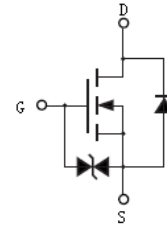


## Features

- Low power loss by high speed switching and low on-resistance
- Excellent thermal behavior
- Very low FOM for fast switching efficiency
- Product validation acc. JEDEC Standard
- Integrated ESD protection diode: HBM: JESD22-A114-B: 2

**HF**

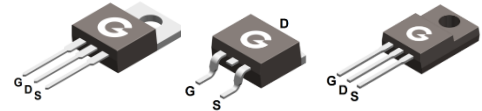


## APPLICATIONS

- PFC power supply stages
- Lighting applications
- Adapter
- Charger

## Mechanical Data

- Case: TO-220AB, TO-263, ITO-220AB
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



**TO-220AB TO-263 ITO-220AB**

## Ordering Information

| Part Number | Package   | Shipping Quantity                      | Marking Code |
|-------------|-----------|----------------------------------------|--------------|
| SJM70R360   | TO-220AB  | 50 pcs / Tube                          | SJM70R360    |
| SJM70R360B  | TO-263    | 50 pcs / Tube or 800 pcs / Tape & Reel | SJM70R360B   |
| SJM70R360F  | ITO-220AB | 50 pcs / Tube                          | SJM70R360F   |

## Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

| Parameter                                                                 | Symbol    | Value           | Unit             |
|---------------------------------------------------------------------------|-----------|-----------------|------------------|
| Drain-to-Source Voltage                                                   | $V_{DS}$  | 700             | V                |
| Gate-to-Source Voltage (Static)                                           | $V_{GS}$  | $\pm 20$        | V                |
| Continuous Drain Current ( $T_C = 25^\circ\text{C}$ )                     | $I_D$     | 13              | A                |
| Continuous Drain Current ( $T_C = 100^\circ\text{C}$ )                    |           | 8               | A                |
| Pulsed Drain Current ( $t_p = 10\mu\text{s}$ , $T_C = 25^\circ\text{C}$ ) | $I_{DM}$  | 52              | A                |
| Single Pulse Avalanche Energy <sup>*2</sup>                               | $E_{AS}$  | 250             | mJ               |
| Power Dissipation (TO-220AB, $T_C = 25^\circ\text{C}$ )                   | $P_D$     | 104             | W                |
| Power Dissipation (TO-263, $T_C = 25^\circ\text{C}$ )                     |           | 104             | W                |
| Power Dissipation (ITO-220AB, $T_C = 25^\circ\text{C}$ )                  |           | 35              | W                |
| Operating Junction Temperature Range                                      | $T_J$     | $-55 \sim +150$ | $^\circ\text{C}$ |
| Storage Temperature Range                                                 | $T_{STG}$ | $-55 \sim +150$ | $^\circ\text{C}$ |

### Thermal Characteristics

| Parameter                                              | Symbol          | Min. | Typ. | Max. | Unit |
|--------------------------------------------------------|-----------------|------|------|------|------|
| Thermal Resistance Junction-to-Case (TO-220AB, TO-263) | $R_{\theta JC}$ | -    | 1    | 1.2  | °C/W |
| Thermal Resistance Junction-to-Case (ITO-220AB)        |                 | -    | 2.6  | 3.6  | °C/W |
| Thermal Resistance Junction-to-Air (TO-220AB, TO-263)  | $R_{\theta JA}$ | -    | -    | 62   | °C/W |
| Thermal Resistance Junction-to-Air (ITO-220AB)         |                 | -    | -    | 75   | °C/W |

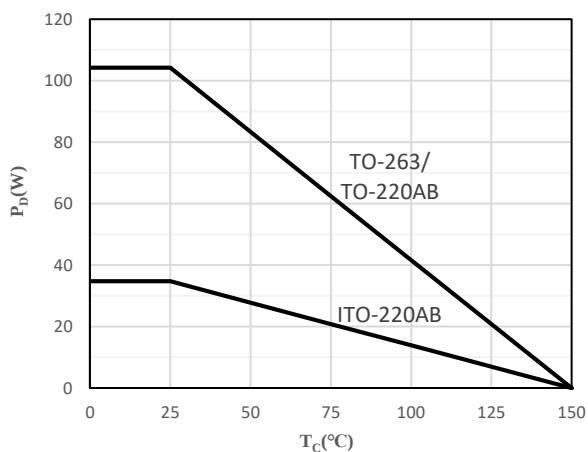
### Electrical Characteristics (@ $T_A = 25^{\circ}\text{C}$ unless otherwise specified)

