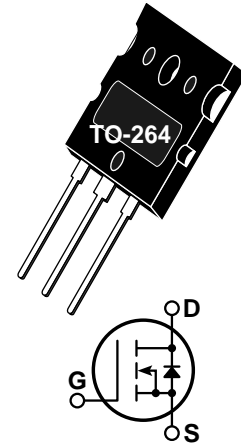


POWER MOS V®

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 TO-264 Package**

MAXIMUM RATINGS

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

| Symbol | Parameter | APT20M22LVR | UNIT |
|----------------|---|-------------|-------|
| V_{DSS} | Drain-Source Voltage | 200 | Volts |
| I_D | Continuous Drain Current @ $T_C = 25^\circ\text{C}$ ⑤ | 100 | Amps |
| I_{DM} | Pulsed Drain Current ① ⑤ | 400 | |
| V_{GS} | Gate-Source Voltage Continuous | ± 30 | Volts |
| V_{GSM} | Gate-Source Voltage Transient | ± 40 | |
| P_D | Total Power Dissipation @ $T_C = 25^\circ\text{C}$ | 520 | Watts |
| | Linear Derating Factor | 4.16 | 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 ⑤ (Repetitive and Non-Repetitive) | 100 | Amps |
| E_{AR} | Repetitive Avalanche Energy ① | 50 | mJ |
| E_{AS} | Single Pulse Avalanche Energy ④ | 2500 | |

STATIC ELECTRICAL CHARACTERISTICS

| Symbol | Characteristic / Test Conditions | MIN | TYP | MAX | UNIT |
|--------------|--|-----|-----|-----------|---------------|
| BV_{DSS} | Drain-Source Breakdown Voltage ($V_{GS} = 0V, I_D = 250\mu\text{A}$) | 200 | | | Volts |
| $I_{D(on)}$ | On State Drain Current ② ⑤ ($V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10V$) | 100 | | | Amps |
| $R_{DS(on)}$ | Drain-Source On-State Resistance ② ($V_{GS} = 10V, 0.5 I_{D[Cont.]}$) | | | 0.022 | Ohms |
| I_{DSS} | Zero Gate Voltage Drain Current ($V_{DS} = V_{DSS}, V_{GS} = 0V$) | | | 25 | μA |
| | Zero Gate Voltage Drain Current ($V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$) | | | 250 | |
| I_{GSS} | Gate-Source Leakage Current ($V_{GS} = \pm 30V, V_{DS} = 0V$) | | | ± 100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 2.5\text{mA}$) | 2 | | 4 | Volts |

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

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DYNAMIC CHARACTERISTICS

APT20M22LVR

| Symbol | Characteristic | Test Conditions | MIN | TYP | MAX | UNIT |
|--------------|--------------------------------|--|-----|------|-------|------|
| C_{iss} | Input Capacitance | $V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1 \text{ MHz}$ | | 8500 | 10200 | pF |
| C_{oss} | Output Capacitance | | | 1950 | 2730 | |
| C_{rss} | Reverse Transfer Capacitance | | | 560 | 840 | |
| Q_g | Total Gate Charge ^③ | $V_{GS} = 10V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_{D[Cont.]} @ 25^\circ C$ | | 290 | 435 | nC |
| Q_{gs} | Gate-Source Charge | | | 66 | 100 | |
| Q_{gd} | Gate-Drain ("Miller") Charge | | | 120 | 180 | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{GS} = 15V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_{D[Cont.]} @ 25^\circ C$ $R_G = 0.6\Omega$ | | 16 | 32 | ns |
| t_r | Rise Time | | | 25 | 50 | |
| $t_{d(off)}$ | Turn-off Delay Time | | | 48 | 72 | |
| t_f | Fall Time | | | 5 | 10 | |

