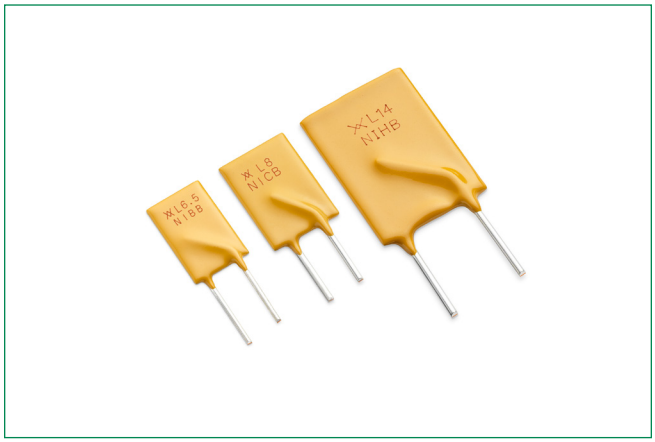
PolySwitch® Resettable PTCs

Radial Leaded > AHRL Series

HF RoHS Pb AUTOMOTIVE GRADE



Additional Information

Resources | Accessories | Samples

Agency Approvals

Agency	Agency File Number
®	E74889

Description

The AHRL Series is a PPTC resettable device with compact size designed for the automotive industry. It is a 16 V high-temperature, lead-free, radial leaded resettable device that meets Littelfuse's Automotive qualification. This qualification is based on AEC-Q200, Stress Test Qualification for Passive Components.

Features

- Compact size (Width and Height)
- Wide range of hold current ratings (3.5 A~15 A) with low thermal derating
- Operating temperature up to 125° C
- AEC-Q200 compliant
- RoHS compliant, Lead-free, and Halogen-free

Benefits

- Resettable overcurrent circuit protection device
- Applicable for Automotive and General Electronics applications with limited space
- Compatible with high-volume electronics assembly
- Customization of leaded type available to facilitate customer design

Applications

- Motor and motor circuit protection including power door- locks, mirrors, lumbar umps,seats, sunroofs, and windows
- Electronic Control Unit (ECU) I/O protection
- Heating, Ventilation and Cooling (HVAC) motor and I/O protection
- Telematics, infotainment and navigations systems
- Liquid Crystal Display (LCD) back-light heaters
- Power and cigarette lighter outlets, plugs and adapter/chargers
- Powered networks and buses
- Air-flow detection and overcurrent protection in HVAC and cooling fan systems
- Stall detection in express window and sunroof circuits
- Resettable overcurrent protection for power distribution, electrical centers and junction boxes
- Wire downsizing
- Motor electromagnetic interference (EMI) suppression
- Electrostatic discharge (ESD) damage protection
- Load dump and other transient voltage protection

© 2022 Littelfuse, Inc.
Specifications are subject to change without notice.
Revised: GD. 03/08/22

