

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (L²-π-MOSV)

2SK2963

HIGH SPEED APPLICATIONS

DC-DC CONVERTER, RELAY DRIVE AND MOTOR DRIVE APPLICATIONS

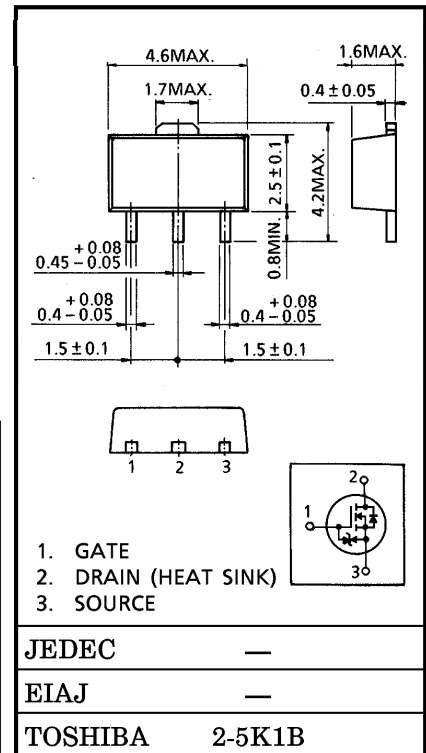
INDUSTRIAL APPLICATIONS

Unit in mm

- 4 V Gate Drive
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 0.5 \Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 1.2 S$ (Typ.)
- Low Leakage Current : $I_{DSS} = 100 \mu A$ (Max.) ($V_{DS} = 100 V$)
- Enhancement-Mode : $V_{th} = 0.8 \sim 2.0 V$
($V_{DS} = 10 V, I_D = 1 mA$)

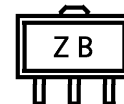
MAXIMUM RATINGS ($T_a = 25^\circ C$)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	V_{DSS}	100	V
Drain-Gate Voltage ($R_{GS} = 20 k\Omega$)	V_{DGR}	100	V
Gate-Source Voltage	V_{GSS}	± 20	V
Drain Current	DC	I_D	1 A
	Pulse	I_{DP}	3 A
Drain Power Dissipation ($T_a = 25^\circ C$)	P_D	0.5	W
Drain Power Dissipation***	P_D	1.5	W
Single Pulse Avalanche Energy**	E_{AS}	137	mJ
Avalanche Current	I_{AR}	1	A
Repetitive Avalanche Energy*	E_{AR}	0.05	mJ
Channel Temperature	T_{ch}	150	$^\circ C$
Storage Temperature Range	T_{stg}	-55~150	$^\circ C$



Weight : 0.05 g (Typ.)

MARKING



THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	250	$^\circ C / W$

Note ;

- * Repetitive rating ; Pulse Width Limited by Max. junction temperature.
- ** $V_{DD} = 25 V, T_{ch} = 25^\circ C$ (initial), $L = 221 mH, R_G = 25 \Omega, I_{AR} = 1 A$
- *** Mounted on ceramic substrate (1 inch² × 0.8 t)

