IPC-7351A Naming Convention for Standard SMT Land Patterns

Surface Mount Land Patterns

Component, Category   Land Pattern Name

Ball Grid Array's .... **BGA** + Pin Qty + **C** or **N** + Pitch **P** + Ball Columns **X** Ball Rows _ Body Length **X** Body Width **X** Height
BGA w/Dual Pitch . **BGA** + Pin Qty + **C** or **N** + Col Pitch **X** Row Pitch **P** + Ball Columns **X** Ball Rows _ Body Length **X** Body Width **X** Height
BGA w/Staggered Pins .... **BGAS** + Pin Qty + **C** or **N** + Pitch **P** + Ball Columns **X** Ball Rows _ Body Length **X** Body Width **X** Height
BGA Note: The **C** or **N** = Collapsing or Non-collapsing Balls
Capacitors, Chip, Array, Concave .... **CAPCAV** + Pitch **P** + Body Length **X** Body Width **X** Height **-** Pin Qty
Capacitors, Chip, Array, Flat .... **CAPCAF** + Pitch **P** + Body Length **X** Body Width **X** Height **-** Pin Qty
Capacitors, Chip, Non-polarized .... **CAPC** + Body Length + Body Width **X** Height
Capacitors, Chip, Polarized .... **CAPCP** + Body Length + Body Width **X** Height
Capacitors, Chip, Wire Rectangle .... **CAPCWR** + Body Length + Body Width **X** Height
Capacitors, Molded, Non-polarized .... **CAPM** + Body Length + Body Width **X** Height
Capacitors, Molded, Polarized.. **CAPMP** + Body Length + Body Width **X** Height
Capacitors, Aluminum Electrolytic .... **CAPAE** + Base Body Size **X** Height
Ceramic Flat Packages.. **CFP127P** + Lead Span Nominal **X** Height **-** Pin Qty
Column Grid Array's .... **CGA** + Pitch **P** + Number of Pin Columns **X** Number of Pin Rows **X** Height **-** Pin Qty
Crystals (2 leads).. **XTAL** + Body Length **X** Body Width **X** Height
Dual Flat No-lead .... **DFN** + Body Length **X** Body Width **X** Height – Pin Qty
Diodes, Chip .... **DIOC** + Body Length + Body Width **X** Height
Diodes, Molded... **DIOM** + Body Length + Body Width **X** Height
Diodes, MELF .... **DIOMELF** + Body Length + Body Diameter
Fuses, Molded .... **FUSM** + Body Length + Body Width **X** Height
Inductors, Chip... **INDC** + Body Length + Body Width **X** Height
Inductors, Molded .... **INDM** + Body Length + Body Width **X** Height
Inductors, Precision Wire Wound .... **INDP** + Body Length + Body Width **X** Height
Inductors, Chip, Array, Concave... **INDCAV** + Pitch **P** + Body Length **X** Body Width **X** Height **-** Pin Qty
Inductors, Chip, Array, Flat... **INDCAF** + Pitch **P** + Body Length **X** Body Width **X** Height **-** Pin Qty
Land Grid Array .... **LGA** + Pin Qty **-** Pitch **P** + Ball Columns **X** Ball Rows _ Body Length **X** Body Width **X** Height
LED's, Molded ....**LEDM** + Body Length + Body Width **X** Height
Oscillators, Side Concave .... **OSCSC** + Pitch **P** + Body Length **X** Body Width **X** Height **-** Pin Qty
Oscillators, J-Lead .... **OSCJ** + Pitch **P** + Body Length **X** Body Width **X** Height **-** Pin Qty
Oscillators, L-Bend Lead ....**OSCL** + Pitch **P** + Body Length **X** Body Width **X** Height **-** Pin Qty
Oscillators, Corner Concave.. **OSCCC** + Body Length **X** Body Width **X** Height
