

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 ($T_C = 25^\circ\text{C}$ unless otherwise noted)

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

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.

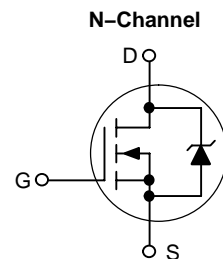
1. When surface mounted to an FR4 board using 0.5 sq in pad size.
2. When surface mounted to an FR4 board using the minimum recommended pad size.
3. Pulse Test: Pulse Width = 10 μs , Duty Cycle = 2%.



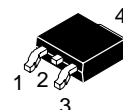
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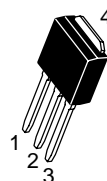
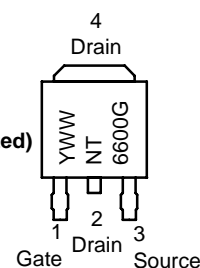
| $V_{(BR)DSS}$ | $R_{DS(on)}$ TYP | I_D MAX |
|---------------|------------------------|-----------|
| 100 V | 118 m Ω @ 5.0 V | 12 A |



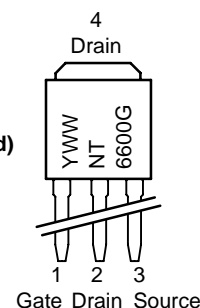
MARKING DIAGRAMS



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.

NTD6600N

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) (V _{GS} = 0 Vdc, V _{DS} = 100 Vdc, T _J = 125°C) | I _{DSS} | – – | – – | 1.0 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 Temperature Coefficient (Negative) | V _{GS(th)} | 1.0 – | 1.5 –4.4 | 2.0 – | Vdc 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) (I _S = 12 Adc, V _{GS} = 0 Vdc, T _J = 125°C) | V _{SD} | – – | 0.90 0.80 | 1.4 – | 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 (Pb-Free) | |
| NTD6600NT4 | DPAK | 2500 Tape & Reel |
| NTD6600NT4G | DPAK (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

