



GEB design and QC: GE21 and ME0

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The 24th GEM workshop Oct.3, 2019



- **Overview**
- **GE21 GEB**
 - ◆ **Timeline**
 - ◆ **QC procedures**
 - ◆ **Plans**
- **ME0 GEB plan**

- PKU take the GE21 GEB design since mid 2018

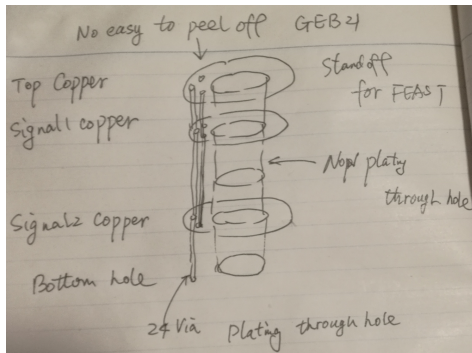
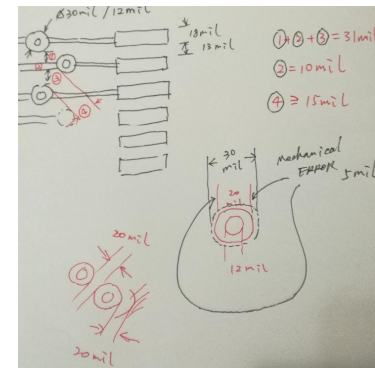
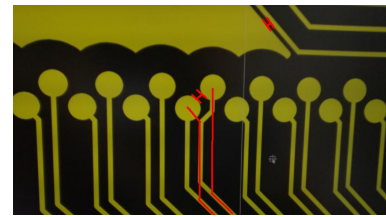
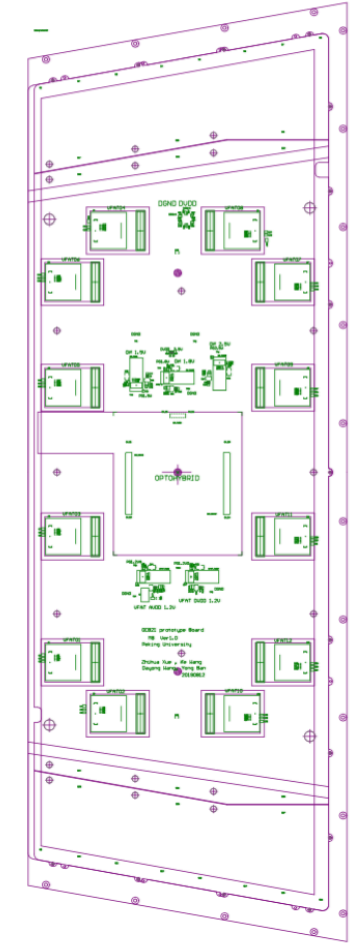
- Mr. Xue completed the schematic design of M1-M8 and PCB design of M1\M2\M5-M8. Ke has completed PCB design of M3\M4.

- Starting from scratch using Atrium

- Many improvement over GE11 GEB

- Balanced materials => avoid deformation
- More solid standoffs => robustness
- Optimized routing => decrease failure risk
- Strict impedance calculation => signal integrity
- many details from one-hand experiences of PCB production to avoid problems

- Top Layer
- Signal 1
- DGNG1 ((Multiple Nets))
- POWER ((Multiple Nets))
- AGND ((Multiple Nets))
- DGND2 ((Multiple Nets))
- Signal 2
- Bottom Layer
- Top Silkscreen Overlay
- Keep Out Layer



<https://twiki.cern.ch/twiki/bin/viewauth/CMS/GE21GEBBoardTwiki>



GE21 GEB prototyping timeline



- **Starting in summer 2018**
- **M1**
 - ◆ 1st Design: 2018/09/10
 - ◆ Production & QC: 2018/10/23 -- 2018/12/05
- **M2**
 - ◆ 1st Design: 2018/11/14
 - ◆ Production & QC: 2018/11/20 -- 2019/01/10
- **M3**
 - ◆ 1st Design: 2018/11/23
 - ◆ Production & QC: 2018/2/23-- 2019/04/18
- **M4**
 - ◆ 1st Design: 2019/01/21
 - ◆ Production & QC: 2019/04/08 -- 2019/05/17
- **M5**
 - ◆ 1st Design: 2019/4/18
 - ◆ Production & QC: 2019/06/08 -- 2019/7/18
- **M6-M8**
 - ◆ 1st Design: 2019/08/12

