### CPC COOPERATIVE PATENT CLASSIFICATION

#### H ELECTRICITY

(NOTE omitted)

#### H05 ELECTRIC TECHNIQUES NOT OTHERWISE PROVIDED FOR

#### H05K PRINTED CIRCUITS; CASINGS OR CONSTRUCTIONAL DETAILS OF ELECTRIC APPARATUS; MANUFACTURE OF ASSEMBLAGES OF ELECTRICAL COMPONENTS

### NOTES

1. This subclass covers:
   - combinations of a radio or television receiver with apparatus having a different main function;
   - printed circuits structurally associated with non-printed electric components.

2. In this subclass, the following expression is used with the meaning indicated:
   - "printed circuits" covers all kinds of mechanical constructions of circuits that consist of an insulating base or support carrying the conductor and are combined structurally with the conductor throughout their length, especially in a two-dimensional plane, the conductors of which are secured to the base in a non-dismountable manner, and also covers the processes or apparatus for manufacturing such constructions, e.g. forming the circuit by mechanical or chemical treatment of a conductive foil, paste, or film on an insulating support.

### WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

<table>
<thead>
<tr>
<th>1/00 Printed circuits</th>
<th>1/021 . . . . . . {Coaxially shielded signal lines comprising a continuous shielding layer partially or wholly surrounding the signal lines}</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/02 . . . . Details</td>
<td>1/022 . . . . . . {for shielding around a single via or around a group of vias, e.g. coaxial vias or vias surrounded by a grounded via fence}</td>
</tr>
<tr>
<td>1/0201 . . . . {Thermal arrangements, e.g. for cooling, heating or preventing overheating}</td>
<td>1/024 . . . . . . {Patterned shielding planes, ground planes or power planes (H05K 1/0253 takes precedence)}</td>
</tr>
<tr>
<td>1/0203 . . . . {Cooling of mounted components (H05K 1/0272 takes precedence)}</td>
<td>1/025 . . . . . . {Single or multiple openings in a shielding, ground or power plane (H05K 1/0227 takes precedence)}</td>
</tr>
<tr>
<td>1/0204 . . . . {using means for thermal conduction connection in the thickness direction of the substrate (H05K 1/0207 takes precedence)}</td>
<td>1/027 . . . . . . {Split or nearly split shielding or ground planes}</td>
</tr>
<tr>
<td>1/0206 . . . . {by printed thermal vias}</td>
<td>1/028 . . . . . . {Compensation of cross-talk by a mutually correlated lay-out of printed circuit traces, e.g. for compensation of cross-talk in mounted connectors (balanced signal pairs H05K 1/0245)}</td>
</tr>
<tr>
<td>1/0207 . . . . {using internal conductor planes parallel to the surface for thermal conduction, e.g. power planes}</td>
<td>1/023 . . . . . . {using auxiliary mounted passive components or auxiliary substances (printed passive components H05K 1/16)}</td>
</tr>
<tr>
<td>1/0209 . . . . {External configuration of printed circuit board adapted for heat dissipation, e.g. layout of conductors, coatings}</td>
<td>1/0231 . . . . . . {Capacitors or dielectric substances}</td>
</tr>
<tr>
<td>1/021 . . . . {Components thermally connected to metal substrates or heat-sinks by insert mounting}</td>
<td>1/0233 . . . . . . {Filters, inductors or a magnetic substance}</td>
</tr>
<tr>
<td>1/0212 . . . . {Printed circuits or mounted components having integral heating means}</td>
<td>1/0234 . . . . . . {Resistors or by disposing resistive or lossy substances in or near power planes (H05K 1/0246 takes precedence)}</td>
</tr>
<tr>
<td>1/0213 . . . . {Electrical arrangements not otherwise provided for}</td>
<td>1/0236 . . . . . . {Electromagnetic band-gap structures}</td>
</tr>
<tr>
<td>1/0215 . . . . {Grounding of printed circuits by connection to external grounding means}</td>
<td>1/0237 . . . . . . {High frequency adaptations (H05K 1/0216 takes precedence)}</td>
</tr>
<tr>
<td>1/0216 . . . . {Reduction of cross-talk, noise or electromagnetic interference (grounding H05K 1/0215)}</td>
<td>1/0239 . . . . . . {Signal transmission by AC coupling}</td>
</tr>
<tr>
<td>1/0218 . . . . {by printed shielding conductors, ground planes or power plane (H05K 1/0236 takes precedence)}</td>
<td>1/0239 . . . . . . {Signal transmission by AC coupling}</td>
</tr>
<tr>
<td>1/0219 . . . . {Printed shielding conductors for shielding around or between signal conductors, e.g. coplanar or coaxial printed shielding conductors}</td>
<td>1/0239 . . . . . . {Signal transmission by AC coupling}</td>
</tr>
</tbody>
</table>
1/024 . . . . [Dielectric details, e.g. changing the dielectric material around a transmission line]
1/0242 . . . . [Structural details of individual signal conductors, e.g. related to the skin effect]
1/0243 . . . . [Printed circuits associated with mounted high frequency components]
1/0245 . . . . [Lay-out of balanced signal pairs, e.g. differential lines or twisted lines]
1/0246 . . . . [Termination of transmission lines]
1/0248 . . . . [Skew reduction or using delay lines]
1/025 . . . . [Impedance arrangements, e.g. impedance matching, reduction of parasitic impedance (H05K 1/024 and H05K 1/0243 take precedence; for semiconductor devices H01L 23/66)]
1/0251 . . . . (related to vias or transitions between vias and transmission lines]
1/0253 . . . . [Impedance adaptations of transmission lines by special lay-out of power planes, e.g. providing openings (H05K 1/0251 takes precedence)]
1/0254 . . . . [High voltage adaptations; Electrical insulation details; Overvoltage or electrostatic discharge protection (electrostatic discharge protection for electric apparatus in general H05K 9/0067; H05K 9/0079: Arrangements for regulating voltages or for using plural voltages]
1/0256 . . . . [Electrical insulation details, e.g. around high voltage areas]
1/0257 . . . . [Overvoltage protection]
1/0259 . . . . . [Electrostatic discharge [ESD] protection]
1/026 . . . . . [Spark gaps]
1/0262 . . . . [Arrangements for regulating voltages or for using plural voltages]
1/0263 . . . . [High current adaptations, e.g. printed high current conductors or using auxiliary non-printed means; Fine and coarse circuit patterns on one circuit board (H05K 1/0293 takes precedence)]
1/0265 . . . . [characterized by the lay-out of or details of the printed conductors, e.g. reinforced conductors, redundant conductors, conductors having different cross-sections]
1/0266 . . . . [Marks, test patterns or identification means]
1/0268 . . . . [for electrical inspection or testing]
1/0269 . . . . [for visual or optical inspection]
1/0271 . . . . [Arrangements for reducing stress or warp in rigid printed circuit boards, e.g. caused by loads, vibrations or differences in thermal expansion]
1/0272 . . . . [Adaptations for fluid transport, e.g. channels, holes]
1/0274 . . . . [Optical details, e.g. printed circuits comprising integral optical means (H05K 1/0269 takes precedence; coupling light guides with optoelectronic components G02B 6/42)]
1/0275 . . . . [Security details, e.g. tampering prevention or detection]
1/0277 . . . . [Bendability or stretchability details (H05K 1/038; H05K 3/4691 take precedence)]
1/0278 . . . . [Rigid circuit boards or rigid supports of circuit boards locally made bendable, e.g. by removal or replacement of material]
1/028 . . . . . [Bending or folding regions of flexible printed circuits (H05K 1/0283 takes precedence)]
1/0281 . . . . . [Reinforcement details thereof]
1/0283 . . . . . [Stretchable printed circuits]
1/0284 . . . . . [Details of three-dimensional rigid printed circuit boards (H05K 1/119 takes precedence; shaping of the substrate H05K 3/0014)]
1/0286 . . . . . [Programmable, customizable or modifiable circuits (by programmable non-printed jumper connections H05K 3/222)]
1/0287 . . . . . [having an universal lay-out, e.g. pad or land grid patterns or mesh patterns]
1/0289 . . . . . [having a matrix lay-out, i.e. having selectively interconnectable sets of X- conductors and Y-conductors in different planes]
1/029 . . . . . [having a programmable lay-out, i.e. adapted for choosing between a few possibilities]
1/0292 . . . . . [having a modifiable lay-out, i.e. adapted for engineering changes or repair (H05K 1/0293 takes precedence)]
1/0293 . . . . . [Individual printed conductors which are adapted for modification, e.g. fusible or breakable conductors, printed switches]
1/0295 . . . . . [adapted for choosing between different types or different locations of mounted components]
1/0296 . . . . . [Conductive pattern lay-out details not covered by sub groups H05K 1/02 - H05K 1/0295 (H05K 1/1 takes precedence; lay-out adapted to mounted component configuration H05K 1/18)]
1/0298 . . . . . [Multilayer circuits]  
1/029 . . . . . [Use of materials for the substrate]
1/0306 . . . . . [Inorganic insulating substrates, e.g. ceramic, glass]  
1/0313 . . . . . [Organic insulating material]
1/032 . . . . . [consisting of one material]

NOTE
In this group, in the absence of an indication to the contrary, a material is classified in the last appropriate place

1/0326 . . . . . [containing O]
1/0333 . . . . . [containing S]
1/034 . . . . . [containing halogen]
1/0346 . . . . . [containing N]
1/0353 . . . . . [consisting of two or more materials, e.g. two or more polymers, polymer + filler, + reinforcement]
1/036 . . . . . [Multilayers with layers of different types]
1/0366 . . . . . [reinforced, e.g. by fibres, fabrics (H05K 1/036 takes precedence)]
1/0373 . . . . . [containing additives, e.g. fillers (H05K 1/036 takes precedence)]
1/038 . . . . . [Textiles (used as reinforcing materials for organic insulating substrates H05K 1/036)]
1/0386 . . . . . [Paper sheets (used as reinforcing materials for organic insulating substrates H05K 1/036)]
1/0393 . . . . . [Flexible materials (H05K 1/038 takes precedence; specific organic compositions are classified in H05K 1/0313 and subgroups)]
1/05 . . . . . [Insulated {conductive substrates, e.g. insulated} metal substrate]
H05K

1/053 . . . . [the metal substrate being covered by an inorganic insulating layer]
1/056 . . . . . . . [the metal substrate being covered by an organic insulating layer]
1/09 . . . . Use of materials for the {conductive, e.g. } metallic pattern
1/092 . . . . [Dispersed materials, e.g. conductive pastes or inks]
1/095 . . . . . . . {for polymer thick films, i.e. having a permanent organic polymeric binder]
1/097 . . . . {Inks comprising nanoparticles and specially adapted for being sintered at low temperature (H05K 1/095 takes precedence)
1/11 . . . . Printed elements for providing electric connections to or between printed circuits
1/111 . . . . . . . {Pads for surface mounting, e.g. lay-out}
1/112 . . . . . . . [directly combined with via connections]
1/113 . . . . . . . {Via provided in pad; Pad over filled via]
1/114 . . . . . . . {Pad being close to via, but not surrounding the via]
1/115 . . . . . . . {Via connections; Lands around holes or via connections (H05K 1/112 takes precedence}
1/116 . . . . . . . [Lands, clearance holes or other lay-out details concerning the surrounding of a via]
1/117 . . . . . . . {Pads along the edge of rigid circuit boards, e.g. for pluggable connectors}
1/118 . . . . . . . {specially for flexible printed circuits, e.g. using folded portions]
1/119 . . . . . . . {Details of rigid insulating substrates therefor, e.g. three-dimensional details (H05K 1/117 takes precedence)
1/14 . . . . Structural association of two or more printed circuits (providing electric connection to or between printed circuits H05K 1/11, H01R 12/00)
1/141 . . . . [One or more single auxiliary printed circuits mounted on a main printed circuit, e.g. modules, adapters (H05K 1/142 and H05K 1/147 take precedence)]]
1/142 . . . . . . . {Arrangements of planar printed circuit boards in the same plane, e.g. auxiliary printed circuit insert mounted in a main printed circuit]
1/144 . . . . . . . {Stacked arrangements of planar printed circuit boards]
1/145 . . . . . . . {Arrangements wherein electric components are disposed between and simultaneously connected to two planar printed circuit boards, e.g. Cordwood modules]
1/147 . . . . . . . {at least one of the printed circuits being bent or folded, e.g. by using a flexible printed circuit (H05K 1/148 takes precedence]
1/148 . . . . . . . {Arrangements of two or more hingeably connected rigid printed circuit boards, i.e. connected by flexible means]
1/16 . . . . incorporating printed electric components, e.g. printed resistor, capacitor, inductor
1/162 . . . . {incorporating printed capacitors}
1/165 . . . . {incorporating printed inductors}
1/167 . . . . {incorporating printed resistors]
1/18 . . . . Printed circuits structurally associated with non-printed electric components (H05K 1/0201, H05K 1/0223, H05K 1/0243, and H05K 1/16 take precedence)
1/181 . . . . {associated with surface mounted components]
1/182 . . . . [associated with components mounted in the printed circuit board, e.g. insert mounted components [IMC]]
1/183 . . . . . . . {Components mounted in and supported by recessed areas of the printed circuit board]
1/184 . . . . . . . {Components including terminals inserted in holes through the printed circuit board and connected to printed contacts on the walls of the holes or at the edges thereof or protruding over or into the holes]
1/185 . . . . . . . {Components encapsulated in the insulating substrate of the printed circuit or incorporated in internal layers of a multilayer circuit (semiconductor chips encapsulated by interconnect and support structures H01L 23/5389, H01L 24/00)
1/186 . . . . . . . [manufactured by mounting on or connecting to patterned circuits before or during embedding]
1/187 . . . . . . . {the patterned circuits being prefabricated circuits, which are not yet attached to a permanent insulating substrate, e.g. on a temporary carrier]
1/188 . . . . . . . {manufactured by mounting on or attaching to a structure having a conductive layer, e.g. a metal foil, such that the terminals of the component are connected to or adjacent to the conductive layer before embedding, and by using the conductive layer, which is patterned after embedding, at least partially for connecting the component]
1/189 . . . . {characterised by the use of a flexible or folded printed circuit (H05K 3/326 takes precedence)

