

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

2SK3316

HIGH SPEED, HIGH VOLTAGE SWITCHING APPLICATIONS

SWITCHING REGULATOR APPLICATIONS

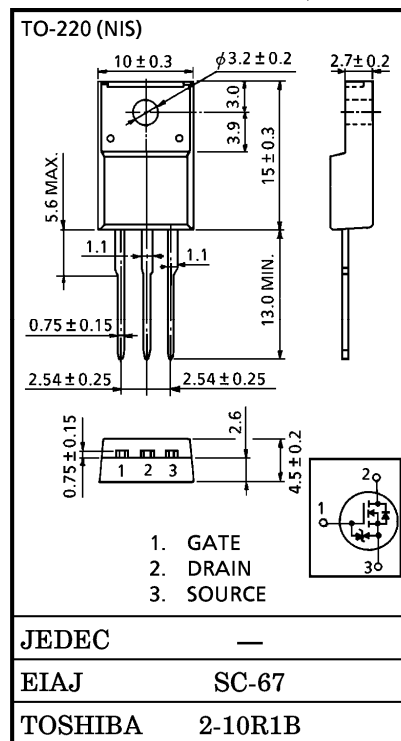
INDUSTRIAL APPLICATIONS

Unit in mm

- Fast Reverse Recovery Time : $t_{rr} = 60 \text{ ns (Typ.)}$
- Built-in High-Speed Free-Wheeling Diode
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 1.6 \Omega \text{ (Typ.)}$
- High Forward Transfer Admittance : $|Y_{fs}| = 3.8 \text{ S (Typ.)}$
- Low Leakage Current : $I_{DSS} = 100 \mu\text{A (Max.) (} V_{DS} = 500 \text{ V)}$
- Enhancement-Mode : $V_{th} = 2.0 \sim 4.0 \text{ V}$
($V_{DS} = 10 \text{ V, } I_D = 1 \text{ mA}$)

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

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	500	V
Drain-Gate Voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	500	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	DC	I_D	5	A
	Pulse	I_{DP}	20	A
Drain Power Dissipation ($T_c = 25^\circ\text{C}$)		P_D	35	W
Single Pulse Avalanche Energy**		E_{AS}	180	mJ
Avalanche Current		I_{AR}	5	A
Repetitive Avalanche Energy*		E_{AR}	3.5	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	$R_{th(ch-c)}$	3.57	$^\circ\text{C/W}$
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	62.5	$^\circ\text{C/W}$

Note ;

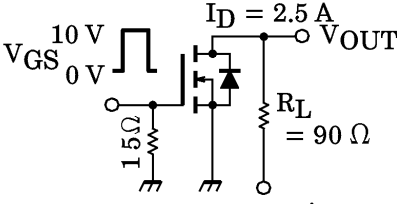
* Repetitive rating ; Pulse Width Limited by Max. junction temperature.

** $V_{DD} = 90 \text{ V, } T_{ch} = 25^\circ\text{C (initial), } L = 12.2 \text{ mH, } R_G = 25 \Omega, I_{AR} = 5 \text{ A}$ **This transistor is an electrostatic sensitive device.****Please handle with caution.**

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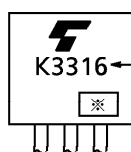
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 25 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Gate-Source Breakdown Voltage		$V_{(BR)GSS}$	$I_G = \pm 100 \mu\text{A}, V_{DS} = 0 \text{ V}$	± 30	—	—	V
Drain Cut-off Current		I_{DSS}	$V_{DS} = 500 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	500	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	2.0	—	4.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = 10 \text{ V}, I_D = 2.5 \text{ A}$	—	1.6	1.8	Ω
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 2.5 \text{ A}$	2.5	3.8	—	S
Input Capacitance		C_{iss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	780	—	pF
Reverse Transfer Capacitance		C_{rss}		—	60	—	
Output Capacitance		C_{oss}		—	200	—	
Switching Time	Rise Time	t_r	 $V_{GS} = 10 \text{ V}, 0 \text{ V}$ $I_D = 2.5 \text{ A}$ $R_L = 90 \Omega$ $V_{DD} \approx 225 \text{ V}$ $V_{IN} : t_r, t_f < 5 \text{ ns}, \text{Duty} \leq 1\%, t_w = 10 \mu\text{s}$	—	12	—	ns
	Turn-on Time	t_{on}		—	25	—	
	Fall Time	t_f		—	15	—	
	Turn-off Time	t_{off}		—	60	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \approx 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 5 \text{ A}$	—	17	—	nC
Gate-Source Charge		Q_{gs}		—	11	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	6	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	5	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	20	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	−1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V}$	—	60	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR}/dt = 100 \text{ A}/\mu\text{s}$	—	0.1	—	μC

MARKING



TYPE

※ Lot Number



Month (Starting from Alphabet A)

Year (Last Number of the Christian Era)