

## N-Channel 100-V (D-S) MOSFET

### PRODUCT SUMMARY

| $V_{(BR)DSS}$ (V) | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A)       |
|-------------------|---------------------------|-----------------|
| 100               | 0.034 at $V_{GS} = 10$ V  | 50 <sup>a</sup> |

### FEATURES

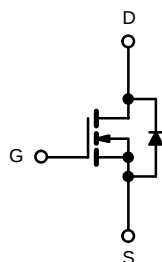
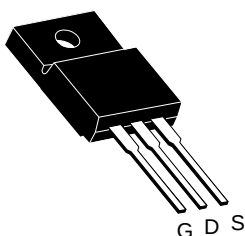
- TrenchFET<sup>®</sup> Power MOSFET
- 175 °C Junction Temperature
- Low Thermal Resistance Package
- 100 %  $R_g$  Tested


**RoHS**  
 COMPLIANT

### APPLICATIONS

- Isolated DC/DC Converters

TO-220 FULLPAK



N-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS $T_C = 25$ °C, unless otherwise noted

| Parameter                                        | Symbol         | Limit            | Unit |
|--------------------------------------------------|----------------|------------------|------|
| Drain-Source Voltage                             | $V_{DS}$       | 100              | V    |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 20$         |      |
| Continuous Drain Current ( $T_J = 175$ °C)       | $I_D$          | 50 <sup>a</sup>  | A    |
|                                                  |                | 28 <sup>a</sup>  |      |
| Pulsed Drain Current                             | $I_{DM}$       | 120              |      |
| Avalanche Current                                | $I_{AS}$       | 31               |      |
| Single Pulse Avalanche Energy <sup>b</sup>       | $E_{AS}$       | 61               | mJ   |
| Maximum Power Dissipation <sup>b</sup>           | $P_D$          | 360 <sup>c</sup> | W    |
|                                                  |                | 3.70             |      |
| Operating Junction and Storage Temperature Range | $T_J, T_{stg}$ | - 55 to 175      | °C   |

### THERMAL RESISTANCE RATINGS

| Parameter                | Symbol     | Limit | Unit |
|--------------------------|------------|-------|------|
| Junction-to-Ambient      | $R_{thJA}$ | 40    | °C/W |
| Junction-to-Case (Drain) | $R_{thJC}$ | 0.4   |      |

Notes:

a. Package limited.

b. Duty cycle  $\leq 1$  %.

c. See SOA curve for voltage derating.

d. When Mounted on 1" square PCB (FR-4 material).

