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

2SK2992

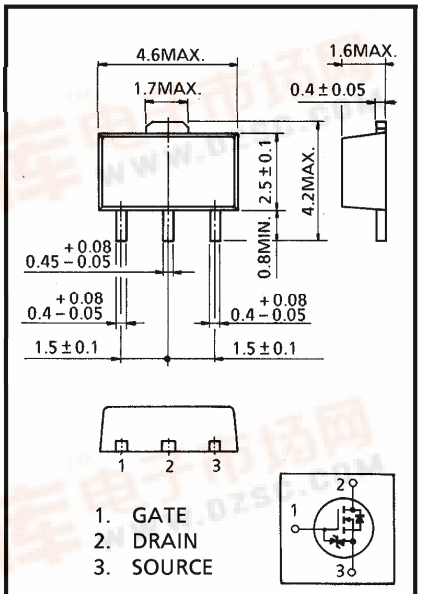
HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL APPLICATIONS

- Low Drain-Source ON Resistance : $R_{DS\,(ON)}$ = 2.2 Ω (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}|$ = 0.9 S (Typ.)
- Low Leakage Current : I_{DSS} = 100 μA (Max.) (V_{DS} = 200 V)
- Enhancement-Mode : V_{th} = 2.0~3.5 V (V_{DS} = 10 V, I_D = 1 mA)

Unit in mm



JEDEC	—
EIAJ	SC-62
TOSHIBA	2-5K1B

Weight : 0.05 g (Typ.)

MARKING

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	200	V
Drain-Gate Voltage (R_{GS} = 20 kΩ)		V_{DGR}	200	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	DC	I_D	1	A
	Pulse	I_{DP}	3	A
Drain Power Dissipation (Ta = 25°C)		P_D	0.5	W
Drain Power Dissipation***		P_D	1.5	W
Single Pulse Avalanche Energy**		E_{AS}	36	mJ
Avalanche Current		I_{AR}	1	A
Repetitive Avalanche Energy*		E_{AR}	0.05	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	$R_{th\,(ch-a)}$	250	°C / W

Note ;

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

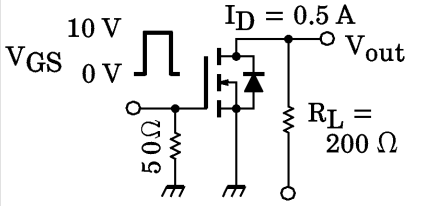
** V_{DD} = 50 V, T_{ch} = 25°C (initial), L = 56.7 mH, R_G = 25 Ω, I_{AR} = 1 A

*** Mounted on ceramic substrate (1 inch^2 × 0.8 t)

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

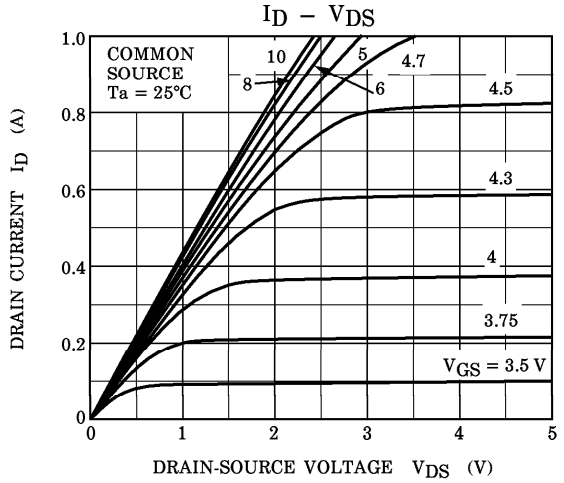
961001EAA1

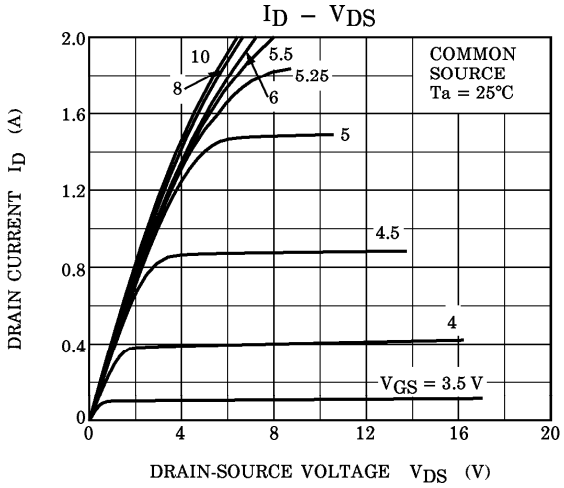
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

