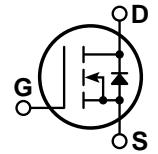
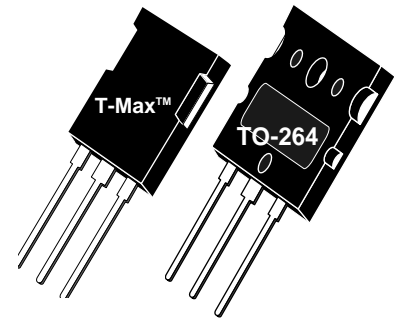


**POWER MOS V®**
**FREDFET**


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.

- **Identical Specifications: T-MAX™ or TO-264 Package**
- **Lower Leakage**
- **Fast Recovery Body Diode**
- **Faster Switching**
- **Avalanche Energy Rated**

**MAXIMUM RATINGS**

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

| Symbol         | Parameter  | APT50M80B2VFR _ LVFR | UNIT  |
|----------------|--|----------------------|-------|
| $V_{DSS}$      | Drain-Source Voltage   | 500                  | Volts |
| $I_D$          | Continuous Drain Current @ $T_C = 25^\circ\text{C}$            | 58                   | Amps  |
| $I_{DM}$       | Pulsed Drain Current <sup>①</sup>                              | 232                  |       |
| $V_{GS}$       | Gate-Source Voltage Continuous                                 | $\pm 30$             | Volts |
| $V_{GSM}$      | Gate-Source Voltage Transient                                  | $\pm 40$             |       |
| $P_D$          | Total Power Dissipation @ $T_C = 25^\circ\text{C}$             | 625                  | Watts |
|                | Linear Derating Factor   | 5.0                  | 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 <sup>①</sup> (Repetitive and Non-Repetitive) | 58                   | Amps  |
| $E_{AR}$       | Repetitive Avalanche Energy <sup>①</sup>                       | 50                   | mJ    |
| $E_{AS}$       | Single Pulse Avalanche Energy <sup>④</sup>                     | 3000                 |       |

**STATIC ELECTRICAL CHARACTERISTICS**

| Symbol       | Characteristic / Test Conditions  | MIN | TYP | MAX       | UNIT          |
|--------------|---|-----|-----|-----------|---------------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 250\mu\text{A}$ )                    | 500 |     |           | Volts         |
| $R_{DS(on)}$ | Drain-Source On-State Resistance <sup>②</sup> ( $V_{GS} = 10V, 29A$ )                     |     |     | 0.080     | Ohms          |
| $I_{DSS}$    | Zero Gate Voltage Drain Current ( $V_{DS} = 500V, V_{GS} = 0V$ )                          |     |     | 250       | $\mu\text{A}$ |
|              | Zero Gate Voltage Drain Current ( $V_{DS} = 400V, V_{GS} = 0V, T_C = 125^\circ\text{C}$ ) |     |     | 1000      |               |
| $I_{GSS}$    | Gate-Source Leakage Current ( $V_{GS} = \pm 30V, V_{DS} = 0V$ )                           |     |     | $\pm 100$ | 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

APT50M80B2VFR\_LVFR

| Symbol              | Characteristic                 | Test Conditions             | MIN | TYP  | MAX | UNIT |
|---------------------|--------------------------------|-----------------------------|-----|------|-----|------|
| C <sub>iss</sub>    | Input Capacitance              | V <sub>GS</sub> = 0V        |     | 8797 |     | pF   |
| C <sub>oss</sub>    | Output Capacitance             | V <sub>DS</sub> = 25V       |     | 1286 |     |      |
| C <sub>rss</sub>    | Reverse Transfer Capacitance   | f = 1 MHz                   |     | 562  |     |      |
| Q <sub>g</sub>      | Total Gate Charge <sup>③</sup> | V <sub>GS</sub> = 10V       |     | 423  |     | nC   |
| Q <sub>gs</sub>     | Gate-Source Charge             | V <sub>DD</sub> = 250V      |     | 41   |     |      |
| Q <sub>gd</sub>     | Gate-Drain ("Miller") Charge   | I <sub>D</sub> = 58A @ 25°C |     | 214  |     |      |
| t <sub>d(on)</sub>  | Turn-on Delay Time             | V <sub>GS</sub> = 15V       |     | 14   |     | ns   |
| t <sub>r</sub>      | Rise Time                      | V <sub>DD</sub> = 250V      |     | 25   |     |      |
| t <sub>d(off)</sub> | Turn-off Delay Time            | I <sub>D</sub> = 58A @ 25°C |     | 64   |     |      |
| t <sub>f</sub>      | Fall Time                      | R <sub>G</sub> = 0.6Ω       |     | 23   |     |      |

### SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Symbol           | Characteristic / Test Conditions   | MIN                    | TYP | MAX  | UNIT  |
|------------------|--|------------------------|-----|------|-------|
| I <sub>S</sub>   | Continuous Source Current (Body Diode)   |                        |     | 58   | Amps  |
| I <sub>SM</sub>  | Pulsed Source Current <sup>①</sup> (Body Diode)                                  |                        |     | 232  |       |
| V <sub>SD</sub>  | Diode Forward Voltage <sup>②</sup> (V <sub>GS</sub> = 0V, I <sub>S</sub> = -58A) |                        |     | 1.3  | Volts |
| dv/dt            | Peak Diode Recovery dv/dt <sup>⑤</sup>   |                        |     | 5    | V/ns  |
| t <sub>rr</sub>  | Reverse Recovery Time<br>(I <sub>S</sub> = -58A, di/dt = 100A/μs)                | T <sub>j</sub> = 25°C  |     | 270  | ns    |
|                  |  | T <sub>j</sub> = 125°C |     | 540  |       |
| Q <sub>rr</sub>  | Reverse Recovery Charge<br>(I <sub>S</sub> = -58A, di/dt = 100A/μs)              | T <sub>j</sub> = 25°C  |     | 2.7  | μC    |
|                  |  | T <sub>j</sub> = 125°C |     | 5.9  |       |
| I <sub>RRM</sub> | Peak Recovery Current<br>(I <sub>S</sub> = -58A, di/dt = 100A/μs)                | T <sub>j</sub> = 25°C  |     | 16   | Amps  |
|                  |  | T <sub>j</sub> = 125°C |     | 22.5 |       |

### THERMAL CHARACTERISTICS

| Symbol           | Characteristic      | MIN | TYP | MAX  | UNIT |
|------------------|---------------------|-----|-----|------|------|
| R <sub>θJC</sub> | Junction to Case    |     |     | 0.20 | °C/W |
| R <sub>θJA</sub> | 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<sub>j</sub> = +25°C, L = 1.78mH, R<sub>G</sub> = 25Ω, Peak I<sub>L</sub> = 58A

⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. I<sub>S</sub> ≤ -58A di/dt ≤ 700A/μs V<sub>R</sub> ≤ 500V T<sub>j</sub> ≤ 150°C

