

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

# 2SJ509

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

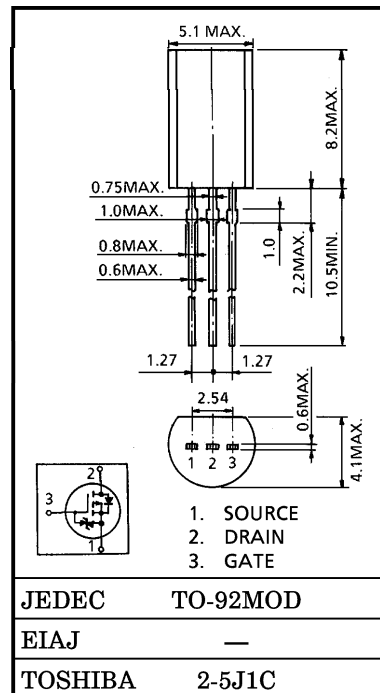
INDUSTRIAL APPLICATIONS

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 (Ta = 25°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 (Ta = 25°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	°C
Storage Temperature Range		$T_{stg}$	-55~150	°C



Weight : 0.36 g (Typ.)

THERMAL CHARACTERISTICS

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

Note ;

- \* Repetitive rating ; Pulse Width Limited by Max. junction temperature.
- \*\*  $V_{DD} = -50 V$ , Starting  $T_{ch} = 25^\circ C$ ,  $L = 168 mH$ ,  $R_G = 25 \Omega$ ,  $I_{AR} = -1 A$

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

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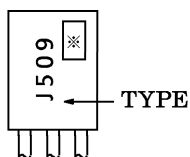
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		$I_{GSS}$	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain Cut-off Current		$I_{DSS}$	$V_{DS} = -100\text{ V}, V_{GS} = 0\text{ V}$	—	—	-100	$\mu\text{A}$
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		$R_{DS(ON)}$	$V_{GS} = -4\text{ V}, I_D = -0.5\text{ A}$	—	1.68	2.5	$\Omega$
			$V_{GS} = -10\text{ V}, I_D = -0.5\text{ A}$	—	1.34	1.9	
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -0.5\text{ A}$	0.3	0.7	—	S
Input Capacitance		$C_{iss}$	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$	—	135	—	pF
Reverse Transfer Capacitance		$C_{rss}$		—	22	—	
Output Capacitance		$C_{oss}$		—	48	—	
Switching Time	Rise Time	$t_r$	<p><math>V_{GS} = 0\text{ V}</math> to <math>-10\text{ V}</math>, <math>I_D = -0.5\text{ A}</math>, <math>V_{out}</math>  <math>50\Omega</math>, <math>R_L = 100\Omega</math>, <math>V_{DD} \cong -50\text{ V}</math></p> <p><math>V_{IN} : t_r, t_f &lt; 5\text{ ns}</math>,                      Duty <math>\leq 1\%</math>, <math>t_w = 10\ \mu\text{s}</math></p>	—	20	—	ns
	Turn-on Time	$t_{on}$		—	32	—	
	Fall Time	$t_f$		—	25	—	
	Turn-off Time	$t_{off}$		—	130	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		$Q_g$	$V_{DD} \cong -80\text{ V}, V_{GS} = -10\text{ V},$ $I_D = -1\text{ A}$	—	6.3	—	nC
Gate-Source Charge		$Q_{gs}$		—	4.1	—	
Gate-Drain ("Miller") Charge		$Q_{gd}$		—	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



※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)