

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

2SK2993

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

- Low Drain-Source ON Resistance : $R_{DS(ON)} = 82 \text{ m}\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 20 \text{ S}$ (Typ.)
- Low Leakage Current : $I_{DSS} = 100 \mu\text{A}$ ($V_{DS} = 250 \text{ V}$)
- 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}	250	V
Drain-Gate Voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	250	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current	DC	I_D	20	A
	Pulse	I_{DP}	60	
Drain Power Dissipation ($T_c = 25^\circ\text{C}$)		P_D	100	W
Single Pulse Avalanche Energy*		E_{AS}	423	mJ
Avalanche Current		I_{AR}	20	A
Repetitive Avalanche Energy**		E_{AR}	10	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	$R_{th(ch-c)}$	1.25	$^\circ\text{C} / \text{W}$
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	83.3	$^\circ\text{C} / \text{W}$

Note ;

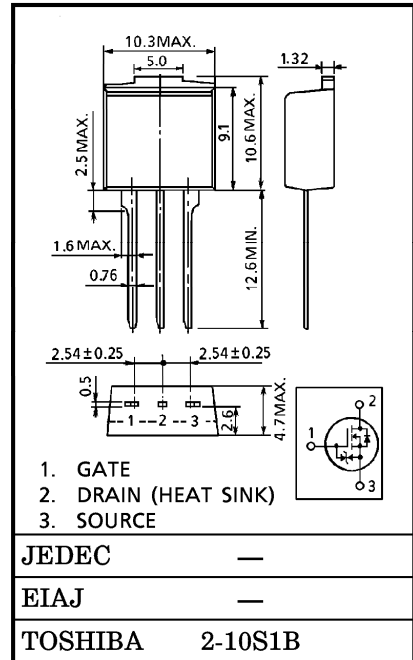
* $V_{DD} = 90 \text{ V}$, Starting $T_{ch} = 25^\circ\text{C}$, $L = 1.79 \text{ mH}$,

$I_{AR} = 20 \text{ A}$ $R_G = 25 \Omega$

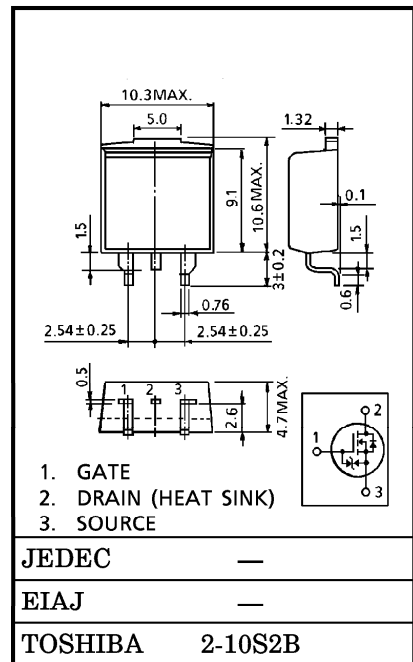
** Repetitive rating ; Pulse Width Limited by Max.

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

INDUSTRIAL APPLICATIONS
 TO-220FL Unit in mm



TO-220SM Unit in mm



Weight : 1.5 g

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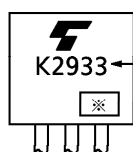
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA	
Drain Cut-off Current	I_{DSS}	$V_{DS} = 250\text{ V}, V_{GS} = 0\text{ V}$	—	—	100	μA	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	250	—	—	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	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}$	—	82	110	$\text{m}\Omega$	
Forward Transfer Admittance	$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 10\text{ A}$	10	20	—	S	
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$	—	4000	—	pF	
Reverse Transfer Capacitance	C_{rss}		—	300	—		
Output Capacitance	C_{oss}		—	680	—		
Switching Time	Rise Time	t_r		—	15	—	ns
	Turn-on Time	t_{on}		—	35	—	
	Fall Time	t_f		—	30	—	
	Turn-off Time	t_{off}		—	180	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q_g	$V_{DD} \approx 200\text{ V}, V_{GS} = 10\text{ V},$ $I_D = 20\text{ A}$	—	100	—	nC	
Gate-Source Charge	Q_{gs}		—	70	—		
Gate-Drain ("Miller") Charge	Q_{gd}		—	30	—		