Typical time for one board(weeks)

- ✓ routing: ~4
- ✓ review & update: 1--x
- ✓ verify with factory: ~2
- ✓ bare board production: 3-4
- ✓ Assembly & QC: 1-1.5

- 1) Visual checks
- 2) Flying probe
- 3) Characteristic impedance measurement
- 4) Power test
- 5) Connectivity test
- 6) Standoff test
 - Position and orientation of standoff
 - Torque test of standoff
- 7) Bending test



Each step has its check-lists and records,
multiple checks in case of questionable

To improve for future production: standardized labeling

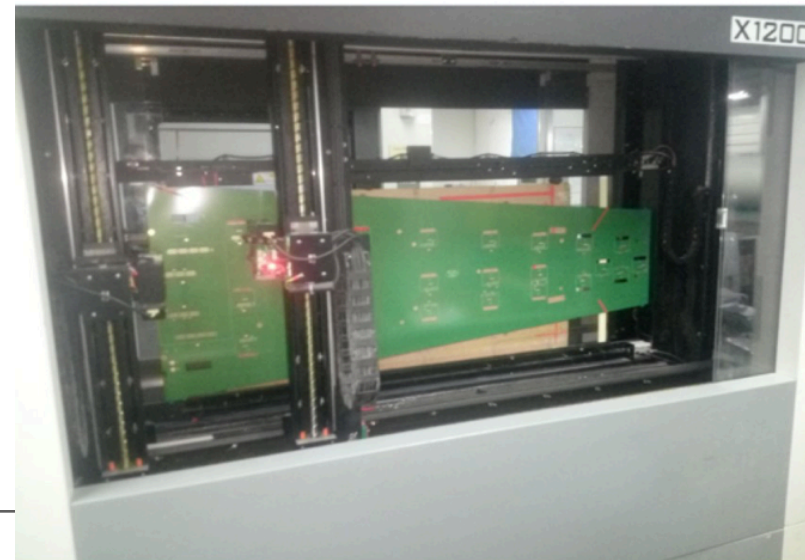
2. Flying Probe test



E-TEST REPORT

Customer	北京大学		Production P/N	BS16337	
Customer P/N	GEB_M4_gerber		Quantity (pcs)	5	Date Code /
Parameter	Test machine model	FLYING PROB TEST			
	Test voltage	250 V	Conduction resistance	40 Ω	
	Test current	10 mA	Isolation resistance	25 MΩ	
Test result	Quantity	5 Pcs	Passed Qty	5 Pcs	
	Open circuit	/ Pcs	Conduction Reject	/ Pcs	
	Short circuit	/ Pcs	Isolation Reject	/ Pcs	
	Total objection	/ Pcs	Other	/ Pcs	
	Repeated test	/ Pcs	Repeated test pass Qty	/ Pcs	

Specification	SURPASS X1200
Test method	Resistance, phase deviation
Min. test area	76X76mm
No. of Flying Probe	2 front, 2 rear
No. of CCD Camera	2 front, 2 rear
Positional accuracy	±5μm
Resolution	2μm
Max. Test area	1200x700mm
Board Thickness	0.3-13mm
Min. Pad pitch	150μm
Min. Pad size	75μm



TESTED BY: _____ GWEI _____ DATE: 2019.05.10

APPROVED BY: _____ DQCAI _____ DATE: 2019.05.10

Documentation NO.D-C-QA-110-01 Rev:1.2

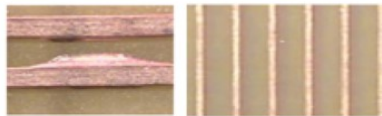
AOI

AOI(Automated optical inspection)
Bare PCB inspection

- Line width violations.