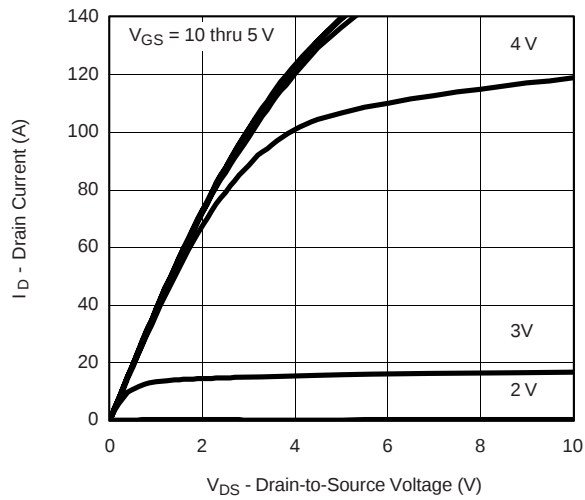
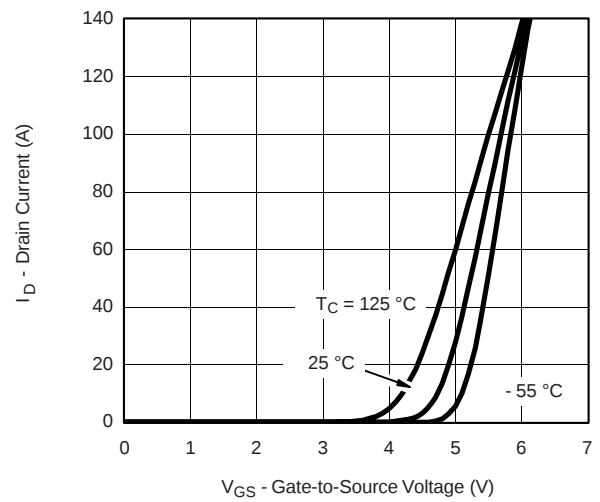
| SPECIFICATIONS T <sub>J</sub> = 25 °C, unless otherwise noted                      |                      |                                                                                                                           |      |       |       |      |
|------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------|------|-------|-------|------|
| Parameter                                                                          | Symbol               | Test Conditions                                                                                                           | Min. | Typ.  | Max.  | Unit |
| Static                                                                             |                      |                                                                                                                           |      |       |       |      |
| Drain-Source Breakdown Voltage                                                     | V <sub>(BR)DSS</sub> | V <sub>DS</sub> = 0 V, I <sub>D</sub> = 250 μA                                                                            | 100  |       |       | V    |
| Gate-Threshold Voltage                                                             | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA                                                               | 1.5  |       | 2.5   |      |
| Gate-Body Leakage                                                                  | I <sub>GSS</sub>     | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V                                                                           |      |       | ± 100 | nA   |
| Zero Gate Voltage Drain Current                                                    | I <sub>DSS</sub>     | V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V                                                                            |      |       | 1     | μA   |
|                                                                                    |                      | V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C                                                   |      |       | 50    |      |
|                                                                                    |                      | V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C                                                   |      |       | 250   |      |
| On-State Drain Current <sup>a</sup>                                                | I <sub>D(on)</sub>   | V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 10 V                                                                             | 120  |       |       | A    |
| Drain-Source On-State Resistance <sup>a</sup>                                      | r <sub>DS(on)</sub>  | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A                                                                             |      | 0.034 |       | Ω    |
|                                                                                    |                      | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 125 °C                                                    |      | 0.063 |       |      |
|                                                                                    |                      | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 175 °C                                                    |      | 0.084 |       |      |
| Forward Transconductance <sup>a</sup>                                              | g <sub>fs</sub>      | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 30 A                                                                             | 25   |       |       | S    |
| Dynamic <sup>b</sup>                                                               |                      |                                                                                                                           |      |       |       |      |
| Input Capacitance                                                                  | C <sub>iss</sub>     | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz                                                                  |      | 5100  |       | pF   |
| Output Capacitance                                                                 | C <sub>oss</sub>     |                                                                                                                           |      | 480   |       |      |
| Reverse Transfer Capacitance                                                       | C <sub>rss</sub>     |                                                                                                                           |      | 210   |       |      |
| Total Gate Charge <sup>c</sup>                                                     | Q <sub>g</sub>       | V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 65 A                                                    |      | 90    | 130   | nC   |
| Gate-Source Charge <sup>c</sup>                                                    | Q <sub>gs</sub>      |                                                                                                                           |      | 23    |       |      |
| Gate-Drain Charge <sup>c</sup>                                                     | Q <sub>gd</sub>      |                                                                                                                           |      | 34    |       |      |
| Gate Resistance                                                                    | R <sub>g</sub>       |                                                                                                                           | 0.5  | 1.7   | 3.3   | Ω    |
| Turn-On Delay Time <sup>c</sup>                                                    | t <sub>d(on)</sub>   | V <sub>DD</sub> = 100 V, R <sub>L</sub> = 1.5 Ω<br>I <sub>D</sub> ≅ 65 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 2.5 Ω |      | 24    | 35    | ns   |
| Rise Time <sup>c</sup>                                                             | t <sub>r</sub>       |                                                                                                                           |      | 220   | 330   |      |
| Turn-Off Delay Time <sup>c</sup>                                                   | t <sub>d(off)</sub>  |                                                                                                                           |      | 45    | 70    |      |
| Fall Time <sup>c</sup>                                                             | t <sub>f</sub>       |                                                                                                                           |      | 200   | 300   |      |
| Source-Drain Diode Ratings and Characteristics T <sub>C</sub> = 25 °C <sup>b</sup> |                      |                                                                                                                           |      |       |       |      |
| Continuous Current                                                                 | I <sub>S</sub>       |                                                                                                                           |      | 50    |       | A    |
| Pulsed Current                                                                     | I <sub>SM</sub>      |                                                                                                                           |      | 120   |       |      |
| Forward Voltage <sup>a</sup>                                                       | V <sub>SD</sub>      | I <sub>F</sub> = 65 A, V <sub>GS</sub> = 0 V                                                                              |      | 1.0   | 1.5   | V    |
| Reverse Recovery Time                                                              | t <sub>rr</sub>      | I <sub>F</sub> = 50 A, di/dt = 100 A/μs                                                                                   |      | 130   | 200   | ns   |
| Peak Reverse Recovery Current                                                      | I <sub>RM(REC)</sub> |                                                                                                                           |      | 8     | 12    | A    |
| Reverse Recovery Charge                                                            | Q <sub>rr</sub>      |                                                                                                                           |      | 0.52  | 1.2   | μC   |

