Sage Electcon

Your Quality Partner in Electronics Construction & Consulting

Guideline Document

for

Providing Ideal Manufacturing Inputs

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3. Introduction:

We prefer to receive the manufacturing inputs in the format of, and as outlined in this document. However, we can still manufacture any board with a Bill of Materials / Items List as the only manufacturing input, but in that event, we are then unable to do a lot of the quality assurance checks that we usually perform.

4. Gerber Files:

4.1 Include all the board layers, preferably with a layer stack-up table. This is primarily used, among other things, for determining / measuring the fiducial marks, estimating the board's thermal energy requirements for reflow, etc.

4.2 Include the NC Drill files along with the Gerber Files.

4.3 If the PCBs are panelised, please include a dimensional drawing of the panel if available.

4.4 Preferably generate the Gerber files with respect to the "relative" origin. The bottom left corner is traditionally chosen as the "relative" position.

4.5 Do not mirror the Bottom layers to face upwards.

4.6 Generate the solder-paste mask layers at 1:1 to the copper layers. We will implement the reductions, as and if necessary, based the necessary paste volume required for each component.

4.6.1 If stencilling is used the contract manufacturer needs to determine the correct amount of aperture reduction based on the stencil thickness, rheology of the selected solder paste, paste application pressure, paste particle powder size and distribution, etc.

4.6.2 If paste printing is to be done, the area of the apertures on the solder paste mask layer becomes the input to determine the correct paste printing volume.

5. Bill of Materials / Items List:

5.1 Include the designators of all the "Not-Fitted" components.

5.1.1 This aids the optical / visual inspection of the finished assemblies.

5.2 Always include the component manufacturer part number.

5.2.1 Necessary to be able to check the component moisture sensitivity level, recommended reflow soldering parameters, special precautions, etc.

5.3 Preferred file formats: *.xlsx, *.txt; *.csv

5.4 An example of the ideal file layout is provided in Figure 1.

Designator	Qty	Description1	Manufacturer	Manu Part No	Supplier Part No	FootPrint
R4, R5, R7, R9, R18, R20, R21, R28, R29, R34, R35, R48, R49, R50, R74, R82, R92	27	10k 1% 1/16W 50V THICK FILM CHIP	Rohm	RHM10.0KCDTR	RHM10.0KCDTR-ND	0402
R37, R38, R52, R53, R59, R61, R62, R68, R72, R75, R97, R101, R102	13	0R 1% 1/16W 50V THICK FILM CHIP	Rohm	RHM0.0CETR	RHM0.0CETR-ND	0402
R76, R77, R78, R79, R80, R81	6	2k2 1% 1/16W 50V THICK FILM CHIP	Vishay	CRCW04022K20F	541-2.2KJCT-ND	0402
R31, R32, R45, R46	4	750R 1% 1/16W 50V THICK FILM CHIP	Vishay	CRCW0402750RF	541-750LCT-ND	0402
R44, R54, R89	3	4k7 1% 1/16W 50V THICK FILM CHIP	Vishay	CRCW04024K70F	541-4.70KLCT-ND	0402
R1, R8	2	33k 1% 1/16W 50V THICK FILM CHIP	Vishay	CRCW040233K0F	541-33.0KLTR-ND	0402
R17, R19	2	47k 1% 1/16W 50V THICK FILM CHIP	Vishay	CRCW040247K0F	541-47.0KLCT-ND	0402

Figure 1: Example of Ideal Bill of Materials / Items List Layout

6. Pick and Place Co-ordinates file of the PCB:

6.1 Generate the Pick and Place Co-ordinate file with respect to the "relative" origin of the board.

6.2 Include all the fiducial XY-positions, if available.

6.3 Include the XY-positions of all the footprints available on the PCB, including "Not-Fitted" items, solder links, test and wire points, through-hole components, etc.

