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.

1/00 Printed circuits
1/02 . Details
1/0201 . . [Thermal arrangements, e.g. for cooling, heating or preventing overheating]
1/0203 . . [Cooling of mounted components (H05K 1/0272 takes precedence)]
1/0204 . . . [using means for thermal conduction connection in the thickness direction of the substrate (H05K 1/0207 takes precedence)]
1/0206 . . . . [by printed thermal vias]
1/0207 . . . . [using internal conductor planes parallel to the surface for thermal conduction, e.g. power planes]
1/0209 . . . . [External configuration of printed circuit board adapted for heat dissipation, e.g. layout of conductors, coatings]
1/021 . . . . [Components thermally connected to metal substrates or heat-sinks by insert mounting]
1/0212 . . . [Printed circuits or mounted components having integral heating means]
1/0213 . . . [Electrical arrangements not otherwise provided for]
1/0215 . . . [Grounding of printed circuits by connection to external grounding means]
1/0216 . . . [Reduction of cross-talk, noise or electromagnetic interference (grounding H05K 1/0215)]
1/0218 . . . [by printed shielding conductors, ground planes or power plane (H05K 1/0236 takes precedence)]
1/0219 . . . . [Printed shielding conductors for shielding around or between signal conductors, e.g. coplanar or coaxial printed shielding conductors]
1/0221 . . . . [C coaxially shielded signal lines comprising a continuous shielding layer partially or wholly surrounding the signal lines]
1/0222 . . . . [for shielding around a single via or around a group of vias, e.g. coaxial vias or vias surrounded by a grounded via fence]
1/0224 . . . . [Patterned shielding planes, ground planes or power planes (H05K 1/0253 takes precedence)]
1/0225 . . . . [Single or multiple openings in a shielding, ground or power plane (H05K 1/0227 takes precedence)]
1/0227 . . . . [Split or nearly split shielding or ground planes]
1/0228 . . . . [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)]
1/023 . . . . [using auxiliary mounted passive components or auxiliary substances (printed passive components H05K 1/16)]
1/0231 . . . [Capacitors or dielectric substances]
1/0233 . . . [Filters, inductors or a magnetic substance]
1/0234 . . . [Resistors or by disposing resistive or lossy substances in or near power planes (H05K 1/0246 takes precedence)]
1/0236 . . . . [Electromagnetic band-gap structures]
1/0237 . . . [High frequency adaptations (H05K 1/0216 takes precedence)]
1/0239 . . . . [Signal transmission by AC coupling]
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 23/661)]
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, inspection means 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 opto-electronic components G02B 6/42)]
1/0275 . . . . [Security details, e.g. tamperability 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 1/11 takes precedence; lay-out adapted to mounted component configuration H05K 1/18)]
1/0298 . . . . [Multilayer circuits]
1/03 . . . . [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
Printed circuits structurally associated with non-printed electric components (H05K 1/11; H05K 1/0201, H05K 1/023, H05K 1/0243; H05K 1/16 take precedence).

Printed elements for providing electric connections to or between printed circuits (H05K 1/11; H05K 1/0201, H05K 1/023, H05K 1/0243; H05K 1/16 take precedence).

Structural association of two or more printed circuits (providing electric connection to or between printed circuits H05K 1/11, H01R 12/00).

Arrangements of planar printed circuit boards (H05K 1/142 and H05K 1/147 take precedence).

Structural association of two or more printed circuits (providing electric connection to or between printed circuits H05K 1/0201, H05K 1/023, H05K 1/0243; H05K 1/16 take precedence).

Associated with surface mounted components (H05K 1/2001, H05K 1/023, H05K 1/0243; H05K 1/16 take precedence).

Apparatus or processes for manufacturing printed circuits (H05K 3/326 takes precedence).
removed from such areas of the surface which are surface of the insulating support and is thereafter in which the conductive material is applied to the (H05K 3/0052 substrate, or temporarily stacked circuit boards simultaneously, e.g. made from a common takes precedence) \{ Processing two or more printed circuits plated vias, e.g. for masking or for mechanical \{ Filling or covering plated through-holes or blind \{ Apparatus for coating printed circuits using liquid \{ characterised by the exposure method of radiation-sensitive masks \{ Apparatus for treatments of printed circuits with liquids not provided for in groups \{ for treatment of holes \{ Apparatus for coating printed circuits using liquid non-metallic coating compositions \{ Filling or covering plated-through-holes or blind plated vias, e.g. for masking or for mechanical reinforcement \{ Processing two or more printed circuits simultaneously, e.g. made from a common substrate, or temporarily stacked circuit boards (H05K 3/0052 takes precedence} \}. 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 \{ Processes for manufacturing precursors of printed circuits, i.e. copper-clad substrates \{ by transfer of thin metal foil formed on a temporary carrier, e.g. peel-apart copper \{ the conductive material being removed by irradiation, e.g. by photons, alpha or beta particles \{ the conductive material being removed mechanically, e.g. by punching \{ by using a die for cutting the conductive material \{ by using a moving tool for milling or cutting the conductive material \{ by making a conductive layer having a relief pattern, followed by abrading of the raised portions \{ by selective transfer or selective detachment of a conductive layer \{ using a lift-off resist pattern or a release layer pattern \{ the conductive material being removed chemically or electrolytically, e.g. by photo-etch process (semi-additive methods H05K 3/108) \}. [Etching masks] \{ consisting of metals or alloys or metallic inorganic compounds (H05K 3/065 takes precedence} \}. [Photoreists] \{ applied by electrographic, electrophotographic or magnetographic methods] \}. [Etchants] \{ Apparatus for etching printed circuits \{ being removed electrolytically \}. 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 \{ by bonding of conductive powder, i.e. metallic powder (H05K 3/12 takes precedence} \}. by bonding or embedding conductive wires or strips \{ by conversion of non-conductive material on or in the support into conductive material, e.g. by using an energy beam \}. by photographic methods \{ by filling grooves in the support with conductive material (H05K 3/045, H05K 3/101, H05K 3/1258 and H05K 3/465 take precedence} \}. 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} \}. 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} \}. by screen printing or stencil printing \{ Screens or stencils; Holders therefor \}. Methods or means for supplying the conductive material and for forcing it through the screen or stencil \}. by ink-jet printing or drawing by dispensing \}. by ink-jet printing \}. by using a substrate provided with a shape pattern, e.g. grooves, banks, resist pattern \}. by electrographic or magnetographic printing \}. by other printing techniques, e.g. letterpress printing, intaglio printing, lithographic printing, offset printing \}. After-treatment of the printed patterns, e.g. sintering or curing methods} \}. by firing or sintering at relative high temperatures for patterns on inorganic boards, e.g. co-firing of circuits on green ceramic sheets} \}. using spraying techniques to apply the conductive material \}. e.g. vapour evaporation \}. [Masks therefor (H05K 3/048 takes precedence]
3/146 . . . [By vapour deposition]
3/16 . . . by cathodic sputtering
3/18 . . . using precipitation techniques to apply the conductive material
3/181 . . . [by electroless plating (adhesives therefor H05K 3/387)]
3/182 . . . [characterised by the patterning method]
3/184 . . . . . . [using masks]
3/185 . . . . . . [by making a catalytic pattern by photo-imaging]
3/187 . . . . . . [means therefor, e.g. baths, apparatus]
3/188 . . . [by direct electroplating]
3/20 . . . by affixing prefabricated conductor pattern
(H05K 1/187, H05K 3/046, H05K 3/4658, H05K 3/4682 takes precedence)
3/202 . . . [by using self-supporting metal foil pattern]
3/205 . . . [by using a pattern electroplated or electroformed on a metallic carrier]
3/207 . . . [by using a prefabricated paste pattern, ink pattern or powder pattern]
3/22 . . . Secondary treatment of printed circuits
(H05K 3/1283 takes precedence; embedding circuits in grooves by pressure H05K 3/107)
3/222 . . . [Completing of printed circuits by adding non-printed jumper connections (printed jumper connections H05K 3/4685)]
3/225 . . . [Correcting or repairing of printed circuits (H05K 1/0292, H05K 3/222, H05K 3/288, H05K 3/4685 takes precedence)]
3/227 . . . [Drying of printed circuits]
3/24 . . . Reinforcing the conductive pattern
(by solder coating H05K 3/3457)]
3/241 . . . [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 . . . . . . [tired compositions for inorganic substrates]
3/249 . . . . . . [comprising carbon particles as main constituent]
3/26 . . . Cleaning or polishing of the conductive pattern

