My KiCad Guidelines Volume 2: Land Patterns

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1 Introduction

This Guideline describes a specification of Land Patterns for PCBNew. The Guideline uses recommendations from many sources, mostly from various standards (freely available information derived from standards).

The KiCad term “module” is replaced by the term “Land Pattern”.

Library structure and file naming conforms to “KiCad” format (s-expression format), except VeeCAD compatible libraries which retain the “Legacy” format (V2, metric).

1.1 Scope

This Guideline covers Library Structure, naming conventions and Technical Layer dimensions. Actual Land Pattern dimensions are determined by IPC-7251 and IPC-7351 (see References).

Wings3D models are not in the scope of this guide but are described in Volume 3: 3D Models.

1.2 Motivation

The motivations for the guide are:

1) How to organise libraries.
2) How to use IPC naming conventions for Land Patterns.
3) How to ensure Technical Layers have an accurate, uniform appearance across device families. e.g. all SOIC devices having the same appearance, all CAPC, RESC devices having the same appearance.
4) Keeping a record of how the Land Patterns were created.

1.3 Audience

The Guideline is intended to only offer ideas about Land Pattern creation.

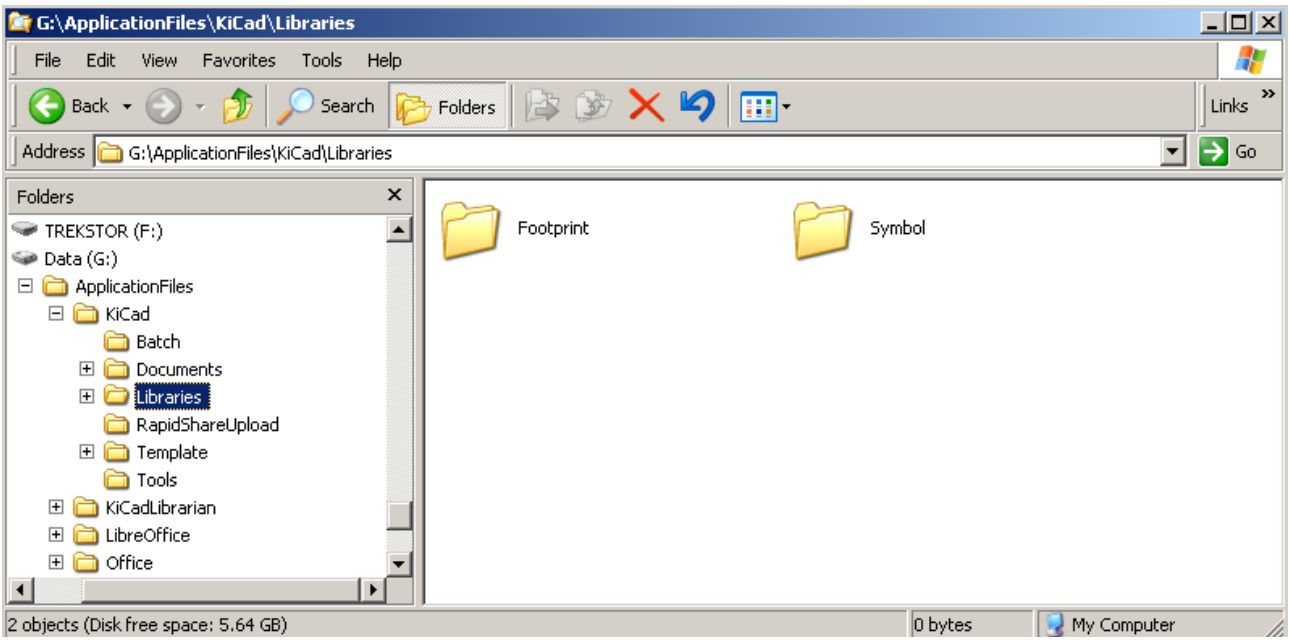
2 Library Structure

2.1 Location (Windows)

The libraries are located outside of the “Program Files” directory. e.g C:\ApplicationFiles\KiCad\Libraries.

“Modules” or “Land Patterns” are located in C:\ApplicationFiles\KiCad\Libraries\Footprint.

General documentation is located in C:\ApplicationFiles\KiCad\Libraries\Documents.



2.2 Location (Linux)

-

2.3 PCBNew Libraries

2.3.1 IPC-7251 Through Hole Land Pattern Library Naming Convention

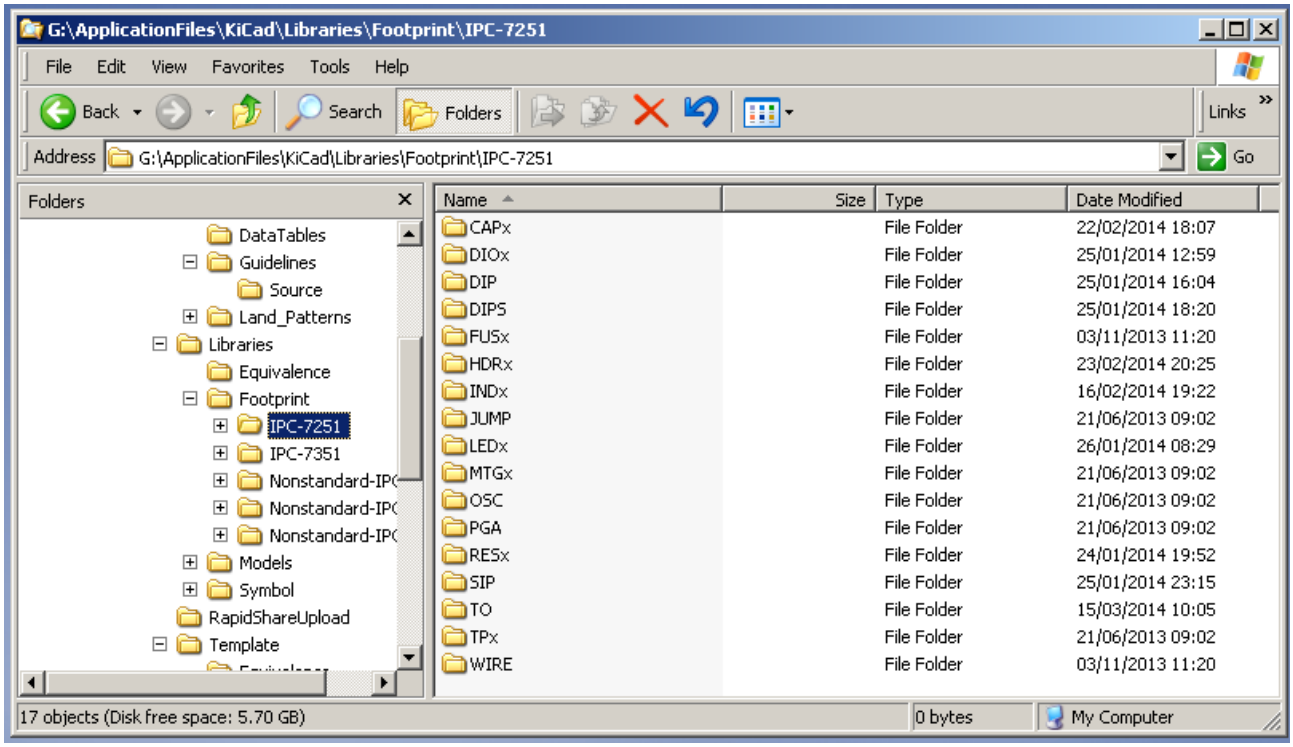
Through Hole Land Patterns that can be designated according to IPC-7251 are contained in files located in folders using IPC- 7251 conventions, under ..\KiCad\Libraries\Footprint\IPC-7251:

Folder Name	Description	Subfolder[1] / Filename[2](s) [*.mod]
CAPx	Capacitors, Non Pol Axial Dia Horizontal Mount Capacitors, Non Polarized Ax Dia Vert Mount Capacitors, Non Polarized Axial Rectangular Capacitors, Non Polarized Ax Rec Vert Mount Capacitors, Non Polarized Radial Diameter Capacitors, Non Polarized Radial Rectangular Capacitors, Non Polarized Radial Disc Button Capacitors, Polarized Axial Dia Horiz Mnt Capacitors, Polarized Axial Dia Vert Mnt Capacitors, Polarized Axial Rectangular Capacitors, Polarized Axial Rec Vert Mount Capacitors, Polarized Radial Diameter Capacitors, Polarized Radial Rectangular	CAPAD-capacitorsNonPolarizedAxialDiameter CAPADV-capacitorsNonPolarizedAxialDiameterVertical CAPAR-capacitorsNonPolarizedAxialRectangular CAPARV-capacitorsNonPolarizedAxialRectangularVertical CAPRD-capacitorsNonPolarizedRadialDiameter CAPRR-capacitorsNonPolarizedRadialRectangular CAPRB-capacitorsNonPolarizedRadialDiscButton CAPPAD-capacitorsPolarizedAxialDiameter CAPPADV-capacitorsPolarizedAxialDiameterVertical CAPPAR-capacitorsPolarizedAxialRectangular CAPPARV-capacitorsPolarizedAxialRectangularVertical CAPPRD-capacitorsPolarizedRadialDiameter CAPPRR-capacitorsPolarizedRadialRectangular
DIOx	Diodes, Axial Diameter Horizontal Mount Diodes, Axial Diameter Vertical Mount Diodes, Axial Rectangular Horizontal Mount Diodes, Axial Rectangular Vertical Mount	DIOAD-diodesAxialDiameter DIOADV-diodesAxialDiameterVertical DIOAR-diodesAxialRectangular DIOARV-diodesAxialRectangularVertical
DIP	Dual-In-Line Packages (JEDEC Standard)	DIP-dualInlinePackages
DIPS	Dual-In-Line Sockets	DIPS-dualInlineSockets
FUSx	Fuses, Axial Diameter Horizontal Mount Fuses, Axial Rectangular Horizontal Mount Fuses, Axial Diameter Vertical Mount Fuses, Axial Rectangular Vertical Mount Fuses, Radial Diameter Fuses, Radial Rectangular	FUSAD-fusesAxialDiameter FUSAR-fusesAxialRectangular FUSADV-fusesAxialDiameterVertical FUSARV-fusesAxialRectangularVertical FUSRD-fusesRadialDiameter FUSRR-fusesRadialRectangular
HDRx	Standard Pin Strip Header, Vertical Standard Pin Strip Header, Right Angle	HDRV127P-headerVertical HDRV254P-headerVertical HDRV200P-headerVertical HDRRA127P-headerRightAngle HDRRA200P-headerRightAngle HDRRA254P-headerRightAngle
INDx	Inductors, Axial Diameter Horizontal Mount Inductors, Axial Diameter Vertical Mount Inductors, Axial Rectangular Horizontal Mount Inductors, Axial Rectangular Vertical Mount Inductors, Radial Diameter Inductors, Radial Rectangular	INDAD-inductorsAxialDiameter INDADV-inductorsAxialDiameterVertical INDAR-inductorsAxialRectangular INDARV-inductorsAxialRectangularVertical INDRD-inductorsRadialDiameter INDRR-inductorsRadialRectangular
JUMP	Jumpers	JUMP-jumpersWire
LEDx	Light-Emitting Diodes, Radial Diameter Light-Emitting Diodes, Radial Rectangular	LEDRD-lightEmittingDiodesRadialDiameter LEDRR-lightEmittingDiodesRadialRectangular
MTGx	Mounting Hole, Non-Plated Mounting Hole, Plated	MTGNP-mountingHoleNonPlated MTGP-mountingHolePlated
PGA	Pin Grid Arrays	PGA-pinGridArray
RESx	Resistors, Axial Diameter Horizontal Mount Resistors, Axial Diameter Vertical Mount Resistors, Axial Rectangular Horizontal Mount Resistors, Axial Rectangular Vertical Mount	RESAD-resistorsAxialDiameter RESADV-resistorsAxialDiameterVertical RESAR-ressistorsAxialRectangular RESARV-ressistorsAxialRectangularVertical
SIP	Single In-Line Networks	SIP-singleInLineNetworks

1 Subfolder name when s-expression format
2 When components can be horizontally or vertically mounted (e.g. Diodes, Resistors), horizontal mounting is considered the default and is **not** included in the file name.

TPx	Test Point, Round/Rectangular Test Point, Square	TPCW-testPointsRound TPRW-testPointsSquare
OSC	Oscillators	OSC-oscillators
TO	Transistor Outlines	TO-transistorOutlines
WIRE	Wire	PAD-wire

Example: G:\ApplicationFiles\KiCad\Libraries\Footprint\IPC-7251\CAPx\CAPPRD-capacitorsPolarizedRadialDiameter.pretty



2.3.2 Non-Standard IPC-7251 Through Hole Land Pattern Library Naming Convention

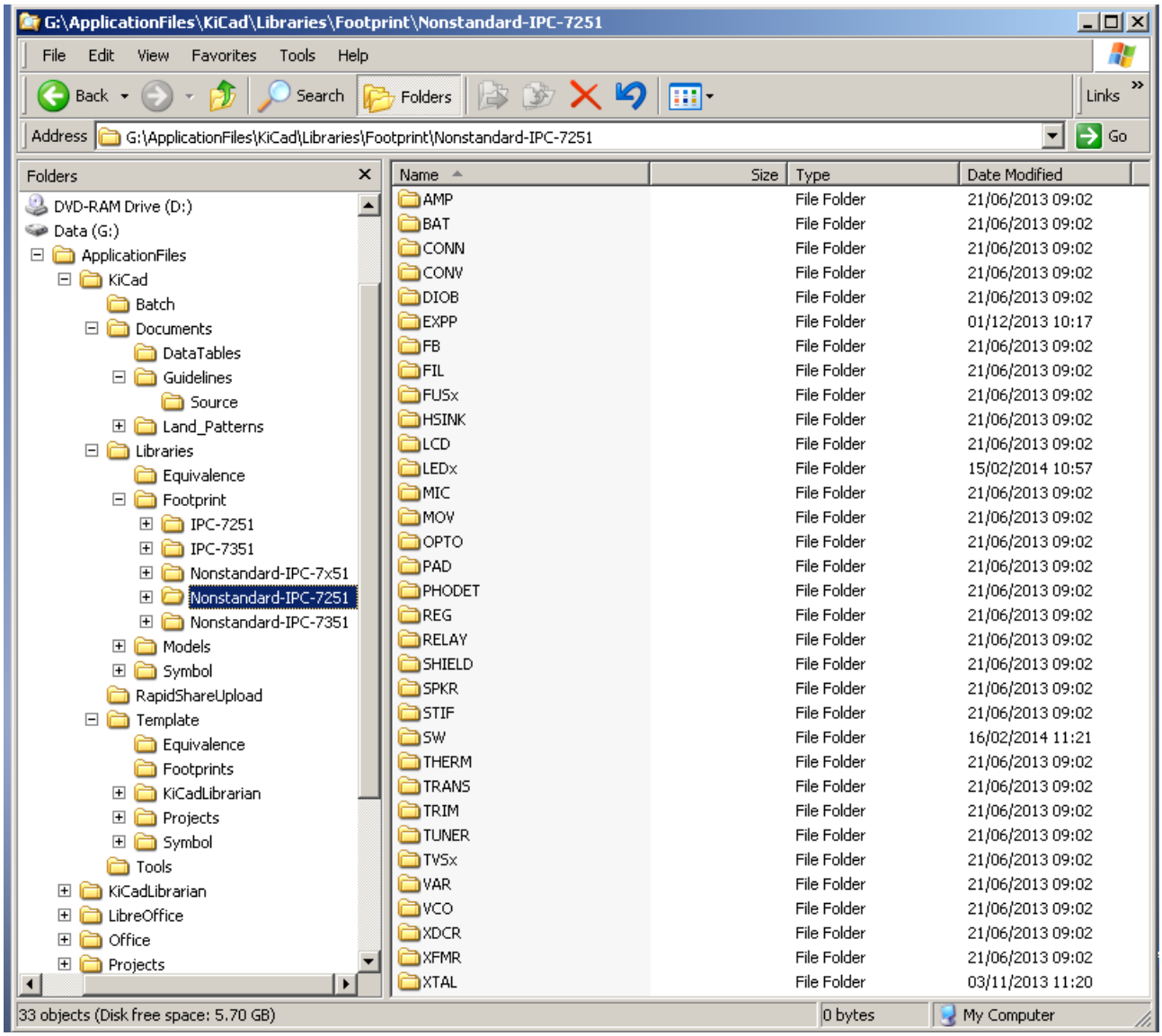
Non-standard Through Hole Land Patterns that can be designated according to IPC-7251 are contained in files located in folders using IPC- 7251 conventions. Through Hole Land Patterns that cannot be designated according to IPC-7251 are contained in files also located in folders under ..\KiCad\Libraries\Footprint\Nonstandard-IPC-7251:

Folder Name	Description	Subfolder[3] / Filename(s) [*.mod]
AMP	Amplifiers	AMP-amplifiers
BAT	Batteries	BAT-batteries
DIOB	Bridge Rectifiers	DIOB-bridgeRectifiers
CONV	Converters	CONV-converters
XTAL	Crystals	XTAL-crystalOscillator
FB	Ferrite Beads	FB-ferriteBeads
FIL	Filters	FIL-filters
FUSx	Fuses Fuses, Resettable	FUSE-fuses FUSER-fusesResettable
HSINK	Heat Sinks	HSINK-heatSinks
IND	Inductors	IND-inductors
LEDx	Light Emitting Diodes, LED 7-Segment LED Displays	LED-lightEmittingDiodes LED7S-7SegmentDisplays
LCD	Liquid Crystal Display	LCD-liquidCrystalDisplay
MIC	Microphones	MIC-microphones
MOV	MOV	MOV
OPTO	Opto Isolators	OPTO-optoisolators
OSC	Oscillators	OSC-oscillators
PAD	PAD	PAD
PHODET	Photo Detectors	PHODET-photoDetectors
REG	Regulators	REG-regulators
RELAY	Relays	RELAY-relays
SHIELD	Shield, off the shelf Shield, Custom	SHIELD
SPKR	Speakers	SPKR-speakers
STIF	Stiffners	STIF-stiffners
SW	Switches	SW-switches
THERM	Thermistors	THERM-thermistors
XDCR	Transducers (IRDA's)	XDCR-transducersIRDA
TVSx	Transient Voltage Suppressors Transient Voltage Suppressors, Polarized	TVS-transientVoltageSuppressors TVSP-transientVoltageSuppressorsPolarized
TRANS	Transistor Outlines, Custom	TRANS-transistorOutlinesCustom
XFMR	Transformers	XFMR-transformers
TRIM	Trimmers & Potentiometers	TRIM-trimmersPotentiometers
TUNER	Tuners	TUNER-tuners
VAR	Varistors	VAR-varistors
VCO	Voltage Controlled Oscillator	VCO-voltageControlledOscillator

3 Subfolder name when s-expression format

Folder Name[4]	Description	Subfolder[5] / Filename(s) [*.mod]
EXPP[6]	Exposed Pad (Thermal Pad)	EXPP-exposedPad
CONN	Connectors	CONN-<connectors/headers>

Example: G:\ApplicationFiles\KiCad\Libraries\Footprint\Nonstandard-IPC-7251\CONN\CONN-audioVisualConnectorsTyco.pretty



4 Not part of IPC-7251
5 Subfolder name when s-expression format
6 EXPP is classified as “Through Hole” due Through Hole pads acting as Thermal Vias

2.3.3 IPC-7351 Surface Mount Land Pattern Library Naming Convention

Standard Surface Mount Land Patterns that can be designated according to IPC-7351 are contained in files located in folders using IPC- 7351 conventions, under ..\KiCad\Libraries\Footprint\IPC-7351:

Folder Name	Description	Subfolder[7] / Filename(s) [*.mod]
BGAx	Ball Grid Arrays, BGA w/Dual Pitch	BGA30P-ballGridArrayNonSolderMaskDefined BGA35P-ballGridArrayNonSolderMaskDefined BGA40P-ballGridArrayNonSolderMaskDefined BGA50P-ballGridArrayNonSolderMaskDefined BGA65P-ballGridArrayNonSolderMaskDefined BGA75P-ballGridArrayNonSolderMaskDefined BGA80P-ballGridArrayNonSolderMaskDefined BGA100P-ballGridArrayNonSolderMaskDefined BGA127P-ballGridArrayNonSolderMaskDefined BGA150P-ballGridArrayNonSolderMaskDefined BGA30P-ballGridArraySolderMaskDefined BGA35P-ballGridArraySolderMaskDefined BGA40P-ballGridArraySolderMaskDefined BGA50P-ballGridArraySolderMaskDefined BGA65P-ballGridArraySolderMaskDefined BGA75P-ballGridArraySolderMaskDefined BGA80P-ballGridArraySolderMaskDefined BGA100P-ballGridArraySolderMaskDefined BGA127P-ballGridArraySolderMaskDefined BGA150P-ballGridArraySolderMaskDefined
	Ball Grid Arrays with Staggered Pins[8]	BGAS-ballGridArrayStaggeredNonSolderMaskDefined BGAS-ballGridArrayStaggeredSolderMaskDefined
CAPx	Capacitors, Chip Array, 2-Side, 4-Side, Concave Capacitors, Chip Array, 2-Side, 4-Side, Flat Capacitors, Chip Array, Convex, E-Version (Even Pin Size) Capacitors, Chip Array, Convex, S-Version (Side Pins Diff) Capacitors, Chip, Non-polarized Capacitors, Chip, Polarized Capacitors, Chip, Wire Rectangle Capacitors, Moulded, Non-polarized Capacitors, Moulded, Polarized Capacitors, Aluminium Electrolytic	CAPCAV-capacitorsChipArrayConcave CAPCAF-capacitorsChipArrayFlat CAPCAXE-resistorsChipArrayConvexE CAPCAXS-resistorsChipArrayConvexS CAPC-capacitorsChipNonPolarized CAPCP-capacitorsChipPolarized CAPCWR-capacitorsChipWireRectangular CAPM-capacitorsMouldedNonPolarized CAPMP-capacitorsMouldedPolarized CAPAE-capacitorsAluminiumElectrolytic
CFP127P	Ceramic Flat Packages	CFP127P-ceramicFlatPackage
CGA	Column Grid Array, Circular Lead Column Grid Array, Square Lead	CGA-columnGridArray
XTAL	Crystal Oscillaror (2 leads)	XTAL-crystalOscillator
DFN	Dual Flat No-lead	DFN-dualFlatNoLead
DIOx	Diodes, Chip Diodes, Moulded Diodes, MELF Diodes, Side Concave, 2 Pin Diodes, Chip Array, 2-Side, 4-Side, Concave Diodes, Chip Array, 2-Side, 4-Side, Flat	DIOC-diodesChip DIOM-diodesMoulded DIOMELF-diodesMELF DIOSC-diodesConcave2Pin DIOCAV-diodesChipArrayConcave DIOCAF-diodesChipArrayFlat
FUSM	Fuses, Moulded	FUSM-fusesMoulded
INDx	Inductors, Chip Inductors, Moulded Inductors, Precision Wire Wound Inductors, Chip Array, 2-Side, 4-Side, Concave Inductors, Chip Array, 2-Side, 4-Side, Flat Inductors, Chip Array, Convex, E-Version (Even Pin Size) Inductors, Chip Array, Convex, S-Version (Side Pins Diff)	INDC-inductorsChip INDM-inductorsMoulded INDP-inductorsPrecisionWireWound INDCAV-inductorsChipArrayConcave INDCAF-inductorsChipArrayFlat INDCAXE-resistorsChipArrayConvexE INDCAXS-resistorsChipArrayConvexS
LGA	Land Grid Array, Circular Lead Land Grid Array, Square Lead Land Grid Array, Rectangle Lead	LGA-landGridArray

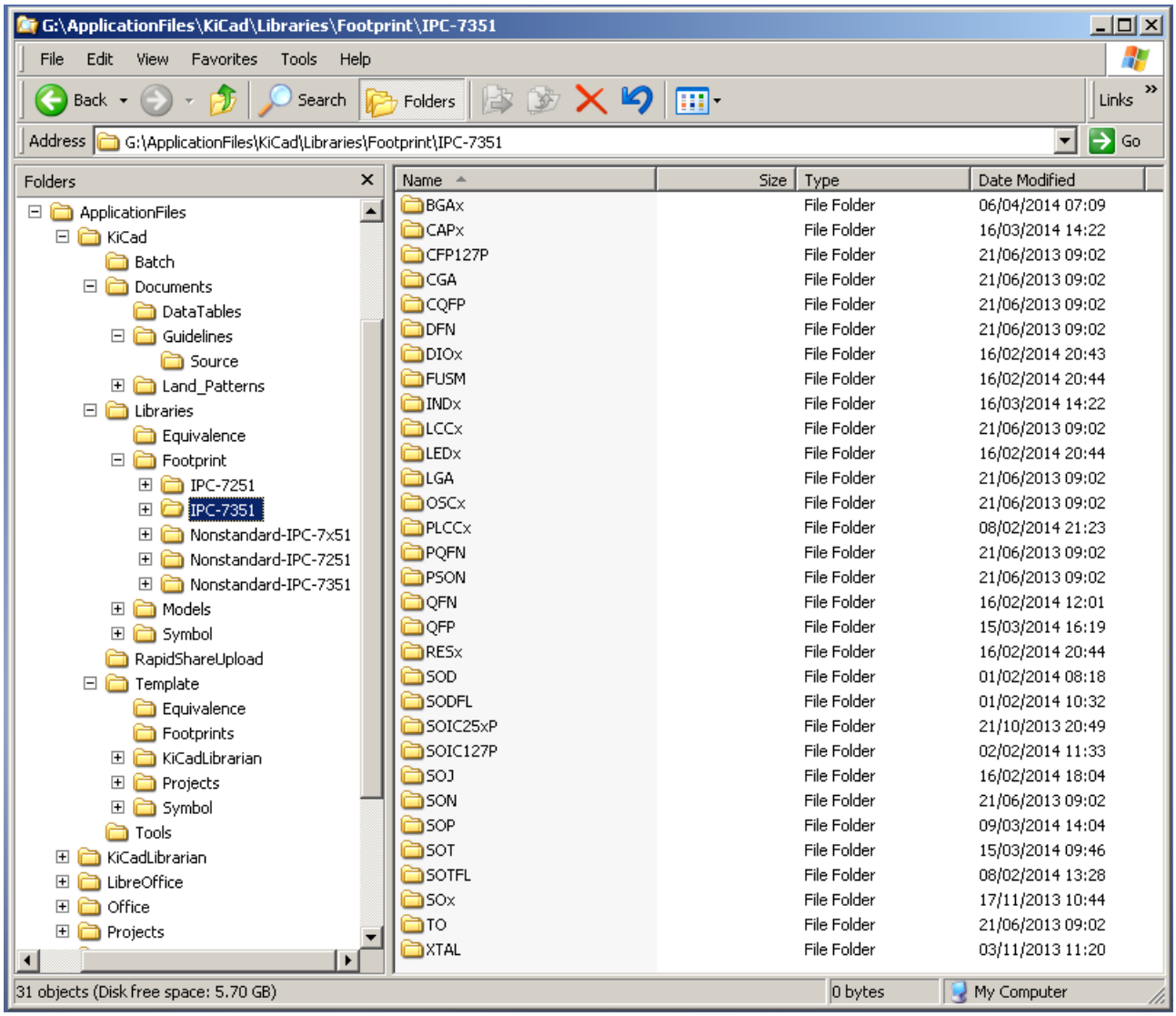
7 Subfolder name when s-expression format
8 All Pitches included

LEDx	LED, Chip LED, Moulded LED, Side Concave, 2 Pin LED, Side Concave, 4 Pin	LEDC-lightEmittingDiodeChip LEDM-lightEmittingDiodeMoulded LEDSC-lightEmittingDiodeConcave2Pin LEDSC-lightEmittingDiodeConcave4Pin
OSCx	Oscillators, Side Concave Oscillators, J-Lead Oscillators, L-Bend Lead Oscillators, Corner Concave	OSCSC-oscillatorsSideConcave OSCJ-oscillatorsJlead OSCL-oscillatorsLbendLead OSCCC-oscillatorsCornerConcave
PLCCx	Plastic Leaded Chip Carriers Plastic Leaded Chip Carrier Sockets Square	PLCC-plasticLeadedChipCarriers PLCCS-plasticLeadedChipCarrierSocketsSquare
QFP	Quad Flat Packages	QFP30P-quadFlatPackages QFP40P-quadFlatPackages QFP50P-quadFlatPackages QFP635P-quadFlatPackages QFP65P-quadFlatPackages QFP80P-quadFlatPackages QFP100P-quadFlatPackages
CQFP	Ceramic Quad Flat Packages	CQFP-ceramicQuadFlatPackages
QFN	Quad Flat No-lead	QFN35P-quadFlatNoLeadPackages QFN40P-quadFlatNoLeadPackages QFN50P-quadFlatNoLeadPackages QFN55P-quadFlatNoLeadPackages QFN65P-quadFlatNoLeadPackages QFN70P-quadFlatNoLeadPackages QFN80P-quadFlatNoLeadPackages QFN90P-quadFlatNoLeadPackages
PQFN	Pull-back Quad Flat No-lead	PQFN40P-pullBackQuadFlatNoLead PQFN50P-pullBackQuadFlatNoLead PQFN65P-pullBackQuadFlatNoLead PQFN80P-pullBackQuadFlatNoLead
LCCx	Quad Leadless Ceramic Chip Carriers Quad Leadless Ceramic Chip Carriers (Pin 1 on Side)	LCC-quadLeadlessCeramicChipCarriers LCCS-quadLeadlessCeramicChipCarriersSide
RESx	Resistors, Chip Resistors, Moulded Resistors, MELF Resistors, Chip Array, 2-Side, 4-Side, Concave Resistors, Chip Array, Convex, E-Version (Even Pin Size) Resistors, Chip Array, Convex, S-Version (Side Pins Diff) Resistors, Chip Array, 2-Side, 4-Side, Flat	RESC-resistorsChip RESM-resistorsMoulded RESMELF-resistorsMELF RESCAV-resistorsChipArrayConcave RESCAXE-resistorsChipArrayConvexE RESCAXS-resistorsChipArrayConvexS RESCAF-resistorsChipArrayFlat
SODFL	Small Outline Diodes, Flat Lead	SODFL-smallOutlineDiodesFlatLead
SOJ	Small Outline IC, J-Leaded	SOJ-smallOutlineJleaded
SOIC127P	Small Outline Integrated Circuit, (50 mil Pitch SOIC)	SOIC127P-smallOutlineIntegratedCircuit
SOIC25xP	Small Outline Integrated Circuit, (100 mil Pitch SOIC)	SOIC25xP-smallOutlineIntegratedCircuit
SOP	Small Outline Packages	SOP30P-smallOutlinePackage SOP40P-smallOutlinePackage SOP50P-smallOutlinePackage SOP55P-smallOutlinePackage SOP635P-smallOutlinePackage SOP65P-smallOutlinePackage SOP80P-smallOutlinePackage SOP100P-smallOutlinePackage SOP147P-smallOutlinePackage SOP192P-smallOutlinePackage
SON	Small Outline No-lead	SON-smallOutlineNoLead
PSON	Pull-back Small Outline No-lead	PSON-pullBackSmallOutlineNoLead
SOTFL	Small Outline Transistors, Flat Lead	SOTFL-smallOutlineTransistorsFlatLead (SOT-89)
SOD	Small Outline Diodes	SOD-JEDEC
SOT	SOT (JEDEC Standard Packages)	SOT143-JEDEC[9]

9 Includes SOT143R-JEDEC

		SOT343-JEDEC[10] SOT23-JEDEC SOT223-JEDEC SOT26-JEDEC SOT323-JEDEC SOT363-JEDEC
TO	TO (Generic DPAK)	TO-genericDPAK
SOx	Integrated Circuit, Chip Array, 2-Side, Flat Integrated Circuit, Chip Array, 2-Side, Concave	SOCAF-integratedCircuitsChipArrayFlat SOCAV-integratedCircuitsChipArrayConcave

Example: G:\ApplicationFiles\KiCad\Libraries\Footprint\IPC-7351\RESx\RESC-resistorsChip.pretty



10 Includes SOT343R-JEDEC

2.3.4 Non-Standard IPC-7351 Surface Mount Land Pattern Library Naming Convention

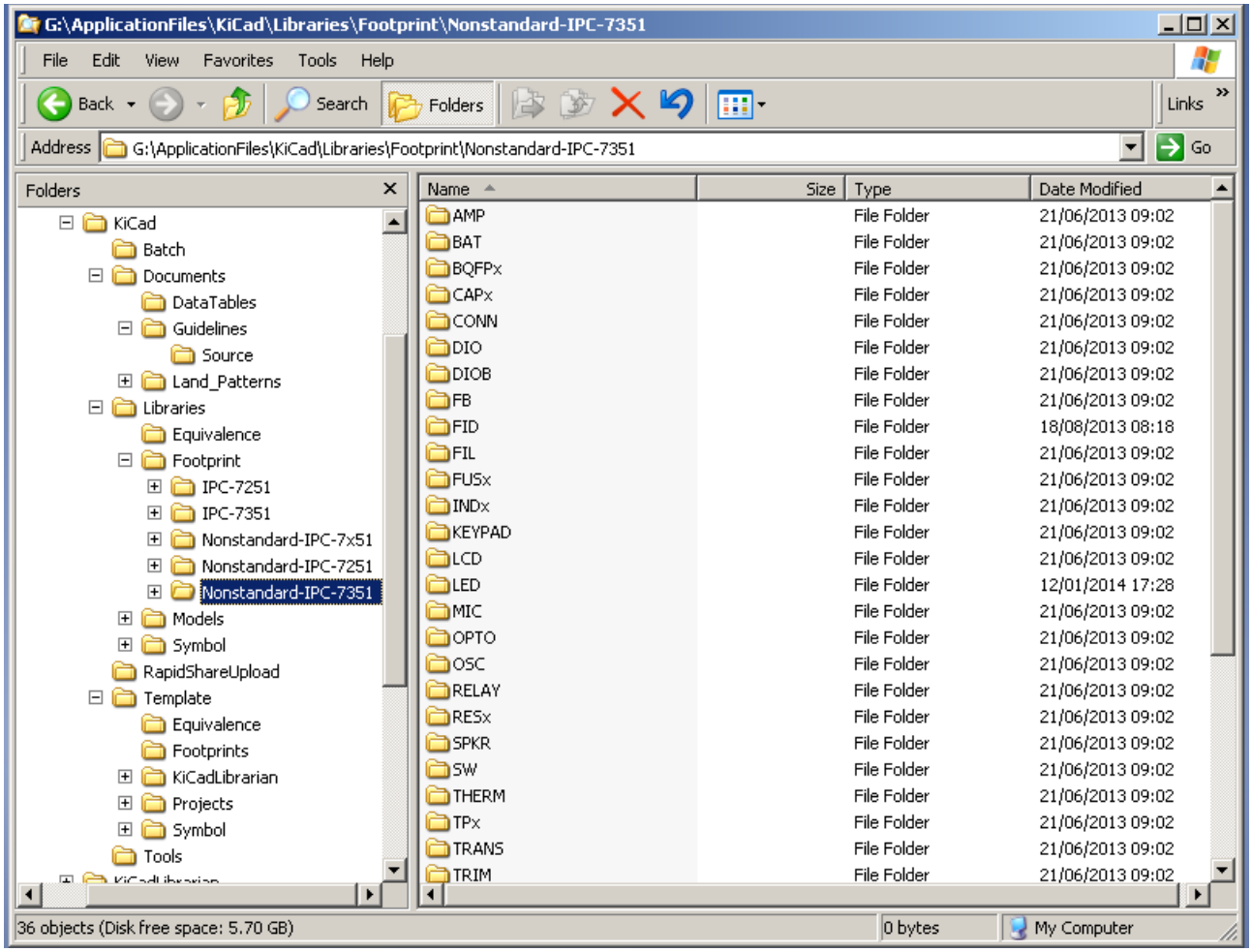
Non-standard Surface Mount Land Patterns that can be designated according to IPC-7351 are contained in files located in folders using IPC- 7351 conventions, under ..\KiCad\Libraries\Footprint\Nonstandard-IPC-7351:

Folder Name	Description	Subfolder[11] / Filename(s) [*.mod]
AMP	Amplifiers	AMP-amplifiers
BAT	Batteries	BAT-batteries
CAPx	Capacitors, Variable Capacitors, Chip, Array, Concave (Pins on 2 or 4 sides) Capacitors, Chip, Array, Flat (Pins on 2 sides) Capacitors, Miscellaneous	CAPV-capacitorsVariable CAPCAV-capacitorsChipArrayConcave CAPCAF-capacitorsChipArrayFlat CAP-capacitorsMiscellaneous
XTAL	Crystals	XTAL-crystalOscillator
DIO	Diodes, Miscellaneous	DIO-diodesMiscellaneous
DIOB	Diodes, Bridge Rectifiers	DIOB-bridgeRectifiers
FB	Ferrite Beads	FB-ferriteBeads
FID	Fiducials	FID-fiducials
FIL	Filters	FIL-filters
FUSx	Fuses Fuses, Resettable	FUSE-fuses FUSER-fusesResettable
INDx	Inductors, Miscellaneous Inductors, Chip, Array, Concave (Pins on 2 or 4 sides) Inductors, Chip, Array, Flat (Pins on 2 sides)	IND-inductorsMiscellaneous INDCAV-inductorsChipArrayConcave INDCAF-inductorsChipArrayFlat
KEYPAD	Keypad	KEYPAD
LED	LED	LED-lightEmittingDiodes
LCD	Liquid Crystal Display	LCD-liquidCrystalDisplay
MIC	Microphones	MIC-microphones
OPTO	Opto Isolators	OPTO-optoisolators
OSC	Oscillators	OSC-oscillators
BQFx	Quad Flat Packages w/Bumper Corners, Pin 1 Side Quad Flat Packages w/Bumper Corners, 1 Center	BQFPS-bumberQuadFlatPackageSide BQFPC-bumberQuadFlatPackageCenter
RESx	Resistors, Chip, Array, Concave (Pins on 2 or 4 sides) Resistors, Chip, Array, Convex Type E (Pins on 2 sides) Resistors, Chip, Array, Convex Type S (Pins on 2 sides) Resistors, Chip, Array, Flat (Pins on 2 sides)	RESCAV-resistorsChipArrayConcave RESCAXE-resistorsChipArrayConvexTypeE RESCAXS-resistorsChipArrayConvexTypeS RESCAF-resistorsChipArrayFlat
RELAY	Relays	RELAY-relays
SPKR	Speakers	SPKR-speakers
SW	Switches	SW-switches
TPx	Test Points, Round Test Points, Rectangle Test Points, Square	TP-testPointsRound TPS-testPointsSquare
THERM	Thermistors	THERM-thermistors
XCVR	Transceivers	XCVR-transceivers
XDCR	Transducers (IRDAs)	XDCR-transducersIRDA
TVSx	Transient Voltage Suppressors Transient Voltage Suppressors, Polarized	TVSP-transientVoltageSuppressorsPolarized TVS-transientVoltageSuppressors
TRANS	Transistor Outlines, Custom	TRANS-transistorOutlinesCustom
XFMR	Transformers	XFMR-transformers
TRIM	Trimmers & Potentiometers	TRIM-trimmersPotentiometers

11 Subfolder name when s-expression format

TUNER	Tuners	TUNER-tuners
VAR	Varistors	VAR-varistors
VCO	Voltage Controlled Oscillators	VCO-voltageControlledOscillator
VREG	Voltage Regulators, Custom	VREG-voltageRegulatorsCustom
CONN	Connectors	CONN-<connectors/headers>

Example: G:\ApplicationFiles\KiCad\Libraries\Footprint\Nonstandard-IPC-7351\CONN\CONN50P-headersHirose.pretty



Note: Does not show all folders

3 PCBNew Land Pattern (Module) Conventions

3.1 General

Where possible, Land Pattern dimensions are based on IPC-7251 (Though Hole) and IPC-7351 (Surface Mount) tools. See References.

3.1.1 Units

All dimensions/grids are metric.

3.1.2 Naming Convention

Where possible, Land Patterns are named according to IPC-7251 and IPC-7351. Generally, component height is not specified in the name[12].

3.1.3 Technical Layers

The Silkscreen Layer is only used to show Polarity Marks (if applicable) and the clearance area of Mounting Holes. Polarity Marks are normally indicated by a "dot" near "Pin 1"/"Positive Pin"/"Cathode". The Reference and Value fields **are not** shown on the Silkscreen Layer.

The Drawings Layer is used for Assembly Drawings and shows the Body Outline, Polarity Mark (if applicable), Pins (if applicable), Reference and Value fields.

3.1.3.1 Through Hole Technical Layers

Layer (nn)	Body Outline	Pins	Polarity Mark	Ref (T0)	Value (T1)	~~Footprint (T2)~~	Courtyard	Line Width
Silkscreen	No	No	Yes	No	No	~~No~~	N/A	0.20 mm
Drawings	Yes	Yes	Yes	Yes	Yes	~~Yes~~	N/A	0.20 mm
Comments[13]	No	No	No	No	No	~~No~~	N/A	0.05 mm

Notes:

- Body Outline should be as simple as possible and be based on the actual component body dimensions. The Body Outline also acts as a basic "Courtyard" for Through Hole components.
- *Placed on Drawings Layer.*
- Pins (where applicable) should be an approximation of the actual pin length and extend from the body of the component to the centre of the finished hole (approx).
- *Placed on Drawings Layer.*
- Polarity Mark shape on the Drawings Layer depends on the component. On the silkscreen layer it should be at least 0.40 mm from any pad and is always a "dot".
- *Placed on Silkscreen Layer.*

Technical Layers for component families are based on a "Type". Each component family is associated with a Type, which represents a particular Body Outline (shape) and Polarity Mark(s) (if applicable). For example, LEDRD and CAPPRD share common characteristics and are grouped as "PTH-PRDV" (Through Hole, Polarized, Radial Diameter, Vertical Orientation). See Appendix A.

