KAL Series

Aluminum Housed Chassis Mount Resistor

Stackpole Electronics, Inc.

Resistive Product Solutions

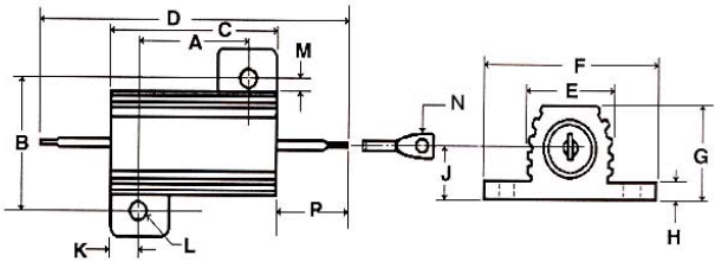
Features:

- Aluminum housing for maximum heat dissipation
- Complete welded construction
- Tinned copper terminals
- Centerless ground steatite or alumina cores
- Molded epoxy body for heat transfer
- Non-inductive winding available (NKAL)
- Suitable for electrical component grade wash process and can be conformally coated or potted
- RoHS compliant, REACH compliant, lead free and halogen free

Electrical Specifications

Type/Code	MIL-R-26 Ref.	Power Rating (W) @ 25 °C		Dielectric Withstanding Voltage (VAC)	TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance		
		Commercial	MIL			0.1%	0.5%	1%, 3%, 5%
KAL10	RE-65	12.5	10	1000	< 0.1 Ω = ±100 ppm 0.1 Ω - 9.9 Ω = ±50 ppm 10 Ω - 49 Ω = ±30 ppm ≥ 50 Ω = ±20 ppm	1 - 1K	1 - 1K	0.05 - 30K
KAL25	RE-70	25	20	3000		1 - 1K	1 - 1K	0.05 - 51.1K
KAL50	RE-75	50	30	3000		1 - 1K	1 - 1K	0.05 - 150K
NKAL10	-	12.5	-	1000		1 - 499	1 - 499	0.05 - 15K
NKAL25	-	25	-	3000		1 - 499	1 - 499	0.05 - 24.9K
NKAL50	-	50	-	3000		1 - 499	1 - 499	0.05 - 75K

Mechanical Specifications - KAL/NKAL 10, 25, 50



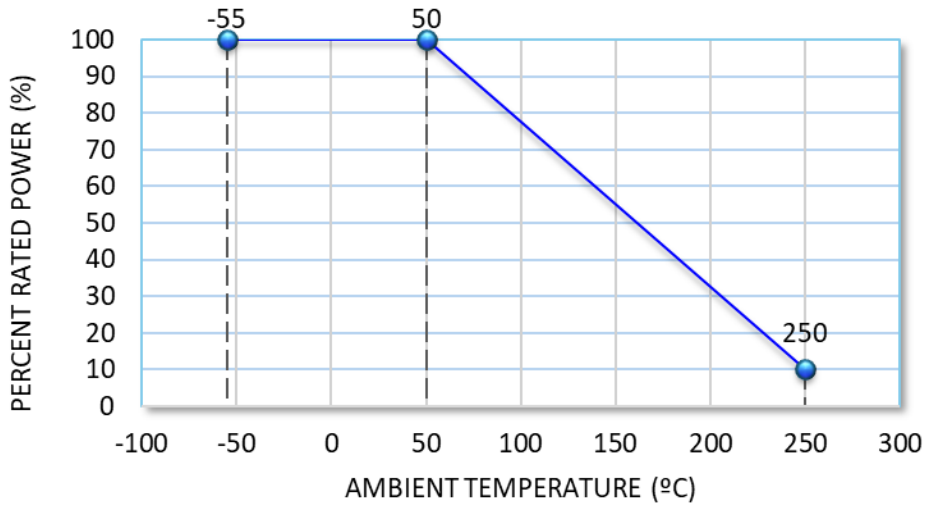
Type	A	B	C	D	E	F	G	Unit
KAL/NKAL10	0.562 ± 0.005 14.27 ± 0.13	0.625 ± 0.005 15.88 ± 0.13	0.750 ± 0.031 19.05 ± 0.79	1.375 ± 0.062 34.93 ± 1.57	0.420 ± 0.015 10.67 ± 0.38	0.800 ± 0.015 20.32 ± 0.38	0.390 ± 0.031 9.91 ± 0.79	inches mm
KAL/NKAL25	0.719 ± 0.005 18.26 ± 0.13	0.781 ± 0.005 19.84 ± 0.13	1.062 ± 0.031 26.97 ± 0.79	1.938 ± 0.062 49.23 ± 1.57	0.550 ± 0.015 13.97 ± 0.38	1.080 ± 0.015 27.43 ± 0.38	0.546 ± 0.031 13.87 ± 0.79	inches mm
KAL/NKAL50	1.563 ± 0.005 39.70 ± 0.13	0.844 ± 0.005 21.44 ± 0.13	1.968 ± 0.031 49.99 ± 0.79	2.781 ± 0.062 70.64 ± 1.57	0.630 ± 0.015 16.00 ± 0.38	1.140 ± 0.015 28.96 ± 0.38	0.610 ± 0.031 15.49 ± 0.79	inches mm
Type	H	J	K	L	M	N	P	Unit
KAL/NKAL10	0.075 ± 0.010 1.91 ± 0.25	0.190 ± 0.015 4.83 ± 0.38	0.093 ± 0.010 2.36 ± 0.25	0.093 ± 0.005 2.36 ± 0.13	0.102 ± 0.015 2.59 ± 0.38	0.086 ± 0.005 2.18 ± 0.13	0.312 ± 0.062 7.92 ± 1.57	inches mm
KAL/NKAL25	0.088 ± 0.010 2.24 ± 0.25	0.260 ± 0.015 6.60 ± 0.38	0.172 ± 0.010 4.37 ± 0.25	0.125 ± 0.005 3.18 ± 0.13	0.115 ± 0.015 2.92 ± 0.38	0.086 ± 0.005 2.18 ± 0.13	0.438 ± 0.062 11.13 ± 1.57	inches mm
KAL/NKAL50	0.088 ± 0.010 2.24 ± 0.25	0.300 ± 0.015 7.62 ± 0.38	0.196 ± 0.010 4.98 ± 0.25	0.125 ± 0.005 3.18 ± 0.13	0.107 ± 0.015 2.72 ± 0.38	0.086 ± 0.005 2.18 ± 0.13	0.410 ± 0.062 10.41 ± 1.57	inches mm

