

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (π -MOSV)

2SK2599

HIGH SPEED, HIGH VOLTAGE SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

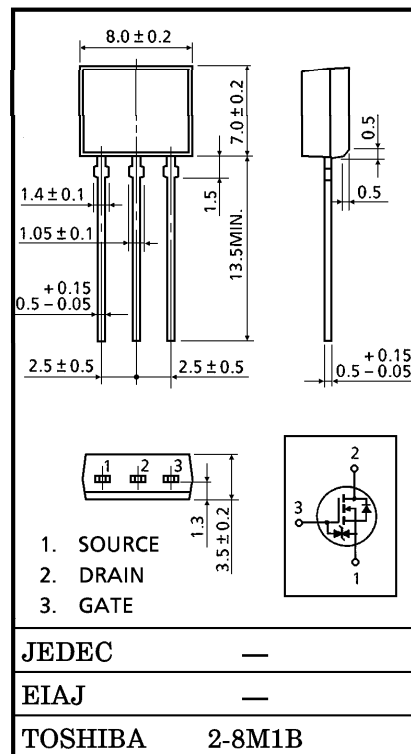
INDUSTRIAL APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance : $R_{DS(ON)} = 2.9\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 1.7S$ (Typ.)
- Low Leakage Current : $I_{DSS} = 100\mu A$ (Max.) ($V_{DS} = 500V$)
- Enhancement-Mode : $V_{th} = 2.0 \sim 4.0V$ ($V_{DS} = 10V, I_D = 1mA$)

MAXIMUM RATINGS ($T_a = 25^\circ C$)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	500	V
Drain-Gate Voltage ($R_{GS} = 20k\Omega$)		V_{DGR}	500	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	DC	I_D	2	A
	Pulse ($t = 1ms$)	I_{DP}	5	A
	Pulse ($t = 100\mu s$)	I_{DP}	12	A
Drain Power Dissipation ($T_a = 25^\circ C$)		P_D	1.3	W
Single Pulse Avalanche Energy**		E_{AS}	112	mJ
Avalanche Current		I_{AR}	2	A
Repetitive Avalanche Energy*		E_{AR}	0.13	mJ
Channel Temperature		T_{ch}	150	$^\circ C$
Storage Temperature Range		T_{stg}	$-55 \sim 150$	$^\circ C$



Weight : 0.54g

THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	96.1	$^\circ C/W$

Note ;

- * Repetitive rating ; Pulse Width Limited by Max. junction temperature.
- ** $V_{DD} = 90V, T_{ch} = 25^\circ C$ (initial), $L = 48.4mH, R_G = 25\Omega, I_{AR} = 2A$

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

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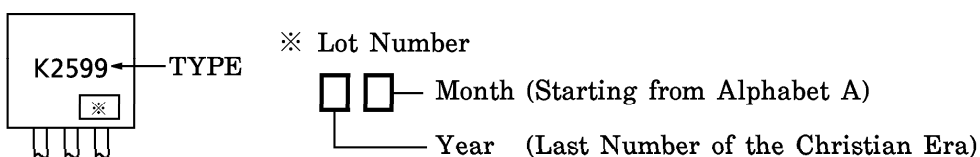
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

