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[2SK3176\(F\)](#)

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**TOSHIBA**

**2SK3176**

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

# 2SK3176

HIGH SPEED, HIGH VOLTAGE SWITCHING APPLICATIONS

SWITCHING REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

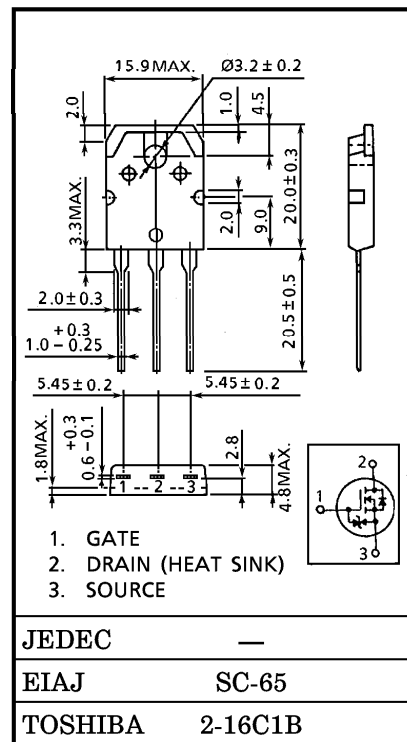
INDUSTRIAL APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 38 \text{ m}\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 28 \text{ S}$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 100 \mu\text{A}$  (Max.) ( $V_{DS} = 200 \text{ V}$ )
- Enhancement-Model :  $V_{th} = 1.5 \sim 3.5 \text{ V}$  ( $V_{DS} = 10 \text{ V}$ ,  $I_D = 1 \text{ mA}$ )

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

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	$V_{DSS}$	200	V
Drain-Gate Voltage ( $R_{GS} = 20 \text{ k}\Omega$ )	$V_{DGR}$	200	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current	DC	$I_D$	30 A
	Pulse	$I_{DP}$	120 A
Drain Power Dissipation ( $T_a = 25^\circ\text{C}$ )	$P_D$	150	W
Single Pulse Avalanche Energy*	$E_{AS}$	925	mJ
Avalanche Current	$I_{AR}$	30	A
Repetitive Avalanche Energy**	$E_{AR}$	15	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	$R_{th(ch-a)}$	50.0	$^\circ\text{C/W}$

Note ;

\*  $V_{DD} = 50 \text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$ ,  $L = 1.66 \text{ mH}$ ,  $I_{AR} = 30 \text{ A}$ ,  $R_G = 25 \Omega$

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

**This transistor is an electrostatic sensitive device.**

**Please handle with caution.**

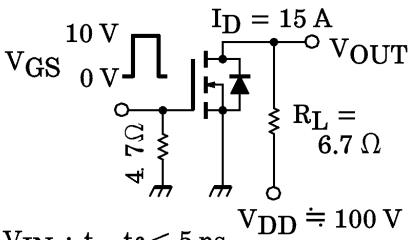
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# TOSHIBA

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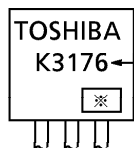
## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		$I_{GSS}$	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain Cut-off Current		$I_{DSS}$	$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}$	—	—	100	$\mu\text{A}$
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	200	—	—	V
Gate Threshold Voltage		$V_{th}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.5	—	3.5	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 15\text{ A}$	—	38	52	$\text{m}\Omega$
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 15\text{ A}$	15	30	—	S
Input Capacitance		$C_{iss}$	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}$ $f = 1\text{ MHz}$	—	5400	—	pF
Reverse Transfer Capacitance		$C_{rss}$		—	580	—	
Output Capacitance		$C_{oss}$		—	1900	—	
Switching Time	Rise Time	$t_r$		—	15	—	ns
	Turn-on Time	$t_{on}$		—	55	—	
	Fall Time	$t_f$		—	25	—	
	Turn-off Time	$t_{off}$		$V_{IN} : t_r, t_f < 5\text{ ns},$ $\text{Duty} \leq 1\%, t_w = 10\ \mu\text{s}$	—	190	
Total Gate Charge (Gate-Source Plus Gate-Drain)		$Q_g$	$V_{DD} \doteq 160\text{ V}, V_{GS} = 10\text{ V}$ $I_D = 30\text{ A}$	—	125	—	nC
Gate-Source Charge		$Q_{gs}$		—	80	—	
Gate-Drain ("Miller") Charge		$Q_{gd}$		—	45	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	$I_{DR}$	—	—	—	30	A
Pulse Drain Reverse Current	$I_{DRP}$	—	—	—	90	A
Diode Forward Voltage	$V_{DSF}$	$I_{DR} = 30\text{ A}, V_{GS} = 0\text{ V}$	—	—	-2.0	V
Reverse Recovery Time	$t_{rr}$	$I_{DR} = 30\text{ A}, V_{GS} = 0\text{ V}$ $dI_{DR}/dt = 100\text{ A}/\mu\text{s}$	—	270	—	ns
Reverse Recovery Charge	$Q_{rr}$		—	3.0	—	$\mu\text{C}$

## MARKING



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