NIF5003N

Preferred Device

Advance Information

Self-protected FET with Temperature and Current Limit

HDPlus™ devices are an advanced series of power MOSFETs which utilize ON Semiconductors 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

- Current Limitation
- Thermal Shutdown with Automatic Restart
- Short Circuit Protection
- I_{DSS} Specified at Elevated Temperature
- Avalanche Energy Specified
- Slew Rate Control for Low Noise Switching
- Overvoltage Clamped Protection

MOSFET MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-to-Source Voltage Internally Clamped	V_{DSS}	40	Vdc
Drain-to-Gate Voltage Internally Clamped (R_{GS} = 1.0 MΩ)	V_{DGR}	40	Vdc
Gate-to-Source Voltage	V_{GS}	±14	Vdc
Drain Current - Continuous @ T_A = 25°C - Continuous @ T_A = 100°C - Pulsed ($t_p \le 10$ μs)	I_D I_D I_{DM}	Internally Limited	
Total Power Dissipation @ T_A = 25°C (Note 1) @ T_A = 25°C (Note 2) @ T_A = 25°C (Note 3)	P_D	1.4 2.2 10.4	W
Thermal Resistance- Junction-to-T ab Junction-to-Ambient (Note 1) Junction-to-Ambient (Note 2)	$R_{\theta JT}$ $R_{\theta JA}$ $R_{\theta JA}$	12 87 55	°C/W
Single Pulse Drain- to- Source Avalanche Energy (V_{DD} = 25 Vdc, V_{GS} = 5.0 Vdc, V_{DS} = 40 Vdc, I_L = 11.6 Apk, L = 2.0 mH, R_G = 25 Ω)	E_{AS}	600	mJ
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 150	°C

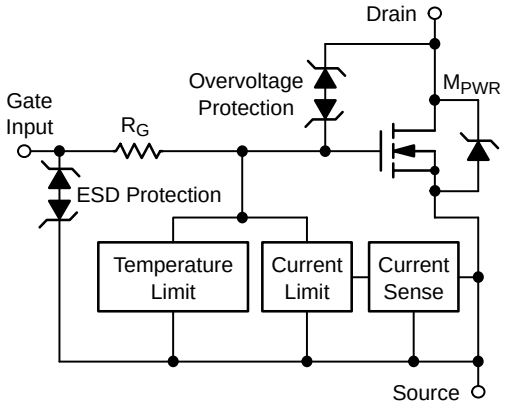
1. Mounted onto min pad board.
2. Mounted onto 1″ pad board.
3. Mounted onto large heatsink.

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

ON Semiconductor®

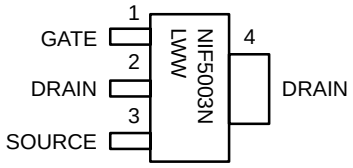
http://onsemi.com

10 AMPERES
40 VOLTS CLAMPED
$R_{DS(on)}$ = 53 mΩ



SOT-223
CASE 318E
Style 3

MARKING DIAGRAM



(Top View)

NIF5003N = Specific Device Code
L = Location Code
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping
NIF5003NT1	SOT-223	1000/Tape & Reel
NIF5003NT3	SOT-223	4000/Tape & Reel