- Spacing violation.



- Excess copper.



- Shorts circuits



- Cuts



- Hole breakage - a drilled hole (via) is outside of its landing pad.
- wrong mounting components identified





3. Characteristic impedance



IMPEDANCE MEASUREMENT REPORT

阻抗测量报告

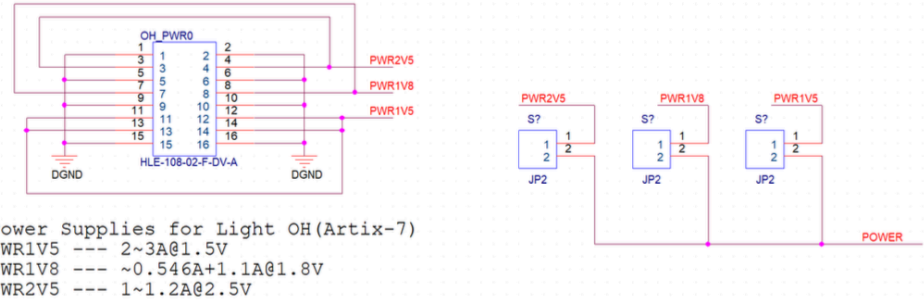
Production P/N:		BS16337		DATE CODE:		/			
CUSTOMER P/N:		GEB_M4_gerber		TESTING QTY:		1PCS			
CUSTOMER:		北京大学							
Measuring Equipment 测量仪器及型号: Agilent E5071C (TDR Time Domain Reflectometer)时域反射仪									
Impedance Measurement 阻抗测量于: Finished Board 成品板									
Sample No. 样品编号	Layer 层号	Line Width 线宽 (mm) +/-10%	Type of Impedance 阻抗类别		Impedance Requirement (ohm) 阻抗值要求	Tolerance		Impedance Value 阻抗测试数值	Result 结果
			Single Ended 单端	Differential 差动		+	-		
1	L2	0.1	/	√	100	10	10	101.23	ACC
	L7	0.1	/	√	100	10	10	98.56	ACC
Remarks:									
Disposition:		Acc <input checked="" type="checkbox"/>		Rej <input type="checkbox"/>					
TESTED BY:		GWEI		DATE:		2019.05.10			
APPROVED BY:		XHKE		DATE:		2019.05.10			

Documentation NO.D-C-QA-110-01 Rev:1.2

Characteristic impedance measurement

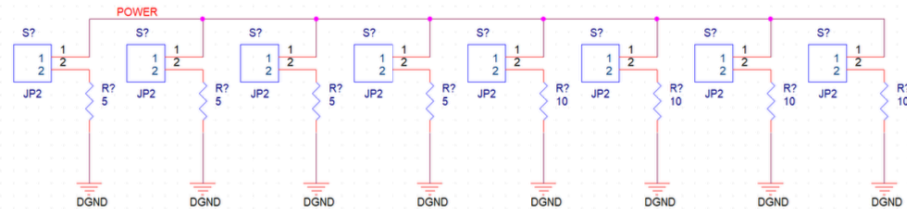
1). No power supply test:

- ◆ No short circuit to each other: DVDD, PWR1V5, PWR1V8, PWR2V5 , 1V2AVFAT,1V2DVFAT, DGND
- ◆ 0 ohm resistance connection: AGND, SHIELD_NET,DGND



2). Power On test:

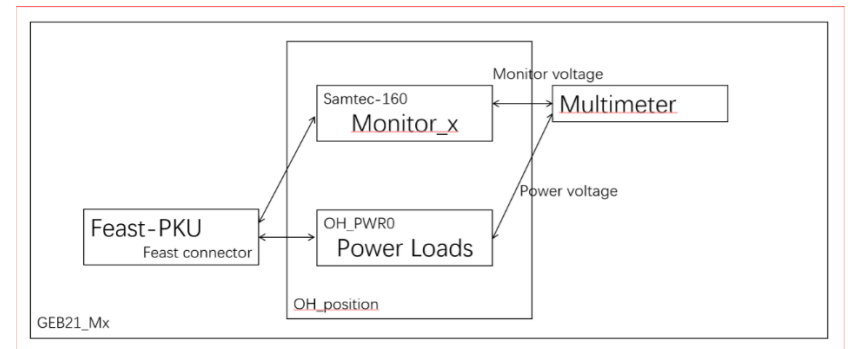
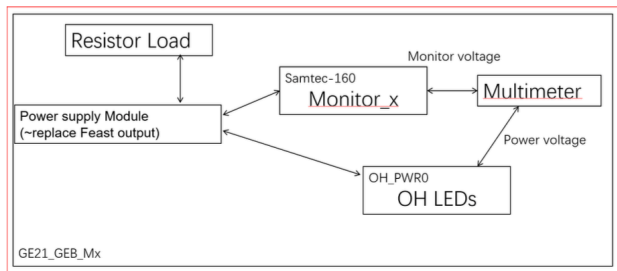
- ◆ GEB LED and OH LED Display: DVDD & 2.5V(GEB),1.0V, PWR1V5, PWR1V8, PWR2V5 (OH)
- ◆ Measuring voltage value: DVDD, PWR1V5, PWR1V8, PWR2V5 , 1V2AVFAT, 1V2DVFAT

