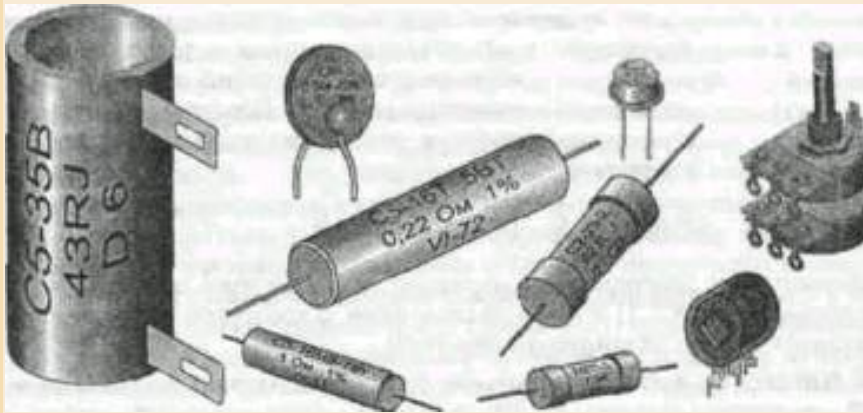


Before introduction of the mentioned above standard, on classification till 1980 (GOST 3453-68), names of domestic constant resistors (named earlier - "resistance") began the letter "With", variable and tuning with "joint venture" (then number of group of the resistor depending on current-bearing followed a part: 1 - not wire thin - layer carbonaceous and pine forest -carbonaceous ; 2 - not wire thin - layer metal -dielectric or metal - ; 3 - not wire composite film; 4 - not wire composite volumetric; 5 - wire; 6 - not wire thin - layer metallized). Names of nonlinear resistance (varistors) began with letters "••" (1 --silicon), thermo-dependent resistance (thermistor) - from letters "••" (1 --manganous, 2 - copper -manganous, 3 - copper -.....-permanganic, 4 - nickel --permanganic), and light - dependent resistance (photoresistors) began with letters "Council of Federation" (1 --lead, 2 --....., 3 --.....). Further through a dash registration number (number of development) followed:

SYSTEM OF THE REDUCED DESIGNATIONS OF RESISTORS.



Resistance of resistors measure in ohms (Ohm), •••-ohms (whom), megaohms (••), etc. The Rating value of resistance defines force of a current taking place through it at the set potential difference on its conclusions Depending on the sizes of resistors the reduced designations of nominal resistance and admissions which will consist of four-five elements including two - three figures and two letters are applied

The FIRST ELEMENT - the figures specifying size of resistance in Ohms. According to GOST 2825-67 it is established six numbers of nominal resistance:



•6, •12, •24, •48, •96, •192. (the figure after letter "•" specifies number of rating values in the given number).

The SECOND ELEMENT - the letter of the Russian or latin alphabet designates a multiplier making

resistance and defines position of a point of a decimal sign (" R (E) " =1; " To (•) " =10³; " M (•) " =10⁶; " G (•) " =10⁹; " • (•) " =10¹²). If nominal resistance is expressed by an integer with fraction a unit of measurements put on a place of a point.

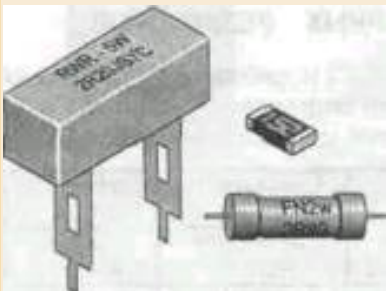
The THIRD ELEMENT - the letter designating size of the admission in percentage: (•=±0.001; L=±0.002; R=±0.005; •=±0.01; U=±0.02; In (•) =±0.1; With (•) =±0.25; D (•) =±0.5; F (•) =±1; G (•) =±2; J (•) =±5; To (•) =±10; M (•) =±20; N (•) =±30. The size of the admission can be put under face value of resistance in the second line.

COLOR CODING OF TINY RESISTORS.

