

**Ultra Fast NPT - IGBT®**

The Ultra Fast NPT - IGBT® is a new generation of high voltage power IGBTs. Using Non-Punch-Through Technology, the Ultra Fast NPT-IGBT® offers superior ruggedness and ultrafast switching speed.


**Features**

- Low Saturation Voltage
- Low Tail Current
- RoHS Compliant 
- Short Circuit Withstand Rated
- High Frequency Switching
- Ultra Low Leakage Current

Unless stated otherwise, Microsemi discrete IGBTs contain a single IGBT die. This device is recommended for applications such as induction heating (IH), motor control, general purpose inverters and uninterruptible power supplies (UPS).


**MAXIMUM RATINGS**

 All Ratings:  $T_C = 25^\circ\text{C}$  unless otherwise specified.

| Symbol         | Parameter  | Ratings    | Unit             |
|----------------|--|------------|------------------|
| $V_{ces}$      | Collector Emitter Voltage  | 1200       | V                |
| $V_{GE}$       | Gate-Emitter Voltage   | $\pm 30$   |                  |
| $I_{C1}$       | Continuous Collector Current @ $T_C = 25^\circ\text{C}$  | 118        | A                |
| $I_{C2}$       | Continuous Collector Current @ $T_C = 75^\circ\text{C}$  | 85         |                  |
| $I_{CM}$       | Pulsed Collector Current <sup>①</sup>  | 340        |                  |
| SCWT           | Short Circuit Withstand Time: $V_{CE} = 600\text{V}$ , $V_{GE} = 15\text{V}$ , $T_C = 125^\circ\text{C}$ | 10         | $\mu\text{s}$    |
| $P_D$          | Total Power Dissipation @ $T_C = 25^\circ\text{C}$   | 595        | W                |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range   | -55 to 150 | $^\circ\text{C}$ |
| $T_L$          | Max. Lead Temp. for Soldering: 0.063" from Case for 10 Sec.  | 300        |                  |

**STATIC ELECTRICAL CHARACTERISTICS**

| Symbol        | Parameter   | Min  | Typ | Max       | Unit          |
|---------------|---|------|-----|-----------|---------------|
| $V_{(BR)CES}$ | Collector-Emitter Breakdown Voltage ( $V_{GE} = 0\text{V}$ , $I_C = 1.0\text{mA}$ )                                   | 1200 |     |           | Volts         |
| $V_{GE(TH)}$  | Gate Threshold Voltage ( $V_{CE} = V_{GE}$ , $I_C = 2.5\text{mA}$ , $T_J = 25^\circ\text{C}$ )                        | 3.5  | 5.0 | 6.5       |               |
| $V_{CE(ON)}$  | Collector-Emitter On Voltage ( $V_{GE} = 15\text{V}$ , $I_C = 85\text{A}$ , $T_J = 25^\circ\text{C}$ )                |      | 2.5 | 3.2       |               |
|               | Collector-Emitter On Voltage ( $V_{GE} = 15\text{V}$ , $I_C = 85\text{A}$ , $T_J = 125^\circ\text{C}$ )               |      | 3.3 |           |               |
|               | Collector-Emitter On Voltage ( $V_{GE} = 15\text{V}$ , $I_C = 170\text{A}$ , $T_J = 25^\circ\text{C}$ )               |      | 3.5 |           |               |
| $I_{CES}$     | Collector Cut-off Current ( $V_{CE} = 1200\text{V}$ , $V_{GE} = 0\text{V}$ , $T_J = 25^\circ\text{C}$ ) <sup>②</sup>  |      | 10  | 1000      | $\mu\text{A}$ |
|               | Collector Cut-off Current ( $V_{CE} = 1200\text{V}$ , $V_{GE} = 0\text{V}$ , $T_J = 125^\circ\text{C}$ ) <sup>②</sup> |      | 100 |           |               |
| $I_{GES}$     | Gate-Emitter Leakage Current ( $V_{GE} = \pm 20\text{V}$ )  |      |     | $\pm 250$ | nA            |


