

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

# 2SK2996

HIGH SPEED, HIGH VOLTAGE SWITCHING APPLICATIONS  
 CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

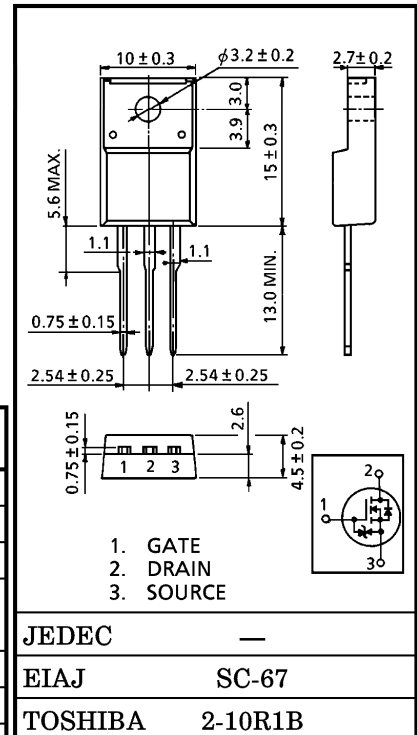
INDUSTRIAL APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 0.74 \Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 6.8 S$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 100 \mu A$  (Max.) ( $V_{DS} = 600 V$ )
- Enhancement-Mode :  $V_{th} = 2.0 \sim 4.0 V$   
 ( $V_{DS} = 10 V, I_D = 1 mA$ )

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

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		$V_{DSS}$	600	V
Drain-Gate Voltage ( $R_{GS} = 20 k\Omega$ )		$V_{DGR}$	600	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Drain Current	DC	$I_D$	10	A
	Pulse	$I_{DP}$	30	
Drain Power Dissipation ( $T_c = 25^\circ C$ )		$P_D$	45	W
Single Pulse Avalanche Energy**		$E_{AS}$	252	mJ
Avalanche Current		$I_{AR}$	10	A
Repetitive Avalanche Energy*		$E_{AR}$	4.5	mJ
Channel Temperature		$T_{ch}$	150	$^\circ C$
Storage Temperature Range		$T_{stg}$	$-55 \sim 150$	$^\circ C$



Weight : 1.9 g

HERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th(ch-c)}$	2.78	$^\circ C / W$
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	62.5	$^\circ C / W$

Note ;

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

\*\*  $V_{DD} = 90 V$ , Starting  $T_{ch} = 25^\circ C$ ,  $L = 4.41 mH$ ,  $R_G = 25 \Omega$ ,  $I_{AR} = 10 A$

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

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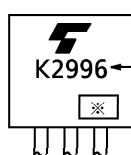
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±25 V, V <sub>DS</sub> = 0 V	—	—	±10	μA	
Gate-Source Breakdown Voltage	V (BR) GSS	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> = 600 V, V <sub>GS</sub> = 0 V	—	—	100	μA	
Drain-Source Breakdown Voltage	V (BR) DSS	I <sub>D</sub> = 10 mA, V <sub>GS</sub> = 0 V	600	—	—	V	
Gate Threshold Voltage	V <sub>th</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	2.0	—	4.0	V	
Drain-Source ON Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 5 A	—	0.74	1.0	Ω	
Forward Transfer Admittance	Y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 5 A	3.4	6.8	—	S	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V, f = 1 MHz	—	1500	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>		—	13	—		
Output Capacitance	C <sub>oss</sub>		—	140	—		
Switching Time	Rise Time	t <sub>r</sub>		—	15	—	ns
	Turn-on Time	t <sub>on</sub>		—	55	—	
	Fall Time	t <sub>f</sub>		—	27	—	
	Turn-off Time	t <sub>off</sub>		V <sub>IN</sub> : t <sub>r</sub> , t <sub>f</sub> < 5 ns, Duty ≤ 1%, t <sub>w</sub> = 10 μs	—	145	
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> = 10 A	—	38	—	nC	
Gate-Source Charge	Q <sub>gs</sub>		—	21	—		
Gate-Drain ("Miller") Charge	Q <sub>gd</sub>		—	17	—		

