

### Field Effect Transistor

#### Silicon N Channel MOS Type ( $\pi$ -MOS II)

#### High Speed, High Current DC-DC Converter,

#### Relay Drive and Motor Drive Applications

#### Features

- 4-Volt Gate Drive
- Low Drain-Source ON Resistance
  - $R_{DS(ON)} = 0.95\Omega$  (Typ.)
- High Forward Transfer Admittance
  - $|Y_{fs}| = 4.0S$  (Typ.)
- Low Leakage Current
  - $I_{DSS} = 300\mu A$  (Max.) @  $V_{DS} = 600V$
- Enhancement-Mode
  - $V_{th} = 1.5 \sim 3.5V$  @  $V_{DS} = 10V$ ,  $I_D = 1mA$

#### Absolute Maximum Ratings ( $T_a = 25^\circ C$ )

| CHARACTERISTIC                                 |       | SYMBOL    | RATING    | UNIT       |
|------------------------------------------------|-------|-----------|-----------|------------|
| Drain-Source Voltage                           |       | $V_{DSS}$ | 600       | V          |
| Drain-Gate Voltage ( $R_{GS} = 20k\Omega$ )    |       | $V_{DGR}$ | 600       | V          |
| Gate-Source Voltage                            |       | $V_{GSS}$ | $\pm 30$  | V          |
| Drain Current                                  | DC    | $I_D$     | 6         | A          |
|                                                | Pulse | $I_{DP}$  | 24        |            |
| Drain Power Dissipation ( $T_c = 25^\circ C$ ) |       | $P_D$     | 45        | W          |
| Channel Temperature                            |       | $T_{ch}$  | 150       | $^\circ C$ |
| Storage Temperature Range                      |       | $T_{stg}$ | -55 ~ 150 | $^\circ C$ |

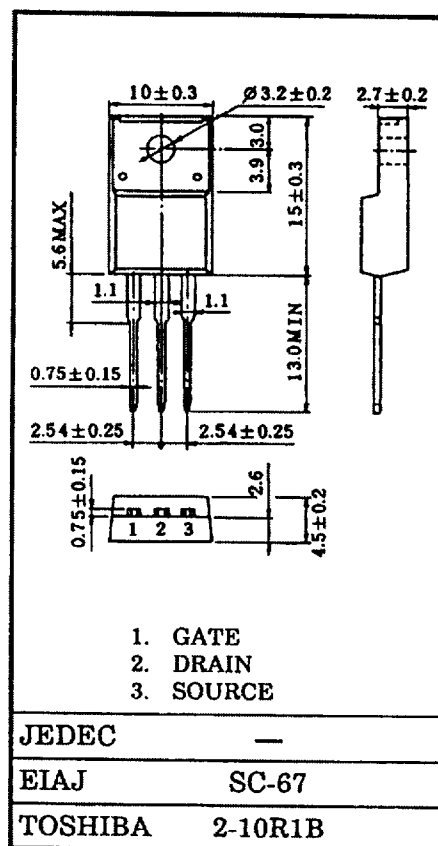
#### Thermal Characteristics

| CHARACTERISTIC                         | SYMBOL         | MAX. | UNIT         |
|----------------------------------------|----------------|------|--------------|
| Thermal Resistance, Channel to Case    | $R_{th(ch-c)}$ | 2.77 | $^\circ C/W$ |
| Thermal Resistance, Channel to Ambient | $R_{th(ch-a)}$ | 62.5 | $^\circ C/W$ |