**CAUTION: These Devices are Sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.**

| Symbol          | Parameter                       | Test Conditions   | Min | Typ  | Max    | Unit |
|-----------------|---------------------------------|---|-----|------|--------|------|
| $C_{ies}$       | Input Capacitance               | Capacitance<br>$V_{GE} = 0V, V_{CE} = 25V$<br>$f = 1MHz$  |     | 8400 |        | pF   |
| $C_{oes}$       | Output Capacitance              |   |     | 725  |        |      |
| $C_{res}$       | Reverse Transfer Capacitance    |   |     | 190  |        |      |
| $V_{GEP}$       | Gate to Emitter Plateau Voltage | Gate Charge<br>$V_{GE} = 15V$<br>$V_{CE} = 600V$<br>$I_C = 85A$   |     | 7.5  |        | V    |
| $Q_g^{(3)}$     | Total Gate Charge               |   |     | 490  | 660    |      |
| $Q_{ge}$        | Gate-Emitter Charge             |   |     | 60   | 85     |      |
| $Q_{gc}$        | Gate- Collector Charge          |   |     | 230  | 320    |      |
| $t_{d(on)}$     | Turn-On Delay Time              | Inductive Switching (25°C)<br>$V_{CC} = 600V$<br>$V_{GE} = 15V$<br>$I_C = 85A$<br>$R_G = 4.3 \Omega^{(4)}$<br>$T_J = +25^\circ C$   |     | 43   |        | ns   |
| $t_r$           | Current Rise Time               |   |     | 70   |        |      |
| $t_{d(off)}$    | Turn-Off Delay Time             |   |     | 300  |        |      |
| $t_f$           | Current Fall Time               |   |     | 85   |        |      |
| $E_{on2}^{(5)}$ | Turn-On Switching Energy        | Inductive Switching (25°C)<br>$V_{CC} = 600V$<br>$V_{GE} = 15V$<br>$I_C = 85A$<br>$R_G = 4.3 \Omega^{(4)}$<br>$T_J = +25^\circ C$   |     | 6000 | 9000   | μJ   |
| $E_{off}^{(6)}$ | Turn-Off Switching Energy       |   |     | 3800 | 5700   |      |
| $t_{d(on)}$     | Turn-On Delay Time              | Inductive Switching (125°C)<br>$V_{CC} = 600V$<br>$V_{GE} = 15V$<br>$I_C = 85A$<br>$R_G = 4.3 \Omega^{(4)}$<br>$T_J = +125^\circ C$ |     | 43   |        | ns   |
| $t_r$           | Current Rise Time               |   |     | 70   |        |      |
| $t_{d(off)}$    | Turn-Off Delay Time             |   |     | 350  |        |      |
| $t_f$           | Current Fall Time               |   |     | 95   |        |      |
| $E_{on2}^{(5)}$ | Turn-On Switching Energy        | Inductive Switching (125°C)<br>$V_{CC} = 600V$<br>$V_{GE} = 15V$<br>$I_C = 85A$<br>$R_G = 4.3 \Omega^{(4)}$<br>$T_J = +125^\circ C$ |     | 7800 | 11,700 | μJ   |
| $E_{off}^{(6)}$ | Turn-Off Switching Energy       |   |     | 4900 | 7350   |      |

THERMAL AND MECHANICAL CHARACTERISTICS

| Symbol          | Characteristic / Test Conditions   | Min  | Typ  | Max  | Unit   |
|-----------------|--|------|------|------|--------|
| $R_{\theta JC}$ | Junction to Case   | -    | -    | 0.21 | °C/W   |
| $W_T$           | Package Weight   | -    | 1.03 | -    | oz     |
| Torque          | Terminals and Mounting Screws.   | -    | -    | 10   | in·lbf |
|                 |  | -    | -    | 1.1  | N·m    |
| $V_{Isolation}$ | RMS Voltage (50-60Hz Sinusoidal Waveform from Terminals to Mounting Base for 1 Min.) | 2500 | -    | -    | Volts  |

- 1 Repetitive Rating: Pulse width and case temperature limited by maximum junction temperature.
  - 2 Pulse test: Pulse Width < 380μs, duty cycle < 2%.
  - 3 See Mil-Std-750 Method 3471.
  - 4  $R_G$  is external gate resistance, not including internal gate resistance or gate driver impedance. (MIC4452)
  - 5  $E_{on2}$  is the energy loss at turn-on and includes the charge stored in the freewheeling diode.
  - 6  $E_{off}$  is the clamped inductive turn-off energy measured in accordance with JEDEC standard JESD24-1.
- Microsemi reserves the right to change, without notice, the specifications and information contained herein.