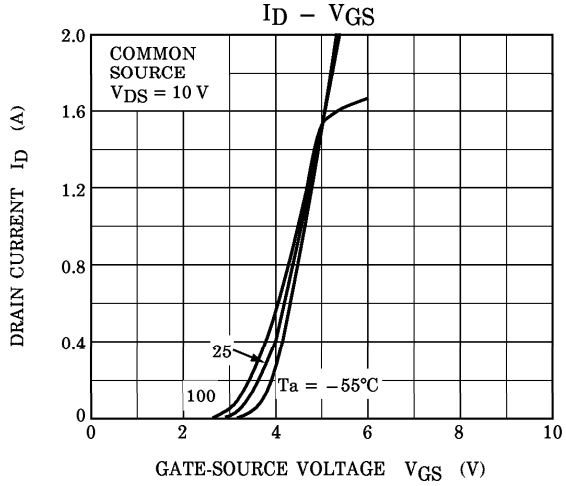
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	V_{GS} = ±16 V, V_{DS} = 0 V	—	—	±10	μA
Drain Cut-off Current		I_{DSS}	V_{DS} = 200 V, V_{GS} = 0 V	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)\,DSS}$	I_D = 10 mA, V_{GS} = 0 V	200	—	—	V
Gate Threshold Voltage		V_{th}	V_{DS} = 10 V, I_D = 1 mA	2.0	—	3.5	V
Drain-Source ON Resistance		$R_{DS\,(ON)}$	V_{GS} = 10 V, I_D = 0.5 A	—	2.2	3.5	Ω
Forward Transfer Admittance		$\|Y_{fs}\|$	V_{DS} = 10 V, I_D = 0.5 A	0.5	0.9	—	S
Input Capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V f = 1 MHz	—	90	—	pF
Reverse Transfer Capacitance		C_{rss}		—	10	—	
Output Capacitance		C_{oss}		—	30	—	
Switching Time	Rise Time	t_r	 V_{IN} : t_r, t_f < 5 ns, Duty ≦ 1%, t_w = 10 μs	—	9	—	ns
	Turn-on Time	t_{on}		—	17	—	
	Fall Time	t_f		—	16	—	
	Turn-off Time	t_{off}		—	45	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	V_{DD} ≒ 160 V, V_{GS} = 10 V I_D = 1 A	—	3.0	—	nC
Gate-Source Charge		Q_{gs}		—	1.8	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	1.2	—	

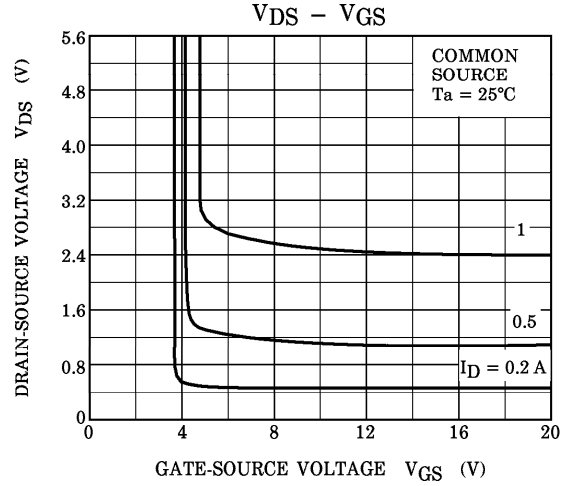
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

