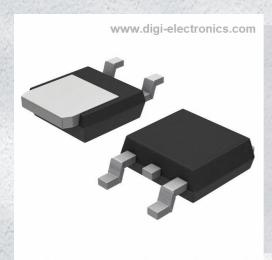


## NID5001NT4G Datasheet



https://www.DiGi-Electronics.com

DiGi Electronics Part Number NID5001NT4G-DG

Manufacturer onsemi

Manufacturer Product Number NID5001NT4G

Description IC PWR DRIVER N-CHANNEL 1:1 DPAK

Detailed Description Power Switch/Driver 1:1 N-Channel 33A DPAK



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.



### **Purchase and inquiry**

Manufacturer Product Number:	Manufacturer:
NID5001NT4G	onsemi
Series:	Product Status:
HDPlus™	Obsolete
Switch Type:	Number of Outputs:
General Purpose	1
Ratio - Input:Output:	Output Configuration:
	Low Side
1:1	
Output Type:	Interface:
N-Channel	On/Off
Voltage - Load:	Voltage - Supply (Vcc/Vdd):
42V (Max)	Not Required
Current - Output (Max):	Rds On (Typ):
33A	23mOhm
Input Type:	Features:
Non-Inverting	Auto Restart, Slew Rate Controlled
Fault Protection:	Operating Temperature:
Current Limiting (Fixed), Over Temperature, Over Voltage	-55°C ~ 150°C (TJ)
Mounting Type:	Supplier Device Package:
Surface Mount	DPAK
Package / Case:	Base Product Number:
TO-252-3, DPAK (2 Leads + Tab), SC-63	NID5001

### **Environmental & Export classification**

Moisture Sensitivity Level (MSL):	REACH Status:
1 (Unlimited)	REACH Unaffected
ECCN:	HTSUS:
EAR99	8541.29.0095

# Self-Protected FET with Temperature and Current Limit

HDPlus devices are an advanced series of power MOSFETs which utilize ON Semicondutor's latest MOSFET technology process to achieve the lowest possible on–resistance per silicon area while incorporating smart features. Integrated thermal and current limits work together to provide short circuit protection. The devices feature an integrated Drain–to–Gate Clamp that enables them to withstand high energy in the avalanche mode. The Clamp also provides additional safety margin against unexpected voltage transients. Electrostatic Discharge (ESD) protection is provided by an integrated Gate–to–Source Clamp.

#### **Features**

- Low R<sub>DS(on)</sub>
- Current Limitation
- Thermal Shutdown with Automatic Restart
- Short Circuit Protection
- I<sub>DSS</sub> Specified at Elevated Temperature
- Avalanche Energy Specified
- Slew Rate Control for Low Noise Switching
- Overvoltage Clamped Protection
- Pb-Free Package is Available

#### **MAXIMUM RATINGS** (T<sub>J</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-to-Source Voltage Internally Clamped	$V_{DSS}$	42	Vdc
Drain-to-Gate Voltage Internally Clamped (RGS = 1.0 M $\Omega$ )	$V_{DGR}$	42	Vdc
Gate-to-Source Voltage	$V_{GS}$	±14	Vdc
Drain Current - Continuous	I <sub>D</sub>	Internally Limited	
Total Power Dissipation @ T <sub>A</sub> = 25°C (Note 1) @ T <sub>A</sub> = 25°C (Note 1) @ T <sub>A</sub> = 25°C (Note 2)	P <sub>D</sub>	64 1.0 1.56	W
Thermal Resistance, Junction-to-Case Junction-to-Ambient (Note 1) Junction-to-Ambient (Note 2)	$R_{ heta JC} \ R_{ heta JA} \ R_{ heta JA}$	1.95 120 80	°C/W
Single Pulse Drain–to–Source Avalanche Energy $(V_{DD}=25~\text{Vdc},~V_{GS}=5.0~\text{Vdc},\\ I_L=4.5~\text{Apk},~L=120~\text{mH},~R_G=25~\Omega)$	E <sub>AS</sub>	1215	mJ
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 150	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

- 1. Minimum FR4 PCB, steady state.
- 2. Mounted onto a 2" square FR4 board (1" square, 2 oz. Cu 0.06" thick single–sided, t = steady state).

