Electrical Design Process

Electrical Design Process Operating Procedure

Circuit Design Work Instruction

******START******
Hardware Requirements Document (HRD)

HRD
HLDC
Load Analysis
Derating Analysis
E^3 Analysis
Timing Analysis

Schematics and Analysis all stored on Electrical Engineering Server by CCA part number

Update as required per the peer reviews

Circuit Design
Circuit is designed to meet requirements

OrCAD Schematic Capture
The circuit design is put into schematic capture
(.DSN)

Verify BOM
Scrub specific BOM for PCN's, EOLs, Errata,etc.

Data Products
-Bill of Materials **(.XLS)**
-Schematic **(.DSN)**
-Other Analyses

Operating Procedure OP
Peer Review:
-HRD
-Schematics

Component Need
1) Search Database for possible fit
2) If not existing, request to CE

Components used in the Schematic are only pulled from the Database

Component Management Work Instruction

Component Engineer
In charge of maintaining the component database (new and existing parts)

Component Database
Stores all data on components (parametric, pricing /lead times, datasheet, etc.)
Component Engineer Adds and Edits Parts in the Component Database used for Design

Product Change Notifications:
Information on Current Component Database Parts we use

Component attributes, RoHS, Datasheets, Pricing / Lead Times, Cross References

Component Engineer would create symbol drawing
(with embedded .PDF data sheet)

Footprint Creation Work Instruction

Quote Requirements
-leave footprint name blank in Library
-Symbol "file" **(.DSN)**

Obtain Quote
Quote from Layout House

SOW
Provide Layout House SOW

Create Footprint & Verify Symbol
-Verify symbol matches footprint

Data Products
-Footprint **(.DRA)**
-Spreadsheet that marries footprint to B-E part number **(.XLS)**
-New symbol (if required) **(.DSN)**

Update Library
-Add footprint name to Library
-Store Library file on server
-Address any symbol changes

PCB Design Work Instruction

Quote Requirements
-Design Rules
-Specific Design rules **(.DOC)**
-Schematic **(.DSN)**
-Board Outline **(.DXF)**
-Bill of Materials
-Need date
-Special instructions
-Library Component Data Complete

Obtain Quote
Quote from Layout House

SOW
Provide Layout House SOW

Update per the reviews

Update Schematic

Layout
Printed Wiring Board is created, components are placed and traces & layers are detailed

Data Products
-Schematic file **(.DSN)**
-Drill dwg **(.DXF)**
-Gerber File **(.ZIP)**
-Pick & Place **(.TXT)**
-Assy drawing **(.DXF)**
-Parts position file **(.EMN)**
-3D model of parts **(.EMP)**

Data Products
-Post Processing of EMN file

General Review of Layout
Review of Layout / Gerber files / DXFs / PDFs

3D Assembly
MCAD Dwg using
-(.EMN) file
-(.EMP) file
-mapping of customer modeled parts

Circuit Assembly TOP & BOTTOM
(Layout Tool derived .DXF file) This file represents the silk screen which is used to create assembly drawings
(.DXF)

Silk Screen
a layer designed to indicate component placement for each side of the board
(.SST and .SSB)

Gerber Files
These files contains information necessary for computer controlled machines to draw wires, drill holes, mill, and cut the PCB
(.PHO)

Drill Dwg
This document contains information on the # of holes and hole sizes, as well as board outline dimensions and detail
(Contains Gerber reference & Rev / Board type and class)
(.DXF)

Pick & Place
Files contain info for creating solder paste template for SMT
(Also used for programming pick and place through hole and SMT)
(.SPT and .SPB)

Schematic
OrCAD Design File scanned in as a .PDF
(.PDF and .DSN)

Update Library
-Add footprint name to Library
-Store Library file on server
-Address any symbol changes

Board Assembly
2D MCAD drawing that uses the 3D MCAD drawing and Silk Screen to generate the Board top and bottom populated views, scanned in as a .PDF
(.PDF)

Bareboard
2D MCAD Drawing of the Bareboard (scanned as a PDF) +

Zip File containing:
-Silk Screen Files
-Gerber Files
-Drill File
-Solder Paste Files

(.PDF + Zipped file)

Operating Procedure
Peer Review

Operating Procedure
Peer Review

Symbol drawings must be released first

Final Package Archive
All released data