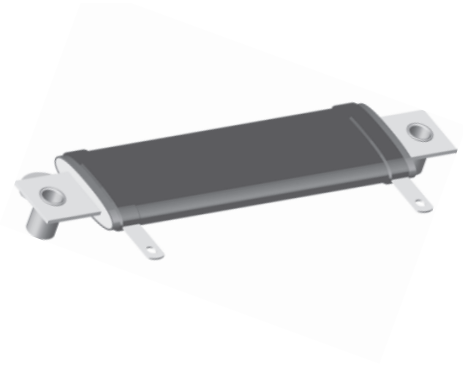
Wirewound Resistors, Industrial Power, Flat (HL)



FEATURES

- High temperature silicon coating
- Mounting accommodations ideally suited to high density packaging
- Self-stacking hardware for horizontal or vertical placement
- Withstands high vibrations without loosening
- Mounting hardware functions as a heat sink allowing greater heat dissipation and less derating of stacked units
- Available in non-inductive styles (type NHL) with Aryton-Perry winding
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free Available

e3

RoHS* Available

HALOGEN FREE Available

GREEN (5-2008) Available

Note

* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details.

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	HISTORICAL MODEL	POWER RATING $P_{25\,°C}$ W	RESISTANCE RANGE Ω ± 5 %	RESISTANCE RANGE Ω ± 10 %	WEIGHT (typical) g
HL024 NHL024	HL-24 NHL-24	30	1.0 to 11K 1.0 to 1.2K	0.10 to 11K 1.0 to 1.2K	20.14
HL035 NHL035	HL-35 NHL-35	40	1.0 to 26K 1.0 to 3K	0.10 to 26K 1.0 to 3K	30.07
HL055 NHL055	HL-55 NHL-55	55	1.0 to 54K 1.0 to 6.8K	0.10 to 54K 1.0 to 6.8K	51.25
HL070 NHL070	HL-70 NHL-70	70	1.0 to 77K 1.0 to 9.4K	0.10 to 77K 1.0 to 9.4K	60.48
HL095 NHL095	HL-95 NHL-95	95	1.0 to 99.9K 1.0 to12.4K	0.10 to 99.9K 1.0 to 12.4K	76.51

TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	HL, NHL FLAT RESISTOR CHARACTERISTICS
Temperature Coefficient	ppm/°C	± 90 for 0.1 Ω to 0.99 Ω; ± 50 for 1 Ω to 9.9 Ω; ± 30 for 10 Ω and above
Dielectric Withstanding Voltage	V_{AC}	1000, from terminal to mounting hardware
Short Time Overload	-	10 x rated power for 5 s
Maximum Working Voltage	V	$(P \times R)^{1/2}$
Insulation Resistance	Ω	1000 MΩ minimum dry, 100 MΩ minimum after moisture test
Operating Temperature Range	°C	-55 to +350

GLOBAL PART NUMBER INFORMATION

Global Part Numbering example: NHL02409Z10R00JJ

N	H	L	0	2	4	0	9	Z	1	0	R	0	0	J	J		

GLOBAL MODEL	TERMINAL DESIGNATION	TERMINAL FINISH	RESISTANCE VALUE	TOLERANCE	PACKAGING CODE	SPECIAL
NHL024 (see "Standard Electrical Specifications" table above for additional P/N's)	**09** **16**	**E** = lead (Pb)-free **Z** = tin / lead **N** = nickel	**R** = decimal **K** = thousand **10R00** = 10.0 Ω **1K000** = 1 kΩ	**J** = ± 5.0 % **K** = ± 10.0 %	**E** = lead (Pb)-free skin pack **J** [1] = skin pack (J01)	(dash number) (up to 2 digits) from **1 to 99** as applicable

Note

[1] Tin / lead for type "Z", lead (Pb)-free for type "N"

Historical Part Number example: NHL-24-09Z 10 Ω 5 % J01

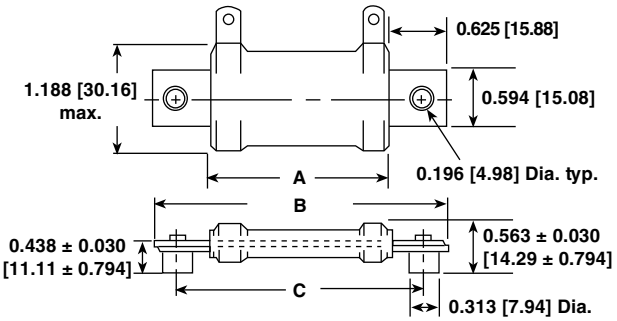
NHL-24	09Z	10 Ω	5 %	J01
HISTORICAL MODEL	TERMINAL/FINISH	RESISTANCE VALUE	TOLERANCE	PACKAGING

For technical questions, contact: ww2dresistors@vishay.com

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DIMENSIONS in inches [millimeters]