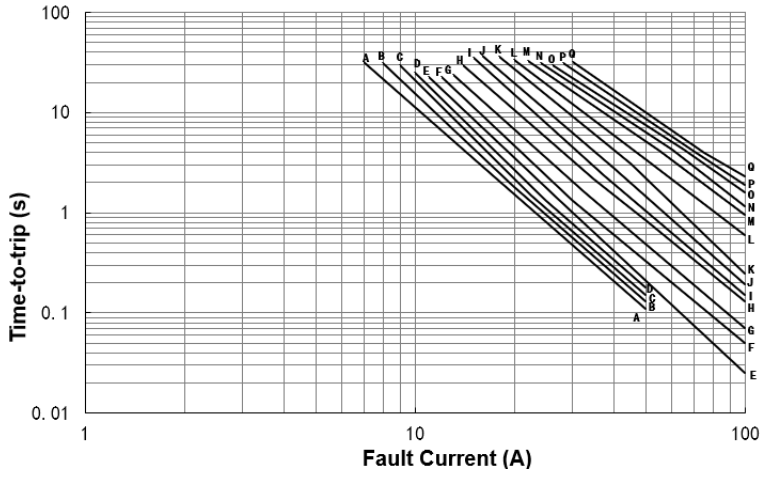
PolySwitch® Resettable PTCs

Radial Leaded > AHRL Series

Electrical Characteristics

Part Number	Ordering Part Number	I_H(A) (R_{1MAX})	I_H(A) (R_{aMAX})	I_T (A)	V_{MAX} (V_{DC})	I_{MAX} (A)	$P_{D\,Typ}$ (W)	Max Time-to-trip (A)	Max Time-to-trip (s)	R_{MIN} (Ω)	R_{MAX} (Ω)	R_{1MAX} (Ω)	Lead Size (mm^2/AWG)
AHRL (High Temperature) – 16 V													
AHRL350	RF4989-000	3.5	3.5	7.0	16	50	3.0	17.5	4.5	0.0180	0.0320	0.0500	0.320/22
AHRL400	RF4990-000	4.0	4.0	8.0	16	50	3.3	20.0	5.0	0.0160	0.0280	0.0440	0.320/22
AHRL450	RF4991-000	4.5	4.5	9.0	16	50	3.5	22.5	5.5	0.0145	0.0260	0.0400	0.520/20
AHRL500	RF4992-000	5.0	5.0	10.0	16	50	3.5	25.0	5.8	0.0135	0.0240	0.0380	0.520/20
AHRL550	RF4993-000	5.5	5.5	11.0	16	50	3.3	27.5	6.0	0.0120	0.0220	0.0340	0.520/20
AHRL600	RF4894-000	6.0	6.0	13.0	16	50	3.0	30.0	6.5	0.0090	0.0140	0.0252	0.520/20
AHRL650	RF4994-000	6.5	6.5	13.0	16	50	3.3	32.5	6.5	0.0095	0.0150	0.0225	0.520/20
AHRL700	RF4995-000	7.0	7.0	14.0	16	100	3.7	35.0	6.8	0.0085	0.0140	0.0190	0.520/20
AHRL750	RF4996-000	7.5	7.5	15.0	16	100	4.0	37.5	7.0	0.0073	0.0125	0.0168	0.520/20
AHRL800	RF4997-000	8.0	8.0	16.0	16	100	4.3	40.0	8.0	0.0060	0.0105	0.0145	0.823/18
AHRL900	RF4998-000	9.0	9.0	18.0	16	100	5.0	45.0	9.0	0.0046	0.0075	0.0098	0.823/18
AHRL1000	RF4999-000	10.0	10.0	20.0	16	100	5.4	50.0	10.0	0.0042	0.0068	0.0090	0.823/18
AHRL1100	RF5000-000	11.0	11.0	22.0	16	100	5.7	55.0	11.2	0.0038	0.0063	0.0083	0.823/18
AHRL1200	RF5001-000	12.0	12.0	24.0	16	100	6.0	60.0	12.5	0.0035	0.0058	0.0077	0.823/18
AHRL1300	RF5002-000	13.0	13.0	26.0	16	100	6.4	65.0	14.0	0.0033	0.0053	0.0070	0.823/18
AHRL1400	RF5003-000	14.0	14.0	28.0	16	100	6.7	70.0	16.0	0.0031	0.0048	0.0064	0.823/18
AHRL1500	RF5004-000	15.0	15.0	30.0	16	100	7.0	75.0	18.0	0.0029	0.0043	0.0056	0.823/18

Typical Time-to-Trip Curves at 25° C



Curve	Part Number
A	AHRL350
B	AHRL400
C	AHRL450
D	AHRL500
E	AHRL550
F	AHRL600
G	AHRL650
H	AHRL700
I	AHRL750
J	AHRL800
K	AHRL900
L	AHRL1000
M	AHRL1100
N	AHRL1200
O	AHRL1300
P	AHRL1400
Q	AHRL1500

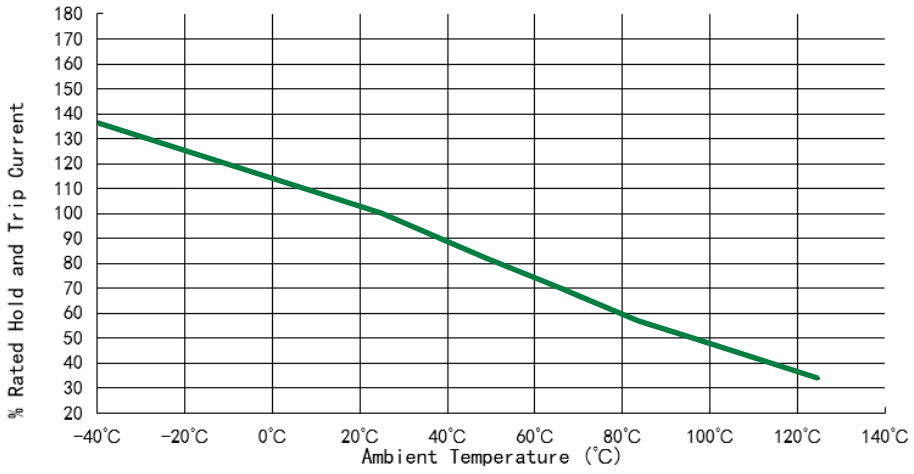
© 2022 Littelfuse, Inc.
Specifications are subject to change without notice.
Revised: GD. 03/08/22

