

Dear Customer,

Customer Supplied Documentation

As a general rule the more information that is provided the better. For assembly quotation purposes, a Bill of Materials and Assembly drawing are strongly recommended. If omitted then quotations will normally be higher to anticipate worse case scenarios. Assembly will require at least a Bill of Materials and some way to locate the components on the PWB. For purchasing of components a list of approved vendors and manufacturers part numbers will be required. Manufacturer specifications and drawings for components are helpful. Any assembly or quality history, in-house work instructions, or other documentation generated for manufacturing is extremely beneficial to prevent reoccurrence of previous assembly problems. A finished sample is probably one of the most beneficial items that can be supplied, it will often answer many questions that can arise during quotation and manufacturing.

Electronic data is preferred when ever possible. We can view many types of files including:

File Extension	Data Type	Used For
Standard text files		
READ ME	text	may contain instructions, file lists, ASCII centroid data
TXT	text	may contain instructions, file lists, ASCII centroid data
LST	text & binary	may contain instructions, file lists, ASCII centroid data
BOM	text	Bill of Materials
Other Info files		
XLS	text & binary	may contain instructions, file lists, ASCII centroid data, Bill of Materials
DOC	text & binary	may contain instructions, file lists, ASCII centroid data, Bill of Materials
MDB	text & binary	may contain instructions, file lists, ASCII centroid data, Bill of Materials
LWP	text & binary	may contain instructions, file lists, ASCII centroid data, Bill of Materials
DBF	text & binary	may contain instructions, file lists, ASCII centroid data, Bill of Materials
Gerber Data and Arpeture lists		
GER	text	gerber data
PHO	text	gerber data
ART	text	gerber data
RPT	text	Arpeture list
ARP	text	Arpeture list
CAD Data (ASCII)		
*	text	Multiple CAD formats see page 5
IPC CAD Data		
IPC	text	IPC test data use for IPC import
356	text	IPC test data use for IPC import

Standard CAD Drawing Files		
DWG	binary	Drawing File
DXF	binary	Drawing File
HP	text	Drawing File
HPG	text	Drawing File
HPGL	text	Drawing File
PEN	text	Drawing File
PLT	text	Drawing File
PRN	text	Drawing File
PS	text	Drawing File
CAD	text	GenCAD File
Image Files		
AI	binary	Graphics File
AVI	binary	Graphics File
AWG	binary	Graphics File
BMP	binary	Graphics File
CDR	binary	Graphics File
CGM	binary	Graphics File
CMX	binary	Graphics File
DIB	binary	Graphics File
DRW	binary	Graphics File
DS4	binary	Graphics File
DSF	binary	Graphics File
EPS	binary	Graphics File
FPX	binary	Graphics File
GIF	binary	Graphics File
JPG	binary	Graphics File
MGX	binary	Graphics File
PCD	binary	Graphics File
PCX	binary	Graphics File
PDF	binary	Graphics File
PIC	binary	Graphics File
PNG	binary	Graphics File
PP4	binary	Graphics File
PP5	binary	Graphics File
PPF	binary	Graphics File
PSD	binary	Graphics File
RAS	binary	Graphics File
SCT	binary	Graphics File
TGA	binary	Graphics File
TIF	binary	Graphics File
TIFF	binary	Graphics File
WMF	binary	Graphics File
WPG	binary	Graphics File

As part of our continuing effort to improve our manufacturing efficiency, quality, and responsiveness, we have invested in CircuitCAM Computer Integrated Manufacturing software for our process. This software system will convert your CAD design data and bill of materials data into a wide array of useful information such as assembly machine programs, AOI programs and quality documentation more quickly and reliably than possible with manual methods. In order to apply the benefits of this software to your production projects, we need your assistance in obtaining the types of data the software requires in order to function most efficiently. This document has been prepared as a guide for your CAD department as well as for personnel providing us with bills of materials. Please provide this information as a quick reference to any and all personnel involved in providing our factory with assembly data.

