TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (L^2-π-MOS Ⅵ)

2SK2964

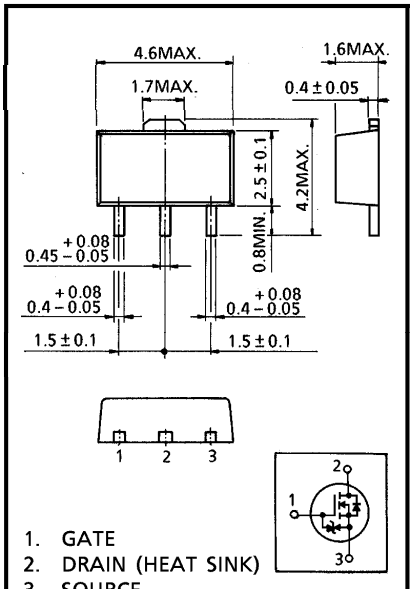
HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL APPLICATIONS

- 4V Gate Drive
- Low Drain-Source ON Resistance : $R_{DS\,(ON)}=0.13\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}|=2.5S$ (Typ.)
- Low Leakage Current : $I_{DSS}=100\mu A$ (Max.) ($V_{DS}=30V$)
- Enhancement-Mode : $V_{th}=0.8\sim2.0V$ ($V_{DS}=10V$, $I_D=1mA$)

Unit in mm



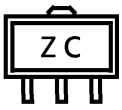
JEDEC	—
EIAJ	—
TOSHIBA	2-5K1B

Weight : 0.05g (Typ.)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	30	V
Drain-Gate Voltage ($R_{GS}=20k\Omega$)		V_{DGR}	30	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	DC	I_D	2	A
	Pulse	I_{DP}	6	A
Drain Power Dissipation***		P_D	1.5	W
Single Pulse Avalanche Energy**		E_{AS}	56	mJ
Avalanche Current		I_{AR}	2	A
Repetitive Avalanche Energy*		E_{AR}	0.15	mJ
Channel Temperature		T_{ch}	150	°C
Storage Temperature Range		T_{stg}	−55~150	°C

MARKING



THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Ambient	$R_{th\,(ch-a)}$	250	°C / W

(Note)

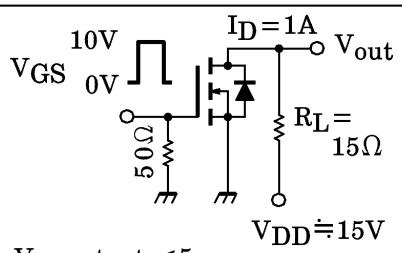
* Repetitive rating ; Pulse Width Limited by Max. junction temperature.

