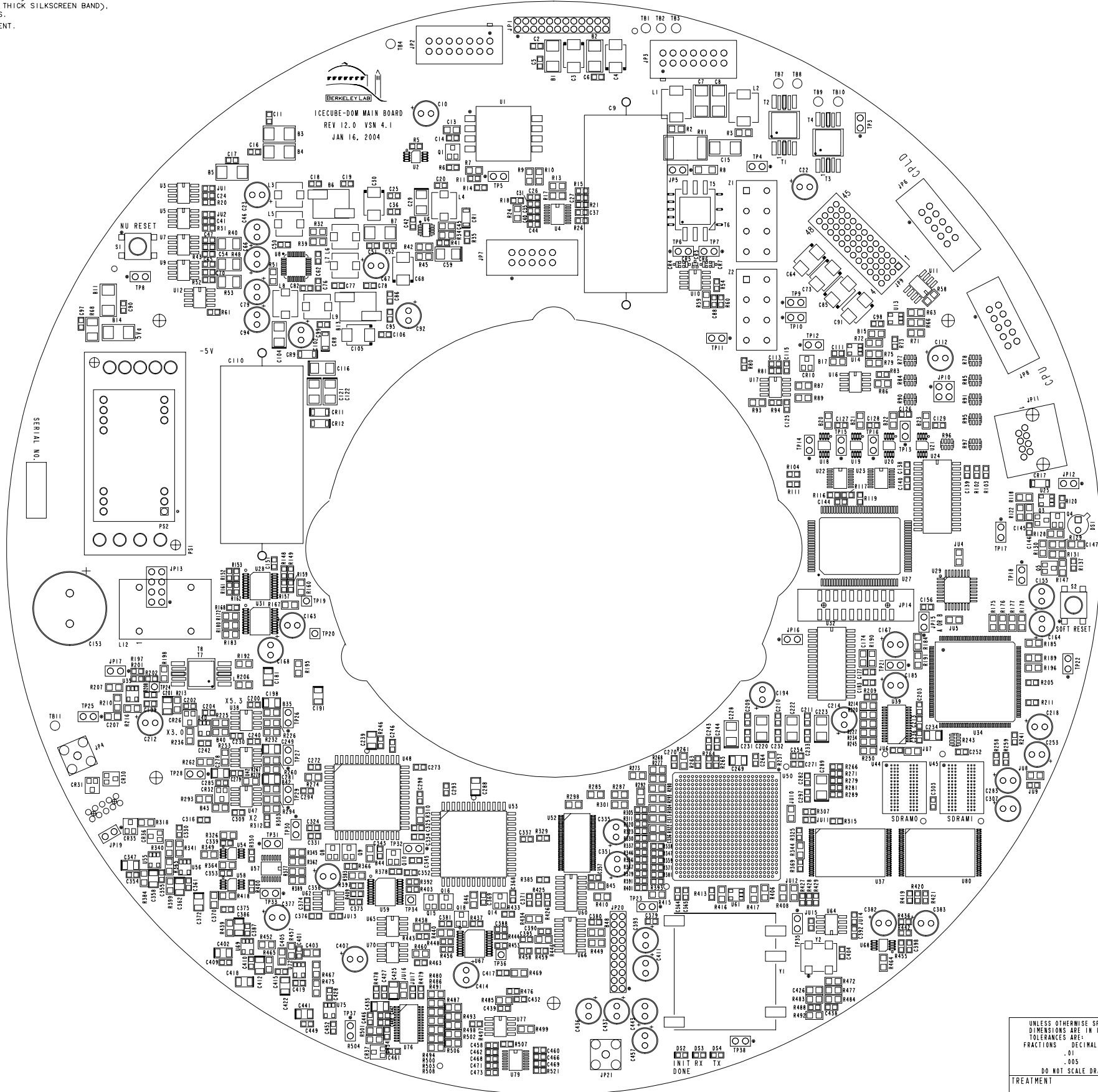


NOTES: (UNLESS OTHERWISE SPECIFIED)

- 1. OBSERVE POLARITY ON CAPACITORS (DENOTED BY THICK SILKSCREEN BAND). PIN ONE ON I.C.'S, AND THREE LEADED DEVICES.
- 2. FIDUCIALS ARE FOR OPTICAL PLACEMENT EQUIPMENT.
- 3. BUILD TO BEST COMMERCIAL PRACTICES.

