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

2SK2838

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL APPLICATIONS

- Low Drain-Source ON Resistance : $R_{DS\,(ON)}=0.84\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}|=4.4S$ (Typ.)
- Low Leakage Current : $I_{DSS}=100\mu A$ (Max.) ($V_{DS}=400V$)
- Enhancement-Mode : $V_{th}=2.0\sim4.0V$ ($V_{DS}=10V$, $I_D=1mA$)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	400	V
Drain-Gate Voltage ($R_{GS}=20k\Omega$)		V_{DGR}	400	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	DC	I_D	5.5	A
	Pulse	I_{DP}	22	A
Drain Power Dissipation (Tc=25°C)		P_D	40	W
Single Pulse Avalanche Energy**		E_{AS}	223	mJ
Avalanche Current		I_{AR}	5.5	A
Repetitive Avalanche Energy*		E_{AR}	4.0	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	$R_{th\,(ch\text{-}c)}$	3.125	°C / W
Thermal Resistance, Channel to Ambient	$R_{th\,(ch\text{-}a)}$	83.3	°C / W

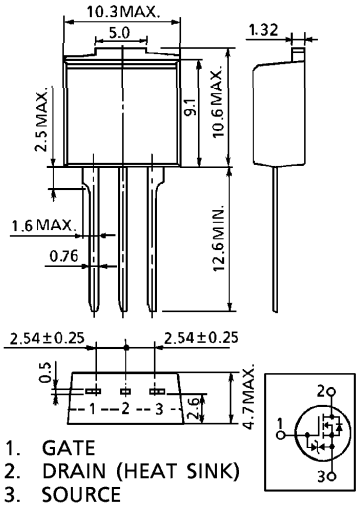
Note ;

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

** $V_{DD}=90V$, Starting $T_{ch}=25°C$, $L=12.0mH$
$R_G=25\Omega$, $I_{AR}=5.5A$ (See Figure)

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

TO-220FL Unit in mm

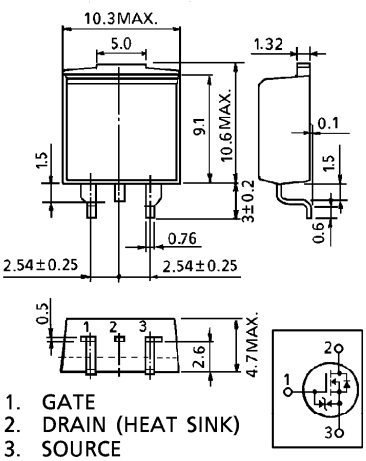


1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

JEDEC	—
EIAJ	—
TOSHIBA	2-10S1B

Weight : 1.5g

TO-220SM



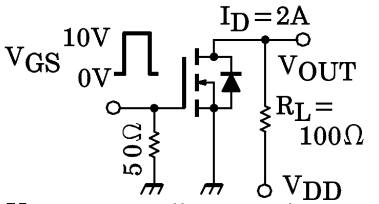
1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

