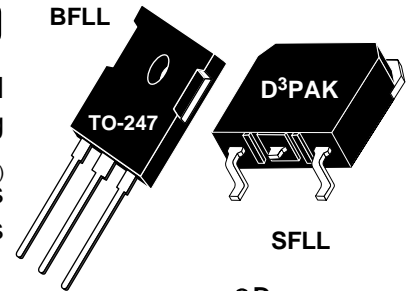
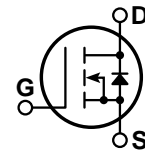


**POWER MOS 7™**
**FREDFET**
**BFLL**

**SFLL**


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,  $Q_g$
- Increased Power Dissipation
- Easier To Drive
- TO-247 or Surface Mount D<sup>3</sup>PAK Package
- **FAST RECOVERY BODY DIODE**

**MAXIMUM RATINGS**

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

| Symbol         | Parameter  | APT6021    | UNIT  |
|----------------|--|------------|-------|
| $V_{DSS}$      | Drain-Source Voltage   | 600        | Volts |
| $I_D$          | Continuous Drain Current @ $T_C = 25^\circ\text{C}$            | 29         | Amps  |
| $I_{DM}$       | Pulsed Drain Current <sup>①</sup>                              | 116        |       |
| $V_{GS}$       | Gate-Source Voltage Continuous                                 | ±30        | Volts |
| $V_{GSM}$      | Gate-Source Voltage Transient                                  | ±40        |       |
| $P_D$          | Total Power Dissipation @ $T_C = 25^\circ\text{C}$             | 400        | Watts |
|                | Linear Derating Factor   | 3.20       | 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) | 29         | Amps  |
| $E_{AR}$       | Repetitive Avalanche Energy <sup>①</sup>                       | 30         | mJ    |
| $E_{AS}$       | Single Pulse Avalanche Energy <sup>④</sup>                     | 1300       |       |

**STATIC ELECTRICAL CHARACTERISTICS**

| Symbol       | Characteristic / Test Conditions   | MIN | TYP | MAX   | UNIT  |
|--------------|--|-----|-----|-------|-------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 250\mu\text{A}$ )                             | 600 |     |       | Volts |
| $I_{D(on)}$  | On State Drain Current <sup>②</sup> ( $V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10V$ ) | 29  |     |       | Amps  |
| $R_{DS(on)}$ | Drain-Source On-State Resistance <sup>②</sup> ( $V_{GS} = 10V, 0.5 I_{D[Cont.]}$ )                 |     |     | 0.210 | 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 ( $V_{DS} = V_{GS}, I_D = 1\text{mA}$ )                                     | 3   |     | 5     | Volts |


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

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

**DYNAMIC CHARACTERISTICS**

**APT6021 BFL - SFLL**

| Symbol              | Characteristic                 | Test Conditions                                | MIN | TYP  | MAX | UNIT |
|---------------------|--------------------------------|--|-----|------|-----|------|
| C <sub>iss</sub>    | Input Capacitance              | V <sub>GS</sub> = 0V                           |     | 3310 |     | pF   |
| C <sub>oss</sub>    | Output Capacitance             | V <sub>DS</sub> = 25V                          |     | 590  |     |      |
| C <sub>rss</sub>    | Reverse Transfer Capacitance   | f = 1 MHz                                      |     | 37   |     |      |
| Q <sub>g</sub>      | Total Gate Charge <sup>③</sup> | V <sub>GS</sub> = 10V                          |     | 76   |     | nC   |
| Q <sub>gs</sub>     | Gate-Source Charge             | V <sub>DD</sub> = 0.5 V <sub>DSS</sub>         |     | 18   |     |      |
| Q <sub>gd</sub>     | Gate-Drain ("Miller") Charge   | I <sub>D</sub> = I <sub>D</sub> [Cont.] @ 25°C |     | 34   |     |      |
| t <sub>d(on)</sub>  | Turn-on Delay Time             | V <sub>GS</sub> = 15V                          |     | 15   |     | ns   |
| t <sub>r</sub>      | Rise Time                      | V <sub>DD</sub> = 0.5 V <sub>DSS</sub>         |     | 10   |     |      |
| t <sub>d(off)</sub> | Turn-off Delay Time            | I <sub>D</sub> = I <sub>D</sub> [Cont.] @ 25°C |     | 35   |     |      |
| t <sub>f</sub>      | Fall Time                      | R <sub>G</sub> = 1.6Ω                          |     | 10   |     |      |

