CHECKSUM

Requirements for Fixture Quoting and Development

Board Documentation

Item	Quote	Test Development	Description
Schematic	**YES**	**YES**	The Schematic is used for circuit description entry, to determine testability, and for program and fixture debug. CheckSum accepts .pdf, .dxf, .dwg, and paper schematics.
Assembly Drawing	**YES**	**YES**	An Assembly Drawing that shows the component layout is needed to identify fixture design considerations and to locate probe points.
PCB Drawing	**NO**	**YES**	The PCB drawing should show dimensions and hole locations. It is used for reference. It can often provide answers pertaining to the boards physical characteristics.
Panelization data	**NO**	**YES**	X/Y offset information between boards in the panel. This can be supplied in one of two ways: panel drawing, or panelized gerber files. The information must include reference from tooling holes in panel rails to a drillable hole in the single boards.
Parts List	**YES**	**YES**	The Bill of Materials (BOM) should show component reference designators, values, tolerances, and commercial part numbers for all devices.
Gerber Files	**YES**	**YES**	The drill files contain the XY location of the holes to be drilled in the test fixture. CheckSum can usually create them by digitizing from a bare board with added expense.
Net List	**YES**	**YES**	This file contains the board interconnection data. Without this file, all interconnection information must be entered manually from the schematic. For a simple, one-page (A or B size) schematic, we do not require a net list. For a multiple-page schematic, the net list is required for a fast and accurate quotation.
Pick and Place	**NO**	**YES**	Pick and Place is needed, but may be contained in the Net List. Check your CAD data outputs to confirm whether or not Pick and Place data is included or not.
Functional Test Procedure	**YES**	**YES**	Required for functional test quotations. The test procedure must be a bench verified step-by-step listing of the requested functional tests, testable using CheckSum equipment A factory test specification is not acceptable as a substitute.
Cross Reference File	**NO**	**NO**	This file references the NET name with the XY location of pads or vias on the net. Without this file, a bare board must be buzzed out if vias or test pads are needed for test points. This file becomes more important as the quantity of surface mounted devices increase.

ISP Device Documentation

Item	Quote	Test Development	Description
Data Sheets	**YES**	**YES**	Data Sheets describe the operation of devices installed on the circuit board. If not provided by customer, must be available on the manufacturer website.
ISP Files	**YES**	**YES**	In System Programming files allow tests to be developed that program ISP capable PLDs and FLASH memory devices.

Sample Boards

Item	Quote	Test Development	Description
Bare Board	**NO**	**YES**	An unpopulated bare board is used for reference. It can help to determine probe locations and fixture damming. It can be used for digitizing when drill files are not available. It can often resolve questions pertaining to the schematic.
Assembled Board	**YES**	**YES**	At least **TWO** known good assembled unit samples should be provided for ICT, while a minimum of **FOUR** sample boards are required for ISP and functional testing. The board(s) should be mechanically and electrically correct and **IDENTICAL** to other documentation provided. If panelized boards are to be tested, then complete panelized known good boards must be provided. The board(s) are used for fixture layout and debug of both the program and the fixture. **NOTE: THE MORE KNOWN GOOD BOARDS PROVIDED THE MORE STATISTICALLY ACCURATE THE TEST PROGRAM.**

NOTES:	
1)	**The quote can be prepared without this item. However the quote can be prepared more quickly and accurately if this item is available.**
2)	**This item can be considered to be insurance as it may solve problems or provide answers to questions that would otherwise cause delays. It may never be needed, but it is prudent to provide if available.**
3)	**The absence of this item can have significant impact on cost and delivery. The test can be developed without this item, but it should be made available if at all possible.**
4)	**For expedited jobs, all data in 'Test Development' column must be included with the exception of the cross reference file.**

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CAD Data Requirements*			
CAD Systems	**File Extension**	**Format**	**Discount Applied**
Accel EDA, Tango	.PCB	ASCII	
Allegro	.PIN	ASCII	
Allegro-Cadence	.BBN	ASCII	
Cadence/Valid Allegro	.PAD, .BRD, .SYM & .RTE	ASCII	Yes, only if all (4) available
Calay	.PCB	ASCII	
Cadnetix	.SCI, .TPT & .NET	ASCII	
EE Designer	.ALA	ASCII	
Fabmaster	.ASC (FATF file)	ASCII	
GenCAD	.CAD	ASCII	Yes
IBM CBDS BNR5	.ARC (.BNR)	ASCII	
IPC 356	.IPC	ASCII	Yes
Mentor	.NET, .CMP, .PRT, .WIR	ASCII	
Mentor	.NET, .NEU	ASCII	Yes, for .NEU only
OrCAD 386	.BD1	ASCII	
OrCAD	.MIN	ASCII	
PADS	.ASC	ASCII	
PCAD	.PDF	ASCII	
Protel	.PCB	ASCII	
SCICARDS	.DAT (.CII)	ASCII	
Zuken Redac Cadstar	.CDI	ASCII	
Zuken Cadstar, Visula	.PAF	ASCII	

