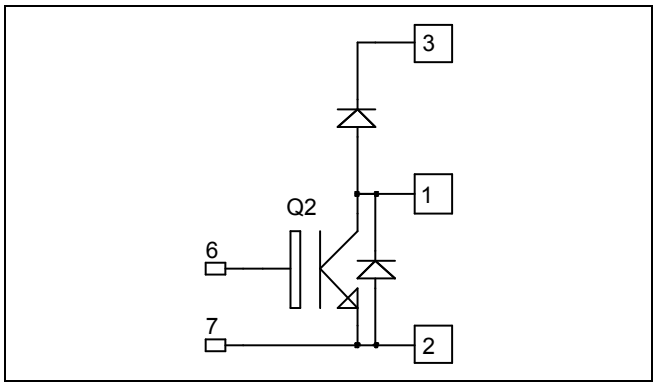
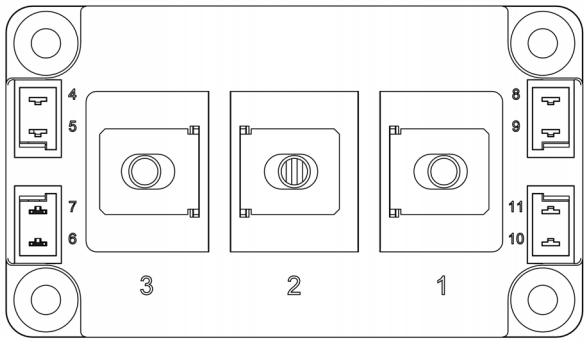
# APTGT300DA170D3G

***Boost chopper***
***Trench + Field Stop IGBT3***
***Power Module***

**$V_{CES}$ = 1700V**
**$I_C$ = 300A @ Tc = 80°C**




**Application**

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

**Features**

- Trench + Field Stop IGBT3 Technology
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 20 kHz
  - Soft recovery parallel diodes
  - Low diode VF
  - Low leakage current
  - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- High level of integration
- M6 power connectors

**Benefits**

- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive $T_C$ of $V_{CEsat}$
- RoHS Compliant

## Absolute maximum ratings

| *Symbol* | *Parameter* | | *Max ratings* | *Unit* |
|---|---|---|---|---|
| $V_{CES}$ | Collector - Emitter Breakdown Voltage | | 1700 | V |
| $I_C$ | Continuous Collector Current | $T_C$ = 25°C | 400 | A |
| | | $T_C$ = 80°C | 300 | |
| $I_{CM}$ | Pulsed Collector Current | $T_C$ = 25°C | 600 | |
| $V_{GE}$ | Gate – Emitter Voltage | | ±20 | V |
| $P_D$ | Maximum Power Dissipation | $T_C$ = 25°C | 1470 | W |
| RBSOA | Reverse Bias Safe Operating Area | $T_j$ = 125°C | 600A@1650V | |

**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling 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, $V_{CE}$ = 1700V | | | | 3 | mA |
| $V_{CE(on)}$ | Collector Emitter on Voltage | $V_{GE}$ = 15V, $I_C$ = 300A | $T_j$ = 25°C | | 2.0 | 2.5 | V |
| | | | $T_j$ = 125°C | | 2.4 | | |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE}$ = $V_{CE}$ , $I_C$ = 12 mA | | 5.2 | 5.8 | 6.4 | V |
| $I_{GES}$ | Gate – Emitter Leakage Current | $V_{GE}$ = 20V, $V_{CE}$ = 0V | | | | 400 | nA |

## Dynamic Characteristics

| *Symbol* | *Characteristic* | *Test Conditions* | | *Min* | *Typ* | *Max* | *Unit* |
|---|---|---|---|---|---|---|---|
| $C_{ies}$ | Input Capacitance | $V_{GE}$ = 0V, $V_{CE}$ = 25V f = 1MHz | | | 27 | | nF |
| $C_{res}$ | Reverse Transfer Capacitance | | | | 0.9 | | |
| $Q_G$ | Gate charge | $V_{GE}$=±15V, $I_C$=300A $V_{CE}$=900V | | | 3.5 | | µC |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (25°C) $V_{GE}$ = ±15V $V_{Bus}$ = 900V $I_C$ = 300A $R_G$ = 4.7Ω | | | 280 | | ns |
| $T_r$ | Rise Time | | | | 80 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | | 850 | | |
| $T_f$ | Fall Time | | | | 120 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (125°C) $V_{GE}$ = ±15V $V_{Bus}$ = 900V $I_C$ = 300A $R_G$ = 4.7Ω | | | 300 | | ns |
| $T_r$ | Rise Time | | | | 100 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | | 1000 | | |
| $T_f$ | Fall Time | | | | 200 | | |
| $E_{on}$ | Turn On Energy | $V_{GE}$ = ±15V $V_{Bus}$ = 900V $I_C$ = 300A $R_G$ = 4.7Ω | $T_j$ = 25°C | | 71 | | mJ |
| | | | $T_j$ = 125°C | | 105 | | |
| $E_{off}$ | Turn Off Energy | | $T_j$ = 25°C | | 64 | | |
| | | | $T_j$ = 125°C | | 94 | | |
| $I_{sc}$ | Short Circuit data | $V_{GE}$ ≤15V ; $V_{Bus}$ = 1000V $t_p$ ≤ 10µs ; $T_j$ = 125°C | | | 1200 | | A |