3/28 . . . Applying non-metallic protective coatings
(H05K 3/0091 takes precedence; methods for intermediate insulating layers for build-up multilayer circuits H05K 3/4673)
3/281 . . . [by means of a preformed insulating foil (H05K 3/284 takes precedence)]
3/282 . . . [for inhibiting the corrosion of the circuit, e.g. for preserving the solderability]
3/284 . . . [for encapsulating the circuit, e.g. for preserving the solderability]
3/285 . . . [Permanent coating compositions]
3/287 . . . [Photosensitive compositions]
3/288 . . . [Removal of non-metallic coatings, e.g. for repairing]
3/30 . . . Assembling printed circuits with electric components, e.g. with resistor
3/301 . . . [by means of a mounting structure (H05K 3/325 takes precedence)]
3/303 . . . [Surface mounted components, e.g. affixing before soldering, aligning means, spacing means (H05K 3/32 takes precedence)]
3/305 . . . [Affixing by adhesive]
3/306 . . . [Lead-in-hole components, e.g. affixing or retention before soldering, spacing means (H05K 3/32 takes precedence)]
3/308 . . . [Adaptations of leads (connectors to printed circuits H01R 12/00)]
3/32 . . . electrically connecting electric components or wires to printed circuits
3/321 . . . [by conductive adhesives]
3/323 . . . [by applying an anisotropic conductive adhesive layer over an array of pads]
3/325 . . . [by abutting or pinching, i.e. without alloying process; mechanical auxiliary parts therefor (adapations of leads inserted in holes for press-fit connections H05K 3/308)]
3/326 . . . [the printed circuit having integral resilient or deformable parts, e.g. tabs or parts of flexible circuits (H05K 3/365 takes precedence)]
3/328 . . . [by welding]
3/34 . . . by soldering
3/3405 . . . . . . [Edge mounted components, e.g. terminals]
3/341 . . . . . . . . . . . . [Surface mounted components]
3/3415 . . . . . . . . . . . . (on both sides of the substrate or combined with lead-in-hole components)
3/3421 . . . . . . . . . . . . [Leaded components]
3/3426 . . . . . . . . . . . . [characterised by the leads]
3/3431 . . . . . . . . . . . . [Leadless components]
3/3436 . . . . . . . . . . . . [having an array of bottom contacts, e.g. pad grid array or ball grid array components]
3/3442 . . . . . . . . . . . . [having edge contacts, e.g. leadless chip capacitors, chip carriers]
3/3447 . . . . . . . . . . . . [Lead-in-hole components (H05K 3/3415 takes precedence)]
3/3452 . . . . . . . . . . . . [Solder masks]
3/3457 . . . . . . . . . . . . [Solder materials or compositions; Methods of application thereof]
3/3463 . . . . . . . . . . . . [Solder compositions in relation to features of the printed circuit board or the mounting process]
3/3468 . . . . . . . . . . . . [Applying molten solder]
3/3473 . . . . . . . . . . . . [Plating of solder]
3/3478 . . . . [Applying solder paste, particles or preforms; Transferring prefabricated solder patterns]
3/3484 . . . . . [Paste or slurry or powder (screen printing or stencil printing of solder paste H05K 3/1216)]
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 1/0212)]
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 3/4092 takes precedence; deposition of finish layers on pads H05K 3/24; forming solder bumps H05K 3/3477)]
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 3/424 takes precedence)]
3/4046 . . . . . [using auxiliary conductive elements, e.g. metallic spheres, eyeflats, 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]
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)]
5/0091 [Housing specially adapted for small components (for resistors 101C; for capacitors 101G; for integrated circuits 101L, 2300)]
5/0095 [hermetically-sealed]
5/02 [Details]
5/0204 [Mounting supporting structure on the outside of casings (mounting supporting structure in casings)]
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, H04M 2/11, H04M 1/202 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)]
7/00 Constructional details common to different types of electric apparatus (casings, cabinets, drawers H05K 5/000)

7/005 . . . . Arrangements of circuit components without supporting structure
7/01 Arrangements of circuit components or wiring on supporting structure
7/02 . . . . . . . . . . (stackable modules)
7/03 . . . . . . . . . . (multiple connections subassemblies)
7/04 . . . . on conductive chassis
7/05 . . . . on insulating boards, e.g. wiring harnesses for printed circuits H05K 1/18, H05K 3/30)
7/06 . . . . on perforated boards
7/10 . . . . plug-in assemblies of components, e.g. IC sockets
7/1007 . . . . (with means for increasing contact pressure at the end of engagement of coupling parts)
7/1011 . . . . (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)
7/105 . . . . (having interior leads)
7/1061 . . . . (co-operating by abutting)
7/1069 . . . . (with spring contact pieces)
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 thereof]
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 7/1495)]
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
7/20099 . . . [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]
[Refrigerating circuit comprising a sorber]

[Heat-exchanger; Refrigeration equipment; Refrigeration apparatus]
H05K

7/20963 . . . {Heat transfer by conduction from internal heat source to heat radiating structure (H05K 7/20972 takes precedence)}

7/20972 . . . {Forced ventilation, e.g. on heat dissipaters coupled to components}

7/20981 . . . {Liquid coolant without phase change}

7/2099 . . . {Liquid coolant with phase change}

9/00 Screening of apparatus or components against electric or magnetic fields (devices for absorbing radiation from an antenna H01Q 17/00)

9/0001 . . . {Rooms or chambers (anechoic chambers G01R 29/0821)}

9/0003 . . . {Shielded walls, floors, ceilings, e.g. wallpaper, wall panel, electro-conductive plaster, concrete, cement, mortar}