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

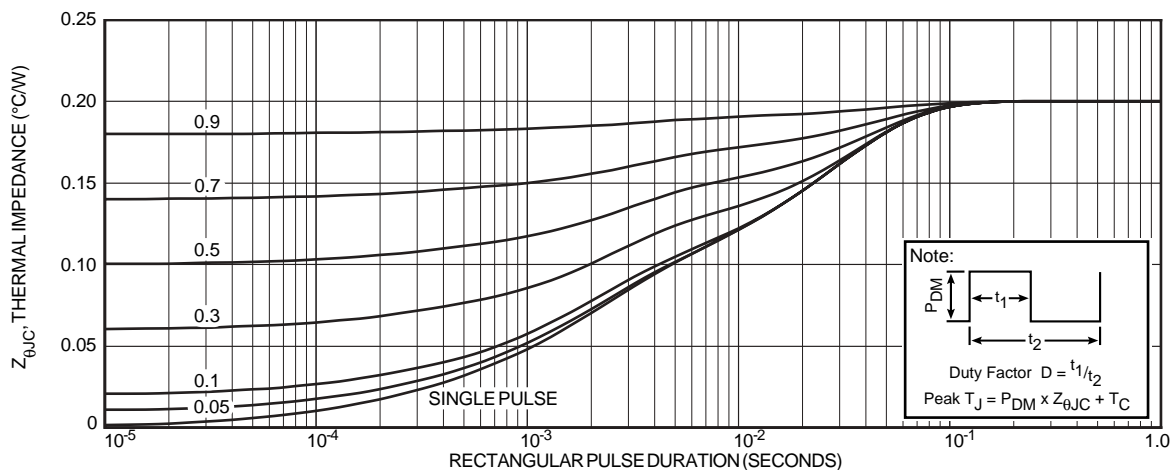


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

# Typical Performance Curves

APT50M80B2VFR\_LVFR

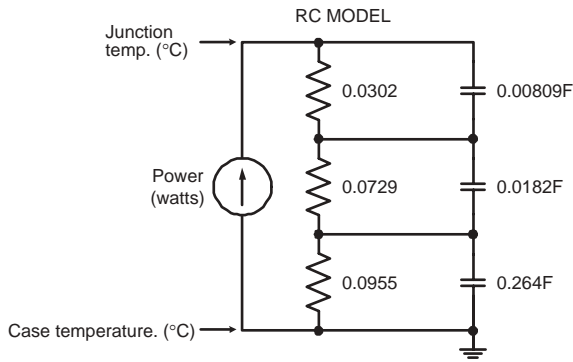


FIGURE 2, TRANSIENT THERMAL IMPEDANCE MODEL

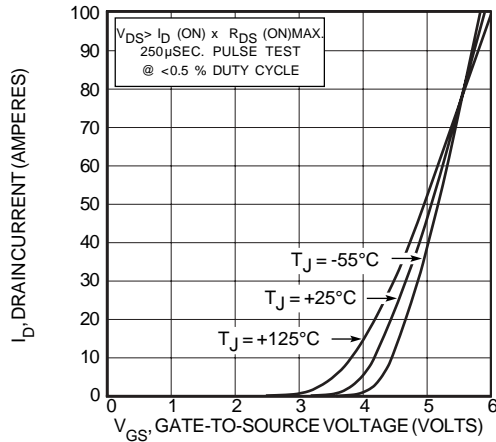


FIGURE 4, TRANSFER CHARACTERISTICS

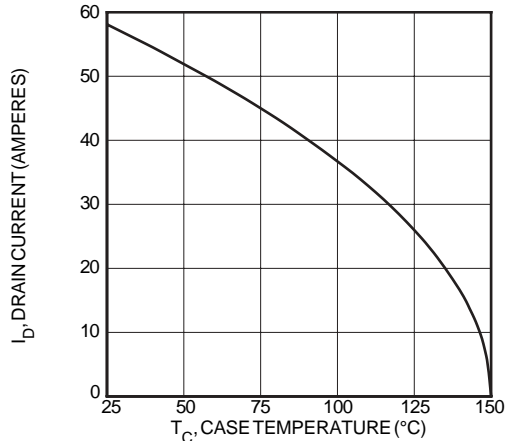


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

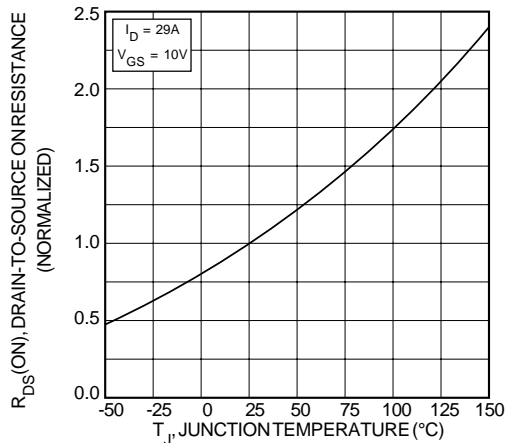


