

POWER MOS V® FREDFET

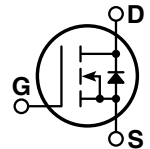
Power MOS V® is a new generation of high voltage N-Channel enhancement mode power MOSFETs. This new technology minimizes the JFET effect, increases packing density and reduces the on-resistance. Power MOS V® also achieves faster switching speeds through optimized gate layout.



- **Faster Switching**
- **Lower Leakage**
- **Popular SOT-227 Package**

- **Avalanche Energy Rated**

• **FAST RECOVERY BODY DIODE**


MAXIMUM RATINGS

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

| Symbol | Parameter | APT12040JVFR | UNIT |
|----------------|--|--------------|---------------------|
| V_{DSS} | Drain-Source Voltage | 1200 | Volts |
| I_D | Continuous Drain Current @ $T_C = 25^\circ\text{C}$ | 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 @ $T_C = 25^\circ\text{C}$ | 700 | Watts |
| | Linear Derating Factor | 5.6 | 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 ^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 ($V_{GS} = 0V, I_D = 250\mu\text{A}$) | 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 ($V_{DS} = V_{DSS}, V_{GS} = 0V$) | | | 250 | μA |
| | 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 ($V_{GS} = \pm 30V, V_{DS} = 0V$) | | | ± 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.

DYNAMIC CHARACTERISTICS

APT12040JVFR

| Symbol | Characteristic | Test Conditions | MIN | TYP | MAX | UNIT |
|---------------------|------------------------------|-----------------------------|-----|-------|-------|------|
| C _{iss} | Input Capacitance | V _{GS} = 0V | | 15000 | 18000 | pF |
| C _{oss} | Output Capacitance | V _{DS} = 25V | | 1240 | 1730 | |
| C _{rss} | Reverse Transfer Capacitance | f = 1 MHz | | 640 | 960 | |
| Q _g | Total Gate Charge ③ | V _{GS} = 10V | | 800 | 1200 | nC |
| Q _{gs} | Gate-Source Charge | V _{DD} = 600V | | 64 | 96 | |
| Q _{gd} | Gate-Drain ("Miller") Charge | I _D = 26A @ 25°C | | 400 | 600 | |
| t _{d(on)} | Turn-on Delay Time | V _{GS} = 15V | | 20 | 40 | ns |
| t _r | Rise Time | V _{DD} = 600V | | 18 | 36 | |
| t _{d(off)} | Turn-off Delay Time | I _D = 26A @ 25°C | | 90 | 135 | |
| t _f | Fall Time | R _G = 0.6Ω | | 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 = - 26A) | | | 1.3 | Volts |
| dv/dt | Peak Diode Recovery dv/dt ⑤ | | | 18 | V/ns |
| t _{rr} | Reverse Recovery Time (I _S = -26A, di/dt = 100A/μs) | T _j = 25°C | | 300 | ns |
| | | T _j = 125°C | | 600 | |
| Q _{rr} | Reverse Recovery Charge (I _S = -26A, di/dt = 100A/μs) | T _j = 25°C | | 1.8 | μC |
| | | T _j = 125°C | | 7.4 | |
| I _{RRM} | Peak Recovery Current (I _S = -26A, di/dt = 100A/μs) | T _j = 25°C | | 15 | Amps |
| | | T _j = 125°C | | 30 | |

THERMAL/PACKAGE CHARACTERISTICS

| Symbol | Characteristic | MIN | TYP | MAX | UNIT |
|------------------------|---|------|-----|------|-------|
| R _{θJC} | Junction to Case | | | 0.18 | °C/W |
| R _{θJA} | 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 | | | 10 | 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_j = +25°C, L = 10.65mH, R_G = 25Ω, Peak I_L = 26A

⑤ I_S ≤ I_D 26A, di/dt = 100A/μs, T_j ≤ 150°C, R_G = 2.0Ω V_R = 1200V.