9/0005 . . . {Shielded windows}

9/0007 . . . {Casings (standardised racks H05K 9/0062)}

9/0009 . . . {with provisions to reduce EMI leakage through the joining parts}

9/0015 . . . {Gaskets or seals}

9/0016 . . . {having a spring contact}

9/0018 . . . {with provisions to reduce aperture leakages in walls, e.g. terminals, connectors, cables}

9/002 . . . {with localised screening}

9/0022 . . . {of components mounted on printed circuit boards [PCB] (shields integrated within component packages H01L 23/552; shields integrated within PCB H05K 1/0218)}

9/0024 . . . {Shield cases mounted on a PCB, e.g. cans, caps, conformal shields}

9/0026 . . . . {integratedly formed from metal sheet}

9/0028 . . . . {with retainers or specific soldering features}

9/003 . . . . {made from electro-conductive plastic material or combining different shielding materials}

9/0032 . . . . {having multiple parts, e.g. frames mating with lids}

9/0033 . . . . {disposed on both PCB faces}

9/0035 . . . . {with retainers mounted beforehand on the PCB, e.g. clips}

9/0037 . . . . {Housings with compartments containing a PCB, e.g. partitioning walls}

9/0039 . . . . {Ground layout on printed circuit board}

9/0041 . . . . {Ventilation panels having provisions for screening}

9/0043 . . . . {being flexible containers, e.g. pouch, pocket, bag}

9/0045 . . . . {being rigid plastic containers having a coating of shielding material}

9/0047 . . . . {being rigid plastic containers having conductive particles, fibres or mesh embedded therein}

9/0049 . . . . {being metallic containers}

9/005 . . . . {being nesting containers}

9/0052 . . . . {Shielding other than Faraday cages}

9/0054 . . . . {specially adapted for display applications}

9/0056 . . . . {specially adapted for microwave applications}

9/0058 . . . . {specially adapted for optoelectronic applications}

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

9/0062 . . . {Structures of standardised dimensions, e.g. 19" rack, chassis for servers or telecommunications}

9/0064 . . . {Earth or grounding circuit}

9/0066 . . . {Constructional details of transient suppressor}

9/0067 . . . {Devices for protecting against damage from electrostatic discharge}

9/0069 . . . {Methods for measuring the shielding efficiency; Apparatus therefor; Isolation container for testing}

9/0071 . . . . {Active shielding}

9/0073 . . . . {Shielding materials (H05K 9/0003 takes precedence)}

9/0075 . . . . {Magnetic shielding materials}

9/0077 . . . . . {comprising superconductors}

9/0079 . . . . . {Electrostatic discharge protection, e.g. ESD treated surface for rapid dissipation of charges}

9/0081 . . . . . {Electromagnetic shielding materials, e.g. EMI, RFI shielding (H05K 9/0002 takes precedence)}

9/0083 . . . . . {comprising electro-conductive non-fibrous particles embedded in an electrically insulating supporting structure, e.g. powder, flakes, whiskers (H05K 9/0066 takes precedence)}

9/0084 . . . . . {comprising a single continuous metallic layer on an electrically insulating supporting structure, e.g. metal foil, film, plating coating, electro-deposition, vapour-deposition}

9/0086 . . . . . {comprising a single discontinuous metallic layer on an electrically insulating supporting structure, e.g. metal grid, perforated metal foil, film, aggregated flakes, sintering}

9/0088 . . . . . {comprising a plurality of shielding layers; combining different shielding material structure}

9/009 . . . . . {comprising electro-conductive fibres, e.g. metal fibres, carbon fibres, metallised textile fibres, electro-conductive mesh, woven, non-woven mat, fleece, cross-linked}

9/0092 . . . . . {comprising electro-conductive pigments, e.g. paint, ink, tampon printing}

9/0094 . . . . . {being light-transmitting, e.g. transparent, translucent}

9/0096 . . . . . {for television displays, e.g. plasma display panel}

9/0098 . . . . . {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 . . . {Oriention; Alignment; Positioning}

13/003 . . . {Placing of components on belts holding the terminals}

13/0038 . . . {placing the components in a predetermined order}
13/0053 . . { Arrangements for assisting the manual mounting of components, e.g. special tables or light spots indicating the place for mounting }

13/0061 . . { Tools for holding the circuit boards during processing; handling transport of printed circuit boards }

13/0069 . . { Holders for printed circuit boards }

13/0076 . . { Straightening or aligning terminal leads of pins mounted on boards, during transport of the boards }

13/0084 . . { Containers and magazines for components, e.g. tube-like magazines }

13/0092 . . { Treatment of the terminal leads as a separate operation (during transport H05K 13/0076, H05K 13/023; during mounting H05K 13/04) }

13/02 . . Feeding of components

13/021 . . . { Loading or unloading of containers (H05K 13/028 takes precedence) }

**WARNING**

Group H05K 13/021 is impacted by reclassification into group H05K 13/0215. Groups H05K 13/021 and H05K 13/0215 should be considered in order to perform a complete search.

13/0215 . . . { Interconnecting of containers, e.g. splicing of tapes }

**WARNING**

Group H05K 13/0215 is impacted by reclassification into group H05K 13/0215. Groups H05K 13/021 and H05K 13/0215 should be considered in order to perform a complete search.

13/022 . . { with orientation of the elements }

13/023 . . { with bending or straightening of the terminal leads }

13/024 . . { Straightening or aligning terminal leads }

13/025 . . . . { of components having oppositely extending terminal leads }

13/026 . . . . { of components having terminal leads in side by side relationship, e.g. using combing elements }

13/027 . . . { Fluid transport of components }

13/028 . . . { Simultaneously loading a plurality of loose objects, e.g. by means of vibrations, pressure differences, magnetic fields }

13/029 . . . { Feeding axial lead components, e.g. using vibrating bowls, magnetic fields (H05K 13/022 takes precedence) }

13/04 . Mounting of components {, e.g. of leadless components }

13/0404 . . { Pick-and-place heads or apparatus, e.g. with jaws }

**WARNING**

Group H05K 13/0404 is impacted by reclassification into groups H05K 13/0406, H05K 13/0408, H05K 13/041, H05K 13/0411 and H05K 13/0413. All groups listed in this Warning should be considered in order to perform a complete search.

13/0406 . . . { Drive mechanisms for pick-and-place heads, e.g. details relating to power transmission, motors or vibration damping }

**WARNING**

Group H05K 13/0406 is incomplete pending reclassification of documents from groups H05K 13/0404, H05K 13/0413 and H05K 13/0452. All groups listed in this Warning should be considered in order to perform a complete search.

13/0408 . . . . { Incorporating a pick-up tool }

**WARNING**

Group H05K 13/0408 is incomplete pending reclassification of documents from group H05K 13/0404. Group H05K 13/0408 is also impacted by reclassification into group H05K 13/0409. Groups H05K 13/0404, H05K 13/0408 and H05K 13/0409 should be considered in order to perform a complete search.

13/0409 . . . . . { Sucking devices }

**WARNING**

Group H05K 13/0409 is incomplete pending reclassification of documents from group H05K 13/0404. Group H05K 13/0409 is also impacted by reclassification into group H05K 13/0408. Groups H05K 13/0408 and H05K 13/0409 should be considered in order to perform a complete search.

