

# Switch-mode Power Rectifiers

## NHP420LFS, NRVHP420LFS

This LFAK ultrafast rectifier provides fast switching performance with soft recovery in a compact thermally efficient package. The LFAK package provides an excellent alternative to the DPAK, offering thermal performance nearly as good in a package occupying less than half the board space. Its low profile makes it a good option for flat panel display and other applications with limited vertical clearance. The device offers low leakage over temperature making it a good match for applications requiring low quiescent current.

### Features

- New Package Provides Capability of Inspection and Probe After Board Mounting
- Low Forward Voltage Drop
- 175°C Operating Junction Temperature
- Excellent Ability to Absorb Stresses Associated with Power Temperature Cycling
- NRV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Mechanical Characteristics:

- Case: Epoxy, Molded
- Lead Finish: 100% Matte Sn (Tin)
- Lead and Mounting Surface Temperature for Soldering Purposes: 260°C Max. for 10 Seconds
- Device Meets MSL 1 Requirements

### Applications

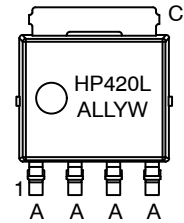
- Excellent Alternative to DPAK in Space-Constrained Automotive Applications
- Very Low Leakage for Higher Temperature Operation
- Output Rectification in Compact Portable Consumer Applications
- Freewheeling Diode used with Inductive Loads

## ULTRAFAST RECTIFIERS 4 AMPERES 200 VOLTS



LFAK4  
 CASE 760AB

### MARKING DIAGRAM



HP420L = Specific Device Code  
 A = Assembly Location  
 LL = Wafer Lot  
 Y = Year  
 W = Work Week

### ORDERING INFORMATION

Device	Package	Shipping†
NHP420LFST1G	LFAK4 (Pb-Free)	3000 / Tape & Reel

### DISCONTINUED (Note 1)

NRVHP420LFST1G	LFAK4 (Pb-Free)	3000 / Tape & Reel
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†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.

1. **DISCONTINUED:** This device is not recommended for new design. Please contact your **onsemi** representative for information. The most current information on this device may be available on [www.onsemi.com](http://www.onsemi.com).

# NHP420LFS, NRVHP420LFS

## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	$V_{RRM}$ $V_{RWM}$ $V_R$	200	V
Average Rectified Forward Current (Rated $V_R$ , $T_C = 169^\circ\text{C}$ )	$I_{F(AV)}$	4.0	A
Peak Repetitive Forward Current, (Rated $V_R$ , Square Wave, 20 kHz, $T_C = 160^\circ\text{C}$ )	$I_{FRM}$	8.0	A
Non-Repetitive Peak Surge Current (Surge Applied at Rated Load Conditions Halfwave, Single Phase, 60 Hz)	$I_{FSM}$	125	A
Storage Temperature Range	$T_{stg}$	-65 to +175	$^\circ\text{C}$
Operating Junction Temperature	$T_J$	-55 to +175	$^\circ\text{C}$
ESD Rating (Human Body Model)		3B	
ESD Rating (Machine Model)		C	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case, Steady State (Assumes 600 mm <sup>2</sup> 1 oz. copper bond pad, on a FR4 board)	$R_{\theta JC}$	1.93	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient, Steady State (Assumes 600 mm <sup>2</sup> 1 oz. copper bond pad, on a FR4 board)	$R_{\theta JA}$	45.4	$^\circ\text{C}/\text{W}$

## ELECTRICAL CHARACTERISTICS

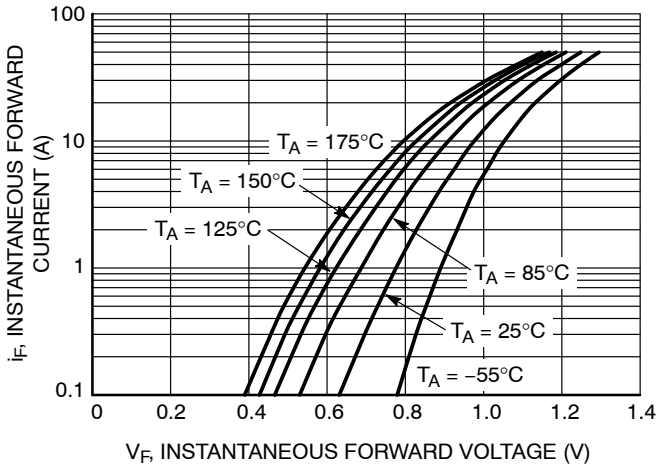
Characteristic	Symbol	Max	Unit
Instantaneous Forward Voltage (Note 1) ( $i_F = 4\text{ A}$ , $T_J = 125^\circ\text{C}$ ) ( $i_F = 4\text{ A}$ , $T_J = 25^\circ\text{C}$ )	$v_F$	0.80 0.95	V
Instantaneous Reverse Current (Note 1) (Rated dc Voltage, $T_J = 125^\circ\text{C}$ ) (Rated dc Voltage, $T_J = 25^\circ\text{C}$ )	$i_R$	50 0.5	$\mu\text{A}$
Maximum Reverse Recovery Time ( $I_F = 1.0\text{ A}$ , $di/dt = 50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$ )	$T_{rr}$	50	ns