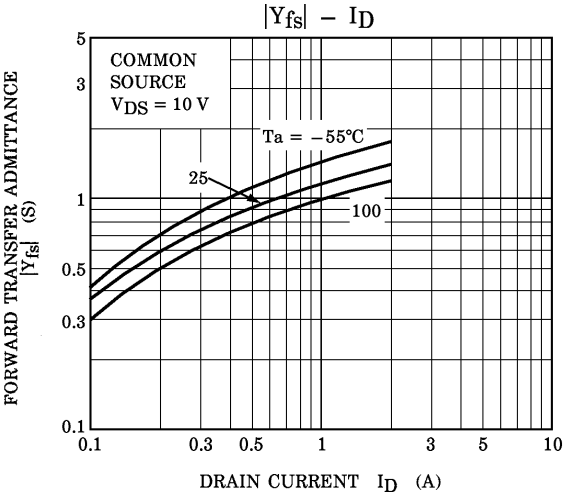
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	1	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	3	A
Diode Forward Voltage	V_{DSF}	I_{DR} = 1 A, V_{GS} = 0 V	—	—	−1.5	V
Reverse Recovery Time	t_{rr}	I_{DR} = 1 A, V_{GS} = 0 V dI_{DR} / dt = 100 A / μs	—	85	—	ns
Reverse Recovery Charge	Q_{rr}		—	190	—	nC

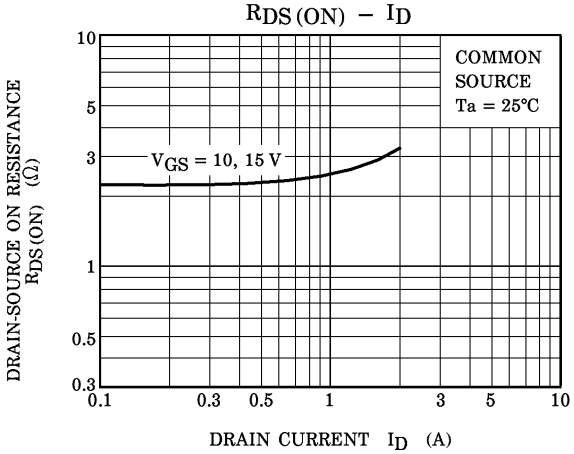

I_D – V_{DS}
COMMON SOURCE
Ta = 25°C
10
8
5
6
4.7
4.5
4.3
4
3.75
V_{GS} = 3.5 V
DRAIN CURRENT I_D (A)
DRAIN-SOURCE VOLTAGE V_{DS} (V)


I_D – V_{DS}
COMMON SOURCE
Ta = 25°C
10
8
5.5
5.25
6
5
4.5
4
V_{GS} = 3.5 V
DRAIN CURRENT I_D (A)
DRAIN-SOURCE VOLTAGE V_{DS} (V)

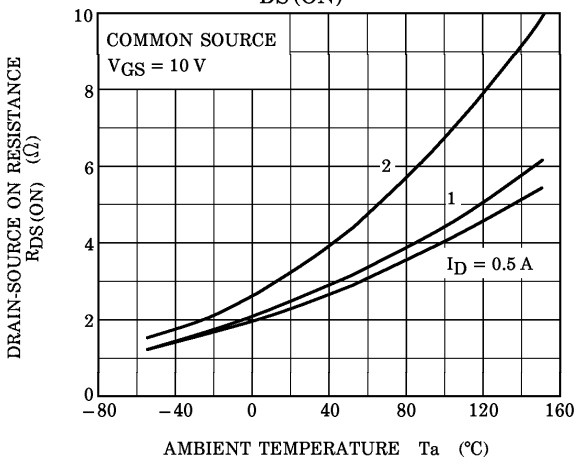

I_D – V_{GS}
COMMON SOURCE
V_{DS} = 10 V
25
100
Ta = −55°C
DRAIN CURRENT I_D (A)
GATE-SOURCE VOLTAGE V_{GS} (V)


V_{DS} – V_{GS}
COMMON SOURCE
Ta = 25°C
1
0.5
I_D = 0.2 A
DRAIN-SOURCE VOLTAGE V_{DS} (V)
GATE-SOURCE VOLTAGE V_{GS} (V)

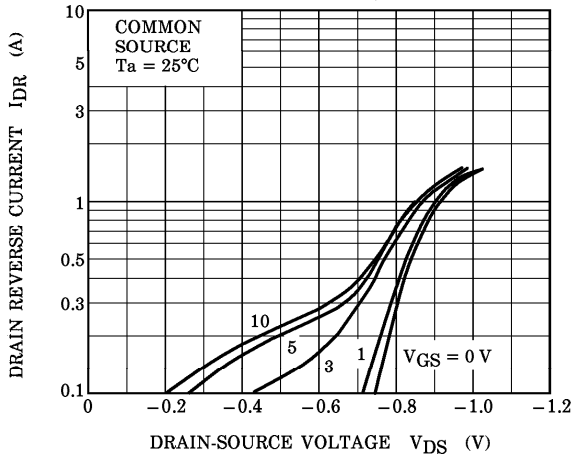

$|Y_{fs}|$ – I_D
COMMON SOURCE
V_{DS} = 10 V
Ta = −55°C
25
100
FORWARD TRANSFER ADMITTANCE $|Y_{fs}|$ (S)
DRAIN CURRENT I_D (A)


$R_{DS\,(ON)}$ – I_D
COMMON SOURCE
Ta = 25°C
V_{GS} = 10, 15 V
DRAIN-SOURCE ON RESISTANCE $R_{DS\,(ON)}$ (Ω)
DRAIN CURRENT I_D (A)

