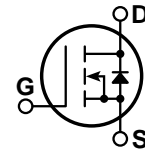


### POWER MOS V®

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**
- **Popular SOT-227 Package**



#### MAXIMUM RATINGS

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

| Symbol         | Parameter  | APT40M70JVR | UNIT                |
|----------------|--|-------------|---------------------|
| $V_{DSS}$      | Drain-Source Voltage   | 400         | Volts               |
| $I_D$          | Continuous Drain Current @ $T_C = 25^\circ\text{C}$            | 53          | Amps                |
| $I_{DM}$       | Pulsed Drain Current <sup>①</sup>                              | 212         |                     |
| $V_{GS}$       | 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/ $^\circ\text{C}$ |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range               | -55 to 150  | $^\circ\text{C}$    |
| $T_L$          | Lead Temperature: 0.063" from Case for 10 Sec.                 | 300         |                     |
| $I_{AR}$       | Avalanche Current <sup>①</sup> (Repetitive and Non-Repetitive) | 53          | 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 ( $V_{GS} = 0\text{V}$ , $I_D = 250\mu\text{A}$ )                              | 400 |     |           | Volts         |
| $I_{D(on)}$  | On State Drain Current <sup>②</sup> ( $V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10\text{V}$ )     | 53  |     |           | Amps          |
| $R_{DS(on)}$ | Drain-Source On-State Resistance <sup>②</sup> ( $V_{GS} = 10\text{V}$ , $0.5 I_{D[Cont.]}$ )                  |     |     | 0.070     | Ohms          |
| $I_{DSS}$    | Zero Gate Voltage Drain Current ( $V_{DS} = V_{DSS}$ , $V_{GS} = 0\text{V}$ )                                 |     |     | 25        | $\mu\text{A}$ |
|              | Zero Gate Voltage Drain Current ( $V_{DS} = 0.8 V_{DSS}$ , $V_{GS} = 0\text{V}$ , $T_C = 125^\circ\text{C}$ ) |     |     | 250       |               |
| $I_{GSS}$    | Gate-Source Leakage Current ( $V_{GS} = \pm 30\text{V}$ , $V_{DS} = 0\text{V}$ )                              |     |     | $\pm 100$ | 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.

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**DYNAMIC CHARACTERISTICS**

**APT40M70JVR**

| Symbol       | Characteristic               | Test Conditions  | MIN | TYP  | MAX  | UNIT |
|--------------|------------------------------|--|-----|------|------|------|
| $C_{iss}$    | Input Capacitance            | $V_{GS} = 0V$<br>$V_{DS} = 25V$<br>$f = 1\text{ MHz}$  |     | 7410 | 8890 | pF   |
| $C_{oss}$    | Output Capacitance           |  |     | 1140 | 1600 |      |
| $C_{rss}$    | Reverse Transfer Capacitance |  |     | 450  | 675  |      |
| $Q_g$        | Total Gate Charge ③          | $V_{GS} = 10V$<br>$V_{DD} = 0.5 V_{DSS}$<br>$I_D = I_{D[Cont.]} @ 25^\circ C$                      |     | 330  | 495  | nC   |
| $Q_{gs}$     | Gate-Source Charge           |  |     | 40   | 60   |      |
| $Q_{gd}$     | Gate-Drain ("Miller") Charge |  |     | 127  | 190  |      |
| $t_{d(on)}$  | Turn-on Delay Time           | $V_{GS} = 15V$<br>$V_{DD} = 0.5 V_{DSS}$<br>$I_D = I_{D[Cont.]} @ 25^\circ C$<br>$R_G = 0.6\Omega$ |     | 16   | 32   | ns   |
| $t_r$        | Rise Time                    |  |     | 16   | 32   |      |
| $t_{d(off)}$ | Turn-off Delay Time          |  |     | 54   | 80   |      |
| $t_f$        | 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)                                  |     |      | 53  | Amps    |
| $I_{SM}$ | Pulsed Source Current ① (Body Diode)                                    |     |      | 212 |         |
| $V_{SD}$ | Diode Forward Voltage ② ( $V_{GS} = 0V, I_S = -I_{D[Cont.]}$ )          |     |      | 1.3 | Volts   |
| $t_{rr}$ | Reverse Recovery Time ( $I_S = -I_{D[Cont.]}, di_S/dt = 100A/\mu s$ )   |     | 540  |     | ns      |
| $Q_{rr}$ | Reverse Recovery Charge ( $I_S = -I_{D[Cont.]}, di_S/dt = 100A/\mu s$ ) |     | 11.8 |     | $\mu C$ |