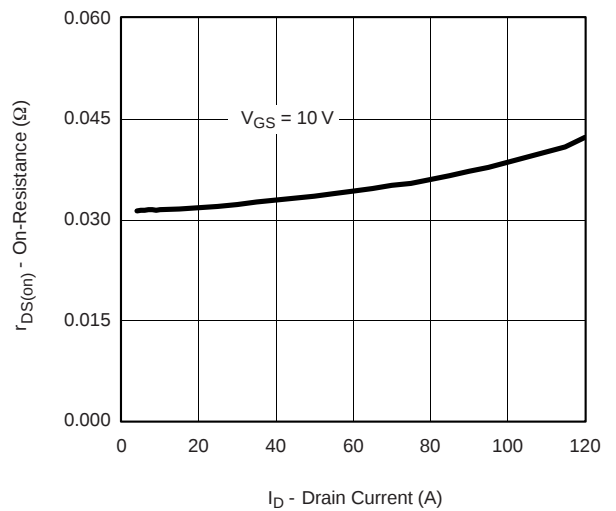
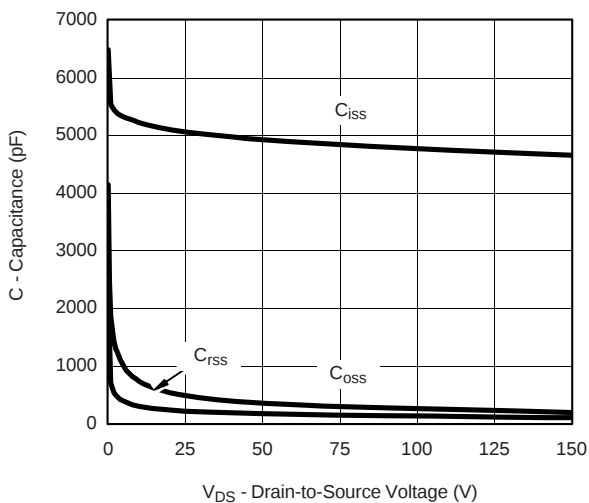
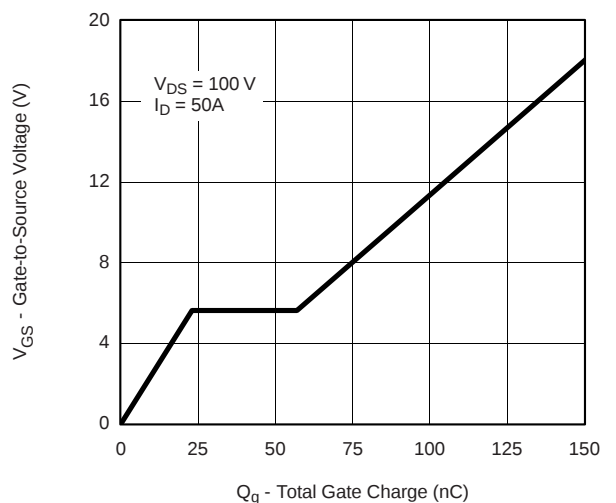
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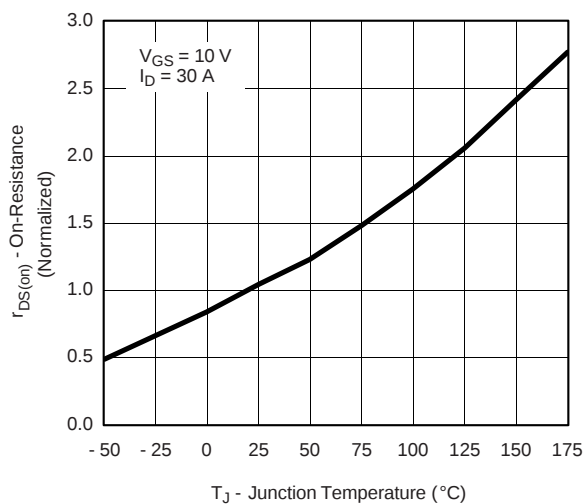
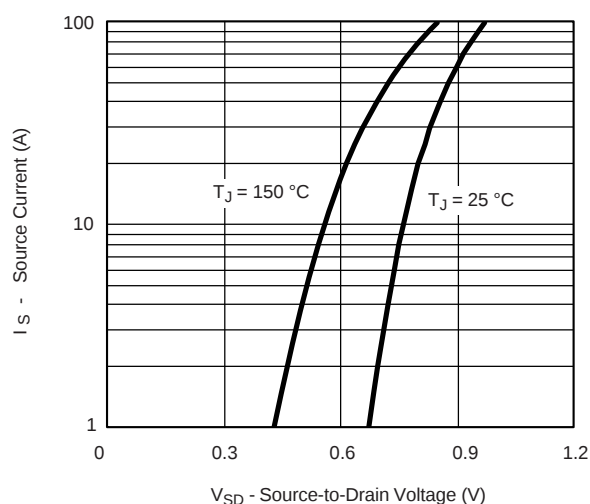
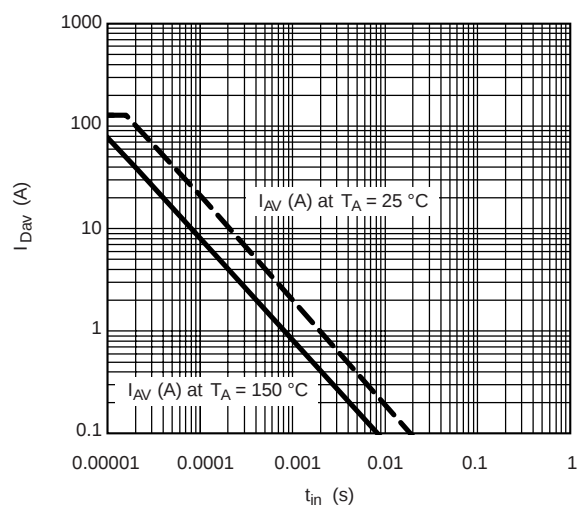
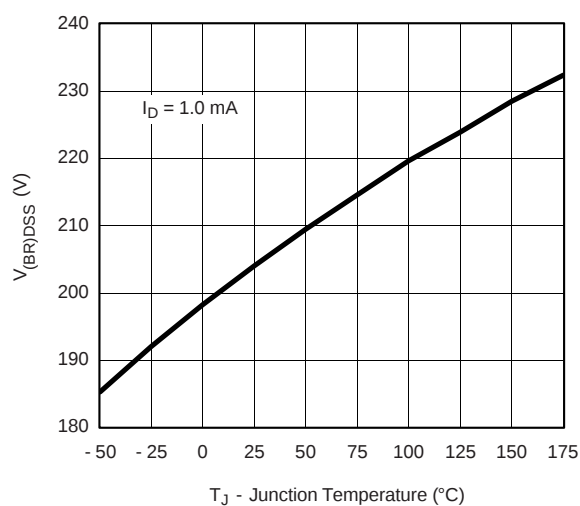
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

