

## Dual Buck Chopper NPT IGBT Power Module

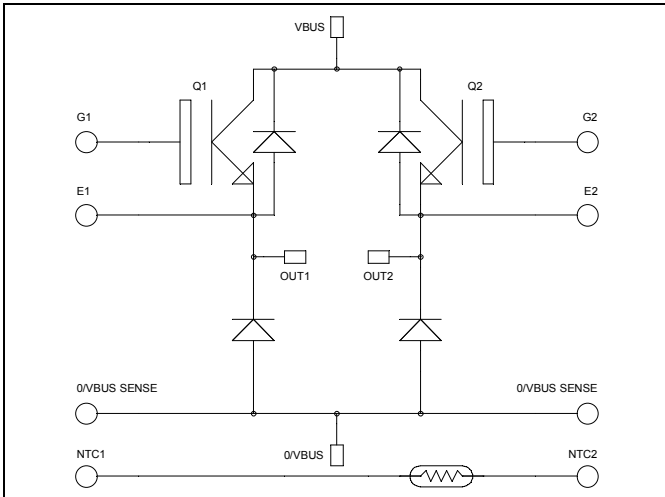
**$V_{CES} = 1200V$**   
 **$I_C = 75A @ T_c = 80^\circ C$**

**Application**

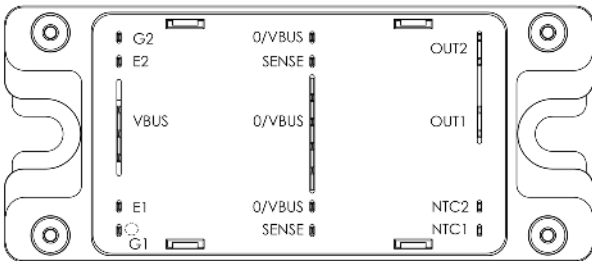
- AC and DC motor control
- Switched Mode Power Supplies

**Features**

- Non Punch Through (NPT) Fast IGBT
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 50 kHz
  - Soft recovery parallel diodes
  - Low diode VF
  - Low leakage current
  - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- Very low stray inductance
  - Symmetrical design
  - Lead frames for power connections
- Internal thermistor for temperature monitoring
- High level of integration


**Benefits**

- Outstanding performance at high frequency operation
- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Easy paralleling due to positive TC of VCEsat
- Low profile
- RoHS compliant


**Absolute maximum ratings**

| Symbol    | Parameter                             | Max ratings         | Unit         |
|-----------|---------------------------------------|---------------------|--------------|
| $V_{CES}$ | Collector - Emitter Breakdown Voltage | 1200                | V            |
| $I_C$     | Continuous Collector Current          | $T_c = 25^\circ C$  | 100          |
|           |                                       | $T_c = 80^\circ C$  | 75           |
| $I_{CM}$  | Pulsed Collector Current              | $T_c = 25^\circ C$  | 150          |
| $V_{GE}$  | Gate - Emitter Voltage                | $\pm 20$            | V            |
| $P_D$     | Maximum Power Dissipation             | $T_c = 25^\circ C$  | 500          |
| RBSOA     | Reverse Bias Safe Operating Area      | $T_j = 150^\circ C$ | 150A @ 1200V |

