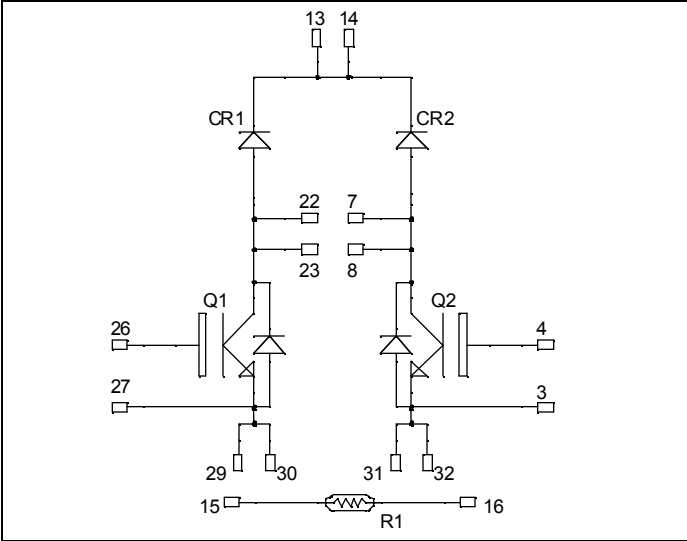


**Dual Boost chopper
NPT IGBT Power Module**

**$V_{CES} = 600V$
 $I_C = 50A @ T_c = 80^\circ C$**

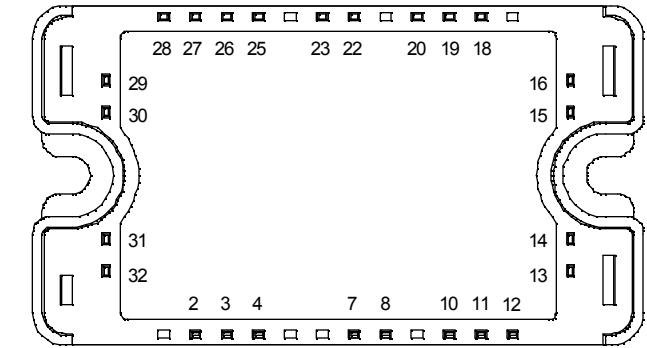


Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

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
 - Avalanche energy rated
 - RBSOA and SCSOA rated
 - Symmetrical design
- Kelvin emitter for easy drive
- Very low stray inductance
- High level of integration
- Internal thermistor for temperature monitoring



All multiple inputs and outputs must be shorted together
Example: 13/14 ; 29/30 ; 22/23 ...

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile
- Easy paralleling due to positive TC of VCEsat
- Each leg can be easily paralleled to achieve a single boost of twice the current capability.

Absolute maximum ratings

| Symbol | Parameter | Max ratings | Unit |
|-----------|---------------------------------------|---------------------|-----------|
| V_{CES} | Collector - Emitter Breakdown Voltage | 600 | V |
| I_C | Continuous Collector Current | $T_c = 25^\circ C$ | 65 |
| | | $T_c = 80^\circ C$ | 50 |
| I_{CM} | Pulsed Collector Current | $T_c = 25^\circ C$ | 230 |
| V_{GE} | Gate - Emitter Voltage | ± 20 | V |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ | 250 |
| RBSOA | Reverse Bias Safe Operating Area | $T_j = 125^\circ C$ | 100A@500V |

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

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

Electrical Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|---------------------------------------|--|-----|-----|------|---------------|
| BV_{CES} | Collector - Emitter Breakdown Voltage | $V_{GE} = 0\text{V}, I_C = 500\mu\text{A}$ | 600 | | | V |
| I_{CES} | Zero Gate Voltage Collector Current | $V_{GE} = 0\text{V}$ | | 1 | 500 | μA |
| | | $V_{CE} = 600\text{V}$ | | 1 | | mA |
| $V_{CE(on)}$ | Collector Emitter on Voltage | $V_{GE} = 15\text{V}$ | 1.7 | 2.0 | 2.45 | V |
| | | $I_C = 50\text{A}$ | | 2.2 | | |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE} = V_{CE}, I_C = 1\text{mA}$ | 4 | | 6 | V |
| I_{GES} | Gate - Emitter Leakage Current | $V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$ | | | 400 | nA |

Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit | |
|--------------|------------------------------|--|-----|------|-----|-------------|-------------|
| C_{ies} | Input Capacitance | $V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$ | | 2200 | | pF | |
| C_{oes} | Output Capacitance | | | 323 | | | |
| C_{res} | Reverse Transfer Capacitance | | | 200 | | | |
| Q_g | Total gate Charge | $V_{GE} = 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 50\text{A}$ | | 166 | | nC | |
| Q_{ge} | Gate - Emitter Charge | | | 20 | | | |
| Q_{gc} | Gate - Collector Charge | | | 100 | | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (25°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 400\text{V}$ $I_C = 50\text{A}$ $R_G = 2.7\Omega$ | | 40 | | ns | |
| T_r | Rise Time | | | 9 | | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 120 | | | |
| T_f | Fall Time | | | 12 | | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (125°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 400\text{V}$ $I_C = 50\text{A}$ $R_G = 2.7\Omega$ | | 42 | | ns | |
| T_r | Rise Time | | | 10 | | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 130 | | | |
| T_f | Fall Time | | | 21 | | | |
| E_{on} | Turn-on Switching Energy ① | | | 0.5 | | | mJ |
| E_{off} | Turn-off Switching Energy ② | | | 1 | | | |

① E_{on} includes diode reverse recovery

② In accordance with JEDEC standard JESD24-1

Diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|-------------|---|---|---------------------------|-----|-----|---------------|
| V_{RRM} | Maximum Peak Repetitive Reverse Voltage | | 600 | | | V |
| I_{RM} | Maximum Reverse Leakage Current | $V_R = 600\text{V}$ | $T_j = 25^\circ\text{C}$ | | 250 | μA |
| | | | $T_j = 125^\circ\text{C}$ | | 500 | |
| $I_{F(AV)}$ | Maximum Average Forward Current | 50% duty cycle | | 60 | | A |
| V_F | Diode Forward Voltage | $I_F = 60\text{A}$ | | 1.6 | 1.8 | V |
| | | $I_F = 120\text{A}$ | | 1.9 | | |
| | | $I_F = 60\text{A}$ | $T_j = 125^\circ\text{C}$ | | 1.4 | |
| t_{rr} | Reverse Recovery Time | $I_F = 60\text{A}$ $V_R = 400\text{V}$ | $T_j = 25^\circ\text{C}$ | | 130 | ns |
| | | | $T_j = 125^\circ\text{C}$ | | 170 | |
| Q_{rr} | Reverse Recovery Charge | $di/dt = 200\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | | 220 | nC |
| | | | $T_j = 125^\circ\text{C}$ | | 920 | |

Temperature sensor NTC

Symbol Characteristic

| | | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> |
|--------------------|----------------------------|------------|------------|------------|-------------|
| R ₂₅ | Resistance @ 25°C | | 68 | | kΩ |
| B _{25/85} | T ₂₅ = 298.16 K | | 4080 | | K |

