TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (U-MOSII)

2SK2986

HIGH CURRENT SWITCHING APPLICATIONS

DC-DC CONVERTER, RELAY DRIVE AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL APPLICATIONS

- Low Drain-Source ON Resistance : $R_{DS\,(ON)} = 4.5\,m\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 80\,S$ (Typ.)
- Low Leakage Current : $I_{DSS} = 100\,\mu A$ (Max.) ($V_{DS} = 60\,V$)
- Enhancement-Mode : $V_{th} = 1.3 \sim 2.5\,V$ ($V_{DS} = 10\,V$, $I_D = 1\,mA$)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	60	V
Drain-Gate Voltage ($R_{GS} = 20\,k\Omega$)		V_{DGR}	60	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	DC	I_D	55	A
	Pulse (t ≦ 10 s)	I_{DP}	70	
	Pulse (t ≦ 1 ms)		280	
Drain Power Dissipation (Tc = 25°C)		P_D	100	W
Single Pulse Avalanche Energy**		E_{AS}	525	mJ
Avalanche Current		I_{AR}	55	A
Repetitive Avalanche Energy*		E_{AR}	10	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 Case	$R_{th\,(ch\text{-}c)}$	1.25	°C / W
Thermal Resistance, Channel To Ambient	$R_{th\,(ch\text{-}a)}$	83.3	°C / W

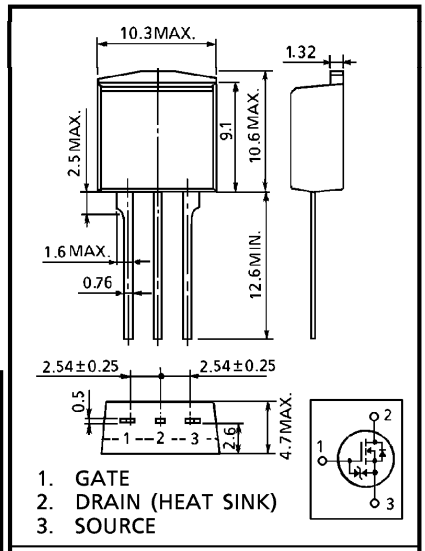
Note ;

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

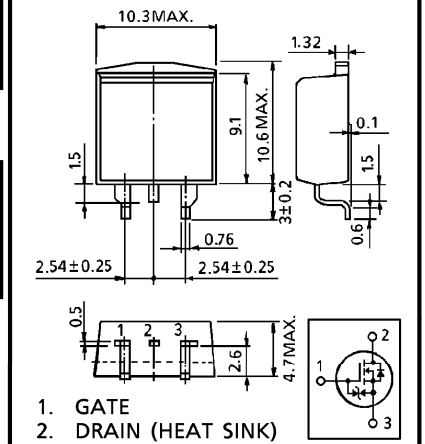
** $V_{DD} = 25\,V$, $T_{ch} = 25°C$ (initial), $L = 236\,\mu H$, $I_{AR} = 55\,A$, $R_G = 25\,\Omega$

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

Unit in mm



JEDEC	—
EIAJ	—
TOSHIBA	2-10S1B

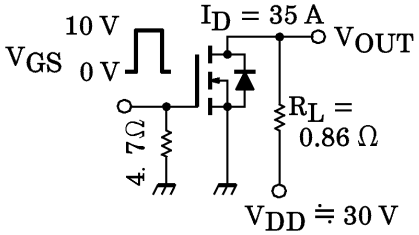


JEDEC	—
EIAJ	—
TOSHIBA	2-10S2B

Weight : 1.5 g

961001EAA2

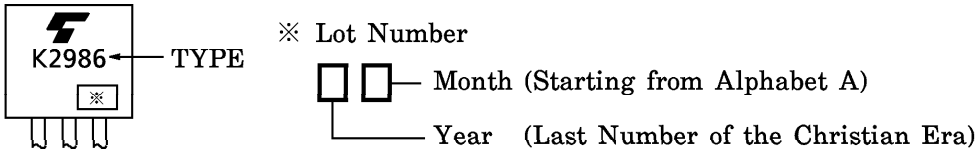
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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} = 60 V, V_{GS} = 0 V	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)\ DSS}$	I_D = 10 mA, V_{GS} = 0 V	60	—	—	V
		$V_{(BR)\ DSX}$	I_D = 10 mA, V_{GS} = −20 V	40	—	—	
Gate Threshold Voltage		V_{th}	V_{DS} = 10 V, I_D = 1 mA	1.3	—	2.5	V
Drain-Source ON Resistance		$R_{DS\ (ON)}$	V_{GS} = 10 V, I_D = 35 A	—	4.5	5.8	mΩ
			V_{GS} = 4 V, I_D = 35 A	—	5.8	10	
Forward Transfer Admittance		$\|Y_{fs}\|$	V_{DS} = 10 V, I_D = 35 A	40	80	—	S
Input Capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	—	9300	—	pF
Reverse Transfer Capacitance		C_{rss}		—	910	—	
Output Capacitance		C_{oss}		—	1435	—	
Switching Time	Rise Time	t_r	 V_{IN} : t_r, t_f < 5 ns Duty ≦ 1%, t_w = 10 μs	—	18	—	ns
	Turn-on Time	t_{on}		—	50	—	
	Fall Time	t_f		—	110	—	
	Turn-off Time	t_{off}		—	480	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	V_{DD} ≒ 48 V, V_{GS} = 10 V, I_D = 55 A	—	210	—	nC
Gate-Source Charge		Q_{gs}		—	145	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	65	—	

