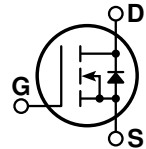




Power MOS V® is a new generation of high voltage N-Channel enhancement mode power MOSFETs. This new technology minimizes the JFET effect, increases packing density and reduces the on-resistance. Power MOS V® also achieves faster switching speeds through optimized gate layout.

- Fast Recovery Body Diode
- Lower Leakage
- Faster Switching
- 100% Avalanche Tested
- Popular SOT-227 Package



### MAXIMUM RATINGS

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

| Symbol         | Parameter  | APT10050JVFR | UNIT  |
|----------------|--|--------------|-------|
| $V_{DSS}$      | Drain-Source Voltage   | 1000         | Volts |
| $I_D$          | Continuous Drain Current @ $T_C = 25^\circ\text{C}$            | 19           | Amps  |
| $I_{DM}$       | Pulsed Drain Current <sup>①</sup>                              | 76           |       |
| $V_{GS}$       | Gate-Source Voltage Continuous                                 | $\pm 30$     | Volts |
| $V_{GSM}$      | Gate-Source Voltage Transient                                  | $\pm 40$     |       |
| $P_D$          | Total Power Dissipation @ $T_C = 25^\circ\text{C}$             | 450          | Watts |
|                | Linear Derating Factor   | 3.6          | 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) | 19           | Amps  |
| $E_{AR}$       | Repetitive Avalanche Energy <sup>①</sup>                       | 50           | mJ    |
| $E_{AS}$       | Single Pulse Avalanche Energy <sup>④</sup>                     | 2500         |       |

### STATIC ELECTRICAL CHARACTERISTICS

| Symbol       | Characteristic / Test Conditions   | MIN  | TYP | MAX       | UNIT          |
|--------------|--|------|-----|-----------|---------------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 250\mu\text{A}$ )                             | 1000 |     |           | Volts         |
| $I_{D(on)}$  | On State Drain Current <sup>②</sup> ( $V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10V$ ) | 19   |     |           | Amps          |
| $R_{DS(on)}$ | Drain-Source On-State Resistance <sup>②</sup> ( $V_{GS} = 10V, 0.5 I_{D[Cont.]}$ )                 |      |     | 0.500     | Ohms          |
| $I_{DSS}$    | Zero Gate Voltage Drain Current ( $V_{DS} = V_{DSS}, V_{GS} = 0V$ )                                |      |     | 250       | $\mu\text{A}$ |
|              | Zero Gate Voltage Drain Current ( $V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$ )   |      |     | 1000      |               |
| $I_{GSS}$    | Gate-Source Leakage Current ( $V_{GS} = \pm 30V, V_{DS} = 0V$ )                                    |      |     | $\pm 100$ | nA            |
| $V_{GS(th)}$ | Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 2.5\text{mA}$ )                                   | 2    |     | 4         | Volts         |

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

**DYNAMIC CHARACTERISTICS**

**APT10050JVFR**

| Symbol              | Characteristic               | Test Conditions                                | MIN | TYP  | MAX  | UNIT |
|---------------------|------------------------------|--|-----|------|------|------|
| C <sub>iss</sub>    | Input Capacitance            | V <sub>GS</sub> = 0V                           |     | 6600 | 7900 | pF   |
| C <sub>oss</sub>    | Output Capacitance           | V <sub>DS</sub> = 25V                          |     | 595  | 830  |      |
| C <sub>rss</sub>    | Reverse Transfer Capacitance | f = 1 MHz                                      |     | 290  | 430  |      |
| Q <sub>g</sub>      | Total Gate Charge ③          | V <sub>GS</sub> = 10V                          |     | 335  | 500  | nC   |
| Q <sub>gs</sub>     | Gate-Source Charge           | V <sub>DD</sub> = 0.5 V <sub>DSS</sub>         |     | 29   | 45   |      |
| Q <sub>gd</sub>     | Gate-Drain ("Miller") Charge | I <sub>D</sub> = I <sub>D</sub> [Cont.] @ 25°C |     | 165  | 250  |      |
| t <sub>d(on)</sub>  | Turn-on Delay Time           | V <sub>GS</sub> = 15V                          |     | 16   | 32   | ns   |
| t <sub>r</sub>      | Rise Time                    | V <sub>DD</sub> = 0.5 V <sub>DSS</sub>         |     | 13   | 26   |      |
| t <sub>d(off)</sub> | Turn-off Delay Time          | I <sub>D</sub> = I <sub>D</sub> [Cont.] @ 25°C |     | 59   | 90   |      |
| t <sub>f</sub>      | Fall Time                    | R <sub>G</sub> = 0.6Ω                          |     | 8    | 16   |      |

