

TOSHIBA FIELD EFFECT TRANSISTOR SILICON P CHANNEL MOS TYPE ($L^2-\pi$ -MOS V)

2SJ511

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

- 4 V Gate Drive
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 0.32 \Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 1.4 S$ (Typ.)
- Low Leakage Current : $I_{DSS} = -100 \mu A$ (Max.) ($V_{DS} = -30 V$)
- 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}	-30	V
Drain-Gate Voltage ($R_{GS} = 20 k\Omega$)		V_{DGR}	-30	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current	DC	I_D	-2	A
	Pulse	I_{DP}	-6	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}	55	mJ
Avalanche Current		I_{AR}	-2	A
Repetitive Avalanche Energy*		E_{AR}	0.05	mJ
Channel Temperature		T_{ch}	150	$^\circ C$
Storage Temperature Range		T_{stg}	-55~150	$^\circ C$

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), $L = 10 mH$, $R_G = 25 \Omega$, $I_{AR} = -2 A$
- *** Mounted on ceramic substrate ($1inch^2 \times 0.8 t$)

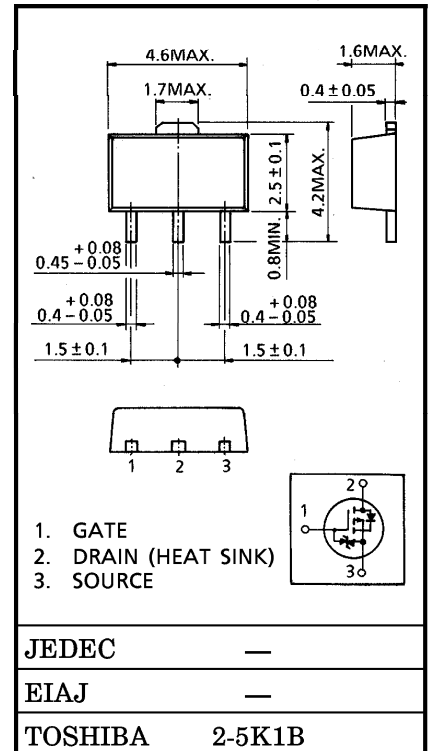
This transistor is an electrostatic sensitive device.**Please handle with caution.**

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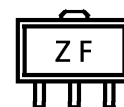
INDUSTRIAL APPLICATIONS

Unit in mm

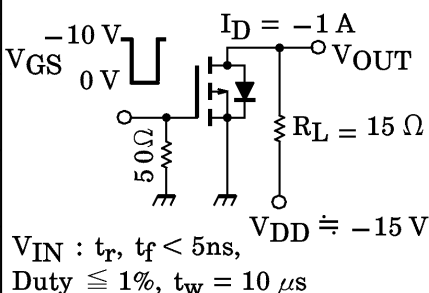


Weight : 0.05 g (Typ.)