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

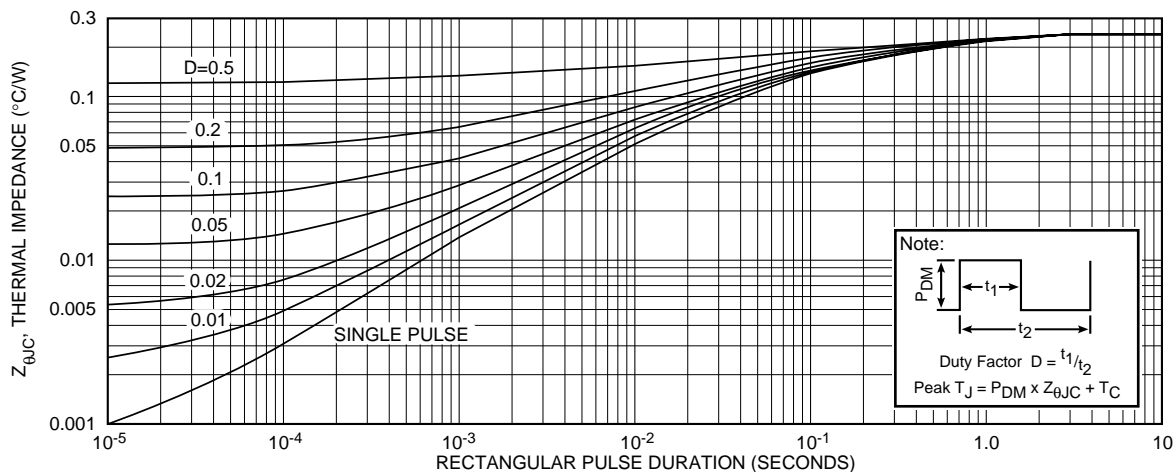
| Symbol | Characteristic / Test Conditions | MIN | TYP | MAX | UNIT |
|----------|---|-----|-----|-----|---------|
| I_S | Continuous Source Current ^⑤ (Body Diode) | | | 100 | Amps |
| I_{SM} | Pulsed Source Current ^{① ⑤} (Body Diode) | | | 400 | |
| V_{SD} | Diode Forward Voltage ^② ($V_{GS} = 0V, I_S = -I_{D[Cont.]}$) | | | 1.3 | Volts |
| t_{rr} | Reverse Recovery Time ($I_S = -I_{D[Cont.]}, di_S/dt = 100A/\mu s$) | | 330 | | ns |
| Q_{rr} | Reverse Recovery Charge ($I_S = -I_{D[Cont.]}, di_S/dt = 100A/\mu s$) | | 5.8 | | μC |

THERMAL CHARACTERISTICS

| Symbol | Characteristic | MIN | TYP | MAX | UNIT |
|-----------------|---------------------|-----|-----|------|--------------|
| $R_{\theta JC}$ | Junction to Case | | | 0.24 | $^\circ C/W$ |
| $R_{\theta JA}$ | Junction to Ambient | | | 40 | |

- ① Repetitive Rating: Pulse width limited by maximum T_j
- ② Pulse Test: Pulse width < 380 μs , Duty Cycle < 2%
- ③ See MIL-STD-750 Method 3471
- ④ Starting $T_j = +25^\circ C$, $L = 500\mu H$, $R_G = 25\Omega$, Peak $I_L = 100A$
- ⑤ The maximum current is limited by lead temperature.