**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

| Symbol           | Characteristic / Test Conditions   | MIN                    | TYP | MAX | UNIT  |
|------------------|--|------------------------|-----|-----|-------|
| I <sub>S</sub>   | Continuous Source Current (Body Diode)   |                        |     | 19  | Amps  |
| I <sub>SM</sub>  | Pulsed Source Current ① (Body Diode)   |                        |     | 76  |       |
| V <sub>SD</sub>  | Diode Forward Voltage ② (V <sub>GS</sub> = 0V, I <sub>S</sub> = -I <sub>D</sub> [Cont.]) |                        |     | 1.3 | Volts |
| dv/dt            | Peak Diode Recovery dv/dt ⑤  |                        |     | 18  | V/ns  |
| t <sub>rr</sub>  | Reverse Recovery Time<br>(I <sub>S</sub> = -I <sub>D</sub> [Cont.], di/dt = 100A/μs)     | T <sub>j</sub> = 25°C  |     | 300 | ns    |
|                  |  | T <sub>j</sub> = 125°C |     | 600 |       |
| Q <sub>rr</sub>  | Reverse Recovery Charge<br>(I <sub>S</sub> = -I <sub>D</sub> [Cont.], di/dt = 100A/μs)   | T <sub>j</sub> = 25°C  | 1.7 |     | μC    |
|                  |  | T <sub>j</sub> = 125°C | 4.8 |     |       |
| I <sub>RRM</sub> | Peak Recovery Current<br>(I <sub>S</sub> = -I <sub>D</sub> [Cont.], di/dt = 100A/μs)     | T <sub>j</sub> = 25°C  | 12  |     | Amps  |
|                  |  | T <sub>j</sub> = 125°C | 19  |     |       |

**THERMAL / PACKAGE CHARACTERISTICS**

| Symbol                 | Characteristic  | MIN  | TYP | MAX  | UNIT  |
|------------------------|---|------|-----|------|-------|
| R <sub>θJC</sub>       | Junction to Case  |      |     | 0.28 | °C/W  |
| R <sub>θJA</sub>       | Junction to Ambient   |      |     | 40   |       |
| V <sub>Isolation</sub> | RMS Voltage (50-60 Hz Sinusoidal Waveform From Terminals to Mounting Base for 1 Min.) | 2500 |     |      | Volts |
| Torque                 | Maximum Torque for Device Mounting Screws and Electrical Terminations.                |      |     | 13   | lb·in |

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 = 13.85mH, R<sub>G</sub> = 25Ω, Peak I<sub>L</sub> = 19A

⑤ I<sub>S</sub> = -I<sub>D</sub> [Cont.], di/dt = 100A/μs, V<sub>DD</sub> = V<sub>DSS</sub>, T<sub>j</sub> = 150°C, R<sub>G</sub> = 2.0Ω, V<sub>R</sub> = 200V

