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

2SK2599

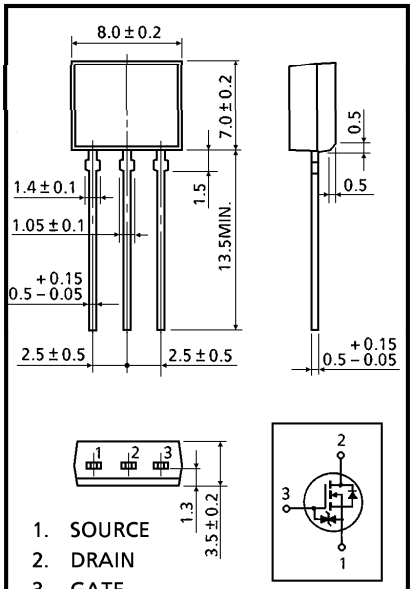
HIGH SPEED, HIGH VOLTAGE SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL APPLICATIONS

- Low Drain-Sorce 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 : $V_{th}=2.0\sim4.0V$ ($V_{DS}=10V$, $I_D=1mA$)

Unit in mm



JEDEC	—
EIAJ	—
TOSHIBA	2-8M1B

Weight : 0.54g

MAXIMUM RATINGS (Ta = 25°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=100μs)	I_{DP}	12	A
Drain Power Dissipation (Ta=25°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	°C
Storage Temperature Range		T_{stg}	−55~150	°C

THERMAL CHARACTERISTICS

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

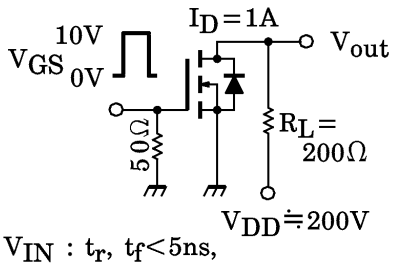
Note ;

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

** $V_{DD}=90V$, Starting $T_{ch}=25°C$, $L=48.4mH$, $R_G=25\Omega$, $I_{AR}=2A$

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

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

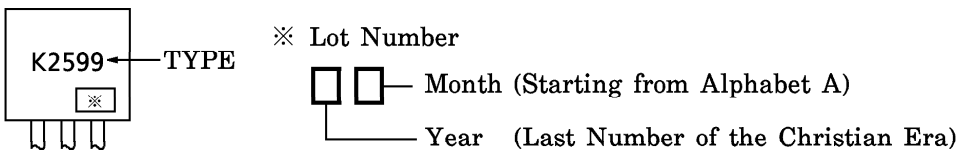
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS}=\pm25V$, $V_{DS}=0V$	—	—	±10	μA
Gate-Source Breakdown Voltage		$V_{(BR)\,GSS}$	$I_G=\pm10\mu A$, $V_{DS}=0V$	±30	—	—	V
Drain Cut-off Current		I_{DSS}	$V_{DS}=500V$, $V_{GS}=0V$	—	—	100	μA
Drain-Source Breakdown 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		—	15	—	ns
	Turn-on Time	t_{on}		—	25	—	
	Fall Time	t_f		—	20	—	
	Turn-off Time	t_{off}		—	80	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD}\fallingdotseq400V$, $V_{GS}=10V$, $I_D=2A$	—	9	—	nC
Gate-Source Charge		Q_{gs}		—	5	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	4	—	

V_{IN} : t_r, $t_f<5ns$,
Duty ≦ 1%, $t_w=10\mu s$

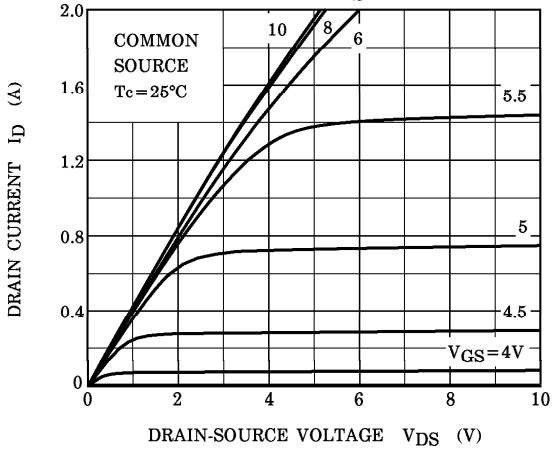
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

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=100μs	—	—	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