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	20	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	60	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 20\text{ A}, V_{GS} = 0\text{ V}$	—	—	-2.0	V
Reverse Recovery Time	t_{rr}	$I_{DR} = 20\text{ A}, V_{GS} = 0\text{ V}$ $dI_{DR}/dt = 100\text{ A}/\mu\text{s}$	—	280	—	ns
Reverse Recovery Charge	Q_{rr}		—	3.8	—	μC

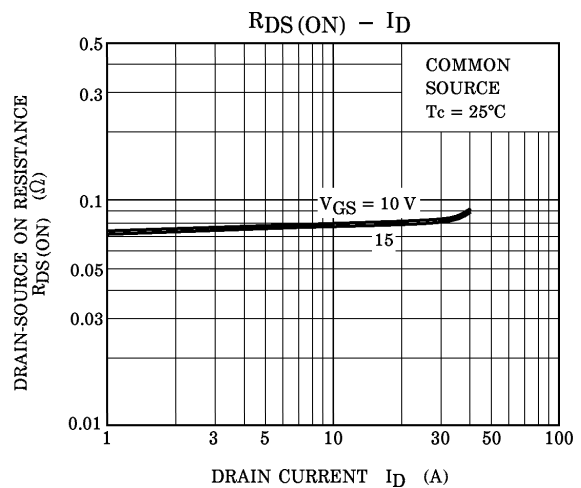
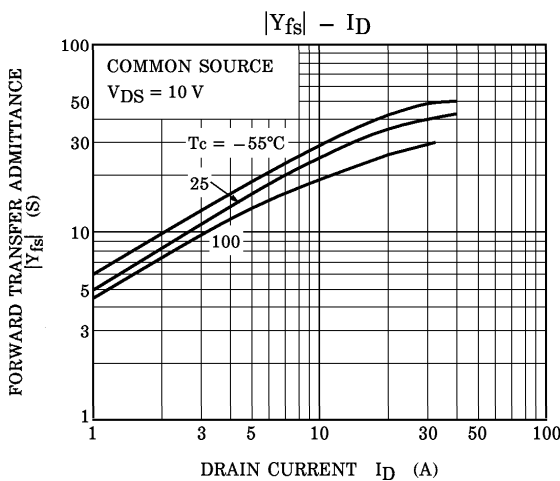
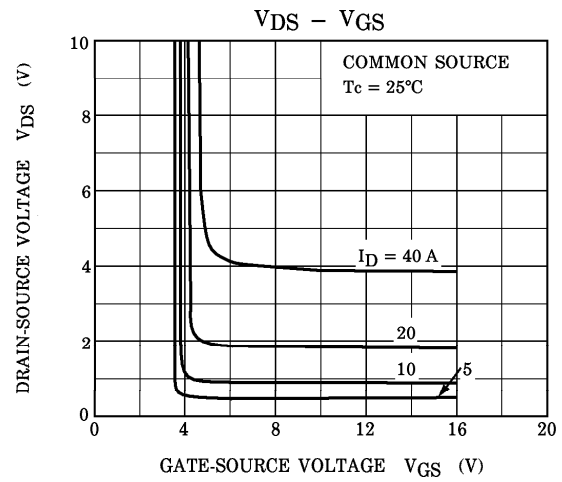
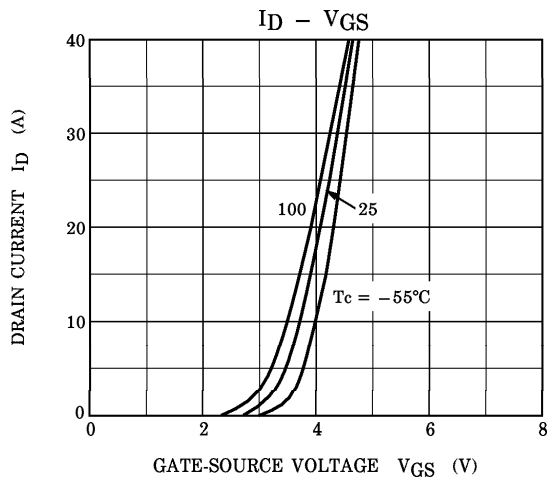
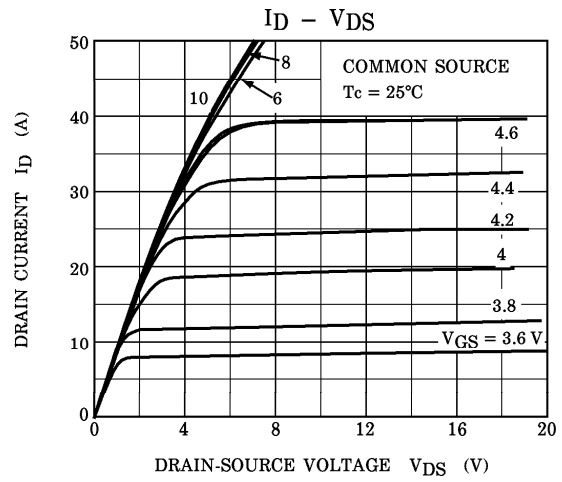
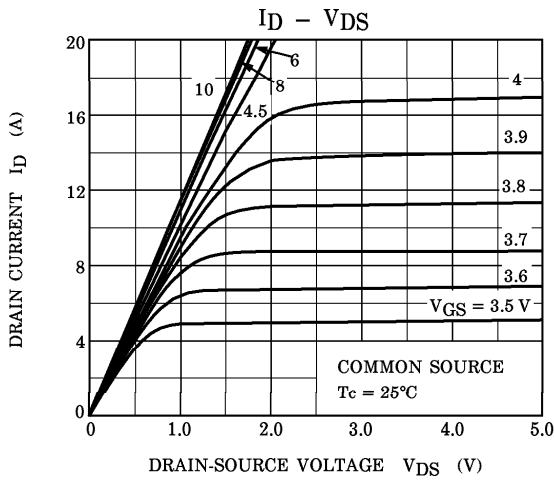
MARKING