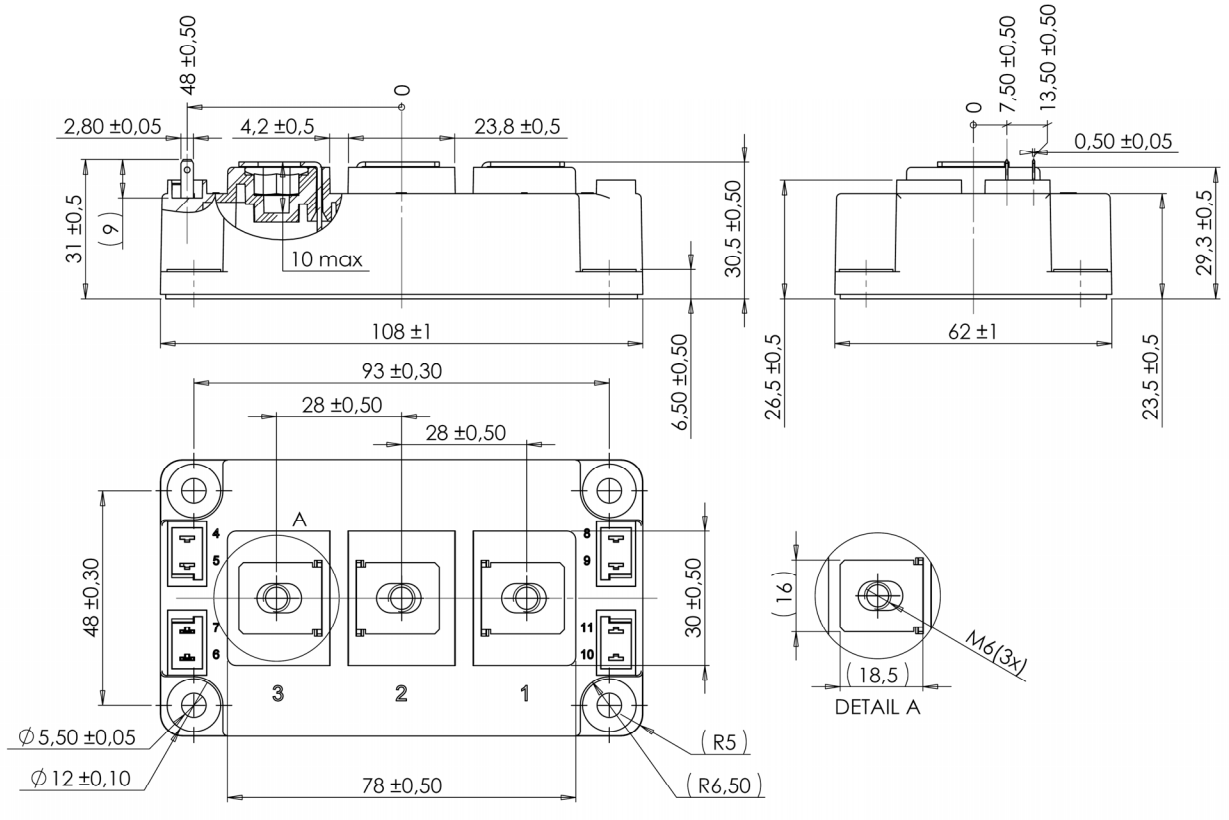
## Reverse diode ratings and characteristics

