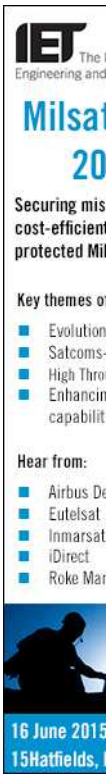
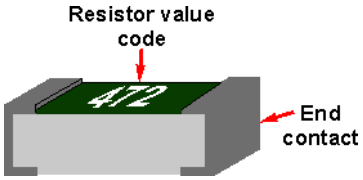


Surface Mount SMD Resistor Codes & Markings

- details of the SMD or SMT resistor markings and codes with the systems used to indicate the resistor values and information - including EIA SMD resistor marking / coding scheme.

Although not all SMD resistors, or SMT resistors are marked with their values, some are, and in view of the lack of space the SMD resistor code systems may not always provide an obvious indication of the resistor value.

The surface mount resistor code systems provide are mainly used to enable service, repair and fault-finding. During manufacture the resistors are held either in tapes that are reeled, or in hoppers used for the surface mount machines. The SMD resistor markings can be used as a check to ensure the correct values are being fitted, but normally the reels or hoppers will be suitable marked and coded.



Typical surface mount resistor code

SMD resistor code systems

Many SMD resistors do not have any markings on them to indicate their value. For these devices, once they are loose and out of their packaging it is very difficult to tell their value. Accordingly SMD resistors are typically used within reels or other packages where there is no chance of different values being mixed.

Many resistors do have markings on them. There are three systems that are used:

- Three figure SMD resistor coding system
- Four figure SMD resistor coding system
- EIA96 SMD resistor coding system

3 figure SMT resistor code system

A three figure SMT resistor coding system is the one that is normally used for standard tolerance resistors.

As the name indicates this SMD resistor marking system uses three figures. The first two figures in the code indicate the significant figures, and the third is a multiplier. This is the same as the coloured rings used for wired resistors, except that actual numbers are used instead of colours.

Therefore an SMD resistor with the figures 472 would have a resistance of 47 x 10^2 ohms, or 4.7kΩ. However beware of resistors marked with figures such as 100. This is not 100 ohms, but it follows the scheme exactly and it

Therefore an SMD resistor with the figures 472 would have a resistance of 47 x 10^2 ohms, or 4.7kΩ. However beware of resistors marked with figures such as 100. This is not 100 ohms, but it follows the scheme exactly and it is 10 x 10^0 or 10 x 1 = 10 Ω.

Three figure SMD resistor code

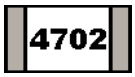
Where resistance values less than ten ohms are used, the letter "R" is used to indicate the position of the decimal point. As an example, a resistor with the value 4R7 would be 4.7Ω.

4 figure SMT resistor code system

The four digit or four figure SMT resistor marking scheme is used for marking high tolerance SMD resistors. Its format is very similar to the three figure SMT resistor making scheme, but expanded to give the higher number of significant figures needed for higher tolerance resistors.

In this coding scheme, the first three numbers will indicate the significant digits, and the fourth is the multiplier.

Therefore an SMD resistor with the figures 4702 would have a resistance of 470 x 10^2 ohms, or 47kΩ.



Four figure SMD resistor code

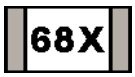
Resistors with values of less than 100 ohms are marked utilise the letter 'R', as before, to indicate the position of the decimal point.

EIA96 SMD resistor code system

A further surface mount resistor code scheme or SMD resistor coding scheme has started to be used, and it is aimed at 1% tolerance SMD resistors, i.e. those using the EIA96 or E-96 resistor series. As higher tolerance resistors are used, further figures are needed. However the small size of SMT resistors makes the figures difficult to read. Accordingly the new system seeks to address this. Using only three figures, the actual characters can be made larger than those of the four figure system that would otherwise be needed.

The EIA SMD resistor coding scheme uses a three character code: the first 2 numbers indicate the 3 significant digits of the resistor value. The third character is a letter which indicates the multiplier. In this way this SMD resistor marking scheme will not be confused with the 3 figure markings scheme as the letters will differentiate it, although the letter R can be used in both systems.

To generate the system the E-96 resistor series has been taken and each value or significant figure set has been numbered sequentially. As there are only 96 values in the E-96 series, only two figures are needed to number each value, and as a result this is a smart way of reducing the number of characters required.



EIA SMD resistor code

The details for the EIA SMT resistor code scheme are tabulated below:

EIA SMD RESISTOR CODE SCHEME	
CODE	MULTIPLIER
Z	0.001
Y or R	0.01
X or S	0.1
A	1
B or H	10
C	100
D	1 000
E	10 000
F	100 000

EIA SMT resistor code scheme multipliers

EIA SMD RESISTOR CODE SCHEME MULTIPLIERS									
CODE	SIG FIGS		CODE	SIG FIGS		CODE	SIG FIGS		CODE	SIG FIGS
01	100		25	178		49	316		73	562
02	102		26	182		50	324		74	576
03	105		27	187		51	332		75	590
04	107		28	191		52	340		76	604
05	110		29	196		53	348		77	619

06	113		30	200		54	357		78	634
07	115		31	205		55	365		79	649
08	118		32	210		56	374		80	665
09	121		33	215		57	383		81	681
10	124		34	221		58	392		82	698
11	127		35	226		59	402		83	715
12	130		36	232		60	412		84	732
13	133		37	237		61	422		85	750
14	137		38	243		62	432		86	768
15	140		39	249		63	442		87	787
16	143		40	255		64	453		88	806
17	147		41	261		65	464		89	825
18	150		42	267		66	475		90	845
19	154		43	274		67	487		91	866
20	158		44	280		68	499		92	887
21	162		45	287		69	511		93	909
22	165		46	294		70	523		94	931
23	169		47	301		71	536		95	953
24	174		48	309		72	549		96	976

EIA SMT resistor code scheme significant figures

For example a resistor that is marked 68X can be split into two elements. 68 refers to the significant figures 499, and X refers to a multiplier of 0.1. Therefore the value indicated is 499 x 0.1 = 49.9Ω.

By Ian Poole (https://plus.google.com/104687638164370436625?rel=author)

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