3/00 Apparatus or processes for manufacturing printed circuits

3/0002 . . . . {for manufacturing artworks for printed circuits]
3/0005 . . . . {for designing circuits by computer]
3/0008 . . . . {for aligning or positioning of tools relative to the circuit board (H05K 3/4638, H05K 3/4679 take precedence; for manufacturing assemblages of components H05K 13/0015)
3/0011 . . . . {Working of insulating substrates or insulating layers]
3/0014 . . . . {Shaping of the substrate, e.g. by moulding]
3/0017 . . . . {Etching of the substrate by chemical or physical means]
3/002 . . . . {by liquid chemical etching]
3/0023 . . . . {by exposure and development of a photosensitive insulating layer]
3/0026 . . . . {by laser ablation}
3/0029 . . . . . . . {of inorganic insulating material]
3/0032 . . . . . . . {of organic insulating material]
3/0035 . . . . . . . {of blind holes, i.e. having a metal layer at the bottom]
3/0038 . . . . . . . {combined with laser drilling through a metal layer]
3/0041 . . . . {by plasma etching]
3/0044 . . . . . . . {Mechanical working of the substrate, e.g. drilling or punching (H05K 3/0008 takes precedence)
3/0047 . . . . {Drilling of holes]
3/005 . . . . {Punching of holes]
3/0052 . . . . {Depaneling, i.e. dividing a panel into circuit boards; Working of the edges of circuit boards]
[After-treatment, e.g. cleaning or desmearing of holes] 3/0055

[Laminating printed circuit boards onto other substrates, e.g. metallic substrates (H05K 1/0281 takes precedence)] 3/0058

[onto a metallic substrate, e.g. a heat sink (heat sinks for electric apparatus H05K 7/20)] 3/0061

[onto a polymeric substrate] 3/0064

[onto an inorganic, non-metallic substrate] 3/0067

[Manufacure or processing of a substrate for a printed circuit board supported by a temporary or sacrificial carrier (H05K 1/187, H05K 3/20 and H05K 3/4682 take precedence)] 3/0073

[Masks not provided for in groups H05K 3/02 - H05K 3/46, e.g. for photomechanical production of patterned surfaces] 3/0076

(characterised by the composition of the mask) 3/0079

(characterised by the method of application or removal of the mask (H05K 3/0091 takes precedence)) 3/0082

(characterised by the exposure method of radiation-sensitive masks) 3/0085

(Apparatus for treatments of printed circuits with liquids not provided for in groups H05K 3/02 - H05K 3/46, conveyors and holding means therefor (apparatus specially adapted for manufacturing assemblages of electric components, e.g. printed circuit boards, H05K 13/00)) 3/0088

(for treatment of holes) 3/0091

(Apparatus for coating printed circuits using liquid non-metallic coating compositions) 3/0094

(Filling or covering plated through-holes or blind plated vias, e.g. for masking or for mechanical reinforcement) 3/0097

(Processing two or more printed circuits simultaneously, e.g. made from a common substrate, or temporarily stacked circuit boards (H05K 3/0052 takes precedence)) 3/012

(in which the conductive material is applied to the surface of the insulating support and is thereafter removed from such areas of the surface which are not intended for current conducting or shielding) 3/02

(Processes for manufacturing precursors of printed circuits, i.e. copper-clad substrates) 3/022

(by transfer of thin metal foil formed on a temporary carrier, e.g. peel-apart copper) 3/025

(the conductive material being removed by irradiation, e.g. by photons, alpha or beta particles) 3/027

(processing of circuits, [semi-additive methods H05K 3/108]) 3/04

(the conductive material being removed mechanically, e.g. by punching) 3/041

(by using a die for cutting the conductive material) 3/043

(by using a moving tool for milling or cutting the conductive material) 3/045

(by making a conductive layer having a relief pattern, followed by abrading of the raised portions) 3/046

(by selective transfer or selective detachment of a conductive layer) 3/048

(using a lift-off resist pattern or a release layer pattern) 3/06

(the conductive material being removed chemically or electrolytically, e.g. by photo-etch process (semi-additive methods H05K 3/108)) 3/061

(Etching masks) 3/062

(consisting of metals or alloys or metallic inorganic compounds (H05K 3/065 takes precedence)) 3/064

(Photoresists) 3/065

(applied by electrographic, electrophotographic or magnetographic methods) 3/067

(Chemicals) 3/068

(Apparatus for etching printed circuits) 3/07

being removed electrolytically) 3/08

the conductive material being removed by electric discharge, e.g. by spark erosion) 3/10

in which conductive material is applied to the insulating support in such a manner as to form the desired conductive pattern) 3/101

(by casting or moulding of conductive material) 3/102

(by bonding of conductive powder, i.e. metallic powder (H05K 3/12 takes precedence)) 3/103

(by bonding or embedding conductive wires or strips) 3/105

(by conversion of non-conductive material on or in the support into conductive material, e.g. by using an energy beam) 3/106

(by photographic methods) 3/107

(by filling grooves in the support with conductive material (H05K 3/045, H05K 3/101, H05K 3/1258 and H05K 3/465 take precedence)) 3/108

(by semi-additive methods; masks therefor (characterised by metallic etch mask H05K 3/062; electroplating methods or apparatus H05K 3/241)) 3/12

(using thick film techniques, e.g. printing techniques to apply the conductive material (or similar techniques for applying conductive paste or ink patterns) 3/1208

(Pretreatment of the circuit board, e.g. modifying wetting properties: Patterning by using affinity patterns (providing shape patterns H05K 3/1258: adhesion treatments H05K 3/38)) 3/1216

(by screen printing or stencil printing) 3/1225

(Screens or stencils; Holders therefor) 3/1233

(Methods or means for supplying the conductive material and for forcing it through the screen or stencil) 3/1241

(by ink-jet printing or drawing by dispensing) 3/125

(by ink-jet printing) 3/1258

(by using a substrate provided with a shape pattern, e.g. grooves, banks, resist pattern) 3/1266

(by electrophotographic or magnetographic printing) 3/1275

(by other printing techniques, e.g. letterpress printing, intaglio printing, lithographic printing, offset printing) 3/1283

(For treatment of the printed patterns, e.g. sintering or curing methods) 3/1291

(Firing or sintering at relative high temperatures for patterns on inorganic boards, e.g. co-firing of circuits on green ceramic sheets) 3/14

(using spraying techniques to apply the conductive material (e.g. vapour evaporation)) 3/143

(Masks therefor (H05K 3/048 takes precedence))
Secondary treatment of printed circuits takes precedence; embedding circuits in grooves by pressure (H05K 3/382)

3/20 . . . by affixing prefabricated conductor pattern (H05K 3/0456, H05K 3/4658, H05K 3/4682 takes precedence)

3/22 . . . Secondary treatment of printed circuits (H05K 3/1283 takes precedence; embedding circuits in grooves by pressure H05K 3/107)

3/24 . . . Reinforcing the conductive pattern (by solder coating H05K 3/3457)

3/24 . . . characterised by the electroplating method; means therefor, e.g. baths or apparatus

3/242 . . . characterised by using temporary conductors on the printed circuit for electrically connecting areas which are to be electroplated

3/243 . . . characterised by selective plating, e.g. for finish plating of pads (selective plating for making the circuit pattern H05K 3/108, H05K 3/182)

3/244 . . . [Finish plating of conductors, especially of copper conductors, e.g. for pads or lands (selective plating methods H05K 3/243; finish plating of conductors made by printing techniques H05K 3/246; solder as finish H05K 3/3457, e.g. by plating H05K 3/3473)]

3/245 . . . [Reinforcing conductive patterns made by printing techniques or by other techniques for applying conductive pastes, inks or powders; Reinforcing other conductive patterns by such techniques]

3/246 . . . [Reinforcing conductive paste, ink or powder patterns by other methods, e.g. by plating]

3/247 . . . [Finish coating of conductors by using conductive pastes, inks or powders]

3/248 . . . [fired compositions for inorganic substrates]

3/249 . . . [comprising carbon particles as main constituent]

3/26 . . . Cleaning or polishing of the conductive pattern
3/3478 . . . . . (Applying solder preforms; Transferring prefabricated solder patterns)
3/3485 . . . . . (Applying solder paste, slurry or powder (thick film methods for applying conductive paste or ink patterns H05K 3/12))
3/3489 . . . . . [Composition of fluxes; Methods of application thereof; Other methods of activating the contact surfaces]
3/3494 . . . . . [Heating methods for reflowing of solder (using integral heating means H05K 1/021)]
3/36 . . Assembling printed circuits with other printed circuits (H05K 7/142 takes precedence)
3/361 . . . . . (Assembling flexible printed circuits with other printed circuits)
3/363 . . . . . [by soldering]
3/365 . . . . . [by abutting, i.e. without alloying process]
3/366 . . . . . (substantially perpendicularly to each other (H05K 3/361 takes precedence))
3/368 . . . . . (parallel to each other (H05K 3/361 takes precedence))
3/38 . . Improvement of the adhesion between the insulating substrate and the metal
3/381 . . . . . [by special treatment of the substrate]
3/382 . . . . . [by special treatment of the metal]
3/383 . . . . . [by microetching]
3/384 . . . . . [by plating]
3/385 . . . . . [by conversion of the surface of the metal, e.g. by oxidation, whether or not followed by reaction or removal of the converted layer]
3/386 . . . . . [by the use of an organic polymeric bonding layer, e.g. adhesive]
3/387 . . . . . [for electroless plating (H05K 3/4661 takes precedence)]
3/388 . . . . . [by the use of a metallic or inorganic thin film adhesion layer]
3/389 . . . . . [by the use of a coupling agent, e.g. silane]
3/40 . . Forming printed elements for providing electric connections to or between printed circuits
3/4007 . . . . . [Surface contacts, e.g. bumps (H05K 3/4002 takes precedence; deposition of finish layers on pads H05K 3/24; forming solder bumps H05K 3/3457)]
3/4015 . . . . . [using auxiliary conductive elements, e.g. pieces of metal foil, metallic spheres]
3/403 . . . . . [Edge contacts; Windows or holes in the substrate having plural connections on the walls thereof (H05K 3/4092 takes precedence)]
3/4038 . . . . . [Through-connections; Vertical interconnect access [VIA] connections (H05K 3/403, H05K 3/42 take precedence)]
3/4046 . . . . . [using auxiliary conductive elements, e.g. metallic spheres, eylets, pieces of wire]
3/4053 . . . . . [by thick-film techniques]
3/4061 . . . . . [for via connections in inorganic insulating substrates]
3/4069 . . . . . [for via connections in organic insulating substrates]
3/4076 . . . . . [by thin-film techniques]
3/4084 . . . . . [by deforming at least one of the conductive layers]
3/4092 . . . . . [Integral conductive tabs, i.e. conductive parts partly detached from the substrate]
3/42 . . . . . . Plated through-holes [or plated via connections]
3/421 . . . . . . [Blind plated via connections (H05K 3/422, H05K 3/423 and H05K 3/425 take precedence)]
3/422 . . . . . . [characterised by electroless plating method; pretreatment thereof]
3/423 . . . . . . [characterised by electroplating method]
3/424 . . . . . . [by direct electroplating]
3/425 . . . . . . [characterised by the sequence of steps for plating the through-holes or via connections in relation to the conductive pattern]
3/426 . . . . . . [initial plating of through-holes in substrates without metal]
3/427 . . . . . . [initial plating of through-holes in metal-clad substrates]
3/428 . . . . . . [initial plating of through-holes in substrates having a metal pattern]
3/429 . . . . . . [Plated through-holes specially for multilayer circuits, e.g. having connections to inner circuit layers]
3/44 . . . . . . Manufacturing insulated metal core circuits [or other insulated electrically conductive core circuits (H05K 3/0058, H05K 3/4608, and H05K 3/4641 take precedence)]
3/445 . . . . . . [having insulated holes or insulated via connections through the metal core]
3/46 . . . . . . Manufacturing multilayer circuits
3/4602 . . . . . [characterized by a special circuit board as base or central core whereon additional circuit layers are built or additional circuit boards are laminated]
3/4605 . . . . . [made from inorganic insulating material]
3/4608 . . . . . [comprising an electrically conductive base or core]
3/4611 . . . . . [by laminating two or more circuit boards (H05K 3/4652 takes precedence)]
3/4614 . . . . . [the electrical connections between the circuit boards being made during lamination]
3/4617 . . . . . [characterized by laminating only or mainly similar single-sided circuit boards]
3/462 . . . . . . [characterized by laminating only or mainly similar double-sided circuit boards]
3/4623 . . . . . [the circuit boards having internal via connections between two or more circuit layers before lamination, e.g. double-sided circuit boards (H05K 3/462 takes precedence)]
3/4626 . . . . . [characterised by the insulating layers or materials (H05K 3/4688 takes precedence)]
3/4629 . . . . . [laminating inorganic sheets comprising printed circuits, e.g. green ceramic sheets]
3/4632 . . . . . [laminating thermoplastic or uncured resin sheets comprising printed circuits without added adhesive materials between the sheets]
3/4635 . . . . . [laminating flexible circuit boards using additional insulating adhesive materials between the boards]
3/4638 . . . . . [Aligning and fixing the circuit boards before lamination; Detecting or measuring the misalignment after lamination; Aligning external circuit patterns or via connections relative to internal circuits]
3/4641 . . . . . [having integrally laminated metal sheets or special power cores]
H05K

