

Features:

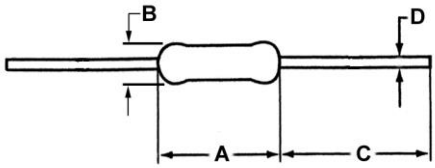
- Specialized materials, processes and controls ensure a part that is impervious to moisture
- Small size with high power density
- Auto sequencing / insertion capable
- Low cost replacement in many applications using metal glaze resistors
- 100% RoHS compliant and lead free without exemption
- Halogen free
- REACH compliant

Electrical Specifications

Type / Code	Power Rating (W) @ 70ºC	Maximum Working Voltage (V) (1)	Maximum Overload Voltage (V)	Ohmic Range (Ω) and Tolerance
				1%, 2%, 5%
HDM14	0.25	300	600	1 - 2.2M
HDM12	0.5	350	700	

(1) Lesser of $\sqrt{P*R}$ or maximum working voltage.

Mechanical Specifications



Type / Code	A Body Length	B Body Diameter	C Lead Length (Bulk)	D Lead Diameter	Unit
HDM14	0.126 +0.008 / -0 3.20 +0.20 / -0	0.071 ± 0.008 1.80 ± 0.20	1.102 ± 0.118 28.00 ± 3.00	0.018 ± 0.002 0.45 ± 0.05	inches mm
HDM12	0.236 ± 0.012 6.00 ± 0.30	0.094 ± 0.008 2.40 ± 0.20	1.102 ± 0.118 28.00 ± 3.00	0.024 ± 0.001 0.60 ± 0.02	inches mm

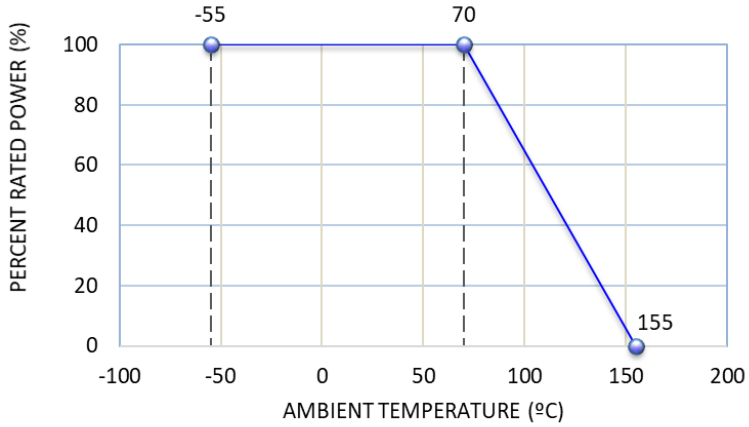
Performance Characteristics

Test	Performance or Quality Acceptance	Test Condition and Method
TCR - Temperature Coefficient of Resistance	R < 100K Ω: -500 ~ +350 ppm/ºC 100K Ω ≤ R < 1 M Ω: -700 ~ 0 ppm/ºC R ≥ 1 M Ω: -1500 ~ 0 ppm/ºC	Measure resistance (R0) at room temperature (t), after that, measure again the resistance (R) at 100ºC higher than room temperature. $TCR = \frac{R - R_0}{R_0} \times \frac{10^6}{(t + 100) - t}$ (ppm/ºC)
Overload (Short Time)	Change of resistance ≤ ± (0.75% + 0.05 Ω)	Apply the 2.5 times rated voltage or max overload voltage whichever is lower for 5 seconds and leave in room temperature for one hour after test.
Damp heat (Steady State)	Change of resistance R < 100K Ω: ≤ ± (3% + 0.05 Ω) R ≥ 100K Ω: ≤ ± (5% + 0.05 Ω)	In the chamber having temperature 40 ± 2ºC and relative humidity 93 ± 3%, apply one percent of the power rating, 1.5 hour ON, 0.5 hour OFF for 1000 hours and leave in room temperature for one hour after test.
Load Life	Change of resistance R < 100K Ω: ≤ ± (2% + 0.05 Ω) R ≥ 100K Ω: ≤ ± (3% + 0.05 Ω)	At 70 ± 2ºC, apply rated DC voltage 1.5 hour ON, 0.5 hour OFF for 1000 hours and leave in room temperature for one hour after test.
Pressure Cooker Bias Test	Change of resistance ≤ ± (20% + 0.05 Ω)	121ºC, 2 atm, 98 - 100% R.H. Apply the rated DC voltage for 100 hours.

