IPC-7351C Revision Goals

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John Perry, IPC
Technical Project Manager

Association Connecting Electronics Industries

IPC-7351C Revision Goals

- 1) Zero Orientation (Pin 1 Upper Left or Lower Left)
  - IPC-7351B provides one orientation option (2 in the LP Calculator)
  - IPC-2581 consortia considering one rotation
  - EIA-471 moved to match IEC rotation
- Subcommittee Feedback as of 08/28/12:

IPC-7351B	IEC 61188-7	EIA-481-D	OTHER
8*	3**	1	1***

- * Minor deviation exists within a few of these
- ** Do not specifically call out IEC 61188-7 but utilize lower left or left which matches that standard.
- *** Compliant with the component data provided by the part manufacturer

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- 1) Zero Orientation (cont'd).
- Our reality is that the global industry uses mixed approaches to zero orientation:
  - Following EIA-481 is no answer as suppliers do what fits their needs
  - Following the JEDEC outline is deviated from by many
  - Design groups make their own decisions
  - It doesn't matter how the packages are originally described provided Rotation and Mirror are correct

- Proposed Solution: Simply have IPC-7351C and IEC provide BOTH options (A &B) and let users decide which one to adopt.

- This was approved by the 1-13 subcommittee at the 09/25/12 web conference

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- 2) Land Pattern Naming Convention
  - Concept of Land Pattern Naming Convention vs. Package Naming Convention
    - Component Height
    - Component Manufacturer
  - Establish a hierarchy of required vs. optional items for the naming convention?
    - Identify optional data such as manufacturer part number and component height
    - Identify a character that represents where the optional data begins (dashes/multiple dashes
  - Subcommittee Feedback to Optional Modifiers for Naming Convention provided in next few slides:

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- 2) Land Pattern Naming Convention (cont'd)
  - Proposed Character Separator for Optional Codes:
  - **A)** Utilize the equal "=" symbol. Repeat as necessary for optional codes.
  - Or **B)** Utilize a single letter between each optional code (e.g., T for Thermal Tab, L for Lead Length, B for BGA Ball Size, P for BGA Pin spacing)
  - The subcommittee agreed to item B) during the 10/09/12 web conference.
  - **Exceptions:** Height, being associated with body length and body width, would precede any equal symbol even though it is itself an optional character
  - *The subcommittee also agreed to add a paragraph to the "C" revision clarifying that the land pattern naming convention has more to do with the package than the actual land pattern

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- 2) Land Pattern Naming Convention (cont'd)
  - Component Manufacturer Code:
  - Why not use the supplier's 5 digit CAGE code instead of name (e.g. TI)?
  - Adding a component manufacturer code/abbreviation as an option will be difficult to maintain as component manufacturer's grow, merge, go out of business (e.g., AMP connectors changed to Tyco and then to TE Connectivity)
  - I disagree with the practice of including any component vendor in the package name. Most of our parts are sourced from multiple component vendors.
  - The subcommittee agreed not to incorporate component manufacturer codes in the naming convention during the 10/09/12 web conference.

