NIF62514

Preferred Device

Self-protected FET with Temperature and Current Limit

HDPlus devices are an advanced series of power MOSFETs which utilize ON Semiconductor'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

- Current Limitation
- Thermal Shutdown with Automatic Restart
- Short Circuit Protection
- Low $R_{DS(on)}$
- 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)

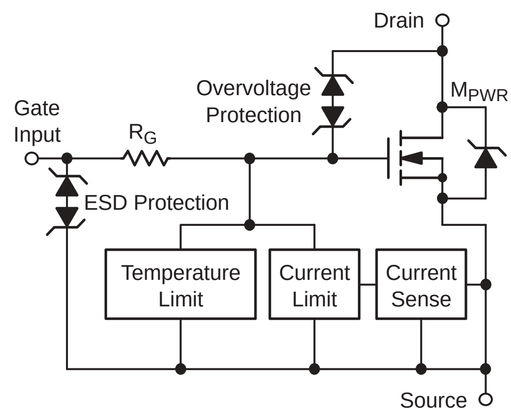
Rating	Symbol	Value	Unit
Drain–to–Source Voltage Internally Clamped	V_{DSS}	40	Vdc
Drain–to–Gate Voltage Internally Clamped (R_{GS} = 1.0 MΩ)	V_{DGR}	40	Vdc
Gate–to–Source Voltage	V_{GS}	±16	Vdc
Drain Current – Continuous @ T_A = 25°C – Continuous @ T_A = 100°C – Pulsed ($t_p \leq 10$ μs)	I_D I_D I_{DM}	6.0 4.0 9.0*	Adc Adc Apk
Total Power Dissipation @ T_A = 25°C (Note 1) @ T_A = 25°C (Note 2) @ T_A = 25°C (Note 3)	P_D	1.1 1.73 8.93	W
Thermal Resistance – Junction–to–Tab Junction–to–Ambient (Note 1) Junction–to–Ambient (Note 2)	$R_{\theta JT}$ $R_{\theta JA}$ $R_{\theta JA}$	14 114 72.3	°C/W
Single Pulse Drain–to–Source Avalanche Energy (V_{DD} = 25 Vdc, V_{GS} = 5.0 Vdc, V_{DS} = 40 Vdc, I_L = 2.8 Apk, L = 80 mH, R_G = 25 Ω)	E_{AS}	300	mJ
Operating and Storage Temperature Range	T_J, T_{stg}	–55 to 150	°C

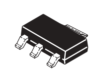
*Limited by the current limit circuit.
1. Mounted onto min pad board.
2. Mounted onto 1″ pad board.
3. Mounted onto large heatsink.

ON Semiconductor®

http://onsemi.com

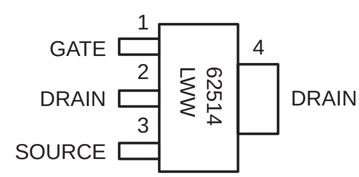
6.0 AMPERES
40 VOLTS CLAMPED
$R_{DS(on)}$ = 90 mΩ





SOT–223
CASE 318E
STYLE 3

MARKING DIAGRAM



(Top View)

62514 = Specific Device Code
L = Location Code
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping
NIF62514T1	SOT–223	1000/Tape & Reel
NIF62514T3	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
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 = 1.4 Adc, T_J @ 25°C) (V_{GS} = 10 Vdc, I_D = 1.4 Adc, T_J @ 150°C)		$R_{DS(on)}$	 – –	 90 165	 100 190	mΩ
Static Drain–to–Source On–Resistance (Note 4) (V_{GS} = 5.0 Vdc, I_D = 1.4 Adc, T_J @ 25°C) (V_{GS} = 5.0 Vdc, I_D = 1.4 Adc, T_J @ 150°C)		$R_{DS(on)}$	 – –	 105 185	 120 210	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	8.0	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}	–	11	20	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	$t_{d(off)}$	–	32	50	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}	–	27	50	μs
Slew–Rate On	R_L = 4.7 Ω, V_{in} = 0 to 10 V, V_{DD} = 12 V	$-dV_{DS}/dt_{on}$	–	1.5	2.5	μs
Slew–Rate Off	R_L = 4.7 Ω, V_{in} = 10 to 0 V, V_{DD} = 12 V	dV_{DS}/dt_{off}	–	0.6	1.0	μs
SELF PROTECTION CHARACTERISTICS (T_J = 25°C unless otherwise noted)						
Current Limit	(V_{GS} = 5.0 Vdc) (V_{GS} = 5.0 Vdc, T_J = 150°C)	I_{LIM}	6.0 3.0	9.0 5.0	11 8.0	Adc
Current Limit	(V_{GS} = 10 Vdc) (V_{GS} = 10 Vdc, T_J = 150°C)	I_{LIM}	7.0 4.0	10.5 7.5	13 10	Adc
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	155	185	°C
Temperature Limit (Circuit Reset)	V_{GS} = 10 Vdc	$T_{LIM(on)}$	130	140	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%.