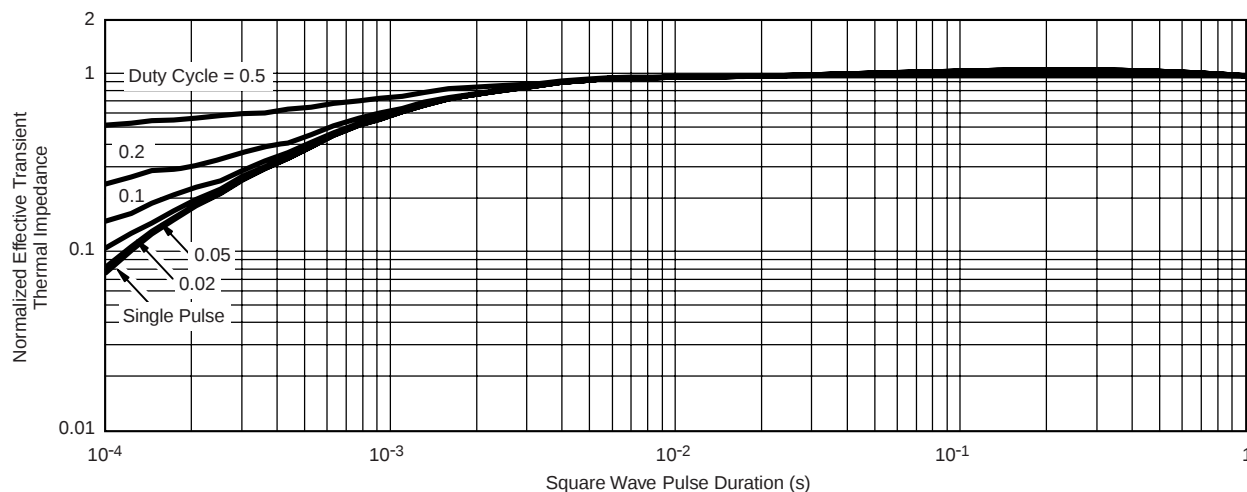
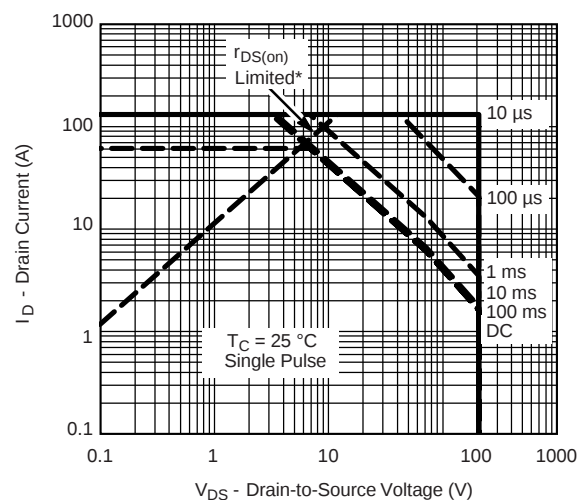
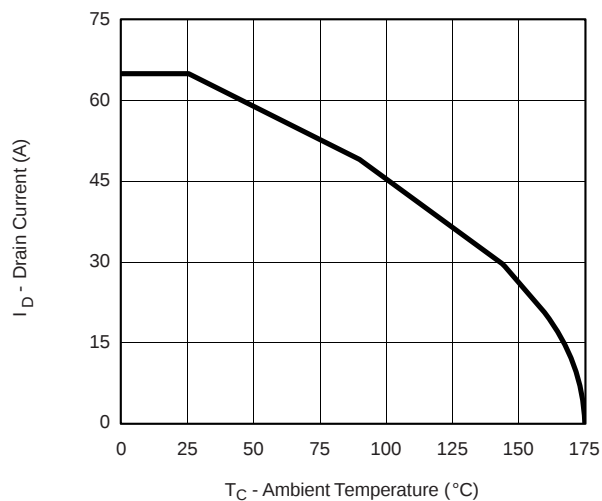
b. Guaranteed by design, not subject to production testing.