13/041 . . . . . . { Having multiple pick-up tools }

**WARNING**

Group H05K 13/041 is incomplete pending reclassification of documents from groups H05K 13/0404, H05K 13/0413 and H05K 13/0452. All groups listed in this Warning should be considered in order to perform a complete search.
13/0411 . . . [having multiple mounting heads]

**WARNING**
Group H05K 13/0411 is incomplete pending reclassification of documents from groups H05K 13/0404 and H05K 13/0452.

Groups H05K 13/0404, H05K 13/0452 and H05K 13/0411 should be considered in order to perform a complete search.

13/0413 . . . [with orientation of the component while holding it; Drive mechanisms for gripping tools, e.g. lifting, lowering or turning of gripping tools]

**WARNING**
Group H05K 13/0413 is incomplete pending reclassification of documents from groups H05K 13/0404 and H05K 13/0452.

Groups H05K 13/0404, H05K 13/0452 and H05K 13/0413 should be considered in order to perform a complete search.

13/0417 . . . [Feeding with belts or tapes]

**WARNING**
Group H05K 13/0417 is impacted by reclassification into group H05K 13/0419.
Groups H05K 13/0417 and H05K 13/0419 should be considered in order to perform a complete search.

13/0419 . . . [tape feeders]

**WARNING**
Group H05K 13/0419 is incomplete pending reclassification of documents from group H05K 13/0417.
Groups H05K 13/0417 and H05K 13/0419 should be considered in order to perform a complete search.

13/0421 . . . [with treatment of the terminal leads]
13/0426 . . . [for components being oppositely extending terminal leads (H05K 13/0421 takes precedence)]

13/043 . . . [Feeding one by one by other means than belts]
13/0434 . . . [with containers]
13/0439 . . . [incorporating means for treating the terminal leads only before insertion]
13/0443 . . . [incorporating means for treating the terminal leads before and after insertion or only after insertion]
13/0447 . . . [Hand tools therefor]

13/0452 . . . [Mounting machines or lines comprising a plurality of tools for guiding different components to the same mounting place (H05K 13/0406, H05K 13/0411 take precedence)]

**WARNING**
Group H05K 13/0452 is impacted by reclassification into groups H05K 13/0406, H05K 13/0411, H05K 13/0413 and H05K 13/0413.

All groups listed in this Warning should be considered in order to perform a complete search.

13/0456 . . . [simultaneously punching the circuit board]
13/046 . . . [Surface mounting (surface mounted components H05K 3/341)]
13/0465 . . . [by soldering (H05K 13/0469 takes precedence)]
13/0469 . . . [by applying a glue or viscous material]
13/0473 . . . [Cutting and clinching the terminal ends of the leads after they are fitted on a circuit board]
13/0478 . . . [Simultaneously mounting of different components]
13/0482 . . . [using templates; using magazines, the configuration of which corresponds to the sites on the boards where the components have to be attached]
13/0486 . . . [Replacement and removal of components]
13/0491 . . . [Hand tools therefor]
13/0495 . . . [having a plurality of work-stations]
13/06 . Wiring by machine
13/065 . . . [Accessories therefor, e.g. light spots]
13/08 . Monitoring manufacture of assemblages

**WARNING**
Group H05K 13/08 is impacted by reclassification into groups H05K 13/081, H05K 13/0812, H05K 13/0813, H05K 13/0815, H05K 13/0817, H05K 13/0818, H05K 13/082, H05K 13/083, H05K 13/084, H05K 13/085, H05K 13/0853, H05K 13/0857, H05K 13/086, H05K 13/087, H05K 13/0882, H05K 13/0885, H05K 13/0888, H05K 13/089 and H05K 13/0895.

All groups listed in this Warning should be considered in order to perform a complete search.

13/081 . . . [Integration of optical monitoring devices in assembly lines; Processes using optical monitoring devices specially adapted for controlling devices or machines in assembly lines]

**WARNING**
Group H05K 13/081 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/081 should be considered in order to perform a complete search.
H05K

13/0812 . . . {the monitoring devices being integrated in the mounting machine, e.g. for monitoring components, leads, component placement}

**WARNING**

Group H05K 13/0812 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/0812 should be considered in order to perform a complete search.

13/0813 . . . {Controlling of single components prior to mounting, e.g. orientation, component geometry (H05K 13/0812 takes precedence)}

**WARNING**

Group H05K 13/0813 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/0813 should be considered in order to perform a complete search.

13/0815 . . . {Controlling of component placement on the substrate during or after manufacturing}

**WARNING**

Group H05K 13/0815 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/0815 should be considered in order to perform a complete search.

13/0817 . . . {Monitoring of soldering processes (inspection of solder joints or of printed solder paste G01N 21/95684)}

**WARNING**

Group H05K 13/0817 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/0817 should be considered in order to perform a complete search.

13/0818 . . . {Setup of monitoring devices prior to starting mounting operations; Teaching of monitoring devices for specific products; Compensation of drifts during operation, e.g. due to temperature shifts}

**WARNING**

Group H05K 13/0818 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/0818 should be considered in order to perform a complete search.

13/082 . . . {Integration of non-optical monitoring devices, i.e. using non-optical inspection means, e.g. electrical means, mechanical means or X-rays}

**WARNING**

Group H05K 13/082 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/082 should be considered in order to perform a complete search.

13/083 . . . {Quality monitoring using results from monitoring devices, e.g. feedback loops (H05K 13/084 takes precedence)}

**WARNING**

Group H05K 13/083 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/083 should be considered in order to perform a complete search.

13/084 . . . {Product tracking, e.g. of substrates during the manufacturing process; Component traceability}

**WARNING**

Group H05K 13/084 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/084 should be considered in order to perform a complete search.

13/085 . . . {Production planning, e.g. of allocation of products to machines, of mounting sequences at machine or facility level}

**WARNING**

Group H05K 13/085 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/085 should be considered in order to perform a complete search.

13/0853 . . . {Determination of transport trajectories inside mounting machines}

**WARNING**

Group H05K 13/0853 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/0853 should be considered in order to perform a complete search.
13/0857 . . . [Product-specific machine setup; Changeover of machines or assembly lines to new product type]

**WARNING**

Group H05K 13/0857 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/0857 should be considered in order to perform a complete search.

13/086 . . . [Supply management, e.g. supply of components or of substrates]

**WARNING**

Group H05K 13/086 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/086 should be considered in order to perform a complete search.

13/087 . . . [Equipment tracking or labelling, e.g. tracking of nozzles, feeders or mounting heads]

**WARNING**

Group H05K 13/087 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/087 should be considered in order to perform a complete search.

13/0882 . . . [Control systems for mounting machines or assembly lines, e.g. centralized control, remote links, programming of apparatus and processes as such (H05K 13/083 takes precedence)]

**WARNING**

Group H05K 13/0882 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/0882 should be considered in order to perform a complete search.

13/0885 . . . [Power supply]

**WARNING**

Group H05K 13/0885 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/0885 should be considered in order to perform a complete search.