| Symbol                             | Parameter                       | Test Condition                                             | Min. | Typ. | Max. | Unit |
|------------------------------------|---------------------------------|------------------------------------------------------------|------|------|------|------|
| Static Characteristics             |                                 |                                                            |      |      |      |      |
| V <sub>DSS</sub>                   | Drain-Source Breakdown Voltage  | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA               | 700  | -    | -    | V    |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current | V <sub>DS</sub> = 700V, V <sub>GS</sub> = 0V               | -    | -    | 1    | μA   |
| I <sub>GSS</sub>                   | Gate-Body Leakage Current       | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V               | -    | -    | ±1   | μA   |
| On Characteristics                 |                                 |                                                            |      |      |      |      |
| R <sub>DS(ON)</sub>                | Drain-Source On-resistance *1   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 3A                 | -    | 0.28 | 0.36 | Ω    |
| V <sub>GS(th)</sub>                | Gate Threshold Voltage          | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA | 2.5  | 3.4  | 4.5  | V    |
| R <sub>G</sub>                     | Gate Resistance                 | V <sub>GS</sub> = 0V, f = 1MHz                             | -    | 3.8  | -    | Ω    |
| Dynamic Characteristics            |                                 |                                                            |      |      |      |      |
| C <sub>ISS</sub>                   | Input Capacitance               | V <sub>GS</sub> = 0V                                       | -    | 1181 | -    | pF   |
| C <sub>OSS</sub>                   | Output Capacitance              | V <sub>DS</sub> = 40V                                      | -    | 171  | -    |      |
| C <sub>RSS</sub>                   | Reverse Transfer Capacitance    | f = 250kHz                                                 | -    | 2    | -    |      |
| Switching Characteristics          |                                 |                                                            |      |      |      |      |
| t <sub>d(ON)</sub>                 | Turn-on Delay Time *3           | V <sub>DD</sub> = 350V                                     | -    | 30   | -    | ns   |
| t <sub>r</sub>                     | Turn-on Rise Time *3            | V <sub>GS</sub> = 10V                                      | -    | 20   | -    |      |
| t <sub>d(OFF)</sub>                | Turn-Off Delay Time *3          | R <sub>G</sub> = 25Ω                                       | -    | 125  | -    |      |
| t <sub>f</sub>                     | Turn-Off Fall Time *3           | I <sub>D</sub> = 5.7A                                      | -    | 17   | -    |      |
| Q <sub>G</sub>                     | Total Gate-Charge               | V <sub>DD</sub> = 560V                                     | -    | 31   | -    | nC   |
| Q <sub>GS</sub>                    | Gate to Source Charge           | V <sub>GS</sub> = 10V                                      | -    | 6.4  | -    |      |
| Q <sub>GD</sub>                    | Gate to Drain (Miller) Charge   | I <sub>D</sub> = 6A                                        | -    | 14.5 | -    |      |
| Source-Drain Diode Characteristics |                                 |                                                            |      |      |      |      |
| V <sub>SD</sub>                    | Diode Forward Voltage *1        | I <sub>SD</sub> = 6A, V <sub>GS</sub> = 0V                 | -    | 0.8  | 1.2  | V    |
| t <sub>rr</sub>                    | Reverse Recovery Time           | I <sub>F</sub> = 3A, V <sub>R</sub> = 400V                 | -    | 230  | -    | ns   |
| Q <sub>rr</sub>                    | Reverse Recovery Charge         | di/dt = 100A/μs                                            | -    | 1.92 | -    | μC   |

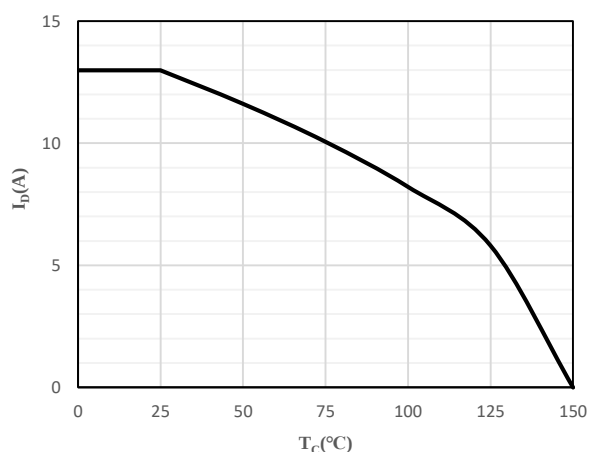
Notes:

- The data tested by pulsed, pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$
- The  $E_{AS}$  data shows Max. rating. The test condition is  $V_{DD} = 100\text{V}, V_{GS} = 15\text{V}, L = 50\text{mH}$
- Guaranteed by design, not subject to production

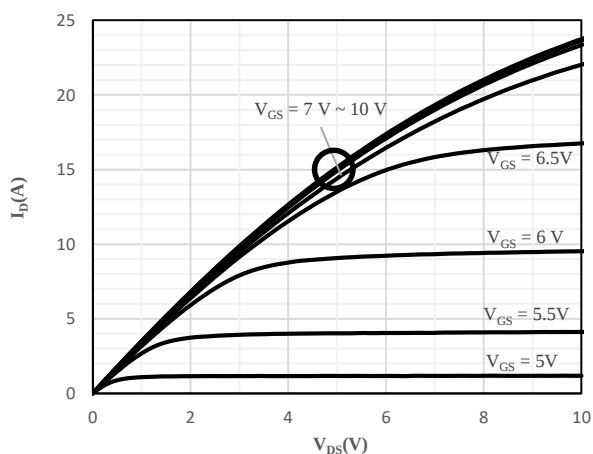
**Ratings and Characteristics Curves** (@  $T_A = 25^\circ\text{C}$  unless otherwise specified)



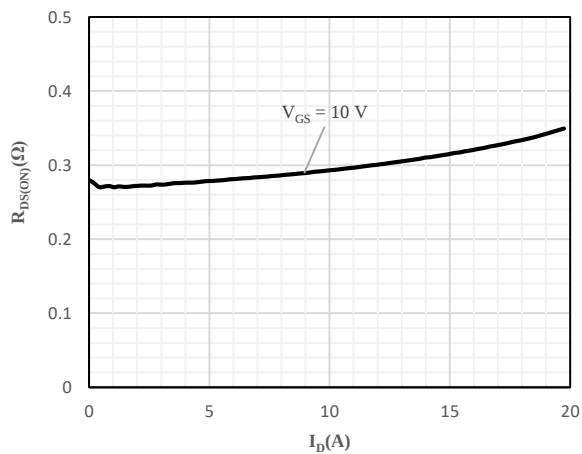
**Fig 1 Power Dissipation**



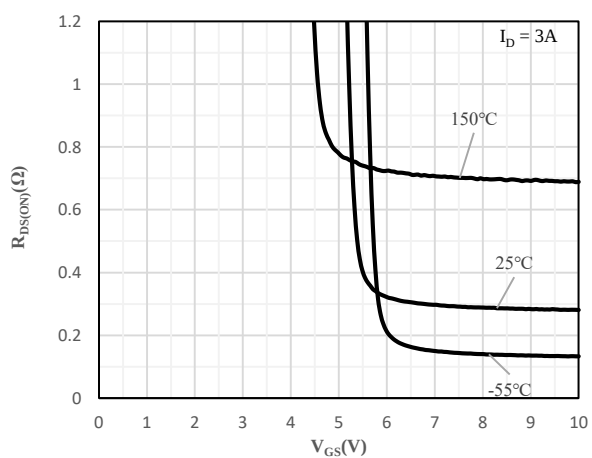
**Fig 2 Drain Current**



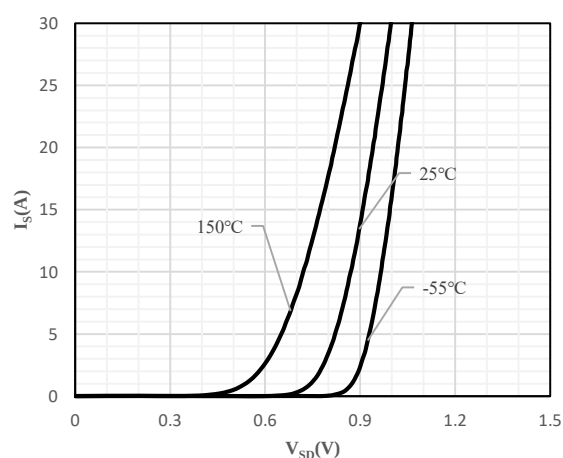
**Fig 3 Typical Output Characteristics**