$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

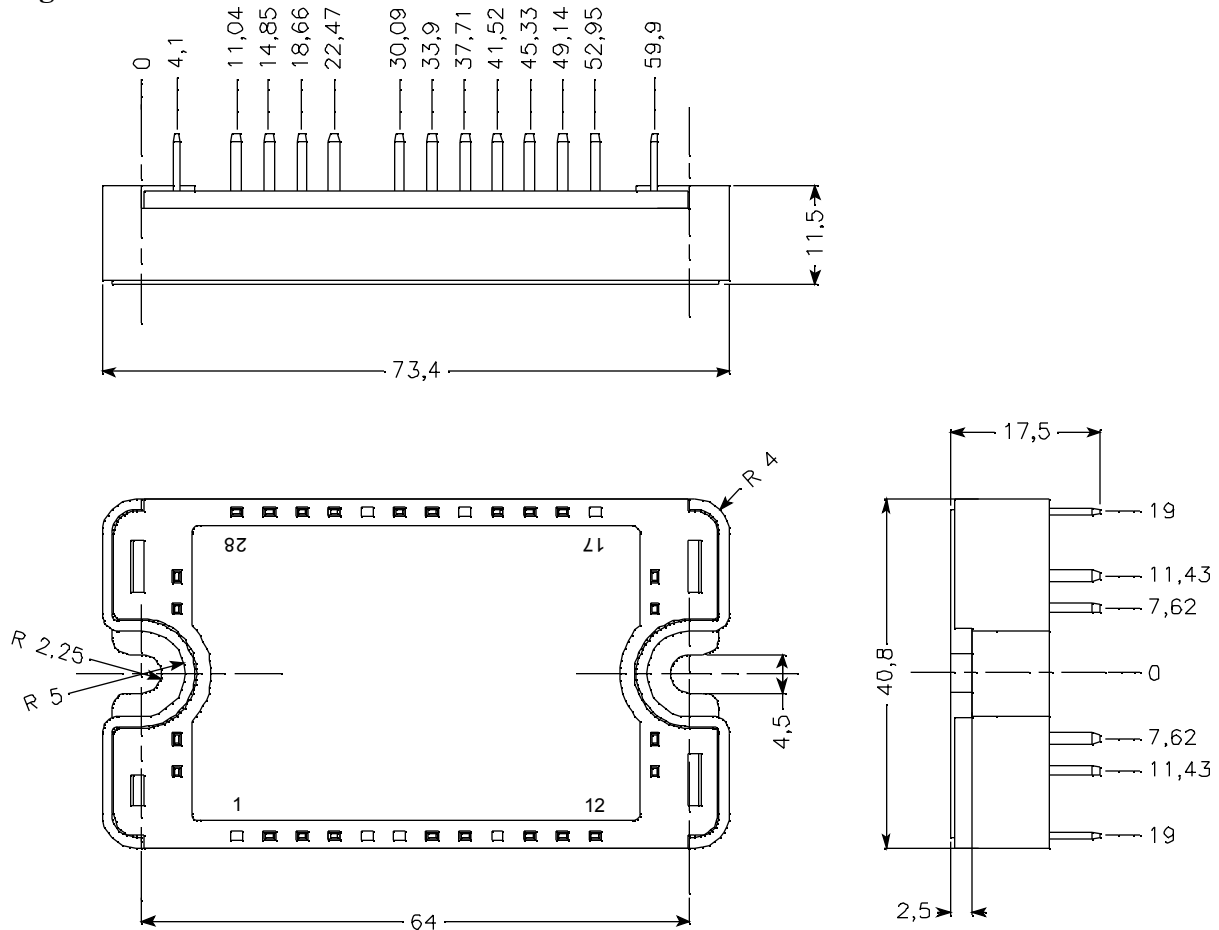
T: Thermistor temperature
R_T: Thermistor value at T