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I <sub>DR</sub>	—	—	—	10	A
Pulse Drain Reverse Current	I <sub>DRP</sub>	—	—	—	30	A
Diode Forward Voltage	V <sub>DSF</sub>	I <sub>DR</sub> = 10 A, V <sub>GS</sub> = 0 V	—	—	-1.7	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>DR</sub> = 10 A, V <sub>GS</sub> = 0 V dI <sub>DR</sub> /dt = 100 A/μs	—	1600	—	ns
Reverse Recovery Charge	Q <sub>rr</sub>		—	17	—	μC

MARKING

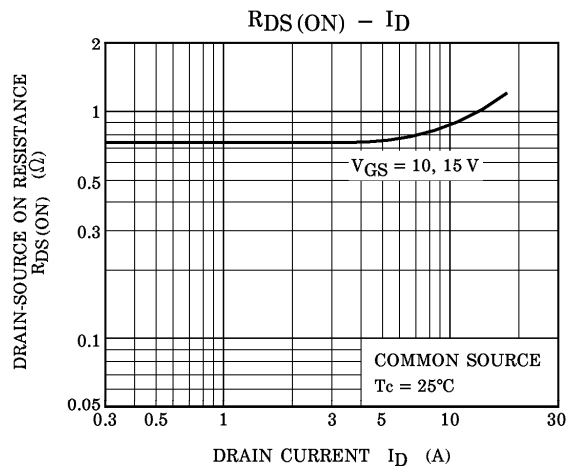
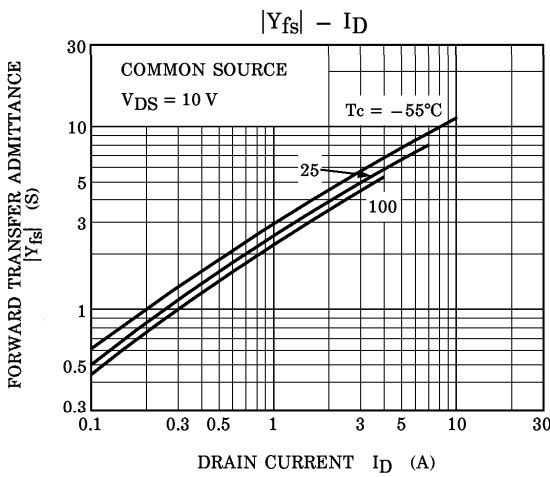
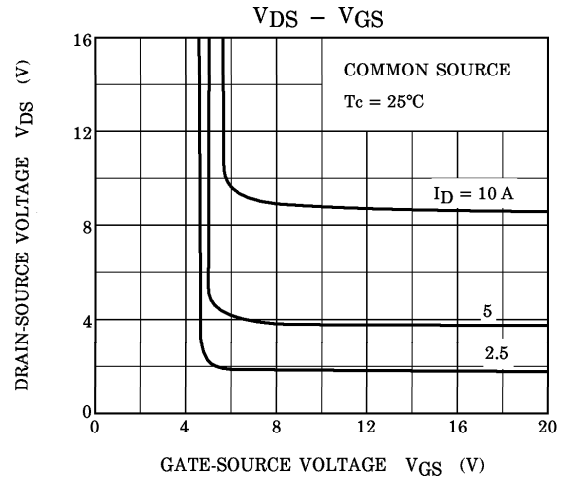
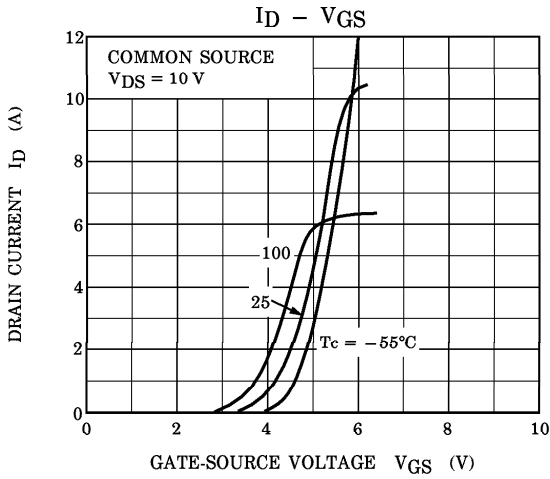
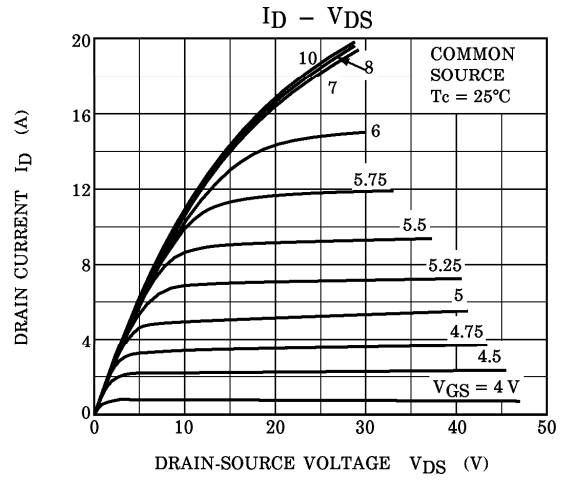
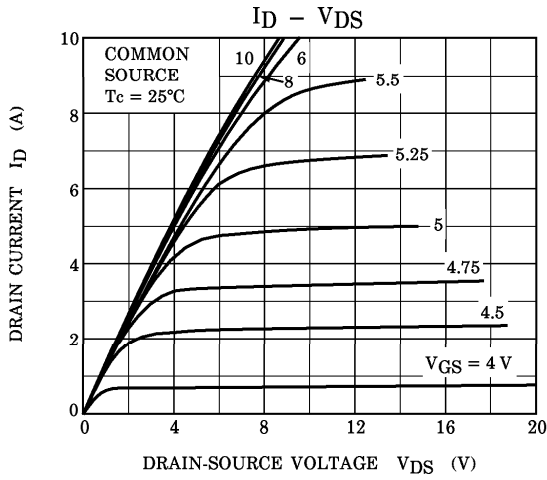


