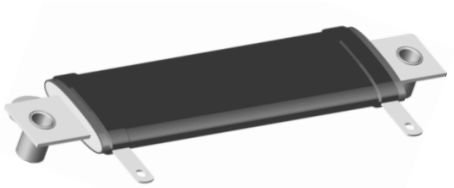
Wirewound Resistors, Industrial Power, Flat (HL), Miniature Flat (HLM)



TYPE HL FLAT STYLE

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 and NHLM) with Aryton-Perry winding

Pb-free Available

e3

RoHS* COMPLIANT

STANDARD ELECTRICAL SPECIFICATIONS

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

TYPE HLM MINIATURE FLAT STYLE

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	HISTORICAL MODEL	POWER RATING $P_{25\ °C}$ W	RESISTANCE RANGE Ω		WEIGHT (typical) g
			± 5 %	± 10 %	
HLM010 NHLM010	HLM-10 NHLM-10	10	1.0 - 15K 1.0 - 1.8K	0.10 - 15K 1.0 - 1.8K	0.41
HLM015 NHLM015	HLM-15 NHLM-15	15	1.0 - 26K 1.0 - 3.6K	0.10 - 26K 1.0 - 3.6K	0.47
HLM020 NHLM020	HLM-20 NHLM-20	20	1.0 - 71K 1.0 - 9.8K	0.10 - 71K 1.0 - 9.8K	0.74

GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: NHLM01010Z10R00JJ (preferred part number format)

N	H	L	M	0	1	0	1	0	Z	1	0	R	0	0	J	J		

GLOBAL MODEL	TERMINAL DESIGNATION	TERMINAL FINISH	RESISTANCE VALUE	TOLERANCE	PACKAGING CODE	SPECIAL
NHLM010 (See "Standard Electrical Specifications" table above for additional P/N's)	**09** **10** **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*** = Skin pack (J01)	(Dash Number) (up to 2 digits) From **1 - 99** as applicable

* Tin/lead for type "Z", lead (Pb)-free for type "N"

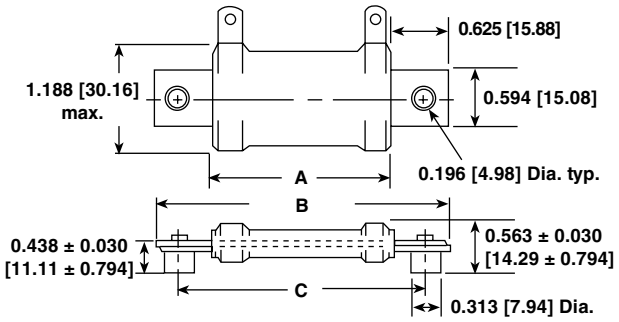
Historical Part Number Example: NHLM-10-10Z 10 Ω 5 % J01 (will continue to be accepted)

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

* Pb containing terminations are not RoHS compliant, exemptions may apply

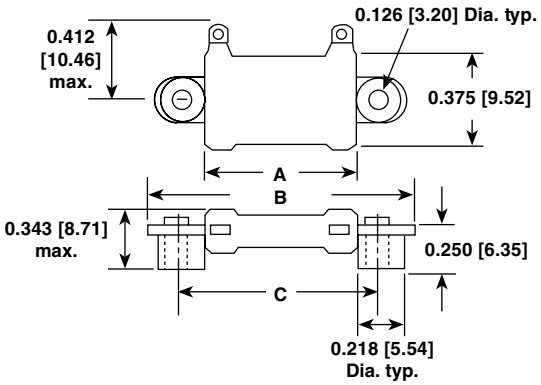
DIMENSIONS in inches [millimeters]

