

**ADVANCED  
POWER  
TECHNOLOGY®**  
APL1001J 1000V 18.0A 0.60Ω

"UL Recognized" File No. E145592 (S)

**POWER MOS IV®**

**SINGLE DIE ISOTOP® PACKAGE**

**N-CHANNEL ENHANCEMENT MODE HIGH VOLTAGE POWER MOSFETS**

**MAXIMUM RATINGS**

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

| Symbol           | Parameter                                                       | APL1001J   | UNIT                |
|------------------|-----------------------------------------------------------------|------------|---------------------|
| $V_{DS}$         | Drain-Source Voltage                                            | 1000       | Volts               |
| $I_D$            | Continuous Drain Current @ $T_C = 25^\circ\text{C}$             | 18         | Amps                |
| $I_{DM}, I_{LM}$ | Pulsed Drain Current <sup>①</sup> and Inductive Current Clamped | 72         |                     |
| $V_{GS}$         | Gate-Source Voltage                                             | $\pm 30$   | Volts               |
| $P_D$            | Total Power Dissipation @ $T_C = 25^\circ\text{C}$              | 520        | Watts               |
|                  | Linear Derating Factor                                          | 4.16       | W/ $^\circ\text{C}$ |
| $T_J, T_{STG}$   | Operating and Storage Junction Temperature Range                | -55 to 150 | $^\circ\text{C}$    |
| $T_L$            | Lead Temperature: 0.063" from Case for 10 Sec.                  | 300        |                     |

**STATIC ELECTRICAL CHARACTERISTICS**

| Symbol       | Characteristic / Test Conditions / Part Number                                                    | MIN  | TYP | MAX       | UNIT          |
|--------------|---------------------------------------------------------------------------------------------------|------|-----|-----------|---------------|
| $BV_{DS}$    | Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 250 \mu\text{A}$ )                           | 1000 |     |           | Volts         |
| $I_{D(ON)}$  | On State Drain Current <sup>②</sup> ( $V_{DS} > I_{D(ON)} \times R_{DS(ON)}$ Max, $V_{GS} = 8V$ ) | 18   |     |           | Amps          |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance <sup>②</sup> ( $V_{GS} = 10V, 0.5 I_D$ [Cont.])                  |      |     | 0.60      | Ohms          |
| $I_{DSS}$    | Zero Gate Voltage Drain Current ( $V_{DS} = V_{DSS}, V_{GS} = 0V$ )                               |      |     | 250       | $\mu\text{A}$ |
|              | 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 ( $V_{DS} = V_{GS}, I_D = 2.5\text{mA}$ )                                  | 2    |     | 4         | Volts         |

**THERMAL CHARACTERISTICS**

| Symbol          | Characteristic                                                                        | MIN  | TYP | MAX  | UNIT               |
|-----------------|---------------------------------------------------------------------------------------|------|-----|------|--------------------|
| $R_{\theta JC}$ | Junction to Case                                                                      |      |     | 0.24 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Junction to Ambient                                                                   |      |     | 40   |                    |
| $V_{Isolation}$ | RMS Voltage (50-60 Hz Sinusoidal Waveform From Terminals to Mounting Base for 1 Min.) | 2500 |     |      | Volts              |
| Torque          | Maximum Torque for Device Mounting Screws and Electrical Terminations.                |      |     | 13   | lb·in              |

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

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

|               |                          |                           |                           |                         |
|---------------|--------------------------|---------------------------|---------------------------|-------------------------|
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| <b>EUROPE</b> | Chemin de Magret         | F-33700 Merignac - France | Phone: (33) 5 57 92 15 15 | FAX: (33) 5 56 47 97 61 |

| Symbol            | Characteristic               | Test Conditions                                                                                               | MIN | TYP  | MAX  | UNIT |
|-------------------|------------------------------|---------------------------------------------------------------------------------------------------------------|-----|------|------|------|
| $C_{iss}$         | Input Capacitance            | $V_{GS} = 0V$<br>$V_{DS} = 25V$<br>$f = 1 \text{ MHz}$                                                        |     | 6000 | 7200 | pF   |
| $C_{oss}$         | Output Capacitance           |                                                                                                               |     | 775  | 1080 |      |
| $C_{rss}$         | Reverse Transfer Capacitance |                                                                                                               |     | 285  | 430  |      |
| $t_d(\text{on})$  | 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>$R_G = 0.6\Omega$ |     | 14   | 28   | ns   |
| $t_r$             | Rise Time                    |                                                                                                               |     | 14   | 28   |      |
| $t_d(\text{off})$ | Turn-off Delay Time          |                                                                                                               |     | 60   | 92   |      |
| $t_f$             | Fall Time                    |                                                                                                               |     | 14   | 20   |      |