TYPICAL ELECTRICAL CHARACTERISTICS

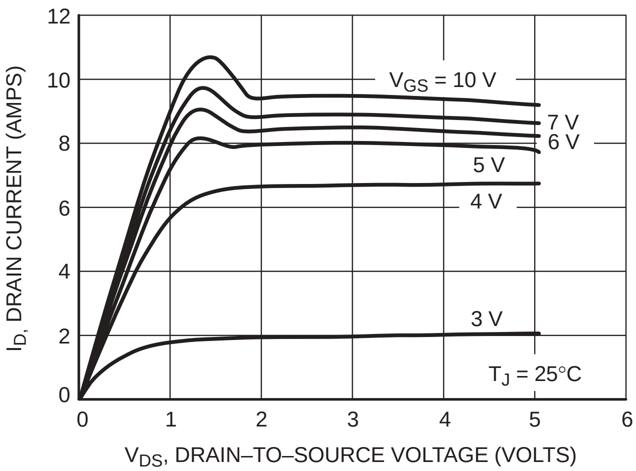


Figure 1. Output Characteristics

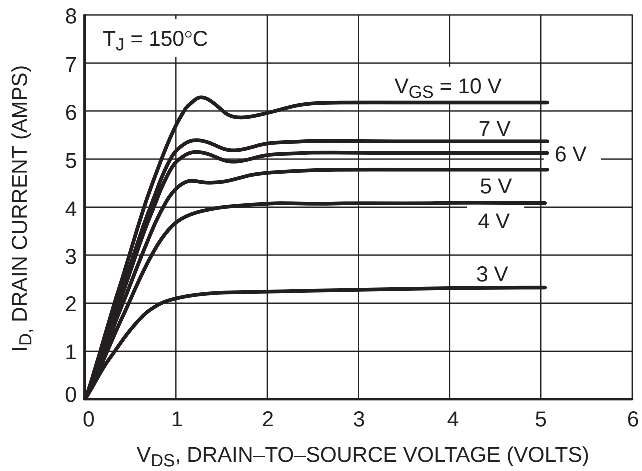


Figure 2. Output Characteristics

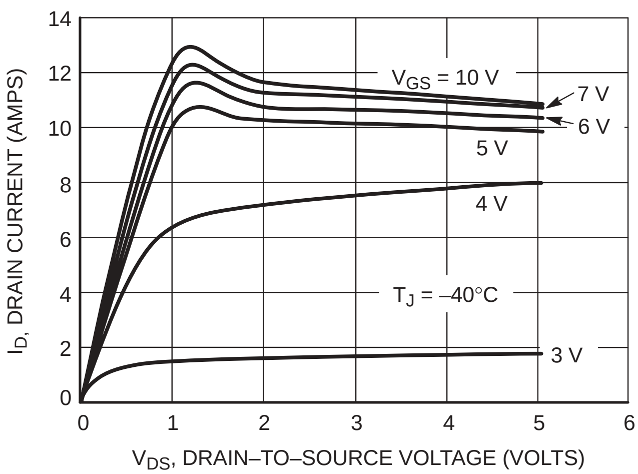


Figure 3. Output Characteristics

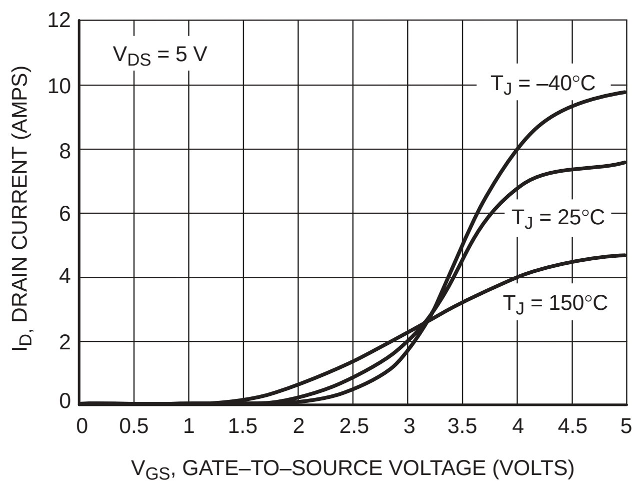


Figure 4. Transfer Characteristics

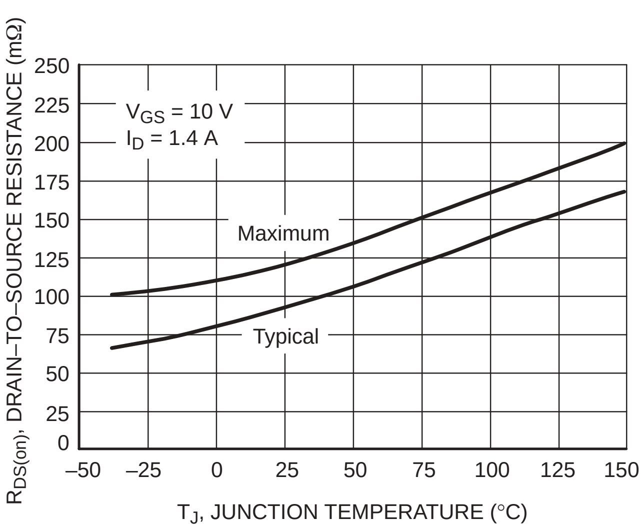