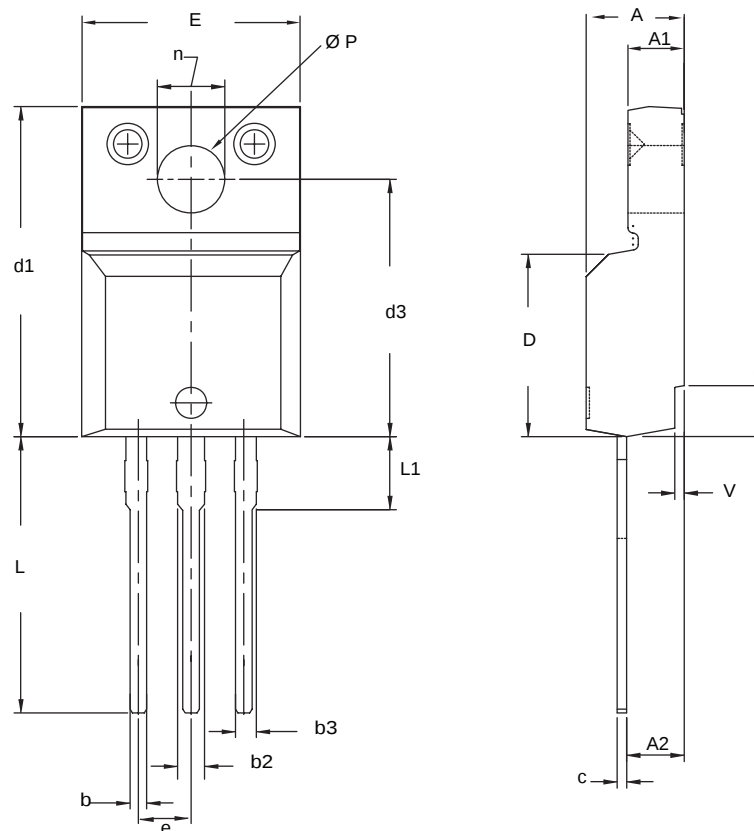
c. Independent of operating temperature.