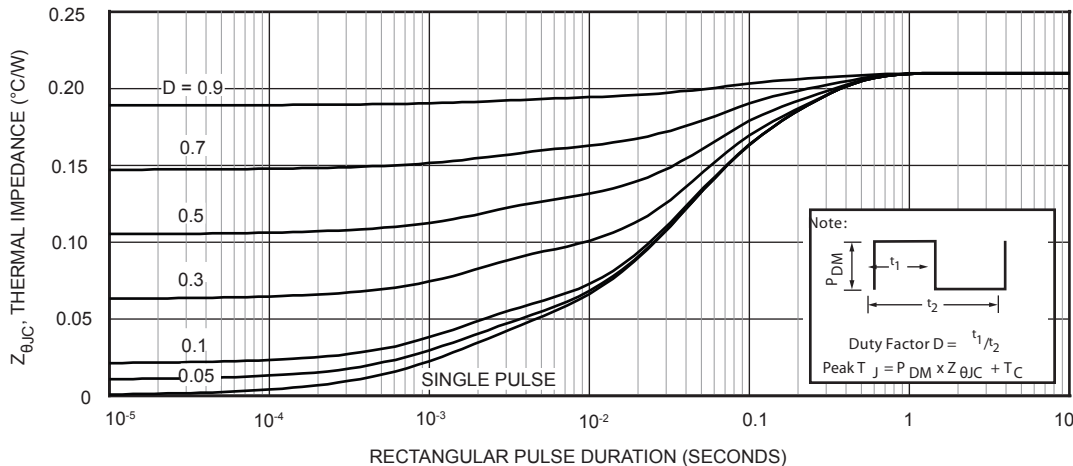
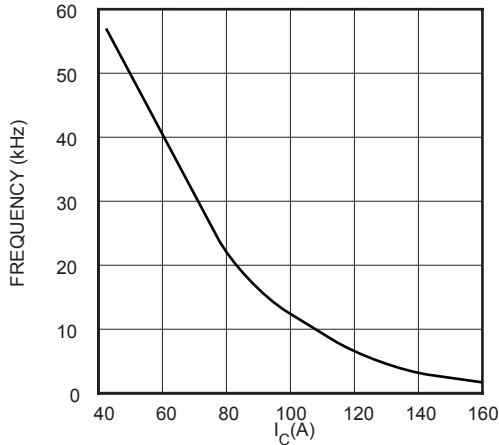


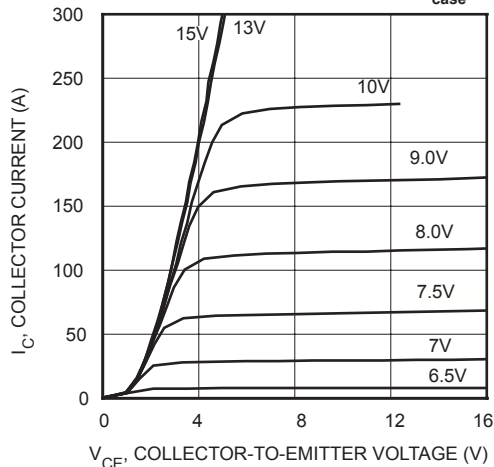
Figure 1, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

**TYPICAL PERFORMANCE CURVES**

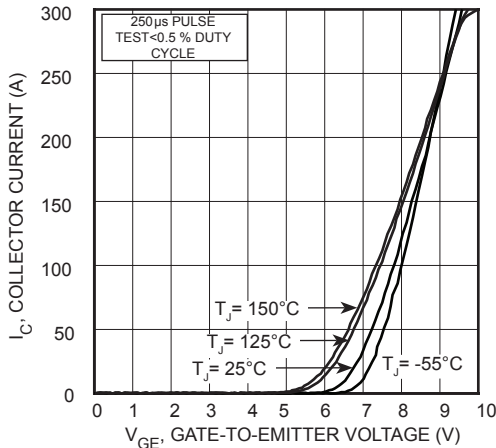
**APT85GR120J**



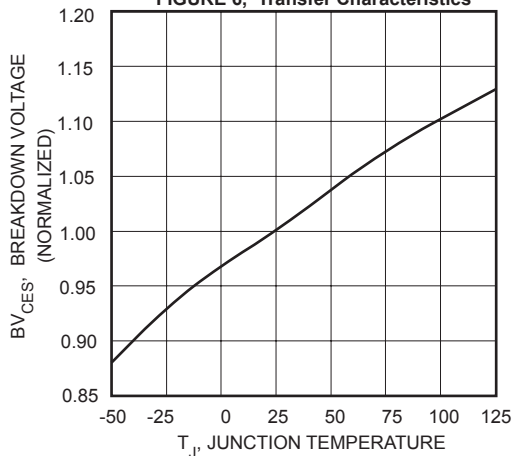
**FIGURE 2, Max Frequency vs Current ( $T_{case} = 75^{\circ}C$ )**



