

## Field Effect Transistor

### Silicon N Channel MOS Type (L<sup>2</sup>-π-MOS III)

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

### Relay Drive and Motor Drive Applications

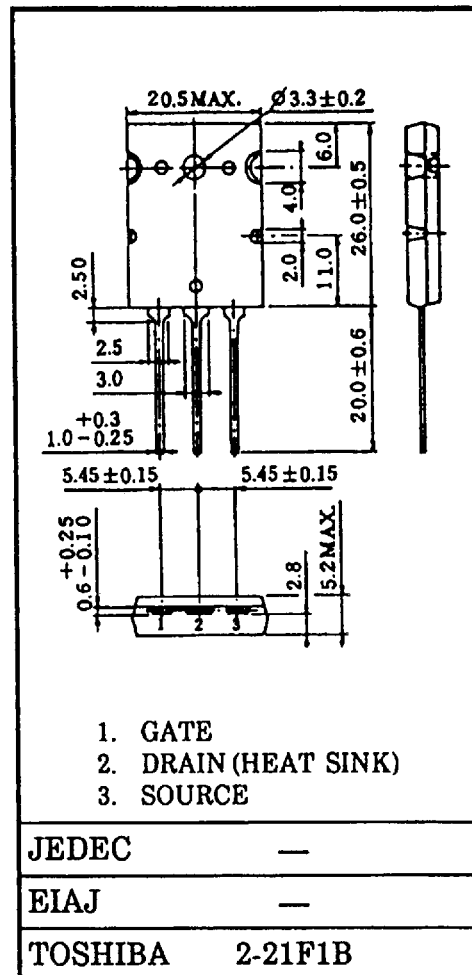
#### Features

- 4-Volt Gate Drive
- Low Drain-Source ON Resistance
  - $R_{DS(ON)} = 6.5\Omega$  (Typ.)
- High Forward Transfer Admittance
  - $|Y_{fs}| = 50S$  (Typ.)
- Low Leakage Current
  - $I_{DSS} = 100\mu A$  (Max.) @  $V_{DS} = 60V$
- Enhancement-Mode
  - $V_{th} = 0.8 \sim 2.0V$  @  $V_{DS} = 10V$ ,  $I_D = 1mA$

#### Absolute Maximum Ratings (Ta = 25°C)

| CHARACTERISTIC                              |       | SYMBOL    | RATING    | UNIT |
|---------------------------------------------|-------|-----------|-----------|------|
| Drain-Source Voltage                        |       | $V_{DSS}$ | 60        | V    |
| Drain-Gate Voltage ( $R_{GS} = 20k\Omega$ ) |       | $V_{DGR}$ | 60        | V    |
| Gate-Source Voltage                         |       | $V_{GSS}$ | ±20       | V    |
| Drain Current                               | DC    | $I_D$     | 60        | A    |
|                                             | Pulse | $I_{DP}$  | 240       |      |
| Drain Power Dissipation<br>(Tc = 25°C)      |       | $P_D$     | 200       | W    |
| Channel Temperature                         |       | $T_{ch}$  | 150       | °C   |
| Storage Temperature Range                   |       | $T_{stg}$ | -55 ~ 150 | °C   |

Unit in mm



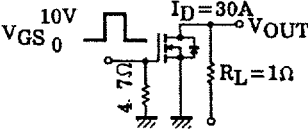
Weight : 9.75g

#### Thermal Characteristics

| CHARACTERISTIC                         | SYMBOL         | MAX.  | UNIT |
|----------------------------------------|----------------|-------|------|
| Thermal Resistance, Channel to Case    | $R_{th(ch-c)}$ | 0.625 | °C/W |
| Thermal Resistance, Channel to Ambient | $R_{th(ch-a)}$ | 35.7  | °C/W |