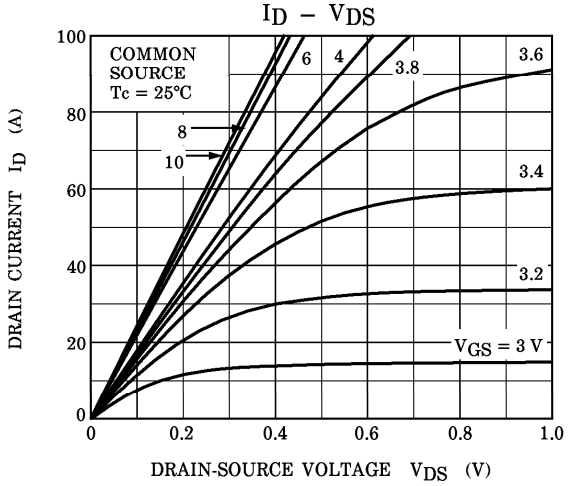
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	55	A
Pulse Drain Reverse Current	I_{DRP}	t ≦ 10 s	—	—	70	A
		t ≦ 1 ms	—	—	280	
Diode Forward Voltage	V_{DSF}	I_{DR} = 55 A, V_{GS} = 0 V	—	—	−1.5	V
Reverse Recovery Time	t_{rr}	I_{DR} = 55 A, V_{GS} = 0 V	—	60	—	ns
Reverse Recovery Charge	Q_{rr}	dI_{DR} / dt = 50 A / μs	—	50	—	nC

