

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

2SK2996

HIGH SPEED, HIGH VOLTAGE SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

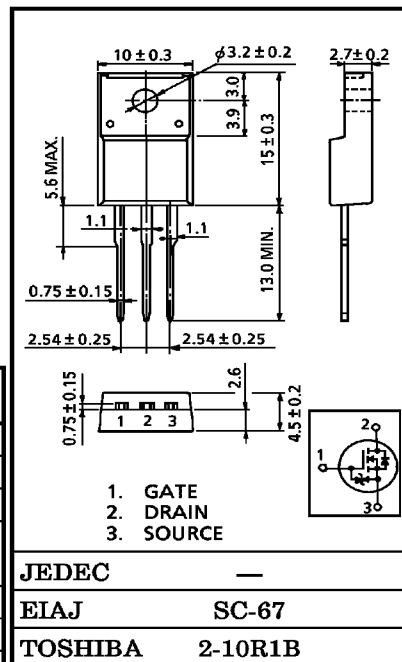
INDUSTRIAL APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance : $R_{DS(ON)} = 0.74 \Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 6.8 \text{ S}$ (Typ.)
- Low Leakage Current : $I_{DSS} = 100 \mu\text{A}$ (Max.) ($V_{DS} = 600 \text{ V}$)
- 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}	600	V
Drain-Gate Voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	600	V
Gate-Source Voltage	V_{GSS}	± 30	V
Drain Current	DC	I_D	10
	Pulse	I_{DP}	30
Drain Power Dissipation ($T_c = 25^\circ\text{C}$)	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	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	$-55 \sim 150$	$^\circ\text{C}$



Weight : 1.9 g

THERMAL CHARACTERISTICS

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

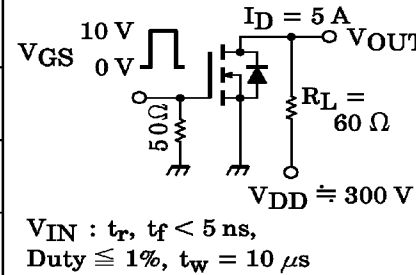
** $V_{DD} = 90 \text{ V}$, Starting $T_{ch} = 25^\circ\text{C}$, $L = 4.41 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = 10 \text{ A}$ **This transistor is an electrostatic sensitive device.****Please handle with caution.**

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1999-06-24 1/5

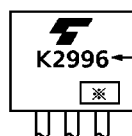
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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	$V_{(BR)GSS}$	$I_G = \pm 10 \mu\text{A}, V_{DS} = 0 \text{ V}$	± 30	—	—	V	
Drain Cut-off Current	I_{DSS}	$V_{DS} = 600 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	μA	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	600	—	—	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	$R_{DS(ON)}$	$V_{GS} = 10 \text{ V}, I_D = 5 \text{ A}$	—	0.74	1.0	Ω	
Forward Transfer Admittance	$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 5 \text{ A}$	3.4	6.8	—	S	
Input Capacitance	C_{iss}	$V_{DS} = 20 \text{ V}, V_{GS} = 0 \text{ V},$ $f = 1 \text{ MHz}$	—	1500	—	pF	
Reverse Transfer Capacitance	C_{rss}		—	13	—		
Output Capacitance	C_{oss}		—	140	—		
Switching Time	Rise Time	t_r		—	15	—	ns
	Turn-on Time	t_{on}		—	55	—	
	Fall Time	t_f		—	27	—	
	Turn-off Time	t_{off}		$V_{IN} : t_r, t_f < 5 \text{ ns},$ $\text{Duty} \leq 1\%, t_w = 10 \mu\text{s}$	—	145	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q_g	$V_{DD} \doteq 400 \text{ V}, V_{GS} = 10 \text{ V},$ $I_D = 10 \text{ A}$	—	38	—	nC	
Gate-Source Charge	Q_{gs}		—	21	—		
Gate-Drain ("Miller") Charge	Q_{gd}		—	17	—		

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


CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	10	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	30	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 10 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR} = 10 \text{ A}, V_{GS} = 0 \text{ V}$	—	1600	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR}/dt = 100 \text{ A}/\mu\text{s}$	—	17	—	μC

