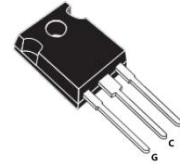


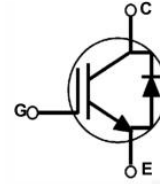
### Features

- High Current Capability
- Low Saturation Voltage:  
 $V_{CE(sat)} = 1.58 \text{ V @ } I_C = 80 \text{ A}$
- High Input Impedance
- RoHS Complaint



### Applications

- PDP TV



### Absolute Maximum Ratings

| Parameter                                                               |                    | Symbol    | Value      | Unit        |
|-------------------------------------------------------------------------|--------------------|-----------|------------|-------------|
| Collector to Emitter Voltage                                            |                    | $V_{CES}$ | 330        | V           |
| Gate to Emitter Voltage                                                 |                    | $V_{GES}$ | ±30        |             |
| Collector Current                                                       | $T_C=25^{\circ}C$  | $I_C$     | 160        | A           |
|                                                                         | $T_C=100^{\circ}C$ |           | 80         |             |
| Pulsed Collector Current $TC=25^{\circ}C$                               |                    | $I_{CM}$  | 450        |             |
| Diode forward current @ $TC= 100^{\circ}C$                              |                    | $I_F$     | 40         | A           |
| Maximum Power Dissipation $TC=25^{\circ}C$                              |                    | $P_D$     | 420        | W           |
| Maximum Power Dissipation $TC=100^{\circ}C$                             |                    |           | 180        |             |
| Operating Junction Temperature                                          |                    | $T_J$     | -55 to 150 | $^{\circ}C$ |
| Storage Temperature Range                                               |                    | $T_{stg}$ | -55 to 150 |             |
| Maximum Lead Temp. for soldering Purposes, 1/8” from case for 5 seconds |                    | $T_L$     | 300        |             |

### Thermal Characteristics

| Parameter                               | Symbol                        | Typ | Max | Unit               |
|-----------------------------------------|-------------------------------|-----|-----|--------------------|
| Thermal Resistance, Junction to Case    | $R_{\theta JC}(\text{IGBT})$  |     | 0.3 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case    | $R_{\theta JC}(\text{Diode})$ |     | 0.8 |                    |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$               |     | 35  |                    |

### Package Marking and Ordering Information

| Device Marking | Device      | Package | MOQ |
|----------------|-------------|---------|-----|
| MSG80N350FL    | MSG80N350FL | TO-247  |     |

**Electrical Characteristics of the IGBT**  $T_C = 25^\circ\text{C}$  unless otherwise noted

| Parameter                                  | Symbo<br>l           |                                                                               | Test<br>Conditions | Min  | Typ  | Max | Unit |
|--------------------------------------------|----------------------|-------------------------------------------------------------------------------|--------------------|------|------|-----|------|
| On/off Characteristics                     |                      |                                                                               |                    |      |      |     |      |
| G-E Threshold Voltag                       | V <sub>GE(th)</sub>  | I <sub>C</sub> = 250uA, V <sub>CE</sub> = V <sub>GE</sub>                     | 2.5                | 4    | 5.5  | V   |      |
| Collector to Emitter<br>Saturation Voltage | V <sub>CE(sat)</sub> | I <sub>C</sub> = 40A, V <sub>GE</sub> = 15V                                   | -                  | 1.19 | 1.45 |     |      |
|                                            |                      | I <sub>C</sub> = 80A, V <sub>GE</sub> = 15V                                   | -                  | 1.58 | -    |     |      |
|                                            |                      | I <sub>C</sub> = 80A, VGE = 15V<br>T <sub>C</sub> = 125°C                     | -                  | 1.78 | -    |     |      |
| Collector to Emitter<br>Breakdown Voltage  | B <sub>VCE</sub>     | V <sub>GE</sub> = 0V, I <sub>C</sub> = 400μA                                  | 330                | -    | -    |     |      |
| Collector Cut-Off Curren                   | I <sub>CE</sub>      | V <sub>CE</sub> = V <sub>CES</sub> , V <sub>GE</sub> = 0                      | -                  | -    | 400  | μA  |      |
| G-E Leakage Curren                         | I <sub>GE</sub>      | V <sub>GE</sub> = V <sub>GES</sub> , V <sub>CE</sub> = 0V                     | -                  | -    | ±400 | nA  |      |
| Dynamic Characteristics                    |                      |                                                                               |                    |      |      |     |      |
| Input Capacitance                          | Cies                 | VCE = 30V, VGE = 0V<br>f = 1MHz                                               | -                  | 3900 | -    | pF  |      |
| Output Capacitance                         | Coes                 |                                                                               | -                  | 320  | -    |     |      |
| Reverse Transfer<br>Capacitance            | Cres                 |                                                                               | -                  | 200  | -    |     |      |
| Switching Characteristics                  |                      |                                                                               |                    |      |      |     |      |
| Turn-On Delay Time                         | td(on)               | VCC = 200V, IC = 40A,<br>RG = 5Ω, VGE = 15V,<br>Resistive Load, TC =<br>25°C  | -                  | 33   | -    | nS  |      |
| Rise Tim                                   | tr                   |                                                                               | -                  | 120  | -    |     |      |
| Turn-Off Delay Tim                         | td(off)              |                                                                               | -                  | 160  | -    |     |      |
| Fall Time                                  | tf                   |                                                                               | -                  | 220  | 260  |     |      |
| Turn-On Delay Time                         | td(on)               | VCC = 200V, IC = 40A,<br>RG = 5Ω, VGE = 15V,<br>Resistive Load, TC =<br>125°C | -                  | 38   | -    |     |      |
| Rise Time                                  | tr                   |                                                                               | -                  | 120  | -    |     |      |
| Turn-Off Delay Tim                         | td(off)              |                                                                               | -                  | 163  | -    |     |      |
| Fall Time                                  | tf                   |                                                                               | -                  | 320  | 350  |     |      |
| Total Gate Charge                          | Qg                   | VCE = 200V, IC = 40A,<br>VGE = 15V                                            | -                  | 175  | -    | nC  |      |
| Gate to Emitter Charg                      | Qge                  |                                                                               | -                  | 25   | -    |     |      |
| Gate to Collector Charg                    | Qgc                  |                                                                               | -                  | 73   | -    |     |      |