13/0888 . . . [Ergonomics; Operator safety; Training; Fail-safe systems]

**WARNING**

Group H05K 13/0888 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/0888 should be considered in order to perform a complete search.

13/089 . . . [Calibration, teaching or correction of mechanical systems, e.g. of the mounting head]

**WARNING**

Group H05K 13/089 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/089 should be considered in order to perform a complete search.

13/0895 . . . [Maintenance systems or processes, e.g. indicating need for maintenance]

**WARNING**

Group H05K 13/0895 is incomplete pending reclassification of documents from group H05K 13/08.

Groups H05K 13/08 and H05K 13/0895 should be considered in order to perform a complete search.

2201/00 Indexing scheme relating to printed circuits covered by H05K 1/00

2201/01 . . . Dielectrics

2201/0104 . . . Properties and characteristics in general

2201/0108 . . . Transparent

2201/0112 . . . Absorbing light, e.g. dielectric layer with carbon filler for laser processing

2201/0116 . . . Porous, e.g. foam

2201/012 . . . Flame-retardant; Preventing of inflammation

2201/0125 . . . Shrinkable, e.g. heat-shrinkable polymer

2201/0129 . . . Thermoplastic polymer, e.g. auto-adhesive layer; Shaping of thermoplastic polymer

2201/0133 . . . Elastomeric or compliant polymer (elastomeric conductor H05K 2201/0314)

2201/0137 . . . Materials

2201/0141 . . . Liquid crystal polymer [LCP]

2201/0145 . . . Polyester, e.g. polyethylene terephthalate [PET], polyethylene naphthalate [PEN]

2201/015 . . . Fluoropolymer, e.g. polytetrafluoroethylene [PTFE]

2201/0154 . . . Polymide

2201/0158 . . . Polyolefin or polyolefin, e.g. polyethylene [PE], polypropylene [PP]

2201/0162 . . . Silicon containing polymer, e.g. silicone

2201/0166 . . . Polymeric layer used for special processing, e.g. resist for etching insulating material or photore sist used as a mask during plasma etching

2201/017 . . . Glass ceramic coating, e.g. formed on inorganic substrate (inorganic, non-metallic substrates H05K 1/0306)
Fibers and reinforcement materials

- Unidirectional or parallel fibers
- Conductive fibers
- Polymeric fibers

Fillers and particles

- Details about a collection of particles
- Elongated particles
- Needles or elongated particles; Elongated flakes, flat particles or lamellar particles
- Microparticles; Particles having a special cross-section, e.g. differing in shape
- Nanoparticles (ink comprising nanoparticles)
- Non-uniform distribution or concentration of particles
- Mixed conductive particles, i.e. using different conductive particles, e.g. differing in shape

Conductive materials

- Conductive materials
- Properties and characteristics in general
- Materials
- Inorganic, non-metallic 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

Materials

- Materials
- Carbon
- Inorganic, non-metallic conductor, e.g. indium-tin oxide [ITO]
- Intrinsically conductive polymer [ICP]: Semiconductive polymer
- Thin film conductor layer; Thin film passive coating
- Resin particles
- Insulating polymer; Semiconductive polymer
- Inorganic, non-metallic layer, e.g. resist or dielectric for printed capacitor
- Thin film deposited insulating layer, e.g. inorganic layer for printed capacitor
- Dielectric layers
- Dielectric or adhesive layers comprising a plurality of layers, e.g. in a multilayer structure
- wherein the thickness of the dielectric plays an important role

Differences between the conductors of different layers of a multilayer

- Differences between the conductors of different layers of a multilayer
- Past usage of solder past
- Paste overlayer, i.e. conductive paste or solder paste over conductive layer
- 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

Polymeric materials

- Polymeric fibers
- Conductive fibers
- Paper, e.g. as reinforcement (paper sheet substrates)
- Unidirectional or parallel fibers

Plastic materials

- Resin coated copper [RCC]
- Metal foils
- Resin coated copper [RCC]
- Etched tri-metal structure, i.e. metal layers or metal patterns on both sides of a different central metal layer which is later at least partly etched

Elastomeric materials

- Elastomeric connector or conductor, e.g. rubber with metallic filler (elastomeric dielectric)

Layered materials

- Layered conductor, e.g. layered metal substrate, layered finish layer, layered thin film adhesion layer (etched tri-metal structure)
- Intermediate metal, e.g. before reinforcing of conductors by plating
- Electroless sublayer, e.g. Ni, Co, Cd or Ag; Transferred electroless sublayer
- Overplating, e.g. for reinforcing conductors or bumps; Plating over filled vias (reinforcing the conductive pattern)

Conductive coatings

- Electroless sublayer, e.g. Ni, Co, Cd or Ag; Transferred electroless sublayer
- Transferred electroless sublayer
- Plating catalyst as filler in insulating material (catalytic ink)
- Intermediate metal, e.g. before reinforcing of conductors by plating
- Overplating, e.g. for reinforcing conductors or bumps; Plating over filled vias (reinforcing the conductive pattern)

Intermetallic compounds

- Metal foils
- Resin coated copper [RCC]
- Etched tri-metal structure, i.e. metal layers or metal patterns on both sides of a different central metal layer which is later at least partly etched

Conductor bumping

- Metallic bump or raised conductor not used as solder bump (solder materials or compositions and methods of application thereof)
- Hollow conductors, i.e. conductors partially or completely surrounding a void, e.g. hollow waveguides
- Conductors having a fine structure, e.g. providing a plurality of contact points with a structured tool (providing micro- or nanometer scale roughness on a metal surface)
- Flush conductors, i.e. flush with the surface of the printed circuit
- Stacked conductors

Conductive interconnects

- Conductive materials
- Properties and characteristics in general
- Materials
- Inorganic, non-metallic 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

Conductive coatings

- Electroless sublayer, e.g. Ni, Co, Cd or Ag; Transferred electroless sublayer
- Transferred electroless sublayer
- Plating catalyst as filler in insulating material (catalytic ink)
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Intermetallic compounds

- Metal foils
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- Metallic bump or raised conductor not used as solder bump (solder materials or compositions and methods of application thereof)
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- Conductors having a fine structure, e.g. providing a plurality of contact points with a structured tool (providing micro- or nanometer scale roughness on a metal surface)
- Flush conductors, i.e. flush with the surface of the printed circuit
- Stacked conductors
Flexible printed circuits [FPCs]  

2201/0391. . . . Other aspects of conductors  

2201/0385. . . . Displaced conductors  

2201/0388. . . . Conductor crossing over a hole in the substrate  

2201/0397. . . . Tab (forming integral conductive tabs)  

2201/04. . . . Assemblies of printed circuits  

2201/041. . . . 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)  

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)  

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

2201/07. . . . Electric details  

2201/070. . . . 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)  

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  

2201/09027. . . . Non-rectangular flat PCB, e.g. circular  

2201/09036. . . . Recesses or grooves in insulating substrate (recess in metallic substrate)  

2201/09045. . . . Locally raised area or protrusion of insulating substrate (rigid curved substrate)  

