

NTAT6H406N

MOSFET – N-Channel

80 V, 2.9 mΩ, 175 A

Features

- Low On-Resistance
- High Current Capability
- 100% Avalanche Tested
- ATPAK Package is Pin-compatible with DPAK (TO-252)
- Pb-Free, Halogen Free and RoHS Compliance

Typical Applications

- Multi Lib Protection
- Motor Control

Specifications

Table 1. ABSOLUTE MAXIMUM RATING at $T_A = 25^\circ\text{C}$

| Parameter | Symbol | Value | Unit |
|---|----------------|-------------|------------------|
| Drain to Source Voltage | V_{DSS} | 80 | V |
| Gate to Source Voltage | V_{GSS} | ± 20 | V |
| Drain Current (DC) | I_D | 175 | A |
| Drain Current (Pulse) PW ≤ 10 ms, Duty Cycle $\leq 1\%$ | I_{DP} | 600 | A |
| Power Dissipation $T_C = 25^\circ\text{C}$ | P_D | 90 | W |
| Operating Junction and Storage Temperature | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |
| Single Pulse Drain to Source Avalanche Energy (L = 0.1 mH, $I_{L(pk)} = 55$ A) | E_{AS} | 151 | mJ |
| Lead Temperature for Soldering Purposes, 3 mm from Case for 10 seconds | T_L | 260 | $^\circ\text{C}$ |

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.

Table 2. THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Value | Unit |
|--|-----------------|-------|--------------------|
| Junction to Case Steady State ($T_C = 25^\circ\text{C}$) | $R_{\theta JC}$ | 1.38 | $^\circ\text{C/W}$ |
| Junction to Ambient (Note 1) | $R_{\theta JA}$ | 77.2 | $^\circ\text{C/W}$ |

1. Surface mounted on FR4 board using a 130 mm², 1 oz. Cu pad.

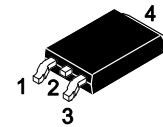
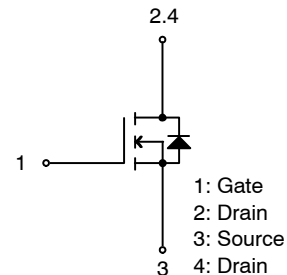


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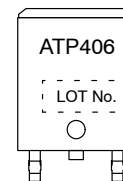
| V_{DSS} | $R_{DS(on)}$ Max | I_D Max |
|-----------|------------------|-----------|
| 80 V | 2.9 mΩ @ 10V | 175 A |

ELECTRICAL CONNECTION N-Channel



**DPAK / ATPAK
CASE 369AM**

MARKING DIAGRAM



ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

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Table 3. ELECTRICAL CHARACTERISTICS at $T_A = 25^\circ\text{C}$

| Parameter | Symbol | Conditions | Value | | | Unit |
|--|---------------|--|-------|------|-----------|------------------|
| | | | min | typ | max | |
| Drain to Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D = 1\text{ mA}, V_{GS} = 0\text{ V}$ | 80 | | | V |
| Zero-Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 80\text{ V}, V_{GS} = 0\text{ V}$ | | | 10 | μA |
| Gate to Source Leakage Current | I_{GSS} | $V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$ | | | ± 100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$ | 2.0 | | 4.0 | V |
| Forward Transconductance | g_{FS} | $V_{DS} = 10\text{ V}, I_D = 50\text{ A}$ | | 185 | | S |
| Static Drain to Source On-State Resistance | $R_{DS(on)}$ | $I_D = 50\text{ A}, V_{GS} = 10\text{ V}$ | | 2.2 | 2.9 | $\text{m}\Omega$ |
| Input Capacitance | C_{ISS} | $V_{DS} = 40\text{ V}, f = 1\text{ MHz}$ | | 8040 | | pF |
| Output Capacitance | C_{OSS} | | | 1120 | | pF |
| Reverse Transfer Capacitance | C_{RSS} | | | 40 | | pF |
| Turn-ON Delay Time | $t_d(on)$ | $V_{GS} = 10\text{ V}, V_{DS} = 48\text{ V}, I_D = 50\text{ A}, R_G = 50\ \Omega,$ | | 77 | | ns |
| Rise Time | t_r | | | 420 | | ns |
| Turn-OFF Delay Time | $t_d(off)$ | | | 310 | | ns |
| Fall Time | t_f | | | 155 | | ns |
| Total Gate Charge | Q_G | $V_{DS} = 48\text{ V}, V_{GS} = 10\text{ V}, I_D = 50\text{ A}$ | | 110 | | nC |
| Gate to Source Charge | Q_{GS} | | | 32.4 | | nC |
| Gate to Drain "Miller" Charge | Q_{GD} | | | 31.8 | | nC |
| Forward Diode Voltage | V_{SD} | $I_S = 100\text{ A}, V_{GS} = 0\text{ V}$ | | 0.9 | 1.5 | V |
| Reverse Recovery Time | t_{RR} | $I_S = 50\text{ A}, V_{GS} = 0\text{ V}, dI/dt = 100\text{ A}/\mu\text{s}$ | | 90 | | ns |
| Reverse Recovery Charge | Q_{RR} | | | 126 | | nC |