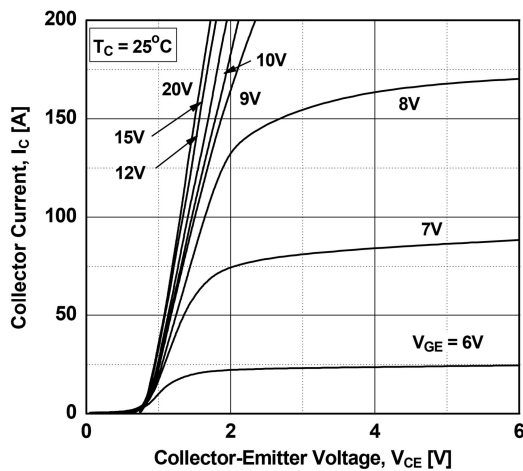
**Electrical Characteristics of the Diode**  $T_C = 25^\circ\text{C}$  unless otherwise noted

| Parameter                   | Symbol   | Test Conditions                     | Min                       | Typ | Max   | Unit |
|-----------------------------|----------|-------------------------------------|---------------------------|-----|-------|------|
| Diode Forward Voltage       | $V_{FM}$ | $I_F = 20\text{A}$                  | $T_C = 25^\circ\text{C}$  | -   | 1..35 | V    |
|                             |          |                                     | $T_C = 125^\circ\text{C}$ | -   | 1     |      |
| Diode Reverse Recovery Time | $t_{rr}$ | $I_F = 20\text{A}$ ,<br>$di_F/dt =$ | $T_C = 25^\circ\text{C}$  | -   | 33    | ns   |
|                             |          |                                     | $T_C = 125^\circ\text{C}$ | -   | 50    |      |

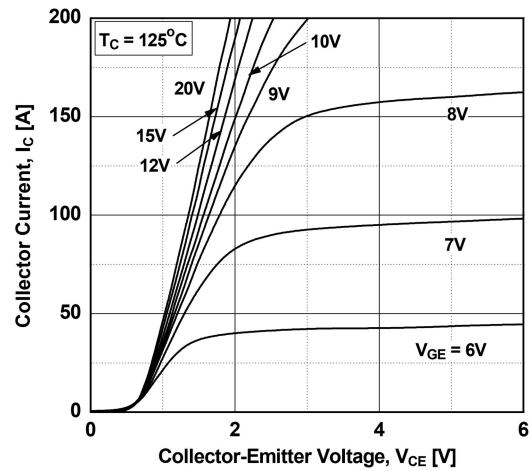
|                                     |          |               |                         |   |     |   |    |
|-------------------------------------|----------|---------------|-------------------------|---|-----|---|----|
| Diode Peak Reverse Recovery Current | $I_{rr}$ | 200A/ $\mu$ s | $T_C=25^\circ\text{C}$  | - | 4   | - | A  |
|                                     |          |               | $T_C=125^\circ\text{C}$ | - | 6   | - |    |
| Diode Reverse Recovery Charge       | $Q_{rr}$ |               | $T_C=25^\circ\text{C}$  | - | 50  | - | nC |
|                                     |          |               | $T_C=125^\circ\text{C}$ | - | 120 | - |    |