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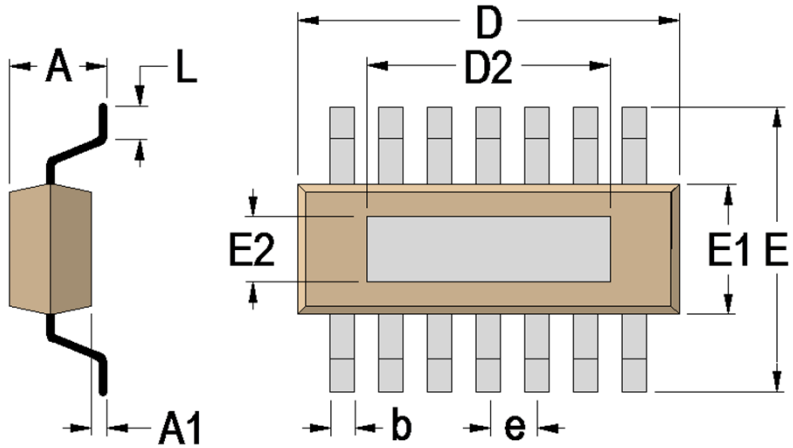
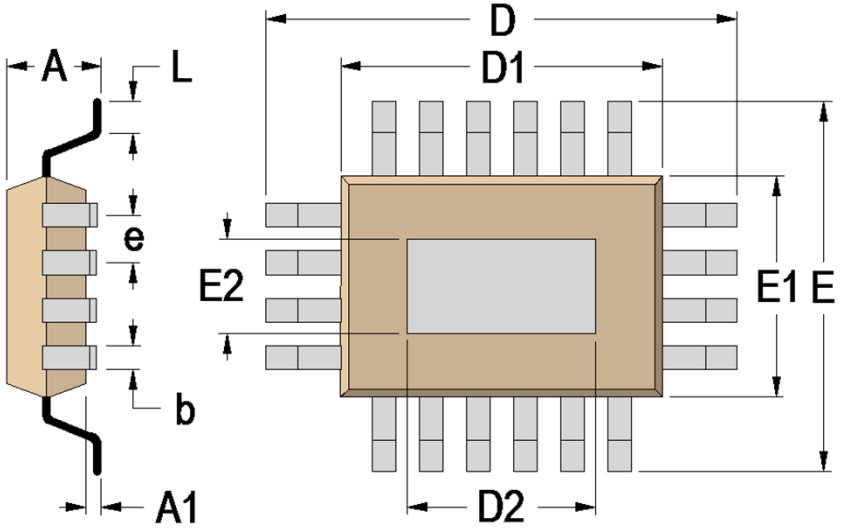
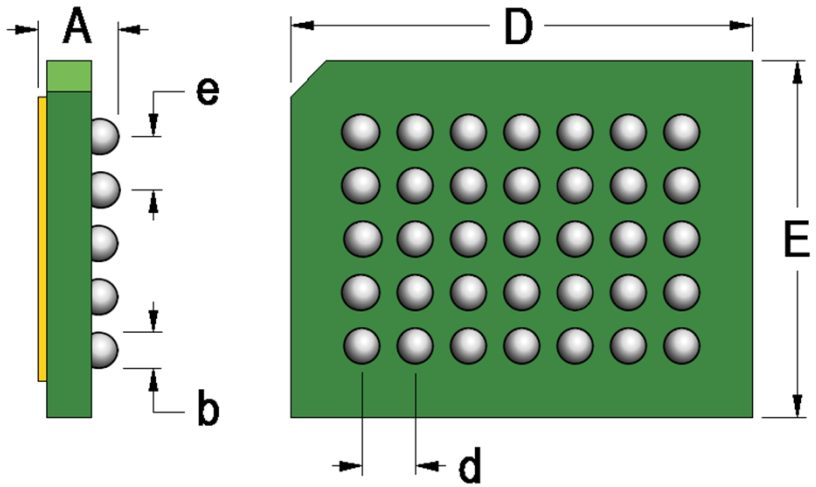
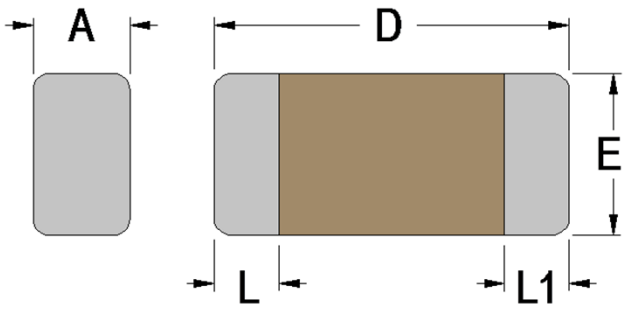
- 3) Component Dimension Naming Convention
  - IPC-7351 naming convention differs from naming convention on JEDEC data sheets:









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- 3) Component Dimension Naming Convention (cont'd)
  - All of the inputs to the PCB Libraries Land Pattern Calculator tool indicate that component vendors are supplying their parts with JEDEC packaging naming conventions.
  - The adoption of this naming convention for the package does not affect land pattern dimensions such as Z, G and X.
  - The adoption of this naming convention for the package does not affect the IPC-7351 Land Pattern Naming Convention (which uses dimensions for body length and width and not alpha characters)
  - The subcommittee agreed to adopt the JEDEC naming convention for the components during the 10/23/2012 web conference

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- 4) Land Pattern Geometry Variations
  - Dieter Bergman reported that the IEC WG12 recommended the elimination of Density Level A (Maximum Land Protrusion) from the IEC-61188-5 document. Does IPC-7351C wish to follow suit?
  - The IEC WG12 feels that Level A does not get utilized very often anymore, and that the land patterns are much larger than need be for a robust solder joint, even for mil-aero applications. It was acknowledged that there was little to no space representation at that IEC meeting.
  - Our subcommittee does not agree with the complete elimination of this density level, as life expectancy (longevity) and mil-aero and space applications have dictated the usage of this density level.
    - Some space application product require 20,000 thermal cycle survivability

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- 4) Land Pattern Geometry Variations (cont'd)
  - The subcommittee proposed a compromise during the 10/23/2012 web conference that does not eliminate Density Level A altogether:
  - Remove Density Level A from small chip component packages, such as making the Level A column in IPC-7351C Table 3-6 blank with appropriate verbiage as to why. We need to investigate if this should be done with other component tables (LGA, CGA, etc.)
  - Add verbiage describing where Level A is to be used (harsh or severe environments, high thermal cycles, tin-lead, etc.)
  - Add verbiage describing Density Level C as the default geometry and the one used most often for lead-free applications.
  - McConnell and Green will search for company data that supports retaining Density Level A for space applications

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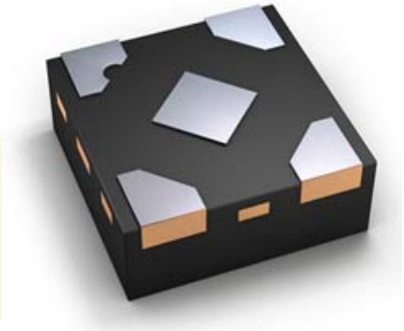
- 5) New/Modified Packages
  - Bottom Termination Components (BTC)
  - IEC Proposal:
    - For bottom only type metallization, add 5% of the pitch to the land size (i.e., pitch of 500 µm would add 25 µm all around the land
      - Solder mask clearance might be 10% of the pitch
    - Using the pitch between lands works consistently and is intended to prevent solder bridging



  - Subcommittee approved IEC proposal during 11/6/12 web conference (combination of perimeter/periphery land swell plus a toe fillet)

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- 5) New/Modified Packages (cont'd)
  - Multiple Thermal Pads
    - The proliferation of segmentation of thermal tabs into multiple patterns of different sizes and shapes has increased
    - PCB Libraries is developing a module for their calculator tool which will have a package editor for addressing variations in thermal tabs.
  - Following the development of this module, the 1-13 subcommittee will determine how to draft verbiage in IPC-7351C describing how to address these unique thermal tabs.
  - Unique Packages (Potentiometers, switches, LEDs, etc.)
    - These packages are virtually impossible to standardize
    - We should, however, provide some guidance on how they might be named
  - McConnell and Hausherr will provide IPC with a listing of non-standard parts that we could draft unique packaging guidelines for

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- 6) Silkscreen Outlines
- Considerations include:
  - Never be located under the component because they are covered up during assembly and do not provide any function
  - Should be mapped to the maximum component body outline and visible after assembly (based on industry feedback – had previously used nominal component body outline)
  - Used for assembly placement registration accuracy
  - Pad to silkscreen rule overrides maximum component body
  - Polarity Marking should indicate Pin 1 location and should be visible after assembly attachment
  - The line width and pad to line gap are normally the same
  - Should always be located inside the Placement Courtyard
  - 3-Tier silkscreen lines widths

