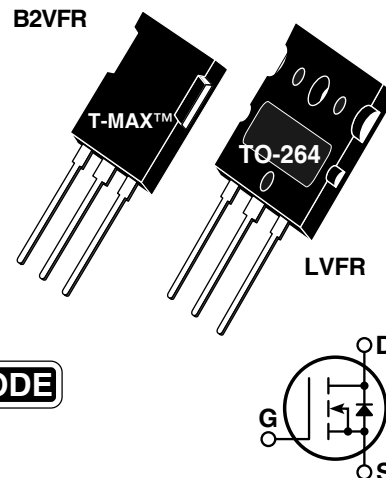


## POWER MOS V® FREDFET

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.

- T-MAX™ or TO-264 Package
- Avalanche Energy Rated
- Faster Switching
- **FAST RECOVERY BODY DIODE**
- Lower Leakage



### MAXIMUM RATINGS

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

| Symbol         | Parameter                                                      | APT40M70B2_LVFR(G) | UNIT  |
|----------------|----------------------------------------------------------------|--------------------|-------|
| $V_{DS}$       | Drain-Source Voltage                                           | 400                | Volts |
| $I_D$          | Continuous Drain Current @ $T_C = 25^\circ\text{C}$            | 57                 | Amps  |
| $I_{DM}$       | Pulsed Drain Current <sup>①</sup>                              | 228                |       |
| $V_{GS}$       | Gate-Source Voltage Continuous                                 | $\pm 30$           | Volts |
| $V_{GSM}$      | Gate-Source Voltage Transient                                  | $\pm 40$           |       |
| $P_D$          | Total Power Dissipation @ $T_C = 25^\circ\text{C}$             | 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 <sup>①</sup> (Repetitive and Non-Repetitive) | 57                 | 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    |
|--------------|----------------------------------------------------------------------------------------------------|-----|-----|-----------|---------|
| $BV_{DS}$    | Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 250\mu A$ )                                   | 400 |     |           | Volts   |
| $I_{D(on)}$  | On State Drain Current <sup>②</sup> ( $V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10V$ ) | 57  |     |           | Amps    |
| $R_{DS(on)}$ | Drain-Source On-State Resistance <sup>②</sup> ( $V_{GS} = 10V, 0.5 I_{D[Cont.]}$ )                 |     |     | 0.070     | Ohms    |
| $I_{DSS}$    | Zero Gate Voltage Drain Current ( $V_{DS} = V_{DSS}, V_{GS} = 0V$ )                                |     |     | 250       | $\mu A$ |
|              | 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 ( $V_{DS} = V_{GS}, I_D = 2.5mA$ )                                          | 2   |     | 4         | Volts   |



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

APT Website - <http://www.advancedpower.com>

# DYNAMIC CHARACTERISTICS

APT40M70B2\_LVFR(G)

| 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>$V_{DD} = 200V$<br>$I_D = 57A @ 25^\circ C$                      |     | 330  | 495  | nC   |
| $Q_{gs}$     | Gate-Source Charge           |                                                                                    |     | 40   | 40   |      |
| $Q_{gd}$     | Gate-Drain ("Miller") Charge |                                                                                    |     | 125  | 190  |      |
| $t_{d(on)}$  | Turn-on Delay Time           | $V_{GS} = 15V$<br>$V_{DD} = 200V$<br>$I_D = 57A @ 25^\circ C$<br>$R_G = 0.6\Omega$ |     | 16   | 32   | ns   |
| $t_r$        | Rise Time                    |                                                                                    |     | 16   | 32   |      |
| $t_{d(off)}$ | Turn-off Delay Time          |                                                                                    |     | 55   | 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)                             |                     |     | 57  | Amps    |
| $I_{SM}$  | Pulsed Source Current ① (Body Diode)                               |                     |     | 228 |         |
| $V_{SD}$  | Diode Forward Voltage ② ( $V_{GS} = 0V$ , $I_S = -57A$ )           |                     |     | 1.3 | Volts   |
| $dv/dt$   | Peak Diode Recovery $dv/dt$ ⑤                                      |                     |     | 15  | V/ns    |
| $t_{rr}$  | Reverse Recovery Time<br>( $I_S = -57A$ , $di/dt = 100A/\mu s$ )   | $T_j = 25^\circ C$  |     | 250 | ns      |
|           |                                                                    | $T_j = 125^\circ C$ |     | 500 |         |
| $Q_{rr}$  | Reverse Recovery Charge<br>( $I_S = -57A$ , $di/dt = 100A/\mu s$ ) | $T_j = 25^\circ C$  | 1.6 |     | $\mu C$ |
|           |                                                                    | $T_j = 125^\circ C$ | 5.5 |     |         |
| $I_{RRM}$ | Peak Recovery Current<br>( $I_S = -57A$ , $di/dt = 100A/\mu s$ )   | $T_j = 25^\circ C$  | 15  |     | Amps    |
|           |                                                                    | $T_j = 125^\circ C$ | 27  |     |         |