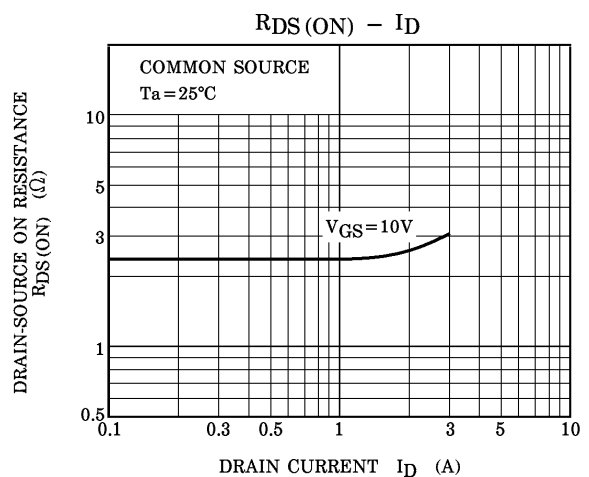
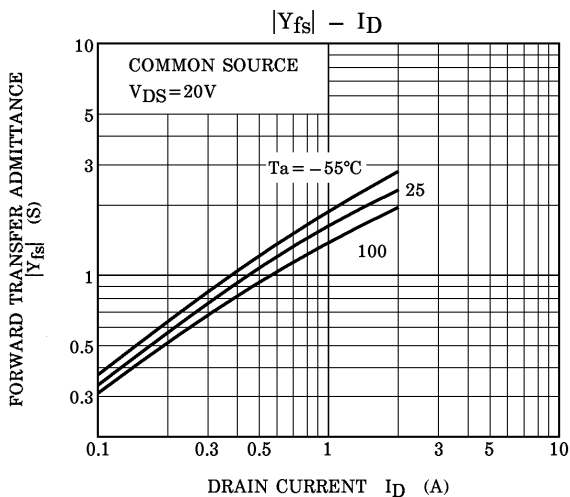
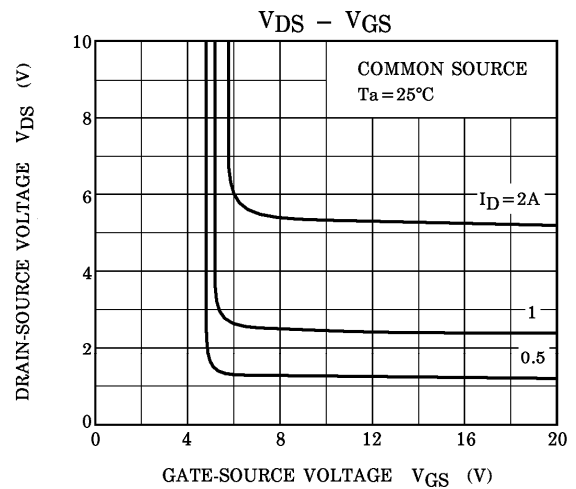
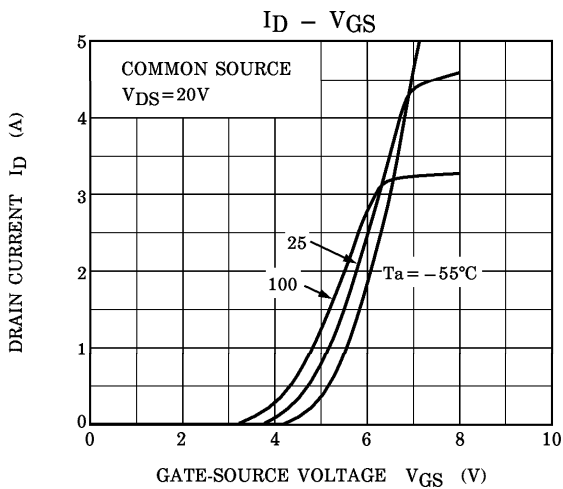
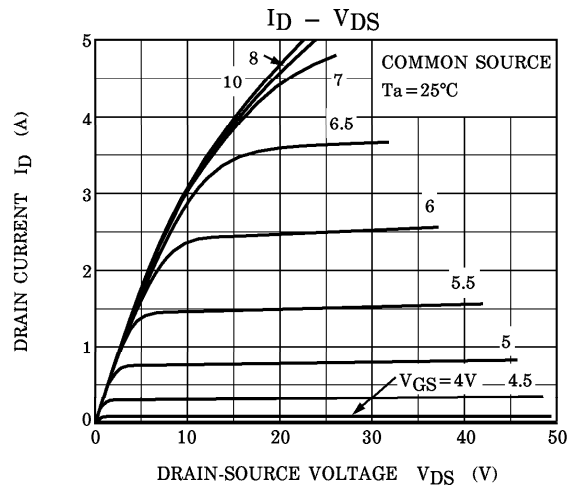
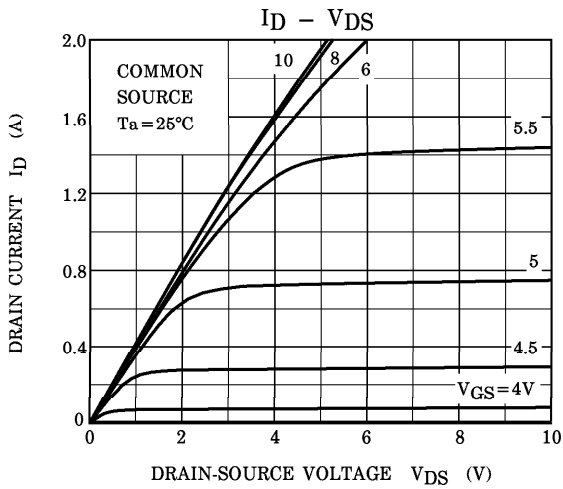
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 25V, V_{DS} = 0V$	—	—	± 10	μA
Gate-Source Breakdown Voltage		$V_{(BR)GSS}$	$I_G = \pm 10\mu A, V_{DS} = 0V$	± 30	—	—	V
Drain Cut-off Current		I_{DSS}	$V_{DS} = 500V, V_{GS} = 0V$	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D = 10mA, V_{GS} = 0V$	500	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS} = 10V, I_D = 1mA$	2.0	—	4.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 1A$	—	2.9	3.2	Ω
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = 10V, I_D = 1A$	0.8	1.7	—	S
Input Capacitance		C_{iss}	$V_{DS} = 10V, V_{GS} = 0V, f = 1MHz$	—	380	—	pF
Reverse Transfer Capacitance		C_{rss}		—	40	—	
Output Capacitance		C_{oss}		—	120	—	
Switching Time	Rise Time	t_r	<p>$V_{GS} = 10V, 0V$ $I_D = 1A$ $R_L = 200\Omega$ $V_{DD} \approx 200V$</p>	—	15	—	ns
	Turn-on Time	t_{on}		—	25	—	
	Fall Time	t_f		—	20	—	
	Turn-off Time	t_{off}		$V_{IN} : t_r, t_f < 5ns,$ $Duty \leq 1\%, t_w = 10\mu s$	—	80	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \approx 400V, V_{GS} = 10V, I_D = 2A$	—	9	—	nC
Gate-Source Charge		Q_{gs}		—	5	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	4	—	

