CPC COOPERATIVE PATENT CLASSIFICATION

H01C RESISTORS

NOTES

1. In this subclass, the term "adjustable" means mechanically adjustable.
2. Variable resistors, the value of which is changed non-mechanically, e.g. by voltage or temperature, are classified in group H01C 7/00.

H01C 1/00	**Details**
H01C 1/01	. Mounting; Supporting
H01C 1/012	. . the base extending along and imparting rigidity or reinforcement to the resistive element (H01C 1/016 takes precedence; the resistive element being formed in two or more coils or loops as a spiral, helical or toroidal winding H01C 3/18, H01C 3/20; the resistive element being formed as one or more layers or coatings on a base H01C 7/00)
H01C 1/014	. . the resistor being suspended between and being supported by two supporting sections (H01C 1/016 takes precedence)
H01C 1/016	. . with compensation for resistor expansion or contraction
H01C 1/02	. Housing; Enclosing; Embedding; Filling the housing or enclosure
H01C 1/022	. . the housing or enclosure being openable or separable from the resistive element
H01C 1/024	. . the housing or enclosure being hermetically sealed (H01C 1/028, H01C 1/032, H01C 1/034 take precedence)
H01C 1/026	. . . with gaseous or vacuum spacing between the resistive element and the housing or casing
H01C 1/028	. . the resistive element being embedded in insulation with outer enclosing sheath
H01C 1/03	. . . with powdered insulation
H01C 1/032	. . plural layers surrounding the resistive element (H01C 1/028 takes precedence)
H01C 1/034	. . the housing or enclosure being formed as coating or mold without outer sheath (H01C 1/032 takes precedence)
H01C 1/036	. . . on wound resistive element
H01C 1/04	. Arrangements of distinguishing marks, e.g. colour coding
H01C 1/06	. Electrostatic or electromagnetic shielding arrangements
H01C 1/08	. Cooling, heating or ventilating arrangements
H01C 1/082	. . using forced fluid flow
H01C 1/084	. . using self-cooling, e.g. fins, heat sinks
H01C 1/12	. Arrangements of current collectors
H01C 1/125	. . of fluid contacts
H01C 1/14	. Terminals or tapping points {or electrodes} specially adapted for resistors (in general H01R); Arrangements of terminals or tapping points {or electrodes} on resistors

H01C 1/1406 . . {Terminals or electrodes formed on resistive elements having positive temperature coefficient}

H01C 1/1413 . . {Terminals or electrodes formed on resistive elements having negative temperature coefficient}

H01C 1/142 . . the terminals or tapping points being coated on the resistive element

H01C 1/144 . . the terminals or tapping points being welded or soldered

H01C 1/146 . . the resistive element surrounding the terminal

H01C 1/148 . . the terminals embracing or surrounding the resistive element (H01C 1/142 takes precedence)

H01C 1/16 . Resistor networks not otherwise provided for

H01C 3/00 **Non-adjustable metal resistors made of wire or ribbon, e.g. coiled, woven or formed as grids**

H01C 3/005 . {Metallic glasses therefor}

H01C 3/02 . arranged or constructed for reducing self-induction, capacitance or variation with frequency

H01C 3/04 . Iron-filament ballast resistors; Other resistors having variable temperature coefficient

H01C 3/06 . Flexible or folding resistors, whereby such a resistor can be looped or collapsed upon itself

H01C 3/08 . Dimension or characteristic of resistive element changing gradually or in discrete steps from one terminal to another

H01C 3/10 . the resistive element having zig-zag or sinusoidal configuration

H01C 3/12 . . Lying in one plane

H01C 3/14 . the resistive element being formed in two or more coils or loops continuously wound as a spiral, helical or toroidal winding (H01C 3/02 to H01C 3/12 take precedence)

H01C 3/16 . . including two or more distinct wound elements or two or more winding patterns

H01C 3/18 . . wound on a flat or ribbon base (H01C 3/16 takes precedence)

H01C 3/20 . . wound on cylindrical or prismatic base (H01C 3/16 takes precedence)