# 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 junction temperature

② Pulse Test: Pulse width < 380  $\mu s$ , Duty Cycle < 2%

③ See MIL-STD-750 Method 3471

④ Starting  $T_j = +25^\circ C$ ,  $L = 1.54mH$ ,  $R_G = 25\Omega$ , Peak  $I_L = 57A$

⑤  $dv/dt$  numbers reflect the limitations of the test circuit rather than the device itself.  $I_S \leq -I_D 57A$   $di/dt \leq 700A/\mu s$   $V_R \leq 400V$   $T_j \leq 150^\circ C$

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

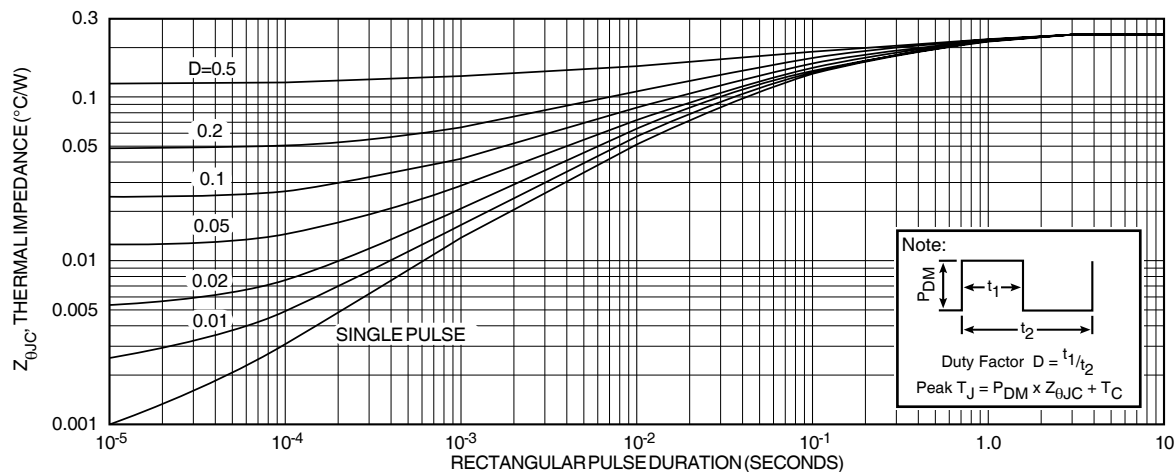


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

# Typical Performance Curves

APT40M70B2\_LVFR(G)

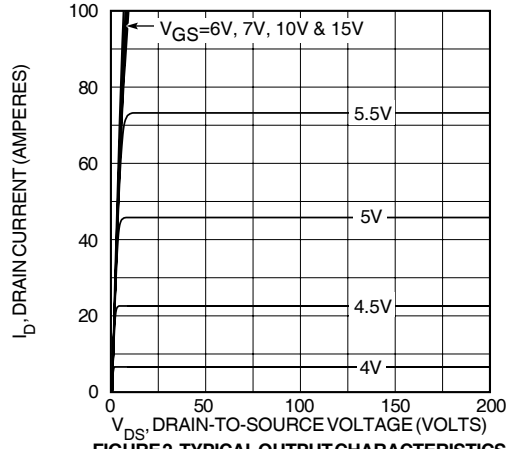


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

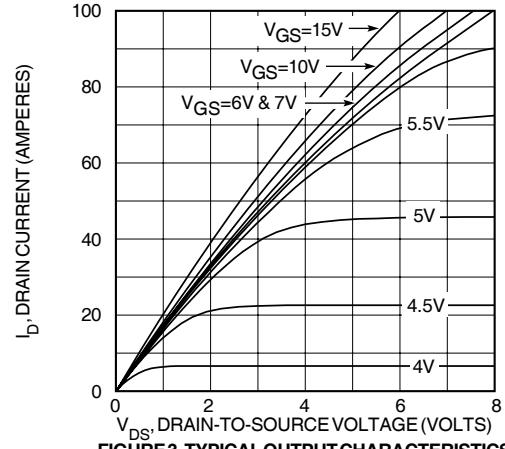


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

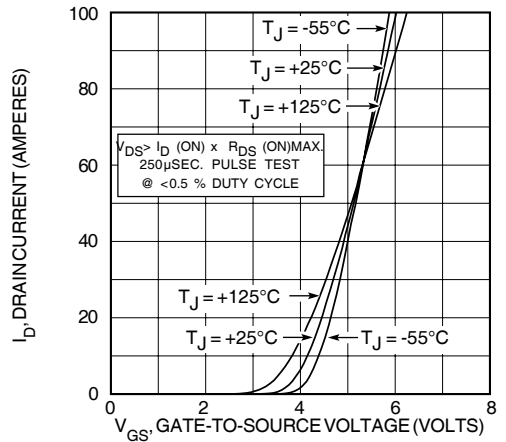


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

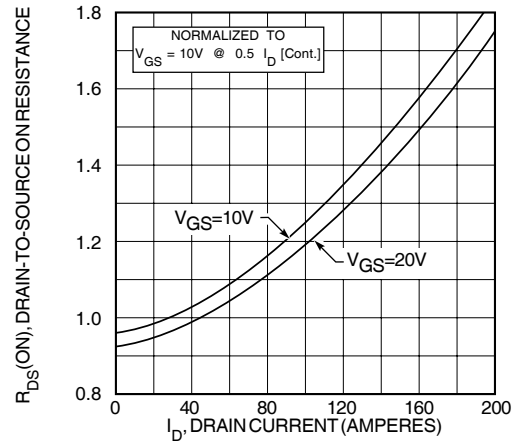


FIGURE 5,  $R_{DS(ON)}$  vs DRAIN CURRENT

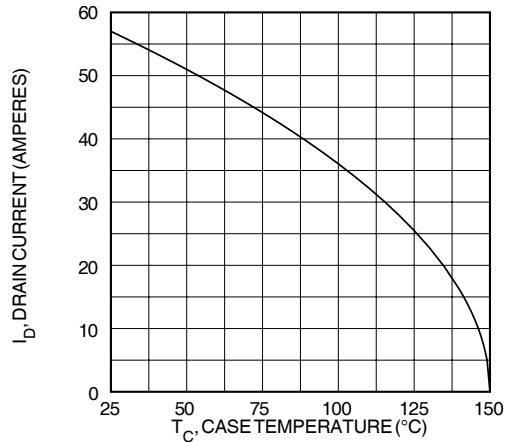


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

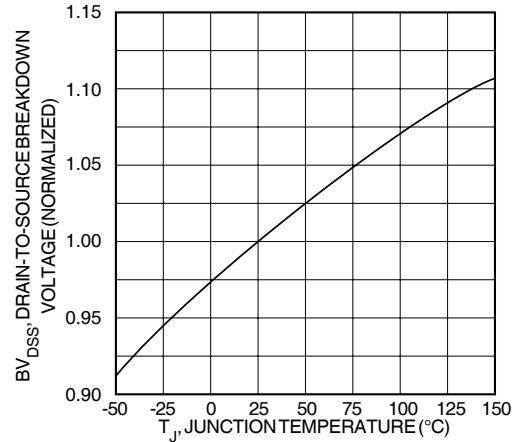


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

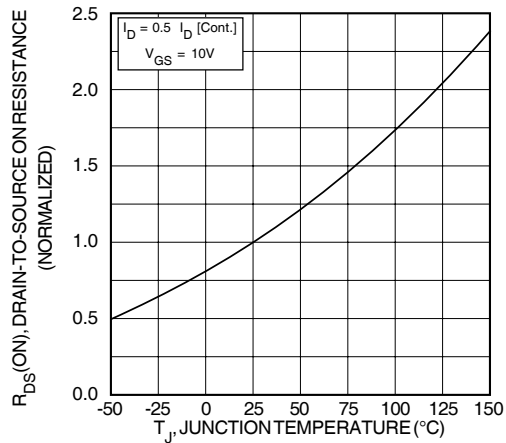


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

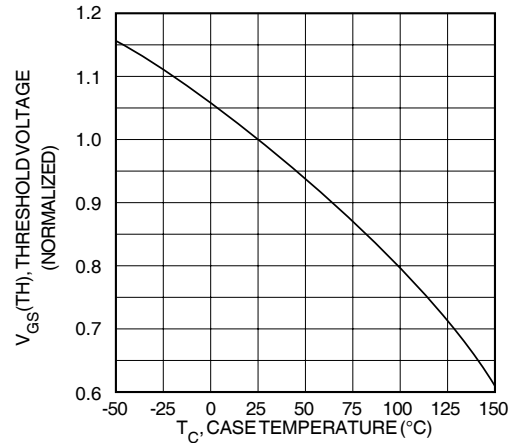
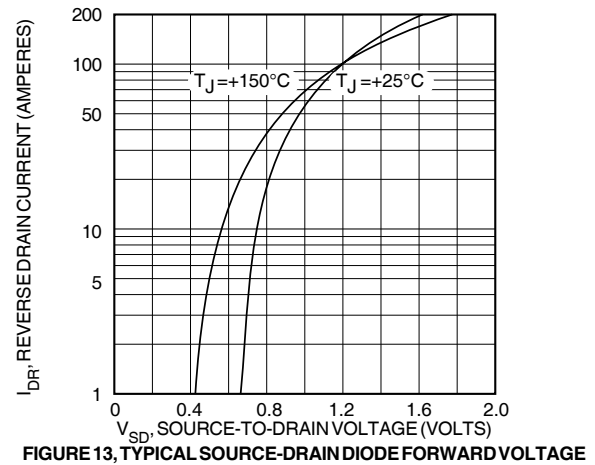
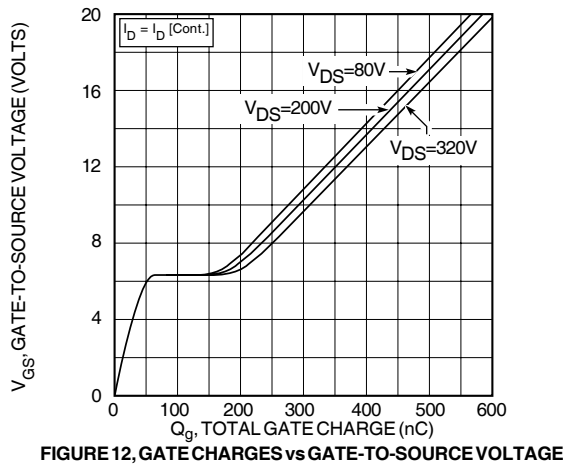
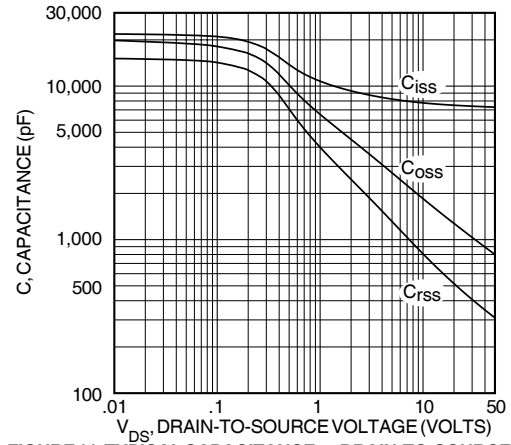
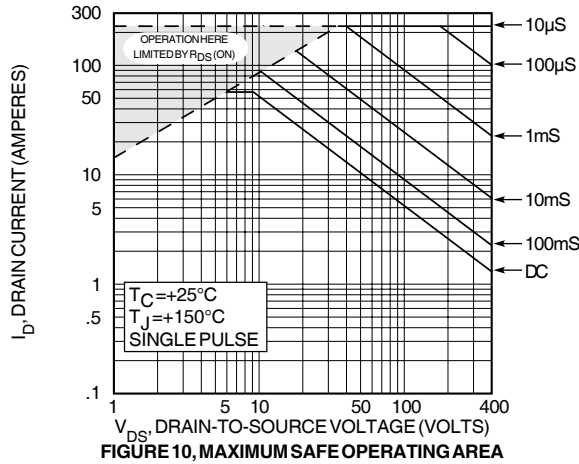
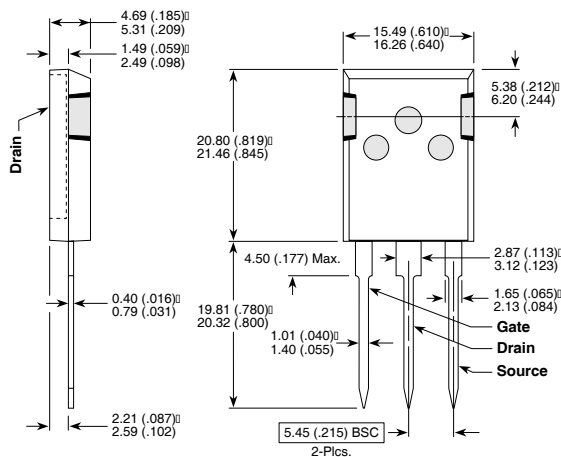


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE



## T-MAX™ (B2) Package Outline (B2VFR)

(e1) SAC: Tin, Silver, Copper



## TO-264 (L) Package Outline (LVFR)

(e1) SAC: Tin, Silver, Copper