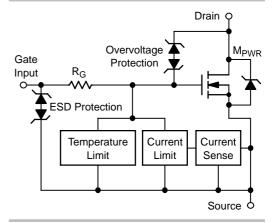


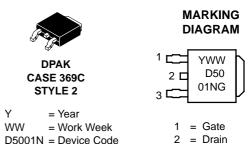
#### ON Semiconductor®

#### http://onsemi.com

V <sub>DSS</sub> (Clamped)	R <sub>DS(ON)</sub> TYP	I <sub>D</sub> MAX (Limited)
42 V	23 m $\Omega$ @ 10 V	33 A*

\*Max current may be limited below this value depending on input conditions.





#### **ORDERING INFORMATION**

= Pb-Free Package

Device	Package	Shipping <sup>†</sup>
NID5001NT4	DPAK	2500/Tape & Reel
NID5001NT4G	DPAK (Pb-Free)	2500/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.

= Source

#### $\textbf{MOSFET ELECTRICAL CHARACTERISTICS} \ (T_J = 25^{\circ}\text{C unless otherwise noted})$

Char	Symbol	Min	Тур	Max	Unit	
OFF CHARACTERISTICS						
$\begin{array}{l} \text{Drain-to-Source Clamped Breakdow} \\ \text{(V}_{GS} = 0 \text{ Vdc, I}_D = 250 \text{ $\mu$Adc)} \\ \text{(V}_{GS} = 0 \text{ Vdc, I}_D = 250 \text{ $\mu$Adc, T}_J = 250  $\mu$	V <sub>(BR)DSS</sub>	42 42	46 44	50 50	Vdc	
Zero Gate Voltage Drain Current (V <sub>DS</sub> = 32 Vdc, V <sub>GS</sub> = 0 Vdc) (V <sub>DS</sub> = 32 Vdc, V <sub>GS</sub> = 0 Vdc, T <sub>J</sub> =	I <sub>DSS</sub>		1.5 6.5	5.0	μAdc	
Gate Input Current (V <sub>GS</sub> = 5.0 Vdc, V <sub>DS</sub> = 0 Vdc)		I <sub>GSSF</sub>		50	100	μAdc
ON CHARACTERISTICS						
Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1.2 mAdc) Threshold Temperature Coefficier	ıt	V <sub>GS(th)</sub>	1.0	1.8 5.0	2.0	Vdc -mV/°C
Static Drain-to-Source On-Resistan ( $V_{GS} = 10 \text{ Vdc}, I_D = 5.0 \text{ Adc}, T_J \text{ (}V_{GS} = 10 \text{ Vdc}, I_D = 5.0 \text{ Adc}, $	25°C) ´	R <sub>DS(on)</sub>		23 43	29 55	mΩ
Static Drain-to-Source On-Resistan ( $V_{GS} = 5.0 \text{ Vdc}$ , $I_D = 5.0 \text{ Adc}$ , $T_J$ ( $V_{GS} = 5.0 \text{ Vdc}$ , $I_D = 5.0 \text{ Adc}$ , $T_J$ ( $V_{GS} = 5.0 \text{ Vdc}$ , $I_D = 5.0 \text{ Adc}$ , $T_J$ ( $V_{GS} = 5.0 \text{ Vdc}$ )	R <sub>DS(on)</sub>		28 50	34 60	mΩ	
Source–Drain Forward On Voltage (I <sub>S</sub> = 5 A, V <sub>GS</sub> = 0 V)	V <sub>SD</sub>		0.80	1.1	V	
SWITCHING CHARACTERISTICS						
Turn-on Time	$V_{GS} = 5.0 V_{dc}, V_{DD} = 25 V_{dc}$	T <sub>(on)</sub>		32	40	μs
Turn-off Time	$I_D = 1.0 A_{dc}$ , Ext $R_G = 2.5 \Omega$	T <sub>(off)</sub>		68	75	
Turn-on Time	$V_{GS} = 10 V_{dc}, V_{DD} = 25 V_{dc}$	T <sub>(on)</sub>		11	15	
Turn-off Time	$I_D = 1.0 A_{dc}$ , Ext $R_G = 2.5 \Omega$	T <sub>(off)</sub>		86	95	1
Slew Rate On	$R_L = 4.7 \Omega,$ $V_{in} = 0 \text{ to } 10 \text{ V}, V_{DD} = 12 \text{ V}$	-dV <sub>DS</sub> /dt <sub>on</sub>		0.5		V/μs
Slew–Rate Off $R_{L} = 4.7 \ \Omega, \\ V_{in} = 10 \ to \ 0 \ V, \ V_{DD} = 12 \ V$		dV <sub>DS</sub> /dt <sub>off</sub>		0.35		V/μs
SELF PROTECTION CHARACTERIS	STICS (T <sub>J</sub> = 25°C unless otherwise noted)	•	•	•	•	•
Current Limit	$(V_{GS} = 5.0 \text{ Vdc})$ $V_{DS} = 10 \text{ V} (V_{GS} = 5.0 \text{ Vdc}, T_J = 150^{\circ}\text{C})$	I <sub>LIM</sub>	21 12	30 19	36 30	Adc
	(V <sub>GS</sub> = 10 Vdc) V <sub>DS</sub> = 10 V (V <sub>GS</sub> = 10 Vdc, T <sub>J</sub> = 150°C)		29 13	41 24	49 31	
Temperature Limit (Turn-off)	V <sub>GS</sub> = 5.0 Vdc	T <sub>LIM(off)</sub>	150	175	200	°C
Temperature Limit (Circuit Reset)	V <sub>GS</sub> = 5.0 Vdc	T <sub>LIM(on)</sub>	135	160	185	°C
Temperature Limit (Turn-off)	V <sub>GS</sub> = 10 Vdc	T <sub>LIM(off)</sub>	150	165	185	°C
Temperature Limit (Circuit Reset)			135	150	170	°C
ESD ELECTRICAL CHARACTERIS	FICS (T <sub>J</sub> = 25°C unless otherwise noted)					
Electro-Static Discharge Capability Human Body Model (HBM) Machine Model (MM)	ESD	4000 400			V	

