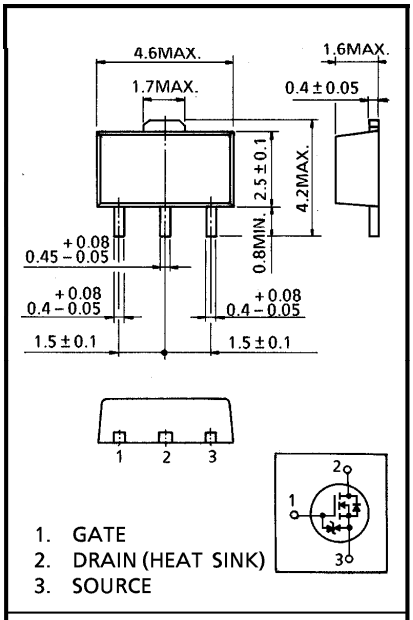
TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (L^2-π-MOS V)

2SK2963

HIGH SPEED APPLICATIONS
DC-DC CONVERTER, RELAY DRIVE AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL APPLICATIONS

Unit in mm



JEDEC	—
EIAJ	—
TOSHIBA	2-5K1B

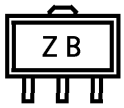
Weight : 0.05g (Typ.)

- 4V Gate Drive
- Low Drain-Source ON Resistance : $R_{DS\,(ON)}=0.5\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}|=1.2S$ (Typ.)
- Low Leakage Current : $I_{DSS}=100\mu A$ (max.) ($V_{DS}=100V$)
- Enhancement-Mode : $V_{th}=0.8\sim2.0V$ ($V_{DS}=10V$, $I_D=1mA$)

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}	±20	V
Drain Current	DC	I_D	1	A
	Pulse	I_{DP}	3	A
Drain Power Dissipation***		P_D	1.5	W
Single Pulse Avalanche Energy**		E_{AS}	137	mJ
Avalanche Current		I_{AR}	1	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	$R_{th\,(ch\text{-}a)}$	83.3	°C / W

Note ;

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

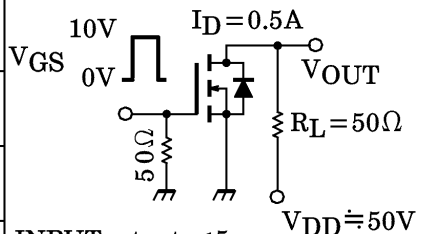
** $V_{DD}=25V$, Starting $T_{ch}=25°C$, $L=221mH$, $R_G=25\Omega$, $I_{AR}=1A$

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

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

961001EAA1

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

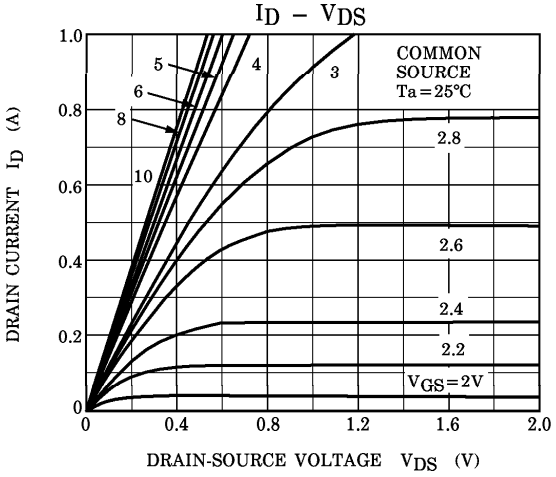
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS}=\pm16V$, $V_{DS}=0V$	—	—	±10	μA
Drain Cut-off Current		I_{DSS}	$V_{DS}=100V$, $V_{GS}=0V$	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D=10mA$, $V_{GS}=0V$	100	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS}=10V$, $I_D=1mA$	0.8	—	2.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS}=4V$, $I_D=0.5A$	—	0.65	0.95	Ω
			$V_{DS}=10V$, $I_D=0.5A$	—	0.5	0.7	
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS}=10V$, $I_D=0.5A$	0.6	1.2	—	S
Input Capacitance		C_{iss}	$V_{DS}=10V$, $V_{GS}=0V$, f=1MHz	—	140	—	pF
Reverse Transfer Capacitance		C_{rss}		—	20	—	
Output Capacitance		C_{oss}		—	45	—	
Switching Time	Rise Time	t_r		—	8	—	ns
	Turn-on Time	t_{on}		—	13	—	
	Fall Time	t_f		—	45	—	
	Turn-off Time	t_{off}		—	175	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD}\fallingdotseq80V$, $V_{GS}=10V$, $I_D=1A$	—	6.3	—	nC
Gate-Source Charge		Q_{gs}		—	4.3	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	2	—	