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

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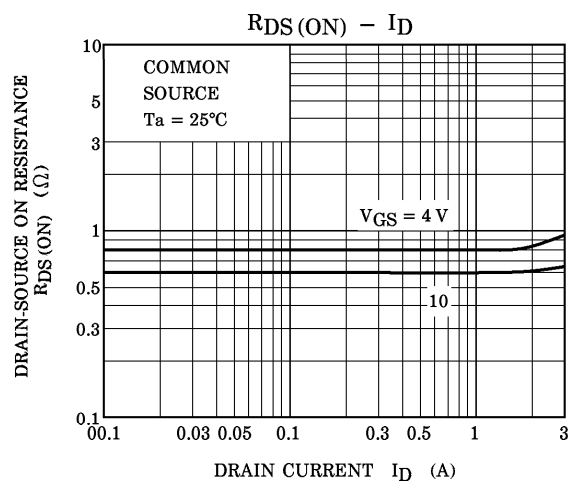
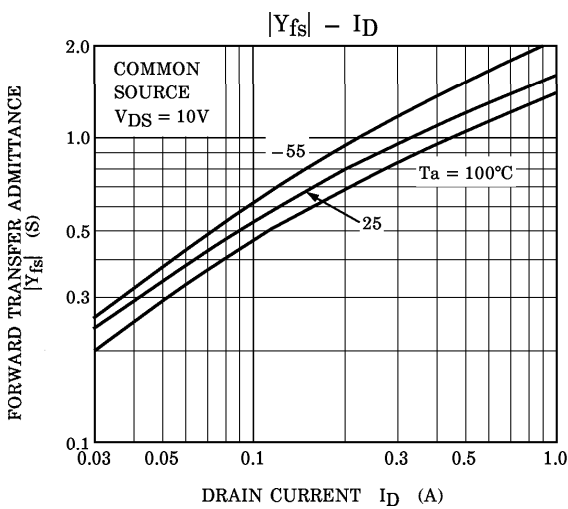
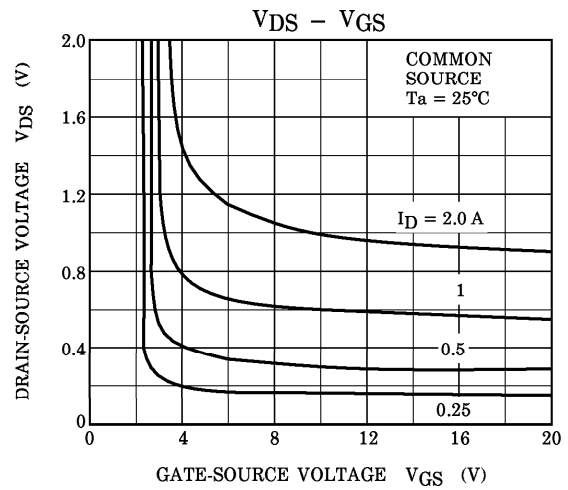