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

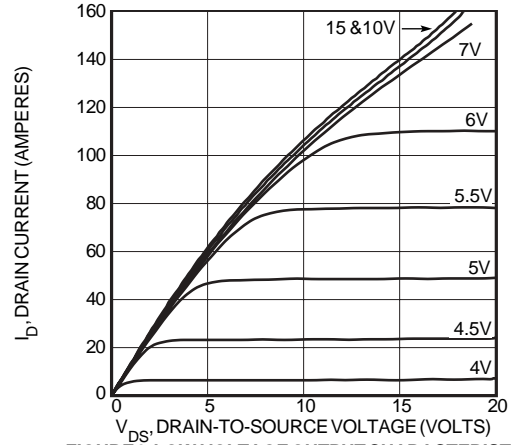


FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS

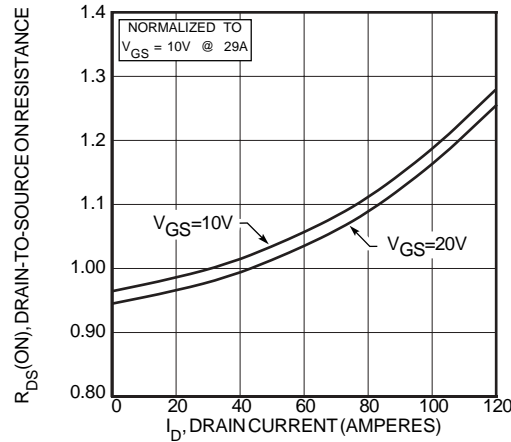


FIGURE 5,  $R_{DS}(ON)$  vs DRAIN CURRENT

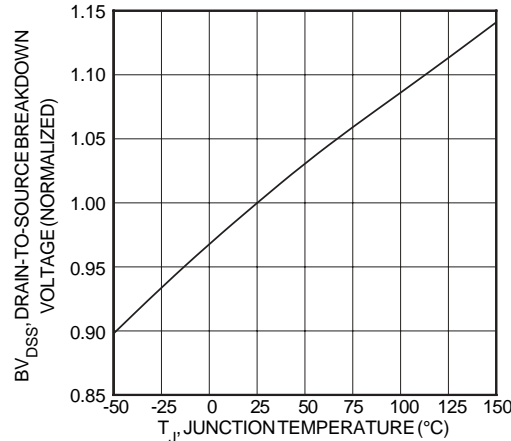


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

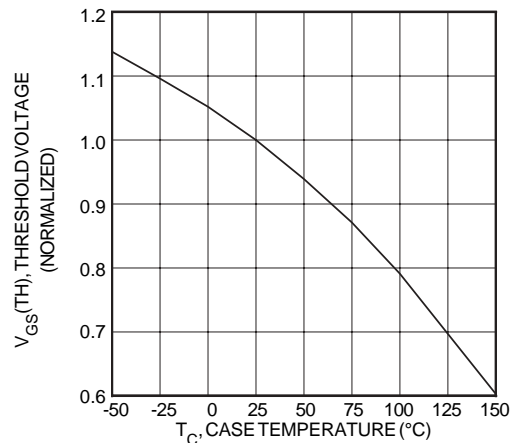


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

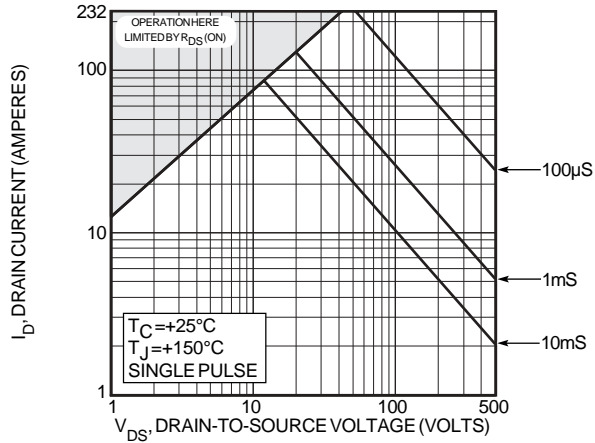


FIGURE 10, MAXIMUM SAFE OPERATING AREA

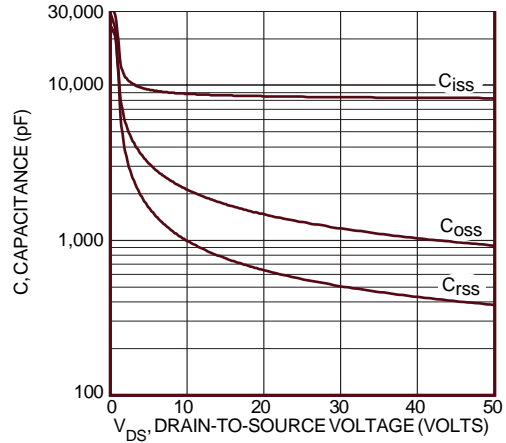