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.

TYPICAL CHARACTERISTICS

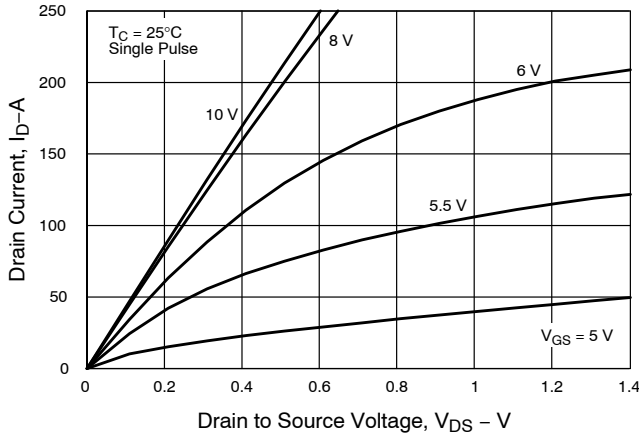


Figure 1. On-Region Characteristics

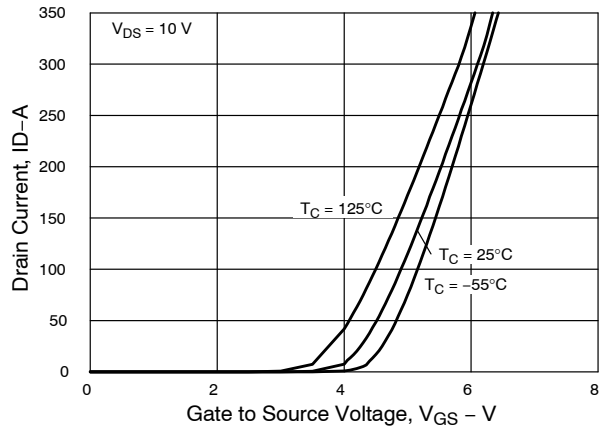


Figure 2. Transfer Characteristics

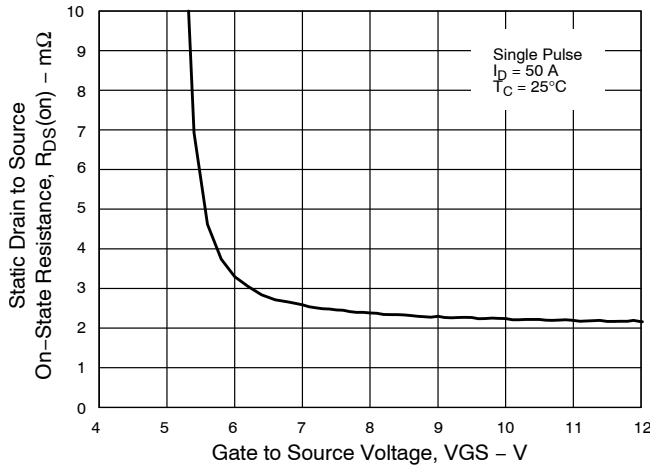


Figure 3. On-Resistance vs. Gate to Source Voltage

