

H05K

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

Definition statement

This place covers:

Constructional features of

- Details of electronic circuit boards such as their materials or their interconnections
- Printed circuit boards
- Casings, cabinets or drawers for electric apparatus
- Constructional details common to different types of electric apparatus such as modifications to facilitate cooling, ventilating or heating, e.g. cooling arrangement for casings / cabinets
- Constructional details of screening for electric apparatus or components against electric or magnetic fields, e.g. EMI shielding arrangements for casings / cabinets
- Manufacture of assemblages of electrical components
- Machines for mounting electronic components on circuit boards

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Details of instruments or comparable details of other apparatus not otherwise provided for	G12B
Thin-film or thick-film circuits	H01L 27/01 , H01L 27/13
Non-printed means for electric connections to or between printed circuits, electric connections or line connectors, apparatus or processes for manufacturing, assembling, maintaining or repairing such connections or connectors	H01R

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Printed circuits	The term covers all kinds of mechanical arrangements of circuits that consist of an insulating base or substrate, having at least one conductive layer permanently formed on the base. The base often extends in a two-dimensional plane. Other conductive layers may be formed in a layer structure within the base. The base may support components on its surface or between its layers. Each conductive layer is formed as separate patterns or tracks to connect the components as required. The term is also applied adjectivally to processes or apparatus for manufacturing such circuits, e.g. by mechanical or chemical treatment of conductive foil, paste, or film that has been applied to an insulating base, support, or substrate.
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H05K 1/00

Printed circuits

Definition statement

This place covers:

- Details of printed circuit boards [PCBs], e.g. structural aspects or use of materials for PCBs
- Printed elements for electrical connection to or between printed circuits
- Printed electric components in PCBs, e.g. resistors, capacitors or inductors formed by printing materials onto the board, or within its layer structure
- Structural association of two or more PCBs
- Structural association of PCBs and non-printed electric components, e.g. within internal layers

Relationships with other classification places

There is no clear boundary between the field of printed circuit boards and other more specific fields, e.g. inductors ([H01F](#)), antennas ([H01Q](#)), waveguides ([H01P](#)), chip cards ([G06K 19/07](#)), thin film and thick film circuits ([H01L 27/00](#)), other packaging levels (semiconductor packages [H01L 21/48](#), [H01L 23/00](#), [H01L 25/00](#)), connectors ([H01R](#)) and various electronic components. The materials and methods (deposition, patterning, connection, etc.) used for manufacture of printed circuit boards have their general fields.

Documents often contain information relevant to several technical fields and have to be circulated for classification in these fields, in particular to [H01L](#) (semiconductors) but also the other parts of [H05K](#), [H01R](#) (connectors).

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Record carriers with integrated circuit chips, e.g. chip cards	G06K 19/07
Thin film inductors	H01F
Semiconductor assemblies	H01L 25/00
Passive thin-film or thick-film elements formed on a common insulating substrate	H01L 27/01
Waveguides	H01P
Antennas	H01Q
Connectors	H01R

Informative references

Attention is drawn to the following places, which may be of interest for search:

Backplanes	H05K 7/14
Screening against electric or magnetic fields	H05K 9/00
Electrostatic discharge protection for electric apparatus in general	H05K 9/0067 , H05K 9/0079
Handling / Transporting	H05K 13/0061 , B65G , H01L 21/68
Cleaning	B08B

Informative references

Casting of metals	B22D
Metal powder processing	B22F
Mechanical drilling	B23B
Mechanical milling, e.g. metal milling	B23C
Slotting, etc.	B23D
Erosion by electric discharge	B23H
Soldering or welding	B23K
Laser ablation, e.g. patterning by laser ablation	B23K 26/00
Details of machining apparatus	B23Q
Grinding, polishing	B24B
Abrasive working	B24C
Cutting, Punching	B26D , B26F
Laminating	B32B 37/00
Printing forms, e.g. masks	B41C , B41N
Printing apparatus	B41F
Inkjet printing	B41J 2/00
Printing processes	B41M
Selective transfer processes	B41M 5/00
Handling flexible substrates	B65G
Etching polymeric substrates	C08J 7/00
Coating by dipping in molten metal	C23C 2/00
Coating by spraying with molten metal	C23C 4/00
Coating by physical vapour deposition or sputtering or ion implantation	C23C 14/00
Coating by chemical deposition	C23C 16/00
Coating by decomposition of compounds	C23C 18/00 , C23C 20/00
Coating by electroless plating	C23C 18/16
Conversion coating of metals	C23C 22/00
Coating by powder methods	C23C 24/00
Other coating methods	C23C 26/00
Coating metal with enamel (glass)	C23D
Corrosion protection of metal	C23F
Cleaning or degreasing of metal	C23G
Electroplating of metal	C25D
Electroforming of metal	C25D 1/00
Anodizing of metal	C25D 11/00
Electrophoretic coating of metal	C25D 13/00
Electrolytic etching of metal	C25F
Lighting devices	F21K , F21S , F21V , H05B
Drying	F26B
Testing, inspection of material	G01N

Informative references

Electrical testing	G01R 31/00
Electro-optical devices comprising optical waveguides, e.g. modules / PCBs having optical waveguides	G02B 6/00
Coupling light guides with opto-electronic components	G02B 6/42
Liquid crystal displays [LCD]	G02F 1/13
Photolithography masks	G03F 1/00
Lithography, e.g. photoresists	G03F 7/00
Photolithography registration	G03F 9/00
Electrography	G03G
Computers	G06F
Touch screens	G06F 3/00
Security details of computer components	G06F 21/70
Designing of the conductive pattern	G06F 30/00
Circuits for displays	G09F 9/00
Disk drive suspensions	G11B 5/00
Memory modules	G11C 5/00
Cables	H01B
Flat cables	H01B 7/00 , H01B 13/00
Resistors, e.g. printed resistors	H01C
Printed inductors	H01F
Inductors	H01F
Printed capacitors	H01G
Capacitors, e.g. printed capacitors	H01G
Switches, fuses	H01H
Plasma displays	H01J 17/49
Semiconductor devices	H01L
Semiconductor packages	H01L 21/48 , H01L 23/00
Treatment apparatus for semiconductor components	H01L 21/68
Impedance arrangements, e.g. impedance matching, reduction of parasitic impedance for semiconductor devices	H01L 23/66
Devices consisting of a plurality of solid state components formed in or on a common substrate, e.g. integrated circuits, thin-film or thick-film circuits	H01L 27/00
Solar cells, Photovoltaic devices	H01L 31/00
LEDs	H01L 33/00
Thermoelectric devices	H01L 35/00
Piezoelectric devices	H01L 41/00
Polymeric semiconductor devices	H01L 51/00
Batteries, Cells	H01M
Laser devices	H01S
Spark gaps, Overvoltage arresters	H01T

