

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

2SK2963

HIGH SPEED APPLICATIONS

DC-DC CONVERTER, RELAY DRIVE AND MOTOR DRIVE APPLICATIONS

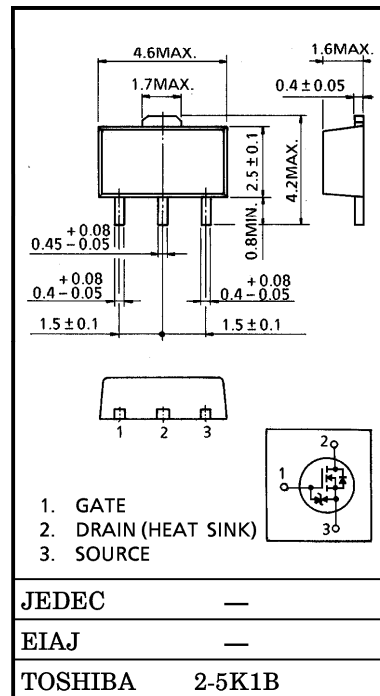
INDUSTRIAL APPLICATIONS

Unit in mm

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

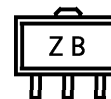
MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	V_{DSS}	100	V
Drain-Gate Voltage ($R_{GS} = 20k\Omega$)	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***	P_D	1.5	W
Single Pulse Avalanche Energy**	E_{AS}	137	mJ
Avalanche Current	I_{AR}	1	A
Repetitive Avalanche Energy*	E_{AR}	0.15	mJ
Channel Temperature	T_{ch}	150	°C
Storage Temperature Range	T_{stg}	-55~150	°C



Weight : 0.05g (Typ.)

MARKING



THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	83.3	°C/W

Note ;

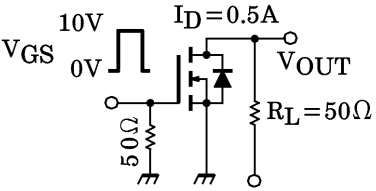
- * Repetitive rating ; Pulse Width Limited by Max. junction temperature.
- ** $V_{DD} = 25V$, Starting $T_{ch} = 25°C$, $L = 221mH$, $R_G = 25\Omega$, $I_{AR} = 1A$
- *** Mounted on ceramic substrate (1inch² × 0.8t)