Thermal and package characteristics

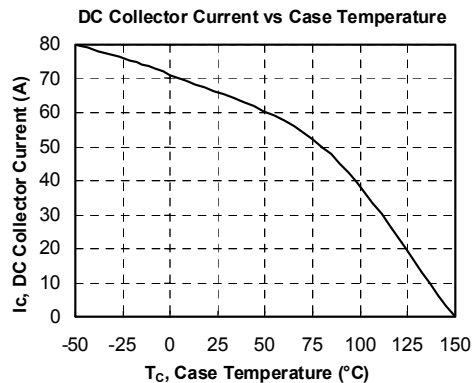
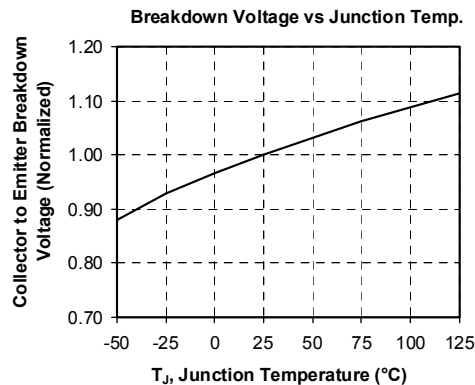
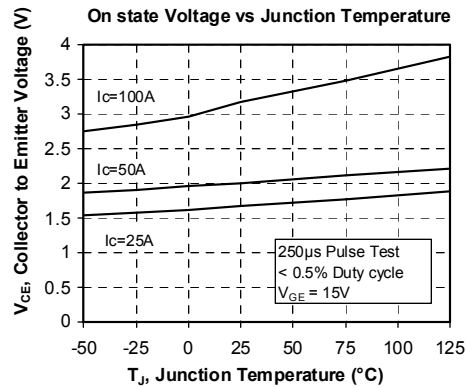
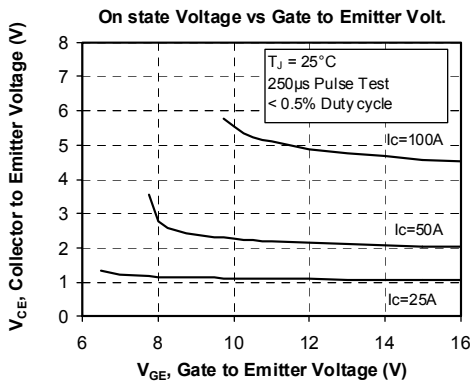
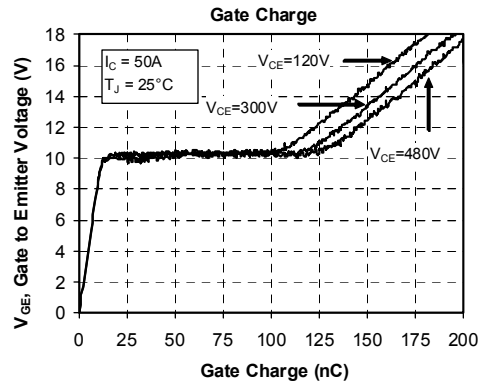
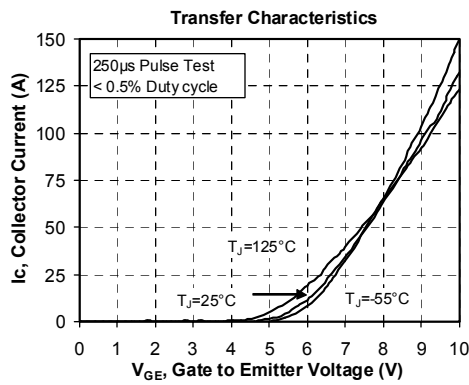
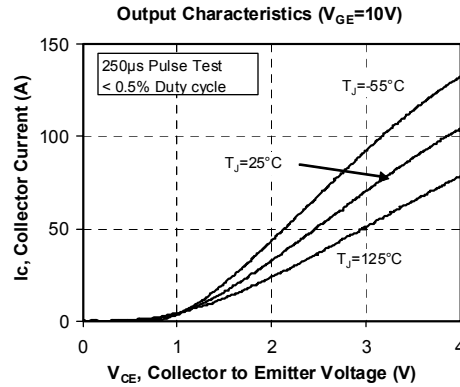
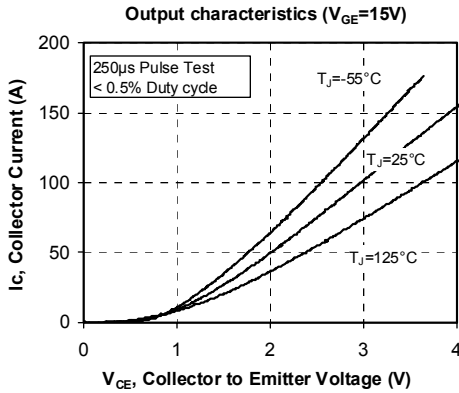
Symbol Characteristic

