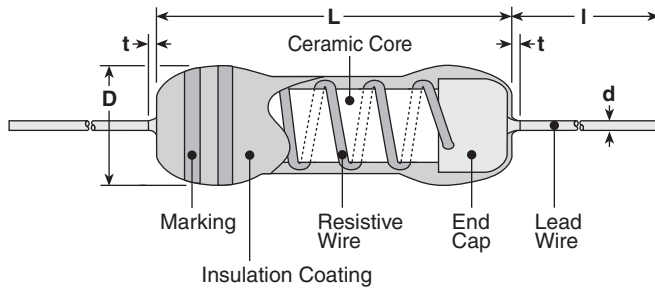


## features

- Flameproof silicone coating equivalent (UL94V0)
- CWH resistors meet MIL-PRF-26 (U characteristics)
- CWH high precision resistors with T.C.R. less than  $\pm 20 \times 10^{-6}/K$
- Suitable for automatic machine insertion
- Excellent in long time stability
- Products with lead-free terminations meet EU RoHS and China RoHS requirements
- CW1SS has UL1412 approval (File No. E320246)
- Surface mount style "N" forming is suitable for automatic mounting CW, CWP

## dimensions and construction



Type	Dimensions inches (mm)				
	L	t (max.)	D	d (nom.)	l*
CW1/4	.13±.012 (3.3±0.3)	.02 (0.5)	.075±.012 (1.9±0.3)	.018 (0.45)	1.18±.118 (30.0±3.0)
CW1/2	.256±.039 (6.5±1.0)	.039 (1.0)	.098±.039 (2.5±1.0)	.024 (0.6)	
CW1	.354±.039 (9.0±1.0)	.118 (3.0)	.138±.039 (3.5±1.0)	.031 (0.8)	
CW1X			.138 <sup>+.006</sup> <sub>-0</sub> (3.5 <sup>+1.5</sup> <sub>-0</sub> )		
CW1P			.138±.039 (3.5±1.0)		
CW2	.157±.039 (4.0±1.0)				
CW2X	.472±.039 (12.0±1.0)		.157 <sup>+.006</sup> <sub>-0</sub> (4.0 <sup>+1.5</sup> <sub>-0</sub> )		
CW2P	.157±.039 (4.0±1.0)				
CW3	.591±.039 (15.0±1.0)		.236±.039 (6.0±1.0)		
CW3X			.236 <sup>+.006</sup> <sub>-0</sub> (6.0 <sup>+1.5</sup> <sub>-0</sub> )		
CW3P			.236±.039 (6.0±1.0)		
CW5	.945±.006 (24.0±1.5)		.354±.006 (9.0±1.5)		1.50±.118 (38.0±3.0)
CW1S	.256±.039 (6.5±1.0)	.039 (1.0)	.098±.039 (2.5±1.0)	.024 (0.6)	1.18±.118 (30.0±3.0)
CW1SS	.354±.039 (9.0±1.0)	.118 (3.0)	.138±.039 (3.5±1.0)	.031 (0.8)	1.18±.118 (30.0±3.0)
CW1H			.157±.039 (4.0±1.0)		
CW2H			.472±.039 (12.0±1.0)		
CW3H	.591±.039 (15.0±1.0)				

\* Lead length changes depending on taping and forming type.

## ordering information

CW	1/2	P	C	T52	A	103	F
Type	Power Rating	Style	Termination Material	Taping and Forming	Packaging	Nominal Resistance	Tolerance
	1/4: 0.25W 1/2: 0.5W 1: 1W 2: 2W 3: 3W 5: 5W	H: Stability Nil: Power P: Precision S: Small X: Power SS: Small type, UL Approved	C: SnCu	Axial: T26, T52, T521, T631 Stand-off Axial: L52A, L52B Radial: VTP*, GT L forming: L10A, L12.5A, L15A, L20A, L25A, L30A, L35A N forming: N17, N20	A: Ammo R: Reel TEB: TEG: Embossed plastic (N forming) Nil: Box	±2%, ±5%: 2 significant figures + 1 multiplier "R" indicates decimal on value <10Ω ±1%: 3 significant figures + 1 multiplier "R" indicates decimal on value <100Ω	C: ±0.25% D: ±0.5% F: ±1% G: ±2% J: ±5% K: ±10%