TYPE HL FLAT STYLE



MODEL	DIMENSIONS in inches [millimeters]					
	A ± 0.063 [1.59]	B ± 0.063 [1.59]	C ± 0.031 [0.79]	DISTANCE BETWEEN TERMINALS (ref.)	TERMINAL DESIGNATION	
					STANDARD	OPTIONAL
HL024 NHL024	1.250 [31.75]	2.500 [63.50]	2.000 [50.80]	0.718 [18.24]	09Z	16N
HL035 NHL035	2.000 [50.80]	3.250 [82.55]	2.750 [69.85]	1.468 [37.29]	09Z	16N
HL055 NHL055	3.500 [88.90]	4.750 [120.65]	4.250 [107.95]	2.968 [75.39]	09Z	16N
HL070 NHL070	4.750 [120.65]	6.000 [152.40]	5.500 [139.70]	4.218 [107.14]	09Z	16N
HL095 NHL095	6.000 [152.40]	7.250 [184.15]	6.750 [171.45]	5.468 [138.89]	09Z	16N

POWER RATING

Vishay HL flat resistor wattage ratings are based on mounting horizontally to 10" x 10" x 0.04" [254.0 mm x 254.0 mm x 1.02 mm] steel plate in 25 °C ambient with no air flow.

EXCLUSIVE BRACKET DESIGN

Mounting strap fits snugly through resistor core and is bound against unit by two eccentric spacers. The bracket eliminates expensive cements and improves heat transfer and power handling capabilities.

MATERIAL SPECIFICATIONS

Element: copper-nickel alloy of nickel-chrome alloy, depending on resistance value

Core: ceramic, steatite

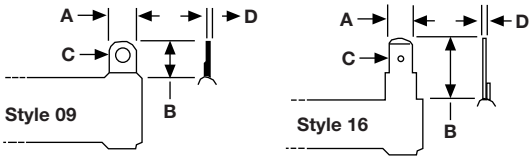
Coating: special high temperature silicone

Standard Terminals: model "E" terminals are tinned steel

Terminal Bands: steel

Part Marking: DALE, model, wattage, value, tolerance, date code

TERMINAL DIMENSIONS



DIMENSION	DIMENSIONS in inches [millimeters]	
	STYLE 09	STYLE 16
A	0.188 [4.76]	0.188 [4.76]
B	0.500 [12.70]	0.563 [14.29]
C	0.104 [2.64]	0.050 [1.27]
D	0.020 [0.51]	0.020 [0.51]

TERMINAL FINISH

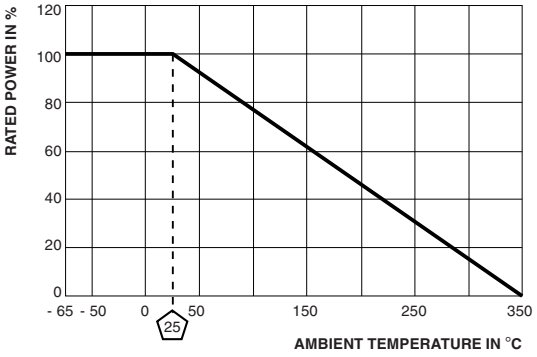
"E" Finish - 100 % Sn coated steel. "Z" Finish - 60/40 Sn/Pb coated steel. "N" Finish - Nickel coated steel. Finish for terminal style 16 is limited to nickel plated steel (N).

NHL NON-INDUCTIVE

Models of equivalent physical and electrical specifications are available with non-inductive (Aryton-Perry) winding. They are identified by adding the letter N to the front of the HL type designation (NHL024, for example). For NHL models maximum resistance values are lower, see STANDARD ELECTRICAL SPECIFICATIONS table.

Derating is required for ambient temperatures above 25 °C per the following graph.

DERATING



PERFORMANCE

TEST	CONDITIONS OF TEST	TEST LIMITS
Thermal Shock	Rated power applied until thermally stable,then a minimum of 15 min at -55 °C	± (2.0 % + 0.05 Ω) ΔR
Short Time Overload	10x rated power for 5 s	± (2.0 % + 0.05 Ω) ΔR
Dielectric Withstanding Voltage	1000 V_{RMS}, 1 min	± (0.1 % + 0.05 Ω) ΔR
Low Temperature Storage	-55 °C for 24 h	± (2.0 % + 0.05 Ω) ΔR
High Temperature Exposure	250 h at + 350 °C	± (2.0 % + 0.05 Ω) ΔR
Moisture Resistance	MIL-STD-202 Method 106, 7b not applicable	± (2.0 % + 0.05 Ω) ΔR
Shock, Specified Pulse	MIL-STD-202 Method 213, 100 *g*'s for 6 ms, 10 shocks	± (0.2 % + 0.05 Ω) ΔR
Vibration, High Frequency	Frequency varied 10 Hz to 2000 Hz, 20 g peak, 2 directions 6 h each	± (0.2 % + 0.05 Ω) ΔR
Load Life	1000 h at rated power, + 25 °C, 1.5 h "ON", 0.5 h "OFF"	± (3.0 % + 0.05 Ω) ΔR

For technical questions, contact: ww2dresistors@vishay.com

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