TYPE HL FLAT STYLE



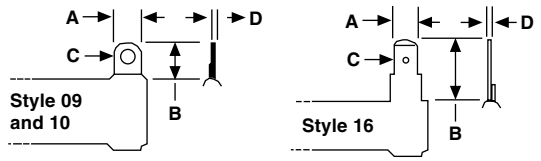
MODEL	DIMENSIONS in inches [millimeters]					
	A ± 0.063 [1.59]	B ± 0.063 [1.59]	C ± 0.031 [0.79]	DISTANCE BETWEEN TERMINALS (REF.)	TERMINAL DESIGNATION	
					STANDARD	OPTIONAL
HL024 NHL024	1.250 [31.75]	2.500 [63.50]	2.000 [50.80]	0.718 [18.24]	09Z	16N
HL035 NHL035	2.000 [50.80]	3.250 [82.55]	2.750 [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

TYPE HLM MINIATURE 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.)	STANDARD TERMINAL DESIGNATION
HLM010 NHLM010	0.750 [19.05]	1.312 [33.32]	1.000 [25.40]	0.406 [10.31]	10Z
HLM015 NHLM015	1.000 [25.40]	1.562 [39.67]	1.250 [31.75]	0.656 [16.66]	10Z
HLM020 NHLM020	2.062 [52.37]	2.625 [66.68]	2.313 [58.75]	1.718 [43.64]	10Z

TERMINAL DIMENSIONS



DIMENSION	DIMENSIONS in inches [millimeters]		
	TERMINAL TYPE		
	TERM 09	TERM 10	TERM 16
A	0.188 [4.76]	0.125 [3.18]	0.188 [4.76]
B	0.500 [12.70]	0.188 [4.76]	0.563 [14.29]
C	0.104 [2.64]	0.063 [1.60]	0.050 [1.27]
D	0.020 [0.51]	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).

TECHNICAL SPECIFICATIONS		
PARAMETER	**UNIT**	**HL, HLM 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

POWER RATING

Vishay HL flat and HLM 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 “Z” terminals are tinned steel

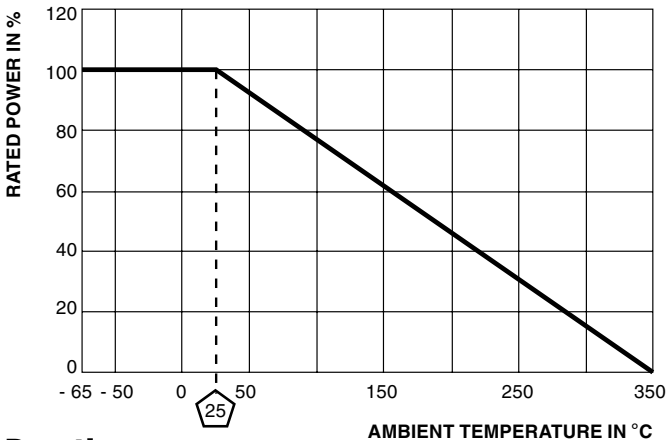
Terminal Bands: Steel

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

NHL, NHLM 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 and HLM type designation (NHLM020, for example). For NHL and NHLM 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) Δ*R*
Short Time Overload	10 x rated power for 5 s	± (2.0 % + 0.05 Ω) Δ*R*
Dielectric Withstanding Voltage	1000 V_{rms}, 1 min	± (0.1 % + 0.05 Ω) Δ*R*
Low Temperature Storage	- 55 °C for 24 h	± (2.0 % + 0.05 Ω) Δ*R*
High Temperature Exposure	250 h at + 350 °C	± (2.0 % + 0.05 Ω) Δ*R*
Moisture Resistance	MIL-STD-202 Method 106, 7b not applicable	± (2.0 % + 0.05 Ω) Δ*R*
Shock, Specified Pulse	MIL-STD-202 Method 213, 100 g's for 6 ms, 10 shocks	± (0.2 % + 0.05 Ω) Δ*R*
Vibration, High Frequency	Frequency varied 10 to 2000 Hz, 20 g peak, 2 directions 6 h each	± (0.2 % + 0.05 Ω) Δ*R*
Load Life	1000 h at rated power, + 25 °C, 1.5 h “ON”, 0.5 h “OFF”	± (3.0 % + 0.05 Ω) Δ*R*

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