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

**Output Characteristics**

**Transfer Characteristics**

**Transconductance**

**On-Resistance vs. Drain Current**

**Capacitance**

**Gate Charge**

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

**On-Resistance vs. Junction Temperature**

**Source-Drain Diode Forward Voltage**

**Avalanche Current vs. Time**

**Drain Source Breakdown vs. Junction Temperature**



**TO-220 FULLPAK (HIGH VOLTAGE)**

| DIM. | MILLIMETERS |        | INCHES    |       |
|------|-------------|--------|-----------|-------|
|      | MIN.        | MAX.   | MIN.      | MAX.  |
| A    | 4.570       | 4.830  | 0.180     | 0.190 |
| A1   | 2.570       | 2.830  | 0.101     | 0.111 |
| A2   | 2.510       | 2.850  | 0.099     | 0.112 |
| b    | 0.622       | 0.890  | 0.024     | 0.035 |
| b2   | 1.229       | 1.400  | 0.048     | 0.055 |
| b3   | 1.229       | 1.400  | 0.048     | 0.055 |
| c    | 0.440       | 0.629  | 0.017     | 0.025 |
| D    | 8.650       | 9.800  | 0.341     | 0.386 |
| d1   | 15.88       | 16.120 | 0.622     | 0.635 |
| d3   | 12.300      | 12.920 | 0.484     | 0.509 |
| E    | 10.360      | 10.630 | 0.408     | 0.419 |
| e    | 2.54 BSC    |        | 0.100 BSC |       |
| L    | 13.200      | 13.730 | 0.520     | 0.541 |
| L1   | 3.100       | 3.500  | 0.122     | 0.138 |
| n    | 6.050       | 6.150  | 0.238     | 0.242 |
| Ø P  | 3.050       | 3.450  | 0.120     | 0.136 |
| u    | 2.400       | 2.500  | 0.094     | 0.098 |
| v    | 0.400       | 0.500  | 0.016     | 0.020 |

ECN: X09-0126-Rev. B, 26-Oct-09  
DWG: 5972

**Notes**

1. To be used only for process drawing.
2. These dimensions apply to all TO-220, FULLPAK leadframe versions 3 leads.
3. All critical dimensions should C meet  $C_{pk} > 1.33$ .
4. All dimensions include burrs and plating thickness.
5. No chipping or package damage.

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