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

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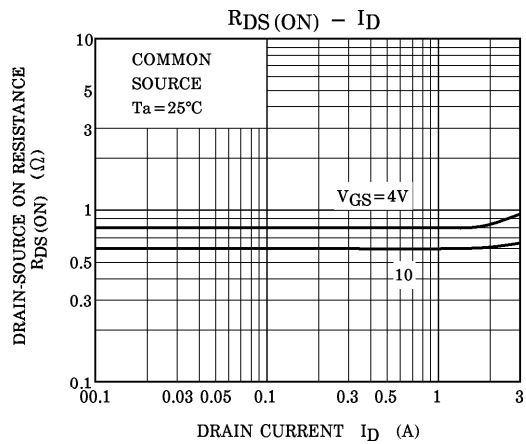
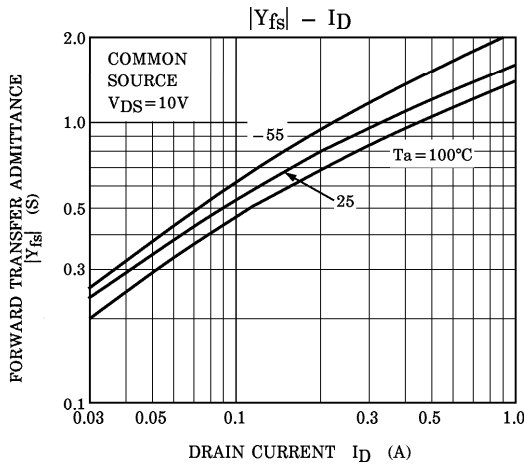
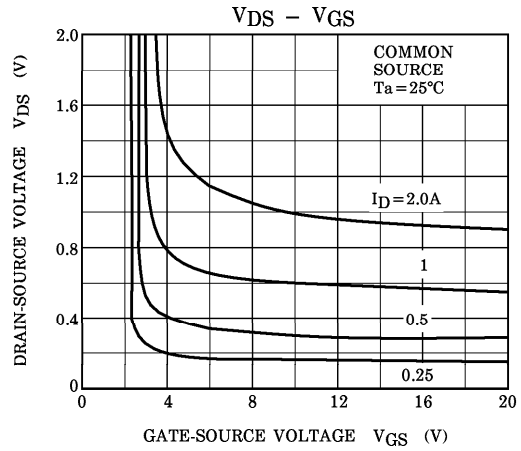
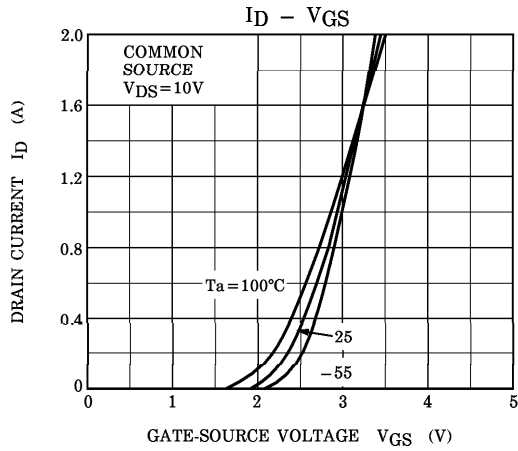
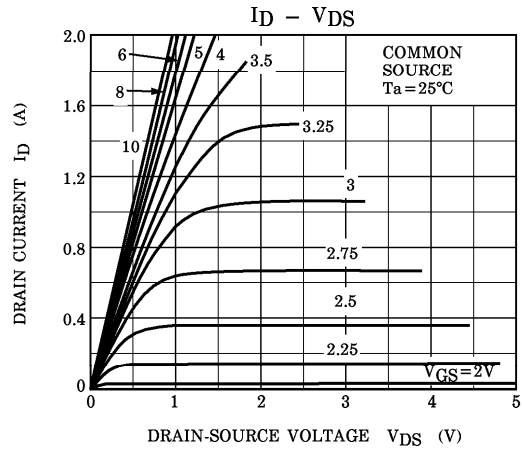
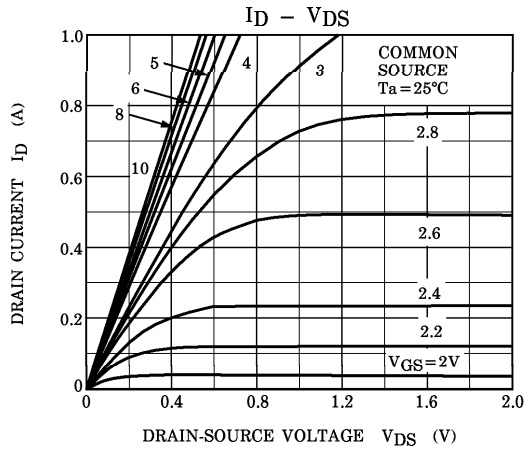