PolySwitch® Resettable PTCs
Radial Leaded > AHRL Series

Temperature Derating

Part Number	Maximum Ambient Temperature										
	-40° C	-20° C	0° C	20° C	25° C	40° C	50° C	60° C	70° C	85° C	125° C
	AHRL (High Temperature) – 16 V										
AHRL350	4.85	4.45	4.05	3.60	3.50	3.15	2.90	2.65	2.40	2.00	1.30
AHRL400	5.60	5.10	4.70	4.10	4.00	3.60	3.30	3.00	2.70	2.30	1.45
AHRL450	6.20	5.60	5.10	4.60	4.50	4.00	3.70	3.35	3.00	2.50	1.60
AHRL500	6.85	6.25	5.65	5.15	5.00	4.45	4.05	3.70	3.30	2.80	1.75
AHRL550	7.50	6.90	6.20	5.70	5.50	4.90	4.40	4.00	3.70	3.10	1.90
AHRL600	8.20	7.50	6.80	6.20	6.00	5.30	4.90	4.40	4.00	3.30	2.05
AHRL650	8.80	8.10	7.40	6.70	6.50	5.70	5.30	4.80	4.30	3.60	2.20
AHRL700	9.50	8.70	8.00	7.20	7.00	6.20	5.60	5.20	4.70	3.90	2.35
AHRL750	10.20	9.40	8.60	7.70	7.50	6.60	6.10	5.60	5.00	4.10	2.50
AHRL800	10.90	10.00	9.10	8.20	8.00	7.10	6.40	5.90	5.30	4.40	2.70
AHRL900	12.20	11.20	10.20	9.30	9.00	8.00	7.20	6.60	6.00	5.00	3.00
AHRL1000	13.60	12.50	11.40	10.30	10.00	8.80	8.10	7.40	6.60	5.50	3.30
AHRL1100	14.90	13.70	12.50	11.30	11.00	9.70	8.80	8.10	7.30	6.10	3.60
AHRL1200	16.30	15.00	13.65	12.35	12.00	10.55	9.65	8.85	7.95	6.65	3.90
AHRL1300	17.70	16.30	14.80	13.40	13.00	11.40	10.50	9.60	8.60	7.20	4.20
AHRL1400	19.10	17.60	15.95	14.45	14.00	12.25	11.35	10.35	9.25	7.75	4.50
AHRL1500	20.30	18.80	17.10	15.50	15.00	13.10	12.20	11.10	9.70	8.10	4.80

Temperature Derating Curve



© 2022 Littelfuse, Inc.
Specifications are subject to change without notice.
Revised: GD. 03/08/22

PolySwitch® Resettable PTCs
Radial Leaded > AHRL Series

Physical Specifications

Lead Material	AHRL350 to AHRL400: Tin-plated Copper, 0.320 mm² (22 AWG), ø 0.64 mm/0.025 in
	AHRL450 to AHRL750: Tin-plated Copper 0.520 mm² (20 AWG), ø 0.81 mm/0.032 in
	AHRL800 to AHRL1500: Tin-plated Copper 0.823 mm² (18 AWG), ø 1.0 mm/0.040 in
Soldering Characteristics	Solderability per ANSI/J-STD 002 Category 3
Solder Heat Withstand	Per IEC 60068-2-20, Test Tb, Method 1; Can withstand 10s at 260° C ± 5° C
Insulating Material	Cured, Flame-retardant Epoxy Polymer; Meets ANSI/UL 94 V-0
Operation Temperature	-40° C~125° C

Notes
See AEC-Q200 for other physical characteristics.
Devices are not designed to be placed through a reflow process.