Plastic Leaded Chip Carriers... **PLCC** + Pitch **P** + Lead Span L1 **X** Lead Span L2 Nominal **X** Height **-** Pin Qty
Plastic Leaded Chip Carrier Sockets Square .... **PLCCS** + Pitch **P** + Lead Span L1 **X** Lead Span L2 Nominal **X** Height **-** Pin Qty
Quad Flat Packages ....**QFP** + Pitch **P** + Lead Span L1 **X** Lead Span L2 Nominal **X** Height **-** Pin Qty
Ceramic Quad Flat Packages... **CQFP** + Pitch **P** + Lead Span L1 **X** Lead Span L2 Nominal **X** Height **-** Pin Qty
Quad Flat No-lead .... **QFN** + Pitch **P** + Body Width **X** Body Length **X** Height **-** Pin Qty + Thermal Pad
Pull-back Quad Flat No-lead ....**PQFN** + Pitch **P** + Body Width **X** Body Length **X** Height **-** Pin Qty + Thermal Pad
Quad Leadless Ceramic Chip Carriers.. **LCC** + Pitch **P** + Body Width **X** Body Length **X** Height **-** Pin Qty
Quad Leadless Ceramic Chip Carriers (Pin 1 on Side).............................. **LCCS** + Pitch **P** + Body Width **X** Body Length **X** Height **-** Pin Qty
Resistors, Chip .... **RESC** + Body Length + Body Width **X** Height
Resistors, Molded... **RESM** + Body Length + Body Width **X** Height
Resistors, MELF .... **RESMELF** + Body Length + Body Diameter
Resistors, Chip, Array, Concave ....**RESCAV** + Pitch **P** + Body Length **X** Body Width **X** Height **-** Pin Qty
Resistors, Chip, Array, Convex, E-Version (Even Pin Size) .... **RESCAXE** + Pitch **P** + Body Length **X** Body Width **X** Height **-** Pin Qty
Resistors, Chip, Array, Convex, S-Version (Side Pins Diff) .... **RESCAXS** + Pitch **P** + Body Length **X** Body Width **X** Height **-** Pin Qty
Resistors, Chip, Array, Flat...**RESCAF** + Pitch **P** + Body Length **X** Body Width **X** Height **-** Pin Qty
Small Outline IC, J-Leaded...**SOJ** + Pitch **P** + Lead Span Nominal **X** Height **-** Pin Qty
Small Outline Integrated Circuit, (50 mil Pitch SOIC)....................................**SOIC127P** + Lead Span Nominal **X** Height **-** Pin Qty
Small Outline Packages ....**SOP** + Pitch **P** + Lead Span Nominal **X** Height **-** Pin Qty
Small Outline No-lead.. **SON** + Pitch **P** + Body Width **X** Body Length **X** Height **-** Pin Qty + Thermal Pad
Pull-back Small Outline No-lead......................................**PSON** + Pitch **P** + Body Width **X** Body Length **X** Height **-** Pin Qty + Thermal Pad
SC89 .... **SC89** + Pitch **P** + Lead Span Nominal **X** Height **-** Pin Qty
SC90 .... **SC90** + Lead Span Nominal + Body Length **X** Body Width **X** Height
SOD (Example: **SOD3717X135** = **JEDEC SOD123**) ....**SOD** + Lead Span Nominal + Body Width **X** Height
SOT89 (JEDEC Standard Package) **SOT89**
SOT143 & SOT343 (JEDEC Standard Package) .... **SOT143 & SOT343**
SOT143 & SOT343 Reverse (JEDEC Standard Package)... **SOT143R & SOT343R**
SOT23 & SOT223 Packages (Example: **SOT230P700X180-4**) .... **SOT** + Pitch **P** + Lead Span Nominal **X** Height **-** Pin Qty
TO (Generic DPAK - Example: **TO228P970X238-3**) ....**TO +** Pitch **P** + Lead Span **X** Height **-** Pin Qty

