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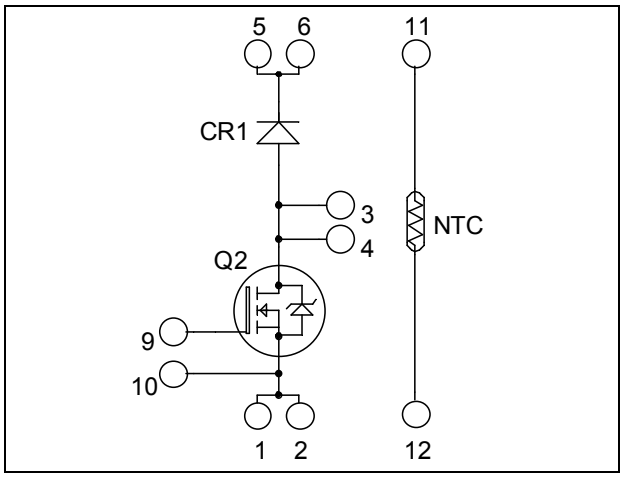
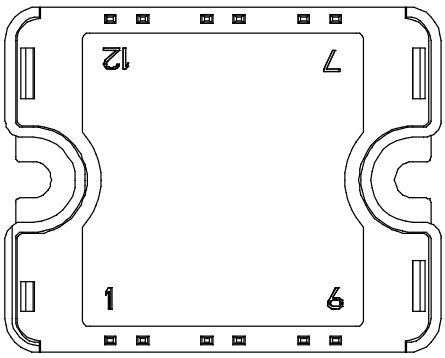
# APTM100DA33T1G

## Boost chopper MOSFET Power Module

$V_{DSS}$ = 1000V
$R_{DSon}$ = 330mΩ typ @ Tj = 25°C
$I_D$ = 23A @ Tc = 25°C




Pins 1/2 ; 3/4 ; 5/6 must be shorted together

**Application**

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

**Features**

- Power MOS 8™ MOSFETs
  - Low $R_{DSon}$
  - Low input and Miller capacitance
  - Low gate charge
  - Avalanche energy rated
  - Very rugged
- Very low stray inductance
- Internal thermistor for temperature monitoring
- High level of integration

**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
- RoHS Compliant

### Absolute maximum ratings

| *Symbol* | *Parameter* | | *Max ratings* | *Unit* |
|---|---|---|---|---|
| $V_{DSS}$ | Drain - Source Breakdown Voltage | | 1000 | V |
| $I_D$ | Continuous Drain Current | $T_c$ = 25°C | 23 | A |
| | | $T_c$ = 80°C | 17 | |
| $I_{DM}$ | Pulsed Drain current | | 140 | |
| $V_{GS}$ | Gate - Source Voltage | | ±30 | V |
| $R_{DSon}$ | Drain - Source ON Resistance | | 396 | mΩ |
| $P_D$ | Maximum Power Dissipation | $T_c$ = 25°C | 390 | W |
| $I_{AR}$ | Avalanche current (repetitive and non repetitive) | | 18 | A |

**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* |
|---|---|---|---|---|---|---|---|
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ =1000V<br>$V_{GS}$ = 0V | $T_j$ = 25°C | | | 100 | µA |
| | | | $T_j$ = 125°C | | | 500 | |
| $R_{DS(on)}$ | Drain – Source on Resistance | $V_{GS}$ = 10V, $I_D$ = 18A | | | 330 | 396 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$ = $V_{DS}$, $I_D$ = 2.5mA | | 3 | 4 | 5 | V |
| $I_{GSS}$ | Gate – Source Leakage Current | $V_{GS}$ = ±30 V | | | | ±100 | nA |

## Dynamic Characteristics

| *Symbol* | *Characteristic* | *Test Conditions* | *Min* | *Typ* | *Max* | *Unit* |
|---|---|---|---|---|---|---|
| $C_{iss}$ | Input Capacitance | $V_{GS}$ = 0V<br>$V_{DS}$ = 25V<br>f = 1MHz | | 7868 | | pF |
| $C_{oss}$ | Output Capacitance | | | 825 | | |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 104 | | |
| $Q_g$ | Total gate Charge | $V_{GS}$ = 10V<br>$V_{Bus}$ = 500V<br>$I_D$ = 18A | | 305 | | nC |
| $Q_{gs}$ | Gate – Source Charge | | | 55 | | |
| $Q_{gd}$ | Gate – Drain Charge | | | 145 | | |
| $T_{d(on)}$ | Turn-on Delay Time | **Resistive switching @ 25°C**<br>$V_{GS}$ = 15V<br>$V_{Bus}$ = 667V<br>$I_D$ = 18A<br>$R_G$ = 2.2Ω | | 44 | | ns |
| $T_r$ | Rise Time | | | 40 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 150 | | |
| $T_f$ | Fall Time | | | 38 | | |