12 The number of Land Patterns can be reduced when Height is not specified
13 Used for miscellaneous markings

3.1.3.2 Surface Mount Technical Layers

Layer (nn)	Body Outline	Pins	Polarity Mark	Ref (T0)	Value (T1)	~~Footprint (T2)~~	Courtyard	Line Width
Silkscreen	No	No	Yes	No	No	~~No~~	N/A	0.20 mm
Drawings	Yes	Yes	Yes	Yes	Yes	~~Yes~~	N/A	0.20 mm
Courtyard	No	No	No	No	No	~~No~~	Yes	0.05 mm
Comments[14]	No	No	No	No	No	~~No~~	N/A	0.05 mm

Notes:

- Body Outline should be as simple as possible and be based on the actual component body dimensions. *Placed on Drawings Layer*.
- Pins (where applicable) should be an approximation of the actual pin length and extend from the body of the component to the centre of the pad (approx).
- *Placed on Drawings Layer*.
- Polarity Mark shape on the Drawings Layer depends on the component. On the silkscreen layer it should be at least 0.4 mm from any pad and is always a "dot". *Placed on Silkscreen Layer*.
- Courtyard is based on IPC-7351.
- *Placed on Courtyard Layer*.

Technical Layers for component families are based on a "Type". Each component family is associated with a Type, which represents a particular Body Outline (shape), Polarity Mark(s) (if applicable) and Placement Courtyard. For example, SOP, SOIC and SOJ share common characteristics and are grouped as "SMD-XLDL_A". See Appendix B.

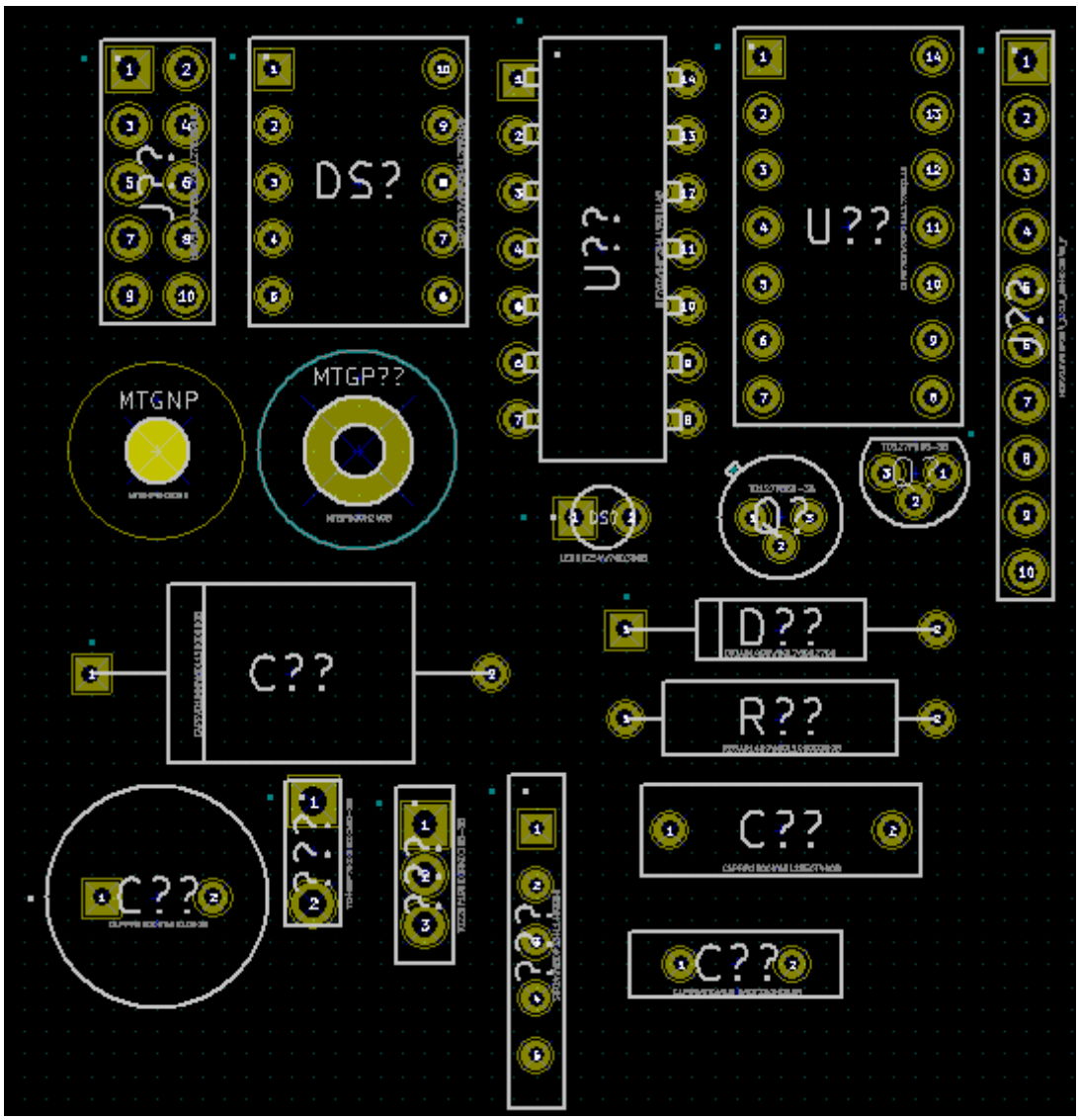
3.1.3.3 Limitations

The Drawings and Comments layers are not "Paired" Layers, so if a component is placed on the opposite side of the PCB, only the Silkscreen Layer will follow the component. A possible alternative is to use the e.c.o.1 & 2 and Adhesive 1 & 2 layers as replacements for the Drawings & Comments layers.

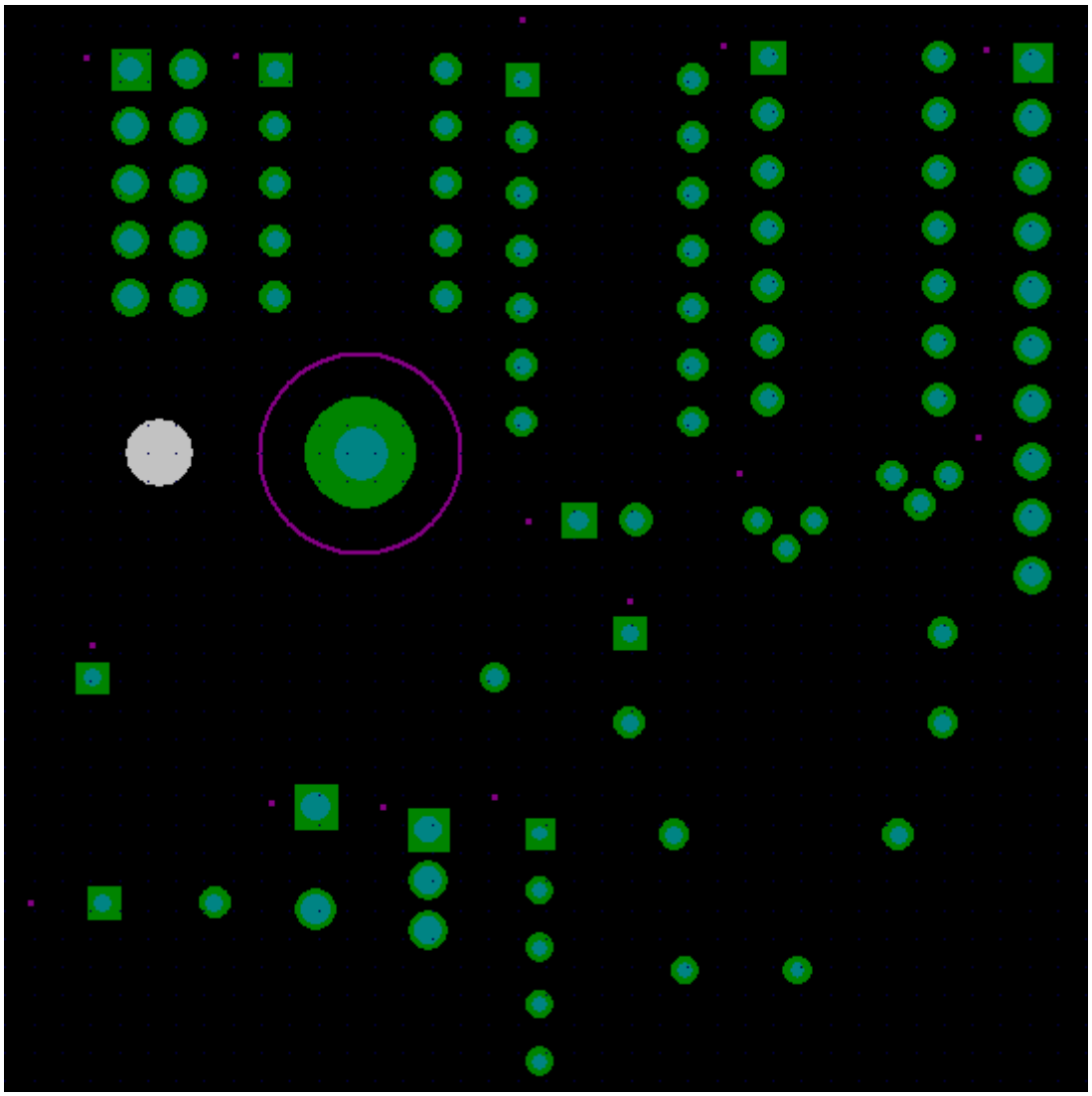
14 Used for miscellaneous markings

3.1.3.4 PTH Technical Layers Example

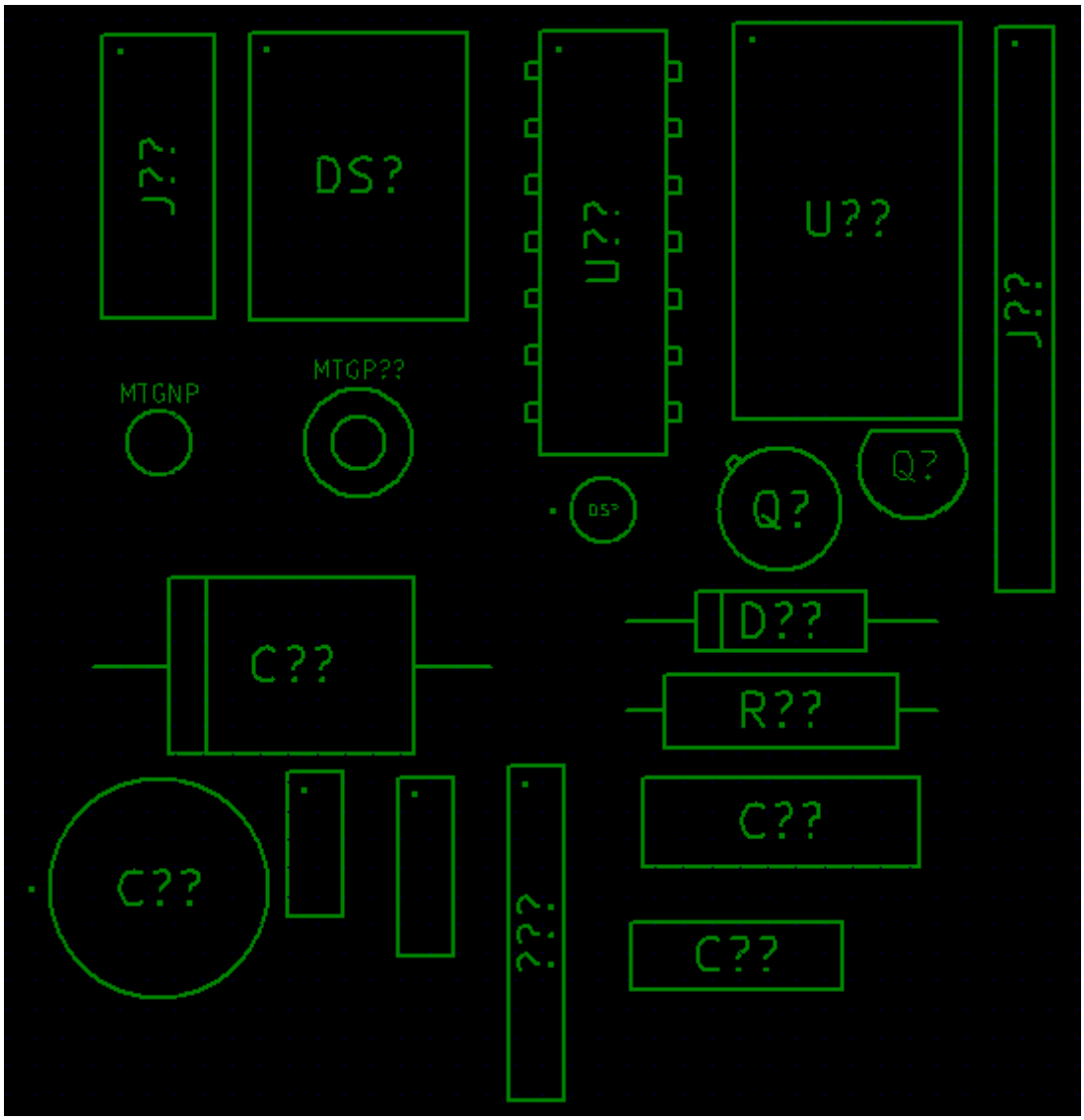
3.1.3.4.1 PCBNew – All Layers Visible



3.1.3.4.2 GerbView – Silkscreen Layer + Front Copper + Drill

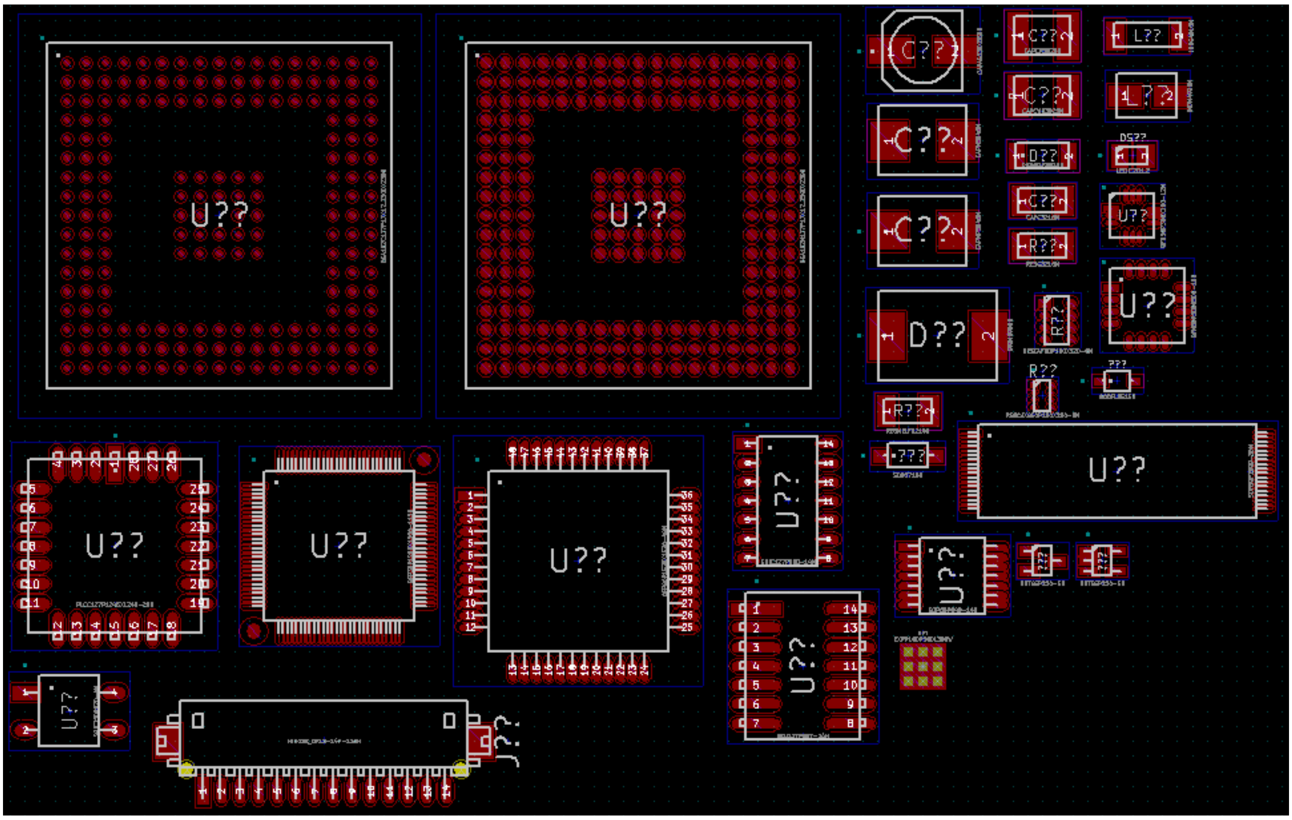


3.1.3.4.3 GerbView – Drawings (Assembly Drawing)

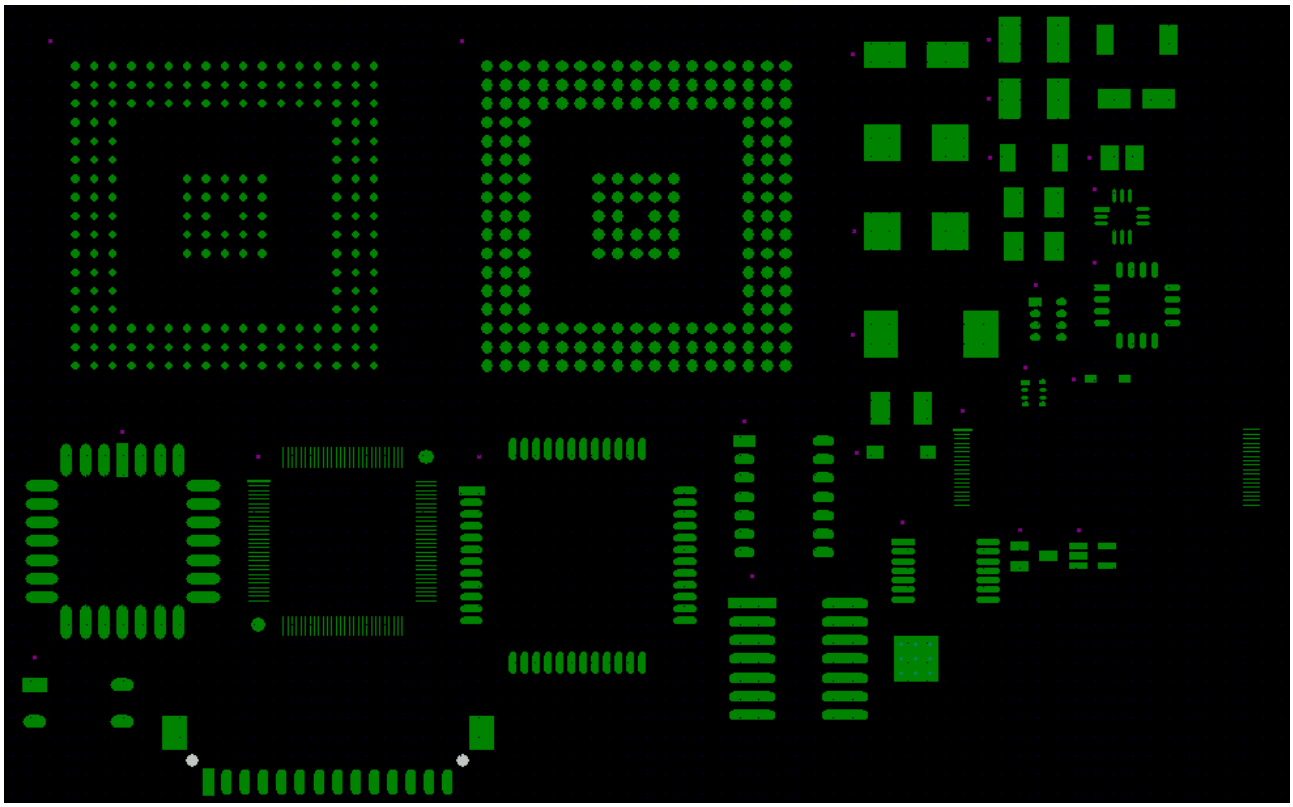


3.1.3.5 SMD Technical Layers Example

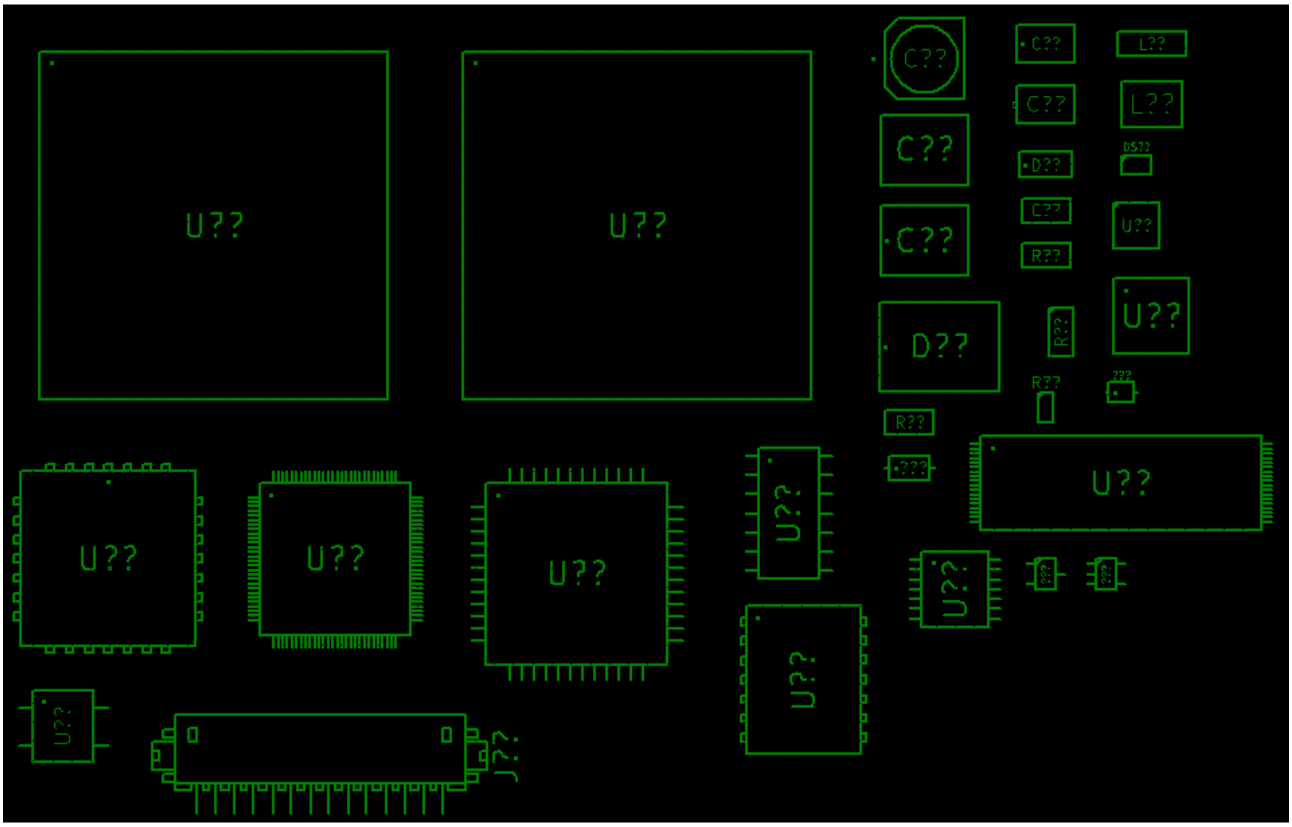
3.1.3.5.1 PCBNew – All Layers Visible



3.1.3.5.2 GerbView – Silkscreen Layer + Front Copper + NPTH + PTH Drill



3.1.3.5.3 GerbView – Drawings (Assembly Drawing)



3.1.4 Module Properties

The Module Properties fields in PCBNew are represented by different attributes within the module files depending on file format:

PCBNew Module Properties	V1, V2 (*.mod)	s-expression (*.kicad_mod)
Doc	Cd	(descr)
Footprint Name in Lib	$MODULE, Li	(lib:module)
Keywords	Kw	(tags)
Reference	T0	(fp_text reference)
Value	T1	(fp_text value)
Attributes, PTH (Normal)	-	-
Attributes, SMD (Normal+Insert)	At SMD	(attr smd)

3.1.4.1 Doc Field

Description of Land Pattern. This is the Land Pattern Name and is the same as 3.1.4.2.

3.1.4.2 Footprint Name in Lib Field

Land Pattern Name in IPC format when applicable

3.1.4.3 Keywords Field

Keywords are set in a hierarchical order:

[IPC-7521 or IPC-7521] [PTH or SMD] <Land_Pattern_Type> [Manufacturers Part Number]

e.g. “IPC-7251 PTH CAPPAD”, “IPC-7351 SMD BGA BGA50P BGAC Ball-Grid Array Collapsable NSMD Microstar GHZ 151”, “PTH CONN Connector HDR Header Male MOLEX KK100”

3.1.4.4 Attributes Field

Set depending on Land Pattern type:

- Normal: PTH Land Patterns
- Normal + Insert: SMD Land Patterns
- Virtual: Virtual Land Patterns

3.1.4.5 Reference and Value Text Fields

These values are common to all PTH and SMD Components[15] except Fiducials[16]

Component Reference is on the Drawings Layer and visible. The designator is placed in the centre of the body outline by default, or if this is not possible due to lack of space, placed above the top of the component. Size of text is adjusted to allow placement of the reference inside the body outline allowing for at least two digits (see 3.1.4.5.1).

15 These values are taken from “The CAD Library”, chapter “Reference Designators”. See References
16 Reference and Value Text is 0.254 mm x 0.254 mm with width of 0.0254 mm

3.1.4.5.1 Reference Text Dimensions

Height: 1.50 mm Width: 0.150 mm (preferred)

Height: 1.25 mm Width: 0.125 mm

Height: 1.00 mm Width: 0.100 mm

Height: 0.75 mm Width: 0.075 mm

Height: 0.50 mm Width: 0.050 mm

3.1.4.5.2 Value Text Dimensions

Component Value is on the Drawings Layer and not visible. Size of text is 0.254 mm x 0.254 mm with width of 0.0254 mm.

3.1.5 Pad Properties

3.1.5.1 PTH/NPTH

- F.Adhes No
- B.Adhes No
- F.Paste No
- B.Paste No
- F.SilkS No
- B.SilkS No
- F.Mask **Yes***
- B.Mask **Yes***
- Dwgs.User No
- Eco1.User No
- Eco2.User No

3.1.5.2 SMD

- F.Adhes No
- B.Adhes No
- F.Paste **Yes**
- B.Paste No
- F.SilkS No
- B.SilkS No
- F.Mask **Yes**
- B.Mask No
- Dwgs.User No
- Eco1.User No
- Eco2.User No

* Not applicable for PTH pads used for Thermal Vias.

3.1.6 Land Pattern Orientation

3.1.6.1 Through-Hole Land Pattern Orientation

The libraries follow IPC guidelines:

- Axial Lead Capacitors, Resistors, Diodes and Inductors (RES, CAP, DIO and IND) – *Pin 1 (Positive or Cathode) on Left*
- Radial Lead Capacitors (CAP) – *Pin 1 (Positive) on Left*
- Dual-in-line Packages (DIP) – *Pin 1 Left – Upper*
- Three Leaded Semiconductor – *Pin 1 Left – Upper*
- Pin Grid Array (PGA) – *Pin 1 Left – Upper*
- Unique Multiple function Parts – *Pin 1 Left – Upper*
- Connectors & Headers (HDR) – *Pin 1 Left – Upper*
- Single-In-line Package (SIP) Single In-Line Networks – *Pin 1 Left – Upper*

3.1.6.2 Surface Mount Land Pattern Orientation

The libraries follow IPC guidelines:

- Chip Capacitors, Resistors and Inductors (RES, CAP and IND) – *Pin 1 (Positive) on Left*
- Moulded Inductors (INDM), Resistors (RESM), Moulded Polarized Capacitors (CAPMP) – *Pin 1 (Positive) on Left*
- Precision Wire-wound Inductors – *Pin 1 (Positive) on Left*
- MELF Diode – *Pin 1 (Cathode) on Left*
- SOD(FL) Diodes – *Pin 1 (Cathode) on Left*
- Aluminium Electrolytic Capacitors – *Pin 1 (Positive) on Left*
- SOT(FL) Devices (SOT23, SOT23-5, SOT223, SOT89, SOT143, etc.) – *Pin 1 Upper Left*
- TO252 & TO263 (DPAK Type) Devices – *Pin 1 Upper Left*
- Small Outline Gull-wing ICs (SOIC, SOP, SOP) – *Pin 1 Upper Left*
- Ceramic Flat Packs (CFP) – *Pin 1 Upper Left*
- Small Outline J Lead ICs (SOJ) – *Pin 1 Upper Left*
- Quad Flat Pack ICs (QFP) – *Pin 1 Upper Left*
- Ceramic Quad Flat Packs (CQFP) – *Pin 1 Upper Left*
- Bumper and Plastic Quad Flat Pack ICs (BQFP) – *Pin 1 Top Centre*
- Plastic Leaded Chip Carriers (PLCC) – *Pin 1 Top Centre*
- Leadless Chip Carriers (LCC) – *Pin 1 Top Centre*
- Leadless Chip Carriers (LCCS Pin 1 on Side) – *Pin 1 Upper Left*
- Quad Flat No-Lead ICs (QFN) – *Pin 1 Upper Left*
- Ball Grid Arrays (BGA) – *Pin A1 Upper Left*

3.1.7 Pad Numbering

Pad numbering is numeric by default. Land Patterns that are composed of columns and rows, such as BGA etc. use alphanumeric numbering.

3.1.8 Default Pads Mask Clearance

Solder mask clearance: 0.0 mm

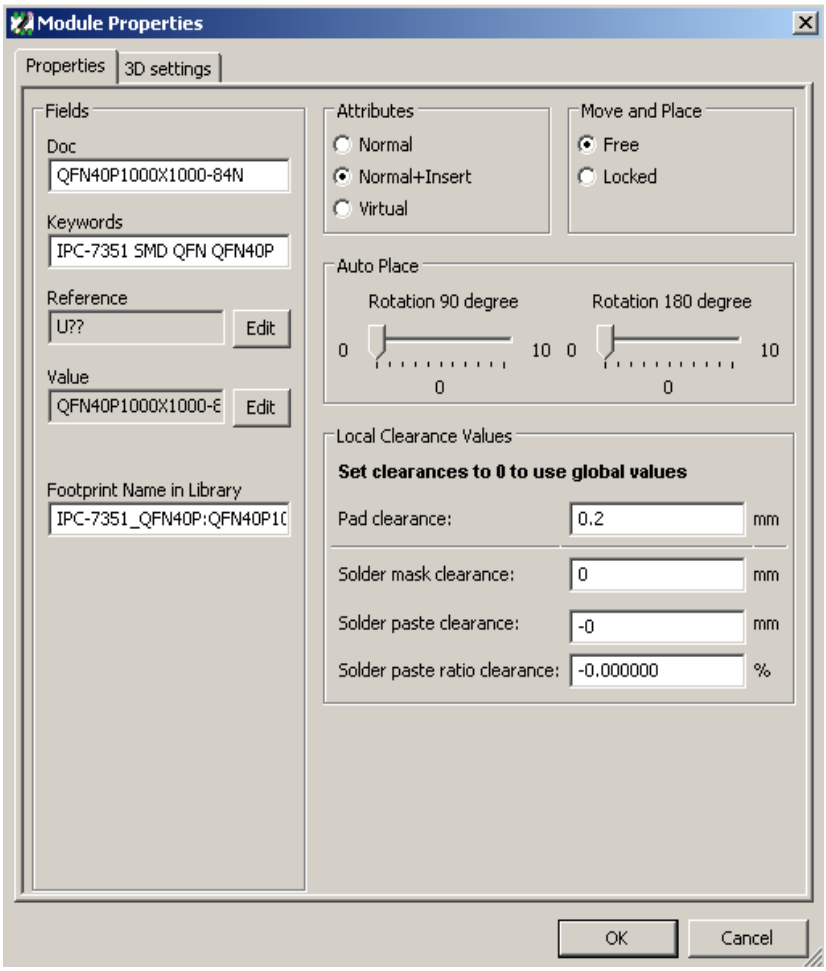
Solder paste clearance: -0.0 mm

Solder mask ratio clearance: -0.0%

Solder Mask and Solder Paste clearances are a ratio of 1:1 of the Pad size. The only exceptions to this are for Non-Collapsable (Soldermask defined) BGA Land Patterns, Fiducial marks and Mounting Holes. *This applies to all Land Patterns.*

3.1.9 Pad Clearance

Pad clearance is set on Land Pattern level. Each Land Pattern is created with a *minimum* Pad clearance of 0.21 mm and the clearance setting in "Module Parameters" is 0.20 mm to ensure successful DRC. *This applies to all Land Patterns.*



3.2 Through Hole Land Patterns

3.2.1 General

3.2.1.1 Land Pattern Names

Names are based on IPC-7251. Three versions of each Land Pattern can exist, suffixed with the "Density (Fabrication) Level" ("A", "B", or "C").

Density Level A: Maximum Land/Lead to Hole Relationship – The 'maximum' land pattern conditions have been developed to accommodate the most robust producability of the solder application method. The geometry furnished may provide a wider process window for solder processing. The level A land patterns are usually associated with low component density product applications.

Density Level B: Nominal Land/Lead to Hole Relationship – Products with a moderate level of component density may consider adapting the 'median' land pattern geometry. The median land patterns furnished for all device families will provide a robust solder attachment condition for most soldering processes and should provide a condition suitable for wave, dip, drag or reflow soldering.

Density Level C: Least Land/Lead to Hole Relationship – High component density typical of portable and hand-held product applications may consider the 'minimum' land pattern geometry variation. Selection of the minimum land pattern geometry may not be suitable for all product use categories.

3.2.1.2 VeeCAD Compatible Land Pattern Names

To assign VeeCAD Land Pattern Names, dummy Land Patterns are used. These Land Patterns use a suffix "V". See 3.7.

3.2.1.3 Pad Shapes

The default pad shape is round. Pads that indicate polarity, or "Pin No. 1" are square.

3.2.1.4 Pad and Hole (Drill) Dimensions

Pad and Hole dimensions use IPC-7251 Padstack data, according to http://www.mentor.com/resources/appnotes/upload/level-a-land-pattern-construction.pdf. "Drill" dimensions are always specified as the "Finished Hole" size.

3.2.1.5 Axial Pad Spacing

To reduce the number of pad spacings, the values in the table below are used. The distance between pads is dependant on component body length and lead diameter:

Body Length	Lead Diameter	Pad Space
≤ 6.99 mm	≤ 1.00 mm	10.00 mm
	> 1.00 mm	14.00 mm
7.00 mm to 10.99 mm	≤ 1.00 mm	14.00 mm
	> 1.00 mm	18.00 mm
11.00 mm to 14.99 mm	≤ 1.00 mm	18.00 mm
	> 1.00 mm	24.00 mm
15.00 mm to 20.99 mm	≤ 1.00 mm	24.00 mm
	> 1.00 mm	28.00 mm
21.00 mm to 24.99 mm	≤ 1.00 mm	28.00 mm
	> 1.00 mm	34.00 mm
25.00 mm to 30.99 mm	≤ 1.00 mm	34.00 mm
	> 1.00 mm	38.00 mm
31.00 mm to 34.99 mm	≤ 1.00 mm	38.00 mm
	> 1.00 mm	44.00 mm
35.00 mm to 40.99 mm	≤ 1.00 mm	44.00 mm
	> 1.00 mm	48.00 mm
41.00 mm to 44.99 mm	≤ 1.00 mm	48.00 mm
	> 1.00 mm	54.00 mm
45.00 mm to 50.99 mm	≤ 1.00 mm	54.00 mm
	> 1.00 mm	58.00 mm
51.00 mm to 54.99 mm	≤ 1.00 mm	58.00 mm
	> 1.00 mm	64.00 mm
55.00 mm to 60.99 mm	≤ 1.00 mm	64.00 mm
	> 1.00 mm	68.00 mm
61.00 mm to 64.99 mm	≤ 1.00 mm	68.00 mm
	> 1.00 mm	74.00 mm

3.3 Standard IPC-7251 Through Hole Land Patterns

3.3.1 CAPAD-capacitorsNonPolarizedAxialDiameter

-

3.3.2 CAPADV-capacitorsNonPolarizedAxialDiameterVertical

-

3.3.3 CAPAR-capacitorsNonPolarizedAxialRectangular

-

3.3.4 CAPARV-capacitorsNonPolarizedAxialRectangularVertical

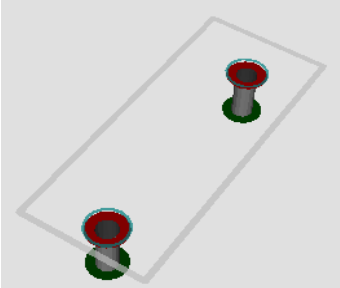
-

3.3.5 CAPRD-capacitorsNonPolarizedRadialDiameter

-

3.3.6 CAPRR-capacitorsNonPolarizedRadialRectangular

This file contains Land Patterns for Non-polarized Capacitors with radial leads, mounted vertically. This category contains Box (potted) and Dipped types.



3.3.6.1 Format

KiCad

3.3.6.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH CAPRR
- Reference: C??
- Value: <IPC Land Pattern Name>
- Attributes: Normal (“At” field not present)

3.3.6.3 IPC Land Pattern Name

CAPRR + Lead Spacing + **W** Lead Width + **L** Body Length + **T** Body thickness + Fabrication Level

e.g. CAPRR1000W60L1250T400B

3.3.6.4 Pad Shapes

3.3.6.4.1 Default

Round

3.3.6.4.2 Pin Indicating Polarity

N/A

3.3.6.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.3.6.6 Pads mask clearance

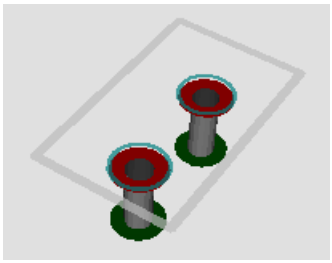
As Default (3.1.8)

3.3.6.7 Technical Layers

PTH-NRRV (5.8)

3.3.7 CAPRB-capacitorsNonPolarizedRadialDiscButton

This file contains Land Patterns for Non-polarized Capacitors with radial leads, mounted vertically. This category contains Disc Button type.



3.3.7.1 Format

KiCad

3.3.7.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH CAPRB
- Reference: C??
- Value: <IPC Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.3.7.3 IPC Land Pattern Name

CAPRB + Lead Spacing + **W** Lead Width + **L** Body Length + **T** Body thickness + **H** Body Height + Fabrication Level

e.g. CAPRB1000W60L1500T500H1500B

3.3.7.4 Pad Shapes

3.3.7.4.1 Default

Round

3.3.7.4.2 Pin Indicating Polarity

N/A

3.3.7.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.3.7.6 Pads mask clearance

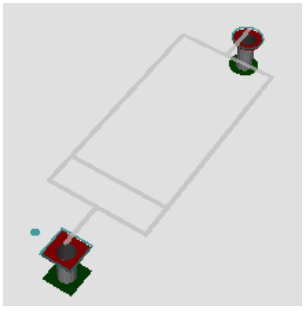
As Default (3.1.8)

3.3.7.7 Technical Layers

PTH-NRRV (5.8)

3.3.8 CAPPAD-capacitorsPolarizedAxialDiameter

This file contains Land Patterns for Polarized Capacitors with axial leads, mounted horizontally.



3.3.8.1 Format

KiCad

3.3.8.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH CAPPAD
- Reference: C??
- Value: <IPC Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.3.8.3 IPC Land Pattern Name

CAPPAD + Lead Spacing + **W** Lead Width + **L** Body Length + **D** Body Diameter + Fabrication Level

e.g. CAPPAD1400W60L1000D450B

3.3.8.4 Pad Shapes

3.3.8.4.1 Default

Round

3.3.8.4.2 Pin Indicating Polarity

Square

3.3.8.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.3.8.6 Pads mask clearance

As Default (3.1.8)

3.3.8.7 Technical Layers

PTH-PAAH (5.4)

3.3.9 CAPPADV-capacitorsPolarizedAxialDiameterVertical

This file contains Land Patterns for Polarized Capacitors with axial leads, mounted Vertically.

3.3.9.1 Format

KiCad

3.3.9.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH CAPPADV
- Reference: C??
- Value: <IPC Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.3.9.3 IPC Land Pattern Name

CAPPADV + Lead Spacing + **W** Lead Width + **L** Body Length + **D** Body Diameter + Fabrication Level

e.g.

3.3.9.4 Pad Shapes

3.3.9.4.1 Default

Round

3.3.9.4.2 Pin Indicating Polarity

Square

3.3.9.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.3.9.6 Pads mask clearance

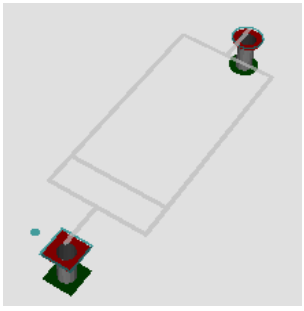
As Default (3.1.8)

3.3.9.7 Technical Layers

PTH-PADV (5.15)

3.3.10 CAPPAR-capacitorsPolarizedAxialRectangular

This file contains Land Patterns for Rectangular Polarized Capacitors with axial leads, mounted horizontally.



3.3.10.1 Format

KiCad

3.3.10.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH CAPPAR
- Reference: C??
- Value: <IPC Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.3.10.3 IPC Land Pattern Name

CAPPAR + Lead Spacing + **W** Lead Width + **L** Body Length + **T** Body Thickness + Fabrication Level

e.g.

3.3.10.4 Pad Shapes

3.3.10.4.1 Default

Round

3.3.10.4.2 Pin Indicating Polarity

Square

3.3.10.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.3.10.6 Pads mask clearance

As Default (3.1.8)

3.3.10.7 Technical Layers

PTH-PAAH (5.4)

3.3.11 CAPPARV-capacitorsPolarizedAxialRectangularVertical

This file contains Land Patterns for Rectangular Polarized Capacitors with axial leads, mounted vertically.

3.3.11.1 Format

KiCad

3.3.11.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH CAPPARV
- Reference: C??
- Value: <IPC Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.3.11.3 IPC Land Pattern Name

CAPPARV + Lead Spacing + **W** Lead Width + **L** Body Length + **T** Body Thickness + Fabrication Level

e.g.

