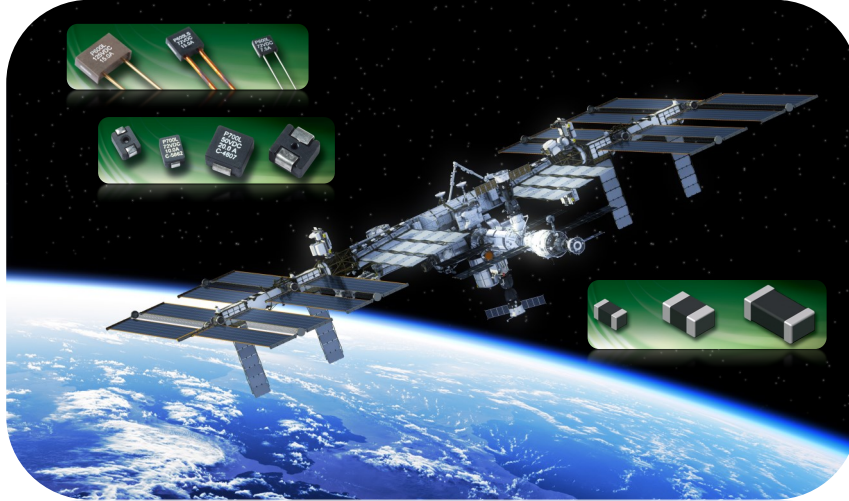


High Reliability (Hi-Rel) Components

Solid Construction with Superior Performance and Reliability for Circuit Protection



In combination of Wallace Technical Ceramics, the Mepcopal high-reliability thick-film fuse (Philips/Copal) and sole source plus first ever Defense Supply Center Columbus (DSCC) approved manufacturing process, AEM's A&D division provides advanced, high-reliability fuses, ferrite chip beads, and tin whisker mitigation products for satellite, defense, and aerospace applications. Its products, which are often custom and application-specific in nature, are used in harsh environments where performance is mission critical.

Hi-Rel Component Features:

- Hi-Rel Fuses: AEM is the sole QPL listed manufacturer of solid body, current limiting fuses produced using a thick film technique for the aerospace industry.
- Hi-Rel Ferrite Beads (HRB): HRB / DSCC 03024 Hi-Rel Ferrite Chip Beads Initial AEM HRB 487070 drawing was developed to meet a market need for a hi-rel ferrite chip. DSCC 03024 drawing is the progressive step to meet increasing hi-rel Mil Spec program requirements. A variety of EIA/EIAJ chip sizes from 0603 to 1206 are offered and feature nickel barrier terminations with a solder plate finish to help ensure a reliable solder joint.
- Tin Whisker Mitigation (TWM): Tin Whisker Mitigation (TWM) by adding lead (Pb) to chip size components with pure tin (Sn) terminals. Our Sn-Pb conversion process involves both Sn-Pb plating and subsequent fusion processing to ensure that the resultant component terminations are a homogenous mixture of Sn-Pb.

Hi-Rel Component Applications:

- Used in aviation, commercial defense satellites and spacecrafts including manned space vehicles
- Protection of power supplies, batteries and solar arrays
- Isolation of redundant and branch circuits
- Short circuit protection from fired squib and jettison circuitry
- Mission critical, where replacement is not an option and pure tin terminations
- Ruggedized Ground Based Electronics Systems
- Circuit Protection for Harsh Environments – High Vibration/Shock Exposure



AEM's HRB-US Product Overview

- Increases effective offering of HRB/DSCC part types to include Hi-Rel equivalents of most commercially available chip beads
- AEM facility uniquely qualified to perform needed processes
- Finished products up-screened to DSCC 03024 specifications
- For use in applications where failure is not an option
- Components provided as AEM warranted and supported products

Processes

- Commercial-grade components procured through OEM-approved distribution channels to ensure counterfeit prevention is maintained and pre-screened to AEM 387070 standard
- Component leads converted from RoHS to Sn/Pb utilizing AEM's proprietary plating process
- Components are completely screened per DSCC 03024 – Group A, B and C
- Up-screened flight components are tape & reel packaged with lot screening data (engineering model versions available upon request)

AEM, Inc. offers a unique service to up-screen high-quality, commercially available ferrite chip to meet high-reliability DSCC 03024 qualifications. This process provides a cost-effective means of producing an expanded inventory of DSCC part types for applications where failure is simply not an option.