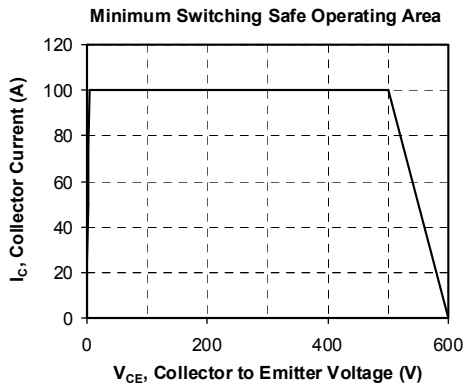
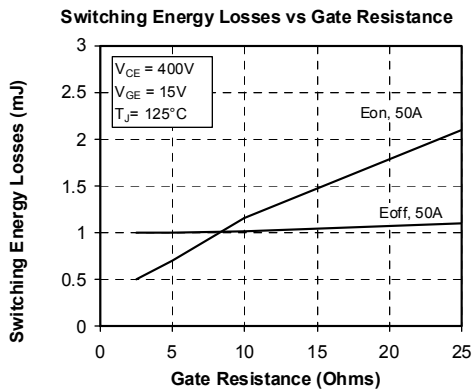
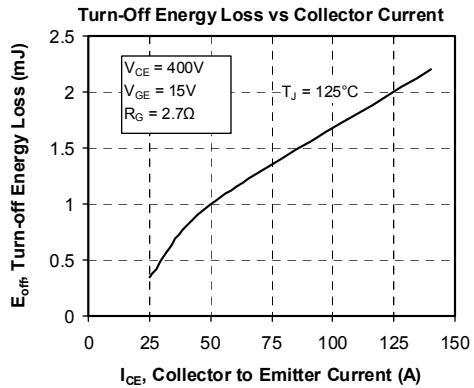
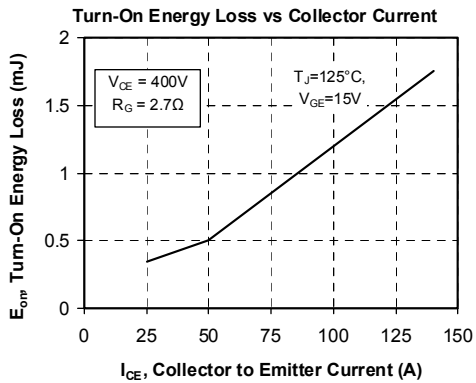
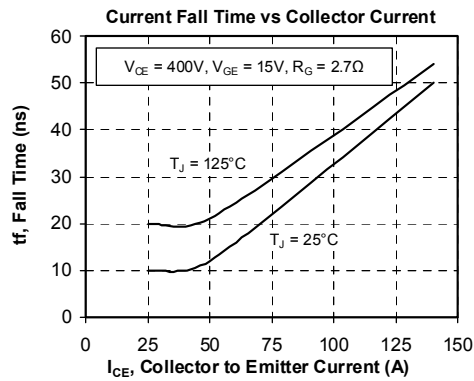
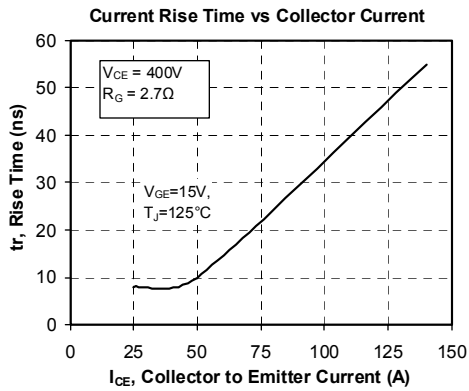
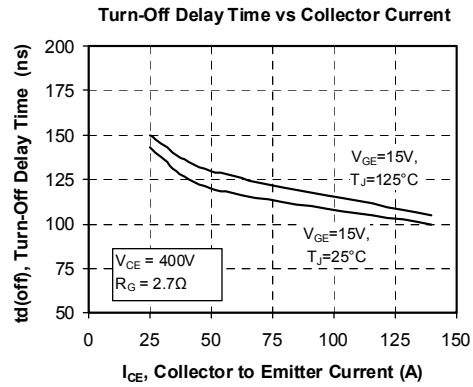
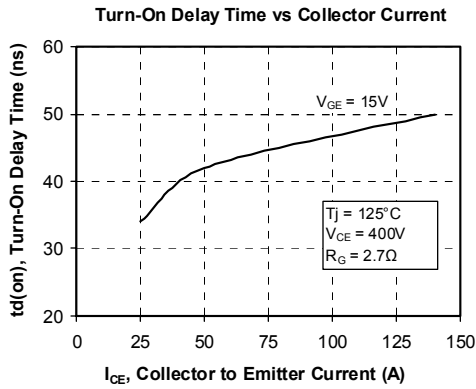
| | | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> | |
|-------------------|--|------------|-------------|------------|-------------|-----|
| R _{thJC} | Junction to Case | IGBT | | 0.5 | °C/W | |
| | | Diode | | 0.9 | | |
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t=1 min, I _{isol} <1mA, 50/60Hz | 2500 | | | V | |
| T _J | Operating junction temperature range | -40 | | 150 | °C | |
| T _{STG} | Storage Temperature Range | -40 | | 125 | | |
| T _C | Operating Case Temperature | -40 | | 100 | | |
| Torque | Mounting torque | | To heatsink | M4 | 4.7 | N.m |
| Wt | Package Weight | | | | 110 | g |

