



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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NTB6411AN, NTP6411AN

N-Channel Power MOSFET 100 V, 77 A, 14 mΩ

Features

- Low $R_{DS(on)}$
- High Current Capability
- 100% Avalanche Tested
- These are Pb-Free Devices

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ Unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|---|----------------|---------------------------|------------------|
| Drain-to-Source Voltage | V_{DS} | 100 | V |
| Gate-to-Source Voltage – Continuous | V_{GS} | ± 20 | V |
| Continuous Drain Current $R_{\theta JC}$ | I_D | $T_C = 25^\circ\text{C}$ | A |
| | | $T_C = 100^\circ\text{C}$ | |
| Power Dissipation $R_{\theta JC}$ | P_D | 217 | W |
| Pulsed Drain Current | I_{DM} | 285 | A |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | -55 to $+175$ | $^\circ\text{C}$ |
| Source Current (Body Diode) | I_S | 77 | A |
| Single Pulse Drain-to-Source Avalanche Energy ($V_{DD} = 50$ Vdc, $V_{GS} = 10$ Vdc, $I_{L(pk)} = 56$ A, $L = 0.3$ mH, $R_G = 25$ Ω) | E_{AS} | 470 | mJ |
| Lead Temperature for Soldering Purposes, 1/8" from Case for 10 Seconds | T_L | 260 | $^\circ\text{C}$ |

THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Max | Unit |
|---------------------------------------|-----------------|------|--------------------|
| Junction-to-Case (Drain) Steady State | $R_{\theta JC}$ | 0.69 | $^\circ\text{C/W}$ |
| Junction-to-Ambient (Note 1) | $R_{\theta JA}$ | 33 | |

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.

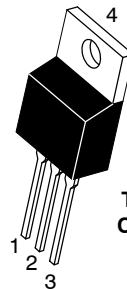
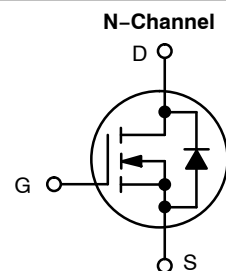
1. Surface mounted on FR4 board using 1 sq in pad size, (Cu Area 1.127 sq in [2 oz] including traces).



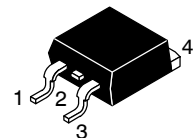
ON Semiconductor®

<http://onsemi.com>

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ MAX | I_D MAX (Note 1) |
|---------------|------------------|--------------------|
| 100 V | 14 mΩ @ 10 V | 77 A |

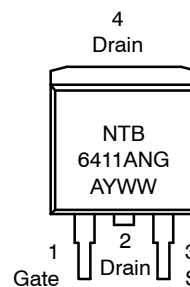
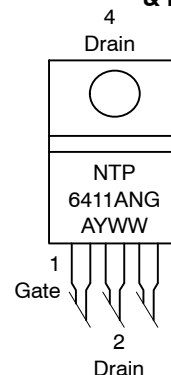


TO-220AB
CASE 221A
STYLE 5



D2PAK
CASE 418B
STYLE 2

MARKING DIAGRAM & PIN ASSIGNMENT



6411AN = Specific Device Code
G = Pb-Free Device
A = Assembly Location
Y = Year
WW = Work Week

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

NTB6411AN, NTP6411AN

ELECTRICAL CHARACTERISTICS (T_J = 25°C Unless otherwise specified)

| Characteristics | Symbol | Test Condition | Min | Typ | Max | Unit |
|-----------------|--------|----------------|-----|-----|-----|------|
|-----------------|--------|----------------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | | |
|---|--------------------------------------|---|------------------------|-----|------|-------|
| Drain-to-Source Breakdown Voltage | V _{(BR)DSS} | V _{GS} = 0 V, I _D = 250 μA | 100 | | | V |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | V _{(BR)DSS} /T _J | | | 113 | | mV/°C |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{GS} = 0 V, V _{DS} = 100 V | T _J = 25°C | | 1.0 | μA |
| | | | T _J = 125°C | | 100 | |
| Gate-to-Source Leakage Current | I _{GSS} | V _{DS} = 0 V, V _{GS} = ±20 V | | | ±100 | nA |