3.3.11.4 Pad Shapes

3.3.11.4.1 Default

Round

3.3.11.4.2 Pin Indicating Polarity

Square

3.3.11.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.3.11.6 Pads mask clearance

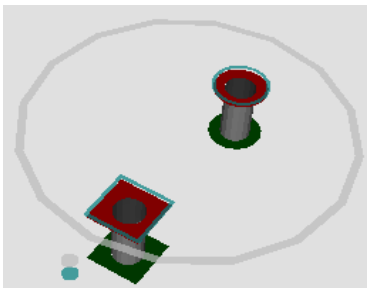
As Default (3.1.8)

3.3.11.7 Technical Layers

PTH-PARV (5.17)

3.3.12 CAPPRD-capacitorsPolarizedRadialDiameter

This file contains Land Patterns for Polarized Capacitors with radial leads, mounted vertically.



3.3.12.1 Format

KiCad

3.3.12.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH CAPPRD
- Reference: C??
- Value: <IPC Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.3.12.3 IPC Land Pattern Name

CAPPRD + Lead Spacing + **W** Lead Width + **D** Body Diameter + **H** Body Height + Fabrication Level

e.g. CAPPRD250W45D400B

3.3.12.4 Pad Shapes

3.3.12.4.1 Default

Round

3.3.12.4.2 Pin Indicating Polarity

Square

3.3.12.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.3.12.6 Pads mask clearance

As Default (3.1.8)

3.3.12.7 Technical Layers

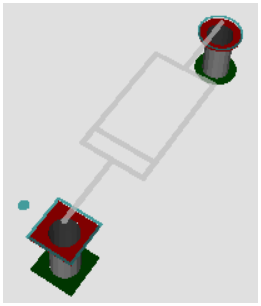
PTH-PRDV (5.6)

3.3.13 CAPPRR-capacitorsPolarizedRadialRectangular

-

3.3.14 DIOAD-diodesAxialDiameter

This file contains Land Patterns for Diodes and Thyristors with axial leads, mounted horizontally.



3.3.14.1 Format

KiCad

3.3.14.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH DIOAD <JEDEC No.>
- Reference: D??
- Value: <IPC Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.3.14.3 IPC Land Pattern Name

DIOAD + Lead Spacing + **W** Lead Width + **L** Body Length + **D** Body Diameter + Fabrication Level

e.g. DIOAD1000W55L300D170B

3.3.14.4 Pad Shapes

3.3.14.4.1 Default

Round

3.3.14.4.2 Pin Indicating Polarity

Square

3.3.14.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.3.14.6 Pads mask clearance

As Default (3.1.8)

3.3.14.7 Technical Layers

PTH-PAAH (5.4)

3.3.15 DIOADV-diodesAxialDiameterVertical

-

3.3.16 DIOAD-diodesAxialRectrangular

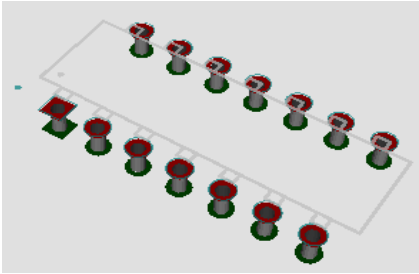
-

3.3.17 DIOARV-diodesAxialRectangularVertical

-

3.3.18 DIP-dualInlinePackages

This file contains Land Patterns for Dual in-line packages for Integrated Circuits.



3.3.18.1 Format

KiCad

3.3.18.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH DIP DIPn<lead_space (mil)> e.g. DIP14300
- Reference: U??
- Value: <IPC Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.3.18.3 IPC Land Pattern Name

DIP + Lead Span + **W** Lead Width + **P** Pin Pitch + **L** Body Length + **Q** Pin Qty + Fabrication Level

e.g. DIP762W60P254L1900Q14B

3.3.18.4 Pad Shapes

3.3.18.4.1 Default

Round

3.3.18.4.2 Pin Indicating Polarity

Square

3.3.18.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.3.18.6 Pads mask clearance

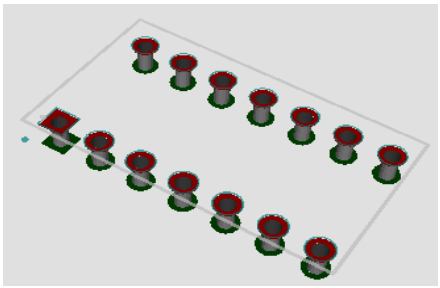
As Default (3.1.8)

3.3.18.7 Technical Layers

PTH-XILX_A (5.2)

3.3.19 DIPS-dualInlineSockets

This file contains Land Patterns for Dual in-line sockets for Integrated Circuits.



3.3.19.1 Format

KiCad

3.3.19.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH DIPS DIPn<lead_space (mil)> e.g. DIPS14300
- Reference: U??
- Value: <IPC Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.3.19.3 IPC Land Pattern Name

DIPS + Lead Span + **W** Lead Width + **P** Pin Pitch + **L** Body Length + **Q** Pin Qty + Fabrication Level

e.g. DIPS762W70P254L2032Q16B

3.3.19.4 Pad Shapes

3.3.19.4.1 Default

Round

3.3.19.4.2 Pin Indicating Polarity

Square

3.3.19.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.3.19.6 Pads mask clearance

As Default (3.1.8)

3.3.19.7 Technical Layers

PTH-XILX_B (5.3)

3.3.20 FUSAD-fusesAxialDiameter

-

3.3.21 FUSAR-fusesAxialRectangular

-

3.3.22 FUSADV-fusesAxialDiameterVertical

-

3.3.23 FUSARV-fusesAxialRectangularVertical

-

3.3.24 FUSRD-fusesRadialDiameter

-

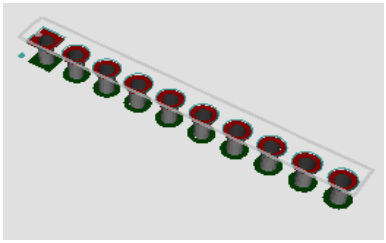
3.3.25 FUSRR-fusesRadialRectangular

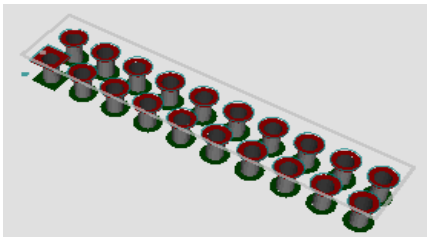
-

3.3.26 HDRV[nn]P-headerVertical

This file contains Land Patterns for Pin Strip Headers, vertically mounted. [nn] defines the pitch e.g 127P, 200P, 254. One file is defined per pitch.

These Land Patterns are obtained from http://www.reniemarquet.cjb.net/kicad.htm with modifications to orientation, Value and Reference Values, replacement of Silkscreen and Drawings Layers, Local Pad Clearances and rounding of pad dimensions.





3.3.26.1 Format

KiCad

3.3.26.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH PTH CONN Connector HDR Header
- Reference: J??
- Value: <IPC Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.3.26.3 IPC Land Pattern Name

HDRV + Total Pins + **W** Lead Width + **P** Row Pitch (+ **X** Column Pitch [if different]) + **_** Rows + **X** Pins per Row + **_** Body Length + **X** Body Thickness + Fabrication Level_Gender

e.g. HDRV12W90P254_1X12_3048X254B_F

3.3.26.4 Pad Shapes

3.3.26.4.1 Default

Round

3.3.26.4.2 Pin Indicating Polarity

Square

3.3.26.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.3.26.6 Pads mask clearance

As Default (3.1.8)

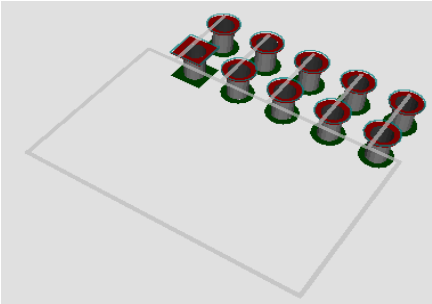
3.3.26.7 Technical Layers

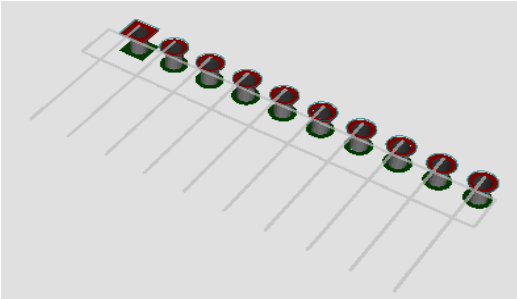
PTH-XILX_B (5.3)

3.3.27 HDRRA[nn]P-headerRightAngle

This file contains Land Patterns for Pin Strip Headers, horizontally mounted. [nn] defines the pitch e.g 127P, 200P, 254. One file is defined per pitch.

These Land Patterns are obtained from http://www.reniemarquet.cjb.net/kicad.htm with modifications to orientation, Value and Reference Values, Silkscreen to Drawings Layer conversion, Local Pad Clearances and rounding of pad dimensions.





3.3.27.1 Format

KiCad

3.3.27.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH CONN Connector HDR Header
- Reference: J??
- Value: <IPC Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.3.27.3 IPC Land Pattern Name

HDRRA + Total Pins + **W** Lead Width + **P** Row Pitch (+ **X** Column Pitch [if different]) + **_** Rows + **X** Pins per Row + **_** Body Length + **X** Body Thickness + Fabrication Level_Gender

e.g. HDRRA30W90P254_2X15_3810X508_F

3.3.27.4 Pad Shapes

3.3.27.4.1 Default

Round

3.3.27.4.2 Pin Indicating Polarity

Square

3.3.27.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.3.27.6 Pads mask clearance

As Default (3.1.8)

3.3.27.7 Technical Layers

As original, with graphics on Silkscreen Layer changed to Drawings Layer..

3.3.28 INDAD-inductorsAxialDiameter

-

3.3.29 INDADV-inductorsAxialDiameterVertical

-

3.3.30 INDAR-inductorsAxialRectangular

-

3.3.31 INDARV-inductorsAxialRectangularVertical

-

3.3.32 INDRD-inductorsRadialDiameter

-

3.3.33 INDRR-inductorsRadialRectangular

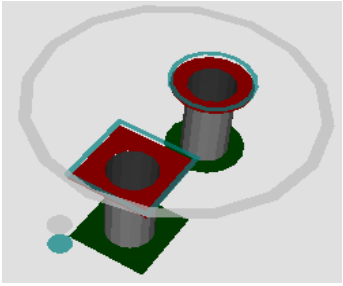
-

3.3.34 JUMP-jumpersWire

-

3.3.35 LEDRD-lightEmittingDiodesRadialDiameter

This file contains Land Patterns for Light Emitting Diodes, vertically mounted.



3.3.35.1 Format

KiCad

3.3.35.2 Module Properties

- Doc: Land Pattern Name
- Footprint Name in Lib: Land Pattern Name
- Keywords: IPC-7251 PTH LED
- Reference: DS??
- Value: Land Pattern Name
- Attributes: Normal ("At" field not present)

3.3.35.3 Land Pattern Name

LEDRD + Lead Spacing + **W** Lead Width + **D** Body Diameter + Fabrication Level

e.g. LEDRD254W70D500B

3.3.35.4 Pad Shapes

3.3.35.4.1 Default

Round

3.3.35.4.2 Pin Indicating Polarity

Square

3.3.35.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.3.35.6 Pads mask clearance

As Default (3.1.8)

3.3.35.7 Technical Layers

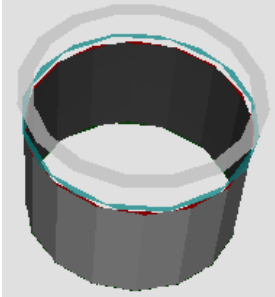
PTH-PRDV (5.6)

3.3.36 LEDRR-lightEmittingDiodesRadialRectangular

-

3.3.37 MTGNP-mountingHoleNonPlated

This file contains Land Patterns for Non-Plated Mounting Holes.



3.3.37.1 Format

KiCad

3.3.37.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH MTGNP Non-Plated Mounting Hole
- Reference: MTGNP
- Value: <IPC Land Pattern Name>
- Attributes: Normal (“At” field not present)

3.3.37.3 IPC Land Pattern Name

MTGNP + Land Size + **H** + Hole Size + Fabrication Level

e.g. MTGNP0H240B

3.3.37.4 Pad Shapes

3.3.37.4.1 Default

N/A

3.3.37.4.2 Pin Indicating Polarity

N/A

3.3.37.5 Pad and Finished Hole Dimensions

Pad Size = Finished Hole Size

3.3.37.6 Pads mask clearance (All)

3.3.37.6.1 Pad Clearance

Used as a "Keepout" area

Hole Size: 2.40 mm Clearance: 1.80 mm

Hole Size: 3.00 mm Clearance: 2.50 mm

Hole Size: 3.70 mm Clearance: 3.15 mm

Hole Size: 4.40 mm Clearance: 3.80 mm

3.3.37.6.2 Solder Paste Clearance (All)

-0.0 mm

3.3.37.6.3 Solder Mask Ratio Clearance (All)

-0.0 %

3.3.37.6.4 Solder Mask Clearance

0.0 mm

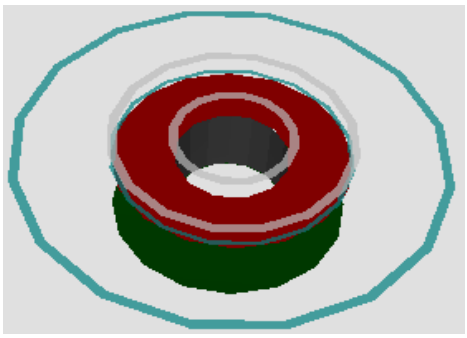
3.3.37.7 Technical Layers

Layer (nn)	Outline	
	LW (mm)	Shape
Drawings (24)	0.20	Circle. Marking Finished Hole Size

Note: LW = Line Width

3.3.38 MTGP-mountingHolePlated

This file contains Land Patterns for Plated Mounting Holes.



3.3.38.1 Format

KiCad

3.3.38.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH MTGP Plated Mounting Hole
- Reference: MTGP??
- Value: <IPC Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.3.38.3 IPC Land Pattern Name

MTGP + Land Size + **H** + Hole Size + Fabrication Level

e.g. MTGP1100H370B

3.3.38.4 Pad Shapes

3.3.38.4.1 Default

Round

3.3.38.4.2 Pin Indicating Polarity

N/A

3.3.38.5 Pad and Finished Hole Dimensions

Pad Size is approximately 2 * Finished Hole Size

3.3.38.6 Pads mask clearance (All)

3.3.38.6.1 Pad Clearance

2.00 mm

3.3.38.6.2 Solder Paste Clearance (All)

-0.0 mm

3.3.38.6.3 Solder Mask Ratio Clearance (All)

-0.0 %

3.3.38.6.4 Solder Mask Clearance

1.00 mm

3.3.38.7 Technical Layers

Layer (nn)	Outline	
	LW (mm)	Shape
Drawings (24)	0.20	Circle. Marking Pad Size Circle. Marking Finished Hole Size

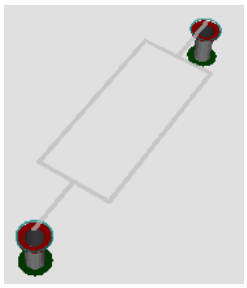
Note: LW = Line Width

3.3.39 PGA-pinGridArray

-

3.3.40 RESAD-resistorsAxialDiameter

This file contains Land Patterns for Resistors, horizontally mounted.



3.3.40.1 Format

KiCad

3.3.40.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH RESAD
- Reference: R??
- Value: <IPC Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.3.40.3 IPC Land Pattern Name

RESAD + Lead Spacing + **W** Lead Width + **L** Body Length + **D** Body Diameter + Fabrication Level

e.g. RESAD1000W50L350D200B

3.3.40.4 Pad Shapes

3.3.40.4.1 Default

Round

3.3.40.4.2 Pin Indicating Polarity

N/A

3.3.40.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.3.40.6 Pads mask clearance

As Default (3.1.8)

3.3.40.7 Technical Layers

PTH-NAAH (5.7)

3.3.41 RESADV-resistorsAxialDiameterVertical

-

3.3.42 RESAR-ressistorsAxialRectangular

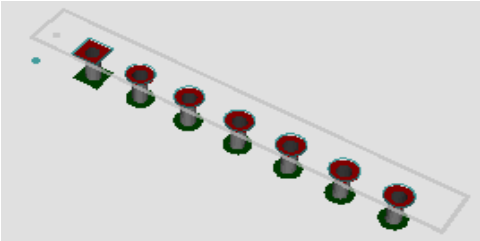
-

3.3.43 RESARV-ressistorsAxialRectangularVertical

-

3.3.44 SIP-singleInLineNetworks

This file contains Land Patterns for Single in-line packages.



3.3.44.1 Format

KiCad

3.3.44.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH SIP
- Reference: ???
- Value: <IPC Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.3.44.3 IPC Land Pattern Name

SIP + Body Width + **W** Lead Width + **P** Pin Pitch + **L** Body Length + **Q** Pin Qty + Fabrication Level

e.g. SIP249W50P254L2007Q7B

3.3.44.4 Pad Shapes

3.3.44.4.1 Default

Round

3.3.44.4.2 Pin Indicating Polarity

Square

3.3.44.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.3.44.6 Pads mask clearance

As Default (3.1.8)

3.3.44.7 Technical Layers

PTH-XILX_B (5.3)

3.3.45 TPCW-testPointsRound

-

3.3.46 TPRW-testPointsSquare

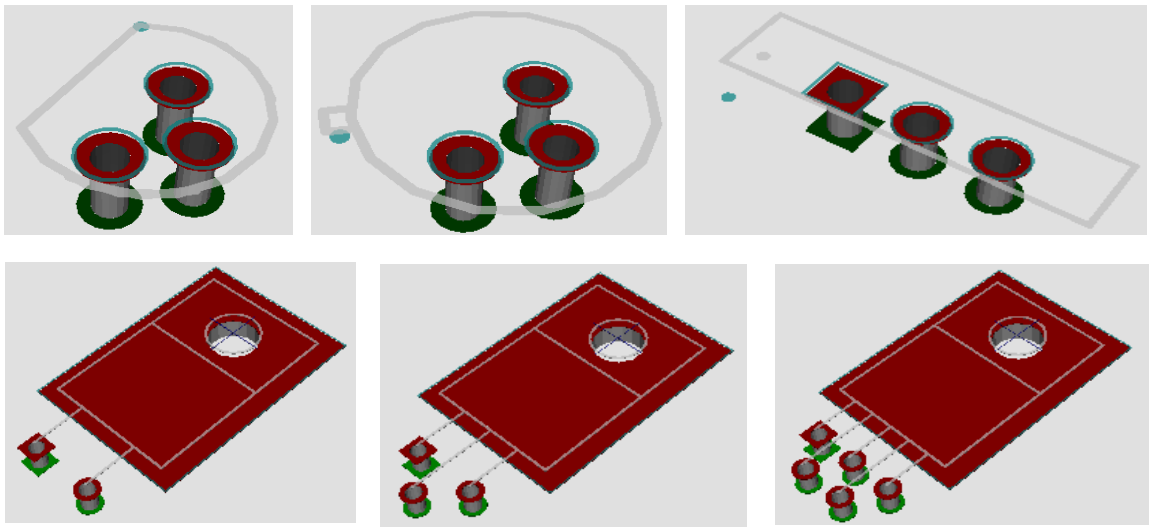
-

3.3.47 OSC-oscillators

-

3.3.48 TO-transistorOutlines

This file contains Land Patterns for Transistors. This category contains Flange Mount, Cylindrical and TO-92 types.



3.3.48.1 Format

KiCad

3.3.48.2 Module Properties, Flange Mount, Vertical

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH <JEDEC No.>
- Reference: ???
- Value: <IPC Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.3.48.2.1 IPC Land Pattern Name

TO + Pitch + **P** + Body Length **X** + Body Width **-** Pin Qty + Fabrication Level

e.g. TO458P750X650X250-2B

3.3.48.3 Module Properties, Flange Mount, Horizontal

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH <JEDEC No.>
- Reference: ???
- Value: <IPC Land Pattern Name>

3.3.48.3.1 IPC Land Pattern Name

TO + Pitch + **P** + Body Length **X** + Body Width **-** Pin Qty + Fabrication Level

e.g -

3.3.48.4 Module Properties, Cylindrical

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7251 PTH <JEDEC No.>
- Reference: ???
- Value: <IPC Land Pattern Name>

3.3.48.4.1 IPC Land Pattern Name

TO + Pitch + **P** + Body Diameter **-** Pin Qty + Fabrication Level

e.g. TO254P508_123-3B

3.3.48.5 Pad Shapes (All)

3.3.48.5.1 Default

Round

3.3.48.5.2 Pin Indicating Polarity[17]

Square

3.3.48.6 Pad and Finished Hole Dimensions (All)

According to IPC-7251

3.3.48.7 Pads mask clearance (All)

As Default (3.1.8)

3.3.48.8 Technical Layers (Flange Mount, Vertical)

PTH-XTFV (5.10)

3.3.48.9 Technical Layers (Flange Mount, Horizontal)

Manual: Body Outline (Drawings Layer), Courtyard.

3.3.48.10 Technical Layers (Cylindrical, TO-92 Type)

PTH-TO92 (5.11)

3.3.48.11 Technical Layers (Cylindrical, Metal Can Type)

PTH-XTCX (5.12)

17 The Square pin matches position of the Polarity Mark on Silkscreen/Assembly Drawing

3.3.49 PAD-wire

-

3.4 Non-Standard IPC-7251 Through Hole Land Patterns

3.4.1 AMP-amplifiers

-

3.4.2 BAT-batteries

-

3.4.3 DIOB-bridgeRectifiers

-

3.4.4 CONV-converters

-

3.4.5 XTAL-crystalOscillator

-

3.4.6 FB-ferriteBeads

-

3.4.7 FIL-filters

-

3.4.8 FUSE-fuses

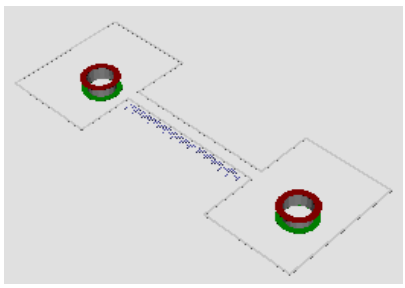
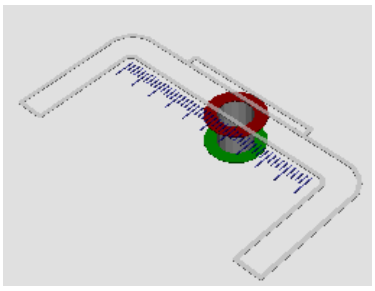
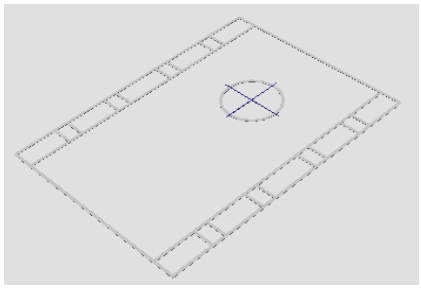
-

3.4.9 FUSER-fusesResettable

-

3.4.10 HSINK-heatSinks

This file contains Land Patterns for Heatsinks.

3.4.10.1 Format

KiCad

3.4.10.2 Module Properties

- Doc: <Land Pattern Name>
- Footprint Name in Lib: <Land Pattern Name>
- Keywords: IPC-7251 PTH CAPPAR
- Reference: HSINK??
- Value: <Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.4.10.3 Land Pattern Name

T.B.D

3.4.10.4 Pad Shapes

3.4.10.4.1 Default

N/A

3.4.10.4.2 Pin Indicating Polarity

N/A

3.4.10.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.4.10.6 Pads mask clearance

As Default (3.1.8)

3.4.10.7 Technical Layers

Manual: Body Outline (Drawings Layer).

3.4.11 IND-inductors

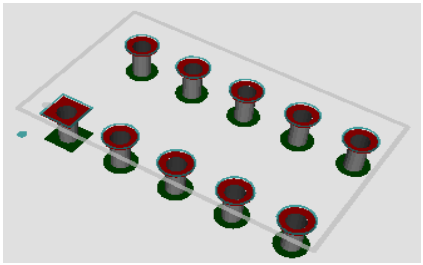
-

3.4.12 LED-lightEmittingDiodes

-

3.4.13 LED7S-7SegmentDisplays

This file contains Land Patterns for Seven-Segment Displays.



3.4.13.1 Format

KiCad

3.4.13.2 Module Properties

- Doc: <Land Pattern Name>
- Footprint Name in Lib: <Land Pattern Name>
- Keywords: IPC-7251 PTH LED7S
- Reference: DS??
- Value: <Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.4.13.3 Land Pattern Name

LED7S + Lead Span + **W** Lead Width + **P** Pin Pitch + **L** Body Length + **Q** Pin Qty_Package + Fab Level

e.g. LED7S1524W60P254L2769Q12_18B

3.4.13.4 Pad Shapes

3.4.13.4.1 Default

Round

3.4.13.4.2 Pin Indicating Polarity

Square

3.4.13.5 Pad and Finished Hole Dimensions

According to IPC-7251

3.4.13.6 Pads mask clearance

As Default (3.1.8)

3.4.13.7 Technical Layers

PTH-XILX_B (5.3)

3.4.14 LCD-liquidCrystalDisplay

-

3.4.15 MIC-microphones

-

3.4.16 MOV

-

3.4.17 OPTO-optoisolators

-

3.4.18 OSC-oscillators

-

3.4.19 PAD

-

3.4.20 PHODET-photoDetectors

-

3.4.21 REG-regulators

-

3.4.22 RELAY-relays

-

3.4.23 SHIELD

-

3.4.24 SPKR-speakers

-

3.4.25 STIF-stiffners

-

3.4.26 SW-switches

-

3.4.27 THERM-thermistors

-

3.4.28 XDCR-transducersIRDA

-

3.4.29 TVS-transientVoltageSuppressors

-

3.4.30 TVSP-transientVoltageSuppressorsPolarized

-

3.4.31 TRANS-transistorOutlinesCustom

-

3.4.32 XFMR-transformers

-

3.4.33 TRIM-trimmersPotentiometers

-

3.4.34 TUNER-tuners

-

3.4.35 VAR-varistors

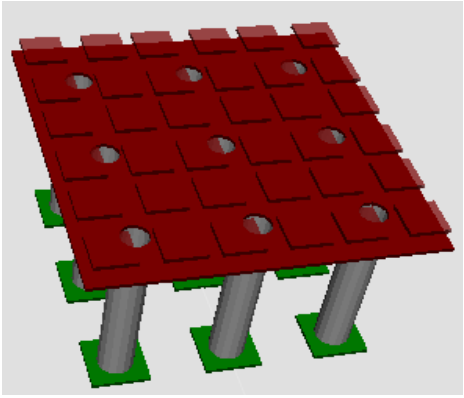
-

3.4.36 VCO-voltageControlledOscillator

-

3.4.37 EXPP-exposedPad

This file contains Land Patterns for Exposed (Thermal) Pads.



3.4.37.1 Format

KiCad

3.4.37.2 Module Properties

- Doc: <Land Pattern Name>
- Footprint Name in Lib: <Land Pattern Name>
- Keywords: IPC-7251 PTH EXPP
- Reference: U??
- Value: <Land Pattern Name>
- Attributes: Normal ("At" field not present)

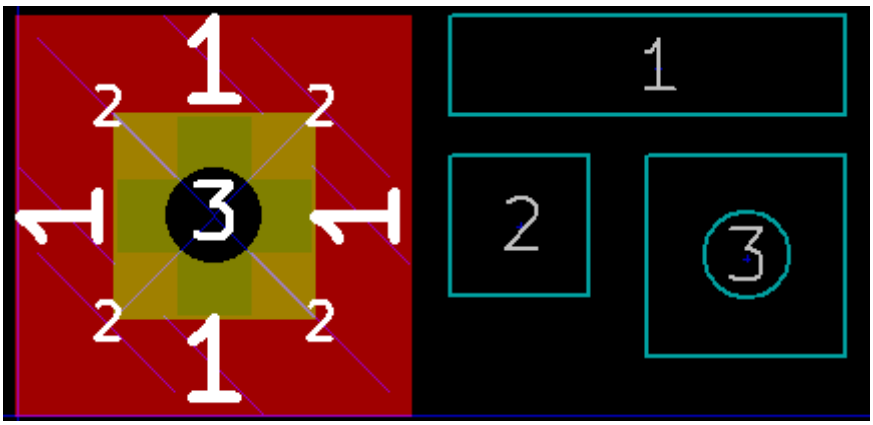
3.4.37.3 Land Pattern Name

EXPP + Pitch **P +** Length **L** + Width **W**

e.g. EXPP100P300L300W

3.4.37.4 Anatomy

The Exposed Pad is created from a combination of pads to form a 1.00 mm x 1.00 mm block:



4 * Pad No.1 – 0.50 mm x 0.125 mm, No Paste, Mask (forms part of bare copper area)

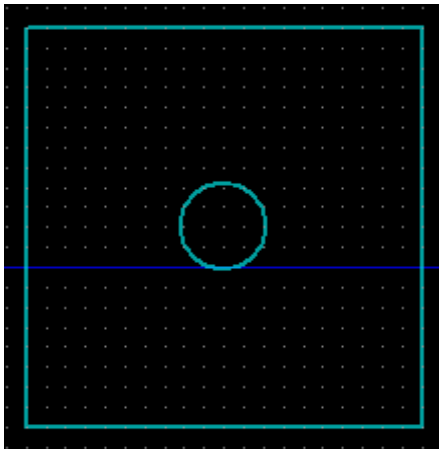
4 * Pad No.2 – 0.35 mm x 0.35 mm, Paste, No Mask (forms solder paste area)

1 * Pad No.3 – 0.51 mm x 0.51 mm, Finished Hole 0.25 mm (Thermal Via and part of bare copper area)

Note: Implemented Exposed Pads have all Pad numbers set to "1". Pad Numbers "1", "2" and "3" are used for illustration.

3.4.37.4.1 Bare Copper Area

Arranging Pad No.s 1 and 3 according to 3.4.37.4 gives a bare copper area of approximately 1.00 mm².



3.4.37.4.2 Solder Paste Area

Adding 4 * Pad No. 2 gives the Solder Paste coverage area on the Copper Pad.

To obtain approximately 50% Solder Paste coverage the area of Solder Paste needed is:

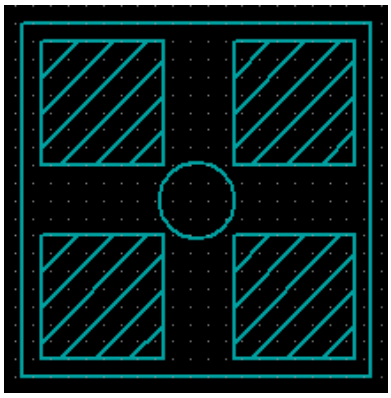
1.00 mm^2 / 2 = 0.50 mm^2

To distribute Solder Paste amongst 4 equal areas:

0.50 mm^2 / 4 = 0.125 mm^2

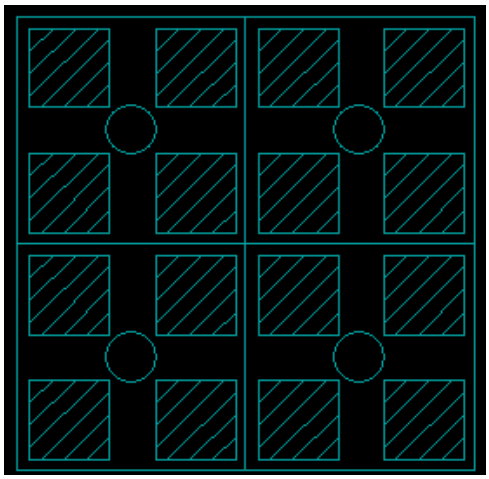
Therefore each pad dimension is:

Pad Length and Width = √ 0.125 mm^2 = 0.35 mm:



3.4.37.4.3 Extending Exposed Pads

Larger Exposed Pads are formed by combining multiple 1.00 mm x 1.00 mm blocks. e.g. for a 2.00 mm x 2.00 mm Exposed Pad:



Copper Area = 2.00 mm * 2.00 mm = 4.00 mm^2

Solder Paste Area = 16 * 0.125 mm^2 = 2.00 mm^2

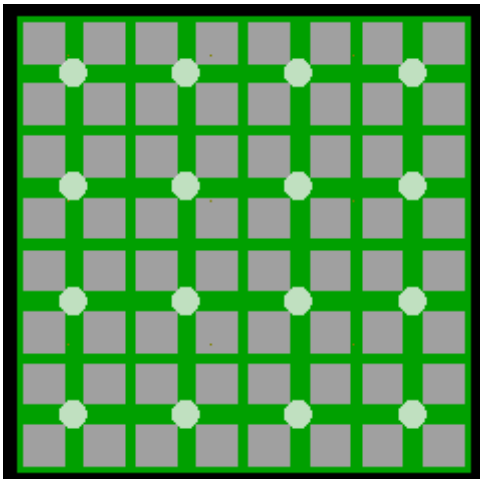
4 * Thermal Vias

3.4.37.4.4 Gerber Outputs

This example shows the Gerber output of a 4.00 mm x 4.00 mm Exposed Pad with sixteen "Thermal Vias".

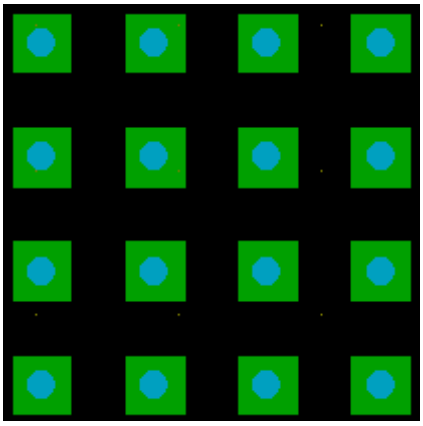
Front

The Layers shown are Drill, Copper and Paste:



Back

The Layers shown are Drill, Copper:



3.4.37.5 Pad Shapes

3.4.37.5.1 Default

Square

3.4.37.5.2 Pin Indicating Polarity

N/A

3.4.37.6 Pad and Finished Hole Dimensions

0.51 mm x 0.51 mm, Finished Hole 0.25 mm

3.4.37.7 Pads mask clearance

Module Level:

Solder mask clearance:	0.000001 mm
Solder paste clearance:	-0.0 mm
Solder mask ratio clearance:	-0.0%

3.4.37.8 Technical Layers

N/A

3.4.38 CONN-<connectors/headers>

These files contain Land Patterns for Connectors and Headers. The file names use the following convention:

CONN[pitch]-[headers][Manufacturer/Generic]

CONN-[connectors][type][Manufacturer/Generic]

e.g CONN125P-headersHirose.mod, CONN-audioVisualConnectorsProsignal.mod

These Land Patterns are obtained from http://www.reniemarquet.cjb.net/kicad.htm with modifications to orientation, Value and Reference Values, Silkscreen to Drawings Layer conversion, Local Pad Clearances and rounding of pad dimensions.

3.4.38.1 Format

KiCad

3.4.38.2 Module Properties

- Doc: <Land Pattern Name>
- Footprint Name in Lib: <Land Pattern Name>
- Keywords: PTH CONN Connector/CONN Connector HDR Header
- Reference: J??
- Value: <Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.4.38.3 Land Pattern Names

Manufacturers Part Number/Generic Name

e.g. HIROSE_DF13-10P-125DS, PROSIGNAL_PSG01544, GENERIC_BOXHEADER_10x2

3.4.38.4 Pad Shapes

3.4.38.4.1 Default

Round

3.4.38.4.2 Pin Indicating Polarity

Square

3.4.38.5 Pad and Finished Hole Dimensions

According to Data Sheet

3.4.38.6 Pads mask clearance

As Default (3.1.8)

3.4.38.7 Technical Layers

As original, with graphics on Silkscreen Layer changed to Drawings Layer..

3.5 Standard IPC-7351 Surface Mount Land Patterns

3.5.1 General

3.5.1.1 Land Pattern Names

Names are based on IPC-7351. Three versions of each Land Pattern can exist[18], suffixed with the "Environment Level" ("L", "N", or "M").

Most Material Condition – The 'maximum' land pattern conditions have been developed to accommodate the most robust producability of the solder application method. The geometry furnished may provide a wider process window for solder processing. The level A land patterns are usually associated with low component density product applications.

Nominal Material Condition – Products with a moderate level of component density may consider adapting the 'median' land pattern geometry. The median land patterns furnished for all device families will provide a robust solder attachment condition for most soldering processes and should provide a condition suitable for wave, dip, drag or reflow soldering.

Least Material Condition – High component density typical of portable and hand-held product applications may consider the 'minimum' land pattern geometry variation. Selection of the minimum land pattern geometry may not be suitable for all product use categories.

3.5.1.2 Pad Shapes

For Dual-in-line and Quad packages, the default pad shape is oval. Pads denoting "Pin 1" are rectangular. For other packages (chip, moulded etc.) the default pad shape is rectangular.

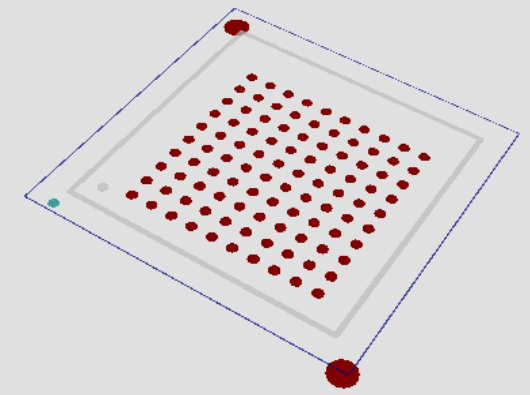
3.5.1.3 Pad Dimensions

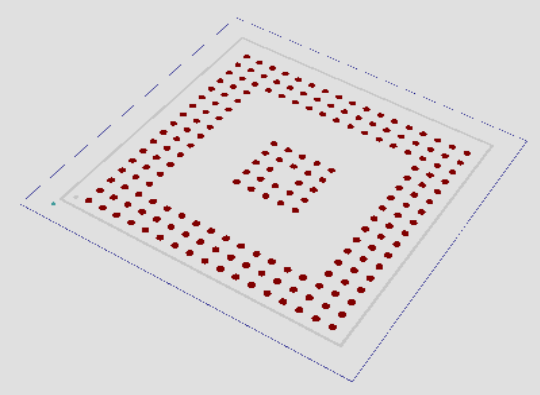
Pad dimensions are according to IPC-7351.

18 Except BGA. Only Nominal is used

3.5.2 BGA[nn]P-ballGridArrayNonSolderMaskDefined

These files contain Land Patterns for Ball-Grid Array Components where the copper area of the pads are not defined by Solder Mask. [nn] defines the pitch e.g 75P, 50P, 127P. One file is defined per pitch.





3.5.2.1 Format

KiCad

3.5.2.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD BGA Non-Solder Mask Defined (Collapsable)
- Reference: U??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.2.3 IPC Land Pattern Name

BGA + Pin Qty + **C** + Pitch **P** + Ball Columns **X** Ball Rows **_** Body Length **X** Body Width

e.g. BGA360C100P22X22_2300X2300

3.5.2.4 Pad Shapes

3.5.2.4.1 Default

Round

3.5.2.4.2 Pin Indicating Polarity

N/A

3.5.2.5 Pad Dimensions

According to IPC-7351

Pitch	Ball Diameter	Reduction	Pad Size
0.25 mm	0.15 mm	15%	0.13 mm
	0.17 mm	15%	0.15 mm
0.30 mm	0.20 mm	15%	0.17 mm
0.5 mm, 0.40 mm	0.25 mm	20%	0.20 mm
0.80 mm, 0.75 mm, 0.65 mm, 0.50 mm	0.30 mm	20%	0.25 mm
	0.35 mm	20%	0.30 mm
0.80 mm, 0.75 mm, 0.65 mm	0.40 mm	20%	0.30 mm
1.00 mm, 0.80 mm, 0.75 mm	0.45 mm	20%	0.35 mm
1.00 mm, 0.80 mm	0.50 mm	20%	0.40 mm
	0.55 mm	25%	0.40 mm
1.00 mm	0.60 mm	25%	0.45 mm
	0.65 mm	25%	0.50 mm
1.50 mm, 1.27 mm	0.75 mm	25%	0.55 mm

3.5.2.6 Pads mask clearance

As Default (3.1.8)

3.5.2.7 Local Fiducial Marks

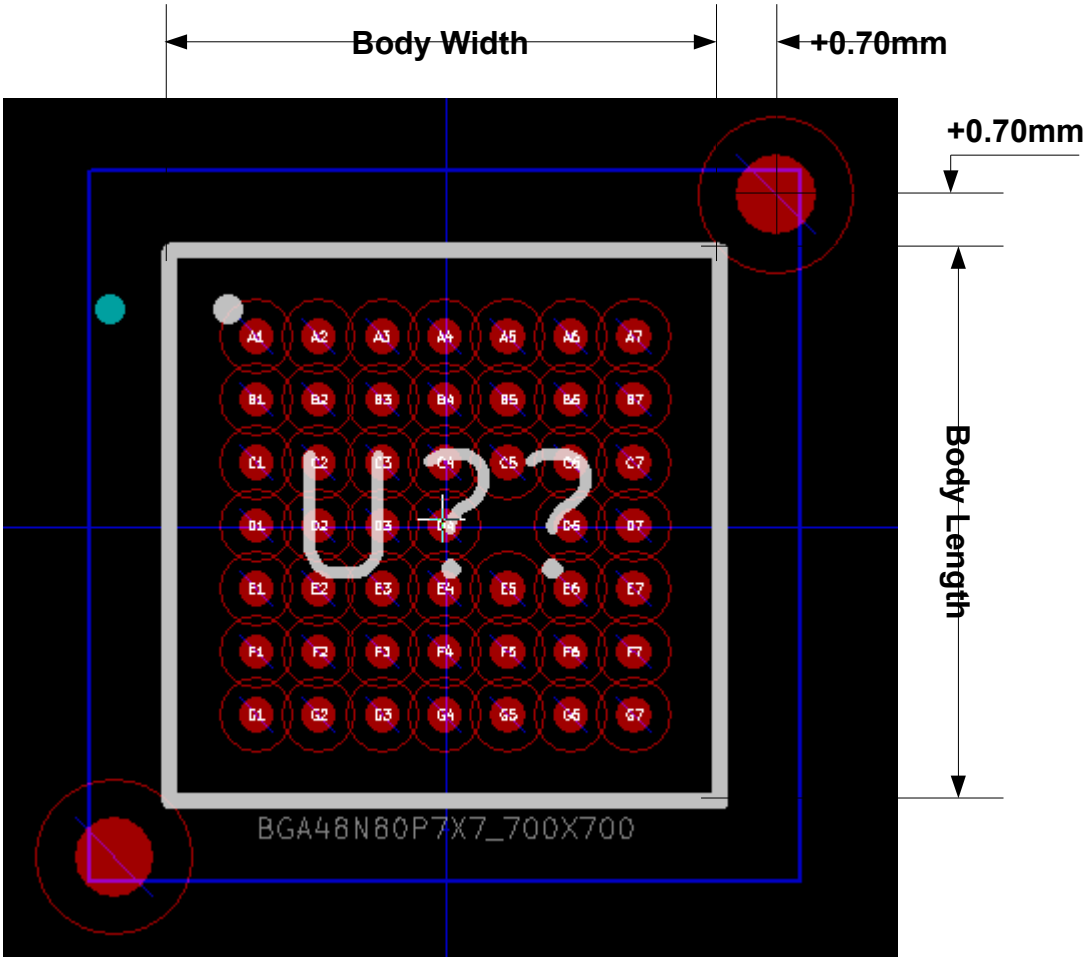
Land Patterns with a pitch of 0.80 mm or less use Local Fiducial Marks.