JEDEC	—
EIAJ	—
TOSHIBA	2-10S2B

Weight : 1.5g

961001EAA2

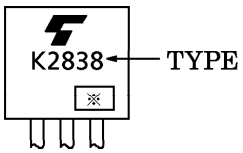
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS}=\pm25V$, $V_{DS}=0V$	—	—	±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}	$V_{DS}=400V$, $V_{GS}=0V$	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)\,DSS}$	$I_D=10mA$, $V_{GS}=0V$	400	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS}=10V$, $I_D=1mA$	2.0	—	4.0	V
Drain-Source ON Resistance		$R_{DS\,(ON)}$	$V_{GS}=10V$, $I_D=3A$	—	0.84	1.2	Ω
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS}=10V$, $I_D=3A$	2.0	4.4	—	S
Input Capacitance		C_{iss}	$V_{DS}=10V$, $V_{GS}=0V$, f=1MHz	—	720	—	pF
Reverse Transfer Capacitance		C_{rss}		—	80	—	
Output Capacitance		C_{oss}		—	250	—	
Switching Time	Rise Time	t_r		—	15	—	ns
	Turn-on Time	t_{on}		—	30	—	
	Fall Time	t_f		—	25	—	
	Turn-off Time	t_{off}		—	110	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD}=320V$, $V_{GS}=10V$, $I_D=5.5A$	—	17	—	nC
Gate-Source Charge		Q_{gs}		—	10	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	7	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	5.5	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	22	A
Diode Forward Voltage	V_{DSF}	$I_{DR}=5.5A$, $V_{GS}=0V$	—	—	−1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR}=5.5A$, $V_{GS}=0V$, $dI_{DR}/dt=100A/\mu s$	—	350	—	ns
Reverse Recovery Charge	Q_{rr}		—	2.1	—	μC

MARKING



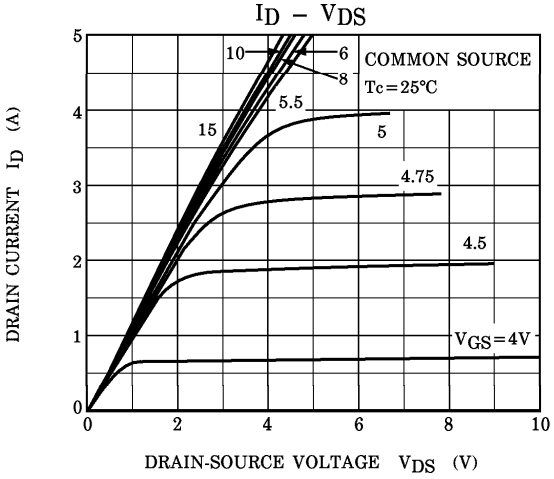
※ Lot Number

□□ — Month (Starting from Alphabet A)

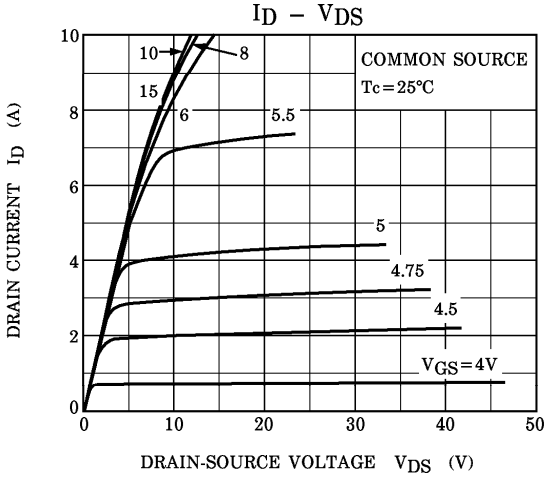
— Year (Last Number of the Christian Era)

961001EAA2'