ON CHARACTERISTICS (Note 2)

| | | | | | | |
|--|-------------------------------------|---|-----|------|-----|-------|
| Gate Threshold Voltage | V _{GS(th)} | V _{GS} = V _{DS} , I _D = 250 μA | 2.0 | | 4.0 | V |
| Negative Threshold Temperature Coefficient | V _{GS(th)} /T _J | | | 8.6 | | mV/°C |
| Drain-to-Source On-Resistance | R _{DS(on)} | V _{GS} = 10 V, I _D = 72 A | | 12.7 | 14 | mΩ |
| Forward Transconductance | g _{FS} | V _{DS} = 5 V, I _D = 10 A | | 24 | | S |

CHARGES, CAPACITANCES & GATE RESISTANCE

| | | | | | | |
|------------------------------|---------------------|--|--|------|--|----|
| Input Capacitance | C _{iss} | V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz | | 3700 | | pF |
| Output Capacitance | C _{oss} | | | 550 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 200 | | |
| Total Gate Charge | Q _{G(TOT)} | V _{GS} = 10 V, V _{DS} = 80 V, I _D = 72 A | | 100 | | nC |
| Threshold Gate Charge | Q _{G(TH)} | | | 4.0 | | |
| Gate-to-Source Charge | Q _{GS} | | | 16 | | |
| Gate-to-Drain Charge | Q _{GD} | | | 47 | | |
| Plateau Voltage | V _{GP} | | | 5.2 | | V |
| Gate Resistance | R _G | | | 3.1 | | Ω |

SWITCHING CHARACTERISTICS, V_{GS} = 10 V (Note 3)

| | | | | | | |
|---------------------|---------------------|--|--|-----|--|----|
| Turn-On Delay Time | t _{d(on)} | V _{GS} = 10 V, V _{DD} = 80 V, I _D = 72 A, R _G = 6.2 Ω | | 16 | | ns |
| Rise Time | t _r | | | 144 | | |
| Turn-Off Delay Time | t _{d(off)} | | | 107 | | |
| Fall Time | t _f | | | 157 | | |

DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | | |
|-------------------------|-----------------|---|------------------------|-----|------|-----|---|
| Forward Diode Voltage | V _{SD} | I _S = 72 A | T _J = 25°C | | 0.92 | 1.3 | V |
| | | | T _J = 125°C | | 0.86 | | |
| Reverse Recovery Time | t _{rr} | V _{GS} = 0 V, I _S = 72 A, di _S /dt = 100 A/μs | | 94 | | ns | |
| Charge Time | t _a | | | 64 | | | |
| Discharge Time | t _b | | | 30 | | | |
| Reverse Recovery Charge | Q _{RR} | | | 330 | | nC | |

