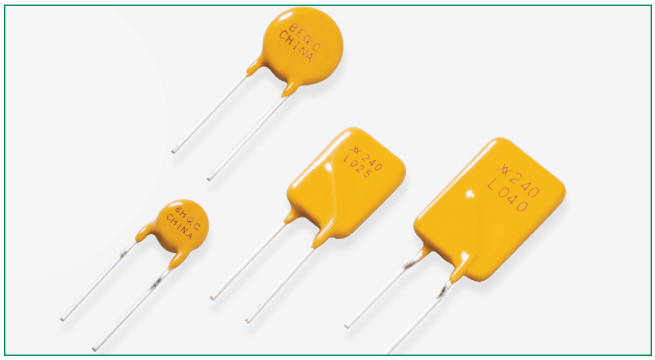
Line-Voltage-Rated Devices



Agency Approvals

Agency	Agency File Number
	E74889
	78165
	72161781
	CQC16001159721

Applications

- Electromagnetic loads
- Game machines
- Industrial controls
- Lighting ballasts
- Loudspeakers
- Medical equipment
- Motors, fans and blowers
- POS equipment
- Satellite video receivers
- Security and fire alarm systems
- Test and measurement equipment
- Transformers
- USB hubs, ports and peripherals
- Intelligent appliance
- Robotic machine

Description

Littelfuse PolySwitch line-voltage-rated (LVR) devices help protect electric motors and transformers used in commercial and home appliances from damage caused by mechanical overloads, overheating, stall, lost neutral and other potentially harmful conditions.

The LVR line-voltage product line of polymeric positive temperature coefficient (PPTC) devices includes components that are rated for line voltages of $120V_{AC}$, V_{DC} and $240V_{AC}$, V_{DC} for up to 2A of operating current at 20°C. They help protect against damage caused by both overcurrent surges and overtemperature faults. They also offer low resistance and are compatibly sized with fuse solutions.

Features

- RoHS and Halogen-free compliant
- Broadest range of radial-leaded resettable devices available in the industry
- Current ratings from 50mA to 2A
- Line voltage rating of $120V_{AC}$, V_{DC} and $240V_{AC}$, V_{DC}
- Fast time-to-trip
- Low resistance
- UL Recognized to UL 1434
- CSA Approved to CSA TIL No. CA-3A
- TUV Approved to EN 60730-1
- CQC Approved to GB 8898, GB/T 7153, GB 14536.1

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics

Part Number	Ordering Part Number	I_H	I_T	V_{MAX}†		I_{MAX}†	$P_{D\ Typ}$	Max Time-to-trip		R_{MIN}	R_{MAX}	R_{1MAX}	Lead Size (mm^2/ AWG)
				Operating	Interrupt	Interrupt							
		(A)	(A)	(V_{AC}, V_{DC})	(V_{AC}, V_{DC})	(A)	(W)	(A)	(s)	(Ω)	(Ω)	(Ω)	
LVR													
LVR005NK LVR005NS	RF1251-000 RF1245-000	0.05	0.12	240	265	1.0	0.9	0.25	10.0	18.5	31.0	65.0	0.51/24
				120	135	20.0							
LVR008NK LVR008NS	RF1252-000 RF1246-000	0.08	0.19	240	265	1.2	0.9	0.40	10.0	7.4	12.0	26.0	0.51/24
				120	135	20.0							

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Electrical Characteristics (Cont'd)

Part Number	Ordering Part Number	I_H	I_T	V_{MAX}†		I_{MAX}†	$P_{D\ Typ}$	Max Time-to-trip		R_{MIN}	R_{MAX}	R_{1MAX}	Lead Size (mm^2/ AWG)
				Operating	Interrupt	Interrupt							
		(A)	(A)	(V_{AC}, V_{DC})	(V_{AC}, V_{DC})	(A)	(W)	(A)	(s)	(Ω)	(Ω)	(Ω)	
LVR													
LVR012K LVR012S	122814-000 D63011-000	0.12	0.30	240	265	1.2	1.0	0.60	15.0	3.0	6.5	12.0	0.51/24
				120	135	20.0							
LVR016K LVR016S	887538-000 224962-000	0.16	0.37	240	265	2.0	1.4	0.80	15.0	2.5	4.1	7.8	0.51/24
				120	135	20.0							
LVR025K LVR025S	657076-000 543478-000	0.25	0.56	240	265	3.5	1.5	1.25	18.5	1.3	2.1	3.8	0.64/22
				120	135	20.0							
LVR033K LVR033S	F74007-000 F71843-000	0.33	0.74	240	265	4.5	1.7	1.65	21.0	0.77	1.24	2.60	0.64/22
				120	135	20.0							
LVR040K LVR040S	598204-000 336638-000	0.40	0.90	240	265	5.5	2.0	2.00	24.0	0.60	0.97	1.90	0.64/22
				120	135	20.0							
LVR055K LVR055S	F17956-000 758968-000	0.55	1.25	240	265	7.0	3.4	2.75	26.0	0.45	0.73	1.45	0.81/20
				120	135	20.0							
LVR075K-240 LVR075S-240	RF4176-000 RF3174-000	0.75	1.50	240	265	7.5	2.6	3.75	18.0	0.316	0.483	0.839	0.81/20
LVR100K-240 LVR100S-240	RF4177-000 RF3175-000	1.00	2.00	240	265	10.0	2.9	5.00	21.0	0.218	0.334	0.580	0.81/20
LVR125K-240 LVR125S-240	RF4178-000 RF3176-000	1.25	2.50	240	265	12.5	3.3	6.25	23.0	0.165	0.253	0.440	0.81/20
LVR200K-240 LVR200S-240	RF4179-000 RF3177-000	2.00	4.00	240	265	20.0	4.5	10.00	28.0	0.089	0.131	0.221	0.81/20

Notes:

I_H : Hold current: maximum current device will pass without interruption in 20°C still air.
I_T : Trip current: minimum current that will switch the device from low resistance to high resistance in 20°C still air.
V_{MAX} Operating : Maximum continuous voltage device can withstand without damage at rated current.
V_{MAX} Interrupt : Under specified conditions this is the highest voltage that can be applied to the device at the maximum interrupt current.
I_{MAX} Interrupt : Maximum fault current device can withstand without damage at rated voltage.
P_D : Power dissipated from device when in the tripped state in 20°C still air.
R_{MIN} : Minimum resistance of device as supplied at 20°C unless otherwise specified.
R_{MAX} : Maximum resistance of device as supplied at 20°C unless otherwise specified.
R_{1MAX} : Maximum resistance of device when measured one hour post trip at 20°C unless otherwise specified.
* Electrical characteristics determined at 25°C.
† See Application Limitations on next page.

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Temperature Rerating

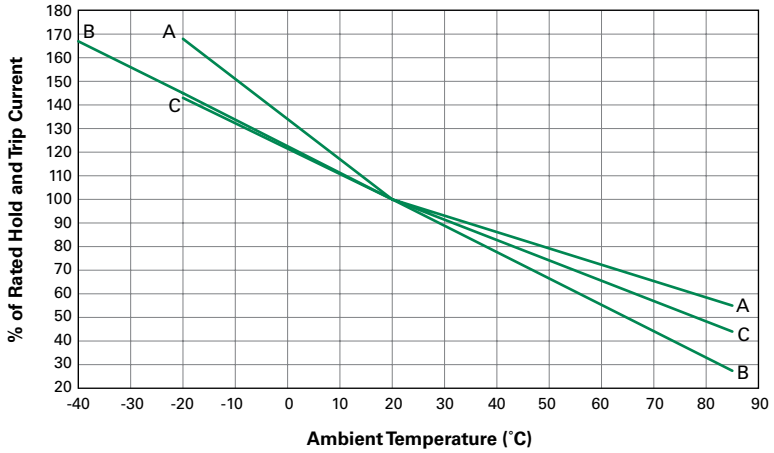
Maximum Ambient Temperature										
	-40°C	-20°C	0°C	20°C	25°C	40°C	50°C	60°C	70°C	85°C
Hold Current (A)										
LVR										
LVR005N	—	0.08	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.02
LVR008N	—	0.12	0.10	0.08	0.08	0.07	0.06	0.05	0.04	0.03
LVR012	—	0.18	0.15	0.12	0.12	0.10	0.09	0.07	0.06	0.04
LVR016	—	0.24	0.20	0.16	0.16	0.13	0.11	0.10	0.08	0.05
LVR025	—	0.38	0.32	0.25	0.25	0.21	0.18	0.15	0.13	0.09
LVR033	—	0.50	0.42	0.33	0.33	0.27	0.23	0.20	0.17	0.11
LVR040	—	0.61	0.51	0.40	0.40	0.33	0.28	0.24	0.20	0.14
LVR055	—	0.80	0.68	0.55	0.54	0.46	0.40	0.35	0.29	0.22
LVR075-240	—	1.23	0.98	0.75	0.74	0.60	0.56	0.49	0.45	0.41
LVR100-240	—	1.65	1.30	1.00	0.94	0.80	0.75	0.65	0.60	0.55
LVR125-240	—	2.06	1.63	1.25	1.20	1.00	0.94	0.81	0.75	0.69
LVR150-240	—	2.48	1.95	1.50	1.46	1.20	1.13	0.97	0.90	0.83
LVR200-240	—	3.30	2.60	2.00	1.97	1.60	1.50	1.30	1.20	1.10