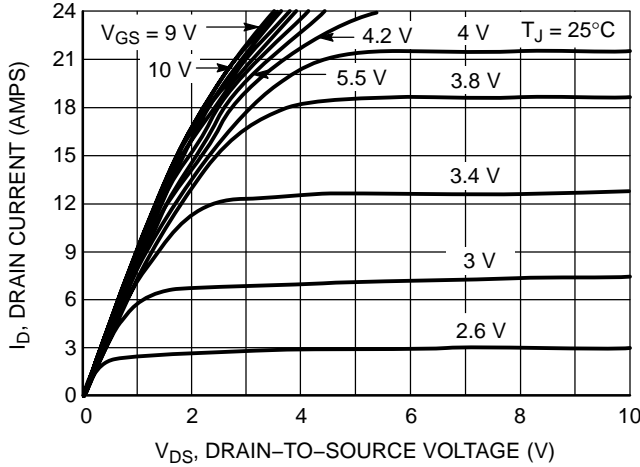


Figure 1. On-Region Characteristics

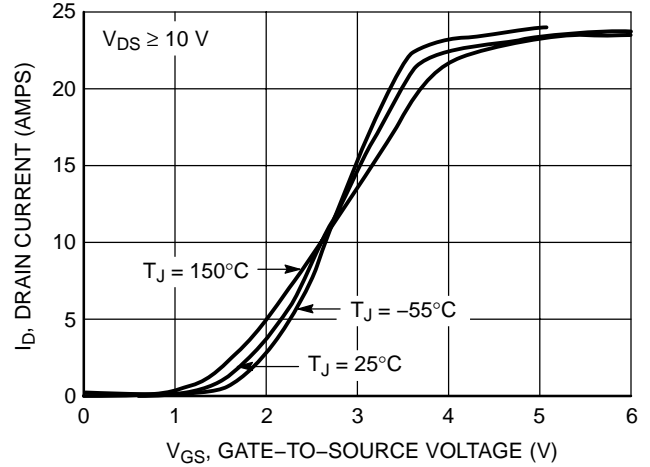


Figure 2. Transfer Characteristics

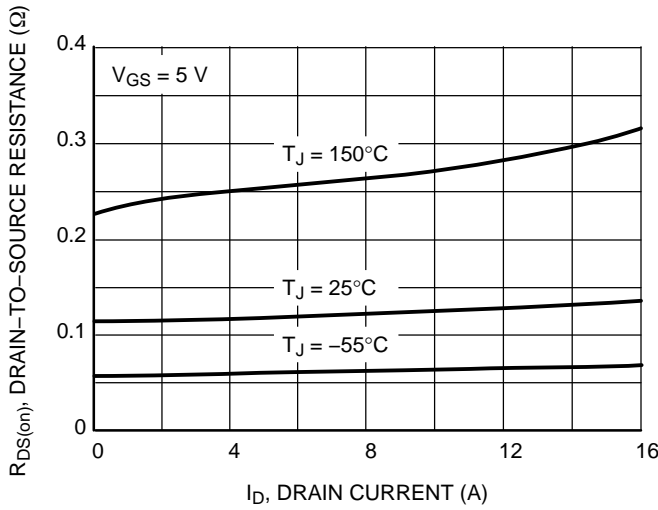


Figure 3. On-Resistance versus Drain Current and Temperature

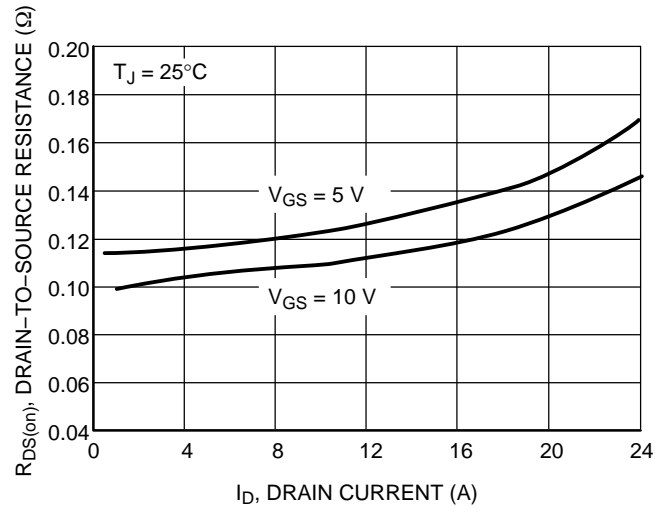


Figure 4. On-Resistance versus Drain Current and Temperature

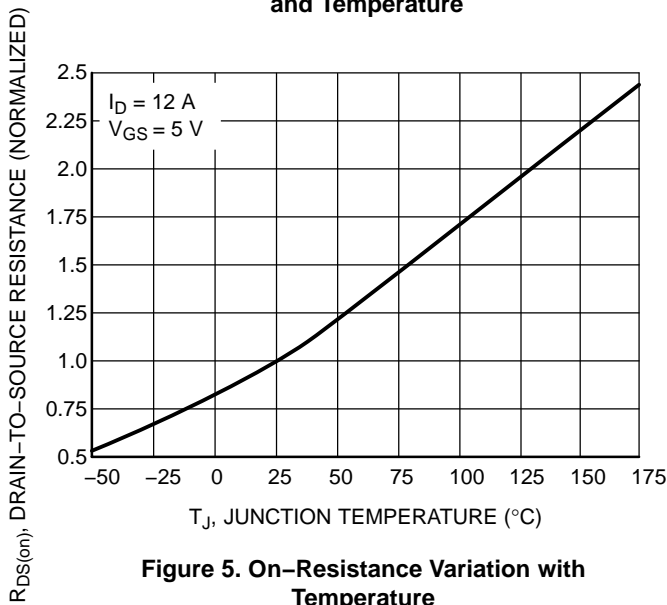


Figure 5. On-Resistance Variation with Temperature

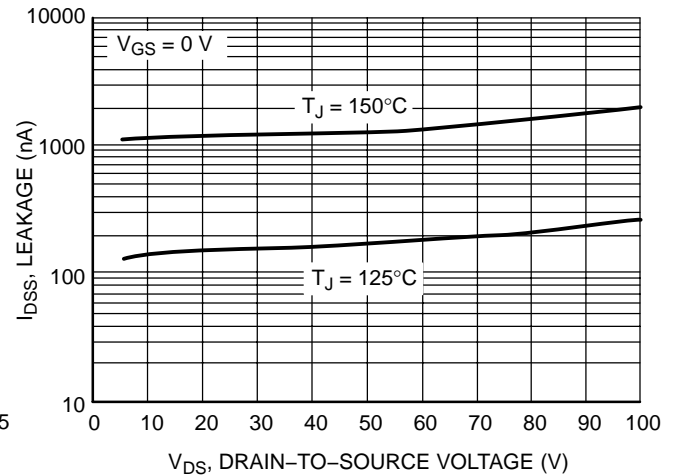


Figure 6. Drain-To-Source Leakage Current versus Voltage

TYPICAL CHARACTERISTICS

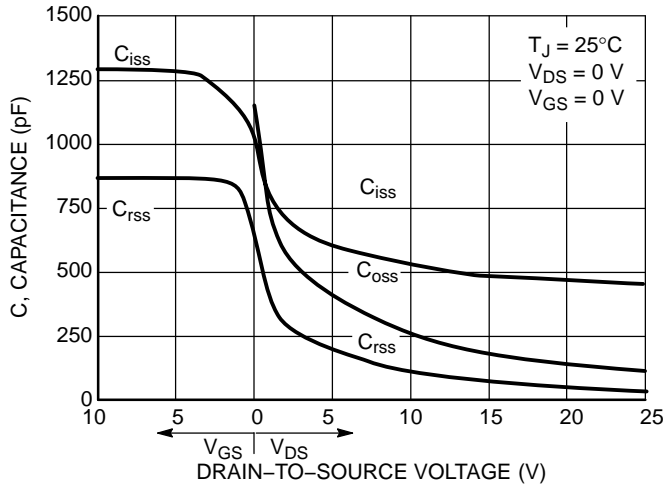