Emergency protective circuits	H02H
Power conversion	H02M
Receivers / Transceivers (modules)	H04B 1/00
Telephones	H04M
Optical modules	H04N , H01L 27/00 , G03B
Electromechanical transducers	H04R

Special rules of classification

In this main group, both "invention information" and "additional information" are classified by the appropriate CPC group symbol.

Indexing Codes are also attributed to provide additional information when no CPC sub-group exists, i.e. to subdivide subject matter belonging to a sub-group.

H05K 1/0203

{Cooling of mounted components ([H05K 1/0272](#) takes precedence)}

References

Limiting references

This place does not cover:

Adaptations for fluid transport, e.g. channels, holes	H05K 1/0272
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H05K 1/0204

{using means for thermal conduction connection in the thickness direction of the substrate ([H05K 1/0207](#) takes precedence)}

References

Limiting references

This place does not cover:

Using internal conductor planes parallel to the surface for thermal conduction, e.g. power planes	H05K 1/0207
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H05K 1/0213

{Electrical arrangements not otherwise provided for}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Screening	H05K 9/00
Emergency protective circuits	H02H

H05K 1/0216

{Reduction of cross-talk, noise or electromagnetic interference (grounding [H05K 1/0215](#))}

References

Limiting references

This place does not cover:

Grounding	H05K 1/0215
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H05K 1/0218

{by printed shielding conductors, ground planes or power plane ([H05K 1/0236](#) takes precedence)}

References

Limiting references

This place does not cover:

Electromagnetic band-gap structures	H05K 1/0236
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H05K 1/0221

{Coaxially shielded signal lines comprising a continuous shielding layer partially or wholly surrounding the signal lines}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Coaxially shielded vias	H05K 1/0222
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H05K 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](#))}

References

Limiting references

This place does not cover:

Balanced signal pairs	H05K 1/0245
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H05K 1/023

{using auxiliary mounted passive components or auxiliary substances (printed passive components [H05K 1/16](#))}

References

Limiting references

This place does not cover:

Incorporating printed electric components, e.g. printed resistor, capacitor, inductor	H05K 1/16
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H05K 1/0236

{Electromagnetic band-gap structures}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Conductive planes with an opening or a split	H05K 1/0225 , H05K 1/0227
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H05K 1/025

{Impedance arrangements, e.g. impedance matching, reduction of parasitic impedance ([H05K 1/024](#) and [H05K 1/0243](#) take precedence; for semiconductor devices [H01L 23/66](#))}

References

Limiting references

This place does not cover:

Dielectric details, e.g. changing the dielectric material around a transmission line	H05K 1/024
Printed circuits associated with mounted high frequency components	H05K 1/0243
Impedance arrangements of semiconductor or other solid state devices	H01L 23/64
High frequency adaptations of semiconductor or other solid state devices	H01L 23/66

Special rules of classification

Indexing Codes are used to additionally specify how impedance is adjusted, e.g. for change in trace width of differential pair [H05K 1/0245](#).

H05K 1/0253

{Impedance adaptations of transmission lines by special lay-out of power planes, e.g. providing openings ([H05K 1/0251](#) takes precedence)}

References

Limiting references

This place does not cover:

Impedance arrangements related to vias or transitions between vias and transmission lines	H05K 1/0251
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Special rules of classification

The lay-out of the power plane is additionally classified with Indexing Codes, e.g. when slotted [H05K 1/0236](#). Except for [H05K 1/0224](#) because that is the default layout in [H05K 1/0253](#).

H05K 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}

References

Limiting references

This place does not cover:

Devices for protecting against damage from electrostatic discharge	H05K 9/0067
Electrostatic discharge protection, e.g. ESD treated surface for rapid dissipation of charges	H05K 9/0079

H05K 1/026

{Spark gaps}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Spark gaps per se	H01T
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H05K 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)}

References

Limiting references

This place does not cover:

Individual printed conductors which are adapted for modification, e.g. fusible or breakable conductors, printed switches	H05K 1/0293
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H05K 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](#))}

References

Limiting references

This place does not cover:

Marks, test patterns, inspection means or identification means for visual or optical inspection	H05K 1/0269
Coupling light guides with opto-electronic components	G02B 6/42

H05K 1/0275

{Security details, e.g. tampering prevention or detection}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Security details of computer components	G06F 21/70
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H05K 1/0277

{Bendability or stretchability details ([H05K 1/038](#), [H05K 3/4691](#) take precedence)}

References

Limiting references

This place does not cover:

Textiles	H05K 1/038
Rigid-flexible multilayer circuits comprising rigid and flexible layers, e.g. having in the bending regions only flexible layers	H05K 3/4691

H05K 1/0284

{Details of three-dimensional rigid printed circuit boards ([H05K 1/119](#) takes precedence; shaping of the substrate [H05K 3/0014](#))}

References**Limiting references**

This place does not cover:

Details of rigid insulating substrates therefor, e.g. three-dimensional details	H05K 1/119
Shaping of the substrate	H05K 3/0014

H05K 1/0286

{Programmable, customizable or modifiable circuits (by programmable non-printed jumper connections [H05K 3/222](#))}

References**Limiting references**

This place does not cover:

Completing of printed circuits by adding non-printed jumper connections	H05K 3/222
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H05K 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](#))}

References**Limiting references**

This place does not cover:

Printed elements for providing electric connections to or between printed circuits	H05K 1/11
Lay-out adapted to mounted component configuration	H05K 1/18

References out of a residual place

Examples of places in relation to which this place is residual:

Details	H05K 1/02 - H05K 1/0295
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H05K 1/03**Use of materials for the substrate****References****Informative references**

Attention is drawn to the following places, which may be of interest for search:

Substrates for semiconductor chips	H01L 23/00
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H05K 1/05**Insulated {conductive substrates, e.g. insulated} metal substrate****Definition statement**

This place covers:

Insulated electrically conductive substrates, e.g. insulated metal substrates, specially adapted for PCBs.