3/4644 . . . [by building the multilayer by layer, i.e. build-up multilayer circuits (making via holes in the insulating layers H05K 3/0011; special circuit boards as base or core wherein the multilayer is built H05K 3/4602)]

3/4647 . . . . [by applying an insulating layer around previously made via studs]

3/465 . . . . [by applying an insulating layer having channels for the next circuit layer]

3/4652 . . . . [Adding a circuit layer by laminating a metal foil or a preformed metal foil pattern (H05K 3/4647 takes precedence)]

3/4655 . . . . [by using a laminate characterized by the insulating layer (general-purpose insulating materials H05K 1/02, H05K 3/4673)]

3/4658 . . . . [characterized by laminating a prefabricated metal foil pattern, e.g. by transfer]

3/4661 . . . . [Adding a circuit layer by direct wet plating, e.g. electroless plating; insulating materials adapted therefor (other insulating materials H05K 3/387)]

3/4664 . . . . [Adding a circuit layer by thick film methods, e.g. printing techniques or by other techniques for making conductive patterns by using pastes, inks or powders (H05K 3/4647 takes precedence)]

3/4667 . . . . . [characterized by using an inorganic intermediate insulating layer]

3/467 . . . . . [Adding a circuit layer by thin film methods (H05K 3/4647 takes precedence)]

3/4673 . . . . . [Application methods or materials of intermediate insulating layers not specially adapted to any one of the previous methods of adding a circuit layer (similar methods for protective coatings H05K 3/28)]

3/4676 . . . . . [Single layer compositions]

3/4679 . . . . . [Aligning added circuit layers or via connections relative to previous circuit layers]

3/4682 . . . . . [Manufacture of core-less build-up multilayer circuits on a temporary carrier or on a metal foil]

3/4685 . . . . . [Manufacturing of cross-over conductors]

3/4688 . . . . . [Composite multilayer circuits, i.e. comprising insulating layers having different properties (having a special base or central core H05K 3/4602)]

3/4691 . . . . . [Rigid-flexible multilayer circuits comprising rigid and flexible layers, e.g. having in the bending regions only flexible layers]

3/4694 . . . . . [Partitioned multilayer circuits having adjacent regions with different properties, e.g. by adding or inserting locally circuit layers having a higher circuit density (H05K 3/4691 takes precedence)]

3/4697 . . . . . [having cavities, e.g. for mounting components (H05K 3/4691 takes precedence)]

5/00 Casings, cabinets or drawers for electric apparatus

5/0004 . . . . [comprising several parts forming a closed casing]

5/0008 . . . . [assembled by screws]

5/0013 . . . . [assembled by resilient members]

5/0017 . . . . [with display or control units]

5/0021 . . . . [Side-by-side or stacked arrangements]

5/0026 . . . . [provided with connectors and printed circuit boards [PCB], e.g. automotive electronic control units]

5/003 . . . . [having an integrally preformed electronic control unit]

5/0034 . . . . [having an overmolded housing covering the PCB]

5/0039 . . . . [having a tubular housing wherein the PCB is inserted longitudinally]

5/0043 . . . . [comprising a frame housing mating with two lids wherein the PCB is flat mounted on the frame housing]

5/0047 . . . . [having a two-part housing enclosing a PCB]

5/0052 . . . . . [characterized by joining features of the housing parts]

5/0056 . . . . . [characterized by features for protecting electronic components against vibration and moisture, e.g. potting, holders for relatively large capacitors]

5/006 . . . . . [characterized by features for holding the PCB within the housing]

5/0065 . . . . . [wherein modules are associated together, e.g. electromechanical assemblies, modular structures]

5/0069 . . . . . [having connector relating features for connecting the connector pins with the PCB or for mounting the connector body with the housing]

5/0073 . . . . . [having specific features for mounting the housing on an external structure]

5/0078 . . . . . [specially adapted for acceleration sensors, e.g. crash sensors, airbag sensors]

5/0082 . . . . . [specially adapted for transmission control units, e.g. gearbox controllers]

5/0086 . . . . . [portable, e.g. battery operated apparatus (casings for switching devices H01H 9/02)]

5/0091 . . . . . [Housing specially adapted for small components (for resistors H01C; for capacitors H01G; for integrated circuits H011, 23/00)]

5/0095 . . . . . [hermetically-sealed]

5/02 . . . . . [Details]

5/0204 . . . . [Mounting supporting structure on the outside of casings (mounting supporting structure in casings H05K 7/14)]

5/0208 . . . . . [Interlock mechanisms; Means for avoiding unauthorised use or function, e.g. tamperproof]

5/0213 . . . . . [Thermal insulation; Venting means; Condensation eliminators]

5/0217 . . . . . [Mechanical details of casings (G06F 1/1613, H01M 2/10, H04M 1/0702 take precedence)]

5/0221 . . . . . [Locks; Latches]

5/0226 . . . . . [Hinges (H02B 1/38 takes precedence)]

5/023 . . . . . [Handles; Grips]

5/0234 . . . . . [Feet; Stands; Pedestals, e.g. wheels for moving casing on floor]

5/0239 . . . . . [Lids; Hoods, e.g. members for covering aperture]

5/0243 . . . . . . [for decorative purposes]

5/0247 . . . . . . [Electrical details of casings, e.g. terminals, passages for cables or wiring]

5/0252 . . . . . . [Labels, e.g. for identification, markings or configuration store]

5/0256 . . . . . . [of interchangeable modules or receptacles therefor, e.g. cartridge mechanisms]

5/026 . . . . . . [having standardized interfaces (flash memory cards G06K 19/077)]
H05K 7/00

Construction details common to different types of electric apparatus (casings, cabinets, drawers H05K 5/00)