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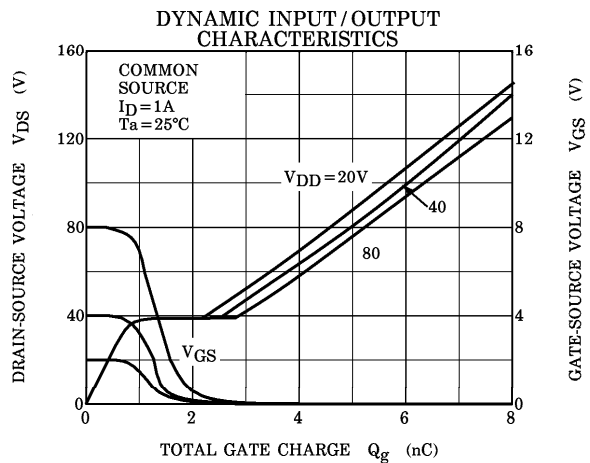
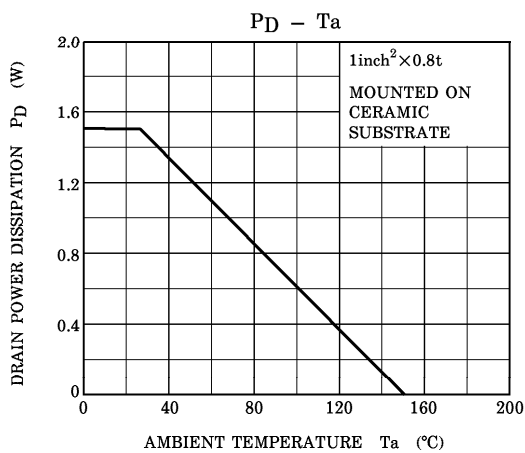
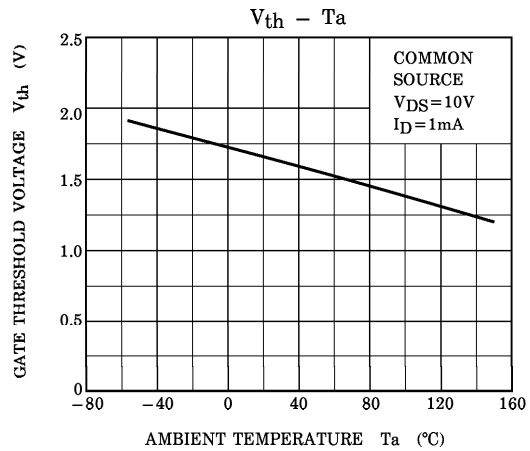
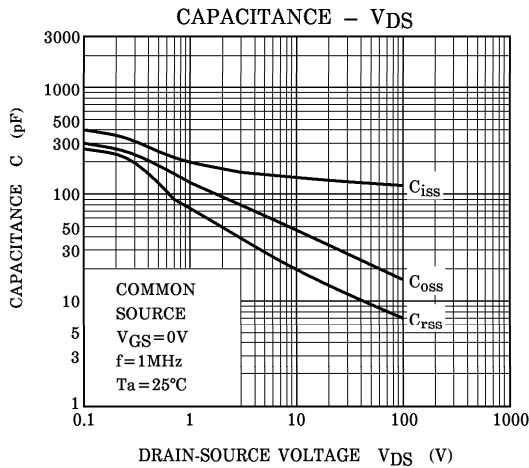
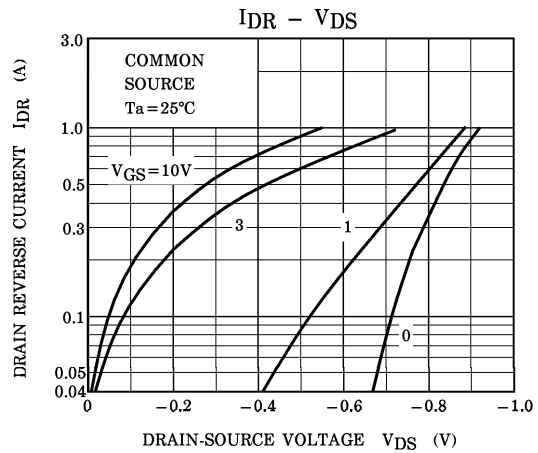
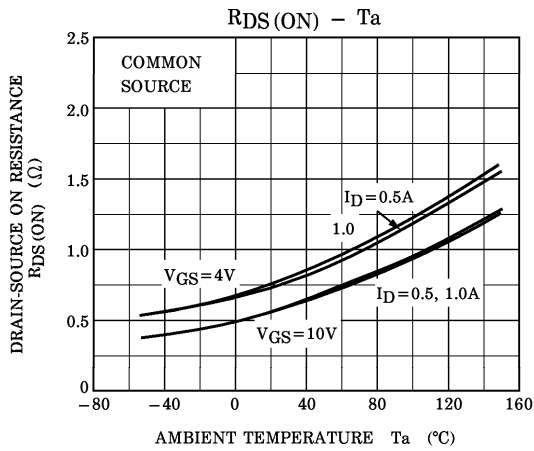
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

