

EIA INTERIM STANDARD

LEADED SURFACE MOUNT
RESISTOR NETWORKS
FIXED FILM

IS-34

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IS-34
Page 1

(From Project No. PN1905, formulated under the cognizance
of EIA Working Group P-1.5 on Resistor Networks.)

1. SCOPE

1.1 Scope

This industry standard covers the general requirements for cermet or metal film type resistor networks, primarily intended for incorporation into electronic circuits.

1.2 Classification

Networks specified herein (see 3.1) shall be identified by a part number which shall consist of the basic style and a dash number. Each article sheet covers a different network style. The dash number shall be coded to provide information concerning the network characteristic, resistance value, resistance tolerance and schematic. The part number shall be in the following form with the dash number derived as indicated:

RZS020	H	1002	F	A
Style	Characteristic	Resistance	Resistance	Schematic
(1.2.1)	(1.2.2)	(1.2.3)	Tolerance (1.2.4)	(1.2.5)

1.2.1 Style

The style is identified by the three-letter symbol "RZS" followed by a three-digit number.

1.2.2 Characteristic

The resistive characteristic is identified by the single letter H, K or M.

TABLE I
CHARACTERISTICS

TEST OR CONDITION	SYMBOL			UNITS
	H	K	M	
Resistance Temperature Characteristic (3.14)	+50	+100	+300	Parts/million/C
Maximum ambient temperature at rated wattage	70	70	70	Degrees Celsius
Maximum ambient temperature at zero power derating (see Figure 1)	125	125	125	Degrees Celsius
Thermal Shock (3.7)	+0.25	+0.5	+0.5	Maximum percent
Short Time Overload (3.9)	+0.1	+0.25	+0.5	change in
Resistance to Soldering Heat (3.11)	+0.1	+0.25	+0.25	resistance
Moisture Resistance (3.12)	+0.4	+0.5	+0.5	(0.01 ohm addi-
Life (3.13)	+0.5	+1.0	+2.0	tional allowed
High Temperature Exposure (3.10)	+0.2	+0.5	+1.0	for measurement
Resistance Tolerance (see Table IV)	0.1(B)	0.5(D)	1.0(F)	+ Percent
	0.5(D)	1.0(F)	2.0(G)	
	1.0(F)	2.0(G)	5.0(J)	
		5.0(J)	10.0(K)	
		10.0(K)		



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1.2.3 Resistance

1.2.3.1 Equal Resistors - When all resistance values in the network are identical, the nominal resistance expressed in ohms is identified by four digits. Standard values are shown in Table II. The first three digits represent significant figures and the last digit specifies the number of zeros to follow. When the value of resistance is less than 100 ohms, or when the fractional values of an ohm are required, the letter "R" should be substituted for one of the significant digits to represent the decimal point. When the letter "R" is used, succeeding digits of the group represent significant figures. The resistance value designations are shown in Tables II and III. Minimum and maximum resistance values for each style shall be as specified (see 3.1).

1.2.3.2 Unequal Resistors - When the resistance value within the network varies, then four digits should be used with the first digit being an "A," and the following three digits a code number indicating a resistance combination described in the applicable detail article sheet.

TABLE II
STANDARD RESISTANCE VALUES FOR THE 10 TO 100 DECADE
FOR .1%, .5%, 1.0%, 2%, 5% AND 10% RESISTANCE TOLERANCES

Resistance Tolerance

B D	F	G J K	B D	F	G J K	B D	F	G J K	B D	F	G J K
(.1)		(2.0)	(.1)		(2.0)	(.1)		(2.0)	(.1)		(2.0)
(.5)	(1.0)	(10.0)	(.5)	(1.0)	(10.0)	(.5)	(1.0)	(10.0)	(.5)	(1.0)	(10.0)
10.00	10.00	10.00	13.00	13.00	13.00	16.90	16.90				22.00
10.10			13.20			17.20			22.10	22.10	
10.20	10.20		13.30	13.30		17.40	17.40		22.30		
10.40			13.50			17.60			22.60	22.60	
10.50	10.50		13.70	13.70		17.80	17.80		22.90		
10.60			13.80			18.00		18.00	23.20	23.10	
10.70	10.70		14.00	14.00		18.20	18.20		23.40		
10.90			14.20			18.40			23.70	23.70	
11.00	11.00	11.00	14.30	14.30		18.70	18.70		24.00		24.00
11.10			14.50			18.90			24.30	24.30	
11.30	11.30		14.70	14.70		19.10	19.10		24.60		
11.40			14.90			19.30			24.90	24.90	
11.50	11.50		15.00	15.00	15.00	19.60	19.60		25.20		
11.70			15.20			19.80			25.50	25.50	
11.80	11.80		15.40	15.40		20.00	20.00	20.00	25.80		
12.00	12.00	12.00	15.60			20.30			26.10	26.10	
12.10	12.10		15.80	15.80		20.50	20.50		26.40		
12.30			16.00	16.00	16.00	20.80			26.70	26.70	
12.40	12.40		16.20	16.20		21.00	21.00				27.00
12.60			16.40			21.30			27.10		
12.70	12.70		16.50	16.50		21.50	21.50		27.40	27.40	
12.90			16.70			21.80			27.70		

