

NTAT6H406N

Power MOSFET 80 V, 2.9 mΩ, 175 A, N-Channel

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_{DS}	80	V
Gate to Source Voltage	V_{GS}	± 20	V
Drain Current (DC)	I_D	175	A
Drain Current (Pulse) $PW \leq 10$ 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.

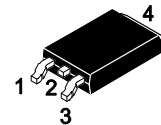
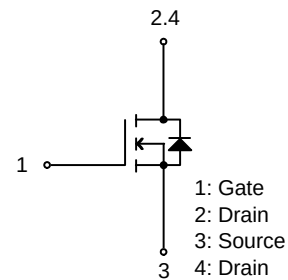


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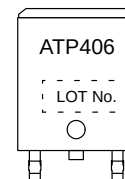
V_{DS}	$R_{DS(on)}$ Max	I_D Max
80 V	2.9 mΩ @ 10V	175 A

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	$t_d(on)$	$V_{GS} = 10\text{ V}, V_{DS} = 48\text{ V},$ $I_D = 50\text{ A}, R_G = 50\text{ }\Omega,$		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

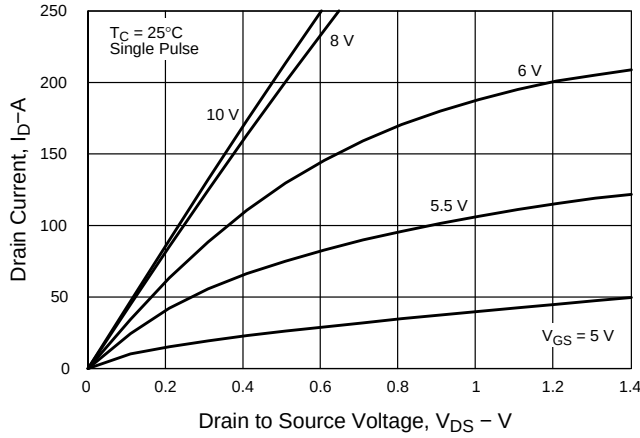


Figure 1. On-Region Characteristics

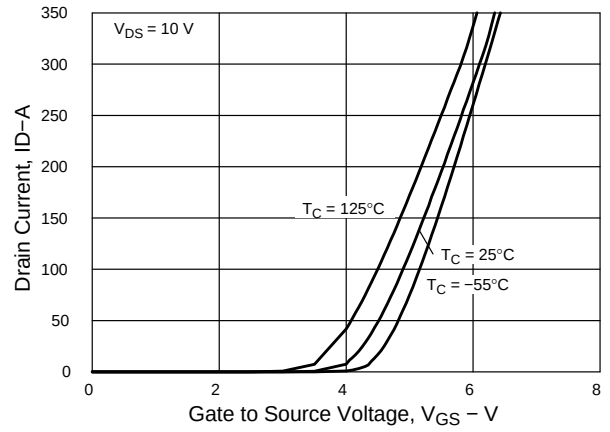


Figure 2. Transfer Characteristics

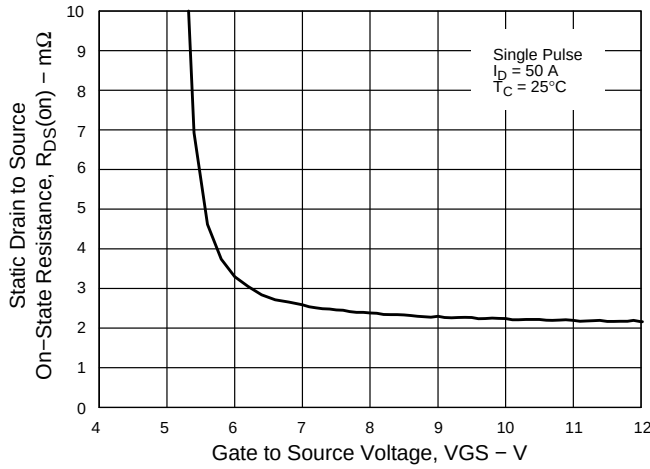


Figure 3. On-Resistance vs. Gate to Source Voltage

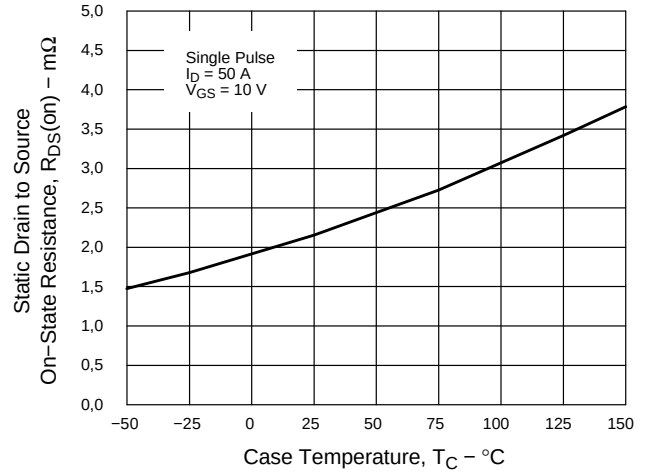


Figure 4. On-Resistance vs. Case Temperature

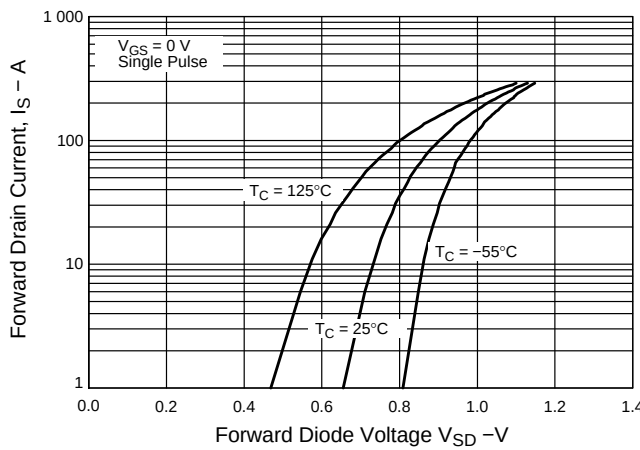


Figure 5. Diode Forward Voltage vs. Current

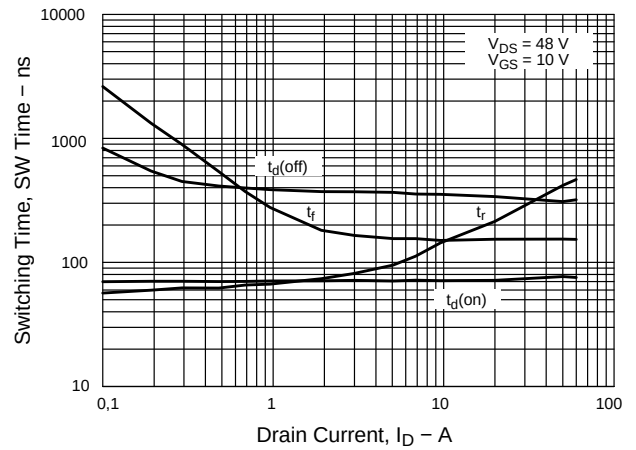


Figure 6. Switching Time vs. Drain Current

TYPICAL CHARACTERISTICS (continued)