7/005 . . . . . . {arrangements of circuit components without supporting structure}
7/02 . . . . . . Arrangements of circuit components or wiring on supporting structure
7/023 . . . . {Stackable modules}
7/026 . . . . {Multiple connections subassemblies}
7/04 . . . on conductive chassis
7/06 . . . . . . on insulating boards, e.g. wiring harnesses (for printed circuits H05K 1/18, H05K 3/30)
7/08 . . . . . . on perforated boards
7/10 . . . Plug-in assemblages of components, e.g. IC sockets
7/1007 . . . . {with means for increasing contact pressure at the end of engagement of coupling parts}
7/1015 . . . . {having exterior leads}
7/1023 . . . . {co-operating by abutting, e.g. flat pack}
7/103 . . . . . . {co-operating by sliding, e.g. DIP carriers}
7/1038 . . . . {with spring contact pieces (H05K 7/1046 takes precedence)}
7/1046 . . . . {J-shaped leads}
7/1053 . . . . {having interior leads}
7/1061 . . . . {co-operating by abutting}
7/1069 . . . . {with spring contact pieces}
7/1076 . . . . . . {co-operating by sliding}
7/1084 . . . . . . {pin grid array package carriers}
7/1092 . . . . . . {with built-in components, e.g. intelligent sockets}
7/12 . . . Resilient or clamping means for holding component to structure
7/14 . . . Mounting supporting structure in casing or on frame or rack (H05K 7/18 takes precedence)
7/1401 . . . . . . {comprising clamping or extracting means (H05K 7/10 takes precedence)}
7/1402 . . . . . . {for securing or extracting printed circuit boards}
7/1404 . . . . . . {by edge clamping, e.g. wedges}
7/1405 . . . . . . {by clips or resilient members, e.g. hooks}
7/1407 . . . . . . {by turn-bolt or screw member}
7/1408 . . . . . . {by a unique member which latches several boards, e.g. locking bars}
7/1409 . . . . . . {by lever-type mechanisms}
7/1411 . . . . . . {for securing or extracting box-type drawers}
7/1412 . . . . . . {hold down mechanisms, e.g. avionic racks}
7/1414 . . . . . . {with power interlock}
7/1415 . . . . . . {manual gripping tools}
7/1417 . . . . . . {having securing means for mounting boards, plates or wiring boards (H05K 7/1461 takes precedence)}
7/1418 . . . . . . {Card guides, e.g. grooves (H05K 7/1425 takes precedence)}
7/142 . . . . . . {Spacers not being card guides}
7/1421 . . . . . . {Drawers for printed circuit boards}
7/1422 . . . . . . {Printed circuit boards receptacles, e.g. stacked structures, electronic circuit modules or box like frames}
7/1424 . . . . . . {Card cages}
7/1425 . . . . . . {of standardised dimensions, e.g. 19"-subrack}
7/1427 . . . . . . {Housings}
7/1428 . . . . . . {for small modular apparatus with terminal block}
7/1429 . . . . . . {for circuits carrying a CPU and adapted to receive expansion cards}
7/1431 . . . . . . {Retention mechanisms for CPU modules}
7/1432 . . . . . . {for power drive units}
7/1434 . . . . . . {for electronics exposed to high gravitational force; Cylindrical housings}
7/1435 . . . . . . {Expandable constructions}
7/1438 . . . . . . {Back panels or connecting means therefor; Terminals; Coding means to avoid wrong insertion}
7/1439 . . . . . . {Back panel mother boards}
7/1441 . . . . . . {with a segmented structure}
7/1442 . . . . . . {with a radial structure}
7/1444 . . . . . . {Complex or three-dimensional arrangements: Stepped or dual mother boards}
7/1445 . . . . . . {with double-sided connections}
7/1447 . . . . . . {External wirings; Wiring ducts; Laying cables}
7/1448 . . . . . . {with connections to the front board}
7/1449 . . . . . . {with connections to the back board}
7/1451 . . . . . . {with connections between circuit boards or units}
7/1452 . . . . . . {Mounting of connectors; Switching; Reinforcing of back panels}
7/1454 . . . [Alignment mechanisms; Drawout cases]
7/1455 . . . [Coding for prevention of wrong insertion]
7/1457 . . . [Power distribution arrangements]
7/1458 . . . [Active back panels; Back panels with filtering means]
7/1459 . . . [Circuit configuration, e.g. routing signals]
7/1461 . . . [Slidable card holders; Card stiffeners; Control or display means therefor]
7/1462 . . . [for programmable logic controllers [PLC] for automation or industrial process control]
7/1464 . . . [Functional units accommodated in the same PLC module housing]
7/1465 . . . [Modular PLC assemblies with separable functional units]
7/1467 . . . [PLC mounted in a cabinet or chassis]
7/1468 . . . [Mechanical features of input/output (I/O) modules]
7/1469 . . . [Terminal blocks for connecting sensors]
7/1471 . . . [Modules for controlling actuators]
7/1472 . . . [Bus coupling modules, e.g. bus distribution modules]
7/1474 . . . [Mounting of modules, e.g. on a base or rail or wall]
7/1475 . . . [Bus assemblies for establishing communication between PLC modules]
7/1477 . . . [including backplanes]
7/1478 . . . [including a segmented bus]
7/1479 . . . [including decentralized modules, e.g. connected to other modules using fieldbus]
7/1481 . . . [User interface, e.g. status displays; Programming interface, e.g. connector for computer programming; Monitoring]
7/1482 . . . [PLC power supply; PLC accessories, e.g. for safety]
7/1484 . . . [Electrical diagrams relating to constructional features, e.g. signal routing within PLC; Provisions for disaster recovery, e.g. redundant systems]
7/1485 . . . [Servers; Data center rooms, e.g. 19-inch computer racks]
7/1487 . . . [Blade assembly, e.g. cases and inner arrangements]
7/1488 . . . [Cabinets therefore, e.g. chassis, racks]
7/1489 . . . [characterized by the mounting of blades therein, e.g. brackets, rails, trays (H05K 7/1491 takes precedence)]
7/1491 . . . [having cable management arrangements (management of optical cables G02B 6/444; in telecommunication cabinets H04Q 1/06)]
7/1492 . . . [having electrical distribution arrangements, e.g. power supply or data communications]
7/1494 . . . [having hardware for monitoring blades, e.g. keyboards, displays (methods or software therefore H05K 7/1498)]
7/1495 . . . [providing data protection in case of earthquakes, floods, storms, nuclear explosions, intrusions, fire]
7/1497 . . . [Rooms for data centers; Shipping containers therefor]
7/1498 . . . [Resource management, Optimisation arrangements, e.g. configuration, identification, tracking, physical location (thermal management H05K 7/20836)]
7/16 . . . on hinges or pivots
7/18 . . . Construction of rack or frame
7/183 . . . [support rails therefor]
7/186 . . . [for supporting telecommunication equipment (selecting apparatus H04Q 1/02)]
7/20 . . . Modifications to facilitate cooling, ventilating, or heating
7/20009 . . . [using a gaseous coolant in electronic enclosures (in cabinets of standardized dimensions H05K 7/20536; in server cabinets H05K 7/20709; in vehicle electronic casings H05K 7/20845; in power control electronics H05K 7/2089; in displays H05K 7/20954)]
7/20127 . . . [Natural convection]
7/20136 . . . [Forced ventilation, e.g. by fans (H05K 7/202 takes precedence)]
7/20145 . . . [Means for directing air flow, e.g. ducts, deflectors, plenum or guides]
7/20154 . . . [Heat dissipaters coupled to components]
7/20163 . . . [the components being isolated from air flow, e.g. hollow heat sinks, wind tunnels or funnels]
7/20172 . . . [Fan mounting or fan specifications]
7/20181 . . . [Filters; Louvers]
7/2019 . . . [Fan safe systems, e.g. mechanical devices for non stop cooling]
7/202 . . . [Air circulating in closed loop within enclosure wherein heat is removed through heat-exchangers]
7/20209 . . . [Thermal management, e.g. fan control]
7/20218 . . . [using a liquid coolant without phase change in electronic enclosures (in cabinets of standardized dimensions H05K 7/20536; in server cabinets H05K 7/20709; in vehicle electronic casings H05K 7/20845; in power control electronics H05K 7/2089; in displays H05K 7/20954)]
7/20236 . . . [by immersion]
7/20245 . . . [by natural convection; Thermosiphons]
7/20254 . . . [Cold plates transferring heat from heat source to coolant]
7/20263 . . . [Heat dissipaters releasing heat from coolant]
7/20272 . . . [Accessories for moving fluid, for expanding fluid, for connecting fluid conduits, for distributing fluid, for removing gas or for preventing leakage, e.g. pumps, tanks or manifolds]
7/20281 . . . [Thermal management, e.g. liquid flow control]
7/2029 . . . [using a liquid coolant with phase change in electronic enclosures (in cabinets of standardized dimensions H05K 7/20536; in server cabinets H05K 7/20709; in vehicle electronic casings H05K 7/20845; in power control electronics H05K 7/2089; in displays H05K 7/20954)]
7/203 . . . [by immersion]
7/20309 . . . [Evaporators]
7/20318 . . . [Condensers]
7/20327 . . . [Accessories for moving fluid, for connecting fluid conduits, for distributing fluid or for preventing leakage, e.g. pumps, tanks or manifolds]
7/20336 . . . [Heat pipes, e.g. wicks or capillary pumps]
7/20345 . . . [Sprayers; Atomizers]
7/20354 . . . [Refrigerating circuit comprising a compressor]
7/20363 . . . [Refrigerating circuit comprising a sorber]
7/20372 . . . [Cryogenic; Nitrogen liquid cooling]
7/20381 . . . [Thermal management, e.g. evaporation control]
7/2039 . . . [characterised by the heat transfer by conduction from the heat generating element to a dissipating body (arrangements for increasing/decreasing heat-transfer, e.g. fins details, F28F 13/00)]
7/20409 . . . [Outer radiating structures on heat dissipating housings, e.g. fins integrated with the housing]
7/20418 . . . [the radiating structures being additional and fastened onto the housing]
7/20427 . . . [having radiation enhancing surface treatment, e.g. black coating]
7/20436 . . . [Inner thermal coupling elements in heat dissipating housings, e.g. protrusions or depressions integrally formed in the housing]
7/20445 . . . [the coupling element being an additional piece, e.g. thermal standoff]
7/20454 . . . [with a conformable or flexible structure compensating for irregularities, e.g. cushion bags, thermal paste]
7/20463 . . . [Filling compound, e.g. potted resin]
7/20472 . . . [Sheet interfaces]
7/20481 . . . [characterised by the material composition exhibiting specific thermal properties]
7/2049 . . . [Pressing means used to urge contact, e.g. springs]
7/205 . . . [Heat-dissipating body thermally connected to heat generating element via thermal paths through printed circuit board [PCB] (details of PCBs relating to heat transfer H05K 14/021)]
7/20509 . . . [Cold plates, e.g. multi-component heat spreader, support plates, non closures structures]
7/20518 . . . [Unevenly distributed heat load, e.g. different sectors at different temperatures, localised cooling, hot spots]
7/20536 . . . [for racks or cabinets of standardized dimensions, e.g. 19-inch electronic racks]
7/20545 . . . [Natural convection of gaseous coolant; Heat transfer by conduction from electronic boards]
7/20554 . . . [Forced ventilation of a gaseous coolant (in closed loop H05K 7/206 or H05K 7/20609 or H05K 7/20618)]
7/20563 . . . [within sub-racks for removing heat from electronic boards]
7/20572 . . . [within cabinets for removing heat from sub-racks, e.g. plenum]
7/20581 . . . [Cabinets including a drawer for fans]
7/2059 . . . [within rooms for removing heat from cabinets, e.g. by air conditioning device]
7/206 . . . [Air circulating in closed loop within cabinets wherein heat is removed through air-to-air heat-exchanger]
7/20609 . . . [Air circulating in closed loop within cabinets wherein heat is removed through air-to-liquid heat-exchanger]
7/20618 . . . [Air circulating in different modes under control of air guidance flaps]
7/20627 . . . [Liquid coolant without phase change]
7/20636 . . . [within sub-racks for removing heat from electronic boards]
7/20645 . . . [within cabinets for removing heat from sub-racks]
7/20654 . . . [within rooms for removing heat from cabinets]
7/20663 . . . [Liquid coolant with phase change, e.g. heat pipes]
7/20672 . . . [within sub-racks for removing heat from electronic boards]
7/20681 . . . [within cabinets for removing heat from sub-racks]
7/2069 . . . [within rooms for removing heat from cabinets]
7/207 . . . [Thermal management, e.g. cabinet temperature control]
7/20709 . . . [for server racks or cabinets; for data centers, e.g. 19-inch computer racks]
7/20718 . . . [Forced ventilation of a gaseous coolant (in closed loop H05K 7/20754)]
7/20727 . . . [within server blades for removing heat from heat source]
7/20736 . . . [within cabinets for removing heat from server blades]
7/20745 . . . [within rooms for removing heat from cabinets, e.g. by air conditioning device]
7/20754 . . . [Air circulating in closed loop within cabinets]
7/20763 . . . [Liquid cooling without phase change]
7/20772 . . . [within server blades for removing heat from heat source]
7/20781 . . . [within cabinets for removing heat from server blades]
7/2079 . . . [within rooms for removing heat from cabinets]
7/208 . . . [Liquid cooling with phase change]
7/20809 . . . [within server blades for removing heat from heat source]
7/20818 . . . [within cabinets for removing heat from server blades]
7/20827 . . . [within rooms for removing heat from cabinets, e.g. air conditioning devices]
7/20836 . . . [Thermal management, e.g. server temperature control]
7/20845 . . . [for vehicle electronic casings]
7/20854 . . . [Heat transfer by conduction from internal heat source to heat radiating structure (H05K 7/20863 takes precedence)]
7/20863 . . . [Forced ventilation, e.g. on heat dissipators coupled to components]
7/20872 . . . [Liquid coolant without phase change]
7/20881 . . . [Liquid coolant with phase change]
7/2089 . . . [for power electronics, e.g. for inverters for controlling motor]
7/209 . . . [Heat transfer by conduction from internal heat source to heat radiating structure (H05K 7/20909 takes precedence)]
7/20909 . . . [Forced ventilation, e.g. on heat dissipators coupled to components]
7/20918 . . . [the components being isolated from air flow, e.g. hollow heat sinks, wind tunnels or funnels]
7/20927 . . . [Liquid coolant without phase change]
7/20936 . . . [Liquid coolant with phase change]
7/20945 . . . [Thermal management, e.g. inverter temperature control]
7/20954 . . . [for display panels]
Radiation from an antenna

Electric or magnetic fields

Screening of apparatus or components against

electric or magnetic fields (devices for absorbing
radiation from an antenna H01Q 17/00)

9/001 . . . Rooms or chambers (anechoic chambers
G01R 29/0821)

9/003 . . . [Shielded walls, floors, ceilings, e.g. wallpaper,
wall panel, electro-conductive plaster, concrete,
cement, mortar]

9/005 . . . [Shielded windows]

9/007 . . . [Casings (standardised racks H05K 9/0062)]

9/009 . . . [with provisions to reduce EMI leakage through
the joining parts]

9/015 . . . [Gaskets or seals]

9/016 . . . [having a spring contact]

9/018 . . . [with provisions to reduce aperture leakages in
walls, e.g. terminals, connectors, cables]

9/02 . . . [with localised screening]

9/022 . . . [of components mounted on printed circuit
boards [PCB] (shields integrated within
component packages H01L 23/55; shields
integrated within PCB H05K 1/0218)]

9/024 . . . [Shield cases mounted on a PCB, e.g. cans,
caps, conformal shields]

9/026 . . . . . . [integratedly formed from metal sheet]

9/028 . . . . . . [with retainers or specific soldering
features]

9/03 . . . . . . [made from electro-conductive plastic
material or combining different shielding
materials]

9/032 . . . . . . [having multiple parts, e.g. frames mating
with lids]

9/033 . . . . . . [disposed on both PCB faces]

9/035 . . . . . . [with retainers mounted beforehand on
the PCB, e.g. clips]

9/037 . . . . . . [Housings with compartments containing a
PCB, e.g. partitioning walls]

9/039 . . . . . . [Galvanic coupling of ground layer on printed
circuit board [PCB] to conductive casing
(printed shielding conductors, ground planes
or power planes for reduction of cross-talk or
noise in printed circuits H05K 1/0218)]

9/041 . . . . . . [Ventilation panels having provisions for
screening]

9/043 . . . . . . [being flexible containers, e.g. pouch, pocket,
bag]

9/045 . . . . . . [being rigid plastic containers having a coating of
shielding material]

9/047 . . . . . . [being rigid plastic containers having conductive
particles, fibres or mesh embedded therein]

9/049 . . . . . . [being metallic containers]

9/05 . . . . . . [being nesting containers]

9/052 . . . . . . [Shielding other than Faraday cages]

9/054 . . . . . . [specially adapted for display applications]

