

TOSHIBA FIELD EFFECT TRANSISTOR SILICON P CHANNEL MOS TYPE (L<sup>2</sup>-π-MOS V)

# 2SJ511

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

INDUSTRIAL APPLICATIONS

Unit in mm

- 4V Gate Drive
- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 0.32\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 1.4S$  (Typ.)
- Low Leakage Current :  $I_{DSS} = -100\mu A$  (Max.) ( $V_{DS} = -30V$ )
- 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		$V_{DSS}$	-30	V
Drain-Gate Voltage ( $R_{GS} = 20k\Omega$ )		$V_{DGR}$	-30	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Drain Current	DC	$I_D$	-2	A
	Pulse	$I_{DP}$	-6	A
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*		$E_{AR}$	0.15	mJ
Channel Temperature		$T_{ch}$	150	°C
Storage Temperature Range		$T_{stg}$	-55~150	°C

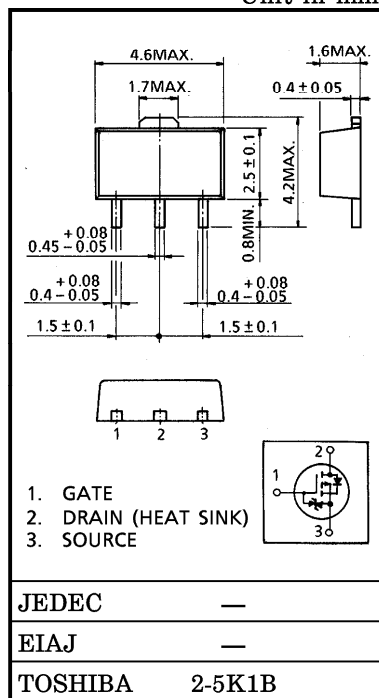
THERMAL CHARACTERISTICS

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

Note ;

- \* Repetitive rating ; Pulse Width Limited by Max. junction temperature.
- \*\*  $V_{DD} = -25V$ , Starting  $T_{ch} = 25^\circ C$ ,  $L = 10mH$ ,  $R_G = 25\Omega$ ,  $I_{AR} = -2A$
- \*\*\* Mounted on ceramic substrate (1inch<sup>2</sup> × 0.8t)

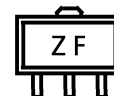
**This transistor is an electrostatic sensitive device.  
 Please handle with caution.**



JEDEC	—
EIAJ	—
TOSHIBA	2-5K1B

Weight : 0.05g (Typ.)

MARKING



961001EAA1

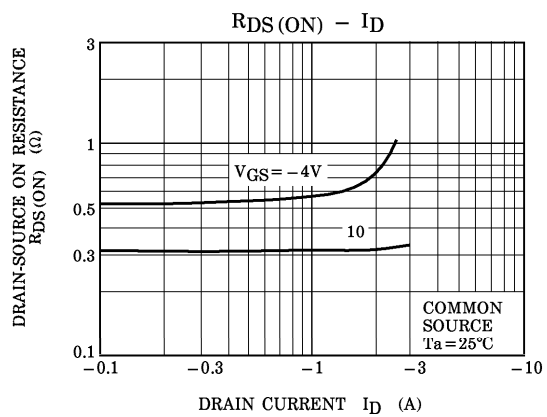
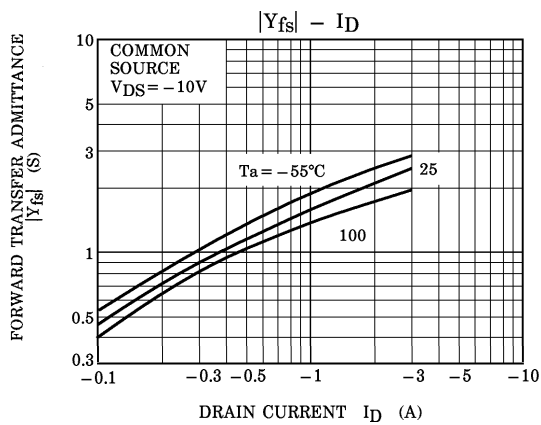
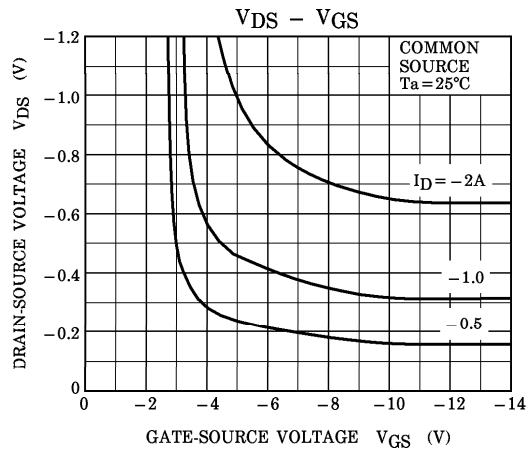
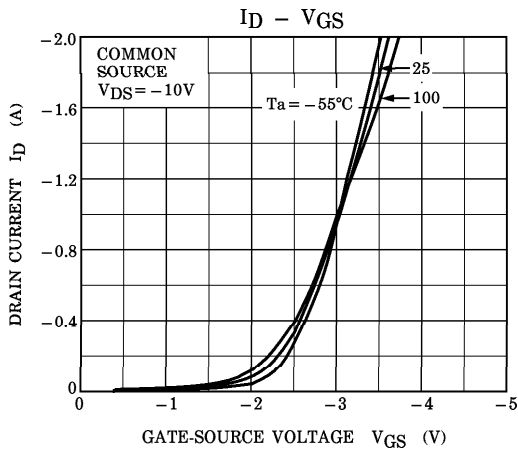
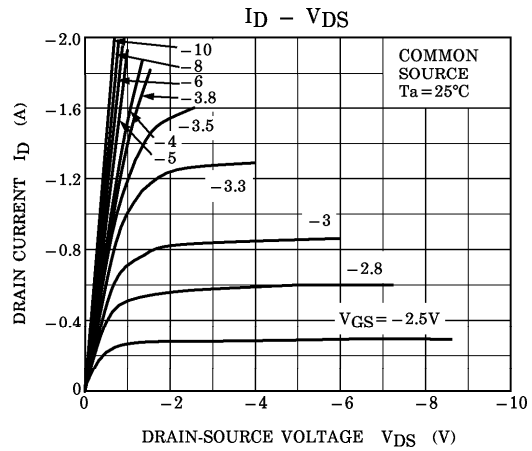
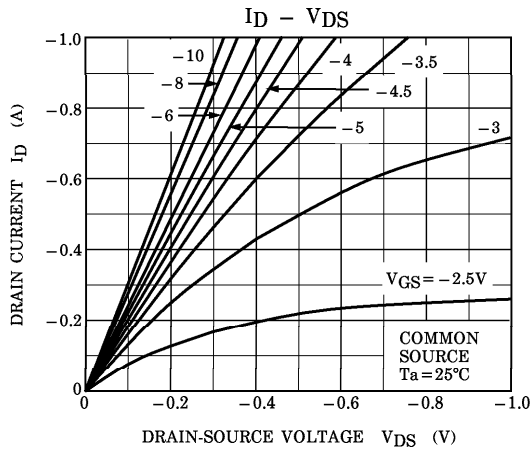
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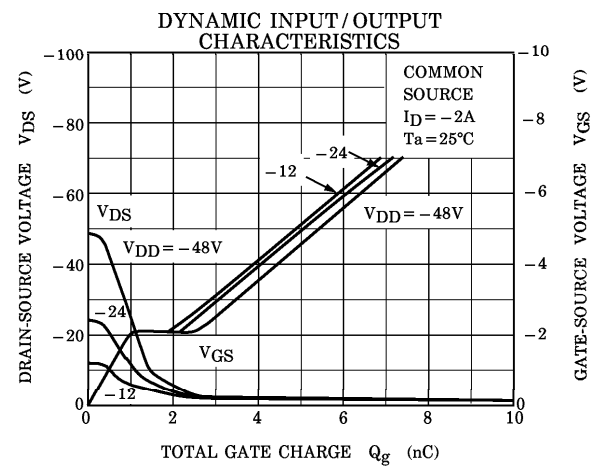
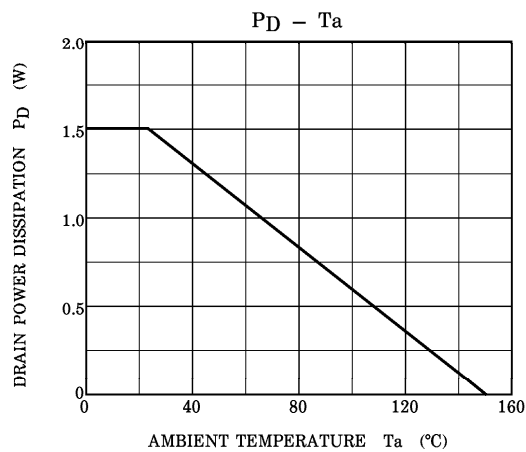
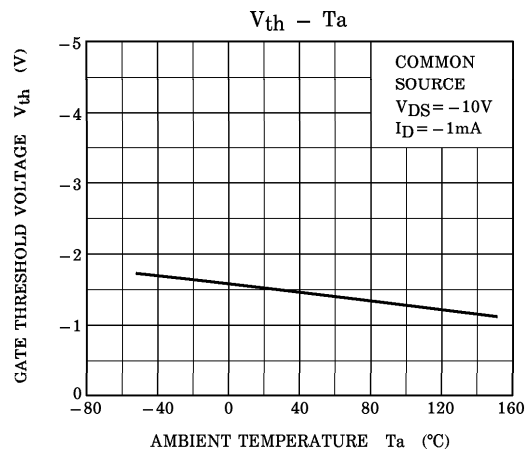
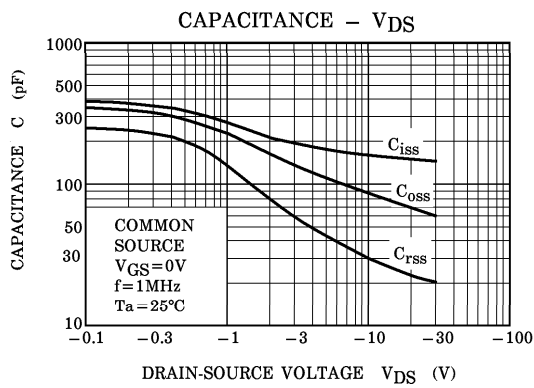
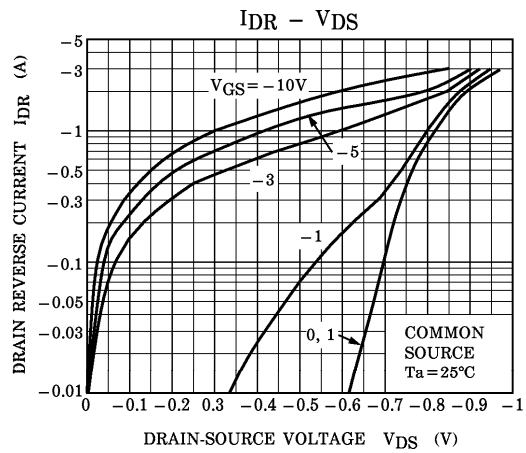
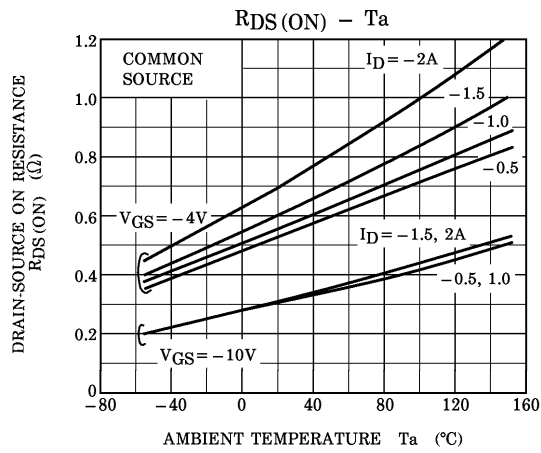
## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