IPC-7351A Land Pattern Naming Convention Notes

- All dimensions are in Metric Units
- All Lead Span and Height numbers go two places past the decimal point and "include" trailing Zeros
- All Lead Span and Body Sizes go two place before the decimal point and "remove" leading Zeros
- All Chip Component Body Sizes are one place to each side of the decimal point
- Pitch Values are two places to the right & left of decimal point with no leading Zeros but include trailing zeros

Naming Convention Special Character Use for Land Patterns

The _ (underscore) is the separator between pin Qty in Hidden & Deleted pin components
The **–** (dash) is used to separate the pin qty.
The **X** (capital letter X) is used instead of the word "by" to separate two numbers such as height **X** width like "Quad Packages".

PCB Libraries Suffix Naming Convention for Land Patterns

Common SMT Land Pattern to Describe Environment Use (This is the last character in every name)
Note: This excludes the BGA component family as they only come in the Nominal Environment Condition

- **M** .... Most Material Condition (Level A)
- **N** .... Nominal Material Condition (Level B)
- **L** .... Least Material Condition (Level C)

Alternate Components that do not follow the JEDEC, EIA or IEC Standard

- **A** .... Alternate Component (used primarily for SOP & QFP when Component Tolerance or Height is different)
- **B** .... Second Alternate Component

Reverse Pin Order

- **-20RN** .... 20 pin part, Reverse Pin Order, Nominal Environment

Hidden Pins

- **-20_24N** ...... 20 pin part in a 24 pin package. The pins are numbered 1 – 24 the hidden pins are skipped. The schematic symbol displays up to 24 pins.

Deleted Pins

- **-24_20N** ...... 20 pin part in a 24 pin package. The pins are numbered 1 – 20. The schematic symbol displays 20 pins.

JEDEC and EIA Standard parts that have several alternate packages

- **AA, AB, AC**. JEDEC or EIA Component Identifier

GENERAL SUFFIXES

_HS.........................**HS = Land Pattern with Heat Sink attachment requiring additional holes or pads**
Example: TO254P1055X160_HS-6N

_BEC ....**BEC = Base, Emitter and Collector (Pin assignments used for three pin Transistors)**
Example: SOT95P280X160_BEC-3N

_SGD ....**SGD = Source, Gate and Drain (Pin assignments used for three pin Transistors)**
Example: SOT95P280X160_SGD-3N

_213.........................**213 = Alternate pin assignments used for three pin Transistors**
Example: SOT95P280X160_213-3N

