

NTD3055-150, NVD3055-150

MOSFET – Power, N-Channel, DPAK/IPAK 9.0 A, 60 V

Designed for low voltage, high speed switching applications in power supplies, converters and power motor controls and bridge circuits.

Features

- NVD Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

Typical Applications

- Power Supplies
- Converters
- Power Motor Controls
- Bridge Circuits

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

| Rating | Symbol | Value | Unit |
|--|-----------------------------------|------------|------|
| Drain-to-Source Voltage | V _{DSS} | 60 | Vdc |
| Drain-to-Gate Voltage (R _{GS} = 10 MΩ) | V _{DGR} | 60 | Vdc |
| Gate-to-Source Voltage | V _{GS} | ±20 | Vdc |
| – Continuous | V _{GS} | ±30 | Vdc |
| – Non-repetitive (t _p ≤ 10 ms) | | | |
| Drain Current | I _D | 9.0 | Adc |
| – Continuous @ T _A = 25°C | I _D | 3.0 | |
| – Continuous @ T _A = 100°C | I _{DM} | 27 | Apk |
| – Single Pulse (t _p ≤ 10 μs) | | | |
| Total Power Dissipation @ T _A = 25°C | P _D | 28.8 | W |
| Derate above 25°C | | 0.19 | W/°C |
| Total Power Dissipation @ T _A = 25°C (Note 1) | | 2.1 | W |
| Total Power Dissipation @ T _A = 25°C (Note 2) | | 1.5 | 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} = 25 Vdc, V _{GS} = 10 Vdc, L = 1.0 mH, I _{L(pk)} = 7.75 A, V _{DS} = 60 Vdc) | E _{AS} | 30 | mJ |
| Thermal Resistance | R _{θJC} | 5.2 | °C/W |
| – Junction-to-Case | R _{θJA} | 71.4 | |
| – Junction-to-Ambient (Note 1) | R _{θJA} | 100 | |
| – Junction-to-Ambient (Note 2) | | | |
| Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds | T _L | 260 | °C |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

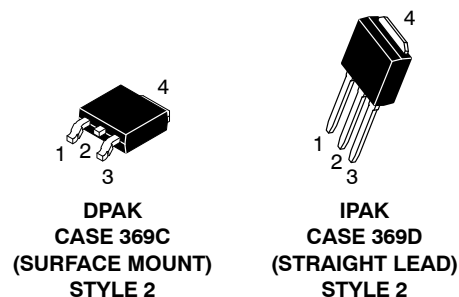
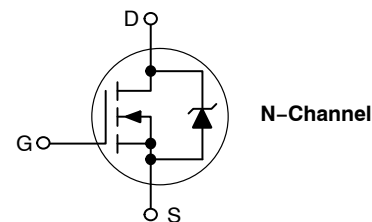
1. When surface mounted to an FR4 board using 0.5 sq in pad size.
2. When surface mounted to an FR4 board using minimum recommended pad size.



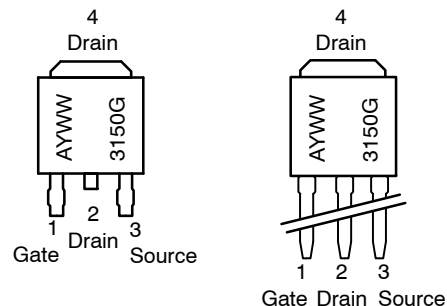
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9.0 AMPERES, 60 VOLTS
R_{DS(on)} = 122 mΩ (Typ)



MARKING DIAGRAMS & PIN ASSIGNMENTS



A = Assembly Location*
3150 = Device Code
Y = Year
WW = Work Week
G = Pb-Free Package

* The Assembly Location code (A) is front side optional. In cases where the Assembly Location is stamped in the package, the front side assembly code may be blank.