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



APT20M22LVR

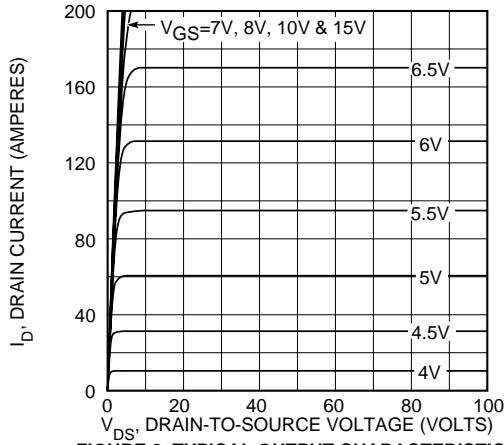


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

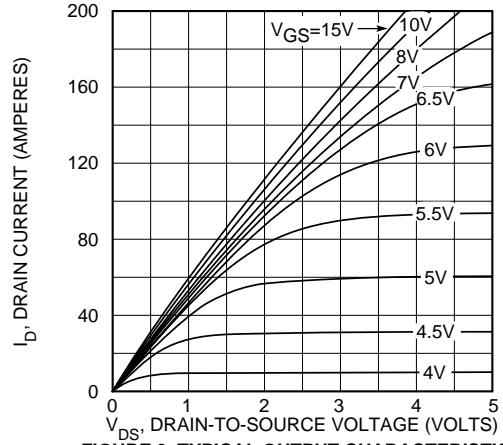


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

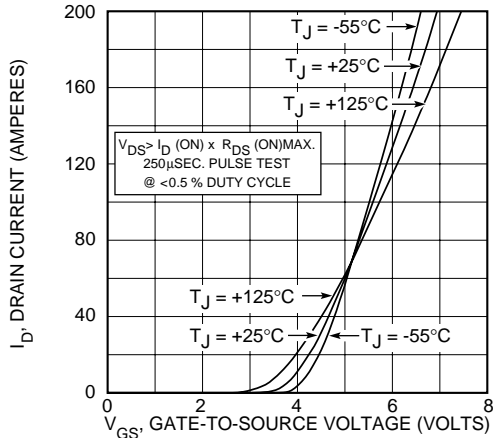


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

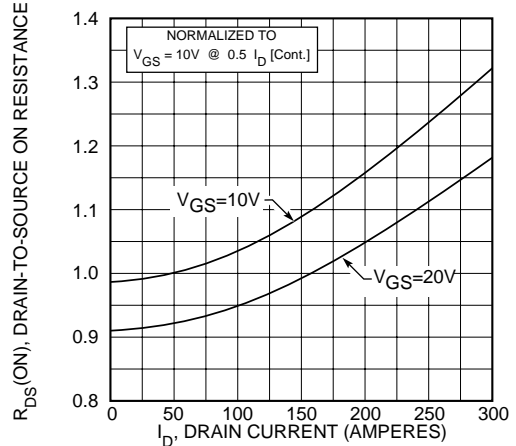


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

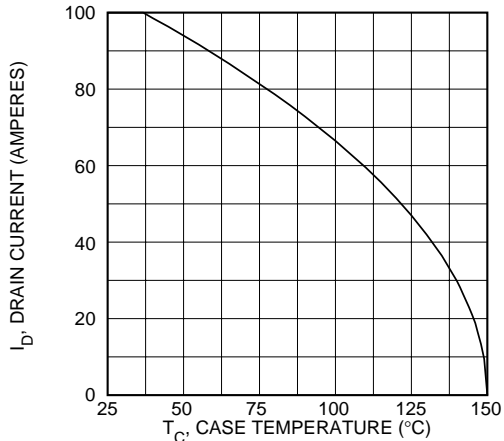


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

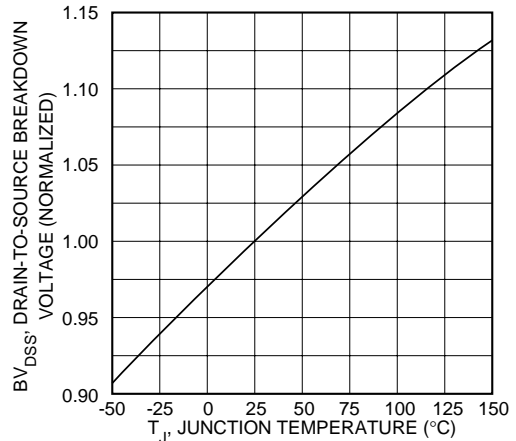


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