For further information on packaging, please refer to Appendix C.  
Contact us when you have control request for environmental hazardous  
material other than the substance specified by the EU RoHS

\* VTP: Applicable to 0.47Ω or over for CW1, CW1P only

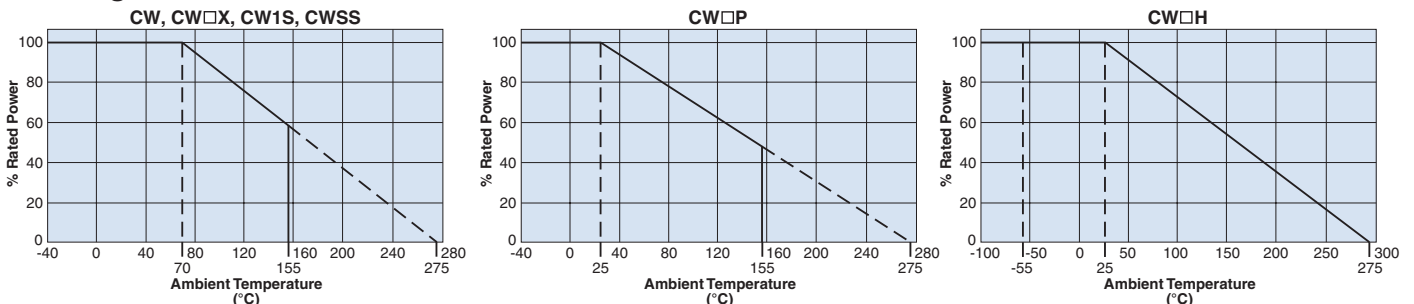
## applications and ratings

Part Designation	Power Rating	T.C.R. (ppm/°C) Max.	Resistance Range (Ω)					Rated Ambient Temperature	Operating Temperature Range	
			E-24, E-96 (C±0.25%)	E-24, E-96 (D±0.5%)	E-24, E-96 (F±1%)	E-24 (G±2%)	E-24 (J±5%)			E-24 (K±10%)
CW1/4	0.25W	±250	—	—	—	—	0.47 - 15	0.47 - 15	+70°C	-40°C to +155°C
CW1/2	0.5W						0.1 - 100	0.1 - 100		
CW1	1.0W						0.1 - 390	0.1 - 390		
CW2	2.0W						0.1 - 390	0.1 - 390		
CW3	3.0W						0.1 - 390	0.1 - 390		
CW5	5.0W						0.1 - 390	0.1 - 390		
CW1X	1.0W	±500	—	—	—	0.01 - 0.091	0.01 - 0.091			
CW2X	2.0W					0.01 - 0.091	0.01 - 0.091			
CW3X	3.0W					0.01 - 0.091	0.01 - 0.091			
CW1S	1.0W	±250	—	—	—	—	0.1 - 100	0.1 - 100		
CW1SS	1.0W	±100	—	—	—	—	10	—		
CW1P	1.0W	±90: R≥10Ω	1 - 100	0.47 - 220	0.1 - 430	—	—	—	+25°C	
CW2P	2.0W	±50: R<10Ω	1 - 390	0.47 - 390	0.1 - 390					
CW3P	3.0W	1 - 390	0.47 - 390	0.1 - 390						
CW1H	1.0W	±20: R≥10Ω ±50: R<10Ω	—	0.47 - 220	0.1 - 430	—	—	—	+25°C	
CW2H	2.0W			0.47 - 750	0.1 - 2k					
CW3H	3.0W			0.47 - 1k	0.1 - 3k					