ORDERING INFORMATION

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

NTD3055-150, NVD3055-150

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|----------------------|---------|-----------|-----------|--------------|
| OFF CHARACTERISTICS | | | | | |
| Drain-to-Source Breakdown Voltage (Note 3) (V _{GS} = 0 Vdc, I _D = 250 μAdc) Temperature Coefficient (Positive) | V _{(BR)DSS} | 60 - | - 70.2 | - - | Vdc mV/°C |
| Zero Gate Voltage Drain Current (V _{DS} = 60 Vdc, V _{GS} = 0 Vdc) (V _{DS} = 60 Vdc, V _{GS} = 0 Vdc, T _J = 150°C) | I _{DSS} | - - | - - | 1.0 10 | μAdc |
| Gate-Body Leakage Current (V _{GS} = ±20 Vdc, V _{DS} = 0 Vdc) | I _{GSS} | - | - | ±100 | nAdc |

ON CHARACTERISTICS (Note 3)

| | | | | | |
|--|---------------------|----------|------------|----------|--------------|
| Gate Threshold Voltage (Note 3) (V _{DS} = V _{GS} , I _D = 250 μAdc) Threshold Temperature Coefficient (Negative) | V _{GS(th)} | 2.0 - | 3.0 6.4 | 4.0 - | Vdc mV/°C |
| Static Drain-to-Source On-Resistance (Note 3) (V _{GS} = 10 Vdc, I _D = 4.5 Adc) | R _{DS(on)} | - | 122 | 150 | mΩ |
| Static Drain-to-Source On-Voltage (Note 3) (V _{GS} = 10 Vdc, I _D = 9.0 Adc) (V _{GS} = 10 Vdc, I _D = 4.5 Adc, T _J = 150°C) | V _{DS(on)} | - - | 1.4 1.1 | 1.9 - | Vdc |
| Forward Transconductance (Note 3) (V _{DS} = 7.0 Vdc, I _D = 6.0 Adc) | g _{FS} | - | 5.4 | - | mhos |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|----------------------|---|------------------|---|-----|-----|----|
| Input Capacitance | (V _{DS} = 25 Vdc, V _{GS} = 0 Vdc, f = 1.0 MHz) | C _{iss} | - | 200 | 280 | pF |
| Output Capacitance | | C _{oss} | - | 70 | 100 | |
| Transfer Capacitance | | C _{rss} | - | 26 | 40 | |

SWITCHING CHARACTERISTICS (Note 4)

| | | | | | | |
|---------------------|---|---------------------|---|------|----|----|
| Turn-On Delay Time | (V _{DD} = 48 Vdc, I _D = 9.0 Adc, V _{GS} = 10 Vdc, R _G = 9.1 Ω) (Note 3) | t _{d(on)} | - | 11.2 | 25 | ns |
| Rise Time | | t _r | - | 37.1 | 80 | |
| Turn-Off Delay Time | | t _{d(off)} | - | 12.2 | 25 | |
| Fall Time | | t _f | - | 23 | 50 | |
| Gate Charge | (V _{DS} = 48 Vdc, I _D = 9.0 Adc, V _{GS} = 10 Vdc) (Note 3) | Q _T | - | 7.1 | 15 | nC |
| | | Q ₁ | - | 1.7 | - | |
| | | Q ₂ | - | 3.5 | - | |

SOURCE-DRAIN DIODE CHARACTERISTICS

| | | | | | | |
|--------------------------------|---|-----------------|--------|--------------|-----------|-----|
| Forward On-Voltage | (I _S = 9.0 Adc, V _{GS} = 0 Vdc) (Note 3) (I _S = 19 Adc, V _{GS} = 0 Vdc, T _J = 150°C) | V _{SD} | - - | 0.98 0.86 | 1.20 - | Vdc |
| Reverse Recovery Time | (I _S = 9.0 Adc, V _{GS} = 0 Vdc, di _S /dt = 100 A/μs) (Note 3) | t _{rr} | - | 28.9 | - | ns |
| | | t _a | - | 21.6 | - | |
| | | t _b | - | 7.3 | - | |
| Reverse Recovery Stored Charge | | Q _{RR} | - | 0.036 | - | μC |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