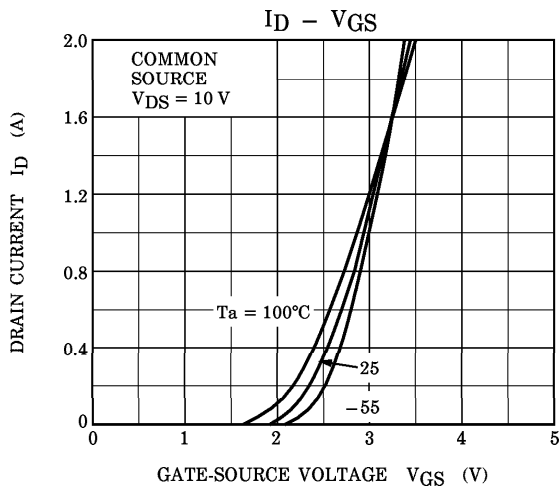
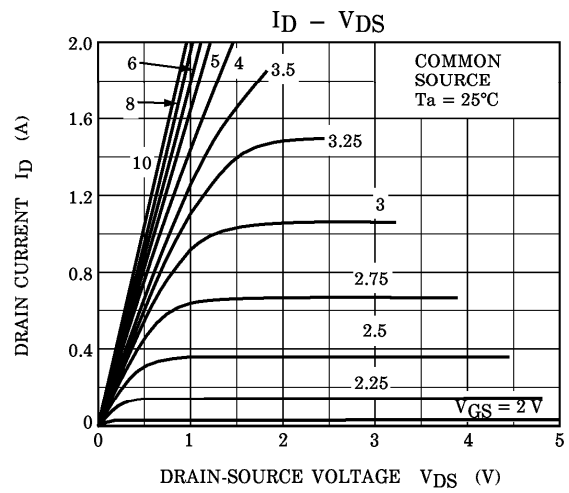
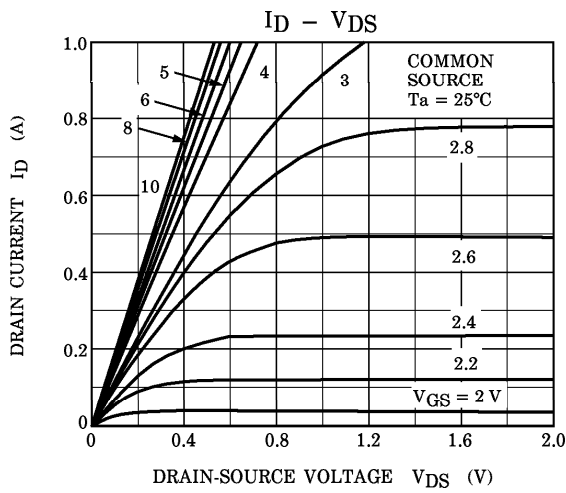
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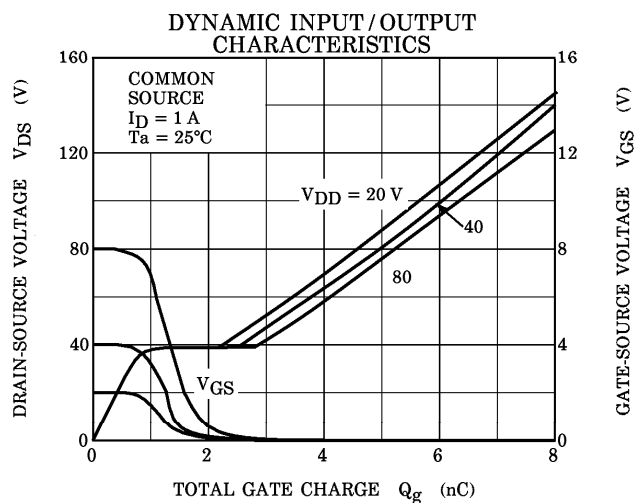
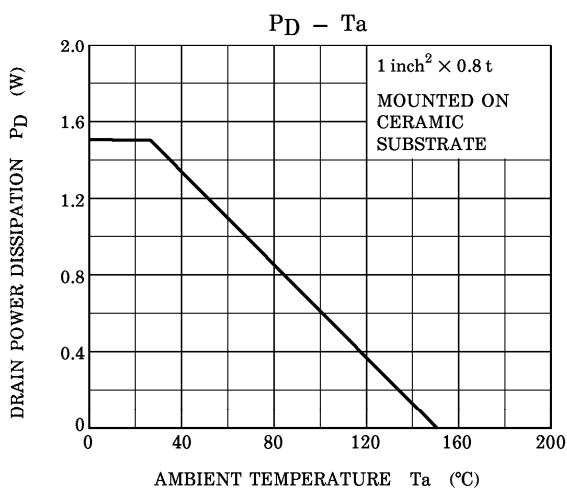
