



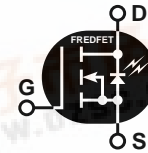
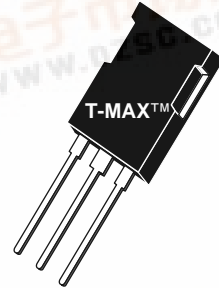
APT20M22B2VFR

200V 100A 0.022Ω

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.



- Fast Recovery Body Diode
- Lower Leakage
- Faster Switching
- 100% Avalanche Tested
- New T-MAX[™] Package (Clip-mounted TO-247 Package)

MAXIMUM RATINGS

All Ratings: T_C = 25°C unless otherwise specified.

| Symbol | Parameter | APT20M22B2VFR | UNIT |
|-----------------------------------|--|---------------|-------|
| V _{DSS} | Drain-Source Voltage | 200 | Volts |
| I _D | Continuous Drain Current @ T _C = 25°C ^⑤ | 100 | Amps |
| I _{DM} | Pulsed Drain Current ^{① ⑤} | 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 | 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 ⑤} (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 = 250μA) | 200 | | | Volts |
| I _{D(on)} | On State Drain Current ^{② ⑤} (V _{DS} > I _{D(on)} × 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) | | | 250 | μA |
| | Zero Gate Voltage Drain Current (V _{DS} = 0.8 V _{DSS} , V _{GS} = 0V, T _C = 125°C) | | | 1000 | |
| 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.

APT Website - <http://www.advancedpower.com>

DYNAMIC CHARACTERISTICS

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| 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 | $V_{GS} = 10V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_D [\text{Cont.}] @ 25^\circ\text{C}$ | | 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 | $V_{GS} = 15V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_D [\text{Cont.}] @ 25^\circ\text{C}$ $R_G = 0.6\Omega$ | | 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 (Body Diode) | | | 100 | Amps |
| I_{SM} | Pulsed Source Current ^① (Body Diode) | | | 400 | |
| V_{SD} | Diode Forward Voltage ^② ($V_{GS} = 0V, I_S = -I_D [\text{Cont.}]$) | | | 1.5 | Volts |
| dv/dt | Peak Diode Recovery dv/dt ^⑥ | | | 5 | V/ns |
| t_{rr} | Reverse Recovery Time ($I_S = -I_D [\text{Cont.}], di/dt = 100A/\mu s$) | $T_j = 25^\circ\text{C}$ | | 220 | ns |
| | | $T_j = 125^\circ\text{C}$ | | 420 | |
| Q_{rr} | Reverse Recovery Charge ($I_S = -I_D [\text{Cont.}], di/dt = 100A/\mu s$) | $T_j = 25^\circ\text{C}$ | 0.8 | | μC |
| | | $T_j = 125^\circ\text{C}$ | 3.0 | | |
| I_{RRM} | Peak Recovery Current ($I_S = -I_D [\text{Cont.}], di/dt = 100A/\mu s$) | $T_j = 25^\circ\text{C}$ | 10 | | Amps |
| | | $T_j = 125^\circ\text{C}$ | 18 | | |

THERMAL CHARACTERISTICS

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

① Repetitive Rating: Pulse width limited by maximum junction temperature.