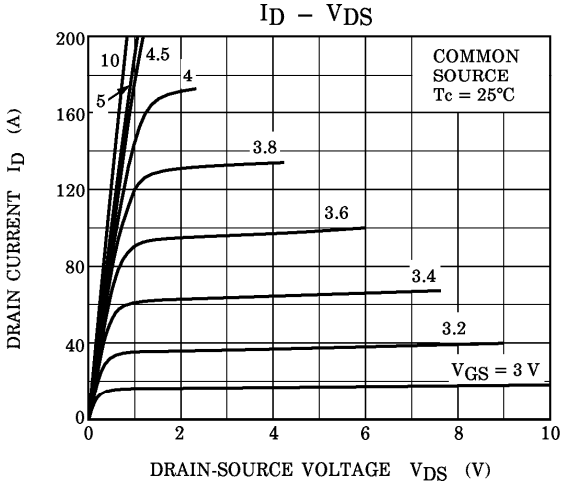
MARKING



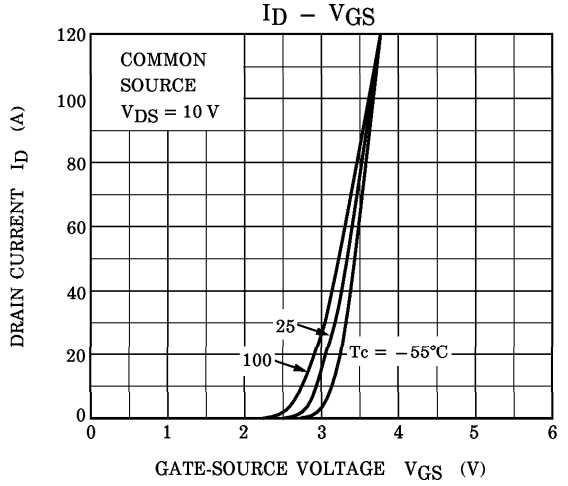
$I_D - V_{DS}$



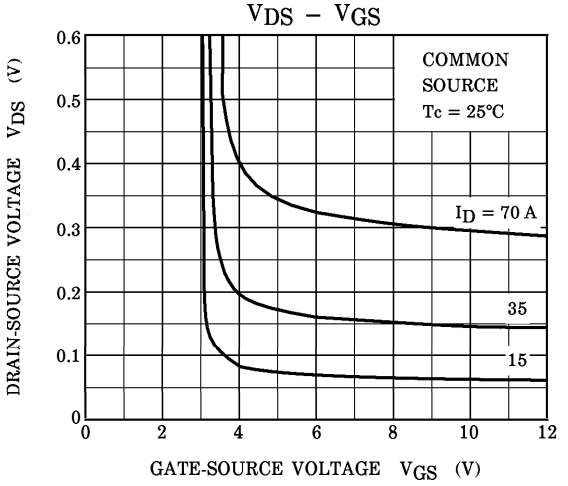
$I_D - V_{DS}$



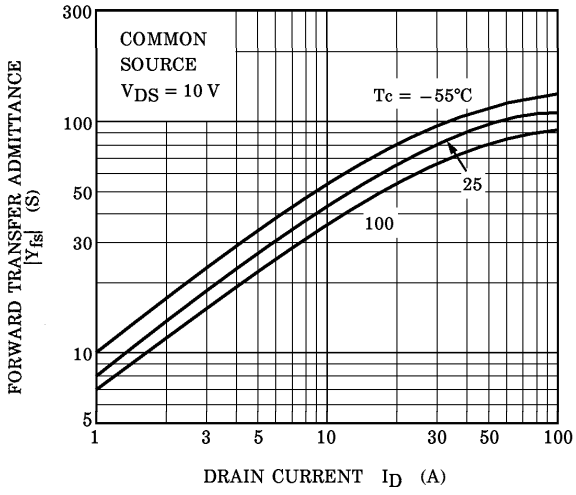
$I_D - V_{GS}$



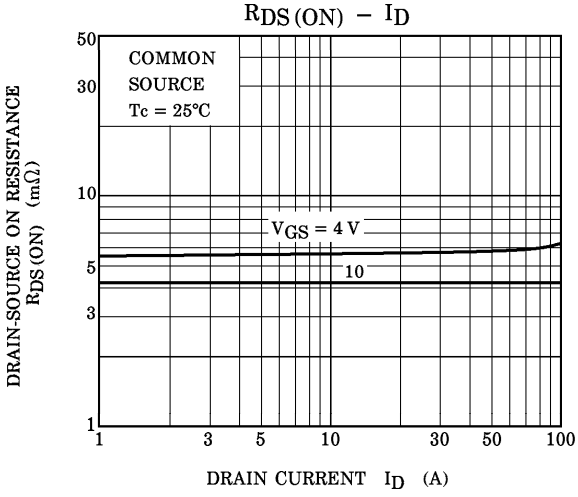
$V_{DS} - V_{GS}$



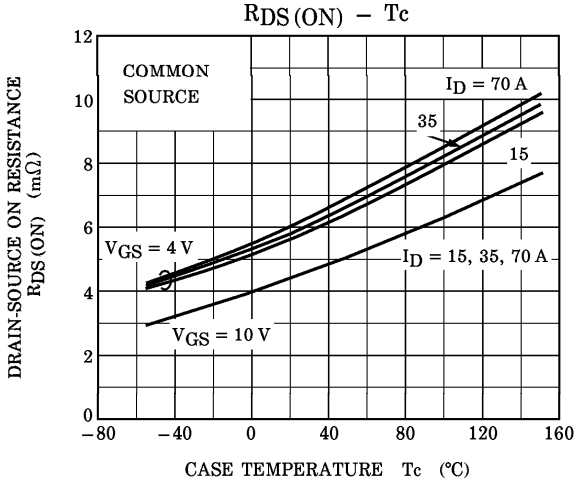
$|Y_{fs}| - I_D$



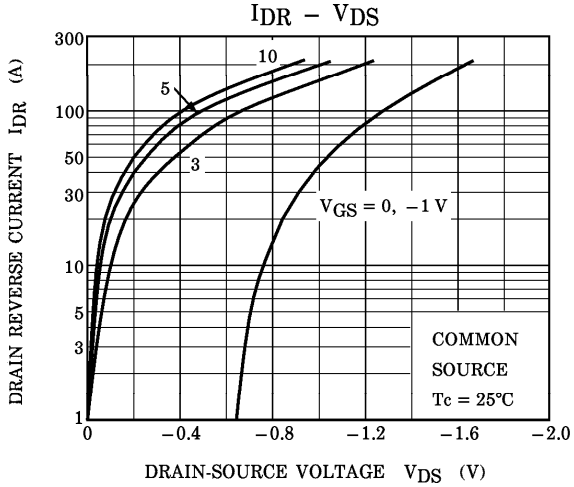
$R_{DS\,(ON)} - I_D$



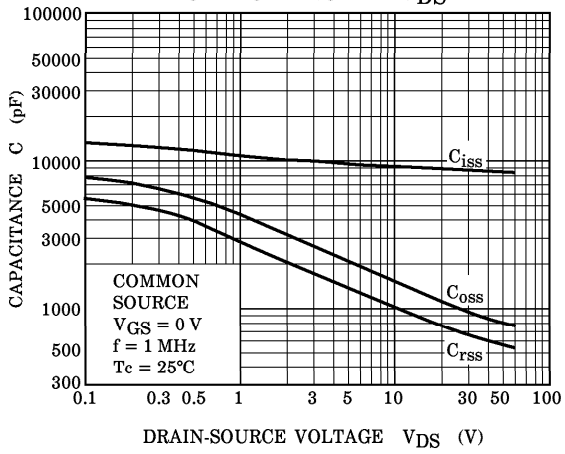
$R_{DS\,(ON)}$ – Tc



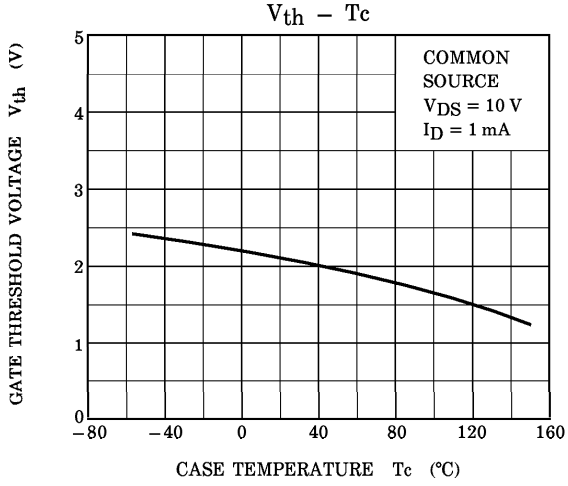
I_{DR} – V_{DS}



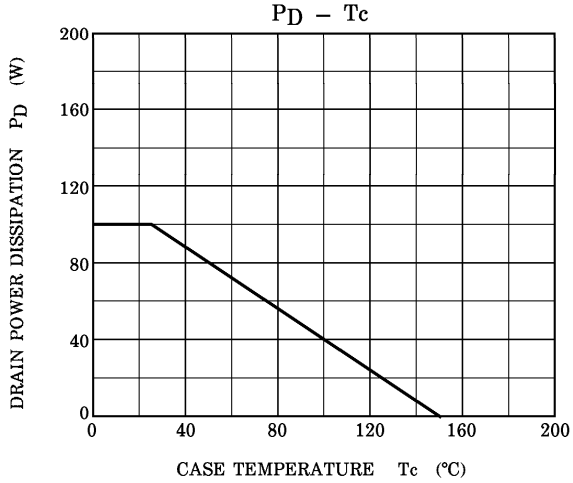
CAPACITANCE – V_{DS}



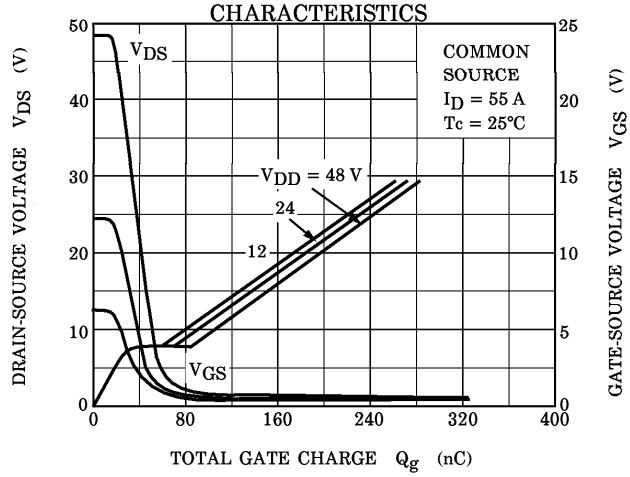
V_{th} – Tc



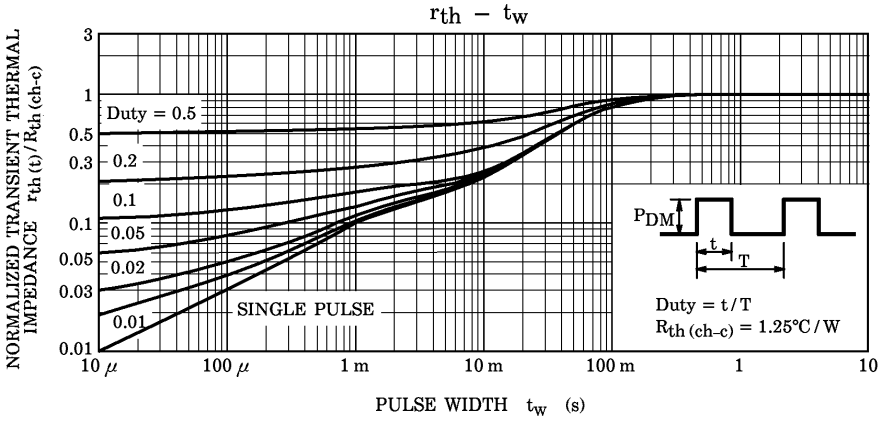
P_D – Tc



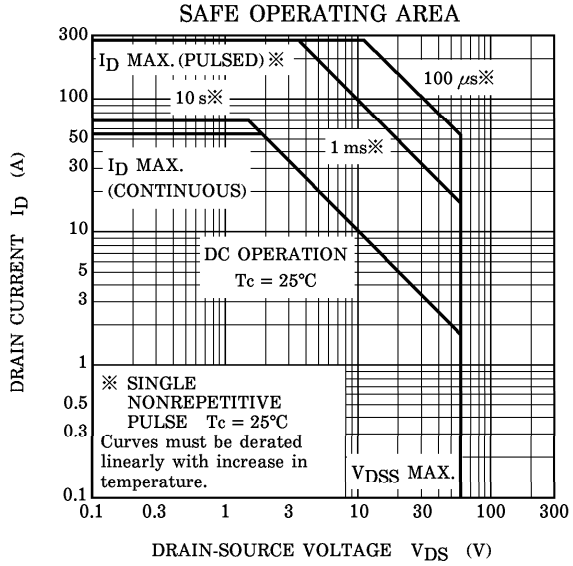
DYNAMIC INPUT / OUTPUT CHARACTERISTICS



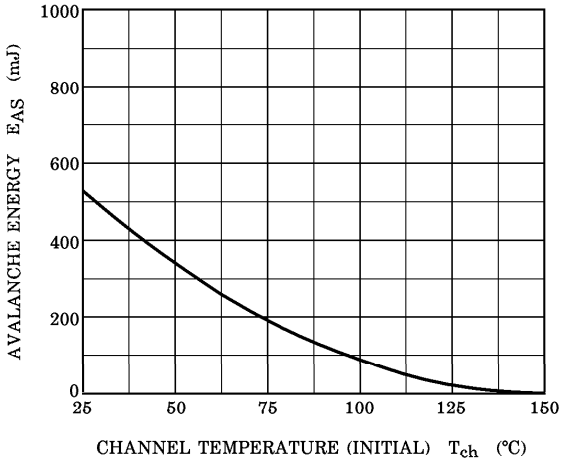
r_{th} – t_w



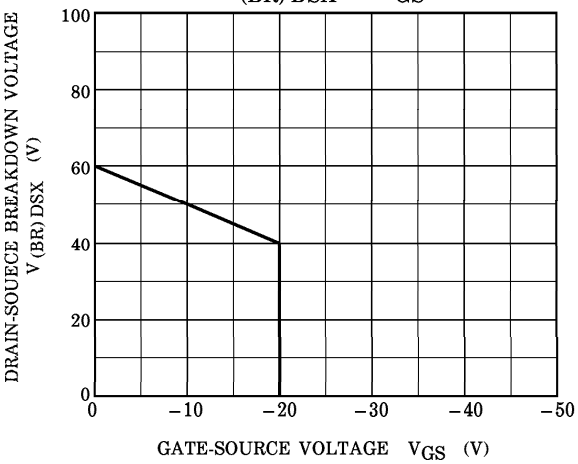
SAFE OPERATING AREA

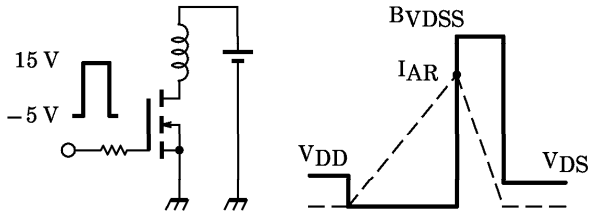


E_{AS} – T_{ch}



$V_{(BR)DSX}$ – V_{GS}





Peak I_{AR} = 55 A, R_G = 25 Ω
V_{DD} = 25 V, L = 236 μH

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