The Fiducial Marks are placed at the top right and bottom left based on Body Length + 0.70 mm and Body Width + 0.70 mm.

Local Fiducial Marks are not shown on the Drawings Layer.

The Pad forming the Fiducial Mark has no Solder Paste Layer.

e.g:



3.5.2.7.1 Fiducial Pad Dimensions

1.00 mm

3.5.2.7.2 Pad Clearance

Used as a “Keepout” area

0.50 mm

3.5.2.7.3 Solder Mask Clearance

0.50 mm

3.5.2.7.4 Solder Paste Clearance

-0.0 mm

3.5.2.7.5 Solder Mask Ratio Clearance

-0.0 %

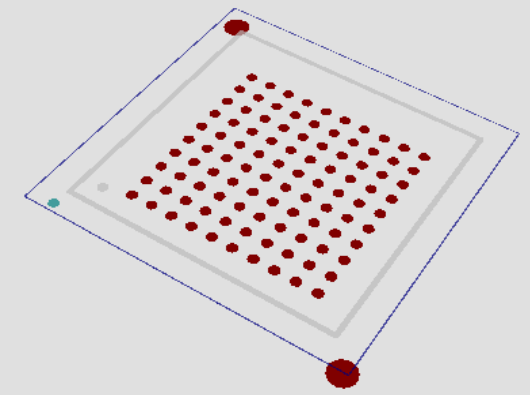
3.5.2.8 Technical Layers

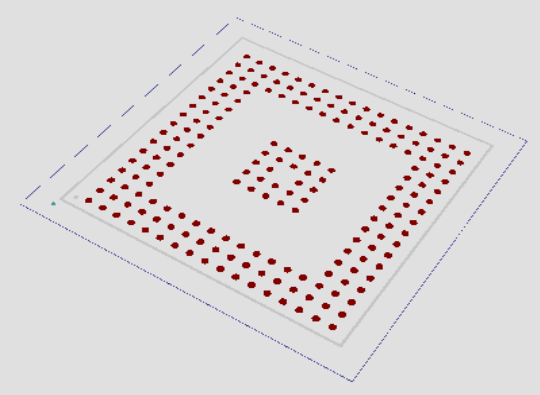
Body Length ≥4.0 mm - SMD-XNBG_A (6.13)

Body Length <4.0 mm - SMD-XNBG_B (6.14)

3.5.3 BGA[nn]P-ballGridArraySolderMaskDefined

These files contain Land Patterns for Ball-Grid Array Components where the copper area of the pads is defined by Solder Mask. [nn] defines the pitch e.g 75P, 50P, 127P. One file is defined per pitch.





3.5.3.1 Format

KiCad

3.5.3.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD BGA Solder Mask Defined (Non-Collapsable)
- Reference: U??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.3.3 IPC Land Pattern Name

BGA + Pin Qty + **N** + Pitch **P** + Ball Columns **X** Ball Rows **_** Body Length **X** Body Width

e.g. BGA204N65P20X20_1300X1300

3.5.3.4 Pad Shapes

3.5.3.4.1 Default

Round

3.5.3.4.2 Pin Indicating Polarity

N/A

3.5.3.5 Pad Dimensions

According to IPC-7351

Pitch	Ball Diameter	Increase	Pad Size
0.25 mm	0.15 mm	5%	0.16 mm
	0.17 mm	5%	0.18 mm
0.30 mm	0.20 mm	5%	0.21 mm
0.5 mm, 0.40 mm	0.25 mm	10%	0.30 mm
0.80 mm, 0.75 mm, 0.65 mm, 0.50 mm	0.30 mm	10%	0.35 mm
	0.35 mm	10%	0.40 mm
0.80 mm, 0.75 mm, 0.65 mm	0.40 mm	10%	0.45 mm
1.00 mm, 0.80 mm, 0.75 mm	0.45 mm	10%	0.50 mm
1.00 mm, 0.80 mm	0.50 mm	10%	0.55 mm
	0.55 mm	15%	0.65 mm
1.00 mm	0.60 mm	15%	0.70 mm
	0.65 mm	15%	0.75 mm
1.50 mm, 1.27 mm	0.75 mm	15%	0.85 mm

3.5.3.6 Pads mask clearance

Pitch	Solder mask clearance	Solder paste clearance	Solder mask ratio clearance
0.5 mm	-0.05 mm	-0.0 mm	-0.0%
0.65 mm	-0.07 mm	-0.0 mm	-0.0%
0.8 mm	-0.08 mm	-0.0 mm	-0.0%
1.0 mm	-0.10 mm	-0.0 mm	-0.0%
1.27 mm	-0.14 mm	-0.0 mm	-0.0%

3.5.3.7 Local Fiducial Marks

See 3.5.2.7

3.5.3.8 Technical Layers

Body Length ≥4.0 mm - SMD-XNBG_A (6.13)

Body Length <4.0 mm - SMD-XNBG_B (6.14)

3.5.4 BGAS-ballGridArrayStaggeredNonSolderMaskDefined

-

3.5.5 BGAS-ballGridArrayStaggeredSolderMaskDefined

-

3.5.6 CAPCAV-capacitorsChipArrayConcave

-

3.5.7 CAPCAF-capacitorsChipArrayFlat

-

3.5.8 CAPCAXS-capacitorsChipArrayConvexS

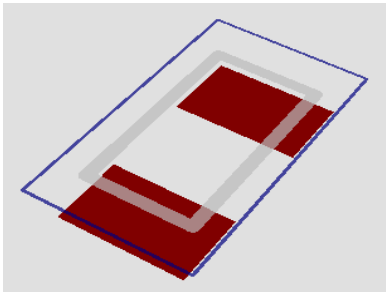
-

3.5.9 CAPCAXE-capacitorsChipArrayConvexE

-

3.5.10 CAPC-capacitorsChipNonPolarized

This file contains Land Patterns for Non-polarized Chip Capacitors.



3.5.10.1 Format

KiCad

3.5.10.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD CAPC
- Reference: C??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.10.3 IPC Land Pattern Name

CAPC + Body Length + Body Width + Environment

e.g. CAPC1320N

3.5.10.4 Pad Shapes

3.5.10.4.1 Default

Rectangular

3.5.10.4.2 Pin Indicating Polarity

N/A

3.5.10.5 Pad Dimensions

According to IPC-7351

3.5.10.6 Pads mask clearance

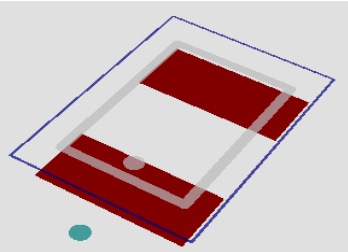
As Default (3.1.8)

3.5.10.7 Technical Layers

SMD-NNCP (6.1)

3.5.11 CAPCP-capacitorsChipPolarized

This file contains Land Patterns for Polarized Chip Capacitors.



3.5.11.1 Format

KiCad

3.5.11.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD CAPCP
- Reference: C??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.11.3 IPC Land Pattern Name

CAPCP + Body Length + Body Width + Environment

e.g. CAPCP2014N

3.5.11.4 Pad Shapes

3.5.11.4.1 Default

Rectangular

3.5.11.4.2 Pin Indicating Polarity

N/A

3.5.11.5 Pad Dimensions

According to IPC-7351

3.5.11.6 Pads mask clearance

As Default (3.1.8)

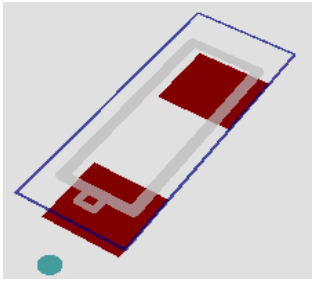
3.5.11.7 Technical Layers

Body Length > 2.5 mm - SMD-PNCP_A (6.2)

Body Length ≤ 2.5 mm - SMD-PNCP_B (6.3)

3.5.12 CAPCWR-capacitorsChipWireRectangular

This file contains Land Patterns for Precision Wire-Wound Chip Capacitors.



3.5.12.1 Format

KiCad

3.5.12.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD CAPCWR
- Reference: C??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.12.3 IPC Land Pattern Name

CAPCWR + Body Length + Body Width + Environment

e.g. CAPCWR5125N

3.5.12.4 Pad Shapes

3.5.12.4.1 Default

Rectangular

3.5.12.4.2 Pin Indicating Polarity

N/A

3.5.12.5 Pad Dimensions

According to IPC-7351

3.5.12.6 Pads mask clearance

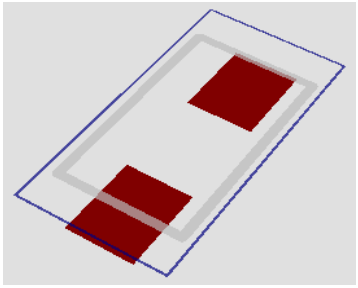
As Default (3.1.8)

3.5.12.7 Technical Layers

SMD-NNCP (6.1)

3.5.13 CAPM-capacitorsMouldedNonPolarized

This file contains Land Patterns for Moulded Non-polarized Capacitors.



3.5.13.1 Format

KiCad

3.5.13.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD CAPM
- Reference: C??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.13.3 IPC Land Pattern Name

CAPM + Body Length + Body Width + Environment

e.g. CAPM2012N

3.5.13.4 Pad Shapes

3.5.13.4.1 Default

Rectangular

3.5.13.4.2 Pin Indicating Polarity

N/A

3.5.13.5 Pad Dimensions

According to IPC-7351

3.5.13.6 Pads mask clearance

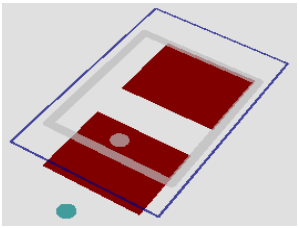
As Default (3.1.8)

3.5.13.7 Technical Layers

SMD-NNMO (6.5)

3.5.14 CAPMP-capacitorsMouldedPolarized

This file contains Land Patterns for Moulded Polarized Capacitors.



3.5.14.1 Format

KiCad

3.5.14.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD CAPMP
- Reference: C??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.14.3 IPC Land Pattern Name

CAPMP + Body Length + Body Width + Environment

e.g. CAPMP3216N

3.5.14.4 Pad Shapes

3.5.14.4.1 Default

Rectangular

3.5.14.4.2 Pin Indicating Polarity

Rectangular

3.5.14.5 Pad Dimensions

According to IPC-7351

3.5.14.6 Pads mask clearance

As Default (3.1.8)

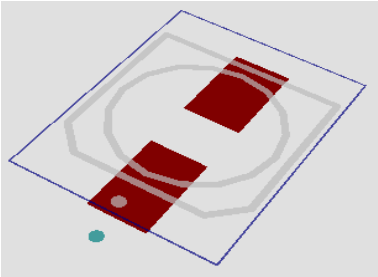
3.5.14.7 Technical Layers

Body Length > 2.5 mm - SMD-PNMO_A (6.6)

Body Length ≤ 2.5 mm - SMD-PNMO_B (6.7)

3.5.15 CAPAE-capacitorsAluminiumElectrolytic

This file contains Land Patterns for Aluminium Electrolytic Polarized Capacitors.



3.5.15.1 Format

KiCad

3.5.15.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD CAPAE
- Reference: C??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.15.3 IPC Land Pattern Name

CAPAE + Base Body Size **X** Height + Environment

e.g. CAPAE330X550N

3.5.15.4 Pad Shapes

3.5.15.4.1 Default

Rectangular

3.5.15.4.2 Pin Indicating Polarity

Rectangular

3.5.15.5 Pad Dimensions

According to IPC-7351

3.5.15.6 Pads mask clearance

As Default (3.1.8)

3.5.15.7 Technical Layers

SMD-PLAE (6.8)

3.5.16 CFP127P-ceramicFlatPackage

-

3.5.17 CGA-columnGridArray

-

3.5.18 XTAL-CrystalOscillator

-

3.5.19 DFN-dualFlatNoLead

-

3.5.20 DIOC-diodesChip

This file contains Land Patterns for Chip Diodes.

3.5.20.1 Format

KiCad

3.5.20.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD DIOC
- Reference: D??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.20.3 IPC Land Pattern Name

DIOC + Body Length + Body Width + Environment

e.g. -

3.5.20.4 Pad Shapes

3.5.20.4.1 Default

Rectangular

3.5.20.4.2 Pin Indicating Polarity

Rectangular

3.5.20.5 Pad Dimensions

According to IPC-7351

3.5.20.6 Pads mask clearance

As Default (3.1.8)

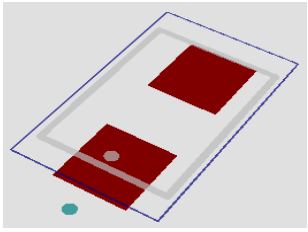
3.5.20.7 Technical Layers

Body Length > 2.5 mm - SMD-PNCP_A (6.2)

Body Length ≤ 2.5 mm - SMD-PNCP_B (6.3)

3.5.21 DIOM-diodesMoulded

This file contains Land Patterns for Moulded Diodes (including DO-214, SMA, SMB, SMC).



3.5.21.1 Format

KiCad

3.5.21.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD DIOM <JEDEC No.>[19]
- Reference: D??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.21.3 IPC Land Pattern Name

DIOM + Body Length + Body Width + Environment

e.g. DIOM5436N

3.5.21.4 Pad Shapes

3.5.21.4.1 Default

Rectangular

3.5.21.4.2 Pin Indicating Polarity

Rectangular

3.5.21.5 Pad Dimensions

According to IPC-7351

3.5.21.6 Pads mask clearance

As Default (3.1.8)

3.5.21.7 Technical Layers

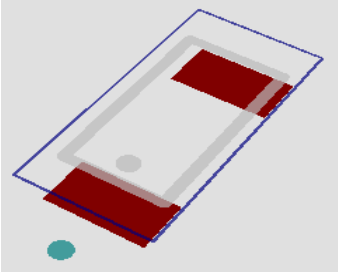
Body Length > 2.5 mm - SMD-PNMO_A (6.6)

Body Length ≤ 2.5 mm - SMD-PNMO_B (6.7)

19 If applicable

3.5.22 DIOMELF-diodesMELF

This file contains Land Patterns for MELF Diodes.



3.5.22.1 Format

KiCad

3.5.22.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD DIOMELF
- Reference: C??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.22.3 IPC Land Pattern Name

DIOMELF + Body Length + Body Diameter + Environment

e.g. DIOMELF5025N

3.5.22.4 Pad Shapes

3.5.22.4.1 Default

Rectangular

3.5.22.4.2 Pin Indicating Polarity

Rectangular

3.5.22.5 Pad Dimensions

According to IPC-7351

3.5.22.6 Pads mask clearance

As Default (3.1.8)

3.5.22.7 Technical Layers

Body Length > 2.5 mm - SMD-PNCP_A (6.2)

Body Length ≤ 2.5 mm - SMD-PNCP_B (6.3)

3.5.23 DIOSC-diodesConcave2Pin

-

3.5.24 DIOCAV-diodessChipArrayConcave

-

3.5.25 DIOCAF-diodesChipArrayFlat

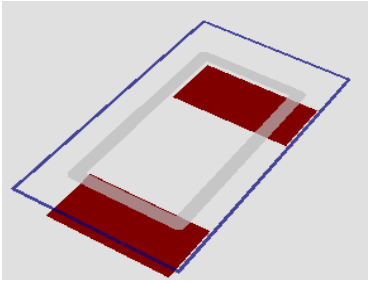
-

3.5.26 FUSM-fusesMoulded

-

3.5.27 INDC-inductorsChip

This file contains Land Patterns for Non-polarized Chip Inductors.



3.5.27.1 Format

KiCad

3.5.27.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD INDC
- Reference: L??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.27.3 IPC Land Pattern Name

INDC + Body Length + Body Width + Environment

e.g. INDC2520N

3.5.27.4 Pad Shapes

3.5.27.4.1 Default

Rectangular

3.5.27.4.2 Pin Indicating Polarity

N/A

3.5.27.5 Pad Dimensions

According to IPC-7351

3.5.27.6 Pads mask clearance

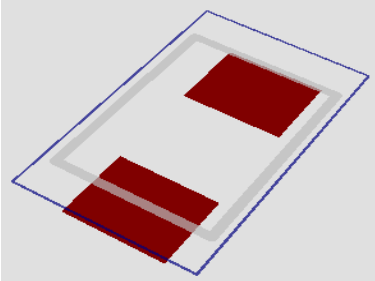
As Default (3.1.8)

3.5.27.7 Technical Layers

SMD-NNCP (6.1)

3.5.28 INDM-inductorsMoulded

This file contains Land Patterns for Moulded Inductors.



3.5.28.1 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD INDM
- Reference: L??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.28.2 IPC Land Pattern Name

INDM + Body Length + Body Width + Environment

e.g. INDM4030N

3.5.28.3 Pad Shapes

3.5.28.3.1 Default

Rectangular

3.5.28.3.2 Pin Indicating Polarity

N/A

3.5.28.4 Pad Dimensions

According to IPC-7351

3.5.28.5 Pads mask clearance

As Default (3.1.8)

3.5.28.6 Technical Layers

SMD-NNMO (6.5)

3.5.29 INDP-inductorsPrecisionWireWound

-

3.5.30 INDCAV-inductorsChipArrayConcave

-

3.5.31 INDCAF-inductorsChipArrayFlat

-

3.5.32 INDCAXS-inductorsChipArrayConvexS

-

3.5.33 INDCAXE-inductorsChipArrayConvexE

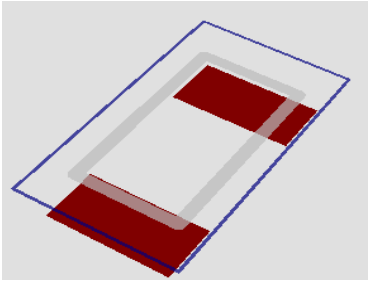
-

3.5.34 LGA-landGridArray

-

3.5.35 LEDC-lightEmittingDiodeChip

This file contains Land Patterns for Light Emitting Chip Diodes.



3.5.35.1 Format

KiCad

3.5.35.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD LEDC
- Reference: DS??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.35.3 IPC Land Pattern Name

LEDC + Body Length + Body Width + Environment

e.g. LEDC3216

3.5.35.4 Pad Shapes

3.5.35.4.1 Default

Rectangular

3.5.35.4.2 Pin Indicating Polarity

Rectangular

3.5.35.5 Pad Dimensions

According to IPC-7351

3.5.35.6 Pads mask clearance

As Default (3.1.8)

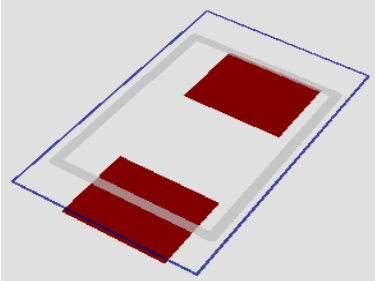
3.5.35.7 Technical Layers

Body Length > 2.5 mm - SMD-PNCP_A (6.2)

Body Length ≤ 2.5 mm - SMD-PNCP_B (6.3)

3.5.36 LEDM-lightEmittingDiodeMoulded

This file contains Land Patterns for Moulded Light Emitting Diodes.



3.5.36.1 Format

KiCad

3.5.36.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD LEDM
- Reference: DS??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.36.3 IPC Land Pattern Name

LEDM + Body Length + Body Width + Environment

e.g. -

3.5.36.4 Pad Shapes

3.5.36.4.1 Default

Rectangular

3.5.36.4.2 Pin Indicating Polarity

Rectangular

3.5.36.5 Pad Dimensions

According to IPC-7351

3.5.36.6 Pads mask clearance

As Default (3.1.8)

3.5.36.7 Technical Layers

Body Length > 2.5 mm - SMD-PNMO_A (6.6)

Body Length ≤ 2.5 mm - SMD-PNMO_B (6.7)

3.5.37 LEDSC-lightEmittingDiodeConcave2Pin

-

3.5.38 LEDSC-lightEmittingDiodeConcave4Pin

-

3.5.39 OSCSC-oscillatorsSideConcave

-

3.5.40 OSCJ-oscillatorsJlead

-

3.5.41 OSCL-oscillatorsLbendLead

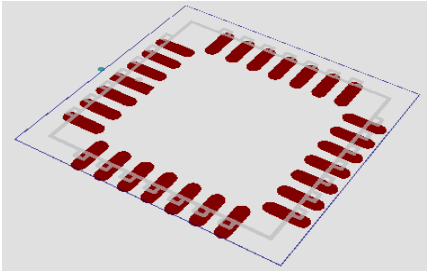
-

3.5.42 OSCCC-oscillatorsCornerConcave

-

3.5.43 PLCC-plasticLeadedChipCarriers

This file contains Land Patterns for Plastic Leaded Chip Carriers (PLCC).



3.5.43.1 Format

KiCad

3.5.43.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD PLCC
- Reference: U??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.43.3 IPC Land Pattern Name

PLCC + Pitch **P** + Lead Span L1 **X** Lead Span L2 Nominal **-** Pin Qty + Environment

e.g. PLCC127P2515X2515-68N

3.5.43.4 Pad Shapes

3.5.43.4.1 Default

Oval

3.5.43.4.2 Pin Indicating Polarity

Rectangular

3.5.43.5 Pad Dimensions

According to IPC-7351

3.5.43.6 Pads mask clearance

As Default (3.1.8)

3.5.43.7 Technical Layers

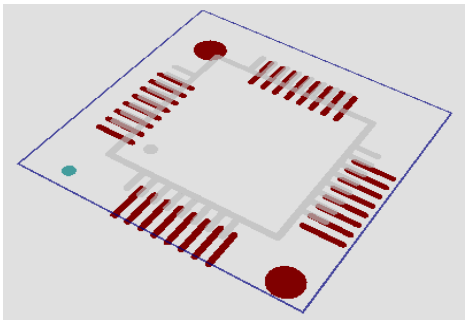
SMD-XLQC (6.12)

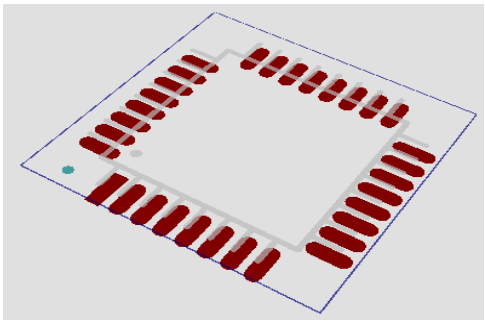
3.5.44 PLCCS-plasticLeadedChipCarrierSocketsSquare

-

3.5.45 QFP[nn]P-quadFlatPackages

These files contain Land Patterns for Quad Flat Package Components. [nn] defines the pitch e.g 40P, 50P, 80P. One file is defined per pitch.





3.5.45.1 Format

KiCad

3.5.45.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD QFP QFP[nn]P
- Reference: U??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.45.3 IPC Land Pattern Name

QFP + Pitch **P** + Lead Span L1 **X** Lead Span L2 Nominal **-** Pin Qty + Environment

e.g. QFP30P1200X1200-112N

3.5.45.4 Pad Shapes

3.5.45.4.1 Default

Oval

3.5.45.4.2 Pin Indicating Polarity

Rectangular

3.5.45.5 Pad Dimensions

According to IPC-7351

3.5.45.6 Pads mask clearance

As Default (3.1.8)

3.5.45.7 Local Fiducial Marks

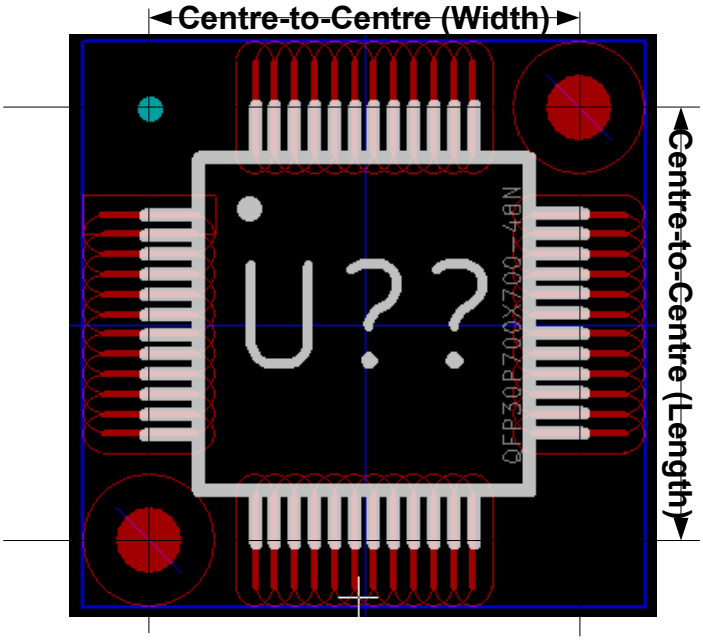
Land Patterns with a pitch of 0.65 mm or less use Local Fiducial Marks.

The Fiducials are placed at the top right and bottom left based on the Pad Centre-to-Centre dimensions.

Local Fiducial Marks are not shown on the Drawings Layer.

The Pad forming the Fiducial Mark has no Solder Paste Layer.

e.g:



3.5.45.7.1 Fiducial Pad Dimensions

1.00 mm

3.5.45.7.2 Pad Clearance

Used as a "Keepout" area

0.50 mm

3.5.45.7.3 Solder Mask Clearance

0.50 mm

3.5.45.7.4 Solder Paste Clearance

-0.0 mm

3.5.45.7.5 Solder Mask Ratio Clearance

-0.0 %

3.5.45.8 Technical Layers

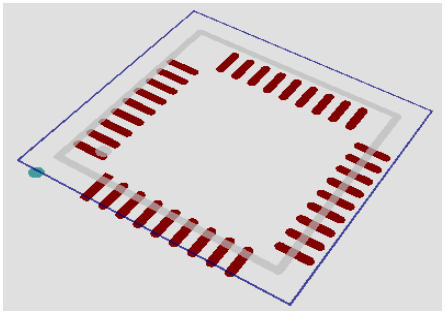
SMD-XLQL (6.9)

3.5.46 CQFP-ceramicQuadFlatPackages

-

3.5.47 QFN[nn]P-quadFlatNoLeadPackages

These files contain Land Patterns for Quad Flat No-Lead Components. [nn] defines the pitch e.g 40P, 50P, 80P. One file is defined per pitch.



3.5.47.1 Format

KiCad

3.5.47.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD QFN QFN[nn]P
- Reference: U??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.47.3 IPC Land Pattern Name

QFN + Pitch **P** + Body Width **X** Body Length **-** Pin Qty + Thermal Pad + Environment

e.g. QFN50P1000X1000-68N

3.5.47.4 Pad Shapes

3.5.47.4.1 Default

Oval

3.5.47.4.2 Pin Indicating Polarity

Rectangular

3.5.47.5 Pad Dimensions

According to IPC-7351

3.5.47.6 Pads mask clearance

As Default (3.1.8)

3.5.47.7 Technical Layers

Body Length ≥4.0 mm - SMD-XNQL_A (6.10)

Body Length <4.0 mm - SMD-XNQL_B (6.11)

3.5.48 PQFN[nn]P-pullBackQuadFlatNoLead

These files contain Land Patterns for Pull-Back Quad Flat No-Lead Components. [nn] defines the pitch e.g 40P, 50P, 80P. One file is defined per pitch.

3.5.48.1 Format

KiCad

3.5.48.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD PQFN PQFN[nn]P
- Reference: U??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.48.3 IPC Land Pattern Name

PQFN + Pitch **P** + Body Width **X** Body Length - Pin Qty + Thermal Pad + Environment

e.g. -

3.5.48.4 Pad Shapes

3.5.48.4.1 Default

Oval

3.5.48.4.2 Pin Indicating Polarity

Rectangular

3.5.48.5 Pad Dimensions

According to IPC-7351

3.5.48.6 Pads mask clearance

As Default (3.1.8)

3.5.48.7 Technical Layers

Body Length ≥4.0 mm - SMD-XNQL_A (6.10)

Body Length <4.0 mm - SMD-XNQL_B (6.11)

3.5.49 LCC-quadLeadlessCeramicChipCarriers

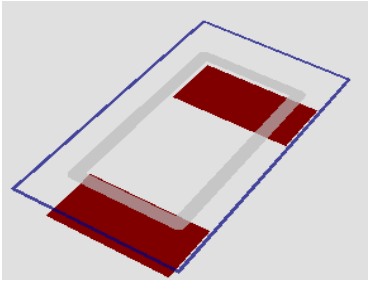
-

3.5.50 LCCS-quadLeadlessCeramicChipCarriersSide

-

3.5.51 RESC-resistorsChip

This file contains Land Patterns for Chip Resistors.



3.5.51.1 Format

KiCad

3.5.51.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD RESC
- Reference: R??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.51.3 IPC Land Pattern Name

RESC + Body Length + Body Width + Environment

e.g. RESC5025N

3.5.51.4 Pad Shapes

3.5.51.4.1 Default

Rectangular

3.5.51.4.2 Pin Indicating Polarity

N/A

3.5.51.5 Pad Dimensions

According to IPC-7351

3.5.51.6 Pads mask clearance

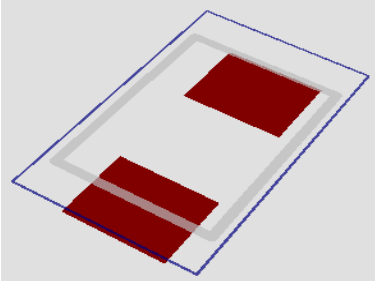
As Default (3.1.8)

3.5.51.7 Technical Layers

SMD-NNCP (6.1)

3.5.52 RESM-resistorsMoulded

This file contains Land Patterns for Moulded Resistors.



3.5.52.1 Format

KiCad

3.5.52.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD RESM
- Reference: R??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.52.3 IPC Land Pattern Name

RESM + Body Length + Body Width + Environment

e.g. -

3.5.52.4 Pad Shapes

3.5.52.4.1 Default

Rectangular

3.5.52.4.2 Pin Indicating Polarity

N/A

3.5.52.5 Pad Dimensions

According to IPC-7351

3.5.52.6 Pads mask clearance

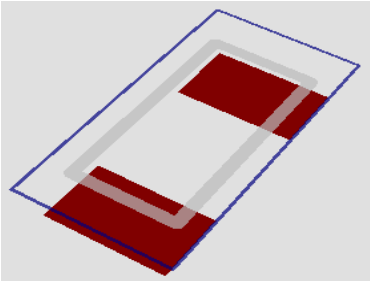
As Default (3.1.8)

3.5.52.7 Technical Layers

SMD-NNMO (6.5)

3.5.53 RESMELF-resistorsMELF

This file contains Land Patterns for MELF Resistors.



3.5.53.1 Format

KiCad

3.5.53.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD RESMELF
- Reference: R??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.53.3 IPC Land Pattern Name

RESMELF + Body Length + Body Diameter + Environment

e.g. RESMELF3516N

3.5.53.4 Pad Shapes

3.5.53.4.1 Default

Rectangular

3.5.53.4.2 Pin Indicating Polarity

N/A

3.5.53.5 Pad Dimensions

According to IPC-7351

3.5.53.6 Pads mask clearance

As Default (3.1.8)

3.5.53.7 Technical Layers

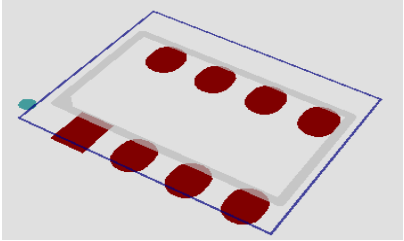
SMD-NNCP (6.1)

3.5.54 RESCAV-resistorsChipArrayConcave

-

3.5.55 RESCAXE-resistorsChipArrayConvexE

These files contain Land Patterns for Resistor Chip Arrays with equal size Convex terminations.



3.5.55.1 Format

KiCad

3.5.55.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD RESCAXE
- Reference: R??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.55.3 IPC Land Pattern Name

RESCAXE + Pitch P + Body Width X Body Length X Height - Pin Qty + Environment

e.g. RESCAXE127P305X640-10N

3.5.55.4 Pad Shapes

3.5.55.4.1 Default

Oval

3.5.55.4.2 Pin Indicating Polarity

Rectangular

3.5.55.5 Pad Dimensions

According to IPC-7351

3.5.55.6 Pads mask clearance

As Default (3.1.8)

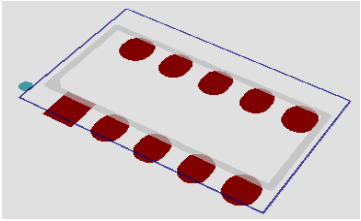
3.5.55.7 Technical Layers

Number of Pins >10 - SMD-XLDL_A (6.15)

Number of Pins ≤10 - SMD-XLDL_B (6.16)

3.5.56 RESCAXS-resistorsChipArrayConvexS

These files contain Land Patterns for Resistor Chip Arrays with Convex terminations where corner terminations are different size.



3.5.56.1 Format

KiCad

3.5.56.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD RESCAXS
- Reference: R??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.56.3 IPC Land Pattern Name

RESCAXS + Pitch P + Body Width X Body Length X Height - Pin Qty + Environment

e.g. RESCAXS65P100X100-4N

3.5.56.4 Pad Shapes

3.5.56.4.1 Default

Oval

3.5.56.4.2 Pin Indicating Polarity

Rectangular

3.5.56.5 Pad Dimensions

According to IPC-7351

3.5.56.6 Pads mask clearance

As Default (3.1.8)

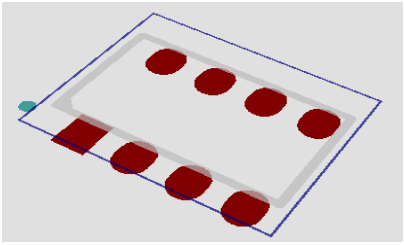
3.5.56.7 Technical Layers

Number of Pins >10 - SMD-XLDL_A (6.15)

Number of Pins ≤10 - SMD-XLDL_B (6.16)

3.5.57 RESCAF-resistorsChipArrayFlat

These files contain Land Patterns for Resistor Chip Arrays with flat terminations.



3.5.57.1 Format

KiCad

3.5.57.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD RESCAF
- Reference: R??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.57.3 IPC Land Pattern Name

RESCAF + Pitch P + Body Width X Body Length X Height - Pin Qty + Environment

e.g. RESCAF80P160X320-8N

3.5.57.4 Pad Shapes

3.5.57.4.1 Default

Oval

3.5.57.4.2 Pin Indicating Polarity

Rectangular

3.5.57.5 Pad Dimensions

According to IPC-7351

3.5.57.6 Pads mask clearance

As Default (3.1.8)

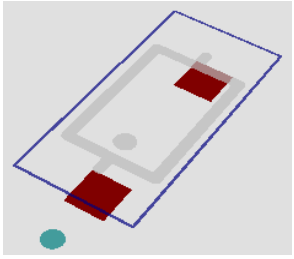
3.5.57.7 Technical Layers

Number of Pins >10 - SMD-XLDL_A (6.15)

Number of Pins ≤10 - SMD-XLDL_B (6.16)

3.5.58 SODFL-smallOutlineDiodesFlatLead

This file contains Land Patterns for Small-Outline Flat Diodes.



3.5.58.1 Format

KiCad

3.5.58.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD SODFL <JEDEC No.>
- Reference: ???
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.58.3 IPC Land Pattern Name

SODFL + Lead Span Nominal + Body Width + Environment

e.g. SODFL1406N

3.5.58.4 Pad Shapes

3.5.58.4.1 Default

Rectangular

3.5.58.4.2 Pin Indicating Polarity

Rectangular

3.5.58.5 Pad Dimensions

According to IPC-7351

3.5.58.6 Pads mask clearance

As Default (3.1.8)

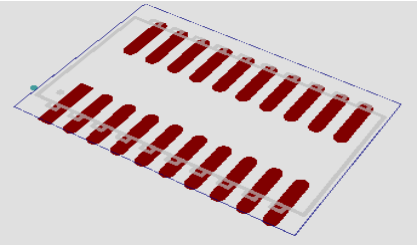
3.5.58.7 Technical Layers

Body Length > 2.5 mm - SMD-PLMO_A (6.19)

Body Length < 2.5 mm - SMD-PLMO_B (6.20)

3.5.59 SOJ-smallOutlineJleaded

This file contains Land Patterns for Small Outline J-Leaded Components.



3.5.59.1 Format

KiCad

3.5.59.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD SOJ
- Reference: U??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.59.3 IPC Land Pattern Name

SOJ + Pitch **P** + Lead Span Nominal **-** Pin Qty + Environment

e.g. SOJ127P1111-20N

3.5.59.4 Pad Shapes

3.5.59.4.1 Default

Oval

3.5.59.4.2 Pin Indicating Polarity

Rectangular

3.5.59.5 Pad Dimensions

According to IPC-7351

3.5.59.6 Pads mask clearance

As Default (3.1.8)

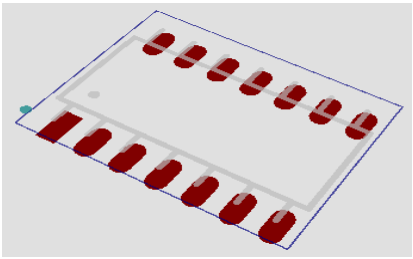
3.5.59.7 Technical Layers

Number of Pins >10 - SMD-XLDL_A (6.15)

Number of Pins ≤10 - SMD-XLDL_B (6.16)

3.5.60 SOIC127P-smallOutlineIntegratedCircuit

This file contains Land Patterns for Small Outline Gull-Wing Components with pitch of 1.27 mm.



3.5.60.1 Format

KiCad

3.5.60.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD SOIC127P
- Reference: U??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.60.3 IPC Land Pattern Name

SOIC127P + Lead Span Nominal **-** Pin Qty + Environment

e.g. SOIC127P1030-20N

3.5.60.4 Pad Shapes

3.5.60.4.1 Default

Oval

3.5.60.4.2 Pin Indicating Polarity

Rectangular

3.5.60.5 Pad Dimensions

According to IPC-7351

3.5.60.6 Pads mask clearance

As Default (3.1.8)

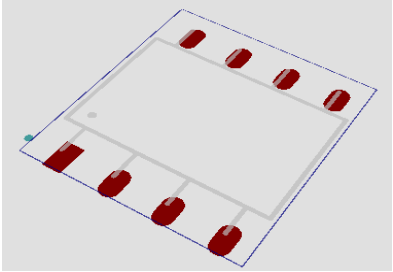
3.5.60.7 Technical Layers

Number of Pins >10 - SMD-XLDL_A (6.15)

Number of Pins ≤10 - SMD-XLDL_B (6.16)

3.5.61 SOIC25xP-smallOutlineIntegratedCircuit

This file contains Land Patterns for Small Outline Gull-Wing Components with pitch of 2.50 mm or 2.54 mm.



3.5.61.1 Format

KiCad

3.5.61.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD SOIC25xP
- Reference: U??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.61.3 IPC Land Pattern Name

SOIC25xP + Lead Span Nominal **-** Pin Qty + Environment

e.g. SOIC254P1030-8N

3.5.61.4 Pad Shapes

3.5.61.4.1 Default

Oval

3.5.61.4.2 Pin Indicating Polarity

Rectangular

3.5.61.5 Pad Dimensions

According to IPC-7351

3.5.61.6 Pads mask clearance

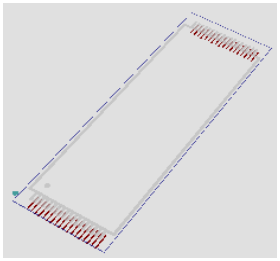
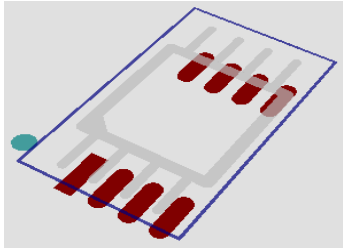
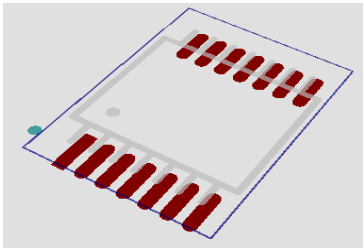
As Default (3.1.8)

3.5.61.7 Technical Layers

SMD-XLDL_A (6.15)

3.5.62 SOP[nn]P-smallOutlinePackage

These files contain Land Patterns for Small Outline Gull-Wing Components with pitch of < 1.27 mm.

