

# EIA INTERIM STANDARD

EIA/IS-48

## Axial Lead Fixed Radio Frequency (RF) Coils

EIA/IS-48

JUNE 1988

ELECTRONIC INDUSTRIES ASSOCIATION  
ENGINEERING DEPARTMENT



## NOTICE

EIA Engineering Standards and Publications are designed to serve the public interest through eliminating misunderstandings between manufacturers and purchasers, facilitating interchangeability and improvement of products, and assisting the purchaser in selecting and obtaining with minimum delay the proper product for his particular need. Existence of such Standards and Publications shall not in any respect preclude any member or non-member of EIA from manufacturing or selling products not conforming to such Standards and Publications, nor shall the existence of such Standards and Publications preclude their voluntary use by those other than EIA members, whether the standard is to be used either domestically or internationally.

Recommended Standards and Publications are adopted by EIA without regard to whether or not their adoption may involve patents on articles, materials, or processes. By such action, EIA does not assume any liability to any patent owner, nor does it assume any obligation whatever to parties adopting the Recommended Standard or Publication.

This Interim Standard was developed by the P-3 Committee on Inductive Components.

## EIA INTERIM STANDARDS

EIA Interim Standards contain information deemed to be of technical value to the industry, and are published at the request of the originating Committee without necessarily following the rigorous public review and resolution of comments which is a procedural part of the development of an EIA Recommended Standard.

EIA Interim Standards should be reviewed on an annual basis by the formulating Committee and a decision made on whether to proceed to develop an EIA Recommended Standard on this subject. EIA Interim Standards must be cancelled by the Committee and removed from the EIA Standards Catalog before the end of their fifth year of existence.

Published by  
ELECTRONIC INDUSTRIES ASSOCIATION  
Engineering Department  
2001 Eye Street, N.W.  
Washington, D.C. 20006

PRICE: \$15.00

Printed in U.S.A.

 **Documents**  
Document Sharing Hub

## AXIAL LEAD FIXED RADIO FREQUENCY (RF) COILS

1. SCOPE

This standard covers industrial grade RF coils which are intended as simple inductive elements in RF circuits. They are primarily intended for machine packaging, insertion and soldering on printed wiring boards.

NOTE: The parts described by this standard and the test procedures are based on inductance measurements using an Analog Q Meter System.

1.1 Part Identification and Designation

Parts shall be identified by a designation numbering system as follows:

RF 02

Style

10R

Inductance

J

Tolerance

1.2 Style

The style is identified by the letters RF followed by two digits. Details of the style are given in the detail specifications associated with this standard.

### 1.3 Performance

The performance identifies the performance and test capability of the part.

TABLE I.

| INSPECTION GROUP                      | TEST | Limits (allowable variation from initial unless otherwise specified) |                                  |
|---------------------------------------|------|----------------------------------------------------------------------|----------------------------------|
|                                       |      | <u>Phenolic &amp; Powdered Iron Core</u>                             | <u>Ferrite Core</u>              |
| Qualification Inspection<br>(Table V) |      |                                                                      |                                  |
| GROUP II                              |      |                                                                      |                                  |
|                                       | L    | $\pm 5\%$                                                            | $\pm 10\%$                       |
|                                       | Q    | $\pm 10\%$                                                           | $-20\%$                          |
|                                       | DCR  | $\pm(3\% + .001 \text{ ohms})\%$                                     | $\pm(5\% + .001 \text{ ohms})\%$ |
|                                       | SRF  | $\pm 8\%$                                                            | $-15\%$ from minimum             |
| GROUP IV                              |      |                                                                      |                                  |
|                                       | L    | $\pm 3\%$                                                            | $\pm 5\%$                        |
|                                       | Q    | $\pm 10\%$                                                           | $-10\%$ from minimum             |
| GROUP V                               |      |                                                                      |                                  |
|                                       | L    | $\pm 5\%$                                                            | $\pm 5\%$                        |
|                                       | Q    | $\pm 15\%$                                                           | $-15\%$ from minimum             |
|                                       | DCR  | $\pm(3\% + .001 \text{ ohms})\%$                                     | $\pm(3\% + .001 \text{ ohms})\%$ |
|                                       | SRF  | $\pm 10\%$                                                           | $-10\%$ from minimum             |
| Group C Inspection<br>(Table VIII)    |      |                                                                      |                                  |
| SUBGROUP I                            |      |                                                                      |                                  |
|                                       | L    | $\pm 5\%$                                                            | $\pm 5\%$                        |
|                                       | Q    | $\pm 15\%$                                                           | $-15\%$ from minimum             |
|                                       | DCR  | $\pm(3\% + .001 \text{ ohms})\%$                                     | $\pm(3\% + .001 \text{ ohms})\%$ |
|                                       | SRF  | $\pm 10\%$                                                           | $-10\%$ from minimum             |
| SUBGROUP III                          |      |                                                                      |                                  |
|                                       | L    | $\pm 5\%$                                                            | $\pm 10\%$                       |
|                                       | Q    | $\pm 10\%$                                                           | $-20\%$ from minimum             |
|                                       | DCR  | $\pm(3\% + .001 \text{ ohms})\%$                                     | $\pm(5\% + .001 \text{ ohms})\%$ |
|                                       | SRF  | $\pm 8\%$                                                            | $-15\%$ from minimum             |