MARKING

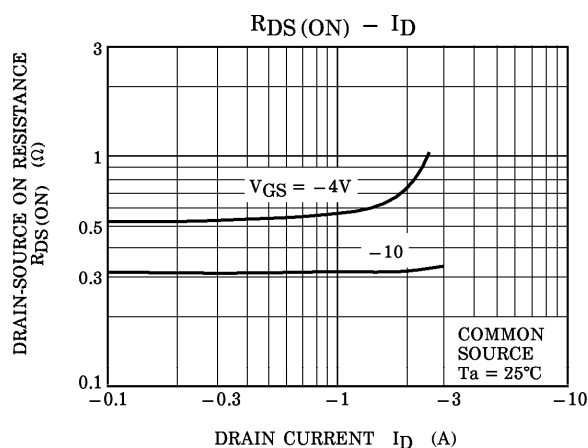
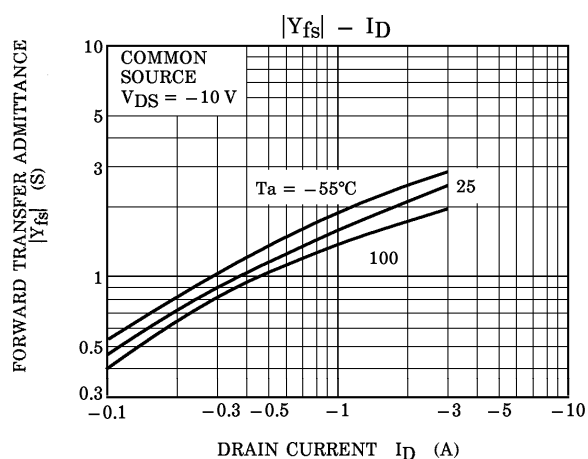
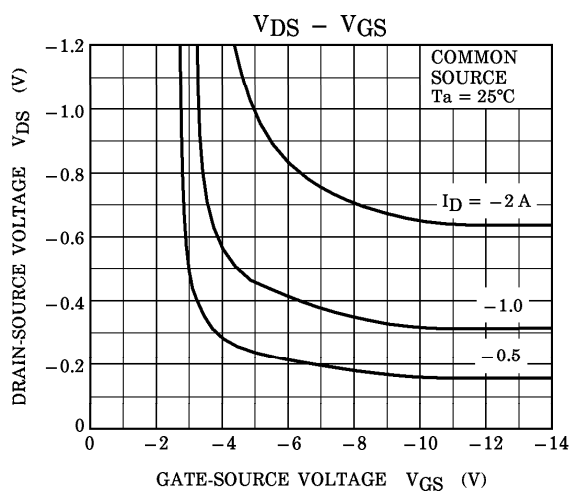
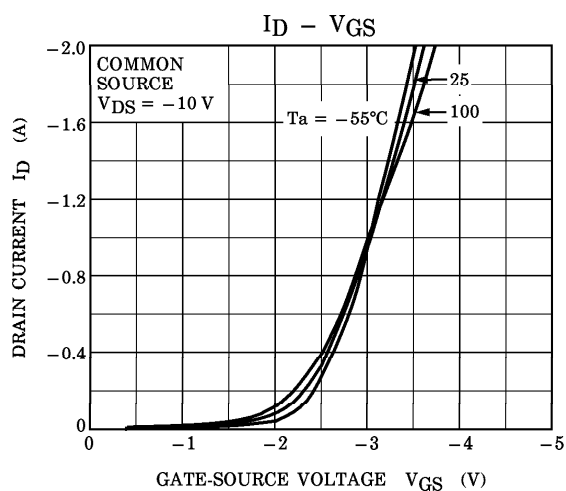
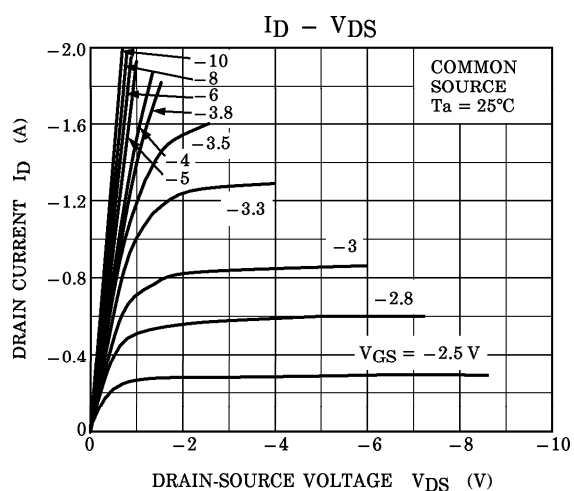
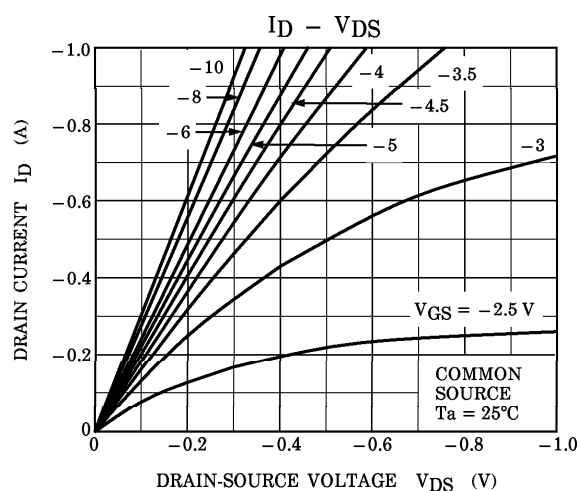