3.5.62.1 Format

KiCad

3.5.62.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD SOP SOP[nn]P
- Reference: U??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.62.3 IPC Land Pattern Name

SOP + Pitch **P** + Lead Span Nominal **-** Pin Qty + Environment

e.g. SOP50P1600-32N

3.5.62.4 Pad Shapes

3.5.62.4.1 Default

Oval

3.5.62.4.2 Pin Indicating Polarity

Rectangular

3.5.62.5 Pad Dimensions

According to IPC-7351

3.5.62.6 Pads mask clearance

As Default (3.1.8)

3.5.62.7 Technical Layers

Number of Pins >10 - SMD-XLDL_A (6.15)

Number of Pins ≤10 - SMD-XLDL_B (6.16)

3.5.63 SON-smallOutlineNoLead

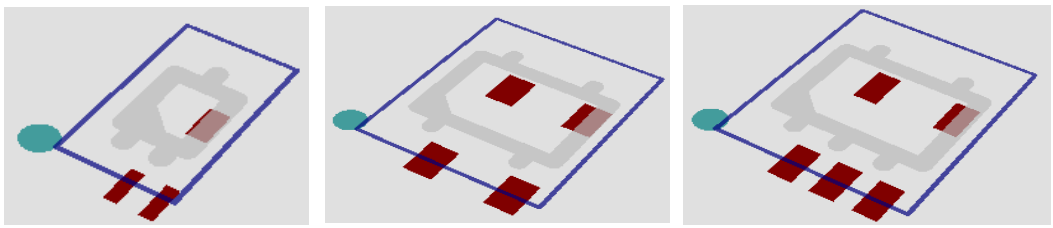
-

3.5.64 PSON-pullBackSmallOutlineNoLead

-

3.5.65 SOTFL-smallOutlineTransistorsFlatLead

This file contains Land Patterns for Small-Outline Flat Lead Transistors (including SOT-89).



3.5.65.1 Format

KiCad

3.5.65.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD SOTFL <JEDEC No.>
- Reference: ???
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.65.3 IPC Land Pattern Name

SOTFL + Pitch **P** + Lead Span Nominal **-** Pin Qty + Environment

e.g. SOTFL37P100-5N, SOTFL150P0_123-4N

3.5.65.4 Pad Shapes

3.5.65.4.1 Default

Rectangular

3.5.65.4.2 Pin Indicating Polarity

Rectangular

3.5.65.5 Pad Dimensions

According to IPC-7351

3.5.65.6 Pads mask clearance

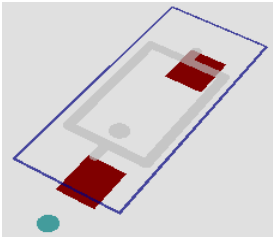
As Default (3.1.8)

3.5.65.7 Technical Layers

SMD-XLSO (6.18)

3.5.66 SOD-JEDEC

This file contains Land Patterns for Small-Outline Diodes.



3.5.66.1 Format

KiCad

3.5.66.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD SOD <JEDEC No.>
- Reference: D??
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.66.3 IPC Land Pattern Name

SOD + Lead Span Nominal + Body Width + Environment

e.g. SOD3716N

3.5.66.4 Pad Shapes

3.5.66.4.1 Default

Rectangular

3.5.66.4.2 Pin Indicating Polarity

Rectangular

3.5.66.5 Pad Dimensions

According to IPC-7351

3.5.66.6 Pads mask clearance

As Default (3.1.8)

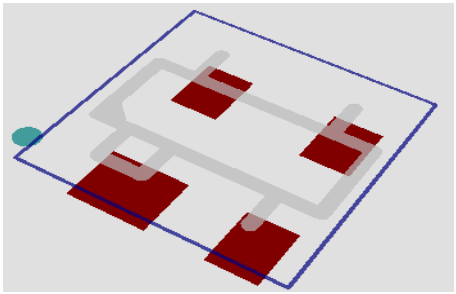
3.5.66.7 Technical Layers

Body Length > 2.5 mm - SMD-PNMO_A (6.6)

Body Length ≤ 2.5 mm - SMD-PNMO_B (6.7)

3.5.67 SOT143-JEDEC

This file contains Land Patterns for Small Outline Transistor Components of type JEDEC SOT-143.



3.5.67.1 Format

KiCad

3.5.67.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD SOT SOT143
- Reference: ???
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.67.3 IPC Land Pattern Name

SOT + Pitch **P** + Lead Span Nominal **-** Pin Qty + Environment

e.g. SOT192P230-4N, SOT192P230-4RN

3.5.67.4 Pad Shapes

3.5.67.4.1 Default

Rectangular

3.5.67.4.2 Pin Indicating Polarity

Rectangular

3.5.67.5 Pad Dimensions

According to IPC-7351

3.5.67.6 Pads mask clearance

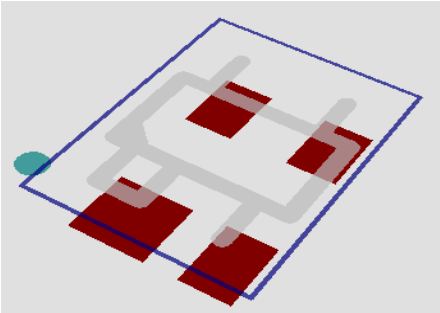
As Default (3.1.8)

3.5.67.7 Technical Layers

SMD-XLSO (6.18)

3.5.68 SOT343-JEDEC

This file contains Land Patterns for Small Outline Transistor Components of type JEDEC SOT-343.



3.5.68.1 Format

KiCad

3.5.68.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD SOT SOT343
- Reference: ???
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.68.3 IPC Land Pattern Name

SOT + Pitch **P** + Lead Span Nominal **-** Pin Qty + Environment

e.g. SOT130P210-4N, SOT130P210-4RN

3.5.68.4 Pad Shapes

3.5.68.4.1 Default

Rectangular

3.5.68.4.2 Pin Indicating Polarity

Rectangular

3.5.68.5 Pad Dimensions

According to IPC-7351

3.5.68.6 Pads mask clearance

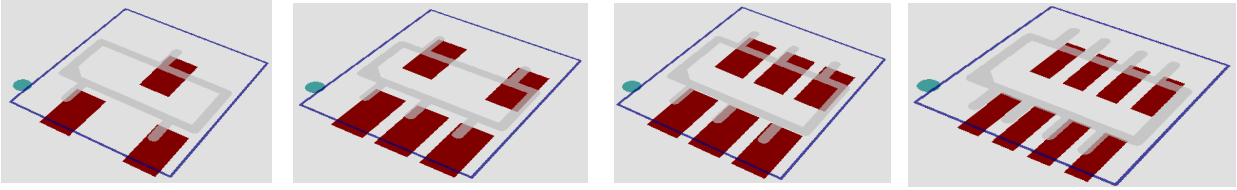
As Default (3.1.8)

3.5.68.7 Technical Layers

SMD-XLSO (6.18)

3.5.69 SOT23-JEDEC

This file contains Land Patterns for Small Outline Transistor Components of type JEDEC SOT-23 including 3, 5, 6 & 8 pin types.



3.5.69.1 Format

KiCad

3.5.69.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD SOT SOT23-[n]
- Reference: ???
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.69.3 IPC Land Pattern Name

SOT + Pitch **P** + Lead Span Nominal **-** Pin Qty + Environment

e.g. SOT95P245_123-3N, SOT95P280-5N

3.5.69.4 Pad Shapes

3.5.69.4.1 Default

Rectangular

3.5.69.4.2 Pin Indicating Polarity

Rectangular

3.5.69.5 Pad Dimensions

According to IPC-7351

3.5.69.6 Pads mask clearance

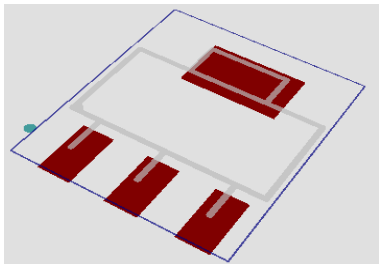
As Default (3.1.8)

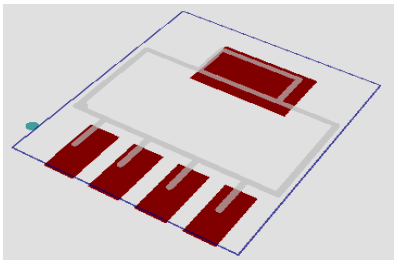
3.5.69.7 Technical Layers

SMD-XLSO (6.18)

3.5.70 SOT223-JEDEC

This file contains Land Patterns for Small Outline Transistor Components of type JEDEC SOT-223 including 4 & 5 pin types.





3.5.70.1 Format

KiCad

3.5.70.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD SOT SOT223-[n]
- Reference: ???
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.70.3 IPC Land Pattern Name

SOT + Pitch **P** + Lead Span Nominal **-** Pin Qty + Environment

e.g. SOT150P700-5N, SOT230P700_123-4N

3.5.70.4 Pad Shapes

3.5.70.4.1 Default

Rectangular

3.5.70.4.2 Pin Indicating Polarity

Rectangular

3.5.70.5 Pad Dimensions

According to IPC-7351

3.5.70.6 Pads mask clearance

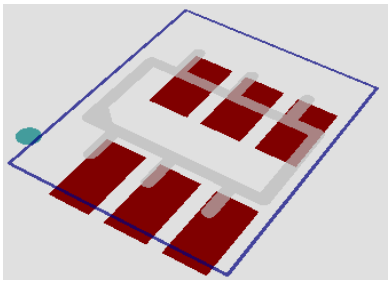
As Default (3.1.8)

3.5.70.7 Technical Layers

SMD-XLSO (6.18)

3.5.71 SOT26-JEDEC

This file contains Land Patterns for Small Outline Transistor Components of type JEDEC SOT-26.



3.5.71.1 Format

KiCad

3.5.71.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD SOT SOT26
- Reference: ???
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.71.3 IPC Land Pattern Name

SOT + Pitch **P** + Lead Span Nominal **-** Pin Qty + Environment

e.g. SOT95P300-6N

3.5.71.4 Pad Shapes

3.5.71.4.1 Default

Rectangular

3.5.71.4.2 Pin Indicating Polarity

Rectangular

3.5.71.5 Pad Dimensions

According to IPC-7351

3.5.71.6 Pads mask clearance

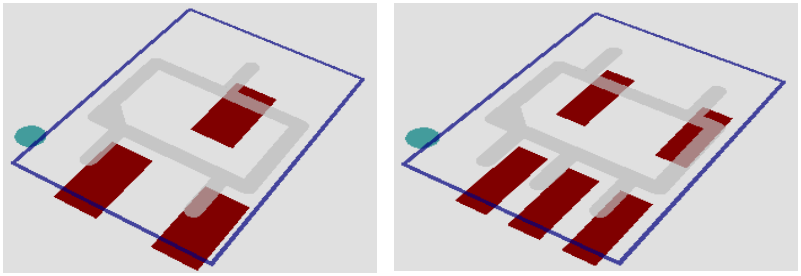
As Default (3.1.8)

3.5.71.7 Technical Layers

SMD-XLSO (6.18)

3.5.72 SOT323-JEDEC

This file contains Land Patterns for Small Outline Transistor Components of type JEDEC SOT-323.



3.5.72.1 Format

KiCad

3.5.72.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD SOT SOT323
- Reference: ???
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.72.3 IPC Land Pattern Name

SOT + Pitch **P** + Lead Span Nominal **-** Pin Qty + Environment

e.g. SOT65P220-3N

3.5.72.4 Pad Shapes

3.5.72.4.1 Default

Rectangular

3.5.72.4.2 Pin Indicating Polarity

Rectangular

3.5.72.5 Pad Dimensions

According to IPC-7351

3.5.72.6 Pads mask clearance

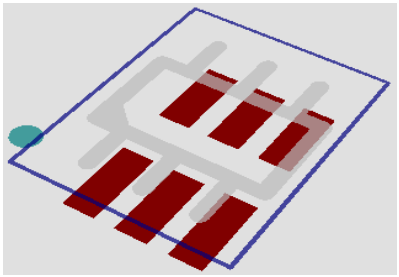
As Default (3.1.8)

3.5.72.7 Technical Layers

SMD-XLSO (6.18)

3.5.73 SOT363-JEDEC

This file contains Land Patterns for Small Outline Transistor Components of type JEDEC SOT-363.



3.5.73.1 Format

KiCad

3.5.73.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD SOT SOT363
- Reference: ???
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.73.3 IPC Land Pattern Name

SOT + Pitch **P** + Lead Span Nominal **-** Pin Qty + Environment

e.g. SOT65P200-6N

3.5.73.4 Pad Shapes

3.5.73.4.1 Default

Rectangular

3.5.73.4.2 Pin Indicating Polarity

Rectangular

3.5.73.5 Pad Dimensions

According to IPC-7351

3.5.73.6 Pads mask clearance

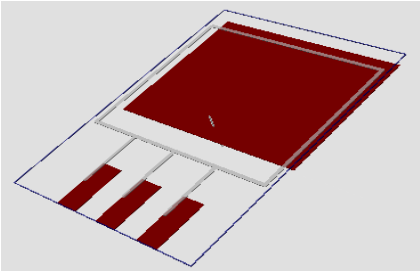
As Default (3.1.8)

3.5.73.7 Technical Layers

SMD-XLSO (6.18)

3.5.74 TO-genericDPAK

This file contains Land Patterns for Transistor Outlines.



3.5.74.1 Format

KiCad

3.5.74.2 Module Properties

- Doc: <IPC Land Pattern Name>
- Footprint Name in Lib: <IPC Land Pattern Name>
- Keywords: IPC-7351 SMD TO <JEDEC No.>
- Reference: ???
- Value: <IPC Land Pattern Name>
- Attributes: Normal+Insert (At SMD/attr smd)

3.5.74.3 IPC Land Pattern Name

TO + Pitch **P** + Lead Span **-** Pin Qty + Environment

e.g. TO228P990-2N

3.5.74.4 Pad Shapes

3.5.74.4.1 Default

Rectangular

3.5.74.4.2 Pin Indicating Polarity

N/A

3.5.74.5 Pad Dimensions

According to IPC-7351

3.5.74.6 Pads mask clearance

As Default (3.1.8)

3.5.74.7 Technical Layers

Manual: Body Outline (Drawings Layer), Courtyard.

3.5.75 SOCAV-integratedCircuitsChipArrayConcave

-

3.5.76 SOCAF-integratedCircuitsChipArrayFlat

-

3.6 Non-Standard IPC-7351 Surface Mount Land Patterns

3.6.1 AMP-amplifiers

-

3.6.2 BAT-batteries

-

3.6.3 CAPV-capacitorsVariable

-

3.6.4 CAPCAV-capacitorsChipArrayConcave

-

3.6.5 CAPCAF-capacitorsChipArrayFlat

-

3.6.6 CAP-capacitorsMiscellaneous

-

3.6.7 XTAL-crystalOscillator

-

3.6.8 DIO-diodesMiscellaneous

-

3.6.9 DIOB-bridgeRectifiers

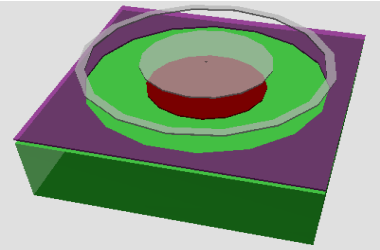
-

3.6.10 FB-ferriteBeads

-

3.6.11 FID-fiducials

This file contains Land Patterns for Fiducial Marks.



3.6.11.1 Format

KiCad

3.6.11.2 Module Properties

- Doc: <Land Pattern Name>
- Footprint Name in Lib: <Land Pattern Name>
- Keywords: IPC-7351 SMD FID Fiducial
- Reference: FID
- Value: <Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.6.11.3 Land Pattern Name

FID + Pad Size **X** Solder Mask Size

e.g. FID150X300

3.6.11.4 Pad Shapes

3.6.11.4.1 Default

Round

3.6.11.4.2 Pin Indicating Polarity

N/A

3.6.11.5 Pad Dimensions

FID100X200: 1.00 mm (R = 0.50 mm)

FID150X300: 1.50 mm (R = 0.75 mm)

FID200X400: 2.00 mm (R = 1.00 mm)

FID300X600: 3.00 mm (R = 1.50 mm)

3.6.11.6 Pads mask clearance

3.6.11.6.1 Pad Clearance

Used as a "Keepout" area

FID100X200: 0.50 mm (2R = (0.50 + R) = 1.00 mm)

FID150X300: 0.75 mm (2R = (0.75 + R) = 1.50 mm)

FID200X400: 1.00 mm (2R = (1.00 + R) = 2.00 mm)

FID300X600: 1.50 mm (2R = (1.50 + R) = 3.00 mm)

3.6.11.6.2 Solder Mask Clearance

FID100X200: 0.50 mm

FID150X300: 0.75 mm

FID200X400: 1.00 mm

FID300X600: 1.50 mm

3.6.11.6.3 Solder Paste Clearance (All)

-0.0 mm

Note: The Pad forming the Fiducial Mark has no Solder Paste Layer.

3.6.11.6.4 Solder Mask Ratio Clearance (All)

-0.0 %

3.6.11.6.5 Solder Mask Clearance

FID100X200: 0.50 mm (2R = (0.50 + R) = 1.00 mm)

FID150X300: 0.75 mm (2R = (0.75 + R) = 1.50 mm)

FID200X400: 1.00 mm (2R = (1.00 + R) = 2.00 mm)

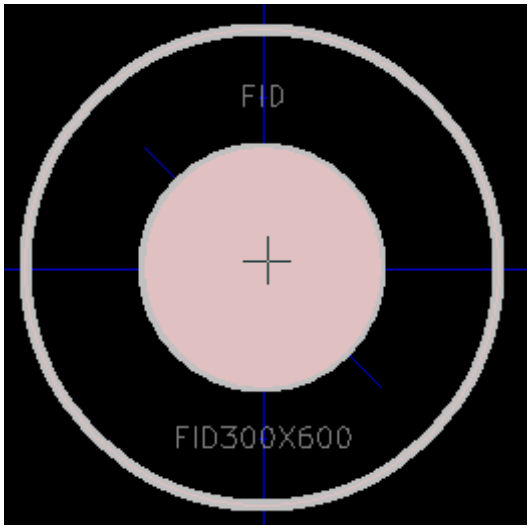
FID300X600: 1.50 mm (2R = (1.50 + R) = 3.00 mm)

3.6.11.7 Technical Layers

Layer (nn)	Outline	
	LW (mm)	Shape
Drawings (24)	0.20	Circle. Concentric circles forming a filled area (Copper pad) Circle. Marking Pad Clearance

Note: LW = Line Width

e.g:



3.6.12 FIL-filters

-

3.6.13 FUSE-fuses

-

3.6.14 FUSER-fusesResettable

-

3.6.15 IND-inductorsMiscellaneous

-

3.6.16 INDCAV-inductorsChipArrayConcave

-

3.6.17 INDCAF-inductorsChipArrayFlat

-

3.6.18 KEYPAD

-

3.6.19 LED-lightEmittingDiodes

-

3.6.20 LCD-liquidCrystalDisplay

-

3.6.21 MIC-microphones

-

3.6.22 OPTO-optoisolators

-

3.6.23 OSC-oscillators

-

3.6.24 BQFPS-bumberQuadFlatPackageSide

-

3.6.25 BQFPC-bumberQuadFlatPackageCenter

-

3.6.26 RESCAV-resistorsChipArrayConcave

-

3.6.27 RESCAXE-resistorsChipArrayConvexTypeE

-

3.6.28 RESCAXS-resistorsChipArrayConvexTypeS

-

3.6.29 RESCAF-resistorsChipArrayFlat

-

3.6.30 RELAY-relays

-

3.6.31 SPKR-speakers

-

3.6.32 SW-switches

-

3.6.33 TP-testPointsRound

-

3.6.34 TPS-testPointsSquare

-

3.6.35 THERM-thermistors

-

3.6.36 XCVR-transceivers

-

3.6.37 XDCR-transducersIRDA

-

3.6.38 TVS-transientVoltageSuppressors

-

3.6.39 TVSP-transientVoltageSuppressorsPolarized

-

3.6.40 TRANS-transistorOutlinesCustom

-

3.6.41 XFMR-transformers

-

3.6.42 TRIM-trimmersPotentiometers

-

3.6.43 TUNER-tuners

-

3.6.44 VAR-varistors

-

3.6.45 VCO-voltageControlledOscillator

-

3.6.46 VREG-voltageRegulatorsCustom

-

3.6.47 CONN-<connectors/headers>

These files contain Land Patterns for Connectors and Headers. The file names use the following convention:

CONN[pitch]-[headers][Manufacturer/Generic]

CONN-[connectors][type][Manufacturer/Generic]

e.g CONN125P-headersHirose.mod, CONN-connectorsMiscellaneous.mod

These Land Patterns are obtained from http://www.reniemarquet.cjb.net/kicad.htm with modifications to orientation, Value and Reference Values, Silkscreen to Drawings Layer conversion, Local Pad Clearances and rounding of pad dimensions.

3.6.47.1 Format

KiCad

3.6.47.2 Module Properties

- Doc: <Land Pattern Name>
- Footprint Name in Lib: <Land Pattern Name>
- Keywords: SMD CONN Connector/CONN Connector HDR Header
- Reference: J??
- Value: <Land Pattern Name>
- Attributes: Normal ("At" field not present)

3.6.47.3 Land Pattern Names

Manufacturers Part Number/Generic Name

e.g. HIROSE_DF13-10P-125H, MOLEX_502774-0811

3.6.47.4 Pad Shapes

3.6.47.4.1 Default

Oval

3.6.47.4.2 Pin Indicating Polarity

Rectangular

3.6.47.5 Pad and Finished Hole Dimensions

According to Data Sheet

3.6.47.6 Pads mask clearance

As Default (3.1.8)

3.6.47.7 Technical Layers

As original, with graphics on Silkscreen Layer changed to Drawings Layer..

3.7 VeeCAD Compatible Libraries

3.7.1 General

For interworking between KiCad and VeeCAD, two methods can be used:

a) Ensure the required Land Pattern name exists in both PCBNew and VeeCAD.

b) Create dedicated Land Patterns for VeeCAD where the Land Pattern name exists in both PCBNew and VeeCAD.

   Note: Although classed as Land Patterns, these are "dummy" components as the goal is just to assign the Land Pattern name to the Symbol (see 3.7)

3.7.2 KiCad to VeeCAD Process

VeeCAD OrcadPCB2 netlist format requires that the Symbols' Footprint Field is populated when generating the Netlist. The following process is used:

1) Create "dummy" VeeCAD Land Patterns. The names contain the suffix "V". These Land Patterns consist of just the Land Pattern name. The dummy Land Pattern name matches an equivalent VeeCAD Land Pattern name.

2) The dummy Land Patterns are assigned as Footprint Filter(s) in Eeschema.

3) Annotate and create a Netlist in KiCad format in Eeschema.

4) Assign Land Patterns with CvPcb.

5) Save the footprint link file (*.cmp).

6) From Eeschema, import the created *.cmp file – The valid VeeCAD Land Patterns will be assigned.

7) Create a Netlist in OrcadPCB2 format and import into VeeCAD.

3.7.3 VeeCAD Compatible Library Naming Convention

The tables below (3.7.3.1 and 3.7.3.2) specify the naming convention of the folders and files containing the KiCad Land Patterns used for assigning VeeCAD Land Patten Names. There is a one-to-one relationship between the applicable Land Pattern names of KiCad and VeeCAD.

Note: VeeCAD Library files use the same naming convention.

e.g. the KiCad file CAPPAD-capacitorsPolarizedAxialDiameter.mod and VeeCAD file CAPPAD-capacitorsPolarizedAxialDiameter.per contain equivalent Land Pattern names.

3.7.3.1 IPC-7251 VeeCAD Compatible Library Naming Convention

Through Hole Land Patterns that can be designated according to IPC-7251 are contained in files located in folders using IPC- 7251 conventions, under ..\KiCad\Libraries\Footprint\VeeCAD:

Folder Name	Description	Subfolder[20] / Filename[21](s) [*.mod]
CAPx	Capacitors, Non Pol Axial Dia Horizontal Mount Capacitors, Non Polarized Ax Dia Vert Mount Capacitors, Non Polarized Axial Rectangular Capacitors, Non Polarized Ax Rec Vert Mount Capacitors, Non Polarized Radial Diameter Capacitors, Non Polarized Radial Rectangular Capacitors, Non Polarized Radial Disc Button Capacitors, Polarized Axial Dia Horiz Mnt Capacitors, Polarized Axial Dia Vert Mnt Capacitors, Polarized Axial Rectangular Capacitors, Polarized Axial Rec Vert Mount Capacitors, Polarized Radial Diameter Capacitors, Polarized Radial Rectangular	CAPAD-capacitorsNonPolarizedAxialDiameter CAPADV-capacitorsNonPolarizedAxialDiameterVertical CAPAR-capacitorsNonPolarizedAxialRectangular CAPARV-capacitorsNonPolarizedAxialRectangularVertical CAPRD-capacitorsNonPolarizedRadialDiameter CAPRR-capacitorsNonPolarizedRadialRectangular CAPRB-capacitorsNonPolarizedRadialDiscButton CAPPAD-capacitorsPolarizedAxialDiameter CAPPADV-capacitorsPolarizedAxialDiameterVertical CAPPAR-capacitorsPolarizedAxialRectangular CAPPARV-capacitorsPolarizedAxialRectangularVertical CAPPRD-capacitorsPolarizedRadialDiameter CAPPRR-capacitorsPolarizedRadialRectangular
DIOx	Diodes, Axial Diameter Horizontal Mount Diodes, Axial Diameter Vertical Mount Diodes, Axial Rectangular Horizontal Mount Diodes, Axial Rectangular Vertical Mount	DIOAD-diodesAxialDiameter DIOADV-diodesAxialDiameterVertical DIOAR-diodesAxialRectangular DIOARV-diodesAxialRectangularVertical
DIP, DIPS	Dual-In-Line Packages (JEDEC Standard)	DIP-dualInlinePackages
FUSx	Fuses, Axial Diameter Horizontal Mount Fuses, Axial Rectangular Horizontal Mount Fuses, Axial Diameter Vertical Mount Fuses, Axial Rectangular Vertical Mount Fuses, Radial Diameter Fuses, Radial Rectangular	FUSAD-fusesAxialDiameter FUSAR-fusesAxialRectangular FUSADV-fusesAxialDiameterVertical FUSARV-fusesAxialRectangularVertical FUSRD-fusesRadialDiameter FUSRR-fusesRadialRectangular
HDRx	Standard Pin Strip Header, Vertical Standard Pin Strip Header, Right Angle	HDRV254P-headerVertical HDRRA254P-headerRightAngle
INDx	Inductors, Axial Diameter Horizontal Mount Inductors, Axial Diameter Vertical Mount Inductors, Axial Rectangular Horizontal Mount Inductors, Axial Rectangular Vertical Mount Inductors, Radial Diameter Inductors, Radial Rectangular	INDAD-inductorsAxialDiameter INDADV-inductorsAxialDiameterVertical INDAR-inductorsAxialRectangular INDARV-inductorsAxialRectangularVertical INDRD-inductorsRadialDiameter INDRR-inductorsRadialRectangular
JUMP	Jumpers	N/A
LEDx	Light-Emitting Diodes, Radial Diameter Light-Emitting Diodes, Radial Rectangular	LEDRD-lightEmittingDiodesRadialDiameter LEDRR-lightEmittingDiodesRadialRectangular
MTGx	Mounting Hole, Non-Plated, Plated	N/A
PGA	Pin Grid Arrays	N/A
RESx	Resistors, Axial Diameter Horizontal Mount Resistors, Axial Diameter Vertical Mount Resistors, Axial Rectangular Horizontal Mount Resistors, Axial Rectangular Vertical Mount	RESAD-resistorsAxialDiameter RESADV-resistorsAxialDiameterVertical RESAR-ressistorsAxialRectangular RESARV-ressistorsAxialRectangularVertical
SIP	Single In-Line Networks	SIP-singleInLineNetworks
TPx	Test Point, Round/Rectangular Test Point, Square	TPCW-testPointsRound TPRW-testPointsSquare
OSC	Oscillators	OSC-oscillators
TO	Transistor Outlines	TO-transistorOutlines
WIRE	Wire	N/A

20 Subfolder name when s-expression format

21 When components can be horizontally or vertically mounted (e.g. Diodes, Resistors), horizontal mounting is considered the default and is **not** included in the file name.

3.7.3.2 Non-Standard IPC-7251 VeeCAD Compatible Library Naming Convention

Non-standard Through Hole Land Patterns that can be designated according to IPC-7251 are contained in files located in folders using IPC- 7251 conventions. Through Hole Land Patterns that cannot be designated according to IPC-7251 are contained in files also located in folders under ..\KiCad\Libraries\Footprint\VeeCAD:

Folder Name	Description	Filename(s) [*.mod] / Subfolder[22]
AMP	Amplifiers	AMP-amplifiers
BAT	Batteries	BAT-batteries
DIOB	Bridge Rectifiers	DIOB-bridgeRectifiers
CONV	Converters	CONV-converters
XTAL	Crystals	XTAL-crystalOscillator
FB	Ferrite Beads	FB-ferriteBeads
FIL	Filters	FIL-filters
FUSx	Fuses Fuses, Resettable	FUSE-fuses FUSER-fusesResettable
HSINK	Heat Sinks	HSINK-heatSinks
IND	Inductors	IND-inductors
LEDx	Light Emitting Diodes, LED 7-Segment LED Displays	LED-lightEmittingDiodes LED7S-7SegmentDisplays
LCD	Liquid Crystal Display	LCD-liquidCrystalDisplay
MIC	Microphones	MIC-microphones
MOV	MOV	MOV
OPTO	Opto Isolators	OPTO-optoisolators
OSC	Oscillators	OSC-oscillators
PAD	PAD	PAD
PHODET	Photo Detectors	PHODET-photoDetectors
REG	Regulators	REG-regulators
RELAY	Relays	RELAY-relays
SHIELD	Shield, off the shelf Shield, Custom	SHIELD
SPKR	Speakers	SPKR-speakers
STIF	Stiffners	STIF-stiffners
SW	Switches	SW-switches
THERM	Thermistors	THERM-thermistors
XDCR	Transducers (IRDA's)	XDCR-transducersIRDA
TVSx	Transient Voltage Suppressors Transient Voltage Suppressors, Polarized	TVS-transientVoltageSuppressors TVSP-transientVoltageSuppressorsPolarized
TRANS	Transistor Outlines, Custom	TRANS-transistorOutlinesCustom
XFMR	Transformers	XFMR-transformers
TRIM	Trimmers & Potentiometers	TRIM-trimmersPotentiometers
TUNER	Tuners	TUNER-tuners
VAR	Varistors	VAR-varistors
VCO	Voltage Controlled Oscillator	VCO-voltageControlledOscillator
CONN	Connectors	CONN-<connectors/headers>

22 Subfolder name when s-expression format

3.7.3.3 VeeCAD Dummy Land Pattern Format

These Land Patterns are fictitious representations of the components. The Land Pattern name always ends in the suffix "V".

3.7.3.3.1 Format

Legacy

3.7.3.3.2 Module Properties

- Doc: <Component_Type>
- Footprint Name in Lib: <Land Pattern Name>"V"
- Keywords: VeeCAD PTH <Component_Type>
- Reference: <Component_Type>
- Value: "Dummy Module"
- Attributes: Normal ("At" field not present)

3.7.3.3.3 Land Pattern Names

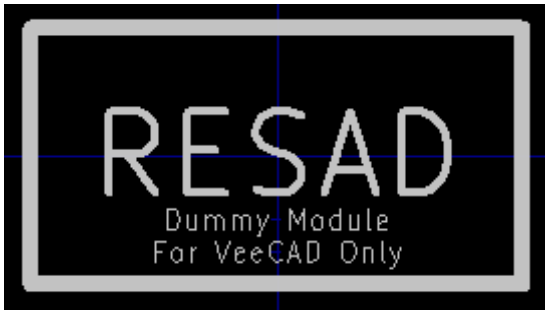
IPC-7521 Name/Manufacturers Part Number/Generic Name with suffix "V"

e.g. RESAD1000W45L320D170V

Where "RESAD" is the Component Type

3.7.3.3.4 Example

- Doc: RESAD
- Footprint Name in Lib: RESAD1000W45L320D170V
- Keywords: VeeCAD PTH RESAD
- Reference: RESAD
- Value: "Dummy Module"
- Attributes: Normal ("At" field not present)



4 References

4.1 Documents

Title: The CAD Library

Author: Tom Hausherr

Link: http://www.frontdoor.biz/HowToPCB/HowToPCB-extra/CADlib.pdf

Title: IPC-7x51 & PCBM Land Pattern Naming Convention

Author: IPC

Link: http://ohm.bu.edu/~pbohn/__Engineering_Reference/pcb_layout/pcbmatrix/IPC-7x51%20&%20PCBM%20Land%20Pattern%20Naming%20Convention.pdf

Title: IPC-7251 PTH Padstack Table for Levels ABC

Author: Mentor Graphics

Link: http://www.mentor.com/resources/appnotes/upload/level-a-land-pattern-construction.pdf

4.2 Tools

Title: footprintbuilder

Author: Robert Fitzsimons

http://cyclerecorder.org/footprintbuilder/

Title: PCB Matrix LP Calculator V2010.00.00

Author: Mentor Graphics

Link: http://www.oldversion.com/windows/pcb-matrix-lp-calculator/

Title: Quick KICAD Module Builder

Author: C. Rohrbacher

Link: http://kicad.rohrbacher.net/quickmod.php

Title: Graphics Calculator

Author: steve28546534

Link: http://tech.groups.yahoo.com/group/kicad-users/files/myTools/ <latest version>

5 Appendix A

This chapter describes the Land Pattern Technical Layers for PTH components.

In the examples, Silkscreen Layer is light blue, Drawings Layer is white.

Graphic Types are named as:

<Land_Pattern_Type>-ABCD_<variant>.

The Graphic Types naming convention is derived from the table below:

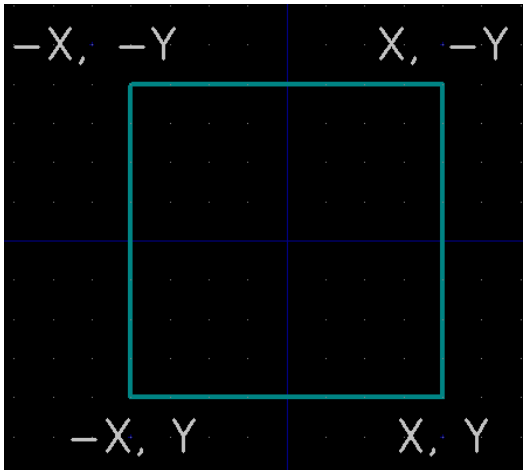
Land Pattern Type	Polarization		Shape		Orientation		Variant
Type	A		BC		D		
PTH-	N	Non-Polarized	AD	Axial, Diameter	V	Vertical	_A to _Z
	P	Polarized	AR	Axial, Rectangular	H	Horizontal	
	X	N/A	AA	Axial, Any	X	N/A	
			RD	Radial, Diameter			
			RR	Radial, Rectangular			
			RA	Radial, Any			
			IL	In-Line (Dual, Single)			
			TC	TO (Cylindrical)			
			TF	TO (Flange			
PTH-	MISC						

e.g. PTH-XILX_A is Through Hole, (Dual) In-Line, Variant "A"

Examples created with Graphics Calculator (see References).

5.1.1 Coordinates

The coordinates used in the following tables are the start-points/end-points used in PCBNew.



5.2 PTH-XILX_A

Applies to:

- Dual In-Line Packages, Pin 1 Top Left, Body < Pin Span

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Length / 2)
			X1A	(Body Width / 2)
Body Outline Polarity	(2)	Dot	Y1B	((Body Length / 2) – (2 * Line Width))
			X1B	((Body Width / 2) – (2 * Line Width))
Courtyard	N/A	N/A	N/A	N/A
			N/A	N/A
Silkscreen Polarity	(2)	Dot	Y2A	((Body Length / 2) + (2 * Line Width))
			X2A	(Pad Centre to Centre / 2)

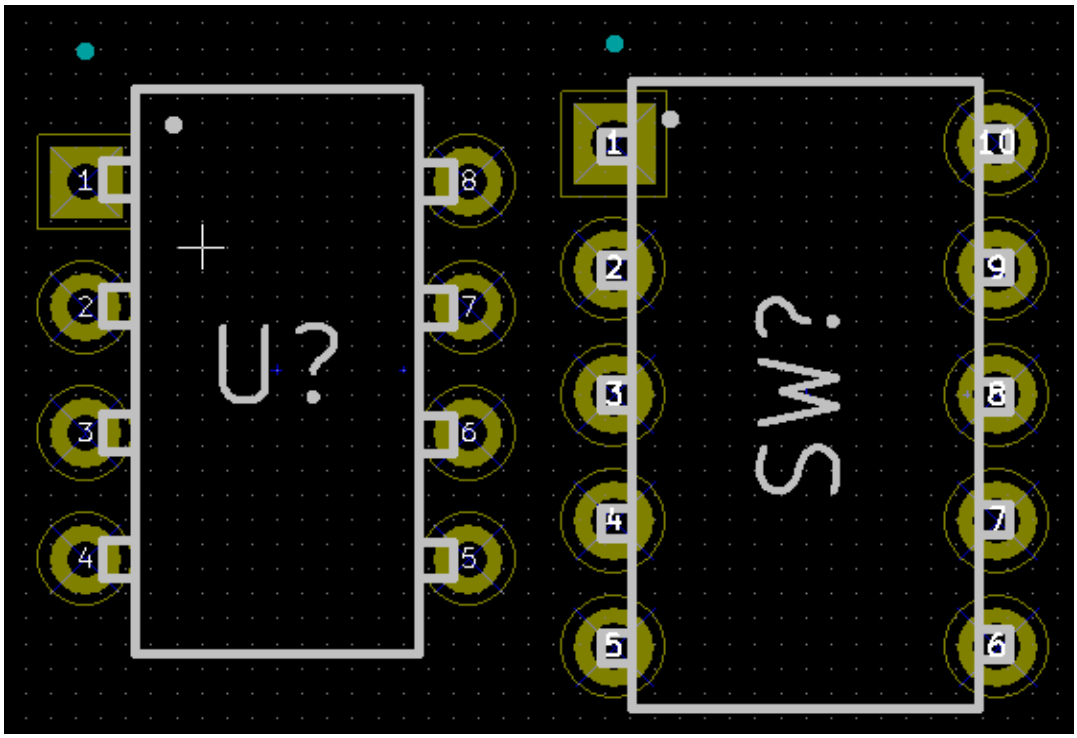
(1) Body Outline. Represents the actual component dimensions

(2) Line Width 0.127 mm to 0.508 mm

Note1: Body Length is measured on the Y-axis

Note2: Body Width is measured on the X-axis

Note3: Pins drawn from body edge to centre of pad



5.3 PTH-XILX_B

Applies to:

- Dual/Single In-Line Packages, Pin 1 Top Left, Body > Pin Span

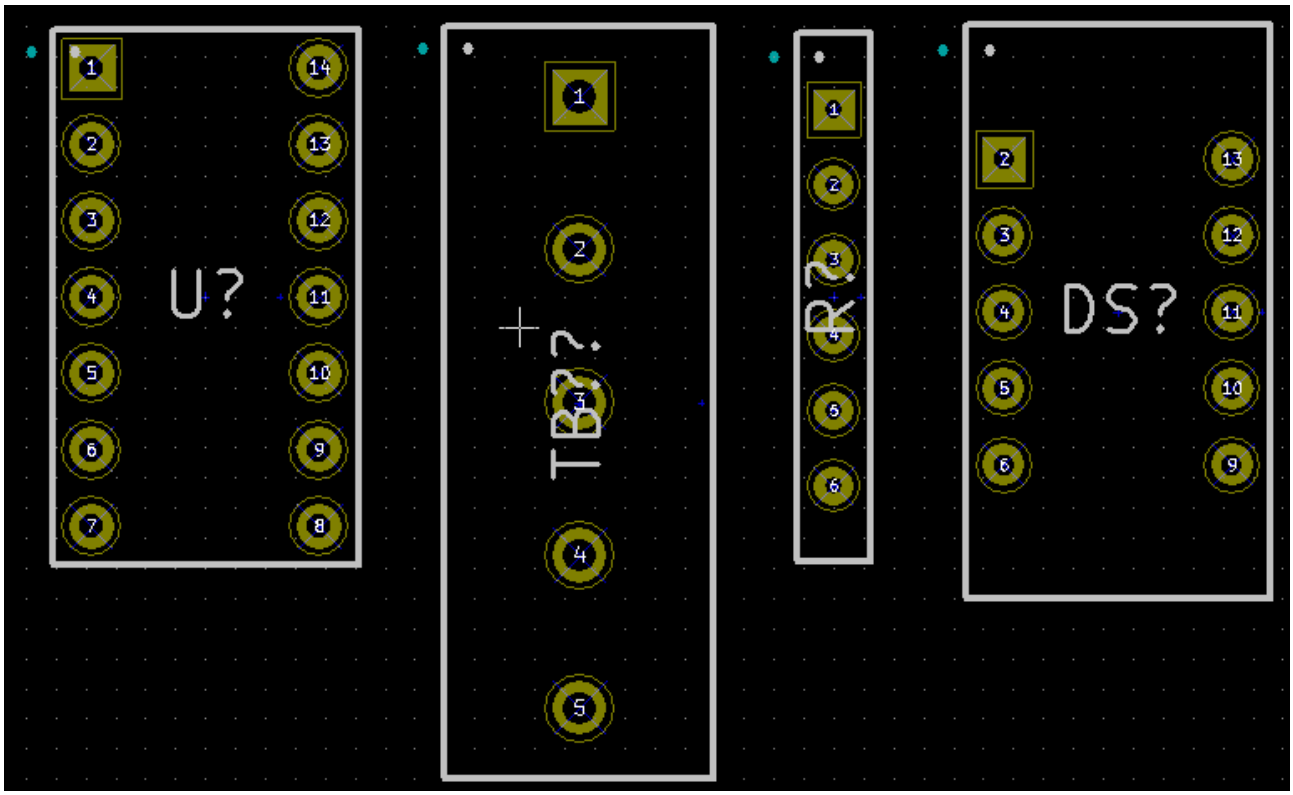
Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Length / 2)
			X1A	(Body Width / 2)
Body Outline Polarity	(2)	Dot	Y1B	((Body Length / 2) – (2 * Line Width))
			X1B	((Body Width / 2) – (2 * Line Width))
Courtyard	N/A	N/A	N/A	N/A
			N/A	N/A
Silkscreen Polarity	(2)	Dot	Y2A	((Body Length / 2) - (2 * Line Width))
			X2A	((Body Width / 2) + (2 * Line Width))

(1) Body Outline. Represents the actual component dimensions

(2) Line Width 0.127 mm to 0.508 mm

Note1: Body Length is measured on the Y-axis

Note2: Body Width is measured on the X-axis



5.4 PTH-PAAH

Applies to:

- Polarized Axial

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Width / 2)
			X1A	(Body Length / 2)
Body Outline Polarity	(2)	Line	Y1B	(Body Width / 2)
			X1B	((Body Length / 2) * 0.7)
Body Outline Pin	0.20	Line	Y2A	(Pitch / 2)
			X2A	(Body Length / 2)
Courtyard	N/A	N/A	N/A	N/A
			N/A	N/A
Silkscreen Polarity	(2)	Dot	Y2B	((Pad Size / 2) + (2 * Line Width))
			X2B	(Pitch / 2)

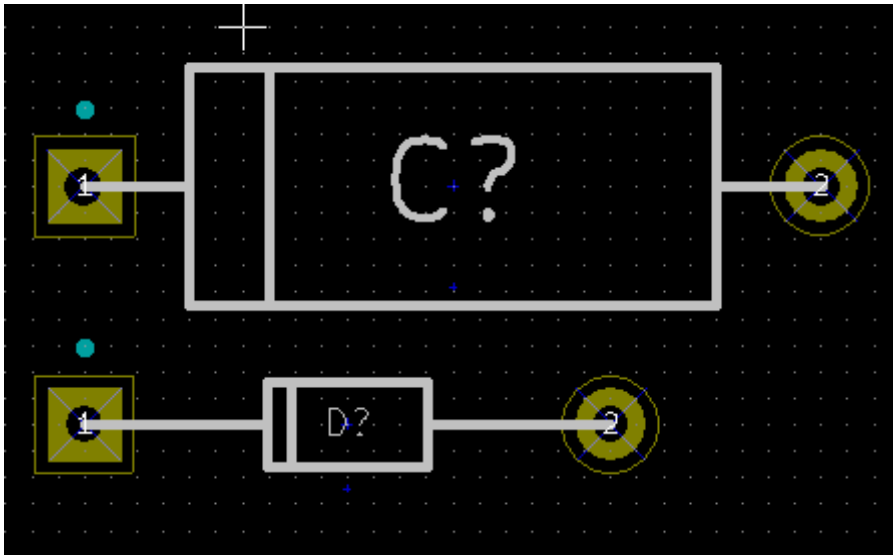
(1) Body Outline. Represents the actual component dimensions

(2) Line Width 0.127 mm to 0.508 mm

Note1: Body Length is measured on the Y-axis

Note2: Body Width is measured on the X-axis

Note3: Pins drawn from body edge to centre of pad



5.5 PTH-NRDV

Applies to:

- Non-Polarized Round Radial

-

5.6 PTH-PRDV

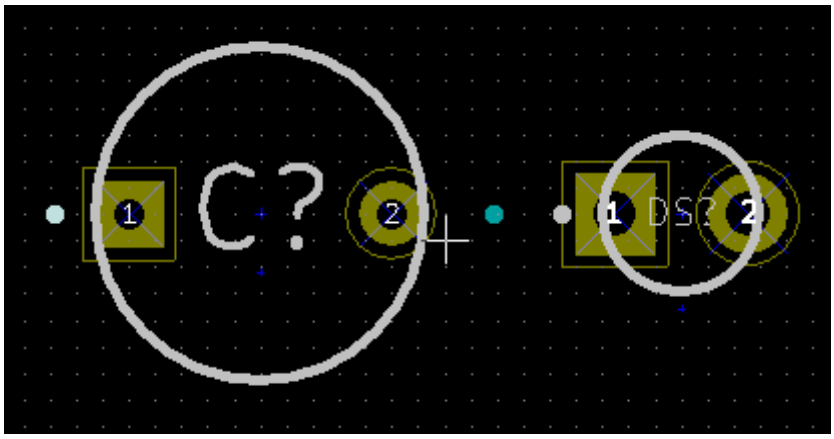
Applies to:

- Polarized Round Radial

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y/X1A	(Body Diameter / 2)
Body Outline Polarity	(2)	Line	Y1B	0
			X1B	((Body Diameter / 2) + (2 * Line Width))
Courtyard	N/A	N/A	N/A	N/A
			N/A	N/A
Silkscreen Polarity	(2)	Dot	Y2A	0
			X2A	If Diameter is > Pitch: ((Body Diameter / 2) + (2 * Line Width)). If Diameter is > Pitch: ((Body Diameter / 2) + 2.032 mm)

(1) Body Outline. Represents the actual component dimensions

(2) Line Width 0.127 mm to 0.508 mm



Note: Silkscreen and Drawings Polarity Mark share same coordinates for C?