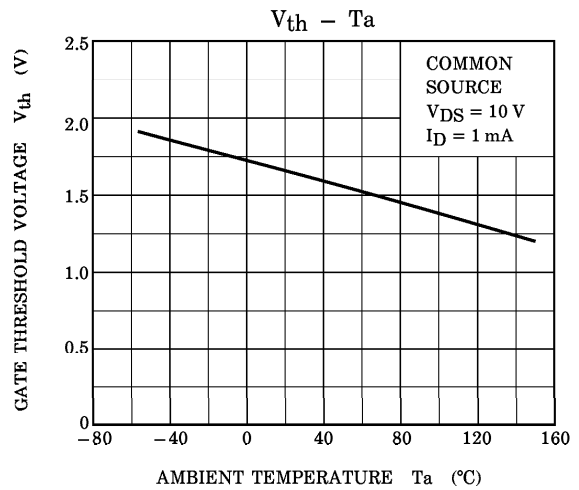
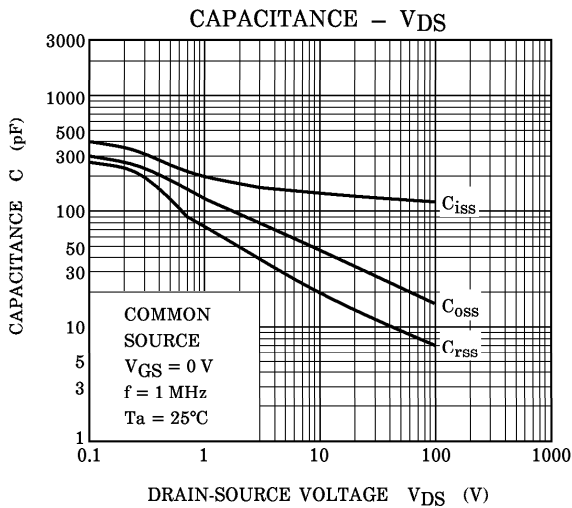
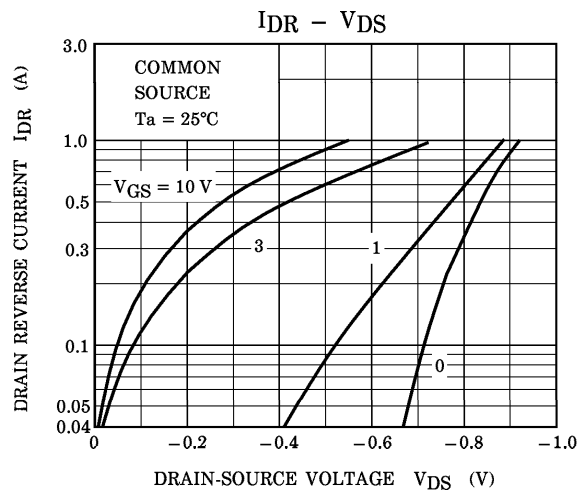
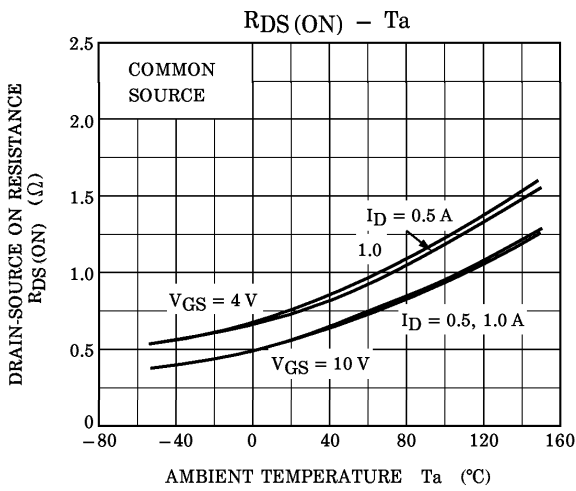
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