4. Switching characteristics are independent of operating junction temperatures.

NTD3055-150, NVD3055-150

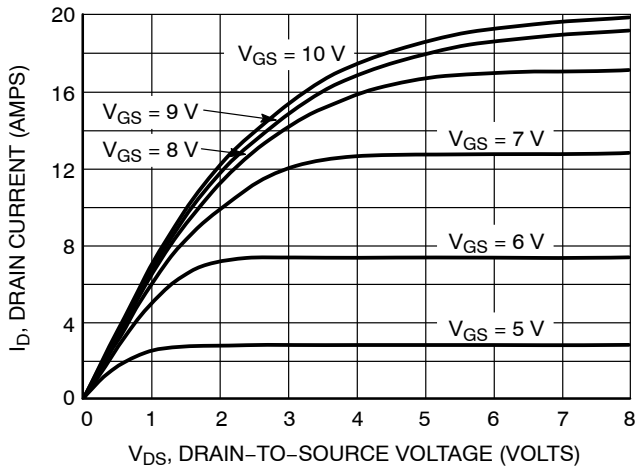


Figure 1. On-Region Characteristics

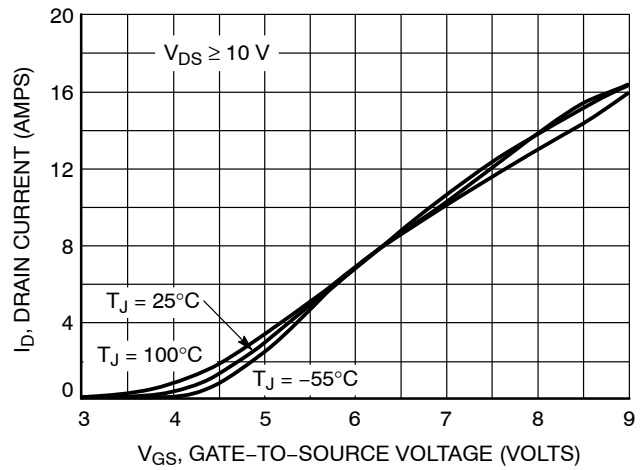


Figure 2. Transfer Characteristics

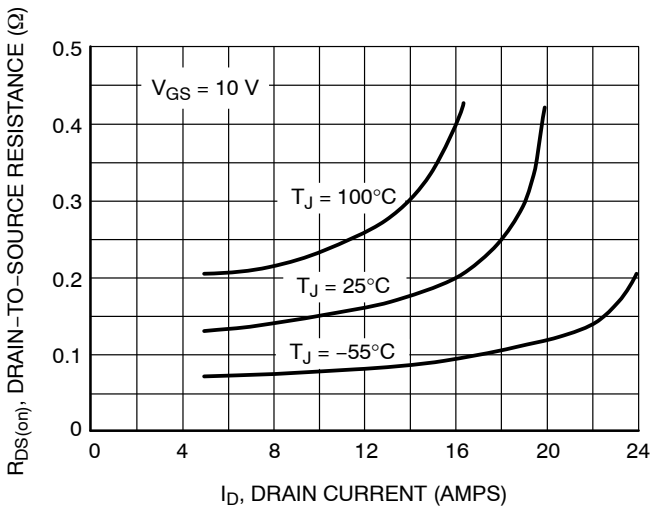


Figure 3. On-Resistance versus Gate-To-Source Voltage

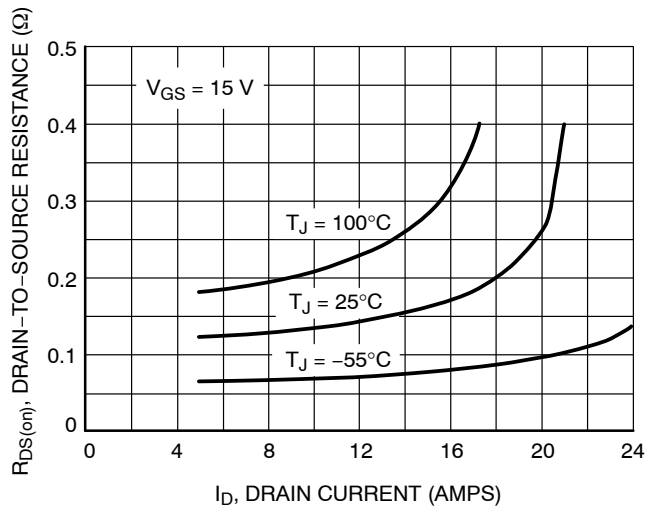


Figure 4. On-Resistance versus Drain Current and Gate Voltage