Performance Characteristics		
Test	Test Condition	Result
Short Time Overload	5 X wattage rating - 5 seconds	ΔR ± (0.5% + 0.05 Ω) MAX
Moisture Resistance	Temp 40ºC moisture 95% CDC 100 V for 500 hours	ΔR ± (0.5% + 0.05 Ω) MAX
Load Life	Load rating (chasis is mounted) 1.5 hours ON, 0.5 hours OFF. Repeated for 1000 hours.	ΔR ± (1.5% + 0.05 Ω) MAX

Operating temperature range is -55 to +275°C

Free Air (Unmounted) Power Rating			
KAL Size	10	25	50
Power Rating (25°C)	7.5	12.5	20

Power Derating Curve:



Note: This curve assumes the part is mounted on a properly sized heat sink.

Type	Recommended Heat Sink Parameters
KAL10	130 sq inch surface area, 0.040" thick
KAL25	166 sq inch surface area, 0.040" thick
KAL50	286 sq inch surface area, 0.060" thick

Recommended Solder Profile

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

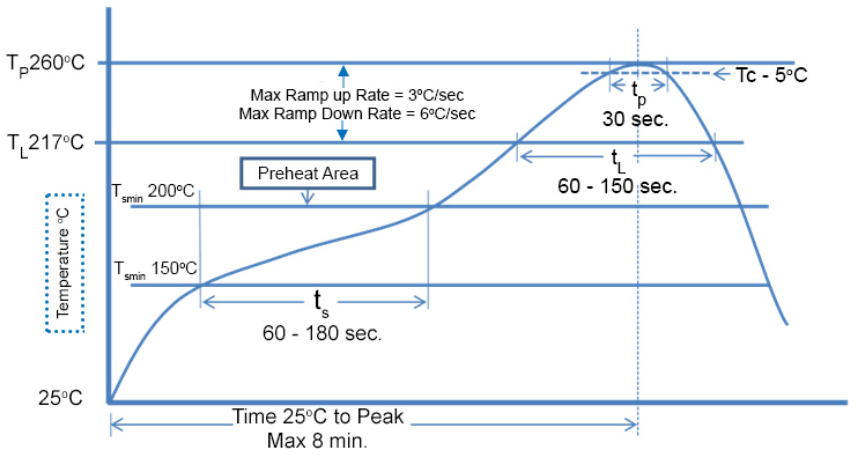
Soldering iron recommended temperatures: 330°C to 350°C with minimum duration.
Maximum number of reflow cycles: 3.

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. = Difference 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 Resistor Reflow Profile



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)
KAL/NKAL	Aluminum Housed Chassis Mount Resistor	Special	YES	100% Matte Sn	Jan-06	06/01

"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

K	A	L	1	0	F	B	1	0	K	0

Product Series

Code	Description
KAL	Standard
NKAL	Non-inductive

Power Rating

Code	W
10	10
25	25
50	50

Tolerance

Code	Tol
B	0.1%
D	0.5%
F	1%
H	3%
J	5%

Packaging

Code	Description	Size	MOQ
B	Bulk	10	250
		25	250
		50	250

Resistance Value

Four characters with the multiplier used as the decimal holder.
"L" used as multiplier of 10^{-3} for any value under 0.1 ohm.

0.05 ohm = 50L0
0.1 ohm = R100
1 ohm = 1R00
30 Kohm = 30K0