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

MOSFET ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain-to-Source Clamped Breakdown Voltage (V_{GS} = 0 Vdc, I_D = 250 μAdc) (V_{GS} = 0 Vdc, I_D = 250 μAdc, T_J = 150°C)	$V_{(BR)DSS}$	 42 42	 46 45	 50 50	Vdc mV/°C
Zero Gate Voltage Drain Current (V_{DS} = 32 Vdc, V_{GS} = 0 Vdc) (V_{DS} = 32 Vdc, V_{GS} = 0 Vdc, T_J = 150°C)	I_{DSS}	 - -	 0.5 2.0	 2.0 10	μAdc
Gate Input Current (V_{GS} = 5.0 Vdc, V_{DS} = 0 Vdc) (V_{GS} = -5.0 Vdc, V_{DS} = 0 Vdc)	I_{GSS}	 - -	 50 550	 100 1000	μAdc
ON CHARACTERISTICS					
Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 150 μAdc) Threshold Temperature Coefficient (Negative)	$V_{GS(th)}$	 1.0 -	 1.7 4.0	 2.0 6.0	 Vdc mV/°C
Static Drain-to-Source On-Resistance (Note 4) (V_{GS} = 10 Vdc, I_D = 5.0 Adc, T_J @ 25°C) (V_{GS} = 10 Vdc, I_D = 5.0 Adc, T_J @ 150°C)	$R_{DS(on)}$	 - -	 53 95	 - -	mΩ
Static Drain-to-Source On-Resistance (Note 4) (V_{GS} = 5.0 Vdc, I_D = 5.0 Adc, T_J @ 25°C) (V_{GS} = 5.0 Vdc, I_D = 5.0 Adc, T_J @ 150°C)	$R_{DS(on)}$	 - -	 63 113	 - -	mΩ
Source-Drain Forward On Voltage (I_S = 7 A, V_{GS} = 0 V)	V_{SD}	-	1.05	-	V
SWITCHING CHARACTERISTICS					
Turn-on Delay Time	10% V_{in} to 10% I_D R_L = 4.7 Ω, V_{in} = 0 to 10 V, V_{DD} = 12 V	$t_{d(on)}$	-	4.0	-	μs
Turn-on Rise Time	10% I_D to 90% I_D R_L = 4.7 Ω, V_{in} = 0 to 10 V, V_{DD} = 12 V	t_{rise}	-	15	-	μs
Turn-off Delay Time	90% V_{in} to 90% I_D R_L = 4.7 Ω, V_{in} = 10 to 0 V, V_{DD} = 12 V	$t_{d(off)}$	-	30	-	μs
Turn-off Fall Time	90% I_D to 10% I_D R_L = 4.7 Ω, V_{in} = 10 to 0 V, V_{DD} = 12 V	t_{fall}	-	40	-	μs
Slew Rate On	R_L = 4.7 Ω, V_{in} = 0 to 10 V, V_{DD} = 12 V	$-dV_{DS}/dt_{on}$	-	0.5	-	V/μs
Slew-Rate Off	R_L = 4.7 Ω, V_{in} = 10 to 0 V, V_{DD} = 12 V	dV_{DS}/dt_{off}	-	0.35	-	V/μs

SELF PROTECTION CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Current Limit	(V_{GS} = 5.0 Vdc) V_{DS} = 10 V (V_{GS} = 5.0 Vdc, T_J = 150°C)	I_{LIM}	 -	 21	 -	Adc
			-	12.4	-	
Current Limit	(V_{GS} = 10 Vdc) V_{DS} = 10 V (V_{GS} = 10 Vdc, T_J = 150°C)	I_{LIM}	 -	 28	 -	Adc
			-	16.5	-	
Temperature Limit (Turn-off)	V_{GS} = 5.0 Vdc	$T_{LIM(off)}$	150	175	200	°C
Temperature Limit (Circuit Reset)	V_{GS} = 5.0 Vdc	$T_{LIM(on)}$	135	160	185	°C
Temperature Limit (Turn-off)	V_{GS} = 10 Vdc	$T_{LIM(off)}$	150	165	185	°C
Temperature Limit (Circuit Reset)	V_{GS} = 10 Vdc	$T_{LIM(on)}$	135	150	170	°C

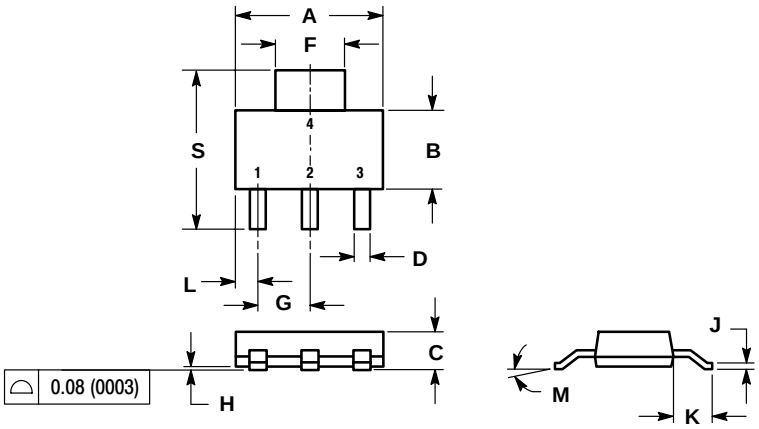
ESD ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Electro-Static Discharge Capability	Human Body Model (HBM)	ESD	4000	-	-	V
Electro-Static Discharge Capability	Machine Model (MM)	ESD	400	-	-	V

4. Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2%.

PACKAGE DIMENSIONS

SOT-223
CASE 318E-04
ISSUE K



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

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.249	0.263	6.30	6.70
B	0.130	0.145	3.30	3.70
C	0.060	0.068	1.50	1.75
D	0.024	0.035	0.60	0.89
F	0.115	0.126	2.90	3.20
G	0.087	0.094	2.20	2.40
H	0.0008	0.0040	0.020	0.100
J	0.009	0.014	0.24	0.35
K	0.060	0.078	1.50	2.00
L	0.033	0.041	0.85	1.05
M	0 °	10 °	0 °	10 °
S	0.264	0.287	6.70	7.30

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

HDPlus is registered trademark of Semiconductor Components Industries, LLC (SCILLC).

PUBLICATION ORDERING INFORMATION

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