

NTD6N40

Preferred Device

Advance Information

Power MOSFET 6 Amps, 400 Volts N-Channel DPAK

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

Features

- Higher Current Rating
- Lower $R_{DS(on)}$
- Lower Capacitances
- Lower Total Gate Charge
- Tighter V_{SD} Specifications
- Avalanche Energy Specified
- Industry Standard DPAK Surface Mount Package

Typical Applications

- Switch Mode Power Supplies
- PWM Motor Controls
- Converters
- Bridge Circuits

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

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	400	Vdc
Drain-Gate Voltage ($R_{GS} = 1.0\text{ M}\Omega$)	V_{DGR}	400	Vdc
Gate-Source Voltage	V_{GS}	± 20	Vdc
– Continuous	V_{GSM}	± 40	
– Non-Repetitive ($t_p \leq 10\text{ ms}$)			
Drain – Continuous	I_D	6.0	Adc
– Continuous @ 100°C	I_D	4.2	
– Single Pulse ($t_p \leq 10\text{ }\mu\text{s}$)	I_{DM}	21	
Total Power Dissipation	P_D	96	Watts
Derate above 25°C		0.77	$\text{W}/^\circ\text{C}$
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ when mounted with the minimum recommended pad size		1.75	$\text{W}/^\circ\text{C}$
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 150	$^\circ\text{C}$
Single Drain-to-Source Avalanche Energy – Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = 100\text{ Vdc}$, $V_{GS} = 10\text{ Vdc}$, $I_L = 6\text{ A}$, $L = 10\text{ mH}$, $R_G = 25\text{ }\Omega$)	E_{AS}	180	mJ
Thermal Resistance	$R_{\theta JC}$	1.30	$^\circ\text{C}/\text{W}$
– Junction-to-Case	$R_{\theta JA}$	100	
– Junction-to-Ambient (Note 1.)	$R_{\theta JA}$	71.4	
Maximum Lead Temperature for Soldering Purposes, $1/8"$ from case for 10 seconds	T_L	260	$^\circ\text{C}$

1. When surface mounted to an FR4 board using the minimum recommended pad size.

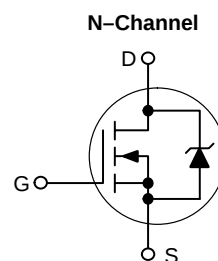
This document contains information on a new product. Specifications and information herein are subject to change without notice.



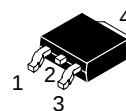
ON Semiconductor

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6 AMPERES
400 VOLTS
 $R_{DS(on)} = 1100\text{ m}\Omega$



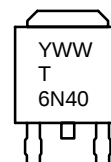
MARKING DIAGRAMS



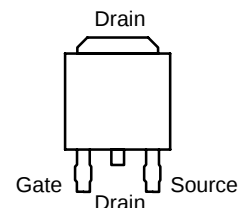
Y
WW
T

CASE 369A
DPAK
STYLE 2

= Year
= Work Week
= MOSFET



PIN ASSIGNMENT



ORDERING INFORMATION

Device	Package	Shipping
NTD6N40	DPAK	75 Units/Rail
NTD6N40-1	DPAK	75 Units/Rail
NTD6N40T4	DPAK	2500 Tape & Reel

Preferred devices are recommended choices for future use and best overall value.

NTD6N40

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage (V _{GS} = 0 Vdc, I _D = 0.25 mAdc) Temperature Coefficient (Positive)	V _{(BR)DSS}	400 –	– 500	– –	Vdc mV/°C
Zero Gate Voltage Collector Current (V _{DS} = 400 Vdc, V _{GS} = 0 Vdc) (V _{DS} = 400 Vdc, V _{GS} = 0 Vdc, T _J = 125°C)	I _{DSS}	– –	– –	10 100	μAdc
Gate-Body Leakage Current (V _{GS} = ±20 Vdc, V _{DS} = 0)	I _{GSS(f)} I _{GSS(r)}	– –	– –	100 100	nAdc

ON CHARACTERISTICS (Note 2.)