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

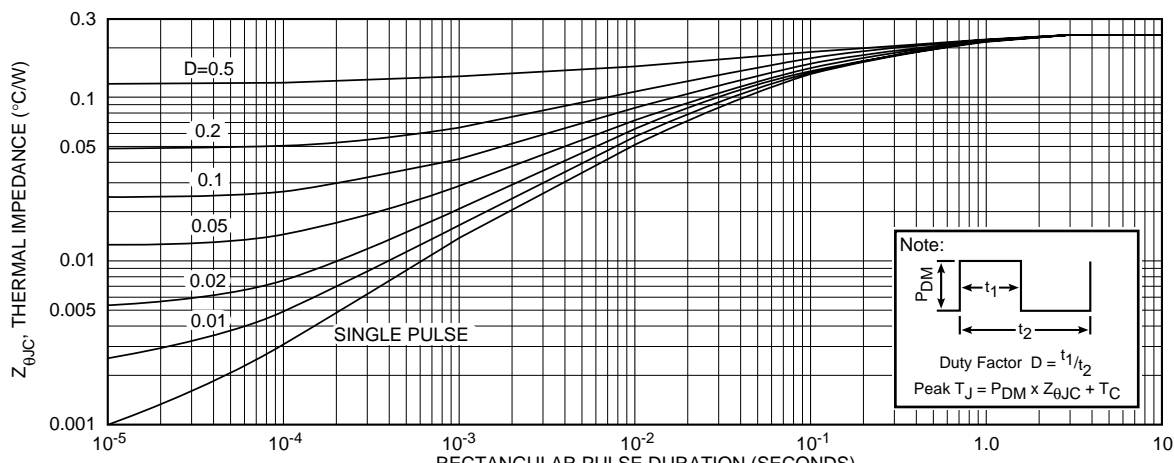
③ See MIL-STD-750 Method 3471

④ Starting $T_j = +25^\circ\text{C}$, $L = 500\mu\text{H}$, $R_G = 25\Omega$, Peak $I_L = 100\text{A}$

⑤ These dimensions are equal to the TO-247 without mounting hole

⑥ $I_S \leq -I_D [\text{Cont.}], di/dt = 100A/\mu\text{s}$, $V_{DD} \leq V_{DSS}$, $T_j \leq 150^\circ\text{C}$, $R_G = 2.0\Omega$, $V_R = 200\text{V}$.

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



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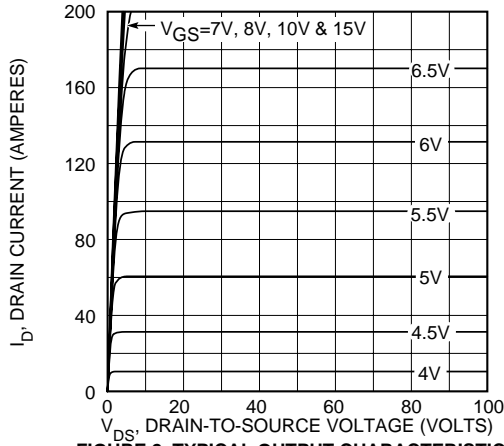


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

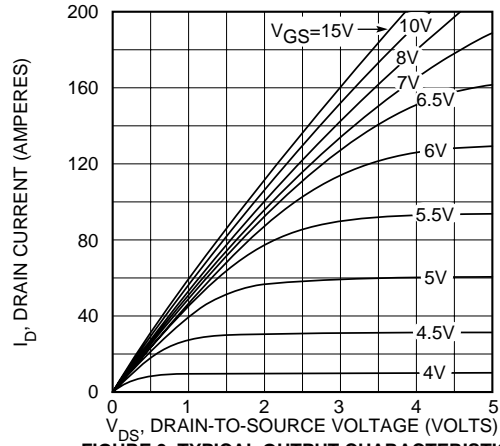


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

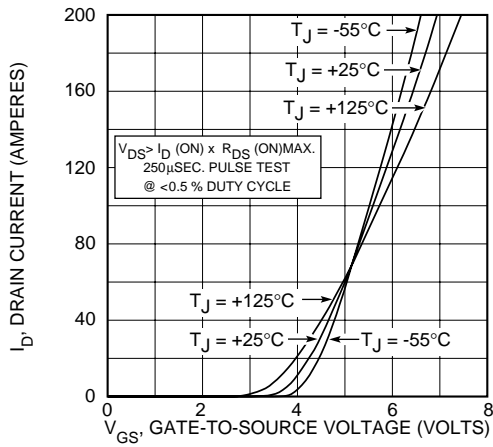


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

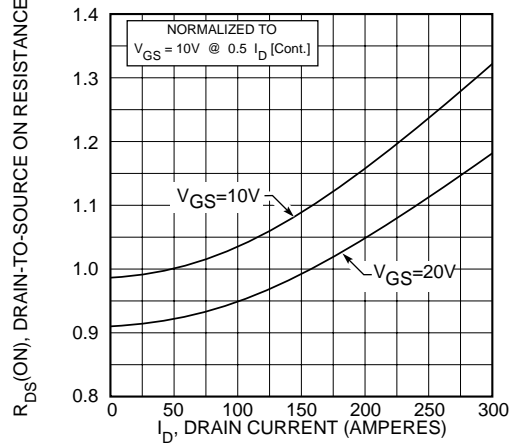


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

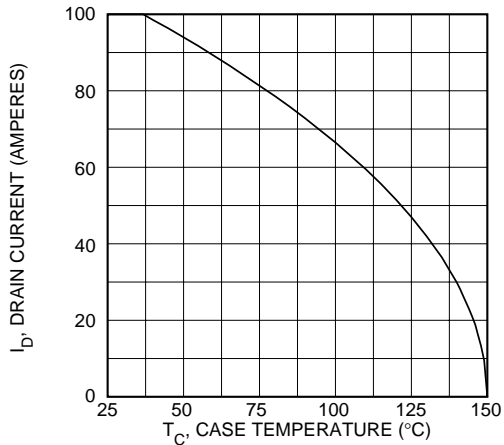


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

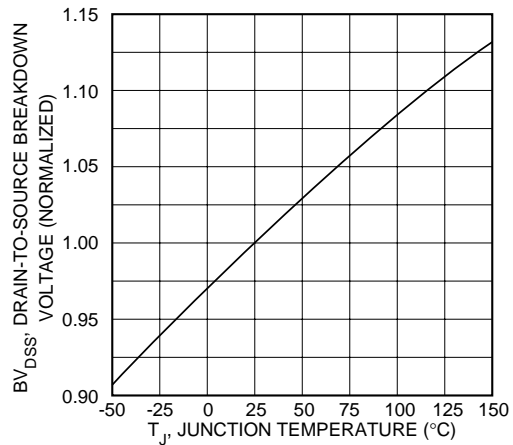


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

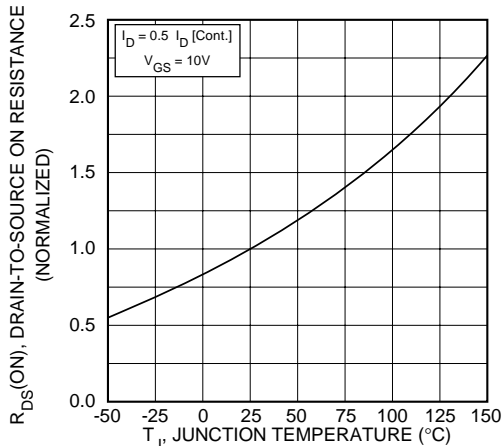


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

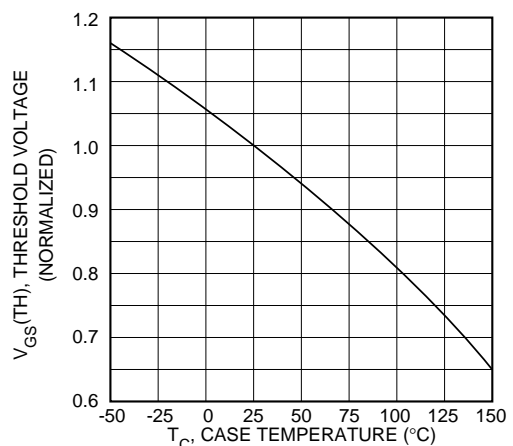


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

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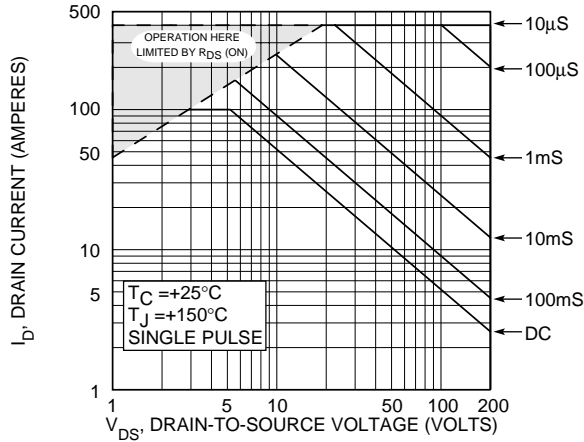