**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on [www.microsemi.com](http://www.microsemi.com)

All ratings @  $T_j = 25^\circ\text{C}$  unless otherwise specified

**Electrical Characteristics**

| Symbol        | Characteristic                       | Test Conditions                                 | Min                       | Typ | Max       | Unit          |
|---------------|--------------------------------------|---|---------------------------|-----|-----------|---------------|
| $I_{CES}$     | Zero Gate Voltage Collector Current  | $V_{GE} = 0\text{V}$<br>$V_{CE} = 1200\text{V}$ | $T_j = 25^\circ\text{C}$  |     | 250       | $\mu\text{A}$ |
|               |                                      |   | $T_j = 125^\circ\text{C}$ |     | 500       |               |
| $V_{CE(sat)}$ | Collector Emitter saturation Voltage | $V_{GE} = 15\text{V}$<br>$I_C = 75\text{A}$     | $T_j = 25^\circ\text{C}$  | 3.2 | 3.7       | V             |
|               |                                      |   | $T_j = 125^\circ\text{C}$ | 3.9 |           |               |
| $V_{GE(th)}$  | Gate Threshold Voltage               | $V_{GE} = V_{CE}, I_C = 2.5\text{mA}$           | 4.5                       |     | 6.5       | V             |
| $I_{GES}$     | Gate – Emitter Leakage Current       | $V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}$   |                           |     | $\pm 500$ | nA            |

