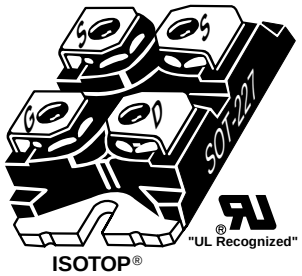
# APT12040JVR

**1200V 26A 0.400Ω**

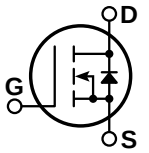
## POWER MOS V®

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.



ISOTOP®

- **Faster Switching**
- **100% Avalanche Tested**
- **Lower Leakage**
- **Popular SOT-227 Package**




**MAXIMUM RATINGS** All Ratings: $T_C$ = 25°C unless otherwise specified.

| Symbol | Parameter | APT12040JVR | UNIT |
|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | 1200 | Volts |
| $I_D$ | Continuous Drain Current @ $T_C$ = 25°C | 26 | Amps |
| $I_{DM}$ | Pulsed Drain Current ① | 104 | |
| $V_{GS}$ | Gate-Source Voltage Continuous | ±30 | Volts |
| $V_{GSM}$ | Gate-Source Voltage Transient | ±40 | |
| $P_D$ | Total Power Dissipation @ $T_C$ = 25°C | 700 | Watts |
| | Linear Derating Factor | 5.6 | 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 ① (Repetitive and Non-Repetitive) | 26 | Amps |
| $E_{AR}$ | Repetitive Avalanche Energy ① | 50 | mJ |
| $E_{AS}$ | Single Pulse Avalanche Energy ④ | 3600 | |

**STATIC ELECTRICAL CHARACTERISTICS**

| Symbol | Characteristic / Test Conditions | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage ($V_{GS}$ = 0V, $I_D$ = 250μA) | 1200 | | | Volts |
| $I_{D(on)}$ | On State Drain Current ② ($V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS}$ = 10V) | 26 | | | Amps |
| $R_{DS(on)}$ | Drain-Source On-State Resistance ② ($V_{GS}$ = 10V, 0.5 $I_{D[Cont.]}$) | | | 0.400 | Ohms |
| $I_{DSS}$ | Zero Gate Voltage Drain Current ($V_{DS} = V_{DSS}$, $V_{GS}$ = 0V) | | | 100 | μA |
| | Zero Gate Voltage Drain Current ($V_{DS}$ = 0.8 $V_{DSS}$, $V_{GS}$ = 0V, $T_C$ = 125°C) | | | 500 | |
| $I_{GSS}$ | Gate-Source Leakage Current ($V_{GS}$ = ±30V, $V_{DS}$ = 0V) | | | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D$ = 5mA) | 2 | | 4 | Volts |

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


*APT Website - http://www.advancedpower.com*

**USA**
**405 S.W. Columbia Street** **Bend, Oregon 97702-1035** **Phone: (541) 382-8028** **FAX: (541) 388-0364**
**EUROPE**
**Chemin de Magret** **33700 Merignac - France** **Phone: (33) 5 57 92 15 15** **FAX: (33) 5 56 47 97 61**


050-5588 Rev C

## DYNAMIC CHARACTERISTICS

**APT12040JVR**

| Symbol | Characteristic | Test Conditions | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| $C_{iss}$ | Input Capacitance | $V_{GS}$ = 0V<br>$V_{DS}$ = 25V<br>f = 1 MHz | | 15000 | 18000 | pF |
| $C_{oss}$ | Output Capacitance | | | 1240 | 1730 | |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 640 | 960 | |
| $Q_g$ | Total Gate Charge ③ | $V_{GS}$ = 10V<br>$V_{DD}$ = 0.5 $V_{DSS}$<br>$I_D$ = $I_{D[Cont.]}$ @ 25°C | | 800 | 1200 | nC |
| $Q_{gs}$ | Gate-Source Charge | | | 64 | 96 | |
| $Q_{gd}$ | Gate-Drain ("Miller") Charge | | | 400 | 600 | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{GS}$ = 15V<br>$V_{DD}$ = 0.5 $V_{DSS}$<br>$I_D$ = $I_{D[Cont.]}$ @ 25°C<br>$R_G$ = 0.6Ω | | 20 | 40 | ns |
| $t_r$ | Rise Time | | | 18 | 36 | |
| $t_{d(off)}$ | Turn-off Delay Time | | | 90 | 135 | |
| $t_f$ | Fall Time | | | 20 | 40 | |

## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Symbol | Characteristic / Test Conditions | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | | | 26 | Amps |
| $I_{SM}$ | Pulsed Source Current ① (Body Diode) | | | 104 | |
| $V_{SD}$ | 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/μs) | | 1400 | | ns |
| $Q_{rr}$ | Reverse Recovery Charge ($I_S$ = -$I_{D[Cont.]}$, $dI_S/dt$ = 100A/μs) | | 38 | | μC |

## THERMAL/PACKAGE CHARACTERISTICS

| Symbol | Characteristic | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| $R_{\theta JC}$ | Junction to Case | | | 0.18 | °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.

◯ , Peak $I_L$ = 26A

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

③ See MIL-STD-750 Method 3471

◯ 4 Starting $T_j$ = +25°C, L = 10.65mH, $R_G$ = 25Ω

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

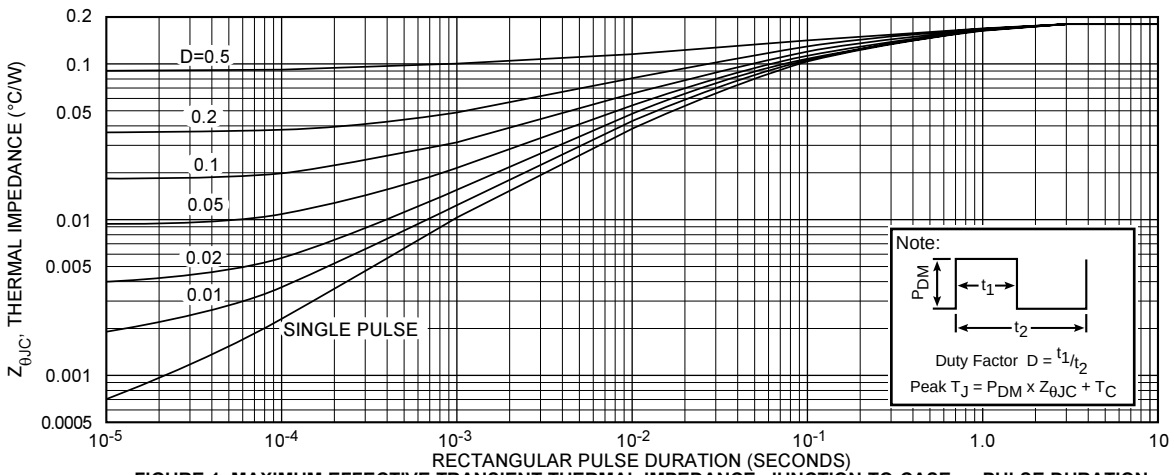



**FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION**

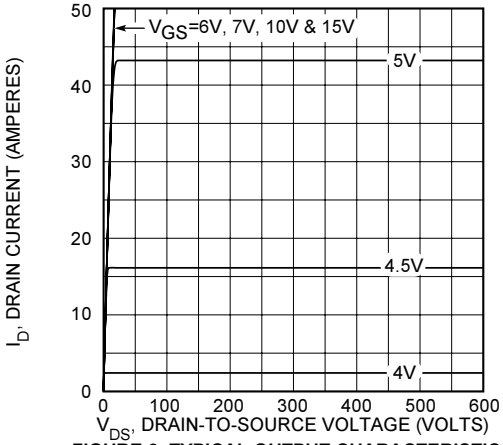



FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

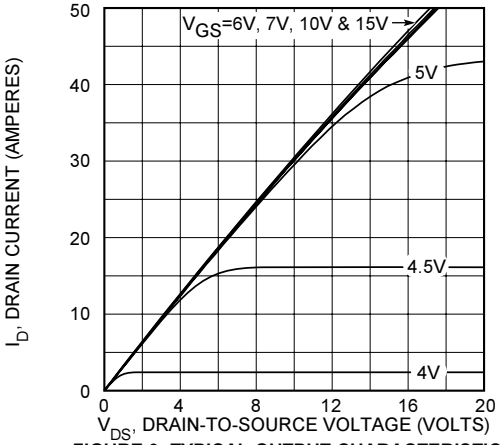



FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

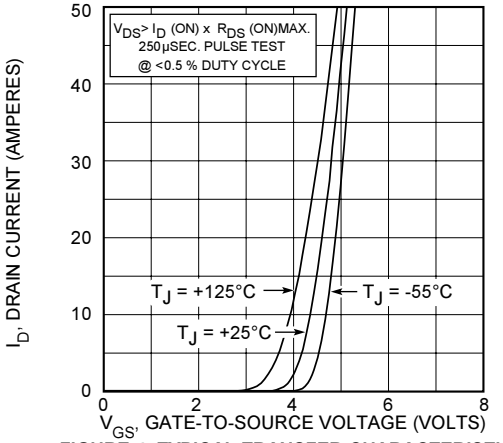



FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