2201/09054. . . . Raised area or protrusion of metal substrate  

2201/09063. . . . Holes or slots in insulating substrate not used for electrical connections  

2201/09072. . . . Hole or recess under component or special relationship between hole and component  

2201/09081. . . . Tongue or tail integrated in planar structure, e.g. obtained by cutting from the planar structure  

2201/0909. . . . Preformed cutting or breaking line  

2201/091. . . . Locally and permanently deformed areas including dielectric material  

2201/09109. . . . Locally detached layers, e.g. in multilayer  

2201/09118. . . . Moulded substrate  

2201/09127. . . . PCB or component having an integral separable or breakable part  

2201/09136. . . . Means for correcting warpage  

2201/09145. . . . Edge details  

2201/09154. . . . Bevelled, chamferred or tapered edge  

2201/09163. . . . Slotted edge  

2201/09172. . . . Notches between edge pads  

2201/09181. . . . Notches in edge pads  

2201/0919. . . . 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)  

2201/092. . . . Exposing inner circuit layers or metal planes at the walls of high aspect ratio holes (forming plated-through holes)  

2201/09209. . . . Shape and layout details of conductors  

2201/09218. . . . Conductive traces  

2201/09227. . . . Layout details of a plurality of traces, e.g. escape layout for Ball Grid Array [BGA] mounting  

2201/09236. . . . Parallel layout (layout of balanced signal pairs)  

2201/09245. . . . Crossing layout (alternating conductors)  

2201/09254. . . . Branched layout  

2201/09263. . . . Meander  

2201/09272. . . . Layout details of angles or corners  

2201/09281. . . . Layout details of a single conductor (meander)  

2201/0929. . . . Conductive planes
Conductive through-holes or vias
Pads and lands
Pad close to a hole, not surrounding the hole
Surface mounting H05K 1/113
Via in pad; Pad over filled via (if used for surface mounting H05K 1/113)
Via connected to metal substrate
Via close to a via, not surrounding the via
Varying width along a single conductor; Conductors or pads having different widths
Varying thickness of a single conductor; Conductors in the same plane having different thicknesses
Recessed pad for surface mounting (recess in pad H05K 2201/09745); Recessed electrode of component
Partial lands, i.e. lands or conductive rings not completely surrounding the hole (landless plated-through hole or via H05K 2201/09545)
Deep blind vias, i.e. blind vias having one side closed
Blind vias, i.e. vias having one side closed
Conductive through-holes or vias
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)
Special sequence of power, ground and signal layers in multilayer PCB
Signal conductors in same plane as power plane
2201/09436 . . . . . . 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)
2201/0939 . . . . . . Curved pads, e.g. semi-circular or elliptical pads or lands
2201/094 . . . . . . 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 2201/09391)
2201/09409 . . . . . . Multiple rows of pads, lands, terminals or dummy patterns; Multiple rows of mounted components
2201/09418 . . . . . . Special orientation of pads, lands or terminals of component, e.g. radial or polygonal orientation
2201/09427 . . . . . . Special relation between the location or dimension of a pad or land and the location or dimension of a terminal
2201/09436 . . . . . . Pads or lands on permanent coating which covers the other conductors
2201/09445 . . . . . . Pads for connections not located at the edge of the PCB, e.g. for flexible circuits
2201/09454 . . . . . . Inner lands, i.e. lands around via or plated through-holes in internal layer of multilayer PCB
2201/09463 . . . . . . Partial lands, i.e. lands or conductive rings not completely surrounding the hole (landless plated-through hole or via H05K 2201/09545)
2201/09472 . . . . . . Recessed pad for surface mounting (recess in pad H05K 2201/09745); Recessed electrode of component
2201/09481 . . . . . . Via in pad; Pad over filled via (if used for surface mounting H05K 1/113)
2201/0949 . . . . . . Pad close to a hole, not surrounding the hole (if used for surface mounting H05K 1/114)
2201/095 . . . . . . Conductive through-holes or vias
2201/09509 . . . . . . Blind vias, i.e. vias having one side closed
2201/09518 . . . . . . Deep blind vias, i.e. blind vias connecting the surface circuit to circuit layers deeper than the first buried circuit layer
2201/09527 . . . . . . Inverse blind vias, i.e. bottoms outwards in multilayer PCB; Blind vias in centre of PCB having opposed bottoms
2201/09536 . . . . . . Buried plated-through-holes, i.e. plated through-holes formed in a core before lamination
2201/09545 . . . . . . Plated through-holes or blind vias without lands
2201/09554 . . . . . . Via connected to metal substrate
2201/09563 . . . . . . Metal filled via (plated through-hole filled with insulating material H05K 2201/0959)
2201/09572 . . . . . . Solder filled plated through-hole in the final product (soldering lead-in-hole components H05K 3/3447)
2201/09581 . . . . . . Applying an insulating coating on the walls of holes
2201/0959 . . . . . . Plated through-holes or plated blind vias filled with insulating material
2201/096 . . . . . . Vertically aligned vias, holes or stacked vias
2201/09609 . . . . . . Via grid, i.e. two-dimensional array of vias or holes in a single plane (interposers H05K 2201/10378)
2201/09618 . . . . . . Via fence, i.e. one-dimensional array of vias
2201/09627 . . . . . . Special connections between adjacent vias, not for grounding vias (redundant conductors or connections H05K 2201/0979)
2201/09636 . . . . . . Details of adjacent, not connected vias
2201/09645 . . . . . . Patterning on via walls; Plural lands around one hole
2201/09654 . . . . . . covering at least two types of conductors provided for in H05K 2201/09218 - H05K 2201/095
2201/09663 . . . . . . Divided layout, i.e. conductors divided in two or more parts (branched layout H05K 2201/09254)
2201/09672 . . . . . . Superposed layout, i.e. in different planes (parallel traces in one plane H05K 2201/09236)
2201/09681 . . . . . . Mesh conductors, e.g. as a ground plane
2201/0969 . . . . . . Apertured conductors
2201/097 . . . . . . Alternating conductors, e.g. alternating different shaped pads, twisted pairs; Alternating components
2201/09709 . . . . . . Staggered pads, lands or terminals; Parallel conductors in different planes
2201/09718 . . . . . . Clearance holes
2201/09727 . . . . . . Varying width along a single conductor; Conductors or pads having different widths
2201/09736 . . . . . . Varying thickness of a single conductor; Conductors in the same plane having different thicknesses
2201/09745 . . . . . . Recess in conductor, e.g. in pad or in metallic substrate
2201/09754 . . . . . . Connector integrally incorporated in the PCB or in housing (mounted connector H05K 2201/10189)
2201/09763 . . . . . . Printed component having superposed conductors, but integrated in one circuit layer
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)

CPC - 2019.05
Details of components or other objects attached to types of components