INPUT : t_r, $t_f<5ns$,
Duty ≦ 1%, $t_w=10\mu s$

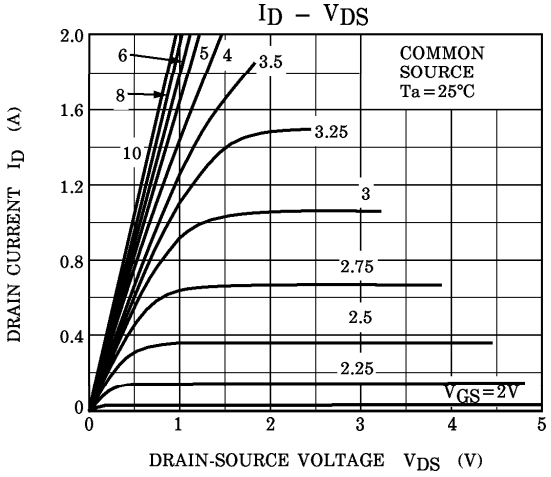
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	1	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	3	A
Diode Forward Voltage	V_{DSF}	$I_{DR}=1A$, $V_{GS}=0V$	—	—	−1.5	V
Reverse Recovery Time	t_{rr}	$I_{DR}=1A$, $V_{GS}=0V$	—	80	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR}/dt=50A/\mu s$	—	140	—	μC