MARKING



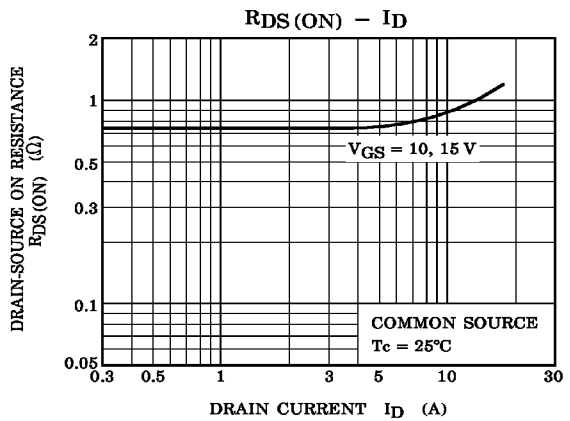
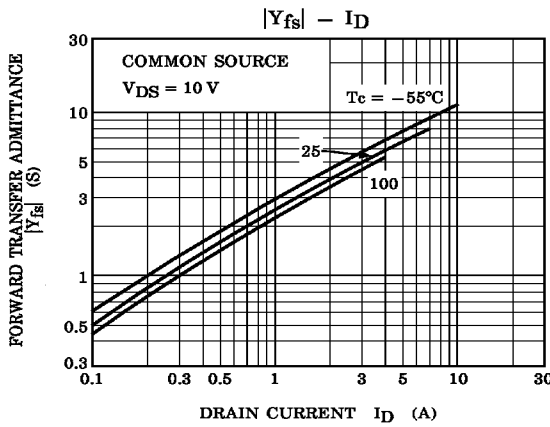
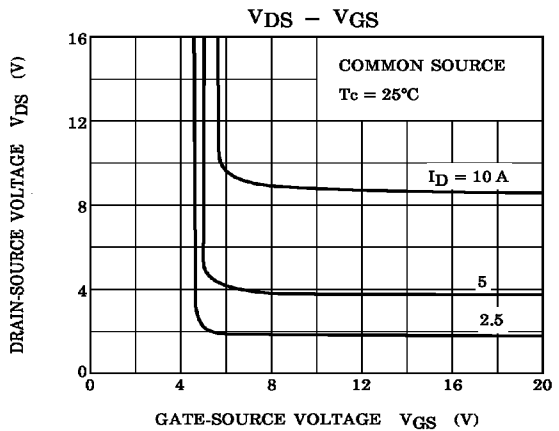
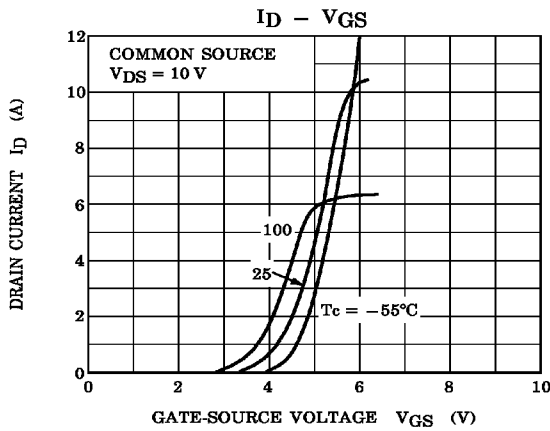
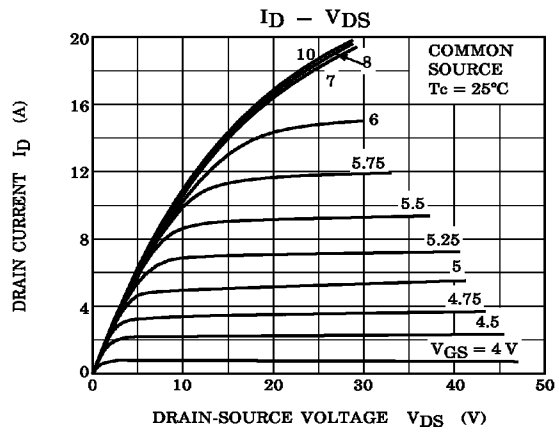
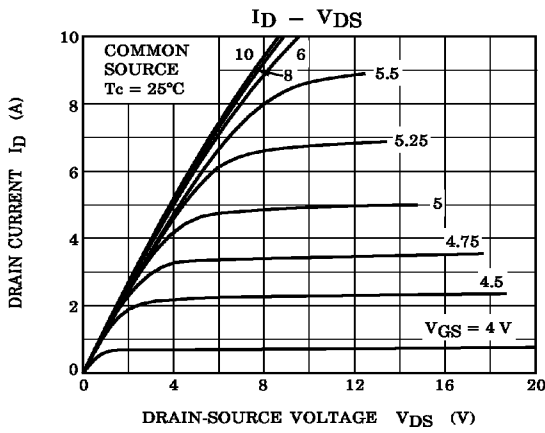
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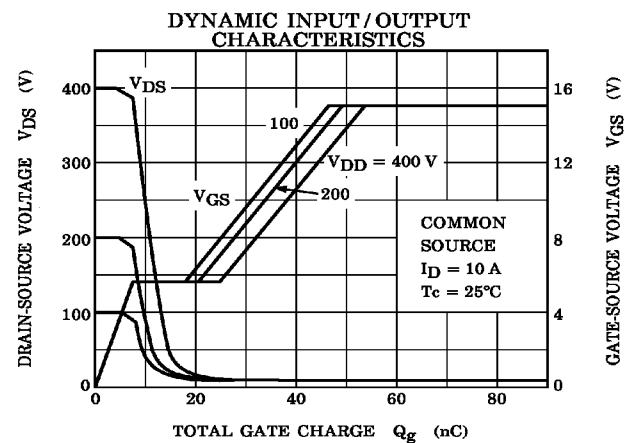