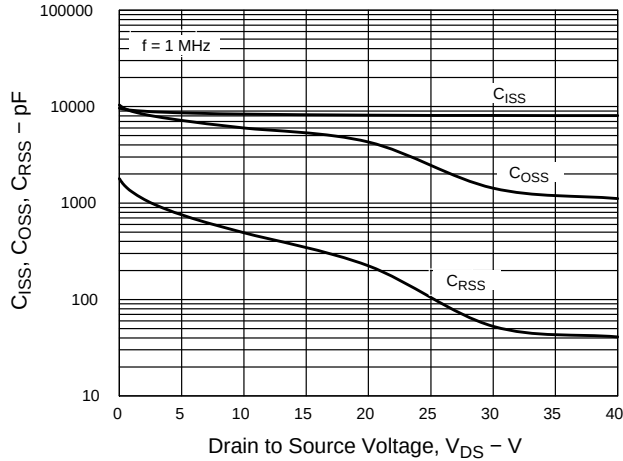


Figure 7. Capacitance Variation

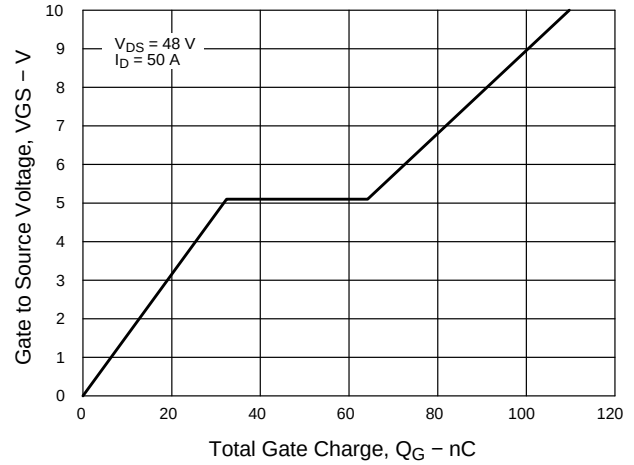


Figure 8. Gate to Source Voltage vs. Total Charge

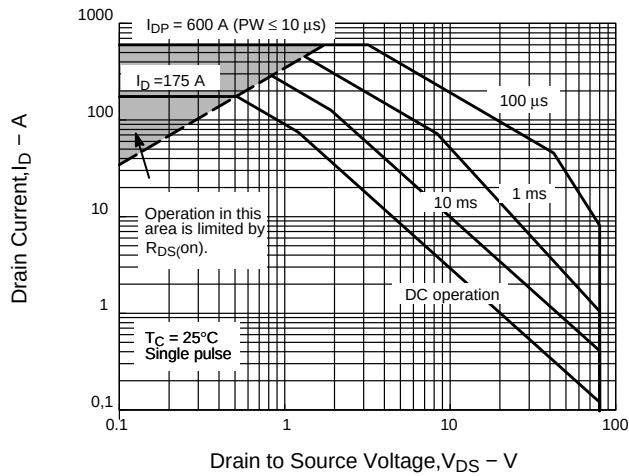


Figure 9. Safe Operating Area

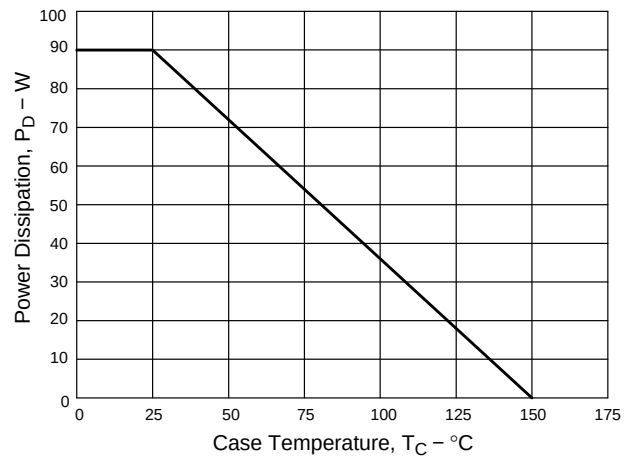


Figure 10. Power Dissipation vs. Case Temperature

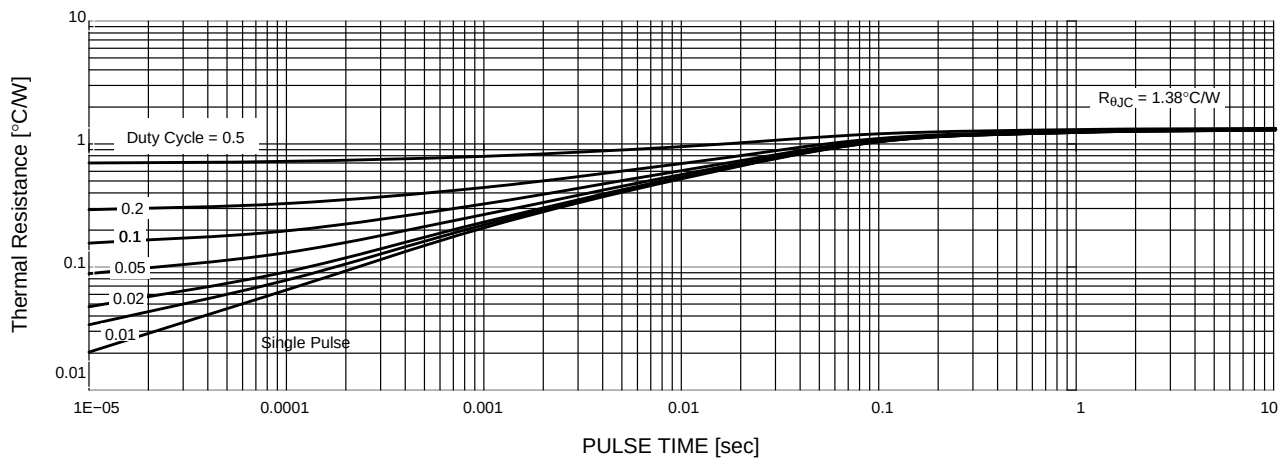


Figure 11. Thermal Response

PACKAGE DIMENSIONS

Technical drawing of a mechanical part, showing three views: front, side, and top.

Front View (Top Left):

- Overall width: 6.5 ± 0.15
- Overall height: 9.5 ± 0.2
- Top flange width: 4
- Top flange thickness: 0.5 ± 0.1 (Feature A)
- Central hole diameter: $\varnothing 1$
- Bottom flange width: 2
- Bottom flange thickness: 0.5 ± 0.15
- Bottom flange holes: $\varnothing 8 \pm 0.15$ (Feature 2.3)
- Bottom flange holes: $\varnothing 6 \pm 0.15$ (Feature 2.3)
- Bottom flange holes: $\varnothing 55$ (Feature 3)
- Bottom flange holes: $\varnothing 7 \pm 0.15$ (Feature 4)
- Bottom flange holes: $\varnothing 4 \pm 0.1$ (Feature 5)

Side View (Top Right):

- Overall width: 4.6
- Overall height: 6.05
- Top flange width: 2.6
- Top flange thickness: 0.4 (Feature 6)
- Top flange holes: $\varnothing 4$ (Feature 7)
- Top flange holes: $\varnothing 4$ (Feature 8)

Top View (Bottom Left):

- Overall width: 0.1 ± 0.08
- Overall height: 0.1 ± 0.08
- Top flange width: 0.1 (Feature 9)
- Top flange thickness: 0.1 (Feature 10)
- Top flange holes: $\varnothing 1$ (Feature 11)

Pin2 is idle pin with electrical
designation only carried

NTAT6H406N

Table 4. ORDERING INFORMATION

Device	Marking	Package	Shipping (Qty / Packing) †
NTAT6H406NT4G	ATP406	DPAK (Single Gauge) / ATPAK (Pb-Free / Halogen Free)	3,000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

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