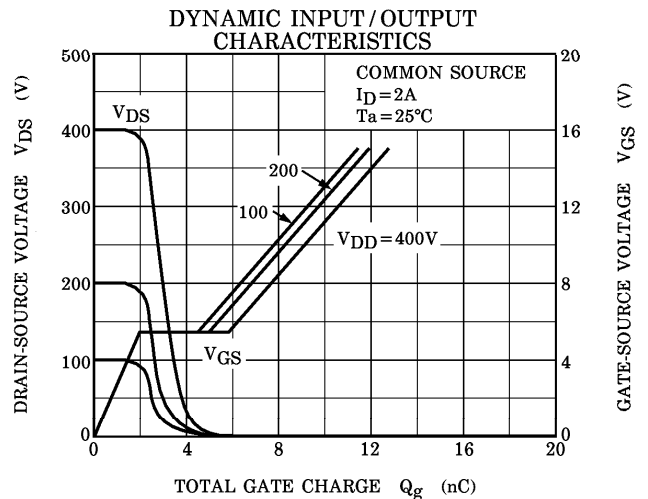
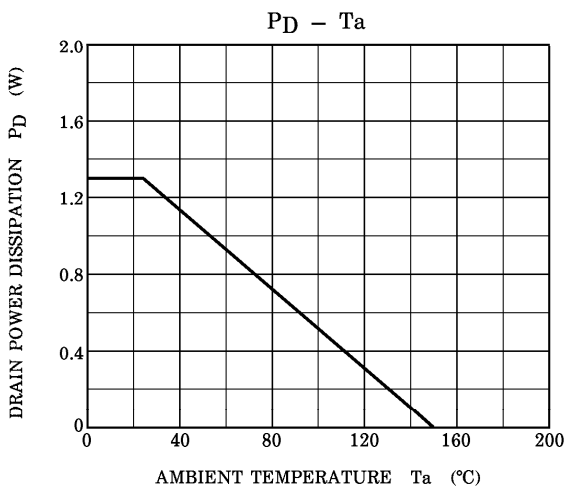
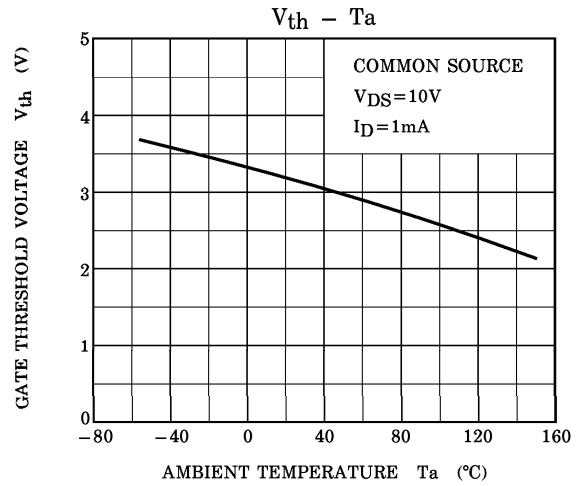
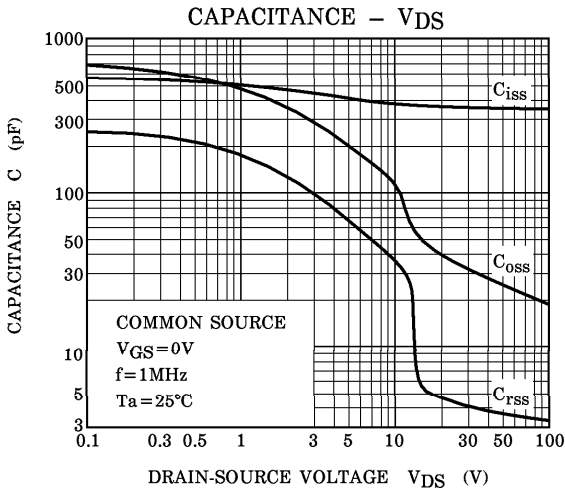
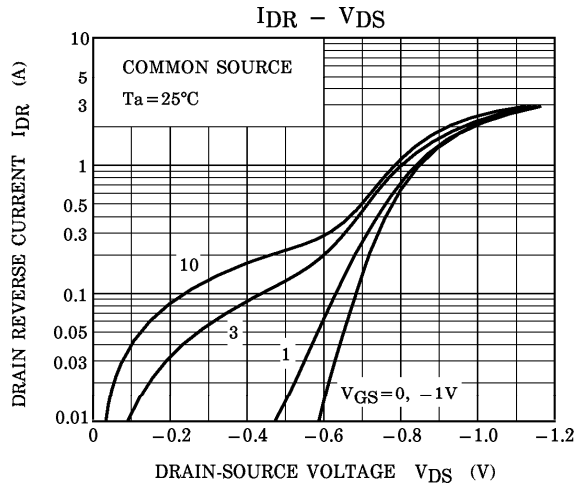
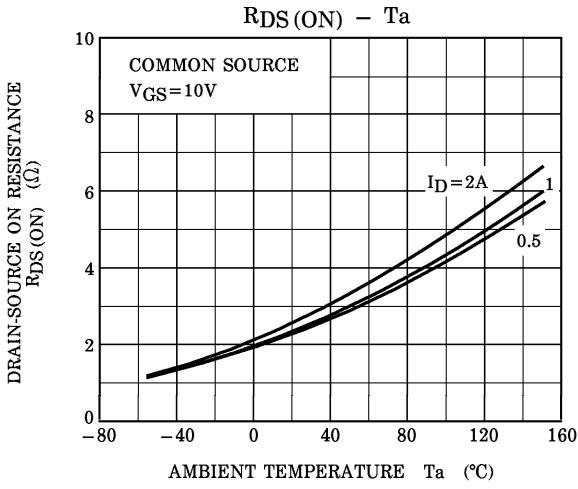
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