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Thermal coupling of mounted components and metal substrate	H05K 1/0204 , H05K 1/021
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H05K 1/09**Use of materials for the {conductive, e.g. } metallic pattern****References****Informative references**

Attention is drawn to the following places, which may be of interest for search:

Materials for conductors	H01B 1/00
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H05K 1/092**{Dispersed materials, e.g. conductive pastes or inks}****References****Informative references**

Attention is drawn to the following places, which may be of interest for search:

Conductive inks in general	C09D 11/52
Conductive material dispersed in non-conductive material in general	H01B 1/14 – H01B 1/24

H05K 1/14

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

References

Limiting references

This place does not cover:

Providing electric connections to or between printed circuits	H05K 1/11 , H01R 12/00
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Connectors for printed circuits	H01R 9/00
Two-part coupling devices for connection to or between printed circuits	H01R 24/68

H05K 1/16

incorporating printed electric components, e.g. printed resistor, capacitor, inductor

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Thick-film or thin-film circuits	H01L 27/01 , H01L 27/13
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H05K 1/18

Printed circuits structurally associated with non-printed electric components ([H05K 1/0201](#), [H05K 1/023](#), [H05K 1/0243](#), and [H05K 1/16](#) take precedence)

References

Limiting references

This place does not cover:

Thermal arrangements, e.g. for cooling, heating or preventing overheating	H05K 1/0201
Reduction of cross-talk, and noise or electromagnetic interference using auxiliary mounted passive components or auxiliary substances	H05K 1/023
Printed circuits associated with mounted high frequency components	H05K 1/0243
Incorporating printed electric components, e.g. printed resistor, capacitor, inductor	H05K 1/16

H05K 3/00

Apparatus or processes for manufacturing printed circuits

Definition statement

This place covers:

General processing of printed circuit boards [PCBs]:

- Processing of insulating substrates or layers for PCBs or processing of conductive layers for PCBs.
- Forming printed elements for providing electric connection to or between printed circuits.
- Manufacturing multilayer printed circuits.
- Manufacturing metal core printed circuits.
- Secondary treatment of PCBs.
- Mounting or printing electric components on PCBs.
- Assembling PCBs with other PCBs.

[H05K 3/00](#) covers mainly manufacturing (apparatuses and process) of printed circuits. However certain sub-groups of [H05K 3/00](#) cover also the respective structural aspects (e.g. [H05K 3/303](#), [H05K 3/306](#)) and materials (e.g. [H05K 3/386](#)).

Relationships with other classification places

There is no clear boundary between the field of printed circuit boards and other more specific fields, e.g. inductors ([H01F](#)), antennas ([H01Q](#)), waveguides ([H01P](#)), chip cards ([G06K 19/07](#)), thin film and thick film circuits ([H01L 27/00](#)), other packaging levels (semiconductor packages [H01L 21/48](#), [H01L 23/00](#), [H01L 25/00](#)), connectors ([H01R](#)) and various electronic components. The materials and methods e.g. deposition, patterning or connection, used for manufacture of printed circuit boards have their general fields.

Documents often contain information relevant to several technical fields and have to be circulated for classification in these fields, in particular to [H01L](#) (semiconductors) but also the other parts of [H05K](#), or [H01R](#) (connectors).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Apparatus specially adapted for manufacturing assemblages of electric components, e.g. for mounting electronic components on circuit boards	H05K 13/00 , H05K 13/04
Working of metal by electro-erosion per se	B23H
Soldering, e.g. brazing, or unsoldering in general	B23K 1/00
Tools, devices, or special appurtenances for soldering, e.g. brazing, or unsoldering, not specially adapted for particular methods	B23K 3/00
Machining by laser in general	B23K 26/00
Selection of soldering or welding materials proper, i.e. solder compositions per se	B23K 35/24
Laminates in general	B32B
Printing apparatus in general	B41F
Printing techniques in general	B41M
Screens or stencils, manufacturing thereof in general	B41N 1/24 , B41C 1/14
Covering metals by metal spraying	C23C 4/00

Informative references

Coating by vacuum evaporation	C23C 14/00
Covering materials by cathodic sputtering	C23C 14/34
Chemical coating of a substrate by decomposition in general	C23C 18/00
Electroless plating in general	C23C 18/16
Non-mechanical removal of metallic material from surfaces	C23F
Local etching in general	C23F 1/02
Apparatus for etching in general	C23F 1/08
Etchants in general	C23F 1/10 - C23F 1/46
Electroplating in general	C25D
Photomechanical production of textured or patterned surfaces, materials or originals therefor, apparatus specially adapted therefor, in general	G03F
Etching masks applied by electrographic, electrophotographic or magnetographic methods in general	G03G
Electron-beam or ion-beam tubes for localised treatment	H01J 37/30
Discharge devices for covering materials by cathodic sputtering	H01J 37/34
Processes or apparatus adapted for the manufacture or treatment of semiconductor or solid state devices or of parts thereof	H01L 21/00
Electrically-conductive connections between two or more conductive members in direct contact using electrically conductive adhesives, in general	H01R 4/04
Connectors for printed circuits	H01R 12/00

Special rules of classification

In this main group, both "invention information" and "additional information" are classified by the appropriate CPC group symbol.

Indexing Codes are also attributed to provide additional information when no CPC sub-group exists, i.e. to subdivide subject matter belonging to a sub-group.