If you have a CAD system other than those listed above then the files provided to CheckSum should contain the following information: (in ASCII format)

1.) Component designator and pin number.
2.) Node name or node number for each component pin.
3.) X-Y locations of all component pins.
4.) X-Y location of all vias and the associated node name or node number.
5.) X-Y location of all test points (TP's) and the associated node name or node number.

*** As of May 2005. Additional CAD Packages are added periodically.**
Contact CheckSum for the current list of supported CAD packages.

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Example Data Formats

Bill of Materials (BOM)

Item	Qty	Reference	Description	MFG # 1	MFG # 1 PN	MFG #2	MFG #2
26	1	C24	CAP, ALUM ELECT, 330 uF, 25V	PANAS	EEV-		
27	1	C21	CAP, ALUM ELECT, 47 UF, 35V	PANAS	EEV-		
16	2	C1,2	CAP, CER, NPO, 33 PF,50V,5%, 0603	PANAS	ECJ-	AVX	06035A33
22	3	C23,28,29	CAP, CERAMIC, 0.1UF, X7R, 50V, 10%,	AVX	12065C104KA		
25	1	C31	CAP, CERAMIC, 1UF, X7R, 16V, 10%,	AVX	1206CY105KA		
1	3	C3,17,33	CAP, CERAMIC, X7R, .001 UF, 50V, 10%,	PANAS	ECJ1VB1H102	AVX	

Netlist

```
*SIG +5V
U2.30.U     C3.1.U      C39.1.U     LED1.A.U
R1.2.U      C49.1.U     R15.2.U     R4.2.U
R3.2.U      R51.2.U     R44.2.U     R65.2.U
R52.2.U     R53.2.U     R86.2.U     C51.1.U
D16.2.U     D11.2.U     L2.2.U      R33.2.U
D14.2.U

*SIG +12V
H600.1.U    U12.8.U     H601.1.U    H602.1.U
C16.1.U     C40.1.U     L3.2.U      Q1.E.U
R29.2.U     R9.2.U      C44.1.U     C43.1.U
U6.1.U

*SIG +15V
C34.1.U     C41.1.U     C14.1.U     U5.8.U
L5.2.U      C45.1.U     U6.8.U
```

Gerber

```
*
G04 Mass Parameters ***
*
G04 Image ***
*
%MOIN*%
%IPPOS*%
%ASAXBY*%
G74*%FSLAN2X34Y34*%
*
G04 Aperture Definitions ***
*
%ADD10C,0.0500X0.0250*%
%ADD11R,0.1100X0.0400*%
*
G04 Plot Data ***
*
G54D25*
G01X0051625Y0019000D02*

Y0016750D01*
X0024125Y-0003750D02*
X0021375D01*
X0018625D01*
```

Cross Reference

Net_Name	Number	Type	Layer	X_Coord	Y_Coord
$90	1-Jan	TESTPOINT	bottom	24.4	35.55
$97	unused	VIA	bottom	138.42	16.21
$97	1-Jan	TESTPOINT	bottom	140.45	28.3
$103	1-Jan	TESTPOINT	bottom	129.25	33.65
$105	1-Jan	TESTPOINT	bottom	149.8	14.35
$108	1-Jan	TESTPOINT	bottom	163.8	38.65
$109	1-Jan	TESTPOINT	bottom	155.4	44.1
$118	1-Jan	TESTPOINT	bottom	169.8	34.15
$119	1-Jan	TESTPOINT	bottom	167.2	38.15
$230	1-Jan	TESTPOINT	bottom	37.95	43.45

Pick and Place

Designator	Comment	Mid X	Mid Y	Layer	Rotation	Footprint
C100	CP06-0550-1111	1728mil	150mil	T	360	CAP_COIN_HORZ
C101	CP51-2625-6104	5700mil	1475mil	T	0	603
C103	CP51-0411-6226	3775mil	25mil	T	90	1210
C105	CP55-0960-0476	4625mil	1900mil	T	180	3528
C108	CP51-2625-6104	775mil	875mil	T	90	603
C11	CP51-2625-6104	5700mil	1050mil	T	0	603
C112	CP51-2651-1680	475mil	850mil	T	0	603
C114	CP51-0251-1221	475mil	50mil	T	270	805
C115	CP51-0251-1221	475mil	-125mil	T	90	805