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

3. Switching characteristics are independent of operating junction temperatures.

NTB6411AN, NTP6411AN

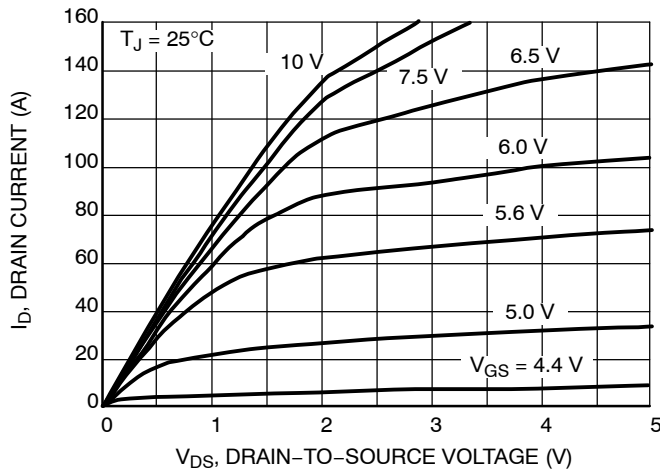


Figure 1. On-Region Characteristics

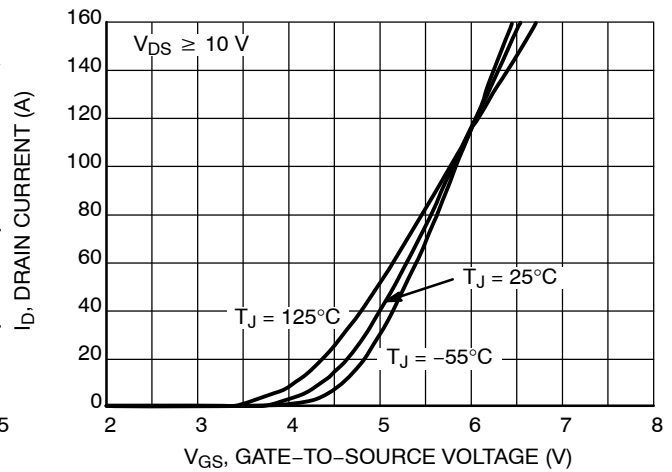


Figure 2. Transfer Characteristics

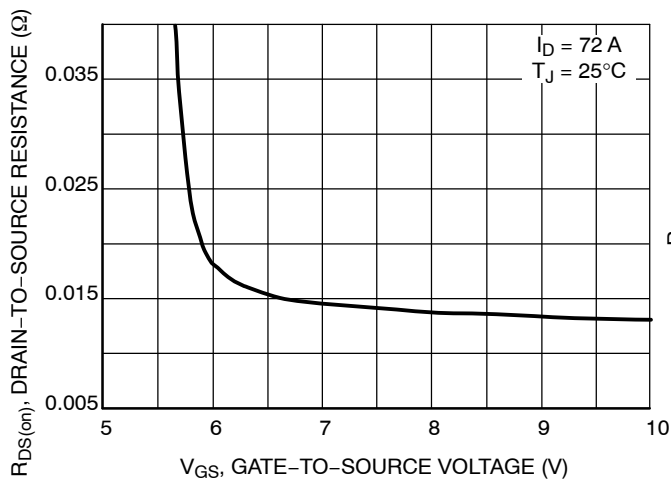


Figure 3. On-Region versus Gate Voltage

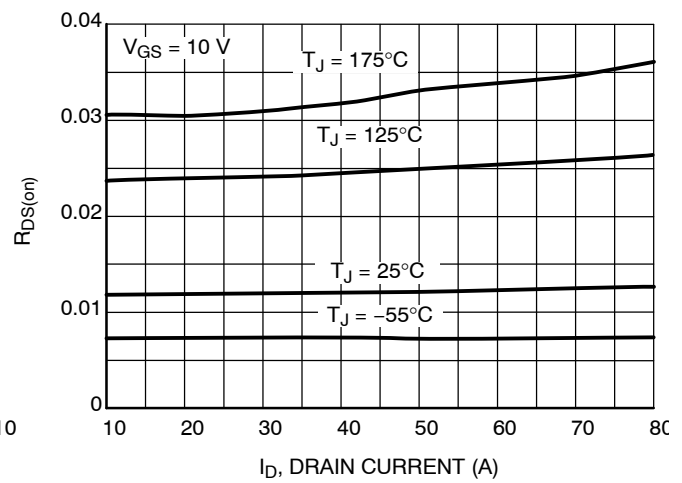


