

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE ( $\pi$ -MOSII.5)

# 2SK1858

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS.

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS.

- Low Drain-Source ON Resistance :  $R_{DS(ON)}=4.3\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}|=1.7S$  (Typ.)
- Low Leakage Current :  $I_{DSS}=100\mu A$  (Max.) ( $V_{DS}=640V$ )
- Enhancement-Mode :  $V_{th}=1.5\sim 3.5V$   
( $V_{DS}=10V, I_D=1mA$ )

**MAXIMUM RATINGS ( $T_a = 25^\circ C$ )**

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		$V_{DSS}$	800	V
Drain-Gate Voltage ( $R_{GS}=20k\Omega$ )		$V_{DGR}$	800	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Drain Current	DC	$I_D$	3	A
	Pulse	$I_{DP}$	9	
Drain Power Dissipation ( $T_c=25^\circ C$ )		$P_D$	60	W
Channel Temperature		$T_{ch}$	150	$^\circ C$
Storage Temperature Range		$T_{stg}$	$-55\sim 150$	$^\circ C$

**THERMAL CHARACTERISTICS**

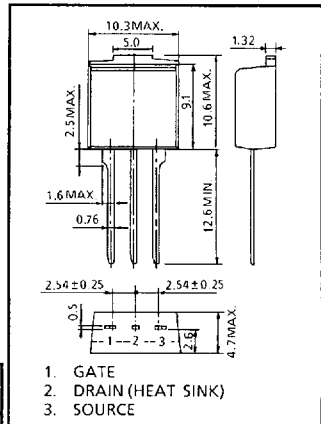
CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th(ch-c)}$	2.08	$^\circ C / W$
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	83.3	$^\circ C / W$

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

**INDUSTRIAL APPLICATIONS**

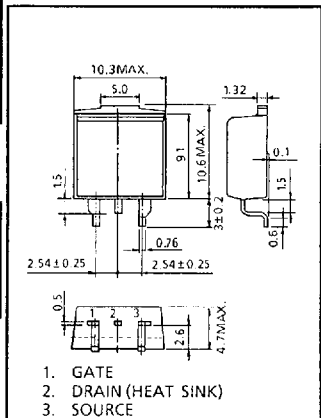
TO-220FL

Unit in mm



JEDEC	—
EIAJ	—
TOSHIBA	2-10S1B

TO-220SM



JEDEC	—
EIAJ	—
TOSHIBA	2-10S2B

Weight : 1.5g

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ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		$I_{GSS}$	$V_{GS} = \pm 25V, V_{DS} = 0V$	—	—	$\pm 100$	nA
Drain Cut-off Current		$I_{DSS}$	$V_{DS} = 640V, V_{GS} = 0V$	—	—	100	$\mu A$
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D = 10mA, V_{GS} = 0V$	800	—	—	V
Gate Threshold Voltage		$V_{th}$	$V_{DS} = 10V, I_D = 1mA$	1.5	—	3.5	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$I_D = 1.5A, V_{GS} = 10V$	—	4.3	5.0	$\Omega$
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = 20V, I_D = 1.5A$	1.0	1.7	—	S
Input Capacitance		$C_{iss}$	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1MHz$	—	360	—	pF
Reverse Transfer Capacitance		$C_{rss}$		—	30	—	
Output Capacitance		$C_{oss}$		—	60	—	
Switching Time	Rise Time	$t_r$	<p><math>I_D = 1.5A</math> <math>V_{GS} \text{ 10V}</math> <math>0V</math> <math>50\Omega</math> <math>V_{OUT}</math> <math>R_L = 267\Omega</math> <math>V_{DD} \approx 400V</math></p>	—	25	—	ns
	Turn-on Time	$t_{on}$		—	40	—	
	Fall Time	$t_f$		—	40	—	
	Turn-off Time	$t_{off}$		$V_{IN} : t_r, t_f < 5ns,$ $Duty \leq 1\%, t_w = 10\mu s$	—	150	
Total Gate Charge (Gate-Source Plus Gate-Drain)		$Q_g$	$V_{DD} \approx 400V, V_{GS} = 10V,$ $I_D = 3A$	—	26	—	nC
Gate-Source Charge		$Q_{gs}$		—	16	—	
Gate-Drain ("Miller") Charge		$Q_{gd}$		—	10	—	

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	$V_{DSF}$	$I_{DR} = 3A, V_{GS} = 0V$	—	—	-2.0	V
Reverse Recovery Time	$t_{rr}$	$I_{DR} = 3A, V_{GS} = 0V$	—	600	—	ns
Reverse Recovered Charge	$Q_{rr}$	$dI_{DR} / dt = 100A / \mu s$	—	12	—	$\mu C$

