

LRV Series

Automotive Grade Current Sensing Chip



FEATURES

- AEC-Q200 Compliance
- Highly reliable multilayer electrode construction
- Reduced size of final equipment reliability
- 3 Watts power rating in 1 Watt size, 1225 package
- Low TCR of ± 100 PPM/ $^{\circ}$ C
- Resistance values from 1m to 1 Ω
- High purity alumina substrate for high power dissipation
- Long side terminations with higher power rating
- Special construction to prevent sulfuration in a sulfur containing environment
- RoHS Compliance

APPLICATIONS

- Automotive Industry
- Power Management Applications
- Switching Power Supply
- Over Current Protection in Audio Applications
- Voltage Regulation Module (VRM)
- DC-DC Converter, Battery Pack, Charger, Adaptor
- Automotive Engine Control
- Disk Driver

SERIES SPECIFICATIONS

Series	Power @70 $^{\circ}$ C	Max. Operating Current	Res. Range (m Ω)	TCR (ppm/ $^{\circ}$ C)
Standard				
LRV02 (0402)	1/16W	1.11A	50 - 100 102 - 500 510 - 1 Ω	± 400 ± 300 ± 200
LRV03 (0603)	1/10W	2.23A	20 - 50 51 - 100 102 - 500 510 - 1 Ω	± 600 ± 400 ± 300 ± 200
LRV05 (0805)	1/8W	2.50A	20 - 50 51 - 100 102 - 196 200 - 1 Ω	± 600 ± 400 ± 300 ± 200
LRV06 (1206)	1/4W	5.00A	10 - 20	± 600
LRV10 (1210)	1/2W	7.07A	21 - 50	± 400
LRV11 (2010)	3/4W	8.66A	51 - 91	± 300
LRV12 (2512)	1W	10.0A	100 - 1 Ω	± 200
LRV25 (1225)	3W	31.6A	3 - 5 6 - 20 21 - 30 33 - 8 Ω	± 300 ± 200 ± 150 ± 100
LRV37 (3720)	1W	10.0A	10 - 18 20 - 500	± 300 ± 150
LRV75 (7520)	2W	44.7A	1 - 4* 5 - 10 11 - 350	± 300 ± 200 ± 150

Series	Power @70 $^{\circ}$ C	Max. Operating Current	Res. Range (m Ω)	TCR (ppm/ $^{\circ}$ C)
High Power and Ultra High Rating				
LRV02 (0402)	1/8W	1.58A	50 - 100	± 400
LRV03 (0603)	1/8W 1/5W	1.58A	102 - 500 510 - 1 Ω	± 300 ± 200
LRV05 (0805)	1/4W	2.23A		
LRV06 (1206)	1/2W	3.16A		
LRV10 (1210)	3/4W	3.87A		
LRV11 (2010)	1W	4.47A	50 - 91	± 300
LRV12 (2512)	1.5W	5.47A	100 - 1 Ω	± 200
LRV12 (2512)	2W**	6.32A		
Low TCR				
LRV05 (0805)	1/8W	1.11A	100 - 1 Ω	± 100
LRV06 (1206)	1/4W	1.58A	100 - 1 Ω	± 100
LRV10 (1210)	1/2W	2.58A	75 - 1 Ω	± 100
LRV11 (2010)	3/4W	3.87A	50 - 1 Ω	± 100
LRV12 (2512)	1W	4.47A	50 - 1 Ω	± 100
LRV12 (2512)	2W	6.32A	50 - 1 Ω	± 100
LRV37 (3720)	1W	3.16A	100 - 500	± 100
LRV75 (7520)	2W	6.32A	50 - 350	± 100

*2% and 5% only **Ultra high power

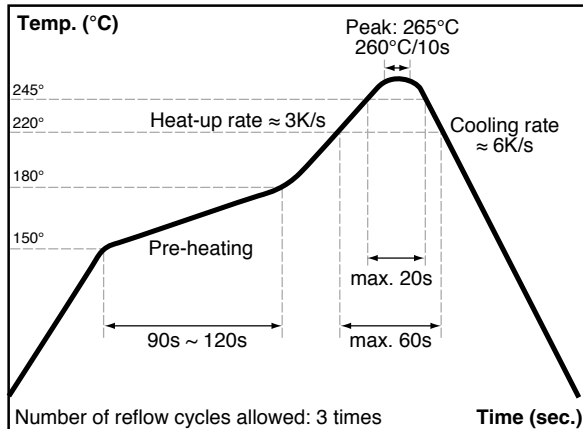
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LRV Series

