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

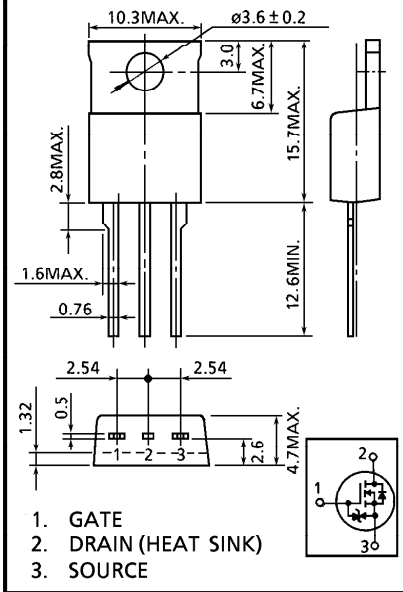
2SK2608

HIGH SPEED, HIGH VOLTAGE SWITCHING APPLICATIONS

SWITCHING REGULATOR APPLICATIONS

INDUSTRIAL APPLICATIONS

Unit in mm



JEDEC	TO-220AB
EIAJ	SC-46
TOSHIBA	2-10P1B

Weight : 2.0g

- Low Drain-Sorce ON Resistance : $R_{DS(ON)} = 3.73\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 2.6S$ (Typ.)
- Low Leakage Current : $I_{DSS} = 100\mu A$ (Max.) ($V_{DS} = 720V$)
- Enhancement-Mode : $V_{th} = 2.0 \sim 4.0V$ ($V_{DS} = 10V$, $I_D = 1mA$)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	900	V
Drain-Gate Voltage ($R_{GS} = 20k\Omega$)		V_{DGR}	900	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	DC	I_D	3	A
	Pulse	I_{DP}	9	A
Drain Power Dissipation (Tc = 25°C)		P_D	100	W
Single Pulse Avalanche Energy**		E_{AS}	295	mJ
Avalanche Current		I_{AR}	3	A
Repetitive Avalanche Energy*		E_{AR}	10.0	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	$R_{th(ch-c)}$	1.25	°C / W
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	83.3	°C / W

Note ;

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

** $V_{DD} = 90V$, $T_{ch} = 25°C$, $L = 60.0mH$, $R_G = 25\Omega$, $I_{AR} = 3A$

THIS TRANSISTOR IS AN ELECTROSTATIC SENSITIVE DEVICE.
PLEASE HANDLE WITH CAUTION.

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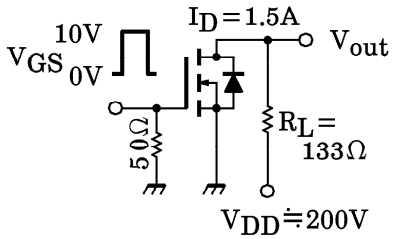
● TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS}=\pm30V$, $V_{DS}=0V$	—	—	±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}	$V_{DS}=720V$, $V_{GS}=0V$	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D=10mA$, $V_{GS}=0V$	900	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS}=10V$, $I_D=1mA$	2.0	—	4.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS}=10V$, $I_D=1.5A$	—	3.73	4.3	Ω
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS}=20V$, $I_D=1.5A$	0.65	2.6	—	S
Input Capacitance		C_{iss}	$V_{DS}=25V$, $V_{GS}=0V$, f=1MHz	—	750	—	pF
Reverse Transfer Capacitance		C_{rss}		—	10	—	
Output Capacitance		C_{oss}		—	70	—	
Switching Time	Rise Time	t_r	 V_{IN} : t_r, $t_f<5ns$, Duty ≦1%, $t_w=10\mu s$	—	15	—	ns
	Turn-on Time	t_{on}		—	55	—	
	Fall Time	t_f		—	30	—	
	Turn-off Time	t_{off}		—	110	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD}\fallingdotseq400V$, $V_{GS}=10V$, $I_D=3A$	—	25	—	nC
Gate-Source Charge		Q_{gs}		—	13	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	12	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	3	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	9	A
Diode Forward Voltage	V_{DSF}	$I_{DR}=3A$, $V_{GS}=0V$	—	—	−1.9	V
Reverse Recovery Time	t_{rr}	$I_{DR}=3A$, $V_{GS}=0V$, $dI_{DR}/dt=100A/\mu s$	—	1200	—	ns
Reverse Recovery Charge	Q_{rr}		—	8.5	—	μC