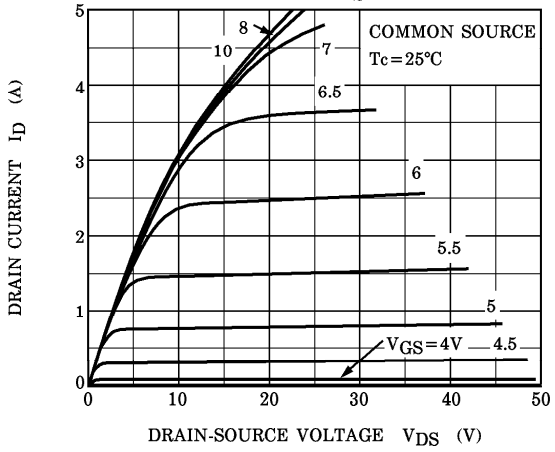
MARKING



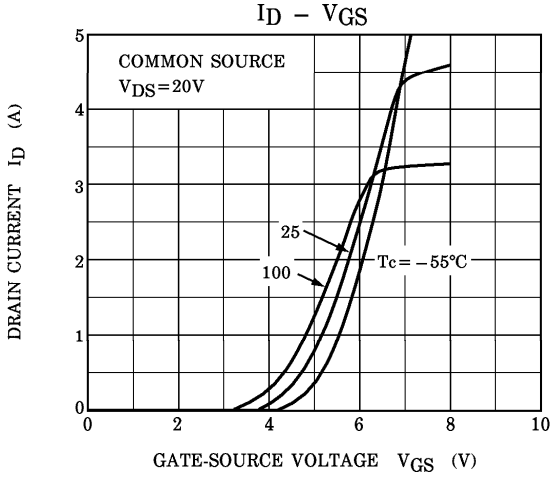
$I_D - V_{DS}$



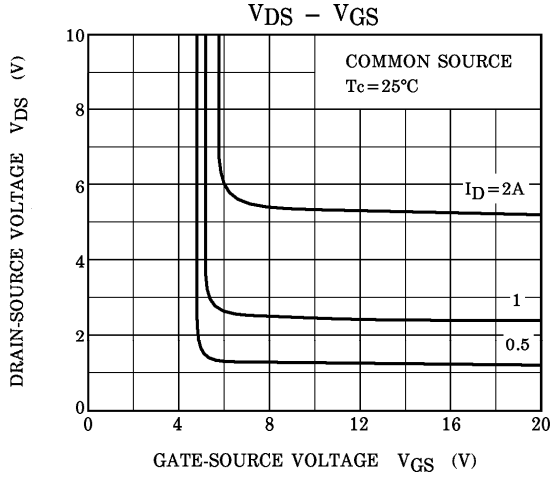
$I_D - V_{DS}$



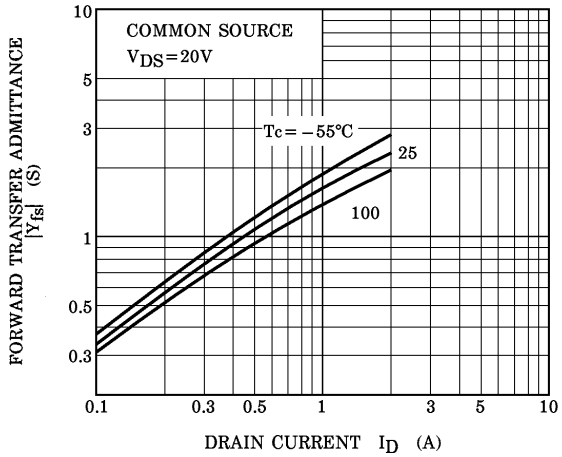
$I_D - V_{GS}$



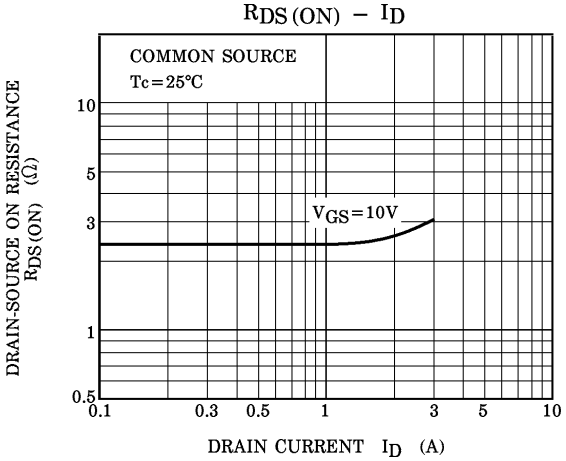
$V_{DS} - V_{GS}$



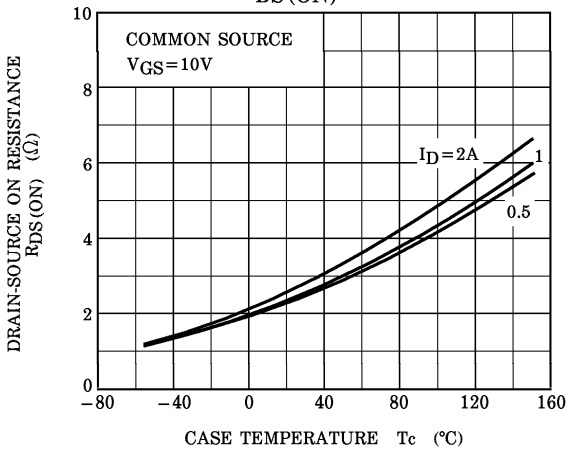
$|Y_{fs}| - I_D$