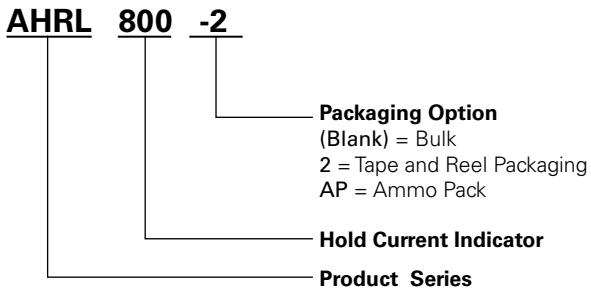
Environmental Specifications

Passive Aging	70° C, 1000 hrs	±5%
	85° C, 1000 hrs	±5%
Humidity Aging	85° C, 85% R.H., 1000 hrs	±5%
Thermal Shock	125° C, -40° C 10 times	±5%
Solvent Resistance	MIL-STD-202, Method 215	No change

Note
See AEC-Q200 for other environmental specifications.

Moisture Resistance Level	Level 1, J-STD-020
Storage Conditions	40°C max, 70% RH max; devices should remain in original sealed bags prior to use. Devices may not meet specified values if these storage conditions are exceeded.

Part Numbering System

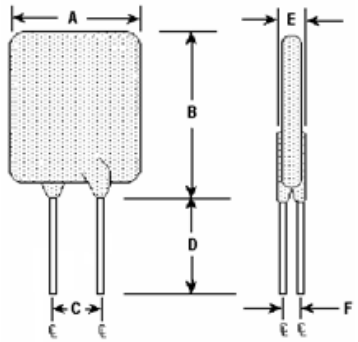


© 2022 Littelfuse, Inc.
Specifications are subject to change without notice.

PolySwitch® Resettable PTCs

Radial Leaded > AHRL Series

Product Dimension



Part Number	Dimensions in Millimeters (Inches)										
	A		B		C		D		E		F
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Typ
	AHRL (High Temperature) – 16 V										
AHRL350	–	8.4 (0.33)	–	12.4 (0.49)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	–	–	3.0 (0.12)	1.0 (0.04)
AHRL400	–	8.4 (0.33)	–	13.4 (0.53)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	–	–	3.0 (0.12)	1.0 (0.04)
AHRL450	–	8.4 (0.33)	–	14.1 (0.56)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	–	–	3.0 (0.12)	1.2 (0.05)
AHRL500	–	9.2 (0.36)	–	14.1 (0.56)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	–	–	3.0 (0.12)	1.2 (0.05)
AHRL550	–	9.4 (0.37)	–	14.4 (0.57)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	–	–	3.0 (0.12)	1.2 (0.05)
AHRL600	–	8.75 (0.34)	–	16.0 (0.63)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	–	–	3.0 (0.12)	1.2 (0.05)
AHRL650	–	10.7 (0.42)	–	17.4 (0.69)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	–	–	3.0 (0.12)	1.2 (0.05)
AHRL700	–	11.8 (0.46)	–	17.4 (0.69)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	–	–	3.0 (0.12)	1.2 (0.05)
AHRL750	–	11.8 (0.46)	–	19.0 (0.75)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	–	–	3.0 (0.12)	1.2 (0.05)
AHRL800	–	12.8 (0.50)	–	20.4 (0.80)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	–	–	3.6 (0.14)	1.4 (0.06)
AHRL900	–	14.4 (0.57)	–	21.4 (0.84)	9.4 (0.37)	10.9 (0.43)	7.6 (0.30)	–	–	3.6 (0.14)	1.4 (0.06)
AHRL1000	–	14.4 (0.57)	–	22.4 (0.88)	9.4 (0.37)	10.9 (0.43)	7.6 (0.30)	–	–	3.6 (0.14)	1.4 (0.06)
AHRL1100	–	17.4 (0.69)	–	22.4 (0.88)	9.4 (0.37)	10.9 (0.43)	7.6 (0.30)	–	–	3.6 (0.14)	1.4 (0.06)
AHRL1200	–	17.4 (0.69)	–	23.4 (0.92)	9.4 (0.37)	10.9 (0.43)	7.6 (0.30)	–	–	3.6 (0.14)	1.4 (0.06)
AHRL1300	–	17.4 (0.69)	–	24.8 (0.98)	9.4 (0.37)	10.9 (0.43)	7.6 (0.30)	–	–	3.6 (0.14)	1.4 (0.06)
AHRL1400	–	17.4 (0.69)	–	26.4 (1.04)	9.4 (0.37)	10.9 (0.43)	7.6 (0.30)	–	–	3.6 (0.14)	1.4 (0.06)
AHRL1500	–	18.4 (0.72)	–	26.4 (1.04)	9.4 (0.37)	10.9 (0.43)	7.6 (0.30)	–	–	3.6 (0.14)	1.4 (0.06)