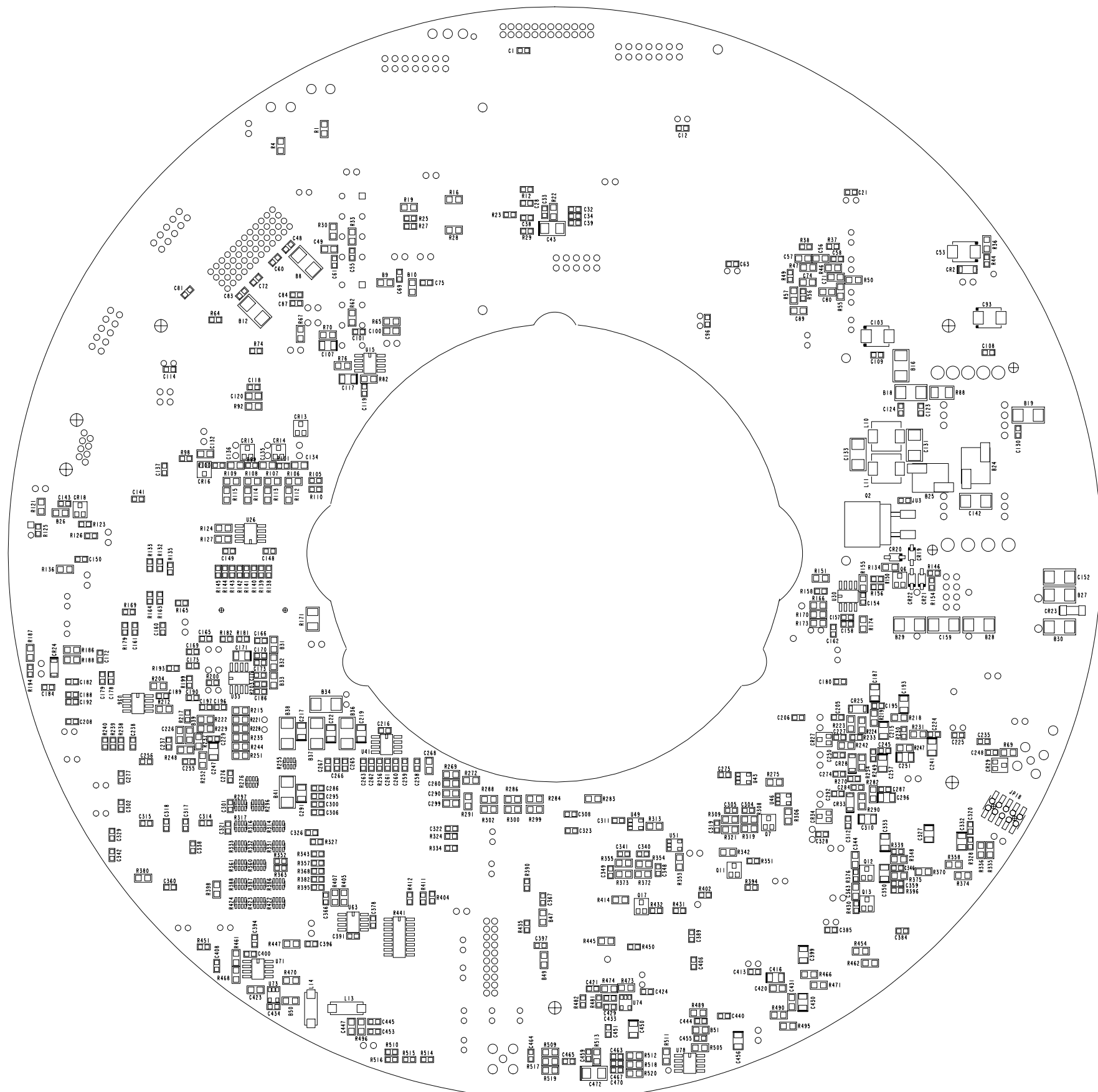


TOP SIDE SILKSCREEN
TOP SIDE SHOWN

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES .01 DO NOT SCALE DRAWING		CONTRACT NO.	
TREATMENT	APPROVALS	DATE	TITLE
FINISH	CHECKED		
SIMILAR TO	ACT. WT	CALC WT	ISSUED
			SCALE 2:1

LAWRENCE BERKELEY NATIONAL LABS	
ASSEMBLY DRAWING ICECUBE - DIGITAL OPTICAL MODULE MAIN BOARD VERSION 4.1	
