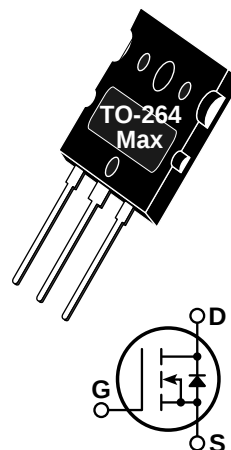


## POWER MOS 7™

**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,  $Q_g$
- Increased Power Dissipation
- Easier To Drive
- Popular TO-264 MAX Package



### MAXIMUM RATINGS

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

| Symbol         | Parameter                                                      | APT50M50L2FLL | UNIT  |
|----------------|----------------------------------------------------------------|---------------|-------|
| $V_{DSS}$      | Drain-Source Voltage                                           | 500           | Volts |
| $I_D$          | Continuous Drain Current @ $T_C = 25^\circ\text{C}$            | 89            | Amps  |
| $I_{DM}$       | Pulsed Drain Current <sup>①</sup>                              | 356           |       |
| $V_{GS}$       | Gate-Source Voltage Continuous                                 | ±30           | Volts |
| $V_{GSM}$      | Gate-Source Voltage Transient                                  | ±40           |       |
| $P_D$          | Total Power Dissipation @ $T_C = 25^\circ\text{C}$             | 890           | Watts |
|                | Linear Derating Factor                                         | 7.12          | 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) | 89            | Amps  |
| $E_{AR}$       | Repetitive Avalanche Energy <sup>①</sup>                       | 50            | mJ    |
| $E_{AS}$       | Single Pulse Avalanche Energy <sup>④</sup>                     | 3200          |       |

### STATIC ELECTRICAL CHARACTERISTICS

| Symbol       | Characteristic / Test Conditions                                                                   | MIN | TYP | MAX   | UNIT    |
|--------------|----------------------------------------------------------------------------------------------------|-----|-----|-------|---------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 250\mu A$ )                                   | 500 |     |       | Volts   |
| $I_{D(on)}$  | On State Drain Current <sup>②</sup> ( $V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10V$ ) | 89  |     |       | Amps    |
| $R_{DS(on)}$ | Drain-Source On-State Resistance <sup>②</sup> ( $V_{GS} = 10V, 0.5 I_{D(Cont.)}$ )                 |     |     | 0.050 | 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 ( $V_{GS} = \pm 30V, V_{DS} = 0V$ )                                    |     |     | ±100  | nA      |
| $V_{GS(th)}$ | Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 5mA$ )                                            | 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

APT50M50L2FLL

| Symbol       | Characteristic                 | Test Conditions                                                                                                | MIN | TYP  | MAX | UNIT |
|--------------|--------------------------------|----------------------------------------------------------------------------------------------------------------|-----|------|-----|------|
| $C_{iss}$    | Input Capacitance              | $V_{GS} = 0V$<br>$V_{DS} = 25V$<br>$f = 1 \text{ MHz}$                                                         |     | 9840 |     | pF   |
| $C_{oss}$    | Output Capacitance             |                                                                                                                |     | 2030 |     |      |
| $C_{rss}$    | Reverse Transfer Capacitance   |                                                                                                                |     | 153  |     |      |
| $Q_g$        | Total Gate Charge <sup>③</sup> | $V_{GS} = 10V$<br>$V_{DD} = 0.5 V_{DSS}$<br>$I_D = I_D [\text{Cont.}] @ 25^\circ\text{C}$                      |     | 246  |     | nC   |
| $Q_{gs}$     | Gate-Source Charge             |                                                                                                                |     | 65   |     |      |
| $Q_{gd}$     | Gate-Drain ("Miller") Charge   |                                                                                                                |     | 112  |     |      |
| $t_{d(on)}$  | Turn-on Delay Time             | $V_{GS} = 15V$<br>$V_{DD} = 0.5 V_{DSS}$<br>$I_D = I_D [\text{Cont.}] @ 25^\circ\text{C}$<br>$R_G = 0.6\Omega$ |     | 24   |     | ns   |
| $t_r$        | Rise Time                      |                                                                                                                |     | 22   |     |      |
| $t_{d(off)}$ | Turn-off Delay Time            |                                                                                                                |     | 56   |     |      |
| $t_f$        | Fall Time                      |                                                                                                                |     | 8    |     |      |

# SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Symbol    | Characteristic / Test Conditions                                                   | MIN                       | TYP | MAX | UNIT    |
|-----------|------------------------------------------------------------------------------------|---------------------------|-----|-----|---------|
| $I_S$     | Continuous Source Current (Body Diode)                                             |                           |     | 89  | Amps    |
| $I_{SM}$  | Pulsed Source Current <sup>①</sup> (Body Diode)                                    |                           |     | 356 |         |
| $V_{SD}$  | Diode Forward Voltage <sup>②</sup> ( $V_{GS} = 0V$ , $I_S = -I_D [\text{Cont.}]$ ) |                           |     | 1.3 | Volts   |
| $dv/dt$   | Peak Diode Recovery $dv/dt$ <sup>⑤</sup>                                           |                           |     | 15  | V/ns    |
| $t_{rr}$  | Reverse Recovery Time<br>( $I_S = -I_D [\text{Cont.}]$ , $di/dt = 100A/\mu s$ )    | $T_j = 25^\circ\text{C}$  |     | 300 | ns      |
|           |                                                                                    | $T_j = 125^\circ\text{C}$ |     | 600 |         |
| $Q_{rr}$  | Reverse Recovery Charge<br>( $I_S = -I_D [\text{Cont.}]$ , $di/dt = 100A/\mu s$ )  | $T_j = 25^\circ\text{C}$  | 2.6 |     | $\mu C$ |
|           |                                                                                    | $T_j = 125^\circ\text{C}$ | 10  |     |         |
| $I_{RRM}$ | Peak Recovery Current<br>( $I_S = -I_D [\text{Cont.}]$ , $di/dt = 100A/\mu s$ )    | $T_j = 25^\circ\text{C}$  | 17  |     | Amps    |
|           |                                                                                    | $T_j = 125^\circ\text{C}$ | 34  |     |         |

# THERMAL CHARACTERISTICS

| Symbol          | Characteristic      | MIN | TYP | MAX  | UNIT               |
|-----------------|---------------------|-----|-----|------|--------------------|
| $R_{\theta JC}$ | Junction to Case    |     |     | 0.14 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | 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%

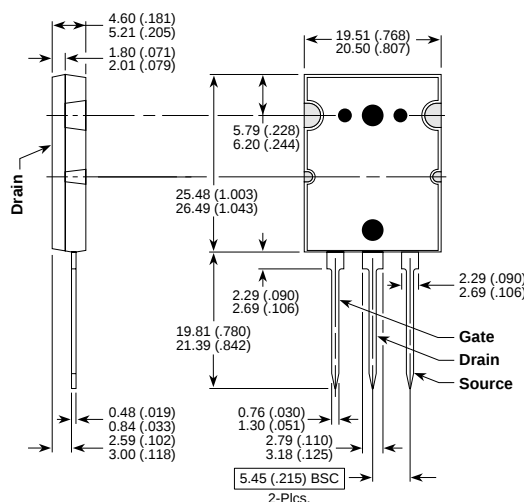
③ See MIL-STD-750 Method 3471

④ Starting  $T_j = +25^\circ\text{C}$ ,  $L = 0.81\text{mH}$ ,  $R_G = 25\Omega$ , Peak  $I_L = 89A$

⑤  $dv/dt$  numbers reflect the limitations of the test circuit rather than the device itself.  $I_S \leq -I_{D[\text{Cont.}]}$   $di/dt \leq 700A/\mu s$   $V_R \leq V_{DSS}$   $T_j \leq 150^\circ\text{C}$

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

# TO-264 MAX<sup>TM</sup>(L2) Package Outline



Dimensions in Millimeters and (Inches)

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