H05K 3/0008

{for aligning or positioning of tools relative to the circuit board ([H05K 3/4638](#), [H05K 3/4679](#) take precedence; for manufacturing assemblages of components [H05K 13/0015](#))}

References**Limiting references**

This place does not cover:

Aligning and fixing the circuit boards before lamination; Detecting or measuring the misalignment after lamination; Aligning external circuit patterns or via connections relative to internal circuits	H05K 3/4638
Aligning added circuit layers or via connections relative to previous circuit layers	H05K 3/4679
Apparatus or processes specially adapted for manufacturing or adjusting assemblages of electric components	H05K 13/0015

H05K 3/0011

{Working of insulating substrates or insulating layers}

Definition statement

This place covers:

- Shaping of the substrate, e.g. by moulding
- Etching of the substrate by chemical or physical means
- Mechanical working of the substrate, e.g. drilling or punching
- After-treatment, e.g. cleaning or desmearing of holes

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Making copper-clad substrates	H05K 3/022
Surface treatment for improvement of adhesion	H05K 3/38

H05K 3/0058

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

References

Limiting references

This place does not cover:

Reinforcement details	H05K 1/0281
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H05K 3/007

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

References

Limiting references

This place does not cover:

Patterned circuits being prefabricated circuits, which are not yet attached to a permanent insulating substrate, e.g. on a temporary carrier	H05K 1/187
Applying conductive material to the insulating support by affixing prefabricated conductor pattern	H05K 3/20
Manufacture of core-less build-up multilayer circuits on a temporary carrier or on a metal foil	H05K 3/4682

H05K 3/0073

{Masks not provided for in groups [H05K 3/02](#) - [H05K 3/46](#), e.g. for photomechanical production of patterned surfaces}

References

References out of a residual place

Examples of places in relation to which this place is residual:

Apparatus or processes for manufacturing printed circuits	H05K 3/02 - H05K 3/46
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H05K 3/0085

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

References

Limiting references

This place does not cover:

Apparatus or processes specially adapted for manufacturing or adjusting assemblages of electric components	H05K 13/00
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References out of a residual place

Examples of places in relation to which this place is residual:

Apparatus or processes for manufacturing printed circuits	H05K 3/02 - H05K 3/46
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H05K 3/0097

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

References

Limiting references

This place does not cover:

De-panelling, i.e. dividing a panel into circuit boards; Working of the edges of circuit boards	H05K 3/0052
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H05K 3/022

{Processes for manufacturing precursors of printed circuits, i.e. copper-clad substrates}

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Laminates in general	B32B
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H05K 3/027

{the conductive material being removed by irradiation, e.g. by photons, alpha or beta particles}

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Machining by laser in general	B23K 26/00
Electron or ion beam tubes therefor	H01J 37/00

H05K 3/06

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

References**Limiting references**

This place does not cover:

Semi-additive methods	H05K 3/108
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Non-mechanical removal of metallic material from surfaces	C23F
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H05K 3/061

{Etching masks}

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Local etching	C23F 1/02
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H05K 3/065**{applied by electrographic, electrophotographic or magnetographic methods}****References*****Informative references****Attention is drawn to the following places, which may be of interest for search:*

Electrography, electrophotography, magnetography in general	G03G
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H05K 3/067**{Etchants}****References*****Informative references****Attention is drawn to the following places, which may be of interest for search:*

Etching compositions in general	C23F 1/10 – C23F 1/46
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H05K 3/068**{Apparatus for etching printed circuits}****References*****Informative references****Attention is drawn to the following places, which may be of interest for search:*

Apparatus for etching in general	C23F 1/08
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H05K 3/08**the conductive material being removed by electric discharge, e.g. by spark erosion****References*****Informative references****Attention is drawn to the following places, which may be of interest for search:*

Working of metal by electro-erosion per se	B23H
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H05K 3/106**{by photographic methods}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Photographic processes in general	G03C
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H05K 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}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Printing apparatus	B41F
Printing techniques in general	B41M

H05K 3/1225**{Screens or stencils; Holders therefor}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Stencil holders for applying liquids	B05C 17/08
Manufacturing of screens or stencils	B41C 1/14
Screens or stencils in general	B41N 1/24

H05K 3/125**{by ink-jet printing}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Ink-jet printers in general	B41J
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H05K 3/1266**{by electrographic or magnetographic printing}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Electrography, magnetography in general	G03G
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H05K 3/14**using spraying techniques to apply the conductive material {, e.g. vapour evaporation}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Covering metals by metal spraying	C23C 4/00
Coating by vacuum evaporation	C23C 14/00

H05K 3/16**by cathodic sputtering****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Covering materials by cathodic sputtering	C23C 14/34
Discharge devices therefor	H01J 37/34

H05K 3/18**using precipitation techniques to apply the conductive material****Definition statement***This place covers:*

Apparatus or process for manufacturing printed circuits, in which conductive material is applied to the insulating support in such a manner as to form the desired conductive pattern using precipitation techniques to apply the conductive material, e.g. electroless plating or electroplating.

References**Informative references***Attention is drawn to the following places, which may be of interest for search:*

Chemical coating of a substrate by decomposition	C23C 18/00
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H05K 3/181

{by electroless plating (adhesives therefor [H05K 3/387](#))}

References

Limiting references

This place does not cover:

Adhesives therefor	H05K 3/387
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Electroless plating in general	C23C 18/16
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H05K 3/20

by affixing prefabricated conductor pattern {([H05K 1/187](#), [H05K 3/046](#), [H05K 3/4658](#), [H05K 3/4682](#) takes precedence)}

References

Limiting references

This place does not cover:

Patterned circuits being prefabricated circuits, which are not yet attached to a permanent insulating substrate, e.g. on a temporary carrier	H05K 1/187
Selective transfer or selective detachment of a conductive layer	H05K 3/046
Adding a circuit layer by laminating a metal foil or a preformed metal foil pattern	H05K 3/4658
Manufacture of core-less build-up multilayer circuits on a temporary carrier or on a metal foil	H05K 3/4682

H05K 3/22

Secondary treatment of printed circuits {([H05K 3/1283](#) takes precedence; embedding circuits in grooves by pressure [H05K 3/107](#))}

Definition statement

This place covers:

- Completing of printed circuits by adding non-printed jumper connections
- Correcting or repairing of printed circuits
- Drying of printed circuits
- Reinforcing the conductive pattern
- Cleaning or polishing of the conductive pattern
- Applying non-metallic protective coatings

References

Limiting references

This place does not cover:

Embedding circuits in grooves by pressure	H05K 3/107
After-treatment of the printed patterns, e.g. sintering or curing methods	H05K 3/1283

