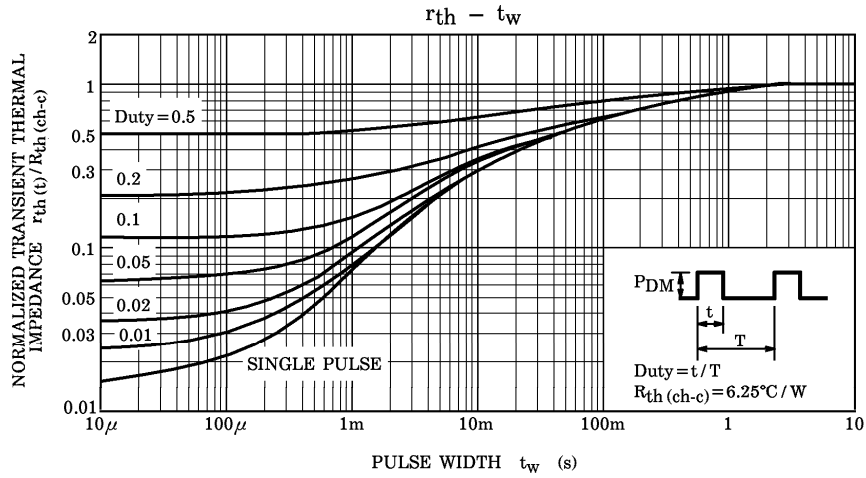
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	IDR	—	—	—	5	A
Pulse Drain Reverse Current	IDRP	—	—	—	20	A
Diode Forward Voltage	VDSF	IDR = 5A, VGS = 0V	—	—	-1.7	V
Reverse Recovery Time	trr	IDR = 5A, VGS = 0V	—	160	—	ns
Reverse Recovery Charge	Qrr	dIDR / dt = 50A / μs	—	0.28	—	μC

MARKING









Peak  $I_{AR} = 5A$ ,  $R_G = 25\Omega$   
 $V_{DD} = 25V$ ,  $L = 11.6mH$

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