

2SK3051

Chopper Regulator DC-DC Converter, and Motor Drive Applications

Unit: mm

- Low drain-source ON resistance : $R_{DS(ON)} = 24 \text{ m}\Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 27 \text{ S}$ (typ.)
- Low leakage current : $I_{DSS} = 100 \text{ }\mu\text{A}$ (max) ($V_{DS} = 50 \text{ V}$)
- Enhancement-mode : $V_{th} = 1.5\sim 3.0 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

Maximum Ratings ($T_a = 25^\circ\text{C}$)

| Characteristics | | Symbol | Rating | Unit |
|--|----------------|-----------|----------|------------------|
| Drain-source voltage | | V_{DSS} | 50 | V |
| Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$) | | V_{DGR} | 50 | V |
| Gate-source voltage | | V_{GSS} | ± 20 | V |
| Drain current | DC (Note 1) | I_D | 45 | A |
| | Pulse (Note 1) | I_{DP} | 135 | A |
| Drain power dissipation ($T_c = 25^\circ\text{C}$) | | P_D | 40 | W |
| Single pulse avalanche energy (Note 2) | | E_{AS} | 115 | mJ |
| Avalanche current | | I_{AR} | 45 | A |
| Repetitive avalanche energy (Note 3) | | E_{AR} | 4 | mJ |
| Channel temperature | | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage temperature range | | T_{stg} | -55~150 | $^\circ\text{C}$ |

Thermal Characteristics

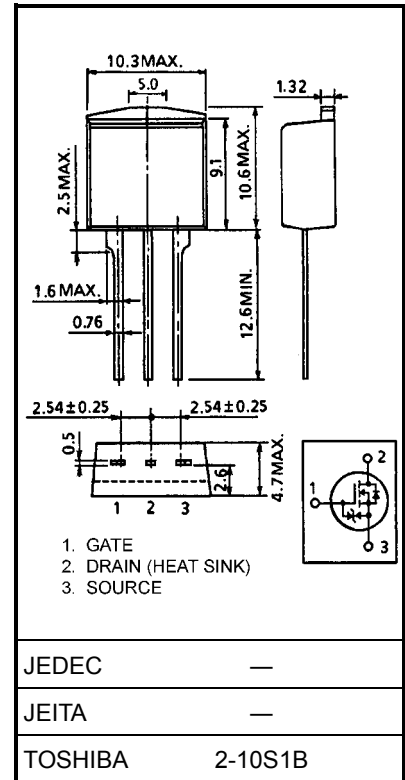
| Characteristics | Symbol | Max | Unit |
|--|----------------|-------|-----------------------------|
| Thermal resistance, channel to case | $R_{th(ch-c)}$ | 3.125 | $^\circ\text{C} / \text{W}$ |
| Thermal resistance, channel to ambient | $R_{th(ch-a)}$ | 83.3 | $^\circ\text{C} / \text{W}$ |

Note 1: Please use devices on condition that the channel temperature is below 150°C .

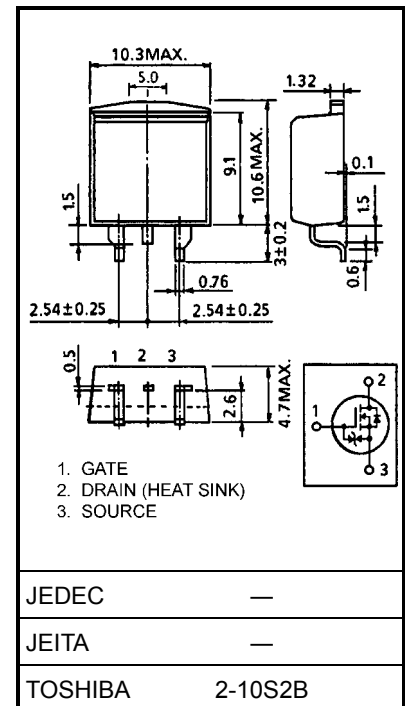
Note 2: $V_{DD} = 25 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 71 \text{ }\mu\text{H}$, $R_G = 25 \text{ }\Omega$, $I_{AR} = 45 \text{ A}$

Note 3: Repetitive rating; Pulse width limited by maximum channel temperature.

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



Weight: 1.5 g (typ.)



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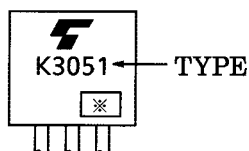
Electrical Characteristics (Ta = 25°C)

| 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} | $V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}$ | — | — | 100 | μA |
| Drain-source breakdown voltage | | $V_{(BR)DSS}$ | $I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$ | 50 | — | — | V |
| Gate threshold voltage | | V_{th} | $V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$ | 1.5 | — | 3.0 | V |
| Drain-source ON resistance | | $R_{DS(ON)}$ | $V_{GS} = 10\text{ V}, I_D = 25\text{ A}$ | — | 24 | 30 | m Ω |
| Forward transfer admittance | | $ Y_{fs} $ | $V_{DS} = 10\text{ V}, I_D = 25\text{ A}$ | 15 | 27 | — | S |
| Input capacitance | | C_{iss} | $V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | — | 1250 | — | pF |
| Reverse transfer capacitance | | C_{rss} | | — | 250 | — | |
| Output capacitance | | C_{oss} | | — | 700 | — | |
| Switching time | Rise time | t_r | <p>$I_D = 25\text{ A}$ $V_{GS} = 10\text{ V}$ $V_{DD} = 25\text{ V}$ $R_L = 1\ \Omega$ Duty $\leq 1\%$, $t_w = 10\ \mu\text{s}$</p> | — | 20 | — | ns |
| | Turn-on time | t_{on} | | — | 30 | — | |
| | Fall time | t_f | | — | 40 | — | |
| | Turn-off time | t_{off} | | — | 120 | — | |
| Total gate charge (Gate-source plus gate-drain) | | Q_g | $V_{DD} \approx 40\text{ V}, V_{GS} = 10\text{ V}, I_D = 45\text{ A}$ | — | 36 | — | nC |
| Gate-source charge | | Q_{gs} | | — | 22 | — | |
| Gate-drain ("miller") charge | | Q_{gd} | | — | 14 | — | |

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

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|-----------|---|-----|------|------|------|
| Continuous drain reverse current (Note 1) | I_{DR} | — | — | — | 45 | A |
| Pulse drain reverse current (Note 1) | I_{DRP} | — | — | — | 135 | A |
| Forward voltage (diode) | V_{DSF} | $I_{DR} = 45\text{ A}, V_{GS} = 0\text{ V}$ | — | — | -1.7 | V |
| Reverse recovery time | t_{rr} | $I_{DR} = 45\text{ A}, V_{GS} = 0\text{ V}$ | — | 75 | — | ns |
| Reverse recovery charge | Q_{rr} | $dI_{DR} / dt = 50\text{ A} / \mu\text{s}$ | — | 75 | — | nC |

Marking



※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)

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