

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE ( $\pi$ -MOSIII)

# 2SK3301

SWITCHING REGULATOR, DC-DC CONVERTER APPLICATIONS

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 15 \Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 0.65 \text{ S}$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 100 \mu\text{A}$  (Max.) ( $V_{DS} = 720 \text{ V}$ )
- Enhancement-Mode :  $V_{th} = 2.4 \sim 3.4 \text{ V}$   
( $V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$ )

MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	$V_{DSS}$	900	V
Drain-Gate Voltage ( $R_{GS} = 20 \text{ k}\Omega$ )	$V_{DGR}$	900	V
Gate-Source Voltage	$V_{GSS}$	$\pm 30$	V
DC Drain Current	DC (Note 1)	$I_D$	1 A
	Pulse (Note 1)	$I_{DP}$	2 A
Drain Power Dissipation ( $T_c = 25^\circ\text{C}$ )	$P_D$	20	W
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	140	mJ
Avalanche Current	$I_{AR}$	1	A
Repetitive Avalanche Energy (Note 3)	$E_{AR}$	2.0	mJ
Channel Temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	$-55 \sim 150$	$^\circ\text{C}$

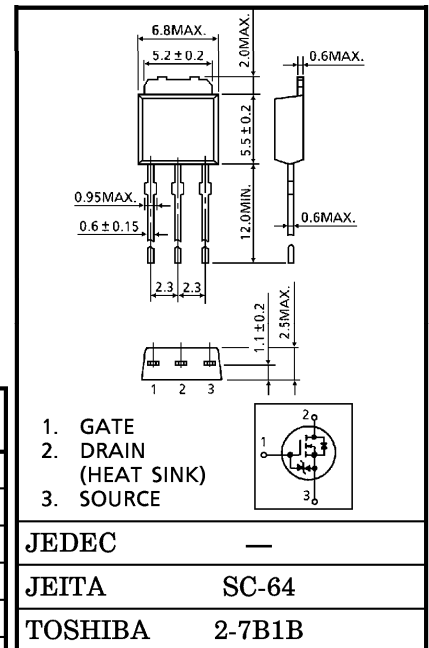
THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th(ch-c)}$	6.25	$^\circ\text{C/W}$
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	125	$^\circ\text{C/W}$

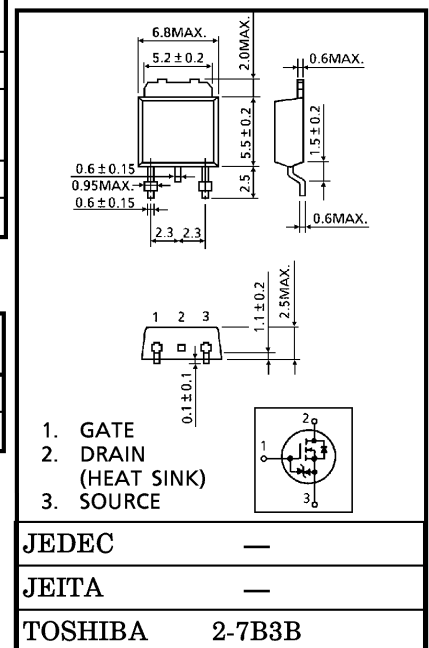
- (Note 1) : Please use devices on condition that the channel temperature is below  $150^\circ\text{C}$ .
- (Note 2) :  $V_{DD} = 90 \text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 257 \text{ mH}$   
 $R_G = 25 \Omega$ ,  $I_{AR} = 1 \text{ A}$
- (Note 3) : Repetitive rating ; Pulse Width Limited by Max. junction temperature.

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

Unit in mm



Weight : 0.36g (Typ.)



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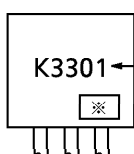
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±30 V, V <sub>DS</sub> = 0 V	—	—	±10	μA
Gate-Source Breakdown Voltage	V <sub>(BR)GSS</sub>	I <sub>G</sub> = ±10 μA, V <sub>DS</sub> = 0 V	±30	—	—	V
Drain Cut-off Current	I <sub>DSS</sub>	V <sub>DS</sub> = 720 V, V <sub>GS</sub> = 0 V	—	—	100	μA
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	I <sub>D</sub> = 10 mA, V <sub>GS</sub> = 0 V	900	—	—	V
Gate Threshold Voltage	V <sub>th</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	2.4	—	3.4	V
Drain-Source ON Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.5 A	—	15	20	Ω
Forward Transfer Admittance	Y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 0.5 A	0.3	0.65	—	S
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1 MHz	—	165	—	pF
Reverse Transfer Capacitance	C <sub>rss</sub>		—	6	—	
Output Capacitance	C <sub>oss</sub>		—	21	—	
Switching Time	Rise Time	t <sub>r</sub>		—	15	ns
	Turn-on Time	t <sub>on</sub>		—	60	
	Fall Time	t <sub>f</sub>		—	40	
	Turn-off Time	t <sub>off</sub>		—	110	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q <sub>g</sub>	V <sub>DD</sub> ≐ 400 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 1 A	—	6	—	nC
Gate-Source Charge	Q <sub>gs</sub>		—	3	—	
Gate-Drain ("Miller") Charge	Q <sub>gd</sub>		—	3	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current (Note 1)	I <sub>DR</sub>	—	—	—	1	A
Pulse Drain Reverse Current (Note 1)	I <sub>DRP</sub>	—	—	—	2	A
Forward Voltage (Diode)	V <sub>DSSF</sub>	I <sub>DR</sub> = 1 A, V <sub>GS</sub> = 0 V	—	—	-1.7	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>DR</sub> = 1 A, V <sub>GS</sub> = 0 V	—	1300	—	ns
Reverse Recovery Charge	Q <sub>rr</sub>	dI <sub>DR</sub> / dt = 100 A / μs	—	1.95	—	μC

MARKING



K3301 ← TYPE  
 ※ Lot Number  
 ← Month (Starting from Alphabet A)  
 ————— ← Year (Last Number of the Christian Era)

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