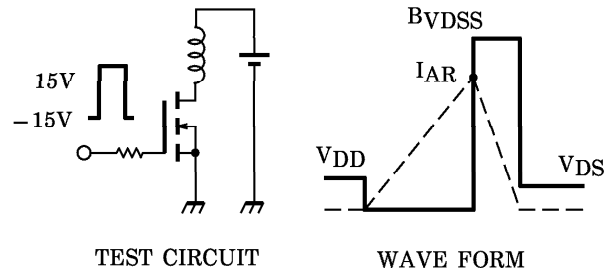
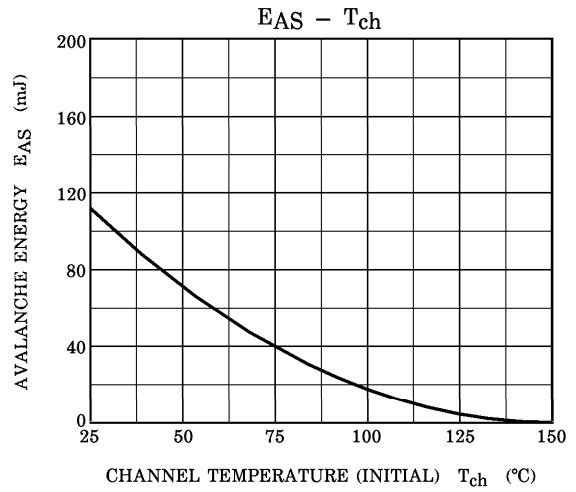
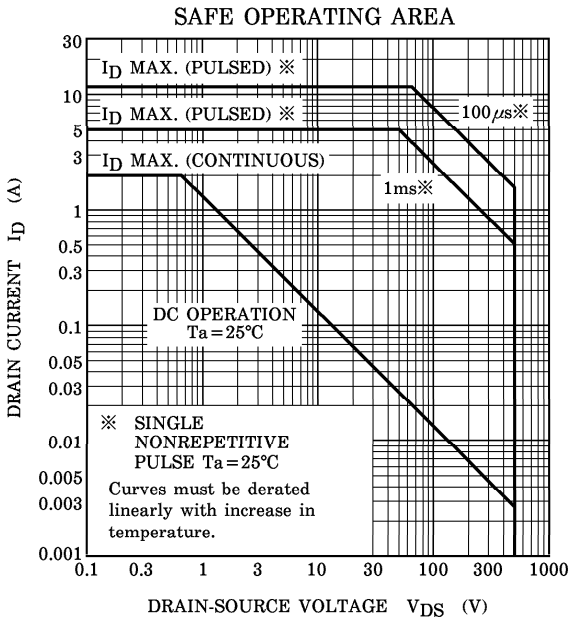
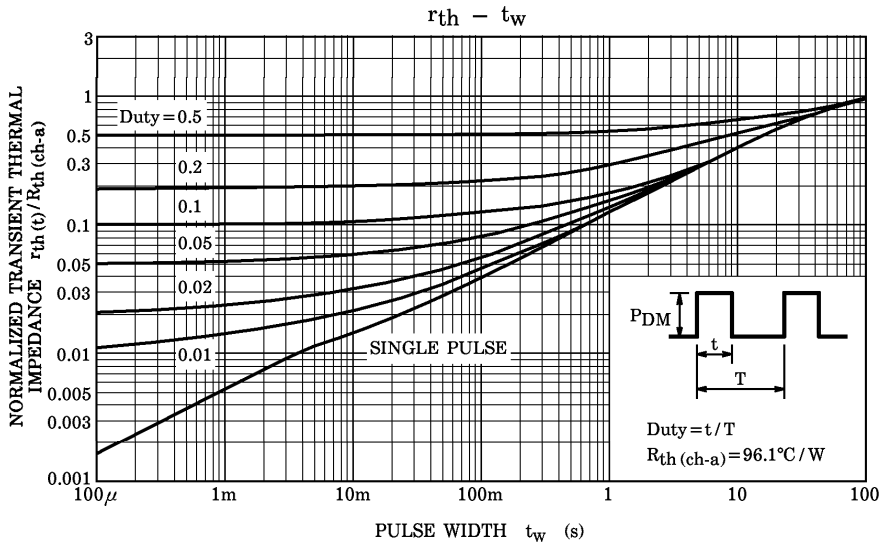
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	2	A
Pulse Drain Reverse Current	I_{DRP}	$t = 1ms$	—	—	5	A
	I_{DRP}	$t = 100\mu s$	—	—	12	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 2A, V_{GS} = 0V$	—	—	-1.5	V
Reverse Recovery Time	t_{rr}	$I_{DR} = 2A, V_{GS} = 0V$	—	1000	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR} / dt = 100A / \mu s$	—	3.5	—	μC

MARKING









Peak $I_{AR} = 2A$, $R_G = 25\Omega$
 $V_{DD} = 90V$, $L = 48.4mH$

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