**Fig 4 On-Resistance vs. Drain Current and Gate Voltage**



**Fig 5 On-Resistance vs. Gate-Source Voltage**



**Fig 6 Body-Diode Characteristics**

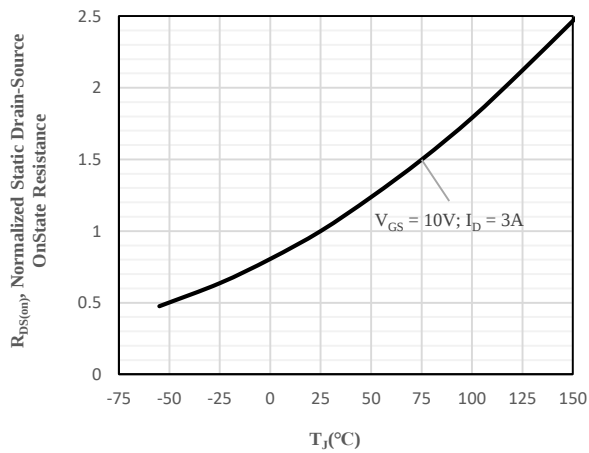


Fig 7 Normalized On-Resistance vs. Junction Temperature

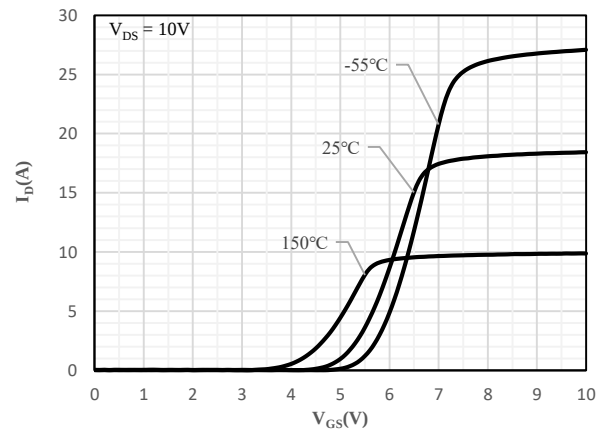


Fig 8 Transfer Characteristics

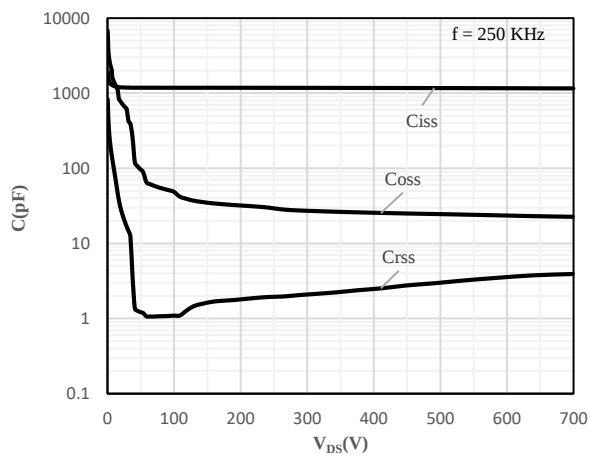


Fig 9 Capacitance Characteristics

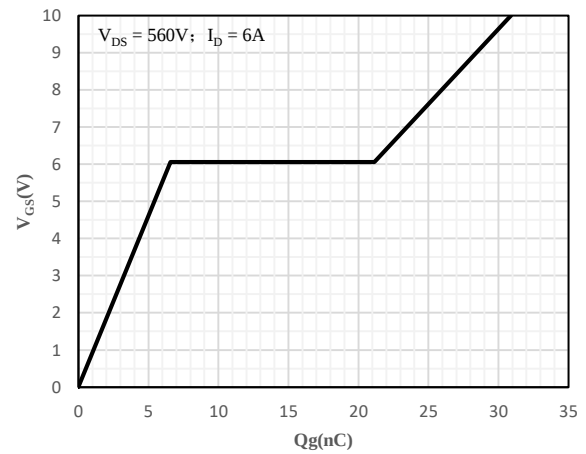