CW\_H: Max. Working Voltage:  $E = \sqrt{P \times R}$  CW\_H: Max. Overload Voltage:  $E = \sqrt{P \times R \times 5}$

## environmental applications

### Derating Curve



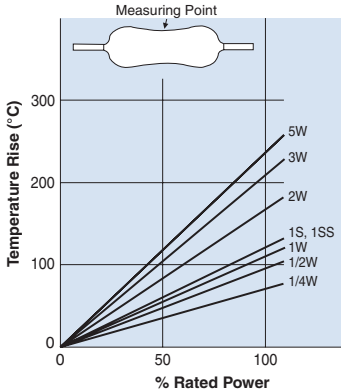
For resistors operated at an ambient temperature of 25°C or above, a power rating shall be derated in accordance with the above derating curve.

Specifications given herein may be changed at any time without prior notice. Please confirm technical specifications before you order and/or use.

11/09/22

## environmental applications

### Surface Temperature Rise



Fixing board: t=1.2  
Material: Glass epoxy board

## Performance Characteristics

Parameter	Requirement $\Delta R \pm(\% + 0.05\Omega)$		Test Method
	Limit	Typical	
Resistance	Within specified tolerance	—	25°C
T.C.R.	Within specified T.C.R.	—	CW, CW□X, CW1S, CW1SS: +25°C/+125°C CW□P: +25°C/-40°C and +25°C/+155°C CW□H: +25°C/-55°C and +25°C/+125°C
Overload (Short Time)	1%: CW, CWX; 0.5%: CW□P; 2%: CW1S, CW1SS 0.2%: CW□P (R<10Ω)*, CW□H	0.8%: CW, CW□X; 0.4: CW□P 1.8%: CW1S, CW1SS 0.18%: CW□P (R<10Ω) 0.15%: CW□H	CW, CW□X, CW1S, CW1SS: Power rating x 10 for 5 seconds CW□P: Power rating x 6.25 for 5 seconds CW□P (R<10Ω), CW□H: Power rating x 5 for 5 seconds
Resistance to Solder Heat	1%: CW, CW1S, CW1SS, CW□X; 0.5%: CW□P; 0.2%: CW□P (R<10Ω)*, CW□H	0.8%: CW, CW1S, CW□X; 0.4%: CW□P, CW1SS; 0.18%: CW□P (R<10Ω); 0.15%: CW□H	350°C ± 10°C, 3 seconds ± 0.5 second 260°C ± 5°C, 10 seconds ± 1 second
Moisture Resistance	5%: CW, CW1S, CW□X 2%: CW□P 0.5%: CW□P (R<10Ω)*	4%: CW, CW1S, CW□X 1.6%: CW□P 0.45%: CW□P (R<10Ω)	Power rating x 1/10, 40°C, 90 - 95% RH, 1000 hours, 1.5 hr ON, 0.5 hr OFF cycle
Endurance @ 70°C	5%: CW, CW1S, CW1SS, CW□X; 2%: CW□P 0.5%: CW□P (R<10Ω)*	4%: CW, CW1S, CW1SS, CW□X; 1.6%: CW□P 0.45%: CW□P (R<10Ω)	70°C, 1000 hours (CW, CW□X, CW1S, CW1SS), 25°C, 1000 hours (CW□P) 1.5 hr ON, 0.5 hr OFF cycle
Resistance to Solvent	No abnormality in appearance such as disappearance of markings, etc.	—	After immersing the sample in IPA for 3 min., the resistor surface should be lightly wiped with a dry cloth (velvet or gauze)
Low Temperature	0.2%: CW□H	0.15%: CW□H	-55°C, 24 hours
High Temperature	0.5%: CW□H	0.45%: CW□H	+275°C, 250 hours
Thunder Surge	3%: CW1SS	—	Combination wave, +1.5kV 20 seconds 3 cycles
Load Life	0.5%: CW□H	0.45%: CW□H	-25°C, power rating, 1.5 hr ON, 0.5 hr OFF 2000 hours

\* Refer to MIL-PRF-26G standard