5.7 PTH-NAAH

Applies to:

- Non-Polarized Axial

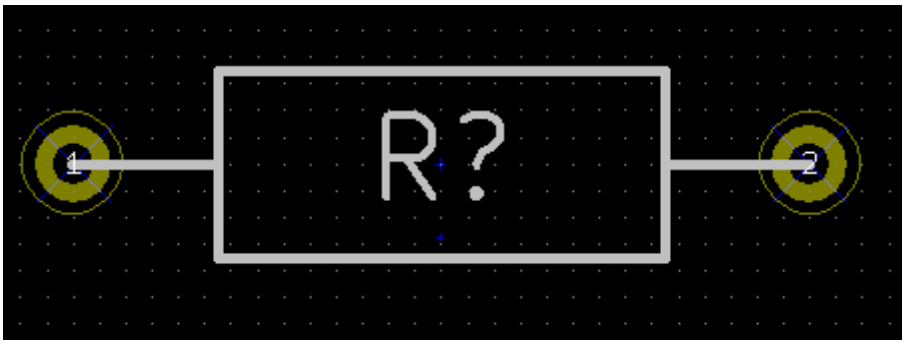
Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Width / 2)
			X1A	(Body Length / 2)
Body Outline Polarity	N/A	N/A	N/A	N/A
			N/A	N/A
Body Outline Pin	0.20	Line	Y2A	(Pitch / 2)
			X2A	(Body Length / 2)
Courtyard	N/A	N/A	N/A	N/A
			N/A	N/A
Silkscreen Polarity	N/A	N/A	N/A	N/A
			N/A	N/A

(1) Body Outline. Represents the actual component dimensions

Note1: Body Length is measured on the Y-axis

Note2: Body Width is measured on the X-axis

Note3: Pins drawn from body edge to centre of pad



5.8 PTH-NRRV

Applies to:

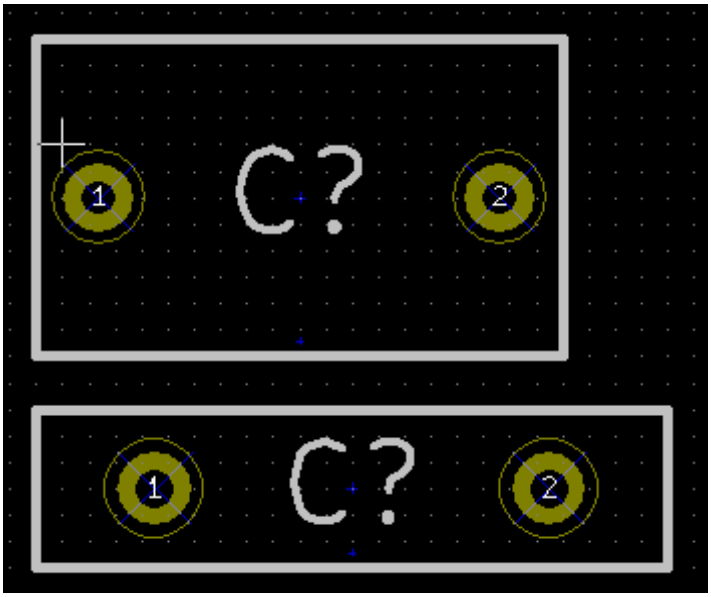
- Non-Polarized Square/Rectangular Radial

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y	(Body Width / 2)
			X	(Body Length / 2)
Body Outline Polarity	N/A	N/A	N/A	N/A
			N/A	N/A
Courtyard	N/A	N/A	N/A	N/A
			N/A	N/A
Silkscreen Polarity	N/A	N/A	N/A	N/A
			N/A	N/A

(1) Body Outline. Represents the actual component dimensions

Note1: Body Length is measured on the X-axis

Note2: Body Width is measured on the Y-axis



5.9 PTH-PRRV

Applies to:

- Polarized Rectangular Radial

-

5.10 PTH-XTFV

Applies to:

- TO (Vertical Flange)

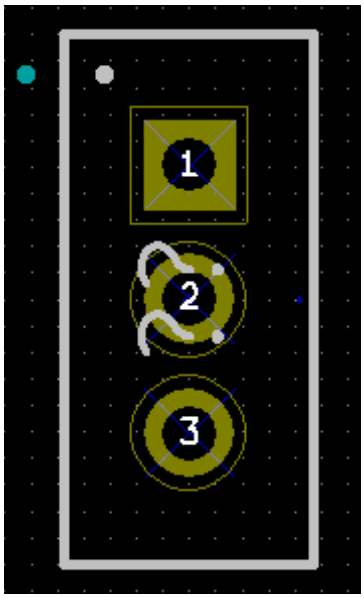
Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Length / 2)
			X1A	(Body Width / 2)
Body Outline Polarity	(2)	Dot	Y1B	((Body Length / 2) – (2 * Line Width))
			X1B	((Body Width / 2) – (2 * Line Width))
Courtyard	N/A	N/A	N/A	N/A
			N/A	N/A
Silkscreen Polarity	(2)	Dot	Y2A	((Body Length / 2) - (2 * Line Width))
			X2A	((Body Width / 2) + (2 * Line Width))

(1) Body Outline. Represents the actual component dimensions

(2) Line Width 0.127 mm to 0.508 mm

Note1: Body Length is measured on the Y-axis

Note2: Body Width is measured on the X-axis



5.11 PTH-TO92

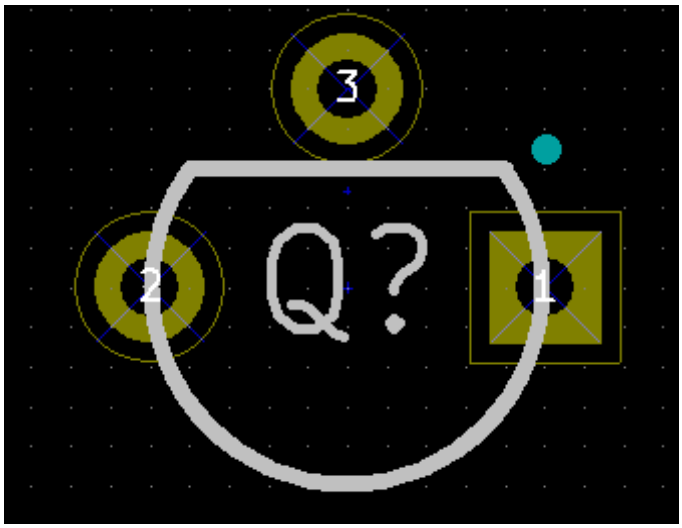
Applies to:

- TO-92 and equivalent

Layer	Line Width (mm)	Shape	Calculation (Actual)
Silkscreen	N/A	N/A	N/A
Body Outline	0.20	BO (1)	DS 1.999 -1.5011 -1.999 -1.5011 0.2 24
			DA 0 0 -1.5011 1.999 2.286 0.2 24
			DA 0 0 1.999 -1.5011 2.286 0.2 24
			DA 0 0 0 2.4994 2.286 0.2 24
			DA 0 0 2.4994 0 2.286 0.2 24
Silkscreen Polarity	(2)	Dot	DS 2.5095 -1.7501 2.509 -1.7501 0.381 21

(1) Body Outline. Represents the actual component dimensions

(2) Line Width 0.127 mm to 0.508 mm



5.12 PTH-XTCX

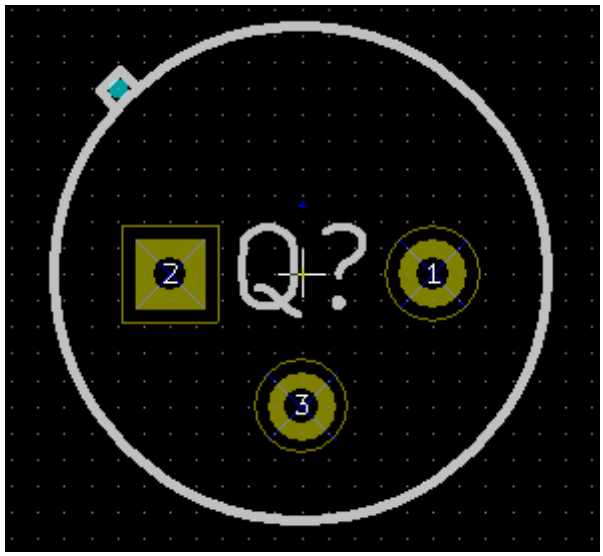
Layer	Line Width (mm)	Shape	Coord	Calculation
Body Outline	0.20	BO (1)	Y/X1A	(Body Diameter / 2)

Layer	Line Width (mm)	Shape	Calculation (Actual)
Silkscreen	N/A	N/A	N/A
Body Outline Polarity	(2)	Dot	DS -3.0988 -2.7 -2.7 -3.0988 0.2 24
			DS -2.4003 -2.7991 -2.7 -3.0988 0.2 24
			DS -2.7991 -2.4003 -3.0988 -2.7 0.2 24
Silkscreen Polarity	(2)	Dot	DS -2.509 -1.7501 -2.509 1.7501 0.2 24

(1) Represents the actual component dimensions

(2) Line Width 0.127 mm to 0.508 mm

Note1: Polarity Marks moved to suit component.



5.13 PTH-XTFH

Applies to:

- TO (Horizontal Flange)

-

5.14 PTH-NADV

Applies to:

- Non-Polarized Axial, Vertical Mount

-

5.15 PTH-PADV

Applies to:

- Polarized Axial, Vertical Mount

-

5.16 PTH-NARV

Applies to:

- Non-Polarized Axial, Rectangular, Vertical Mount

-

5.17 PTH-PARV

Applies to:

- Polarized Axial, Rectangular, Vertical Mount

-

6 Appendix B

This chapter describes the Land Pattern Technical Layers for SMD components.

Courtyard dimensions are rounded to 0.05

In the examples, Silkscreen Layer is light blue, Drawings Layer is white, Comments Layer is dark blue.

Graphic Types are named as:

<Land_Pattern_Type>-ABCD_<variant>.

The Graphic Types naming convention is derived from the table below:

Land Pattern Type	Polarization		Lead		Shape		Variant
Type	A		B		CD		
SMD-	N	Non-Polarized	L	Leaded	CP	Chip/MELF	_A to _Z
	P	Polarized	N	Leadless	WW	Wire-Wound	
	X	N/A			MO	Moulded	
					AE	Aluminium Elect.	
					QL	Quad, Pin 1 top left	
					QC	Quad, Pin 1 centre	
					BG	Ball Grid Array	
					DL	Dual In-Line	
					SO	Small Outline	

e.g. SMD-NNCP is Surface Mount, Non-Polarized, Leadless, Chip/MELF

Examples created with Graphics Calculator (see References).

6.1 SMD-NNCP

Applies to:

- All Non-Polarized Chip components
- All Non-Polarized MELF components

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1	(Body Width / 2)
			X1	(Body Length / 2)
Body Outline Polarity	N/A	N/A	N/A	N/A
			N/A	N/A
Courtyard (3)	0.05	SQ (2)	Y2	((Pad Width /2) + Courtyard.Excess)
			X2	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre / 2))
Silkscreen Polarity	N/A	N/A	N/A	N/A
			N/A	N/A

(1) Body Outline. Represents the actual component dimensions

(2) SQuare. Clearance around Component and Land Pattern.

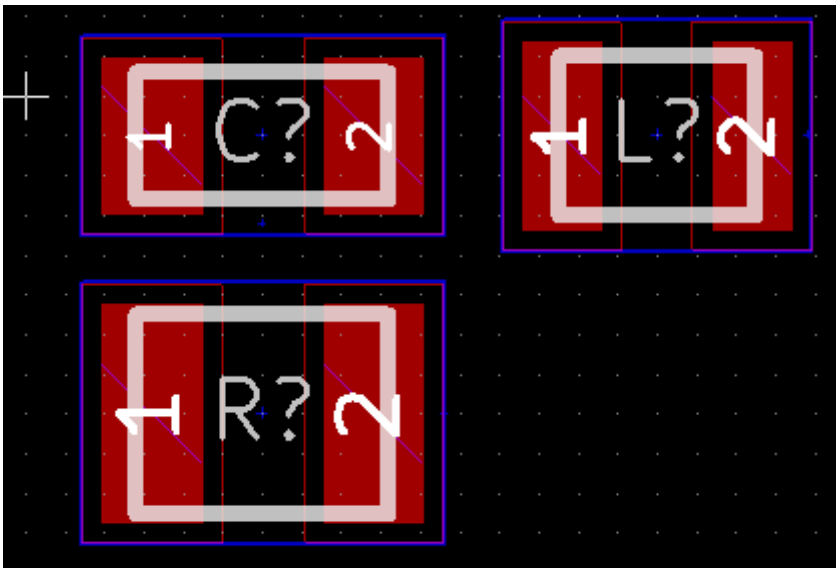
(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

Note1: Pad Width is measured on the Y-axis

Note2: Pad Length is measured on the X-axis

Note3: Body Length is measured on the X-axis

Note4: Body Width is measured on the Y-axis



6.2 SMD-PNCP_A

Applies to:

- All Polarized Chip components, Body Length **>** 2.0 mm
- All Polarized MELF components, Body Length > 2.0 mm

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Width / 2)
			X1A	(Body Length / 2)
Body Outline Polarity	(4)	Dot	Y1B	0
			X1B	(Body Length / 2) – 0.381 mm
Courtyard (3)	0.05	SQ (2)	Y2A	((Pad Width /2) + Courtyard.Excess))
			X2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre / 2))
Silkscreen Polarity	(4)	Dot	Y2B	0
			X2B	((Pad Length /2) + (2 * Line Width) + (Pad Centre to Centre / 2))

(1) Body Outline. Represents the actual component dimensions

(2) SQuare. Clearance around Component and Land Pattern.

(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

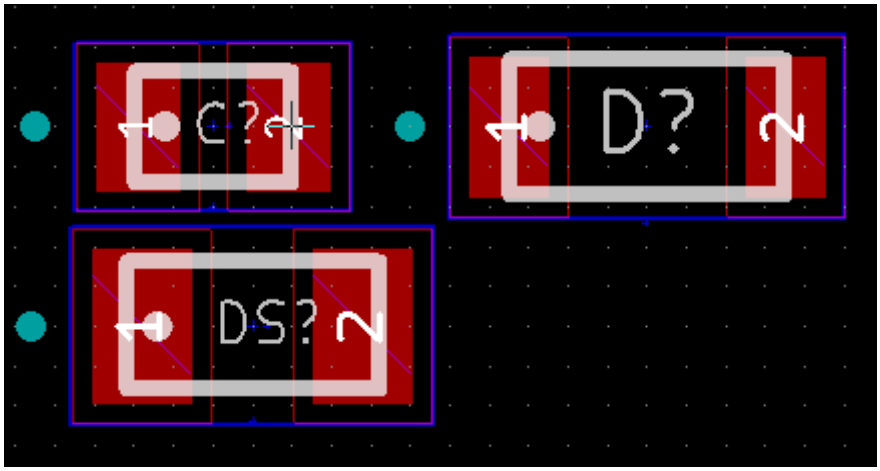
(4) Line Width 0.127 mm to 0.508 mm

Note1: Pad Width is measured on the Y-axis

Note2: Pad Length is measured on the X-axis

Note3: Body Length is measured on the X-axis

Note4: Body Width is measured on the Y-axis



6.3 SMD-PNCP_B

Applies to:

- All Polarized Chip components, Body Length ≤ 2.0 mm
- All Polarized MELF components, Body Length ≤ 2.0 mm

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Width / 2)
			X1A	(Body Length / 2)
Body Outline Polarity	(4)	Line	Y1B	((Body Width / 2) – 0.3 mm)
			X1B	((Body Length / 2) – 0.3 mm)
Courtyard (3)	0.05	SQ (2)	Y2A	((Pad Width /2) + Courtyard.Excess)
			X2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre / 2))
Silkscreen Polarity	(4)	Dot	Y2B	0
			X2B	((Pad Length /2) + (2 * Line Width) + (Pad Centre to Centre / 2))

(1) Body Outline. Represents the actual component dimensions

(2) SQuare. Clearance around Component and Land Pattern.

(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

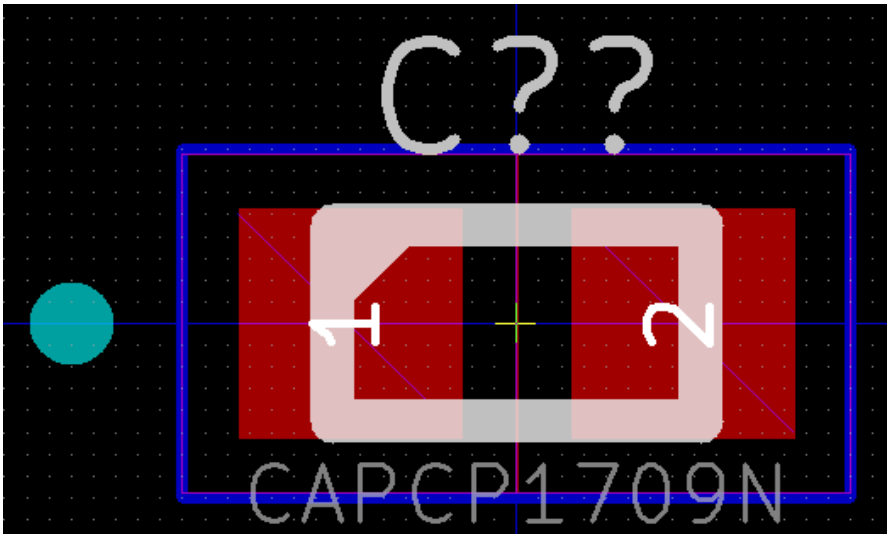
(4) Line Width 0.127 mm to 0.508 mm

Note1: Pad Width is measured on the Y-axis

Note2: Pad Length is measured on the X-axis

Note3: Body Length is measured on the X-axis

Note4: Body Width is measured on the Y-axis



6.4 SMD-NNWW_A

Applies to:

- All Chip, Wire-Wound Components >2.0 mm

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Width / 2)
			X1A	(Body Length / 2)
Body Outline Polarity	(4)	Box	Y1B	0.15 mm (Height above/below Centre)
			X1B	(Body Length / 2) + 0.3 mm
Courtyard (3)	0.05	SQ (2)	Y2A	((Pad Width /2) + Courtyard.Excess)
			X2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre / 2))
Silkscreen Polarity	(4)	Dot	Y2B	0
			X2B	((Pad Length /2) + (2 * Line Width) + (Pad Centre to Centre / 2))

(1) Body Outline. Represents the actual component dimensions

(2) SQuare. Clearance around Component and Land Pattern.

(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

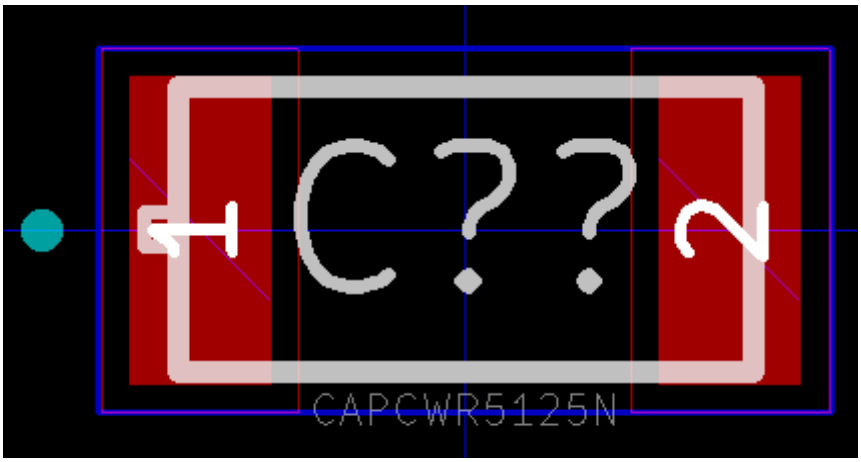
(4) Line Width 0.127 mm to 0.508 mm

Note1: Pad Width is measured on the Y-axis

Note2: Pad Length is measured on the X-axis

Note3: Body Length is measured on the X-axis

Note4: Body Width is measured on the Y-axis



6.5 SMD-NNMO

Applies to:

- All Non-polarized Leadless Moulded components

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1	(Body Width / 2)
			X1	(Body Length / 2)
Body Outline Polarity	N/A	N/A	N/A	N/A
			N/A	N/A
Courtyard (3)	0.05	SQ (2)	Y2	((Body Width / 2) + Courtyard.Excess)
			X2	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre / 2))
Silkscreen Polarity	N/A	N/A	N/A	N/A
			N/A	N/A

(1) Body Outline. Represents the actual component dimensions

(2) SQuare. Clearance around Component and Land Pattern.

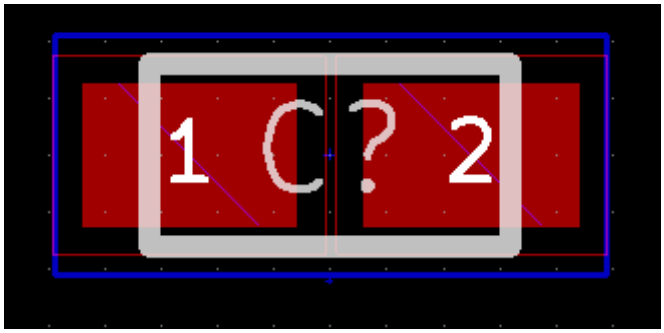
(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

Note1: Pad Width is measured on the Y-axis

Note2: Pad Length is measured on the X-axis

Note3: Body Length is measured on the X-axis

Note4: Body Width is measured on the Y-axis



6.6 SMD-PNMO_A

Applies to:

- All Polarized Leadless Moulded components, Body Length > 2.5 mm

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Width / 2)
			X1A	(Body Length / 2)
Body Outline Polarity	(4)	Dot	Y1B	0
			X1B	(Body Length / 2) – 0.381 mm
Courtyard (3)	0.05	SQ (2)	Y2A	((Body Width /2) + Courtyard.Excess))
			X2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre / 2))
Silkscreen Polarity	(4)	Dot	Y2B	0
			X2B	((Pad Length /2) + (2 * Line Width) + (Pad Centre to Centre / 2))

(1) Body Outline. Represents the actual component dimensions

(2) SQuare. Clearance around Component and Land Pattern.

(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

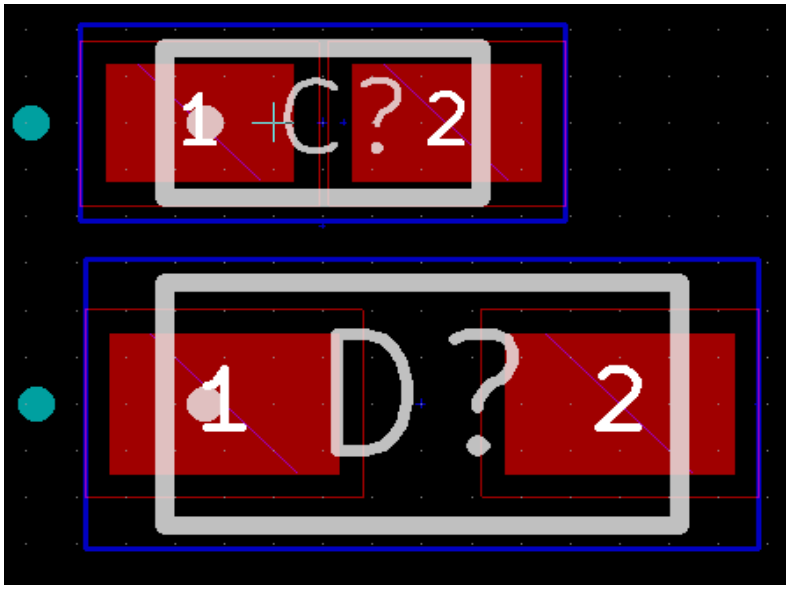
(4) Line Width 0.127 mm to 0.508 mm

Note1: Pad Width is measured on the Y-axis

Note2: Pad Length is measured on the X-axis

Note3: Body Length is measured on the X-axis

Note4: Body Width is measured on the Y-axis



6.7 SMD-PNMO_B

Applies to:

- All Polarized Leadless Moulded components, Body Length ≤ 2.0 mm

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Width / 2)
			X1A	(Body Length / 2)
Body Outline Polarity	(4)	Line	Y1B	((Body Width / 2) – 0.3 mm)
			X1B	((Body Length / 2) – 0.3 mm)
Courtyard (3)	0.05	SQ (2)	Y2A	((Body Width /2) + Courtyard.Excess)
			X2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre / 2))
Silkscreen Polarity	(4)	Dot	Y2B	0
			X2B	((Pad Length /2) + (2 * Line Width) + (Pad Centre to Centre / 2))

(1) Body Outline. Represents the actual component dimensions

(2) SQuare. Clearance around Component and Land Pattern.

(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

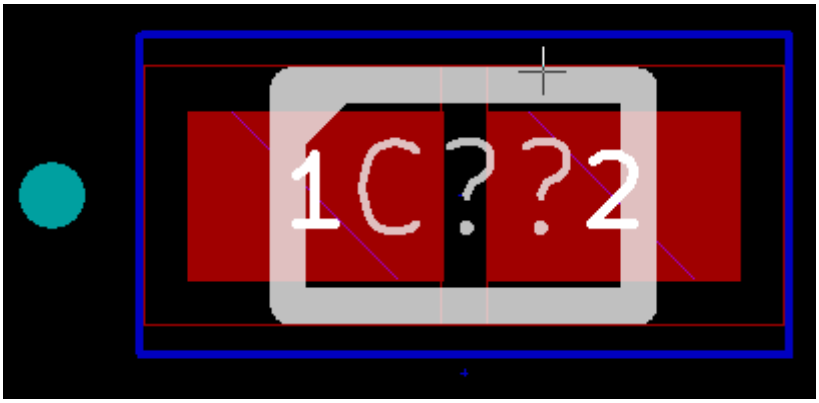
(4) Line Width 0.127 mm to 0.508 mm

Note1: Pad Width is measured on the Y-axis

Note2: Pad Length is measured on the X-axis

Note3: Body Length is measured on the X-axis

Note4: Body Width is measured on the Y-axis



6.8 SMD-PLAE

Applies to:

- All Polarized Aluminium Electrolytic Capacitors

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Width / 2)
			X1A	(Body Length / 2)
Body Outline	0.20	BO (2)	Y1B	((Body Width / 2) – 15%)
			X1B	((Body Length / 2 – 15%)
Body Outline	0.20	C (3)	Dia	(Y1A – 0.381 mm)
Body Outline Polarity	(5)	Line	Y1C	0
			X1C	((Body Width / 2) + (2 * Line Width))
Courtyard (4)	0.05	SQ (4)	Y2A	((Body Width /2) + Courtyard.Excess)
			X2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre / 2))
Silkscreen Polarity	(5)	Dot	Y2B	0
			X2B	((Pad Length /2) + (2 * Line Width) + (Pad Centre to Centre / 2))

(1), (2) Main Body Outline. Represents the actual component dimensions (Base)

(3) Circle. Represents the actual component dimensions (Capacitor)

(3) SQuare. Clearance around Component and Land Pattern.

(4) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

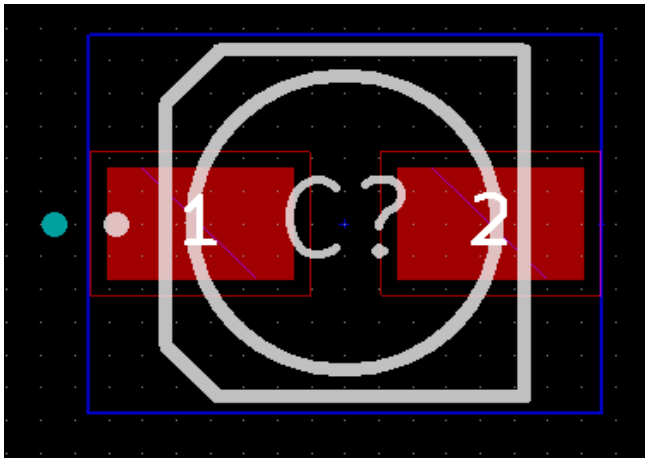
(5) Line Width 0.127 mm to 0.508 mm

Note1: Pad Width is measured on the Y-axis

Note2: Pad Length is measured on the X-axis

Note3: Body Length is measured on the X-axis

Note4: Body Width is measured on the Y-axis



6.9 SMD-XLQL

Applies to:

- Quad Leaded Packages, Pin 1 Top Left

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Length / 2)
			X1A	(Body Width / 2)
Body Outline Polarity	(4)	Dot	Y1B	((Body Length / 2) – (2 * Line Width))
			X1B	((Body Width / 2) – (2 * Line Width))
Courtyard (3)	0.05	SQ (2)	Y2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre [L] / 2))
			X2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre [W] / 2))
Silkscreen Polarity	(4)	Dot	Y2B	((Body Length /2) + (2 * Line Width))
			X2B	((Body Width /2) + (2 * Line Width))

(1) Body Outline. Represents the actual component dimensions

(2) SQuare. Clearance around Component and Land Pattern.

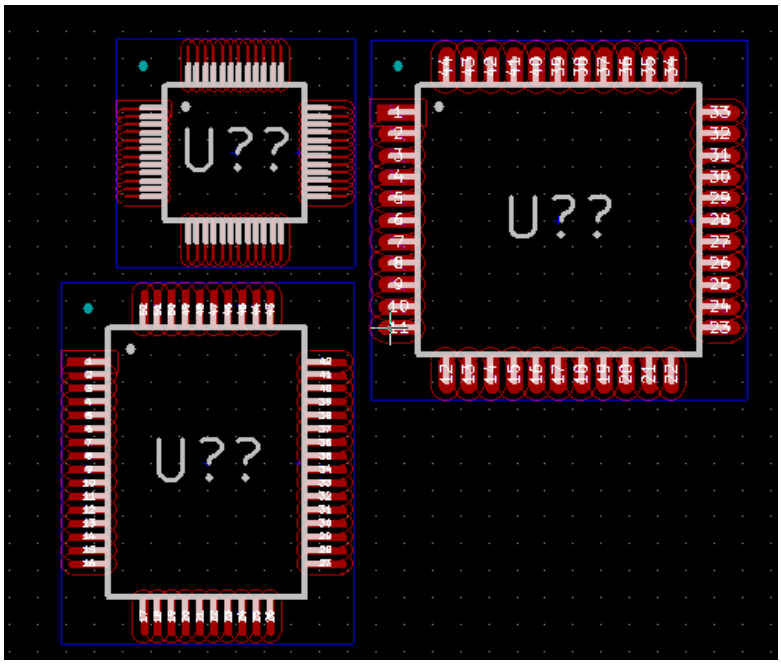
(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

(4) Line Width 0.127 mm to 0.508 mm

Note1: Body Length is measured on the Y-axis

Note2: Body Width is measured on the X-axis

Note3: Pins drawn from body edge to centre of pad



6.10 SMD-XNQL_A

Applies to:

- Quad Non-Leaded Packages, Body Length. ≥4.0 mm, Pin 1 Top Left

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Length / 2)
			X1A	(Body Width / 2)
Body Outline Polarity	(4)	Dot	Y1B	((Body Length / 2) – (2 * Line Width))
			X1B	((Body Width / 2) – (2 * Line Width))
Courtyard (3)	0.05	SQ (2)	Y2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre [L] / 2))
Silkscreen Polarity	(4)	Dot	X2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre [W] / 2))
			Y2B	((Body Length /2) + (1 * Line Width))
			X2B	((Body Width /2) + (1 * Line Width))

(1) Body Outline. Represents the actual component dimensions

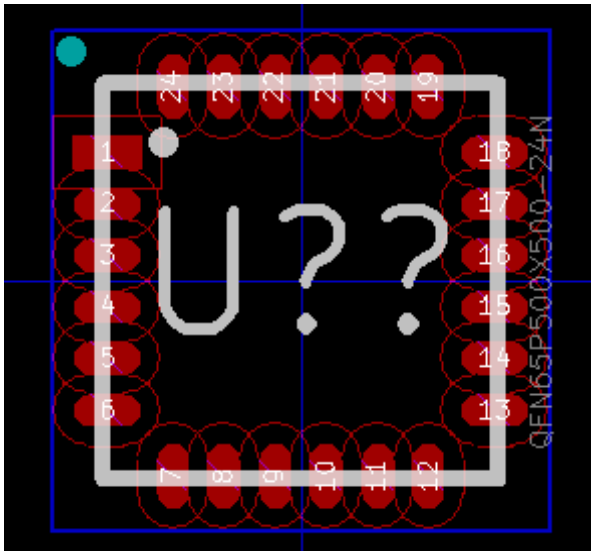
(2) SQuare. Clearance around Component and Land Pattern.

(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

(4) Line Width 0.127 mm to 0.508 mm

Note1: Body Length is measured on the Y-axis

Note2: Body Width is measured on the X-axis



6.11 SMD-XNQL_B

Applies to:

- Quad Non-Leaded Packages, Body Length. <4.0 mm, Pin 1 Top Left

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Length / 2)
			X1A	(Body Width / 2)
Body Outline Polarity	(4)	Line	Y1B	((Body Length / 2) – 0.3 mm)
			X1B	((Body Width / 2) – 0.3 mm)
Courtyard (3)	0.05	SQ (2)	Y2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre [L] / 2))
			X2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre [W] / 2))
Silkscreen Polarity	(4)	Dot	Y2B	((Body Length /2) + (1 * Line Width))
			X2B	((Body Width /2) + (1 * Line Width))

(1) Body Outline. Represents the actual component dimensions

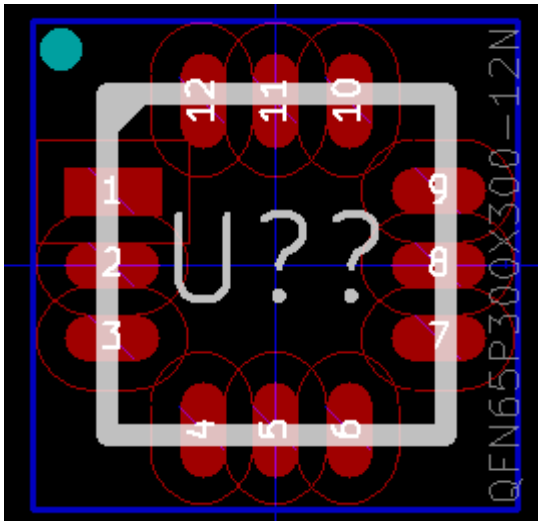
(2) SQuare. Clearance around Component and Land Pattern.

(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

(4) Line Width 0.127 mm to 0.508 mm

Note1: Body Length is measured on the Y-axis

Note2: Body Width is measured on the X-axis



6.12 SMD-XLQC

Applies to:

- Quad Leaded Packages, Pin 1 Top Middle (PLCC)

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Length / 2)
			X1A	(Body Width / 2)
Body Outline Polarity (5)	(4)	Dot	Y1B	((Body Length / 2) – (2 * Line Width))
			X1B	0
Courtyard (3)	0.05	SQ (2)	Y2A	((Pad Length /2) + (Pad Centre to Centre /2 [L]) + Courtyard.Excess)
			X2A	((Pad Length /2) + (Pad Centre to Centre /2 [W]) + Courtyard.Excess)
Silkscreen Polarity (5)	(4)	Dot	Y2B	((Pad Length /2) + (Pad Centre to Centre /2 [L]) + (2 * Line Width))
			X2B	0

(1) Body Outline. Represents the actual component dimensions

(2) SQuare. Clearance around Component and Land Pattern.

(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

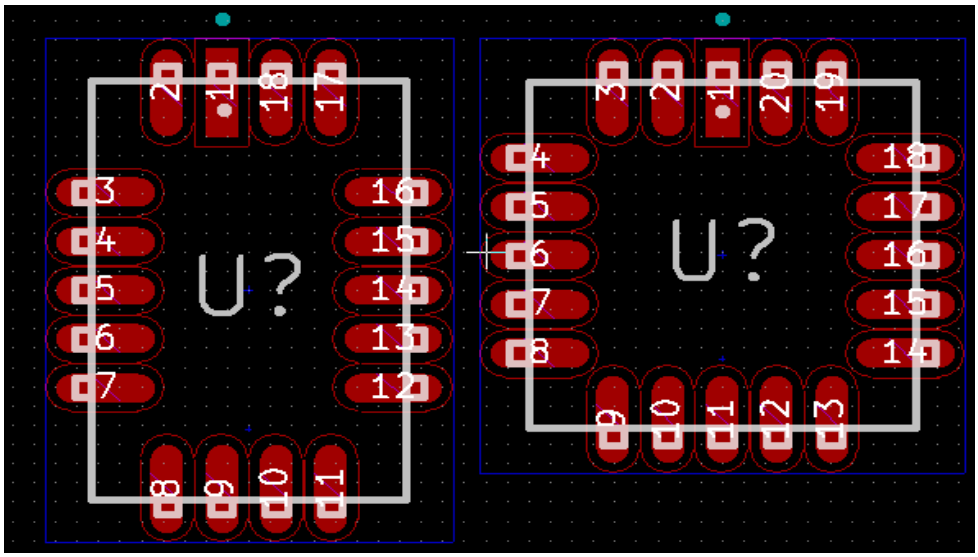
(4) Line Width 0.127 mm to 0.508 mm

(5) Polarity Marks moved if Pin No. 1 is not centre

Note1: Body Length is measured on the Y-axis

Note2: Body Width is measured on the X-axis

Note3: Pins drawn from body edge to centre of pad



6.13 SMD-XNBG_A

Applies to:

- Ball Grid Array Packages, Body Length ≥4.0 mm, Pin 1 Top Left

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Length / 2)
			X1A	(Body Width / 2)
Body Outline Polarity	(4)	Dot	Y1B	((Body Length / 2) – (2 * Line Width))
			X1B	((Body Width / 2) – (2 * Line Width))
Courtyard (3)	0.05	SQ (2)	Y2A	((Body Length /2) + Courtyard.Excess)
			X2A	((Body Width /2) + Courtyard.Excess)
Silkscreen Polarity	(4)	Dot	Y2B	((Body Length /2) + (1 * Line Width))
			X2B	((Body Width /2) + (1 * Line Width))

(1) Body Outline. Represents the actual component dimensions

(2) SQuare. Clearance around Component and Land Pattern.

