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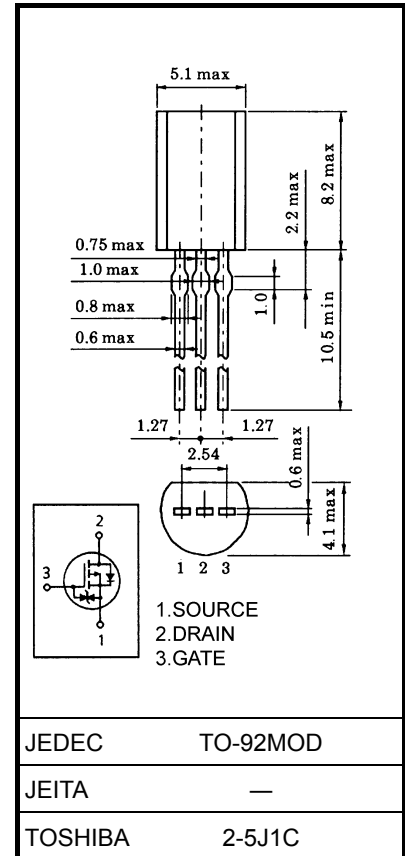
Chopper Regulator, DC-DC Converter and Motor Drive Applications

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 : $V_{th} = -0.8 \sim -2.0 V$ ($V_{DS} = -10 V, I_D = -1 mA$)

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} | -55~150 | °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.

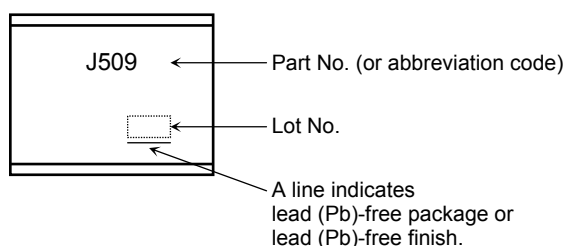
Electrical Characteristics (Ta = 25°C)

| 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>$V_{GS} = 0\text{ V}$ $V_{GS} = -10\text{ V}$ $I_D = -0.5\text{ A}$ V_{OUT} $R_L = 100\Omega$ $V_{DD} = -50\text{ V}$ 50Ω</p> <p>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



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