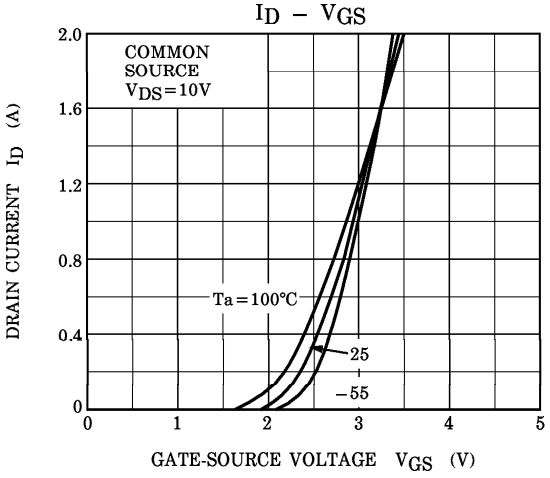
$I_D - V_{DS}$



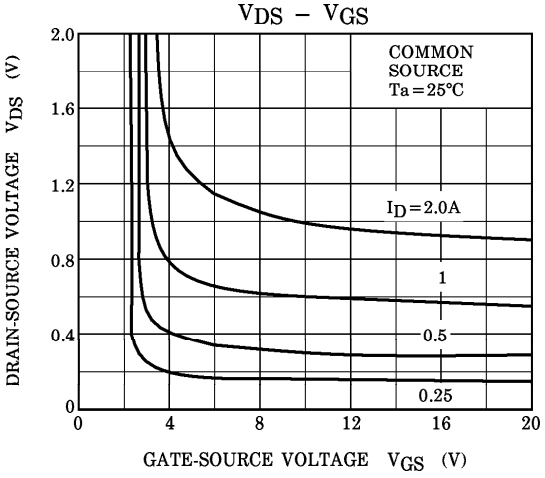
$I_D - V_{DS}$



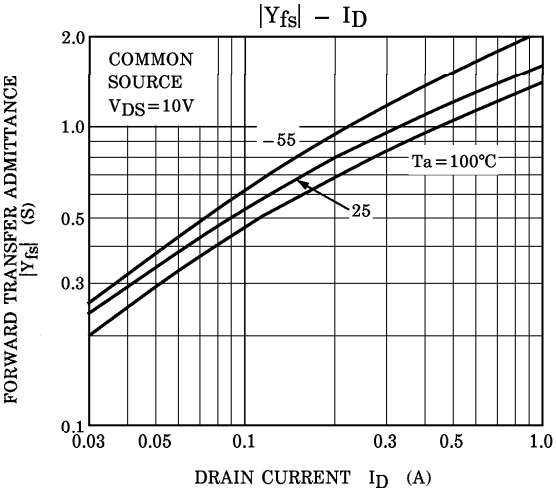
$I_D - V_{GS}$



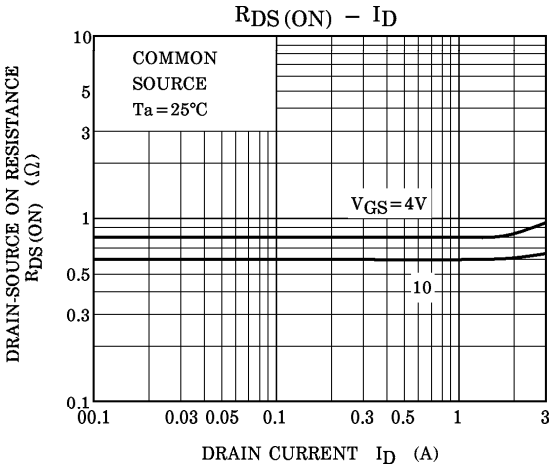
$V_{DS} - V_{GS}$



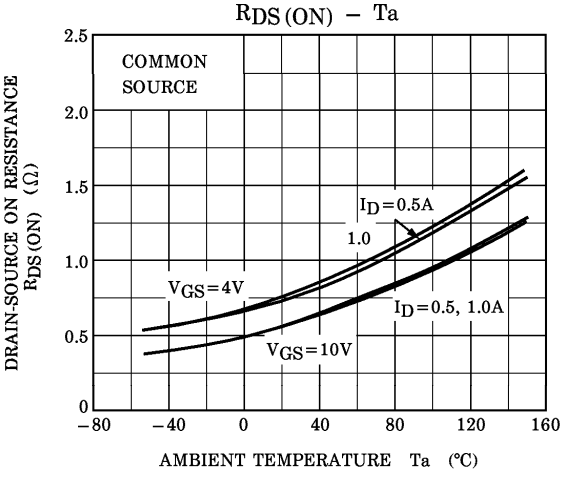
$|Y_{fs}| - I_D$



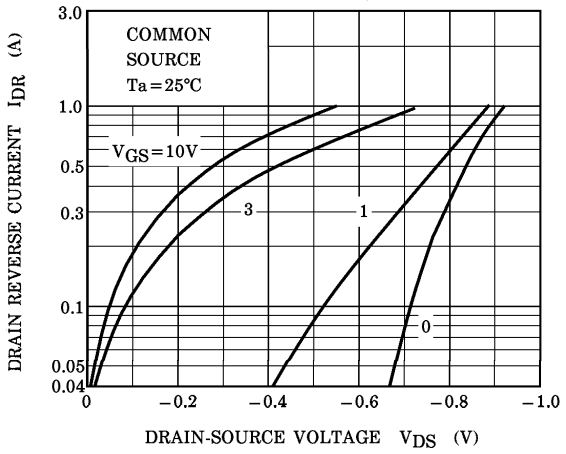