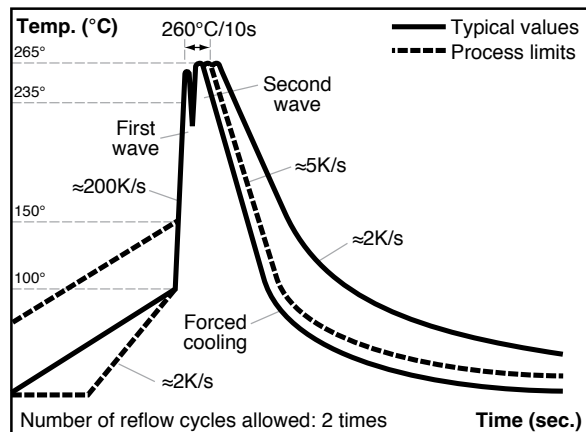
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SOLDERING

IR Reflow Soldering

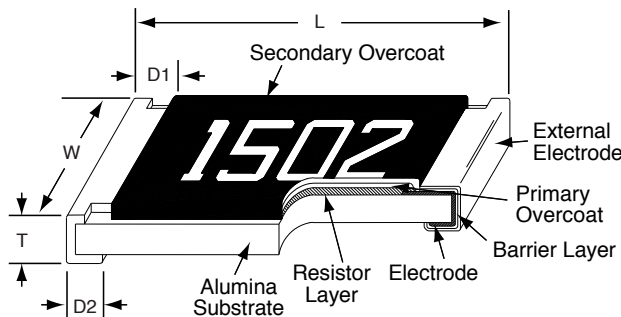


Wave Soldering (Flow Soldering)

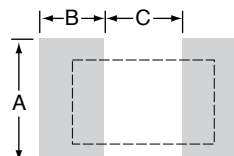


- (1) Time of IR reflow soldering at maximum temperature point 260°C: 10s
- (2) Time of wave soldering at maximum temperature point 260°C: 10s
- (3) Time of soldering iron at maximum temperature point 410°C: 5s

DIMENSIONS



Land pattern



Type	Size	L	W	T	D1	D2	A	B	C ± 2	Weigh (g)
LRV02	0402	1.00 ± 0.05	0.50 ± 0.05	0.32 ± 0.10	0.25 ± 0.10	0.20 ± 0.10	0.60	0.50	0.50	0.7
LRV03	0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20	0.90	1.00	0.80	1.99
LRV05	0805	2.00 ± 0.10	1.25 ± 0.10	0.55 ± 0.10	0.30 ± 0.20	0.40 ± 0.25	1.35	1.00	1.00	5.3
LRV06	1206	3.10 ± 0.10	1.55 ± 0.10	0.55 ± 0.10	0.50 ± 0.30	0.40 ± 0.25	1.70	1.15	2.00	8.82
LRV10	1210	3.10 ± 0.10	2.60 ± 0.15	0.55 ± 0.10	0.50 ± 0.30	0.50 ± 0.25	2.50	1.15	2.00	15.5
LRV11	2010	5.00 ± 0.10	2.50 ± 0.15	0.60 ± 0.15	0.60 ± 0.30	0.50 ± 0.25	2.50	1.40	3.60	27.03
LRV12	2512	6.35 ± 0.10	3.10 ± 0.15	0.60 ± 0.10	0.60 ± 0.30	0.55 ± 0.25	3.20	1.60	4.90	43.08
LRV12 (2W)	2512 (10 – 99m Ω)	6.35 ± 0.20	3.15 ± 0.15	0.74 ± 0.10	0.60 ± 0.30	0.55 ± 0.25	3.20	1.60	4.90	53.08
LRV12 (2W)	2512 (100 – 1000m Ω)	6.35 ± 0.20	3.15 ± 0.15	0.74 ± 0.10	0.60 ± 0.30	2.10 ± 0.10	3.20	3.55	1.00	53.08
LRV25	1225	3.20 ± 0.15	6.45 ± 0.15	0.90 ± 0.15	0.60 ± 0.30	0.80 ± 0.25	7.00	2.00	1.20	64.88
LRV37	3720	2.00 ± 0.20	3.75 ± 0.20	0.60 ± 0.10	0.40 ± 0.20	0.40 ± 0.20	3.90	1.80	1.00	19.96
LRV75	7520	2.00 ± 0.20	7.50 ± 0.30	0.60 ± 0.10	0.40 ± 0.20	0.40 ± 0.20	7.60	1.80	1.00	35.71