© 2022 Littelfuse, Inc.
Specifications are subject to change without notice.
Revised: GD. 03/08/22

PolySwitch® Resettable PTCs
Radial Leaded > AHRL Series

Packaging and Marking Information

Part Number	Bag Quantity	Tape and Reel Quantity	Ammo Pack Quantity	Standard Package Quantity	Part Marking	Agency Recognition
	AHRL (High Temperature) – 16 V					
AHRL350	500	—	—	10,000	L3.5	UL
AHRL350-2	—	2,500	—	12,500	L3.5	UL
AHRL350-AP	—	—	2,500	12,500	L3.5	UL
AHRL400	500	—	—	10,000	L4	UL
AHRL400-2	—	2,500	—	12,500	L4	UL
AHRL400-AP	—	—	2,500	12,500	L4	UL
AHRL450	500	—	—	10,000	L4.5	UL
AHRL450-2	—	2,500	—	12,500	L4.5	UL
AHRL450-AP	—	—	2,500	12,500	L4.5	UL
AHRL500	500	—	—	10,000	L5	UL
AHRL500-2	—	2,500	—	12,500	L5	UL
AHRL500-AP	—	—	2,500	12,500	L5	UL
AHRL550	500	—	—	10,000	L5.5	UL
AHRL550-2	—	2,500	—	12,500	L5.5	UL
AHRL550-AP	—	—	2,500	12,500	L5.5	UL
AHRL600	500	—	—	10,000	L6	UL
AHRL600-2	—	2,500	—	12,500	L6	UL
AHRL600-AP	—	—	2,500	12,500	L6	UL
AHRL650	500	—	—	10,000	L6.5	UL
AHRL650-2	—	2,500	—	12,500	L6.5	UL
AHRL650-AP	—	—	2,500	12,500	L6.5	UL
AHRL700	500	—	—	10,000	L7	UL
AHRL700-2	—	1,500	—	7,500	L7	UL
AHRL700-AP	—	—	1,500	7,500	L7	UL
AHRL750	500	—	—	10,000	L7.5	UL
AHRL750-2	—	1,500	—	7,500	L7.5	UL
AHRL750-AP	—	—	1,500	7,500	L7.5	UL
AHRL800	500	—	—	10,000	L8	UL
AHRL800-2	—	1,500	—	7,500	L8	UL
AHRL800-AP	—	—	1,500	7,500	L8	UL

Note
These devices are intended for use in automotive applications.

© 2022 Littelfuse, Inc.
Specifications are subject to change without notice.
Revised: GD. 03/08/22

PolySwitch® Resettable PTCs
Radial Leaded > AHRL Series

Packaging and Marking Information

Part Number	Bag Quantity	Tape and Reel Quantity	Ammo Pack Quantity	Standard Package Quantity	Part Marking	Agency Recognition
	AHRL (High Temperature) – 16 V					
AHRL900	250	—	—	5,000	L9	UL
AHRL900-2	—	1,500	—	7,500	L9	UL
AHRL900-AP	—	—	1,500	7,500	L9	UL
AHRL1000	250	—	—	5,000	L10	UL
AHRL1000-2	—	1,500	—	7,500	L10	UL
AHRL1000-AP	—	—	1,500	7,500	L10	UL
AHRL1100	250	—	—	5,000	L11	UL
AHRL1100-2	—	1,000	—	5,000	L11	UL
AHRL1100-AP	—	—	1,000	5,000	L11	UL
AHRL1200	250	—	—	5,000	L12	UL
AHRL1200-2	—	1,000	—	5,000	L12	UL
AHRL1200-AP	—	—	1,000	5,000	L12	UL
AHRL1300	250	—	—	5,000	L13	UL
AHRL1300-2	—	1,000	—	5,000	L13	UL
AHRL1300-AP	—	—	1,000	5,000	L13	UL
AHRL1400	250	—	—	5,000	L14	UL
AHRL1400-2	—	1,000	—	5,000	L14	UL
AHRL1400-AP	—	—	1,000	5,000	L14	UL
AHRL1500	250	—	—	5,000	L15	UL
AHRL1500-2	—	1,000	—	5,000	L15	UL
AHRL1500-AP	—	—	1,000	5,000	L15	UL

Note
These devices are intended for use in automotive applications.