$R_{DS\,(ON)} - I_D$



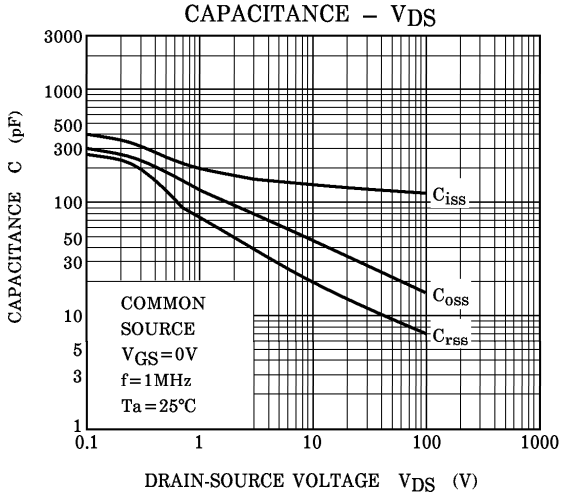
$R_{DS\,(ON)}$ – Ta



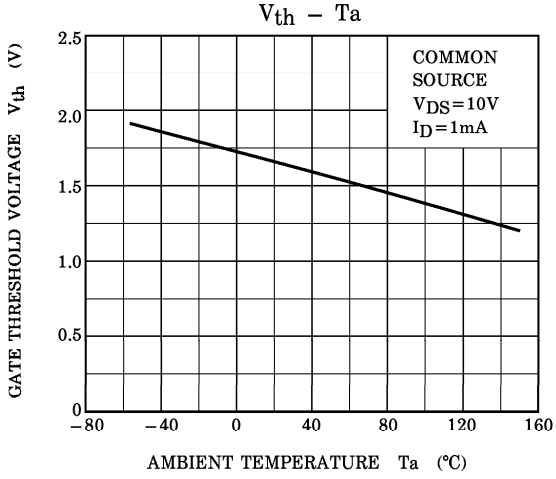
I_{DR} – V_{DS}



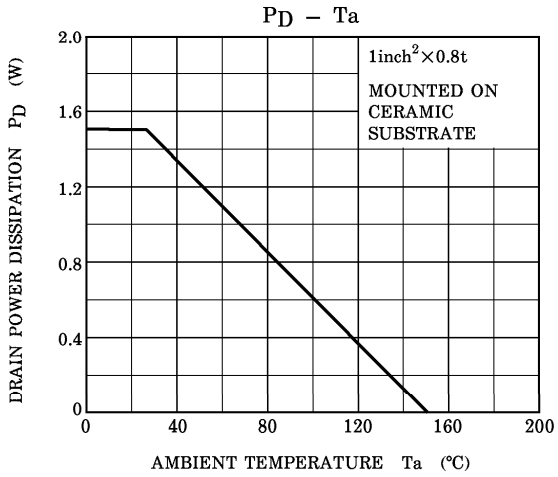
CAPACITANCE – V_{DS}



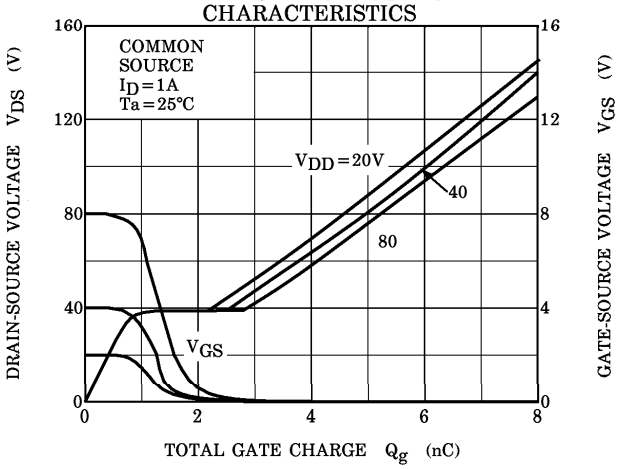
V_{th} – Ta



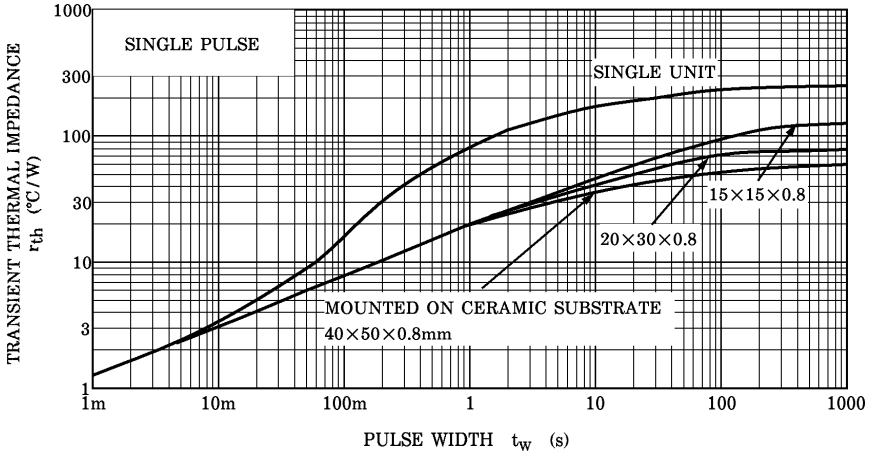
P_D – Ta



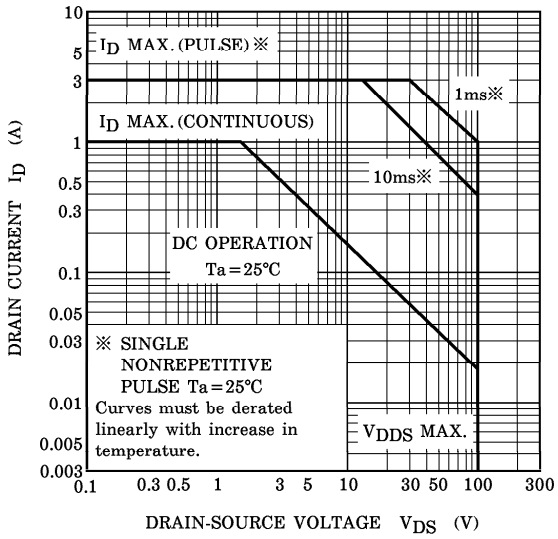