On constant resistors according to GOST 175-72 and requirements of the Publication 62 ••• () marks is rendered to the International electrotechnical commission as color rings. To each color there corresponds the certain color value:

| Color of a sign | Nominal resistance, in the Ohm | | | Multiplier | The admission, % |
|-----------------|--------------------------------|------------------|-----------------|------------------|------------------|
| | The front page | The second strip | The third strip | The fourth strip | The fifth strip |
| Silvery | | | | 0,01 | ±10 |
| Golden | | 0 | | 0,1 | ±5 |
| Black | | 0 | | 1 | |
| Brown | 1 | 1 | 1 | 10 | ±1 |
| Red | 2 | 2 | 2 | 100 | ±2 |
| Orange | 3 | 3 | 3 | 1000 | |
| Yellow | 4 | 4 | 4 | 10 ⁴ | |
| Green | 5 | 5 | 5 | 10 ⁵ | ±0,5 |
| Blue | 6 | 6 | 6 | 10 ⁶ | ±0,25 |
| Violet | 7 | 7 | 7 | 10 ⁷ | ±0,1 |
| Grey | 8 | 8 | 8 | 10 ⁸ | |
| White | 9 | 9 | 9 | 10 ⁹ | |

•••••••••• signs on resistors are shifted to one of conclusions and settle down from left to right. If the sizes of the resistor do not allow to place marks closer to one of conclusions, the width of a strip of the first sign is done (made) approximately twice more than others.



Resistors with small size of the admission (0.1 %... 10 %) are marked by five color rings. First three - numerical size of resistance in Ohms, the fourth - a multiplier, the fifth ring - the admission. Resistors with size of the admission ±20 % are marked by four color rings. First three - numerical size of resistance in Ohms,

the fourth ring a multiplier.

Non-significant zero in the third category and size of the admission are not marked. Therefore such resistors are marked by three color rings. First two - numerical size of resistance in Ohms, the third ring - a multiplier. Capacity of the resistor is defined roughly on its sizes.

DESIGNATION OF RESISTORS OF FOREIGN FIRMS.

The uniform structure of symbols of resistors abroad is absent. it is any way established by firms - manufacturers. In a basis of a designation of constant resistors it is put alphanumeric (or digital) a code which designate type, values of key parameters (rated power, $\bullet\bullet\bullet$, nominal resistance, a permissible deviation) and a kind of packing.

For resistors of special purpose (made under standards MIL) the symbol is formed as follows:

The FIRST ELEMENT - designates a series of the resistor, agrees tables:

| A series | The name of resistors | N the standard |
|------------|--|----------------|
| RL | Standard $\bullet\bullet\bullet\bullet\bullet\bullet\bullet\bullet\bullet$ resistors (the admission $\pm 2, \pm 5$) | MIL-R-22684 |
| RN | $\bullet\bullet\bullet\bullet\bullet\bullet\bullet\bullet\bullet$ precision resistors | MIL-R-10509 |
| RE | Powerful wire resistors with an aluminium radiator | MIL-R-18546 |
| RNC | $\bullet\bullet\bullet\bullet\bullet\bullet\bullet\bullet\bullet$ resistors with a level of reliability "S" | MIL-R-55182 |
| RLR | $\bullet\bullet\bullet\bullet\bullet\bullet\bullet\bullet\bullet$ resistors with a level of reliability "•" | MIL-R-39017 |
| RB | Wire precision resistors tiny and subtiny | MIL-R-93 |
| RBR | Wire precision resistors with a level of reliability "R" | MIL-R-39005 |
| RW | Wire powerful resistors for superficial installation | MIL-R-26 |
| RNR RNN | $\bullet\bullet\bullet\bullet\bullet\bullet\bullet\bullet\bullet$ precision resistors with tight condensation | MIL-R-55182 |
| RCR | Carbonaceous composite resistors | MIL-R-39008 |
| •55342 | Thick-film crystals of resistors with a level of reliability "R" | MIL-R-55342 |

The SECOND, THIRD, FOURTH AND FIFTH ELEMENT - the digital code designating nominal resistance

The SIXTH ELEMENT - an alphabetic code by which the level of reliability of resistors within 1000 hours is designated

| Code | M | • | R | S |
|--|---|-----|------|-------|
| Level of reliability (number of refusals in %) | 1 | 0,1 | 0,01 | 0,001 |

The designation of nominal resistance represents a code from four figures, first three of which specify size of face value of resistance in Ohms, and last - number of the subsequent zero. For resistors with the admission more than 10 % the code will consist of three figures in which first two are meaning. Some firms specify the nominal resistance coded according to Publication $\bullet\bullet\bullet \bullet 62, 63$:

| Resistance | code | Resistance | code | Resistance | code | Resistance | code |
|------------|------|------------|------|------------|------|------------|------|
| | | | | | | | |