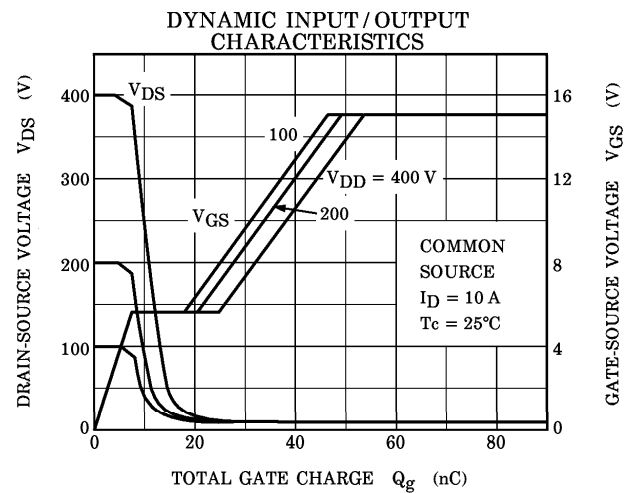
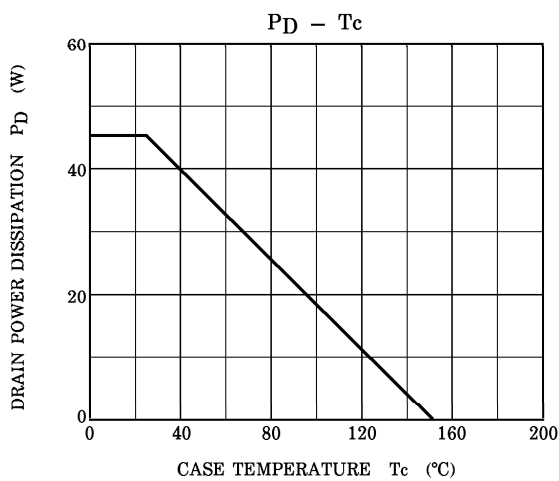
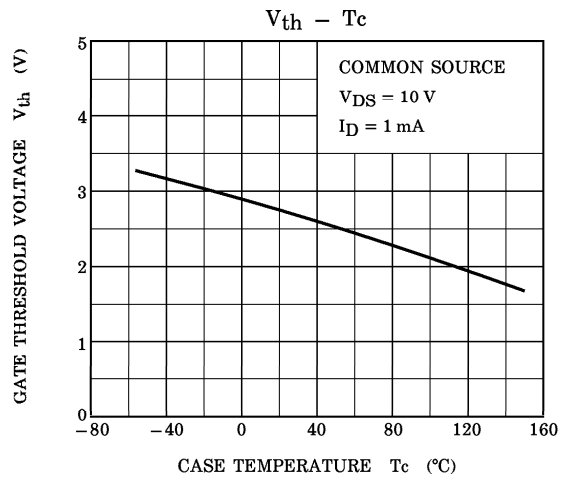
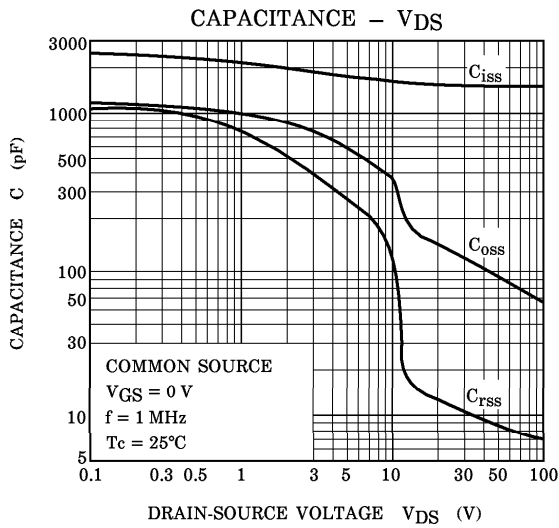
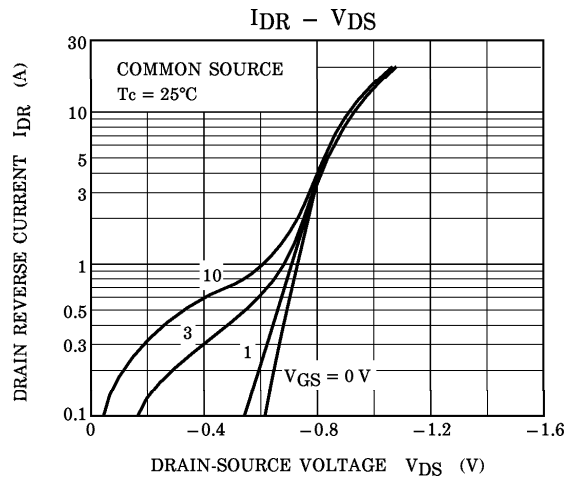
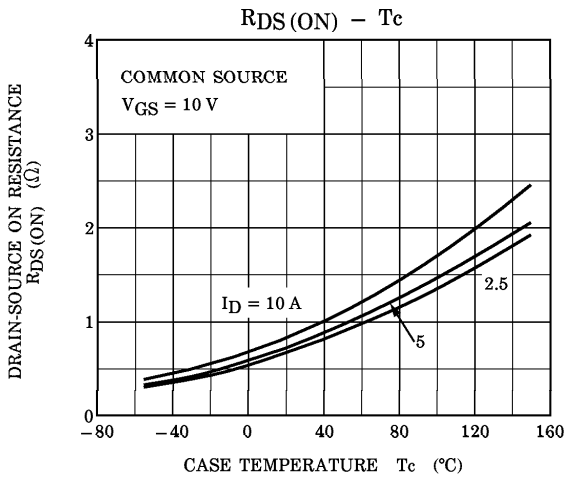
← TYPE