H01C 7/00 **Non-adjustable resistors formed as one or more layers or coatings; Non-adjustable resistors made from powdered conducting material or powdered semi-conducting material with or without insulating material** (consisting of loose powdered or granular material H01C 8/00; {measuring deformation in a solid state using the change in resistance formed by printed-circuit technique G01B 7/20; insulating materials H01B 3/00; passive thin-film or thick-film semiconductor or solid state devices H01L 27/00; resistors without a potential-jump or surface barrier specially adapted for integrated circuits, details thereof, multistep manufacturing processes therefor H01L 28/20}; resistors with a potential-jump barrier or surface barrier, e.g. field effect resistors H01L 29/00; semiconductor devices sensitive to electro-magnetic or corpuscular radiation, e.g. photoresistors, H01L 31/00; devices using superconductivity H01L 39/00; devices using galvanomagnetic or similar magnetic effects, e.g. magnetic-field-controlled resistors, H01L 43/00; solid state devices for rectifying, amplifying, oscillating or switching without a potential-jump barrier or surface barrier H01L 45/00; bulk negative resistance effect devices H01L 47/00; {ohmic resistance heating H05B 3/00; printed circuits H05K})

H01C 7/001 . {Mass resistors}

H01C 7/003 . {Thick film resistors}

H01C 7/005 . . {Polymer thick films}

H01C 7/006 . {Thin film resistors}

H01C 7/008 . {Thermistors (H01C 7/02 to H01C 7/06 take precedence)}

H01C 7/02 . having positive temperature coefficient {(ceramics C04B)}

H01C 7/021 . . {formed as one or more layers or coatings}

H01C 7/022 . . {mainly consisting of non-metallic substances (H01C 7/021 takes precedence)}

H01C 7/023 . . . {containing oxides or oxidic compounds, e.g. ferrites}

H01C 7/025 . . . . {Perowskites, e.g. titanates}

H01C 7/026 . . . . {Vanadium oxides or oxidic compounds, e.g. VOx}

H01C 7/027 . . {consisting of conducting or semi-conducting material dispersed in a non-conductive organic material}

H01C 7/028 . . {consisting of organic substances}

H01C 7/04 . having negative temperature coefficient {(thermometers using resistive elements G01K 7/16)}

H01C 7/041 . . {formed as one or more layers or coatings}

H01C 7/042 . . {mainly consisting of inorganic non-metallic substances (H01C 7/041 takes precedence)}

NOTE

In groups H01C 7/043 to H01C 7/049, in the absence of an indication to the contrary, classification is made in the last appropriate place

H01C 7/043 . . . {Oxides or oxidic compounds}

H01C 7/044 . . . . {Zinc or cadmium oxide}

H01C 7/045 . . . . {Perowskites, e.g. titanates}

H01C 7/046 . . . . {Iron oxides or ferrites}

H01C 7/047 . . . . {Vanadium oxides or oxidic compounds, e.g. VOx}

H01C 7/048 . . . {Carbon or carbides}

H01C 7/049 . . {mainly consisting of organic or organo-metal substances (H01C 7/041 takes precedence)}

H01C 7/06 . including means to minimise changes in resistance with changes in temperature

H01C 7/10 . voltage responsive, i.e. varistors

H01C 7/1006 . . {Thick film varistors}

H01C 7/1013 . . {Thin film varistors}

H01C 7/102 . . Varistor boundary, e.g. surface layers (H01C 7/12 takes precedence)

H01C 7/105 . . Varistor cores (H01C 7/12 takes precedence)

H01C 7/108 . . . Metal oxide

H01C 7/112 . . . . ZnO type

H01C 7/115 . . . . Titanium dioxide- or titanate type

H01C 7/118 . . . Carbide, e.g. SiC type

H01C 7/12 . . Overvoltage protection resistors {(series resistors structurally associated with spark gaps H01T 1/16)}

H01C 7/123 . . . {Arrangements for improving potential distribution}

H01C 7/126 . . . {Means for protecting against excessive pressure or for disconnecting in case of failure}

H01C 7/13 . current responsive

NOTE

Groups H01C 7/02 to H01C 7/13 take precedence over groups H01C 7/18 to H01C 7/22.