Figure 4. On-Resistance versus Drain Current and Temperature

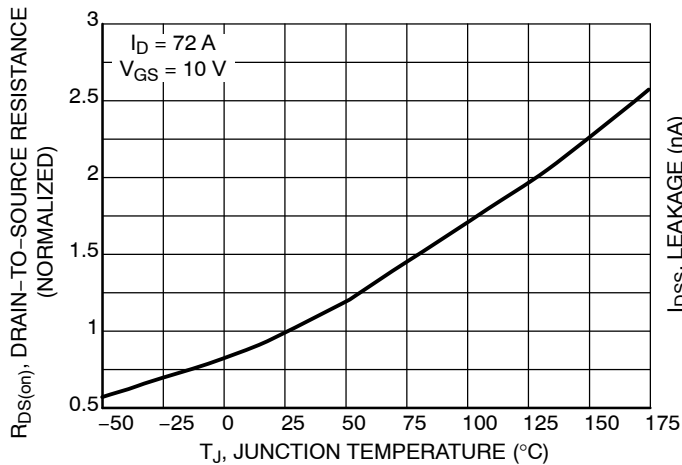


Figure 5. On-Resistance Variation with Temperature

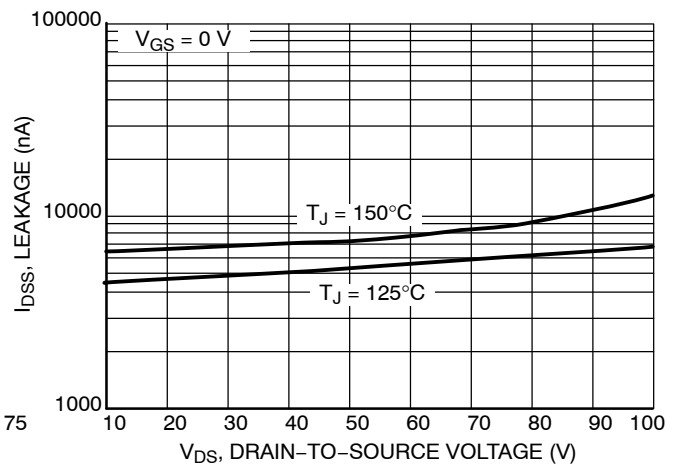


Figure 6. Drain-to-Source Leakage Current versus Voltage

NTB6411AN, NTP6411AN

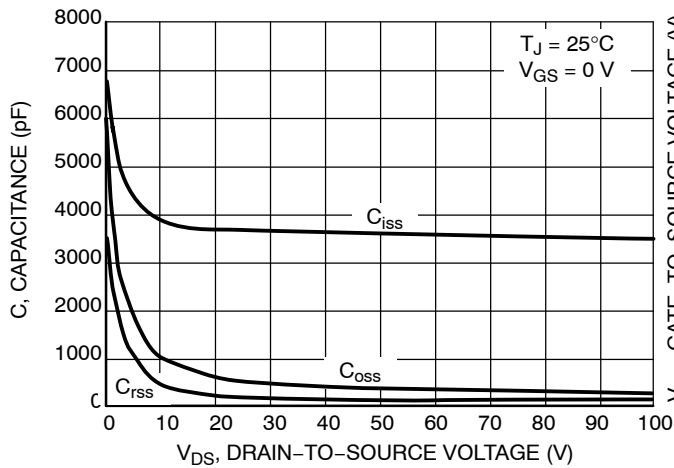


Figure 7. Capacitance Variation

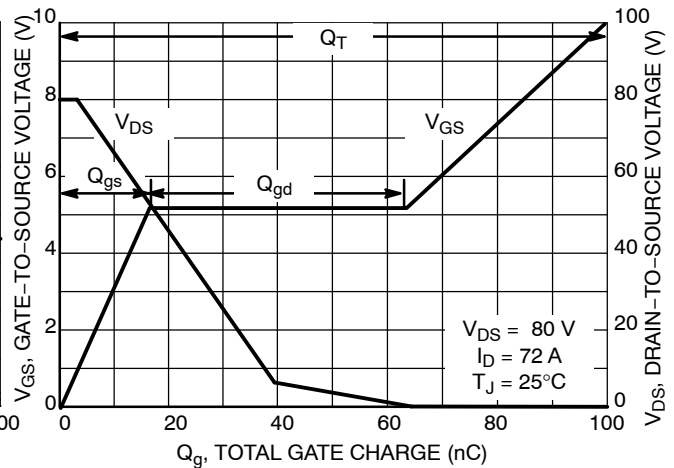


Figure 8. Gate-to-Source Voltage and Drain-to-Source Voltage versus Total Charge