Fig 10 Gate-Charge Characteristics

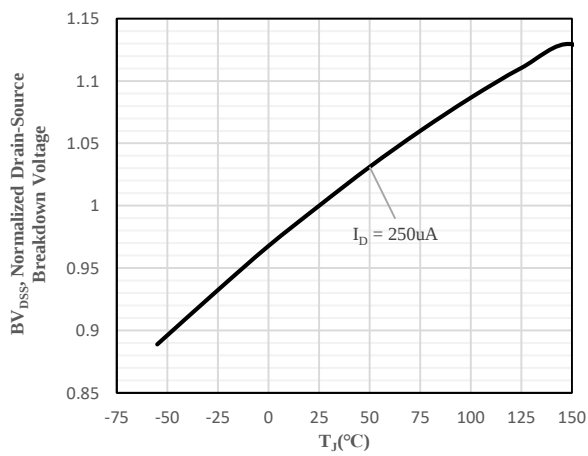


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

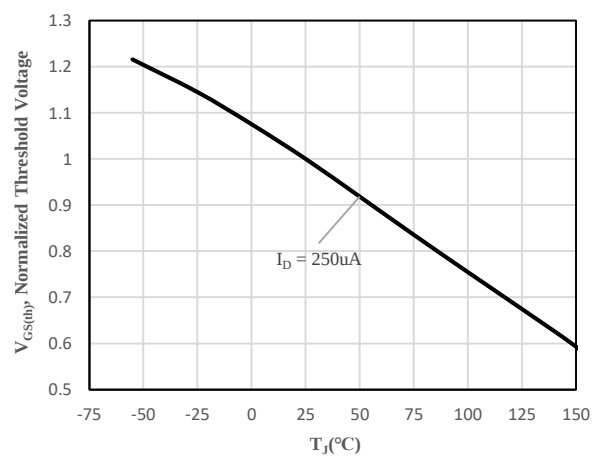


Fig 12 Normalized  $V_{GS(th)}$  vs. Junction Temperature

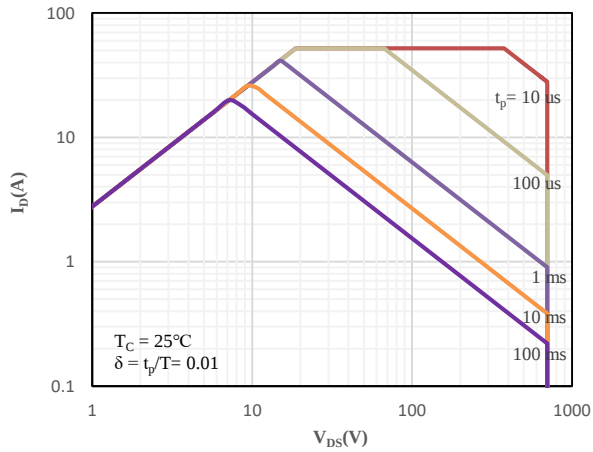


Fig 13 Safe Operation Area (TO-220AB / TO-263)

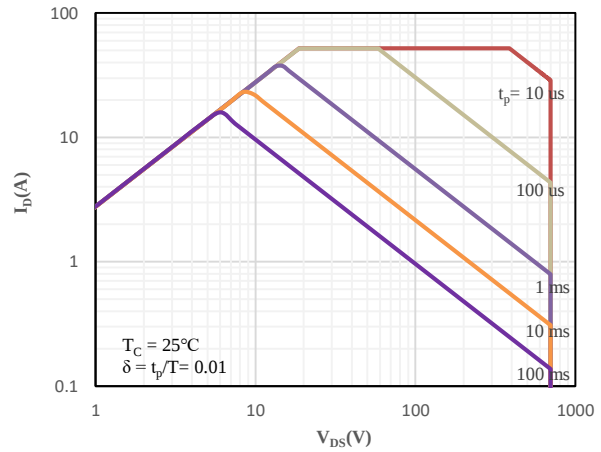


Fig 14 Safe Operation Area (ITO-220AB)