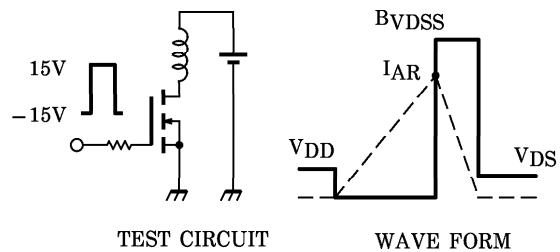
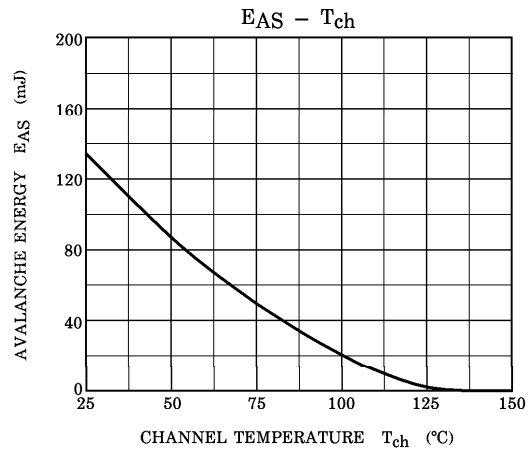
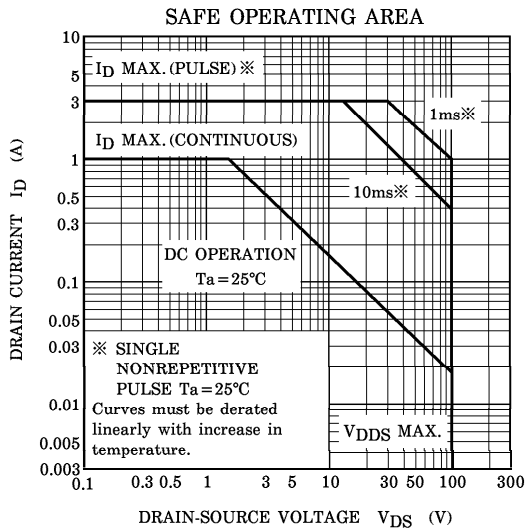
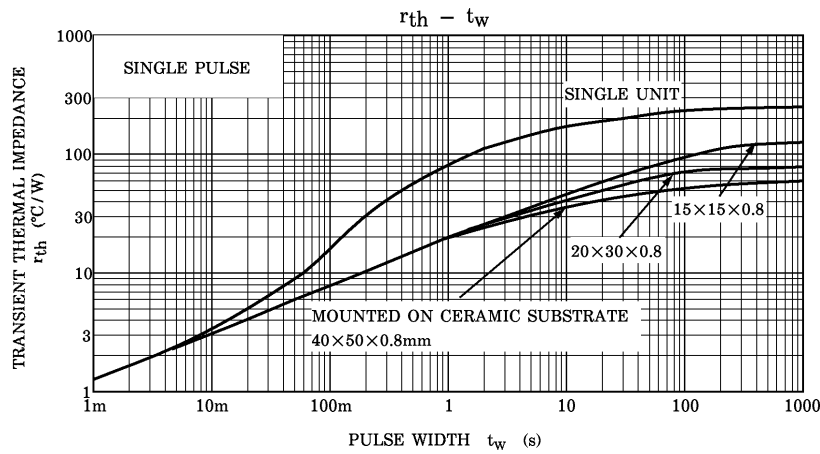
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 16V, V_{DS} = 0V$	—	—	± 10	μA
Drain Cut-off Current		I_{DSS}	$V_{DS} = 100V, V_{GS} = 0V$	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D = 10mA, V_{GS} = 0V$	100	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS} = 10V, I_D = 1mA$	0.8	—	2.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = 4V, I_D = 0.5A$	—	0.65	0.95	Ω
			$V_{DS} = 10V, I_D = 0.5A$	—	0.5	0.7	
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = 10V, I_D = 0.5A$	0.6	1.2	—	S
Input Capacitance		C_{iss}	$V_{DS} = 10V, V_{GS} = 0V, f = 1MHz$	—	140	—	pF
Reverse Transfer Capacitance		C_{rss}		—	20	—	
Output Capacitance		C_{oss}		—	45	—	
Switching Time	Rise Time	t_r	 <p>$V_{GS} = 10V, I_D = 0.5A, R_L = 50\Omega, V_{DD} = 50V$</p>	—	8	—	ns
	Turn-on Time	t_{on}		—	13	—	
	Fall Time	t_f		—	45	—	
	Turn-off Time	t_{off}		INPUT : $t_r, t_f < 5ns,$ Duty $\leq 1\%, t_w = 10\mu s$	—	175	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} = 80V, V_{GS} = 10V, I_D = 1A$	—	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}	$I_{DR} = 1A, V_{GS} = 0V$	—	—	-1.5	V
Reverse Recovery Time		t_{rr}	$I_{DR} = 1A, V_{GS} = 0V$	—	80	—	ns
Reverse Recovery Charge		Q_{rr}	$dI_{DR} / dt = 50A / \mu s$	—	140	—	μC







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

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