**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

| Symbol           | Characteristic / Test Conditions  | MIN                    | TYP | MAX | UNIT  |
|------------------|---|------------------------|-----|-----|-------|
| I <sub>S</sub>   | Continuous Source Current (Body Diode)  |                        |     | 29  | Amps  |
| I <sub>SM</sub>  | Pulsed Source Current <sup>①</sup> (Body Diode)   |                        |     | 116 |       |
| V <sub>SD</sub>  | Diode Forward Voltage <sup>②</sup> (V <sub>GS</sub> = 0V, I <sub>S</sub> = -I <sub>D</sub> [Cont.]) |                        |     | 1.3 | Volts |
| dv/dt            | Peak Diode Recovery dv/dt <sup>⑤</sup>  |                        |     | 15  | V/ns  |
| t <sub>rr</sub>  | Reverse Recovery Time<br>(I <sub>S</sub> = -I <sub>D</sub> [Cont.], di/dt = 100A/μs)                | T <sub>j</sub> = 25°C  |     | 250 | ns    |
|                  |   | T <sub>j</sub> = 125°C |     | 525 |       |
| Q <sub>rr</sub>  | Reverse Recovery Charge<br>(I <sub>S</sub> = -I <sub>D</sub> [Cont.], di/dt = 100A/μs)              | T <sub>j</sub> = 25°C  |     | 1.5 | μC    |
|                  |   | T <sub>j</sub> = 125°C |     | 5.5 |       |
| I <sub>RRM</sub> | Peak Recovery Current<br>(I <sub>S</sub> = -I <sub>D</sub> [Cont.], di/dt = 100A/μs)                | T <sub>j</sub> = 25°C  |     | 13  | Amps  |
|                  |   | T <sub>j</sub> = 125°C |     | 23  |       |

**THERMAL CHARACTERISTICS**

| Symbol           | Characteristic      | MIN | TYP | MAX  | UNIT |
|------------------|---------------------|-----|-----|------|------|
| R <sub>θJC</sub> | Junction to Case    |     |     | 0.31 | °C/W |
| R <sub>θJA</sub> | Junction to Ambient |     |     | 40   |      |

① Repetitive Rating: Pulse width limited by maximum junction temperature.

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

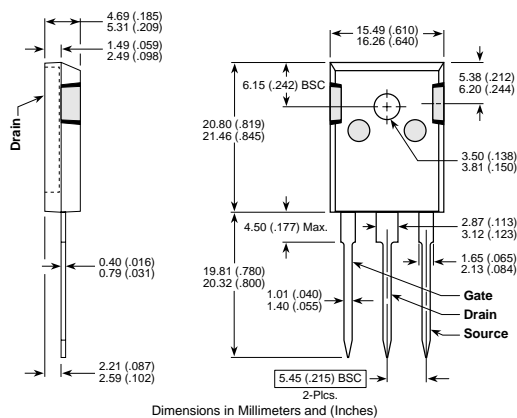
③ See MIL-STD-750 Method 3471

④ Starting T<sub>j</sub> = +25°C, L = 3.09mH, R<sub>G</sub> = 25Ω, Peak I<sub>L</sub> = 29A

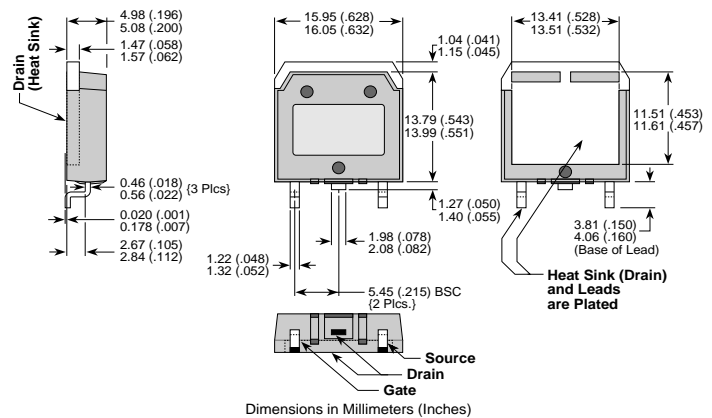
⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. I<sub>S</sub> ≤ -I<sub>D</sub>[Cont.] di/dt ≤ 700A/μs V<sub>R</sub> ≤ V<sub>DSS</sub> T<sub>J</sub> ≤ 150°C

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

**TO-247 Package Outline**



**D<sup>3</sup>PAK Package Outline**



050-7068 Rev - 8-2001

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