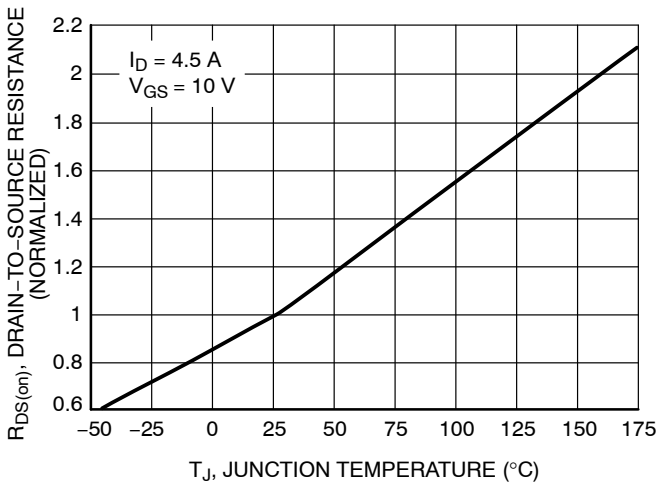


Figure 5. On-Resistance Variation with Temperature

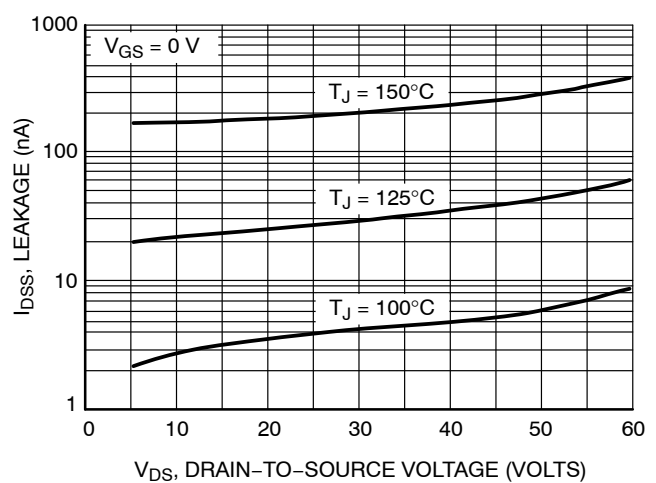


Figure 6. Drain-To-Source Leakage Current versus Voltage

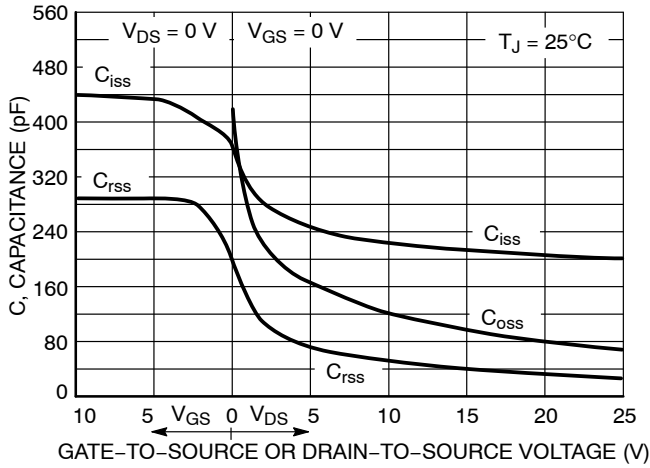


Figure 7. Capacitance Variation

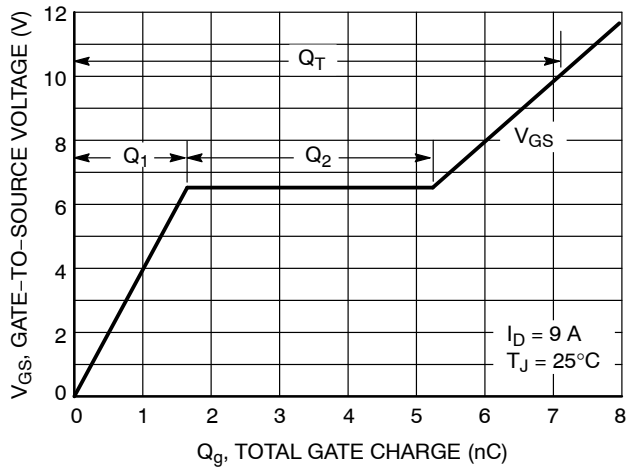


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

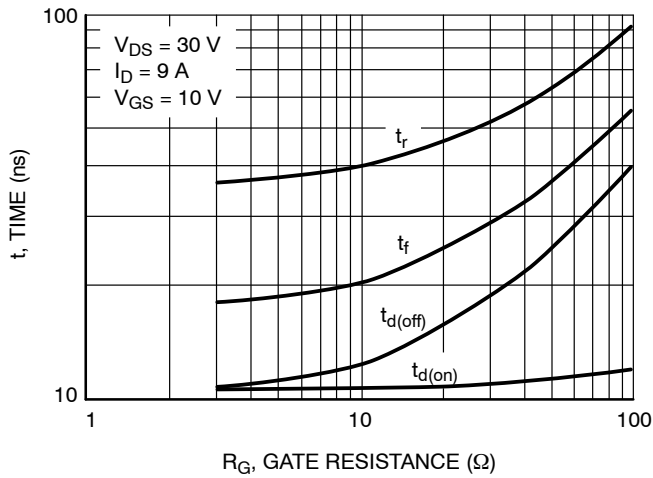


Figure 9. Resistive Switching Time Variation versus Gate Resistance