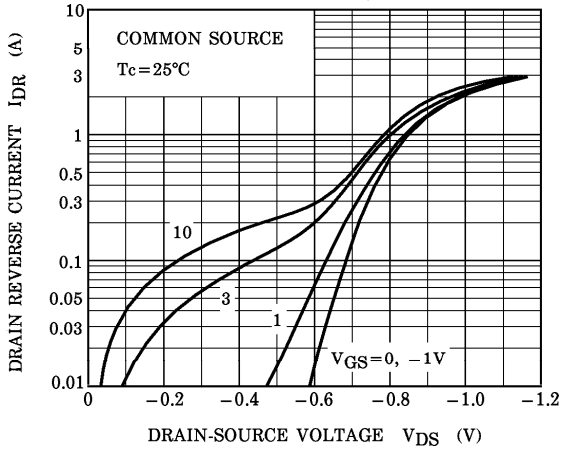
$R_{DS(ON)} - I_D$



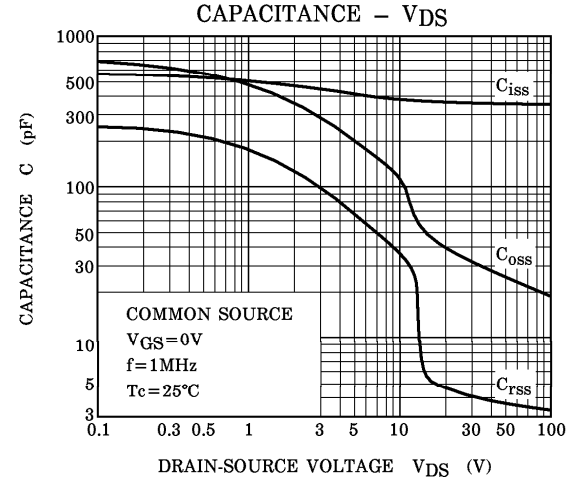
$R_{DS(ON)}$ – Tc



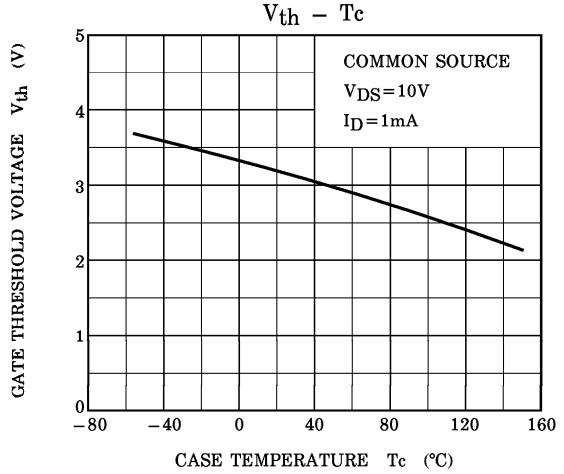
I_{DR} – V_{DS}



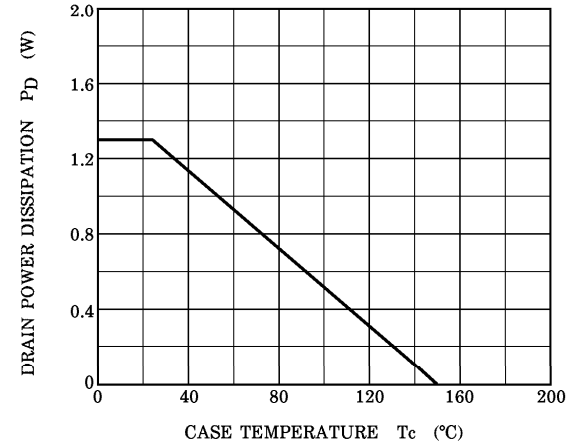
CAPACITANCE – V_{DS}



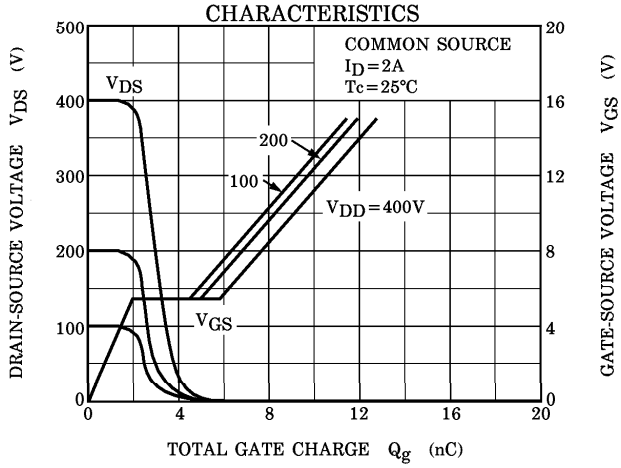
V_{th} – Tc



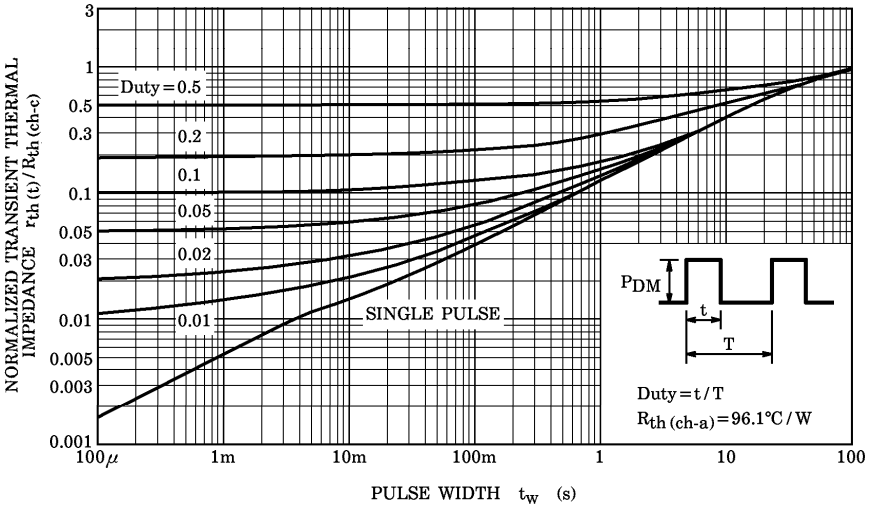
P_D – Tc



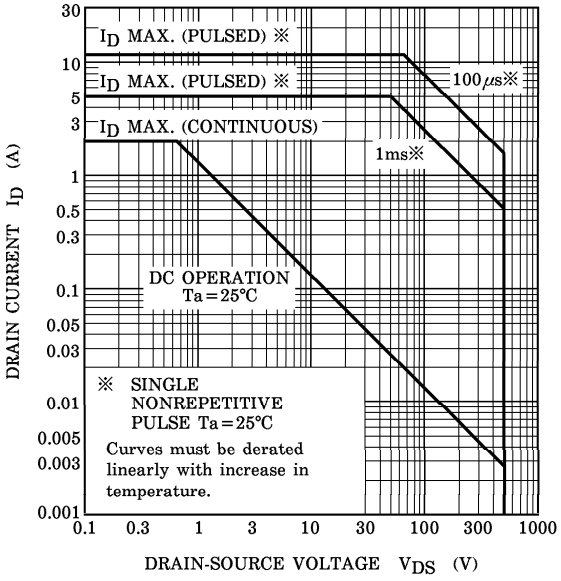
