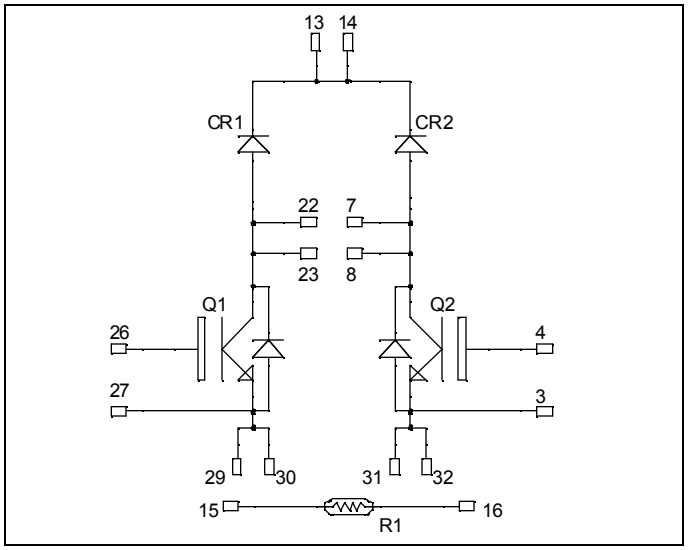
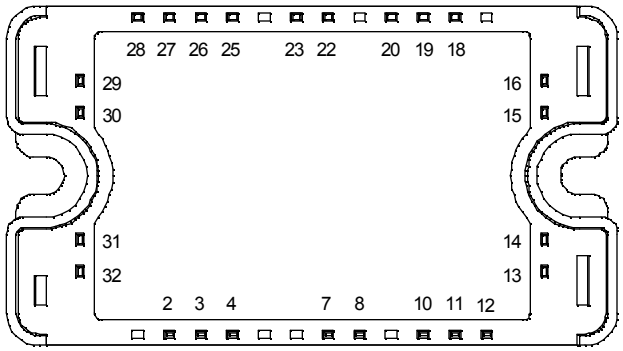
# APTGT30DDA60T3G

## *Dual Boost chopper*
## *Trench + Field Stop IGBT® Power Module*

**$V_{CES}$ = 600V**
**$I_C$ = 30A @ Tc = 80°C**




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

**Application**

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

**Features**

- Trench + Field Stop IGBT® Technology
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 20 kHz
  - Soft recovery parallel diodes
  - Low diode VF
  - Low leakage current
  - Avalanche energy rated
  - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- Very low stray inductance
  - Symmetrical design
- High level of integration
- Internal thermistor for temperature monitoring

**Benefits**

- Stable temperature behavior
- Very rugged
- Solderable terminals for easy PCB mounting
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of VCEsat
- Low profile
- Each leg can be easily paralleled to achieve a single boost of twice the current capability.
- RoHS Compliant

## Absolute maximum ratings

| *Symbol* | *Parameter* | | *Max ratings* | *Unit* |
|---|---|---|---|---|
| $V_{CES}$ | Collector - Emitter Breakdown Voltage | | 600 | V |
| $I_C$ | Continuous Collector Current | $T_C$ = 25°C | 50 | A |
| | | $T_C$ = 80°C | 30 | |
| $I_{CM}$ | Pulsed Collector Current | $T_C$ = 25°C | 60 | |
| $V_{GE}$ | Gate – Emitter Voltage | | ±20 | V |
| $P_D$ | Maximum Power Dissipation | $T_C$ = 25°C | 90 | W |
| RBSOA | Reverse Bias Safe Operating Area | $T_J$ = 150°C | 60A @ 550V | |