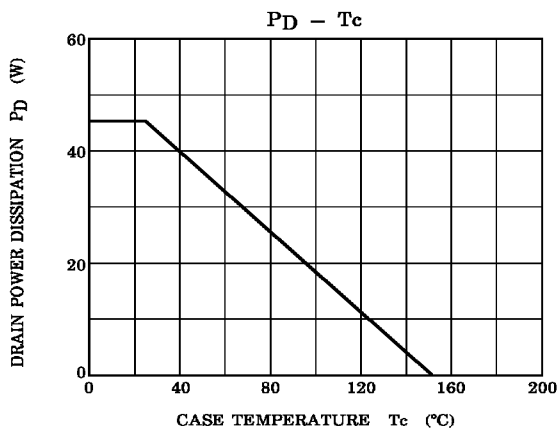
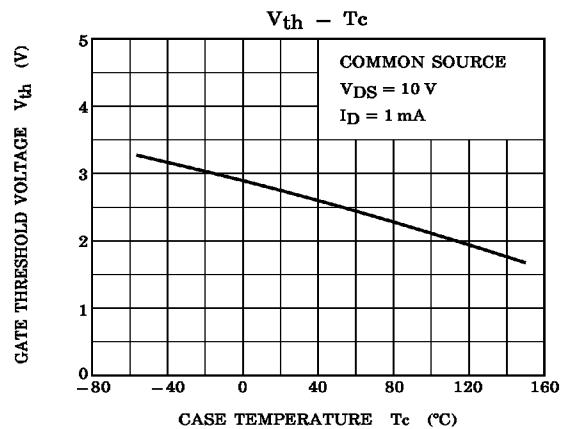
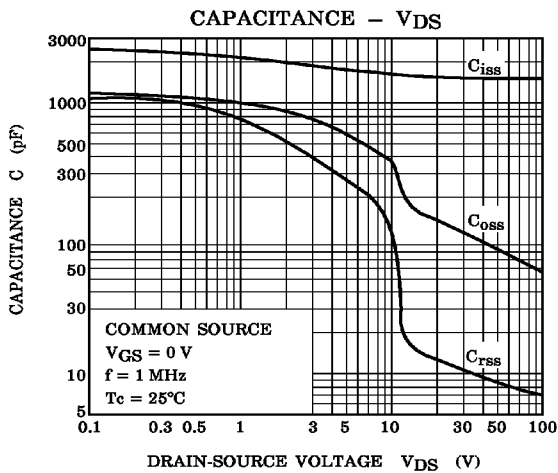
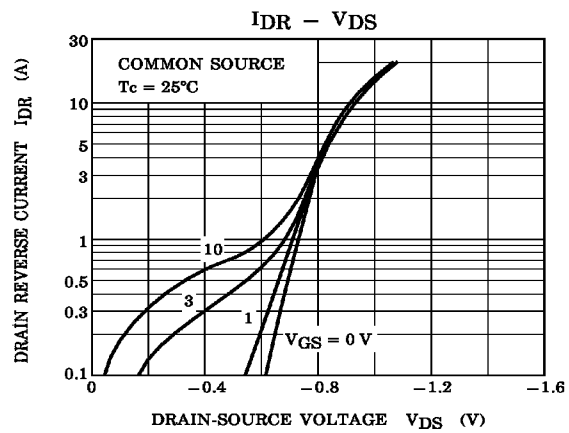
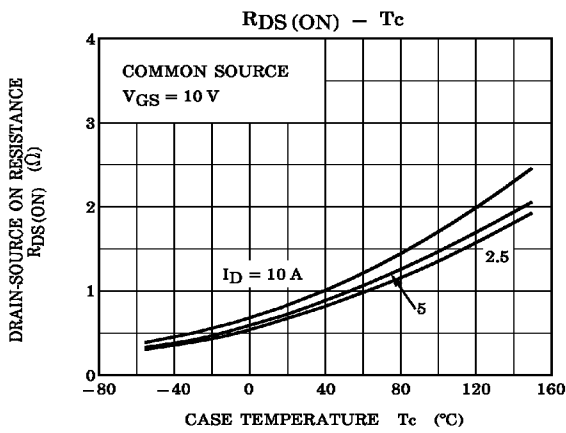
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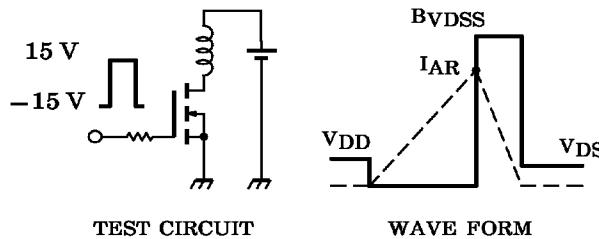
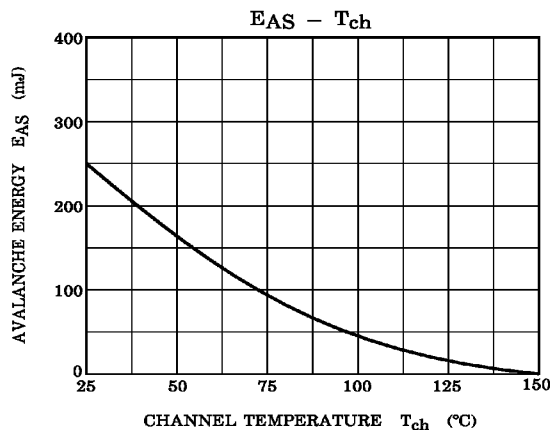