SAFE OPERATING AREA CHARACTERISTICS

| Symbol | Characteristic      | Test Conditions / Part Number                                                                          | MIN | TYP | MAX | UNIT  |
|--------|---------------------|--------------------------------------------------------------------------------------------------------|-----|-----|-----|-------|
| SOA1   | Safe Operating Area | $V_{DS} = 400 \text{ V}$ , $I_{DS} = 0.813\text{A}$ , $t = 20 \text{ sec.}$ , $T_C = 60^\circ\text{C}$ | 325 |     |     | Watts |

- ① Repetitive Rating: Pulse width limited by maximum junction temperature. See Transient Thermal Impedance Curve. (Fig.1)  
 ② Pulse Test: Pulse width < 380  $\mu\text{s}$ , Duty Cycle < 2%  
 ③ See MIL-STD-750 Method 3471

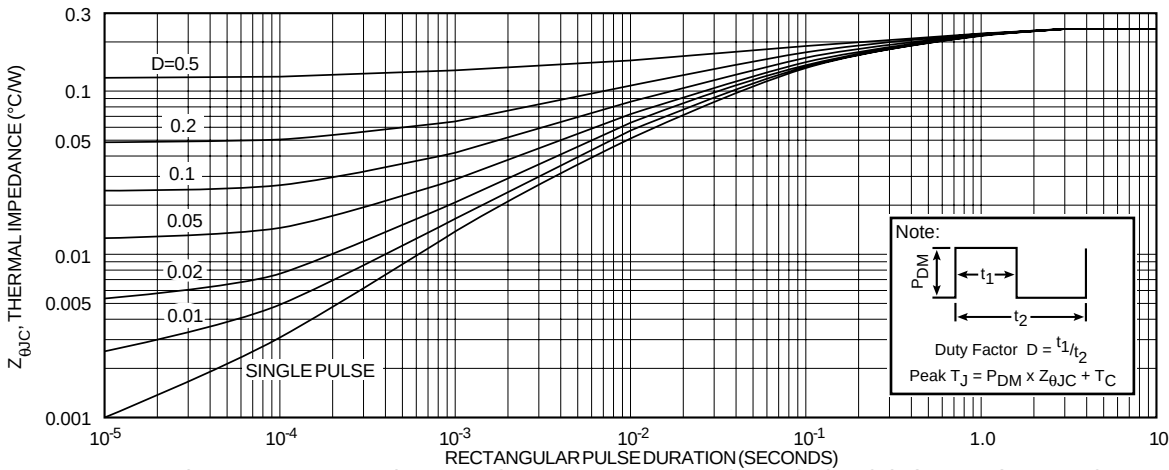


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

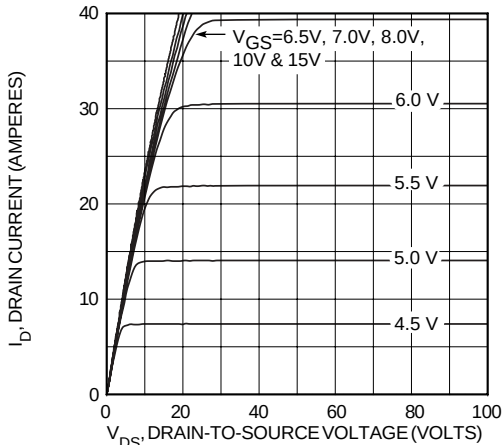


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

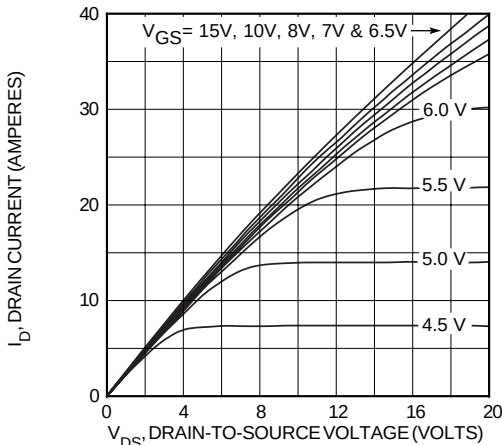


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

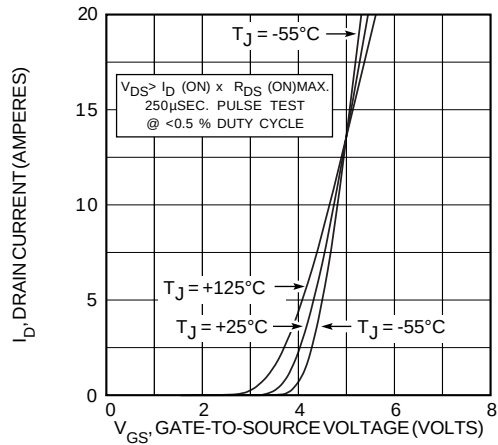


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

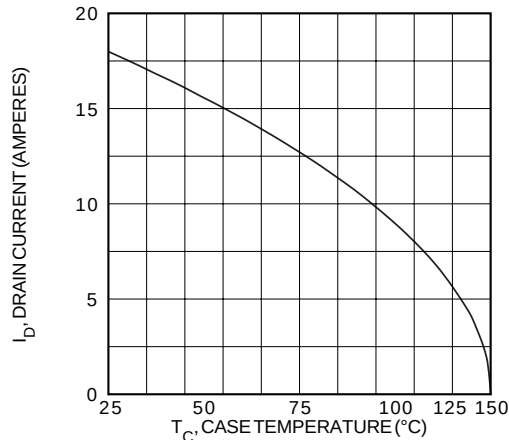


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

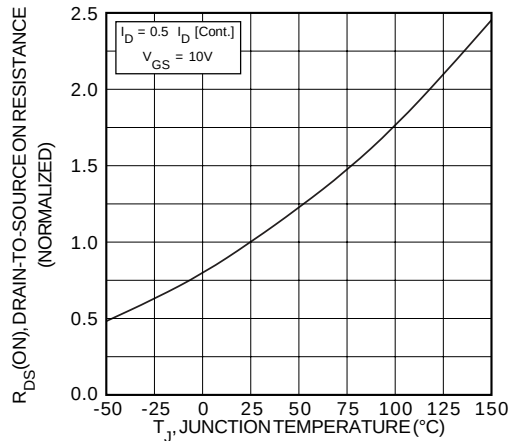