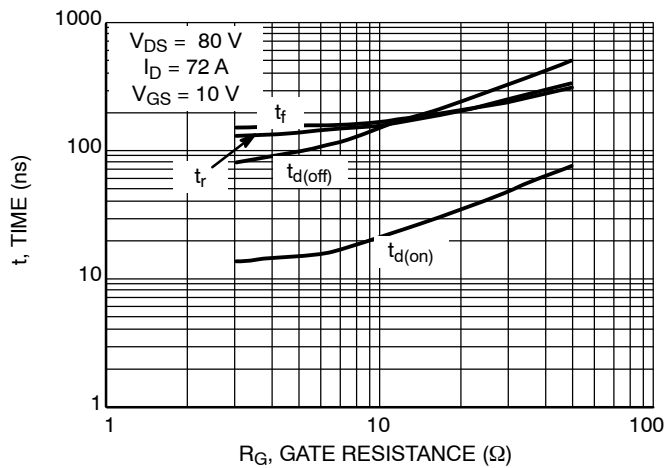


Figure 9. Resistive Switching Time Variation versus Gate Resistance

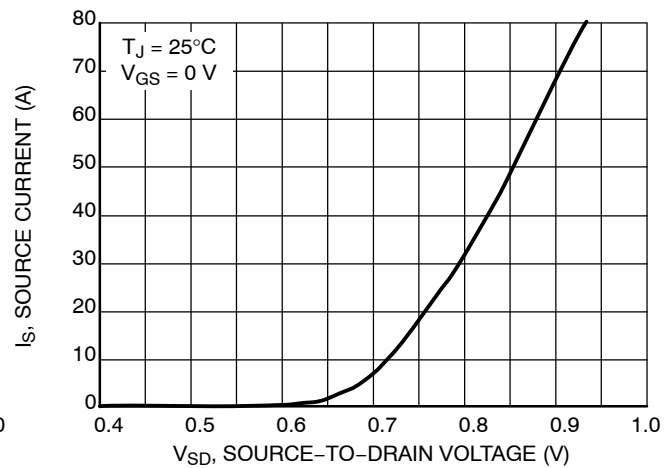


Figure 10. Diode Forward Voltage versus Current

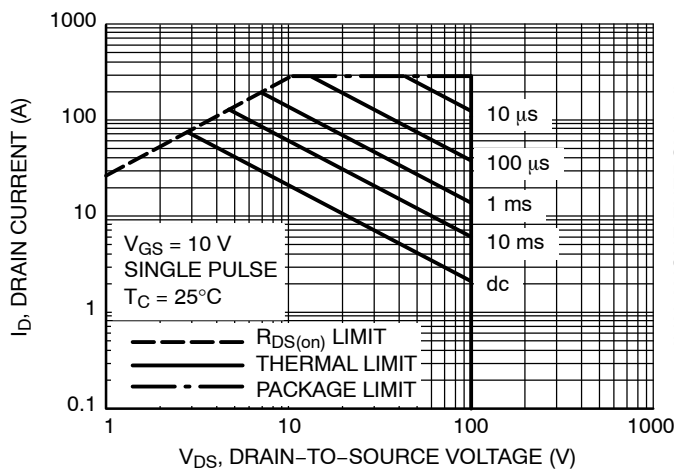


Figure 11. Maximum Rated Forward Biased Safe Operating Area

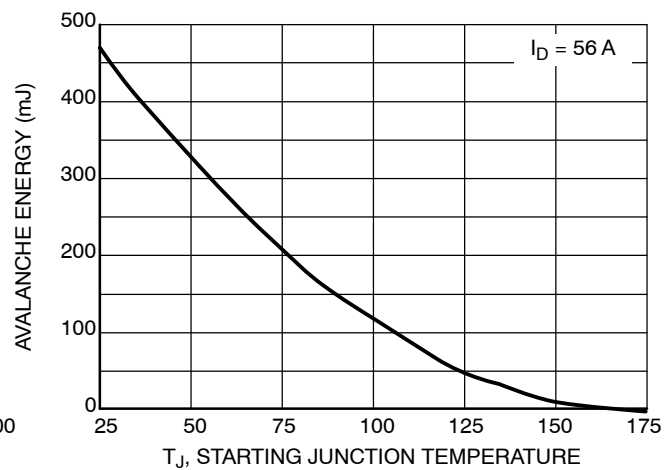


Figure 12. Maximum Avalanche Energy versus Starting Junction Temperature

NTB6411AN, NTP6411AN