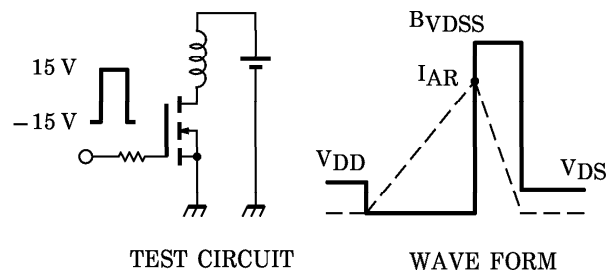
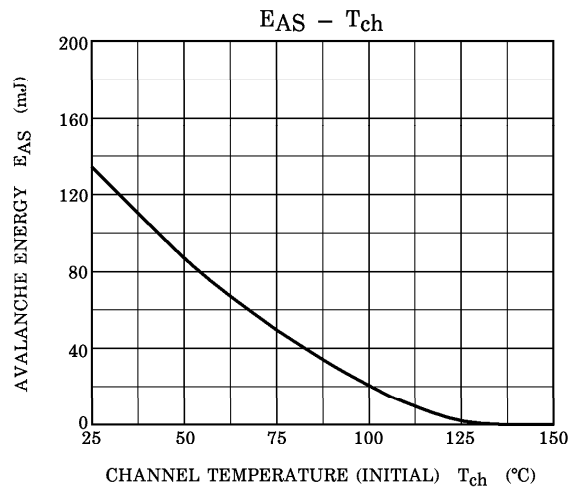
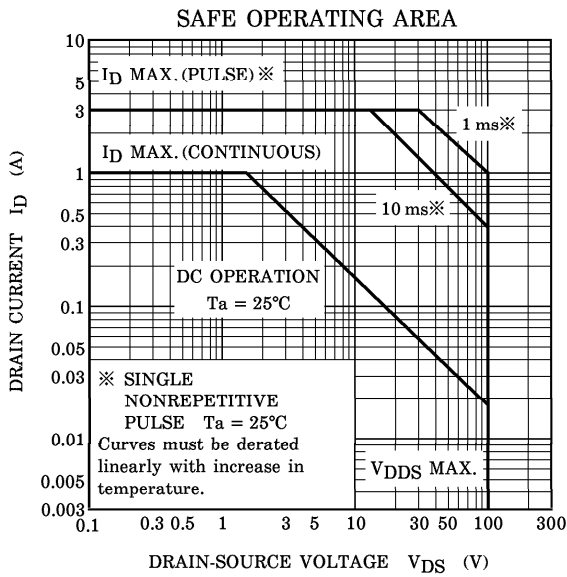
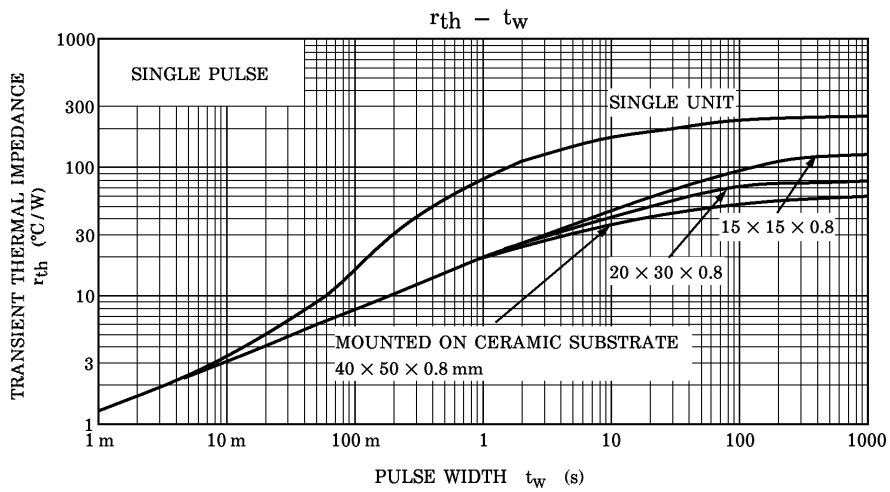
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain Cut-off Current		I_{DSS}	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	100	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	0.8	—	2.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = 4\text{ V}, I_D = 0.5\text{ A}$	—	0.65	0.95	Ω
			$V_{DS} = 10\text{ V}, I_D = 0.5\text{ A}$	—	0.5	0.7	
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 0.5\text{ A}$	0.6	1.2	—	S
Input Capacitance		C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	140	—	pF
Reverse Transfer Capacitance		C_{rss}		—	20	—	
Output Capacitance		C_{oss}		—	45	—	
Switching Time	Rise Time	t_r	<p>$I_D = 0.5\text{ A}$ $V_{GS} = 10\text{ V}$ V_{OUT} $R_L = 50\ \Omega$ $V_{DD} \doteq 50\text{ V}$</p>	—	8	—	ns
	Turn-on Time	t_{on}		—	13	—	
	Fall Time	t_f		—	45	—	
	Turn-off Time	t_{off}		INPUT : $t_r, t_f < 5\text{ ns}$, Duty $\leq 1\%$, $t_w = 10\ \mu\text{s}$	—	175	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \doteq 80\text{ V}, V_{GS} = 10\text{ V}, I_D = 1\text{ A}$	—	6.3	—	nC
Gate-Source Charge		Q_{gs}		—	4.3	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	2	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	1	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	3	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 1\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.5	V
Reverse Recovery Time	t_{rr}	$I_{DR} = 1\text{ A}, V_{GS} = 0\text{ V}$	—	80	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR} / dt = 50\text{ A} / \mu\text{s}$	—	140	—	μC







Peak $I_{AR} = 1 \text{ A}$, $R_G = 25 \Omega$
 $V_{DD} = 25 \text{ V}$, $L = 221 \text{ mH}$

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