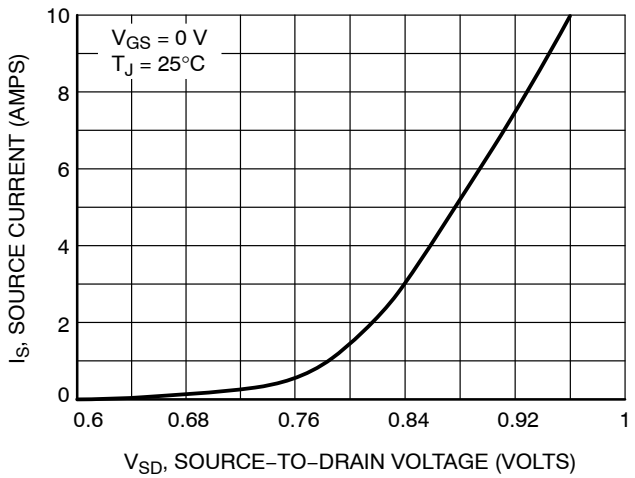


Figure 10. Diode Forward Voltage versus Current

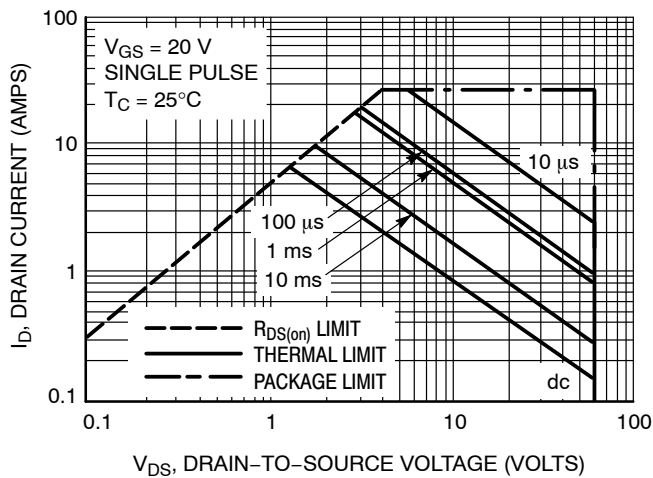


Figure 11. Maximum Rated Forward Biased Safe Operating Area

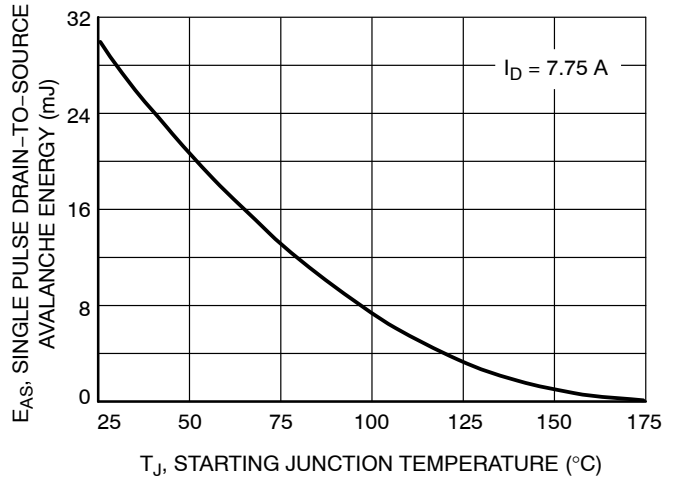


Figure 12. Maximum Avalanche Energy versus Starting Junction Temperature

NTD3055-150, NVD3055-150

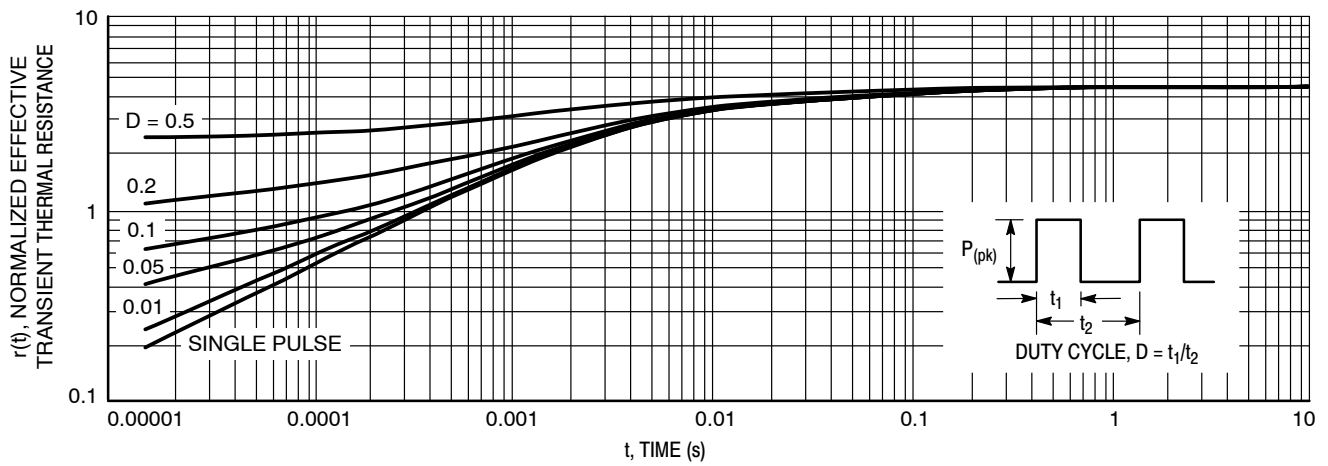


Figure 13. Thermal Response

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|---------------------|-----------------------|-----------------------|
| NTD3055-150G | DPAK (Pb-Free) | 75 Units / Rail |
| NTD3055-150-1G | IPAK (Pb-Free) | 75 Units / Rail |
| NTD3055-150T4G | DPAK (Pb-Free) | 2500 / Tape & Reel |
| NTD3055-150T4H | DPAK (Halide-Free) | 2500 / Tape & Reel |
| NVD3055-150T4G* | DPAK (Pb-Free) | 2500 / Tape & Reel |
| NVD3055-150T4G-VF01 | DPAK (Pb-Free) | 2500 / Tape & Reel |

[†]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.