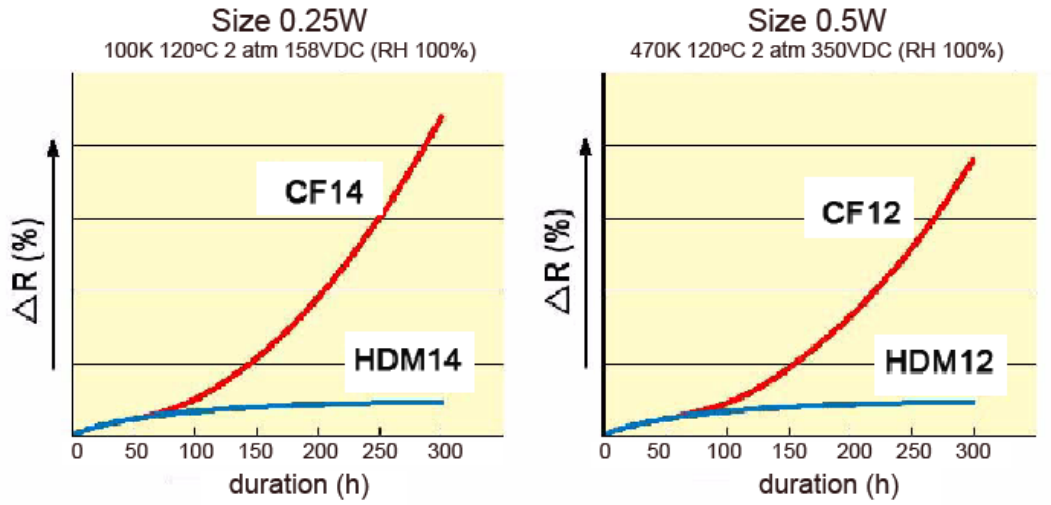
Reference standards: JIS C5201-1, IEC60115-1
Operating temperature range is -55ºC to +155ºC

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

Power Derating Curve:



Pressure Cooker Test Performance



Recommended Solder Profiles

This information is intended as a reference for solder profiles for Stackpole resistive components. These profiles should be compatible with most soldering processes. These are only recommendations. Actual numbers will depend on board density, geometry, packages used, etc., especially those cells labeled with "*".

100% Matte Tin / RoHS Compliant Terminations

Soldering iron recommended temperatures: 330°C to 350°C with minimum duration.
Maximum number of reflow cycles: 3.

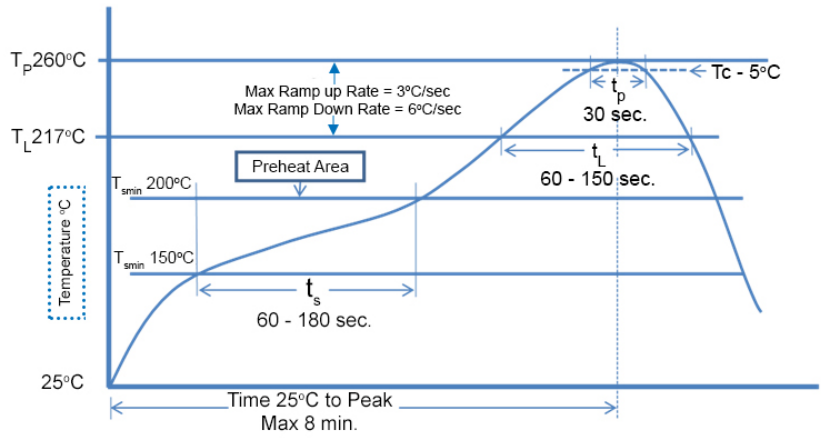
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Wave Soldering			
Description	Maximum	Recommended	Minimum
Preheat Time	80 seconds	70 seconds	60 seconds
Temperature Diff.	140°C	120°C	100°C
Solder Temp.	260°C	250°C	240°C
Dwell Time at Max.	10 seconds	5 seconds	*
Ramp DN (°C/sec)	N/A	N/A	N/A

Temperature Diff. = Defference between final preheat stage and soldering stage.