## Chopper 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 | $V_R$=1200V | $T_j$ = 25°C | | | 100 | µA |
| | | | $T_j$ = 125°C | | | 500 | |
| $I_F$ | DC Forward Current | | Tc = 80°C | | 30 | | A |
| $V_F$ | Diode Forward Voltage | $I_F$ = 30A | | | 2.6 | 3.1 | V |
| | | $I_F$ = 60A | | | 3.2 | | |
| | | $I_F$ = 30A | $T_j$ = 125°C | | 1.8 | | |
| $t_{rr}$ | Reverse Recovery Time | $I_F$ = 30A<br>$V_R$ = 800V<br>di/dt =200A/µs | $T_j$ = 25°C | | 300 | | ns |
| | | | $T_j$ = 125°C | | 380 | | |
| $Q_{rr}$ | Reverse Recovery Charge | | $T_j$ = 25°C | | 360 | | nC |
| | | | $T_j$ = 125°C | | 1700 | | |

## Thermal and package characteristics

| *Symbol* | *Characteristic* | | | *Min* | *Typ* | *Max* | *Unit* |
|---|---|---|---|---|---|---|---|
| $R_{thJC}$ | Junction to Case Thermal Resistance | | Transistor | | | 0.32 | °C/W |
| | | | Diode | | | 1.2 | |
| $V_{ISOL}$ | 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 | | 100 | |
| Torque | Mounting torque | To heatsink | M4 | 2 | | 3 | N.m |
| Wt | Package Weight | | | | | 80 | g |

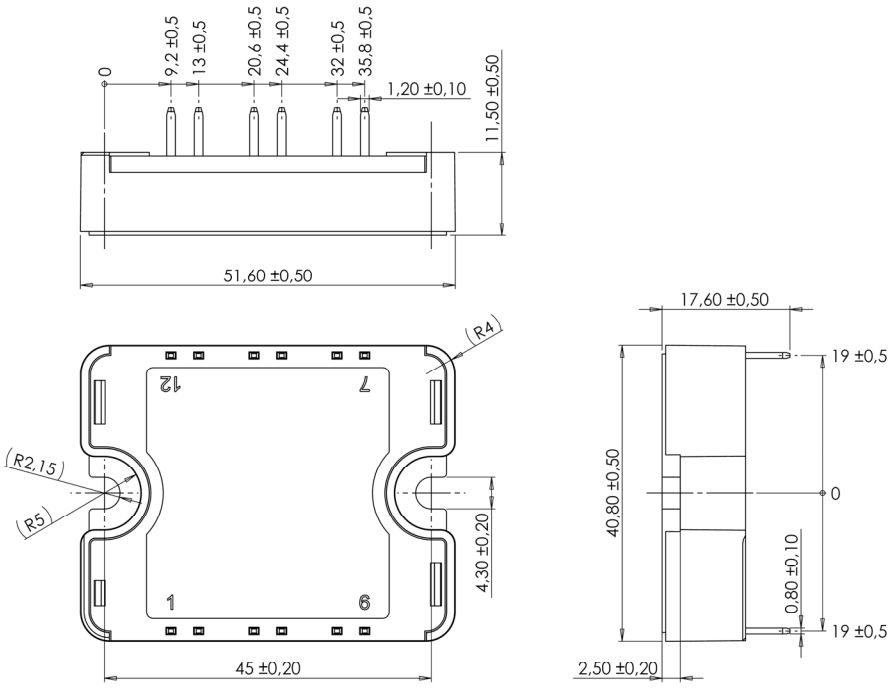
## Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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

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

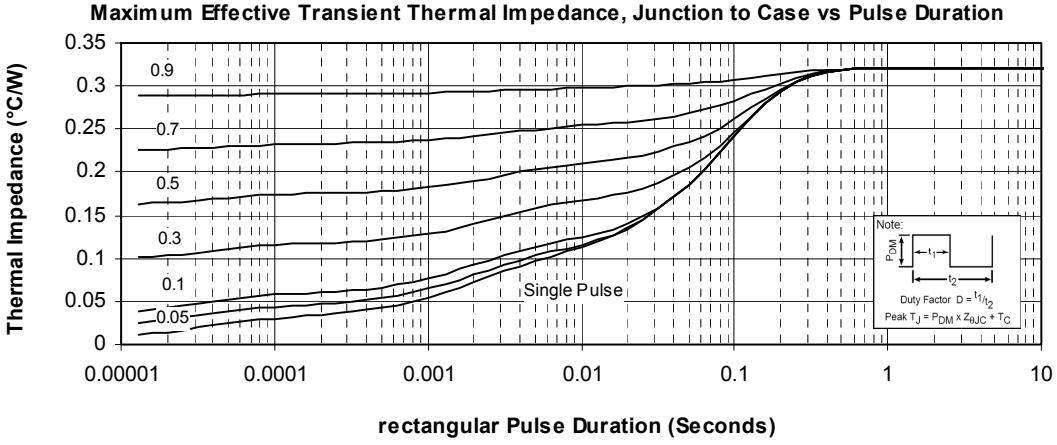
T: Thermistor temperature
$R_T$: Thermistor value at T

## SP1 Package outline (dimensions in mm)

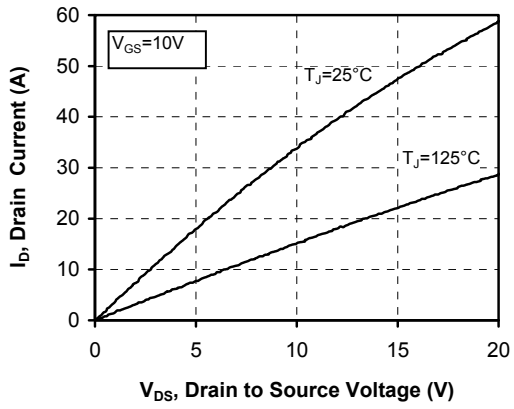



See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

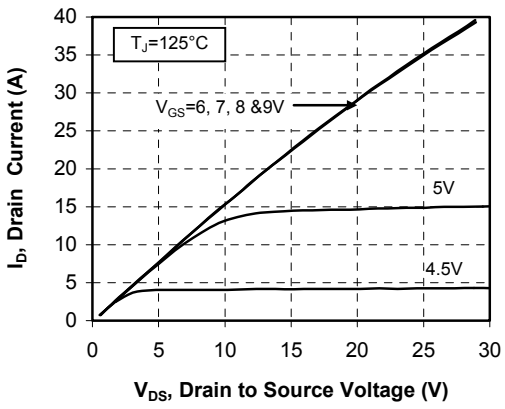
## Typical Mosfet Performance Curve



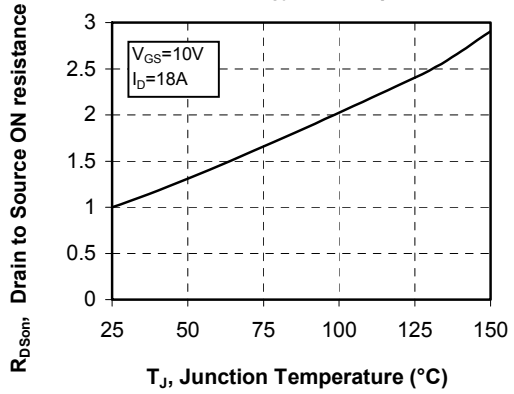
**Low Voltage Output Characteristics**



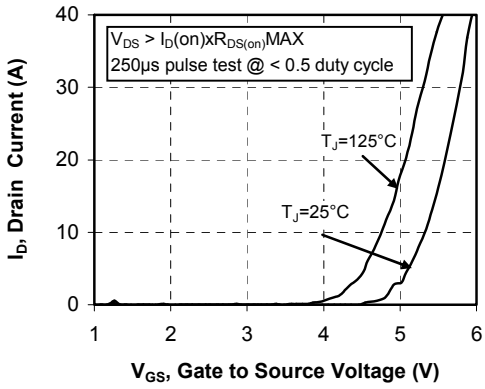

**Low Voltage Output Characteristics**



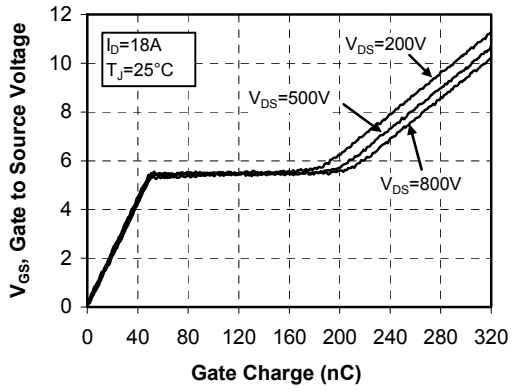

**Normalized $R_{DSon}$ vs. Temperature**



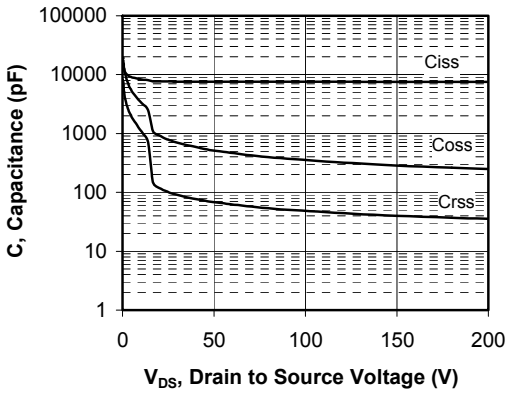