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PERFORMANCE

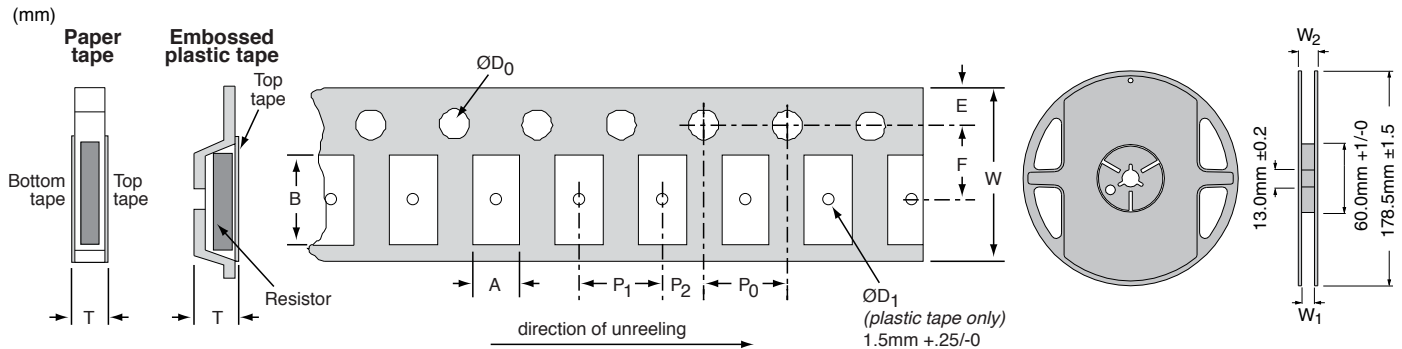
Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	JIS C 5201-1 4.8; IEC 60115-1 4.8; -55°C~+125°C, 25°C is the reference temperature
Short Time Overload	(0.5%+0.05Ω); (1.0%+0.05Ω) for high power rating	JIS C 5201-1 4.13; IEC 60115-1 4.13; RCWV 2.5 or Max. Overload Voltage whichever is lower for 5 seconds
Insulation Resistance	10G	JIS C 5201-1 4.6; IEC 60115-1 4.6; Max. Overload Voltage for 1 minute
Operational Life	(1.0%+0.05Ω)	MIL-STD-202 Method 108; Condition D Steady State TA=125°C at derated power. Measurement at 24±4 hours after test conclusion.
Biased Humidity	(1.0%+0.05Ω)	MIL-STD-202 Method 103; 1000 hrs 85°C/85%RH 10% of operating power.
High Temperature Exposure	(0.5%+0.05Ω)	MIL-STD-202 Method 108; at +155°C for 1000 hrs
Board Flex	(1.0%+0.05Ω)	AEC-Q200-005; Bending once for 60 seconds; 2010, 2512 sizes: 2mm; Other sizes: 3mm
Solderability	95% min. coverage	JIS C 5201-1 4.17; IEC 60115-1 4.17; J-STD-002; 245 5°C for 3 seconds
Resistance to Soldering Heat	(0.5%+0.05Ω)	MIL-STD-202 Method 210; 260 5°C for 10 seconds
Voltage Proof	No breakdown or flashover	JIS C 5201-1 4.7; IEC 60115-1 4.7; 1.42 times Max. Operating Voltage for 1 minute
Leaching	Individual leaching area 5% ; Total leaching area 10%	JIS C 5201-1 4.18; IEC 60068-2-58 8.2.1; 260 5°C for 30 seconds
Temperature Cycling	(0.5%+0.05Ω)	JESD22 Method JA-104; -55°C to +125°C, 1000 cycles
Mechanical Shock	(0.25%+0.05Ω)	MIL-STD-202 Method 213; Wave Form: Tolerance for half sine shock pulse. Peak value is 100g. Normal duration (D) is 6.
Vibration	(0.5%+0.05Ω)	MIL-STD-202 Method 204; 5 g s for 20 min., 12 cycles each of 3 orientations, 10-2000 Hz
ESD	(1%+0.05Ω)	AEC-Q200-002; Human body, 2KV
Resistance to Solvents	No visible damage on appearance and marking.	MIL-STD-202 Method 215; Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.
Terminal Strength	No broken	AEC-Q200-006; Force of 1.8kg for 60 seconds.
Flammability	No ignition of the tissue paper or scorching or the pinewood board	UL-94; V-0 or V-1 are acceptable. Electrical test not required.
Sulfur Test	(0.5%+0.05Ω)	ASTM-B-809-95; H2S, 50 2°C, 91~93% R.H., no power rating for 1000 hrs