** $V_{DD}=25V$, Starting $T_{ch}=25°C$, $L=10mH$, $R_G=25\Omega$, $I_{AR}=2A$

*** Mounted on ceramic substrate ($1inch^2\times0.8t$)

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

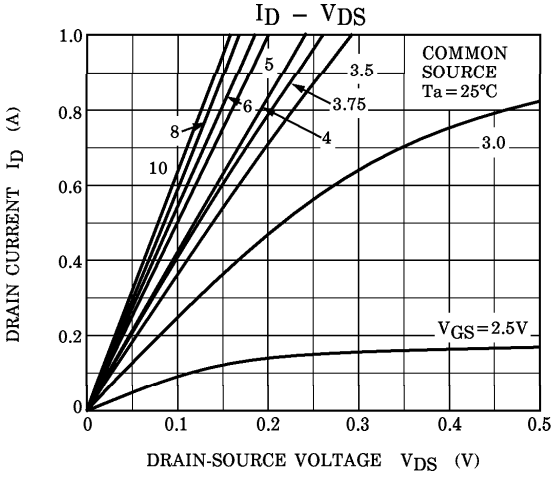
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS}=\pm16V$, $V_{DS}=0V$	—	—	±10	μA
Drain Cut-off Current		I_{DSS}	$V_{DS}=30V$, $V_{GS}=0V$	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D=10mA$, $V_{GS}=0V$	30	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS}=10V$, $I_D=1mA$	0.8	—	2.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS}=4V$, $I_D=1A$	—	0.18	0.25	Ω
			$V_{GS}=10V$, $I_D=1A$	—	0.13	0.18	
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS}=10V$, $I_D=1A$	1.2	2.5	—	S
Input Capacitance		C_{iss}	$V_{DS}=10V$, $V_{GS}=0V$, f=1MHz	—	140	—	pF
Reverse Transfer Capacitance		C_{rss}		—	30	—	
Output Capacitance		C_{oss}		—	80	—	
Switching Time	Rise Time	t_r		—	10	—	ns
	Turn-on Time	t_{on}		—	15	—	
	Fall Time	t_f		—	85	—	
	Turn-off Time	t_{off}	V_{IN} : t_r, $t_f<5ns$, Duty ≦ 1%, $t_w=10\mu s$	—	195	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD}\fallingdotseq24V$, $V_{GS}=10V$, $I_D=2A$	—	5.8	—	nC
Gate-Source Charge		Q_{gs}		—	4.3	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	1.5	—	

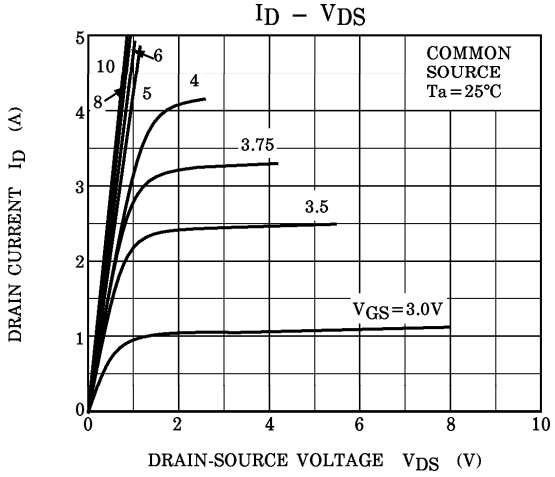
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	2	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	6	A
Diode Forward Voltage	V_{DSF}	$I_{DR}=2A$, $V_{GS}=0V$	—	—	−1.5	V
Reverse Recovery Time	t_{rr}	$I_{DR}=2A$, $V_{GS}=0V$	—	50	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR}/dt=50A/\mu s$	—	20	—	nC