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

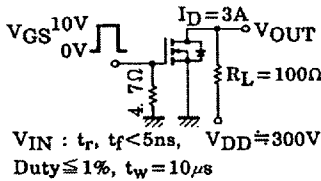
#### Industrial Applications

Unit in mm



Weight : 1.9g

## Electrical Characteristics (Ta = 25°C)

| CHARACTERISTIC                                  |               | SYMBOL         | TEST CONDITION                                                                                                                                                                                                                                                                                                                               | MIN. | TYP. | MAX.      | UNIT     |
|-------------------------------------------------|---------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-----------|----------|
| Gate Leakage Current                            |               | $I_{GSS}$      | $V_{GS} = \pm 25V, V_{DS} = 0V$                                                                                                                                                                                                                                                                                                              | —    | —    | $\pm 100$ | nA       |
| Drain Cut-off Current                           |               | $I_{DSS}$      | $V_{DS} = 600V, V_{GS} = 0V$                                                                                                                                                                                                                                                                                                                 | —    | —    | 300       | $\mu A$  |
| Drain-Source Breakdown Voltage                  |               | $V_{(BR) DSS}$ | $I_D = 10mA, V_{GS} = 0V$                                                                                                                                                                                                                                                                                                                    | 600  | —    | —         | V        |
| Gate Threshold Voltage                          |               | $V_{th}$       | $V_{DS} = 10V, I_D = 1mA$                                                                                                                                                                                                                                                                                                                    | 1.5  | —    | 3.5       | V        |
| Drain-Source ON Resistance                      |               | $R_{DS(ON)}$   | $I_D = 3A, V_{GS} = 10V$                                                                                                                                                                                                                                                                                                                     | —    | 0.95 | 1.25      | $\Omega$ |
| Forward Transfer Admittance                     |               | $ Y_{fs} $     | $V_{DS} = 10V, I_D = 3A$                                                                                                                                                                                                                                                                                                                     | 3.0  | 4.0  | —         | S        |
| Input Capacitance                               |               | $C_{iss}$      | $V_{DS} = 10V, V_{GS} = 0V,$<br>$f = 1MHz$                                                                                                                                                                                                                                                                                                   | —    | 1400 | 2000      | pF       |
| Reverse Transfer Capacitance                    |               | $C_{rss}$      |                                                                                                                                                                                                                                                                                                                                              | —    | 75   | 120       |          |
| Output Capacitance                              |               | $C_{oss}$      |                                                                                                                                                                                                                                                                                                                                              | —    | 250  | 380       |          |
| Switching Time                                  | Rise Time     | $t_r$          |  <p><math>V_{GS} 10V, 0V</math><br/><math>I_D = 3A</math><br/><math>V_{OUT}</math><br/><math>R_L = 100\Omega</math><br/><math>4.7\Omega</math><br/><math>V_{IN} : t_r, t_f &lt; 5ns, V_{DD} = 300V</math><br/><math>Duty \leq 1\%, t_w = 10\mu s</math></p> | —    | 25   | 50        | ns       |
|                                                 | Turn-on Time  | $t_{on}$       |                                                                                                                                                                                                                                                                                                                                              | —    | 40   | 80        |          |
|                                                 | Fall Time     | $t_f$          |                                                                                                                                                                                                                                                                                                                                              | —    | 20   | 40        |          |
|                                                 | Turn-off Time | $t_{off}$      |                                                                                                                                                                                                                                                                                                                                              | —    | 85   | 170       |          |
| Total Gate Charge (Gate-Source Plus Gate-Drain) |               | $Q_g$          | $V_{DD} = 400V, V_{GS} = 10V,$<br>$I_D = 6A$                                                                                                                                                                                                                                                                                                 | —    | 56   | 110       | nC       |
| Gate-Source Charge                              |               | $Q_{gs}$       |                                                                                                                                                                                                                                                                                                                                              | —    | 32   | —         |          |
| Gate-Drain ("Miller") Charge                    |               | $Q_{gd}$       |                                                                                                                                                                                                                                                                                                                                              | —    | 24   | —         |          |

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

| CHARACTERISTICS                  | SYMBOL    | TEST CONDITION             | MIN. | TYP. | MAX. | UNIT    |
|----------------------------------|-----------|----------------------------|------|------|------|---------|
| Continuous Drain Reverse Current | $I_{DR}$  | —                          | —    | —    | 6    | A       |
| Pulse Drain Reverse Current      | $I_{DRP}$ | —                          | —    | —    | 24   | A       |
| Diode Forward Voltage            | $V_{DSF}$ | $I_{DR} = 6A, V_{GS} = 0V$ | —    | —    | -2.0 | V       |
| Reverse Recovery Time            | $t_{rr}$  | $I_{DR} = 6A, V_{GS} = 0V$ | —    | 460  | —    | ns      |
| Reverse Recovered Charge         | $Q_{rr}$  | $dI_{DR}/dt = 100A/\mu s$  | —    | 3.5  | —    | $\mu C$ |