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

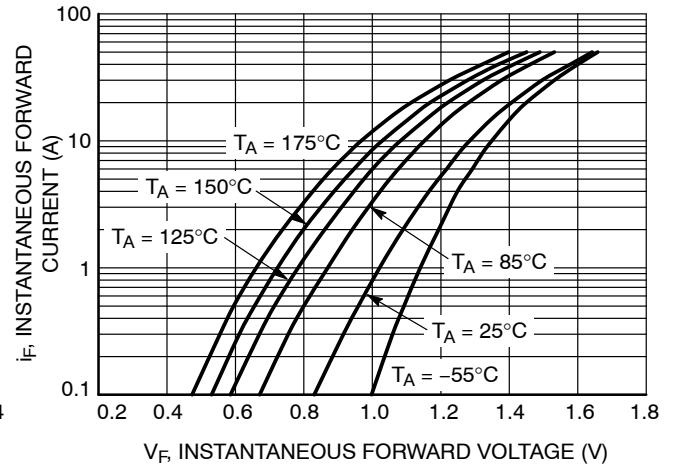
1. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

# NHP420LFS, NRVHP420LFS

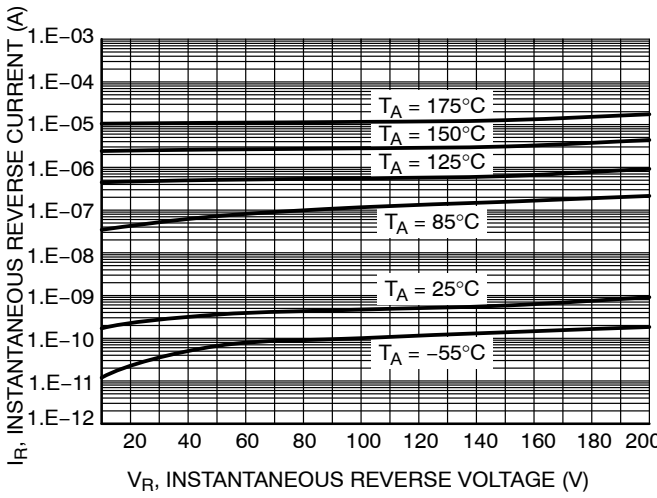
## TYPICAL CHARACTERISTICS



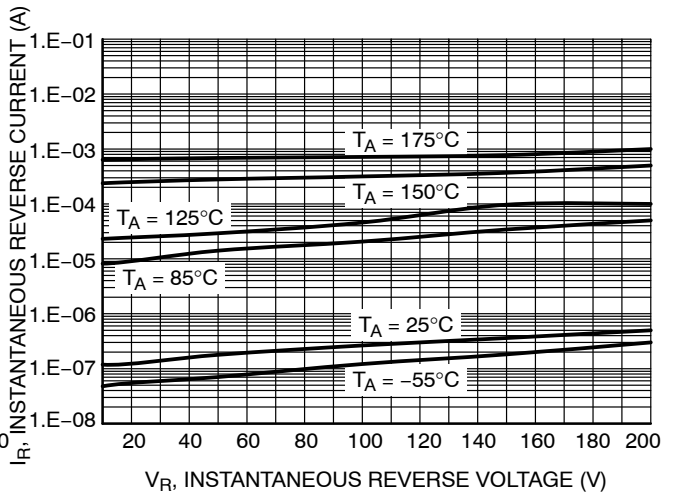
**Figure 1. Typical Instantaneous Forward Characteristics**



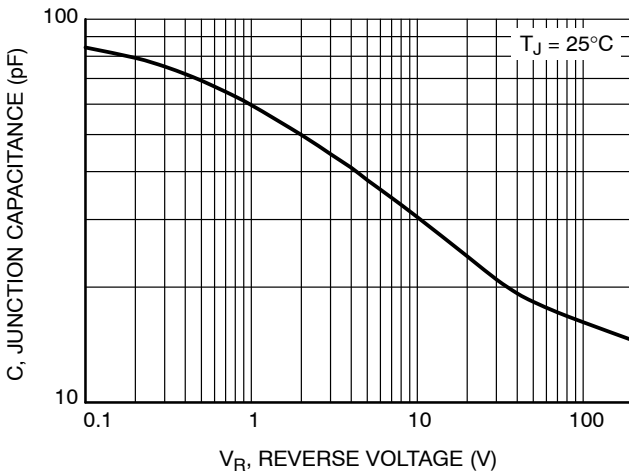
**Figure 2. Maximum Instantaneous Forward Characteristics**