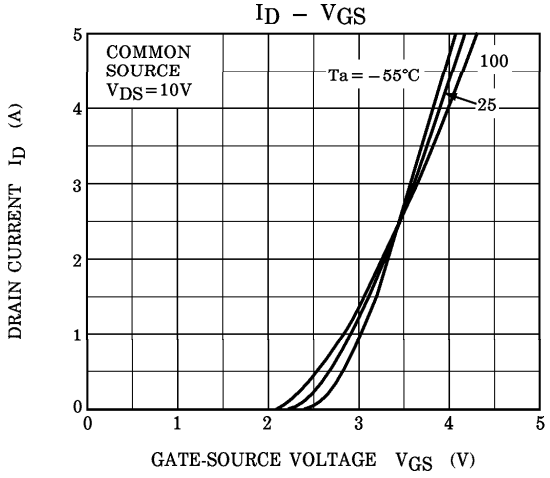
$I_D - V_{DS}$



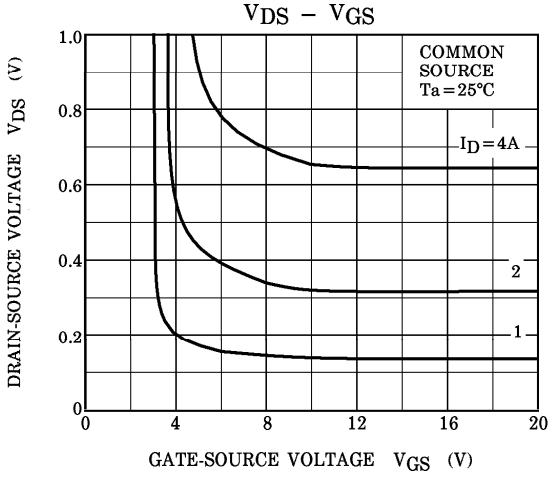
$I_D - V_{DS}$



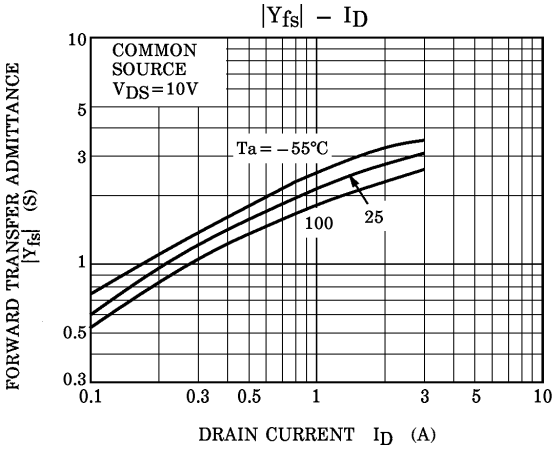
$I_D - V_{GS}$



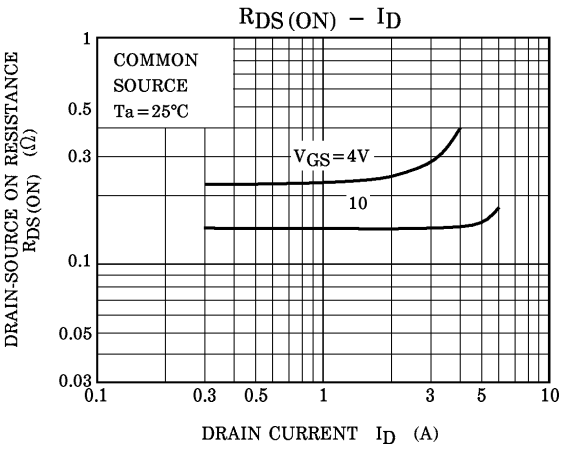
$V_{DS} - V_{GS}$



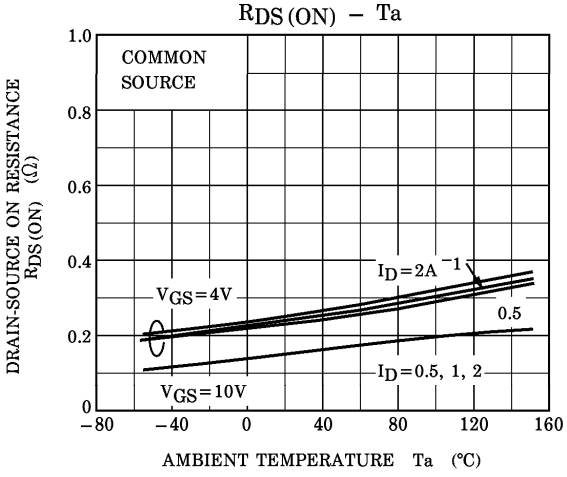
$|Y_{fs}| - I_D$



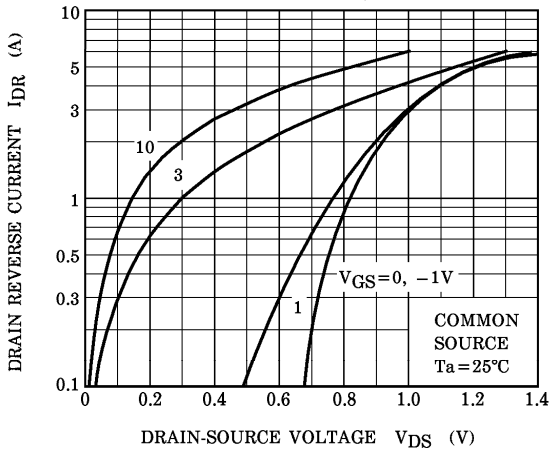