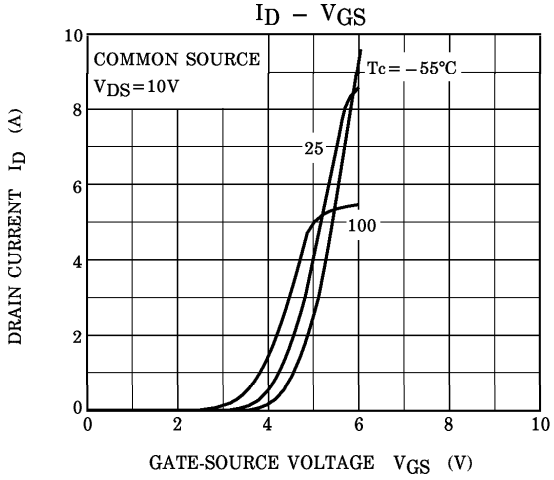
$I_D - V_{DS}$



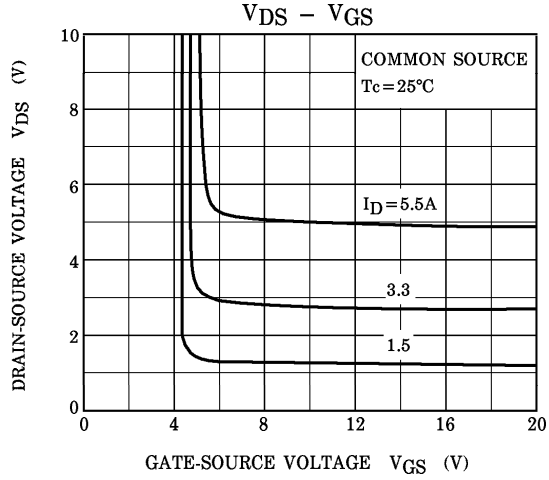
$I_D - V_{DS}$



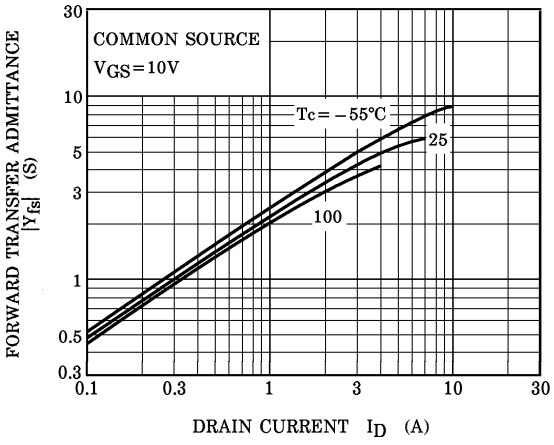
$I_D - V_{GS}$



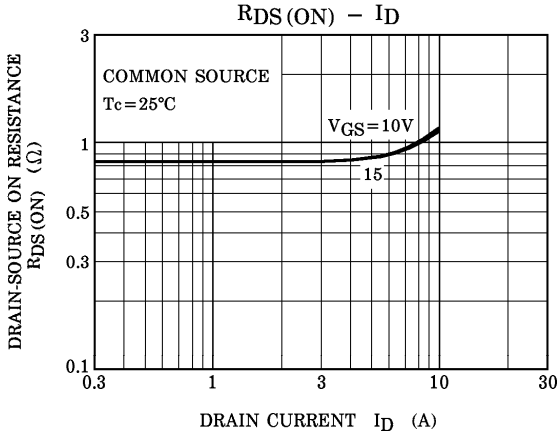
$V_{DS} - V_{GS}$



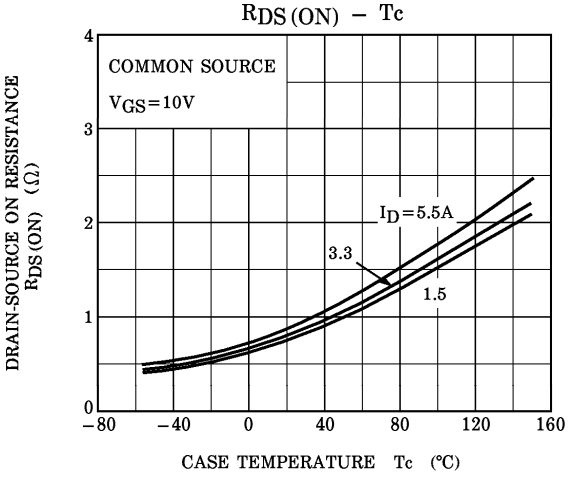
$|Y_{fs}| - I_D$



