NTD4N60

Preferred Device

Advance Information

Power MOSFET 4 Amps, 600 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°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain–Source Voltage	V_{DSS}	600	Vdc
Drain–Gate Voltage (R_{GS} = 1.0 MΩ)	V_{DGR}	600	Vdc
Gate–Source Voltage – Continuous – Non–Repetitive ($t_p \le 10$ ms)	 V_{GS} V_{GSM}	 ±20 ±40	Vdc
Drain – Continuous – Continuous @ 100°C – Single Pulse ($t_p \le 10$ μs)	I_D I_D I_{DM}	4.0 3.0 14	Adc
Total Power Dissipation Derate above 25°C Total Power Dissipation @ T_C = 25°C	P_D	96 0.77 1.75	Watts W/°C W/°C
Operating and Storage Temperature Range	T_J, T_{stg}	–55 to 150	°C
Single Drain–to–Source Avalanche Energy – Starting T_J = 25°C (V_{DD} = 100 V, V_{GS} = 10 Vdc, I_L = 4 A, L = 10 mH, R_G = 25 Ω)	E_{AS}	80	mJ
Thermal Resistance – Junction–to–Case – Junction–to–Ambient – Junction–to–Ambient (Note 1.)	 $R_{\theta JC}$ $R_{\theta JA}$ $R_{\theta JA}$	 1.30 100 71.4	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 10 seconds	T_L	260	°C

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

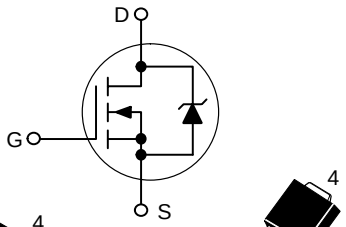
This document contains information on a new product. Specifications and information herein are subject to change without notice.

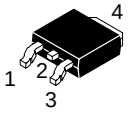
ON Semiconductor™

http://onsemi.com

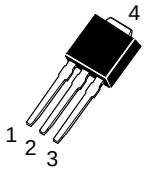
4 AMPERES
600 VOLTS
$R_{DS(on)}$ = 2400 mΩ

N–Channel



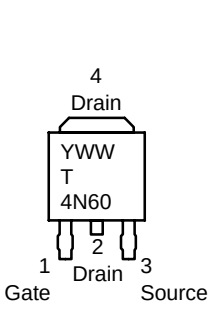


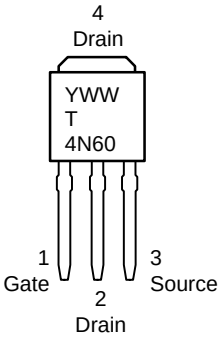
CASE 369A
DPAK
(Bent Lead)
STYLE 2



CASE 369
DPAK
(Straight Lead)
STYLE 2

MARKING DIAGRAMS & PIN ASSIGNMENTS





4N60	= Device Code
Y	= Year
WW	= Work Week
T	= MOSFET

ORDERING INFORMATION

Device	Package	Shipping
NTD4N60	DPAK	75 Units/Rail
NTD4N60–1	DPAK Straight Lead	75 Units/Rail
NTD4N60T4	DPAK	2500 Tape & Reel

