# IPC-7351B 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, Circular Lead | **CGA** + Pin Qty + **C** + Pitch **P** + Pin Columns **X** Pin Rows _ Body Length **X** Body Width **X** Height |
| Column Grid Array, Square Lead | **CGA** + Pin Qty + **S** + Pitch **P** + Pin Columns **X** Pin Rows _ Body Length **X** Body Width **X** Height |
| Crystals (2 leads) | **XTAL** + Body Length **X** Body Width **X** Height |
| Dual-in-Line Packages (Butt Mount) | **DIP** + Pitch **P** + Lead Span Nominal **X** Height **-** Pin Qty |
| 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 |
| Diodes, Side Concave, 2 Pin | **DIOSC** + Body Length **X** Body Width **X** Height **-** Pin Qty |
| 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, Circular Lead | **LGA** + Pin Qty + **C** + Pitch **P** + Pin Columns **X** Pin Rows _ Body Length **X** Body Width **X** Height |
| Land Grid Array, Square Lead | **LGA** + Pin Qty + **S** + Pitch **P** + Pin Columns **X** Pin Rows _ Body Length **X** Body Width **X** Height |
| Land Grid Array, Rectangle Lead | **LGA** + Pin Qty + **R** + Pitch **P** + Pin Columns **X** Pin Rows _ Body Length **X** Body Width **X** Height |
| LED's, Molded | **LEDM** + Body Length + Body Width **X** Height |
| LED's, Side Concave, 2 Pin | **LEDSC** + Body Length **X** Body Width **X** Height **-** Pin Qty |
| LED's, Side Concave, 4 Pin | **LEDSC** + Pitch **P** + Body Length **X** Body Width **X** Height **-** Pin Qty |
| Oscillators, Side Concave | **OSCSC** + Pitch **P** + Body Length **X** Body Width **X** Height **-** Pin Qt |
| 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 Diodes, Flat Lead | **SODFL** + Lead Span Nominal + Body Width **X** Height |
| 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 |
| Small Outline Transistors, Flat Lead | **SOTFL** + Pitch **P** + Lead Span Nominal **X** Height **-** Pin Qty |
| 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-7351B 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”.

# IPC-7351B 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

 

# Mentor Graphics Naming Convention for Non-Standard SMT Land Patterns

## Surface Mount Land Patterns

| 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**

# IPC-7x51 Naming Convention for Connector Land Patterns

| Library Name | Land Pattern Name |
|---|---|

**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 |
| ERNI | ERNI_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 |
| NEUTRIK™ | NEUTRIK_Part Number |
| PHOENIX™ | PHOENIX_Part Number |
| PULSE™ | PULSE_Part Number |
| RIA™ | RIA_Part Number |
| SAMTEC™ | SAMTEC_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 |
| 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**