$R_{DS\,(ON)} - I_D$



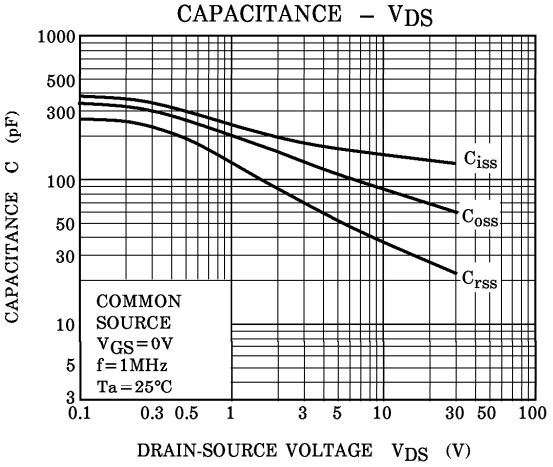
$R_{DS\,(ON)}$ – Ta



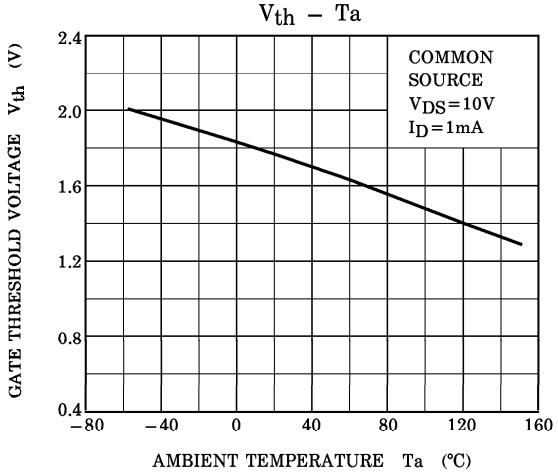
I_{DR} – V_{DS}



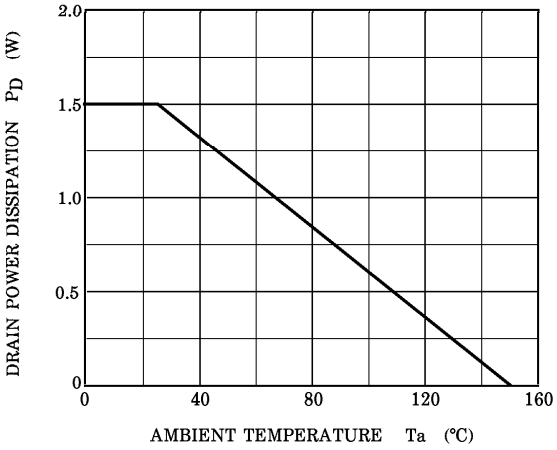
CAPACITANCE – V_{DS}



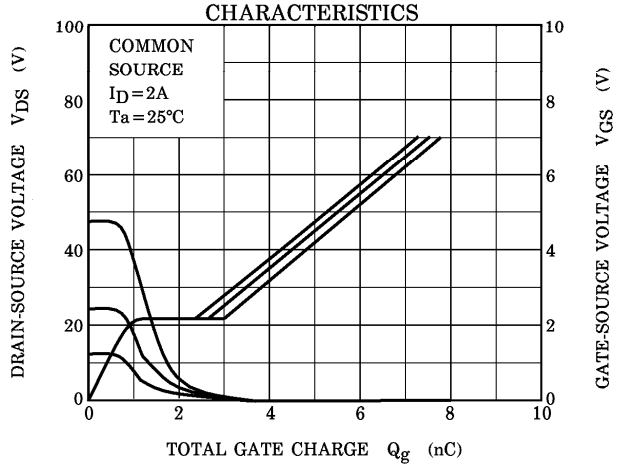
V_{th} – Ta



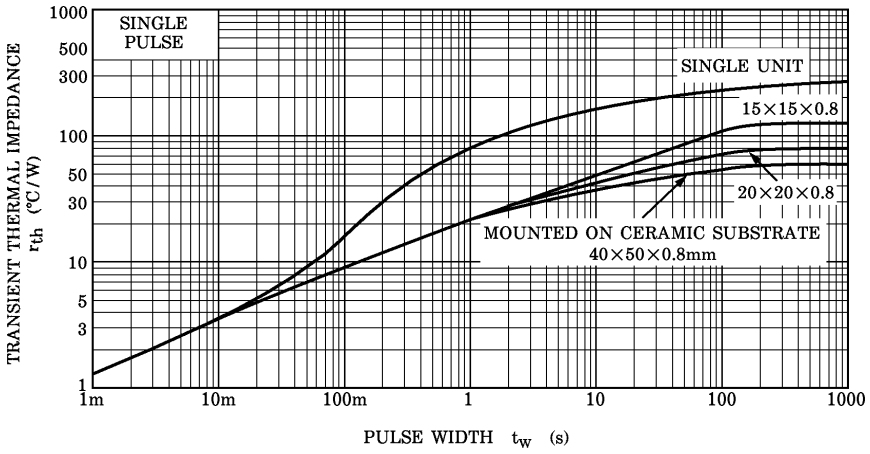
P_D – Ta