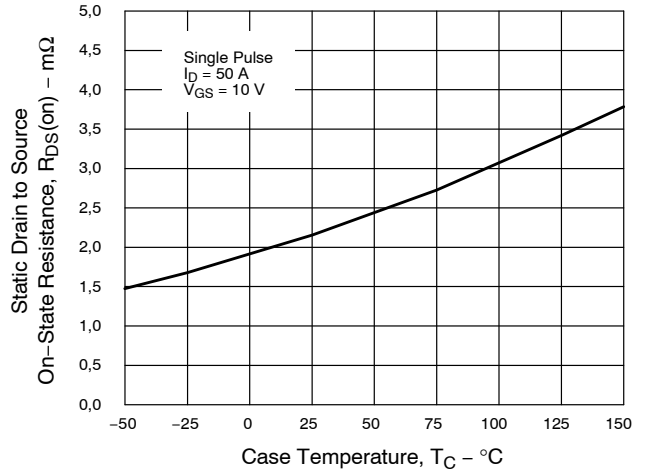


Figure 4. On-Resistance vs. Case Temperature

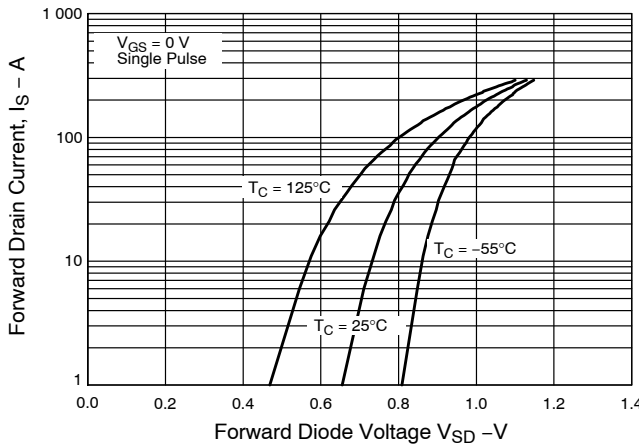


Figure 5. Diode Forward Voltage vs. Current

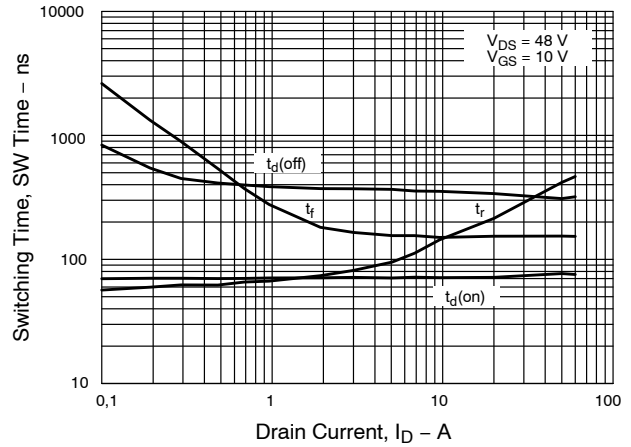


Figure 6. Switching Time vs. Drain Current

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TYPICAL CHARACTERISTICS (continued)

