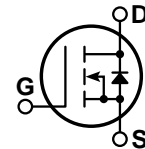
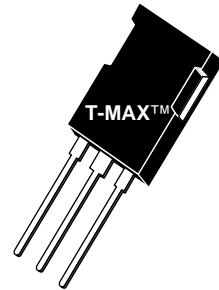


POWER MOS V®

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.



- **Faster Switching**
- **100% Avalanche Tested**
- **Lower Leakage**
- **New T-MAX™ Package**
(Clip-mounted TO-247 Package)

MAXIMUM RATINGS

All Ratings: $T_C = 25^\circ\text{C}$ unless otherwise specified.

| Symbol | Parameter | APT20M22B2VR | UNIT |
|----------------|---|--------------|-------|
| V_{DSS} | Drain-Source Voltage | 200 | Volts |
| I_D | Continuous Drain Current @ $T_C = 25^\circ\text{C}$ ⑥ | 100 | Amps |
| I_{DM} | Pulsed Drain Current ① ⑥ | 400 | |
| V_{GS} | Gate-Source Voltage Continuous | ± 30 | Volts |
| V_{GSM} | Gate-Source Voltage Transient | ± 40 | |
| P_D | Total Power Dissipation @ $T_C = 25^\circ\text{C}$ | 520 | Watts |
| | Linear Derating Factor | 4.16 | 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 ⑥ (Repetitive and Non-Repetitive) | 100 | Amps |
| E_{AR} | Repetitive Avalanche Energy ① | 50 | mJ |
| E_{AS} | Single Pulse Avalanche Energy ④ | 2500 | |

STATIC ELECTRICAL CHARACTERISTICS

| Symbol | Characteristic / Test Conditions | MIN | TYP | MAX | UNIT |
|--------------|--|-----|-----|-----------|---------------|
| BV_{DSS} | Drain-Source Breakdown Voltage ($V_{GS} = 0V, I_D = 250\mu\text{A}$) | 200 | | | Volts |
| $I_{D(on)}$ | On State Drain Current ② ⑥ ($V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10V$) | 100 | | | Amps |
| $R_{DS(on)}$ | Drain-Source On-State Resistance ② ($V_{GS} = 10V, 0.5 I_{D[Cont.]}$) | | | 0.022 | Ohms |
| I_{DSS} | Zero Gate Voltage Drain Current ($V_{DS} = V_{DSS}, V_{GS} = 0V$) | | | 25 | μA |
| | Zero Gate Voltage Drain Current ($V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$) | | | 250 | |
| I_{GSS} | Gate-Source Leakage Current ($V_{GS} = \pm 30V, V_{DS} = 0V$) | | | ± 100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 2.5\text{mA}$) | 2 | | 4 | Volts |

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

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F-33700 Merignac - France Phone: (33) 5 57 92 15 15 FAX: (33) 5 56 47 97 61

DYNAMIC CHARACTERISTICS

APT20M22B2VR

| Symbol | Characteristic | Test Conditions | MIN | TYP | MAX | UNIT |
|--------------|--------------------------------|--|-----|------|-------|------|
| C_{iss} | Input Capacitance | $V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$ | | 8500 | 10200 | pF |
| C_{oss} | Output Capacitance | | | 1950 | 2730 | |
| C_{rss} | Reverse Transfer Capacitance | | | 560 | 840 | |
| Q_g | Total Gate Charge ^③ | $V_{GS} = 10V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_{D[Cont.]} @ 25^\circ C$ | | 290 | 435 | nC |
| Q_{gs} | Gate-Source Charge | | | 66 | 100 | |
| Q_{gd} | Gate-Drain ("Miller") Charge | | | 120 | 180 | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{GS} = 15V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_{D[Cont.]} @ 25^\circ C$ $R_G = 0.6\Omega$ | | 16 | 32 | ns |
| t_r | Rise Time | | | 25 | 50 | |
| $t_{d(off)}$ | Turn-off Delay Time | | | 48 | 72 | |
| t_f | Fall Time | | | 5 | 10 | |

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Symbol | Characteristic / Test Conditions | MIN | TYP | MAX | UNIT |
|----------|---|-----|-----|-----|---------|
| I_S | Continuous Source Current ^⑥ (Body Diode) | | | 100 | Amps |
| I_{SM} | Pulsed Source Current ^{① ⑥} (Body Diode) | | | 400 | |
| V_{SD} | Diode Forward Voltage ^② ($V_{GS} = 0V, I_S = -I_{D[Cont.]}$) | | | 1.5 | Volts |
| t_{rr} | Reverse Recovery Time ($I_S = -I_{D[Cont.]}, di_S/dt = 100A/\mu s$) | | 330 | | ns |
| Q_{rr} | Reverse Recovery Charge ($I_S = -I_{D[Cont.]}, di_S/dt = 100A/\mu s$) | | 5.8 | | μC |

THERMAL CHARACTERISTICS

| Symbol | Characteristic | MIN | TYP | MAX | UNIT |
|-----------------|---------------------|-----|-----|------|--------------|
| $R_{\theta JC}$ | Junction to Case | | | 0.24 | $^\circ C/W$ |
| $R_{\theta JA}$ | Junction to Ambient | | | 40 | |

- ① Repetitive Rating: Pulse width limited by maximum T_j
- ② Pulse Test: Pulse width < 380 μs , Duty Cycle < 2%
- ③ See MIL-STD-750 Method 3471
- ④ Starting $T_j = +25^\circ C, L = 500\mu H, R_G = 25\Omega, \text{Peak } I_L = 100A$
- ⑤ These dimensions are equal to the TO-247AD without mounting hole.
- ⑥ The maximum current is limited by lead temperature.

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

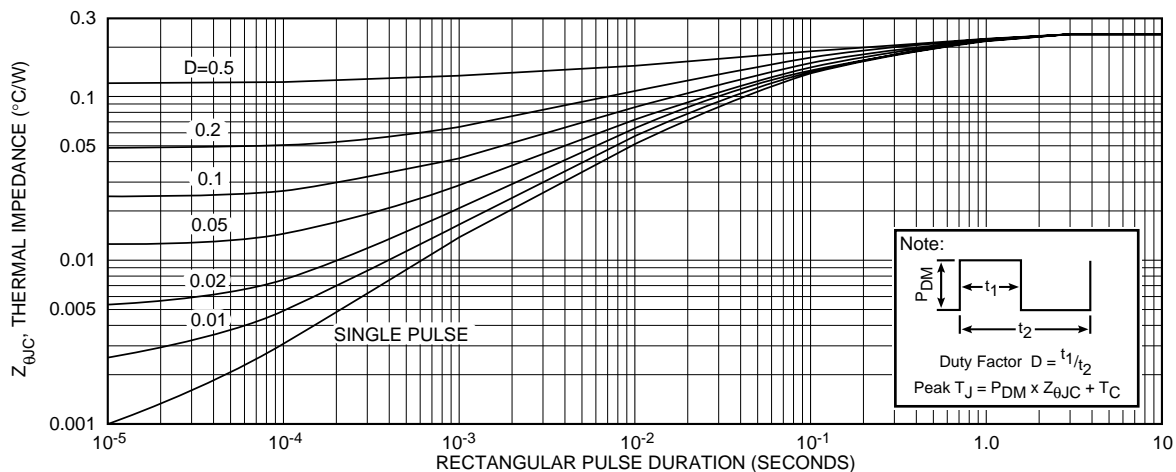


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

APT20M22B2VR

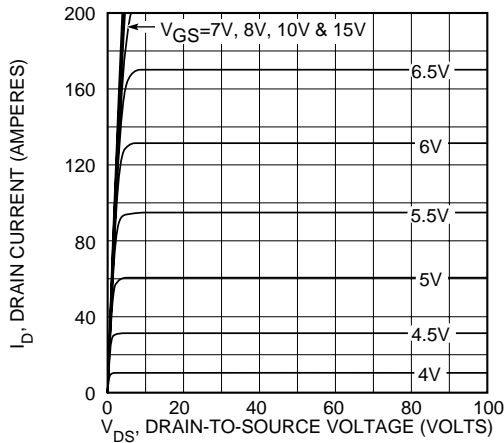


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

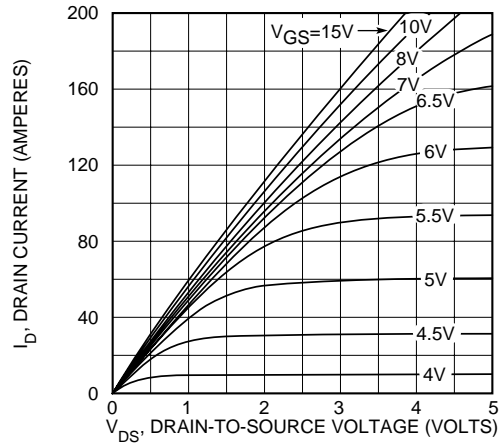


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

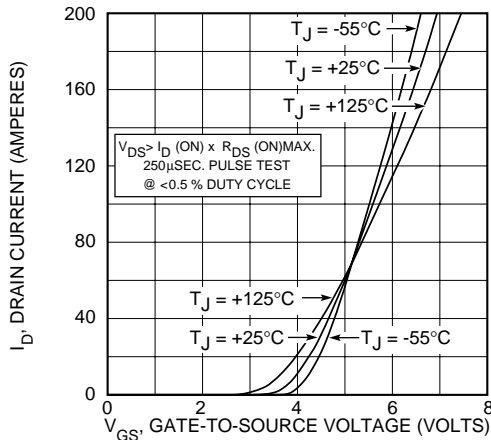


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

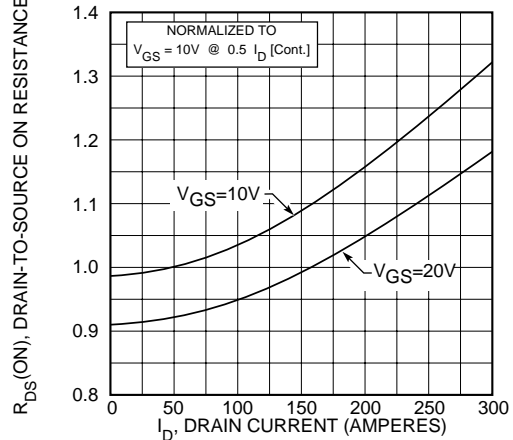


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

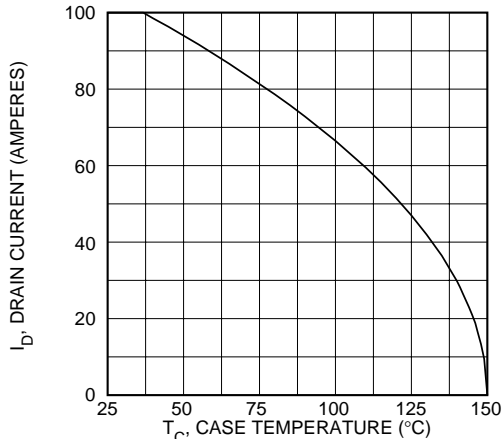


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

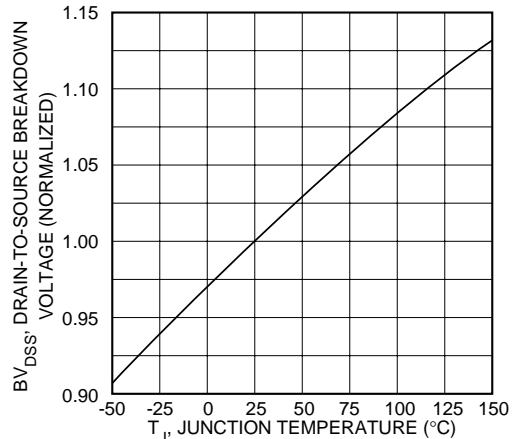


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

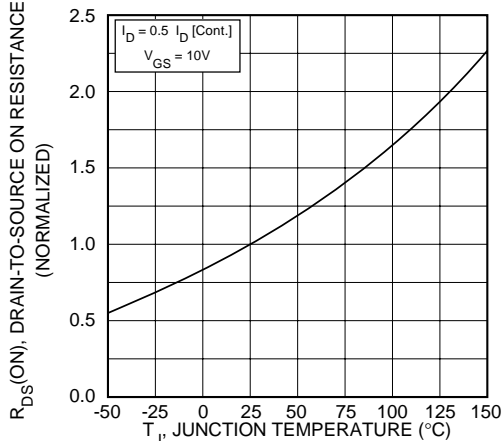


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

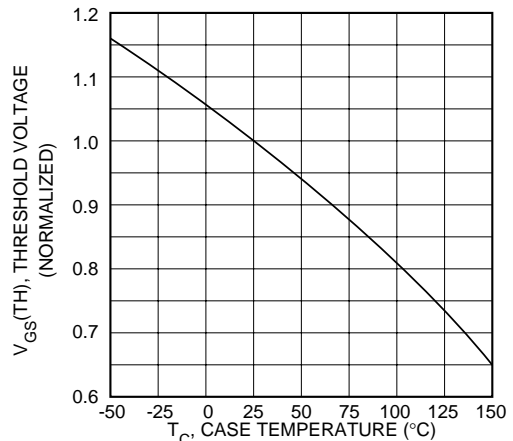


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

APT20M22B2VR

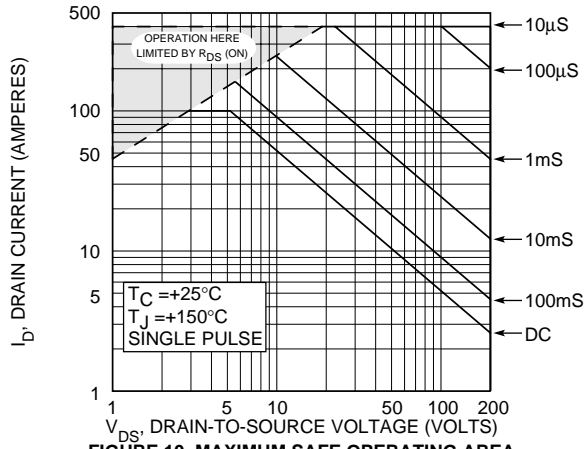


FIGURE 10, MAXIMUM SAFE OPERATING AREA

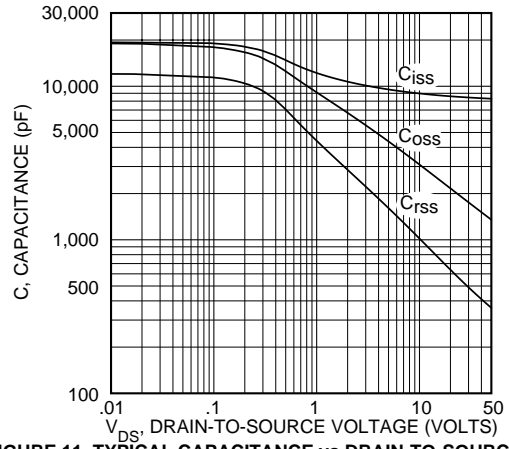


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

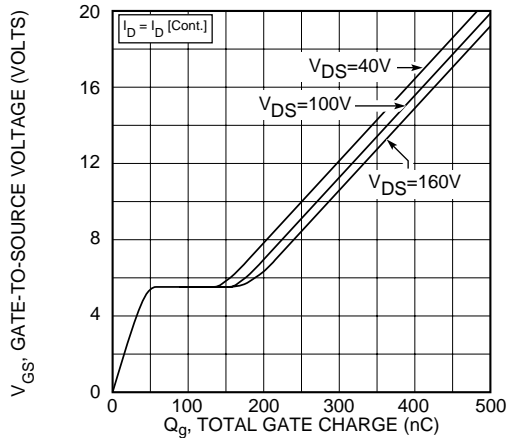


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

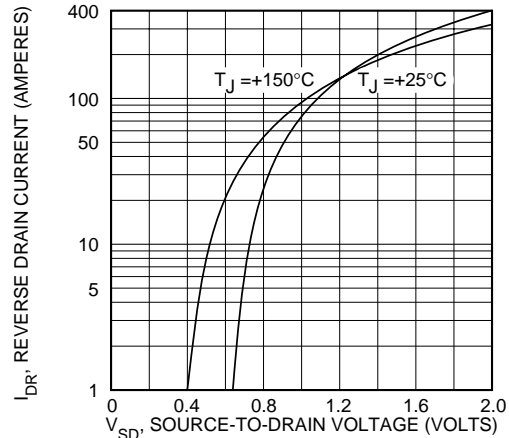
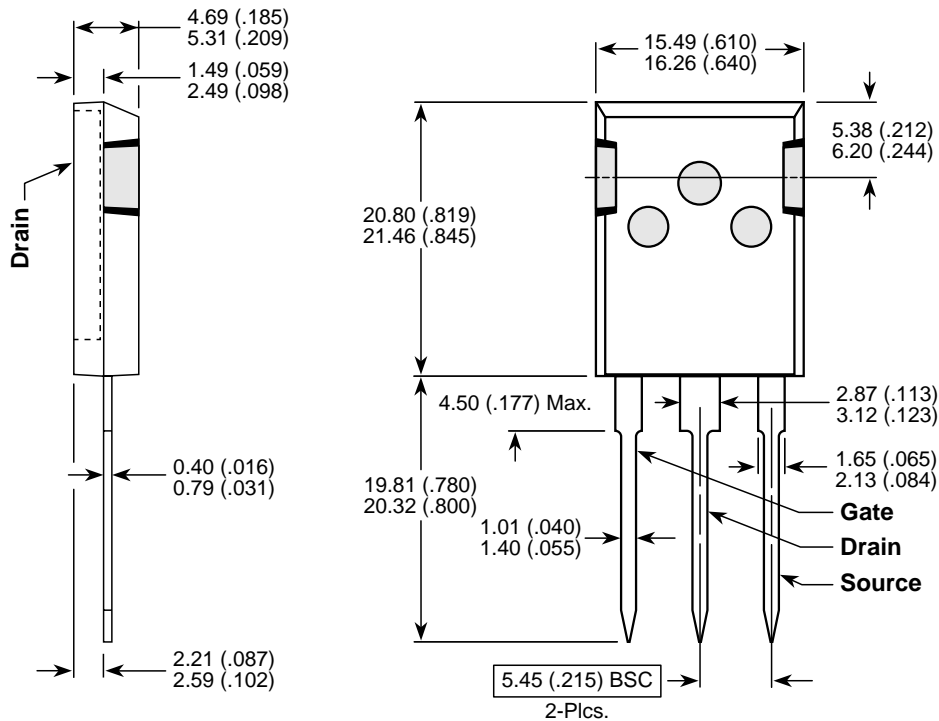


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

T-MAX™ Package Outline ⑤



Dimensions in Millimeters and (Inches)