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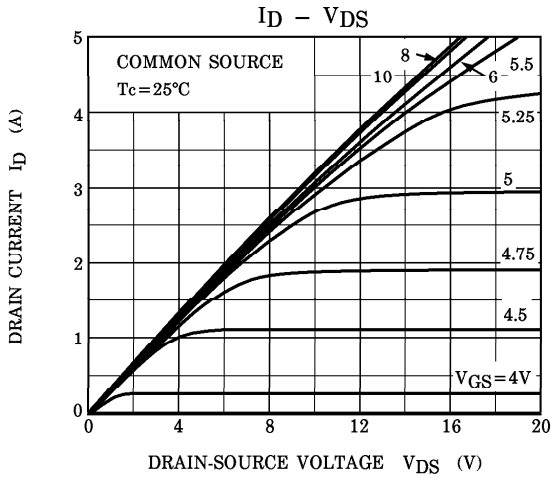
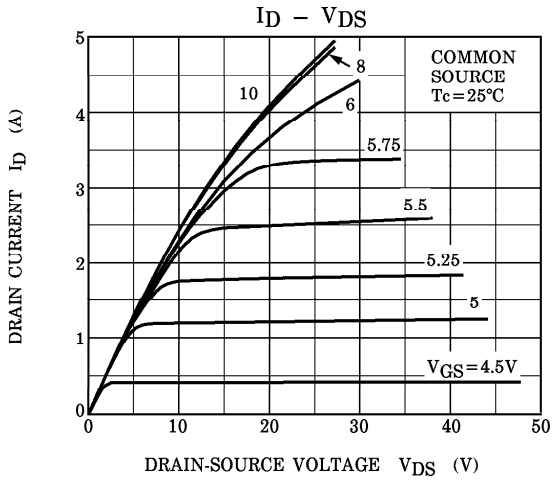
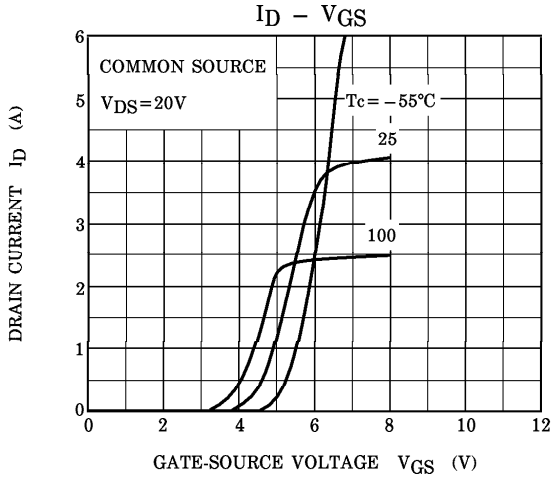
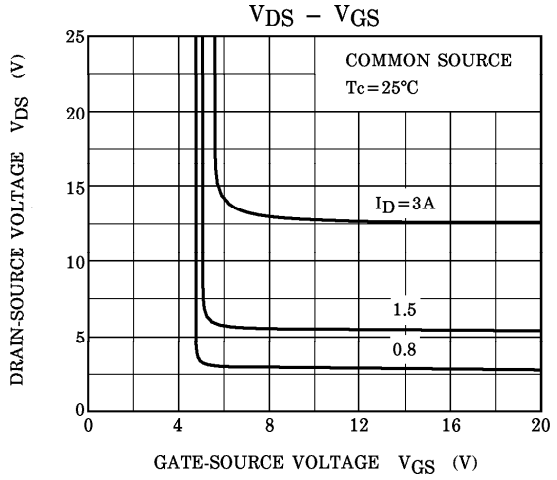
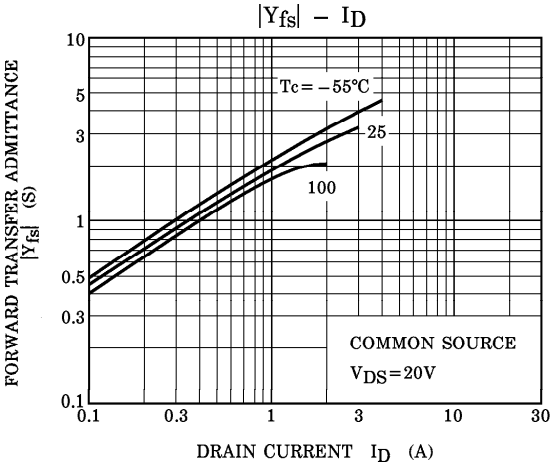
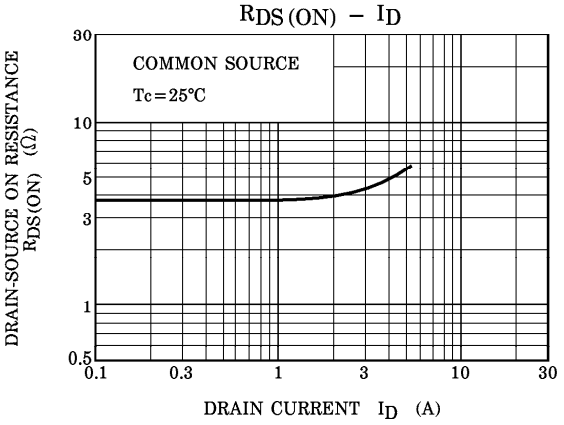

