

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

# 2SK3129

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

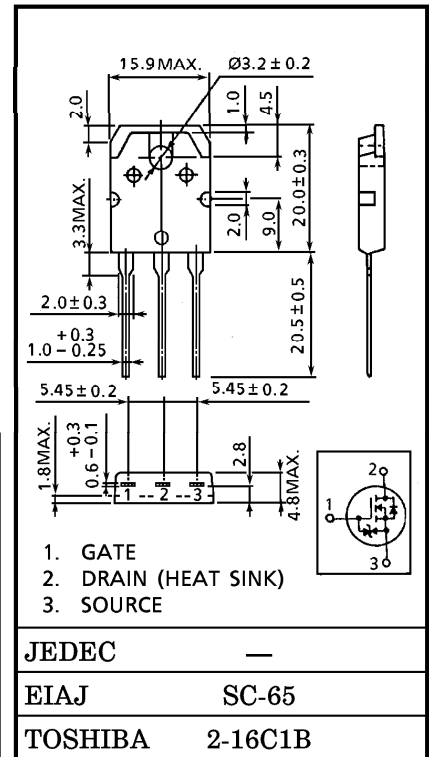
INDUSTRIAL APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 5.5 \text{ m}\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 70 \text{ S}$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 100 \mu\text{A}$  (Max.) ( $V_{DS} = 30 \text{ V}$ )
- Enhancement-Mode :  $V_{th} = 1.5 \sim 3.0 \text{ V}$   
( $V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$ )

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

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	$V_{DSS}$	50	V
Drain-Gate Voltage ( $R_{GS} = 20 \text{ k}\Omega$ )	$V_{DGR}$	50	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current	DC	$I_D$	60
	Pulse	$I_{DP}$	240
Drain Power Dissipation ( $T_c = 25^\circ\text{C}$ )	$P_D$	150	W
Single Pulse Avalanche Energy**	$E_{AS}$	721	mJ
Avalanche Current	$I_{AR}$	60	A
Repetitive Avalanche Energy*	$E_{AR}$	12	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	$R_{th(ch-c)}$	0.833	$^\circ\text{C/W}$
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	50	$^\circ\text{C/W}$

Note ;

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

\*\*  $V_{DD} = 25 \text{ V}, T_{ch} = 25^\circ\text{C}$  (initial),  $L = 246 \mu\text{H}, R_G = 25 \Omega, I_{AR} = 60 \text{ A}$

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

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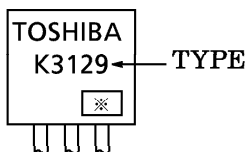
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		IGSS	VGS = ±16 V, VDS = 0 V	—	—	±10	μA
Drain Cut-off Current		IDSS	VDS = 30 V, VGS = 0 V	—	—	100	μA
Drain-Source Breakdown Voltage		V(BR)DSS	ID = 10 mA, VGS = 0 V	50	—	—	V
Gate Threshold Voltage		Vth	VDS = 10 V, ID = 1 mA	0.8	—	2.0	V
Drain-Source ON Resistance		RDS(ON)	VGS = 10 V, ID = 30 A	—	5.5	7	mΩ
Forward Transfer Admittance		Yfs	VDS = 10 V, ID = 30 A	40	70	—	S
Input Capacitance		Ciss	VDS = 10 V, VGS = 0 V f = 1 MHz	—	3700	—	pF
Reverse Transfer Capacitance		Crss		—	650	—	
Output Capacitance		Coss		—	1800	—	
Switching Time	Rise Time	tr	<p> <math>V_{GS} = 10\text{ V}</math>  <math>V_{GS} = 0\text{ V}</math>  <math>I_D = 30\text{ A}</math>  <math>R_L = 0.83\ \Omega</math>  <math>V_{DD} \cong 25\text{ V}</math> </p>	—	20	—	ns
	Turn-on Time	ton		—	35	—	
	Fall Time	tf		—	160	—	
	Turn-off Time	t <sub>off</sub>		$V_{IN} : t_r, t_f < 5\text{ ns},$ $\text{Duty} \leq 1\%, t_w = 10\ \mu\text{s}$	—	480	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Qg	VDD ≅ 40 V, VGS = 10 V	—	135	—	nC
Gate-Source Charge		Qgs	ID = 60 A	—	90	—	
Gate-Drain (“Miller”) Charge		Qgd		—	45	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	IDR	—	—	—	60	A
Pulse Drain Reverse Current	IDRP	—	—	—	240	A
Diode Forward Voltage	VDSF	IDR = 60 A, VGS = 0 V	—	—	-1.4	V
Reverse Recovery Time	t <sub>rr</sub>	IDR = 60 A, VGS = 0 V	—	180	—	ns
Reverse Recovery Charge	Q <sub>rr</sub>	dIDR / dt = 50 A / μs	—	0.32	—	μC

MARKING



※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)