H05K 3/225

{Correcting or repairing of printed circuits ([H05K 1/0292](#), [H05K 3/222](#), [H05K 3/288](#), [H05K 3/4685](#) take precedence)}

References

Limiting references

This place does not cover:

Programmable, customizable or modifiable circuits	H05K 1/0286
Completing of printed circuits by adding non-printed jumper connections	H05K 3/222
Removal of non-metallic coatings, e.g. for repairing	H05K 3/288

H05K 3/24

Reinforcing the conductive pattern {(by solder coating [H05K 3/3457](#))}

References

Limiting references

This place does not cover:

By solder coating	H05K 3/3457
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H05K 3/241

{characterised by the electroplating method; means therefor, e.g. baths or apparatus}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electroplating in general	C25D
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H05K 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](#))}

References**Limiting references**

This place does not cover:

Apparatus for coating printed circuits using liquid non-metallic coating compositions	H05K 3/0091
Methods for intermediate insulating layers for build-up multilayer circuits	H05K 3/4673

H05K 3/284

{for encapsulating mounted components ([H05K 1/185](#) takes precedence)}

References**Limiting references**

This place does not cover:

Components encapsulated in the insulating substrate of the printed circuit or incorporated in internal layers of a multilayer circuit	H05K 1/185
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H05K 3/321

{by conductive adhesives}

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Using electrically conductive adhesives in general	H01R 4/04
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H05K 3/34

by soldering

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Soldering or de-soldering apparatus	H05K 13/04 , B23K 1/00 , B23K 3/00
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H05K 3/3457

{Solder materials or compositions; Methods of application thereof}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Solder compositions per se	B23K 35/24
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H05K 3/36

Assembling printed circuits with other printed circuits {([H05K 7/142](#) takes precedence)}

References

Limiting references

This place does not cover:

Spacers not being card guides	H05K 7/142
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Special rules of classification

[H05K 3/36](#) relates to the method of assembling at least two printed circuits to form a single entity as a final product, whereas [H05K 3/0097](#) relates to processing two printed circuits at the same time. This implicitly means that after processing, the printed circuits are again separated from one another.

H05K 3/38

Improvement of the adhesion between the insulating substrate and the metal

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Laminates per se	B32B
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H05K 3/44

Manufacturing insulated metal core circuits {or other insulated electrically conductive core circuits ([H05K 3/0058](#), [H05K 3/4608](#), and [H05K 3/4641](#) take precedence)}

References

Limiting references

This place does not cover:

Laminating printed circuit boards onto other substrates, e.g. metallic substrates	H05K 3/0058
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Special circuit board as base or central core comprising an electrically conductive core	H05K 3/4608
Laminating two or more circuit boards having integrally laminated metal sheets or special power cores	H05K 3/4641

H05K 3/46

Manufacturing multilayer circuits

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Incorporating non-printed electric components in internal layers	H05K 1/185
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H05K 5/00

Casings, cabinets or drawers for electric apparatus

Definition statement

This place covers:

Constructional features of electronic housings that are not characterised by their inner electronic arrangement, such as:

- means for assembling the housing parts
- means for associating or coupling several housings
- venting means
- sealing means
- interlocking means
- mounting and fixing means
- handling means

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Electronic boxes of vehicles, e.g. electric distribution centers	B60R 16/00
LCD display panels	G02F 1/13
Projectors	G03B 21/00
Desktop and laptop computer housings	G06F 1/16
Casings and housings of instrument	G12B 9/00
Plasma display panels	H01J 29/00
Receptacles for batteries	H01M 50/00
Constructional details, e.g. cabinets, of receivers	H04B 1/08
Mobile phone housings	H04M 1/02
Constructional details of receivers, e.g. cabinets or dust covers	H04N 5/64

Informative references

Attention is drawn to the following places, which may be of interest for search:

Furniture/cabinets	A47B 87/00
Handles and grip in general	B65D
Locks and Latches in general	E05B , E05C
Hinges in general	E05D
Sealing in general	F16J 15/00
Stands and supports for apparatus in general	F16M 11/00
Constructional details of record carriers in general	G06K 7/00
Connectors in general	H01R
Details for decorative purposes in mobiles phones	H04M 1/0283
CRT Television housings	H04N 5/00

H05K 5/06

Hermetically-sealed casings {(specially adapted for small components [H05K 5/0095](#))}

References**Limiting references**

This place does not cover:

Specially adapted for small components	H05K 5/0095
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H05K 7/00

Constructional details common to different types of electric apparatus (casings, cabinets, drawers [H05K 5/00](#))

Definition statement

This place covers:

- Constructional features of electronic housings common to different types of electric apparatus;
- Constructional features of standardized electronic cabinets and racks for receiving Printed Circuit Boards (PCB) such as guides, retainers, drawers, plug-in modules;
- Constructional features of Servers, Data Center Rooms, 19-inch computer racks such as mounting means of blades within cabinets, cable management, power distribution, mobile data centers arranged in shipping containers;
- Constructional features of industrial controllers such as PLCs;
- Cooling features of electronic housings,
- Cooling features of standardized electronic cabinets and racks for receiving Printed Circuit Boards (PCB);
- Cooling features of Servers, Data Center Rooms, 19-inch computer racks;
- Cooling features of power electronics, such as inverters;
- Cooling features of vehicle control units;
- Cooling features of display panels;
- Cooling features of outdoor telecommunication equipments, such as base stations.