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

## Electrical Characteristics (Ta = 25°C)

| CHARACTERISTIC                                  |               | SYMBOL         | TEST CONDITION                                                                                                                                                                                     | MIN. | TYP. | MAX.      | UNIT     |
|-------------------------------------------------|---------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-----------|----------|
| Gate Leakage Current                            |               | $I_{GSS}$      | $V_{GS} = \pm 20V, V_{DS} = 0V$                                                                                                                                                                    | —    | —    | $\pm 100$ | nA       |
| Drain Cut-off Current                           |               | $I_{DSS}$      | $V_{DS} = 60V, V_{GS} = 0V$                                                                                                                                                                        | —    | —    | 100       | $\mu A$  |
| Drain-Source Breakdown Voltage                  |               | $V_{(BR) DSS}$ | $I_D = 10mA, V_{GS} = 0V$                                                                                                                                                                          | 60   | —    | —         | V        |
| Gate Threshold Voltage                          |               | $V_{th}$       | $V_{DS} = 10V, I_D = 1mA$                                                                                                                                                                          | 0.8  | —    | 2.0       | V        |
| Drain-Source ON Resistance                      |               | $R_{DS(ON)}$   | $V_{GS} = 4V, I_D = 30A,$                                                                                                                                                                          | —    | 9    | 15        | $\Omega$ |
|                                                 |               |                | $V_{GS} = 10V, I_D = 30A,$                                                                                                                                                                         | —    | 6.5  | 11        |          |
| Forward Transfer Admittance                     |               | $ Y_{fs} $     | $V_{DS} = 10V, I_D = 30A$                                                                                                                                                                          | 40   | 50   | —         | S        |
| Input Capacitance                               |               | $C_{iss}$      | $V_{DS} = 10V, V_{GS} = 0V,$<br>$f = 1MHz$                                                                                                                                                         | —    | 6200 | 7100      | pF       |
| Reverse Transfer Capacitance                    |               | $C_{rss}$      |                                                                                                                                                                                                    | —    | 1700 | 2100      |          |
| Output Capacitance                              |               | $C_{oss}$      |                                                                                                                                                                                                    | —    | 4500 | 5300      |          |
| Switching Time                                  | Rise Time     | $t_r$          |  <p><math>V_{IN} : t_r, t_f &lt; 5ns, V_{DD} \approx 30V</math><br/>Duty <math>\leq 1\%, t_w = 10\mu s</math></p> | —    | 30   | 60        | ns       |
|                                                 | Turn-on Time  | $t_{on}$       |                                                                                                                                                                                                    | —    | 70   | 140       |          |
|                                                 | Fall Time     | $t_f$          |                                                                                                                                                                                                    | —    | 190  | 380       |          |
|                                                 | Turn-off Time | $t_{off}$      |                                                                                                                                                                                                    | —    | 550  | 900       |          |
| Total Gate Charge (Gate-Source Plus Gate-Drain) |               | $Q_g$          | $V_{DD} = 48V, V_{GS} = 10V,$<br>$I_D = 60A$                                                                                                                                                       | —    | 300  | 600       | nC       |
| Gate-Source Charge                              |               | $Q_{gs}$       |                                                                                                                                                                                                    | —    | 200  | —         |          |
| Gate-Drain ("Miller") Charge                    |               | $Q_{gd}$       |                                                                                                                                                                                                    | —    | 100  | —         |          |

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

| CHARACTERISTICS                  | SYMBOL    | TEST CONDITION                                          | MIN. | TYP.  | MAX. | UNIT    |
|----------------------------------|-----------|---------------------------------------------------------|------|-------|------|---------|
| Continuous Drain Reverse Current | $I_{DR}$  | —                                                       | —    | —     | 60   | A       |
| Pulse Drain Reverse Current      | $I_{DRP}$ | —                                                       | —    | —     | 240  | A       |
| Diode Forward Voltage            | $V_{DSF}$ | $I_{DR} = 60A, V_{GS} = 0V$                             | —    | -0.93 | -1.6 | V       |
| Reverse Recovery Time            | $t_{rr}$  | $I_{DR} = 60A, V_{GS} = 0V$<br>$dI_{DR}/dt = 50A/\mu s$ | —    | 350   | —    | ns      |
| Reverse Recovered Charge         | $Q_{rr}$  |                                                         | —    | 0.7   | —    | $\mu C$ |