Normally what we request from customers for electronic data is the following.

*BOM - for part numbers, descriptions, references.

*ASCII Text CAD file - for pad shapes, references, polarity

*Solder paste gerbers - for stencils

*Solder mask gerbers - for pad shapes that may be missing from CAD data (fiducials are usually not in the IPC data, other CAD data is usually complete)

Silkscreen gerbers - used if CAD and XY data are not supplied.

Arpeture lists if 274D gerber data.

XY data - used for references if a CAD file is not provided, used for programming if IPC, CAD and gerber data is not provided (cannot create color coded documents, cannot create solder inspection program for AOI, OK for placement machines, glue station and component placement inspection program on AOI).

The files with asterisks are the minimum preferred set of files to be provided. This file set ensures the best accuracy and fastest documentation and program development.

As a general rule more data is better than less. Internal gerber layers can help with wave soldering, if problem areas are noted. Sometimes we use outer layer gerbers when etch cut prints are required, etc. If solder paste layer cannot be provided then the outer layers requiring solder paste will need to be provided.

Our CircuitCAM software vendor also offers their services to you in the form of consultation with your design engineers providing the CAD data, as well as the personnel providing BOM data. If for any reason this document is not adequately clear, or you have any questions that are beyond its scope, please contact AEGIS (CircuitCAM) at 215-773-3571 and request technical support. Their service and support engineers are trained to guide you through any issues regarding data formats that might arise.

Sincerely,

David Persall

Custom Manufacturing Services, Inc.

Frequently Asked Questions

Does this software compromise the security of our data?

No: CircuitCAM does not alter in any way the CAD data or BOM data provided. The files are opened, scanned, and closed immediately without alteration.

If the design is proprietary, does this software present an intellectual property risk?

No: CircuitCAM does not extract the netlist information from any design data files. Therefore, the information maintained within CircuitCAM's database is inadequate to reproduce the design in its entirety.

Why should we bother assembling this data if it was never required before and we still received quality product on time?

Computer Integrated Manufacturing Software like CircuitCAM enables us to improve our responsiveness to initial project setup as well as engineering changes. Furthermore, it improves the overall quality of many aspects of process engineering functions and assembly functions. In summary, we can produce boards at our usual level of excellence without CircuitCAM—but we can be even more efficient with the software.

To Learn More About CAM Software and Its Benefits

AEGIS Web Site

www.aiscorp.com sales@aiscorp.com

CircuitCAM Data Requirements

In order to successfully process your assemblies with our new CircuitCAM software, we will require a bill of materials and one of the following groups of board design data (CAD most preferred). However, more data is always beneficial in order to cope with unforeseen file difficulties, so if more information and formats are available, please provide them.

Summary Information

In the following table, please note the "Required" column indicates "A" and "B" flags per data type. In order to properly use CircuitCAM a single "A" and a single "B" type data source must be provided.

Gerber Data	Forms	Provides	Required?
Gerber Data	RS-274X, RS-274-D	Locations, reference designators, and board graphics	A (If RS-274-D, Aperture List will also be required. See next item.)
Aperture List	Text File	Shape information required to render the Gerber image	RS-274-D: YES RS-274-X: NO
Centroid File	Text File	Relative locations of components (defined by reference designator) on the PCB. Allows automatic joining of references.	NO: However, the use of this file is very helpful in the processing of assemblies if the data source is scanned board or Gerber data.
Native CAD Data			Required?