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

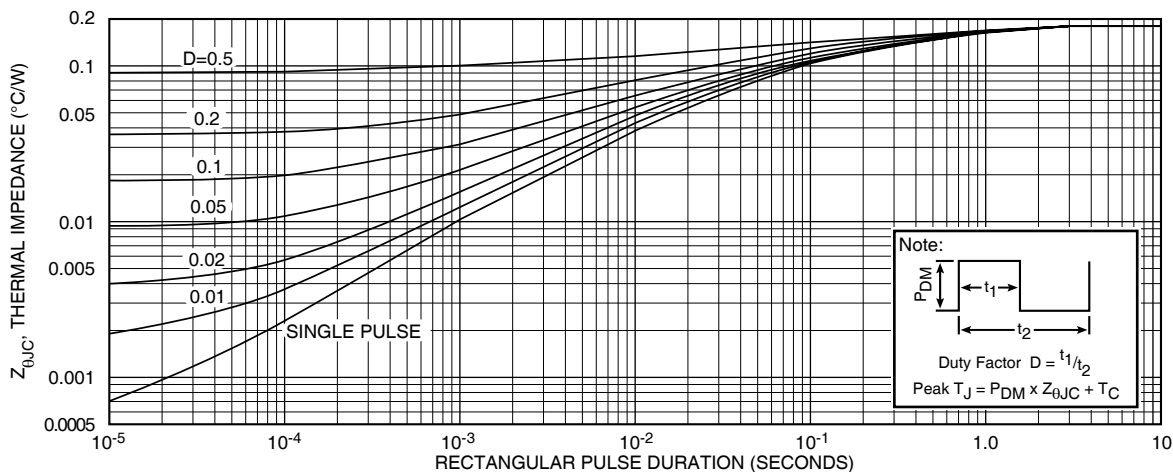


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

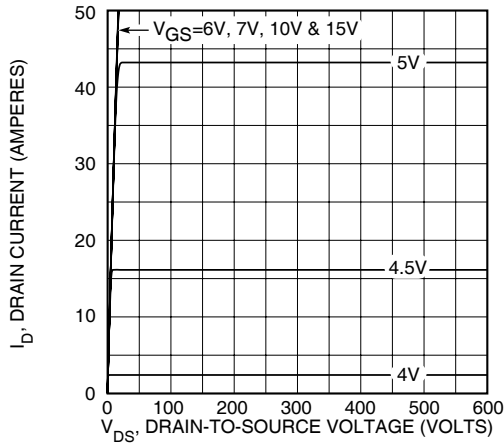


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

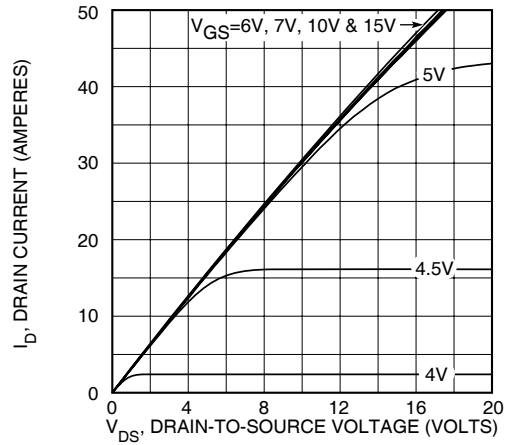


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

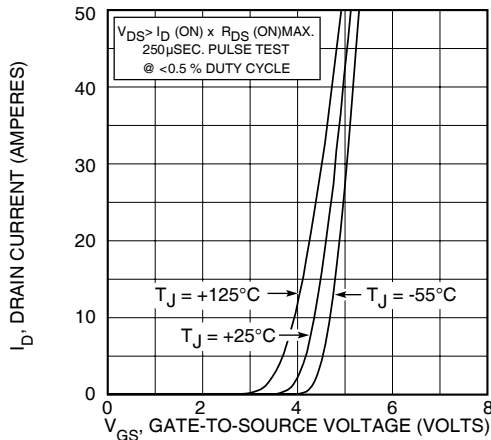


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

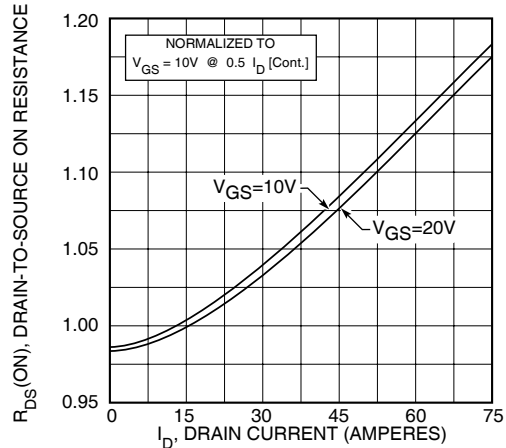