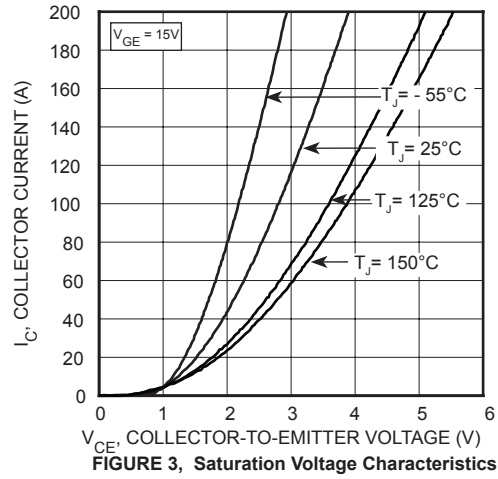
**FIGURE 4, Output Characteristics ( $T_J = 25^{\circ}C$ )**



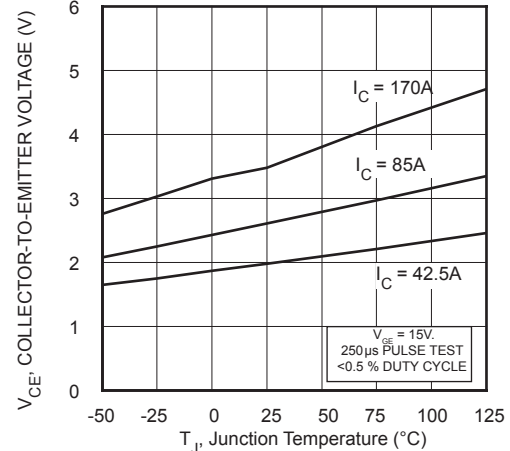
**FIGURE 6, Transfer Characteristics**



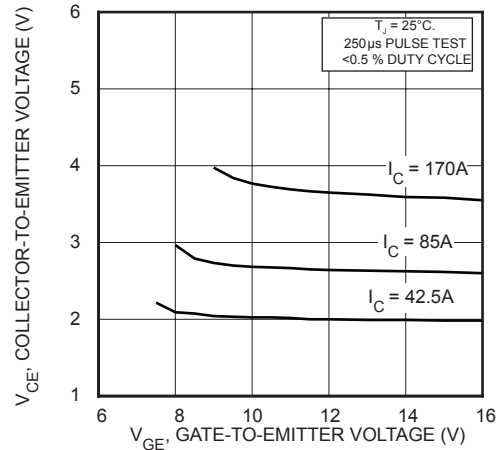
**FIGURE 8, Breakdown Voltage vs Junction Temperature**



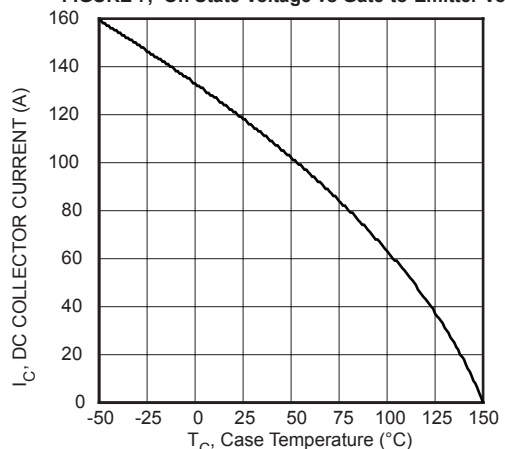
**FIGURE 3, Saturation Voltage Characteristics**