6.4 Preferred file formats: *.xlsx, *.txt; *.csv

6.5 An example of the ideal file layout is provided in Figure 2.

Designator	Comment	Description	Footprint	X-Pos	Y-Pos	Rotation	Layer	Height
C1	C1608X5R1A106K080AC	CAP; 10uF 10% 10V C1608X5R1A106K080AC X5R C	0603	-41.50	-23.04	0	Bottom	0.9
C2	C0402C104K4RAC	CAP; 100nF 10% 16V C0402C104K4RAC X7R CHIP	0402	-45.96	-22.28	0	Bottom	0.55
C3	C0603C182K5RAC	CAP; 1.8nF 10% 50V C0603C182K5RAC X7R CHIP C	0603	-39.78	-24.46	180	Bottom	0.95
C4	C2012X5R1A226M125AB	CAP; 22uF 20% 10V C2012X5R1A226M125AB X5R	0805	-40.38	-19.95	0	Bottom	1.45
C5	C2012X5R1A226M125AB	CAP; 22uF 20% 10V C2012X5R1A226M125AB X5R	0805	-40.38	-18.25	0	Bottom	1.45
C6	C1608X5R1A106K080AC	CAP; 10uF 10% 10V C1608X5R1A106K080AC X5R C	0603	-53.11	-23.14	180	Bottom	0.9
C7	C0603C182K5RAC	CAP; 1.8nF 10% 50V C0603C182K5RAC X7R CHIP C	0603	-54.74	-24.49	0	Bottom	0.95
C8	C0402C104K4RAC	CAP; 100nF 10% 16V C0402C104K4RAC X7R CHIP	0402	-49.21	-22.28	0	Bottom	0.55
C9	C2012X5R1A226M125AB	CAP; 22uF 20% 10V C2012X5R1A226M125AB X5R	0805	-54.80	-19.95	180	Bottom	1.45
C10	C2012X5R1A226M125AB	CAP; 22uF 20% 10V C2012X5R1A226M125AB X5R	0805	-54.80	-18.25	180	Bottom	1.45
C11	C0603C224K3RAC	CAP; 220nF 10% 25V C0603C224K3RAC X7R CHIP	0603	-54.55	-8.93	180	Bottom	0.95

Figure 2: Example of Ideal Pick and Place Co-ordinate file layout

7. Document containing any Special Instructions (if applicable):

7.1 Required quality level, process and recordkeeping requirements:

7.1.1 IPC-A-610G and IPC-J-STD-001G – Class 1

7.1.2 IPC-A-610G and IPC-J-STD-001G – Class 2

7.1.3 IPC-A-610G and IPC-J-STD-001G – Class 3

7.1.4 IPC-J-STD-001 GS (Space) / NASA-STD 8739.6 (Legacy)

Increasing Quality & Cost

(By Prior Contract and Arrangement Only)

7.2 Specify the status of solder links (Open / Closed) – If applicable.

7.3 Any modifications (Cut tracks, etc.) – if applicable.

7.4 Mechanical fitment / assembly – if applicable (for example: Heatsinks, EMI Shielding etc.)

7.5 Preferred file formats: *.docx, *.pdf; *.txt

8. Some notes on Bare PCBs:

8.1 If there are components closer than 6mm from the edge of the board then the boards should ideally have a clamping zone, breakaway tabs or cut-away border of at least 8mm wide, on two opposite sides.

8.1.1 This is not strictly necessary for prototyping quantities, but can become crucial with medium to high volumes.

8.2 Do not place the fiducials inside the machine clamping zones.

8.2.1 After the machine's conveyor system clamps the PCBs the fiducials are no longer visible.

8.3 There are only 3x fiducial marks necessary on a board. In the past automated placement machines weren't accurate enough, and therefore whenever fine pitch components were present on the board, there was a requirement to have extra fiducials close to those components. This is no longer necessary since the newer pick and place machines in use today are far more accurate than in the past.

Process Engineer: