

NTD32N06L

Power MOSFET 32 Amps, 60 Volts Logic Level, N-Channel DPAK

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

Features

- Smaller Package than MTB30N06VL
- Lower $R_{DS(on)}$, $V_{DS(on)}$, and Total Gate Charge
- Lower and Tighter V_{SD}
- Lower Diode Reverse Recovery Time
- Lower Reverse Recovery Stored Charge
- Pb-Free Packages are Available

Typical Applications

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

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

| Rating | Symbol | Value | Unit |
|---|---|----------------------|--------------------------|
| Drain-to-Source Voltage | V_{DS} | 60 | Vdc |
| Drain-to-Gate Voltage ($R_{GS} = 10\text{ M}\Omega$) | V_{DGR} | 60 | Vdc |
| Gate-to-Source Voltage - Continuous - Non-Repetitive ($t_p \leq 10\text{ ms}$) | V_{GS} V_{GS} | ± 20 ± 30 | Vdc |
| Drain Current - Continuous @ $T_A = 25^\circ\text{C}$ - Continuous @ $T_A = 100^\circ\text{C}$ - Single Pulse ($t_p \leq 10\text{ }\mu\text{s}$) | I_D I_D I_{DM} | 32 22 90 | Adc Adc Apk |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 93.75 0.625 | W W/ $^\circ\text{C}$ |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 1) | | 2.88 | W |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 2) | | 1.5 | W |
| Operating and Storage Temperature Range | T_J, T_{stg} | -55 to +175 | $^\circ\text{C}$ |
| Single Pulse Drain-to-Source Avalanche Energy - Starting $T_J = 25^\circ\text{C}$ (Note 3) ($V_{DD} = 50\text{ Vdc}$, $V_{GS} = 5\text{ Vdc}$, $L = 1.0\text{ mH}$, $I_{L(pk)} = 25\text{ A}$, $V_{DS} = 60\text{ Vdc}$, $R_G = 25\text{ }\Omega$) | E_{AS} | 313 | mJ |
| Thermal Resistance - Junction-to-Case - Junction-to-Ambient (Note 1) - Junction-to-Ambient (Note 2) | $R_{\theta JC}$ $R_{\theta JA}$ $R_{\theta JA}$ | 1.6 52 100 | $^\circ\text{C/W}$ |
| Maximum Lead Temperature for Soldering Purposes, 1/8 in from case for 10 seconds | 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.

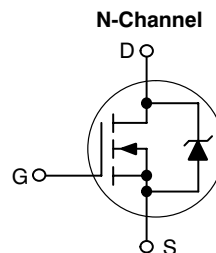
1. When surface mounted to FR4 board using 0.5 in pad size.
2. When surface mounted to FR4 board using minimum recommended pad size.
3. Repetitive rating; pulse width limited by maximum junction temperature.



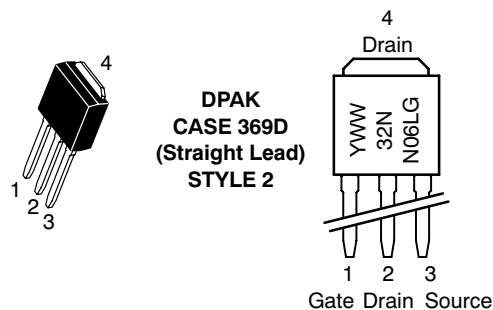
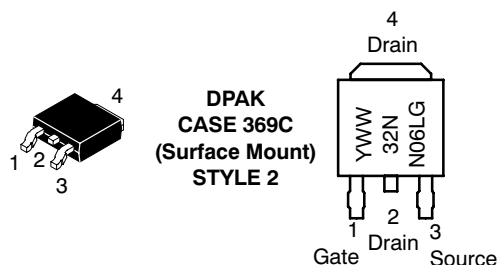
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| V_{DS} | $R_{DS(on)}$ TYP | I_D MAX |
|----------|------------------|-----------|
| 60 V | 23.7 m Ω | 32 A |



MARKING DIAGRAMS & PIN ASSIGNMENTS



Y = Year
WW = Work Week
32N06L = 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.

NTD32N06L

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

| Characteristic | Symbol | Min | Typ | Max | Unit | |
|---|--|---------------------|----------------------|----------------------|---------------|-----|
| OFF CHARACTERISTICS | | | | | | |
| Drain-to-Source Breakdown Voltage (Note 4) (V _{GS} = 0 Vdc, I _D = 250 μAdc) Temperature Coefficient (Positive) | V _{(BR)DSS} | 60 - | 70 62 | - - | 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 4) | | | | | | |
| Gate Threshold Voltage (Note 4) (V _{DS} = V _{GS} , I _D = 250 μAdc) Threshold Temperature Coefficient (Negative) | V _{GS(th)} | 1.0 - | 1.7 4.8 | 2.0 - | Vdc mV/°C | |
| Static Drain-to-Source On-Resistance (Note 4) (V _{GS} = 5 Vdc, I _D = 16 Adc) | R _{DS(on)} | - | 23.7 | 28 | mΩ | |
| Static Drain-to-Source On-Resistance (Note 4) (V _{GS} = 5 Vdc, I _D = 20 Adc) (V _{GS} = 5 Vdc, I _D = 32 Adc) (V _{GS} = 5 Vdc, I _D = 16 Adc, T _J = 150°C) | V _{DS(on)} | - - - | 0.48 0.78 0.61 | 0.67 - - | Vdc | |
| Forward Transconductance (Note 4) (V _{DS} = 6 Vdc, I _D = 16 Adc) | g _{FS} | - | 27 | - | mhos | |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | (V _{DS} = 25 Vdc, V _{GS} = 0 Vdc, f = 1.0 MHz) | C _{iss} | - | 1214 | pF | |
| Output Capacitance | | C _{oss} | - | 343 | | |
| Transfer Capacitance | | C _{rss} | - | 87 | | |
| SWITCHING CHARACTERISTICS (Note 5) | | | | | | |
| Turn-On Delay Time | (V _{DD} = 30 Vdc, I _D = 32 Adc, V _{GS} = 5 Vdc, R _G = 9.1 Ω) (Note 4) | t _{d(on)} | - | 12.8 | ns | |
| Rise Time | | t _r | - | 221 | | |
| Turn-Off Delay Time | | t _{d(off)} | - | 37 | | |
| Fall Time | | t _f | - | 128 | | |
| Gate Charge | (V _{DS} = 48 Vdc, I _D = 32 Adc, V _{GS} = 5 Vdc) (Note 4) | Q _T | - | 23 | nC | |
| | | Q ₁ | - | 4.5 | | |
| | | Q ₂ | - | 14 | | |
| SOURCE-DRAIN DIODE CHARACTERISTICS | | | | | | |
| Forward On-Voltage | (I _S = 20 Adc, V _{GS} = 0 Vdc) (Note 4) (I _S = 32 Adc, V _{GS} = 0 Vdc) (Note 4) (I _S = 20 Adc, V _{GS} = 0 Vdc, T _J = 150°C) | V _{SD} | - - - | 0.89 0.95 0.74 | 1.0 - - | Vdc |
| Reverse Recovery Time | (I _S = 32 Adc, V _{GS} = 0 Vdc, dI _S /dt = 100 A/μs) (Note 4) | t _{rr} | - | 56 | ns | |
| | | t _a | - | 31 | | |
| | | t _b | - | 25 | | |
| Reverse Recovery Stored Charge | | Q _{RR} | - | 0.093 | - | μC |

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

5. Switching characteristics are independent of operating junction temperatures.

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|--------------|-----------------------------------|--------------------------|
| NTD32N06L | DPAK | 75 Units / Rail |
| NTD32N06LG | DPAK (Pb-Free) | 75 Units / Rail |
| NTD32N06L-1 | DPAK (Straight Lead) | 75 Units / Rail |
| NTD32N06L-1G | DPAK (Straight Lead) (Pb-Free) | 75 Units / Rail |
| NTD32N06LT4 | DPAK | 2500 Units / Tape & Reel |
| NTD32N06LT4G | DPAK (Pb-Free) | 2500 Units / 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.

NTD32N06L

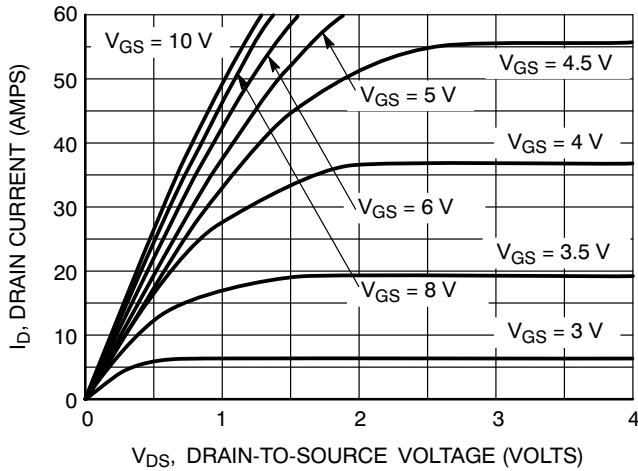


Figure 1. On-Region Characteristics

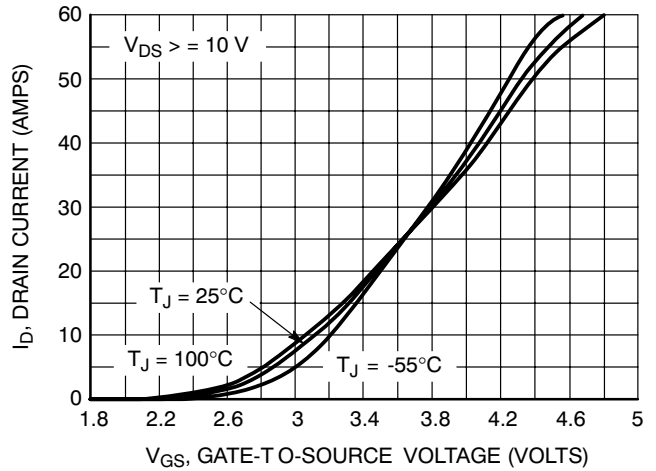


Figure 2. Transfer Characteristics

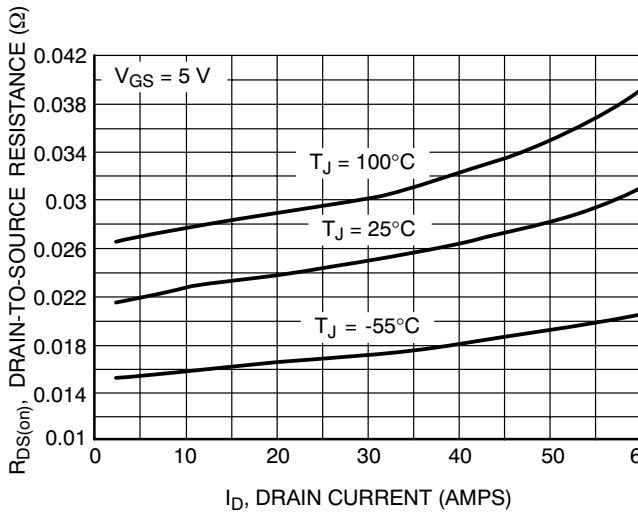


Figure 3. On-Resistance vs. Drain Current

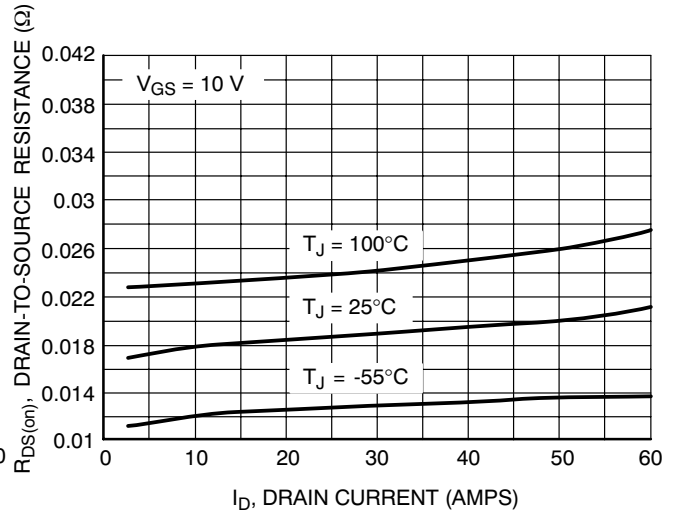


Figure 4. On-Resistance vs. Drain Current

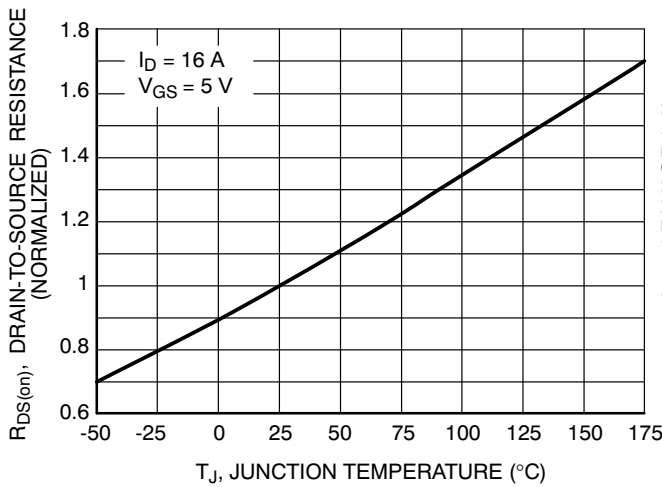


Figure 5. On-Resistance Variation with Temperature

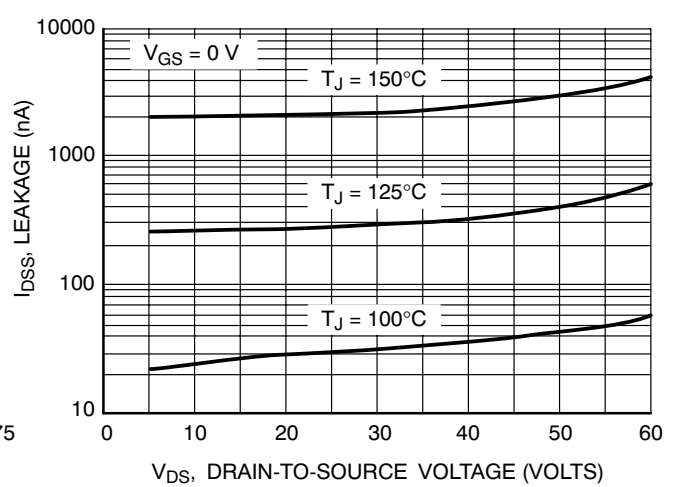


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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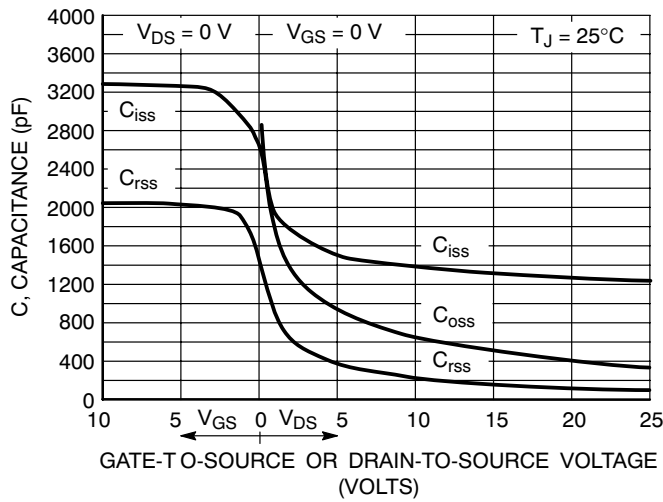