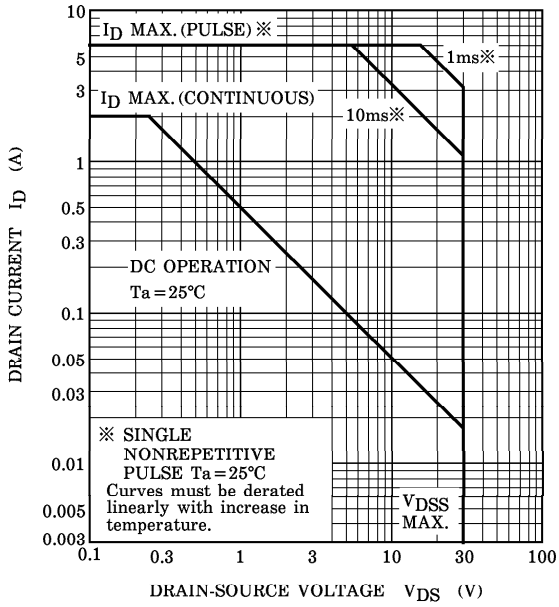
DYNAMIC INPUT / OUTPUT CHARACTERISTICS



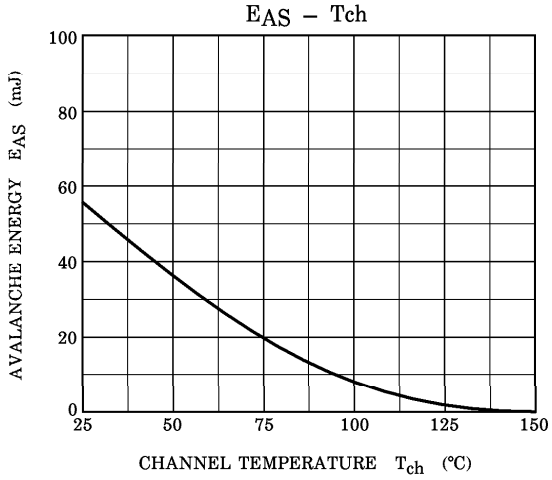
r_{th} – t_w

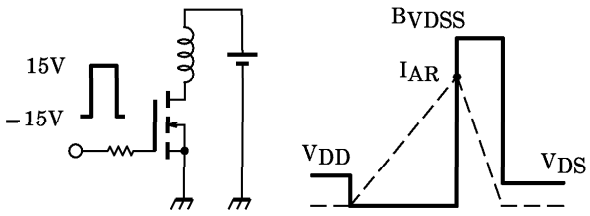


SAFE OPERATING AREA



E_{AS} – Tch





TEST CIRCUIT WAVE FORM

Peak I_{AR} = 2A, R_G = 25Ω
V_{DD} = 25V, L = 10mH

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