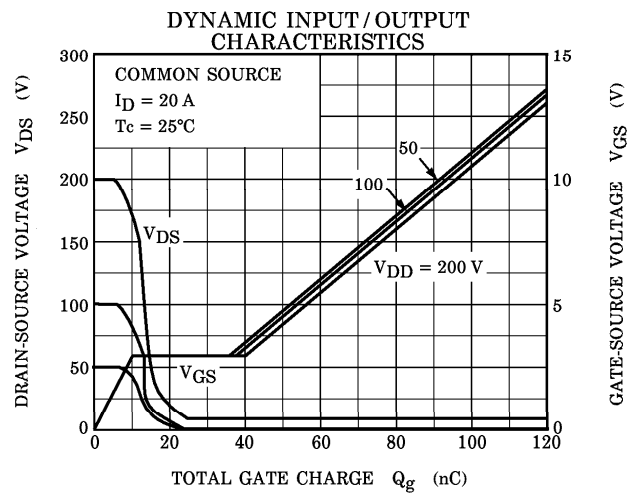
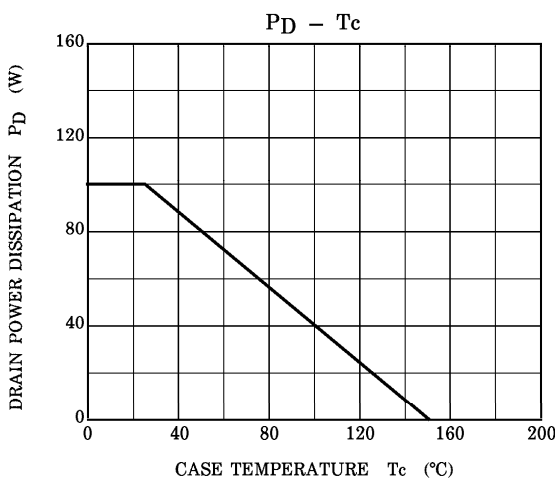
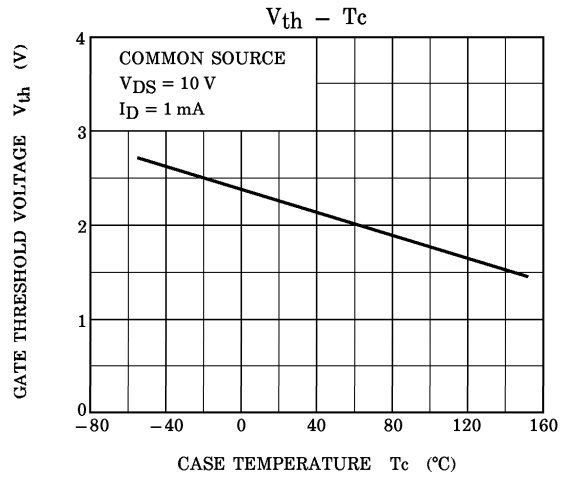
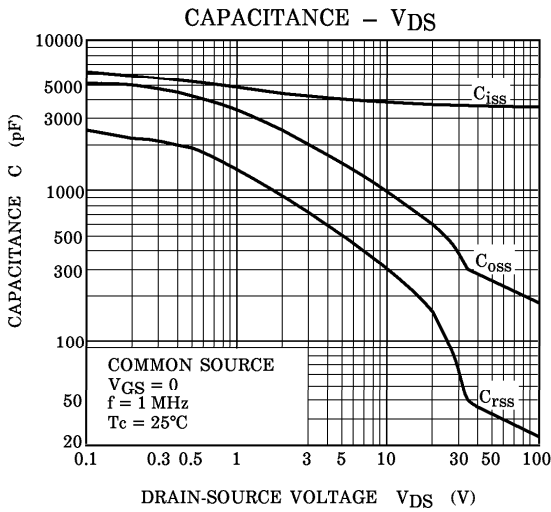
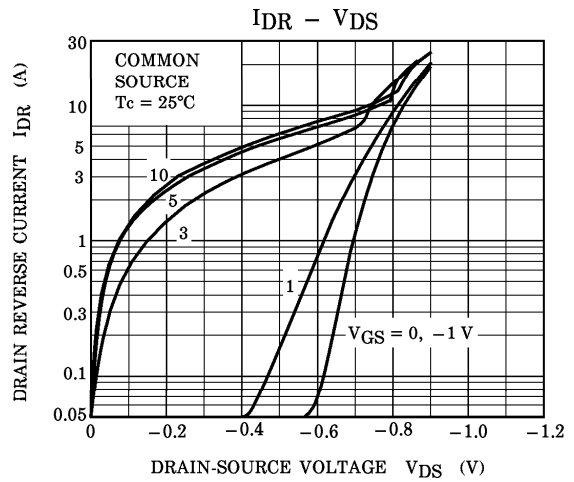
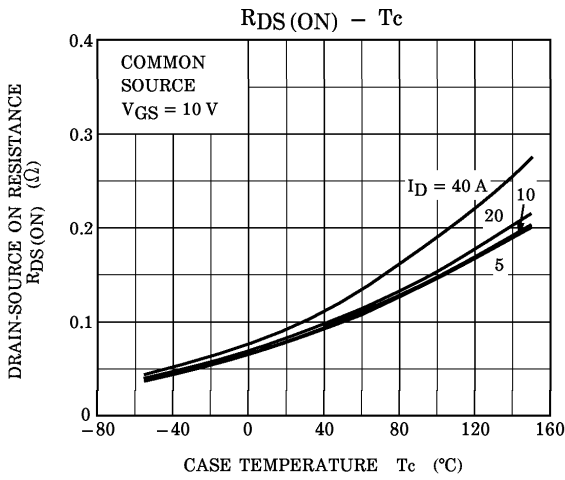