Figure 7. Capacitance Variation

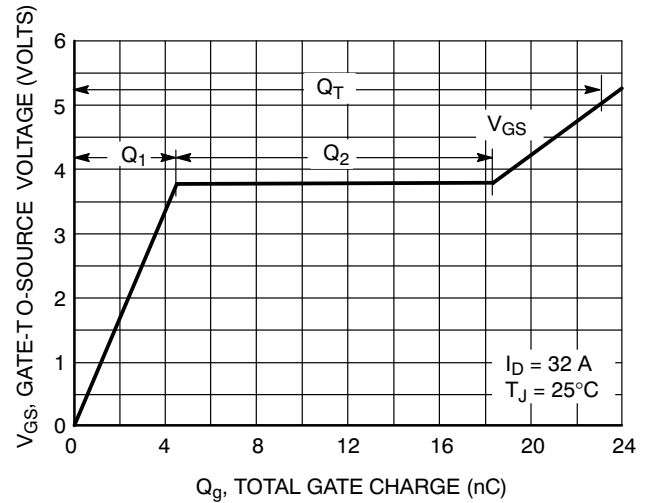


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

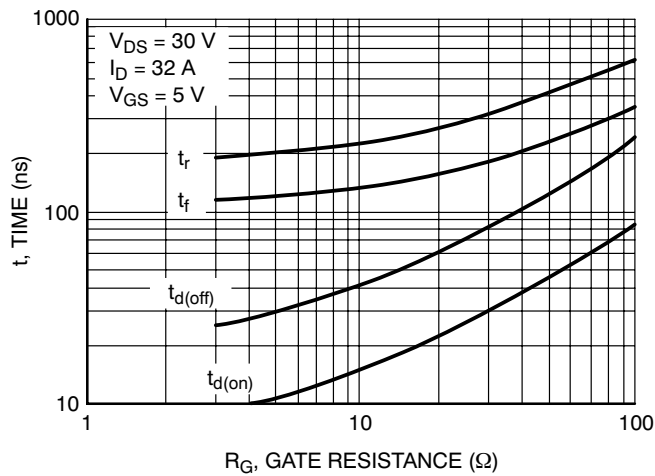


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

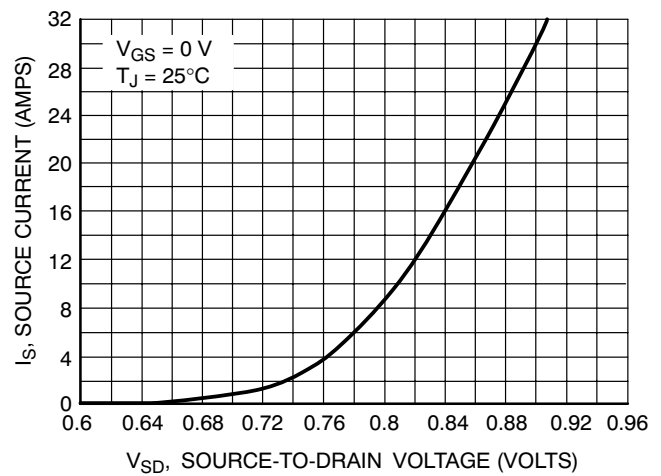


Figure 10. Diode Forward Voltage vs. Current