DYNAMIC INPUT / OUTPUT CHARACTERISTICS



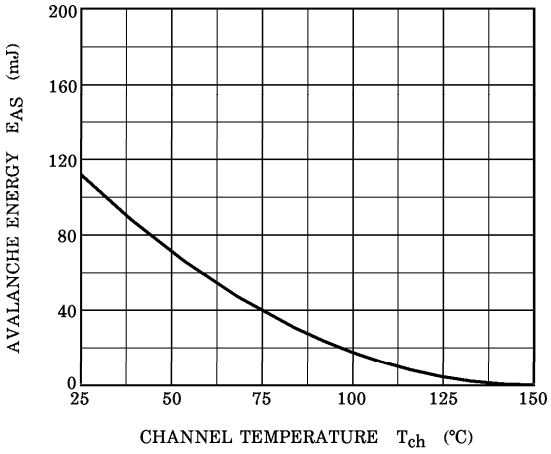
r_{th} – t_w

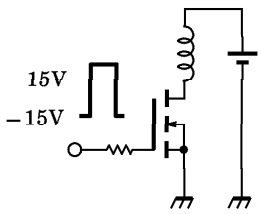


SAFE OPERATING AREA

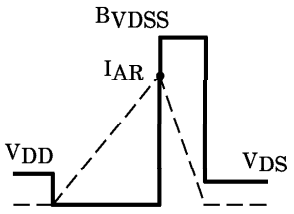


E_{AS} – T_{ch}





TEST CIRCUIT



WAVE FORM

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

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