# NTD6600N

# Power MOSFET
## 100 V, 12 A, N−Channel, Logic Level DPAK

### Features

- Source−to−Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- Avalanche Energy Specified
- Logic Level
- Pb−Free Packages are Available

### Typical Applications

- PWM Motor Controls
- Power Supplies
- Converters

**MAXIMUM RATINGS** ($T_C$ = 25°C unless otherwise noted)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Drain−to−Source Voltage | $V_{DSS}$ | 100 | Vdc |
| Drain−to−Source Voltage ($R_{GS}$ = 1.0 MΩ) | $V_{DGR}$ | 100 | Vdc |
| Gate−to−Source Voltage − Continuous | $V_{GS}$ | ± 20 | Vdc |
| Drain Current − Continuous @ $T_A$ = 25°C<br>− Continuous @ $T_A$ =100°C<br>− Pulsed (Note 3) | $I_D$<br>$I_D$<br>$I_{DM}$ | 12<br>9.0<br>44 | Adc<br><br>Apk |
| Total Power Dissipation<br>Derate above 25°C<br>Total Power Dissipation @ $T_A$ = 25°C (Note 1)<br>Total Power Dissipation @ $T_A$ = 25°C (Note 2) | $P_D$ | 56.6<br>0.38<br>1.76<br>1.28 | W<br>W/°C<br>W<br>W |
| Operating and Storage Temperature Range | $T_J$, $T_{stg}$ | −55 to +175 | °C |
| Single Pulse Drain−to−Source Avalanche Energy − Starting $T_J$ = 25°C ($V_{DD}$ = 50 Vdc, $V_{GS}$ = 5.0 Vdc, $I_L$ = 12 Apk, L = 1.0 mH, $R_G$ = 25 Ω) | $E_{AS}$ | 72 | mJ |
| Thermal Resistance<br>− Junction−to−Case<br>− Junction−to−Ambient (Note 1)<br>− Junction−to−Ambient (Note 2) | <br>$R_{\theta JC}$<br>$R_{\theta JA}$<br>$R_{\theta JA}$ | <br>2.65<br>85<br>117 | °C/W |
| Maximum Temperature for Soldering Purposes, (1/8″ from case for 10 s) | $T_L$ | 260 | °C |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. When surface mounted to an FR4 board using 0.5 sq in pad size.
2. When surface mounted to an FR4 board using the minimum recommended pad size.
3. Pulse Test: Pulse Width = 10 μs, Duty Cycle = 2%.

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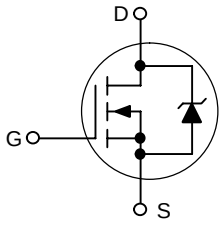
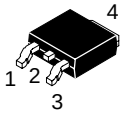
| $V_{(BR)DSS}$ | $R_{DS(on)}$ TYP | $I_D$ MAX |
|---|---|---|
| 100 V | 118 mΩ @ 5.0 V | 12 A |

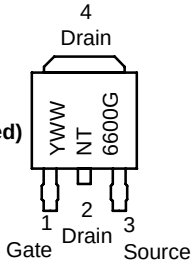
**N−Channel**

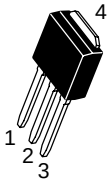



**MARKING DIAGRAMS**

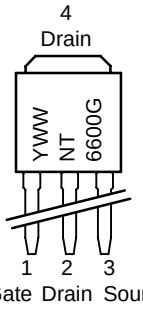



**DPAK**
**CASE 369C**
**(Surface Mounted)**
**STYLE 2**




**DPAK−3**
**CASE 369D**
**(Straight Lead)**
**STYLE 2**




| | |
|---|---|
| Y | = Year |
| WW | = Work Week |
| NT6600 | = Device Code |
| G | = Pb−Free Package |