- Non-printed resistor
- Non-printed oscillator
- Electromechanical or electro-acoustic component, e.g. microphone
- Electromotor
- Component for radio transmission, e.g. Radio Frequency Identification Tag [RFID]
- Light emitting diode [LED]
- Lamp
- Optical component, e.g. opto-electronic component
- Display
- Liquid Crystal display [LCD]
- Solar cell
- Sensor
- Memory
- Transistor
- Diode
- Fuse
- Non-printed connector
- Variable component, e.g. variable resistor
- Dummy component, dummy PCB or template, e.g. for monitoring, controlling of processes, comparing, scanning
- Programmable component
- Thermoelectric component
- Other objects, e.g. metallic pieces
- Metallic balls (solder balls H05K 2203/041)
- Metallic cylinders (small solder preforms other than balls H05K 2203/0415)
- Metallic discs (small solder preforms other than balls H05K 2203/0415)
- Hollow pieces of metal, e.g. used in connection between component and PCB
- Metalic coils or springs, e.g. as part of a connection element
- Busbars, i.e. thick metal bars mounted on the PCB as high-current conductors (metal strips H05K 2201/028)
- Thin metal strips as connectors or conductors
- Metal wires as connectors or conductors
- Metallic connector elements partly mounted in a hole of the PCB
- Pin-in-hole mounted pins
- Surface mounted metallic connector elements
- Surface mounted metallic pins
- Individual female type metallic connector elements
- Edge terminals, i.e. separate pieces of metal attached to the edge of the PCB (tab H05K 2201/0397)
- Fuzz’s as connector elements, i.e. small pieces of metallic fiber to make connection
- Cables
- Jumpers, i.e. non-printed cross-over connections
- Shields or metal cases
- Interposers
- Clip leads; Terminals gripping the edge of a substrate
Details of electrical connections of non-printed components H05K 1/16

Details of mounted components (printed components H05K 1/16)

Position of a single component H05K 2201/10393

Mounted on an edge (soldering edge mounted components H05K 3/3405; edge terminals H05K 2201/1034)

Vertically mounted H05K 2201/10454

Flat component oriented parallel to the PCB surface H05K 2201/10462

Asymmetrically mounted component H05K 2201/10469

Inverted H05K 2201/10477

Obliquely mounted H05K 2201/10484

Electrically connected to another device (mounted components directly electrically connected to each other H05K 2201/1053)

Mechanically attached to another device (attached components H05K 2201/10537)

Involving several components H05K 2201/10507

Stacked components H05K 2201/10515

Adjacent components H05K 2201/10522

Mounted components directly electrically connected to each other, i.e. not via the PCB H05K 2201/1053

Attached components H05K 2201/10537

Related components mounted on both sides of the PCB H05K 2201/10545

Component over metal, i.e. metal plate in between bottom of component and surface of PCB H05K 2201/10553

Metal over component, i.e. metal plate over component mounted on or embedded in PCB H05K 2201/1056

Integral adaptations of a component or an auxiliary PCB for mounting, e.g. integral spacer element H05K 2201/10568

Insulating foil under component (permanent spacer or stand-off H05K 2201/2036) H05K 2201/10575

Cylindrically shaped component; Fixing means therefore H05K 2201/10583

Connections made by press-fit insertion H05K 2201/1059

Means for fastening a component, a casing or a heat sink whereby a pressure is exerted on the component towards the PCB H05K 2201/10598

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) H05K 2201/10606

Details of electrical connections of non-printed components, e.g. special leads H05K 2201/10613

Components characterised by their electrical contacts H05K 2201/10621

Leaded surface mounted device (soldering surface mounted leaded components H05K 3/3421) H05K 2201/10628

Leadless chip, e.g. chip capacitor or resistor H05K 2201/10636

Disc shaped leadless component H05K 2201/10645

Component having two leads, e.g. resistor, capacitor H05K 2201/10651

Different types of terminals for the same component, e.g. solder balls combined with leads H05K 2201/10659

Plated through-hole for surface mounting on PCB H05K 2201/10666

Flip chip H05K 2201/10674

Tape Carrier Package (TCP); Flexible sheet connector H05K 2201/10681

Leaded Integrated Circuit (IC) package, e.g. dual-in-line (DIL) H05K 2201/10689

Single-in-line (SIL) package H05K 2201/10696

Pin grid array (PGA) H05K 2201/10704

Via grid array, e.g. via grid array capacitor H05K 2201/10712

Land grid array (LGA) H05K 2201/10719

Leadless chip carrier (LCC), e.g. chip-modules for cards H05K 2201/10727

Ball grid array [BGA]; Bump grid array H05K 2201/10734

Details of leads H05K 2201/10742

Shape details H05K 2201/1075

Bent leads H05K 2201/10757

Leads folded back, i.e. bent with an angle of 180 deg H05K 2201/10765

Leads of a surface mounted component bent for providing a gap between the lead and the pad during soldering H05K 2201/10772

Leads having locally deformed portion, e.g. for retention H05K 2201/1078

Leads having protrusions, e.g. for retention or insert stop H05K 2201/10787

Details of lead tips, e.g. pointed H05K 2201/10795

Tapered leads, i.e. leads having changing width or diameter H05K 2201/10803

Special cross-section of a lead; Different cross-sections of different leads; Matching cross-section, e.g. matched to a land H05K 2201/1081

Flat leads H05K 2201/10818

Distorted or twisted flat leads, i.e. deformed by torque H05K 2201/10825

having a curved or folded cross-section H05K 2201/10833

Notched leads H05K 2201/1084

Thinned leads H05K 2201/10848

Divided leads, e.g. by slot in length direction of lead, or by branching of the lead H05K 2201/10856

Adaptations of leads or holes for facilitating insertion H05K 2201/10863

Leads having an integral insert stop H05K 2201/10871

Means for retention of a lead in a hole H05K 2201/10878

Other details H05K 2201/10886

Grouped leads, i.e. element comprising multiple leads distributed around but not through a common insulator H05K 2201/10893

Lead partly inserted in hole or via H05K 2201/10901

Materials of terminal, e.g. of leads or electrodes of components H05K 2201/10909

Terminals having auxiliary metallic piece, e.g. for soldering H05K 2201/10916

Leads formed from a punched metal foil (affixing a prefabricated self-supporting metal foil pattern H05K 3/202) H05K 2201/10924
Exposed leads, i.e. encapsulation of component partly removed for exposing a part of lead, e.g. for soldering purposes

Lead of component used as a connector

Leads attached onto leadless component after manufacturing the component

Other details of electrical connections

Component not directly connected to the PCB

Metallic case or integral heatsink of component electrically connected to a pad on PCB

Encapsulated connections (applying non-metallic protective coatings for encapsulating mounted components) H05K 3/284

Component carrying a connection agent, e.g. solder, adhesive (soldering leadless components having an array of bottom contacts H05K 3/343; BGA components H05K 2201/0734)

Using different connection materials, e.g. different solders, for the same connection

Details of printed circuits not provided for in H05K 2201/01 - H05K 2201/10

Reinforced areas, e.g. for a specific part of a flexible printed circuit

Presence of a frame in a printed circuit or printed circuit assembly

Guiding means, e.g. for guiding flexible circuits

Permanent spacer or stand-off in a printed circuit or printed circuit assembly (pattern for applying drops or paste H05K 2203/0545)