AEM combines its unique testing and processing expertise to achieve this result. First, AEM's proprietary, aerospace-qualified plating and fusion process is used to convert the pre-screened commercial-grade parts, manufactured to be RoHS-compliant, to tin-lead (Sn/Pb) terminations and homogenizes the Sn/Pb terminal finish. The converted parts are then subjected to full DSCC 03024 Group A, B and C screening and repackaged in full reel with lot screening data.

HRB-US Series High-Reliability Ferrite Chip Beads

AEM is the first and only manufacturer of ferrite chip beads approved to the DSCC 03024 specification. In order to meet this demanding specification, AEM's ferrite beads are subjected to rigorous testing to assure compliance. While 03024 chip beads have been specifically design from the

ground up, AEM has determined that AEM sourced and tin/lead converted commercial components can approach 03024 series reliability through rigorous up-screening, utilizing the same lot acceptance testing performed on AEM's 03024 ferrite beads.

1

AEM procures OEM components through OEM-approved distribution channels. Only full reel quantities are obtained to maintain OEM Lot Number Date Code and Traceability.

2

AEM's proprietary, aerospace-qualified Sn/Pb plating and fusion process has been used to prevent tin-whiskers on surface-mount component terminations. Parts are screened prior to the Sn/Pb conversion (QA1), as well as following (QA2). Sampled parts are then subjected to destructive physical analysis (DPA) to verify internal microstructure integrity prior to DSCC screening.

3

Comprehensive DSCC screening involves three Groups as shown in the table below. AEM also conducts additional destructive physical analysis (DPA) sample evaluations on all HRB-US components.

4

HRB-US chip beads are then packaged in tape & reel with AEM lot number / AEM lot date code assigned to compliment OEM traceability information.

Group A Testing	Group B Testing	Group C Testing
Thermal Shock	Resistance to solvents	Low Temperature Operation
DC Resistance	Solderability	Life (1000 Hours)
Impedance	Resistance to Soldering Heat	Thermal Vacuum
Visual and Mechanical Examination	Termination Strength	Bending
Material Verification Outgassing	Current Carrying Capacity	Vibration
Material Verification Terminations/Body		Shock
		Salt Spray
		Moisture Resistance
		Thermal Shock (100 Cycle)
		Current Carrying Capacity (+25°C)
		Insulation Resistance



July 2016

First and only DSCC approved Ferrite Chip Bead

designed for space and other high reliability use. AEM HRB Series Ferrite Chip Beads are manufactured in our QPL certified facility in San Diego, providing complete material and process traceability.



All components are manufactured with space qualified materials and terminations. AEM HRB components are qualified and tested to AEM Drawing 487070 or DSCC Drawing 03024.

Do not let penny cost commodity components disable your mission-critical program !



← **Ni Barrier & S/N PB Solder Plate**



Benefits

- Sole Source, DSCC Drawing 03024, 1st ever Military specification for Ferrite Chip Bead
- Made in USA
- Tin-lead terminations (5%+ Pb, no Tin Whisker worries)
- Designed and qualified as Hi Rel
- Complete material and process traceability
- Meets all high reliability demands

Features

- Military Temperatures -55°C to $+125^{\circ}\text{C}$
- Tin-lead or gold terminations
- Reliability Qualified—Groups A/B data is supplied with shipment. Group C Inspection is optional
- Monolithic structure for closed magnetic path and high reliability
- Standard EIA/EIAJ chip sizes from 0603 to 1206

Applications

- Noise suppression in analog and digital circuits
- Where pure tin termination is prohibited
- Commercial or Military high reliability
- Medical instrumentation
- Down-hole and undersea
- Where reliability is a priority