### 1.4 Inductance

The inductance value in microhenries is specified by three digits. Except for values below 10 microhenries the first two digits are significant figures and the last digit indicates the number of zeros to follow. For values below 10 uh an R is used to indicate a decimal point. See examples in TABLE II.

Standard inductance values are shown for each style in the detail specifications.

TABLE II

## Designation of Inductance Values

| DESIGNATION      | INDUCTANCE-MICROHENRIES |    |              |
|------------------|-------------------------|----|--------------|
| R01 to R09 ..... | 0.01                    | to | .09 incl.    |
| R10 to R91 ..... | 0.1                     | to | .91 incl.    |
| 1R0 to 9R1 ..... | 1.0                     | to | 9.1 incl.    |
| 100 to 910 ..... | 10                      | to | 91 incl.     |
| 101 to 911 ..... | 100                     | to | 910 incl.    |
| 102 to 912 ..... | 1000                    | to | 9100 incl.   |
| 103 to 913 ..... | 10000                   | to | 91000 incl.  |
| 104 to 914 ..... | 100000                  | to | 910000 incl. |

1.5 Tolerance

The inductance tolerance shall be specified according to TABLE III

TABLE III.

Inductance Tolerance

| <u>Symbol</u> | <u>Inductance Tolerance-Percent (<math>\pm</math>)</u> |
|---------------|--------------------------------------------------------|
| J             | 5                                                      |
| K             | 10                                                     |
| M             | 20                                                     |

2. APPLICABLE DOCUMENTS

Unless otherwise specified the latest issue of the referenced specifications and standards are applicable.

Standards

|          |        |                                                                               |
|----------|--------|-------------------------------------------------------------------------------|
| EIA      | RS-186 | Standard Test Methods for Passive Electronic Component Parts                  |
| EIA      | RS-296 | Lead Taping of Components in Axial Lead Configuration for Automatic Insertion |
| MIL-STD- | 202    | Test Methods for Electronic and Electrical Component Parts                    |
| MIL-STD- | 105    | Sampling Procedures and Tables for Inspection by Attributes                   |

Specifications

|          |                          |
|----------|--------------------------|
| J-W-1177 | Wire, Magnet, Electrical |
| QQ-S-571 | Solder, Tin-Lead Alloy   |

### 3. REQUIREMENTS

#### 3.1 Detail Specification Sheets

Detailed requirements are specified in this standard and in the detail specification sheets for individual styles. In case of conflict between this standard and the detail sheets, the latter shall govern.

#### 3.2 Qualification

Parts furnished to this specification may be qualified (certified) to compliance with this specification by being tested to and meeting the requirements of TABLE V.

#### 3.3 Materials

Materials shall be as specified herein. When a definite material is not specified, any material may be used which will enable the part to meet the performance requirements.

##### 3.3.1 Enclosure

Body material must not soften or deform when exposed to the maximum operating temperature specified or when subjected to the specified tests.

##### 3.3.2 Magnet Wire

Insulated wire used in winding shall conform to J-W-1177 when applicable.

##### 3.3.3 Terminals

The terminal lead wires shall be copper with a tin-lead solder coating with a 10% to 90% tin content.

#### 3.4 Marking

Coils shall be marked with four bands, three indicating the inductance in microhenries and the fourth band indicating the tolerance in percent. Color coding shall be in accordance with the color code of Table IV. When either the first or second band of the three bands is gold, this band shall represent the decimal point for inductance values less than 10, and the other two bands shall represent significant figures. For inductance values of 10 or more, the first two bands shall represent significant figures, and the third band shall represent the multiplier. The colors used shall be in accordance with EIA RS-359. Typical color coding for units with inductance values less than 10 and for 10 or greater is shown on Figure 1. The marking shall be legible upon completion of each examination or test.