Figure 5. Drain–to–Source Resistance versus Junction Temperature

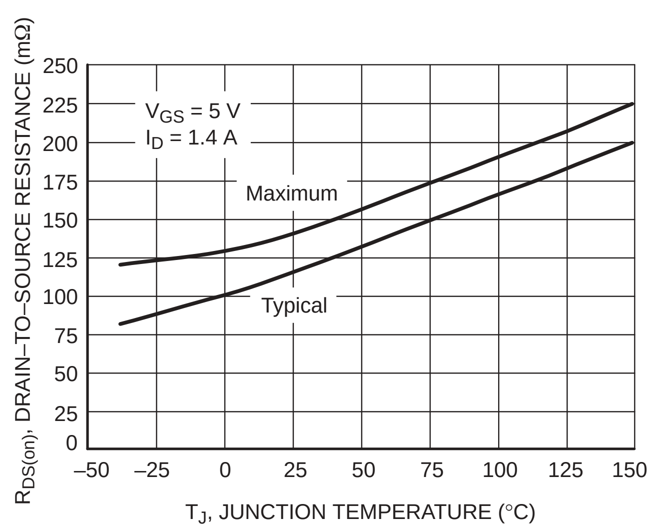


Figure 6. Drain–to–Source Resistance versus Junction Temperature

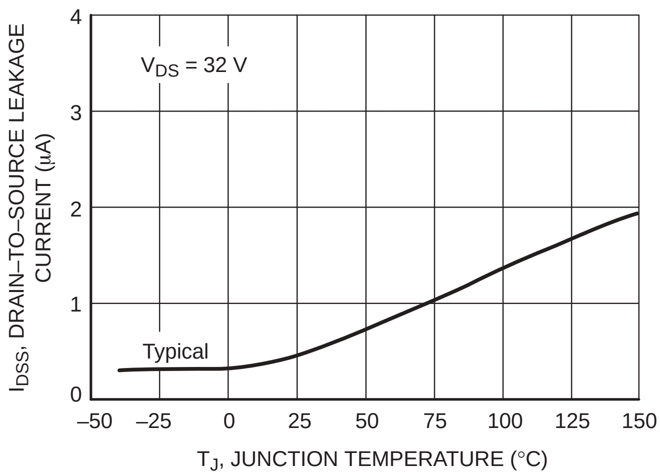


Figure 7. Drain–to–Source Resistance versus Junction Temperature

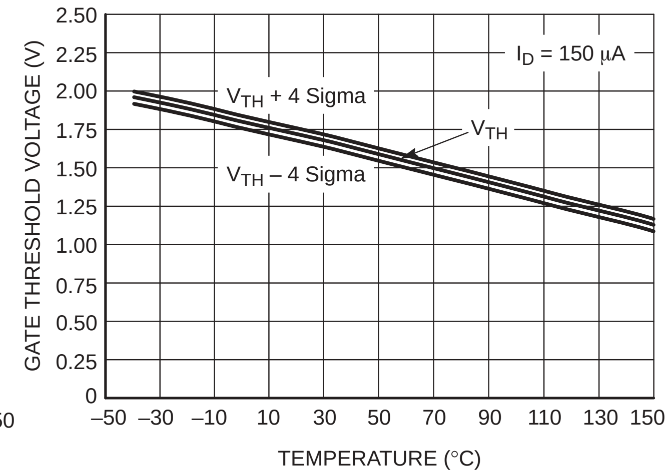


Figure 8. Gate Threshold Voltage versus Temperature

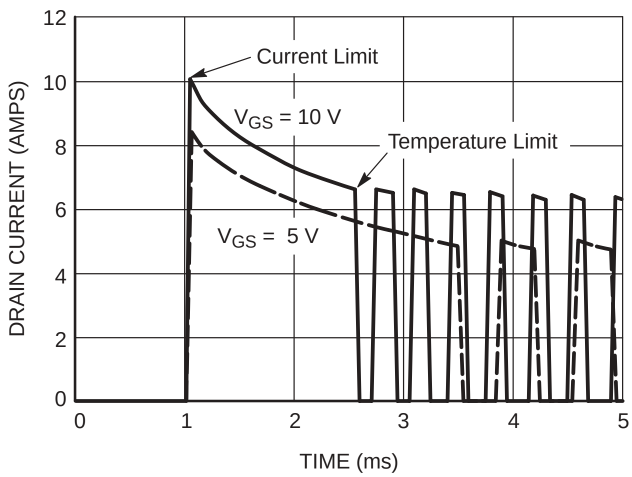