**Dynamic Characteristics**

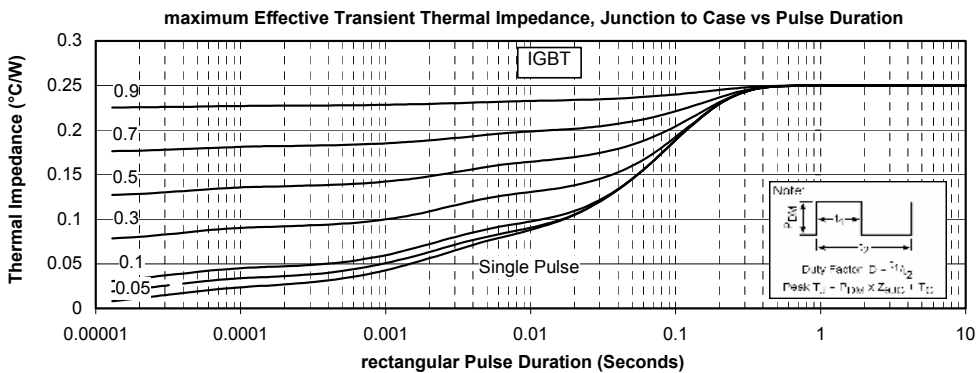
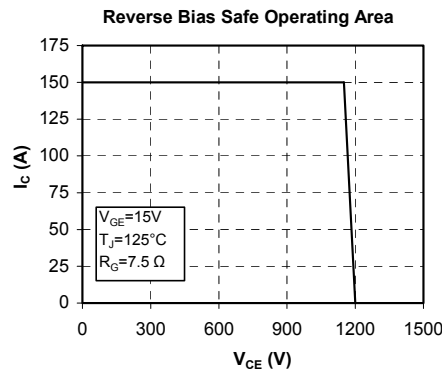
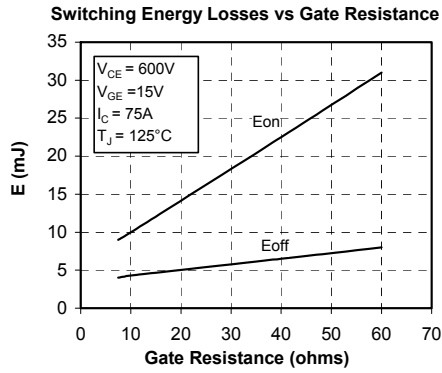
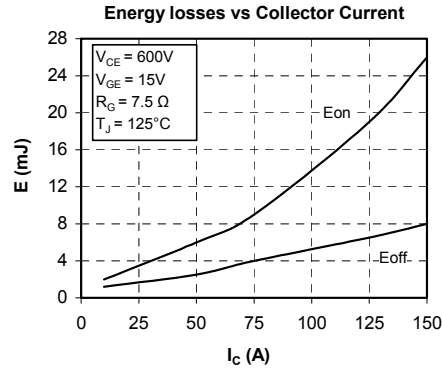
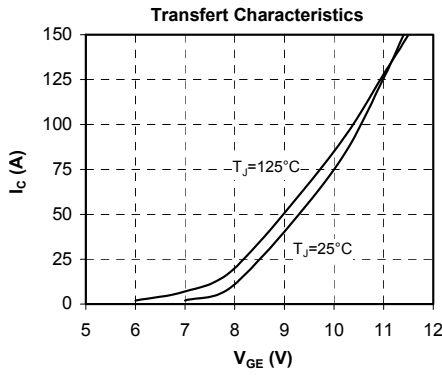
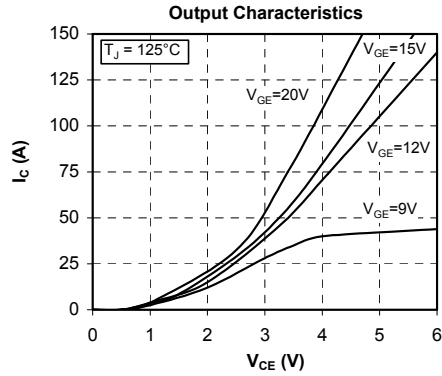
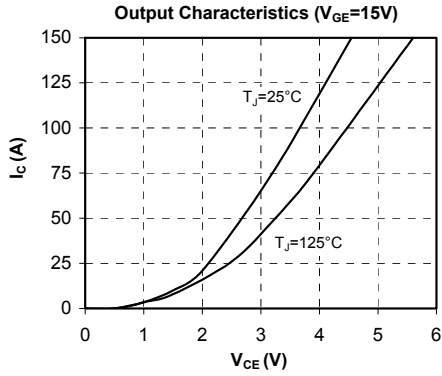
| Symbol       | Characteristic               | Test Conditions  | Min                       | Typ | Max | Unit |
|--------------|------------------------------|--|---------------------------|-----|-----|------|
| $C_{ies}$    | Input Capacitance            | $V_{GE} = 0\text{V}$<br>$V_{CE} = 25\text{V}$<br>$f = 1\text{MHz}$   |                           | 5.1 |     | nF   |
| $C_{oes}$    | Output Capacitance           |  |                           | 0.7 |     |      |
| $C_{res}$    | Reverse Transfer Capacitance |  |                           | 0.4 |     |      |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $25^\circ\text{C}$ )<br>$V_{GE} = 15\text{V}$<br>$V_{Bus} = 600\text{V}$<br>$I_C = 75\text{A}$<br>$R_G = 7.5\Omega$  |                           | 120 |     | ns   |
| $T_r$        | Rise Time                    |  |                           | 50  |     |      |
| $T_{d(off)}$ | Turn-off Delay Time          |  |                           | 310 |     |      |
| $T_f$        | Fall Time                    |  |                           | 20  |     |      |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $125^\circ\text{C}$ )<br>$V_{GE} = 15\text{V}$<br>$V_{Bus} = 600\text{V}$<br>$I_C = 75\text{A}$<br>$R_G = 7.5\Omega$ |                           | 130 |     | ns   |
| $T_r$        | Rise Time                    |  |                           | 60  |     |      |
| $T_{d(off)}$ | Turn-off Delay Time          |  |                           | 360 |     |      |
| $T_f$        | Fall Time                    |  |                           | 30  |     |      |
| $E_{on}$     | Turn-on Switching Energy     | $V_{GE} = 15\text{V}$<br>$V_{Bus} = 600\text{V}$<br>$I_C = 75\text{A}$<br>$R_G = 7.5\Omega$  | $T_j = 125^\circ\text{C}$ | 9   |     | mJ   |
| $E_{off}$    | Turn-off Switching Energy    |  | $T_j = 125^\circ\text{C}$ | 4   |     |      |