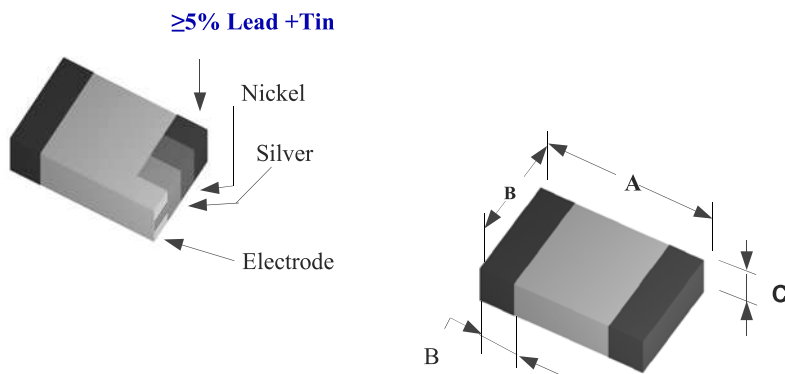
AEM Ferrite Chip Beads



	AEM Part #	DSCC Drawing #	Impedance Ω	Max. Ω R_{DC}	Max. Amps
0603	HRB0603S300P.500 ..	03024-001	30	0.15	0.50
	HRB0603S600P.500 ..	03024-002	60	0.15	0.50
	HRB0603S101P.400 ..	03024-003	100	0.20	0.40
	HRB0603S151P.400 ..	03024-004	150	0.25	0.40
	HRB0603S181P.400 ..	03024-005	180	0.25	0.40
	HRB0603S301P.200 ..	03024-006	300	0.30	0.20
	HRB0603S401P.200 ..	03024-007	400	0.35	0.20
	HRB0603S601P.200 ..	03024-008	600	0.40	0.20
	HRB0603S102P.200 ..	03024-009	1000	0.60	0.20
0805	HRB0805S300P4.00 ..	03024-010	30	0.02	4.00
	HRB0805S500P2.00 ..	03024-011	50	0.08	2.00
	HRB0805S600P1.50 ..	03024-012	60	0.15	1.50
	HRB0805S700P1.50 ..	03024-013	70	0.15	1.50
	HRB0805S101P1.00 ..	03024-014	100	0.20	1.00
	HRB0805S121P1.00 ..	03024-015	120	0.20	1.00
	HRB0805S151P1.00 ..	03024-016	150	0.20	1.00
	HRB0805S221P1.00 ..	03024-017	220	0.20	1.00
	HRB0805S331P1.00 ..	03024-018	330	0.25	1.00
	HRB0805S471P1.00 ..	03024-019	470	0.25	1.00
	HRB0805S601P1.00 ..	03024-020	600	0.30	1.00
	HRB0805S102P1.00 ..	03024-021	1000	0.40	1.00
1206	HRB1206S300P4.00 ..	03024-022	30	0.01	4.00
	HRB1206S500P3.00 ..	03024-023	50	0.03	3.00
	HRB1206S800P1.50 ..	03024-024	80	0.10	1.50
	HRB1206S121P1.50 ..	03024-025	120	0.10	1.50
	HRB1206S251P1.50 ..	03024-026	250	0.10	1.50
	HRB1206S501P1.00 ..	03024-027	500	0.20	1.00
	HRB1206S601P1.00 ..	03024-028	600	0.30	1.00

Other Sizes and Values may be added by request

Shape and Dimensions



Product Identification

HRB 0805 S 300 P 4.00 F T
 (1) (2) (3) (4) (5) (6) (7) (8)

- (1) Series code: **H**igh **R**eliability Ferrite Chip **B**ead
- (2) Chip size, EIA/EIAJ dimensions A x B
 First 2 digits: **A** ("length") Last 2 digits: **B** ("width")
- (3) Speed code: **S** = Standard **H** = High speed
- (4) Value code: Impedance (Ohms at 100 MHz)
 The first two digits are significant.
 The last digit specifies zeros to follow **300**=30 Ohms
- (5) Tolerance code: **J** = $\pm 5\%$ **K** = $\pm 10\%$
M = $\pm 20\%$ **P** = $\pm 25\%$
- (6) Current value in Ampere (**4.00**=4A; .150=0.15A)
- (7) Termination code: **F** = Sn/Pb solder plate **G** = Gold
- (8) Package Code: **T** = Tape & Reel **B** = Bulk

CHIP SIZE EIA/EIAJ	A INCH (mm)	B INCH (mm)	C INCH (mm)	TERMINATION (BW) INCH (mm)
0603/1608	0.063 \pm 0.006 (1.60 \pm 0.15)	0.031 \pm 0.006 (0.80 \pm 0.15)	0.031 \pm 0.006 (0.80 \pm 0.15)	0.014 \pm 0.006 (0.36 \pm 0.15)
0805/2012	0.079 \pm 0.008 (2.00 \pm 0.20)	0.049 \pm 0.008 (1.25 \pm 0.20)	0.035 \pm 0.008 (0.90 \pm 0.20)	0.020 \pm 0.010 (0.51 \pm 0.25)
1206/3216	0.126 \pm 0.008 (3.20 \pm 0.20)	0.063 \pm 0.008 (1.60 \pm 0.20)	0.043 \pm 0.008 (1.10 \pm 0.20)	0.020 \pm 0.010 (0.51 \pm 0.25)