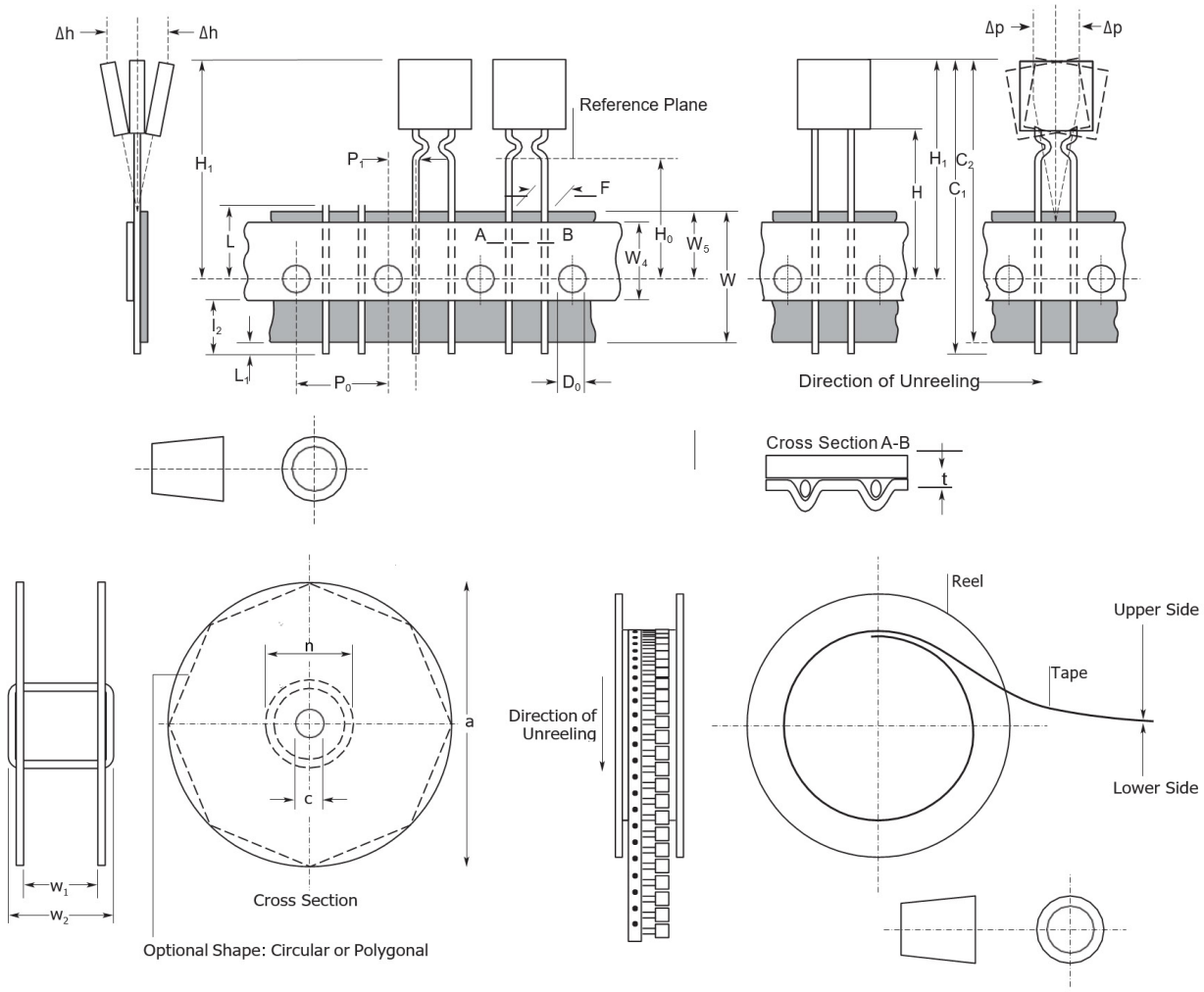
Warning

- Users should independently evaluate the suitability of and test each product selected for their own application.
- Operation beyond the maximum ratings or improper use may result in device damage and possible electrical arcing and flame.
- These devices are intended for protection against damage caused by occasional overcurrent or overtemperature fault conditions and should not be used when repeated fault conditions or prolonged trip events are anticipated.
- Contamination of the PPTC material with certain silicone-based oils or some aggressive solvents can adversely impact the performance of the devices.
- Device performance can be impacted negatively if devices are handled in a manner inconsistent with recommended electronic, thermal, and mechanical procedures for electronic components.
- PPTC devices are not recommended for installation in applications where the device is constrained such that its PTC properties are inhibited, for example in rigid potting materials or in rigid housings, which lack adequate clearance to accommodate device expansion.
- Operation in circuits with a large inductance can generate a circuit voltage (Ldi/dt) above the rated voltage of the device.