| *Symbol* | *Characteristic* | *Test Conditions* | | *Min* | *Typ* | *Max* | *Unit* |
|---|---|---|---|---|---|---|---|
| $V_{RRM}$ | Maximum Peak Repetitive Reverse Voltage | | | 1700 | | | V |
| $I_{RRM}$ | Maximum Reverse Leakage Current | $V_R$=1700V | $T_j$ = 25°C | | | 750 | µA |
| | | | $T_j$ = 125°C | | | 1000 | |
| $I_F$ | DC Forward Current | | Tc = 80°C | | 300 | | A |
| $V_F$ | Diode Forward Voltage | $I_F$ = 300A | $T_j$ = 25°C | | 1.8 | 2.2 | V |
| | | | $T_j$ = 125°C | | 1.9 | | |
| $t_{rr}$ | Reverse Recovery Time | $I_F$ = 300A $V_R$ = 900V di/dt =3500A/µs | $T_j$ = 25°C | | 385 | | ns |
| | | | $T_j$ = 125°C | | 490 | | |
| $Q_{rr}$ | Reverse Recovery Charge | | $T_j$ = 25°C | | 76 | | µC |
| | | | $T_j$ = 125°C | | 124 | | |
| $E_{rr}$ | Reverse Recovery Energy | | $T_j$ = 25°C | | 35 | | mJ |
| | | | $T_j$ = 125°C | | 70 | | |

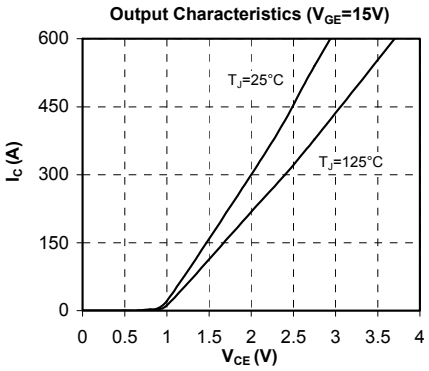
## Thermal and package characteristics

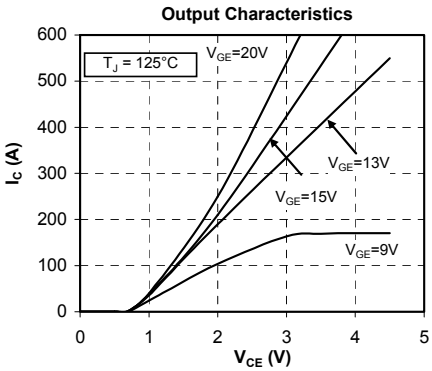
| *Symbol* | *Characteristic* | | | *Min* | *Typ* | *Max* | *Unit* |
|---|---|---|---|---|---|---|---|
| $R_{thJC}$ | Junction to Case Thermal Resistance | | IGBT | | | 0.085 | °C/W |
| | | | Diode | | | 0.13 | |
| $V_{ISOL}$ | RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz | | | 4000 | | | V |
| $T_J$ | Operating junction temperature range | | | -40 | | 150 | °C |
| $T_{STG}$ | Storage Temperature Range | | | -40 | | 125 | |
| $T_C$ | Operating Case Temperature | | | -40 | | 125 | |
| Torque | Mounting torque | For terminals | M6 | 3 | | 5 | N.m |
| | | To Heatsink | M6 | 3 | | 5 | |
| Wt | Package Weight | | | | | 350 | g |

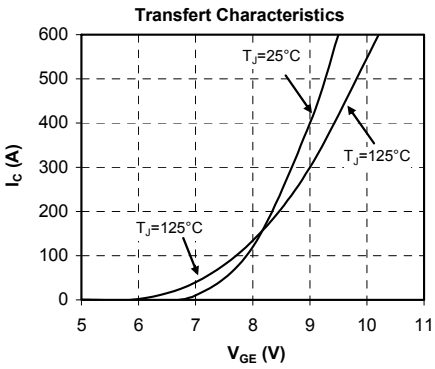
## D3 Package outline (dimensions in mm)