**FIGURE 5, On State Voltage vs Junction Temperature**



**FIGURE 7, On State Voltage vs Gate-to-Emitter Voltage**



**FIGURE 9, DC Collector Current vs Case Temperature**

TYPICAL PERFORMANCE CURVES

APT85GR120J

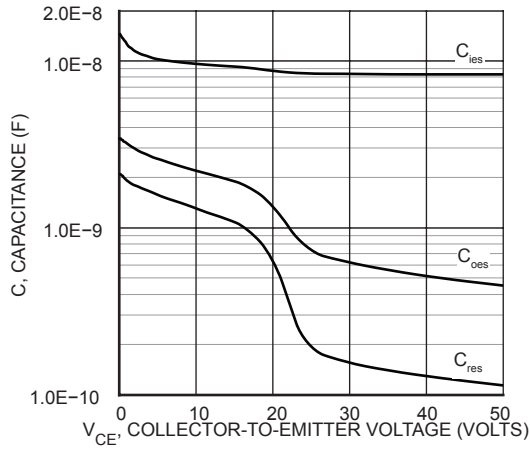


FIGURE 10, Capacitance vs Collector-To-Emitter Voltage

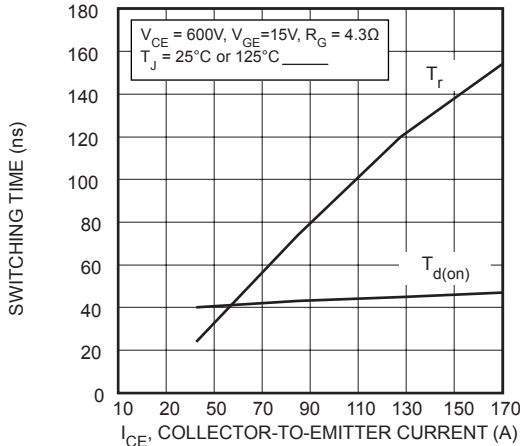


FIGURE 12, Turn-On Time vs Collector Current

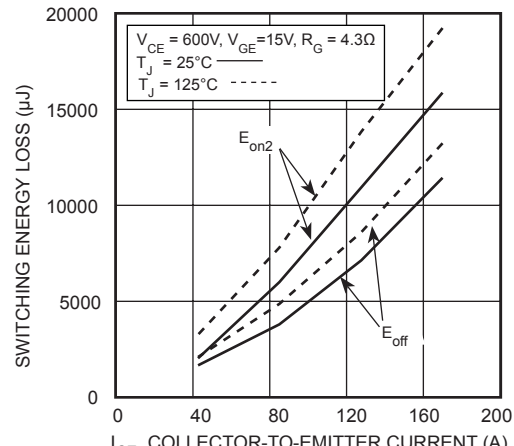


FIGURE 14, Energy Loss vs Collector Current

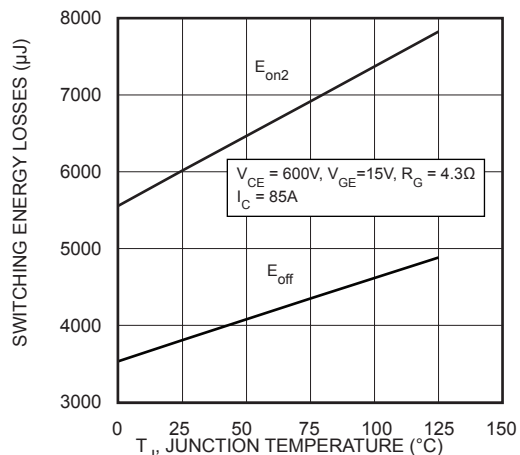


FIGURE 16, Switching Energy vs Junction Temperature