TABLE II (Continued)

Resistance Tolerance

B D	F	G J K	B D	F	G J K	B D	F	G J K	B D	F	G J K
(.1)		(2.0)	(.1)		(2.0)	(.1)		(2.0)	(.1)		(2.0)
(.5)	(1.0)	(5.0)	(.5)	(1.0)	(5.0)	(.5)	(1.0)	(5.0)	(.5)	(1.0)	(5.0)
(.5)	(1.0)	(10.0)	(.5)	(1.0)	(10.0)	(.5)	(1.0)	(10.0)	(.5)	(1.0)	(10.0)
28.00	28.00	-----	38.80	-----	-----	53.60	53.60	-----	74.10	-----	-----
28.40	-----	-----	-----	-----	39.00	54.20	-----	-----	75.00	75.00	75.00
28.70	28.70	-----	39.20	39.20	-----	54.90	54.90	-----	75.90	-----	-----
29.10	-----	-----	39.70	-----	-----	55.60	-----	-----	76.80	76.80	-----
29.40	29.40	-----	40.20	40.20	-----	-----	-----	56.00	77.70	-----	-----
29.80	-----	-----	40.70	-----	-----	56.20	56.20	-----	78.70	78.70	-----
-----	-----	30.00	41.20	41.20	-----	56.90	-----	-----	79.60	-----	-----
30.10	30.10	-----	41.70	-----	-----	57.60	57.60	-----	80.60	80.60	-----
30.50	-----	-----	42.20	42.20	-----	58.30	-----	-----	81.60	-----	-----
30.90	30.90	-----	42.70	-----	-----	59.00	59.00	-----	-----	-----	82.00
31.20	-----	-----	-----	-----	43.00	59.70	-----	-----	82.50	82.50	-----
31.60	31.60	-----	43.20	43.20	-----	60.40	60.40	-----	83.50	-----	-----
32.00	-----	-----	43.70	-----	-----	61.20	-----	-----	84.50	84.50	-----
32.40	32.40	-----	44.20	44.20	-----	61.90	61.90	-----	85.60	-----	-----
32.80	-----	-----	44.80	-----	-----	-----	-----	62.00	86.60	86.60	-----
-----	-----	33.00	45.30	45.30	-----	62.60	-----	-----	87.60	-----	-----
33.20	33.20	-----	45.90	-----	-----	63.40	63.40	-----	88.70	88.70	-----
33.60	-----	-----	46.40	46.40	-----	64.20	-----	-----	89.80	-----	-----
34.00	34.00	-----	47.00	-----	47.00	64.90	64.90	-----	90.90	90.90	-----
34.40	-----	-----	47.50	47.50	-----	65.70	-----	-----	-----	-----	91.00
34.80	34.80	-----	48.10	-----	-----	66.50	66.50	-----	92.00	-----	-----
35.20	-----	-----	48.70	48.70	-----	67.30	-----	-----	93.10	93.10	-----
35.70	35.70	-----	49.30	-----	-----	-----	-----	68.00	94.20	-----	-----
-----	-----	36.00	49.90	49.90	-----	68.10	68.10	-----	95.30	95.30	-----
36.10	-----	-----	50.50	-----	-----	69.00	-----	-----	96.50	-----	-----
36.50	36.50	-----	-----	-----	51.00	69.80	69.80	-----	97.60	97.60	-----
37.00	-----	-----	51.10	51.10	-----	70.60	-----	-----	98.80	-----	-----
37.40	37.40	-----	51.70	-----	-----	71.50	71.50	-----	-----	-----	-----
37.90	-----	-----	52.30	52.30	-----	72.30	-----	-----	-----	-----	-----
38.30	38.30	-----	53.00	-----	-----	73.20	73.20	-----	-----	-----	-----