**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handing Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

**All ratings @ $T_j$ = 25°C unless otherwise specified**

## Electrical Characteristics

| *Symbol* | *Characteristic* | *Test Conditions* | | *Min* | *Typ* | *Max* | *Unit* |
|---|---|---|---|---|---|---|---|
| $I_{CES}$ | Zero Gate Voltage Collector Current | $V_{GE}$ = 0V, $V_{CE}$ = 600V | | | | 250 | µA |
| $V_{CE(sat)}$ | Collector Emitter Saturation Voltage | $V_{GE}$ =15V, $I_C$ = 30A | $T_j$ = 25°C | | 1.5 | 1.9 | V |
| | | | $T_j$ = 150°C | | 1.7 | | |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE}$ = $V_{CE}$, $I_C$ = 400µA | | 5.0 | 5.8 | 6.5 | V |
| $I_{GES}$ | Gate – Emitter Leakage Current | $V_{GE}$ = 20V, $V_{CE}$ = 0V | | | | 300 | nA |

## Dynamic Characteristics

| *Symbol* | *Characteristic* | *Test Conditions* | | *Min* | *Typ* | *Max* | *Unit* |
|---|---|---|---|---|---|---|---|
| $C_{ies}$ | Input Capacitance | $V_{GE}$ = 0V<br>$V_{CE}$ = 25V<br>f = 1MHz | | | 1600 | | pF |
| $C_{oes}$ | Output Capacitance | | | | 110 | | |
| $C_{res}$ | Reverse Transfer Capacitance | | | | 50 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (25°C)<br>$V_{GE}$ = ±15V<br>$V_{Bus}$ = 300V<br>$I_C$ = 30A<br>$R_G$ = 10Ω | | | 110 | | ns |
| $T_r$ | Rise Time | | | | 45 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | | 200 | | |
| $T_f$ | Fall Time | | | | 40 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (150°C)<br>$V_{GE}$ = ±15V<br>$V_{Bus}$ = 300V<br>$I_C$ = 30A<br>$R_G$ = 10Ω | | | 120 | | ns |
| $T_r$ | Rise Time | | | | 50 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | | 250 | | |
| $T_f$ | Fall Time | | | | 60 | | |
| $E_{on}$ | Turn-on Switching Energy | $V_{GE}$ = ±15V<br>$V_{Bus}$ = 300V<br>$I_C$ = 30A<br>$R_G$ = 10Ω | $T_j$ = 25°C | | 0.16 | | mJ |
| | | | $T_j$ = 150°C | | 0.3 | | |
| $E_{off}$ | Turn-off Switching Energy | | $T_j$ = 25°C | | 0.7 | | mJ |
| | | | $T_j$ = 150°C | | 1.05 | | |

## Chopper 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 | $V_R$=600V | $T_j$ = 25°C | | | 250 | µA |
| | | | $T_j$ = 150°C | | | 500 | |
| $I_F$ | DC Forward Current | | Tc = 80°C | | 30 | | A |
| $V_F$ | Diode Forward Voltage | $I_F$ = 30A<br>$V_{GE}$ = 0V | $T_j$ = 25°C | | 1.6 | 2 | V |
| | | | $T_j$ = 150°C | | 1.5 | | |
| $t_{rr}$ | Reverse Recovery Time | $I_F$ = 30A<br>$V_R$ = 300V<br>di/dt =1800A/µs | $T_j$ = 25°C | | 100 | | ns |
| | | | $T_j$ = 150°C | | 150 | | |
| $Q_{rr}$ | Reverse Recovery Charge | | $T_j$ = 25°C | | 1.5 | | µC |
| | | | $T_j$ = 150°C | | 3.1 | | |
| $E_r$ | Reverse Recovery Energy | | $T_j$ = 25°C | | 0.34 | | mJ |
| | | | $T_j$ = 150°C | | 0.75 | | |

## Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

| Symbol | Characteristic | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| $R_{25}$ | Resistance @ 25°C | | 50 | | kΩ |
| $B_{25/85}$ | $T_{25}$ = 298.15 K | | 3952 | | K |