Figure 7. Capacitance Variation

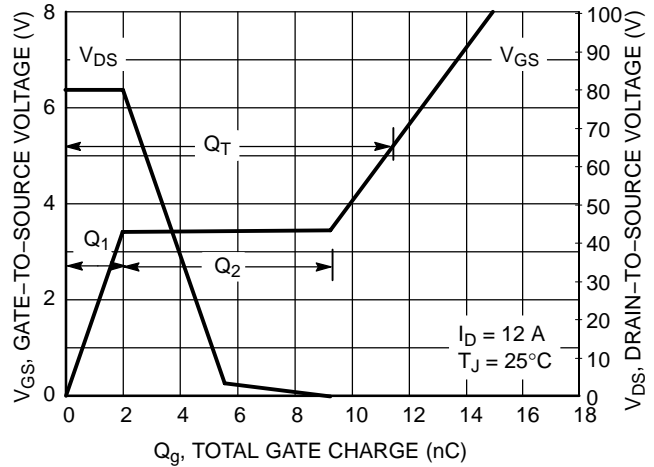


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

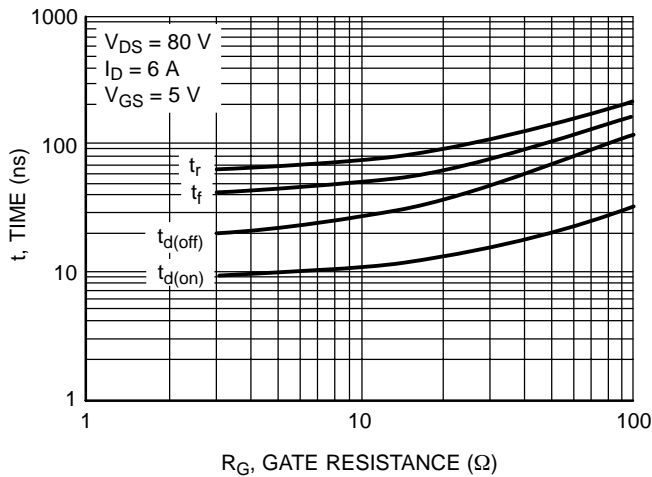


Figure 9. Resistive Switching Time Variation versus Gate Resistance

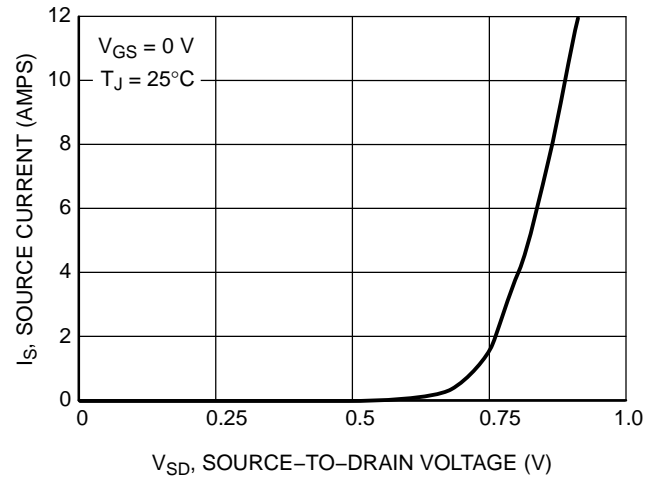


Figure 10. Diode Forward Voltage versus Current

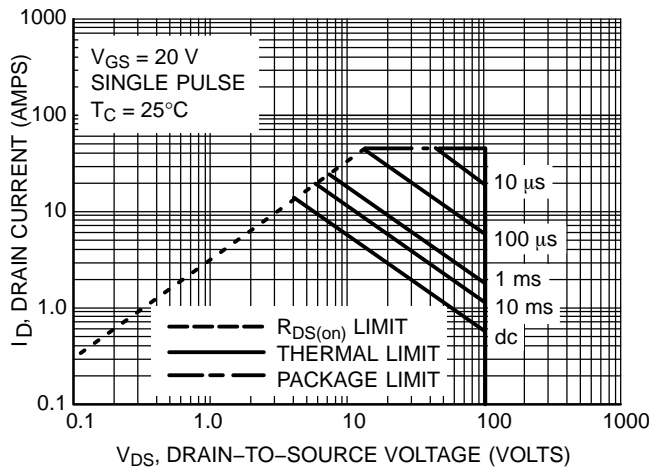


Figure 11. Maximum Rated Forward Biased Safe Operating Area

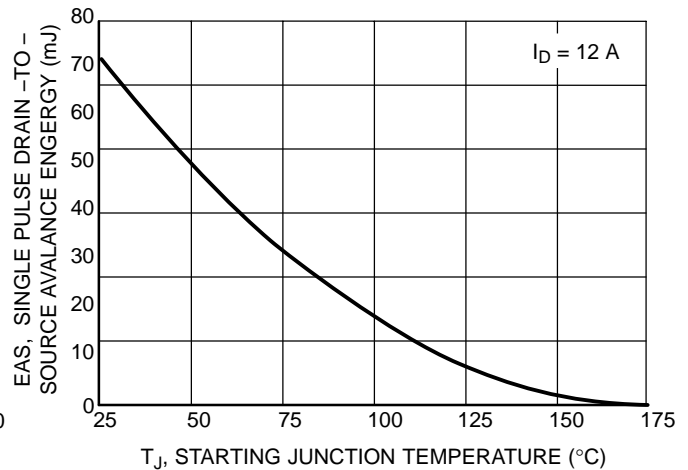
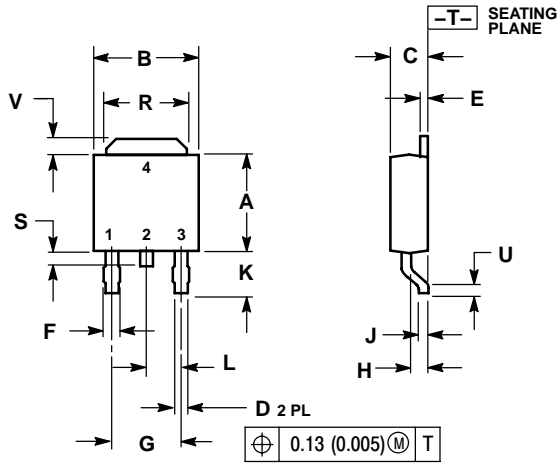


Figure 12. Maximum Avalanche Energy versus Starting Junction Temperature

NTD6600N

PACKAGE DIMENSIONS

DPAK
CASE 369C-01
ISSUE O