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



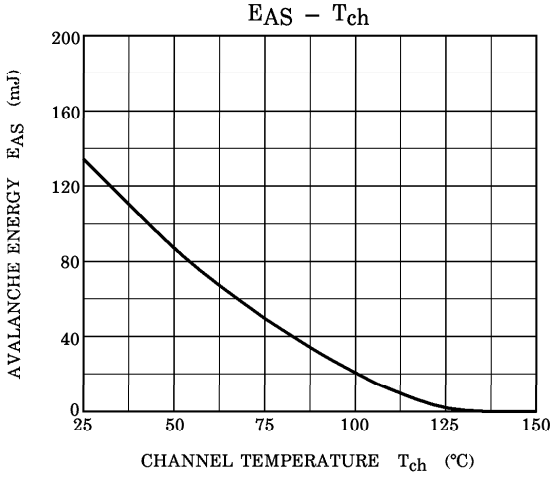
r_{th} – t_w

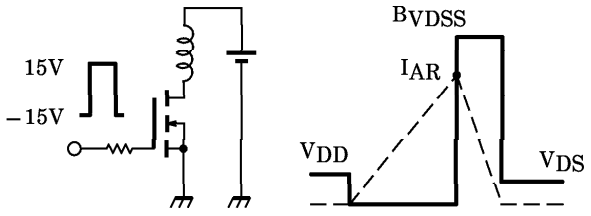


SAFE OPERATING AREA



E_{AS} – T_{ch}





TEST CIRCUIT WAVE FORM

Peak I_{AR} = 1A, R_G = 25Ω
V_{DD} = 25V, L = 221mH

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