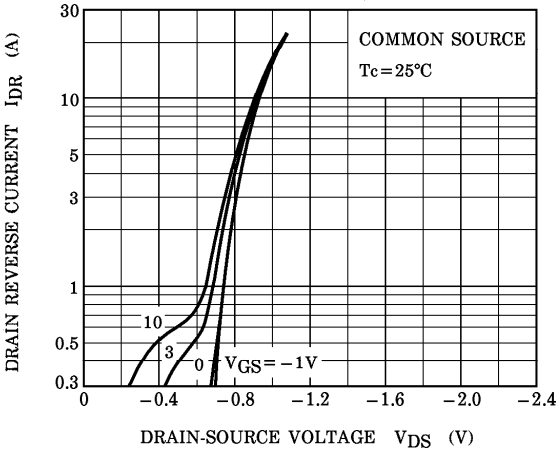
$R_{DS\,(ON)} - I_D$



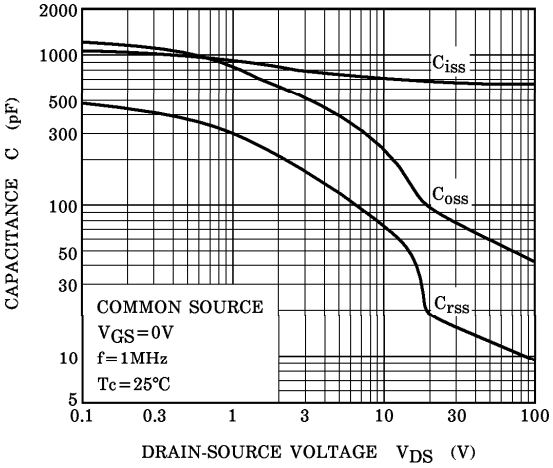
$R_{DS\,(ON)}$ – Tc



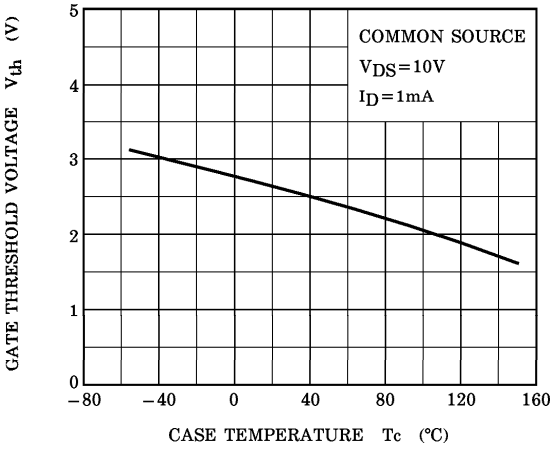
I_{DR} – V_{DS}



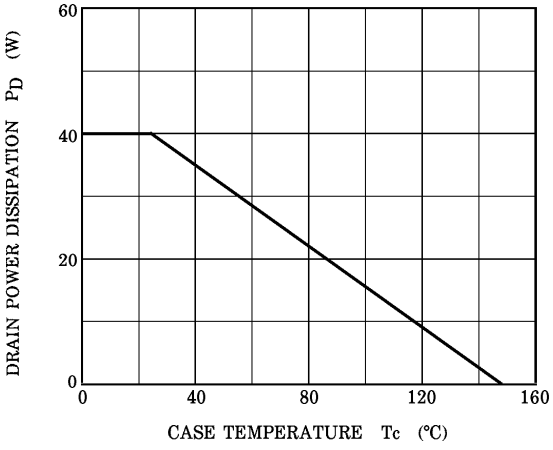
CAPACITANCE – V_{DS}



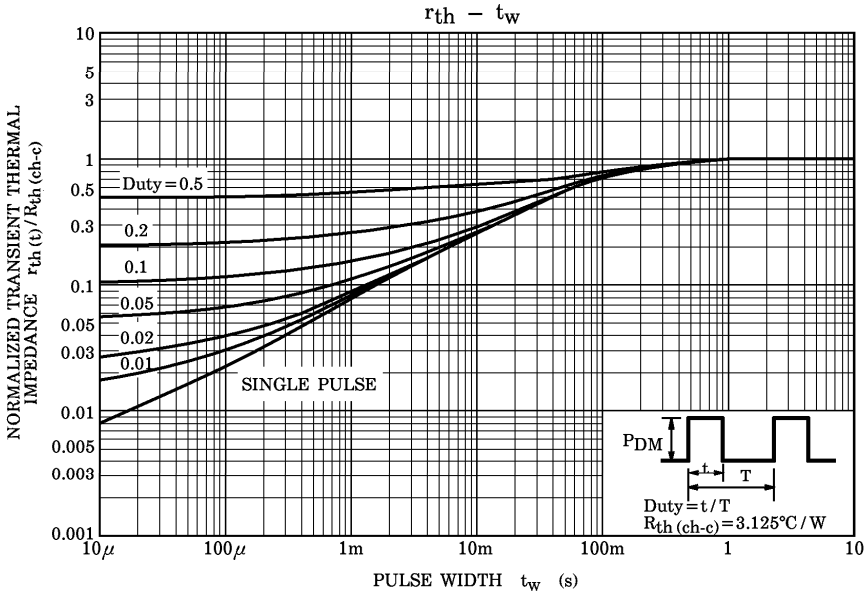
V_{th} – Tc