9/056 . . . . . . [specially adapted for microwave applications]

9/058 . . . . . . [specially adapted for optoelectronic
applications]

9/006 . . . [specially adapted for signal processing
applications, e.g. CATV, tuner, antennas
amplifier]

9/062 . . . [Structures of standardised dimensions, e.g. 19"
rack, chassis for servers or telecommunications]

9/064 . . . [Earth or grounding circuit]

9/066 . . . [Constructional details of transient suppressor]

9/067 . . . [Devices for protecting against damage from
electrostatic discharge]

9/069 . . . [Methods for measuring the shielding efficiency;
Apparatus therefor; Isolation container for testing]

9/071 . . . [Active shielding]

9/073 . . . [Shielding materials (H05K 9/0003 takes
precedence)]

9/075 . . . [Magnetic shielding materials]

9/077 . . . . . . [comprising superconductors]

9/079 . . . [Electrostatic discharge protection, e.g. ESD
treated surface for rapid dissipation of charges]

9/081 . . . [Electromagnetic shielding materials, e.g. EMI,
RFI shielding (H05K 9/0002 takes precedence)]

9/083 . . . [comprising electro-conductive non-fibrous
particles embedded in an electrically insulating
supporting structure, e.g. powder, flakes,
whiskers (H05K 9/0006 takes precedence)]

9/084 . . . [comprising a single continuous metallic
layer on an electrically insulating supporting
structure, e.g. metal foil, film, plating coating,
electro-deposition, vapour-deposition]

9/086 . . . [comprising a single discontinuous metallic
layer on an electrically insulating supporting
structure, e.g. metal grid, perforated metal foil,
film, aggregated flakes, sintering]

9/088 . . . [comprising a plurality of shielding layers;
combining different shielding material
structure]

9/09 . . . [comprising electro-conductive fibres, e.g.
metal fibres, carbon fibres, metallised textile
fibres, electro-conductive mesh, woven, non-
 woven mat, fleece, cross-linked]

9/092 . . . [comprising electro-conductive pigments, e.g.
paint, ink, tampon printing]

9/094 . . . [being light-transmitting, e.g. transparent,
translucent]

9/096 . . . [for television displays, e.g. plasma display
panel]

9/098 . . . [for shielding electrical cables]

10/00 Arrangements for improving the operating
reliability of electronic equipment, e.g. by
providing a similar standby unit

11/00 Combinations of a radio or television receiver
with apparatus having a different main function
(combined with clocks G04B 47/00; controlled by a
clock G04C 21/28)]

11/02 . . with vehicles

13/00 Apparatus or processes specially adapted for
manufacturing or adjusting assemblages of electric
components

13/0007 . . . [using handtools (for mounting on a circuit board
H05K 13/0447)]

13/0015 . . . [Orientation; Alignment; Positioning]

13/003 . . . [Placing of components on belts holding the
terminals]
Components {Mounting of components, e.g. of leadless tubes like magazines}

- Feeding of components
  - Arrangements for assisting the manual mounting of components, e.g. special tables or light spots indicating the place for mounting
  - Tools for holding the circuit boards during processing; handling transport of printed circuit boards
  - Holders for printed circuit boards
  - Straightening or aligning terminal leads of pins mounted on boards, during transport of the boards
  - Containers and magazines for components, e.g. boards
  - Tools for holding the circuit boards during indicating the place for mounting
  - Arrangements for assisting the manual mounting
  - Feeding one by one by other means than belts
  - Incorporating means for treating the terminal leads before and after insertion

- Treatment of the terminal leads as a separate operation (during transport H05K 13/0076, H05K 13/023; during mounting H05K 13/04)
  - Loading or unloading of containers (H05K 13/028 takes precedence)
  - Interconnecting of containers, e.g. splicing of tapes
  - with orientation of the terminal leads
  - with bending or straightening of the terminal leads
  - [of components having oppositely extending terminal leads]
  - [of components having terminal leads in side by side relationship, e.g. using combing elements]
  - Fluid transport of components
  - Simultaneously loading a plurality of loose objects, e.g. by means of vibrations, pressure differences, magnetic fields
  - Feeding axial lead components, e.g. using vibrating bowls, magnetic fields (H05K 13/022 takes precedence)

- Mounting of components {entracting the leads before and after insertion}
  - Arranging for placing the components in a predetermined order
  - Arranging for assisting the manual mounting of components, e.g. special tables or light spots indicating the place for mounting
  - Tools for holding the circuit boards during processing; handling transport of printed circuit boards
  - Holders for printed circuit boards
  - Straightening or aligning terminal leads of pins mounted on boards, during transport of the boards
  - Containers and magazines for components, e.g. tubes like magazines

- Feeding of components
  - [Mounting machines or lines comprising a plurality of tools for guiding different components to the same mounting place (H05K 13/0406, H05K 13/041 take precedence)]
  - [Simultaneously punching the circuit board]
  - [Surface mounting (surface mounted components H05K 3/341)]
  - [by soldering (H05K 13/0469 takes precedence)]
  - [by applying a glue or viscous material]
  - [Cutting and clinching the terminal ends of the leads after they are fitted on a circuit board]
  - [Simultaneously mounting of different components]

- [Loading or unloading of containers (H05K 13/028 takes precedence)]
  - Interconnecting of containers, e.g. splicing of tapes
  - with orientation of the terminal leads
  - with bending or straightening of the terminal leads
  - [of components having oppositely extending terminal leads]
  - [of components having terminal leads in side by side relationship, e.g. using combing elements]

- [Fluid transport of components]
  - [Simultaneously loading a plurality of loose objects, e.g. by means of vibrations, pressure differences, magnetic fields]
  - [Feeding axial lead components, e.g. using vibrating bowls, magnetic fields (H05K 13/022 takes precedence)]

- Mounting of components {entracting the leads before and after insertion}
  - Arranging for placing the components in a predetermined order
  - Arranging for assisting the manual mounting of components, e.g. special tables or light spots indicating the place for mounting
  - Tools for holding the circuit boards during processing; handling transport of printed circuit boards
  - Holders for printed circuit boards
  - Straightening or aligning terminal leads of pins mounted on boards, during transport of the boards
  - Containers and magazines for components, e.g. tubes like magazines

- Feeding of components
  - [Mounting machines or lines comprising a plurality of tools for guiding different components to the same mounting place (H05K 13/0406, H05K 13/041 take precedence)]
  - [Simultaneously punching the circuit board]
  - [Surface mounting (surface mounted components H05K 3/341)]
  - [by soldering (H05K 13/0469 takes precedence)]
  - [by applying a glue or viscous material]
  - [Cutting and clinching the terminal ends of the leads after they are fitted on a circuit board]
  - [Simultaneously mounting of different components]

- [Loading or unloading of containers (H05K 13/028 takes precedence)]
  - Interconnecting of containers, e.g. splicing of tapes
  - with orientation of the terminal leads
  - with bending or straightening of the terminal leads
  - [of components having oppositely extending terminal leads]
  - [of components having terminal leads in side by side relationship, e.g. using combing elements]

- [Fluid transport of components]
  - [Simultaneously loading a plurality of loose objects, e.g. by means of vibrations, pressure differences, magnetic fields]
  - [Feeding axial lead components, e.g. using vibrating bowls, magnetic fields (H05K 13/022 takes precedence)]
Dielectrics

Fillers and particles

indicating need for maintenance

{ Maintenance systems or processes, e.g. of the mounting head }

{ Calibration, teaching or correction of mechanical systems, e.g. of the mounting head }

{ Ergonomics; Operator safety; Training; Failsafe }

links, programming of apparatus and processes as assembly lines, e.g. centralized control, remote

{ Control systems for mounting machines or nozzles, feeders or mounting heads }

{ Equipment tracking or labelling, e.g. tracking of

plurality of layers, e.g. in a multilayer structure }

important role

changing the dielectric properties

with regions of different dielectrics in the same

inorganic layer for printed capacitor

Thin film deposited insulating layer, e.g. dielectric for printed capacitor

Inorganic, non-metallic layer, e.g. resist or etching

photoresist used as a mask during plasma etching

polymer, e.g. heat-shrinkable polymer

Shaping of thermoplastic polymer

Thermoplastic polymer, e.g. auto-adhesive

Shrinkable, e.g. heat-shrinkable polymer

Flame-retardant; Preventing of inflammation

Connections between PCB or components, e.g. solder used for other purposes than

elliptical

Fibers with a special cross-section, e.g. elliptical

fibers

Polymeric fibers

Common polymeric fibers

Polyalkene or polyolefin, e.g. polyethylene

Polymer, e.g. polyethylene terephthalate

PET, polyethylene naphthalate [PEN]

Fluoropolymer, e.g. polytetrafluoroethylene

PTFE

Woven fibrous reinforcement or textile ( textile substrates H05K 1/038)

Unidirectional or parallel fibers

Woven fibrous reinforcement or textile (textile substrates H05K 1/038)

Non-woven fibrous reinforcement

Fibers with a special cross-section, e.g. elliptical

Details about a collection of particles

Size distribution

Non-uniform distribution or concentration of particles

Mixed conductive particles, i.e. using different conductive particles, e.g. differing in shape

Fibers and reinforcement materials

Polymeric fibers

Conductive fibers

Paper, e.g. as reinforcement (paper sheet substrates H05K 1/0386)

Unidirectional or parallel fibers

Woven fibrous reinforcement or textile (textile substrates H05K 1/038)

Non-woven fibrous reinforcement

Fibers with a special cross-section, e.g. elliptical

Conductive materials

Properties and characteristics in general

Solder used for other purposes than connections between PCB or components, e.g. for filling vias or for programmable patterns

Shape memory alloy [SMA]

Metallic part with specific elastic properties, e.g. bent piece of metal as electrical contact

Fibers and reinforcement materials

Fillers; Particles; Fibers; Reinforcement materials

Materials

Inorganic, non-metallic particles

Resin particles

Metallic fillers

Composite particles, i.e. first metal coated with second metal

Insulating particles having an electrically conductive coating

Conductive particles having an insulating coating

Insulating particles having an insulating coating

Hard particles, i.e. particles in conductive adhesive at least partly penetrating an electrode

Deformable particles (insulating particles having an electrically conductive coating H05K 2201/0221)

Plating catalyst as filler in insulating material (catalytic ink H05K 2203/0709)

Coupling agent for particles (using a coupling agent to improve the adhesion between an insulating substrate and a metal H05K 3/389)

Non-conductive microfibers (relatively short elongated particles H05K 2201/0248)

Microballoons or hollow filler particles

Nanoparticles (inks comprising nanoparticles H05K 1/097)

Nanotubes or nanowires

Details about a collection of particles

Size distribution

Non-uniform distribution or concentration of particles

Mixed conductive particles, i.e. using different conductive particles, e.g. differing in shape

Fibers and reinforcement materials

Polymeric fibers

Conductive fibers

Paper, e.g. as reinforcement (paper sheet substrates H05K 1/0386)

Unidirectional or parallel fibers

Woven fibrous reinforcement or textile (textile substrates H05K 1/038)

Non-woven fibrous reinforcement

Fibers with a special cross-section, e.g. elliptical

Conductive materials

Properties and characteristics in general

Solder used for other purposes than connections between PCB or components, e.g. for filling vias or for programmable patterns

Shape memory alloy [SMA]

Metallic part with specific elastic properties, e.g. bent piece of metal as electrical contact
Assemblies of printed circuits

Stacked PCBs, i.e. having neither an empty space nor mounted components in between

2201/042 . . . Stacked spaced PCBs; Planar parts of folded flexible circuits having mounted components in between or spaced from each other

2201/043 . . . Stacked PCBs with their backs attached to each other without electrical connection

2201/044 . . . Details of backplane or midplane for mounting orthogonal PCBs

2201/045 . . . Hierarchy auxiliary PCB, i.e. more than two levels of hierarchy for daughter PCBs are important

2201/046 . . . Planar parts of folded PCBs making an angle relative to each other (assembling printed circuits perpendicularly to each other H05K 3/366)

2201/047 . . . Box-like arrangements of PCBs

2201/048 . . . Second PCB mounted on first PCB by inserting in window or holes of the first PCB

2201/049 . . . PCB for one component, e.g. for mounting onto mother PCB

2201/05 . . . Flexible printed circuits [FPCs]

2201/051 . . . Rolled

2201/052 . . . Branched

2201/053 . . . Tails

2201/055 . . . Folded back on itself

2201/056 . . . Folded around rigid support or component

2201/057 . . . Shape retainable

2201/058 . . . Direct connection between two or more FPCs or between flexible parts of rigid PCBs

2201/06 . . . Thermal details

2201/062 . . . Means for thermal insulation, e.g. for protection of parts

2201/064 . . . Fluid cooling, e.g. by integral pipes

2201/066 . . . Heatsink mounted on the surface of the PCB (heatsink inserted in the PCB H05K 2201/10416)

2201/068 . . . wherein the coefficient of thermal expansion is important

2201/07 . . . Electric details

2201/0707 . . . Shielding

2201/0715 . . . provided by an outer layer of PCB

2201/0723 . . . provided by an inner layer of PCB

2201/073 . . . High voltage adaptations (overvoltage protection H05K 1/0257)

2201/0738 . . . Use of voltage responsive materials, e.g. voltage switchable dielectric or varistor materials

2201/0746 . . . Protection against transients, e.g. layout adapted for plugging of connector

2201/0753 . . . Insulation

2201/0761 . . . Insulation resistance, e.g. of the surface of the PCB between the conductors

2201/0769 . . . Anti metal-migration, e.g. avoiding tin whisker growth

2201/0776 . . . Resistance and impedance

2201/0784 . . . Uniform resistance, i.e. equalizing the resistance of a number of conductors

2201/0792 . . . Means against parasitic impedance; Means against eddy currents

2201/08 . . . Magnetic details

2201/083 . . . Magnetic materials

2201/086 . . . for inductive purposes, e.g. printed inductor with ferrite core

2201/09 . . . Shape and layout

2201/09009 . . . Substrate related

2201/09018 . . . Rigid curved substrate
Shape and layout details of conductors

Edge details

Bevelled, chamfered or tapered edge
Slotted edge
Notches between edge pads
Notches in edge pads

Means for correcting warpage

Exposing inner circuit layers or metal planes at the side edge of the PCB or at the walls of large holes (shielding provided by an inner layer of PCB H05K 2201/09723)

Exposing inner circuit layers or metal planes at the walls of high aspect ratio holes (forming plated-through holes H05K 3/42; cutting around hole H05K 2203/0242)

Shape and layout details of conductors
Conductive traces

Parallel layout (layout of balanced signal pairs H05K 1/0245; superposed layout H05K 2201/09672)
Crossing layout (alternating conductors H05K 2201/097)
Branched layout
Meander

Layout details of a plurality of traces, e.g. escape layout for Ball Grid Array [BGA] mounting

Array of pads or lands differing from one another, e.g. in size, pitch, thickness; Using different connections on the pads (using different types of conductors H05K 2201/0931)

Multiple rows of pads, lands, terminals or dummy patterns; Multiple rows of mounted components

Special orientation of pads, lands or terminals of component, e.g. radial or polygonal orientation

Special relation between the location or dimension of a pad or land and the location or dimension of a terminal

Multiple rows of pads, lands, terminals or dummy patterns; Multiple rows of mounted components

Partial lands, i.e. lands or conductive rings not completely surrounding the hole (landless plated-through-hole or via H05K 2201/09545)

Recessed pad for surface mounting (recess in pad H05K 2201/09745); Recessed electrode of component

Via in pad; Pad over filled via (if used for surface mounting H05K 1/113)

Pad close to a hole, not surrounding the hole (if used for surface mounting H05K 1/114)

Conductive through-holes or vias

Blind vias, i.e. vias having one side closed
Deep blind vias, i.e. blind vias connecting the surface circuit to circuit layers deeper than the first buried circuit layer

Inverted blind vias, i.e. bottoms outwards in multilayer PCB; Blind vias in centre of PCB having opposed bottoms

Buried plated through-holes, i.e. plated through-holes formed in a core before lamination

Plated through-holes or blind vias without lands

Via connected to metal substrate

Metal filled via (plated through-hole filled with insulating material H05K 2201/0959)

Signal conductors in same plane as power plane

Power and ground in the same plane; Power planes for two voltages in one plane

Ground conductor along edge of main surface (edge contacts H05K 3/403)

wherein only contours around conductors are removed for insulation

Pads and lands

Shape of non-curved single flat metallic pad, land or exposed part thereof; Shape of electrode of leadless component (notches in edge pads H05K 2201/09181)

Curved pads, e.g. semi-circular or elliptical pads or lands

PCB or component having an integral separable or breakable part

Locally detached layers, e.g. in multilayer PCB or component having an integral separable or breakable part

Moulded substrate

PCB or component having an integral separable or breakable part

Locally and permanently deformed areas including dielectric material

Means for correcting warpage

Exposing inner circuit layers or metal planes at the side edge of the PCB or at the walls of large holes (shielding provided by an inner layer of PCB H05K 2201/09723)

Exposing inner circuit layers or metal planes at the walls of high aspect ratio holes (forming plated-through holes H05K 3/42; cutting around hole H05K 2203/0242)

Shape and layout details of conductors
Conductive traces

Parallel layout (layout of balanced signal pairs H05K 1/0245; superposed layout H05K 2201/09672)
Crossing layout (alternating conductors H05K 2201/097)
Branched layout
Meander

Layout details of a plurality of traces, e.g. escape layout for Ball Grid Array [BGA] mounting

Array of pads or lands differing from one another, e.g. in size, pitch, thickness; Using different connections on the pads (using different types of conductors H05K 2201/0931)

Multiple rows of pads, lands, terminals or dummy patterns; Multiple rows of mounted components

Special orientation of pads, lands or terminals of component, e.g. radial or polygonal orientation

Special relation between the location or dimension of a pad or land and the location or dimension of a terminal

Multiple rows of pads, lands, terminals or dummy patterns; Multiple rows of mounted components

Partial lands, i.e. lands or conductive rings not completely surrounding the hole (landless plated-through-hole or via H05K 2201/09545)

Recessed pad for surface mounting (recess in pad H05K 2201/09745); Recessed electrode of component

Via in pad; Pad over filled via (if used for surface mounting H05K 1/113)

Pad close to a hole, not surrounding the hole (if used for surface mounting H05K 1/114)

Conductive through-holes or vias

Blind vias, i.e. vias having one side closed
Deep blind vias, i.e. blind vias connecting the surface circuit to circuit layers deeper than the first buried circuit layer

Inverted blind vias, i.e. bottoms outwards in multilayer PCB; Blind vias in centre of PCB having opposed bottoms

Buried plated through-holes, i.e. plated through-holes formed in a core before lamination

Plated through-holes or blind vias without lands

Via connected to metal substrate

Metal filled via (plated through-hole filled with insulating material H05K 2201/0959)
H05K 2201/09572 . . . Solder filled plated through-hole in the final product (soldering lead-in-hole components H05K 3/3447)

H05K 2201/09581 . . . Applying an insulating coating on the walls of holes

H05K 2201/0959 . . . Plated through-holes or plated blind vias filled with insulating material

H05K 2201/096 . . . Vertically aligned vias, holes or stacked vias

H05K 2201/09609 . . . Via grid, i.e. two-dimensional array of vias or holes in a single plane (interposers H05K 2201/01378)

H05K 2201/09618 . . . Via fence, i.e. one-dimensional array of vias

H05K 2201/09627 . . . Special connections between adjacent vias, not for grounding vias (redundant conductors or connections H05K 2201/0979)

H05K 2201/09636 . . . Details of adjacent, not connected vias

H05K 2201/09645 . . . Patterning on via walls; Plural lands around one hole

H05K 2201/09654 . . . covering at least two types of conductors provided for in H05K 2201/09218 - H05K 2201/095

H05K 2201/09663 . . . Divided layout, i.e. conductors divided in two or more parts (branched layout H05K 2201/09254)

H05K 2201/09672 . . . Superposed layout, i.e. in different planes (parallel traces in one plane H05K 2201/09236)

H05K 2201/09681 . . . Mesh conductors, e.g. as a ground plane

H05K 2201/0969 . . . Apertured conductors

H05K 2201/097 . . . Alternating conductors, e.g. alternating different shaped pads, twisted pairs; Alternating components

H05K 2201/09709 . . . Staggered pads, lands or terminals; Parallel conductors in different planes

H05K 2201/09718 . . . Clearance holes

H05K 2201/09727 . . . Varying width along a single conductor; Conductors or pads having different widths

H05K 2201/09736 . . . Varying thickness of a single conductor; Conductors in the same plane having different thicknesses

H05K 2201/09745 . . . Recess in conductor, e.g. in pad or in metallic substrate

H05K 2201/09754 . . . Connector integrally incorporated in the PCB or in housing (mounted connector H05K 2201/0189)

H05K 2201/09763 . . . Printed component having superposed conductors, but integrated in one circuit layer

H05K 2201/09772 . . . Conductors directly under a component but not electrically connected to the component (cooling of mounted components by printed thermal vias H05K 1/0206)

H05K 2201/09781 . . . Dummy conductors, i.e. not used for normal transport of current; Dummy electrodes of components

H05K 2201/0979 . . . Redundant conductors or connections, i.e. more than one current path between two points

H05K 2201/098 . . . Special shape of the cross-section of conductors, e.g. very thick plated conductors

H05K 2201/09809 . . . Coaxial layout (reduction of cross-talk, noise or interference by printed shielding conductors for shielding around a single via or around a group of vias H05K 1/0222)

H05K 2201/09818 . . . Shape or layout details not covered by a single group of H05K 2201/09009 - H05K 2201/09809

H05K 2201/09827 . . . Tapered, e.g. tapered hole, via or groove (bevelled, chamfered or tapered edge H05K 2201/09154)

H05K 2201/09836 . . . Oblique hole, via or bump

H05K 2201/09845 . . . Stepped hole, via, edge, bump or conductor

H05K 2201/09854 . . . Hole or via having special cross-section, e.g. elliptical

H05K 2201/09863 . . . Concave hole or via

H05K 2201/09872 . . . Insulating conformal coating (foil encapsulation H05K 2203/1311)

H05K 2201/09881 . . . Coating only between conductors, i.e. flush with the conductors

H05K 2201/0989 . . . Coating free areas, e.g. areas other than pads or lands free of solder resist

H05K 2201/099 . . . Coating over pads, e.g. solder resist partly over pads

H05K 2201/09909 . . . Special local insulating pattern, e.g. as dam around component

H05K 2201/09918 . . . Optically detected marks used for aligning tool relative to the PCB, e.g. for mounting of components

H05K 2201/09927 . . . Machine readable code, e.g. bar code

H05K 2201/09936 . . . Marks, inscriptions, etc. for information

H05K 2201/09945 . . . Universal aspects, e.g. universal inner layers or via grid, or anisotropic interposer

H05K 2201/09954 . . . More mounting possibilities, e.g. on same place of PCB, or by using different sets of edge pads

H05K 2201/09963 . . . Programming circuit by using small elements, e.g. small PCBs

H05K 2201/09972 . . . Partitioned, e.g. portions of a PCB dedicated to different functions; Boundary lines therefore; Portions of a PCB being processed separately or differently

H05K 2201/09981 . . . Hollowised walls

H05K 2201/09985 . . . Circuit printed on or in housing, e.g. housing as PCB: Circuit printed on the case of a component; PCB affixed to housing

H05K 2201/0999 . . . Circuit printed on or in housing, e.g. housing as PCB; Circuit printed on the case of a component; PCB affixed to housing

H05K 2201/10 . . . Details of components or other objects attached to or integrated in a printed circuit board

H05K 2201/10007 . . . Types of components

H05K 2201/10015 . . . Non-printed capacitor

H05K 2201/10022 . . . Non-printed resistor

H05K 2201/1003 . . . Non-printed inductor

H05K 2201/10037 . . . Printed or non-printed battery

H05K 2201/10045 . . . Mounted network component having plural terminals

H05K 2201/10053 . . . Switch

H05K 2201/1006 . . . Non-printed filter

H05K 2201/10068 . . . Non-printed resonator

H05K 2201/10075 . . . Non-printed oscillator

H05K 2201/10083 . . . Electromechanical or electro-acoustic component, e.g. microphone

H05K 2201/1009 . . . Electromotor

H05K 2201/10098 . . . Components for radio transmission, e.g. radio frequency identification [RFID] tag, printed or non-printed antennas

H05K 2201/10106 . . . Light emitting diode [LED]