Temperature Derating Curve

LVR / LVB

A = LVR075-LVR200

C = LVR005N-LVR055



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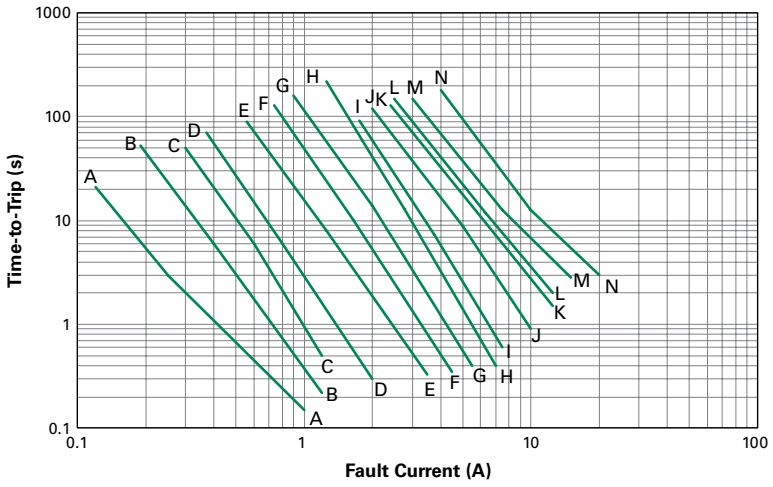
Typical Time-to-Trip Curves at 20°C

LVR / LVB

A	=	LVR005N	I	=	LVR075-240
B	=	LVR008N	J	=	LVR100-240
C	=	LVR012	K	=	LVR125-240
D	=	LVR016	N	=	LVR200-240
E	=	LVR025			
F	=	LVR033			
G	=	LVR040			
H	=	LVR055			



Physical Specifications

Lead Material	LVR005N to LVR016 : Tin-plated Copper, (24AWG), ø0.51mm (0.020in) LVR025 to LVR040 : Tin-plated Copper, (22AWG), ø0.64mm (0.025in) LVR055 : Tin-plated Copper, (20AWG), ø0.81mm (0.032in) LVR075-240 to LVR200-240 : Tin-plated Copper, (20AWG), ø0.81mm (0.032in)
Soldering Characteristics	Solderability per ANSI/J-STD-002 Category 3
Solder Heat Withstand	per IEC-STD 68-2-20, Test Tb, Method 1a, Condition b; Can Wthstand 10s at 260°C ±5°C
Insulating Material	LVR005N to LVR055 : Cured, Flame-retardant Epoxy Polymer, Meets UL 94V-0 LVR075-240 to LVR200-240 : Cured, Flame-retardant Epoxy Polymer, Meets UL 94V-0

Note: Devices are not designed to be placed through a reflow process.

Environmental Specifications

Test	Conditions	Resistance Change
Passive Aging	70°C, 1000 hrs 85°C, 1000 hrs	±10% ±10%
Humidity Aging	85°C, 85% R.H., 1000 hrs	±20%
Thermal Shock	85°C, -40°C (10 Times)	±25%
Solvent Resistance	MIL-STD-202, Method 215F	No change

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.

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Dimension Figures

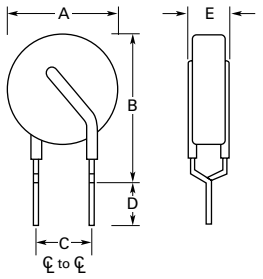

Figure 1

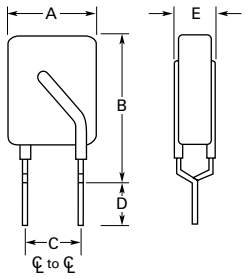

Figure 2

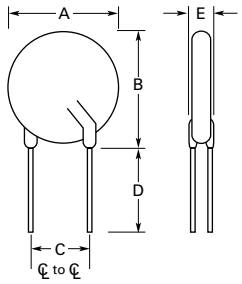

Figure 3

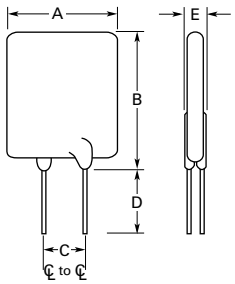

Figure 4

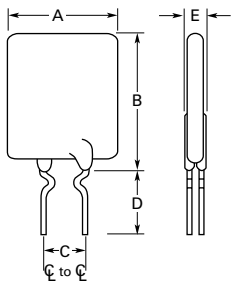

Figure 5

Dimensions and Weights

Part Number	Dimensions in Millimeters (Inches)										Figure	Device Mass (g) (Only for Reference)
	A		B		C		D		E			
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
LVR												
LVR005NK	—	6.9 (0.27)	—	12.1 (0.48)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	4.6 (0.18)	1	0.177
LVR005NS	—	6.9 (0.27)	—	9.9 (0.39)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	4.6 (0.18)	3	0.211
LVR008NK	—	7.2 (0.28)	—	12.4 (0.49)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	4.6 (0.18)	1	0.233
LVR008NS	—	7.2 (0.28)	—	10.2 (0.40)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	4.6 (0.18)	3	0.211
LVR012K	—	8.3 (0.33)	—	12.9 (0.51)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.8 (0.15)	1	0.231
LVR012S	—	8.3 (0.33)	—	10.7 (0.43)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.8 (0.15)	3	0.235
LVR016K	—	9.9 (0.39)	—	13.8 (0.54)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.8 (0.15)	1	0.253
LVR016S	—	9.9 (0.39)	—	12.5 (0.50)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.8 (0.15)	3	0.291
LVR025K	—	9.6 (0.38)	—	18.8 (0.74)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.8 (0.15)	2	0.508
LVR025S	—	9.6 (0.38)	—	17.4 (0.69)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.8 (0.15)	4	0.472
LVR033K	—	11.4 (0.45)	—	19.0 (0.75)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.8 (0.15)	2	0.628
LVR033S	—	11.4 (0.45)	—	16.5 (0.65)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.8 (0.15)	4	0.600

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Dimensions and Weights (Cont'd)

Part Number	Dimensions in Millimeters (Inches)										Figure	Device Mass (g) (Only for Reference)
	A		B		C		D		E			
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
LVR												
LVR040K	—	11.5 (0.46)	—	20.9 (0.82)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.8 (0.15)	2	0.698
LVR040S	—	11.5 (0.44)	—	19.5 (0.77)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.8 (0.15)	4	0.688
LVR055K	—	14.0 (0.55)	—	22.4 (0.88)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	4.1 (0.16)	2	1.100
LVR055S	—	14.0 (0.55)	—	21.7 (0.85)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	4.1 (0.16)	4	1.060
LVR075S-240	—	11.5 (0.45)	—	23.4 (0.92)	4.1 (0.16)	6.1 (0.24)	5.1 (0.20)	—	—	4.8 (0.19)	4	1.088
LVR100S-240	—	18.7 (0.74)	—	24.4 (0.96)	8.9 (0.35)	11.4 (0.45)	5.1 (0.20)	—	—	5.1 (0.20)	3	1.345
LVR125S-240	—	21.2 (0.84)	—	27.4 (1.08)	8.9 (0.35)	11.4 (0.45)	5.1 (0.20)	—	—	5.3 (0.21)	3	1.800
LVR200S-240	—	24.9 (0.98)	—	33.8 (1.33)	8.9 (0.35)	11.4 (0.45)	5.1 (0.20)	—	—	6.1 (0.24)	4	2.777
LVR075K-240	—	11.5 (0.45)	—	25.4 (1.00)	4.1 (0.16)	6.1 (0.24)	7.6 (0.30)	—	—	4.1 (0.16)	2	1.088
LVR100K-240	—	18.7 (0.74)	—	28.8 (1.13)	8.9 (0.35)	11.4 (0.45)	7.6 (0.30)	—	—	4.1 (0.16)	1	1.345
LVR125K-240	—	21.2 (0.84)	—	31.8 (1.25)	8.9 (0.35)	11.4 (0.45)	7.6 (0.30)	—	—	4.1 (0.16)	1	1.800
LVR200K-240	—	24.9 (0.98)	—	34.80 (1.37)	8.9 (0.35)	11.4 (0.45)	7.6 (0.30)	—	—	4.1 (0.16)	5	2.777