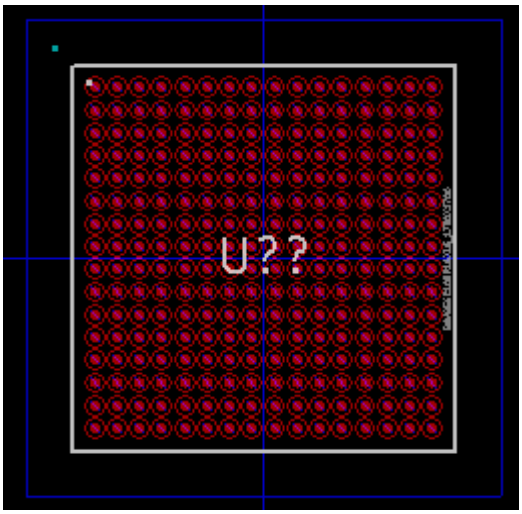
(3) Courtyard.Excess: Ball Size 0.15-0.2 mm, 0.5 mm; Ball Size 0.25-0.55 mm, 1.0, mm;

Ball Size 0.55-0.75 mm, 2.0 mm

(4) Line Width 0.127 mm to 0.508 mm

Note1: Body Length is measured on the Y-axis

Note2: Body Width is measured on the X-axis



6.14 SMD-XNBG_B

Applies to:

- Ball Grid Array Packages, Body Length <4.0 mm, Pin 1 Top Left

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Length / 2)
			X1A	(Body Width / 2)
Body Outline Polarity	(4)	Dot	Y1B	((Body Length / 2) – 0.3 mm)
			X1B	((Body Width / 2) – 0.3 mm)
Courtyard (3)	0.05	SQ (2)	Y2A	((Body Length /2) + Courtyard.Excess)
			X2A	((Body Width /2) + Courtyard.Excess)
Silkscreen Polarity	(4)	Dot	Y2B	((Body Length /2) + (1 * Line Width))
			X2B	((Body Width /2) + (1 * Line Width))

(1) Body Outline. Represents the actual component dimensions

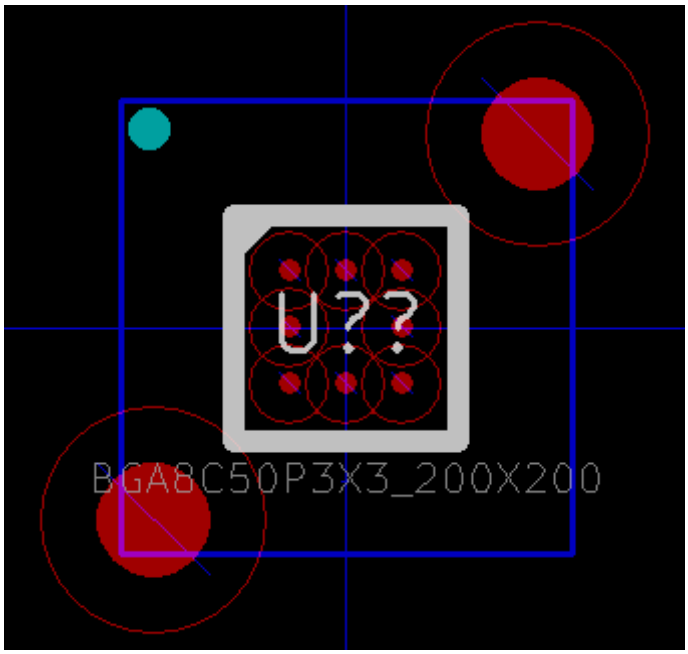
(2) SQuare. Clearance around Component and Land Pattern.

(3) Courtyard.Excess: Ball Size 0.15-0.2 mm, 0.5 mm; Ball Size 0.25-0.55 mm, 1.0, mm; Ball Size 0.55-0.75 mm, 2.0 mm

(4) Line Width 0.127 mm to 0.508 mm

Note1: Body Length is measured on the Y-axis

Note2: Body Width is measured on the X-axis



6.15 SMD-XLDL_A

Applies to:

- Dual In-Line Packages, No. Pins >10 & all SOIC25xP, Pin 1 Top Left

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Length / 2)
			X1A	(Body Width / 2)
Body Outline Polarity	(4)	Dot	Y1B	((Body Length / 2) – (2 * Line Width))
			X1B	((Body Width / 2) – (2 * Line Width))
Courtyard (3)	0.05	SQ (2)	Y2A	((Body Length / 2) + Courtyard.Excess)
			X2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre [W] / 2))
Silkscreen Polarity	(4)	Dot	Y2B	((Body Length / 2) + (2 * Line Width))
			X2B	(Pad Centre to Centre / 2 [W])

(1) Body Outline. Represents the actual component dimensions

(2) SQuare. Clearance around Component and Land Pattern.

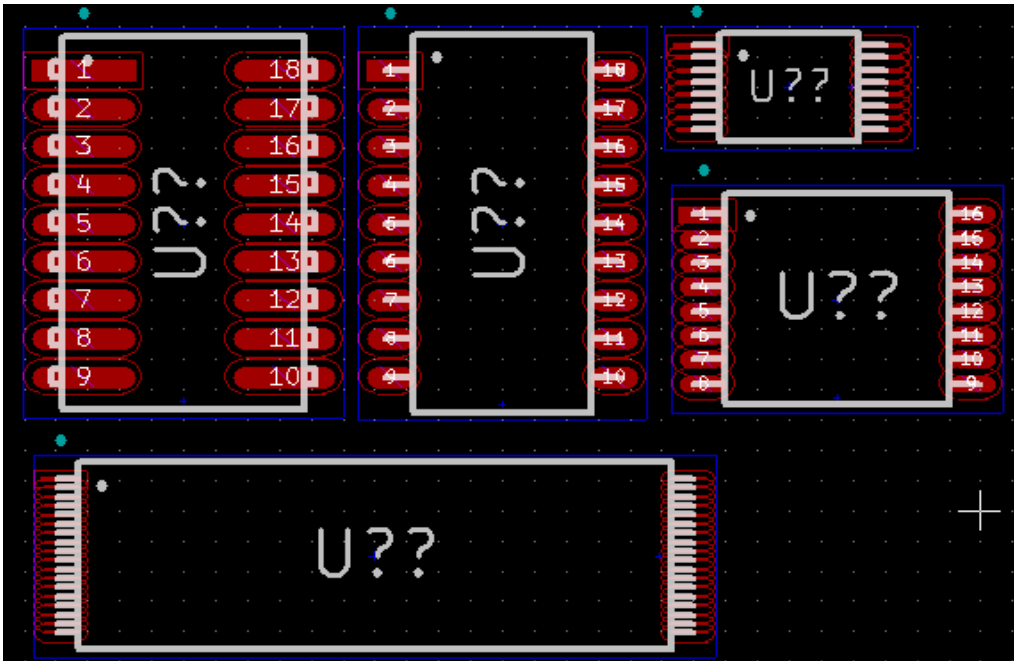
(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

(4) Line Width 0.127 mm to 0.508 mm

Note1: Body Length is measured on the Y-axis

Note2: Body Width is measured on the X-axis

Note3: Pins drawn from body edge to centre of pad



6.16 SMD-XLDL_B

Applies to:

- Dual In-Line Packages, No. Pins ≤10, Pin 1 Top Left

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Length / 2)
			X1A	(Body Width / 2)
Body Outline Polarity	(4)	Dot	Y1B	((Body Length / 2) – 0.3 mm)
			X1B	((Body Width / 2) – 0.3 mm)
Courtyard (3)	0.05	SQ (2)	Y2A	((Body Length / 2) + Courtyard.Excess)
Silkscreen Polarity	(4)	Dot	X2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre [W] / 2))
			Y2B	((Body Length / 2) + (2 * Line Width))
			X2B	(Pad Centre to Centre / 2 [W])

(1) Body Outline. Represents the actual component dimensions

(2) SQuare. Clearance around Component and Land Pattern.

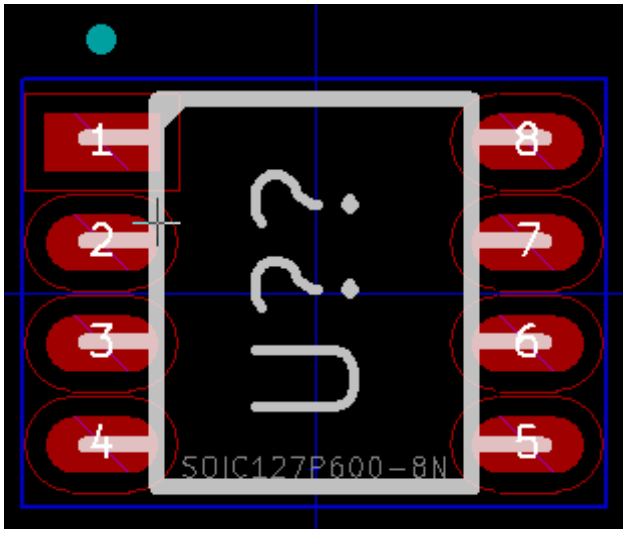
(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

(4) Line Width 0.127 mm to 0.508 mm

Note1: Body Length is measured on the Y-axis

Note2: Body Width is measured on the X-axis

Note3: Pins drawn from body edge to centre of pad



6.17 SMD-XNDL

Applies to:

- Small Outline Non-Leaded Packages, Pin 1 Top Left

Not Implemented

6.18 SMD-XLSO

Applies to:

- Small Outline Transistor Packages, Pin 1 Top Left

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Length / 2)
			X1A	(Body Width / 2)
Body Outline Polarity	(4)	Dot	Y1B	((Body Length / 2) – 0.3 mm)
			X1B	((Body Width / 2) – 0.3 mm)
Courtyard (3)	0.05	SQ (2)	Y2A	((Body Length / 2) + Courtyard.Excess)
			X2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre [W] / 2))
Silkscreen Polarity	(4)	Dot	Y2B	((Body Length / 2) + (2 * Line Width))
			X2B	(Pad Centre to Centre / 2 [W])

(1) Body Outline. Represents the actual component dimensions

(2) SQuare. Clearance around Component and Land Pattern.

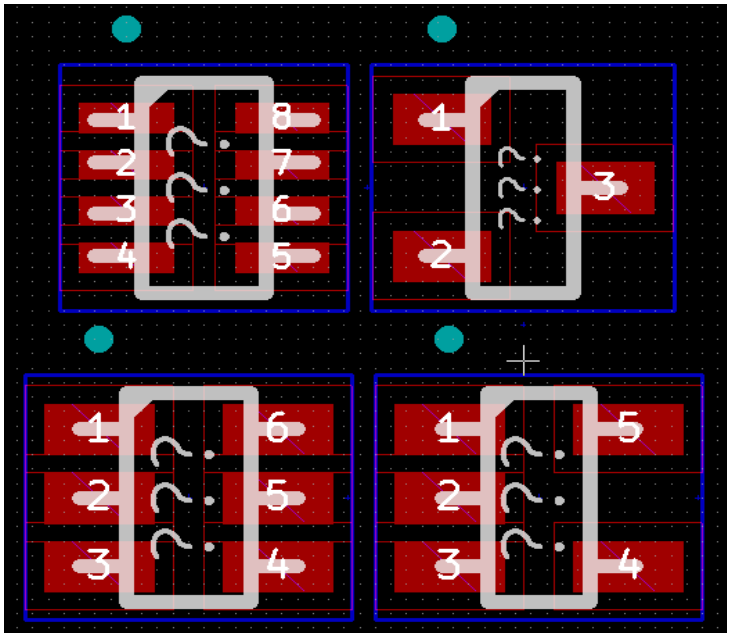
(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

(4) Line Width 0.127 mm to 0.508 mm

Note1: Body Length is measured on the Y-axis

Note2: Body Width is measured on the X-axis

Note3: Pins drawn from body edge to centre of pad



6.19 SMD-PLMO_A

Applies to:

- All Polarized Leaded Moulded components, Body Length > 2.0 mm

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Width / 2)
			X1A	(Body Length / 2)
Body Outline Polarity	(4)	Dot	Y1B	0
			X1B	(Body Length / 2) – 0.381 mm
Courtyard (3)	0.05	SQ (2)	Y2A	((Body Width /2) + Courtyard.Excess))
			X2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre / 2))
Silkscreen Polarity	(4)	Dot	Y2B	0
			X2B	((Pad Length /2) + (2 * Line Width) + (Pad Centre to Centre / 2))

(1) Body Outline. Represents the actual component dimensions

(2) SQuare. Clearance around Component and Land Pattern.

(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

(4) Line Width 0.127 mm to 0.508 mm

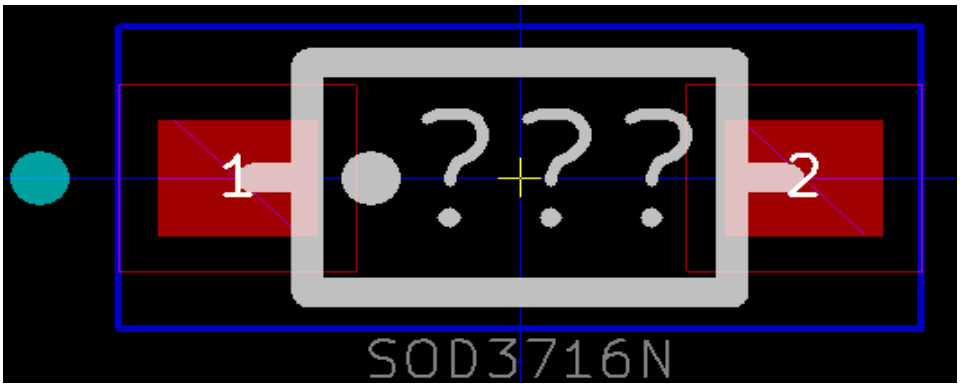
Note1: Pad Width is measured on the Y-axis

Note2: Pad Length is measured on the X-axis

Note3: Body Length is measured on the X-axis

Note4: Body Width is measured on the Y-axis

Note5: Pins drawn from body edge to centre of pad



6.20 SMD-PLMO_B

Applies to:

- All Polarized Leaded Moulded components, Body Length ≤ 2.0 mm

Layer	Line Width (mm)	Shape	Coord	Calculation
Silkscreen	N/A	N/A	N/A	N/A
Body Outline	0.20	BO (1)	Y1A	(Body Width / 2)
			X1A	(Body Length / 2)
Body Outline Polarity	(4)	Dot	Y1B	((Body Width / 2) – 0.3 mm)
			X1B	((Body Length / 2) – 0.3 mm)
Courtyard (3)	0.05	SQ (2)	Y2A	((Body Width /2) + Courtyard.Excess))
			X2A	((Pad Length /2) + Courtyard.Excess + (Pad Centre to Centre / 2))
Silkscreen Polarity	(4)	Dot	Y2B	0
			X2B	((Pad Length /2) + (2 * Line Width) + (Pad Centre to Centre / 2))

(1) Body Outline. Represents the actual component dimensions

(2) SQuare. Clearance around Component and Land Pattern.

(3) Courtyard.Excess: Least: 0.10 mm, Nominal: 0.25 mm, Most: 0.50 mm

(4) Line Width 0.127 mm to 0.508 mm

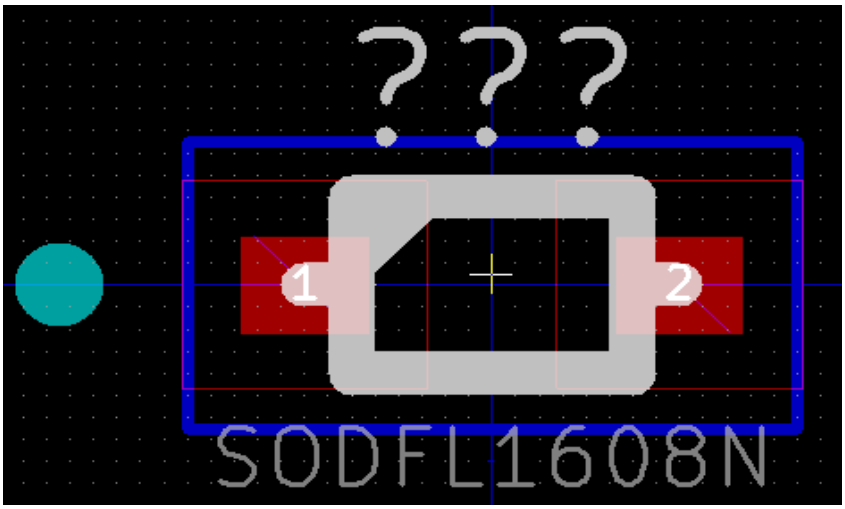
Note1: Pad Width is measured on the Y-axis

Note2: Pad Length is measured on the X-axis

Note3: Body Length is measured on the X-axis

Note4: Body Width is measured on the Y-axis

Note5: Pins drawn from body edge to centre of pad



7 Appendix C

7.1 Sample kicad.pro file

```
update=20/11/2008-19:07:03
version=1
last_client=eeschema
[general]
version=1
RootSch=
BoardNm=
[cvpcb]
version=1
NetIType=0
NetIExt=.net
PkgIExt=.pkg
NetDir=
LibDir=G:/ApplicationFiles/KiCad/Libraries/Equivalence
NetType=0
[cvpcb/libraries]
EquName1=D-DIAC
EquName2=D-PIN
EquName3=D-protectionDiodesAndArrays
EquName4=D-diodesRectifier
EquName5=D-diodesSchottky
EquName6=D-SCR
EquName7=D-SIDAC
EquName8=D-diodesSmallSignalSwitching
EquName9=D-thyristorSurgeProtectionDevices
EquName10=D-TRIAC
EquName11=D-diodesTuning
EquName12=D-diodesZener
EquName13=Q-transistorsBiPolar
EquName14=Q-transistorsDarlington
EquName15=Q-transistorsIGBT
EquName16=Q-transistorsJFET
EquName17=Q-transistorsMOSFET
EquName18=Q-transistorsPhoto
EquName19=Q-transistorsPowerMOSFETS
EquName20=Q-transistorsRF
[pcbnew]
version=1
LastNetListRead=
UseCmpFile=1
PadDrill=0.6
PadSizeH=1
PadSizeV=1
PcbTextSizeV=1.5
PcbTextSizeH=1.5
PcbTextThickness=0.3
ModuleTextSizeV=1.5
ModuleTextSizeH=1.5
ModuleTextSizeThickness=0.15
SolderMaskClearance=0
SolderMaskMinWidth=0
DrawSegmentWidth=0.2
BoardOutlineThickness=0.15
ModuleOutlineThickness=0.15
[pcbnew/libraries]
LibDir=G:/ApplicationFiles/KiCad/Libraries/Footprint
[eeschema]
version=1
LibDir=G:/ApplicationFiles/KiCad/Libraries/Symbol
NetFmt=1
HPGLSpd=20
HPGLDm=15
HPGLNum=1
offX_A4=0
offY_A4=0
offX_A3=0
offY_A3=0
```

```
offX_A2=0
offY_A2=0
offX_A1=0
offY_A1=0
offX_A0=0
offY_A0=0
offX_A=0
offY_A=0
offX_B=0
offY_B=0
offX_C=0
offY_C=0
offX_D=0
offY_D=0
offX_E=0
offY_E=0
RptD_X=0
RptD_Y=100
RptLab=1
SimCmd=
UseNetN=0
LabSize=30
[eeschema/libraries]
#
# LibName1 | Power
#
LibName1=Power/power
#
# LibName2...LibName99 | Non-Integrated Circuit according to IEEE 315-1975
#
LibName2=IEEE_315/A/A-separateAssembly
LibName3=IEEE_315/AR/AR-amplifier
LibName4=IEEE_315/AR/AR-repeater
LibName5=IEEE_315/AT/AT-attenuator
LibName6=IEEE_315/AT/AT-bolometer
LibName7=IEEE_315/AT/AT-capacitiveTermination
LibName8=IEEE_315/AT/AT-inductiveTermination
LibName9=IEEE_315/AT/AT-isolator
LibName10=IEEE_315/AT/AT-pad
LibName11=IEEE_315/AT/AT-resistiveTermination
LibName12=IEEE_315/B/B-blower
LibName13=IEEE_315/B/B-motor
LibName14=IEEE_315/B/B-synchro
LibName15=IEEE_315/BT/BT-battery
LibName16=IEEE_315/BT/BT-photovoltaic
LibName17=IEEE_315/C/C-capacitorNetwork
LibName18=IEEE_315/C/C-capacitorNonPolarized
LibName19=IEEE_315/C/C-capacitorMisc
LibName20=IEEE_315/C/C-capacitorPolarized
LibName21=IEEE_315/CB/CB-circuitBreaker
LibName22=IEEE_315/CB/CB-networkProtector
LibName23=IEEE_315/CP/CP-connectorAdapter
LibName24=IEEE_315/CP/CP-coupling
LibName25=IEEE_315/CP/CP-junction
LibName26=IEEE_315/D/D-diode
LibName27=IEEE_315/DC/DC-directionalCoupler
LibName28=IEEE_315/DL/DL-delayFunction
LibName29=IEEE_315/DS/DS-alphanumericDisplay
LibName30=IEEE_315/DS/DS-generalLightSource
LibName31=IEEE_315/DS/DS-lightEmittingDiode
LibName32=IEEE_315/DS/DS-visualSignallingDevice
LibName33=IEEE_315/E/E-aluminiumCell
LibName34=IEEE_315/E/E-antenna
LibName35=IEEE_315/E/E-armature
LibName36=IEEE_315/E/E-bindingPost
LibName37=IEEE_315/E/E-cableTermination
LibName38=IEEE_315/E/E-carbonBlock
LibName39=IEEE_315/E/E-circuitTerminal
LibName40=IEEE_315/E/E-conductivityCell
LibName41=IEEE_315/E/E-electricalContact
LibName42=IEEE_315/E/E-electricalShield
LibName43=IEEE_315/E/E-electrolyticCell
LibName44=IEEE_315/E/E-ferriteBeadRings
LibName45=IEEE_315/E/E-filmElement
```

```
LibName46=IEEE_315/E/E-gap
LibName47=IEEE_315/E/E-hallElement
LibName48=IEEE_315/E/E-igniterGap
LibName49=IEEE_315/E/E-insulator
LibName50=IEEE_315/E/E-lightningArrester
LibName51=IEEE_315/E/E-magneticCore
LibName52=IEEE_315/E/E-miscellaneousElectricalPart
LibName53=IEEE_315/E/E-opticalShield
LibName54=IEEE_315/E/E-permanentMagnet
LibName55=IEEE_315/E/E-rotaryJoint
LibName56=IEEE_315/E/E-shortCircuit
LibName57=IEEE_315/E/E-sparkGap
LibName58=IEEE_315/E/E-splice
LibName59=IEEE_315/E/E-telephoneProtector
LibName60=IEEE_315/E/E-terminal
LibName61=IEEE_315/E/E-valveElement
LibName62=IEEE_315/E/E-vibratingReed
LibName63=IEEE_315/EQ/EQ-equalizer
LibName64=IEEE_315/F/F-fuse
LibName65=IEEE_315/FL/FL-filter
LibName66=IEEE_315/G/G-electronicChopper
LibName67=IEEE_315/G/G-generator
LibName68=IEEE_315/G/G-ignitionMagneto
LibName69=IEEE_315/G/G-interrupterVibrator
LibName70=IEEE_315/G/G-oscillator
LibName71=IEEE_315/G/G-rotatingAmplifier
LibName72=IEEE_315/G/G-telephoneMagneto
LibName73=IEEE_315/H/H-hardware
LibName74=IEEE_315/HP/HP-hydraulicPart
LibName75=IEEE_315/HR/HR-heater
LibName76=IEEE_315/HR/HR-heatingLamp
LibName77=IEEE_315/HR/HR-heatingResistor
LibName78=IEEE_315/HR/HR-infraredLamp
LibName79=IEEE_315/HR/HR-thermomechanicalTransducer
LibName80=IEEE_315/HS/HS-handset
LibName81=IEEE_315/HT/HT-earphone
LibName82=IEEE_315/HT/HT-electricalheadset
LibName83=IEEE_315/HT/HT-receiver
LibName84=IEEE_315/HT/HT-telephoneReceiver
LibName85=IEEE_315/HY/HY-circulator
LibName86=IEEE_315/HY/HY-directionallySelectiveTransmissionDevice
LibName87=IEEE_315/HY/HY-hybridCircuitNetwork
LibName88=IEEE_315/HY/HY-hybridCoil
LibName89=IEEE_315/HY/HY-hybridJunction
LibName90=IEEE_315/J/J-stationaryReceptacleGeneric
LibName91=IEEE_315/J/J-stationaryReceptacle
LibName92=IEEE_315/J/J-waveguideFlange
LibName93=IEEE_315/K/K-contactor
LibName94=IEEE_315/K/K-relay
LibName95=IEEE_315/L/L-coil
LibName96=IEEE_315/L/L-electricalSolenoid
LibName97=IEEE_315/L/L-fieldWinding
LibName98=IEEE_315/L/L-generatorField
LibName99=IEEE_315/L/L-inductor
LibName100=IEEE_315/L/L-lampBallast
LibName101=IEEE_315/L/L-motorField
LibName102=IEEE_315/L/L-reactor
LibName103=IEEE_315/L/L-winding
LibName104=IEEE_315/LS/LS-audibleSignallingDevice
LibName105=IEEE_315/M/M-readoutDevice
LibName106=IEEE_315/MG/MG-directCurrentMachine
LibName107=IEEE_315/MK/MK-microphone
LibName108=IEEE_315/MP/MP-mechanicalPart
LibName109=IEEE_315/P/P-movableReceptacle
LibName110=IEEE_315/PS/PS-powerSupply
LibName111=IEEE_315/PS/PS-rectifier
LibName112=IEEE_315/PU/PU-pickup
LibName113=IEEE_315/Q/Q-thyristor
LibName114=IEEE_315/Q/Q-Transistor
LibName115=IEEE_315/R/R-resistor
LibName116=IEEE_315/R/R-resistorNetwork
LibName117=IEEE_315/R/R-resistorVariable
LibName118=IEEE_315/RE/RE-radioReceiver
LibName119=IEEE_315/RT/RT-thermistor
```

```
LibName120=IEEE_315/RV/RV-varistor
LibName121=IEEE_315/S/S-switch
LibName122=IEEE_315/T/T-transformer
LibName123=IEEE_315/TB/TB-terminalBoard
LibName124=IEEE_315/TC/TC-thermocouple
LibName125=IEEE_315/TC/TC-thermopile
LibName126=IEEE_315/TP/TP-testPoint
LibName127=IEEE_315/V/V-electronTube
LibName128=IEEE_315/VR/VR-voltageCurrentReference
LibName129=IEEE_315/VR/VR-voltageRegulator
LibName130=IEEE_315/W/W-transmissionPath
LibName131=IEEE_315/X/X-fuseHolder
LibName132=IEEE_315/X/X-lampHolder
LibName133=IEEE_315/X/X-socket
LibName134=IEEE_315/Y/Y-crystal
LibName135=IEEE_315/Z/Z-miscellaneous
LibName136=Non-IEEE_315/Reserved/Reserved
LibName137=Non-IEEE_315/Reserved/Reserved
LibName138=Non-IEEE_315/Reserved/Reserved
LibName139=Non-IEEE_315/Reserved/Reserved
LibName140=Non-IEEE_315/Reserved/Reserved
LibName141=Non-IEEE_315/Reserved/Reserved
LibName142=Non-IEEE_315/Reserved/Reserved
LibName143=Non-IEEE_315/Reserved/Reserved
LibName144=Non-IEEE_315/Reserved/Reserved
LibName145=Non-IEEE_315/Reserved/Reserved
LibName146=Non-IEEE_315/Reserved/Reserved
LibName147=Non-IEEE_315/Reserved/Reserved
LibName148=Non-IEEE_315/Reserved/Reserved
LibName149=Non-IEEE_315/Reserved/Reserved
#
# LibName150...LibName199 | Integrated Circuit according to IEEE 315-1975
#
LibName150=IEEE_315/U/U-standardLogic
LibName151=IEEE_315/U/U-standardLogicGate
LibName152=IEEE_315/U/U-littleLogic
LibName153=IEEE_315/U/U-littleLogicGate
LibName154=IEEE_315/U/U-microcontroller
LibName155=IEEE_315/U/U-digitalPowerControl
LibName156=IEEE_315/U/U-exposedPad
LibName157=IEEE_315/U/U-digitalPotentiometer
LibName158=IEEE_315/U/U-interface
LibName159=IEEE_315/U/U-dataConverter
LibName160=IEEE_315/U/U-digitalPowerSupervision
LibName161=IEEE_315/U/U-digitalSignalProcessor
LibName162=IEEE_315/U/U-integratedSwitch
LibName163=IEEE_315/U/U-microprocessor
LibName164=IEEE_315/U/U-sensorsSensorControl
LibName165=IEEE_315/U/U-microcircuit
LibName166=IEEE_315/U/U-micromodule
LibName167=IEEE_315/U/U-integratedAmplifier
LibName168=IEEE_315/U/U-realTimeClock
LibName169=IEEE_315/U/U-timer
LibName170=Non-IEEE_315/Reserved/Reserved
LibName171=Non-IEEE_315/Reserved/Reserved
LibName172=Non-IEEE_315/Reserved/Reserved
LibName173=Non-IEEE_315/Reserved/Reserved
LibName174=Non-IEEE_315/Reserved/Reserved
LibName175=Non-IEEE_315/Reserved/Reserved
LibName176=Non-IEEE_315/Reserved/Reserved
LibName177=Non-IEEE_315/Reserved/Reserved
LibName178=Non-IEEE_315/Reserved/Reserved
LibName179=Non-IEEE_315/Reserved/Reserved
LibName180=Non-IEEE_315/Reserved/Reserved
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LibName182=Non-IEEE_315/Reserved/Reserved
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LibName185=Non-IEEE_315/Reserved/Reserved
LibName186=Non-IEEE_315/Reserved/Reserved
LibName187=Non-IEEE_315/Reserved/Reserved
LibName188=Non-IEEE_315/Reserved/Reserved
LibName189=Non-IEEE_315/Reserved/Reserved
LibName190=Non-IEEE_315/Reserved/Reserved
```

```
LibName191=Non-IEEE_315/Reserved/Reserved
LibName192=Non-IEEE_315/Reserved/Reserved
LibName193=Non-IEEE_315/Reserved/Reserved
LibName194=Non-IEEE_315/Reserved/Reserved
LibName195=Non-IEEE_315/Reserved/Reserved
LibName196=Non-IEEE_315/Reserved/Reserved
LibName197=Non-IEEE_315/Reserved/Reserved
LibName198=Non-IEEE_315/Reserved/Reserved
LibName199=Non-IEEE_315/Reserved/Reserved
#
# LibName200...LibName229 | Non-IEEE 315-1975
#
LibName200=Non-IEEE_315/Graphics/graphics
LibName201=Non-IEEE_315/Reserved/Reserved
LibName202=Non-IEEE_315/Reserved/Reserved
LibName203=Non-IEEE_315/Reserved/Reserved
LibName204=Non-IEEE_315/Reserved/Reserved
LibName205=Non-IEEE_315/Reserved/Reserved
LibName206=Non-IEEE_315/Reserved/Reserved
LibName207=Non-IEEE_315/Reserved/Reserved
LibName208=Non-IEEE_315/Reserved/Reserved
LibName209=Non-IEEE_315/Reserved/Reserved
LibName210=Non-IEEE_315/Reserved/Reserved
LibName211=Non-IEEE_315
```

```
/Reserved/Reserved
LibName212=Non-IEEE_315/Reserved/Reserved
LibName213=Non-IEEE_315/Reserved/Reserved
LibName214=Non-IEEE_315/Reserved/Reserved
LibName215=Non-IEEE_315/Reserved/Reserved
LibName216=Non-IEEE_315/Reserved/Reserved
LibName217=Non-IEEE_315/Reserved/Reserved
LibName218=Non-IEEE_315/Reserved/Reserved
LibName219=Non-IEEE_315/Reserved/Reserved
LibName220=Non-IEEE_315/Reserved/Reserved
LibName221=Non-IEEE_315/Reserved/Reserved
LibName222=Non-IEEE_315/Reserved/Reserved
LibName223=Non-IEEE_315/Reserved/Reserved
LibName224=Non-IEEE_315/Reserved/Reserved
LibName225=Non-IEEE_315/Reserved/Reserved
LibName226=Non-IEEE_315/Reserved/Reserved
LibName227=Non-IEEE_315/Reserved/Reserved
LibName228=Non-IEEE_315/Reserved/Reserved
LibName229=Non-IEEE_315/Reserved/Reserved
```