**Transfert Characteristics**



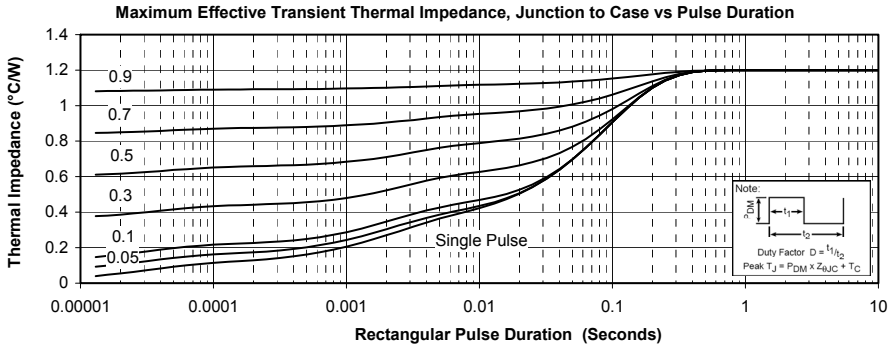

**Gate Charge vs Gate to Source**

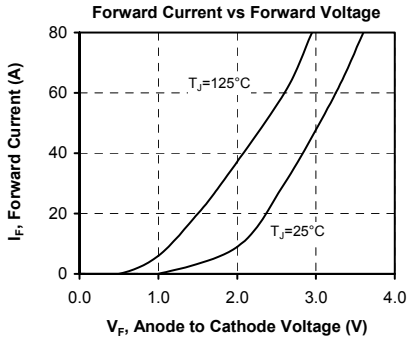


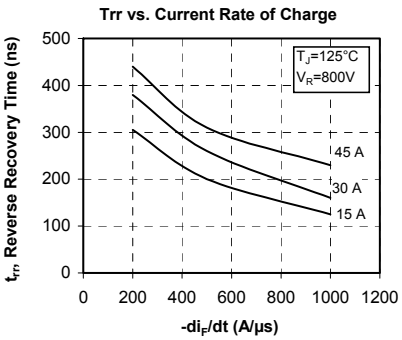

**Capacitance vs Drain to Source Voltage**

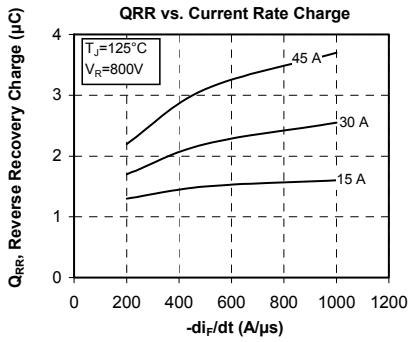


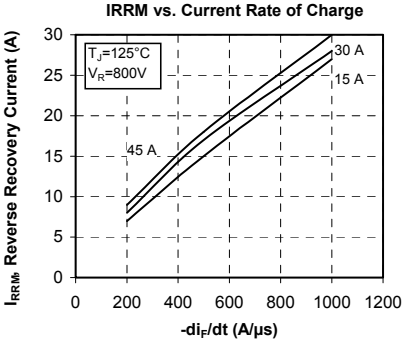
## Typical Diode Performance Curve

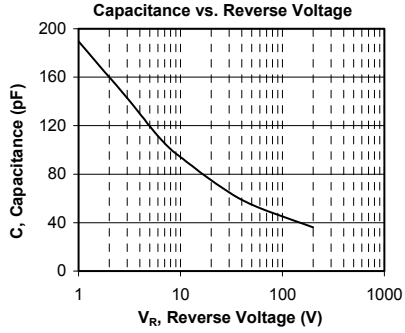


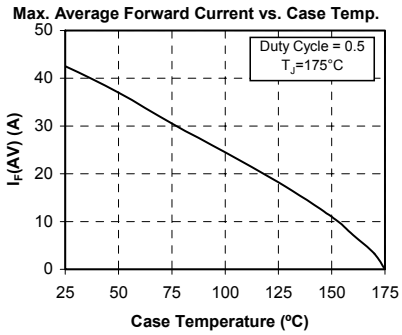



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