Gate Threshold Voltage I _D = 0.25 mA, V _{DS} = V _{GS} Temperature Coefficient (Negative)	V _{GS(th)}	2.0 –	2.7 6.0	4.0 –	Vdc mV/°C
Static Drain-to-Source On-Resistance (V _{GS} = 10 Vdc, I _D = 3 Adc)	R _{DS(on)}	–	900	1100	mOhm
Drain-to-Source On-Voltage (V _{GS} = 10 Vdc, I _D = 6 Adc) (V _{GS} = 10 Vdc, I _D = 3 Adc, T _J = 125°C)	V _{DS(on)}	– –	– –	7.9 6.9	Vdc
Forward Transconductance (V _{DS} = 15 Vdc, I _D = 3 Adc)	g _{FS}	2.0	4.4	–	mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	(V _{DS} = 25 Vdc, V _{GS} = 0 Vdc, f = 1.0 MHz)	C _{iss}	–	515	720	pF
Output Capacitance		C _{oss}	–	185	260	
Transfer Capacitance		C _{rss}	–	15	30	

SWITCHING CHARACTERISTICS (Note 3.)

Turn-On Delay Time	(V _{DD} = 200 Vdc, I _D = 6 Adc, V _{GS} = 10 Vdc, R _G = 9.1 Ω)	t _{d(on)}	–	7.0	10	ns
Rise Time		t _r	–	11	20	
Turn-Off Delay Time		t _{d(off)}	–	19	40	
Fall Time		t _f	–	10	20	
Gate Charge	(V _{DS} = 320 Vdc, I _D = 6 Adc, V _{GS} = 10 Vdc)	Q _T	–	9.5	19	nC
		Q ₁	–	2.0	–	
		Q ₂	–	3.0	–	
		Q ₃	–	6.0	–	

SOURCE-DRAIN DIODE CHARACTERISTICS

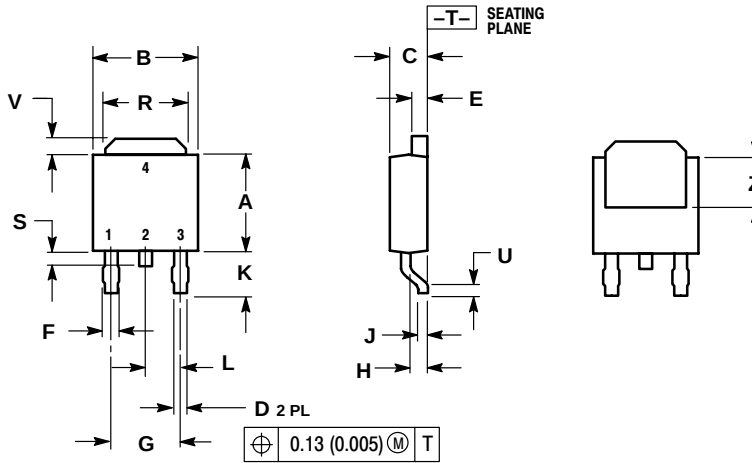
Forward On-Voltage (Note 2.)	(I _S = 6 Adc, V _{GS} = 0 Vdc) (I _S = 6 Adc, V _{GS} = 0 Vdc, T _J = 125°C)	V _{SD}	– –	0.9 0.8	1.0 –	Vdc
Reverse Recovery Time	(I _S = 6 Adc, V _{GS} = 0 Vdc, di _S /dt = 100 A/μs)	t _{rr}	–	270	–	ns
		t _a	–	110	–	
		t _b	–	160	–	
Reverse Recovery Stored Charge		Q _{RR}	–	1.6	–	μC

- Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
- Switching characteristics are independent of operating junction temperature.

NTD6N40

PACKAGE DIMENSIONS

DPAK
CASE 369A-13
ISSUE AA



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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.250	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	0.033	0.040	0.84	1.01
F	0.037	0.047	0.94	1.19
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	0.175	0.215	4.45	5.46
S	0.020	0.050	0.51	1.27
U	0.020	---	0.51	---
V	0.030	0.050	0.77	1.27
Z	0.138	---	3.51	---

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

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