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

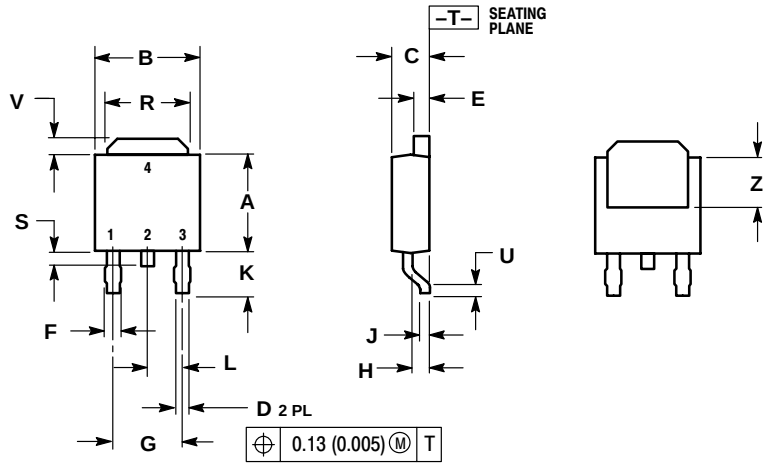
ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain–to–Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D = 0.25 mAdc) Temperature Coefficient (Positive)		$V_{(BR)DSS}$	600 –	– 700	– –	Vdc mV/°C
Zero Gate Voltage Collector Current (V_{DS} = 600 Vdc, V_{GS} = 0 Vdc) (V_{DS} = 600 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 = 2 Adc)		$R_{DS(on)}$	–	2100	2400	mOhm
Drain–to–Source On–Voltage (V_{GS} = 10 Vdc, I_D = 4 Adc) (V_{GS} = 10 Vdc, I_D = 2 Adc, T_J = 125°C)		$V_{DS(on)}$	– –	– –	11.5 10.5	Vdc
Forward Transconductance (V_{DS} = 15 Vdc, I_D = 2 Adc)		g_{FS}	0.7	3.8	–	mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = 25 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{iss}	–	540	760	pF
Output Capacitance		C_{oss}	–	125	180	
Transfer Capacitance		C_{rss}	–	8.0	20	
SWITCHING CHARACTERISTICS (Note 3.)						
Turn–On Delay Time	(V_{DD} = 300 Vdc, I_D = 4 Adc, V_{GS} = 10 Vdc, R_G = 9.1 Ω)	$t_{d(on)}$	–	12	20	ns
Rise Time		t_r	–	7.0	10	
Turn–Off Delay Time		$t_{d(off)}$	–	19	40	
Fall Time		t_f	–	10	20	
Gate Charge	(V_{DS} = 480 Vdc, I_D = 4 Adc, V_{GS} = 10 Vdc)	Q_T	–	5.0	10	nC
		Q_1	–	2.7	–	
		Q_2	–	2.0	–	
		Q_3	–	6.0	–	
SOURCE–DRAIN DIODE CHARACTERISTICS						
Forward On–Voltage (Note 2.)	(I_S = 4 Adc, V_{GS} = 0 Vdc) (I_S = 4 Adc, V_{GS} = 0 Vdc, T_J = 125°C)	V_{SD}	– –	0.86 0.75	1.0 –	Vdc
Reverse Recovery Time	(I_S = 4 Adc, V_{GS} = 0 Vdc, di_S/dt = 100 A/μs)	t_{rr}	–	655	–	ns
		t_a	–	103	–	
		t_b	–	552	–	
Reverse Recovery Stored Charge		Q_{RR}	–	1.9	–	μC

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

PACKAGE DIMENSIONS

DPAK
CASE 369A–13
ISSUE AA



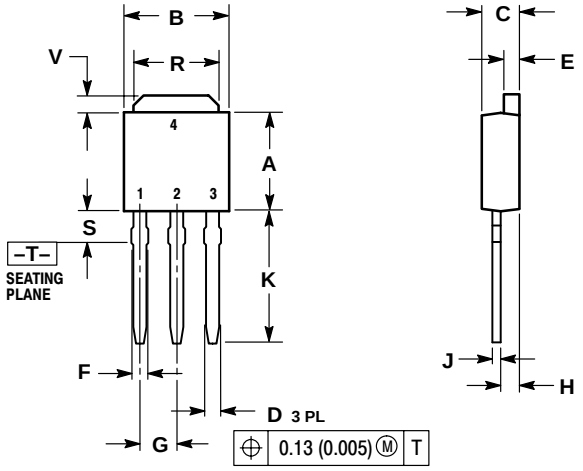
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	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

PACKAGE DIMENSIONS

DPAK
CASE 369–07
ISSUE M



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F	0.037	0.047	0.94	1.19
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	0.175	0.215	4.45	5.46
S	0.050	0.090	1.27	2.28
V	0.030	0.050	0.77	1.27

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

PUBLICATION ORDERING INFORMATION

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