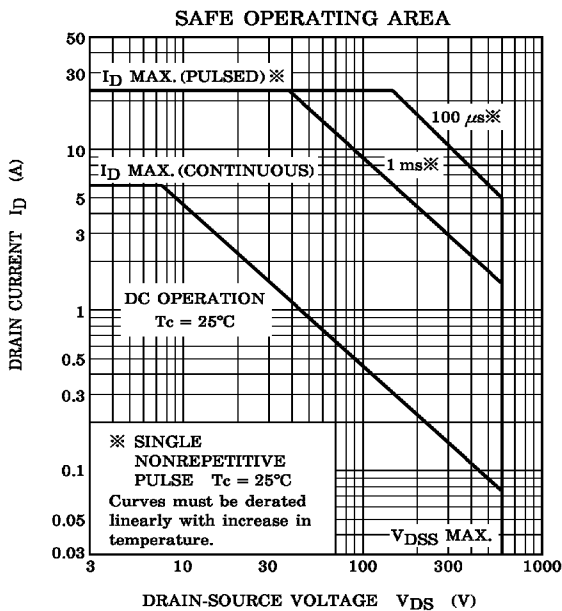
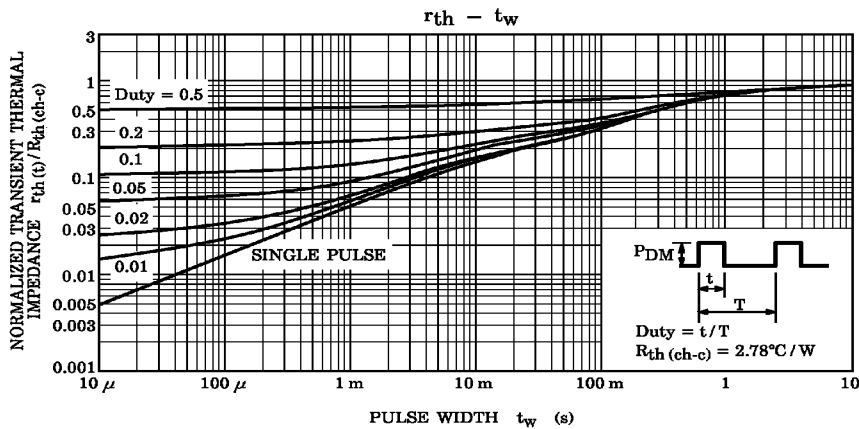

 Month (Starting from Alphabet A)

Year (Last Number of the Christian Era)

1999-06-24 2/5







Peak $I_{AR} = 10 \text{ A}$, $R_G = 25 \Omega$, $V_{DD} = 90 \text{ V}$, $L = 4.41 \text{ mH}$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{B_{VDSS}}{B_{VDSS} - V_{DD}} \right)$$