7.2 Sample fp-lib-table file

```
(fp_lib_table
# Standard Through-Hole footprints according to IPC-7251
  (lib (name IPC-7251_CAPAD)(type Legacy)(uri ${KISYSMOD}\IPC-7251\CAPx\CAPAD-capacitorsNonPolarizedAxialDiameter.mod)(options "")(descr "IPC-7251 Capacitors, Non-Polarized Axial Diameter Horizontal Mount"))
  (lib (name IPC-7251_CAPADV)(type Legacy)(uri ${KISYSMOD}\IPC-7251\CAPx\CAPADV-capacitorsNonPolarizedAxialDiameterVertical.mod)(options "")(descr "IPC-7251 Capacitors, Non-Polarized Axial Diameter Vertical Mount"))
  (lib (name IPC-7251_CAPAR)(type Legacy)(uri ${KISYSMOD}\IPC-7251\CAPx\CAPAR-capacitorsNonPolarizedAxialRectangular.mod)(options "")(descr "IPC-7251 Capacitors, Non-Polarized Axial Rectangular Horizontal Mount"))
  (lib (name IPC-7251_CAPARV)(type Legacy)(uri ${KISYSMOD}\IPC-7251\CAPx\CAPARV-capacitorsNonPolarizedAxialRectangularVertical.mod)(options "")(descr "IPC-7251 Capacitors, Non-Polarized Axial Rectangular Vertical Mount"))
  (lib (name IPC-7251_CAPRB)(type Legacy)(uri ${KISYSMOD}\IPC-7251\CAPx\CAPRB-capacitorsNonPolarizedRadialDiscButton.mod)(options "")(descr "IPC-7251 Capacitors, Non-Polarized Radial Disc Button"))
  (lib (name IPC-7251_CAPRD)(type Legacy)(uri ${KISYSMOD}\IPC-7251\CAPx\CAPRD-capacitorsNonPolarizedRadialDiameter.mod)(options "")(descr "IPC-7251 Capacitors, Non-Polarized Radial Diameter"))
  (lib (name IPC-7251_CAPRR)(type Legacy)(uri ${KISYSMOD}\IPC-7251\CAPx\CAPRR-capacitorsNonPolarizedRadialRectangular.mod)(options "")(descr "IPC-7251 Capacitors, Non-Polarized Radial Rectangular"))
  (lib (name IPC-7251_CAPPAD)(type Legacy)(uri ${KISYSMOD}\IPC-7251\CAPx\CAPPAD-capacitorsPolarizedAxialDiameter.mod)(options "")(descr "IPC-7251 Capacitors, Polarized Axial Diameter Horizontal Mount"))
  (lib (name IPC-7251_CAPPADV)(type Legacy)(uri ${KISYSMOD}\IPC-7251\CAPx\CAPPADV-capacitorsPolarizedAxialDiameterVertical.mod)(options "")(descr "IPC-7251 Capacitors, Non-Polarized Axial Diameter Vertical Mount"))
  (lib (name IPC-7251_CAPPAR)(type Legacy)(uri ${KISYSMOD}\IPC-7251\CAPx\CAPPAR-capacitorsPolarizedAxialRectangular.mod)(options "")(descr "IPC-7251 Capacitors, Polarized Axial Rectangular Horizontal Mount"))
  (lib (name IPC-7251_CAPPARV)(type Legacy)(uri ${KISYSMOD}\IPC-7251\CAPx\CAPPARV-capacitorsPolarizedAxialRectangularVertical.mod)(options "")(descr "IPC-7251 Capacitors, Polarized Axial Rectangular Vertical Mount"))
  (lib (name IPC-7251_CAPPRD)(type Legacy)(uri ${KISYSMOD}\IPC-7251\CAPx\CAPPRD-capacitorsPolarizedRadialDiameter.mod)(options "")(descr "IPC-7251 Capacitors, Polarized Radial Diameter"))
  (lib (name IPC-7251_CAPPRR)(type Legacy)(uri ${KISYSMOD}\IPC-7251\CAPx\CAPPRR-capacitorsPolarizedRadialRectangular.mod)(options "")(descr "IPC-7251 Capacitors, Polarized Rectangular Diameter"))
  (lib (name IPC-7251_DIOAD)(type Legacy)(uri ${KISYSMOD}\IPC-7251\DIOx\DIOAD-diodesAxialDiameter.mod)(options "")(descr "IPC-7251 Diodes, Axial Diameter Horizontal Mount"))
  (lib (name IPC-7251_DIOADV)(type Legacy)(uri ${KISYSMOD}\IPC-7251\DIOx\DIOADV-diodesAxialDiameterVertical.mod)(options "")(descr "IPC-7251 Diodes, Axial Diameter Vertical Mount"))
  (lib (name IPC-7251_DIOAR)(type Legacy)(uri ${KISYSMOD}\IPC-7251\DIOx\DIOAR-diodesAxialRectangular.mod)(options "")(descr "IPC-7251 Diodes, Axial Rectangular Horizontal Mount"))
  (lib (name IPC-7251_DIOARV)(type Legacy)(uri ${KISYSMOD}\IPC-7251\DIOx\DIOARV-diodesAxialRectangularVertical.mod)(options "")(descr "IPC-7251 Diodes, Axial Rectangular Vertical Mount"))
  (lib (name IPC-7251_DIP)(type Legacy)(uri ${KISYSMOD}\IPC-7251\DIP\DIP-dualInlinePackages.mod)(options "")(descr "IPC-7251 Dual-In-Line Packages (JEDEC Standard)"))
  (lib (name IPC-7251_DIPS)(type Legacy)(uri ${KISYSMOD}\IPC-7251\DIPS\DIPS-dualInlineSockets.mod)(options "")(descr "IPC-7251 Dual-In-Line Sockets"))
  (lib (name IPC-7251_FUSAD)(type Legacy)(uri ${KISYSMOD}\IPC-7251\FUSx\FUSAD-fusesAxialDiameter.mod)(options "")(descr "IPC-7251 Fuses, Axial Diameter Horizontal Mount"))
  (lib (name IPC-7251_FUSAR)(type Legacy)(uri ${KISYSMOD}\IPC-7251\FUSx\FUSAR-fusesAxialRectangular.mod)(options "")(descr "IPC-7251 Fuses, Axial Rectangular Horizontal Mount"))
  (lib (name IPC-7251_FUSADV)(type Legacy)(uri ${KISYSMOD}\IPC-7251\FUSx\FUSADV-fusesAxialDiameterVertical.mod)(options "")(descr "IPC-7251 Fuses, Axial Diameter Vertical Mount"))
  (lib (name IPC-7251_FUSARV)(type Legacy)(uri ${KISYSMOD}\IPC-7251\FUSx\FUSARV-fusesAxialRectangularVertical.mod)(options "")(descr "IPC-7251 Fuses, Axial Rectangular Vertical Mount"))
  (lib (name IPC-7251_FUSRD)(type Legacy)(uri ${KISYSMOD}\IPC-7251\FUSx\FUSRD-fusesRadialDiameter.mod)(options "")(descr "IPC-7251 Fuses, Radial Diameter"))
  (lib (name IPC-7251_FUSRR)(type Legacy)(uri ${KISYSMOD}\IPC-7251\FUSx\FUSRR-fusesRadialRectangular.mod)(options "")(descr "IPC-7251 Fuses, Radial Rectangular"))
  (lib (name IPC-7251_HDRV)(type Legacy)(uri ${KISYSMOD}\IPC-7251\HDRx\HDRV-headerVertical.mod)(options "")(descr "IPC-7251 Header, Vertical"))
  (lib (name IPC-7251_HDRRA)(type Legacy)(uri ${KISYSMOD}\IPC-7251\HDRx\HDRRA-headerRightAngle.mod)(options "")(descr "IPC-7251 Header, Right Angle"))
  (lib (name IPC-7251_INDAD)(type Legacy)(uri ${KISYSMOD}\IPC-7251\INDx\INDAD-inductorsAxialDiameter.mod)(options "")(descr "IPC-7251 Inductors, Axial Diameter Horizontal Mount"))
  (lib (name IPC-7251_INDADV)(type Legacy)(uri ${KISYSMOD}\IPC-7251\INDx\INDADV-inductorsAxialDiameterVertical.mod)(options "")(descr "IPC-7251 Inductors, Axial Diameter Vertical Mount"))
  (lib (name IPC-7251_INDAR)(type Legacy)(uri ${KISYSMOD}\IPC-7251\INDx\INDAR-inductorsAxialRectangular.mod)(options "")(descr "IPC-7251 Inductors, Axial Rectangular Horizontal Mount"))
  (lib (name IPC-7251_INDARV)(type Legacy)(uri ${KISYSMOD}\IPC-7251\INDx\INDARV-inductorsAxialRectangularVertical.mod)(options "")(descr "IPC-7251 Inductors, Axial Rectangular Vertical Mount"))
  (lib (name IPC-7251_INDRD)(type Legacy)(uri ${KISYSMOD}\IPC-7251\INDx\INDRD-inductorsRadialDiameter.mod)(options "")(descr "IPC-7251 Inductors, Radial Diameter"))
  (lib (name IPC-7251_INDRR)(type Legacy)(uri ${KISYSMOD}\IPC-7251\INDx\INDRR-inductorsRadialRectangular.mod)(options "")(descr "IPC-7251 Inductors, Radial Rectangular"))
  (lib (name IPC-7251_JUMP)(type Legacy)(uri ${KISYSMOD}\IPC-7251\JUMP\JUMP-jumpersWire.mod)(options "")(descr "IPC-7251 Jumpers"))
  (lib (name IPC-7251_LEDRD)(type Legacy)(uri ${KISYSMOD}\IPC-7251\LEDx\LEDRD-lightEmittingDiodesRadialDiameter.mod)(options "")(descr "IPC-7251 Light-Emitting Diodes, Radial Diameter"))
  (lib (name IPC-7251_LEDRR)(type Legacy)(uri ${KISYSMOD}\IPC-7251\LEDx\LEDRR-lightEmittingDiodesRadialRectangular.mod)(options "")(descr "IPC-7251 Light-Emitting Diodes, Radial Rectangular"))
  (lib (name IPC-7251_MTGNP)(type Legacy)(uri ${KISYSMOD}\IPC-7251\MTGx\MTGNP-mountingHoleNonPlated.mod)(options "")(descr "IPC-7251 Mounting Hole, Non-Plated"))
  (lib (name IPC-7251_MTGP)(type Legacy)(uri ${KISYSMOD}\IPC-7251\MTGx\MTGP-mountingHolePlated.mod)(options "")(descr "IPC-7251 Mounting Hole, Plated"))
  (lib (name IPC-7251_OSC)(type Legacy)(uri ${KISYSMOD}\IPC-7251\OSC\OSC-oscillators.mod)(options "")(descr "IPC-7251 Oscillators"))
  (lib (name IPC-7251_PGA)(type Legacy)(uri ${KISYSMOD}\IPC-7251\PGA\PGA-pinGridArray.mod)(options "")(descr "IPC-7251 Pin Grid Arrays"))
  (lib (name IPC-7251_RESAD)(type Legacy)(uri ${KISYSMOD}\IPC-7251\RESx\RESAD-resistorsAxialDiameter.mod)(options "")(descr "IPC-7251 Resistors, Axial Diameter Horizontal Mount"))
  (lib (name IPC-7251_RESADV)(type Legacy)(uri ${KISYSMOD}\IPC-7251\RESx\RESADV-resistorsAxialDiameterVertical.mod)(options "")(descr "IPC-7251 Resistors, Axial Diameter Vertical Mount"))
  (lib (name IPC-7251_RESAR)(type Legacy)(uri ${KISYSMOD}\IPC-7251\RESx\RESAR-ressistorsAxialRectangular.mod)(options "")(descr "IPC-7251 Resistors, Axial Rectangular Horizontal Mount"))
  (lib (name IPC-7251_RESARV)(type Legacy)(uri ${KISYSMOD}\IPC-7251\RESx\RESARV-ressistorsAxialRectangularVertical.mod)(options "")(descr "IPC-7251 Resistors, Axial Rectangular Vertical Mount"))
  (lib (name IPC-7251_SIP)(type Legacy)(uri ${KISYSMOD}\IPC-7251\SIP\SIP-resistorNetworks.mod)(options "")(descr "IPC-7251 Resistor Networks"))
  (lib (name IPC-7251_TPCW)(type Legacy)(uri ${KISYSMOD}\IPC-7251\TPx\TPCW-testPointsRound.mod)(options "")(descr "IPC-7251 Test Point, Round/Rectangular"))
  (lib (name IPC-7251_TPRW)(type Legacy)(uri ${KISYSMOD}\IPC-7251\TPx\TPRW-testPointsSquare.mod)(options "")(descr "IPC-7251 Test Point, Square"))
  (lib (name IPC-7251_TO)(type Legacy)(uri ${KISYSMOD}\IPC-7251\TO\TO-transistorOutlines.mod)(options "")(descr "IPC-7251 Transistor Outlines"))
  (lib (name IPC-7251_PAD)(type Legacy)(uri ${KISYSMOD}\IPC-7251\WIRE\PAD-wire.mod)(options "")(descr "IPC-7251 Wire"))
# Non-Standard IPC-7251 Through-Hole footprints
  (lib (name PTH_AMP)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\AMP\AMP-amplifiers.mod)(options "")(descr "Non-IPC-7251 Amplifiers"))
  (lib (name PTH_BAT)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\BAT\BAT-batteries.mod)(options "")(descr "Non-IPC-7251 Batteries"))
  (lib (name PTH_CONN)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\CONN\CONN-connectors.mod)(options "")(descr "Non-IPC-7251 Connectors"))
  (lib (name PTH_CONV)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\CONV\CONV-converters.mod)(options "")(descr "Non-IPC-7251 Converters"))
  (lib (name PTH_DIOB)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\DIOB\DIOB-bridgeRectifiers.mod)(options "")(descr "Non-IPC-7251 Bridge Rectifiers"))
  (lib (name PTH_EXPP)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\EXPP\EXPP-exposedPad.mod)(options "")(descr "Non-IPC-7251 Exposed Pad (Thermal Pad)"))
  (lib (name PTH_FB)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\FB\FB-ferriteBeads.mod)(options "")(descr "Non-IPC-7251 Ferrite Beads"))
  (lib (name PTH_FIL)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\FIL\FIL-filters.mod)(options "")(descr "Non-IPC-7251 Filters"))
  (lib (name PTH_FUSE)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\FUSx\FUSE-fuses.mod)(options "")(descr "Non-IPC-7251 Fuses"))
  (lib (name PTH_FUSER)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\FUSx\FUSER-fusesResettable.mod)(options "")(descr "Non-IPC-7251 Fuses, Resettable"))
  (lib (name PTH_HSINK)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\HSINK\HSINK-heatSinks.mod)(options "")(descr "Non-IPC-7251 Heat Sinks"))
  (lib (name PTH_LCD)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\LCD\LCD-liquidCrystalDisplay.mod)(options "")(descr "Non-IPC-7251 Liquid Crystal Display"))
  (lib (name PTH_LED)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\LEDx\LED-lightEmittingDiodes.mod)(options "")(descr "Non-IPC-7251 Light Emitting Diodes, LED"))
  (lib (name PTH_LED7S)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\LEDx\LED7S-7SegmentDisplays.mod)(options "")(descr "Non-IPC-7251 Seven-segment Displays"))
  (lib (name PTH_MIC)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\MIC\MIC-microphones.mod)(options "")(descr "Non-IPC-7251 Microphones"))
  (lib (name PTH_MOV)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\MOV\MOV.mod)(options "")(descr "Non-IPC-7251 MOV"))
  (lib (name PTH_OPTO)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\OPTO\OPTO-optoIsolators.mod)(options "")(descr "Non-IPC-7251 Opto Isolators"))
  (lib (name PTH_PAD)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\PAD\PAD.mod)(options "")(descr "Non-IPC-7251 PAD"))
  (lib (name PTH_PHODET)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\PHODET\PHODET-photoDetectors.mod)(options "")(descr "Non-IPC-7251 Photo Detectors"))
  (lib (name PTH_REG)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\REG\REG-regulators.mod)(options "")(descr "Non-IPC-7251 Regulators"))
  (lib (name PTH_RELAY)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\RELAY\RELAY-relays.mod)(options "")(descr "Non-IPC-7251 Relays"))
  (lib (name PTH_SHIELD)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\SHIELD\SHIELD.mod)(options "")(descr "Non-IPC-7251 Shield"))
  (lib (name PTH_SPKR)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\SPKR\SPKR-speakers.mod)(options "")(descr "Non-IPC-7251 Speakers"))
  (lib (name PTH_STIF)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\STIF\STIF-stiffners.mod)(options "")(descr "Non-IPC-7251 Stiffners"))
  (lib (name PTH_SW)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\SW\SW-switches.mod)(options "")(descr "Non-IPC-7251 Switches"))
  (lib (name PTH_THERM)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\THERM\THERM-thermistors.mod)(options "")(descr "Non-IPC-7251 Thermistors"))
  (lib (name PTH_TRANS)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\TRANS\TRANS-transistorOutlinesCustom.mod)(options "")(descr "Non-IPC-7251 Transistor Outlines, Custom"))
  (lib (name PTH_TRIM)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\TRIM\TRIM-trimmersPotentiometers.mod)(options "")(descr "Non-IPC-7251 Trimmers & Potentiometers"))
  (lib (name PTH_TUNER)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\TUNER\TUNER-tuners.mod)(options "")(descr "Non-IPC-7251 Tuners"))
  (lib (name PTH_TVS)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\TVSx\TVS-transientVoltageSuppressors.mod)(options "")(descr "Non-IPC-7251 Transient Voltage Suppressors"))
  (lib (name PTH_TVSP)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\TVSx\TVSP-transientVoltageSuppressorsPolarized.mod)(options "")(descr "Non-IPC-7251 Transient Voltage Suppressors, Polarized"))
  (lib (name PTH_VAR)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\VAR\VAR-varistors.mod)(options "")(descr "Non-IPC-7251 Varistors"))
  (lib (name PTH_VCO)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\VCO\VCO-voltageControlledOscillator.mod)(options "")(descr "Non-IPC-7251 Voltage Controlled Oscillator"))
  (lib (name PTH_XDCR)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\XDCR\XDCR-transducersIRDA.mod)(options "")(descr "Non-IPC-7251 Transducers (IRDAs)"))
  (lib (name PTH_XFMR)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\XFMR\XFMR-transformers.mod)(options "")(descr "Non-IPC-7251 Transformers"))
  (lib (name PTH_XTAL)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7251\XTAL\XTAL-crystalOscillator.mod)(options "")(descr "Non-IPC-7251 Crystals"))
# Standard Surface-Mount footprints according to IPC-7351
  (lib (name IPC-7351_BGAC30P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA30P-ballGridArrayNonSolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 0.30 mm Pitch, Non Solder Mask Defined"))
  (lib (name IPC-7351_BGAC35P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA35P-ballGridArrayNonSolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 0.35 mm Pitch, Non Solder Mask Defined"))
  (lib (name IPC-7351_BGAC40P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA40P-ballGridArrayNonSolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 0.40 mm Pitch, Non Solder Mask Defined"))
  (lib (name IPC-7351_BGAC50P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA50P-ballGridArrayNonSolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 0.50 mm Pitch, Non Solder Mask Defined"))
  (lib (name IPC-7351_BGAC65P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA65P-ballGridArrayNonSolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 0.65 mm Pitch, Non Solder Mask Defined"))
  (lib (name IPC-7351_BGAC75P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA75P-ballGridArrayNonSolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 0.75 mm Pitch, Non Solder Mask Defined"))
  (lib (name IPC-7351_BGAC80P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA80P-ballGridArrayNonSolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 0.80 mm Pitch, Non Solder Mask Defined"))
  (lib (name IPC-7351_BGAC100P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA100P-ballGridArrayNonSolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 1.00 mm Pitch, Non Solder Mask Defined"))
  (lib (name IPC-7351_BGAC127P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA127P-ballGridArrayNonSolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 1.27 mm Pitch, Non Solder Mask Defined"))
  (lib (name IPC-7351_BGAC150P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA150P-ballGridArrayNonSolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 1.50 mm Pitch, Non Solder Mask Defined"))
  (lib (name IPC-7351_BGAN30P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA30P-ballGridArraySolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 0.30 mm Pitch, Solder Mask Defined"))
  (lib (name IPC-7351_BGAN35P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA35P-ballGridArraySolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 0.35 mm Pitch, Solder Mask Defined"))
  (lib (name IPC-7351_BGAN40P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA40P-ballGridArraySolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 0.40 mm Pitch, Solder Mask Defined"))
  (lib (name IPC-7351_BGAN50P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA50P-ballGridArraySolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 0.50 mm Pitch, Solder Mask Defined"))
  (lib (name IPC-7351_BGAN65P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA65P-ballGridArraySolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 0.65 mm Pitch, Solder Mask Defined"))
  (lib (name IPC-7351_BGAN75P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA75P-ballGridArraySolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 0.75 mm Pitch, Solder Mask Defined"))
  (lib (name IPC-7351_BGAN80P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA80P-ballGridArraySolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 0.80 mm Pitch, Solder Mask Defined"))
  (lib (name IPC-7351_BGAN100P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA100P-ballGridArraySolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 1.00 mm Pitch, Solder Mask Defined"))
  (lib (name IPC-7351_BGAN127P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA127P-ballGridArraySolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 1.27 mm Pitch, Solder Mask Defined"))
  (lib (name IPC-7351_BGAN150P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGA150P-ballGridArraySolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays, 1.50 mm Pitch, Solder Mask Defined"))
  (lib (name IPC-7351_BGACS)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGAS-ballGridArrayStaggeredNonSolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays with Staggered Pins, Non Solder Mask Defined"))
  (lib (name IPC-7351_BGANS)(type Legacy)(uri ${KISYSMOD}\IPC-7351\BGAx\BGAS-ballGridArrayStaggeredSolderMaskDefined.mod)(options "")(descr "IPC-7351 Ball Grid Arrays with Staggered Pins, Solder Mask Defined"))
  (lib (name IPC-7351_CAPAE)(type Legacy)(uri ${KISYSMOD}\IPC-7351\CAPx\CAPAE-capacitorsAluminiumElectrolytic.mod)(options "")(descr "IPC-7351 Capacitors, Aluminium Electrolytic"))
  (lib (name IPC-7351_CAPCAF)(type Legacy)(uri ${KISYSMOD}\IPC-7351\CAPx\CAPCAF-capacitorsChipArrayFlat.mod)(options "")(descr "IPC-7351 Capacitors, Chip Array, 2-Side, 4-Side, Flat"))
  (lib (name IPC-7351_CAPCAV)(type Legacy)(uri ${KISYSMOD}\IPC-7351\CAPx\CAPCAV-capacitorsChipArrayConcave.mod)(options "")(descr "IPC-7351 Capacitors, Chip Array, 2-Side, 4-Side, Concave"))
  (lib (name IPC-7351_CAPC)(type Legacy)(uri ${KISYSMOD}\IPC-7351\CAPx\CAPC-capacitorsChipNonPolarized.mod)(options "")(descr "IPC-7351 Capacitors, Chip, Non-Polarized"))
  (lib (name IPC-7351_CAPCP)(type Legacy)(uri ${KISYSMOD}\IPC-7351\CAPx\CAPCP-capacitorsChipPolarized.mod)(options "")(descr "IPC-7351 Capacitors, Chip, Polarized"))
  (lib (name IPC-7351_CAPCWR)(type Legacy)(uri ${KISYSMOD}\IPC-7351\CAPx\CAPCWR-capacitorsChipWireRectangular.mod)(options "")(descr "IPC-7351 Capacitors, Chip, Wire Rectangle"))
  (lib (name IPC-7351_CAPM)(type Legacy)(uri ${KISYSMOD}\IPC-7351\CAPx\CAPM-capacitorsMouldedNonPolarized.mod)(options "")(descr "IPC-7351 Capacitors, Moulded, Non-polarized"))
  (lib (name IPC-7351_CAPMP)(type Legacy)(uri ${KISYSMOD}\IPC-7351\CAPx\CAPMP-capacitorsMouldedPolarized.mod)(options "")(descr "IPC-7351 Capacitors, Moulded, Polarized"))
  (lib (name IPC-7351_CFP127P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\CFP127P\CFP127P-ceramicFlatPackage.mod)(options "")(descr "IPC-7351 Ceramic Flat Packages"))
  (lib (name IPC-7351_CGA)(type Legacy)(uri ${KISYSMOD}\IPC-7351\CGA\CGA-columnGridArray.mod)(options "")(descr "IPC-7351 Column Grid Array"))
  (lib (name IPC-7351_CQFP)(type Legacy)(uri ${KISYSMOD}\IPC-7351\CQFP\CQFP-ceramicQuadFlatPackages.mod)(options "")(descr "IPC-7351 Ceramic Quad Flat Packages"))
  (lib (name IPC-7351_DFN)(type Legacy)(uri ${KISYSMOD}\IPC-7351\DFN\DFN-dualFlatNoLead.mod)(options "")(descr "IPC-7351 Dual Flat No-lead"))
  (lib (name IPC-7351_DIOC)(type Legacy)(uri ${KISYSMOD}\IPC-7351\DIOx\DIOC-diodesChip.mod)(options "")(descr "IPC-7351 Diodes, Chip"))
  (lib (name IPC-7351_DIOM)(type Legacy)(uri ${KISYSMOD}\IPC-7351\DIOx\DIOM-diodesMoulded.mod)(options "")(descr "IPC-7351 Diodes, Moulded"))
  (lib (name IPC-7351_DIOMELF)(type Legacy)(uri ${KISYSMOD}\IPC-7351\DIOx\DIOMELF-diodesMELF.mod)(options "")(descr "IPC-7351 Diodes, MELF"))
  (lib (name IPC-7351_DIOSC)(type Legacy)(uri ${KISYSMOD}\IPC-7351\DIOx\DIOSC-diodesConcave2Pin.mod)(options "")(descr "IPC-7351 Diodes, Side Concave, 2 Pin"))
  (lib (name IPC-7351_DIOCAF)(type Legacy)(uri ${KISYSMOD}\IPC-7351\DIOx\DIOCAF-diodesChipArrayFlat.mod)(options "")(descr "IPC-7351 Diodes, Chip Array, 2-Side, 4-Side, Flat"))
  (lib (name IPC-7351_DIOCAV)(type Legacy)(uri ${KISYSMOD}\IPC-7351\DIOx\DIOCAV-diodesChipArrayConcave.mod)(options "")(descr "IPC-7351 Diodes, Chip Array, 2-Side, 4-Side, Concave"))
  (lib (name IPC-7351_FUSM)(type Legacy)(uri ${KISYSMOD}\IPC-7351\FUSM\FUSM-fusesMoulded.mod)(options "")(descr "IPC-7351 Fuses, Moulded"))
  (lib (name IPC-7351_INDCAF)(type Legacy)(uri ${KISYSMOD}\IPC-7351\INDx\INDCAF-inductorsChipArrayFlat.mod)(options "")(descr "IPC-7351 Inductors, Chip Array, 2-Side, 4-Side, Flat"))
  (lib (name IPC-7351_INDCAV)(type Legacy)(uri ${KISYSMOD}\IPC-7351\INDx\INDCAV-inductorsChipArrayConcave.mod)(options "")(descr "IPC-7351 Inductors, Chip Array, 2-Side, 4-Side, Concave"))
  (lib (name IPC-7351_INDC)(type Legacy)(uri ${KISYSMOD}\IPC-7351\INDx\INDC-inductorsChip.mod)(options "")(descr "IPC-7351 Inductors, Chip"))
  (lib (name IPC-7351_INDM)(type Legacy)(uri ${KISYSMOD}\IPC-7351\INDx\INDM-inductorsMoulded.mod)(options "")(descr "IPC-7351 Inductors, Moulded"))
  (lib (name IPC-7351_INDP)(type Legacy)(uri ${KISYSMOD}\IPC-7351\INDx\INDP-inductorsPrecisionWireWound.mod)(options "")(descr "IPC-7351 Inductors, Precision Wire Wound"))
  (lib (name IPC-7351_LCC)(type Legacy)(uri ${KISYSMOD}\IPC-7351\LCCx\LCC-quadLeadlessCeramicChipCarriers.mod)(options "")(descr "IPC-7351 Quad Leadless Ceramic Chip Carriers"))
  (lib (name IPC-7351_LCCS)(type Legacy)(uri ${KISYSMOD}\IPC-7351\LCCx\LCCS-quadLeadlessCeramicChipCarriersSide.mod)(options "")(descr "IPC-7351 Quad Leadless Ceramic Chip Carriers (Pin 1 on Side)"))
  (lib (name IPC-7351_LEDC)(type Legacy)(uri ${KISYSMOD}\IPC-7351\LEDx\LEDC-lightEmittingDiodeChip.mod)(options "")(descr "IPC-7351 LED, Chip"))
  (lib (name IPC-7351_LEDM)(type Legacy)(uri ${KISYSMOD}\IPC-7351\LEDx\LEDM-lightEmittingDiodeMoulded.mod)(options "")(descr "IPC-7351 LED, Moulded"))
  (lib (name IPC-7351_LEDSC2)(type Legacy)(uri ${KISYSMOD}\IPC-7351\LEDx\LEDSC-lightEmittingDiodeConcave2Pin.mod)(options "")(descr "IPC-7351 LED, Side Concave, 2 Pin"))
  (lib (name IPC-7351_LEDSC4)(type Legacy)(uri ${KISYSMOD}\IPC-7351\LEDx\LEDSC-lightEmittingDiodeConcave4Pin.mod)(options "")(descr "IPC-7351 LED, Side Concave, 4 Pin"))
  (lib (name IPC-7351_LGA)(type Legacy)(uri ${KISYSMOD}\IPC-7351\LGA\LGA-landGridArray.mod)(options "")(descr "IPC-7351 Land Grid Array"))
  (lib (name IPC-7351_OSCCC)(type Legacy)(uri ${KISYSMOD}\IPC-7351\OSCx\OSCCC-oscillatorsCornerConcave.mod)(options "")(descr "IPC-7351 Oscillators, Corner Concave"))
  (lib (name IPC-7351_OSCJ)(type Legacy)(uri ${KISYSMOD}\IPC-7351\OSCx\OSCJ-oscillatorsJlead.mod)(options "")(descr "IPC-7351 Oscillators, J-Lead"))
  (lib (name IPC-7351_OSCL)(type Legacy)(uri ${KISYSMOD}\IPC-7351\OSCx\OSCL-oscillatorsLbendLead.mod)(options "")(descr "IPC-7351 Oscillators, L-Bend Lead"))
  (lib (name IPC-7351_OSCSC)(type Legacy)(uri ${KISYSMOD}\IPC-7351\OSCx\OSCSC-oscillatorsSideConcave.mod)(options "")(descr "IPC-7351 Oscillators, Side Concave"))
  (lib (name IPC-7351_PLCC)(type Legacy)(uri ${KISYSMOD}\IPC-7351\PLCCx\PLCC-plasticLeadedChipCarriers.mod)(options "")(descr "IPC-7351 Plastic Leaded Chip Carriers"))
  (lib (name IPC-7351_PLCCS)(type Legacy)(uri ${KISYSMOD}\IPC-7351\PLCCx\PLCCS-plasticLeadedChipCarrierSocketsSquare.mod)(options "")(descr "IPC-7351 Plastic Leaded Chip Carrier Sockets Square"))
  (lib (name IPC-7351_PQFN40P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\PQFN\PQFN40P-pullBackQuadFlatNoLead.mod)(options "")(descr "IPC-7351 Pull-back Quad Flat No-lead, 0.40 mm Pitch"))
  (lib (name IPC-7351_PQFN50P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\PQFN\PQFN50P-pullBackQuadFlatNoLead.mod)(options "")(descr "IPC-7351 Pull-back Quad Flat No-lead, 0.50 mm Pitch"))
  (lib (name IPC-7351_PQFN65P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\PQFN\PQFN65P-pullBackQuadFlatNoLead.mod)(options "")(descr "IPC-7351 Pull-back Quad Flat No-lead, 0.65 mm Pitch"))
  (lib (name IPC-7351_PQFN80P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\PQFN\PQFN80P-pullBackQuadFlatNoLead.mod)(options "")(descr "IPC-7351 Pull-back Quad Flat No-lead, 0.80 mm Pitch"))
  (lib (name IPC-7351_PSON)(type Legacy)(uri ${KISYSMOD}\IPC-7351\PSON\PSON-pullBackSmallOutlineNoLead.mod)(options "")(descr "IPC-7351 Pull-back Small Outline No-lead"))
  (lib (name IPC-7351_QFN35P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\QFN\QFN35P-quadFlatNoLeadPackages.mod)(options "")(descr "IPC-7351 Quad Flat No-lead, 0.35 mm Pitch"))
  (lib (name IPC-7351_QFN40P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\QFN\QFN40P-quadFlatNoLeadPackages.mod)(options "")(descr "IPC-7351 Quad Flat No-lead, 0.40 mm Pitch"))
  (lib (name IPC-7351_QFN50P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\QFN\QFN50P-quadFlatNoLeadPackages.mod)(options "")(descr "IPC-7351 Quad Flat No-lead, 0.50 mm Pitch"))
  (lib (name IPC-7351_QFN55P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\QFN\QFN55P-quadFlatNoLeadPackages.mod)(options "")(descr "IPC-7351 Quad Flat No-lead, 0.55 mm Pitch"))
  (lib (name IPC-7351_QFN65P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\QFN\QFN65P-quadFlatNoLeadPackages.mod)(options "")(descr "IPC-7351 Quad Flat No-lead, 0.65 mm Pitch"))
  (lib (name IPC-7351_QFN70P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\QFN\QFN70P-quadFlatNoLeadPackages.mod)(options "")(descr "IPC-7351 Quad Flat No-lead, 0.70 mm Pitch"))
  (lib (name IPC-7351_QFN80P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\QFN\QFN80P-quadFlatNoLeadPackages.mod)(options "")(descr "IPC-7351 Quad Flat No-lead, 0.80 mm Pitch"))
  (lib (name IPC-7351_QFN90P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\QFN\QFN90P-quadFlatNoLeadPackages.mod)(options "")(descr "IPC-7351 Quad Flat No-lead, 0.90 mm Pitch"))
  (lib (name IPC-7351_QFP30P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\QFP\QFP30P-quadFlatPackages.mod)(options "")(descr "IPC-7351 Quad Flat Packages, 0.30 mm Pitch"))
  (lib (name IPC-7351_QFP40P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\QFP\QFP40P-quadFlatPackages.mod)(options "")(descr "IPC-7351 Quad Flat Packages, 0.40 mm Pitch"))
  (lib (name IPC-7351_QFP50P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\QFP\QFP50P-quadFlatPackages.mod)(options "")(descr "IPC-7351 Quad Flat Packages, 0.50 mm Pitch"))
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    (lib (name IPC-7351_QFP635P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\QFP\QFP635P-quadFlatPackages.mod)(options "")(descr "IPC-7351 Quad Flat Packages, 0.635 mm Pitch"))
    (lib (name IPC-7351_QFP65P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\QFP\QFP65P-quadFlatPackages.mod)(options "")(descr "IPC-7351 Quad Flat Packages, 0.65 mm Pitch"))
    (lib (name IPC-7351_QFP80P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\QFP\QFP80P-quadFlatPackages.mod)(options "")(descr "IPC-7351 Quad Flat Packages, 0.80 mm Pitch"))
    (lib (name IPC-7351_QFP100P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\QFP\QFP100P-quadFlatPackages.mod)(options "")(descr "IPC-7351 Quad Flat Packages, 1.00 mm Pitch"))
    (lib (name IPC-7351_RESCAF)(type Legacy)(uri ${KISYSMOD}\IPC-7351\RESx\RESCAF-resistorsChipArrayFlat.mod)(options "")(descr "IPC-7351 Resistors, Chip Array, 2-Side, 4-Side, Flat"))
    (lib (name IPC-7351_RESCAV)(type Legacy)(uri ${KISYSMOD}\IPC-7351\RESx\RESCAV-resistorsChipArrayConcave.mod)(options "")(descr "IPC-7351 Resistors, Chip Array, 2-Side, 4-Side, Concave"))
    (lib (name IPC-7351_RESCAXE)(type Legacy)(uri ${KISYSMOD}\IPC-7351\RESx\RESCAXE-resistorsChipArrayConvexE.mod)(options "")(descr "IPC-7351 Resistors, Chip Array, Convex, E-Version (Even Pin Size)"))
    (lib (name IPC-7351_RESCAXS)(type Legacy)(uri ${KISYSMOD}\IPC-7351\RESx\RESCAXS-resistorsChipArrayConvexS.mod)(options "")(descr "IPC-7351 Resistors, Chip Array, Convex, S-Version (Side Pins Differ)"))
    (lib (name IPC-7351_RESC)(type Legacy)(uri ${KISYSMOD}\IPC-7351\RESx\RESC-resistorsChip.mod)(options "")(descr "IPC-7351 Resistors, Chip"))
    (lib (name IPC-7351_RESMELF)(type Legacy)(uri ${KISYSMOD}\IPC-7351\RESx\RESMELF-resistorsMELF.mod)(options "")(descr "IPC-7351 Resistors, MELF"))
    (lib (name IPC-7351_RESM)(type Legacy)(uri ${KISYSMOD}\IPC-7351\RESx\RESM-resistorsMoulded.mod)(options "")(descr "IPC-7351 Resistors, Moulded"))
    (lib (name IPC-7351_SOD)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOD\SOD-JEDEC.mod)(options "")(descr "IPC-7351 Small Outline Diodes"))
    (lib (name IPC-7351_SOIC127P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOIC127P\SOIC127P-smallOutlineIntegratedCircuit.mod)(options "")(descr "IPC-7351 Small Outline Integrated Circuit, (50 mil Pitch SOIC)"))
    (lib (name IPC-7351_SOIC25xP)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOIC25xP\SOIC25xP-smallOutlineIntegratedCircuit.mod)(options "")(descr "IPC-7351 Small Outline Integrated Circuit, (100 mil Pitch SOIC)"))
    (lib (name IPC-7351_SODFL)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SODFL\SODFL-smallOutlineDiodesFlatLead.mod)(options "")(descr "IPC-7351 Small Outline Diodes, Flat Lead"))
    (lib (name IPC-7351_SOJ)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOJ\SOJ-smallOutlineJleaded.mod)(options "")(descr "IPC-7351 Small Outline IC, J-Leaded"))
    (lib (name IPC-7351_SON)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SON\SON-smallOutlineNoLead.mod)(options "")(descr "IPC-7351 Small Outline No-lead"))
    (lib (name IPC-7351_SOP30P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOP\SOP30P-smallOutlinePackage.mod)(options "")(descr "IPC-7351 Small Outline Packages, 0.30 mm Pitch"))
    (lib (name IPC-7351_SOP40P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOP\SOP40P-smallOutlinePackage.mod)(options "")(descr "IPC-7351 Small Outline Packages, 0.40 mm Pitch"))
    (lib (name IPC-7351_SOP50P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOP\SOP50P-smallOutlinePackage.mod)(options "")(descr "IPC-7351 Small Outline Packages, 0.50 mm Pitch"))
    (lib (name IPC-7351_SOP55P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOP\SOP55P-smallOutlinePackage.mod)(options "")(descr "IPC-7351 Small Outline Packages, 0.55 mm Pitch"))
    (lib (name IPC-7351_SOP635P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOP\SOP635P-smallOutlinePackage.mod)(options "")(descr "IPC-7351 Small Outline Packages, 0.635 mm Pitch"))
    (lib (name IPC-7351_SOP65P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOP\SOP65P-smallOutlinePackage.mod)(options "")(descr "IPC-7351 Small Outline Packages, 0.65 mm Pitch"))
    (lib (name IPC-7351_SOP80P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOP\SOP80P-smallOutlinePackage.mod)(options "")(descr "IPC-7351 Small Outline Packages, 0.80 mm Pitch"))
    (lib (name IPC-7351_SOP100P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOP\SOP100P-smallOutlinePackage.mod)(options "")(descr "IPC-7351 Small Outline Packages, 1.00 mm Pitch"))
    (lib (name IPC-7351_SOP147P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOP\SOP147P-smallOutlinePackage.mod)(options "")(descr "IPC-7351 Small Outline Packages, 1.47 mm Pitch"))
    (lib (name IPC-7351_SOP192P)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOP\SOP192P-smallOutlinePackage.mod)(options "")(descr "IPC-7351 Small Outline Packages, 1.92 mm Pitch"))
    (lib (name IPC-7351_SOT23)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOT\SOT23-JEDEC.mod)(options "")(descr "IPC-7351 SOT23 (JEDEC Standard Packages)"))
    (lib (name IPC-7351_SOT223)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOT\SOT223-JEDEC.mod)(options "")(descr "IPC-7351 SOT223 (JEDEC Standard Packages)"))
    (lib (name IPC-7351_SOT143)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOT\SOT143-JEDEC.mod)(options "")(descr "IPC-7351 SOT143 (JEDEC Standard Packages)"))
    (lib (name IPC-7351_SOT343)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOT\SOT343-JEDEC.mod)(options "")(descr "IPC-7351 SOT343 (JEDEC Standard Packages)"))
    (lib (name IPC-7351_SOT26)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOT\SOT26-JEDEC.mod)(options "")(descr "IPC-7351 SOT26 (JEDEC Standard Packages)"))
    (lib (name IPC-7351_SOT323)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOT\SOT323-JEDEC.mod)(options "")(descr "IPC-7351 SOT323 (JEDEC Standard Packages)"))
    (lib (name IPC-7351_SOT363)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOT\SOT363-JEDEC.mod)(options "")(descr "IPC-7351 SOT363 (JEDEC Standard Packages)"))
    (lib (name IPC-7351_SOT404)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOT\SOT404-JEDEC.mod)(options "")(descr "IPC-7351 SOT404 (JEDEC Standard Packages)"))
    (lib (name IPC-7351_SOTFL)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOTFL\SOTFL-smallOutlineTransistorsFlatLead.mod)(options "")(descr "IPC-7351 Small Outline Transistors, Flat Lead"))
    (lib (name IPC-7351_SOCAF)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOx\SOCAF-integratedCircuitsChipArrayFlat.mod)(options "")(descr "IPC-7351 Integrated Circuit, Chip Array, 2-Side, Flat"))
    (lib (name IPC-7351_SOCAV)(type Legacy)(uri ${KISYSMOD}\IPC-7351\SOx\SOCAV-integratedCircuitsChipArrayConcave.mod)(options "")(descr "IPC-7351 Integrated Circuit, Chip Array, 2-Side, Concave"))
    (lib (name IPC-7351_TO)(type Legacy)(uri ${KISYSMOD}\IPC-7351\TO\TO-generic_DPAK.mod)(options "")(descr "IPC-7351 TO (Generic DPAK)"))
    (lib (name IPC-7351_XTAL)(type Legacy)(uri ${KISYSMOD}\IPC-7351\XTAL\XTAL-crystalOscillator.mod)(options "")(descr "IPC-7351 Crystal Oscillaror (2 leads)"))
# Non-Standard IPC-7351 Surface-Mount footprints
    (lib (name SMD_AMP)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\AMP\AMP-amplifiers.mod)(options "")(descr "Non-IPC-7351 Amplifiers"))
    (lib (name SMD_BAT)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\BAT\BAT-batteries.mod)(options "")(descr "Non-IPC-7351 Batteries"))
    (lib (name SMD_BQFPC)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\BQFPx\BQFPC-bumperQuadFlatPackageCenter.mod)(options "")(descr "Non-IPC-7351 Quad Flat Packages with Bumper Corners, 1 Centre"))
    (lib (name SMD_BQFPS)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\BQFPx\BQFPS-bumperQuadFlatPackageSide.mod)(options "")(descr "Non-IPC-7351 Quad Flat Packages with Bumper Corners, Pin 1 Side"))
    (lib (name SMD_CAPCAF)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\CAPx\CAPCAF-capacitorsChipArrayFlat.mod)(options "")(descr "Non-IPC-7351 Capacitors, Chip, Array, Flat (Pins on 2 sides)"))
    (lib (name SMD_CAP)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\CAPx\CAP-capacitorsMiscellaneous.mod)(options "")(descr "Non-IPC-7351 Capacitors, Miscellaneous"))
    (lib (name SMD_CAPCAV)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\CAPx\CAPCAV-capacitorsChipArrayConcave.mod)(options "")(descr "Non-IPC-7351 Capacitors, Chip, Array, Concave (Pins on 2 or 4 sides)"))
    (lib (name SMD_CAPV)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\CAPx\CAPV-capacitorsVariable.mod)(options "")(descr "Non-IPC-7351 Capacitors, Variable"))
    (lib (name SMD_DIO)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\DIO\DIO-diodesMiscellaneous.mod)(options "")(descr "Non-IPC-7351 Diodes, Miscellaneous"))
    (lib (name SMD_DIOB)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\DIOB\DIOB-diodesBridgeRectifiers.mod)(options "")(descr "Non-IPC-7351 Diodes, Bridge Rectifiers"))
    (lib (name SMD_FB)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\FB\FB-ferriteBeads.mod)(options "")(descr "Non-IPC-7351 Ferrite Beads"))
    (lib (name SMD_FID)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\FID\FID-fiducials.mod)(options "")(descr "Non-IPC-7351 Fiducials"))
    (lib (name SMD_FIL)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\FIL\FIL-filters.mod)(options "")(descr "Non-IPC-7351 Filters"))
    (lib (name SMD_FUSE)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\FUSx\FUSE-fuses.mod)(options "")(descr "Non-IPC-7351 Fuses"))
    (lib (name SMD_FUSER)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\FUSx\FUSER-fusesResettable.mod)(options "")(descr "Non-IPC-7351 Fuses, Resettable"))
    (lib (name SMD_INDCAF)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\INDx\INDCAF-inductorsChipArrayFlat.mod)(options "")(descr "Non-IPC-7351 Inductors, Chip, Array, Flat (Pins on 2 sides)"))
    (lib (name SMD_INDCAV)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\INDx\INDCAV-inductorsChipArrayConcave.mod)(options "")(descr "Non-IPC-7351 Inductors, Chip, Array, Concave (Pins on 2 or 4 sides)"))
    (lib (name SMD_IND)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\INDx\IND-inductorsMiscellaneous.mod)(options "")(descr "Non-IPC-7351 Inductors, Miscellaneous"))
    (lib (name SMD_KEYPAD)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\KEYPAD\KEYPAD.mod)(options "")(descr "Non-IPC-7351 Keypad"))
    (lib (name SMD_LCD)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\LCD\LCD-liquidCrystalDisplay.mod)(options "")(descr "Non-IPC-7351 Liquid Crystal Display"))
    (lib (name SMD_LED)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\LED\LED-lightEmittingDiodes.mod)(options "")(descr "Non-IPC-7351 Light Emitting Diodes, LED"))
    (lib (name SMD_MIC)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\MIC\MIC-microphones.mod)(options "")(descr "Non-IPC-7351 Microphones"))
    (lib (name SMD_OPTO)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\OPTO\OPTO-optoIsolators.mod)(options "")(descr "Non-IPC-7351 Opto Isolators"))
    (lib (name SMD_OSC)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\OSC\OSC-oscillators.mod)(options "")(descr "Non-IPC-7351 Oscillators"))
    (lib (name SMD_RELAY)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\RELAY\RELAY-relays.mod)(options "")(descr "Non-IPC-7351 Relays"))
    (lib (name SMD_RESCAF)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\RESx\RESCAF-resistorsChipArrayFlat.mod)(options "")(descr "Non-IPC-7351 Resistors, Chip, Array, Flat (Pins on 2 sides)"))
    (lib (name SMD_RESCAV)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\RESx\RESCAV-resistorsChipArrayConcave.mod)(options "")(descr "Non-IPC-7351 Resistors, Chip, Array, Concave (Pins on 2 or 4 sides)"))
    (lib (name SMD_RESCAXE)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\RESx\RESCAXE-resistorsChipArrayConvexTypeE.mod)(options "")(descr "Non-IPC-7351 Resistors, Chip, Array, Convex Type E (Pins on 2 sides)"))
    (lib (name SMD_RESCAXS)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\RESx\RESCAXS-resistorsChipArrayConvexTypeS.mod)(options "")(descr "Non-IPC-7351 Resistors, Chip, Array, Convex Type S (Pins on 2 sides))"))
    (lib (name SMD_SPKR)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\SPKR\SPKR-speakers.mod)(options "")(descr "Non-IPC-7351 Speakers"))
    (lib (name SMD_SW)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\SW\SW-switches.mod)(options "")(descr "Non-IPC-7351 Switches"))
    (lib (name SMD_THERM)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\THERM\THERM-thermistors.mod)(options "")(descr "Non-IPC-7351 Thermistors"))
    (lib (name SMD_TP)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\TPx\TP-testPointsRound.mod)(options "")(descr "Non-IPC-7351 Test Points, Round"))
    (lib (name SMD_TPS)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\TPx\TPS-testPointsSquare.mod)(options "")(descr "Non-IPC-7351 Test Points, Rectangle, Square"))
    (lib (name SMD_TRANS)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\TRANS\TRANS-transistorOutlinesCustom.mod)(options "")(descr "Non-IPC-7351 Transistor Outlines, Custom"))
    (lib (name SMD_TRIM)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\TRIM\TRIM-trimmersPotentiometers.mod)(options "")(descr "Non-IPC-7351 Trimmers & Potentiometers"))
    (lib (name SMD_TUNERs)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\TUNER\TUNER-tuners.mod)(options "")(descr "Non-IPC-7351 Tuners"))
    (lib (name SMD_TVS)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\TVSx\TVS-transientVoltageSuppressors.mod)(options "")(descr "Non-IPC-7351 Transient Voltage Suppressors"))
    (lib (name SMD_TVSP)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\TVSx\TVSP-transientVoltageSuppressorsPolarized.mod)(options "")(descr "Non-IPC-7351 Transient Voltage Suppressors, Polarized"))
    (lib (name SMD_VAR)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\VAR\VAR-varistors.mod)(options "")(descr "Non-IPC-7351 Varistors"))
    (lib (name SMD_VCOr)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\VCO\VCO-voltageControlledOscillator.mod)(options "")(descr "Non-IPC-7351 Voltage Controlled Oscillators"))
    (lib (name SMD_VREG)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\VREG\VREG-voltageRegulatorsCustom.mod)(options "")(descr "Non-IPC-7351 Voltage Regulators, Custom"))
    (lib (name SMD_XCVR)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\XCVR\XCVR-transceivers.mod)(options "")(descr "Non-IPC-7351 Transceivers"))
    (lib (name SMD_XDCR)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\XDCR\XDCR-transducersIRDA.mod)(options "")(descr "Non-IPC-7351 Transducers (IRDAs)"))
    (lib (name SMD_XFMR)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\XFMR\XFMR-transformers.mod)(options "")(descr "Non-IPC-7351 Transformers"))
    (lib (name SMD_XTAL)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\XTAL\XTAL-crystalOscillator.mod)(options "")(descr "Non-IPC-7351 Crystals"))
    (lib (name SMD_CONN)(type Legacy)(uri ${KISYSMOD}\Nonstandard-IPC-7351\CONN\CONN-connectors.mod)(options "")(descr "Non-IPC-7351 Connectors"))
)
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