

# IPC-7351B Naming Convention for Standard SMT Land Patterns

## Surface Mount Land Patterns

### Component, Category

### Land Pattern Name

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

<u>Component, Category</u>	<u>Land Pattern Name</u>
Amplifiers.....	<b>AMP_</b> Mfr.'s Part Number
Batteries .....	<b>BAT_</b> Mfr.'s Part Number
Capacitors, Variable .....	<b>CAPV_</b> Mfr.'s Part Number
Capacitors, Chip, Array, Concave (Pins on 2 or 4 sides).....	<b>CAPCAV_</b> Mfr Series No. - Pin Qty
Capacitors, Chip, Array, Flat (Pins on 2 sides).....	<b>CAPCAF_</b> Mfr Series No. - Pin Qty
Capacitors, Miscellaneous.....	<b>CAP_</b> Mfr.'s Part Number
Crystals .....	<b>XTAL_</b> Mfr.'s Part Number
Diodes, Miscellaneous.....	<b>DIO_</b> Mfr.'s Part Number
Diodes, Bridge Rectifiers .....	<b>DIOB_</b> Mfr.'s Part Number
Ferrite Beads .....	<b>FB_</b> Mfr.'s Part Number
Fiducials .....	<b>FID</b> + Pad Size X Solder Mask Size
Filters.....	<b>FIL_</b> Mfr.'s Part Number
Fuses.....	<b>FUSE_</b> Mfr.'s Part Number
Fuse, Resettable .....	<b>FUSER_</b> Mfr.'s Part Number
Inductors, Miscellaneous.....	<b>IND_</b> Mfr.'s Part Number
Inductors, Chip, Array, Concave (Pins on 2 or 4 sides).....	<b>INDCAV_</b> Mfr Series No. - Pin Qty
Inductors, Chip, Array, Flat (Pins on 2 sides).....	<b>INDCAF_</b> Mfr Series No. - Pin Qty
Keypad .....	<b>KEYPAD_</b> Mfr.'s Part Number
LEDS .....	<b>LED_</b> Mfr.'s Part Number
LEDS, Chip.....	<b>LED_</b> Mfr.'s Part Number
Liquid Crystal Display .....	<b>LCD_</b> Mfr.'s Part Number
Microphones .....	<b>MIC_</b> Mfr.'s Part Number
Opto Isolators .....	<b>OPTO_</b> Mfr.'s Part Number
Oscillators.....	<b>OSC_</b> Mfr.'s Part Number - Pin Qty
Quad Flat Packages w/Bumper Corners, Pin 1 Side .....	<b>BQFP</b> + Pitch <b>P</b> + Lead Span L1 <b>X</b> Lead Span L2 Nominal <b>X</b> Height - Pin Qty
Quad Flat Packages w/Bumper Corners, 1 Center.....	<b>BQFPC</b> + Pitch <b>P</b> + Lead Span L1 <b>X</b> Lead Span L2 Nominal <b>X</b> Height - Pin Qty
Resistors, Chip, Array, Concave (Pins on 2 or 4 sides).....	<b>RESCAV_</b> Mfr Series No. - Pin Qty
Resistors, Chip, Array, Convex Type E (Pins on 2 sides).....	<b>RESCAXE_</b> Mfr Series No. - Pin Qty
Resistors, Chip, Array, Convex Type S (Pins on 2 sides).....	<b>RESCAXS_</b> Mfr Series No. - Pin Qty
Resistors, Chip, Array, Flat (Pins on 2 sides).....	<b>RESCAF_</b> Mfr Series No. - Pin Qty
Relays .....	<b>RELAY_</b> Mfr.'s Part Number
Speakers .....	<b>SPKR_</b> Mfr.'s Part Number
Switches .....	<b>SW_</b> Mfr.'s Part Number
Test Points, Round .....	<b>TP</b> + Pad Size (1 place left of decimal and 2 places right of decimal, Example <b>TP100</b> = 1.00mm)
Test Points, Square .....	<b>TPS</b> + Pad Size (1 place left of decimal and 2 places right of decimal)
Test Points, Rectangle .....	<b>TP</b> + Pad Length <b>X</b> Pad Width (1 place left of decimal and 2 places right of decimal)
Thermistors.....	<b>THERM_</b> Mfr.'s Part Number
Transceivers .....	<b>XCVR_</b> Mfr.'s Part Number
Transducers (IRDA's) .....	<b>XDCR_</b> Mfr.'s Part Number
Transient Voltage Suppressors .....	<b>TVS_</b> Mfr.'s Part Number
Transient Voltage Suppressors, Polarized .....	<b>TVSP_</b> Mfr.'s Part Number
Transistor Outlines, Custom .....	<b>TRANS_</b> Mfr.'s Part Number
Transformers .....	<b>XFMR_</b> Mfr.'s Part Number
Trimmers & Potentiometers.....	<b>TRIM_</b> Mfr.'s Part Number
Tuners .....	<b>TUNER_</b> Mfr.'s Part Number
Varistors .....	<b>VAR_</b> Mfr.'s Part Number
Voltage Controlled Oscillators .....	<b>VCO_</b> Mfr.'s Part Number
Voltage Regulators, Custom.....	<b>VREG_</b> 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 Leadless 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 & QFN RV, QFN RH – **Pin 1 Upper Left**
- 19) Ball Grid Arrays (BGA) – **Pin A1 Upper Left**