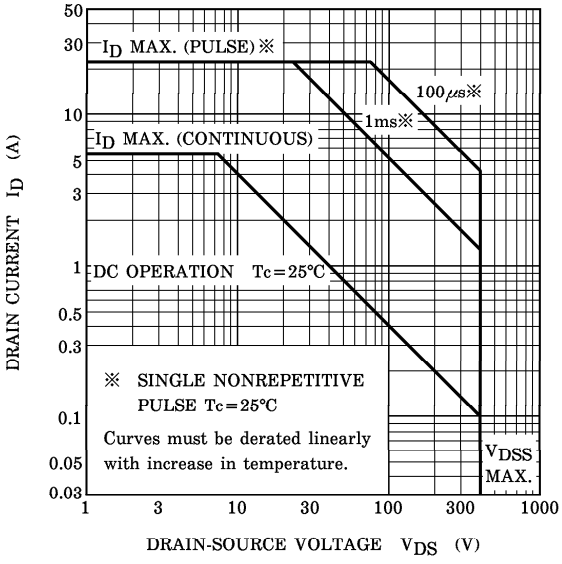
P_D – Tc



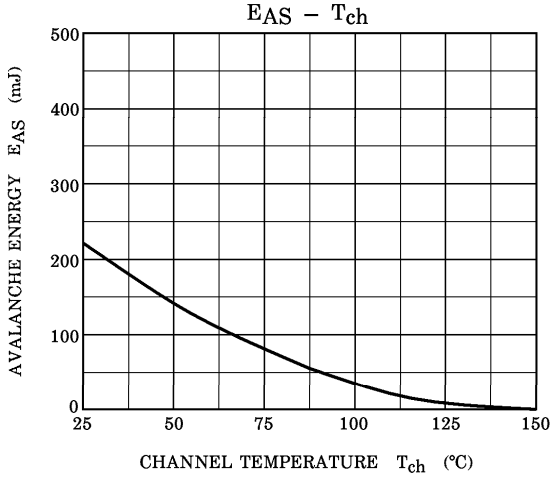
r_{th} – t_w

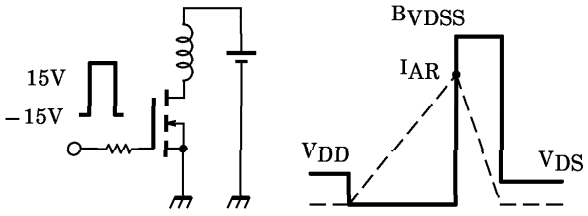


SAFE OPERATING AREA



E_{AS} – T_{ch}





TEST CIRCUIT WAVE FORM

Peak I_{AR} = 5.5A, R_G = 25Ω
V_{DD} = 90V, L = 12mH

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