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Packaging and Marking Information

Part Number	Bag Quantity	Tape and Reel Quantity	Ammo Pack Quantity	Standard Package Quantity	Part Marking	Agency Recognition
			LVR			
LVR005NK	500	—	—	10,000	L005	UL, CSA, TÜV
LVR005NK-2	—	1,500	—	7,500	L005	UL, CSA, TÜV
LVR005NS	500	—	—	10,000	L005	UL, CSA, TÜV
LVR005NS-2	—	1,500	—	7,500	L005	UL, CSA, TÜV
LVR008NK	500	—	—	10,000	L008	UL, CSA, TÜV
LVR008NK-2	—	1,500	—	7,500	L008	UL, CSA, TÜV
LVR008NS	500	—	—	10,000	L008	UL, CSA, TÜV
LVR008NS-2	—	1,500	—	7,500	L008	UL, CSA, TÜV
LVR012K	500	—	—	10,000	L012	UL, CSA, TÜV
LVR012K-2	—	2,000	—	10,000	L012	UL, CSA, TÜV
LVR012S	500	—	—	10,000	L012	UL, CSA, TÜV
LVR012S-2	—	2,000	—	10,000	L012	UL, CSA, TÜV
LVR016K	500	—	—	10,000	L016	UL, CSA, TÜV
LVR016K-2	—	2,000	—	10,000	L016	UL, CSA, TÜV
LVR016S	500	—	—	10,000	L016	UL, CSA, TÜV
LVR016S-2	—	2,000	—	10,000	L016	UL, CSA, TÜV
LVR025K	500	—	—	10,000	L025	UL, CSA, TÜV
LVR025K-2	—	2,000	—	10,000	L025	UL, CSA, TÜV
LVR025S	500	—	—	10,000	L025	UL, CSA, TÜV
LVR025S-2	—	2,000	—	10,000	L025	UL, CSA, TÜV
LVR033K	500	—	—	10,000	L033	UL, CSA, TÜV
LVR033K-2	—	2,000	—	10,000	L033	UL, CSA, TÜV
LVR033S	500	—	—	10,000	L033	UL, CSA, TÜV
LVR033S-2	—	2,000	—	10,000	L033	UL, CSA, TÜV
LVR040K	500	—	—	10,000	L040	UL, CSA, TÜV
LVR040K-2	—	2,000	—	10,000	L040	UL, CSA, TÜV
LVR040S	500	—	—	10,000	L040	UL, CSA, TÜV
LVR040S-2	—	2,000	—	10,000	L040	UL, CSA, TÜV
LVR055K	500	—	—	10,000	L055	UL, CSA, TÜV
LVR055S	500	—	—	10,000	L055	UL, CSA, TÜV
LVR055S-2	—	1,000	—	5,000	L055	UL, CSA, TÜV
LVR075S-240	500	—	—	10,000	L075	UL, CSA, TÜV
LVR075S-240-2	—	1,000	—	5,000	L075	UL, CSA, TÜV
LVR075S-240-AP	—	—	1,000	5,000	L075	UL, CSA, TÜV
LVR100S-240	250	—	—	5,000	L100	UL, CSA, TÜV
LVR100S-240-2	—	1,000	—	5,000	L100	UL, CSA, TÜV
LVR100S-240-AP	—	—	1,000	5,000	L100	UL, CSA, TÜV