References

Limiting references

This place does not cover:

Casings, cabinets, drawers	H05K 5/00
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Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Constructional details of optoelectronic equipment	G02B 6/42
Cooling arrangements of desktop and laptop computers	G06F 1/20
Constructional details of Hard disk drives	G11B 33/00
Arrangements for cooling of semiconductor or other solid state devices	H01L 23/34
Cooling of batteries	H01M 10/60

Informative references

Attention is drawn to the following places, which may be of interest for search:

Blowers and fans in general	F04D 29/00
Cooling tubular elements with fins for cooling	F28F 1/10
Cooling element with means for increasing heat exchange area	F28F 3/02
Program control systems PLC without constructional details	G05B 19/00
Inner arrangements of desktop and laptop computers	G06F 1/18
Bus systems and interfaces of computers	G06F 13/409
Constructional details of record carriers	G06K 7/00
Stacked arrangements of semiconductor devices	H01L 25/065
Telecommunication distribution frames and equipments	H04Q 1/00

H05K 7/10

Plug-in assemblages of components {, e.g. IC sockets}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

IC sockets for connection on printed circuit board	H01R 12/00
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H05K 7/12

Resilient or clamping means for holding component to structure

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Holding two-part couplings together	H01R 13/00
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H05K 7/14

Mounting supporting structure in casing or on frame or rack

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Construction of racks or frames	H05K 7/18
Test adapters	G01R 31/2808

H05K 7/1462

{for programmable logic controllers [PLC] for automation or industrial process control}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Programmable logic controllers per se	G05B 19/05
---------------------------------------	----------------------------

H05K 7/1469

{Terminal blocks for connecting sensors}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Terminal blocks in general	H01R 9/24
----------------------------	---------------------------

H05K 7/20

Modifications to facilitate cooling, ventilating, or heating

Definition statement

This place covers:

Arrangements for cooling, ventilating or heating of electric apparatus by:

- using a gaseous coolant in electronic enclosures
- using a liquid coolant without phase change in electronic enclosures
- using a liquid coolant with phase change in electronic enclosures
- heat transfer by conduction from the heat generating element to a dissipating body

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Cooling, ventilating, or heating of printed circuits	H05K 1/02
Cooling or ventilating of personal computers	G06F 1/20
Cooling, ventilating, or heating of resistors	H01C
Cooling, ventilating, or heating of capacitors	H01G
Cooling or ventilating of individual semiconductor components	H01L 23/34
Cooling or ventilating of solar cells	H01L 31/052
Cooling or ventilating of LEDs	H01L 33/64
Cooling or ventilating of photovoltaic modules	H02S 40/42

H05K 7/20172

{Fan mounting or fan specifications}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Blowers in general	F04D 29/601
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H05K 7/20181

{Filters; Louvers}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Filters in general	B01D 46/00
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H05K 7/20954**{for display panels}****References****Application-oriented references**

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Heating or cooling of liquid crystal cells	G02F 1/133382
Cooling for projectors	G03B 21/16
Cooling means for computer displays	G06F 1/20
Plasma display panels per se	H01J 17/49

H05K 9/00

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

Definition statement

This place covers:

- Screening of electronic equipment against magnetic or electromagnetic fields, or electrostatic discharges;
- Shielding features applied to rooms or buildings for protecting against external electromagnetic interference;
- Shielded electronic casings achieving electromagnetic compatibility;
- Shielding features of electronic equipment having standardized dimensions, such as 19-inch racks;
- Shielding materials therefor.

References**Limiting references**

This place does not cover:

Devices for absorbing radiation from an antenna	H01Q 17/00
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Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Grounding and RFI shielding of Desktop and laptop computers	G06F 1/182
Magnetic shielding of transformers	H01F 27/36
Screening of semiconductor devices	H01L 23/552 , H01L 24/00
Protection against electrostatic charges or discharges of semiconductor devices, e.g. Faraday shields	H01L 23/60
Screening of dynamo-electric machines	H02K 11/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Screening of human body against electromagnetic influences	A61N 1/16
Anechoic chambers	G01R 29/0821
Shielding of Nuclear magnetic Resonance devices	G01R 33/42
Screening against nuclear radiation	G21F
Conductive materials in general	H01B 1/00
Magnetic materials in general	H01F 1/00
RFI Filter construction	H03H 1/0007
Prevention of electrostatic charge in general	H05F 1/00

H05K 9/0001

{Rooms or chambers (anechoic chambers [G01R 29/0821](#))}

References**Limiting references**

This place does not cover:

Anechoic chambers	G01R 29/0821
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Building construction in general	E04B
Nuclear magnetic resonance	G01R 33/42

H05K 9/0005

{Shielded windows}

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Windows for building construction in general	E06B 5/00
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H05K 9/0066

{Constructional details of transient suppressor}

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Protective circuits	H02H
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H05K 9/0067**{Devices for protecting against damage from electrostatic discharge}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Materials for electrostatic discharge protection	H05K 9/0079
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H05K 9/0075**{Magnetic shielding materials}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Magnetic material in general	H01F 1/00
For transformer	H01F 27/28
For electrical motor	H02K 11/00

H05K 9/0077**{comprising superconductors}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Superconductors in general	H01L 39/00
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H05K 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}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Screening during electrotherapy	A61N 1/16
---------------------------------	---------------------------

H05K 10/00

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

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Electric redundant control systems	G05B 9/03
Error detection or correction of data by redundancy in digital computer hardware	G06F 11/16
Security signalling or alarm systems	G08B 29/16
Redundant emergency protective circuit arrangements	H02H 3/05
Arrangements for parallel feeding of a single network	H02J 3/38
Circuit arrangements with stand-by power supply	H02J 9/04
Modifications for increasing the reliability of logic circuits or inverting circuits	H03K 19/003
Fail-safe logic circuits or inverting circuits	H03K 19/007
Redundant clock signal generation in generators of electronic oscillations or pulses	H03L 7/07
Transmission systems using redundant channels or apparatus	H04B 1/74
Redundant apparatus for increasing reliability of arrangements used for the transmission of digital information	H04L 1/22

H05K 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](#))}

References

Limiting references

This place does not cover:

Combinations of a radio or television receiver with clocks	G04B 47/00
Radio or television receiver controlled by a clock	G04C 21/28

H05K 13/00

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

Definition statement

This place covers:

Apparatus and methods for placing components, e.g. onto the printed circuit boards. This group only relates to bare printed circuit boards and not circuit boards already fitted in an apparatus (thus no displays or hard disks, etc.).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Manufacture of printed circuit boards	H05K 1/00
Assembling printed circuits with electric components	H05K 3/30
Apparatus and methods for soldering	B23K
Manipulators	B25J
Packaging, Packing or unpacking	B65B
Manufacture or treatments of solid state devices	H01L 21/00

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

PCB	Printed Circuit Board
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H05K 13/0007

{using handtools (for mounting on a circuit board [H05K 13/0447](#))}

Definition statement

This place covers:

Hand-tools specially adapted for adjusting assemblages of electric components

References

Limiting references

This place does not cover:

Hand-tools for mounting electric components on a circuit board	H05K 13/0447
--	------------------------------

H05K 13/0015

{Orientation; Alignment; Positioning}

Definition statement

This place covers:

orientation, alignment and positioning only of the printed circuit boards

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Orientation, alignment and positioning of the printed circuit boards for testing	G01R 31/00
--	----------------------------

H05K 13/003

{Placing of components on belts holding the terminals}

Definition statement

This place covers:

preparing the components before delivering to mounting machines by grouping the components for batch mounting

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Attaching a series of articles, e.g. small electrical components, to a continuous web	B65B 15/04
---	----------------------------

Special rules of classification

Only concerns filling of belts as a separate operation

H05K 13/0038

{placing the components in a predetermined order}

Definition statement

This place covers:

Filling of belts according to the mounting order of different types of components.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Attaching a series of articles, e.g. small electrical components, to a continuous web	B65B 15/04
---	----------------------------

Special rules of classification

Must concern different type of components

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Belt	continuous web holding the components in order to be delivered in rolls to the mounting machines
------	--

H05K 13/0053

{Arrangements for assisting the manual mounting of components, e.g. special tables or light spots indicating the place for mounting}

Definition statement

This place covers:

Manual mounting posts for components on PCB

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Hand-tools for mounting electric components on a circuit board	H05K 13/0447
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H05K 13/0061

{Tools for holding the circuit boards during processing; handling transport of printed circuit boards}

Definition statement

This place covers:

Provision for displacing printed circuit boards [PCB] between machines or for displacing PCBs inside mounting machines

Gripping PCBs for transport or conveyance

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Transport of articles, e.g. conveyors	B65G
Apparatus specially adapted for handling semiconductor or electric solid state devices during manufacture or treatment thereof	H01L 21/67

Special rules of classification

Documents must include movement of printed circuit board

H05K 13/0069

{Holders for printed circuit boards}

Definition statement

This place covers:

Fixation of printed circuit boards inside mounting machines

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Fixation of printed circuit boards in testing machines	G01R 31/00
--	----------------------------

Special rules of classification

Printed circuit board must be static relative to holder.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Chuck	Holder, usually using vacuum
-------	------------------------------

H05K 13/0076

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

Definition statement

This place covers:

Transport of boards temporary fitted with components before definitive fixation, e.g. soldering.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Straightening or aligning terminal leads of pins mounted on boards, during the mounting operation, after fitting components on the board	H05K 13/0473
--	------------------------------

Special rules of classification

Components are not definitively fixed.

H05K 13/0084

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

Definition statement

This place covers:

Any type of container for delivering components to mounting machines and manufacture thereof

Details of component tubes, trays or belts.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Filling of containers	H05K 13/02
Use of said containers in mounting machines	H05K 13/04
Containers for storage or transport	B65D

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Stick	tube-like container
-------	---------------------

H05K 13/0092

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

Definition statement

This place covers:

Preparing leads of components before bringing to mounting machines

Special separate machines for lead treatment.

References

Limiting references

This place does not cover:

Treatment of the terminal leads as a separate operation during transport	H05K 13/0076 , H05K 13/023
Treatment of leads after fitting in printed circuit boards	H05K 13/04

Special rules of classification

Must be a separate machine.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Clinching	bending of leads
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H05K 13/02

Feeding of components

Definition statement

This place covers:

Feeding of components to containers before fitting said container to machines, e.g. filling or refilling of containers

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Emptying of containers by the mounting machine itself	H05K 13/04
Feeding of components in general	B65G

H05K 13/021

{Loading or unloading of containers ([H05K 13/028](#) takes precedence)}

Definition statement

This place covers:

Loading or unloading containers with components, the containers not being in use by the mounting machine.

References

Limiting references

This place does not cover:

Simultaneously loading a plurality of loose objects, e.g. by means of vibrations, pressure differences, magnetic fields	H05K 13/028
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Special rules of classification

Do not classify here documents concerning pick and place in the mounting machine

H05K 13/022

{with orientation of the elements}

Definition statement

This place covers:

Giving orientation to components before feeding into containers

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Orientation in general	B23P 19/00
------------------------	----------------------------

H05K 13/023

{with bending or straightening of the terminal leads}

Definition statement

This place covers:

Feeding of components with bending or straightening of the terminal leads, e.g. in order to fit into containers

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Treatment of the terminal leads as a separate operation (not during transport)	H05K 13/0092
Bending and cutting after the mounting on a pc board	H05K 13/0473

Special rules of classification

Not during or after mounting of component.

H05K 13/024

{Straightening or aligning terminal leads}

Definition statement

This place covers:

Straightening or aligning leads during the feeding

H05K 13/025

{of components having oppositely extending terminal leads}

Definition statement

This place covers:

Straightening or aligning leads of e.g. resistors

H05K 13/026

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

Definition statement

This place covers:

Straightening or aligning lead of chips.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Dual in line	chip with two rows of parallel leads
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H05K 13/027**{Fluid transport of components}****Definition statement***This place covers:*

Transport of components using fluids, e.g. jets of air, water.

H05K 13/028**{Simultaneously loading a plurality of loose objects, e.g. by means of vibrations, pressure differences, magnetic fields}****Definition statement***This place covers:*

Feeding bulk components simultaneously to containers

References**Informative references***Attention is drawn to the following places, which may be of interest for search:*

Orientation of the elements	H05K 13/022
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H05K 13/029**{Feeding axial lead components, e.g. using vibrating bowls, magnetic fields ([H05K 13/022](#) takes precedence)}****Definition statement***This place covers:*

Feeding bulk axial components to containers.