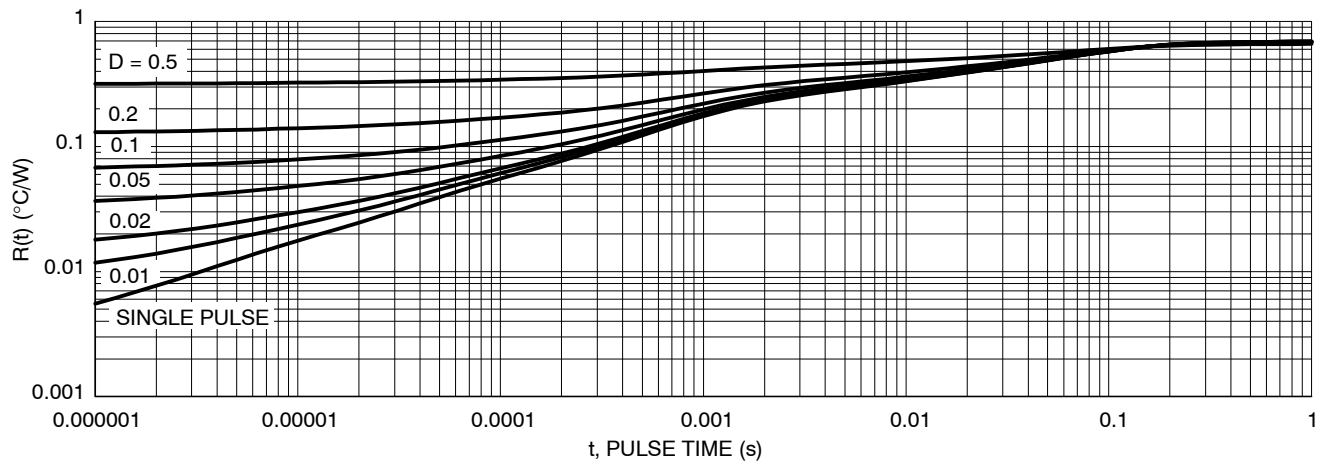


Figure 13. Thermal Response

ORDERING INFORMATION

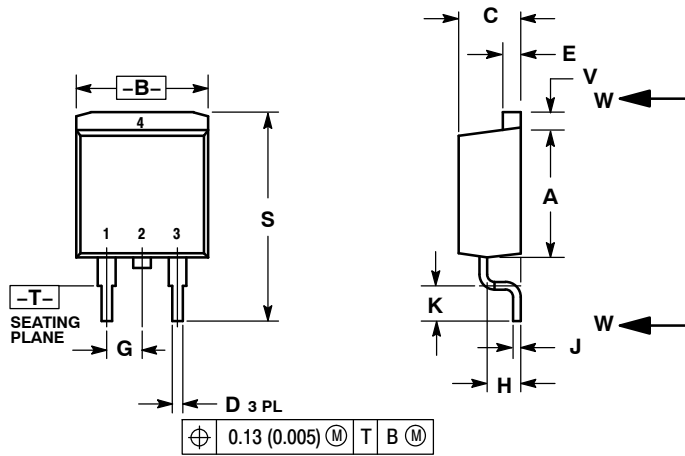
| Device | Package | Shipping [†] |
|--------------|---------------------------------|-----------------------|
| NTB6411ANG | D ² PAK (Pb-Free) | 50 Units / Rail |
| NTB6411ANT4G | D ² PAK (Pb-Free) | 800 / Tape & Reel |
| NTP6411ANG | TO-220 (Pb-Free) | 50 Units / Rail |

[†]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.