## Typical Performance Characteristics

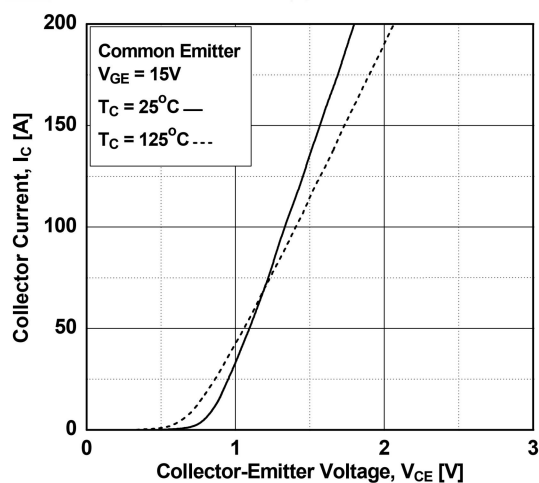
### Typical Output Characteristics



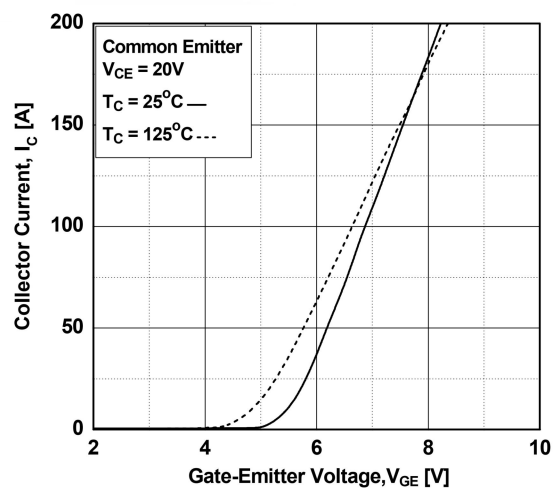
### Typical Output Characteristics



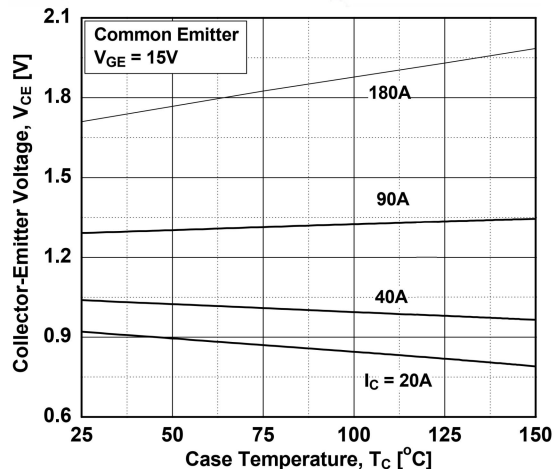
### Typical Saturation Voltage Characteristics