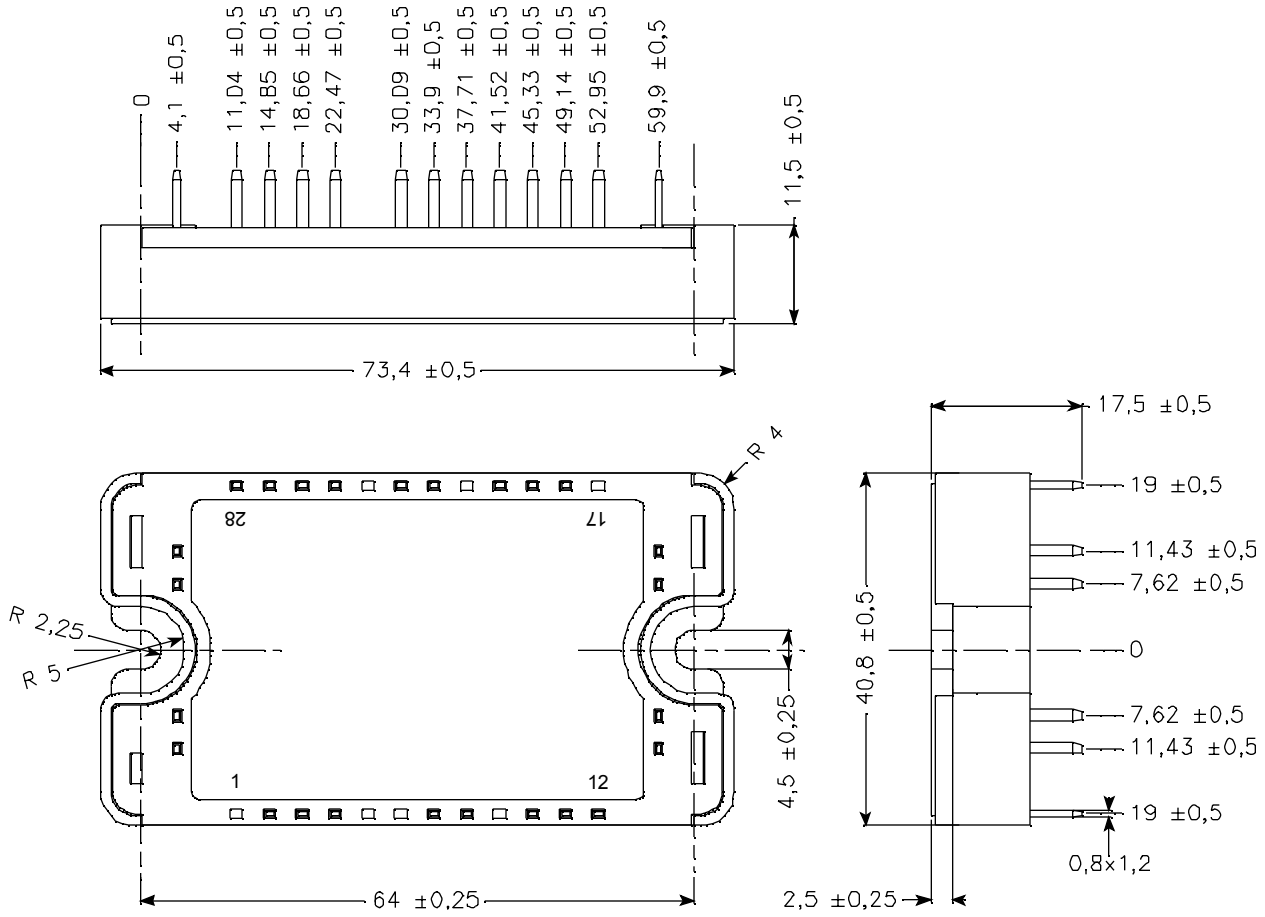
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature
$R_T$: Thermistor value at T

## Thermal and package characteristics

| Symbol | Characteristic | | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $R_{thJC}$ | Junction to Case Thermal Resistance | | IGBT | | | 1.6 | °C/W |
| | | | Diode | | | 2.45 | |
| $V_{ISOL}$ | RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz | | | 2500 | | | V |
| $T_J$ | Operating junction temperature range | | | -40 | | 175 | °C |
| $T_{STG}$ | Storage Temperature Range | | | -40 | | 125 | |
| $T_C$ | Operating Case Temperature | | | -40 | | 100 | |
| Torque | Mounting torque | To heatsink | M4 | 2.5 | | 4.7 | N.m |
| Wt | Package Weight | | | | | 110 | g |