**Figure 3. Typical Reverse Characteristics**



**Figure 4. Maximum Reverse Characteristics**



**Figure 5. Typical Junction Capacitance**

# NHP420LFS, NRVHP420LFS

## TYPICAL CHARACTERISTICS

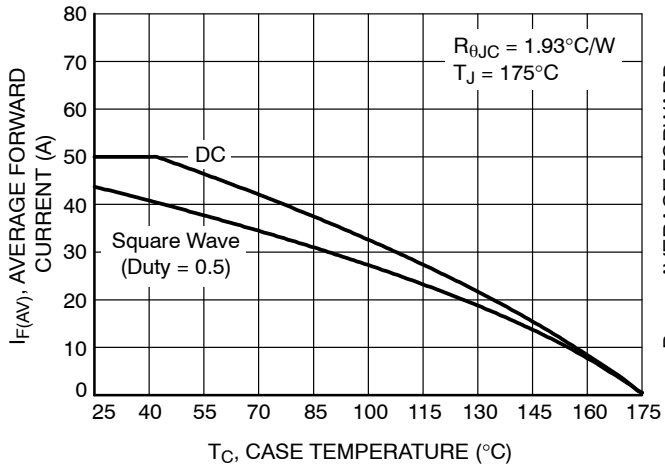


Figure 6. Current Derating per Device

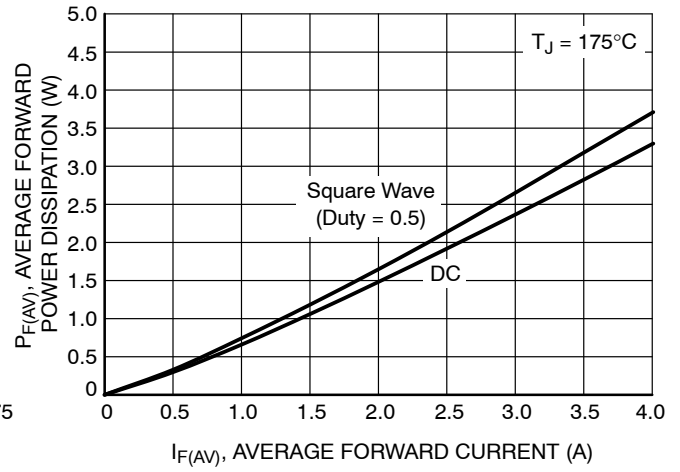


Figure 7. Forward Power Dissipation

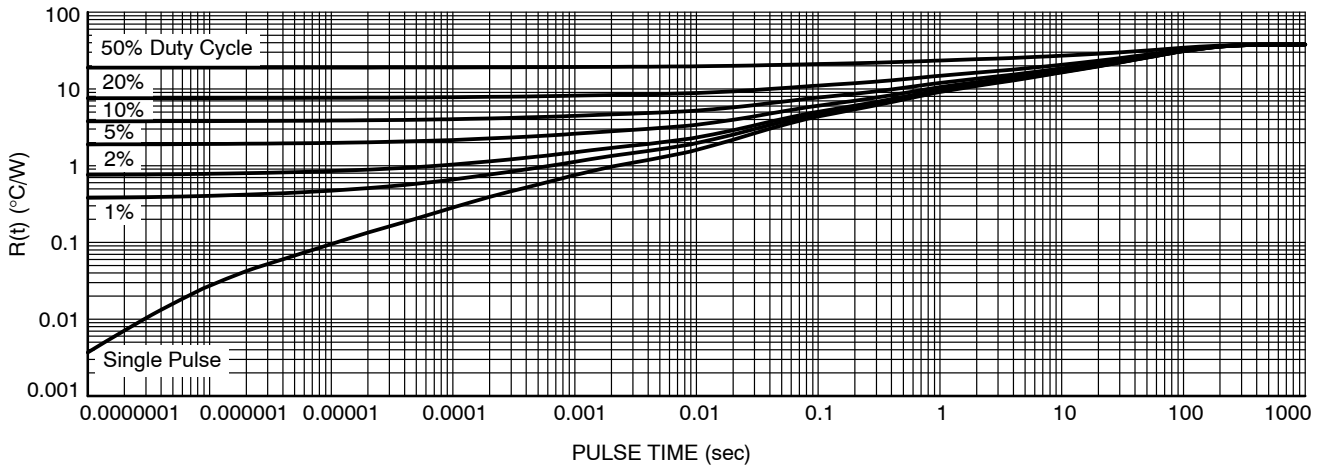


Figure 8. Typical Thermal Characteristics, Junction-to-Ambient

# MECHANICAL CASE OUTLINE

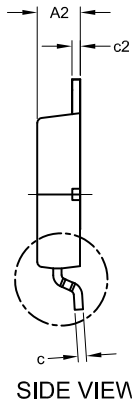
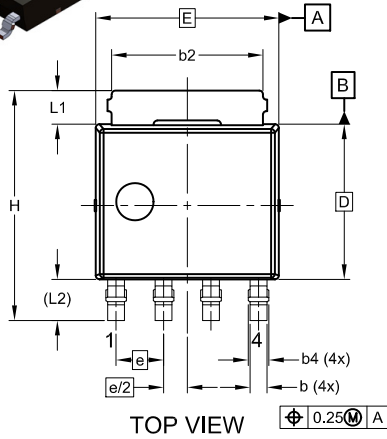
## PACKAGE DIMENSIONS

ON Semiconductor®



### LFLPAK4 4.90x4.15x1.15MM, 1.27P CASE 760AB ISSUE D

DATE 22 MAY 2024

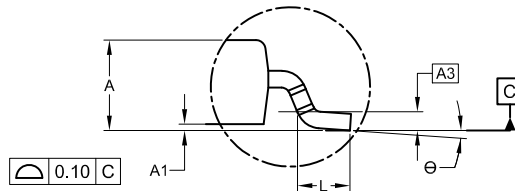


NOTES:

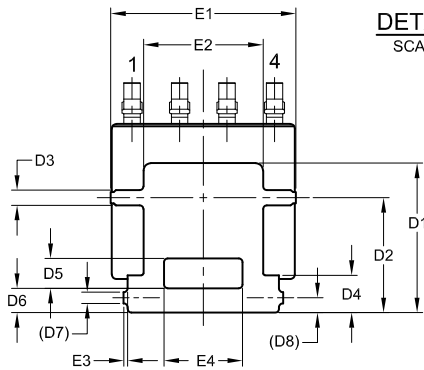
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.150mm PER SIDE.
4. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.

TOP VIEW  $\text{M} \text{ } \text{A} \text{ } 0.25$

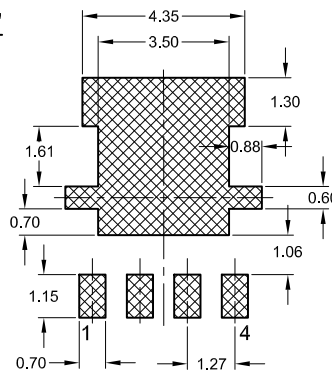
SIDE VIEW



DETAIL 'A'  
SCALE: 2:1



BOTTOM VIEW

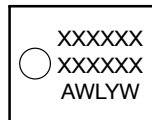