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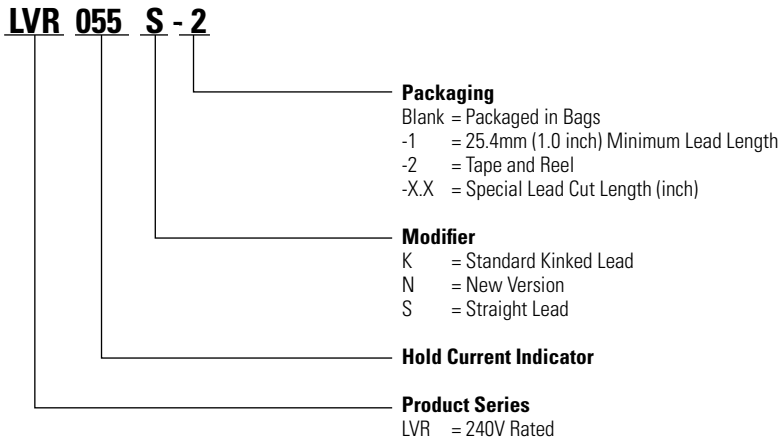
Packaging and Marking Information (Cont'd)

Part Number	Bag Quantity	Tape and Reel Quantity	Ammo Pack Quantity	Standard Package Quantity	Part Marking	Agency Recognition
			LVR			
LVR125S-240	250	—	—	5,000	L125	UL, CSA, TÜV
LVR125S-240-2	—	1,000	—	5,000	L125	UL, CSA, TÜV
LVR125S-240-AP	—	—	1,000	5,000	L125	UL, CSA, TÜV
LVR200S-240	250	—	—	5,000	L200	UL, CSA, TÜV
LVR200S-240-2	—	1,000	—	5,000	L200	UL, CSA, TÜV
LVR200S-240-AP	—	—	1,000	5,000	L200	UL, CSA, TÜV
LVR075K-240	500	—	—	10,000	L075	UL, CSA, TÜV
LVR075K-240-2	—	1,000	—	5,000	L075	UL, CSA, TÜV
LVR075K-240-AP	—	—	1,000	5,000	L075	UL, CSA, TÜV
LVR100K-240	250	—	—	5,000	L100	UL, CSA, TÜV
LVR100K-240-2	—	1,000	—	5,000	L100	UL, CSA, TÜV
LVR100K-240-AP	—	—	1,000	5,000	L100	UL, CSA, TÜV
LVR125K-240	250	—	—	5,000	L125	UL, CSA, TÜV
LVR125K-240-2	—	1,000	—	5,000	L125	UL, CSA, TÜV
LVR125K-240-AP	—	—	1,000	5,000	L125	UL, CSA, TÜV
LVR200K-240	250	—	—	5,000	L200	UL, CSA, TÜV
LVR200K-240-2	—	1,000	—	5,000	L200	UL, CSA, TÜV
LVR200K-240-AP	—	—	1,000	5,000	L200	UL, CSA, TÜV

Part Ordering Number System



Revised: GD. 12/20/20

Tape and Reel Specifications

LVR devices are available in tape and reel packaging per EIA468-B/IEC60286-2 standards.
See Figures 1 and 2 for details.

Description	EIA Mark	Dimension (mm)	Tolerance
Carrier Tape Width	W	18	-0.5/+1.0
Hold-down Tape Width	W_4	11	Minimum
Top Distance between Tape Edges	W_6	3	Maximum
Sprocket Hole Position	W_5	9	-0.5/+0.75
Sprocket Hole Diameter	D_0	4	± 0.2
Abscissa to Plane (Straight Lead) (LVR005N to LVR200)	H	18.5	± 2.5
Abscissa to Plane (Kinked Lead) (LVR005N to LVR055)	H_0	16.0	± 0.5
Abscissa to Top (LVR005N to LVR016)	H_1	32.2	Maximum
Abscissa to Top* (LVR025 to LVR200)	H_1	45.0	Maximum
Overall Width with Lead Protrusion (LVR005N to LVR016)	C_1	43.2	Maximum
Overall Width with Lead Protrusion (LVR025 to LVR200)	C_1	55	Maximum
Overall Width without Lead Protrusion (LVR005N to LVR016)	C_2	42.5	Maximum
Overall Width without Lead Protrusion (LVR025 to LVR200)	C_2	54	Maximum
Lead Protrusion	L_1	1.0	Maximum
Protrusion of Cut-out	L	11	Maximum
Protrusion beyond Hold-down Tape	I_2	Not Specified	—
Sprocket Hole Pitch	P_0	12.7	± 0.3
Device Pitch (LVR005N to LVR040)	—	25.4	± 0.61
Device Pitch (LVR055 to LVR200)	—	25.4	± 0.6
Pitch Tolerance	—	20 Consecutive	± 1
Tape Thickness	T	0.9	Maximum
Overall Tape and Lead Thickness (LVR005N to LVR040)	T_1	2.0	Maximum
Overall Tape and Lead Thickness (LVR055 to LVR200)	T_1	2.3	Maximum
Splice Sprocket Hole Alignment	—	0	± 0.3
Body Lateral Deviation	Δh	0	± 1.0
Body Tape Plane Deviation	Δp	0	± 1.3
Ordinate to Adjacent Component Lead	P_1	3.81	± 0.7
Lead Spacing*	F	10.15	± 0.75
Reel Width (LVR005N to LVR040)	W_2	56.0	Maximum
Reel Width* (LVR055 to LVR200)	W_2	63.5	Maximum
Reel Diameter	A	370.0	Maximum
Space between Flanges* (LVR005N to LVR040)	W_1	48.0	Maximum
Space between Flanges* (LVR055 toLVR200)	W_1	55.0	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