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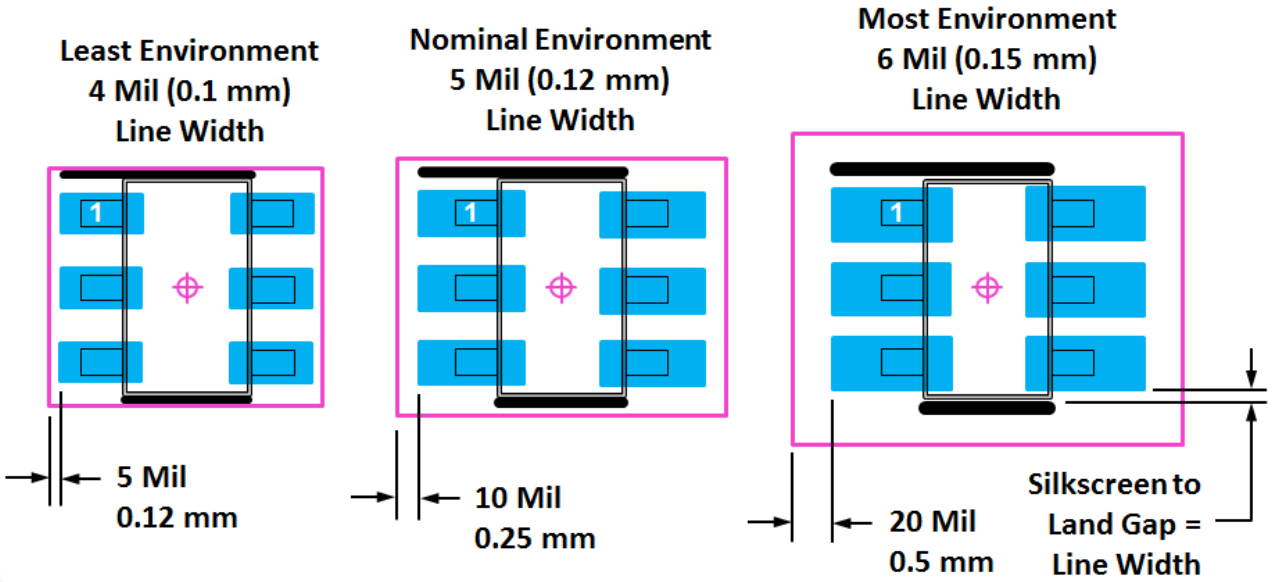
- 6) Silkscreen Outlines (cont'd)
  - The preliminary IEC recommendation for 3-Tier line widths and Silkscreen to Pad Gap are illustrated in the pictures below representing a SOT23-6 component package:



  - Subcommittee approved the 3-tier line width concept during the 11/06/12 web conference. Also requested imagery where Pin 1 is in the middle.

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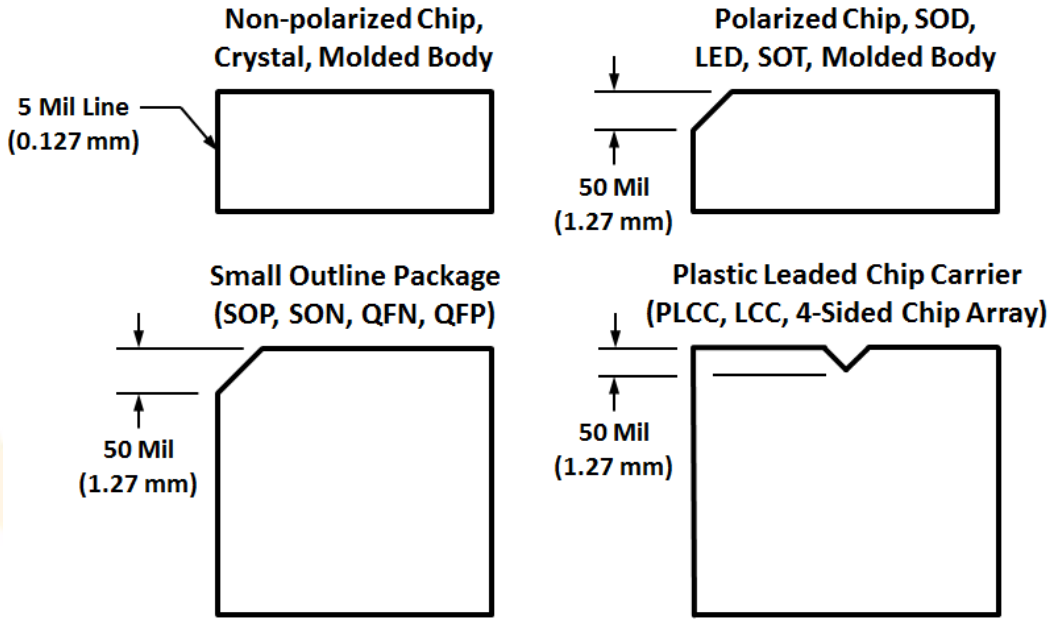
- 7) Assembly Outline
  - Considerations Include:
  - Closed Polygon with a 0.127 mm [0.005 in] line width (1-Tier)
  - 1.27 mm [0.050 in] 45˚ chamfer corner to indicate pin 1 location
  - Outline shape mapped to maximum component body size