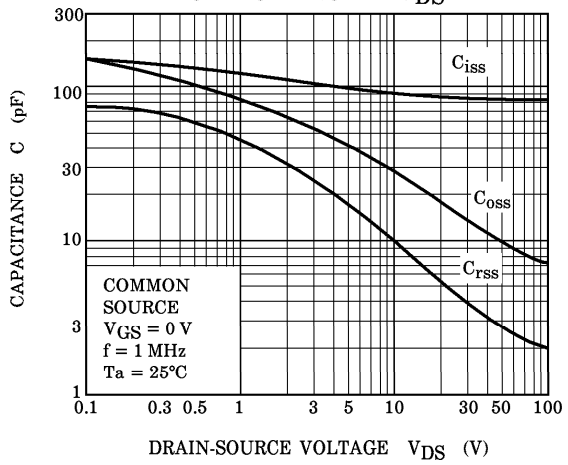
$R_{DS\,(ON)}$ – Ta



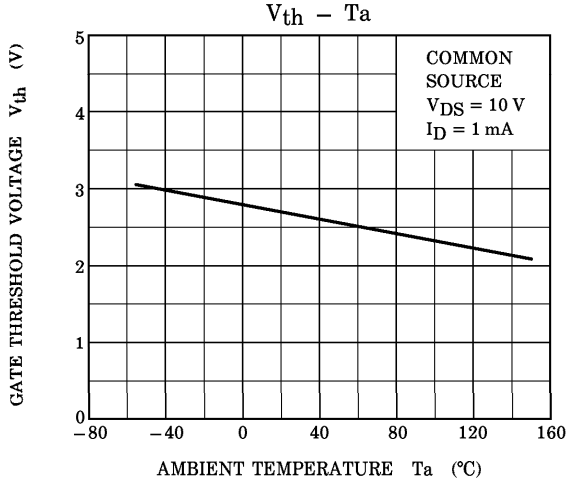
I_{DR} – V_{DS}



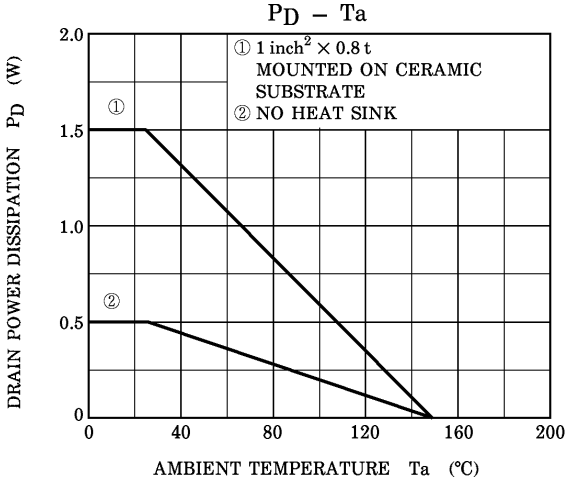
CAPACITANCE – V_{DS}



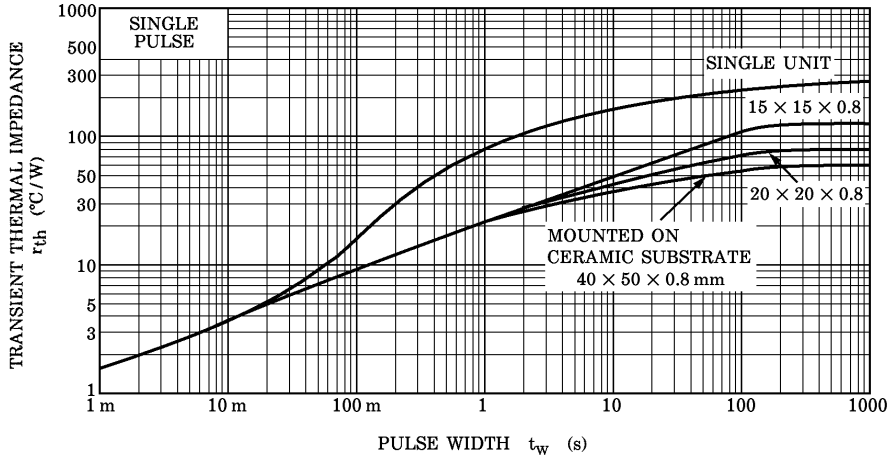
V_{th} – Ta



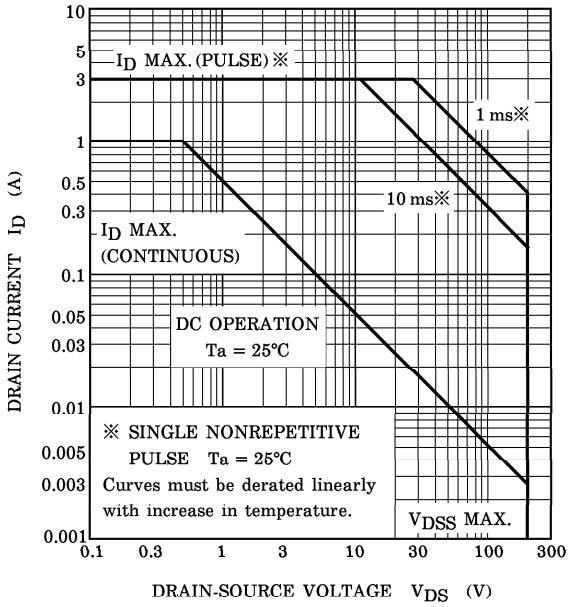
P_D – Ta



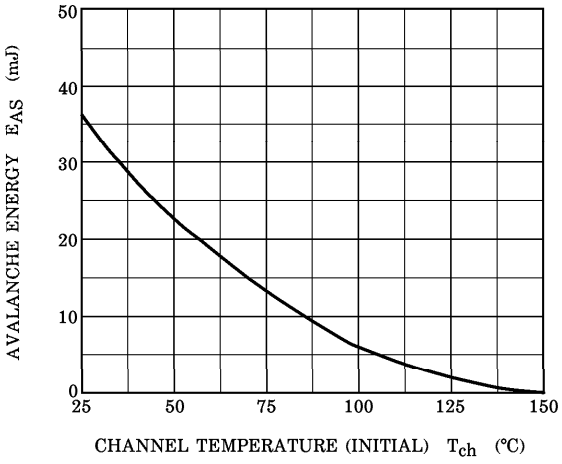
$r_{th} - t_w$

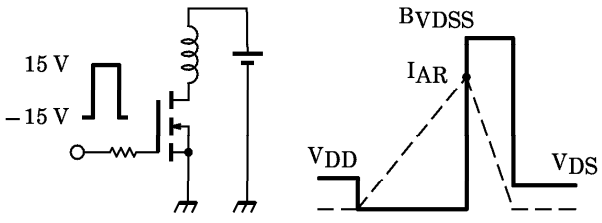


SAFE OPERATING AREA



$E_{AS} - T_{ch}$





TEST CIRCUIT WAVE FORM

Peak $I_{AR} = 1$ A, $R_G = 25\ \Omega$
$V_{DD} = 50$ V, L = 56.7 mH

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