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TAPE AND REEL



	A	B	W	E	F	P0	P1	P2	D0	T	W1	W2	Qty.
Paper tape													
LRV02	0.65 ± 10	1.15 ± 10	8.0 ± 20	1.75 ± 10	3.50 ± 05	4.00 ± 10	2.00 ± 05	2.00 ± 05	1.50+0.1,-0	0.45 ± 10	9.5 ± 0.1	11.5 ± 1.0	10,000
LRV03	1.10 ± 10	1.90 ± 10	8.0 ± 20	1.75 ± 10	3.50 ± 05	4.00 ± 10	4.00 ± 05	2.00 ± 05	1.50+0.1,-0	0.70 ± 10	9.5 ± 0.1	11.5 ± 1.0	5,000
LRV05	1.60 ± 10	2.40 ± 20	8.0 ± 20	1.75 ± 10	3.50 ± 05	4.00 ± 10	4.00 ± 05	2.00 ± 05	1.50+0.1,-0	0.85 ± 10	9.5 ± 0.1	11.5 ± 1.0	5,000
LRV06	1.90 ± 10	3.50 ± 20	8.0 ± 20	1.75 ± 10	3.50 ± 05	4.00 ± 10	4.00 ± 05	2.00 ± 05	1.50+0.1,-0	0.85 ± 10	9.5 ± 0.1	11.5 ± 1.0	5,000
LRV13	2.90 ± 10	3.50 ± 20	8.0 ± 20	1.75 ± 10	3.50 ± 05	4.00 ± 10	4.00 ± 05	2.00 ± 05	1.50+0.1,-0	0.85 ± 10	9.5 ± 0.1	11.5 ± 1.0	5,000
Embossed plastic tape													
LRV10	2.80 ± 10	5.50 ± 10	12.0 ± 30	1.75 ± 10	5.5 ± 05	4.00 ± 05	4.00 ± 10	2.00 ± 05	1.50+0.10	1.00 ± 20	13.5 ± 1.0	15.5 ± 1.0	4,000
LRV12	3.50 ± 10	6.70 ± 10	12.0 ± 30	1.75 ± 10	5.5 ± 05	4.00 ± 05	4.00 ± 10	2.00 ± 05	1.50+0.10	1.00 ± 20	13.5 ± 1.0	15.5 ± 1.0	4,000
LRV12 (2W)	3.38 ± 10	6.68 ± 10	12.0 ± 30	1.75 ± 10	5.5 ± 10	4.00 ± 10	4.00 ± 10	2.00 ± 05	1.55+0.05	1.45 ± 20	13.5 ± 1.0	15.5 ± 1.0	2,000
LRV25	3.38 ± 10	6.68 ± 10	12.0 ± 30	1.75 ± 10	5.5 ± 10	4.00 ± 10	4.00 ± 10	2.00 ± 05	1.55+0.05	1.45 ± 20	13.5 ± 1.0	15.5 ± 1.0	2,000
LRV37	2.50 ± 20	4.45 ± 20	12.0 ± 30	1.75 ± 10	5.5 ± 05	4.00 ± 05	4.00 ± 10	2.00 ± 05	1.50+0.10	1.20 ± 20	13.5 ± 1.0	15.5 ± 1.0	2,000
LRV75	2.50 ± 20	8.30 ± 20	16.0 ± 30	1.75 ± 10	7.8 ± 05	4.00 ± 05	4.00 ± 10	2.00 ± 05	1.50+0.10	1.20 ± 20	17.5 ± 1.0	19.5 ± 1.0	2,000

ORDERING INFORMATION

Tolerance			
F = 1%			
G = 2%			
J = 5%			
RoHS Compliant			
LRV06FTR100E			
LRVC	Size	Special code	Resistance
commercial	02 = 0402	Blank = Std	R010 = 0.01Ω
	03 = 0603	P = High Pwr	R100 = 0.1Ω
	05 = 0805	T = Low TCR	1R00 = 1Ω
	06 = 1206	U = Ultra Pwr	
	10 = 2010	LRV12 Only	
	11 = 1210		
	12 = 2512		
	25 = 1225		
	37 = 3720		
	75 = 7520		

Marking for 0603

Examples
1R0 = 1.000Ω
R10 = 0.100Ω
R01 = 0.010Ω
102 = 0.102Ω
024 = 0.024Ω