PCB Libraries Naming Convention for Non-Standard SMT Land Patterns

Surface Mount Land Patterns

Component, Category   Land Pattern Name

Component, Category	Land Pattern Name
Amplifiers	**AMP**_ Mfr.'s Part Number
Batteries	**BAT**_ Mfr.'s Part Number
Capacitors, Variable	**CAPV**_Mfr.'s Part Number
Capacitors, Chip, Array, Concave (Pins on 2 or 4 sides)	**CAPCAV**_Mfr Series No. **-** Pin Qty
Capacitors, Chip, Array, Flat (Pins on 2 sides)	**CAPCAF**_Mfr Series No. **-** Pin Qty
Capacitors, Miscellaneous	**CAP**_Mfr.'s Part Number
Crystals	**XTAL**_Mfr.'s Part Number
Diodes, Miscellaneous	**DIO**_Mfr.'s Part Number
Diodes, Bridge Rectifiers	**DIOB**_Mfr.'s Part Number
Ferrite Beads	**FB**_Mfr.'s Part Number
Fiducials	**FID** + Pad Size X Solder Mask Size
Filters	**FIL**_Mfr.'s Part Number
Fuses	**FUSE**_Mfr.'s Part Number
Fuse, Resettable	**FUSER**_Mfr.'s Part Number
Inductors, Miscellaneous	**IND**_Mfr.'s Part Number
Inductors, Chip, Array, Concave (Pins on 2 or 4 sides)	**INDCAV**_Mfr Series No. **-** Pin Qty
Inductors, Chip, Array, Flat (Pins on 2 sides)	**INDCAF**_Mfr Series No. **-** Pin Qty
Keypad	**KEYPAD**_Mfr.'s Part Number
LEDS	**LED**_Mfr.'s Part Number
LEDS, Chip	**LED**_Mfr.'s Part Number
Liquid Crystal Display	**LCD**_Mfr.'s Part Number
Microphones	**MIC**_Mfr.'s Part Number
Opto Isolators	**OPTO**_Mfr.'s Part Number
Oscillators	**OSC**_Mfr.'s Part Number **-** Pin Qty
Quad Flat Packages w/Bumper Corners, Pin 1 Side	**BQFP** + Pitch **P** + Lead Span L1 **X** Lead Span L2 Nominal **X** Height **-** Pin Qty
Quad Flat Packages w/Bumper Corners, 1 Center	**BQFPC** + Pitch **P** + Lead Span L1 **X** Lead Span L2 Nominal **X** Height **-** Pin Qty
Resistors, Chip, Array, Concave (Pins on 2 or 4 sides)	**RESCAV**_Mfr Series No. **-** Pin Qty
Resistors, Chip, Array, Convex Type E (Pins on 2 sides)	**RESCAXE**_Mfr Series No. **-** Pin Qty
Resistors, Chip, Array, Convex Type S (Pins on 2 sides)	**RESCAXS**_Mfr Series No. **-** Pin Qty
Resistors, Chip, Array, Flat (Pins on 2 sides)	**RESCAF**_Mfr Series No. **-** Pin Qty
Relays	**RELAY**_Mfr.'s Part Number
Speakers	**SPKR**_Mfr's Part Number
Switches	**SW**_Mfr.'s Part Number
Test Points, Round	**TP** + Pad Size (1 place left of decimal and 2 places right of decimal, Example **TP100** = 1.00mm)
Test Points, Square	**TPS** + Pad Size (1 place left of decimal and 2 places right of decimal)
Test Points, Rectangle	**TP** + Pad Length **X** Pad Width (1 place left of decimal and 2 places right of decimal)
Thermistors	**THERM**_Mfr.'s Part Number
Transceivers	**XCVR**_ Mfr.'s Part Number
Transducers (IRDA's)	**XDCR**_Mfr.'s Part Number
Transient Voltage Suppressors	**TVS**_Mfr.'s Part Number
Transient Voltage Suppressors, Polarized	**TVSP**_Mfr.'s Part Number
Transistor Outlines, Custom	**TRANS**_Mfr.'s Part Number
Transformers	**XFMR**_Mfr.'s Part Number
Trimmers & Potentiometers	**TRIM**_Mfr.'s Part Number
Tuners	**TUNER**_Mfr.'s Part Number
Varistors	**VAR**_Mfr.'s Part Number
Voltage Controlled Oscillators	**VCO**_Mfr.'s Part Number
Voltage Regulators, Custom	**VREG**_Mfr.'s Part Number

Note: All dimensions are in Metric Units and all numbers go two places past the decimal point

PCB Libraries Naming Convention for Through-Hole Land Patterns

Through Hole Land Patterns

Component, Category	Land Pattern Name
Amplifiers	**AMP**_Mfr.'s Part Number
Batteries	**BAT**_Mfr.'s Part Number
Bridge Rectifiers	**DIOB**_Mfr.'s Part Number
Capacitors, Non Polarized Axial	**CAPA** + Pin Spacing **-** Body Length **X** Body Diameter
Capacitors, Non Polarized Radial, Round	**CAPR** + Pin Spacing **-** Body Diameter **X** Component Height
Capacitors, Non Polarized Radial, Oval	**CAPR** + Pin Spacing **-** Body Width **X** Body Length **X** Component Height
Capacitors, Polarized Axial	**CAPPA** + Pin Spacing **-** Body Length **X** Body Diameter
Capacitor, Polarized Radial	**CAPPR** + Pin Spacing **-** Body Diameter **X** Component Height
Converters	**CONV**_Mfr.'s Part Number
Crystals	**XTAL**_Mfr.'s Part Number
Diodes (JEDEC Standard Package)	**DO-** JEDEC Part Number
Diodes, Miscellaneous	**DIO**_Mfr.'s Part Number
Dual-In-Line Packages (JEDEC Standard Package)	**DIP** + Pin Qty + Pin Span in MILS
Dual-In-Line Sockets	**DIPS** + Pin Qty + Pin Span in MILS
Ferrite Beads	**FB**_Mfr.'s Part Number
Filters	**FIL**_Mfr's Part Number
Fuses	**FUSE**_Mfr.'s Part Number
Fuses, Resettable	**FUSER**_Mfr.'s Part Number
Headers, .100" Pin Centers	**HDR** + Number of Rows **X** Number of pins per Row
Heat Sinks	**HSINK**_Mfr.'s Part Number
Inductors	**IND**_Mfr.'s Part Number
Jumpers, Wire	**JUMP** + Distance between Pads
LED's	**LED**_Mfr.'s Part Number
Liquid Crystal Display	**LCD**_Mfr.'s Part Number
Microphones	**MIC**_Mfr.'s Part Number
Mounting Holes Nonplated	**MTG** + Hole Size
Mounting Holes Plated	**MTG** + Hole Size_Pad Size
Mounting Holes Plated with 8 Vias	**MTG** + Hole Size_Pad Size - **VIA**
MOV	**MOV**_Mfr.'s Part Number
Opto Isolators	**OPTO**_Mfr.'s Part Number
Oscillators	**OSC**_Mfr.'s Part Number
PAD	**PAD** + Pad Size **X** Hole Size + **H**
Photo Detectors	**PHODET**_Mfr.'s Part Number
Pin Grid Array's	**PGA** + Number of Pin Rows **X** Number of Pin Columns **-** Pin Qty
Regulators	**REG**_Mfr.'s Part Number
Relays	**RELAY**_Mfr.'s Part Number
Resistors, Axial Leads	**RES** + Pad Spacing **-** Body Length **X** Body Diameter
Resistor Networks	**SIP** + Pin Qty
Shield, off the shelf	**SHIELD**_Mfr.'s Part Number
Shield, Custom	**SHIELD** + Body Length **X** Body Width
Speakers	**SPKR**_Mfr's Part Number
Stiffners	**STIF**_Mfr's Part Number
Switches	**SW**_Mfr.'s Part Number
Test Points, Round	**TP** + Pad Size + **P** + Hole Size + **D** + Height + **H**
Test Points, Square	**TPS** + Pad Size + **P** + Hole Size + **D** + Height + **H**
Test Points, Top & Bottom Pad Different Size	**TP** + Top Pad **X** Bottom Pad + **P** + Hole Size + **D** + Height + **H**
Thermistors	**THERM**_Mfr.'s Part Number
Transducers (IRDA's)	**XDCR**_Mfr.'s Part Number
Transient Voltage Suppressors	**TVS** + Mfr.'s Part Number
Transient Voltage Suppressors, Polarized	**TVSP** + Mfr.'s Part Number
Transistor Outlines (JEDEC Standard Package)	**TO-** JEDEC Number
Transistor Outlines, Custom	**TRANS**_Mfr.'s Part Number
Transformers	**XFMR**_Mfr.'s Part Number
Trimmers & Potentiometers	**TRIM**_Mfr.'s Part Number
Tuners	**TUNER**_Mfr.'s Part Number
Varistors	**VAR**_Mfr.'s Part Number
Voltage Controlled Oscillator	**VCO**_Mfr.'s Part Number
Voltage Regulators (JEDEC Standard Package)	**TO-** JEDEC Number

Note: All dimensions are in Metric Units and all numbers go two places past the decimal point

PCB Libraries Naming Convention for Connector Land Patterns

Library Name   Land Pattern Name

SAMTEC™ .... SAMTEC Part Number

CONNECTORS (Miscellaneous Connector Libraries)

3M™ .... 3M_Part Number
AGILENT™ .... AGILENT_Part Number
AIRBORNE™ .... AIRBORNE_Part Number
AMPHENOL™ .... AMPHENOL_Part Number
AVX™ .... AVX_Part Number
BERG™ .... BERG_Part Number
BLOCKMASTER ELECTRONICS™ .... BLOCKMASTER_Part Number
CUI-STACK™ .... CUI-STACK_Part Number
E.F. JOHNSON™ .... JOHNSON_Part Number
FCI ELECTRONICS™ .... FCI_Part Number
FUJITSU™ .... FUJITSU_Part Number
HIROSE™ .... HIROSE_Part Number
ITT CANNON™ .... ITT_Part Number
JALCO™ .... JALCO_Part Number
JWT™ .... JWT_Part Number
JST™ .... JST_Part Number
KEYSTONE™ .... KEYSTONE_Part Number
KYCON™ .... KYCON_Part Number
LEMO™ .... LEMO_Part Number
MILL-MAX™ .... MILL-MAX_Part Number
MOLEX™ .... MOLEX_Part Number – Pin Qty
NEUTRIK™ .... NEUTRIK_Part Number
PHOENIX™ .... PHOENIX_Part Number
PULSE™ .... PULSE_Part Number
RIA™ .... RIA_Part Number
SIEMENS™ .... SIEMENS_Part Number
SPEEDTECH™ .... SPEEDTECH_Part Number
STEWART™ .... STEWART_Part Number
SULLINS™ .... SULLINS_Part Number
SWITCHCRAFT™ .... SWITCHCRAFT_Part Number
TYCO™ .... TYCO_Part Number – Pin Qty
YAMAICHI™ .... YAMAICHI_Part Number