RECOMMENDED LAND PATTERN

MILLIMETER			
DIM	MIN	NOM	MAX
A	1.10	1.20	1.30
A1	0.00	0.08	0.15
A2	1.10	1.15	1.20
A3	0.25 BSC		
b	0.40	0.45	0.50
b2	3.80	4.10	4.40
b4	0.45	0.55	0.65
c	0.19	0.22	0.25
c2	0.19	0.22	0.25
D	4.15 BSC		
D1	3.80	4.00	4.20
D2	3.00	3.10	3.20
D3	0.30	0.40	0.50
D4	0.90	1.00	1.10
D5	0.70	0.80	0.90
D6	0.55	0.65	0.75
D7	0.31 REF		
D8	0.40 REF		
E	4.90 BSC		
E1	4.85	4.95	5.05
E2	3.10	3.20	3.30
E3	0.00	0.10	0.20
E4	2.00	2.10	2.20
e	1.27 BSC		
e/2	0.635 BSC		
e1	0.40 REF		
H	6.00	6.15	6.30
L	0.50	0.70	0.90
L1	0.80	0.90	1.00
L2	1.10 REF		
Θ	0°	4°	8°

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

### GENERIC MARKING DIAGRAM\*



XXXXXX = Specific Device Code  
 A = Assembly Location  
 WL = Wafer Lot  
 Y = Year  
 W = Work Week

\*This information is generic. Please refer to device data sheet for actual part marking. Some products may not follow the Generic Marking.

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DESCRIPTION:	LFLPAK4 4.90x4.15x1.15MM, 1.27P	PAGE 1 OF 1

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