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

**ELECTRICAL CHARACTERISTICS** ($T_C$ = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Drain−to−Source Breakdown Voltage ($V_{GS}$ = 0 Vdc, $I_D$ = 250 μAdc) | $V_{(BR)DSS}$ | 100 | − | − | Vdc |
| Zero Gate Voltage Drain Current ($V_{GS}$ = 0 Vdc, $V_{DS}$ = 100 Vdc, $T_J$ = 25°C)<br>($V_{GS}$ = 0 Vdc, $V_{DS}$ = 100 Vdc, $T_J$ = 125°C) | $I_{DSS}$ | −<br>− | −<br>− | 1.0<br>10 | μAdc |
| Gate−Body Leakage Current ($V_{GS}$ = ±20 Vdc, $V_{DS}$ = 0) | $I_{GSS}$ | − | − | ±100 | nAdc |
| **ON CHARACTERISTICS** | | | | | |
| Gate Threshold Voltage ($V_{DS}$ = $V_{GS}$, $I_D$ = 250 μAdc)<br>Temperature Coefficient (Negative) | $V_{GS(th)}$ | 1.0<br>− | 1.5<br>−4.4 | 2.0<br>− | Vdc<br>mV/°C |
| Static Drain−to−Source On−State Resistance ($V_{GS}$ = 5.0 Vdc, $I_D$ = 6.0 Adc) | $R_{DS(on)}$ | − | 118 | 146 | mΩ |
| Drain−to−Source On−Voltage ($V_{GS}$ = 5.0 Vdc, $I_D$ = 12 Adc) | $V_{DS(on)}$ | − | 1.5 | 2.2 | Vdc |
| Forward Transconductance ($V_{DS}$ = 10 Vdc, $I_D$ = 6.0 Adc) | $g_{FS}$ | − | 10 | − | mhos |
| **DYNAMIC CHARACTERISTICS** | | | | | |
| Input Capacitance | ($V_{DS}$ = 25 Vdc, $V_{GS}$ = 0 Vdc, f = 1.0 MHz) | $C_{iss}$ | − | 463 | 700 | pF |
| Output Capacitance | | $C_{oss}$ | − | 116 | 225 | |
| Reverse Transfer Capacitance | | $C_{rss}$ | − | 36 | 75 | |
| **SWITCHING CHARACTERISTICS** (Notes 4 & 5) | | | | | |
| Turn−On Delay Time | ($V_{DD}$ = 80 Vdc, $I_D$ = 6.0 Adc, $V_{GS}$ = 5.0 Vdc, $R_G$ = 9.1 Ω) | $t_{d(on)}$ | − | 10.5 | 20 | ns |
| Rise Time | | $t_r$ | − | 75 | 140 | |
| Turn−Off Delay Time | | $t_{d(off)}$ | − | 26 | 40 | |
| Fall Time | | $t_f$ | − | 50 | 90 | |
| Total Gate Charge | ($V_{DS}$ = 80 Vdc, $I_D$ = 6.0 Adc, $V_{GS}$ = 5.0 Vdc) | $Q_{tot}$ | − | 11.3 | 20 | nC |
| Gate−to−Source Charge | | $Q_{gs}$ | − | 1.9 | − | |
| Gate−to−Drain Charge | | $Q_{gd}$ | − | 7.4 | − | |
| **BODY−DRAIN DIODE RATINGS** (Note 4) | | | | | |
| Diode Forward On−Voltage | ($I_S$ = 12 Adc, $V_{GS}$ = 0 Vdc)<br>($I_S$ = 12 Adc, $V_{GS}$ = 0 Vdc, $T_J$ = 125°C) | $V_{SD}$ | −<br>− | 0.90<br>0.80 | 1.4<br>− | Vdc |
| Reverse Recovery Time | ($I_S$ = 12 Adc, $V_{GS}$ = 0 Vdc, $dI_S/dt$ = 100 A/μs) | $t_{rr}$ | − | 80 | − | ns |
| | | $t_a$ | − | 50 | − | |
| | | $t_b$ | − | 30 | − | |
| Reverse Recovery Stored Charge | | $Q_{RR}$ | − | 0.240 | − | μC |

4. Indicates Pulse Test: P.W. = 300 μs max, Duty Cycle = 2%.
5. Switching characteristics are independent of operating junction temperature.

## ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| NTD6600N | DPAK | 75 Units/Rail |
| NTD6600N−1 | DPAK−3 | |
| NTD6600N−1G | DPAK−3<br>(Pb−Free) | |
| NTD6600NT4 | DPAK | 2500 Tape & Reel |
| NTD6600NT4G | DPAK<br>(Pb−Free) | |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

## TYPICAL CHARACTERISTICS

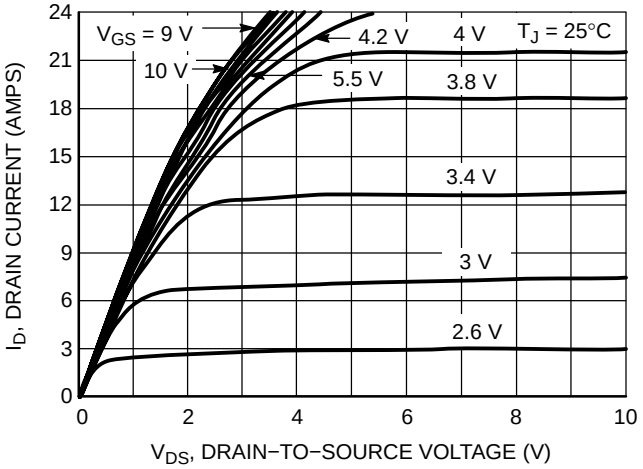



**Figure 1. On−Region Characteristics**

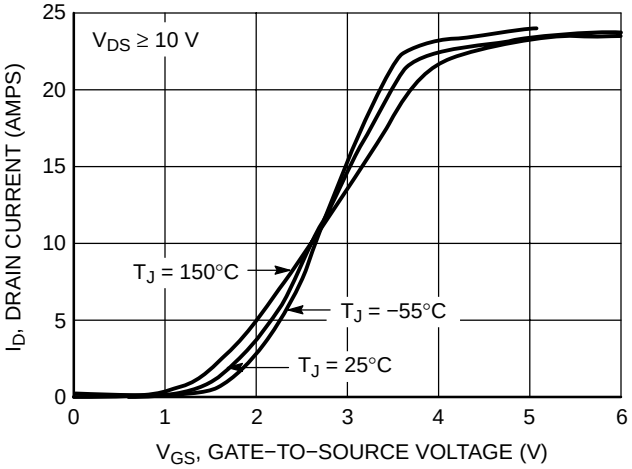



**Figure 2. Transfer Characteristics**

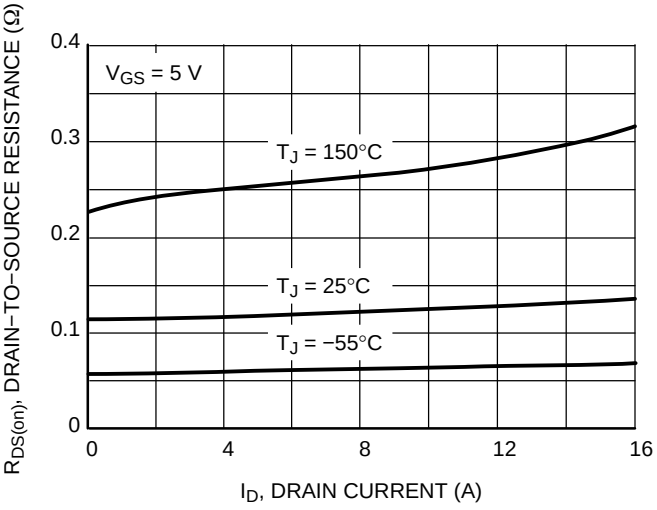



**Figure 3. On−Resistance versus Drain Current and Temperature**

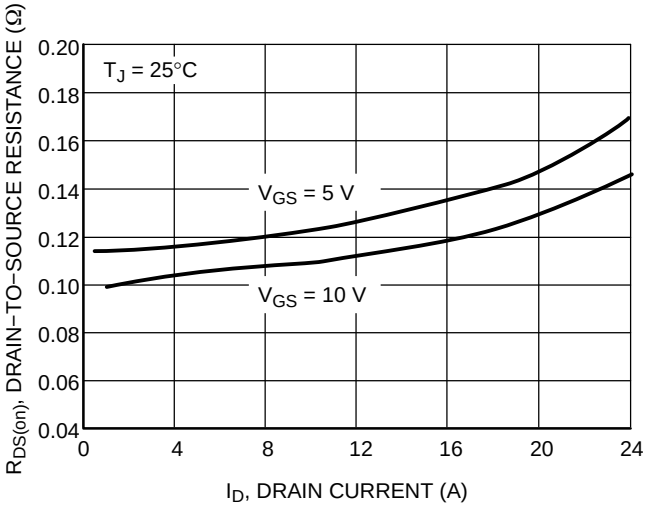



**Figure 4. On−Resistance versus Drain Current and Temperature**

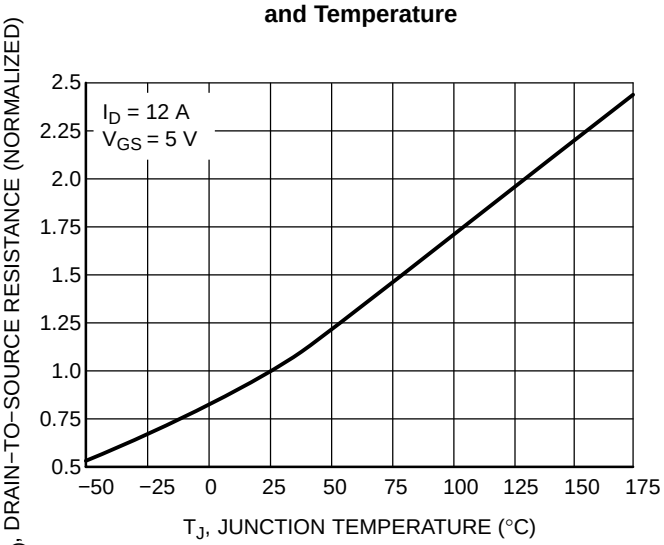



**Figure 5. On−Resistance Variation with Temperature**

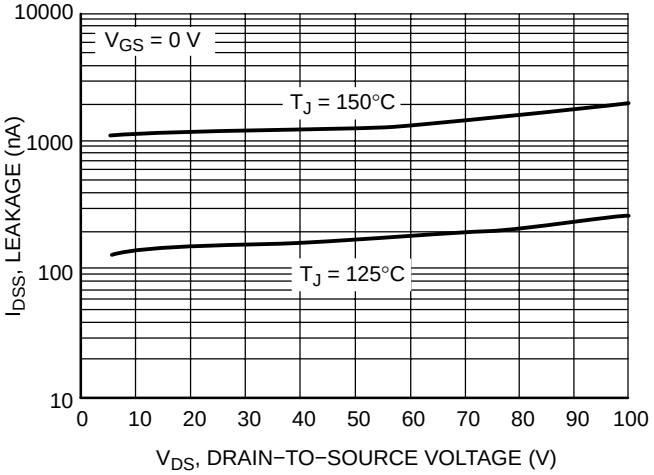



**Figure 6. Drain−To−Source Leakage Current versus Voltage**

## TYPICAL CHARACTERISTICS

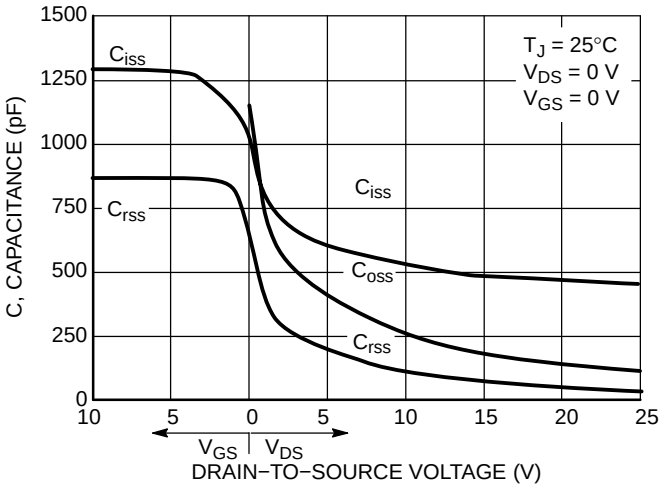



**Figure 7. Capacitance Variation**

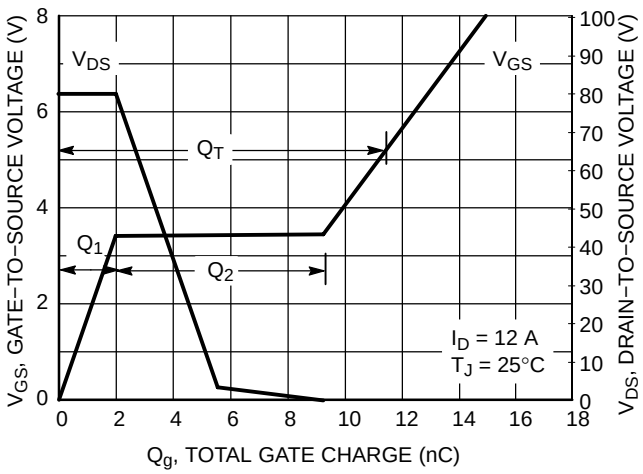



**Figure 8. Gate−to−Source and Drain−to−Source Voltage versus Total Charge**

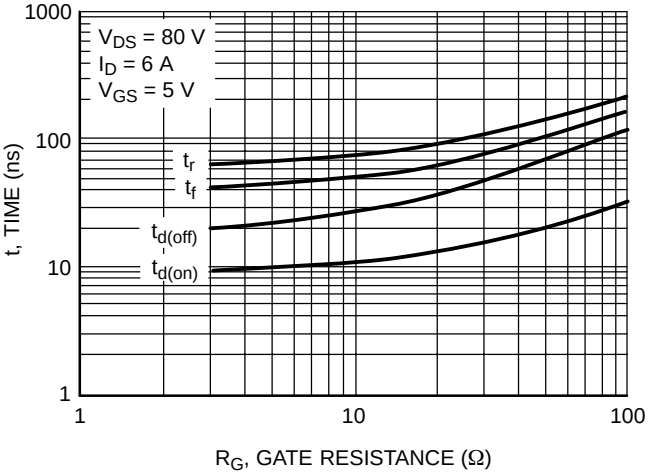