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

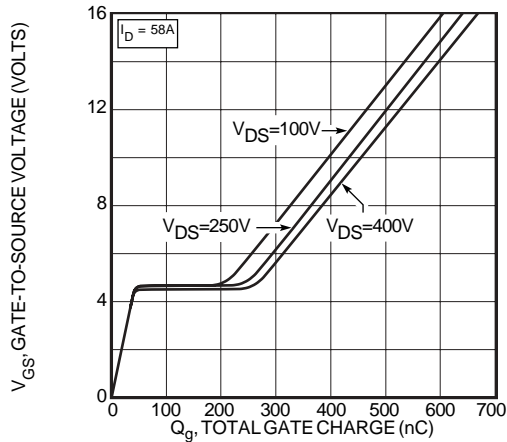


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

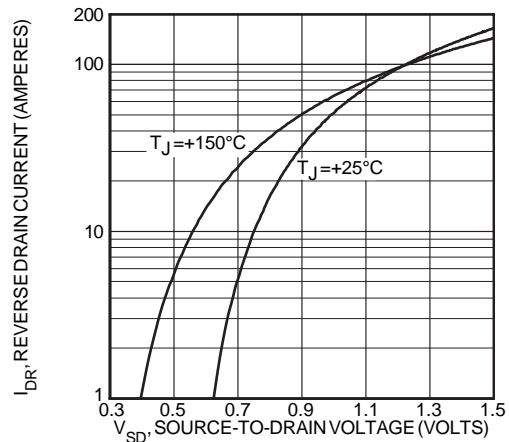
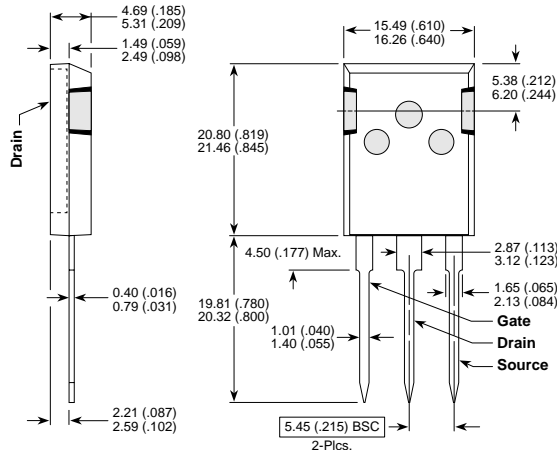


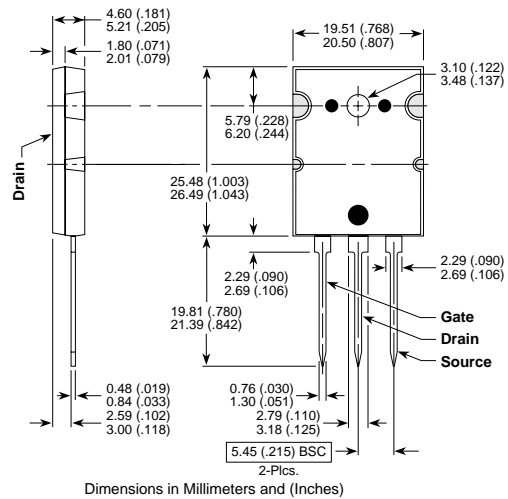
FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

T-MAX™ (B2) Package Outline



These dimensions are equal to the TO-247 without the mounting hole.  
Dimensions in Millimeters and (Inches)

TO-264 (L) Package Outline



Dimensions in Millimeters and (Inches)