*NVD Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

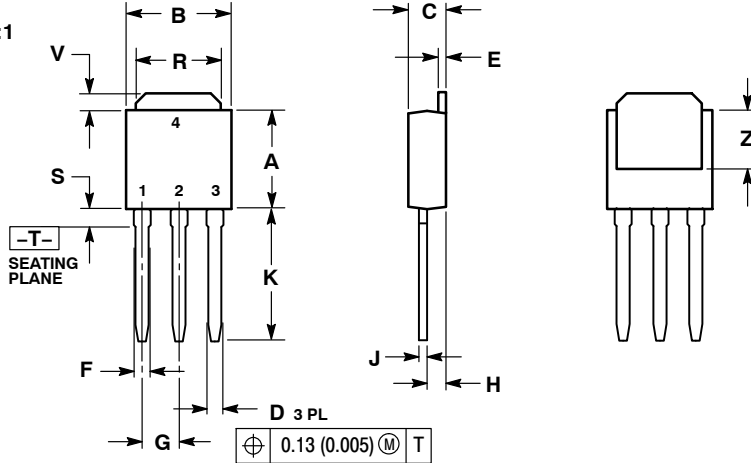
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IPAK CASE 369D-01 ISSUE C

DATE 15 DEC 2010

SCALE 1:1



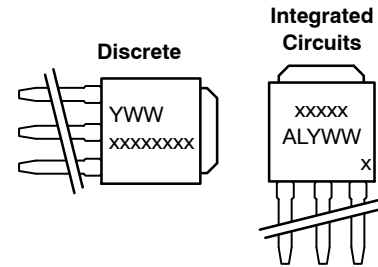
NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- 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 | --- |

MARKING DIAGRAMS

- | | | | |
|--|---|--|--|
| <p>STYLE 1: PIN 1. BASE 2. COLLECTOR 3. EMITTER 4. COLLECTOR</p> | <p>STYLE 2: PIN 1. GATE 2. DRAIN 3. SOURCE 4. DRAIN</p> | <p>STYLE 3: PIN 1. ANODE 2. CATHODE 3. ANODE 4. CATHODE</p> | <p>STYLE 4: PIN 1. CATHODE 2. ANODE 3. GATE 4. ANODE</p> |
| <p>STYLE 5: PIN 1. GATE 2. ANODE 3. CATHODE 4. ANODE</p> | <p>STYLE 6: PIN 1. MT1 2. MT2 3. GATE 4. MT2</p> | <p>STYLE 7: PIN 1. GATE 2. COLLECTOR 3. EMITTER 4. COLLECTOR</p> | |



- xxxxxxxxx = Device Code
- A = Assembly Location
- IL = Wafer Lot
- Y = Year
- WW = Work Week

| | | |
|-------------------------|------------------------------------|--|
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| DESCRIPTION: | IPAK (DPAK INSERTION MOUNT) | PAGE 1 OF 1 |

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MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS



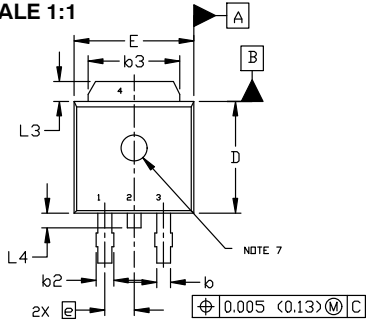
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CASE 369C

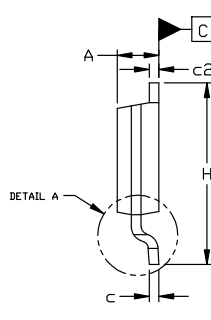
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SCALE 1:1