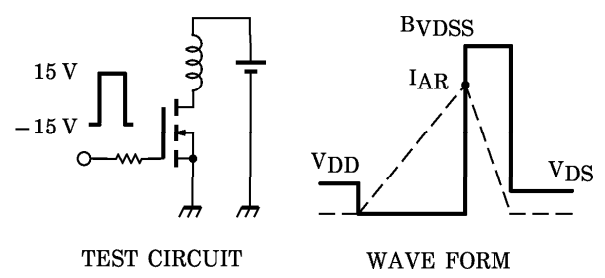
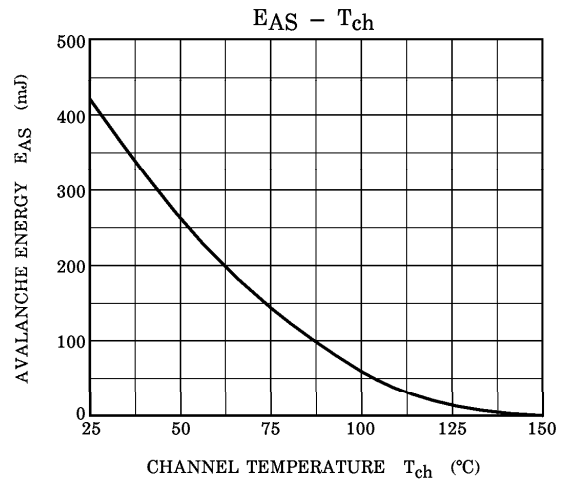
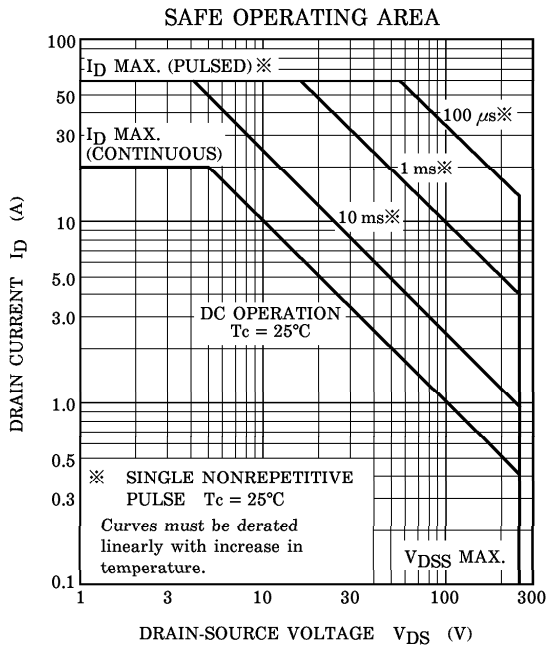
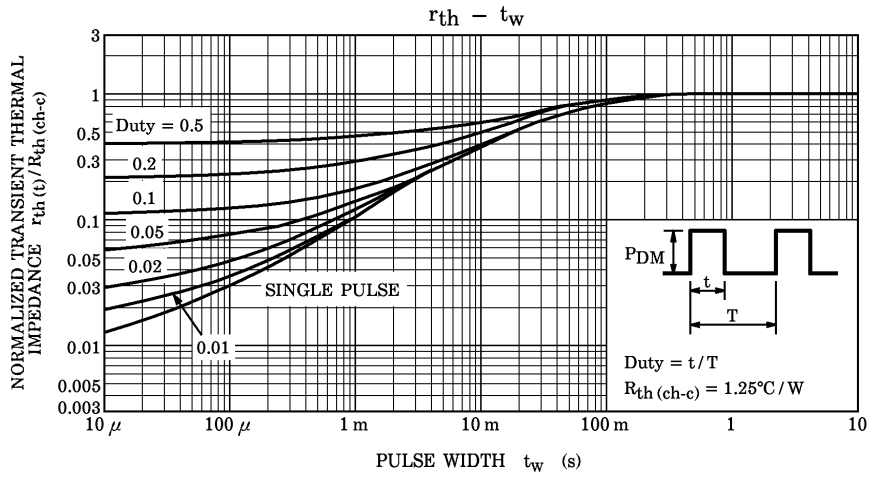
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







Peak $I_{AR} = 20 \text{ A}$, $R_G = 25 \Omega$
 $V_{DD} = 90 \text{ V}$, $L = 1.79 \text{ mH}$

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