ID – VDS
COMMON SOURCE
Tc=25°C
8
10
6
5.5
5.25
5
4.75
4.5
VGS=4V
DRAIN CURRENT ID (A)
DRAIN-SOURCE VOLTAGE VDS (V)


ID – VDS
COMMON SOURCE
Tc=25°C
8
10
6
5.75
5.5
5.25
5
VGS=4.5V
DRAIN CURRENT ID (A)
DRAIN-SOURCE VOLTAGE VDS (V)

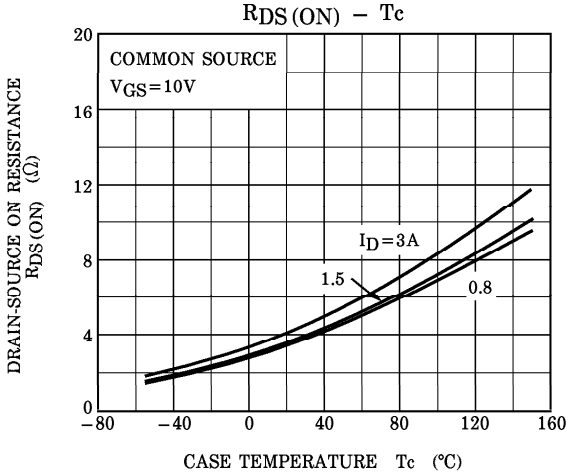

ID – VGS
COMMON SOURCE
VDS=20V
Tc=–55°C
25
100
DRAIN CURRENT ID (A)
GATE-SOURCE VOLTAGE VGS (V)


VDS – VGS
COMMON SOURCE
Tc=25°C
ID=3A
1.5
0.8
DRAIN-SOURCE VOLTAGE VDS (V)
GATE-SOURCE VOLTAGE VGS (V)

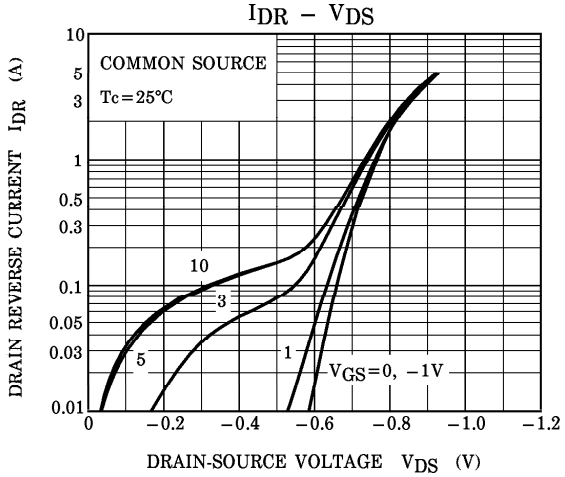

|Yfs| – ID
Tc=–55°C
25
100
COMMON SOURCE
VDS=20V
FORWARD TRANSFER ADMITTANCE |Yfs| (S)
DRAIN CURRENT ID (A)


RDS (ON) – ID
COMMON SOURCE
Tc=25°C
DRAIN-SOURCE ON RESISTANCE RDS(ON) (Ω)
DRAIN CURRENT ID (A)

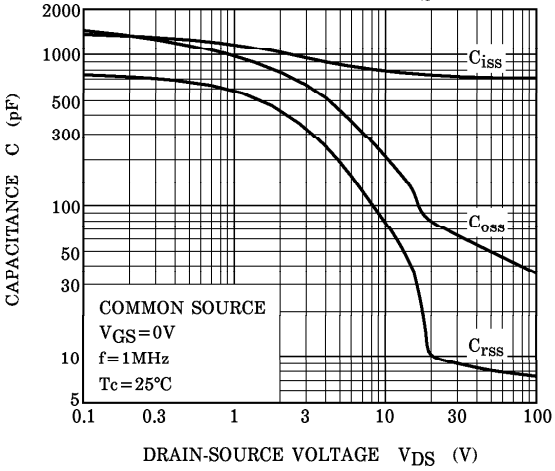
$R_{DS(ON)}$ – Tc



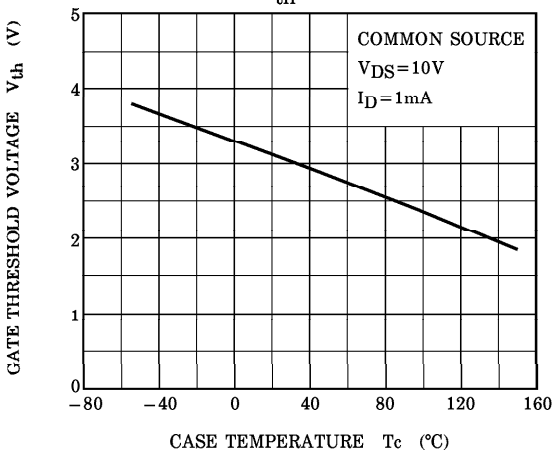
I_{DR} – V_{DS}



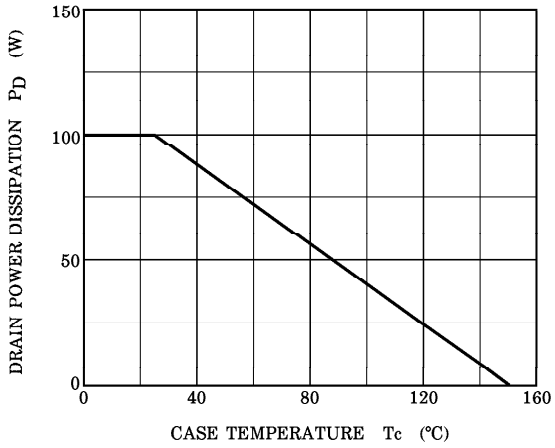
CAPACITANCE – V_{DS}



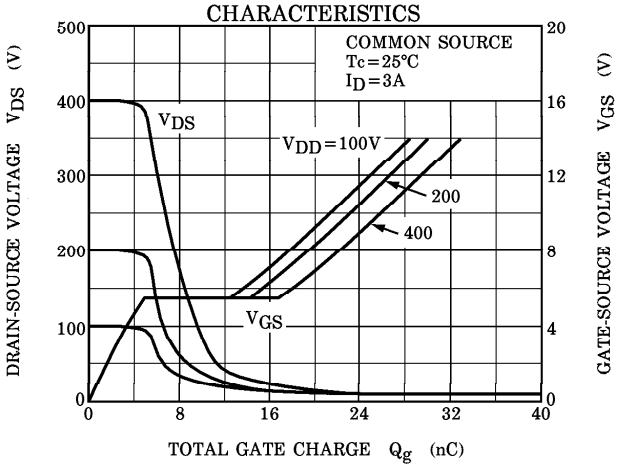
V_{th} – Tc

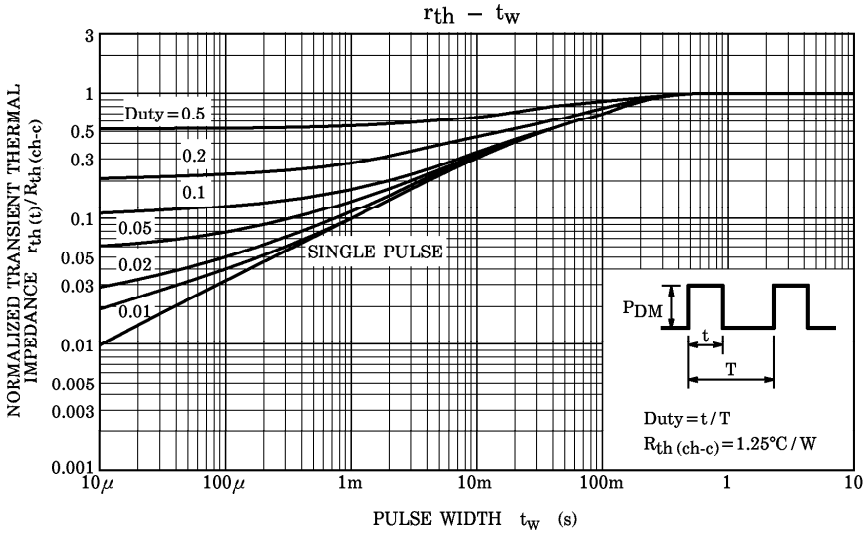


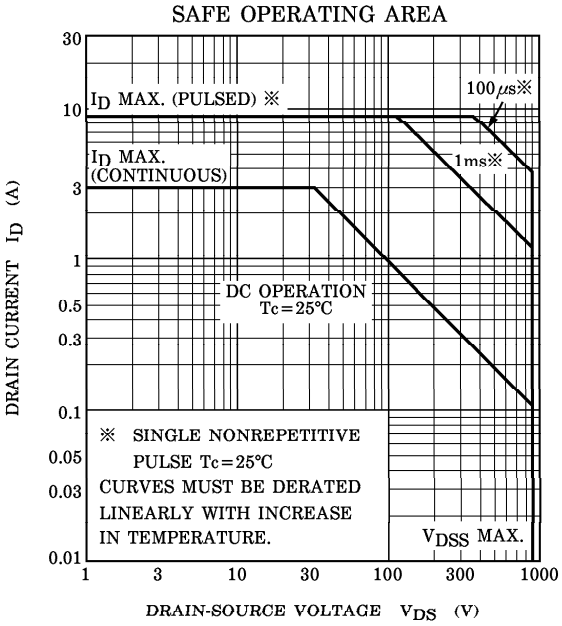
P_D – Tc

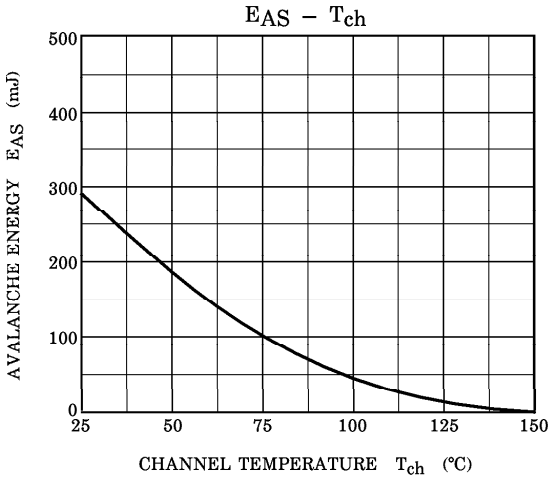


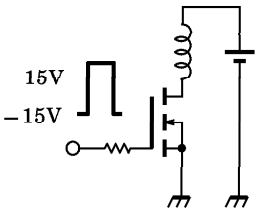
DYNAMIC INPUT / OUTPUT CHARACTERISTICS



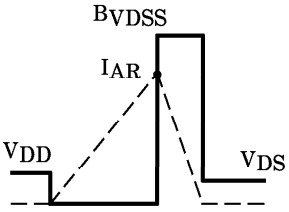








TEST CIRCUIT



WAVE FORM

Peak I_{AR} = 3A, R_G = 25Ω
V_{DD} = 90V, L = 60mH

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