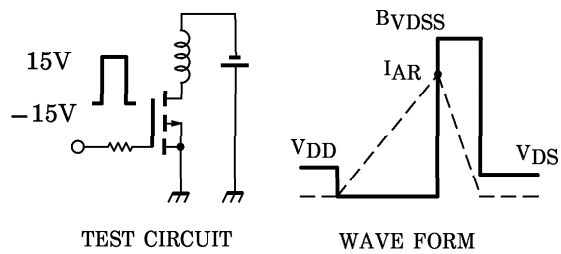
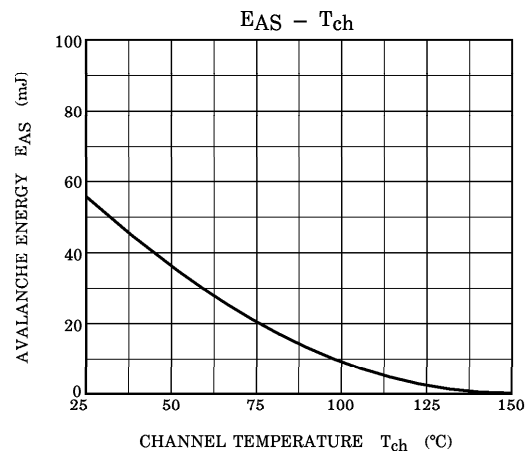
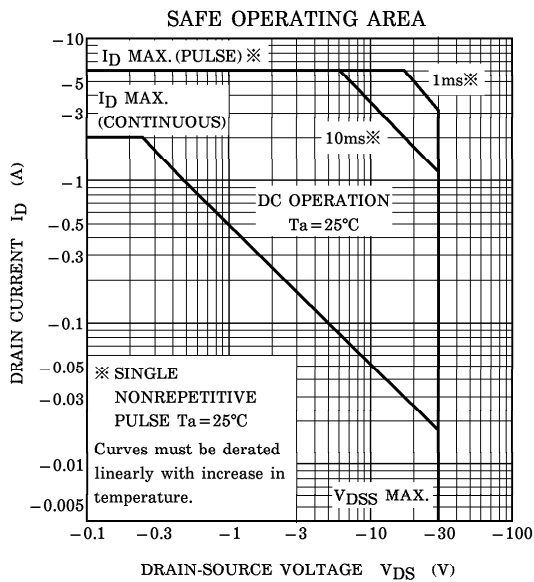
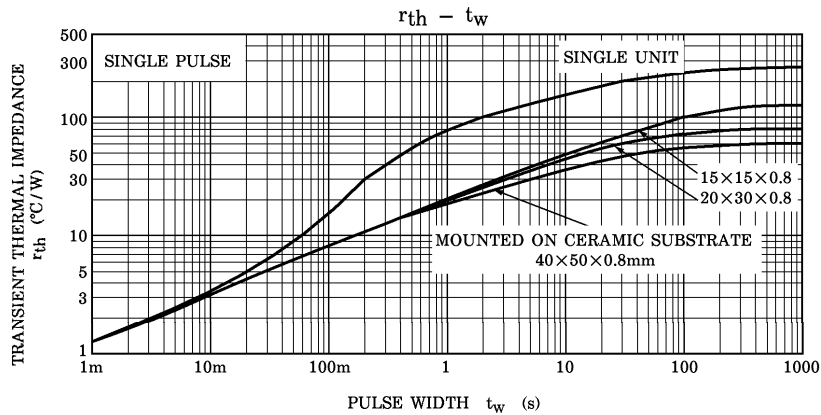
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I <sub>GSS</sub>	V <sub>GS</sub> = ±16V, V <sub>DS</sub> = 0V	—	—	±10	μA
Drain Cut-off Current		I <sub>DSS</sub>	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V	—	—	-100	μA
Drain-Source Breakdown Voltage		V <sub>(BR)DSS</sub>	I <sub>D</sub> = -10mA, V <sub>GS</sub> = 0V	-30	—	—	V
Gate Threshold Voltage		V <sub>th</sub>	V <sub>DS</sub> = -10V, I <sub>D</sub> = -1mA	-0.8	—	-2.0	V
Drain-Source ON Resistance		R <sub>D(S)ON</sub>	V <sub>GS</sub> = -4V, I <sub>D</sub> = -1A	—	0.55	0.76	Ω
			V <sub>GS</sub> = -10V, I <sub>D</sub> = -1A	—	0.32	0.45	
Forward Transfer Admittance		Y <sub>fs</sub>	V <sub>DS</sub> = -10V, I <sub>D</sub> = -1A	0.7	1.4	—	S
Input Capacitance		C <sub>iss</sub>	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V, f = 1MHz	—	160	—	pF
Reverse Transfer Capacitance		C <sub>rss</sub>		—	30	—	
Output Capacitance		C <sub>oss</sub>		—	85	—	
Switching Time	Rise Time	t <sub>r</sub>	<p>V<sub>GS</sub> = -10V, 0V, I<sub>D</sub> = -1A, V<sub>OUT</sub>, R<sub>L</sub> = 15Ω, V<sub>DD</sub> = -15V</p>	—	30	—	ns
	Turn-on Time	t <sub>on</sub>		—	45	—	
	Fall Time	t <sub>f</sub>		—	30	—	
	Turn-off Time	t <sub>off</sub>		V <sub>IN</sub> : t <sub>r</sub> , t <sub>f</sub> < 5ns, Duty ≤ 1%, t <sub>w</sub> = 10μs	—	120	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q <sub>g</sub>	V <sub>DD</sub> = -24V, V <sub>GS</sub> = -10V, I <sub>D</sub> = -2A	—	5.5	—	nC
Gate-Source Charge		Q <sub>gs</sub>		—	4.3	—	
Gate-Drain ("Miller") Charge		Q <sub>gd</sub>		—	1.2	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I <sub>DR</sub>	—	—	—	-2	A
Pulse Drain Reverse Current	I <sub>DRP</sub>	—	—	—	-6	A
Diode Forward Voltage	V <sub>DSF</sub>	I <sub>DR</sub> = -2A, V <sub>GS</sub> = 0V	—	—	1.5	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>DR</sub> = -2A, V <sub>GS</sub> = 0V	—	40	—	ns
Reverse Recovery Charge	Q <sub>rr</sub>	dI <sub>DR</sub> / dt = 50A / μs	—	18	—	nC







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

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