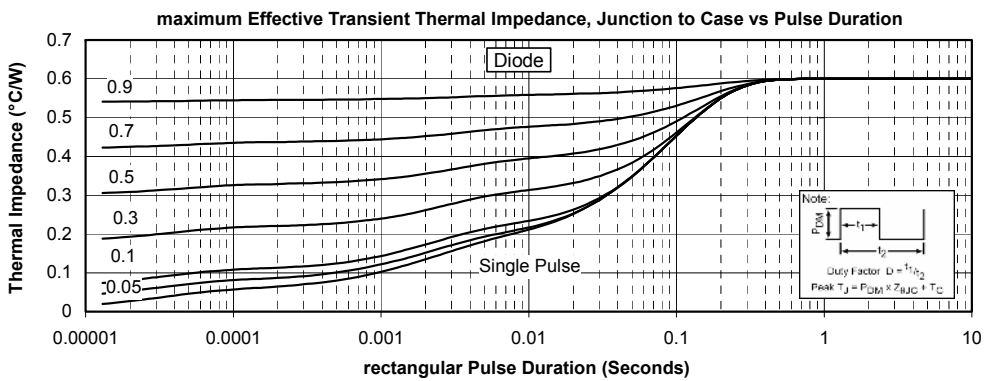
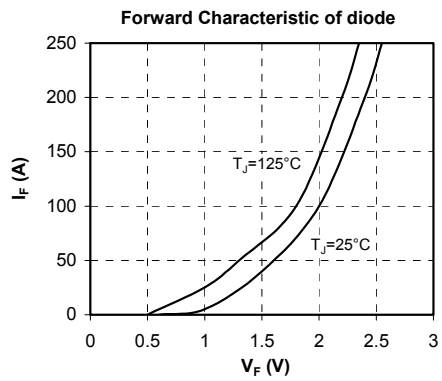
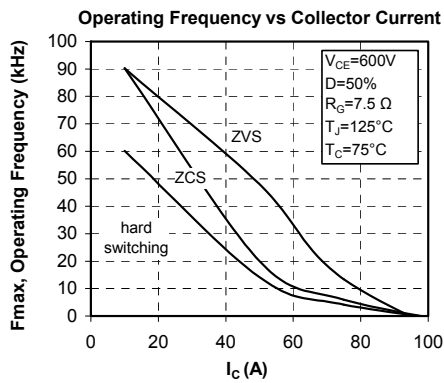
**Diode ratings and characteristics**

| Symbol    | Characteristic                          | Test Conditions   | Min                       | Typ | Max | Unit          |  |
|-----------|---|---|---------------------------|-----|-----|---------------|--|
| $V_{RRM}$ | Maximum Peak Repetitive Reverse Voltage |   | 1200                      |     |     | V             |  |
| $I_{RM}$  | Maximum Reverse Leakage Current         | $V_R = 1200\text{V}$  | $T_j = 25^\circ\text{C}$  |     | 250 | $\mu\text{A}$ |  |
|           |   |   | $T_j = 125^\circ\text{C}$ |     | 500 |               |  |
| $I_F$     | DC Forward Current                      |   |                           | 100 |     | A             |  |
| $V_F$     | Diode Forward Voltage                   | $I_F = 100\text{A}$   |                           | 2.0 | 2.5 | V             |  |
|           |   |   | $I_F = 200\text{A}$       |     | 2.3 |               |  |
|           |   |   | $T_j = 125^\circ\text{C}$ |     | 1.8 |               |  |
| $t_{rr}$  | Reverse Recovery Time                   | $I_F = 100\text{A}$<br>$V_R = 800\text{V}$<br>$di/dt = 200\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$  | 420 |     | ns            |  |
|           |   |   | $T_j = 125^\circ\text{C}$ | 580 |     |               |  |
| $Q_{rr}$  | Reverse Recovery Charge                 | $I_F = 100\text{A}$<br>$V_R = 800\text{V}$<br>$di/dt = 200\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$  | 1.2 |     | $\mu\text{C}$ |  |
|           |   |   | $T_j = 125^\circ\text{C}$ | 5.3 |     |               |  |



## Typical Performance Curve





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