Wire Wound Ceramic Inductors



Features

- Groups A/B and Qualification data
- From an AEM selected manufacturer
- Standard 5%+ Pb solder plate terminations
- Storage Temperature -55C to +125
- Wire wound structure with high Q and large current capacity
- 0402, 0603, 0805 and 1008 sizes

Applications

- For applications where reliability is Priority 1
- Where pure tin termination is prohibited
- General Noise, EMI, RFI suppression
- Surface mounting

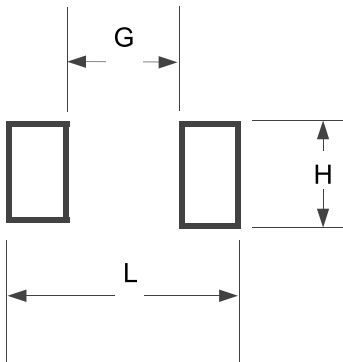
Product Identification

HRI 0603 C 1N0 J T
 (1) (2) (3) (4) (5) (6)

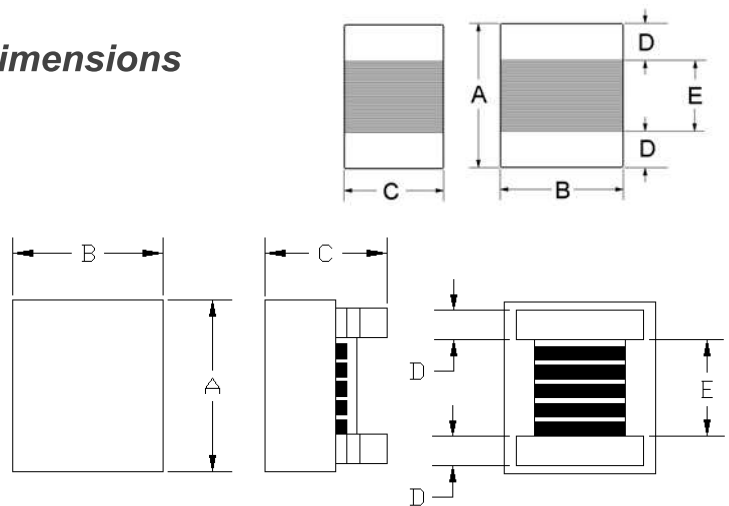
- (1) Series code:
HRI: High Reliability Inductors
- (2) Dimensions A x C inches
 The first two digits: A (length)
 The last two digits: C (height/thickness)
- (3) Characteristic code: **C**
- (4) Value code: Inductance
 N — decimal point for nH
 Example: **1N2** = 1.2 nH
 R — decimal point for μ H (1000 nH)
 Example: **R12** = 0.12 μ H = 120 nH
- (5) Tolerance code:
 F = $\pm 1\%$
 G = $\pm 2\%$
 J = $\pm 5\%$
 K = $\pm 10\%$
 M = $\pm 20\%$
- (6) Package code:
T = Tape & Reel
B = Bulk

Recommended PC Board Land Patterns

CHIP SIZE	L INCH (mm)	G INCH (mm)	H INCH (mm)
0402	0.044 (1.12)	0.016 (0.40)	0.027 (0.68)
0603	0.075 (1.91)	0.025 (0.64)	0.040 (1.02)
0805	0.110 (2.80)	0.036 (0.92)	0.069 (1.75)
1008	0.130 (3.30)	0.050 (1.27)	0.100 (2.54)



Shape and Dimensions



CHIP SIZE	A INCH (mm)	B INCH (mm)	C INCH (mm)	D INCH (mm)	E INCH (mm)
0402	0.039 (1.00)	0.027 (0.68)	0.022 (0.55)	0.008 (0.20)	0.024 (0.60)
0603	0.071 (1.80)	0.044 (1.12)	0.040 (1.02)	0.013 (0.33)	0.034 (0.86)
0805	0.091 (2.30)	0.067 (1.70)	0.063 (1.60)	0.017 (0.43)	0.046 (1.17)
1008	0.112 (2.85)	0.104 (2.65)	0.087 (2.20)	0.020 (0.50)	0.059 (1.50)

Note: Dimensions A, B, and C are maximum. Dimensions D and E are typical.

High Reliability, HRI Series **Wire Wound Inductors**

Size	AEM Part Number	L_nH @MHz	$Q(min)$ @MHz	$SRF(min)$ MHz	DCR Ω	$mA(max)$
1206						
0805						
0603	HRI0603C72N	72@150	33@150	1700	0.49	400
	HRI0603CR15	150@150	28@150	1300	1.80	200