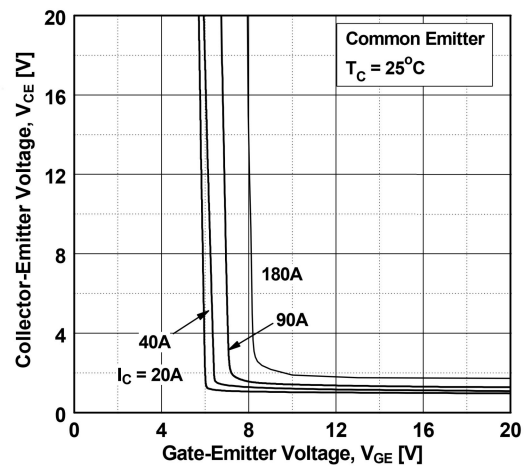
### Transfer Characteristics



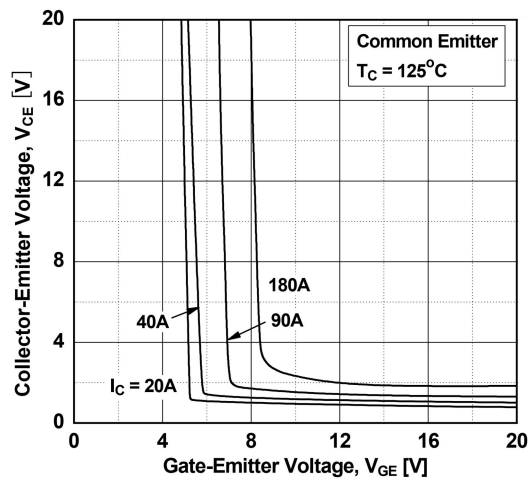
**Saturation Voltage vs. Case Temperature at Variant Current Level**