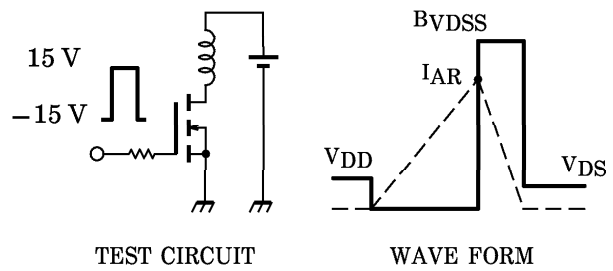
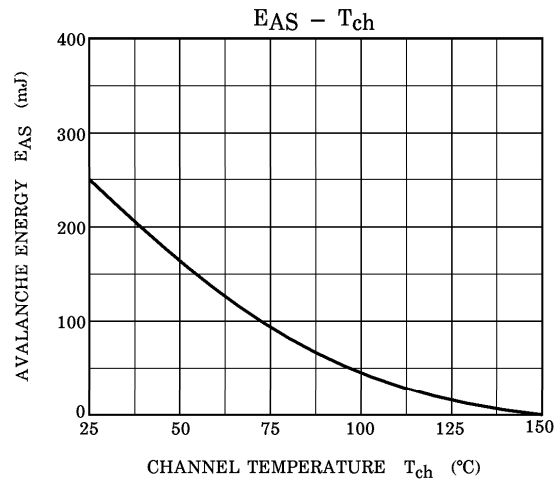
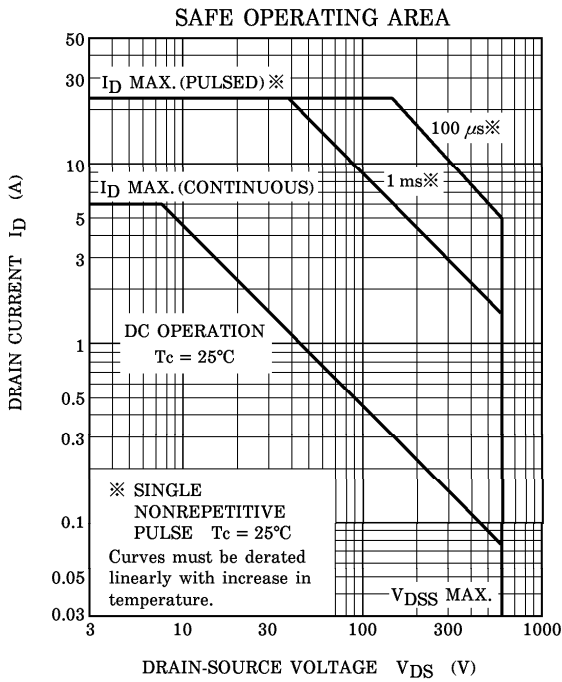
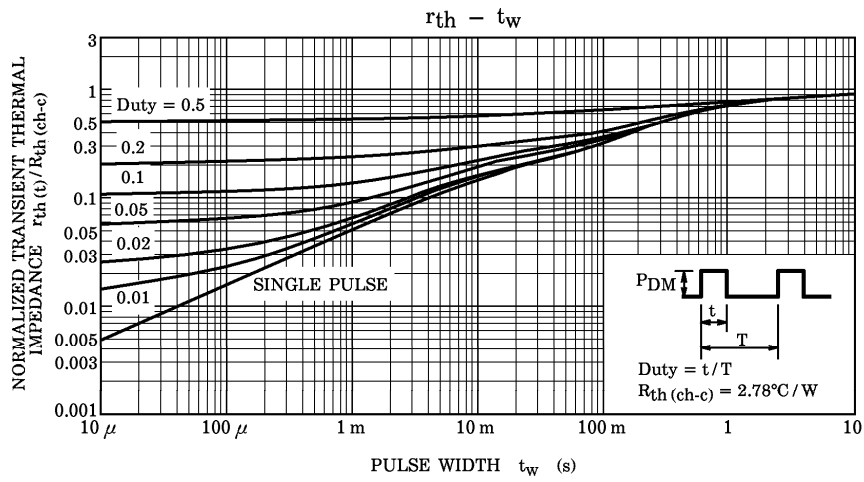
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







Peak  $I_{AR} = 10 \text{ A}$ ,  $R_G = 25 \Omega$      $E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left( \frac{B_{VDSS}}{B_{VDSS} - V_{DD}} \right)$   
 $V_{DD} = 90 \text{ V}$ ,  $L = 4.41 \text{ mH}$