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- 7) Assembly Outline (cont'd)
  - Considered optional for those who want to add assembly outlines to their library
    - Proposal designed to be as simple as possible
    - Is there buy-in among assembly shops for this concept? IPC should poll some assembly shops and see if this will be adopted or not
    - Perry will submit to assembly shops participating in 7351, 001 and 610 on whether they would utilize this concept.

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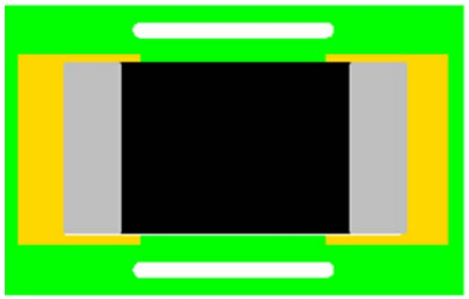
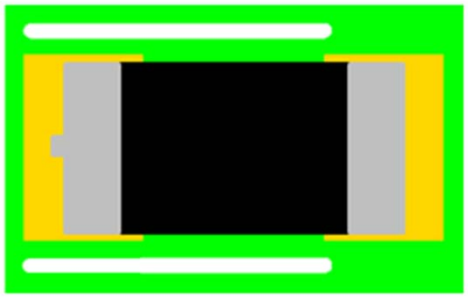
- 8) Polarized Parts
  - Should we incorporate an option for polarity markings?
  - Yes! - This is actually already being addressed within the silkscreen outline, as noted in the following illustrations:

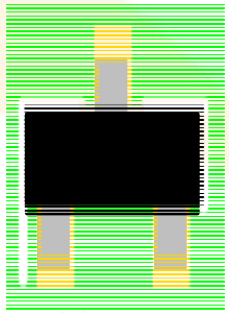
Non-polarized Silkscreen



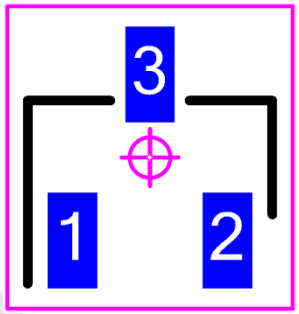
Polarized Silkscreen

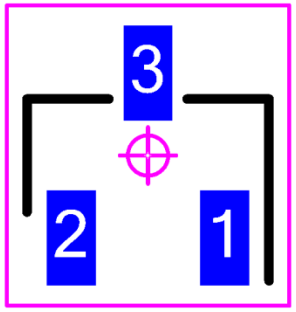


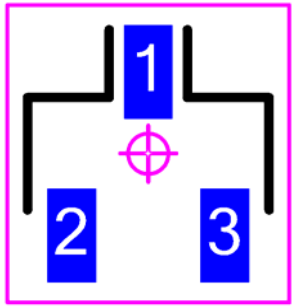
Component



Various Silkscreen Outlines with Polarity on Pin 1







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- 9) Local Fiducials
  - Other organizations such as JEITA requesting 3 tier fiducial size

- 10) Courtyard Excess
  - Proposal to change the LEAST courtyard dimension from 0.004 in to 0.005 in.

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- 11) Land Pattern Trimming

- 12) Land Shapes
  - Do we want rounded rectangle land shapes as default with options for square?
  - Maximum corner radius, radius round-off guidance