Accel EDA , Accel Tango, & Accel PCAD	A		
Cadence Allegro via Aegis Script	A		
DIF (Design Interchange Format), PADS DFT Audit, and C-Link	A		
EE Designer III ASCII File	A		
GenCAD v. 1.4	A		
INCASES TL CAD File	A		
Intergraph Veribest GenCAD	A		
IPC-D-356	A		
Mentor Graphics Neutral File	A		
OrCAD	A		
PADS PowerPCB, PADS Perform, PADS 2000, PADS Work	A		
Pantheon PDB File	A		
P-CAD PDF Design File	A		
P-CAD for DOS	A		
Protel 98/99 ASCII PCB File	A		
SCI Cards Neutral File	A		
Supermax CAD	A		
Tango for DOS	A		
Ultiboard	A		
Valor ODB++ CAD Project	A		
Zuken Visula and Cadstar	A		
3rd Party CIM Software Applications	Required?		
Fabmaster FATF File	A		
Panapro / PanaCIM PCB File	A		
Unicam Project File	A		
Assembly Machine Program Data	Required?		
CONTACT Systems 3AV/S/Z Series SMT Machines	A: Suitable for Machine Programming		
MYDATA automation PCB Files and TPSYS Databases	A: Suitable for Machine Programming		
Eurolplacer Program Files	A: Suitable for Machine Programming		
Fuji Source Programs and Part Data Files	A: Suitable for Machine Programming		
Panasonic POS File	A: Suitable for Machine Programming		
PHILIPS FTTP-II Programs	A: Suitable for Machine Programming		
Sanyo Chipshooter Program	A: Suitable for Machine Programming		
SIEMENS Program Files, and Part Databases	A: Suitable for Machine Programming		
Part Data	Forms	Provides	Required?
Bill of Materials File	Text or Excel File	Part numbers, descriptions, and an unlimited number of other fields.	B : Required for use with all Gerber data, and any CAD source in which the embedded part number information is not the correct manufacturing part number data (almost always the case)

Bill of Materials:

(CircuitCAM Required Data Form)

Preferred Formats: Capable of handling most formats, but prefer:

- i. Excel Spreadsheet with at least reference and part numbers.
- ii. ASCII text file with at least reference and part numbers.
- iii. Delimiters do not affect ability to import.
- iv. Example: R1-65,R98,105,108-200 1000-901 Resistor 2K

The bill of materials is essential to processing the assembly. If you are not familiar with the above formats or if you know you cannot obtain a bill of materials in electronic form, please contact our engineering department to discuss other options.

Board Design Data:

(CircuitCAM Required Data Form)

Fortunately, *all* CAD systems output Gerber data, therefore you can be assured that at least this data has been available at some time in the product's life cycle. The photoplotters used to fabricate bare boards are driven by this data exclusively, and therefore if a bare board exists, someone had access to the Gerber data at one time.

Please obtain *at least one* of the sets of data listed below. (The sets are listed in order of preference, 1 being most preferred):

Set 1: Any of the Listed Native CAD File Import Formats (See Previous Page)

Set 2: Gerber RS-274X Data Files

Gerber Files to include:

Top Mask Layer

Top Silkscreen Layer

Bottom mask Layer (if applicable)

Bottom Silkscreen Layer (if applicable)

Optional but Highly Desirable: ASCII text component location file (Ref, X, Y, theta)

Set 3: Gerber RS-274D Data Files

Gerber Files to include:

Aperture List (D-code, Shape, X-size, Y-size)

Top Mask Layer

Top Silkscreen Layer

Bottom mask Layer (if applicable)

Bottom Silkscreen Layer (if applicable)

Optional but Highly Desirable: ASCII text component location file (Ref, X, Y, theta)

Set 4: ASCII Centroid File

Not Essential but greatly helpful if available. Most CAD systems will export this file and it is sometimes referred to as an "insertion file" or "manufacturing file" or "CAM" file. It can also be used as a sole source of CAD information, but this is not desirable since these files lack graphical information required for good visual aid and documentation development. In summary, the text(ASCII) file contains the following:

2. Reference designators

3. X coordinate

4. Y coordinate

5. Package rotation (theta)

Set 5: Scanned Board Image – Please provide one of the following:

Scanned Image – (.jpg or .bmp formats)

Bare Board

Assembly Drawing

Optional but Highly Desirable: ASCII text component location file (Ref, X, Y, theta)

Set 6: Any of the Listed Machine File Import Formats (See Previous Page)