TABLE III
DESIGNATION OF RESISTANCE VALUES

Designation	Resistance Ohms
1R00 to 9R76 incl.	1.0 to 9.76 incl.
10R0 to 97R6 incl.	10.0 to 97.6 incl.
1000 to 9760 incl.	100 to 976 incl.
1001 to 9761 incl.	1,000 to 9,760 incl.
1002 to 9762 incl.	10,000 to 97,600 incl.
1003 to 9763 incl.	100,000 to 976,000 incl.
1004 to 9764 incl.	1,000,000 to 9,760,000 incl.
1005.....	10,000,000



1.2.4 Tolerance

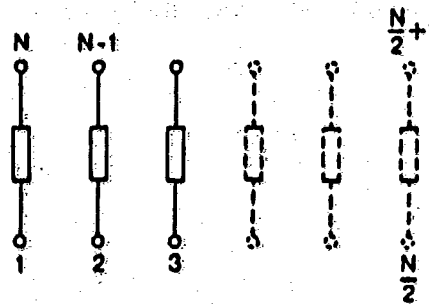
The resistor tolerance is identified by a single letter in accordance with Table IV.

TABLE IV
TOLERANCE

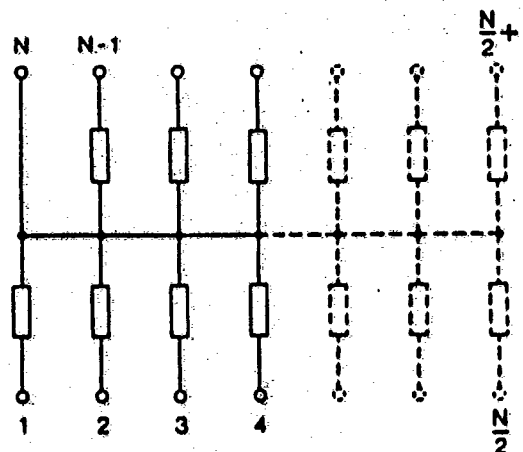
Symbol	Tolerance Percent $\pm$
B	0.1
D	0.5
F	1.00
G	2.00
J	5.00
K	10.00

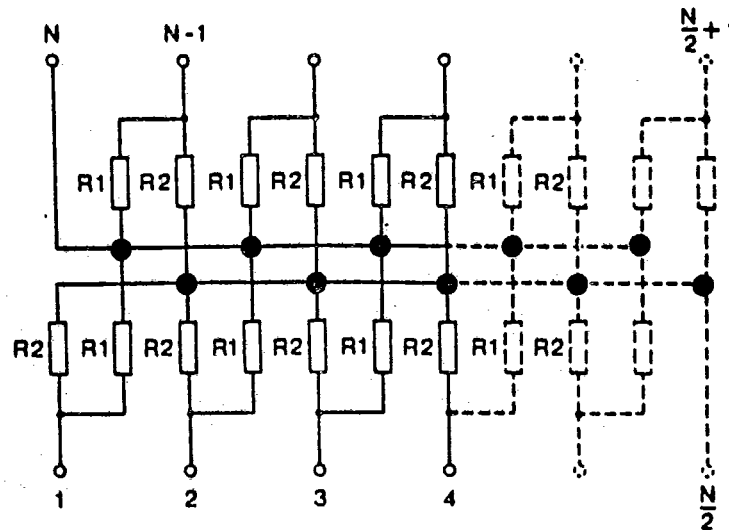
1.2.5 Schematic

The Schematic of the network shall be identified by a single letter in accordance with the drawing below:

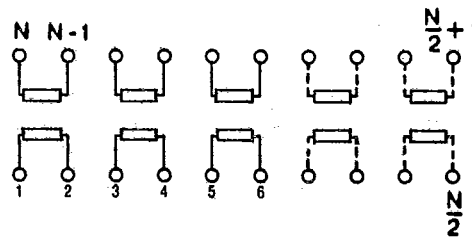
Schematic A
SO Package/PCC10 Package

N = Number of terminations.