*Differs from EIA specification.

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Tape and Reel Diagrams

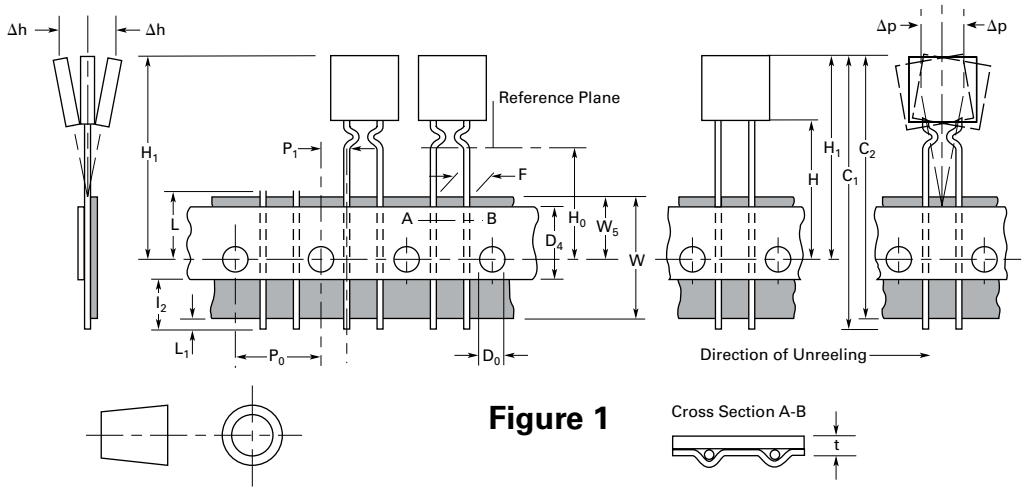

Figure 1

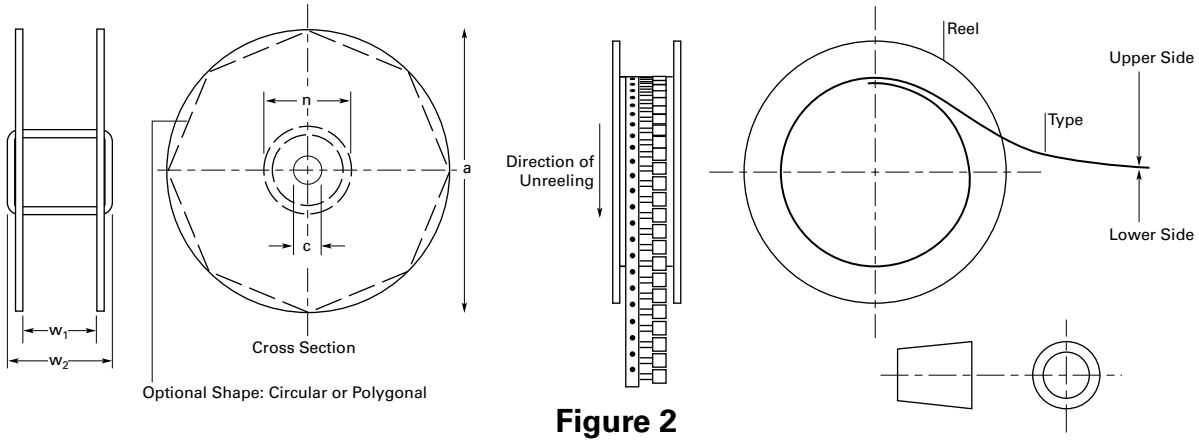

Figure 2

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.

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