**Figure 9. Resistive Switching Time Variation versus Gate Resistance**

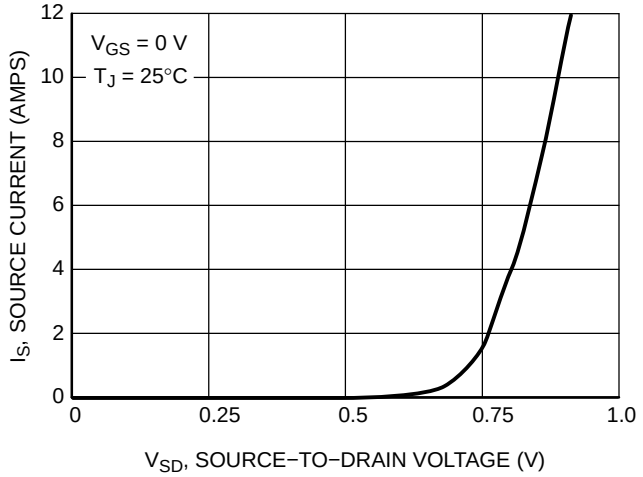



**Figure 10. Diode Forward Voltage versus Current**

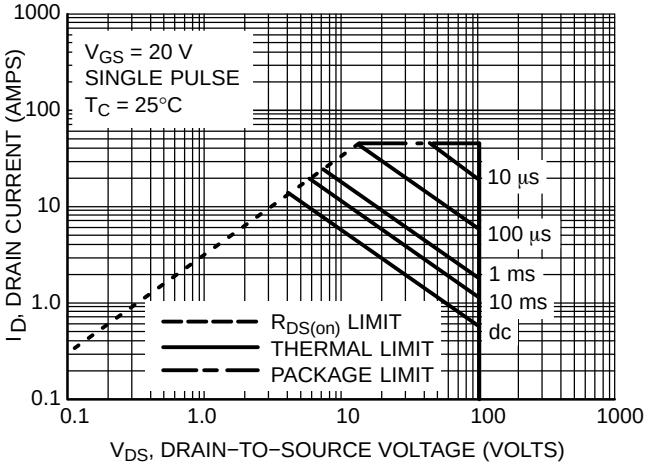



**Figure 11. Maximum Rated Forward Biased Safe Operating Area**

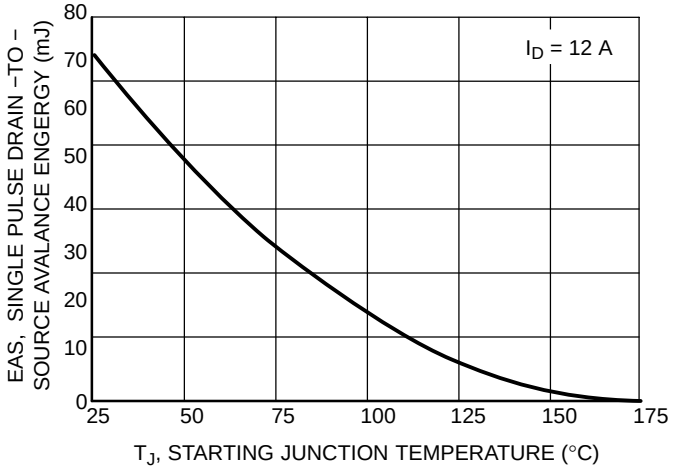
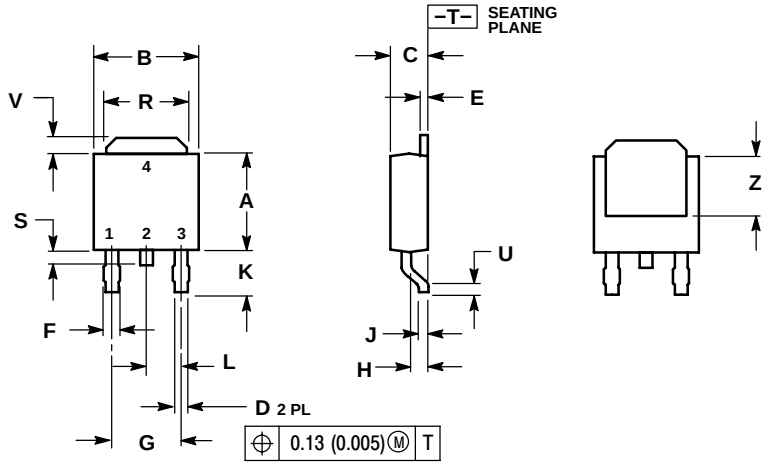



**Figure 12. Maximum Avalanche Energy versus Starting Junction Temperature**

## PACKAGE DIMENSIONS

**DPAK**
CASE 369C−01
ISSUE O

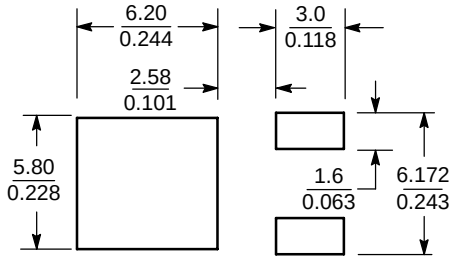



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.235 | 0.245 | 5.97 | 6.22 |
| B | 0.250 | 0.265 | 6.35 | 6.73 |
| C | 0.086 | 0.094 | 2.19 | 2.38 |
| D | 0.027 | 0.035 | 0.69 | 0.88 |
| E | 0.018 | 0.023 | 0.46 | 0.58 |
| F | 0.037 | 0.045 | 0.94 | 1.14 |
| G | 0.180 BSC | | 4.58 BSC | |
| H | 0.034 | 0.040 | 0.87 | 1.01 |
| J | 0.018 | 0.023 | 0.46 | 0.58 |
| K | 0.102 | 0.114 | 2.60 | 2.89 |
| L | 0.090 BSC | | 2.29 BSC | |
| R | 0.180 | 0.215 | 4.57 | 5.45 |
| S | 0.025 | 0.040 | 0.63 | 1.01 |
| U | 0.020 | −−− | 0.51 | −−− |
| V | 0.035 | 0.050 | 0.89 | 1.27 |
| Z | 0.155 | −−− | 3.93 | −−− |

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

### SOLDERING FOOTPRINT*

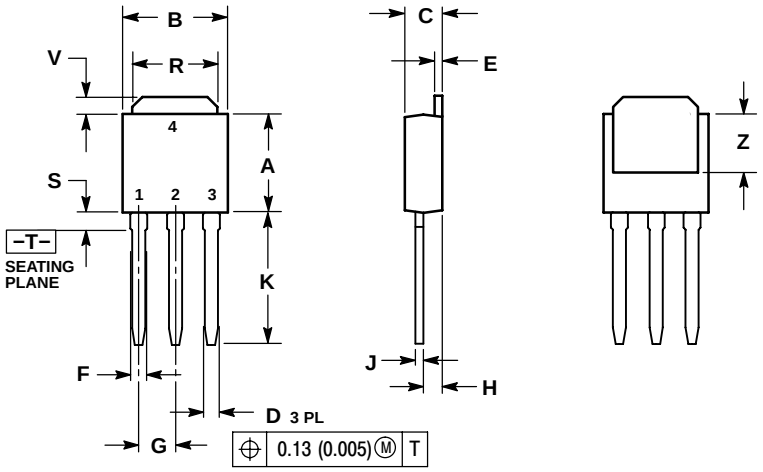



SCALE 3:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

## PACKAGE DIMENSIONS

**DPAK−3**
CASE 369D−01
ISSUE B




NOTES:
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2. CONTROLLING DIMENSION: INCH.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.235 | 0.245 | 5.97 | 6.35 |
| B | 0.250 | 0.265 | 6.35 | 6.73 |
| C | 0.086 | 0.094 | 2.19 | 2.38 |
| D | 0.027 | 0.035 | 0.69 | 0.88 |
| E | 0.018 | 0.023 | 0.46 | 0.58 |
| F | 0.037 | 0.045 | 0.94 | 1.14 |
| G | 0.090 BSC | | 2.29 BSC | |
| H | 0.034 | 0.040 | 0.87 | 1.01 |
| J | 0.018 | 0.023 | 0.46 | 0.58 |
| K | 0.350 | 0.380 | 8.89 | 9.65 |
| R | 0.180 | 0.215 | 4.45 | 5.45 |
| S | 0.025 | 0.040 | 0.63 | 1.01 |
| V | 0.035 | 0.050 | 0.89 | 1.27 |
| Z | 0.155 | −−− | 3.93 | −−− |

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN



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