References**Limiting references***This place does not cover:*

Orientation of the elements	H05K 13/022
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H05K 13/04**Mounting of components {, e.g. of leadless components}****Definition statement***This place covers:*

Mounting of components such as:

- mounting machines for components on printed circuit boards;
- attaching containers to mounting machines for components delivery.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Assembling printed circuits with electric components	H05K 3/30
Manipulators	B25J

H05K 13/0404

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

Definition statement

This place covers:

Pick-and-place-heads for picking components out of a container and placing them on a printed circuit board using gripping devices.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Manipulators	B25J
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Special rules of classification

Orientation while holding component is not classified here

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Jaws	gripping device having means moving towards each other for pinching component
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H05K 13/0408

{Incorporating a pick-up tool}

Definition statement

This place covers:

Pick-and-place-heads for picking components out of a container and placing them on a printed circuit board by suction, e.g. using vacuum.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Manipulators	B25J
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Special rules of classification

Orientation while holding component is not classified here

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Nozzle	vacuum or air suction device
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H05K 13/0413

{with orientation of the component while holding it; Drive mechanisms for gripping tools, e.g. lifting, lowering or turning of gripping tools}

Definition statement

This place covers:

Orientation of component held by mounting head just before or during mounting.

Mechanical and vacuum holders for components with orientation provisions.

Vision devices for orientation or correct placing of components.

Includes camera looking at the PC boards before mounting

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Vision system	camera
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H05K 13/0417

{Feeding with belts or tapes}

Definition statement

This place covers:

Delivery of components to a mounting machine via belts or tapes; tape feeders; attachment of tape feeders to the mounting machine; details related to the picking up of components by mounting head from tapes/belts.

Special rules of classification

Interconnection/splicing of belts/tapes to be classified in [H05K 13/021](#).

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Blister, belt, tape	Belt or tape wound on a reel/roll and carrying electronic devices
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Synonyms and Keywords

Blister	component belt in rolls
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H05K 13/0421**{with treatment of the terminal leads}****Definition statement***This place covers:*

Treatment of leads during or after picking up.

References**Informative references***Attention is drawn to the following places, which may be of interest for search:*

Feeding one by one by other means than belts	H05K 13/043
Bending and cutting after fitting on a circuit board	H05K 13/0473

H05K 13/0426**{for components being oppositely extending terminal leads ([H05K 13/0421](#) takes precedence)}****Definition statement***This place covers:*

For resistor type components.

References**Limiting references***This place does not cover:*

Treatment of the terminal leads (bending and cutting after fitting on a circuit board	H05K 13/0421
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H05K 13/043**{Feeding one by one by other means than belts}****Definition statement***This place covers:*

Delivery of single components by other type of containers.

H05K 13/0434**{with containers}****Definition statement***This place covers:*

Delivery with containers, e.g. trays.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Components belts	H05K 13/0417
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H05K 13/0439

{incorporating means for treating the terminal leads only before insertion}

Definition statement

This place covers:

Treatment of leads before insertion.

H05K 13/0443

{incorporating means for treating the terminal leads before and after insertion or only after insertion}

Definition statement

This place covers:

Treatment of leads before and/or only after insertion.

H05K 13/0452

{Mounting machines or lines comprising a plurality of tools for guiding different components to the same mounting place ([H05K 13/0406](#), [H05K 13/041](#) take precedence)}

Definition statement

This place covers:

Mounting machine for several types of components.

Mounting of different type of components to the same mounting place.

Multi nozzle machines

Machines with several holders for pc boards

References

Limiting references

This place does not cover:

Drive mechanisms for pick-and-place heads	H05K 13/0406
Pick-and-place heads having multiple pick-up tools	H05K 13/041

Special rules of classification

Multiple work tables and multiple heads, e.g. revolver heads, are classified here

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Revolver head	turning multiple head with multiple nozzles or grippers
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H05K 13/0456

{simultaneously punching the circuit board}

Definition statement

This place covers:

Mounting machines including hole puncher

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Hole shaping and details of holes	H05K 3/00
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H05K 13/046

{Surface mounting (surface mounted components [H05K 3/341](#))}

Definition statement

This place covers:

Methods and apparatus for surface mounting electric components in general

References**Limiting references**

This place does not cover:

Surface mounted components	H05K 3/341
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Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

SMD	Surface mounted device
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H05K 13/0465

{by soldering ([H05K 13/0469](#) takes precedence)}

Definition statement

This place covers:

Soldering machines of surface mounted components

References

Limiting references

This place does not cover:

Surface mounting by applying a glue or viscous material	H05K 13/0469
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Surface mounting on PCBs by soldering	H05K 3/341
Reflow soldering apparatus and process; Soldering process per se	B23K

H05K 13/0469

{by applying a glue or viscous material}

Definition statement

This place covers:

Use of glue or viscous material with dispenser nozzles.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Details of glue fixation between component and PC board	H05K 3/00
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H05K 13/0473

{Cutting and clinching the terminal ends of the leads after they are fitted on a circuit board}

Definition statement

This place covers:

Treatment of leads after insertion out of mounting process

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Cutting and clinching the terminal ends of the leads after they are fitted on a circuit board during transport	H05K 13/0076
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H05K 13/0478**{Simultaneously mounting of different components}****Definition statement***This place covers:*

simultaneous mounting of different components placed on PC board at the same moment.

H05K 13/0482**{using templates; using magazines, the configuration of which corresponds to the sites on the boards where the components have to be attached}****Definition statement***This place covers:*

Simultaneous mounting of different components being arranged beforehand in preset positions.

Templates, trays and special multi heads.

H05K 13/0486**{Replacement and removal of components}****Definition statement***This place covers:*

Method and apparatus for taking off or replacing misplaced components

Special rules of classification

No recycling.

May include a de-soldering device

H05K 13/0491**{Hand tools therefor}****Definition statement***This place covers:*

Hand tools for repairing printed circuit boards or exchanging components.

Special rules of classification

No recycling.

H05K 13/0495**{having a plurality of work-stations}****Definition statement***This place covers:*

Arrangements of mounting machines in clusters or lines

H05K 13/06

Wiring by machine

Definition statement

This place covers:

Placing of wires on or in printed circuit boards by machines; machines therefor.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Multiplex wire bundles for vehicles	B60R
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H05K 13/065

{Accessories therefor, e.g. light spots}

Definition statement

This place covers:

Accessories for wiring, e.g. special tables or light spots.

H05K 13/08

Monitoring manufacture of assemblages

Definition statement

This place covers:

- Control or planning of manufacturing processes of assemblages, e.g. of processes for mounting components on printed circuit boards
- Control of apparatus therefor
- Planning of production facilities and apparatus layout
- Visual inspection after placing of components

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrical testing of finished printed circuit boards	G01R 31/00
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