H05K 2201/10113 . . . Lamp
2201/10121 . . . Optical component, e.g. opto-electronic component
2201/10128 . . . Display
2201/10136 . . . Liquid Crystal display [LCD]
2201/10143 . . . Solar cell
2201/10151 . . . Sensor
2201/10159 . . . Memory
2201/10166 . . . Transistor
2201/10174 . . . Diode
2201/10181 . . . Fuse
2201/10189 . . . Non-printed connector
2201/10196 . . . Variable component, e.g. variable resistor
2201/10204 . . . Dummy component, dummy PCB or template, e.g. for monitoring, controlling of processes, comparing, scanning
2201/10212 . . . Programmable component
2201/10219 . . . Thermoelectric component
2201/10227 . . . Other objects, e.g. metallic pieces
2201/10234 . . . Metallic balls (solder balls H05K 2203/041)
2201/10242 . . . Metallic cylinders (small solder preforms other than balls H05K 2203/0415)
2201/1025 . . . Metallic discs (small solder preforms other than balls H05K 2203/0415)
2201/10257 . . . Hollow pieces of metal, e.g. used in connection between component and PCB
2201/10265 . . . Metallic coils or springs, e.g. as part of a connection element
2201/10272 . . . Busbars, i.e. thick metal bars mounted on the PCB as high-current conductors (metal strips H05K 2201/1028)
2201/1028 . . . Thin metal strips as connectors or conductors
2201/10287 . . . Metal wires as connectors or conductors
2201/10295 . . . Metallic connector elements partly mounted in a hole of the PCB
2201/10303 . . . Pin-in-hole mounted pins
2201/1031 . . . Surface mounted metallic connector elements
2201/10318 . . . Surface mounted metallic pins
2201/10325 . . . Sockets, i.e. female type connectors comprising metallic connector elements integrated in, or bonded to a common dielectric support
2201/10333 . . . Individual female type metallic connector elements
2201/1034 . . . Edge terminals, i.e. separate pieces of metal attached to the edge of the PCB (tab H05K 2201/0397)
2201/10348 . . . Fuzz’s as connector elements, i.e. small pieces of metallic fiber to make connection
2201/10356 . . . Cables
2201/10363 . . . Jumpers, i.e. non-printed cross-over connections
2201/10371 . . . Shields or metal cases
2201/10378 . . . Interposers
2201/10386 . . . Clip leads; Terminals gripping the edge of a substrate
2201/10393 . . . Clamping a component by an element or a set of elements
2201/10401 . . . Eyelets, i.e. rings inserted into a hole through a circuit board
2201/10409 . . . Screws
2201/10416 . . . Metallic blocks or heatsinks completely inserted in a PCB (metallic supports H05K 3/0061)
2201/10424 . . . Frame holders
2201/10431 . . . Details of mounted components (printed components H05K 1/16)
2201/10439 . . . Position of a single component
2201/10446 . . . Mounted on an edge (soldering edge mounted components H05K 3/3405; edge terminals H05K 2201/1034)
2201/10454 . . . Vertically mounted
2201/10462 . . . Flat component oriented parallel to the PCB surface
2201/10469 . . . Asymmetrically mounted component
2201/10477 . . . Inverted
2201/10484 . . . Obliquely mounted
2201/10492 . . . Electrically connected to another device (mounted components directly electrically connected to each other H05K 2201/1053)
2201/105 . . . Mechanically attached to another device (attached components H05K 2201/10537)
2201/10507 . . . Involving several components
2201/10515 . . . Stacked components
2201/10522 . . . Adjacent components
2201/1053 . . . Mounted components directly electrically connected to each other, i.e. not via the PCB
2201/10537 . . . Attached components
2201/10545 . . . Related components mounted on both sides of the PCB
2201/10553 . . . Component over metal, i.e. metal plate in between bottom of component and surface of PCB
2201/1056 . . . Metal over component, i.e. metal plate over component mounted on or embedded in PCB
2201/10568 . . . Integral adaptations of a component or an auxiliary PCB for mounting, e.g. integral spacer element
2201/10575 . . . Insulating foil under component (permanent spacer or stand-off H05K 2201/2036)
2201/10583 . . . Cylindrically shaped component; Fixing means therefore
2201/1059 . . . Connections made by press-fit insertion
2201/10598 . . . Means for fastening a component, a casing or a heat sink whereby a pressure is exerted on the component towards the PCB
2201/10606 . . . Permanent holder for component or auxiliary PCB mounted on a PCB (clamping a component by an element or a set of elements H05K 2201/10393)
2201/10613 . . . Details of electrical connections of non-printed components, e.g. special leads
2201/10621 . . . Components characterised by their electrical contacts
2201/10628 . . . Leadend surface mounted device (soldering surface mounted leaded components H05K 3/3421)
2201/10636 . . . Leadless chip, e.g. chip capacitor or resistor
2201/10643 . . . Disc shaped leadless component
2201/10651 . . . Component having two leads, e.g. resistor, capacitor
2201/10659 . . . Different types of terminals for the same component, e.g. solder balls combined with leads
2201/10666 . . . Plated through-hole for surface mounting on PCB
2201/10674 . . . Flip chip
2201/10681 . . . Tape Carrier Package [TCP]; Flexible sheet connector

H05K
2201/10689 . . . . Leaded Integrated Circuit [IC] package, e.g. dual-in-line [DIL]
2201/10704 . . . . Pin grid array [PGA]
2201/10712 . . . . Via grid array, e.g. via grid array capacitor
2201/10719 . . . . Land grid array [LGA]
2201/10727 . . . . Leadless chip carrier [LCC], e.g. chip-modules for cards
2201/10734 . . . . Ball grid array [BGA]; Bump grid array
2201/10742 . . . . Details of leads
2201/1075 . . . . Shape details
2201/10757 . . . . Bent leads
2201/10765 . . . . Leads folded back, i.e. bent with an angle of 180 deg
2201/10772 . . . . Leads of a surface mounted component bent for providing a gap between the lead and the pad during soldering
2201/1078 . . . . Leads having locally deformed portion, e.g. for retention
2201/10787 . . . . Leads having protrusions, e.g. for retention or insert stop
2201/10795 . . . . Details of lead tips, e.g. pointed
2201/10803 . . . . Tapered leads, i.e. leads having changing width or diameter
2201/1081 . . . . Special cross-section of a lead; Different cross-sections of different leads; Matching cross-section, e.g. matched to a land
2201/10818 . . . . Flat leads
2201/10825 . . . . Distorted or twisted flat leads, i.e. deformed by torque
2201/10833 . . . . having a curved or folded cross-section
2201/1084 . . . . Notched leads
2201/10848 . . . . Thinned leads
2201/10856 . . . . Divided leads, e.g. by slot in length direction of the lead, or by branching of the lead
2201/10863 . . . . Adaptations of leads or holes for facilitating insertion
2201/10871 . . . . Leads having an integral insert stop
2201/10878 . . . . Means for retention of a lead in a hole
2201/10886 . . . . Other details
2201/10893 . . . . Grouped leads, i.e. element comprising multiple leads distributed around but not through a common insulator
2201/10901 . . . . Lead partly inserted in hole or via
2201/10909 . . . . Materials of terminal, e.g. of leads or electrodes of components
2201/10916 . . . . Terminals having auxiliary metallic piece, e.g. for soldering
2201/10924 . . . . Leads formed from a punched metal foil (affixing a prefabricated self-supporting metal foil pattern H05K 3/202)
2201/10931 . . . . Exposed leads, i.e. encapsulation of component partly removed for exposing a part of the lead, e.g. for soldering purposes
2201/10939 . . . . Lead of component used as a connector
2201/10946 . . . . Leads attached onto leadless component after manufacturing the component
2201/10954 . . . . Other details of electrical connections
2201/10962 . . . . Component not directly connected to the PCB
2201/10969 . . . . Metallic case or integral heatsink of component electrically connected to a pad on PCB
2201/10977 . . . . Encapsulated connections (applying non-metallic protective coatings for encapsulating mounted components H05K 3/284)
2201/10984 . . . . Component carrying a connection agent, e.g. solder, adhesive (soldering leadless components having an array of bottom contacts H05K 3/3436; BGA components H05K 2201/10734)
2201/10992 . . . . Using different connection materials, e.g. different solders, for the same connection
2201/2020 . . . . Details of printed circuits not provided for in H05K 2201/01 - H05K 2201/10
2201/2009 . . . . Reinforced areas, e.g. for a specific part of a flexible printed circuit
2201/2018 . . . . Presence of a frame in a printed circuit or printed circuit assembly
2201/2027 . . . . Guiding means, e.g. for guiding flexible circuits
2201/2036 . . . . Permanent spacer or stand-off in a printed circuit or printed circuit assembly (pattern for applying drops or paste H05K 2203/0545)
2201/2045 . . . . Protection against vibrations
2201/2054 . . . . Light-reflecting surface, e.g. conductors, substrates, coatings, dielectrics
2201/2063 . . . . mixed adhesion layer containing metallic/inorganic and polymeric materials
2201/2072 . . . . Anchoring, i.e. one structure gripping into another (providing micro- or nanometer scale roughness on a metal surface H05K 2203/0307)
2201/2081 . . . . Compound repelling a metal, e.g. solder
2201/209 . . . . Auto-mechanical connection between a component and a PCB or between two PCBs

2203/00 Indexing scheme relating to apparatus or processes for manufacturing printed circuits covered by H05K 3/00
2203/01 . . . . Tools for processing; Objects used during processing
2203/0104 . . . . for patterning or coating
2203/0108 . . . . Male die used for patterning, punching or transferring
2203/0113 . . . . Female die used for patterning or transferring, e.g. temporary substrate having recessed pattern
2203/0117 . . . . Pattern shaped electrode used for patterning, e.g. plating or etching
2203/0121 . . . . Patterning, e.g. plating or etching by moving electrode
2203/0126 . . . . Dispenser, e.g. for solder paste, for supplying conductive paste for screen printing or for filling holes
2203/013 . . . . Inkjet printing, e.g. for printing insulating material or resist (using ink-jet printing to form a conductive pattern H05K 3/125)
2203/0134 . . . . Drum, e.g. rotary drum or dispenser with a plurality of openings
2203/0139 . . . . Blade or squeegee, e.g. for screen printing or filling of holes
2203/0143 . . . . Using a roller; Specific shape thereof; Providing locally adhesive portions thereon
2203/0147 . . . . Carriers and holders
Metal processing, e.g. drilling, punching, cutting, using ultrasound

Details related to mechanical or acoustic processing, deforming

Working metal substrate or core, e.g. by etching, oxidising metal
dendrites on a metal surface, e.g. by plating of nodules or
Providing micro- or nanometer scale roughness

Using ultrasound, e.g. for cleaning, soldering or anisotropic conductive adhesive

Flat pressure, e.g. for connecting terminals with shearing or pulling

Mechanical force other than pressure, e.g. brushing or wiping

Peeling insulating layer, e.g. foil, or separating mask

Mechanical force other than pressure, e.g. shearing or pulling

Flat pressure, e.g. for connecting terminals with anisotropic conductive adhesive

Using ultrasonic, e.g. for cleaning, soldering or wet treatment

Using vibration, e.g. during soldering or screen printing

Metal processing

Providing micro- or nanometer scale roughness on a metal surface, e.g. by plating of nodules or dendrites

Oxidising metal

Working metal substrate or core, e.g. by etching, deforming

Punching metal foil, e.g. solder foil (affixing a prefabricated self-supporting metal foil pattern H05K 3/202)

Transferring metal or conductive material other than a circuit pattern, e.g. bump, solder, printed component (affixing a prefabricated conductor pattern H05K 3/20)

Deburring, rounding, bevelling or smoothing conductor edges

Making conductive layer thin, e.g. by etching (selective thinning for providing different thickness H05K 2203/0369)

Stripping a part of an upper metal layer to expose a lower metal layer, e.g. by etching or using a laser

Etching selective parts of a metal substrate through part of its thickness, e.g. using etch resist

Etching temporary metallic carrier substrate

Etch stop layer, i.e. a buried barrier layer for preventing etching of layers under the etch stop layer

Pretreatment of metal, e.g. before finish plating, etching (improvement of the adhesion between an insulating substrate and a metal by special treatment of the metal H05K 3/382)

Soldering or other types of metallurgic bonding (using molten metal H05K 2203/128)

Solder foil, tape or wire

Solder preforms in the shape of solder balls (soldering leadless components having an array of bottom contacts H05K 3/3436)

Small preforms other than balls, e.g. discs, cylinders or pillars

Remote solder depot on the PCB, the solder flowing to the connections from this depot

Solder powder or solder coated metal powder

Reflowing of solder coated conductors, not during connection of components, e.g. reflowing solder paste

Metal coated solder, e.g. for passivation of solder balls

Solder dip coating, i.e. coating printed conductors, e.g. pads by dipping in molten solder or by wave soldering

Removing excess solder on pads; removing solder bridges, e.g. for repairing or reworking

Solder-filled plated through-hole [PTH] during processing wherein the solder is removed from the PTH after processing