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

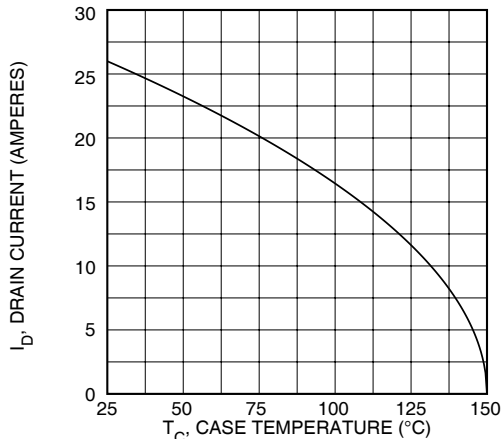


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

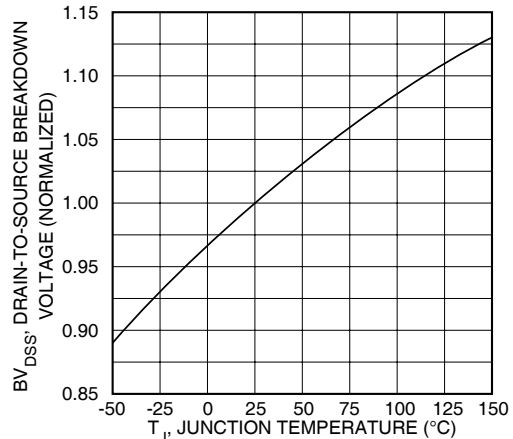


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

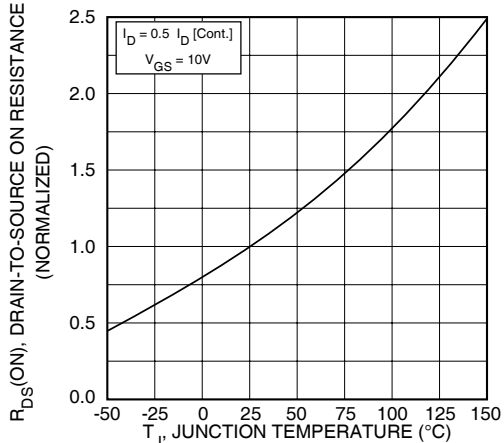


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

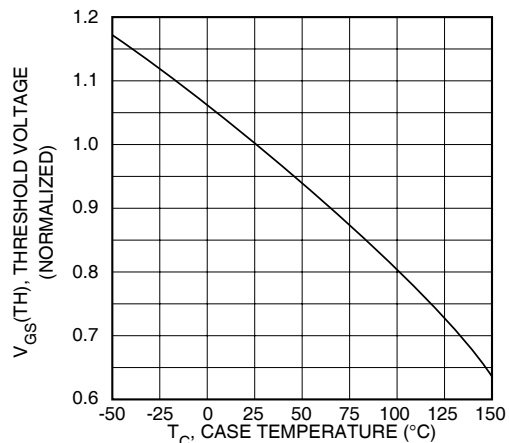


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