TOP VIEW

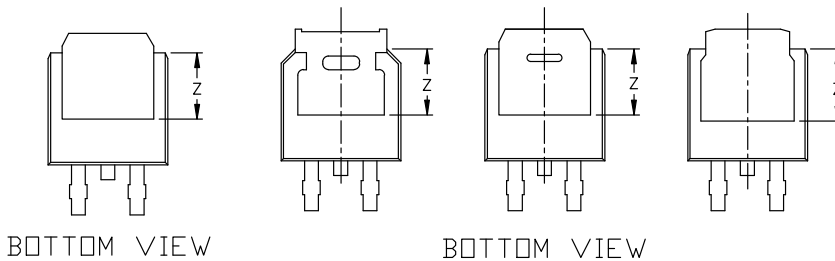


SIDE VIEW

NOTES:

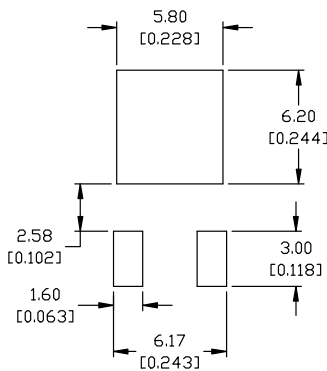
1. DIMENSIONING AND TOLERANCING ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3, AND Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.
7. OPTIONAL MOLD FEATURE.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 0.086 | 0.094 | 2.18 | 2.38 |
| A1 | 0.000 | 0.005 | 0.00 | 0.13 |
| b | 0.025 | 0.035 | 0.63 | 0.89 |
| b2 | 0.028 | 0.045 | 0.72 | 1.14 |
| b3 | 0.180 | 0.215 | 4.57 | 5.46 |
| c | 0.018 | 0.024 | 0.46 | 0.61 |
| c2 | 0.018 | 0.024 | 0.46 | 0.61 |
| D | 0.235 | 0.245 | 5.97 | 6.22 |
| E | 0.250 | 0.265 | 6.35 | 6.73 |
| e | 0.090 BSC | | 2.29 BSC | |
| H | 0.370 | 0.410 | 9.40 | 10.41 |
| L | 0.055 | 0.070 | 1.40 | 1.78 |
| L1 | 0.114 REF | | 2.90 REF | |
| L2 | 0.020 BSC | | 0.51 BSC | |
| L3 | 0.035 | 0.050 | 0.89 | 1.27 |
| L4 | ---- | 0.040 | --- | 1.01 |
| Z | 0.155 | ---- | 3.93 | --- |



BOTTOM VIEW

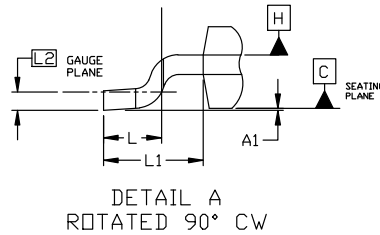
ALTERNATE CONSTRUCTIONS



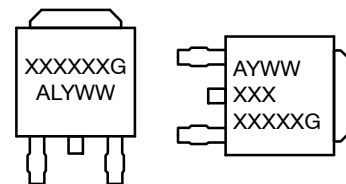
RECOMMENDED MOUNTING FOOTPRINT*

*FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

- STYLE 1: PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR
- STYLE 2: PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN
- STYLE 3: PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE
- STYLE 4: PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE
- STYLE 5: PIN 1. GATE
2. ANODE
3. CATHODE
4. ANODE
- STYLE 6: PIN 1. MT1
2. MT2
3. GATE
4. MT2
- STYLE 7: PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR
- STYLE 8: PIN 1. N/C
2. CATHODE
3. ANODE
4. CATHODE
- STYLE 9: PIN 1. ANODE
2. CATHODE
3. RESISTOR ADJUST
4. CATHODE
- STYLE 10: PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE



GENERIC MARKING DIAGRAM*



- IC Discrete
- XXXXXX = Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
WW = Work Week
G = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

| | | |
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