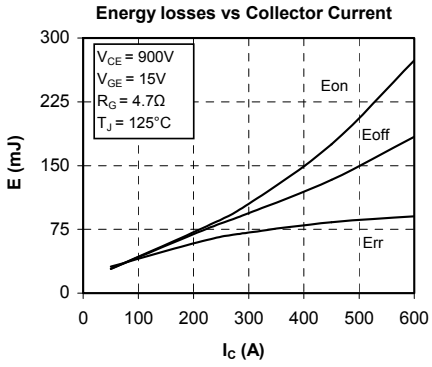


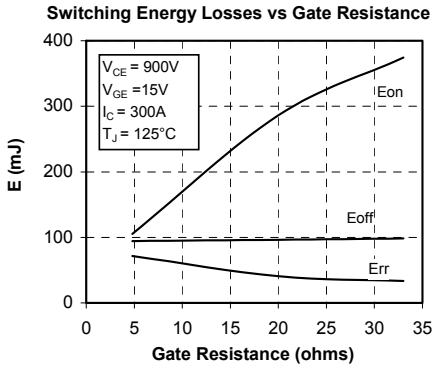
## Typical Performance Curve

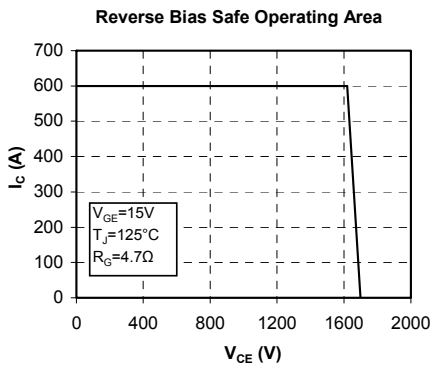


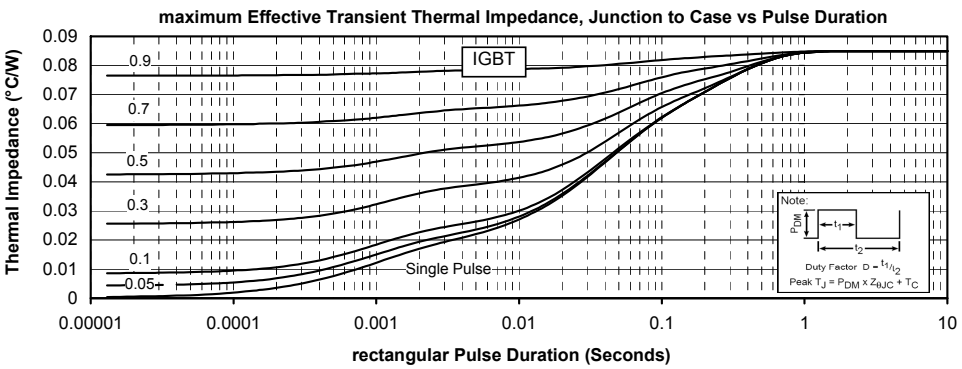



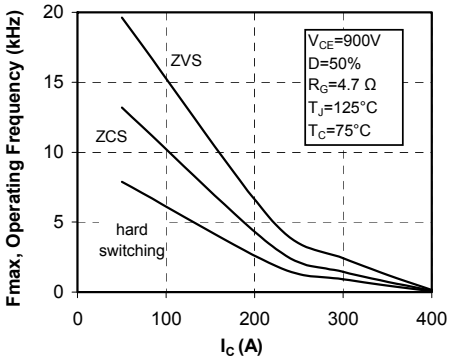



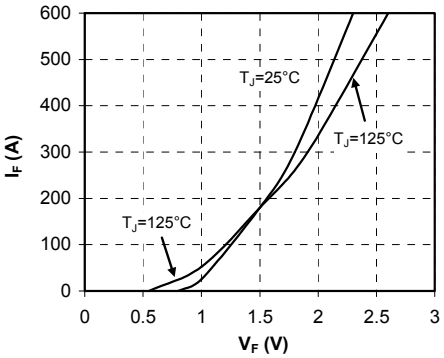



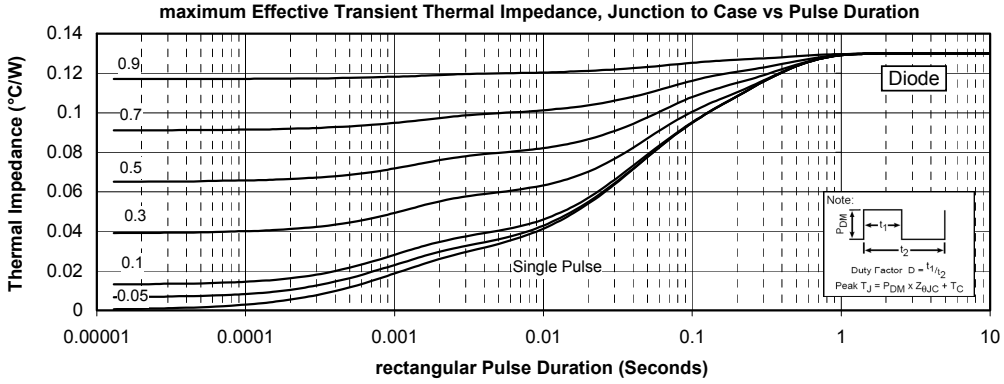
**Operating Frequency vs Collector Current**




**Forward Characteristic of diode**




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



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