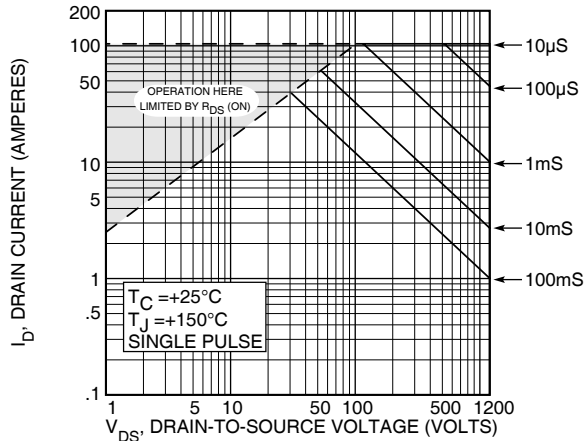


FIGURE 10, MAXIMUM SAFE OPERATING AREA

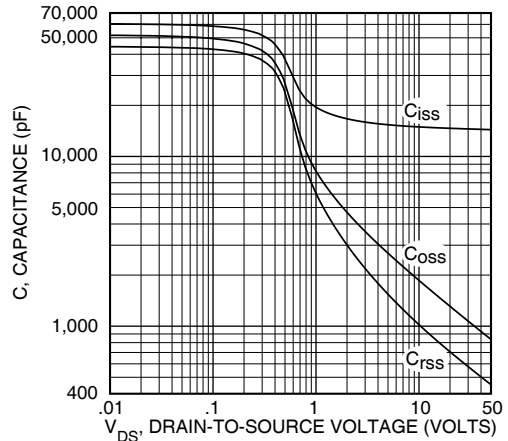


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

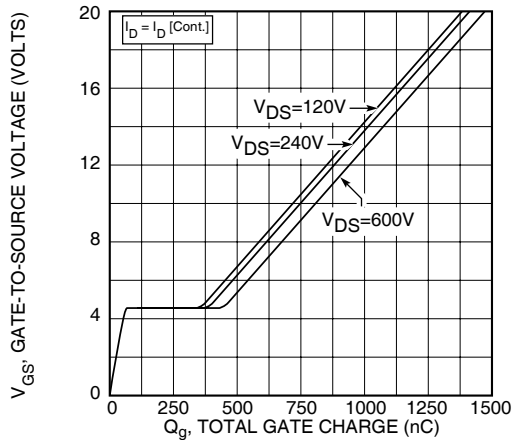


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

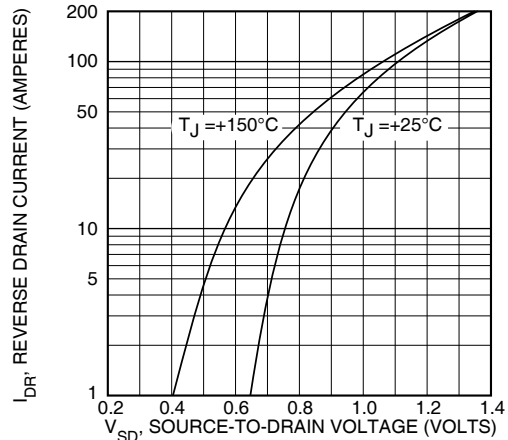
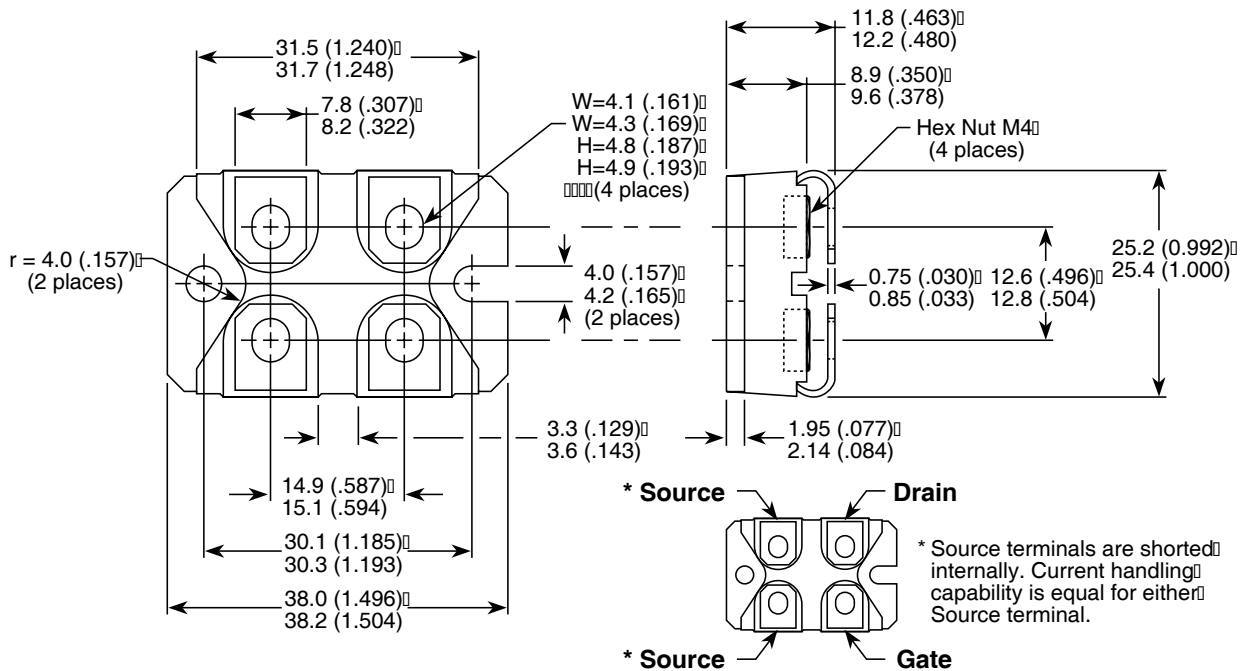


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

SOT-227 (ISOTOP®) Package Outline



Dimensions in Millimeters and (Inches)