

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

## 2SJ509

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

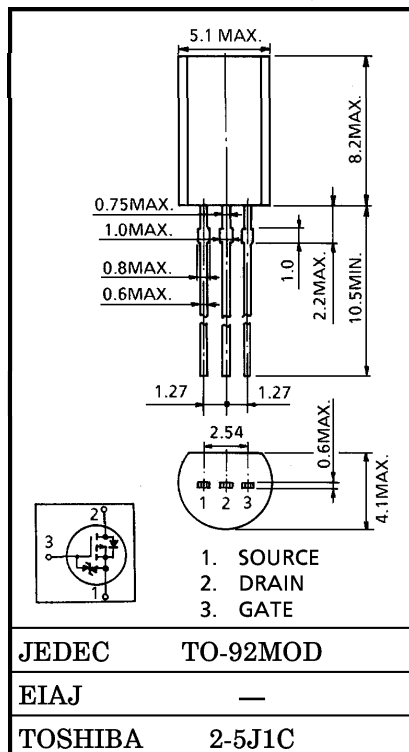
INDUSTRIAL APPLICATIONS

Unit in mm

- 4 V Gate Drive
- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 1.35 \Omega$  (Typ.)
- High Forward Transfer Admittance:  $|Y_{fs}| = 0.7 S$  (Typ.)
- Low Leakage Current  
:  $I_{DSS} = -100 \mu A$  ( $V_{DS} = -100 V$ )
- 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		$V_{GSS}$	$\pm 20$	V
Drain Current	DC	$I_D$	-1	A
	Pulse	$I_{DP}$	-3	A
Drain Power Dissipation ( $T_a = 25^\circ C$ )		$P_D$	0.9	W
Single Pulse Avalanche Energy**		$E_{AS}$	136.5	mJ
Avalanche Current		$I_{AR}$	-1	A
Repetitive Avalanche Energy*		$E_{AR}$	0.09	mJ
Channel Temperature		$T_{ch}$	150	$^\circ C$
Storage Temperature Range		$T_{stg}$	-55~150	$^\circ C$



Weight : 0.36 g (Typ.)

## THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	138	$^\circ C/W$

Note ;

\* Repetitive rating ; Pulse Width Limited by Max. junction temperature.

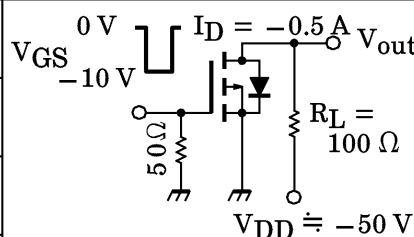
\*\*  $V_{DD} = -50 V$ ,  $T_{ch} = 25^\circ C$  (initial),  $L = 168 mH$ ,  $R_G = 25 \Omega$ ,  $I_{AR} = -1 A$ 

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

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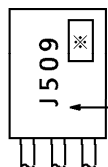
## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I <sub>GSS</sub>	V <sub>GS</sub> = ±16 V, V <sub>DS</sub> = 0 V	—	—	±10	μA
Drain Cut-off Current		I <sub>DSS</sub>	V <sub>DS</sub> = −100 V, V <sub>GS</sub> = 0 V	—	—	−100	μA
Drain-Source Breakdown Voltage		V (BR) DSS	I <sub>D</sub> = −10 mA, V <sub>GS</sub> = 0 V	−100	—	—	V
Gate Threshold Voltage		V <sub>th</sub>	V <sub>DS</sub> = −10 V, I <sub>D</sub> = −1 mA	−0.8	—	−2.0	V
Drain-Source ON Resistance		R <sub>DS (ON)</sub>	V <sub>GS</sub> = −4 V, I <sub>D</sub> = −0.5 A	—	1.68	2.5	Ω
			V <sub>GS</sub> = −10 V, I <sub>D</sub> = −0.5 A	—	1.34	1.9	
Forward Transfer Admittance		Y <sub>fs</sub>	V <sub>DS</sub> = −10 V, I <sub>D</sub> = −0.5 A	0.3	0.7	—	S
Input Capacitance		C <sub>iss</sub>	V <sub>DS</sub> = −10 V, V <sub>GS</sub> = 0 V, f = 1 MHz	—	135	—	pF
Reverse Transfer Capacitance		C <sub>rss</sub>		—	22	—	
Output Capacitance		C <sub>oss</sub>		—	48	—	
Switching Time	Rise Time	t <sub>r</sub>		—	20	—	ns
	Turn-on Time	t <sub>on</sub>		—	32	—	
	Fall Time	t <sub>f</sub>		—	25	—	
	Turn-off Time	t <sub>off</sub>		—	130	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q <sub>g</sub>	V <sub>DD</sub> ≐ −80 V, V <sub>GS</sub> = −10 V, I <sub>D</sub> = −1 A	—	6.3	—	nC
Gate-Source Charge		Q <sub>gs</sub>		—	4.1	—	
Gate-Drain (“Miller”) Charge		Q <sub>gd</sub>		—	2.2	—	

## 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	$t_{rr}$	$I_{DR} = -1 \text{ A}$ , $V_{GS} = 0 \text{ V}$	—	90	—	ns
Reverse Recovery Charge	$Q_{rr}$	$dI_{DR}/dt = 50 \text{ A}/\mu\text{s}$	—	180	—	nC

## MARKING



TYPE

※ Lot Number



Month (Starting from Alphabet A)

Year (Last Number of the Christian Era)