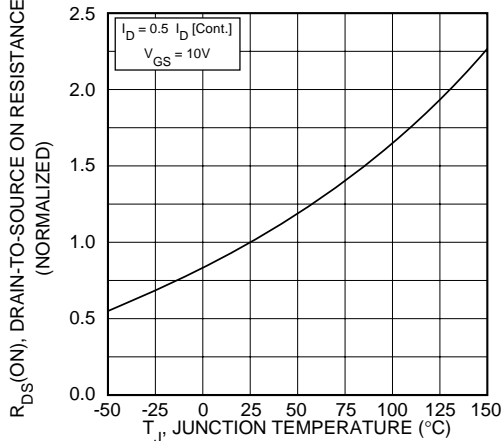


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

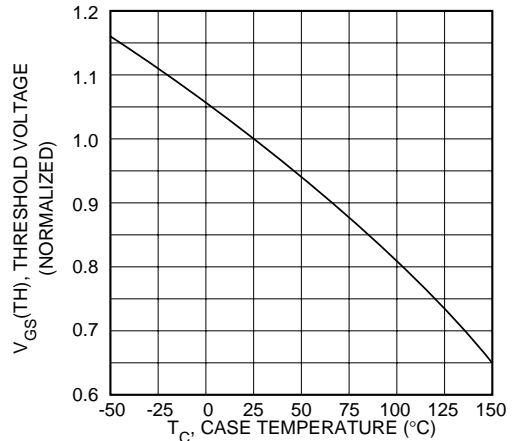


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

APT20M22LVR

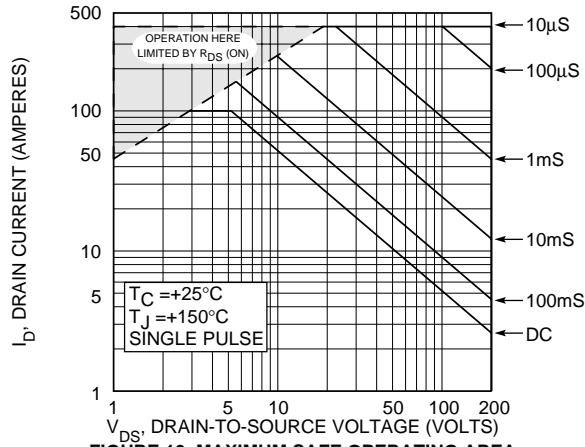


FIGURE 10, MAXIMUM SAFE OPERATING AREA

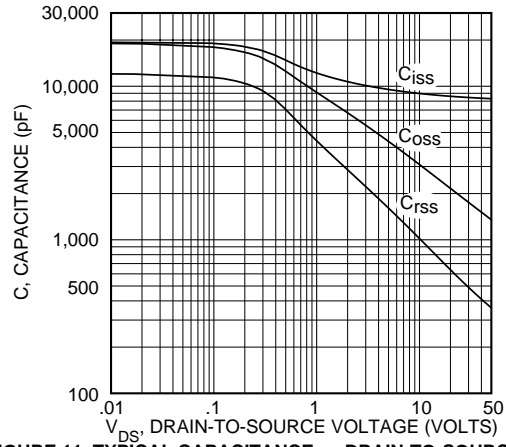


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

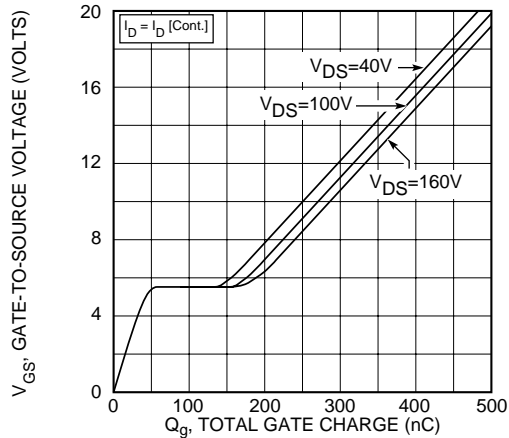


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

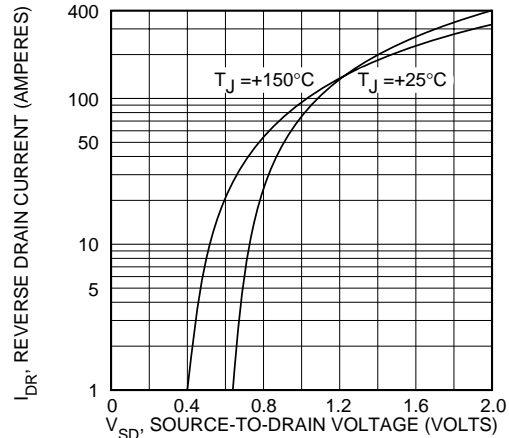
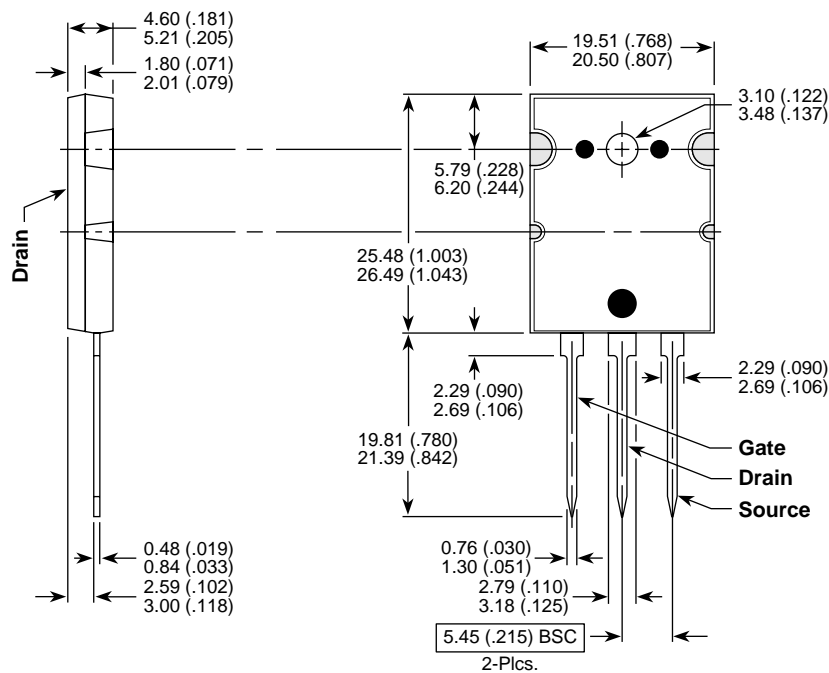


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-264 Package Outline



Dimensions in Millimeters and (Inches)