Protection against vibrations

Light-reflecting surface, e.g. conductors, substrates, coatings, dielectrics

Mixed adhesion layer containing metallic/inorganic and polymeric materials

Anchoring, i.e. one structure gripping into another (providing micro- or nanometer scale roughness on a metal surface H05K 2203/0307)

Compound repelling a metal, e.g. solder

Auto-mechanical connection between a component and a PCB or between two PCBs

Indexing scheme relating to apparatus or processes for manufacturing printed circuits covered by H05K 3/00

Tools for processing; Objects used during processing

for patterning or coating

Male die used for patterning, punching or transferring

Female die used for patterning or transplanting, e.g. temporary substrate having recessed pattern

Pattern shaped electrode used for patterning, e.g. plating or etching

Patterning, e.g. plating or etching by moving electrode

Dispenser, e.g. for solder paste, for supplying conductive paste for screen printing or for filling holes

Inkjet printing, e.g. for printing insulating material or resist (using ink-jet printing to form a conductive pattern H05K 3/125)

Drum, e.g. rotary drum or dispenser with a plurality of openings

 Blade or squeegee, e.g. for screen printing or filling of holes

Using a roller; Specific shape thereof; Providing locally adhesive portions thereon

Temporary metallic carrier, e.g. for transferring material (affixing a prefabricated conductor pattern formed by electroplating or electroforming on a metallic carrier H05K 3/205)

Temporary polymeric carrier or foil, e.g. for processing or transferring

Temporary inorganic, non-metallic carrier, e.g. for processing or transferring

Holder for holding a Printed Circuit Board [PCB] during processing, e.g. during screen printing

Using a temporary frame during processing

Template for holding a PCB having mounted components thereon

Projectile, e.g. for perforating substrate

Using a temporary spacer element or stand-off during processing

Mask formed or laid on PCB, the mask having recesses or openings specially designed for mounting components or body parts thereof

Using tape or non-metallic foil in a process, e.g. during filling of a hole with conductive paste

Tool for a process not provided for in, e.g. tool for handling objects using suction, for deforming objects, for applying local pressure

Details related to mechanical or acoustic processing, e.g. drilling, punching, cutting, using ultrasound

Partly drilling through substrate until a controlled depth, e.g. with end-point detection

Back-up or entry material, e.g. for mechanical drilling

Perforating

Cutting, sawing, milling or shearing

Laminating followed by cutting or slicing perpendicular to plane of the laminate; Embedding wires in an object and cutting or slicing the object perpendicular to direction of the wires

Cutting around hole, e.g. for disconnecting land or Plated Through-Hole [PTH] or for partly removing a PTH

Abrading, e.g. grinding or sand blasting (deburring, rounding, bevelling or smoothing conductor edges H05K 2203/0346)

Brushing, e.g. cleaning the conductive pattern by 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 ultrasound, 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 3/20)

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 2203/369)

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 H05K 2203/369

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. reflooding solder layer

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 PTH during processing (solder filled plated through-hole in the final product H05K 2201/09572)

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

Wire bonding

Cold welding

Patterning and lithography; Masks; Details of resist H05K 2203/0503

Patterning and lithography H05K 2203/0505

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)

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
Lamination

Methods for applying liquids, e.g. spraying

Plating

- Using electric, magnetic and electromagnetic fields; Using laser light
- Using microwave, 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 3/0026)
- Using a plurality of lasers or laser light with a plurality of wavelengths
- Heating or thermal processing not related to soldering, firing, curing or laminating, e.g. for shaping the substrate or during finish plating

features related to the fluid pressure plating on the walls

Electroforming, i.e. electroplating on a metallic carrier thereby forming a self-supporting structure

Displacement plating, substitution plating or immersion plating, e.g. for finishing 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

- Second resist used as mask for selective stripping of 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 2203/0818)

- 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 finishing plating

- Metal forming or shaping the substrate or during finish plating

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

- 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 solder 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 3/0026)

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

- Treatments characterised by their effect, e.g.

- Heating, cooling, roughening
Techniques; Protective layers

Using specific substances

Deposition techniques, e.g. coating

Spraying small metal particles or droplets of molten metal

Electrophoretic deposition of insulating material

Coating by immersion in coating bath

Spraying coating (apparatus for coating printed circuit boards using liquid non-metallic coating compositions)

Coating by using a liquid wave

Protective layers

Temporary protective insulating layer

Temporary protective conductive layer

Covering open PTHs, e.g. by dry film resist or by metal disc

Related to the order of processing steps

Applying catalyst before applying plating resist

Applying catalyst after applying plating resist

Applying catalyst before etching, e.g. plating catalyst in holes before etching circuit

Treating holes before another process, e.g. coating holes before coating the substrate

Treating holes after another process, e.g. coating holes after coating the substrate (metal used as mask for etching vias)

Treating after insertion of lead into hole, e.g. bending, cutting, caulking or curing of adhesive but excluding soldering

Applying the circuit pattern before another process, e.g. before filling of vias with conductive paste, before making printed resistors

Applying or finishing the circuit pattern after another process, e.g. after filling of vias with conductive paste, after making printed resistors

Circuit made after mounting or encapsulation of the components

Same or similar kind of process performed in phases, e.g. coarse patterning followed by fine patterning

Simultaneous treatments, e.g. soldering lead-in-hole components simultaneously with surface mounted components

Periodical treatments, e.g. pulse plating of through-holes

Position of the PCB during processing

Horizontally held PCB

Vertically held PCB

Obliquely held PCB

Temporarily stacked PCBs

Continuous processing, i.e. involving rolls moving a band-like or solid carrier along a continuous production path

Rotating or turning the PCB in a continuous manner

Reversing the PCB

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

Treating the backside of the PCB, e.g. for heating during soldering or providing a liquid coating on the backside

Using gravitational force; Processing against the gravity direction; Using centrifugal force

Inspection; Monitoring; Aligning
Using chemical substances, e.g. colored or fluorescent, for facilitating optical or visual inspection

Testing a finished product, e.g. heat cycle testing of solder joints (patterns for electrical inspection or testing H05K 1/0268)

Monitoring a manufacturing process

Stabilizing, e.g. temperature stabilization

Alignment or registration; Control of registration

Using mechanical means for positioning, alignment or registration, e.g. using rod-in-hole alignment

Wrong mounting prevention

Post-manufacturing processes

Adding connections between adjacent pads or conductors, e.g. for modifying or repairing (programmable, customizable or modifiable circuits H05K 1/0286)

Configurations of connections suitable for easy deletion, e.g. modifiable circuits or temporary conductors for electroplating; Processes for deleting connections

Removing, replacing or disconnecting component; Easily removable component (thermal arrangements, e.g. to prevent overheating H05K 1/0201)

Demolishing, e.g. recycling, reverse engineering, destroying for security purposes; Using biodegradable materials

Details of processes not otherwise provided for in H05K 2203/01 - H05K 2203/17

Bending a rigid substrate; Breaking rigid substrates by bending (rigid circuit boards or rigid supports locally made bendable H05K 1/0278)

Protecting a component during manufacturing

Lifting the component during or after mounting; Increasing the gap between component and PCB

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