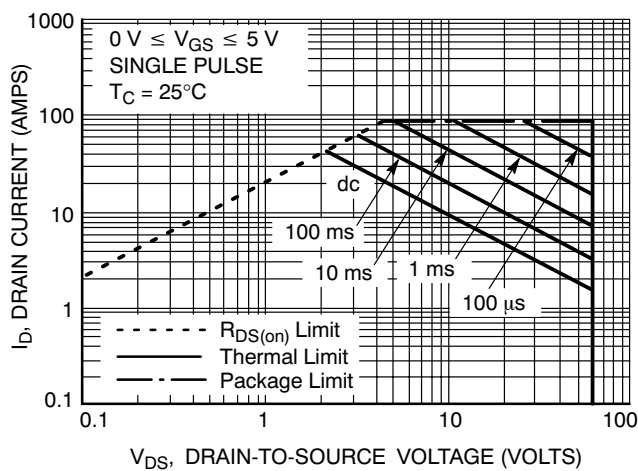


Figure 11. Maximum Rated Forward Biased Safe Operating Area

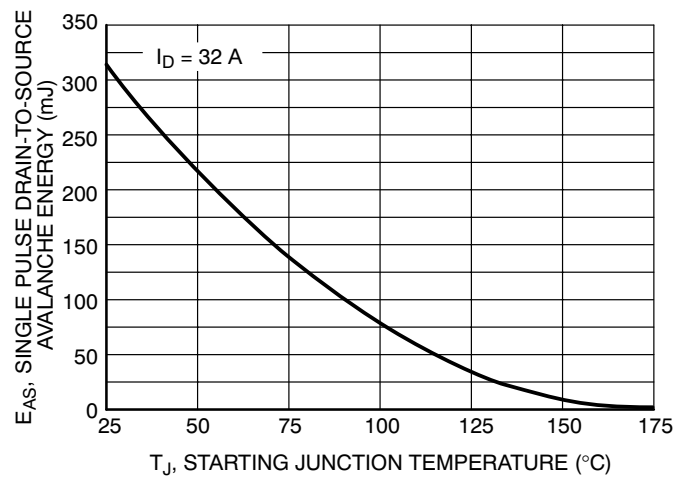


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

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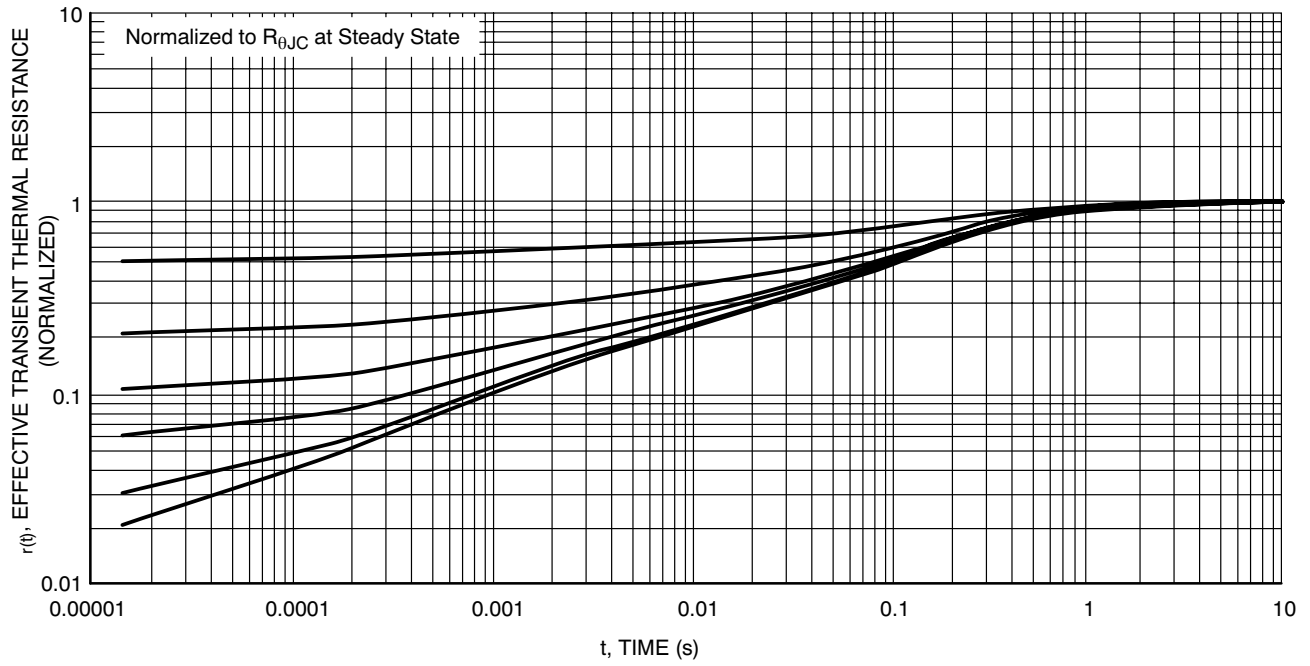


