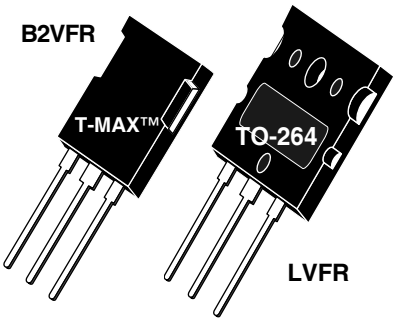
MICROCHIP

Microsemi Product Portfolio

# APT10M09B2VFR
# APT10M09LVFR

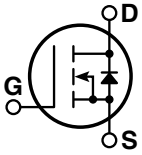
**100V 100A 0.01Ω**

## POWER MOS V® FREDFET




Power MOS V® is a new generation of high voltage N-Channel enhancement mode power MOSFETs. This new technology minimizes the JFET effect, increases packing density and reduces the on-resistance. Power MOS V® also achieves faster switching speeds through optimized gate layout.

- **T-MAX™ or TO-264 Package**
- **Faster Switching**
- **Lower Leakage**
- **Avalanche Energy Rated**
- **FAST RECOVERY BODY DIODE**




**MAXIMUM RATINGS** All Ratings: $T_C$ = 25°C unless otherwise specified.

| Symbol | Parameter | APT10M09B2VFR_LVFR | UNIT |
|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | 100 | Volts |
| $I_D$ | Continuous Drain Current ⑥ @ $T_C$ = 25°C | 100 | Amps |
| $I_{DM}$ | Pulsed Drain Current ① | 400 | |
| $V_{GS}$ | Gate-Source Voltage Continuous | ±30 | Volts |
| $V_{GSM}$ | Gate-Source Voltage Transient | ±40 | |
| $P_D$ | Total Power Dissipation @ $T_C$ = 25°C | 625 | Watts |
| | Linear Derating Factor | 5.00 | W/°C |
| $T_J$,$T_{STG}$ | Operating and Storage Junction Temperature Range | -55 to 150 | °C |
| $T_L$ | Lead Temperature: 0.063" from Case for 10 Sec. | 300 | |
| $I_{AR}$ | Avalanche Current ① (Repetitive and Non-Repetitive) | 100 | Amps |
| $E_{AR}$ | Repetitive Avalanche Energy ① | 50 | mJ |
| $E_{AS}$ | Single Pulse Avalanche Energy ④ | 3000 | |

**STATIC ELECTRICAL CHARACTERISTICS**

| Symbol | Characteristic / Test Conditions | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage ($V_{GS}$ = 0V, $I_D$ = 250μA) | 100 | | | Volts |
| $R_{DS(on)}$ | Drain-Source On-State Resistance ② ($V_{GS}$ = 10V, $I_D$ = 50A) | | | 0.01 | Ohms |
| $I_{DSS}$ | Zero Gate Voltage Drain Current ($V_{DS}$ = 100V, $V_{GS}$ = 0V) | | | 100 | μA |
| | Zero Gate Voltage Drain Current ($V_{DS}$ = 80V, $V_{GS}$ = 0V, $T_C$ = 125°C) | | | 500 | |
| $I_{GSS}$ | Gate-Source Leakage Current ($V_{GS}$ = ±30V, $V_{DS}$ = 0V) | | | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage ($V_{DS}$ = $V_{GS}$, $I_D$ = 2.5mA) | 2 | | 4 | Volts |

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

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## DYNAMIC CHARACTERISTICS



| Symbol | Characteristic | Test Conditions | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| $C_{iss}$ | Input Capacitance | $V_{GS}$ = 0V<br>$V_{DS}$ = 25V<br>f = 1 MHz | | 9875 | | pF |
| $C_{oss}$ | Output Capacitance | | | 3940 | | |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 1470 | | |
| $Q_g$ | Total Gate Charge ③ | $V_{GS}$ = 10V<br>$V_{DD}$ = 50V<br>$I_D$ = 100A @ 25°C | | 350 | | nC |
| $Q_{gs}$ | Gate-Source Charge | | | 60 | | |
| $Q_{gd}$ | Gate-Drain ("Miller") Charge | | | 180 | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{GS}$ = 15V<br>$V_{DD}$ = 50V<br>$I_D$ = 100A @ 25°C<br>$R_G$ = 0.6Ω | | 18 | | ns |
| $t_r$ | Rise Time | | | 36 | | |
| $t_{d(off)}$ | Turn-off Delay Time | | | 50 | | |
| $t_f$ | Fall Time | | | 9 | | |

## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Symbol | Characteristic / Test Conditions | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | | | | 100 | Amps |
| $I_{SM}$ | Pulsed Source Current ① (Body Diode) | | | | 400 | |
| $V_{SD}$ | Diode Forward Voltage ② ($V_{GS}$ = 0V, $I_S$ = -100A) | | | | 1.3 | Volts |
| $^{dv}/_{dt}$ | Peak Diode Recovery $^{dv}/_{dt}$ ⑤ | | | | 8 | V/ns |
| $t_{rr}$ | Reverse Recovery Time ($I_S$ = -100A, $^{di}/_{dt}$ = 100A/µs) | $T_j$ = 25°C | | | 190 | ns |
| | | $T_j$ = 125°C | | | 370 | |
| $Q_{rr}$ | Reverse Recovery Charge ($I_S$ = -100A, $^{di}/_{dt}$ = 100A/µs) | $T_j$ = 25°C | | 0.4 | | µC |
| | | $T_j$ = 125°C | | 1.7 | | |
| $I_{RRM}$ | Peak Recovery Current ($I_S$ = -100A, $^{di}/_{dt}$ = 100A/µs) | $T_j$ = 25°C | | 9 | | Amps |
| | | $T_j$ = 125°C | | 15 | | |

## THERMAL CHARACTERISTICS

| Symbol | Characteristic | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| $R_{\theta JC}$ | Junction to Case | | | 0.20 | °C/W |
| $R_{\theta JA}$ | Junction to Ambient | | | 40 | |

① Repetitive Rating: Pulse width limited by maximum junction temperature

② Pulse Test: Pulse width < 380 µs, Duty Cycle < 2%

③ See MIL-STD-750 Method 3471

④ Starting $T_j$ = +25°C, L = 0.60mH, $R_G$ = 25Ω, Peak $I_L$ = 100A

⑤ $^{dv}/_{dt}$ numbers reflect the limitations of the test circuit rather than the device itself. $I_S \leq -I_D 100A$ $^{di}/_{dt} \leq 200A/\mu s$ $V_R \leq 100V$ $T_J \leq 150°C$

⑥ The maximum current is limited by lead temperature.

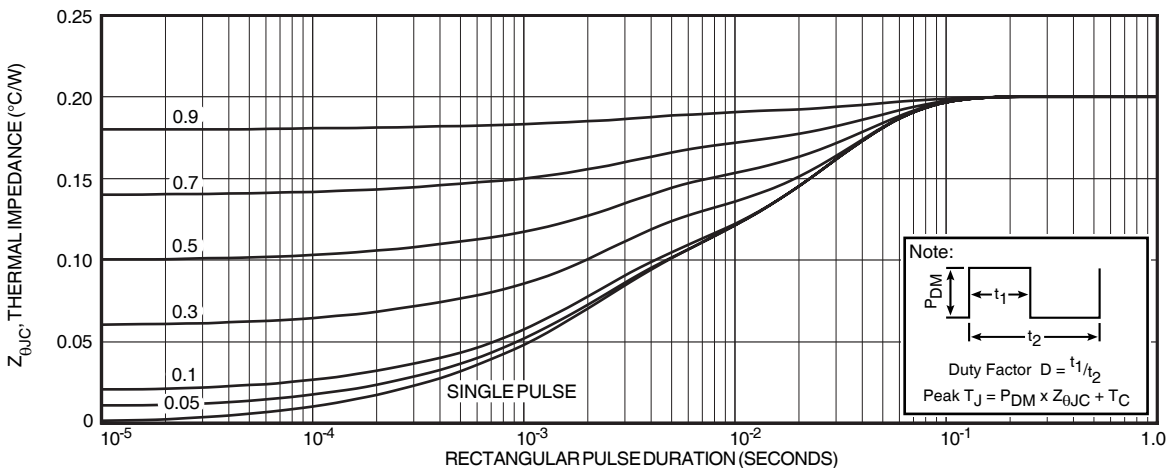



**FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION**

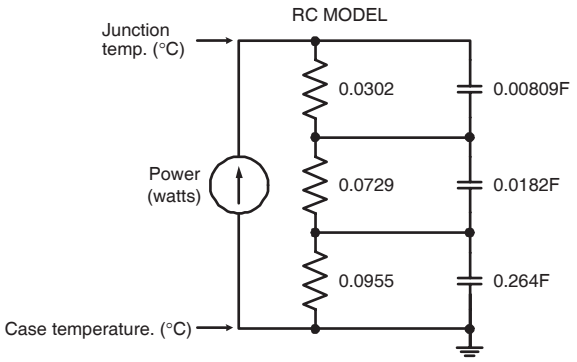



**FIGURE 2, TRANSIENT THERMAL IMPEDANCE MODEL**

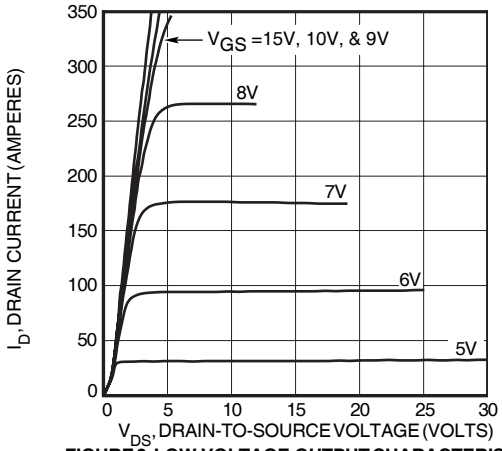



**FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS**

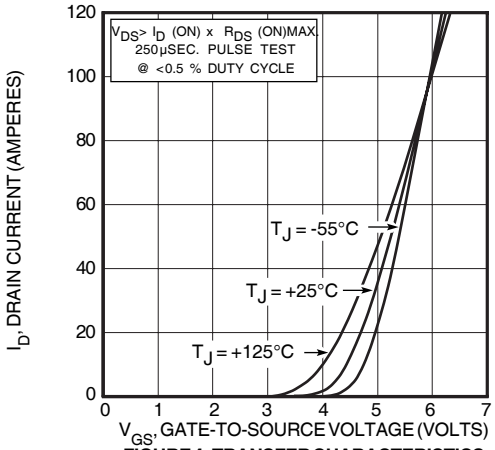



**FIGURE 4, TRANSFER CHARACTERISTICS**

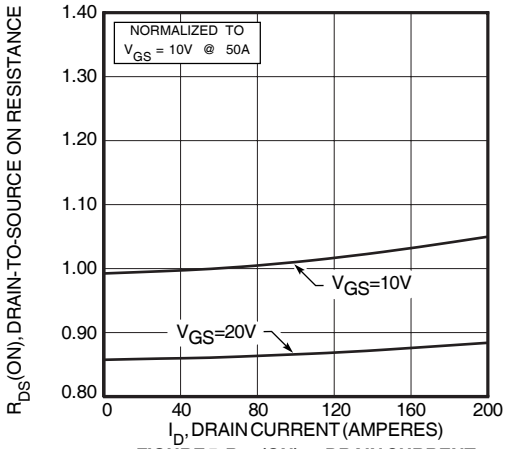



**FIGURE 5, $R_{DS}$(ON) vs DRAIN CURRENT**

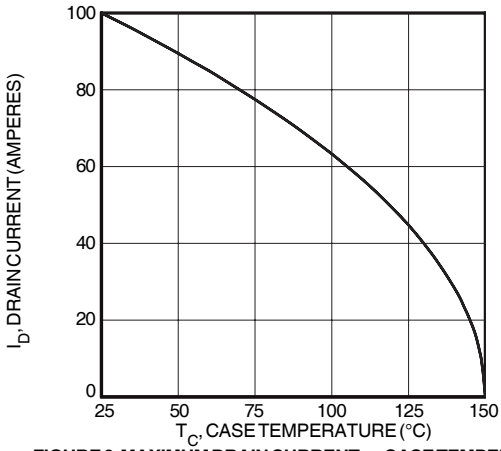



**FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE**

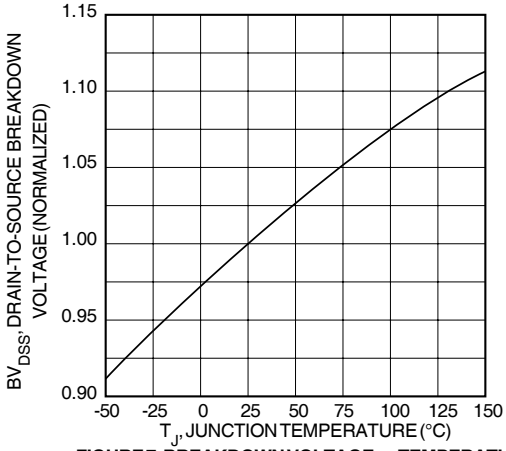



**FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE**

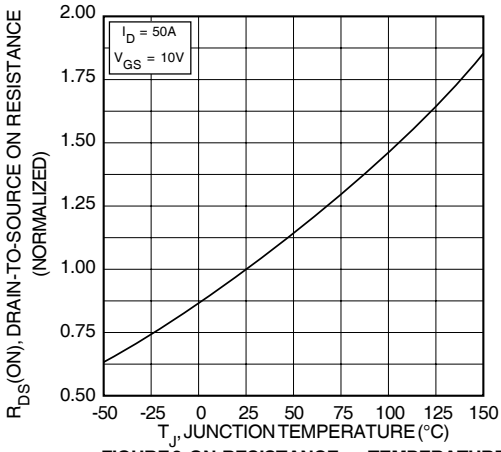



**FIGURE 8, ON-RESISTANCE vs. TEMPERATURE**

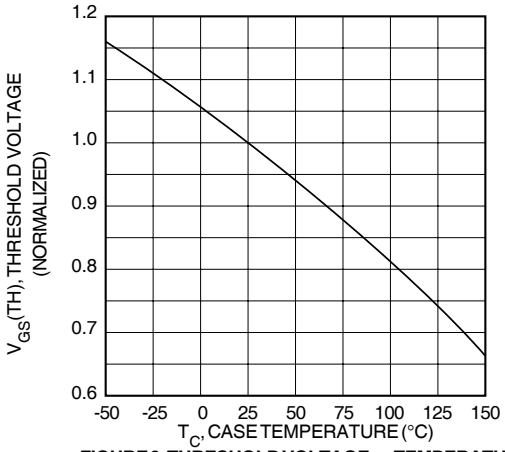



**FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE**

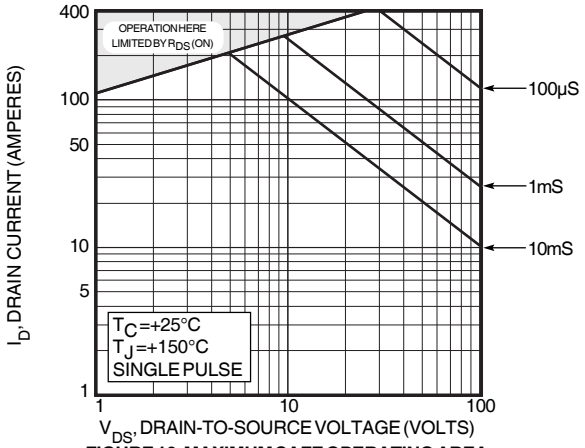



**FIGURE 10, MAXIMUM SAFE OPERATING AREA**

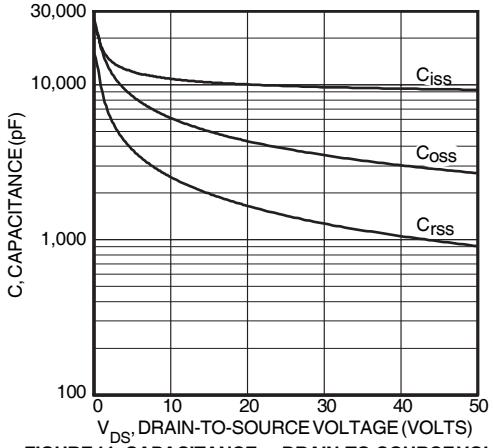



**FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE**

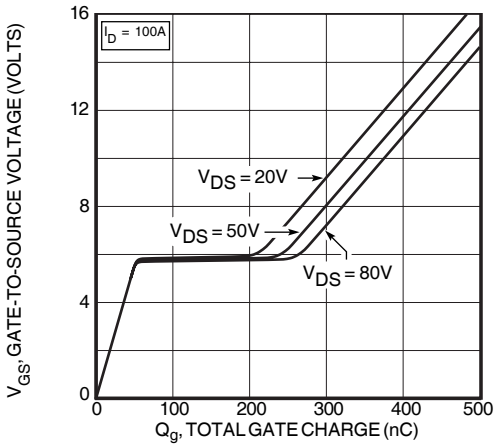



**FIGURE 12, GATE CHARGE vs GATE-TO-SOURCE VOLTAGE**

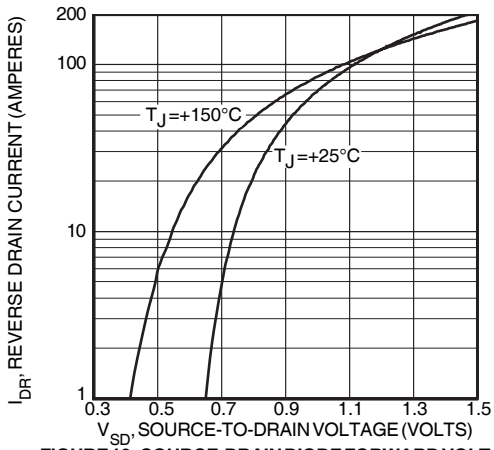
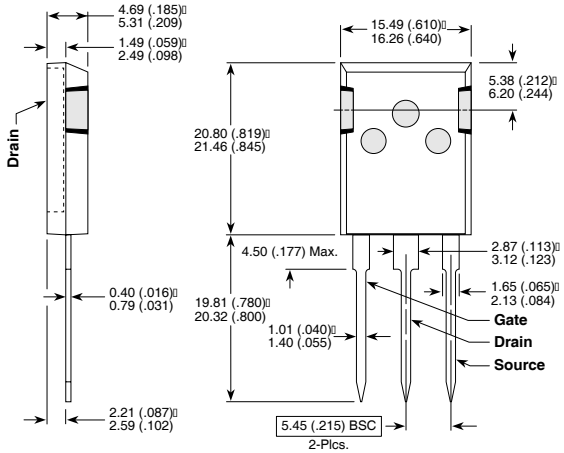



**FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE**

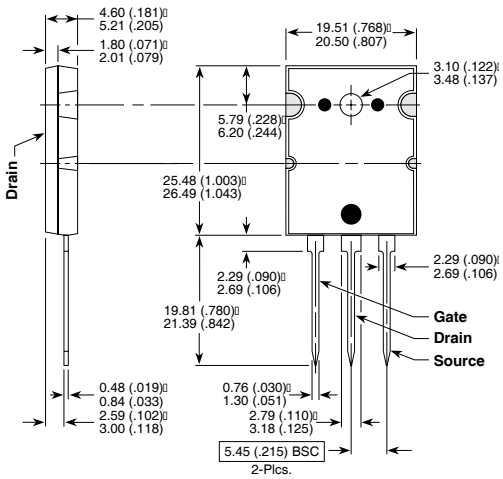
## T-MAX™ (B2) Package Outline (B2VFR)




These dimensions are equal to the TO-247 without the mounting hole.

Dimensions in Millimeters and (Inches)

## TO-264 (L) Package Outline (LVFR)




Dimensions in Millimeters and (Inches)

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