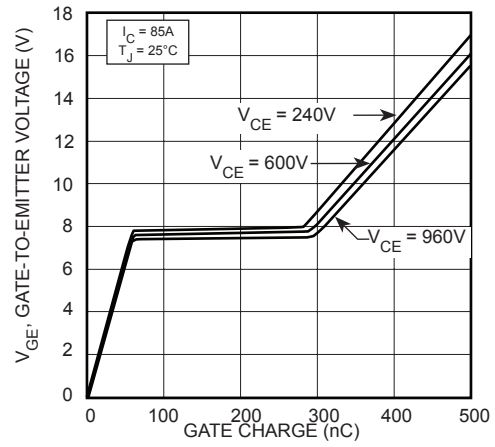


FIGURE 11, Gate charge

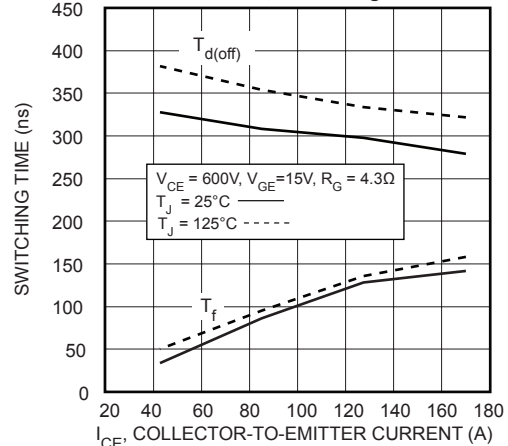


FIGURE 13, Turn-Off Time vs Collector Current

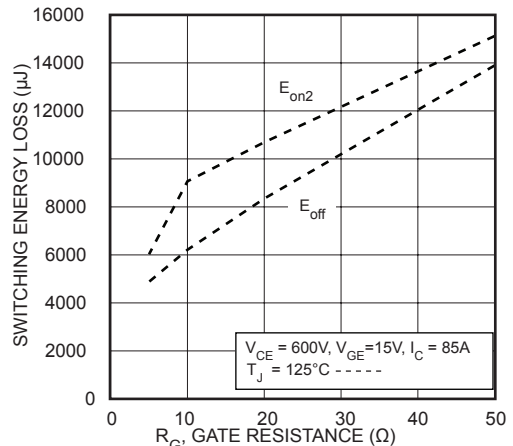


FIGURE 15, Energy Loss vs Gate Resistance

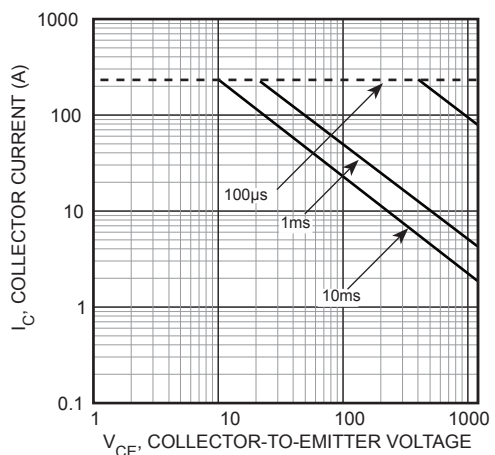
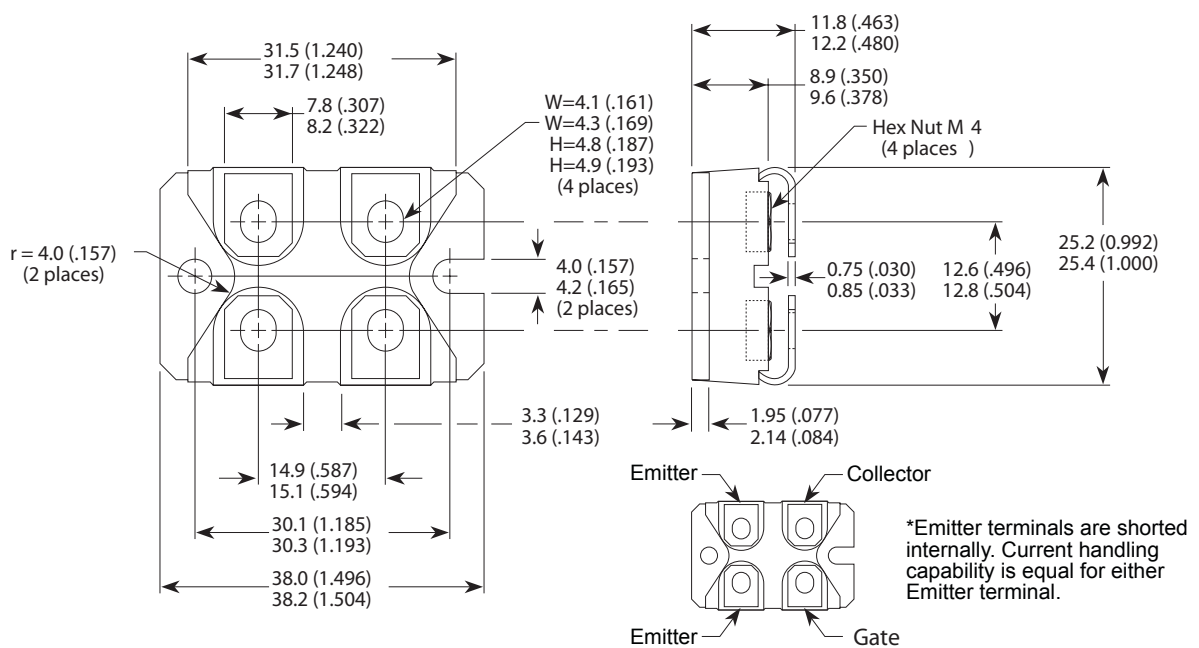


FIGURE 17, Minimum Switching Safe Operating Area

SOT-227 (ISOTOP®) Package Outline



Dimensions in Millimeters and (Inches)

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## JONHON

«JONHON» (основан в 1970 г.)

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