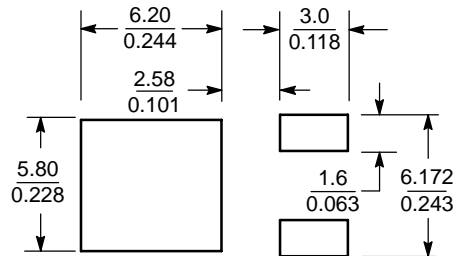


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|------|
| | 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*



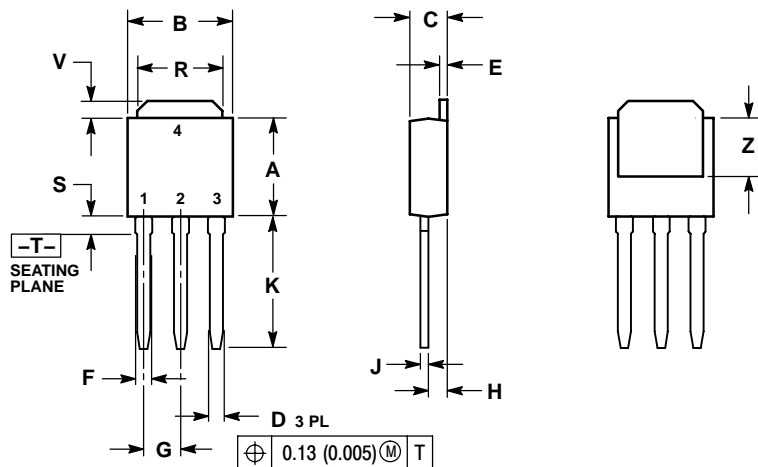
SCALE 3:1 $\left(\frac{\text{mm}}{\text{inches}} \right)$

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

NTD6600N

PACKAGE DIMENSIONS

DPAK-3 CASE 369D-01 ISSUE B



NOTES:

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

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|------|
| | 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
- DRAIN
- SOURCE
- DRAIN

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