NTB6411AN, NTP6411AN

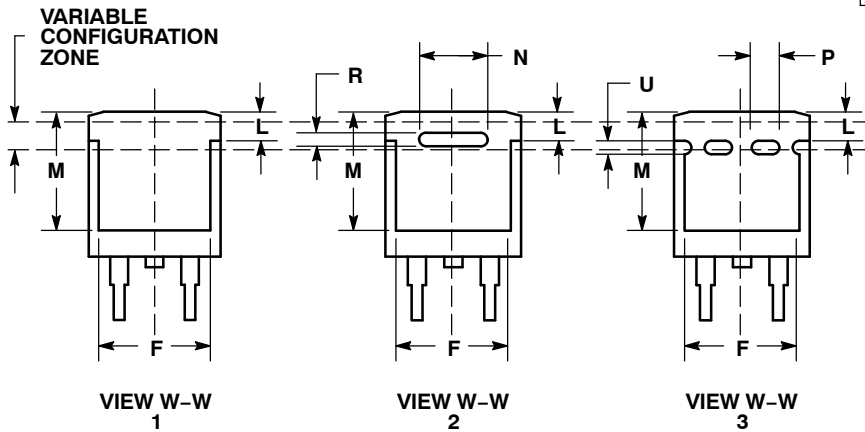
PACKAGE DIMENSIONS

D²PAK 3
CASE 418B-04
ISSUE K



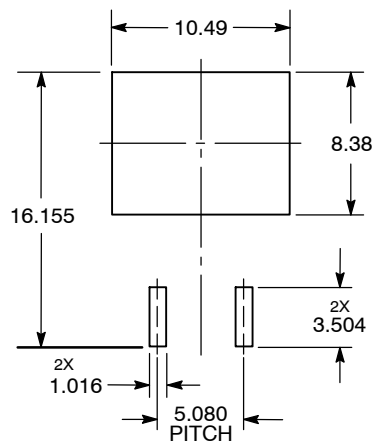
- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. 418B-01 THRU 418B-03 OBSOLETE, NEW STANDARD 418B-04.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.340 | 0.380 | 8.64 | 9.65 |
| B | 0.380 | 0.405 | 9.65 | 10.29 |
| C | 0.160 | 0.190 | 4.06 | 4.83 |
| D | 0.020 | 0.035 | 0.51 | 0.89 |
| E | 0.045 | 0.055 | 1.14 | 1.40 |
| F | 0.310 | 0.350 | 7.87 | 8.89 |
| G | 0.100 BSC | | 2.54 BSC | |
| H | 0.080 | 0.110 | 2.03 | 2.79 |
| J | 0.018 | 0.025 | 0.46 | 0.64 |
| K | 0.090 | 0.110 | 2.29 | 2.79 |
| L | 0.052 | 0.072 | 1.32 | 1.83 |
| M | 0.280 | 0.320 | 7.11 | 8.13 |
| N | 0.197 REF | | 5.00 REF | |
| P | 0.079 REF | | 2.00 REF | |
| R | 0.039 REF | | 0.99 REF | |
| S | 0.575 | 0.625 | 14.60 | 15.88 |
| V | 0.045 | 0.055 | 1.14 | 1.40 |



- STYLE 2:
- PIN 1. GATE
 - DRAIN
 - SOURCE
 - DRAIN

SOLDERING FOOTPRINT*



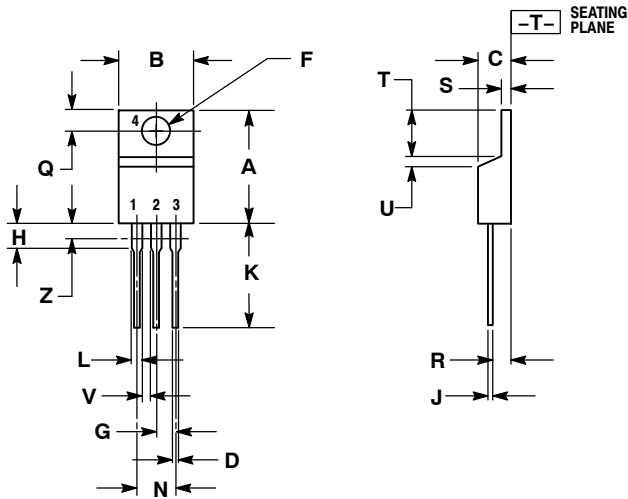
DIMENSIONS: MILLIMETERS

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

NTB6411AN, NTP6411AN

PACKAGE DIMENSIONS

TO-220
CASE 221A-09
ISSUE AF




NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.570 | 0.620 | 14.48 | 15.75 |
| B | 0.380 | 0.405 | 9.66 | 10.28 |
| C | 0.160 | 0.190 | 4.07 | 4.82 |
| D | 0.025 | 0.035 | 0.64 | 0.88 |
| F | 0.142 | 0.161 | 3.61 | 4.09 |
| G | 0.095 | 0.105 | 2.42 | 2.66 |
| H | 0.110 | 0.155 | 2.80 | 3.93 |
| J | 0.014 | 0.025 | 0.36 | 0.64 |
| K | 0.500 | 0.562 | 12.70 | 14.27 |
| L | 0.045 | 0.060 | 1.15 | 1.52 |
| N | 0.190 | 0.210 | 4.83 | 5.33 |
| Q | 0.100 | 0.120 | 2.54 | 3.04 |
| R | 0.080 | 0.110 | 2.04 | 2.79 |
| S | 0.045 | 0.055 | 1.15 | 1.39 |
| T | 0.235 | 0.255 | 5.97 | 6.47 |
| U | 0.000 | 0.050 | 0.00 | 1.27 |
| V | 0.045 | --- | 1.15 | --- |
| Z | --- | 0.080 | --- | 2.04 |

STYLE 5:

- PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

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