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

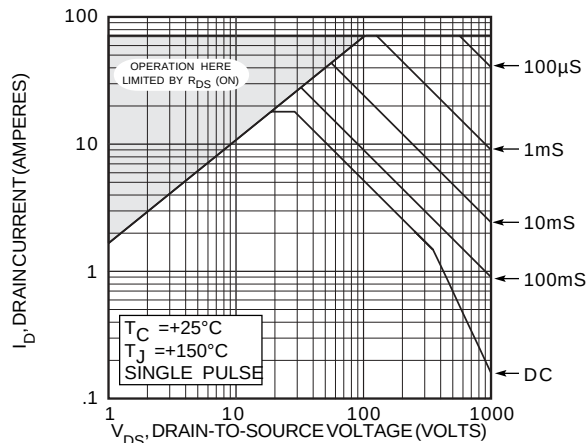


FIGURE 10, MAXIMUM SAFE OPERATING AREA

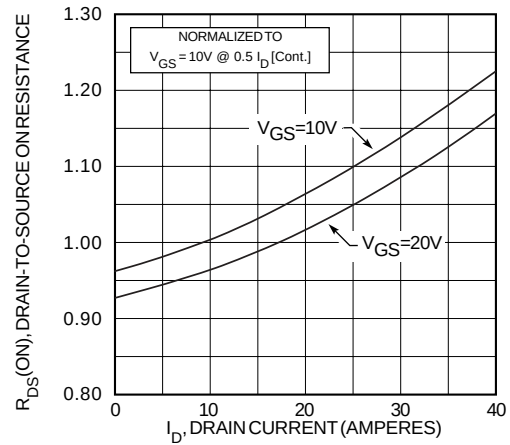


FIGURE 5,  $R_{DS(ON)}$  vs DRAIN CURRENT

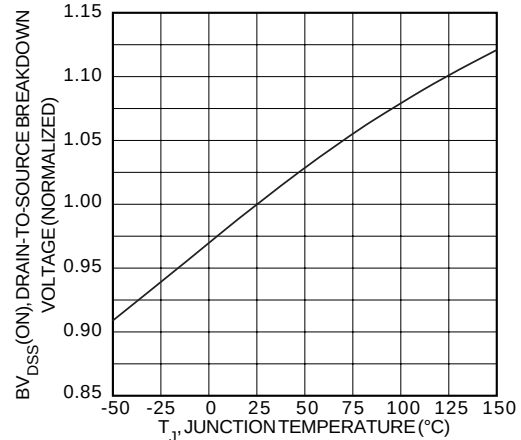


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

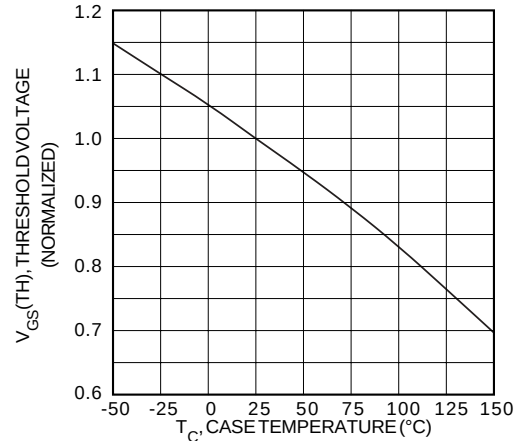


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

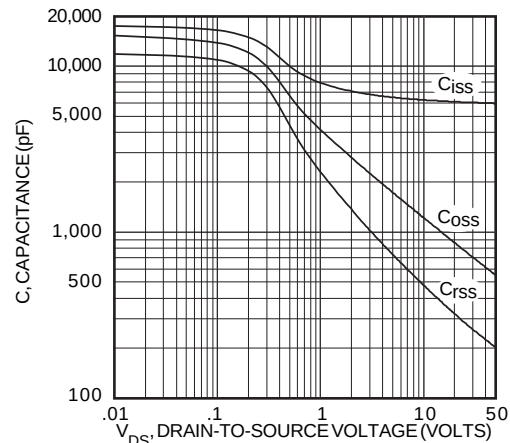
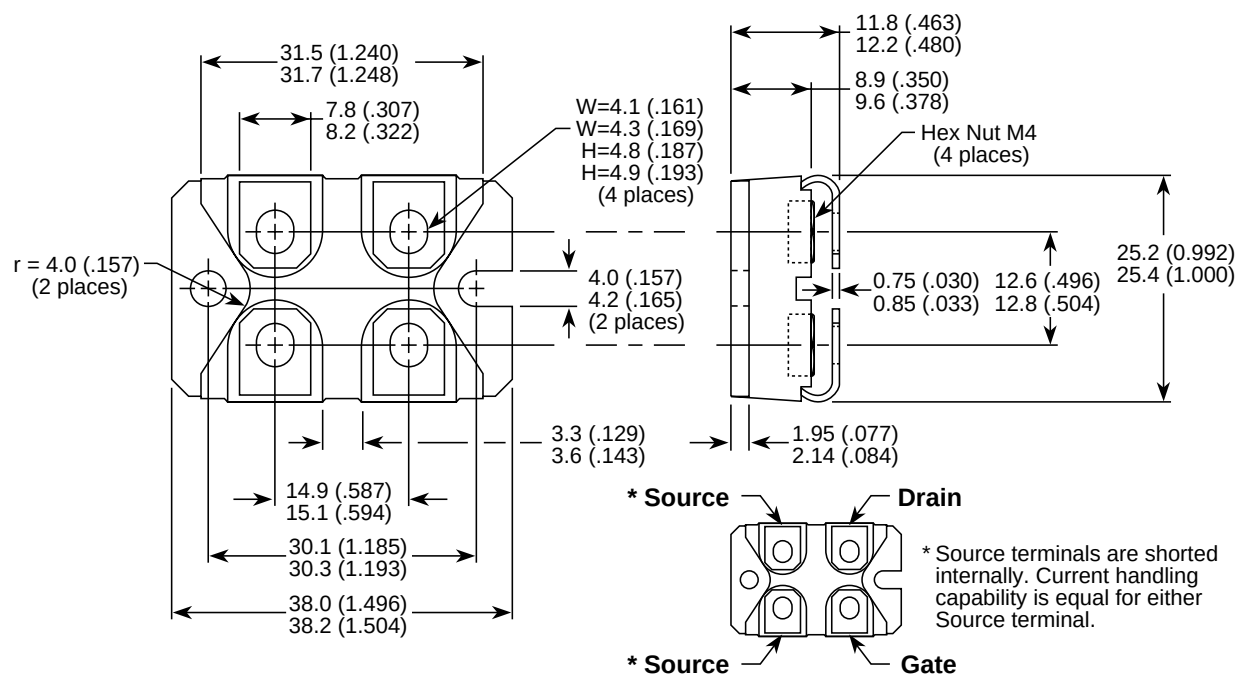


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

## SOT-227 (ISOTOP®) Package Outline



Dimensions in Millimeters and (Inches)