PTH for surface mount device [SMD], e.g. wherein solder flows through the PTH during mounting

Means for drawing solder, e.g. for removing excess solder from pads

Shape of solder, e.g. differing from spherical shape, different shapes due to different solder pads

Soldering with different solders, e.g. two different solders on two sides of the PCB

Molten solder just before placing the component

Self-alignment during soldering: Terminals, pads or shape of solder adapted therefor

Tacky flux, e.g. for adhering components during mounting
Patterning and lithography; Masks; Details of resist

- Patterning and lithography
- Double exposure of the same photosensitive layer
- Flood exposure
- Diffusion patterning
- Photodevelopable thick film, e.g. conductive or insulating paste
- Electrographic patterning
- Magnetographic patterning
- Using an adhesive pattern
- Patterning by phototackifying or by photopatterning adhesive
- Patterning during transfer, i.e. without preformed pattern, e.g. by using a die, a programmed tool or a laser
- Decalcomania, i.e. transfer of a pattern detached from its carrier before affixing the pattern to the substrate
- Offset printing, i.e. transfer of a pattern from a carrier onto the substrate by using an intermediate member
- Transfer of pre-fabricated insulating pattern
- Continuous temporary metal layer over resist, e.g. for selective electroplating
- Continuous temporary metal layer over metal pattern (reinforcing the conductive pattern characterised by the electroplating method H05K 3/241)
- Pattern for applying drops or paste; Applying a pattern made of drops or paste (using thick film techniques to apply conductive material by using a substrate with a shape pattern H05K 3/1258)
- Masks
- Exposure mask directly printed on the PCB
- Metal used as mask for etching vias, e.g. by laser ablation
- Non-printed masks
- Using an artwork, i.e. a photomask for exposing photosensitive layers
- Details of resist
- Resist used only for applying catalyst, not for plating itself
- Resist used for applying paste, ink or powder
- Dual purpose resist, e.g. etch resist used as solder resist, solder resist used as plating resist
- Stacked resist layers used for different processes
- Double layer of resist having the same pattern
- Additional resists used for the same purpose but in different areas, i.e. not stacked
- Coating by resist, i.e. resist used as mask for application of insulating coating or of second resist
- Second resist used as mask for selective stripping of first resist
- Second resist used as pattern over first resist
- Organic non-polymeric coating, e.g. for inhibiting corrosion thereby preserving solderability

- Insulating resist or coating with special shaped edges
- Resist applied over the edges or sides of conductors, e.g. for protection during etching or plating (coating over pads H05K 2201/09818)
- Lamination
- Of previously made multilayered subassemblies (laminating only or mainly similar single-sided circuit boards H05K 3/4617; laminating only or mainly similar double-sided circuit boards H05K 3/462)
- Of preperforated insulating layer
- Binding insulating layers without adhesive, e.g. by local heating or welding, before lamination of the whole PCB
- Transfer laminating of insulating material, e.g. resist as a whole layer, not as a pattern (transferring an insulating pattern H05K 2203/0537)
- Features of the lamination press or of the lamination process, e.g. using special separator sheets
- Treatments involving liquids, e.g. plating, rinsing
- Plating
- Inactivating or removing catalyst, e.g. on surface of resist
- Catalytic ink or adhesive for electroless plating (catalyst filler H05K 2201/0236)
- Plating poison, e.g. for selective plating or for preventing plating on resist
- Metallic plating catalysts, e.g. for direct electroplating of through holes; Sensitising or activating metallic plating catalysts
- Electroless plating, e.g. finish plating or initial plating
- Electroplating, e.g. finish plating
- Electroforming, i.e. electroplating on a metallic carrier thereby forming a self-supporting structure
- Displacement plating, substitution plating or immersion plating, e.g. for finish plating
- Method for plating stud vias, i.e. massive vias formed by plating the bottom of a hole without plating on the walls
- Methods for applying liquids, e.g. spraying
- Features related to the fluid pressure
- Mechanical agitation of fluid, e.g. during cleaning of the conductive pattern
- Local treatment using a fluid jet, e.g. for removing or cleaning material; Providing mechanical pressure using a fluid jet
- Global treatment of printed circuits by fluid spraying, e.g. cleaning a conductive pattern using nozzles
- Reversing fluid direction, e.g. in holes
- Uses of liquids, e.g. rinsing, coating, dissolving
- Forming a polymer layer by liquid coating, e.g. a non-metallic protective coating or an organic bonding layer
- Treating individual holes or single row of holes, e.g. by nozzle
- Rinsing, e.g. after cleaning or polishing a conductive pattern
Dissolving insulating materials, e.g. coatings, not used for developing resist after exposure

Dissolving the filler without dissolving the matrix material; Dissolving the matrix material without dissolving the filler

Uses of liquids not otherwise provided for in H05K 2203/0759 - H05K 2203/0773

characterised by the specific liquids involved

Using solvent, e.g. for cleaning; Regulating solvent content of pastes or coatings for adjusting the viscosity

Using an aqueous solution, e.g. for cleaning or during drilling of holes

Aqueous acid solution, e.g. for cleaning or etching

Aqueous alkaline solution, e.g. for cleaning or etching

Oxidant in aqueous solution, e.g. permanganate

Treatments involving gases

Blowing of gas, e.g. for cooling or for providing heat during soldering/reflowing

Suction, e.g. for holding solder balls or components

Evaporation or sublimation of a compound, e.g. gas bubble generating agent

Using vacuum or low pressure

Using an inert gas

Using a reactive gas

Using a vapour or mist, e.g. cleaning using water vapor

Treatments involving charged particles

Particle beam, e.g. using an electron beam or an ion beam

Plasma, e.g. for treating a substrate to improve adhesion with a conductor or for cleaning holes

Corona discharge

Using electric, magnetic and electromagnetic fields; Using laser light

Using electrical induction, e.g. for heating during soldering

Using microwaves, e.g. for curing ink patterns or adhesive

Using magnetic force, e.g. to align particles or for a temporary connection during processing

Using an electrical field; Special methods of applying an electric potential (electroplating H05K 2203/0723)

Using laser light (shaping a substrate by laser ablation H05K 2203/0026)

Using a plurality of lasers or laser light with a plurality of wavelengths

Treatments characterised by their effect, e.g. heating, cooling, roughening

Heating or thermal processing not related to soldering, firing, curing or laminating, e.g. for shaping the substrate or during finish plating

Preheating, e.g. before soldering

Resistance heating, e.g. by current through the PCB conductors or through a metallic mask

Cooling, e.g. specific areas of a PCB being cooled during reflow soldering (details related to cooling of mounted components H05K 1/0203)

Firing, i.e. heating a powder or paste above the melting temperature of at least one of its constituents

Sintering, i.e. fusing of metal particles to achieve or improve electrical conductivity

Conversion of insulating material into conductive material, e.g. by pyrolysis

Conversion of conductive material into insulating material or into dissolvable compound

Sealing or impregnating, e.g. of pores

Replicating the surface structure of a sacrificial layer, e.g. for roughening

Using means for chemical reduction

Chemical reaction, e.g. heating solder by exothermic reaction (oxidising metal H05K 2203/0315)

Graft-polymerization

Differences in wettability, e.g. hydrophilic or hydrophobic areas

Means for venting or for letting gases escape

Underetching, e.g. etching of substrate under conductors or etching of conductor under dielectrics; Means for allowing or controlling underetching

Pressing leads, bumps or a die through an insulating layer

Thermal treatment leading to a different chemical state of a material, e.g. annealing for stress-relief, aging

Using specific substances

Metallo-organic compounds

Organic non-polymeric compounds, e.g. oil, wax, thiol (using solvent H05K 2203/0783)

Heterocyclic organic compounds, e.g. azole, furan

Inorganic compounds, e.g. silver salt

Lubricants, e.g. during drilling of holes

Molten metals, e.g. casting thereof, or melting by heating and excluding molten solder (spraying droplets of molten metal H05K 2203/1344)

Moulding and encapsulation; Deposition techniques; Protective layers

Moulding and encapsulation

Foil encapsulation, e.g. of mounted components

Moulded encapsulation of mounted components

Encapsulation comprising more than one layer

Encapsulation comprising more than one layer (applying non-metallic protective coatings for encapsulating mounted components H05K 3/284)

Deposition techniques, e.g. coating

Chemical vapour deposition

Spraying small metal particles or droplets of molten metal

Electrophoretic deposition of insulating material

Powder coating of insulating material

Coating by immersion in coating bath (applying molten solder H05K 3/3468)

Spraying coating (apparatus for coating printed circuit boards using liquid non-metallic coating compositions H05K 3/0091)
H05K

2203/1372 . . . Coating by using a liquid wave (solder dip coating H05K 2203/04)
2203/1377 . . . Protective layers
2203/1383 . . . Temporary protective insulating layer
2203/1388 . . . Temporary protective conductive layer
2203/1394 . . . Covering open PTHs, e.g. by dry film resist or by metal disc
2203/1395 . . . Related to the order of processing steps
2203/1407 . . . Applying catalyst before applying plating resist
2203/1415 . . . Applying catalyst after applying plating resist
2203/1423 . . . Applying catalyst before etching, e.g. plating catalyst in holes before etching circuit
2203/143 . . . Treating holes before another process, e.g. coating holes before coating the substrate
2203/1438 . . . Treating holes after another process, e.g. coating holes after coating the substrate (metal used as mask for etching vias H05K 2203/0554)
2203/1446 . . . Treatment after insertion of lead into hole, e.g. bending, cutting, caulking or curing of adhesive but excluding soldering
2203/1453 . . . Applying the circuit pattern before another process, e.g. before filling of vias with conductive paste, before making printed resistors
2203/1461 . . . Applying or finishing the circuit pattern after another process, e.g. after filling of vias with conductive paste, after making printed resistors
2203/1469 . . . Circuit made after mounting or encapsulation of the components
2203/1476 . . . Same or similar kind of process performed in phases, e.g. coarse patterning followed by fine patterning
2203/1484 . . . Simultaneous treatments, e.g. soldering lead-in-hole components simultaneously with surface mounted components
2203/1492 . . . Periodical treatments, e.g. pulse plating of through-holes
2203/145 . . . Position of the PCB during processing
2203/1509 . . . Horizontally held PCB
2203/1518 . . . Vertically held PCB
2203/1527 . . . Obliquely held PCB
2203/1536 . . . Temporarily stacked PCBs
2203/1545 . . . Continuous processing, i.e. involving rolls moving a band-like or solid carrier along a continuous production path
2203/1554 . . . Rotating or turning the PCB in a continuous manner
2203/1563 . . . Reversing the PCB
2203/1572 . . . Processing both sides of a PCB by the same process; Providing a similar arrangement of components on both sides; Making interlayer connections from two sides
2203/1581 . . . Treating the backside of the PCB, e.g. for heating during soldering or providing a liquid coating on the backside
2203/159 . . . Using gravitational force; Processsing against the gravity direction; Using centrifugal force
2203/166 . . . Alignment or registration; Control of registration
2203/167 . . . Using mechanical means for positioning, alignment or registration, e.g. using rod-in-hole alignment
2203/168 . . . Wrong mounting prevention
2203/17 . . . Post-manufacturing processes
2203/171 . . . Tuning, e.g. by trimming of printed components or high frequency circuits
2203/173 . . . Adding connections between adjacent pads or conductors, e.g. for modifying or repairing (programmable, customizable or modifiable circuits H05K 1/0286)
2203/175 . . . Configurations of connections suitable for easy deletion, e.g. modifiable circuits or temporary conductors for electroplating; Processes for deleting connections
2203/176 . . . Removing, replacing or disconnecting component; Easily removable component (thermal arrangements, e.g. to prevent overheating H05K 1/0201)
2203/178 . . . Demolishing, e.g. recycling, reverse engineering, destroying for security purposes; Using biodegradable materials
2203/30 . . . Details of processes not otherwise provided for in H05K 2203/01 - H05K 2203/17
2203/302 . . . Bending a rigid substrate; Breaking rigid substrates by bending (rigid circuit boards or rigid supports locally made bendable H05K 1/0278)
2203/304 . . . Protecting a component during manufacturing
2203/306 . . . Lifting the component during or after mounting; Increasing the gap between component and PCB
2203/308 . . . Sacrificial means, e.g. for temporarily filling a space for making a via or a cavity or for making rigid-flexible PCBs

Dummy groups for the purpose of scheme testing, logistics of documents or the like

999/00 . . . dummy group

WARNING

This group and its subgroups are not real classification places. They are used only for the purpose of scheme testing, logistics of documents or the like.

999/99 . . . dummy group