FIGURE 10, MAXIMUM SAFE OPERATING AREA

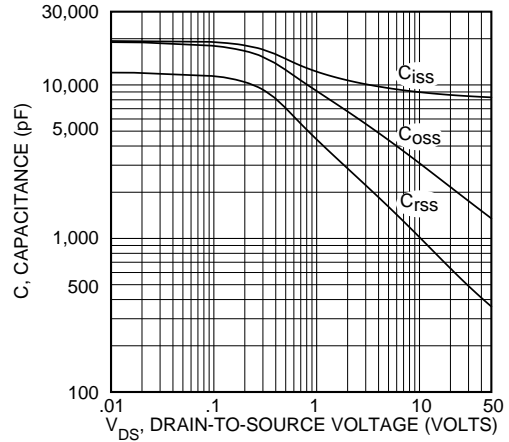


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

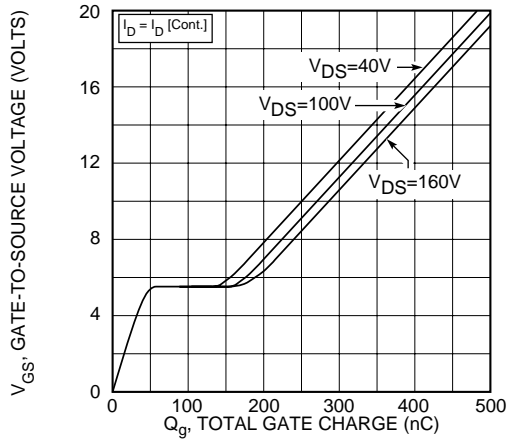


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

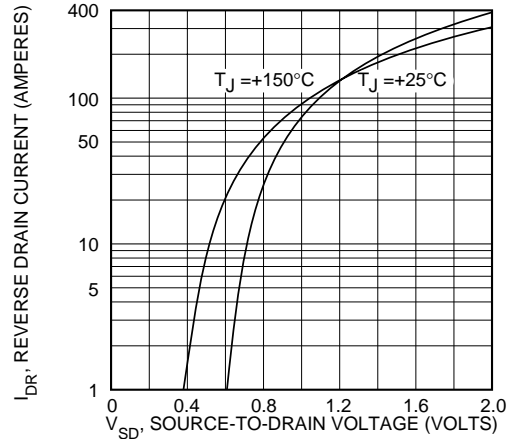
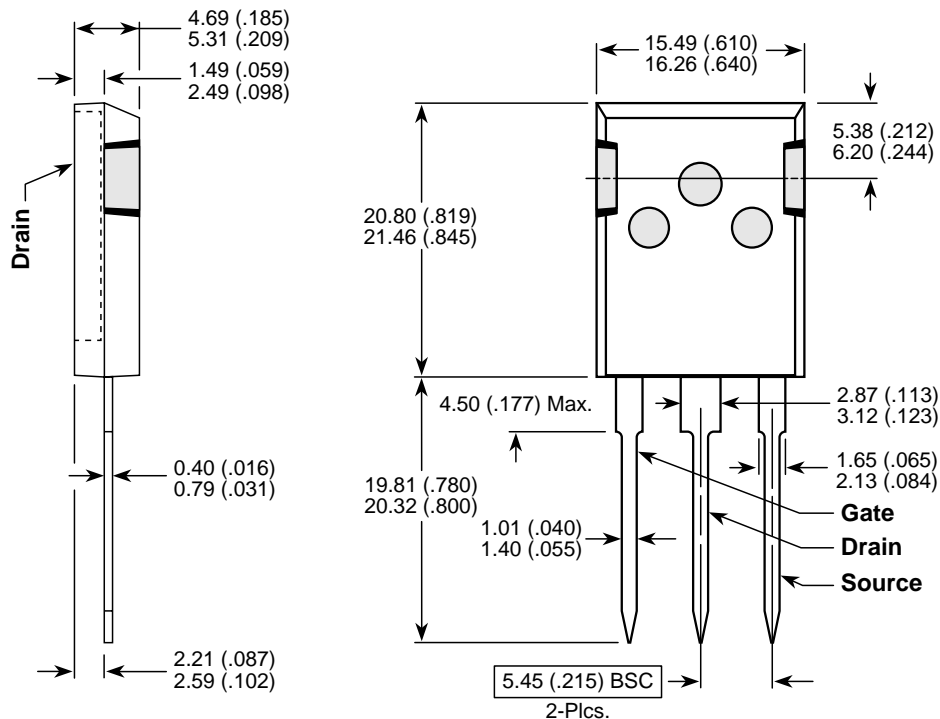


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

T-MAX™ Package Outline ⑤



Dimensions in Millimeters and (Inches)