**THERMAL/PACKAGE CHARACTERISTICS**

| Symbol          | Characteristic  | MIN  | TYP | MAX  | UNIT         |
|-----------------|---|------|-----|------|--------------|
| $R_{\theta JC}$ | Junction to Case  |      |     | 0.28 | $^\circ C/W$ |
| $R_{\theta JA}$ | Junction to Ambient   |      |     | 40   |              |
| $V_{isolation}$ | 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  $\mu s$ , Duty Cycle < 2%
- ③ See MIL-STD-750 Method 3471
- ④ Starting  $T_j = +25^\circ C, L = 1.78mH, R_G = 25\Omega, \text{Peak } I_L = 53A$

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

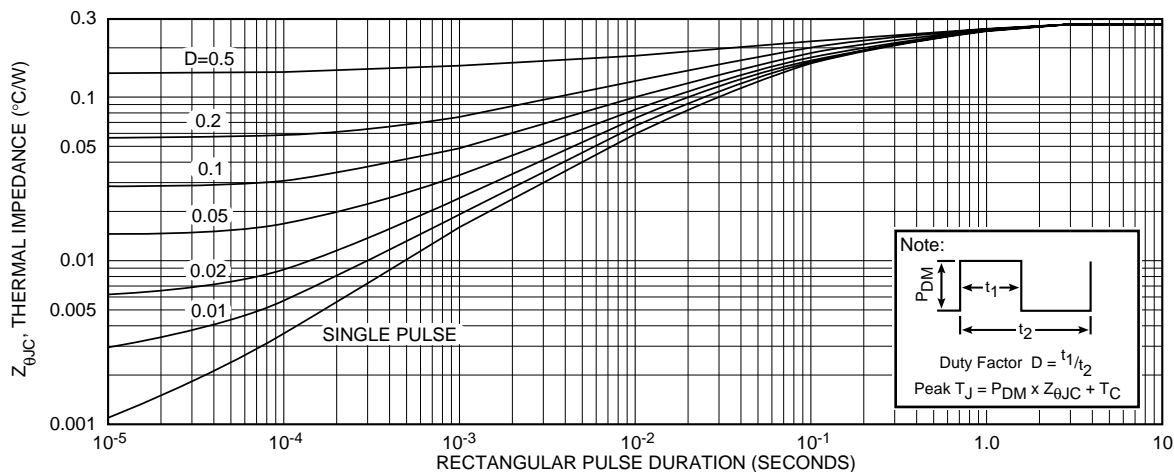
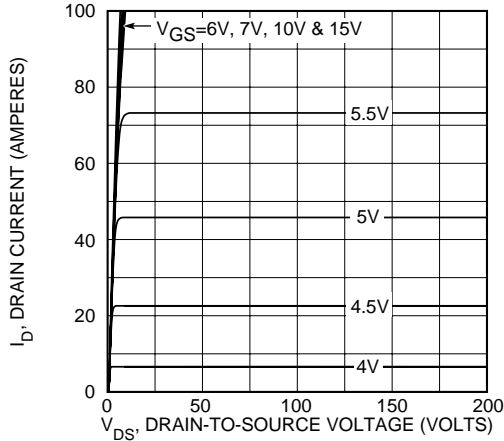
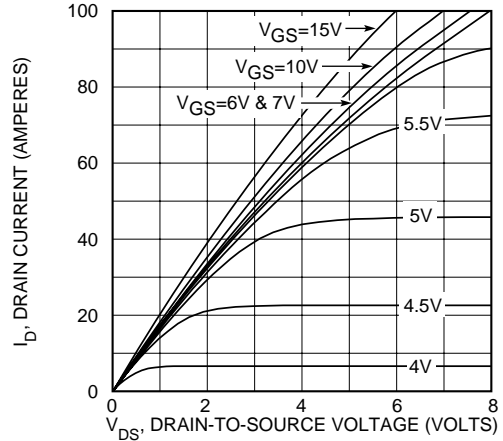


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

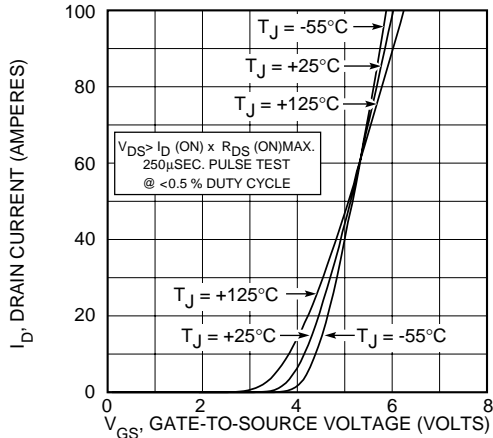
**APT40M70JVR**



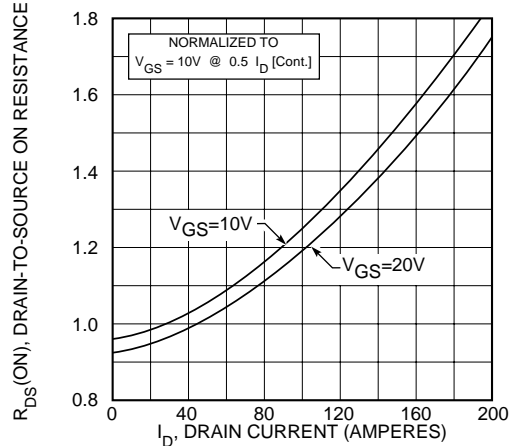
**FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS**



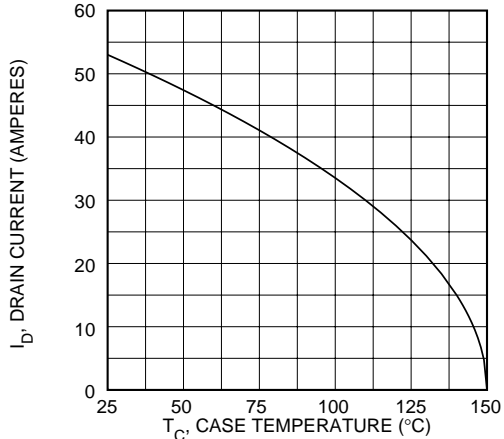
**FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS**



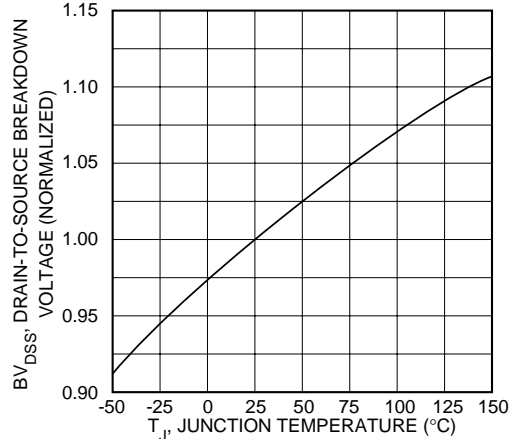
**FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS**



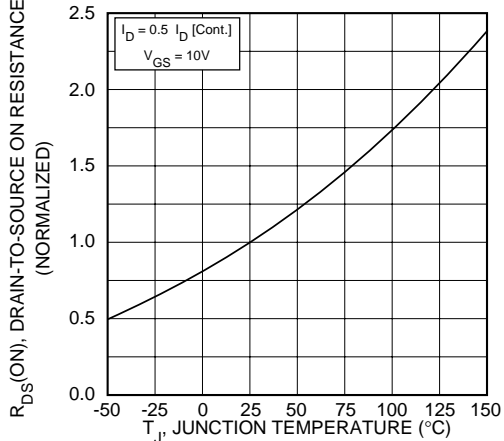
**FIGURE 5,  $R_{DS(ON)}$  vs DRAIN CURRENT**



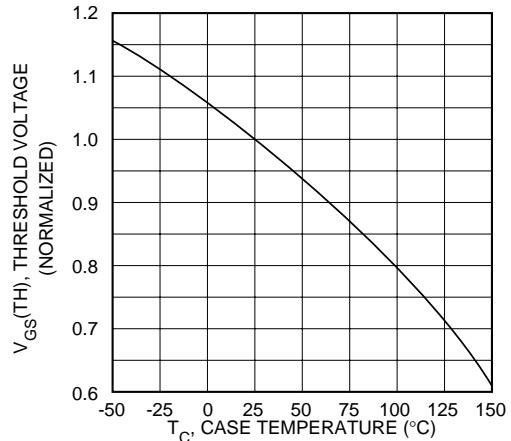
**FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE**



**FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE**

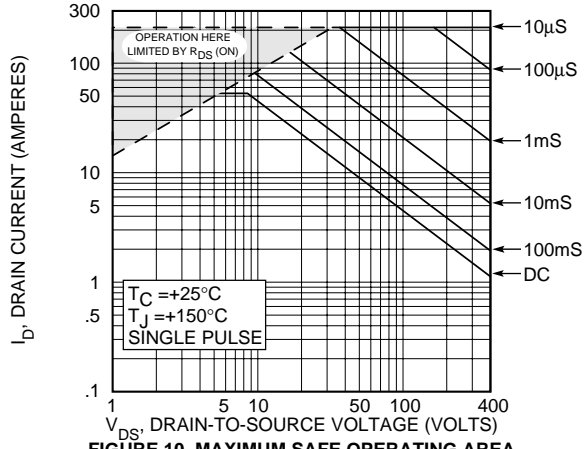


**FIGURE 8, ON-RESISTANCE vs. TEMPERATURE**

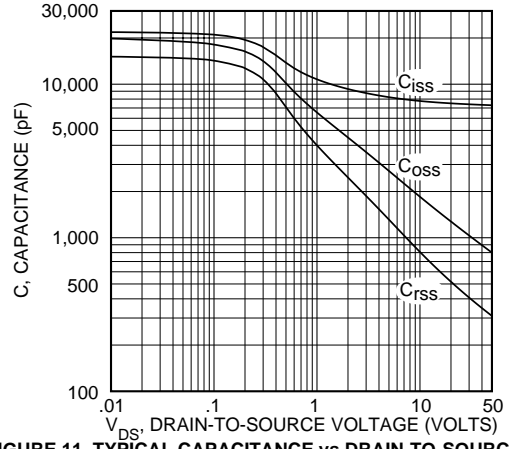


**FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE**

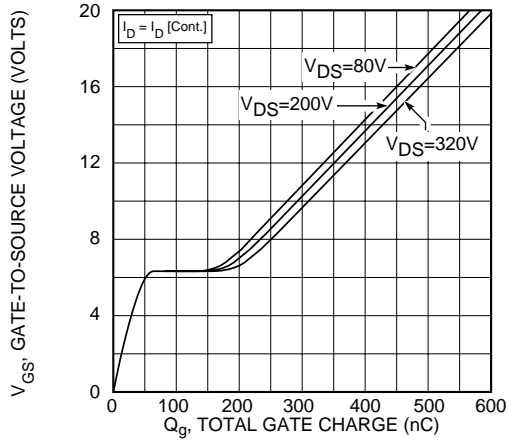
**APT40M70JVR**



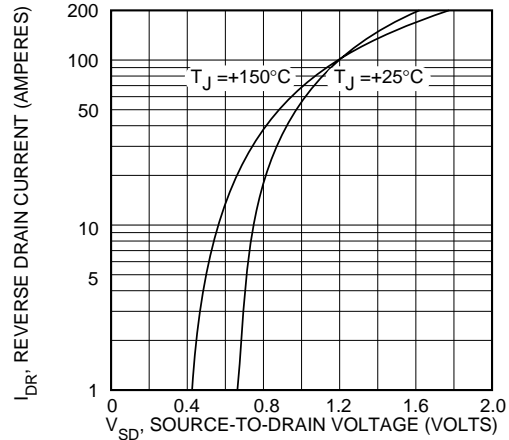
**FIGURE 10, MAXIMUM SAFE OPERATING AREA**



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

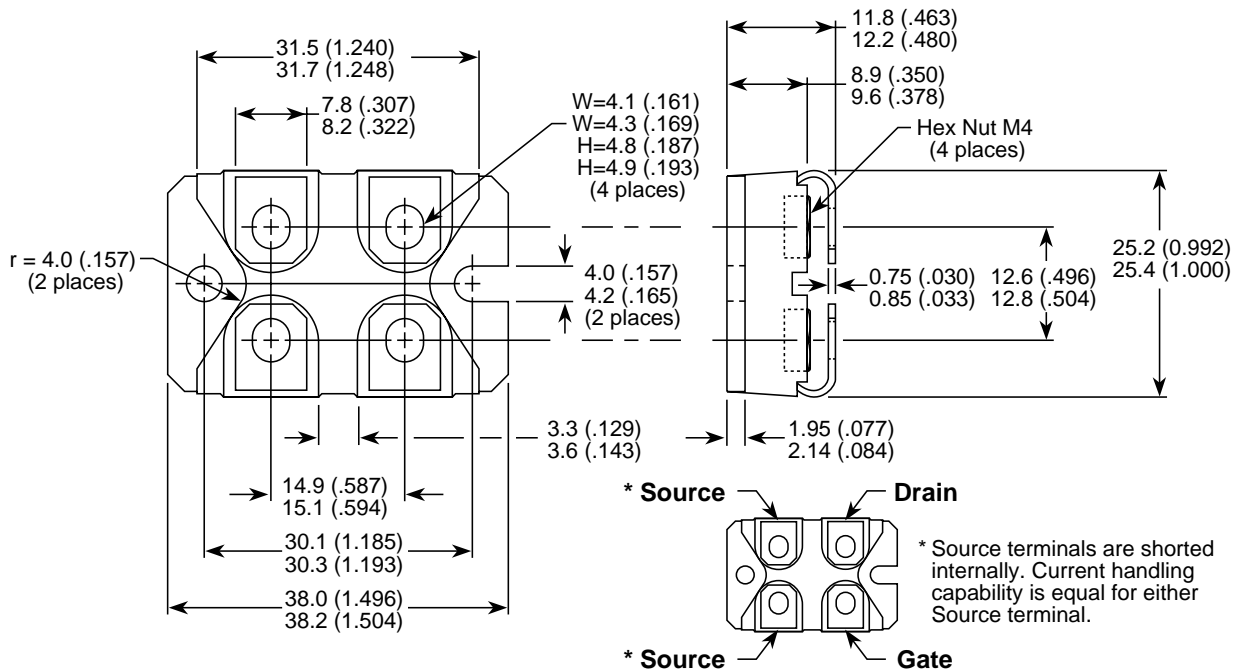


**FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE**



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

**SOT-227 (ISOTOP®) Package Outline**



Dimensions in Millimeters and (Inches)



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