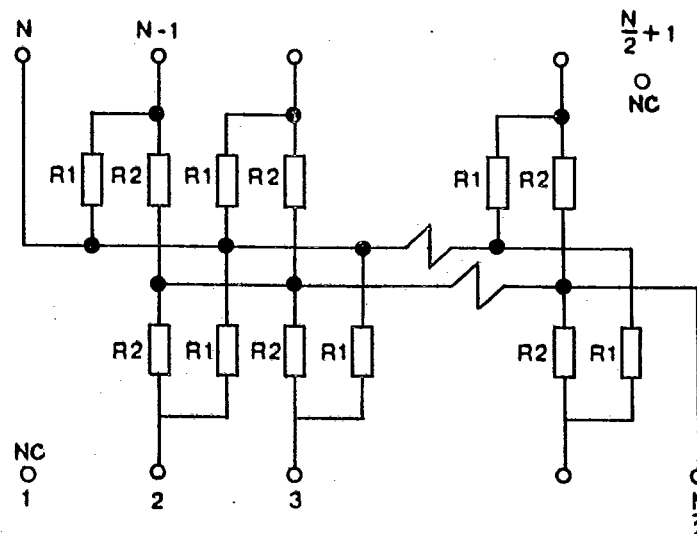
Schematic B
SO Package



Schematic J
SO Package

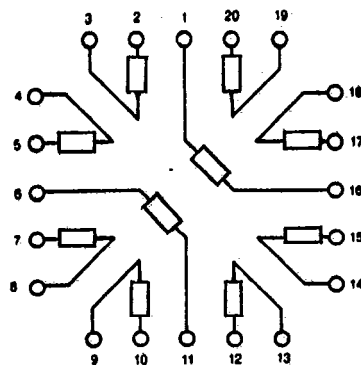


Schematic M
SO Package

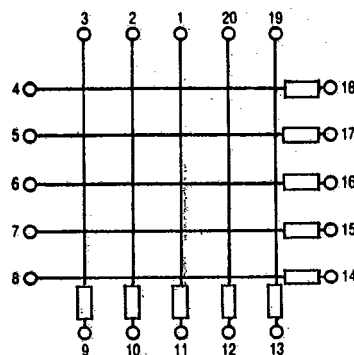


Schematic N
SO Package

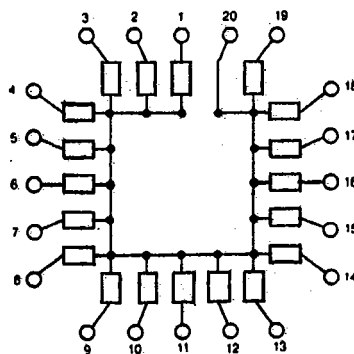
IS-34
Page 6



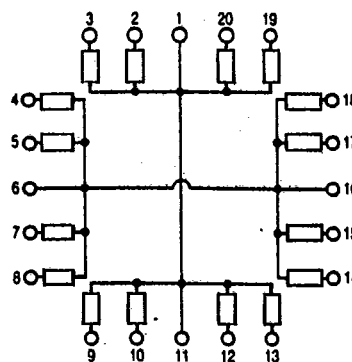
Schematic P
PCC 20



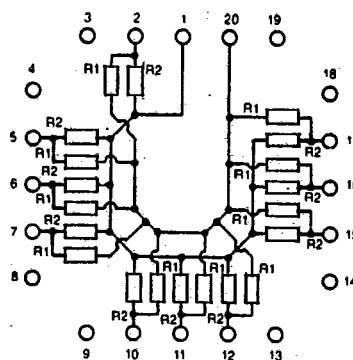
Schematic R
PCC 20



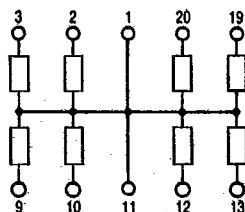
Schematic S
PCC 20



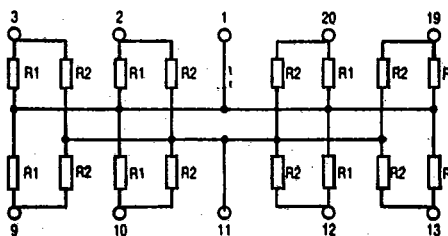
Schematic T
PCC 20 Package



Schematic U
PCC 20 Package



Schematic V
PCC 10 Package



Schematic W
PCC 10 Package

Schematic X

Additional schematics will be as indicated on applicable detail article sheets.

2 APPLICABLE DOCUMENTS

- 2.1 MIL-STD-202: Test Methods for Electronic and Electrical Component Parts.
- 2.2 EIA Standard RS-186: Standard Test Methods for Passive Electronic Component Parts.
- 2.3 EIA RS-327: Solvent Resistance of Applied Marking Materials.

3 REQUIREMENTS

3.1 Detail Specifications

The individual part requirements shall be as specified herein and in accordance with the attached applicable detail specification. In the event of any conflict between the requirements of this section and the detail specification, the latter shall govern.