Figure 9. Short–circuit Response

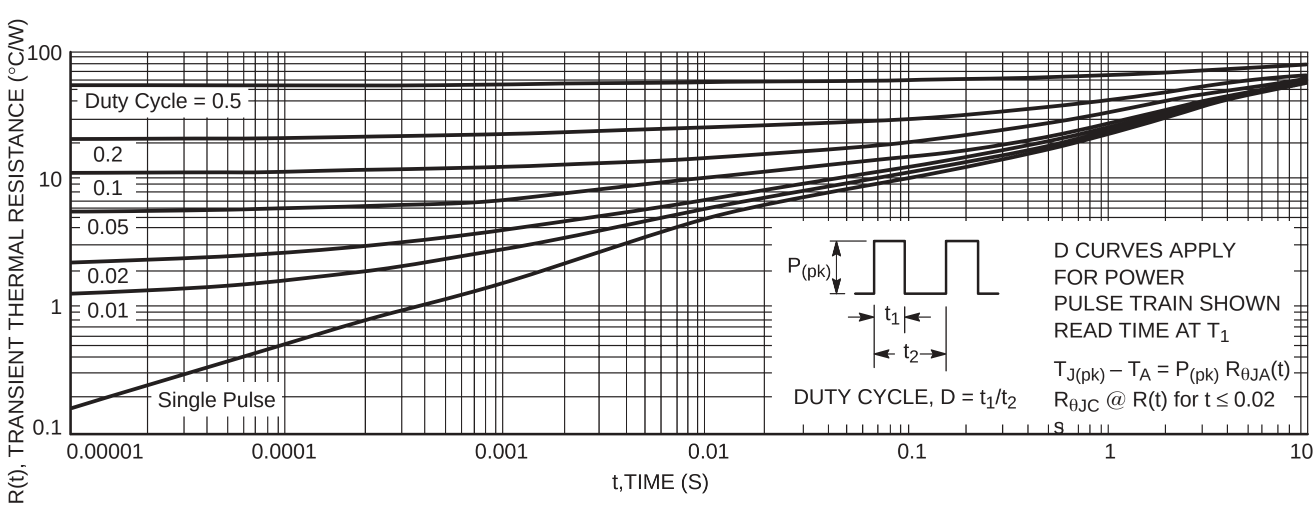
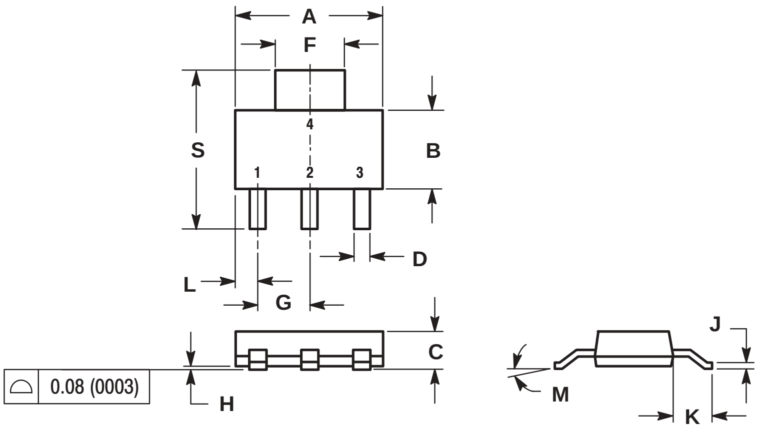


Figure 10. Transient Thermal Resistance (Non–normalized Junction–to–Ambient mounted on minimum pad area)

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

PUBLICATION ORDERING INFORMATION

Literature Fulfillment:
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