Convection IR Reflow			
Description	Maximum	Recommended	Minimum
Ramp Up (°C/sec)	3°C/sec	2°C/sec	*
Dwell Time > 217°C	150 seconds	90 seconds	60 seconds
Solder Temp.	260°C	245°C	*
Dwell Time at Max.	30 seconds	15 seconds	10 seconds
Ramp DN (°C/sec)	6°C/sec	3°C/sec	*

Recommended Lead Free Resistor Reflow Profile

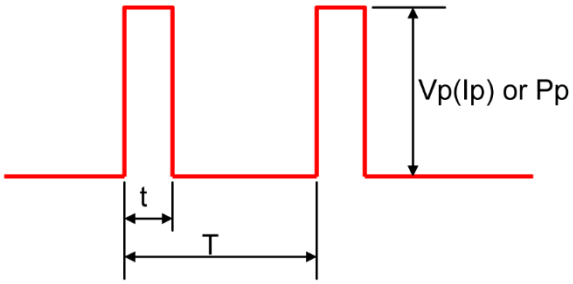


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Repetitive Pulse Information:

If repetitive pulses are applied to resistors, pulse wave form must be less than “pulse limiting voltage”, “pulse limiting current” or “pulse limiting wattage” calculated by the formula below.

$$Vp = K\sqrt{P \times R \times T/t}$$
$$Ip = K\sqrt{P/P \times T/t}$$
$$Pp = K^2 \times P \times T/t$$



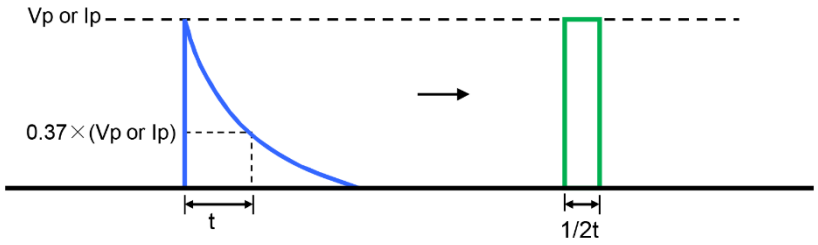
Where: Vp: Pulse limiting voltage (V)
Ip: Pulse limiting current (A)
Pp: Pulse limiting wattage (W)
P: Power rating (W)
R: Nominal resistance (ohm)
T: Repetitive period (sec)
t: Pulse duration (sec)
K: Coefficient: 0.8
[Vr: Rated Voltage (V), Ir: Rated Current (A)]

Note 1: If T > 10 → T = 10 (sec), T / t > 1000 → T / t = 1000
Note 2: If T > 10 and T / t > 1000, “Pulse Limiting power (Single pulse) is applied
Note 3: If Vp < Vr (Ip < Ir or Pp < P), Vr (Ir, P) is Vp (Ip, Pp)
Note 4: Pulse limiting voltage (current, wattage) is applied at less than rated ambient temperature. If ambient temperature is more than the rated temperature (70 °C), decrease power rating according to “Power Derating Curve”
Note 5: Assure sufficient margin for use period and conditions for “pulse limiting voltage”
Note 6: If the pulse waveform is not square wave, judge after transform the waveform into square wave according to the “Waveform Transformation to Square Wave”.

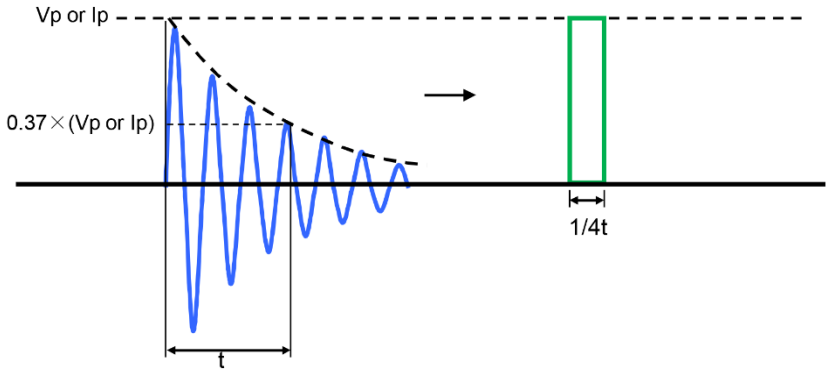
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Waveform Transformation to Square Wave