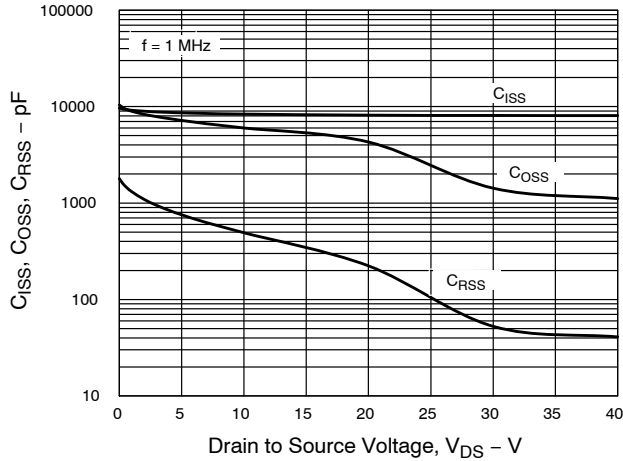


Figure 7. Capacitance Variation

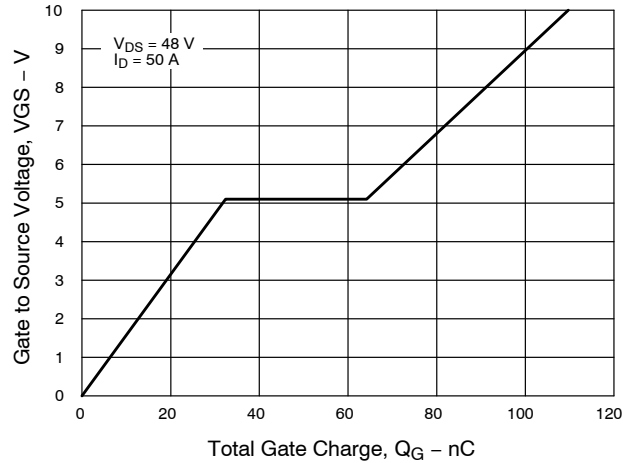


Figure 8. Gate to Source Voltage vs. Total Charge

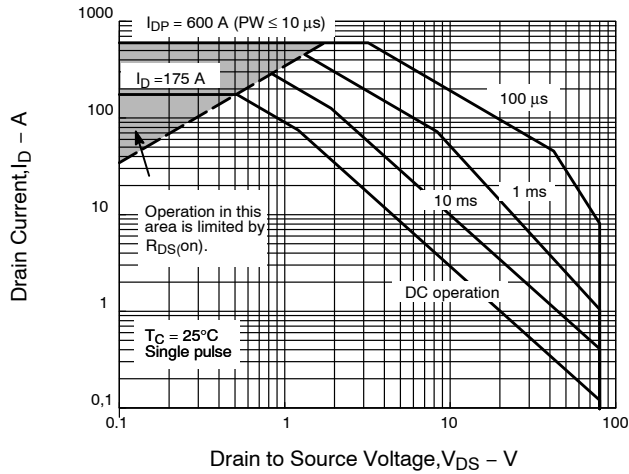


Figure 9. Safe Operating Area

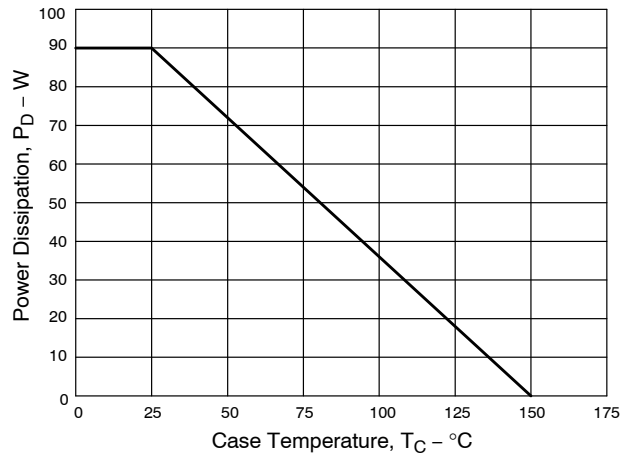


Figure 10. Power Dissipation vs. Case Temperature

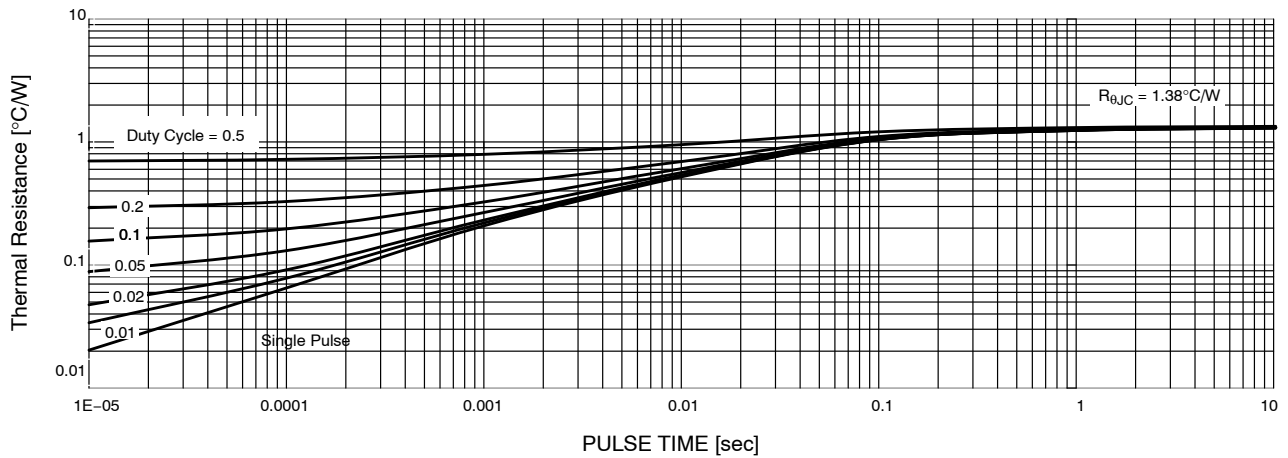


Figure 11. Thermal Response