Figure 13. Thermal Response

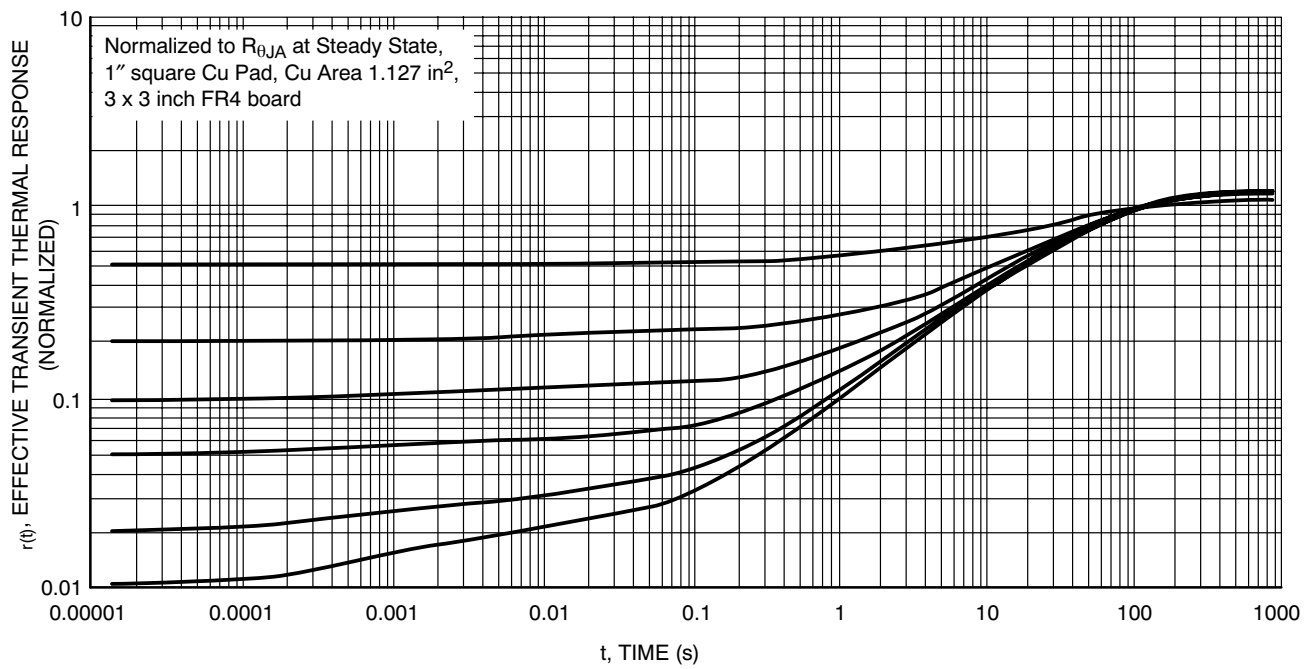
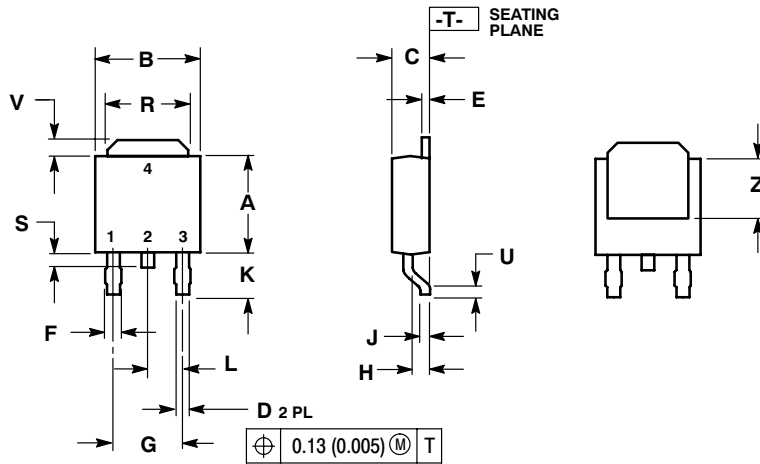


Figure 14. Thermal Response

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PACKAGE DIMENSIONS

DPAK
CASE 369C-01
ISSUE O

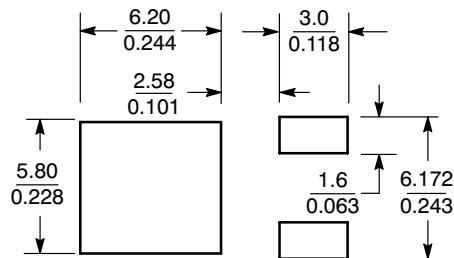


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| 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*



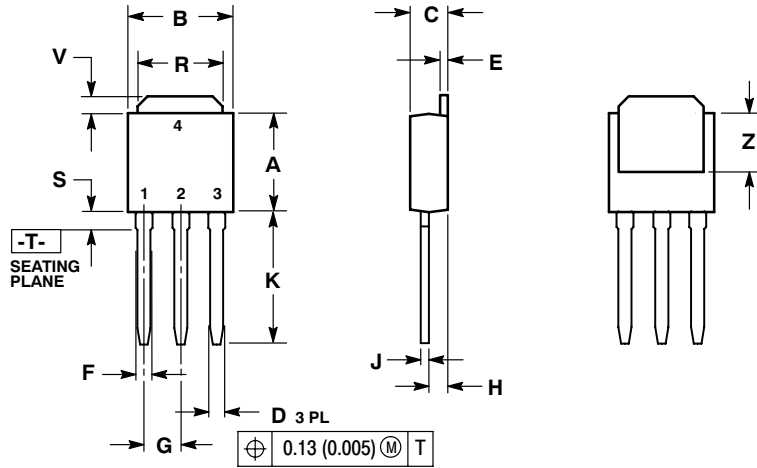
SCALE 3:1 (mm/inches)

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

NTD32N06L

PACKAGE DIMENSIONS

DPAK
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
2. DRAIN
3. SOURCE
4. DRAIN

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