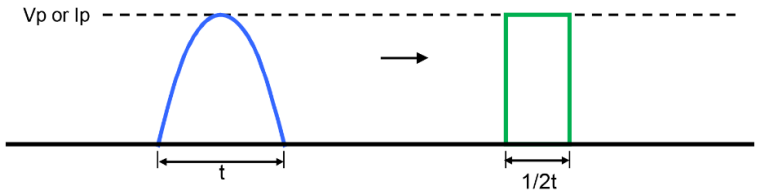
1. Discharge curve wave with time constant "t" → Square wave



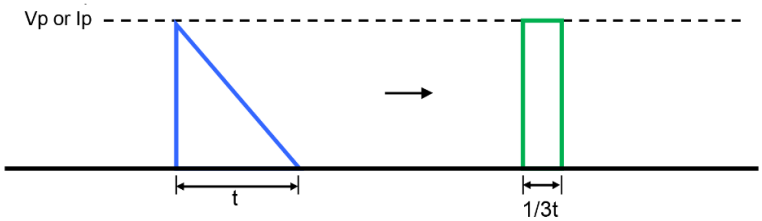
2. Damping oscillation wave with time constant of envelope "t" → Square wave



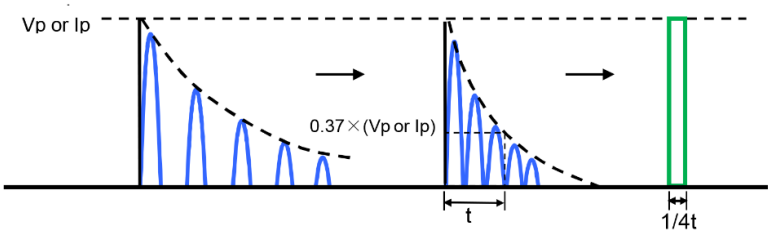
3. Half-wave rectification wave → Square wave



4. Triangular wave → Square wave



5. Special wave → Square wave



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RoHS Compliance

Stackpole Electronics has joined the worldwide effort to reduce the amount of lead in electronic components and to meet the various regulatory requirements now prevalent, such as the European Union's directive regarding "Restrictions on Hazardous Substances" (RoHS 3). As part of this ongoing program, we periodically update this document with the status regarding the availability of our compliant components. All our standard part numbers are compliant to EU Directive 2011/65/EU of the European Parliament as amended by Directive (EU) 2015/863/EU as regards the list of restricted substances.

RoHS Compliance Status

Standard Product Series	Description	Package / Termination Type	Standard Series RoHS Compliant	Lead-Free Termination Composition	Lead-Free Mfg. Effective Date (Std Product Series)	Lead-Free Effective Date Code (YY/WW)
HDM	Moisture Resistant Carbon Film Leaded Resistor	Axial	YES	100% Matte Sn	Always	Always

"Conflict Metals" Commitment

We at Stackpole Electronics, Inc. are joined with our industry in opposing the use of metals mined in the "conflict region" of the eastern Democratic Republic of the Congo (DRC) in our products. Recognizing that the supply chain for metals used in the electronics industry is very complex, we work closely with our own suppliers to verify to the extent possible that the materials and products we supply do not contain metals sourced from this conflict region. As such, we are in compliance with the requirements of Dodd-Frank Act regarding Conflict Minerals.

Compliance to "REACH"

We certify that all passive components supplied by Stackpole Electronics, Inc. are SVHC (Substances of Very High Concern) free and compliant with the requirements of EU Directive 1907/2006/EC, "The Registration, Evaluation, Authorization and Restriction of Chemicals", otherwise referred to as REACH. Contact us for complete list of REACH Substance Candidate List.

Environmental Policy

It is the policy of Stackpole Electronics, Inc. (SEI) to protect the environment in all localities in which we operate. We continually strive to improve our effect on the environment. We observe all applicable laws and regulations regarding the protection of our environment and all requests related to the environment to which we have agreed. We are committed to the prevention of all forms of pollution.

How to Order

1	2	3	4	5	6	7	8	9	10	11
H	D	M	1	2	J	T	4	K	7	0

Product Series	
Code	Description
HDM	Moisture Resistant Carbon Film

Power Rating	
Code	W
14	0.25
12	0.5

Tolerance		
Code	Tol	Value
F	1%	E24
G	2%	
J	5%	

Code	Description	Size	Quantity
T	Tape and Reel	All Sizes	5000
A	Ammo	All Sizes	5000
B	Bulk	14	2000
		12	1000

Resistance Value
Four characters with the multiplier used as the decimal holder.
1 ohm = 1R00 10 Kohm = 10K0 2.2 Mohm = 2M20

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