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

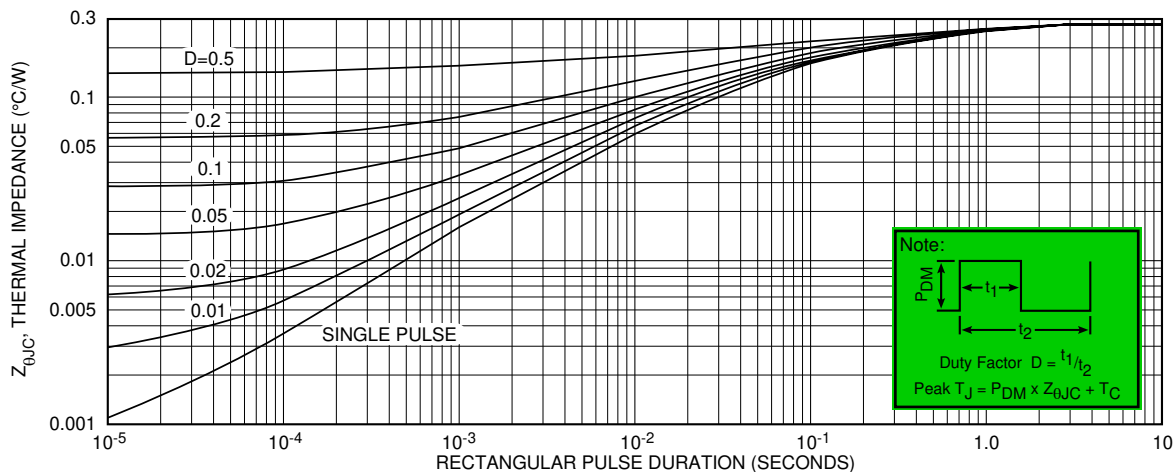
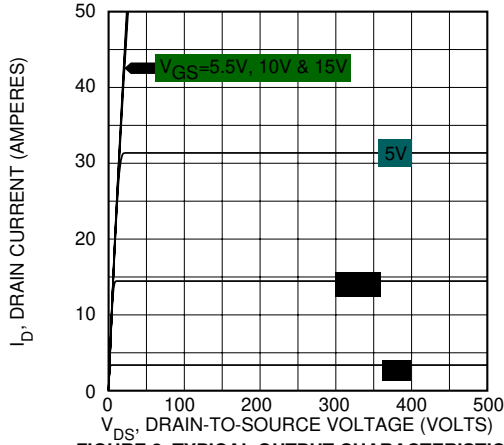
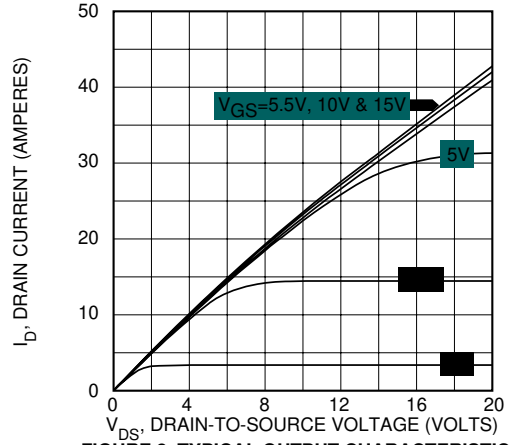


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

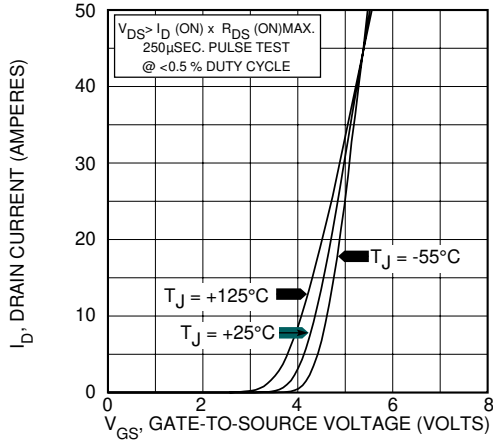
**APT10050JVFR**



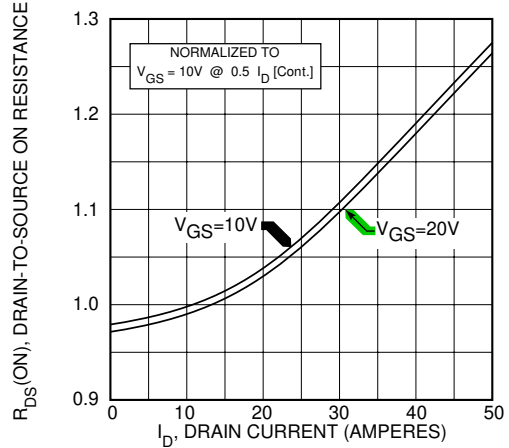
**FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS**



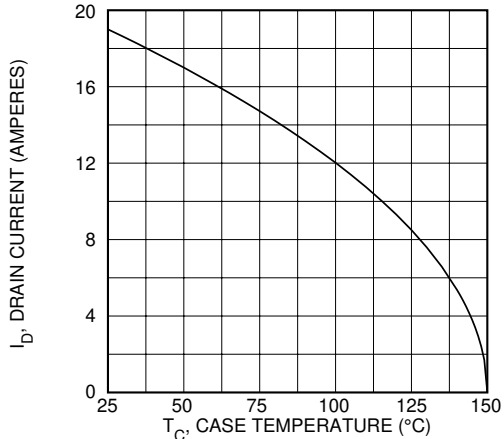
**FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS**



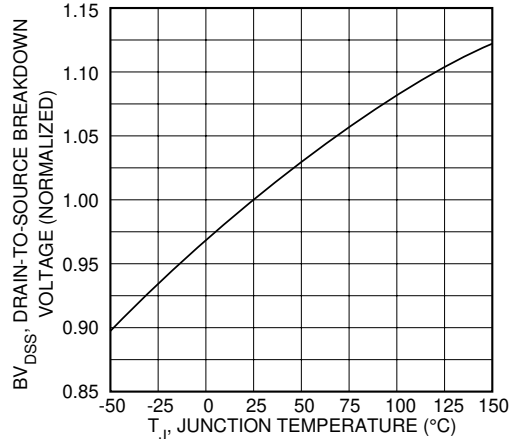
**FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS**



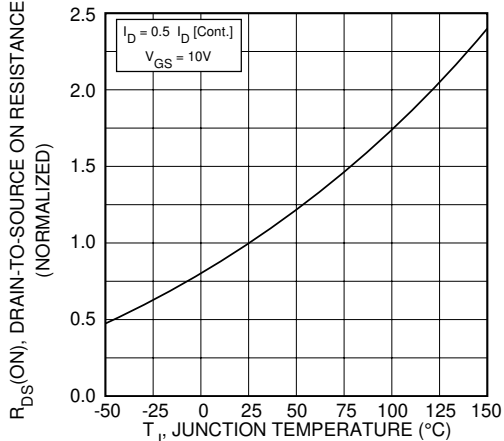
**FIGURE 5,  $R_{DS(ON)}$  vs DRAIN CURRENT**



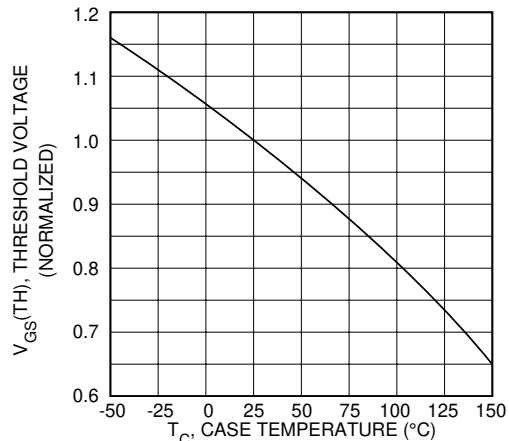
**FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE**



**FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE**



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



**FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE**

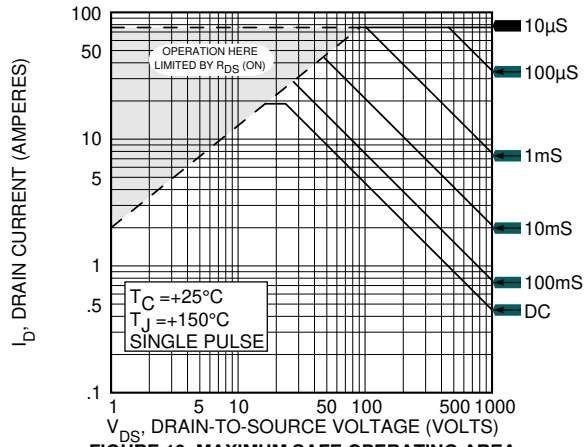


FIGURE 10, MAXIMUM SAFE OPERATING AREA

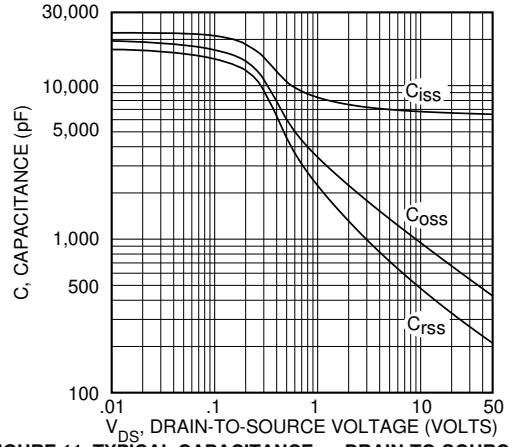


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

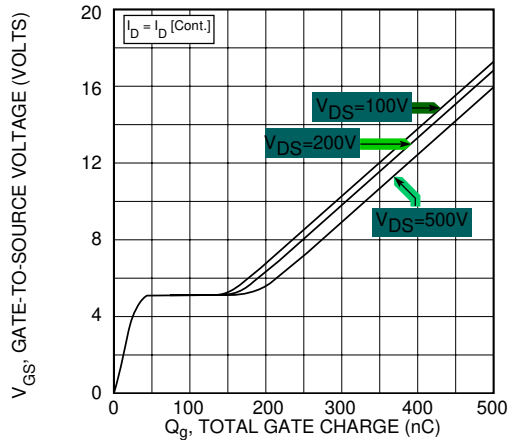


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

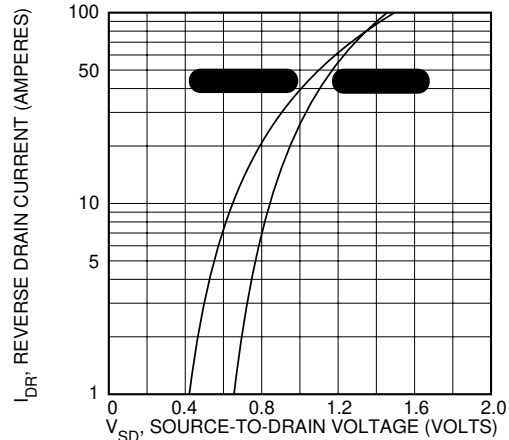
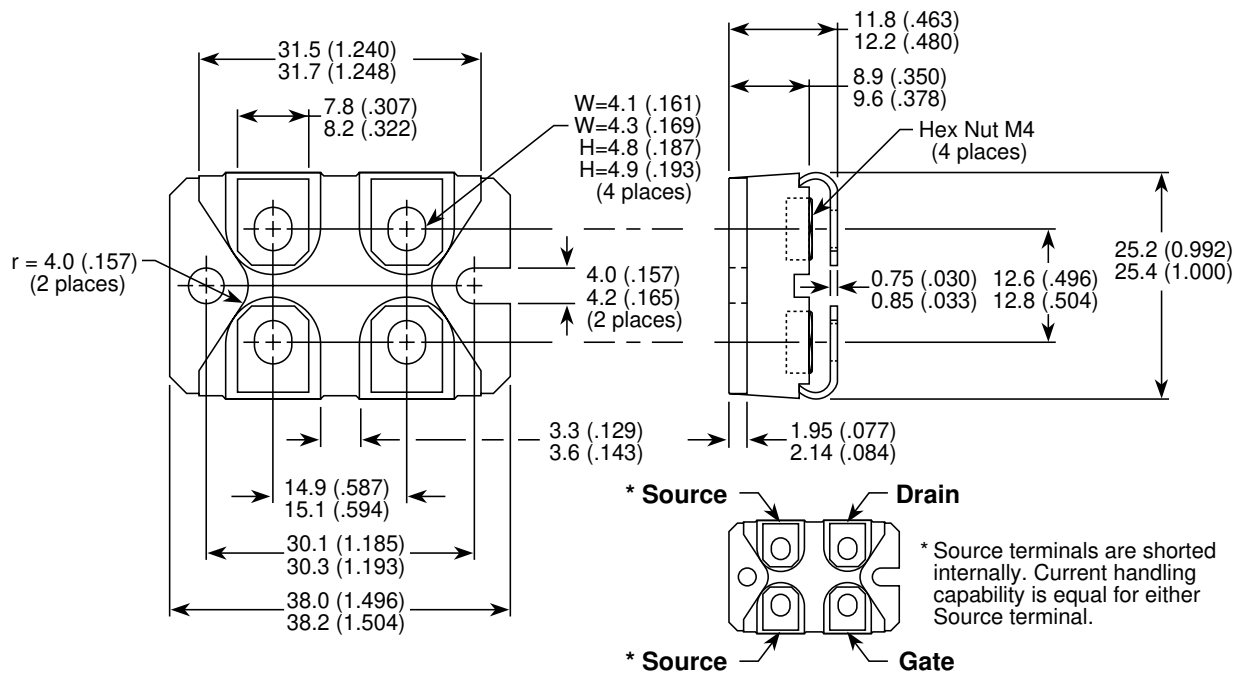


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

SOT-227 (ISOTOP®) Package Outline



Dimensions in Millimeters and (Inches)