<sup>3.</sup> Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

#### TYPICAL PERFORMANCE CURVES

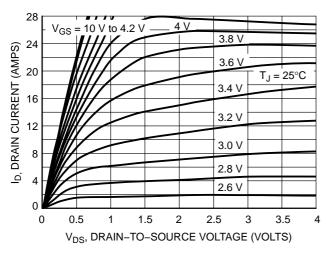
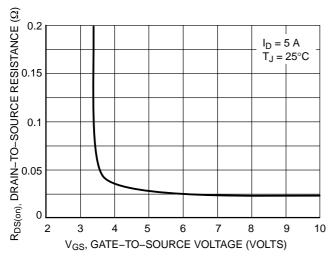


Figure 1. On-Region Characteristics

Figure 2. Transfer Characteristics



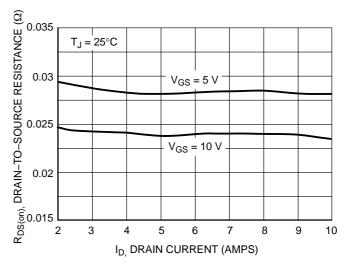
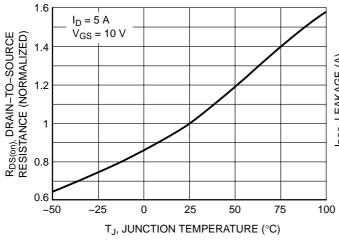


Figure 3. On-Resistance vs. Gate-to-Source Voltage

Figure 4. On-Resistance vs. Drain Current and Gate Voltage



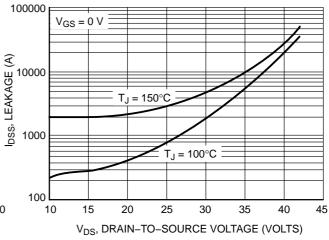


Figure 5. On–Resistance Variation with Temperature

Figure 6. Drain-to-Source Leakage Current vs. Voltage

#### **TYPICAL PERFORMANCE CURVES**

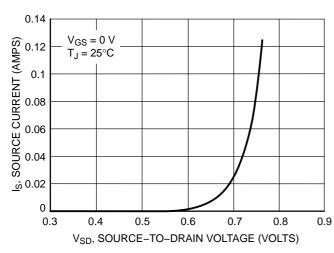


Figure 7. Diode Forward Voltage vs. Current

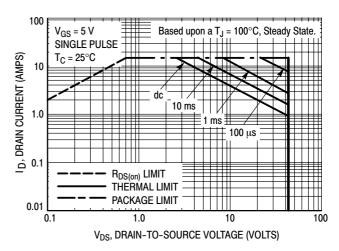
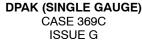


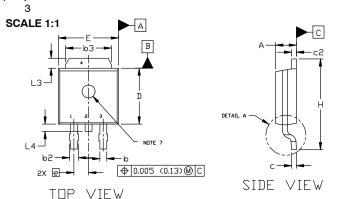
Figure 8. Maximum Rated Forward Biased Safe Operating Area



#### **MECHANICAL CASE OUTLINE** PACKAGE DIMENSIONS



**DATE 31 MAY 2023** 

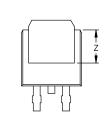


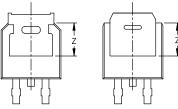


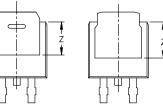
- DIMENSIONING AND TOLERANCING ASME Y14.5M, 1994. CONTROLLING DIMENSION: INCHES 1. 2.
- THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS 63,
- L3. AND Z. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH,
  PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR
  GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
- DIMENSIONS D AND E ARE DETERMINED AT THE DUTERMOST EXTREMES OF THE PLASTIC BODY.

  DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.
- OPTIONAL MOLD FEATURE.

DIM	INCHES		MILLIM	ETERS
DIM	MIN.	MAX.	MIN.	MAX.
Α	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.028	0.045	0.72	1.14
b3	0.180	0.215	4.57	5.46
C	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
е	0.090	BSC	2.29	BSC
Н	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.114	REF	2.90	REF
L2	0.020	BSC	0.51	BSC
L3	0.035	0.050	0.89	1.27
L4		0.040	-	1.01
Z	0.155		3.93	







BOTTOM VIEW

2.58

[0.102]

1.60

[0.063]

5.80

BOTTOM VIEW AL TERNATE CONSTRUCTIONS

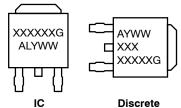
ROTATED 90°

[0.228] 6.20 -L2 GAUGE PLANE [0.244] 3.00 FN 1181 DETAIL A

Н С Δ1

CW

**GENERIC MARKING DIAGRAM\*** 



XXXXXX	= Device Code
Α	= Assembly Location
L	= Wafer Lot
Υ	= Year
WW	= Work Week
G	= Pb-Free Package

RECOMMENDED MOUNTING FOOTPRINT\* \*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DUWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

6.17 [0.243]

STYLE 1: PIN 1. BASE

STYLE 2: PIN 1. GATE STYLE 3: PIN 1. ANODE STYLE 4: PIN 1. CATHODE STYLE 5: PIN 1. GATE 2. COLLECTOR 2. DRAIN 2. CATHODE 2. ANODE 2. ANODE 3 SOURCE 3 CATHODE 3 FMITTER 3 ANODE 3 GATE COLLECTOR 4. DRAIN 4. CATHODE 4. ANODE ANODE

STYLE 6: STYLE 7: PIN 1. GATE 2. COLLECTOR STYLE 8: STYLE 9: STYLE 10: PIN 1. MT1 2. MT2 PIN 1. N/C 2. CATHODE 3. ANODE PIN 1. ANODE 2. CATHODE PIN 1. CATHODE 2. ANODE 3 CATHODE 3 FMITTER 3 RESISTOR ADJUST 3 GATE 4. COLLECTOR 4. CATHODE 4. ANODE CATHODE

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.

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DESCRIPTION:	DPAK (SINGLE GAUGE)		PAGE 1 OF 1

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