When specified on the contract or order the coils may be printed in place of being color banded. The printing shall include the inductance value and tolerance as a minimum.

The package marking should include all items listed below:

1. Inductance value (See Paragraph 1.4)
2. Inductance tolerance
3. Type designation
4. Manufacturers trade mark or source code
5. Manufacturing date code

TABLE IV.

Color code.

| Color             | Significant figure | Multiplier 1/ | Inductance tolerance (percent) |
|-------------------|--------------------|---------------|--------------------------------|
| Black - - - - -   | 0                  | 1             | ---                            |
| Brown - - - - -   | 1                  | 10            | +1%                            |
| Red- - - - -      | 2                  | 100           | +2%                            |
| Orange- - - - -   | 3                  | 1,000         | +3%                            |
| Yellow- - - - -   | 4                  | ---           | ---                            |
| Green - - - - -   | 5                  | ---           | ---                            |
| Blue- - - - -     | 6                  | ---           | ---                            |
| Violet- - - - -   | 7                  | ---           | ---                            |
| Gray- - - - -     | 8                  | ---           | ---                            |
| White - - - - -   | 9                  | ---           | ---                            |
| None 2/ - - - - - | ---                | ---           | ±20                            |
| Silver- - - - -   | ---                | ---           | ±10                            |
| Gold- - - - -     | Decimal point      | ---           | ±5                             |

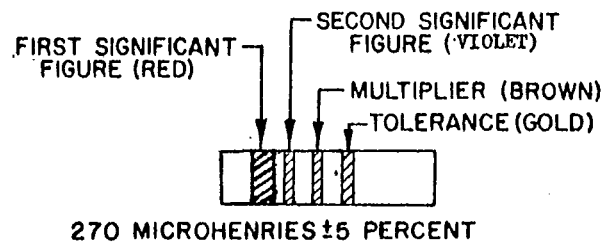
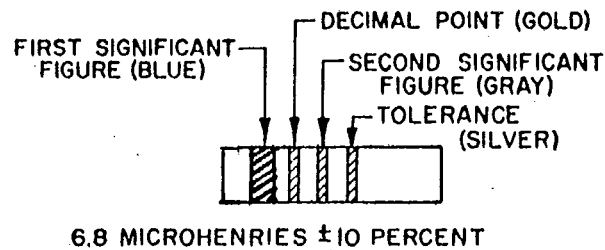
- 1/ The multiplier is the factor by which the two significant figures are multiplied to yield the nominal inductance value.  
 2/ Indicates body color.

### 3.5 Workmanship

Parts shall be processed in such a manner as to be uniform in quality and be free from defects that will affect life, serviceability or function.

### 3.6 Packaging

Unless otherwise specified item quantities higher than 499 pieces shall be packaged in accordance with EIA RS-296 "Lead Taping of Components in Axial Lead Configuration for Automatic Insertion". Other quantities shall be in normal commercial bulk packages.



NOTE: The color band for the first significant digit shall be twice the width of the other bands

FIGURE 1. Typical color coding

#### 4. QUALITY ASSURANCE PROVISIONS

##### 4.1 Responsibility for Inspection

The manufacturer is responsible for verifying that the parts conform to the requirements of this standard and the applicable detail specification.

##### 4.2 Test Equipment and Inspection Facilities

##### 4.3 Inspection Conditions

Unless otherwise specified herein, all inspections shall be performed in accordance with the test conditions specified in the General Requirements of MIL-STD-202.

###### 4.3.1 Precautions

Adequate precautions shall be taken during inspection to prevent condensation of moisture on coils except during the moisture-resistance and thermal shock tests.

###### 4.3.2 Test voltage

The test voltage shall contain no more than 5 percent harmonic distortion.

###### 4.3.3 Test Frequency

When a test frequency is specified without a tolerance, the frequency used shall be within  $\pm 1.0$  percent of the specified value.

###### 4.3.4 Demagnetization

When necessary to overcome remanence effects, demagnetization is permitted.

##### 4.4 Qualification

Qualification testing shall be performed as specified in TABLE V.

###### 4.4.1 Qualification Sample

A sample consisting of 21 units of the highest value and 21 units of the lowest value for which qualification is sought shall be submitted.

###### 4.4.2 Inspection Routine

The sample shall be subjected to the inspections specified in TABLE V, in the order shown. All sample units except Group III, shall be subjected to the inspection of Group I. The sample shall then be divided as specified in TABLE V for Groups II to VII inclusive, and the sample units subjected to the inspection for their particular group.