SIZE D	FSCM NO.
DWG. NO. -	REV. 12.0
SHEET 1 OF 2	

THIS SHEET IS COMPUTER GENERATED



BOTTOM SIDE SILKSCREEN
BACK SIDE SHOWN

ICECUBE - DIGITAL OPTICAL MODULE
MAIN BOARD VERSION 4.1

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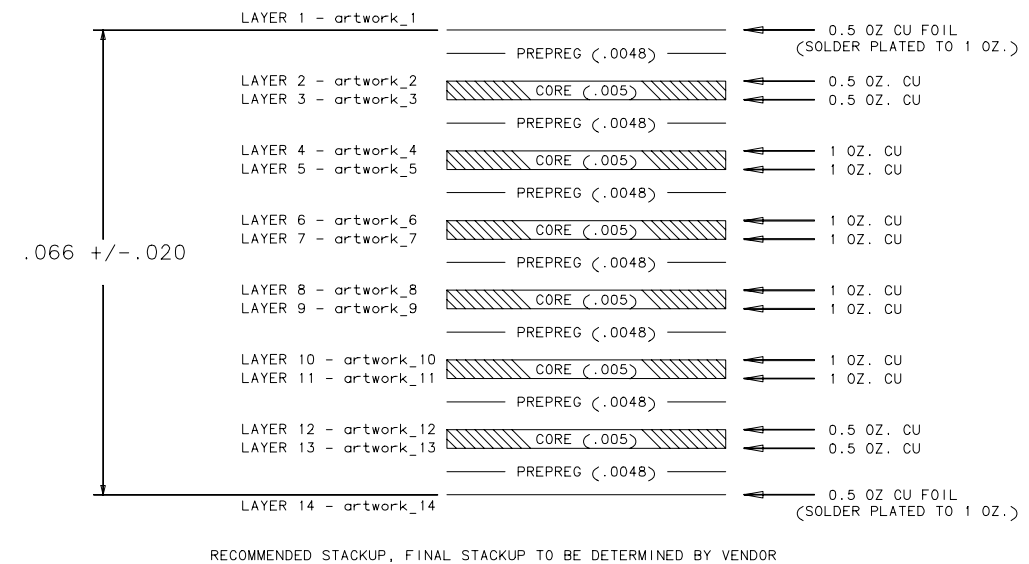
DRWN	B C HOLMES	SIZE	D	FSCM NO.	DWG. NO.	-	REV.	12.0
ISSUED	1/21/04	SCALE	2:1	SHEET			2 OF 2	

NOTES:

1. Specifications.
 - 1.0 Fabricate and inspect per IPC-A-600F Class 3.
 - 1.1 Producibility study - It is the responsibility of the supplier to conduct a thorough review of the artwork and media for manufacturability in the supplier's process compliance to all applicable specifications. LBNL must be advised in writing (in advance of manufacturing) of any changes, revisions, or corrections made or recommendations to ensure conformance to LBNL standards, and of any specifications that cannot be met.
 - 1.2 This drawing is to be used in conjunction with the provided gerber and drill data when applicable.
 - 1.3 All notes are 'Unless Otherwise Specified.'
2. Material
 - 2.0 High Temp. FR-4/Epoxy glass, foil lamination structure for core and copper thickness in accordance with IPC 4101A/24, 126,128
 - 2.1 Two ply construction is preferred.
3. Soldermask
 - 3.0 Solder mask both sides with (green color) liquid photoimageable soldermask, 003 inch. max. thickness.
 - 3.1 Soldermask over bare copper.
4. Drilling
 - 4.0 All hole diameters are finished sizes (inch).
 - 4.1 All holes to be +/- .003 inch from true position unless otherwise specified.
 - 4.2 All hole diameters to be +/- .003 inch unless otherwise specified.
 - 4.3 An NC drill file has been supplied - see drill table.
5. Finish
 - 5.0 Plate holes thru with copper .0008 inch min., .001 inch average per IPC-A-600F Class 3.
 - 5.1 SMOBC - gold immersion (ENIG) 3-10 microinches of gold over 100 microinches (+/- 1 microinch) of Nickel minimum
6. Silkscreen
 - 6.0 Silkscreen using white non-conductive epoxy or equivalent (both sides).
 - 6.1 No silkscreen allowed on exposed lands or in holes.
 - 6.2 Silkscreen must be a minimum of 1mm away from fiducial marks.
 - 6.3 Minimum clearance between silkscreen legend and untented vias, pads, or holes to be .005 inch.
 - 6.4 registration to be +/- .005 inch and must pass peel test.
7. Electrical Test
 - 7.0 All boards shall be 100% electrically tested for opens/short at a minimum of 200 Volts and a maximum of 250 Volts.
 - 7.1 Apply test stamp in non-legend area on solder side of PCB.
8. Packaging
 - 8.0 There shall be a max of 25 units per package, individually wrapped, and shipped in cardboard cartons with sufficient surrounding material to prevent shipping damage.
9. Bow and Twist
 - 9.0 Bow and twist to be less than 0.75% according to IPC-A-600F.
10. Inspection
 - 10.0 Automatic optical inspection of all layers required.
 - 10.1 The supplier shall provide a PCB certification, first article inspection report and cross section report with every lot shipped.
11. Microwelding
 - 11.0 Finished boards to be free of microwelds.

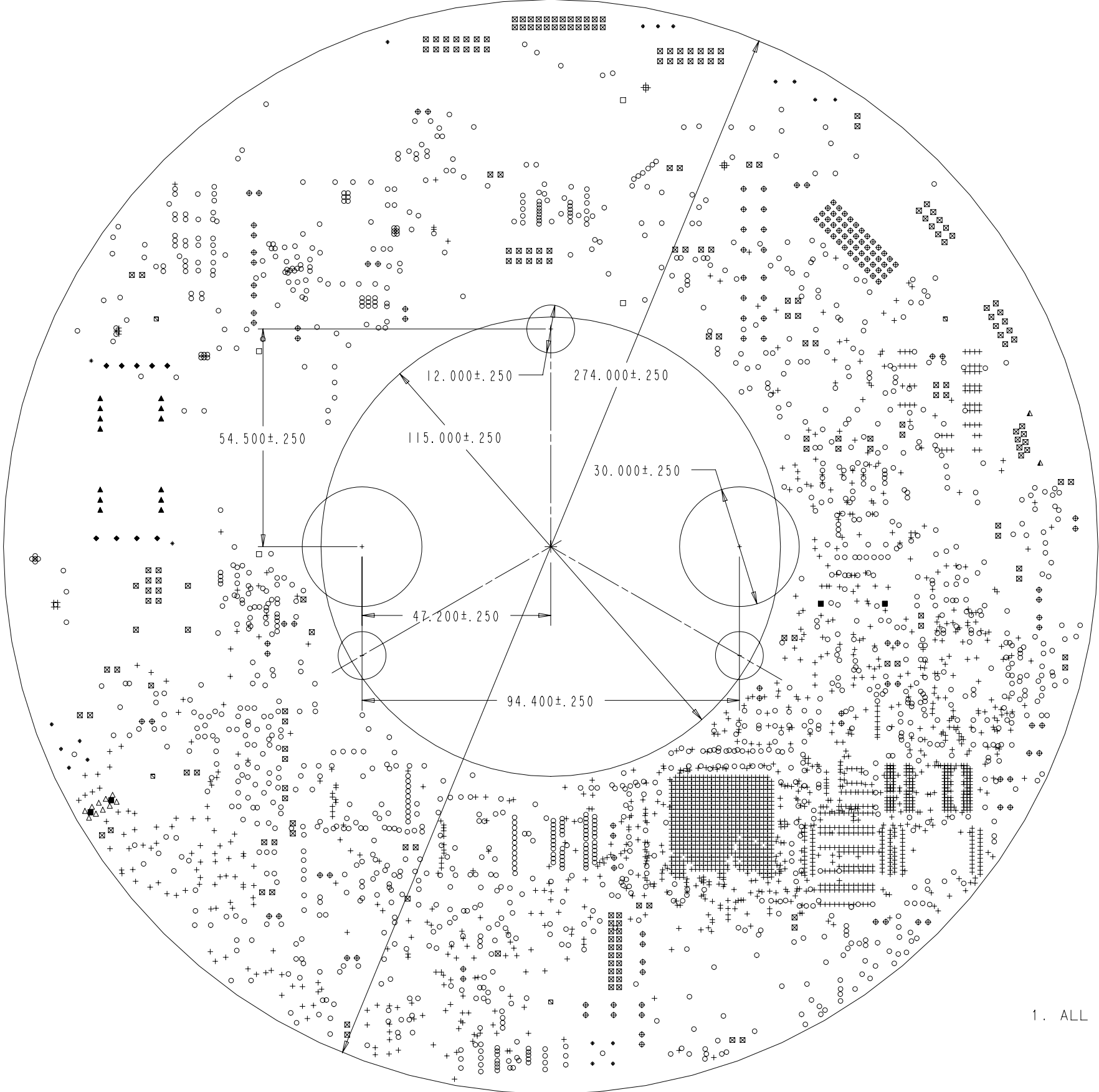
ICECUBE BOARD'S DRILL SCHEDULE

DRILL SYMBOL	DRILL SIZE	COUNT	PLATED	Min/Max
+	.008	1965	YES	---
O	.012	1427	YES	---
Δ	.034	10	YES	---
⊕	.036	142	YES	---
□	.04	4	YES	---
⊗	.041	205	YES	---
▲	.045	13	YES	---
■	.047	4	NO	---
○	.055	4	YES	---
◆	.06	9	YES	---
⊗	.07	17	YES	---
*	.1	2	NO	---
⊠	.125	4	NO	---
▲	.128	2	NO	---



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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES .01 .005 DO NOT SCALE DRAWING			CONTRACT NO.		LAWRENCE BERKELEY NATIONAL LABS		
TREATMENT			APPROVALS	DATE	TITLE		
FINISH			DRAWN B C HOLMES	1/21/04	FABRICATION DRAWING ICECUBE - DIGITAL OPTICAL MODULE MAIN BOARD VERSION 4.1		
SIMILAR TO			CHECKED	ISSUED	SIZE D	FSCM NO.	REV. 12.0
ACT. WT	CALC WT				DWG. NO.	-	SHEET 1 OF 2
					SCALE NONE		



1. ALL BOARD OUTLINE DIMENSIONS ARE IN MM.

TOP SIDE SHOWN

ICECUBE - DIGITAL OPTICAL MODULE
MAIN BOARD VERSION 4.1

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DRAWN	B C HOLMES	SIZE	D	FSCM NO.	DWG. NO.	-	REV.	12.0
ISSUED	1/21/04	SCALE	1.75:1	SHEET		2 OF 2		