H01C 7/18 . comprising a plurality of layers stacked between terminals

H01C 7/20 . the resistive layer or coating being tapered

H01C 7/22 . Elongated resistive element being bent or curved, e.g. sinusoidal, helical

H01C 8/00 Non-adjustable resistors consisting of loose powdered or granular conducting, or powdered or granular semi-conducting material

H01C 8/02 . Coherers or like imperfect resistors for detecting electromagnetic waves

H01C 8/04 . Overvoltage protection resistors; Arresters

H01C 10/00 Adjustable resistors

H01C 10/005 . {Surface mountable, e.g. chip trimmer potentiometer}

H01C 10/02 . Liquid resistors

H01C 10/025 . . {Electrochemical variable resistors (trimming resistors by electrolytic treatment H01C 17/2412, H01C 17/262)}

H01C 10/04 . with specified mathematical relationship between movement of resistor actuating means and value of resistance, other than direct proportional relationship

H01C 10/06 . adjustable by short-circuiting different amounts of the resistive element

H01C 10/08 . . with intervening conducting structure between the resistive element and the short-circuiting means, e.g. taps

H01C 10/10 . adjustable by mechanical pressure of force

H01C 10/103 . . {by using means responding to magnetic or electric fields, e.g. by addition of magnetisable or piezoelectric particles to the resistive material, or by an electromagnetic actuator}

H01C 10/106 . . {on resistive material dispersed in an elastic material (H01C 10/103 and H01C 10/12 take precedence; for electric switches H01H 1/029)}

H01C 10/12 . . by changing surface pressure between resistive masses or resistive and conductive masses, e.g. pile type

H01C 10/14 . adjustable by auxiliary driving means

H01C 10/16 . including plural resistive elements

H01C 10/18 . . including coarse and fine resistive elements

H01C 10/20 . . Contact structure or movable resistive elements being ganged

H01C 10/22 . resistive element dimensions changing gradually in one direction, e.g. tapered resistive element (H01C 10/04 takes precedence)

H01C 10/23 . resistive element dimensions changing in a series of discrete, progressive steps

H01C 10/24 . the contact moving along turns of a helical resistive element, or vica versa

H01C 10/26 . resistive element moving (H01C 10/16, H01C 10/24 take precedence)

NOTE

Groups H01C 10/02 to H01C 10/26 take precedence over groups H01C 10/28 to H01C 10/50.

H01C 10/28 . the contact rocking or rolling along resistive element or taps

H01C 10/30 . the contact sliding along resistive element

H01C 10/301 . . {consisting of a wire wound resistor}

H01C 10/303 . . . {the resistor being coated, e.g. lubricated, conductive plastic coated, i.e. hybrid potentiometer}

H01C 10/305 . . {consisting of a thick film}

H01C 10/306 . . . {Polymer thick film, i.e. PTF}

H01C 10/308 . . {consisting of a thin film}

H01C 10/32 . . the contact moving in an arcuate path

H01C 10/34 . . . the contact or the associated conducting structure riding on collector formed as a ring or portion thereof

H01C 10/345 . . . . {the collector and resistive track being situated in 2 parallel planes}

H01C 10/36 . . . structurally combined with switching arrangements

H01C 10/363 . . . . {by axial movement of the spindle, e.g. pull-push switch (H01C 10/366 takes precedence)}

H01C 10/366 . . . . {using an electromagnetic actuator}

H01C 10/38 . . the contact moving along a straight path

H01C 10/40 . . . screw operated

H01C 10/42 . . . . the contact bridging and sliding along resistive element and parallel conducting bar or collector

H01C 10/44 . . . the contact bridging and sliding along resistive element and parallel conducting bar or collector (H01C 10/42 takes precedence)

H01C 10/46 . Arrangements of fixed resistors with intervening connectors, e.g. taps (H01C 10/28, H01C 10/30 take precedence)

H01C 10/48 . . including contact movable in an arcuate path

H01C 10/50 . structurally combined with switching arrangements (H01C 10/36 takes precedence)

H01C 11/00 Non-adjustable liquid resistors

H01C 13/00 Resistors not provided for elsewhere

H01C 13/02 . Structural combinations of resistors (impedance networks per se H03H)