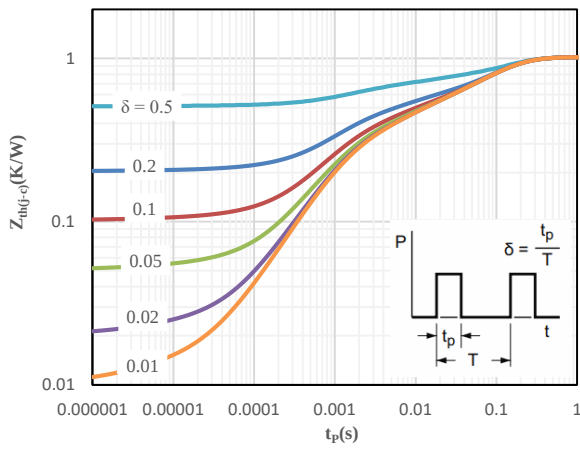


Fig 15 Maximum transient thermal impedance  
(TO-220AB / TO-263)

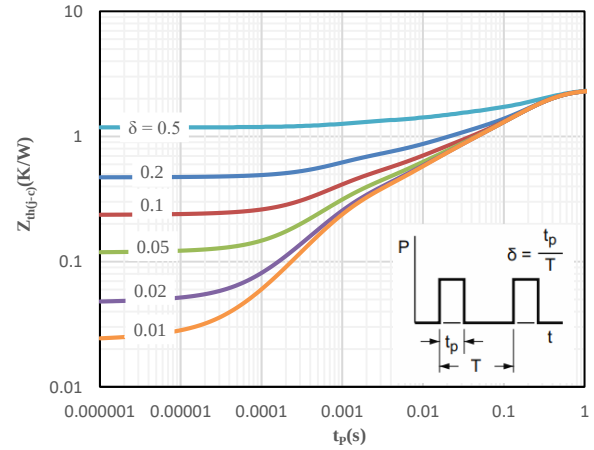
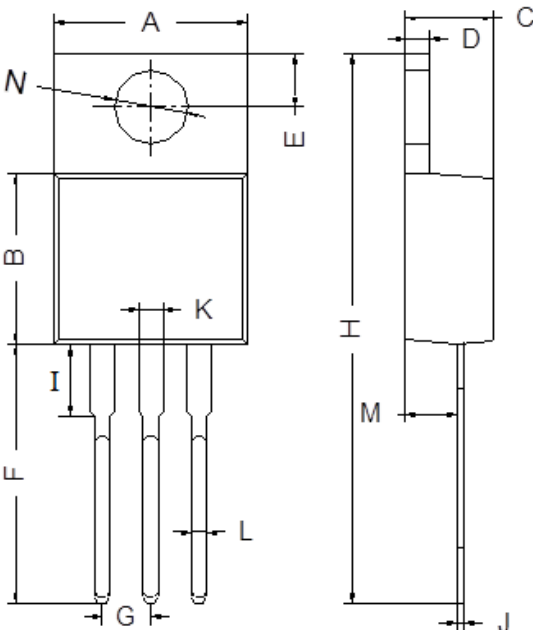
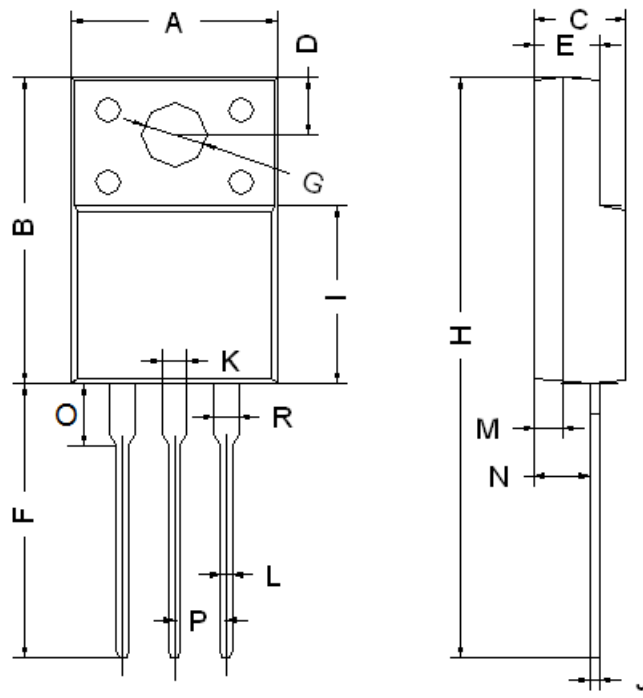


Fig 16 Maximum transient thermal impedance  
(ITO-220AB)

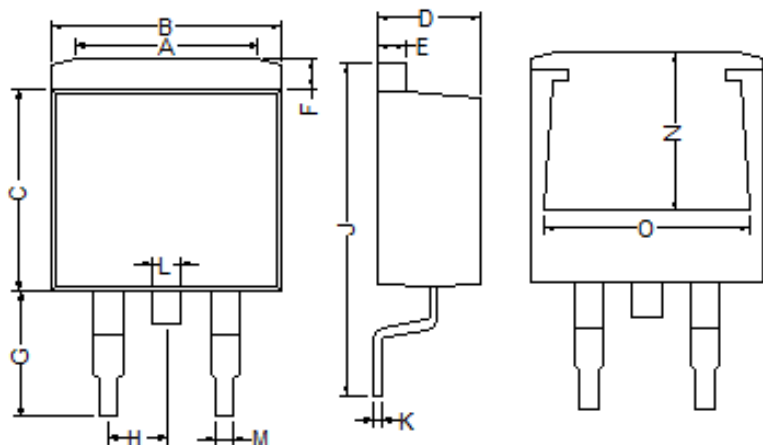
Package Outline Dimensions (Unit: mm)

|  |  | TO-220AB  |       |       |
|-----------------------------------------------------------------------------------|--|-----------|-------|-------|
|                                                                                   |  | Dimension | Min.  | Max.  |
|                                                                                   |  | A         | 9.80  | 10.30 |
|                                                                                   |  | B         | 8.70  | 9.10  |
|                                                                                   |  | C         | 4.37  | 4.77  |
|                                                                                   |  | D         | 1.07  | 1.47  |
|                                                                                   |  | E         | 2.64  | 2.84  |
|                                                                                   |  | F         | 13.14 | 13.74 |
|                                                                                   |  | G         | 2.44  | 2.64  |
|                                                                                   |  | H         | 28.03 | 28.83 |
|                                                                                   |  | I         | 3.50  | 4.00  |
|                                                                                   |  | J         | 0.28  | 0.48  |
|                                                                                   |  | K         | 1.22  | 1.32  |
|                                                                                   |  | L         | 0.71  | 0.91  |
|                                                                                   |  | M         | 2.40  | 2.60  |
|                                                                                   |  | N         | 3.76  | 3.96  |

|  |  | ITO-220AB |       |       |
|------------------------------------------------------------------------------------|--|-----------|-------|-------|
|                                                                                    |  | Dimension | Min.  | Max.  |
|                                                                                    |  | A         | 9.90  | 10.30 |
|                                                                                    |  | B         | 14.80 | 15.20 |
|                                                                                    |  | C         | 4.30  | 4.70  |
|                                                                                    |  | D         | 2.50  | 2.90  |
|                                                                                    |  | E         | 2.80  | 3.30  |
|                                                                                    |  | F         | 13.00 | 13.60 |
|                                                                                    |  | G         | 3.10  | 3.30  |
|                                                                                    |  | H         | 28.00 | 28.60 |
|                                                                                    |  | I         | 7.90  | 8.90  |
|                                                                                    |  | J         | 0.40  | 0.60  |
|                                                                                    |  | L         | 0.70  | 0.90  |
|                                                                                    |  | M         | 1.30  | 1.50  |
|                                                                                    |  | N         | 2.60  | 2.80  |
|                                                                                    |  | O         | 2.60  | 3.10  |
|                                                                                    |  | P         | 2.45  | 2.65  |
|                                                                                    |  | K/R       | 1.10  | 1.30  |

Package Outline Dimensions (Unit: mm)



| TO-263    |       |       |
|-----------|-------|-------|
| Dimension | Min.  | Max.  |
| A         | 6.00  | 8.00  |
| B         | 9.90  | 10.30 |
| C         | 8.50  | 9.10  |
| D         | 4.37  | 4.77  |
| E         | 1.07  | 1.47  |
| F         | 1.07  | 1.47  |
| G         | 5.05  | 5.74  |
| H         | 2.44  | 2.66  |
| J         | 15.15 | 15.80 |
| K         | 0.28  | 0.48  |
| L         | 1.17  | 1.37  |
| M         | 0.71  | 0.91  |
| N         | 6.55  | 7.68  |
| O         | 7.70  | 8.10  |

## Mounting Pad Layout (Unit: mm)

### TO-263

