

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type ( $\pi$ -MOSVI)

# 2SK3129

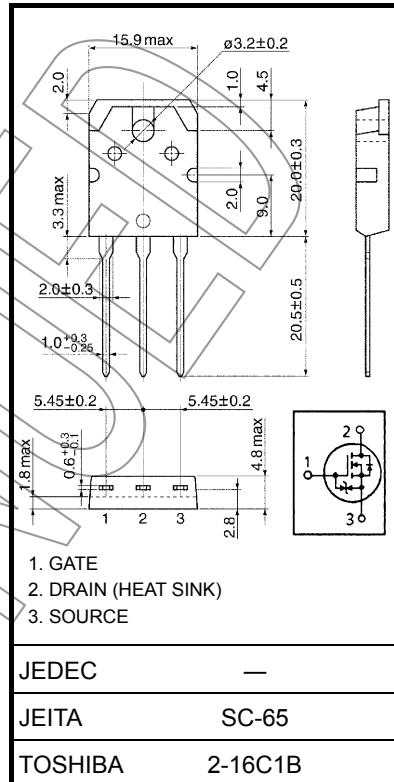
Chopper Regulator, DC-DC Converter and Motor Drive  
Applications

Unit: 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:  $V_{th} = 0.8$  to  $2.0 \text{ V}$  ( $V_{DS} = 10 \text{ V}$ ,  $I_D = 1 \text{ mA}$ )

## Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Characteristics	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 (Note 1)	$I_D$	A
	Pulse (Note 1)	$I_{DP}$	
Drain power dissipation ( $T_c = 25^\circ\text{C}$ )	$P_D$	150	W
Single pulse avalanche energy (Note 2)	$E_{AS}$	721	mJ
Avalanche current	$I_{AR}$	60	A
Repetitive avalanche energy (Note 3)	$E_{AR}$	12	mJ
Channel temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55 to 150	$^\circ\text{C}$



Weight: 4.6 g (typ.)

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

## Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th}(\text{ch-c})$	0.833	$^\circ\text{C/W}$
Thermal resistance, channel to ambient	$R_{th}(\text{ch-a})$	50	$^\circ\text{C/W}$

Note 1: Ensure that the channel temperature does not exceed  $150^\circ\text{C}$ .

Note 2:  $V_{DD} = 25 \text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 246 \mu\text{H}$ ,  $R_G = 25 \Omega$ ,  $I_{AR} = 60 \text{ A}$

Note 3: Repetitive rating: pulse width limited by maximum junction temperature.

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

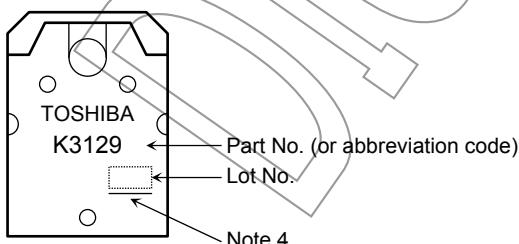
Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	$I_{GSS}$	$V_{GS} = \pm 16\text{ V}$ , $V_{DS} = 0\text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-off current	$I_{DSS}$	$V_{DS} = 30\text{ V}$ , $V_{GS} = 0\text{ V}$	—	—	100	$\mu\text{A}$
Drain-source breakdown voltage	$V_{(\text{BR})\text{DSS}}$	$I_D = 10\text{ mA}$ , $V_{GS} = 0\text{ V}$	50	—	—	V
Gate threshold voltage	$V_{th}$	$V_{DS} = 10\text{ V}$ , $I_D = 1\text{ mA}$	0.8	—	2.0	V
Drain-source ON resistance	$R_{DS(\text{ON})}$	$V_{GS} = 10\text{ V}$ , $I_D = 30\text{ A}$	—	5.5	7	$\text{m}\Omega$
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10\text{ V}$ , $I_D = 30\text{ A}$	40	70	—	S
Input capacitance	$C_{iss}$	$V_{DS} = 10\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$	—	3700	—	$\text{pF}$
Reverse transfer capacitance	$C_{rss}$		—	650	—	$\text{pF}$
Output capacitance	$C_{oss}$		—	1800	—	$\text{pF}$
Switching time	Rise time	$t_r$	—	20	—	ns
	Turn-on time	$t_{on}$	—	35	—	
	Fall time	$t_f$	—	160	—	
	Turn-off time	$t_{off}$	—	480	—	
Total gate charge (gate-source plus gate-drain)	$Q_g$	$V_{DD} \approx 40\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 60\text{ A}$	—	135	—	nC
Gate-source charge	$Q_{gs}$		—	90	—	nC
Gate-drain ("miller" charge	$Q_{gd}$		—	45	—	nC

Source-Drain Ratings and Characteristics ( $T_a = 25^\circ\text{C}$ )

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	$I_{DR}$	—	—	—	60	A
Pulse drain reverse current (Note 1)	$I_{DRP}$	—	—	—	240	A
Forward voltage (diode)	$V_{DSF}$	$I_{DR} = 60\text{ A}$ , $V_{GS} = 0\text{ V}$	—	—	-1.4	V
Reverse recovery time	$t_{rr}$	$I_{DR} = 60\text{ A}$ , $V_{GS} = 0\text{ V}$	—	180	—	ns
Reverse recovery charge	$Q_{rr}$	$dI_{DR}/dt = 50\text{ A}/\mu\text{s}$	—	0.32	—	$\mu\text{C}$

## Marking



Note 4: A line under a Lot No. identifies the indication of product Labels.

Not underlined: [[Pb]]/INCLUDES > MCV

Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

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