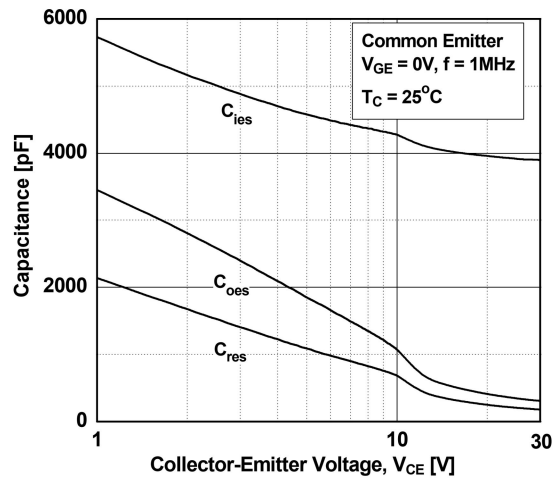
**Saturation Voltage vs.  $V_{GE}$**



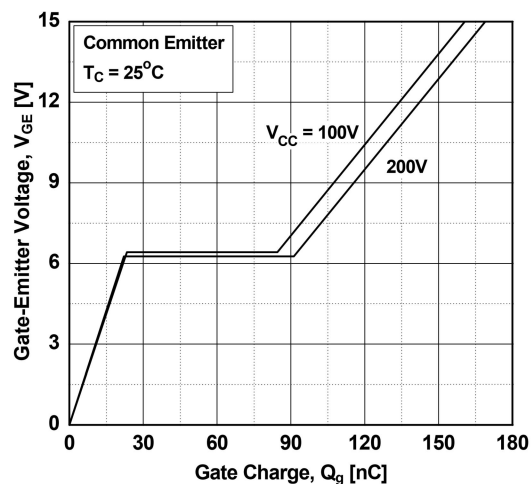
**Saturation Voltage vs.  $V_{GE}$**



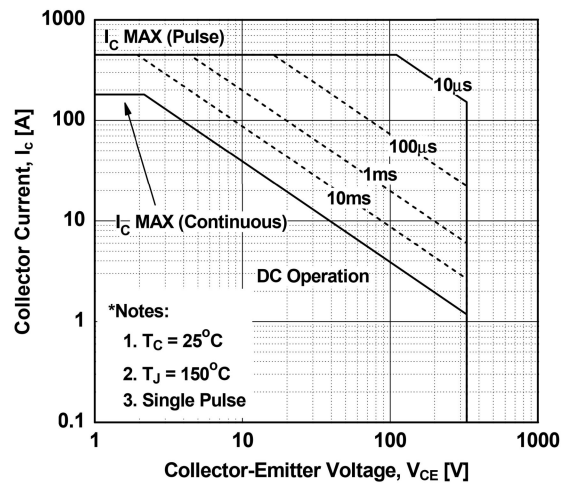
**Capacitance Characteristics**



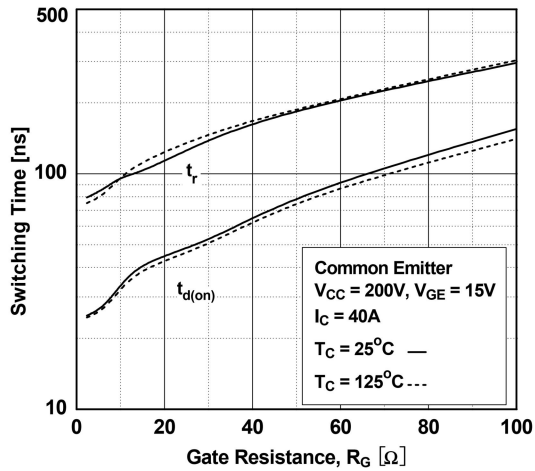
**Gate charge Characteristics**



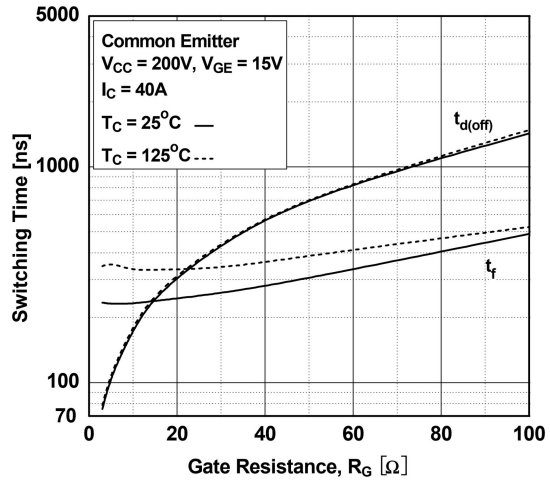
**SOA Characteristics**



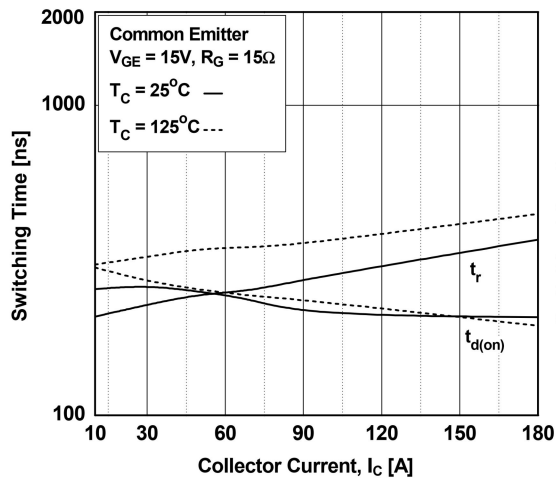
### Turn-on Characteristics vs. Gate Resistance



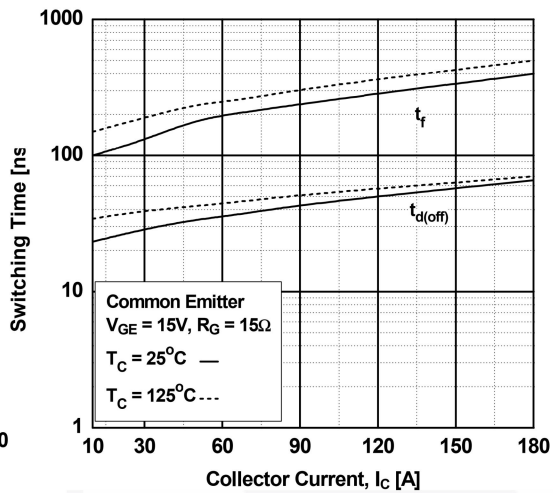
### Turn-off Characteristics vs Gate Resistance



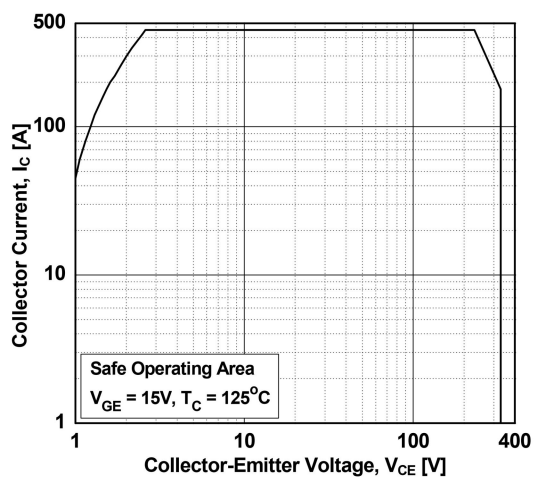
### Turn-on Characteristics vs. Collector Current



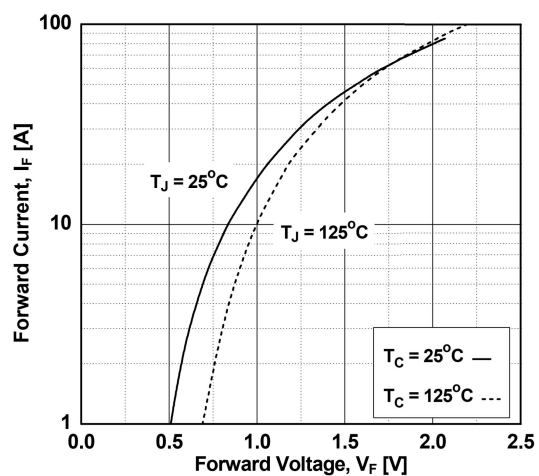
### Turn-off Characteristics v Collector Current

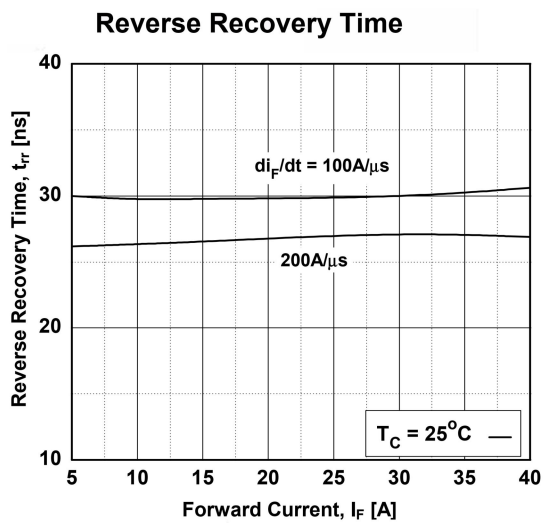


### Turn off Switching SOA Characteristics

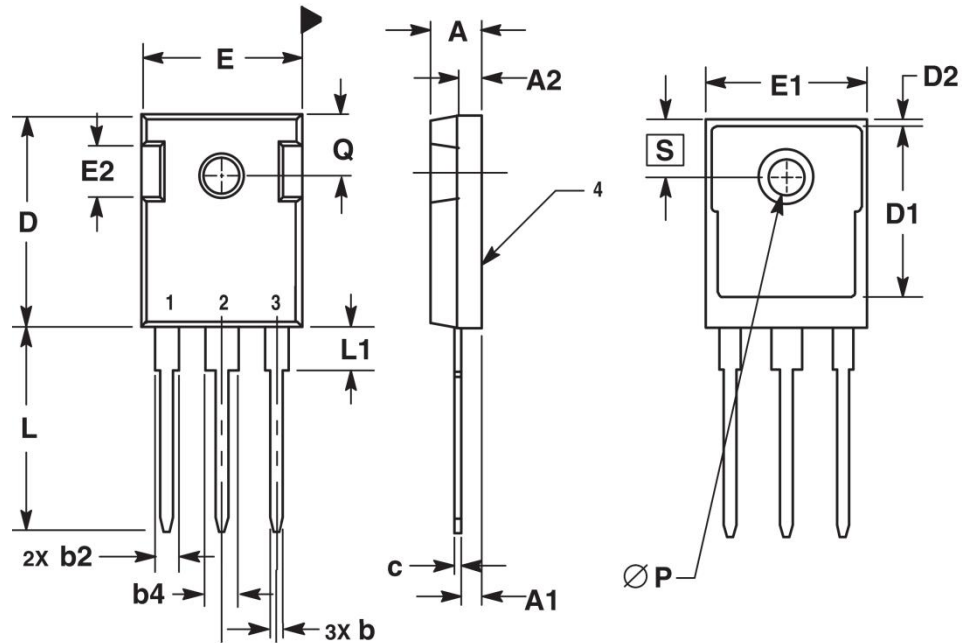


### Forward Characteristics





### Package outline dimension



| Symbol | Min     | Max   | Unit |
|--------|---------|-------|------|
| A      | 4.7     | 5.31  | mm   |
| A1     | 2.21    | 2.59  |      |
| A2     | 1.5     | 2.49  |      |
| b      | 1       | 1.4   |      |
| b2     | 1.65    | 2.39  |      |
| b4     | 2.59    | 3.43  |      |
| c      | 0.38    | 0.89  |      |
| D      | 20.8    | 21.46 |      |
| D1     | 13.08   | -     |      |
| D2     | 0.51    | 1.35  |      |
| E      | 15.49   | 16.26 |      |
| E1     | 13.46   | -     |      |
| E2     | 4.32    | 5.49  |      |
| e      | 5.46BSC |       |      |
| L      | 19.81   | 20.32 |      |
| L1     | -       | 4.5   |      |
| P      | 3.56    | 3.66  |      |
| Q      | 5.38    | 6.2   |      |
| S      | 6.15BSC |       |      |