| | | | | | | | |
|----------|-----|----------|------|----------|-----|----------|-----|
| 0,1 Ohm | R10 | 47 Ohm | 47R | 4,7 whom | 4•7 | 220 whom | •22 |
| 0,15 Ohm | R15 | 68 Ohm | 68R | 6,8 whom | 6•8 | 330 whom | •• |
| 0,22 Ohm | R22 | 100 Ohm | 100R | 10 whom | 10• | 470 whom | •47 |
| 0,33 Ohm | R33 | 150 Ohm | 150R | 15 whom | 15• | 680 whom | •68 |
| 4,7 Ohm | 4R7 | 220 Ohm | 220R | 22 whom | 22• | 1,0 •• | 1•• |
| 6,8 Ohm | 6R8 | 330 Ohm | 330R | 33 whom | ••• | 1,5 •• | 1•5 |
| 10 Ohm | 10R | 1 whom | 1•• | 47 whom | 47• | 2,2 •• | 2•2 |
| 15 Ohm | 15R | 1,5 whom | 1•5 | 68 whom | 68• | 3,3 •• | ••• |
| 22 Ohm | 22R | 2,2 whom | 2•2 | 100 whom | •10 | 4,7 •• | 4•7 |
| 33 0• | 33R | 3,3 whom | ••• | 150 whom | •15 | 6,8••• | 6•8 |

For an example we shall consider a symbol of constant resistors of firm Philips:

The FIRST ELEMENT - type (class) of the resistor: AC, ACL (Cemented Wirewound ' Nonisolated) powerful ceramic wire, CR (Carbon Resistor) carbonaceous film, EH (Power Wirewound Isolated) powerful, basic wire. MPR (Metal film precision Resistor)-..... precision, MR (Vetal film Resistor)-....., NPR (Fussible) safety ••••••••••, PR (Power metal film Resistor) powerful ••••••••••, RC (Chip Resistor) - •••••••••• (crystals), SFR (Standart film Resistor) standard film, VR (High-ohmic Voltage Resistor) high-voltage, WR (Enamelled Wirewound Isolated Resistor) - powerful enameled film;

The SECOND ELEMENT - the maximal diameter of the case (except for class RC): 06 — 0,6 mm; 08 — 0,8 mm; 16-1,6 mm; 21 — 2,1 mm; 24 or 25 — 2,5 mm; 30-3 mm; 31 or 34 — 3,1 mm; 37 or 39 — 3,7 mm; 52 or 54 — 5,2 mm; 68 or 74 — 6,8 mm.

The NOTE: For classes AC, ACL and •• figures designate allowable capacity of dispersion: 01 — 1 ••; 02 — 2 ••; 03-3 ••; 04-4 ••; 05-5 ••; 07-7 ••; 09-9 ••; 10 - 10 ••; 15 - 15 ••; 17 - 17 ••; 20 - 20 ••.

The THIRD ELEMENT - is coded by alphabetic symbols and designates a design of contact conclusions and a material of a covering of contacts (see tab. 1). The designation of nominal resistance, depending on type of the resistor, can be submitted: - a code from four (or three) figures in which first three (or two) are meaning, and last designates number of the subsequent zero; - a code according to Publication •• • 62; - a color code according to Publication •• • 63.

Table 1. Color distinction of let out(of released) cases of resistors.

| Color of the case | Type of the resistor |
|-------------------|---|
| Light brown | CR16, CR25, CR37, CR52, CR68 |
| Light green | SFR16, SFR25, SFR30 |
| Grey | NFR25, NFR30 |
| Green | MR16, MR25, MR30, MR52, MR24E (C), MR34E (C), MR54E (C), MR74E (C), MPR24, MPR34, AC04, AC05, AC07, AC10, AC15, AC20, ACL01, ACL02, ACL03 |
| Light blue | VR25, VR37, VR68 |
| Red | PR37, PR52 |
| Brown | WRO167E, WRO842E, WRO825E, WRO865E |

Some firms apply color coding to difference of the resistors made under standards MIL, from resistors of industrial and household purpose or designation •• for difference of wire resistors from constants.

SOME RECOMMENDATIONS ON APPLICATION OF RESISTORS.

The resistors used in oscillatory contours, amplifiers of high frequency, attenuator , should possess only active resistance, i.e. not change the resistance in a working range of frequencies. Boundary frequency on which the resistor can work, depends on its nominal resistance and own capacity:

$$F_{rp} = 1/4\pi RC.$$

Own capacities, for example, not wire resistors (••, ••, ••••, •2-6, •2-13, •2-14, •2-23, •2-33) are in an interval 0,1...1,1 ••. At work in a pulse mode average capacity should not exceed nominal since through the resistor periodic pulses of a current which instant values can considerably exceed values in a continuous mode proceed.



Copyright © V.F. Gainutdinov, 2006. All rights reserved.

It is authorized publication materials of a site in the Internet with the obligatory instruction of the reference to the given site and referring to the author of a material (the instruction of the author, his site)