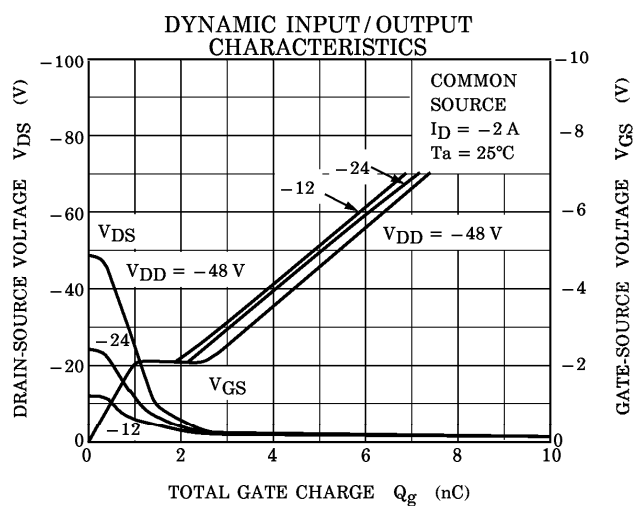
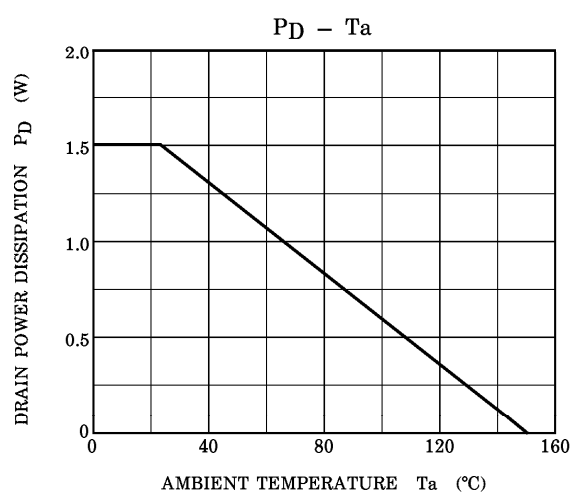
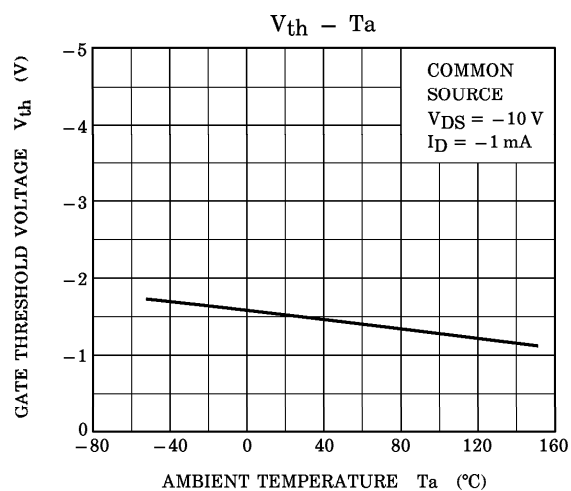
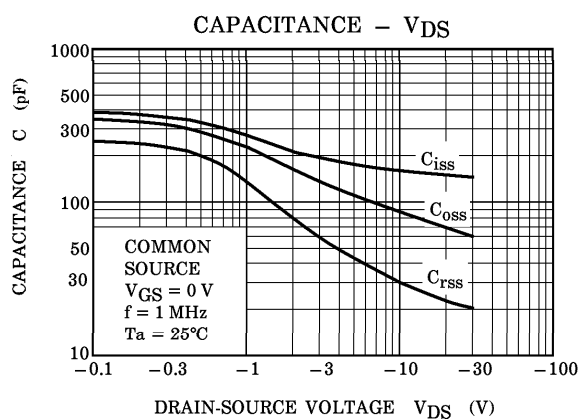
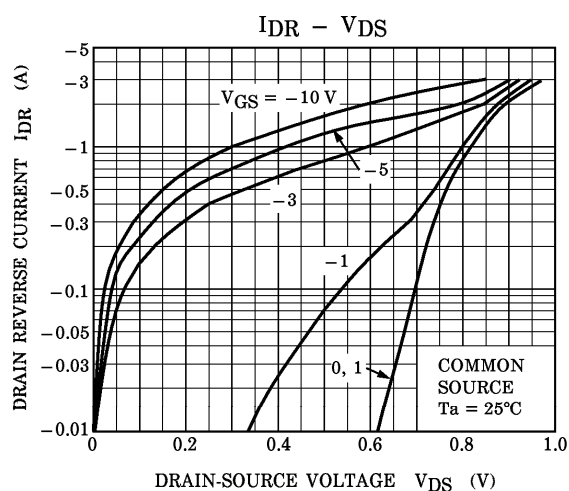
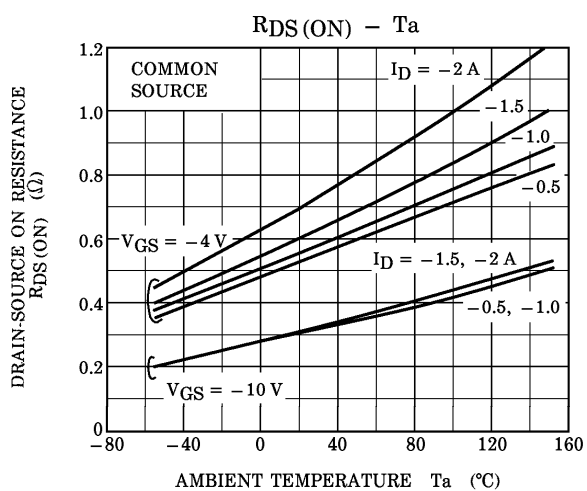
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

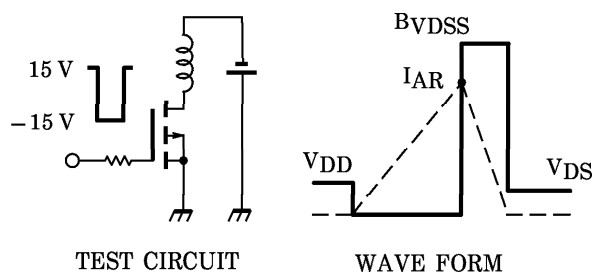
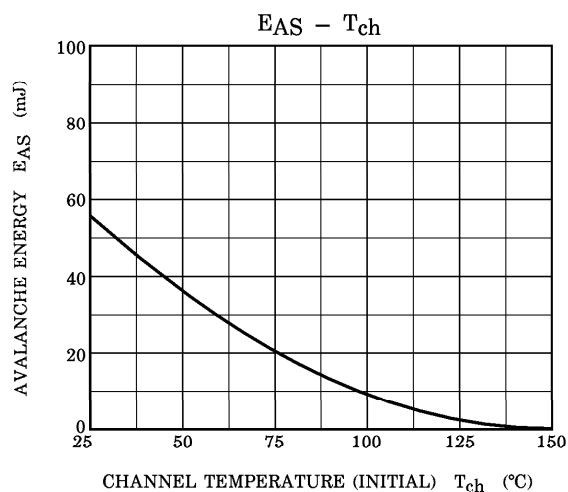
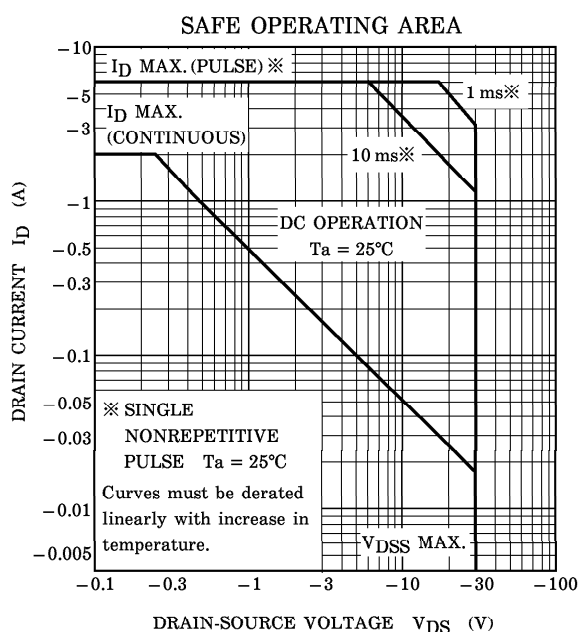
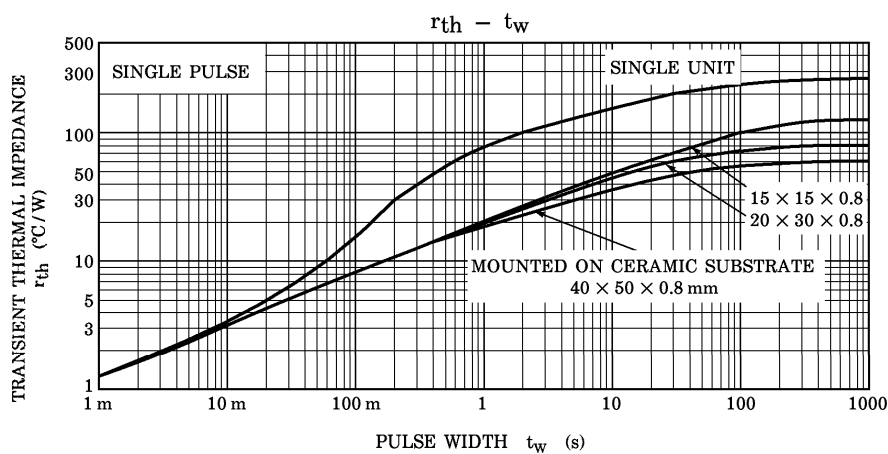
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Drain Cut-off Current		I_{DSS}	$V_{DS} = -30 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	-100	μA
Drain-Source Breakdown Voltage		$V_{(BR) DSS}$	$I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$	-30	—	—	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		$R_{DS(ON)}$	$V_{GS} = -4 \text{ V}, I_D = -1 \text{ A}$	—	0.55	0.76	Ω
			$V_{GS} = -10 \text{ V}, I_D = -1 \text{ A}$	—	0.32	0.45	
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = -10 \text{ V}, I_D = -1 \text{ A}$	0.7	1.4	—	S
Input Capacitance		C_{iss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	160	—	pF
Reverse Transfer Capacitance		C_{rss}		—	30	—	
Output Capacitance		C_{oss}		—	85	—	
Switching Time	Rise Time	t_r		—	30	—	ns
	Turn-on Time	t_{on}		—	45	—	
	Fall Time	t_f		—	30	—	
	Turn-off Time	t_{off}		—	120	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \cong -24 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -2 \text{ A}$	—	5.5	—	nC
Gate-Source Charge		Q_{gs}		—	4.3	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	1.2	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	-2	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	-6	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = -2 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	1.5	V
Reverse Recovery Time	t_{rr}	$I_{DR} = -2 \text{ A}, V_{GS} = 0 \text{ V}$	—	40	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR} / dt = 50 \text{ A} / \mu\text{s}$	—	18	—	nC







Peak $I_{AR} = -2\text{ A}$, $R_G = 25\ \Omega$
 $V_{DD} = -25\text{ V}$, $L = 10\text{ mH}$

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