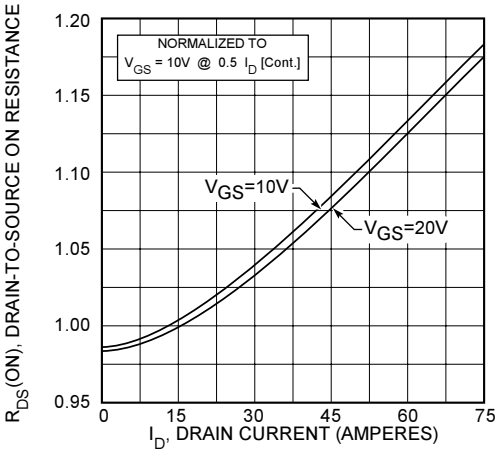



FIGURE 5, $R_{DS}$(ON) vs DRAIN CURRENT

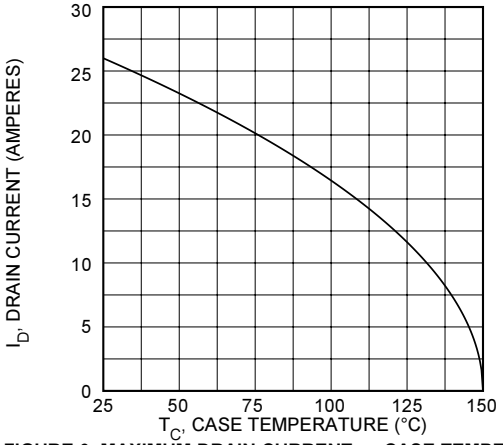



FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

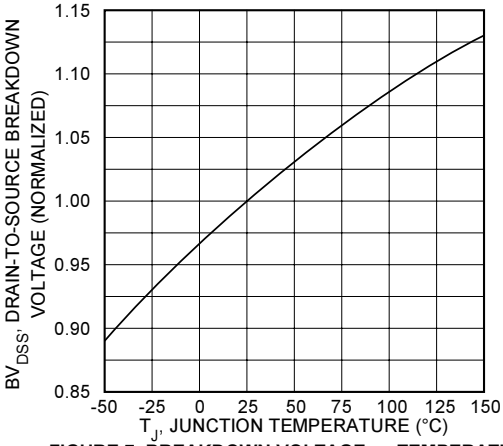



FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

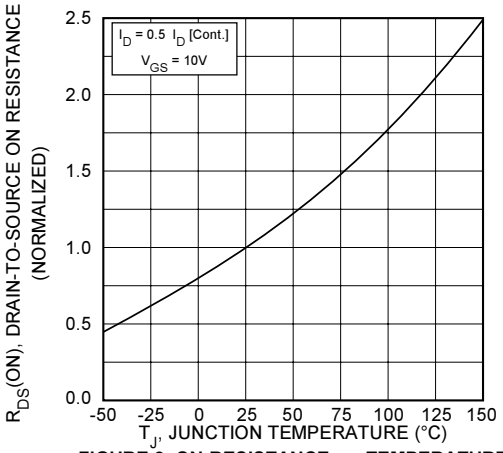



FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

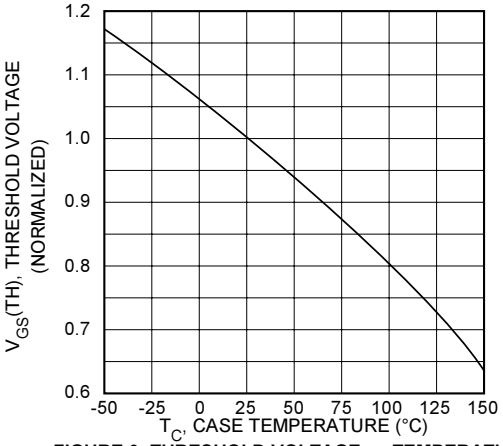



FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

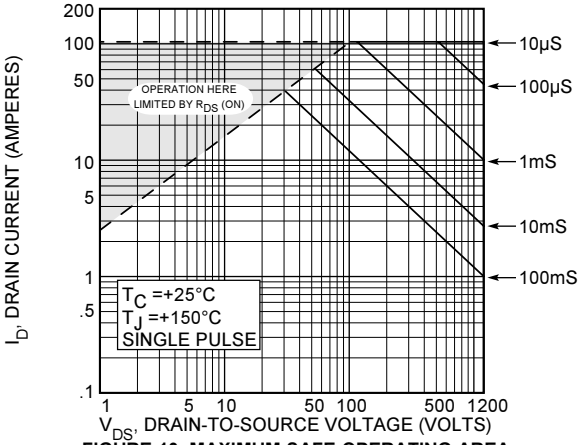



**FIGURE 10, MAXIMUM SAFE OPERATING AREA**

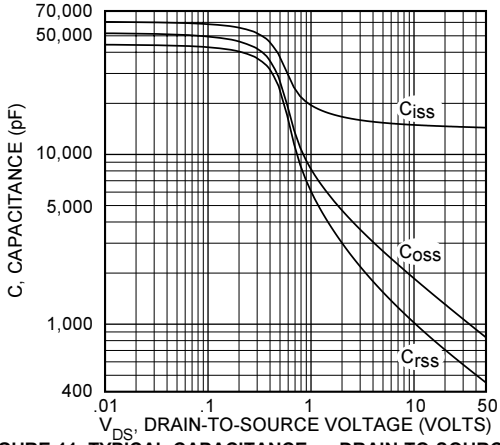



**FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE**

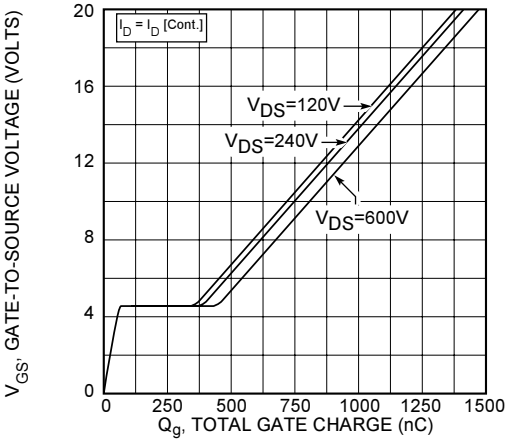



**FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE**

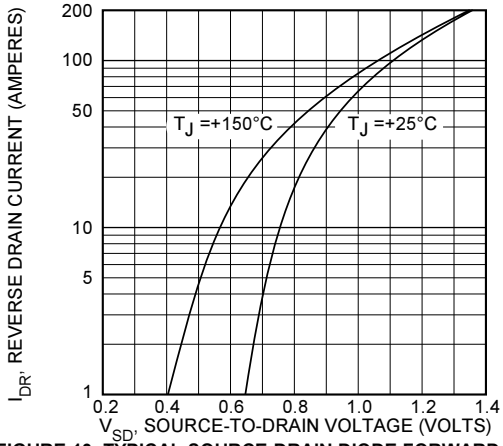
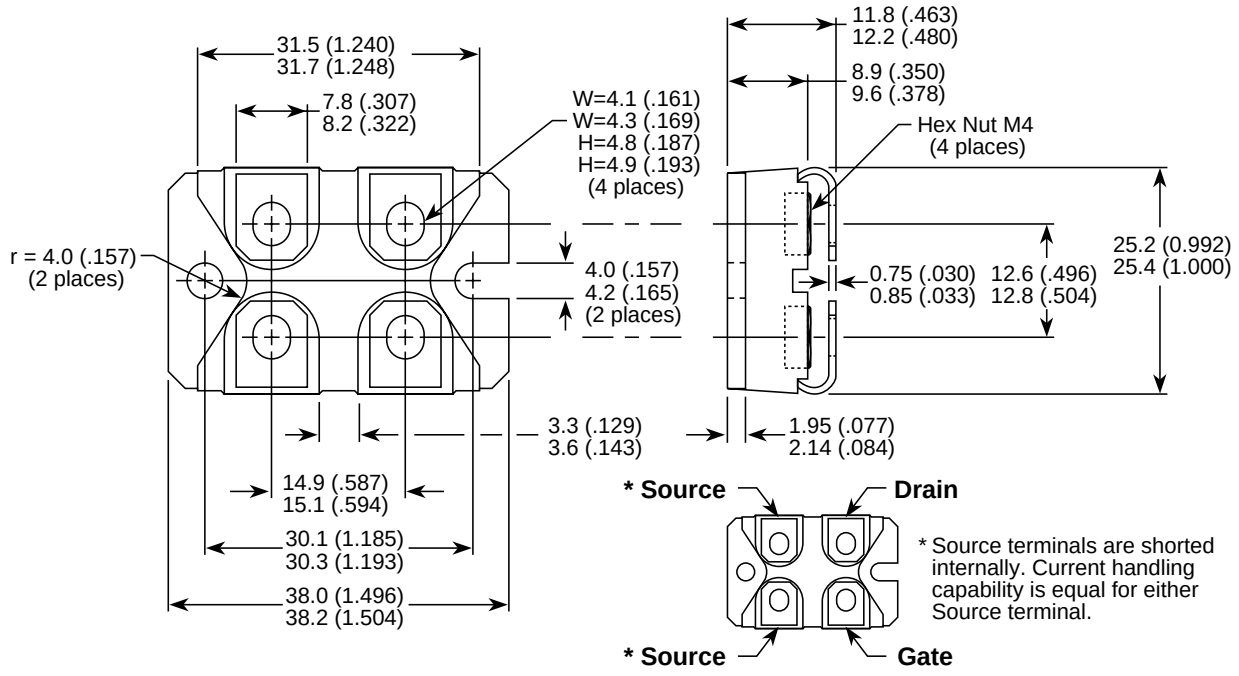



**FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE**

## SOT-227 (ISOTOP®) Package Outline




Dimensions in Millimeters and (Inches)

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"UL Recognized" File No. E145592

APT's devices are covered by one or more of the following U.S.patents: 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058

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