

NTD6N40

Preferred Device

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	W/ $^\circ\text{C}$
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ when mounted with the minimum recommended pad size		1.75	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			$^\circ\text{C/W}$
- Junction-to-Case	$R_{\theta JC}$	1.30	
- Junction-to-Ambient	$R_{\theta JA}$	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	$^\circ\text{C}$

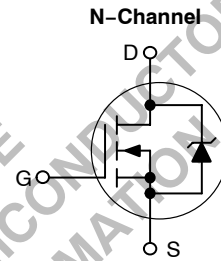
1. When surface mounted to an FR4 board using the minimum recommended pad size.



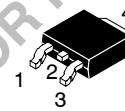
ON Semiconductor

<http://onsemi.com>

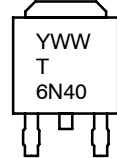
6 AMPERES
400 VOLTS
 $R_{DS(on)} = 1.1\text{ }\Omega$



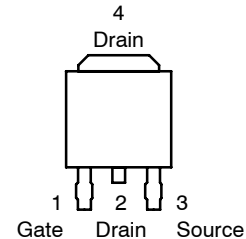
MARKING DIAGRAMS



Y = Year
WW = Work Week
T = 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
Drain-to-Source Breakdown Voltage (V _{GS} = 0 Vdc, I _D = 0.25 mAdc) Temperature Coefficient (Positive)	V _{(BR)DSS}	400	-	-	Vdc
		-	500	-	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	μAdc
		-	-	100	
Gate-Body Leakage Current (V _{GS} = ±20 Vdc, V _{DS} = 0)	I _{GSS(f)} I _{GSS(r)}	-	-	100	nAdc
		-	-	100	

ON CHARACTERISTICS (Note 1)

Gate Threshold Voltage I _D = 0.25 mA, V _{DS} = V _{GS} Temperature Coefficient (Negative)	V _{GS(th)}	2.0	2.7	4.0	Vdc
		-	6.0	-	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	Vdc
		-	-	6.9	
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 _{FSS}	-	15	30	

SWITCHING CHARACTERISTICS (Note 2)

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

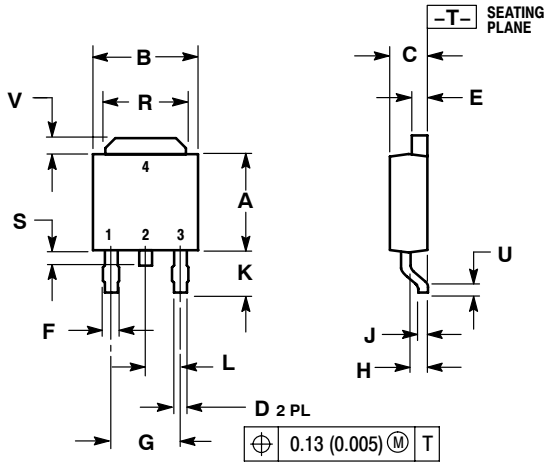
Forward On-Voltage (Note 1)	(I _S = 6 Adc, V _{GS} = 0 Vdc) (I _S = 6 Adc, V _{GS} = 0 Vdc, T _J = 125°C)	V _{SD}	-	0.9	1.0	Vdc
			-	0.8	-	
Reverse Recovery Time	(I _S = 6 Adc, V _{GS} = 0 Vdc, di _S /dt = 100 A/μs)	t _{rr}	-	270	-	ns
		t _a	-	110	-	
		t _b	-	160	-	
Reverse Recovery Stored Charge		Q _{RR}	-	1.6	-	μC

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
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	0.080	0.050	0.77	1.27
Z	0.188	---	3.51	---

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

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com
Order Literature: <http://www.onsemi.com/orderlit>
For additional information, please contact your local Sales Representative