3.2 Material

The material shall be as specified herein. However, when a definite material is not specified, a material shall be used which will enable the networks to meet the performance requirements of this article sheet. Acceptance or approval of any constituent material shall not be construed as a guarantee of the acceptance of the finished product.

3.3 Design and Construction

Networks shall be of the design, construction and physical dimensions specified (see 3.1).

3.3.1 Enclosure

Networks shall be protected to withstand the environmental tests specified.

3.3.2 Termination Leads

Terminal leads shall be free of foreign materials and solderable as specified.

- 3.4 For temperatures in excess of 70°C, the load capability of each resistor and package shall be derated in accordance with Figure 1.

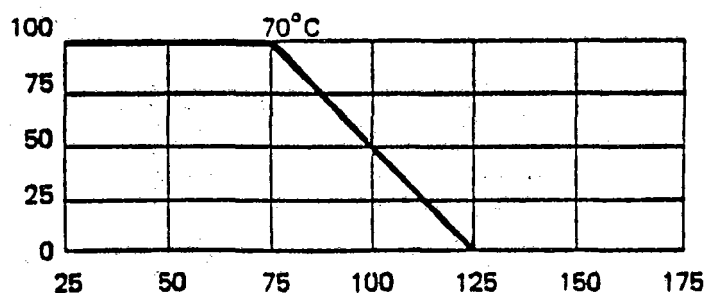


FIGURE 1
DERATING CURVES FOR HIGH AMBIENT TEMPERATURES

This curve indicates the percentage of nominal wattage to be applied at temperatures higher than 70°C. However, at no time shall the applied voltage exceed the maximum for each style (see 3.1)

3.5 Voltage Rating

Each resistor shall have a rated dc continuous working voltage or an approximate sine-wave root-mean-square (rms) continuous working voltage corresponding to the wattage (power) rating, as determined from the following formula:

$$E = \sqrt{PR}$$

E = Continuous rated dc or rms working voltage in volts

P = Rated wattage in watts

R = Nominal resistance in ohms

In no case shall the rated voltage be greater than the applicable maximum voltage. (See detail spec.)

3.6 DC Resistance

When the networks are tested as specified in 4.3.1 the dc resistance shall be within the specified tolerance of the nominal resistance (see 1.2.4), and shall be stable within the specified tolerance during the measurement.

3.7 Thermal Shock

When networks are tested as specified in 4.4, there shall be no evidence of mechanical damage; the change in resistance shall not exceed $\pm (0.5\% + .01 \text{ ohm})$ for characteristic M and K; $\pm (0.25\% + 0.01 \text{ ohm})$ for characteristic H.

3.8 Low-Temperature Operation

When networks are tested as specified in 4.5, there shall be no evidence of mechanical damage; the change in resistance between the initial and final measurements at $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$, shall not exceed $\pm (0.5\% + 0.01 \text{ ohm})$ for characteristic M $\pm (.25\% + 0.01 \text{ ohm})$ for characteristic K; $\pm (0.10\% + 0.01 \text{ ohm})$ for characteristic H.

3.9 Short-Time Overload

When networks are tested as specified in 4.6, there shall be no evidence of arcing, burning, or charring; the change in resistance shall not exceed $\pm (0.1\% + 0.01 \text{ ohm})$ for characteristic H, $\pm (0.25\% + 0.01 \text{ ohm})$ for characteristic K, $\pm (0.50\% + 0.01 \text{ ohm})$ for characteristic M.

3.10 High Temperature Exposure

When networks are tested as specified in 4.7, there shall be no evidence of mechanical damage, and the change in resistance shall not exceed $\pm (1.0\% + 0.01 \text{ ohm})$ for characteristic M, $\pm (0.20\% + 0.01 \text{ ohm})$ for characteristic H, and $\pm (.50\% + 0.01 \text{ ohm})$ for characteristic K.

3.11 Resistance to Soldering Heat

When networks are tested as specified in 4.8, there shall be no evidence of mechanical damage and the change in resistance shall not exceed $\pm (0.25\% + 0.01 \text{ ohm})$ for characteristic M and K, $\pm (0.10\% + 0.01 \text{ ohm})$ for characteristic H.

3.12 Moisture Resistance

When networks are tested as specified in 4.9, there shall be no evidence of mechanical damage, the change in resistance between the initial and final measurements shall not exceed $\pm (0.5\% + 0.01 \text{ ohm})$ for characteristic M and K; $\pm (0.40\% + 0.01 \text{ ohm})$ for characteristic H.