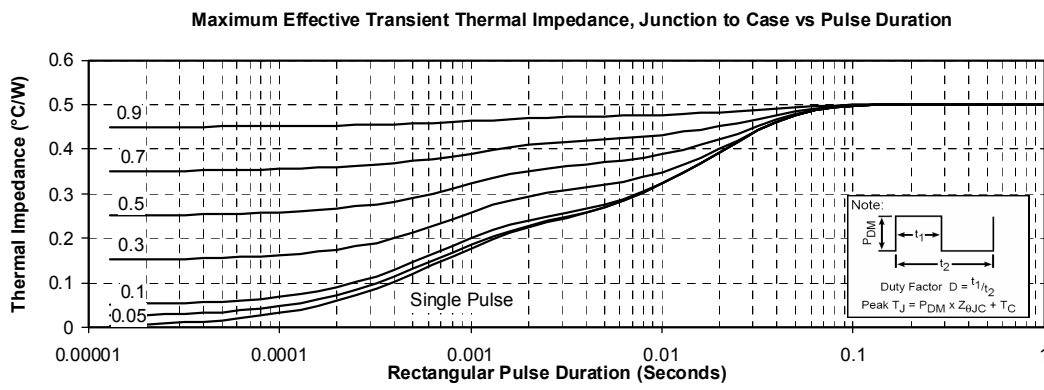
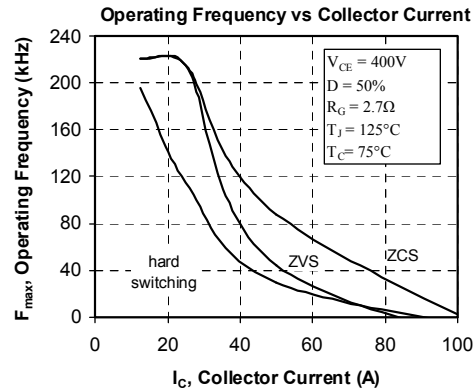
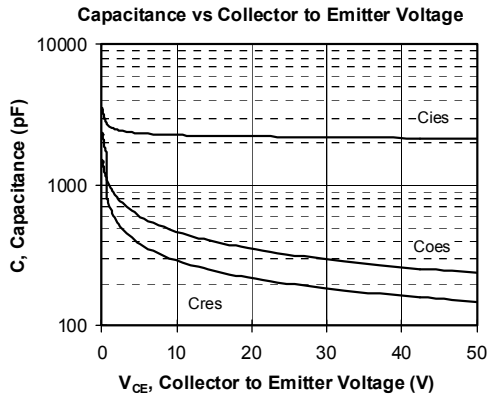
Package outline



Typical Performance Curve







APT reserves the right to change, without notice, the specifications and information contained herein

APT's products are covered by one or more of U.S patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. U.S and Foreign patents pending. All Rights Reserved.