

2SJ509

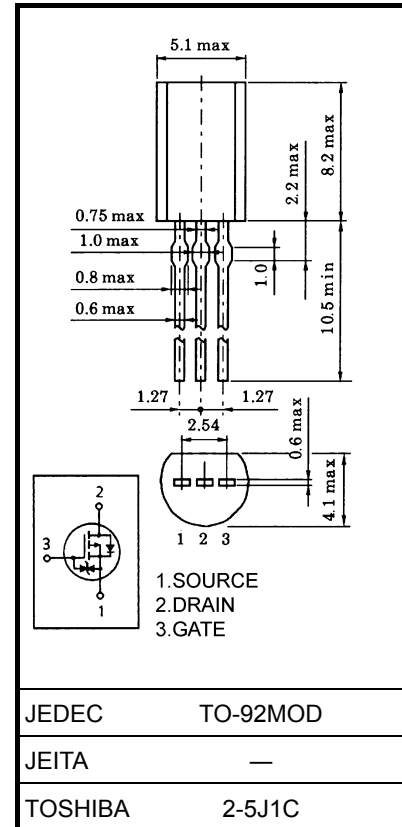
Chopper Regulator, DC-DC Converter and Motor Drive Applications

Unit: 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 : $I_{DSS} = -100 \mu A$ (max) ($V_{DS} = -100 V$)
- Enhancement mode : $V_{th} = -0.8$ to $-2.0 V$ ($V_{DS} = -10 V, I_D = -1 mA$)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	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}	± 20	V
Drain current	DC (Note 1)	I_D	-1
	Pulse (Note 1)	I_{DP}	-3
Drain power dissipation (Ta = 25°C)	P_D	0.9	W
Single pulse avalanche energy (Note 2)	E_{AS}	136.5	mJ
Avalanche current	I_{AR}	-1	A
Repetitive avalanche energy (Note 3)	E_{AR}	0.09	mJ
Channel temperature	T_{ch}	150	°C
Storage temperature range	T_{stg}	-55 to 150	°C



Weight: 0.36 g (typ.)

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	138	°C / W

Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2: $V_{DD} = -50 V, T_{ch} = 25^\circ C$ (initial), $L = 168 mH, R_G = 25 \Omega, I_{AR} = -1 A$

Note 3: Repetitive rating: pulse width limited by maximum channel temperature

This transistor is an electrostatic-sensitive device.

Please handle with caution.

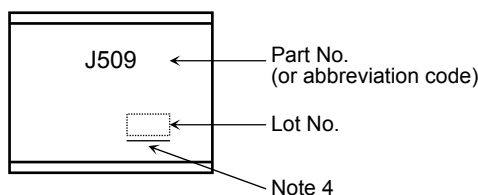
Electrical Characteristics (Ta = 25°C)

Characteristics		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}	$V_{DS} = -100\text{ V}, V_{GS} = 0\text{ V}$	—	—	-100	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-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	Ω
			$V_{GS} = -10\text{ V}, I_D = -0.5\text{ A}$	—	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>$I_D = -0.5\text{ A}$ $V_{GS} = 0\text{ V}, -10\text{ V}$ 50Ω $R_L = 100\Omega$ $V_{DD} = -50\text{ V}$ V_{OUT} Duty $\leq 1\%$, $t_w = 10\mu\text{s}$</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	$V_{DD} \approx -80\text{ V}, V_{GS} = -10\text{ V}, I_D = -1\text{ A}$	—	6.3	—	nC
Gate-source charge		Q_{gs}		—	4.1	—	
Gate-drain ("miller") charge		Q_{gd}		—	2.2	—	

Source-Drain Ratings and Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)		I_{DR}	—	—	—	-1	A
Pulse drain reverse current (Note 1)		I_{DRP}	—	—	—	-3	A
Forward voltage (diode)		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



Note 4: A line under a Lot No. identifies the indication of product Labels.

Not underlined: $[[\text{Pb}]]/\text{INCLUDES} > \text{MCV}$

Underlined: $[[\text{G}]]/\text{RoHS COMPATIBLE}$ or $[[\text{G}]]/\text{RoHS} [[\text{Pb}]]$

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