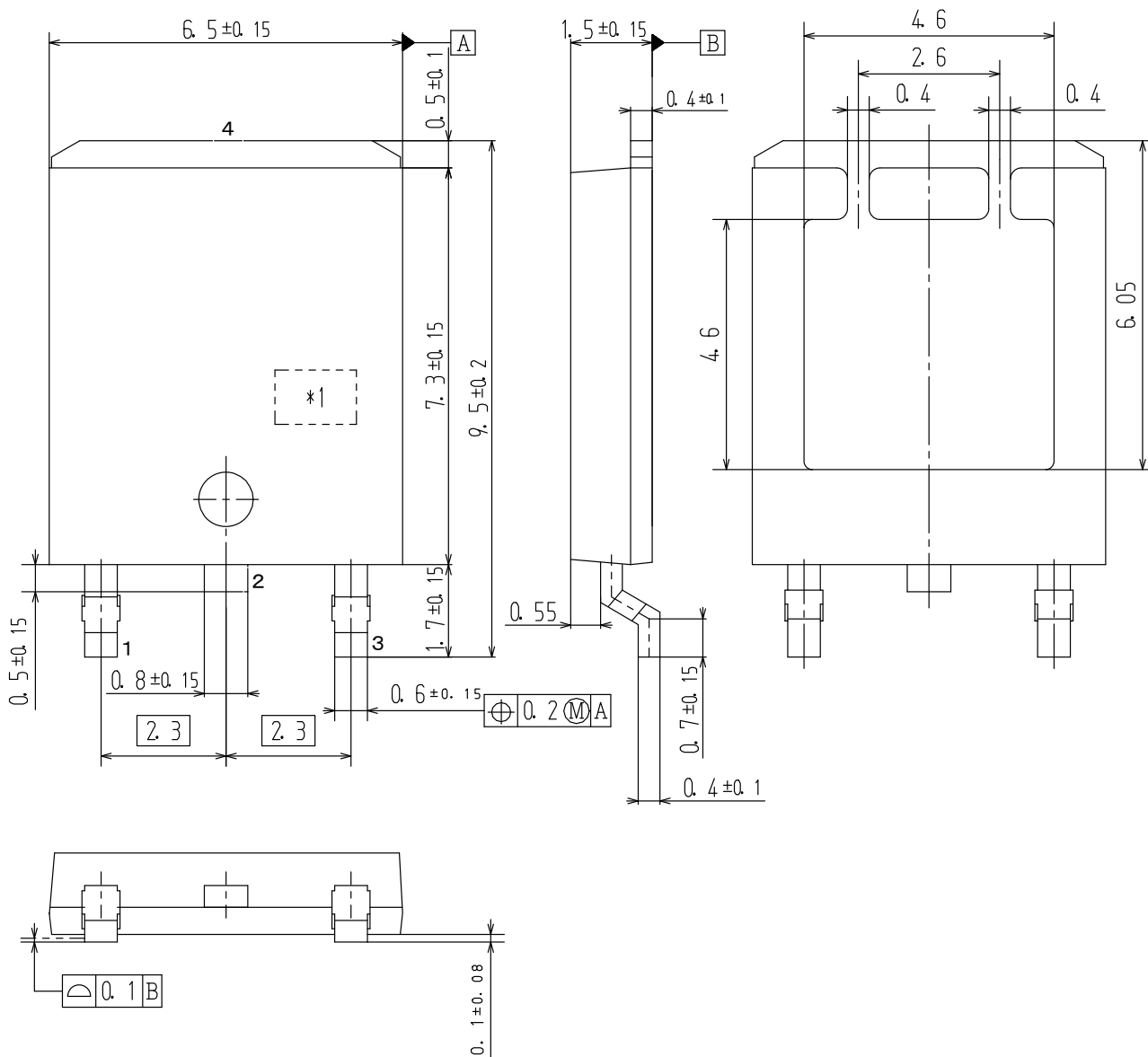
**MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS**

ON Semiconductor®



**DPAK (Single Gauge) / ATPAK
CASE 369AM
ISSUE O**

DATE 29 FEB 2012



Pin2 is idle pin with electrical designation only carried

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|-------------------------|------------------------------------|--|
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