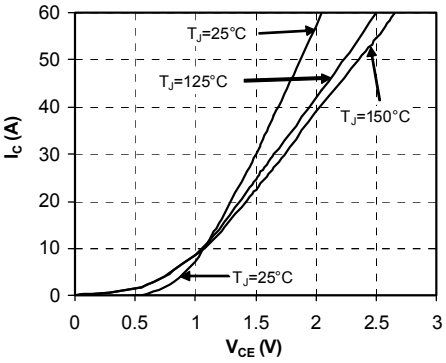
## SP3 Package outline (dimensions in mm)



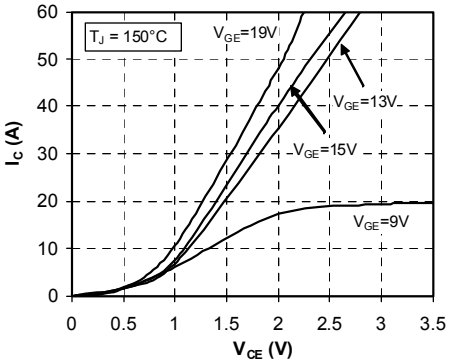

See application note 1901 - Mounting Instructions for SP3 Power Modules on www.microsemi.com

## Typical Performance Curve

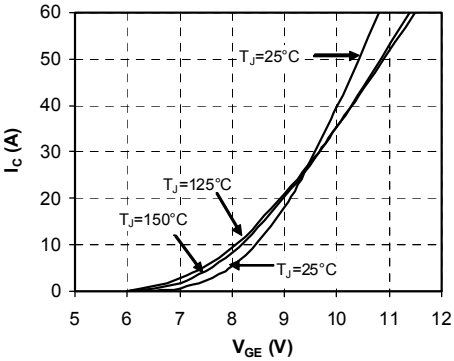
Output Characteristics ($V_{GE}$=15V)



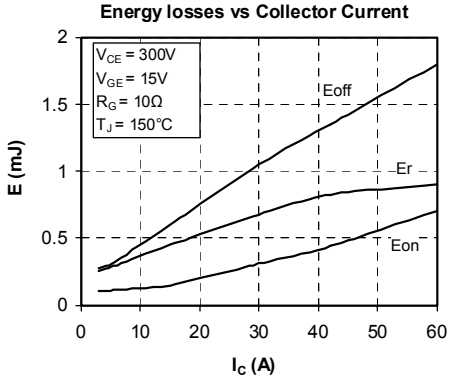

Output Characteristics



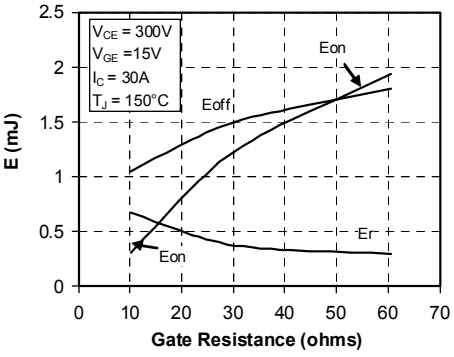

Transfert Characteristics



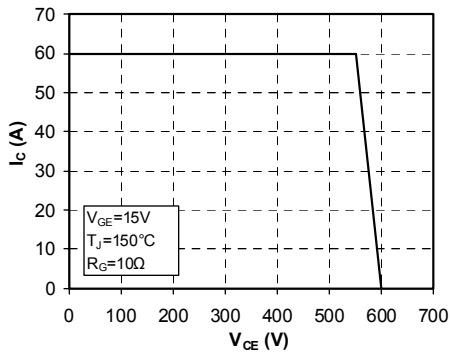

Energy losses vs Collector Current




Switching Energy Losses vs Gate Resistance




Reverse Bias Safe Operating Area




maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration