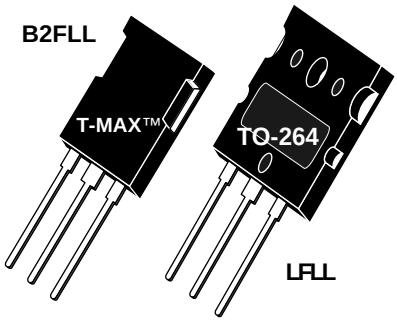
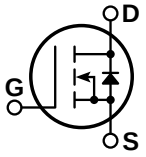
# APT20M20B2FLL
# APT20M20LFLL
## 200V 100A 0.020Ω

## POWER MOS 7® FREDFET




Power MOS 7® is a new generation of low loss, high voltage, N-Channel enhancement mode power MOSFETS. Both conduction and switching losses are addressed with Power MOS 7® by significantly lowering $R_{DS(ON)}$ and $Q_g$. Power MOS 7® combines lower conduction and switching losses along with exceptionally fast switching speeds inherent with APT's patented metal gate structure.

- **Lower Input Capacitance**
- **Lower Miller Capacitance**
- **Lower Gate Charge, Qg**
- **Increased Power Dissipation**
- **Easier To Drive**
- **Popular T-MAX™ or TO-264 Package**
- **FAST RECOVERY BODY DIODE**




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

| Symbol | Parameter | APT20M20 | UNIT |
|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | 200 | Volts |
| $I_D$ | Continuous Drain Current @ $T_C$ = 25°C ⑤ | 100 | Amps |
| $I_{DM}$ | Pulsed Drain Current ① | 460 | |
| $V_{GS}$ | Gate-Source Voltage Continuous | ±30 | Volts |
| $V_{GSM}$ | Gate-Source Voltage Transient | ±40 | |
| $P_D$ | Total Power Dissipation @ $T_C$ = 25°C | 568 | Watts |
| | Linear Derating Factor | 4.55 | 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) | 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, $I_D$ = 250μA) | 200 | | | Volts |
| $I_{D(on)}$ | On State Drain Current ② ($V_{DS}$ > $I_{D(on)}$ x $R_{DS(on)}$ Max, $V_{GS}$ = 10V) | 100 | | | Amps |
| $R_{DS(on)}$ | Drain-Source On-State Resistance ② ($V_{GS}$ = 10V, 50A) | | | 0.020 | Ohms |
| $I_{DSS}$ | Zero Gate Voltage Drain Current ($V_{DS}$ = 200V, $V_{GS}$ = 0V) | | | 250 | μA |
| | Zero Gate Voltage Drain Current ($V_{DS}$ = 160V, $V_{GS}$ = 0V, $T_C$ = 125°C) | | | 1000 | |
| $I_{GSS}$ | Gate-Source Leakage Current ($V_{GS}$ = ±30V, $V_{DS}$ = 0V) | | | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage ($V_{DS}$ = $V_{GS}$, $I_D$ = 2.5mA) | 3 | | 5 | Volts |

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

## DYNAMIC CHARACTERISTICS

**APT20M20 B2FLL - LFLL**

| Symbol | Characteristic | Test Conditions | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| $C_{iss}$ | Input Capacitance | $V_{GS}$ = 0V | | 6850 | | pF |
| $C_{oss}$ | Output Capacitance | $V_{DS}$ = 25V | | 2180 | | |
| $C_{rss}$ | Reverse Transfer Capacitance | f = 1 MHz | | 97 | | |
| $Q_g$ | Total Gate Charge ③ | $V_{GS}$ = 10V | | 112 | | nC |
| $Q_{gs}$ | Gate-Source Charge | $V_{DD}$ = 100V | | 43 | | |
| $Q_{gd}$ | Gate-Drain ("Miller") Charge | $I_D$ = 75A @ 25°C | | 47 | | |
| $t_d(on)$ | Turn-on Delay Time | $V_{GS}$ = 15V | | 13 | | ns |
| $t_r$ | Rise Time | $V_{DD}$ = 100V | | 40 | | |
| $t_d(off)$ | Turn-off Delay Time | $I_D$ = 75A @ 25°C | | 26 | | |
| $t_f$ | Fall Time | $R_G$ = 0.6Ω | | 2 | | |

## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Symbol | Characteristic / Test Conditions | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | | | | 100 | Amps |
| $I_{SM}$ | Pulsed Source Current ① (Body Diode) | | | | 400 | |
| $V_{SD}$ | Diode Forward Voltage ② ($V_{GS}$ = 0V, $I_S$ = -75A) | | | | 1.3 | Volts |
| $^{dv}/_{dt}$ | Peak Diode Recovery $^{dv}/_{dt}$ ⑥ | | | | 8 | V/ns |
| $t_{rr}$ | Reverse Recovery Time ($I_S$ = -75A, $^{di}/_{dt}$ = 100A/µs) | $T_j$ = 25°C | | | 220 | ns |
| | | $T_j$ = 125°C | | | 420 | |
| $Q_{rr}$ | Reverse Recovery Charge ($I_S$ = -75A, $^{di}/_{dt}$ = 100A/µs) | $T_j$ = 25°C | | 1.07 | | µC |
| | | $T_j$ = 125°C | | 2.9 | | |
| $I_{RRM}$ | Peak Recovery Current ($I_S$ = -75A, $^{di}/_{dt}$ = 100A/µs) | $T_j$ = 25°C | | 12.1 | | Amps |
| | | $T_j$ = 125°C | | 20.6 | | |

## THERMAL CHARACTERISTICS

| Symbol | Characteristic | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| $R_{\theta JC}$ | Junction to Case | | | 0.22 | °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 µs, Duty Cycle < 2%

③ See MIL-STD-750 Method 3471

④ Starting $T_j$ = +25°C, L = 0.50mH, $R_G$ = 25Ω, Peak $I_L$ = 100A

⑤ The maximum current is limited by lead temperature

⑥ $^{dv}/_{dt}$ numbers reflect the limitations of the test circuit rather than the device itself. $I_S \le -I_D 75A$ $^{di}/_{dt} \le 700A/\mu s$ $V_R \le V_{DSS}$ $T_J \le 150°C$



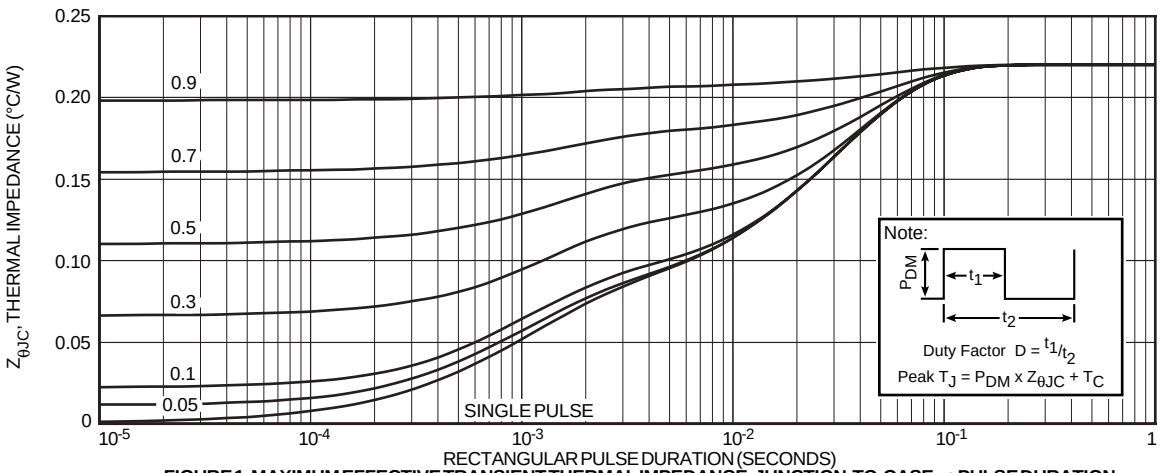



**FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION**

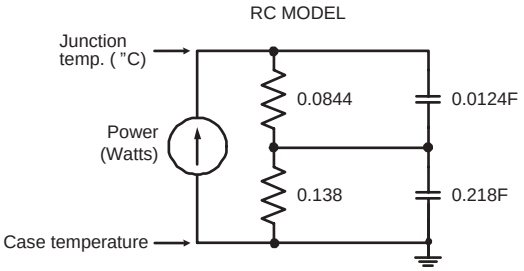



**FIGURE 2, TRANSIENT THERMAL IMPEDANCE MODEL**

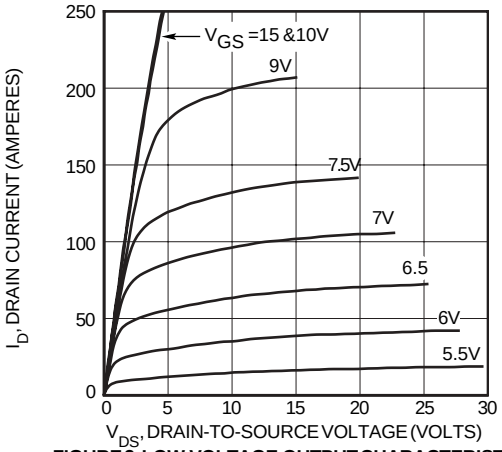



**FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS**

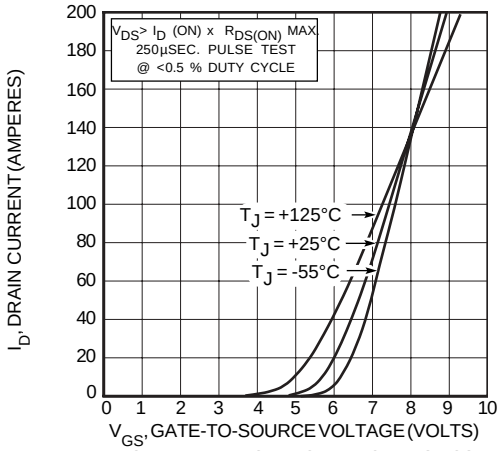



**FIGURE 4, TRANSFER CHARACTERISTICS**

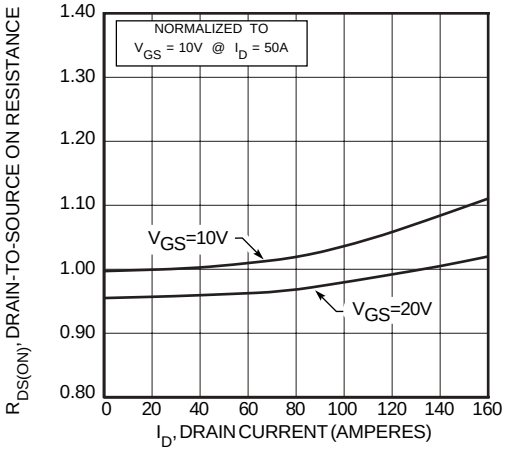



**FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT**

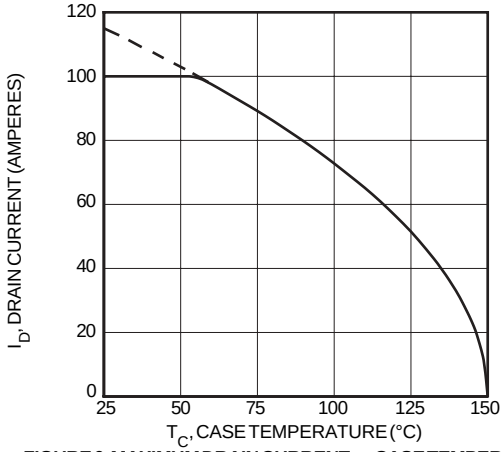



**FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE**

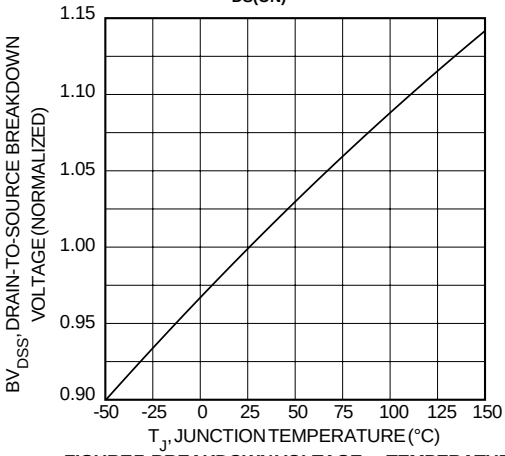



**FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE**

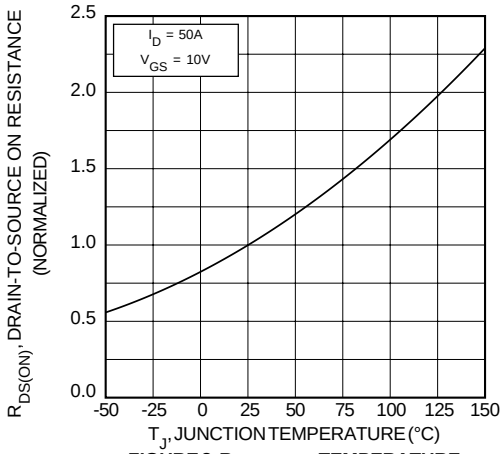



**FIGURE 8, $R_{DS(ON)}$ vs. TEMPERATURE**

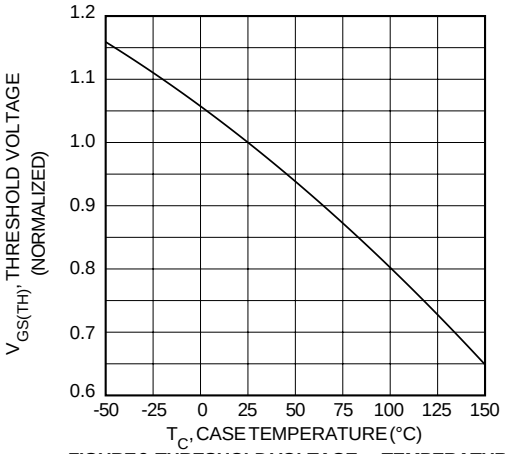



**FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE**

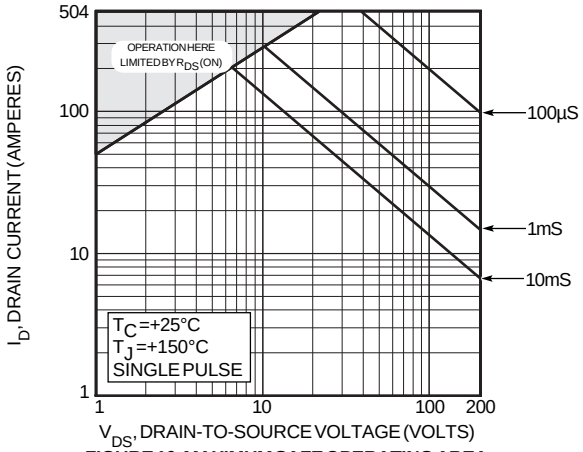



**FIGURE 10, MAXIMUM SAFE OPERATING AREA**

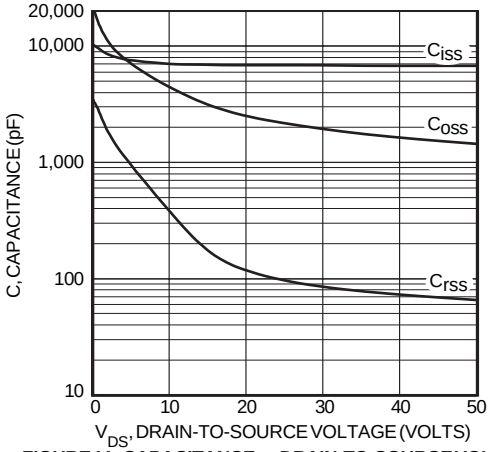



**FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE**

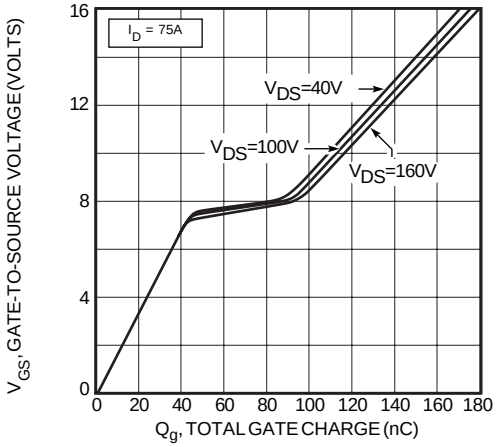



**FIGURE 12, GATE CHARGE vs GATE-TO-SOURCE VOLTAGE**

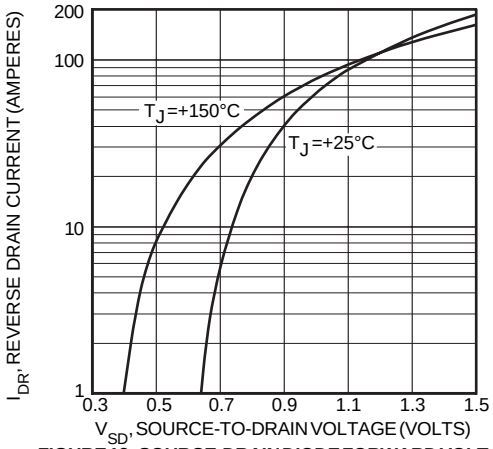
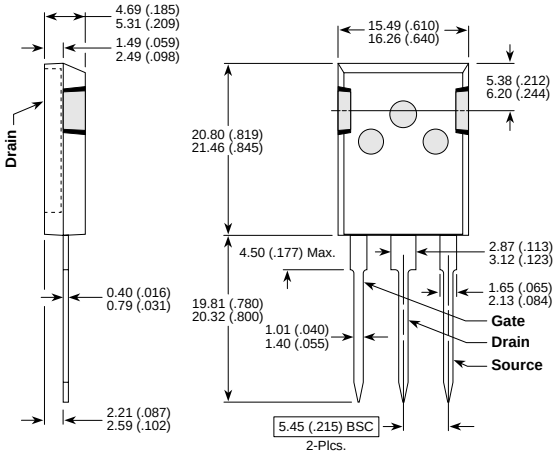



**FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE**

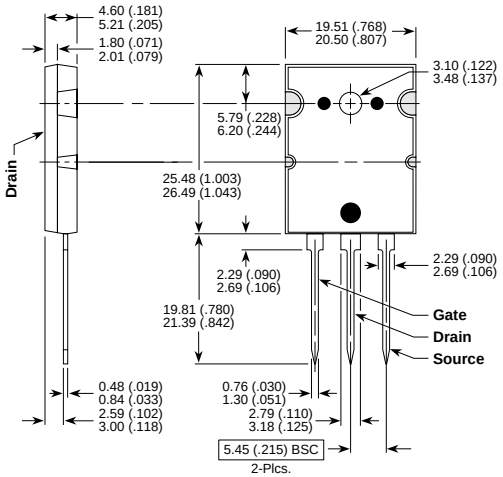
## T-MAX™ (B2) Package Outline




These dimensions are equal to the TO-247 without the mounting hole.

Dimensions in Millimeters and (Inches)

## TO-264 (L) Package Outline




Dimensions in Millimeters and (Inches)