© 2022 Littelfuse, Inc.
Specifications are subject to change without notice.
Revised: GD. 03/08/22

PolySwitch® Resettable PTCs
Radial Leaded > AHRL Series

Tape and Reel Specifications



Note
AHRL devices are available in tape and reel packaging per EIA468-B/IEC286-2 and EIA 481-2 standards.

© 2022 Littelfuse, Inc.
Specifications are subject to change without notice.
Revised: GD. 03/08/22

PolySwitch® Resettable PTCs
Radial Leaded > AHRL Series

Description	EIA Mark	Dimension (mm)	Tolerance
Carrier Tape Width	**W**	18.0	-0.5/+1.0
Hold Down Tape Width	**W_4**	11.0	Minimum
Top Distance between Tape Edges	**W_6**	3.0	Maximum
Sprocket Hole Position	**W_5**	9.0	-0.5/+0.75
Sprocket Hole Diameter	**D_0**	4.0	±0.2
Abscissa to plane (Straight lead) (AHRL350 to AHRL1500)	**H**	18.5	±2.5
Abscissa to Plane (Kinked Lead) (AHRL350 to AHRL1500)	**H_0**	16.0	±0.5
Abscissa to Top (AHRL350 to AHRL600)	**H_1**	32.2	Maximum
Abscissa to Top (AHRL650 to AHRL1500*)	**H_1**	45.0	Maximum
Overall Width with Lead Protrusion (AHRL350 to AHRL600)	**C_1**	43.2	Maximum
Overall Width with Lead Protrusion (AHRL650 to AHRL1500)	**C_1**	55.0	Maximum
Overall Width without Lead Protrusion (AHRL350 to AHRL600)	**C_2**	42.5	Maximum
Overall Width without Lead Protrusion (AHRL650 to AHRL1500)	**C_2**	54.0	Maximum
Lead Protrusion	**L_1**	1.0	Maximum
Protrusion of Cut-out	**L**	11.0	Maximum
Protrusion Beyond Hold-Down Tape	**I_2**	Not specified	—
Sprocket Hole Pitch	**P_0**	12.7	± 0.3
Device Pitch (AHRL350 to AHRL650)	—	12.7	± 0.3
Device Pitch (AHRL700 to AHRL1500)	—	25.4	± 0.6
Pitch Tolerance	—	20 consec.	± 0.1
Tape Thickness	**t**	0.9	Maximum
Overall Tape and Lead Thickness (AHRL350 to AHRL750*)	**t_1**	2.0	Maximum
Overall Tape and Lead Thickness (AHRL800 to AHRL1500*)	**t_1**	2.3	Maximum
Splice Sprocket Hole Alignment	—	0	± 0.3
Body Lateral Deviation	**Δ_h**	0	± 1.0
Body Tape Plane Deviation	**Δ_p**	0	± 1.3
Ordinate to Adjacent Component Lead (AHRL350 to AHRL800)	**P_1**	3.81	± 0.7
Ordinate to Adjacent Component Lead (AHRL900 to AHRL1500)	**P_1**	7.62	± 0.7
Lead Spacing (AHRL350 to AHRL800*)	**F**	5.05	± 0.75
Lead Spacing (AHRL900 to AHRL1500*)	**F**	10.15	± 0.75
Reel Width (AHRL350 to AHRL600)	**w_2**	56.0	Maximum
Reel Width(AHRL650 to AHRL1500*)	**w_2**	63.5	Maximum
Reel Diameter	**A**	370.0	Maximum
Arbor Hold Diameter	**c**	26.0	±12.0
Core Diameter*	**n**	91.0	Maximum
Box	—	64/372/362	Maximum
Consecutive Missing Places	—	None	—
Empty Places per Reel	—	0.1%	Maximum

Note
Differs from EIA specification.

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at https://www.littelfuse.com/legal/disclaimers/polyswitch-products.aspx.

© 2022 Littelfuse, Inc.
Specifications are subject to change without notice.
Revised: GD. 03/08/22