H01C 17/00 Apparatus or processes specially adapted for manufacturing resistors (providing fillings for housings or enclosures H01C 1/02; reducing insulation surrounding a resistor to powder H01C 1/03; manufacture of thermally variable resistors H01C 7/02, H01C 7/04)

H01C 17/003 . {using lithography, e.g. photolithography (lithographic compositions and processing in general G03F)}

H01C 17/006 . {adapted for manufacturing resistor chips}
H01C 17/02 . adapted for manufacturing resistors with envelope or housing
H01C 17/04 . adapted for winding the resistive element
H01C 17/06 . adapted for coating resistive material on a base
H01C 17/065 . . by thick film techniques, e.g. serigraphy
H01C 17/06506 . . . {Precursor compositions therefor, e.g. pastes, inks, glass frits}
H01C 17/06513 . . . . {characterised by the resistive component}
H01C 17/0652 . . . . . {containing carbon or carbides}
H01C 17/06526 . . . . . {composed of metals}
H01C 17/06533 . . . . . {composed of oxides}
H01C 17/0654 . . . . . {Oxides of the platinum group}
H01C 17/06546 . . . . . {Oxides of zinc or cadmium}
H01C 17/06553 . . . . . {composed of a combination of metals and oxides}
H01C 17/0656 . . . . . {composed of silicides (H01C 17/0652 takes precedence)}
H01C 17/06566 . . . . . {composed of borides (H01C 17/0652 takes precedence)}
H01C 17/06573 . . . . {characterised by the permanent binder}
H01C 17/0658 . . . . . {composed of inorganic material}
H01C 17/06586 . . . . . {composed of organic material}
H01C 17/06593 . . . . {characterised by the temporary binder}
H01C 17/07 . . by resistor foil bonding, e.g. cladding
H01C 17/075 . . by thin film techniques {(H01C 17/20 takes precedence)}
H01C 17/08 . . . by vapour deposition
H01C 17/10 . . . by flame spraying
H01C 17/12 . . . by sputtering
H01C 17/14 . . . by chemical deposition
H01C 17/16 . . . . using electric current
H01C 17/18 . . . . without using electric current
H01C 17/20 . . by pyrolytic processes
H01C 17/22 . adapted for trimming
H01C 17/23 . . by opening or closing resistor geometric tracks of predetermined resistive values, {e.g. snapistors}
H01C 17/232 . . Adjusting the temperature coefficient; Adjusting value of resistance by adjusting temperature coefficient of resistance
H01C 17/235 . . Initial adjustment of potentiometer parts for calibration
H01C 17/24 . . by removing or adding resistive material (H01C 17/23, H01C 17/232, H01C 17/235 take precedence)
H01C 17/2404 . . . {by charged particle impact e.g. by electron or ion beam milling, sputtering, plasma etching}
H01C 17/2408 . . . {by pulsed voltage erosion, e.g. spark erosion}
H01C 17/2412 . . . {by electrolytic treatment e.g. electroplating (for anodic oxydation H01C 17/262)}

H01C 17/2416 . . . {by chemical etching}

H01C 17/242 . . . by laser {(trimming by laser in general B23K 26/351)}

H01C 17/245 . . . by mechanical means, e.g. sand blasting, cutting, ultrasonic treatment

H01C 17/26 . . by converting resistive material

H01C 17/262 . . . {by electrolytic treatment, e.g. anodic oxydation}

H01C 17/265 . . . {by chemical or thermal treatment, e.g. oxydation, reduction, annealing (etching H01C 17/2416)}

H01C 17/267 . . . . {by passage of voltage pulses or electric current}

H01C 17/28 . adapted for applying terminals

H01C 17/281 . . {by thick film techniques}

H01C 17/283 . . . {Precursor compositions therefor, e.g. pastes, inks, glass frits}

H01C 17/285 . . . . {applied to zinc or cadmium oxide resistors}

H01C 17/286 . . . . {applied to TiO_2 or titanate resistors}

H01C 17/288 . . {by thin film techniques}

H01C 17/30 . adapted for baking