IPC-7351 Surface Mount Land Patterns Sectional Breakdown

IPC-735* Component Family Breakdown:

IPC-7351 = IEC 61188-5-1, Generic requirements - Attachment (land/joint) considerations – **General Description**

IPC-7352 = IEC 61188-5-2, Sectional requirements - Attachment (land/joint) considerations – **Discrete Components**

IPC-7353 = IEC 61188-5-3, Sectional requirements - Attachment (land/joint) considerations – **Gull-Wing leads, two sides (SOP)**

IPC-7354 = IEC 61188-5-4, Sectional requirements - Attachment (land/joint) considerations – **J leads, two sides (SOJ)**

IPC-7355 = IEC 61188-5-5, Sectional requirements - Attachment (land/joint) considerations – **Gull-Wing leads, four sides (QFP)**

IPC-7356 = IEC 61188-5-6, Sectional requirements - Attachment (land/joint) considerations – **J leads, four sides (PLCC)**

IPC-7357 = IEC 61188-5-7, Sectional requirements - Attachment (land/joint) considerations – **Post leads, two sides (DIP)**

IPC-7358 = IEC 61188-5-8, Sectional requirements - Attachment (land/joint) considerations – **Area Array Components (BGA)**

IPC-7359 = NO IEC Document, Sectional requirements - Attachment (land/joint) considerations – **No Lead Components (LCC)**

IPC-7351 Surface Mount Land Pattern Zero Orientation

1) Chip Capacitors, Resistors and Inductors (RES, CAP and IND) – **Pin 1 (Positive) on Left**

2) Molded Inductors (INDM), Resistors (RESM), Molded Polarized Capacitors (CAPMP) – **Pin 1 (Positive) on Left**

3) Precision Wire-wound Inductors – **Pin 1 (Positive) on Left**

4) MELF Diode – **Pin 1 (Cathode) on Left**

5) SOD Diodes – **Pin 1 (Cathode) on Left**

6) Aluminum Electrolytic Capacitors – **Pin 1 (Positive) on Left**

7) SOT Devices (SOT23, SOT23-5, SOT223, SOT89, SOT143, etc.) – **Pin 1 Upper Left**

8) TO252 & TO263 (DPAK Type) Devices – **Pin 1 Upper Left**

9) Small Outline Gullwing ICs (SOIC, SOP, TSOP, SSOP, TSSOP) – **Pin 1 Upper Left**

10) Ceramic Flat Packs (CFP) – **Pin 1 Upper Left**

11) Small Outline J Lead ICs (SOJ) – **Pin 1 Upper Left**

12) Quad Flat Pack ICs (PQFP, SQFP) – **Pin 1 Upper Left**

13) Ceramic Quad Flat Packs (CQFP) – **Pin 1 Upper Left**

14) Bumper and Plastic Quad Flat Pack ICs (BQFPC, PQFPC Pin 1 Center) – **Pin 1 Top Center**

15) Plastic Leaded Chip Carriers (PLCC) – **Pin 1 Top Center**

16) Leadless Chip Carriers (LCC) – **Pin 1 Top Center**

17) Leadless Chip Carriers (LCCS Pin 1 on Side) – **Pin 1 Upper Left**

18) Quad Flat No-Lead ICs (QFN) QFNS & QFNRV, QFNRH – **Pin 1 Upper Left**

19) Ball Grid Arrays (BGA) – **Pin A1 Upper Left**