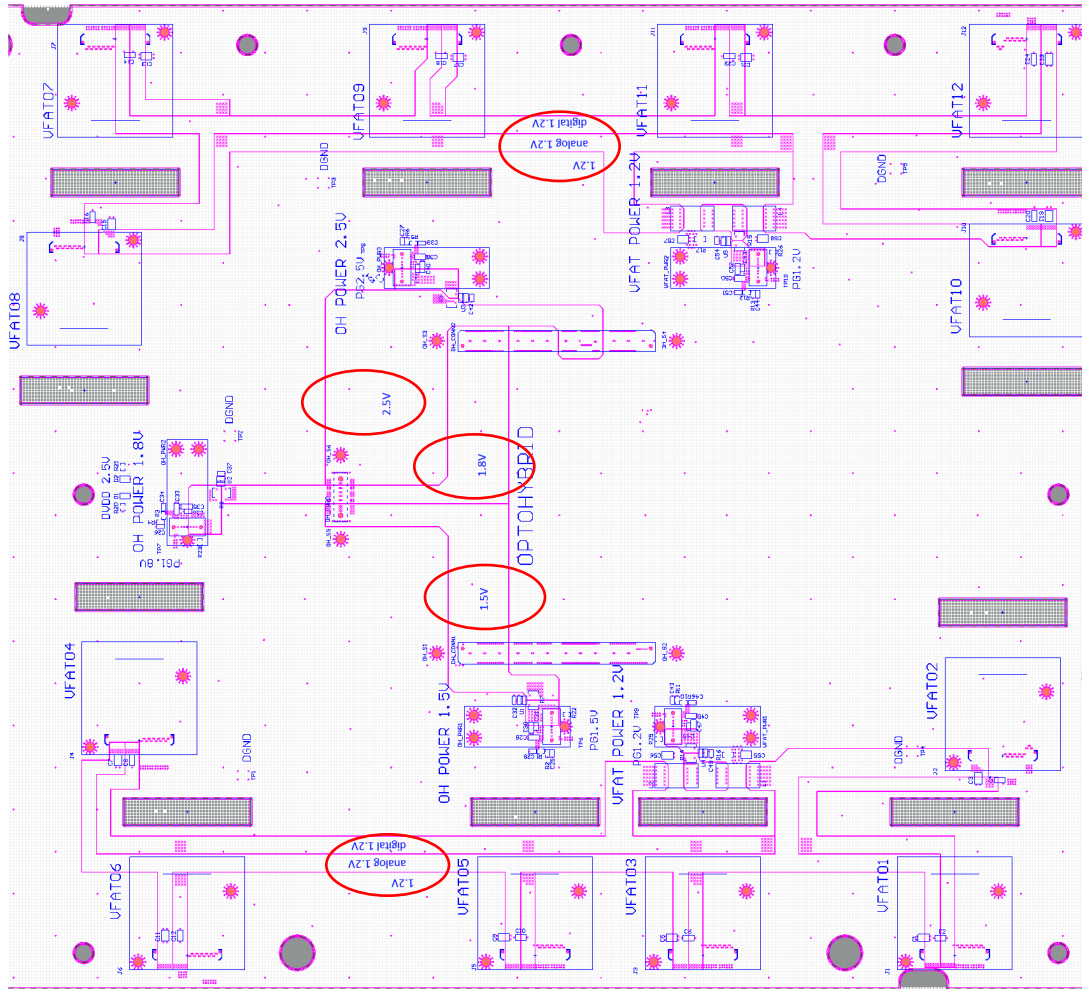


Power Loads for monitor voltage test

3). Power On test:

- ◆ Measuring voltage value: Monitor1-5, PowerGood(all 5 FEASTs)







1.1 GEB21-M2 Power Checking List (Install All 5 FEASTs, No Power Supply)

ABOUT THE CHECKING BOX:
 : no open circuit : no short circuit

GEB No.	DATE:										RESULT:										NOTE:
	GEB: 1	GEB: 2	GEB: 3	GEB: 4	GEB: 5	GEB: 6	GEB: 7	GEB: 8	GEB: 9	GEB: 0	GEB: 1	GEB: 2	GEB: 3	GEB: 4	GEB: 5	GEB: 6	GEB: 7	GEB: 8	GEB: 9	GEB: 0	
	No short circuit to each other																				<input checked="" type="checkbox"/> : 1 st time is okay <input checked="" type="checkbox"/> : repaired
DVDD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR1V5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR1V8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR2V5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1V2AVFAT1(D)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1V2AVFAT2(D)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
DGND																					
	0 ohm resistance connection																				
1V2AVFAT1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1V2DVFAT1																					
1V2AVFAT2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1V2DVFAT2																					
VFATAGND1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
VFATAGND2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
SHIELD_NET	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
DGND																					
NOTE:																					SIGNATURE:

No short circuit and 0 ohm connection test pass!



1.2 GEB21-M2 Power Checking List (Install All 5 FEASTs and OH, Power On)

ABOUT THE CHECKING BOX:
 : no open circuit : no short circuit

GEB No.	DATE:										RESULT:										NOTE:
	GEB: 1	GEB: 2	GEB: 3	GEB: 4	GEB: 5	GEB: 6	GEB: 7	GEB: 8	GEB: 9	GEB: 0	GEB: 1	GEB: 2	GEB: 3	GEB: 4	GEB: 5	GEB: 6	GEB: 7	GEB: 8	GEB: 9	GEB: 0	
	GEB LED(RED)																				<input checked="" type="checkbox"/> : 1 st time is okay <input checked="" type="checkbox"/> : repaired GEB: DVDD OH Board PWR1V5 PWR1V8 PWR2V5 VFAT: 1V2AVFAT1 & 1V2DVFAT1 VFAT01-VFAT06 1V2AVFAT2 & 1V2DVFAT2 VFAT11-VFAT12
DVDD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR2V5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	OH LED																				
1.0V	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR1V5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR1V8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR2V5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	voltage																				
DVDD	5.06	5.06	5.06	5.06	5.06																
PWR1V5	1.506	1.50	1.506	1.50	1.506																
PWR1V8	1.798	1.79	1.797	1.79	1.797																
PWR2V5	2.49	2.49	2.49	2.49	2.49																
1V2AVFAT1	1.207	1.20	1.207	1.20	1.207																
1V2DVFAT1	1.207	1.20	1.207	1.20	1.207																
1V2AVFAT2	1.204	1.20	1.204	1.20	1.204																
1V2DVFAT2	1.204	1.20	1.204	1.20	1.204																
NOTE:											Power checking pass!										SIGNATURE:



1.3 GEB21-M5 Power Checking List (Install All 5 FEASTs, OH Adapter, Load Resistors Board, Power On)

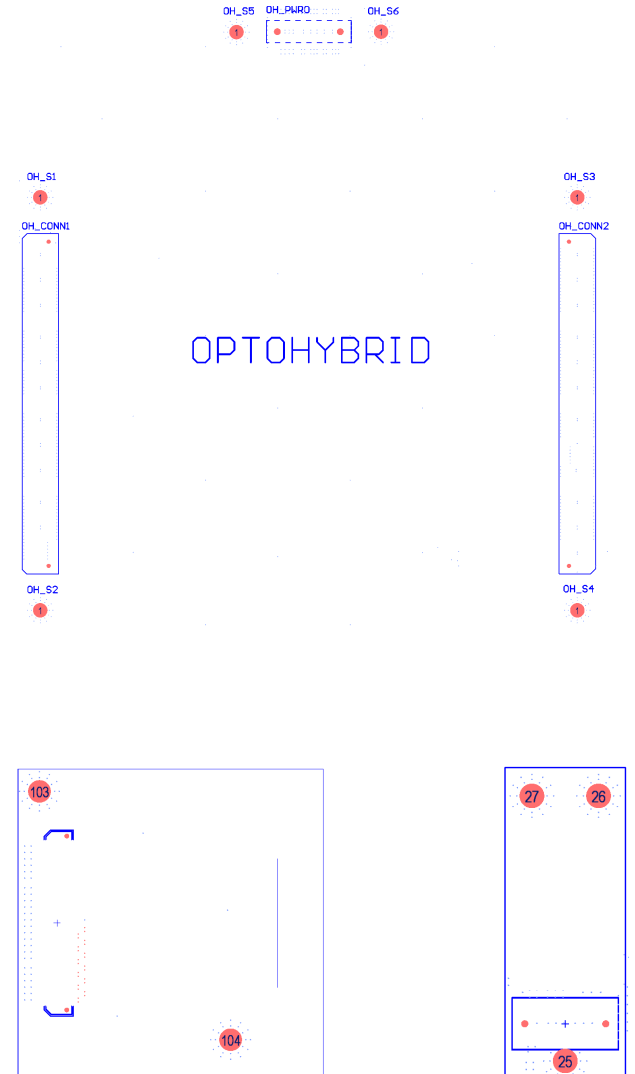
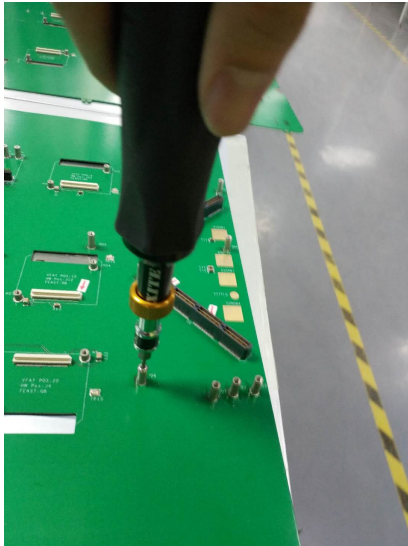
ABOUT THE CHECKING BOX:
 : no open circuit : no short circuit

GEB No.	DATE:		RESULT:										NOTE:		
	GEB: 1	GEB: 2	GEB: 3	GEB: 4	GEB: 5	GEB: 6	GEB: 7	GEB: 8	GEB: 9	GEB: 0					
	voltage														Monitor1-3 Load resistance 0/2 ohm Monitor4-5 Load resistance 0 ohm Monitor1<-1.8V Monitor2<-1.5V Monitor3<-2.5V Monitor4<-1.2V Monitor5<-1.2V
Monitor1															
Monitor2															
Monitor3															
Monitor4															
Monitor5															
PG1.8V															
PG1.5V															
PG2.5V															
PG1.2V(A)															
PG1.2V(D)															
	GEB: 1	GEB: 2	GEB: 3	GEB: 4	GEB: 5	GEB: 6	GEB: 7	GEB: 8	GEB: 9	GEB: 0					
Monitor1															
Monitor2															
Monitor3															
Monitor4															
Monitor5															
PG1.8V															
PG1.5V															
PG2.5V															
PG1.2V(A)															
PG1.2V(D)															
NOTE:											SIGNATURE:				

- 1). Position: FEAST,OH,VFAT

- 2). Torque: OH

: survive 0.5 Nm





2.1 GEB21-M2 Standoff Checking List (Standoffs of FEAST)

ABOUT THE CHECKING BOX:
 : checked OK : misalignment

	DATE:						RESULT:									NOTE:
	For VFAT						For Opto-hybrid									
	Left			Right			1.5V			1.8V			2.5V			
Standoff Number	25	26	27	25	26	27	25	26	27	25	26	27	25	26	27	<input checked="" type="checkbox"/> : 1 st time is okay <input type="checkbox"/> : repaired
GEB: 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
GEB: 2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
GEB: 3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
GEB: 4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
GEB: 5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
NOTE:																SIGNATURE:

- Standoff collimation is fine

2.2 GEB21-M2 Standoff Checking List (Standoffs of Opto-Hybrid)

ABOUT THE CHECKING BOX:
 : checked OK : misalignment

	DATE:						RESULT:						NOTE:
	OH_S1	OH_S2	OH_S3	OH_S4	OH_S5	OH_S6	OH_S4	OH_S5	OH_S6				
GEB: 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> : 1 st time is okay <input type="checkbox"/> : repaired		
GEB: 2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
GEB: 3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
GEB: 4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
GEB: 5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
NOTE:													SIGNATURE:

- collimation of OH_S2 in GEB_No 1# and OH_S4 in GEB_No 5# is little difficult to screw.



2.3 GEB21-M5 Standoff Checking List (Standoffs of VFAT)

ABOUT THE CHECKING BOX:
 : checked OK : misalignment

Standoff Number	DATE:						RESULT:						NOTE:	
	VFAT01		VFAT02		VFAT03		VFAT04		VFAT05		VFAT06			
	103	104	103	104	103	104	103	104	103	104	103	104		
GEB: 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
GEB: 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
GEB: 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
GEB: 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
GEB: 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
GEB: 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	VFAT07		VFAT08		VFAT09		VFAT10		VFAT11		VFAT12			
GEB: 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
GEB: 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
GEB: 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
GEB: 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
GEB: 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
GEB: 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
NOTE:												SIGNATURE:		

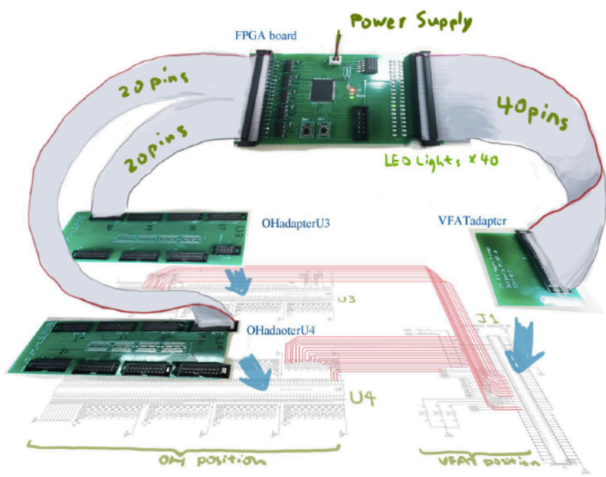
2.4 GEB21-M_2 Standoff Checking List (torque test of OH Standoffs)

● Torque test of OH standoffs pass!

Unit: Nm
 : survive 0.5 Nm

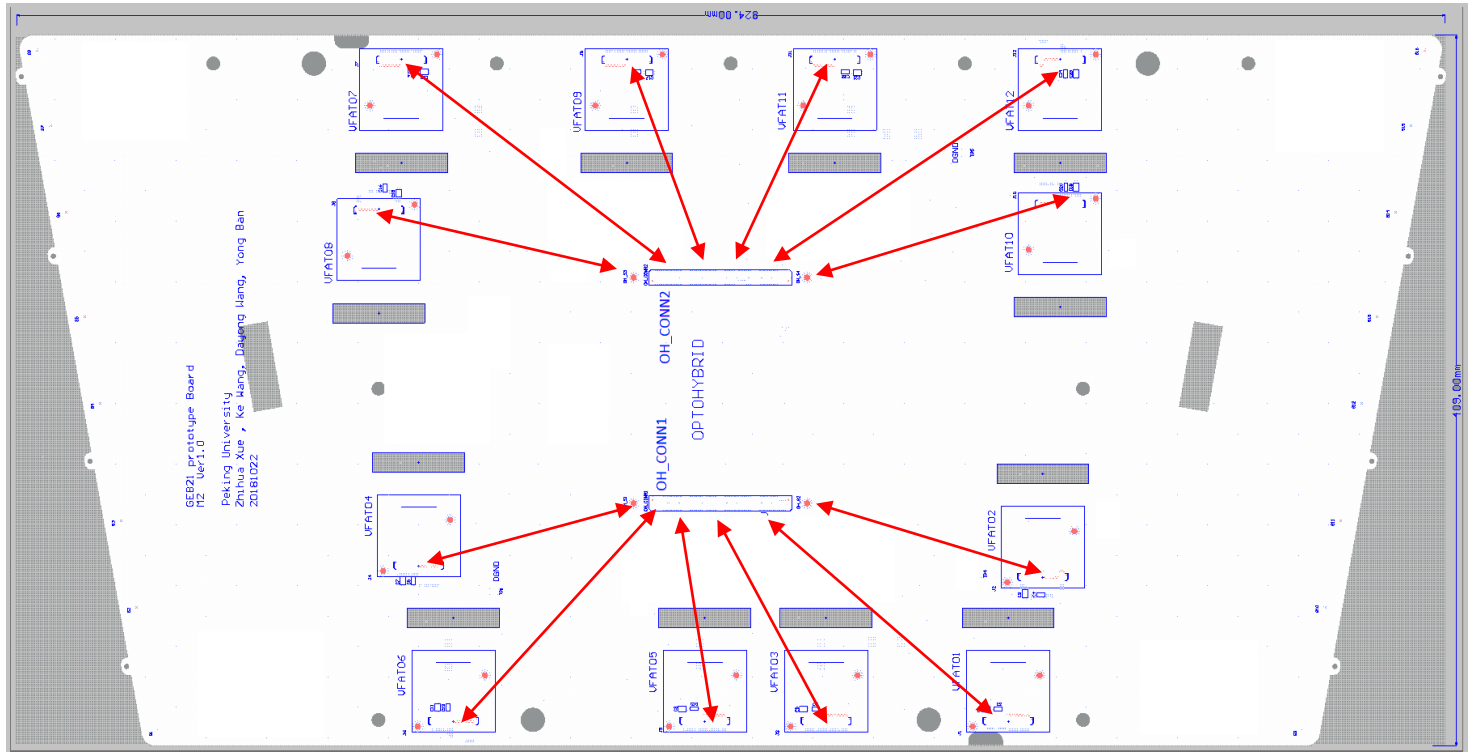
Standoff Number	DATE:						RESULT:						NOTE:
	OH_S1		OH_S2		OH_S3		OH_S4		OH_S5		OH_S6		
GEB: 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
GEB: 2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
GEB: 3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
GEB: 4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
GEB: 5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
GEB: 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
GEB: 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
GEB: 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
GEB: 9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
GEB: 0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
NOTE: 2019/10/3	GE21&ME0 GEB status and plan											SIGNATURE: Dayong Wang	

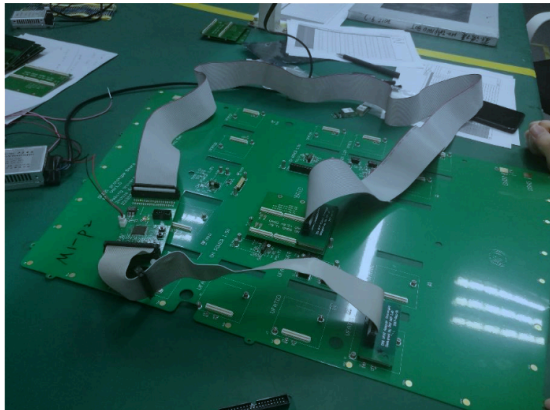
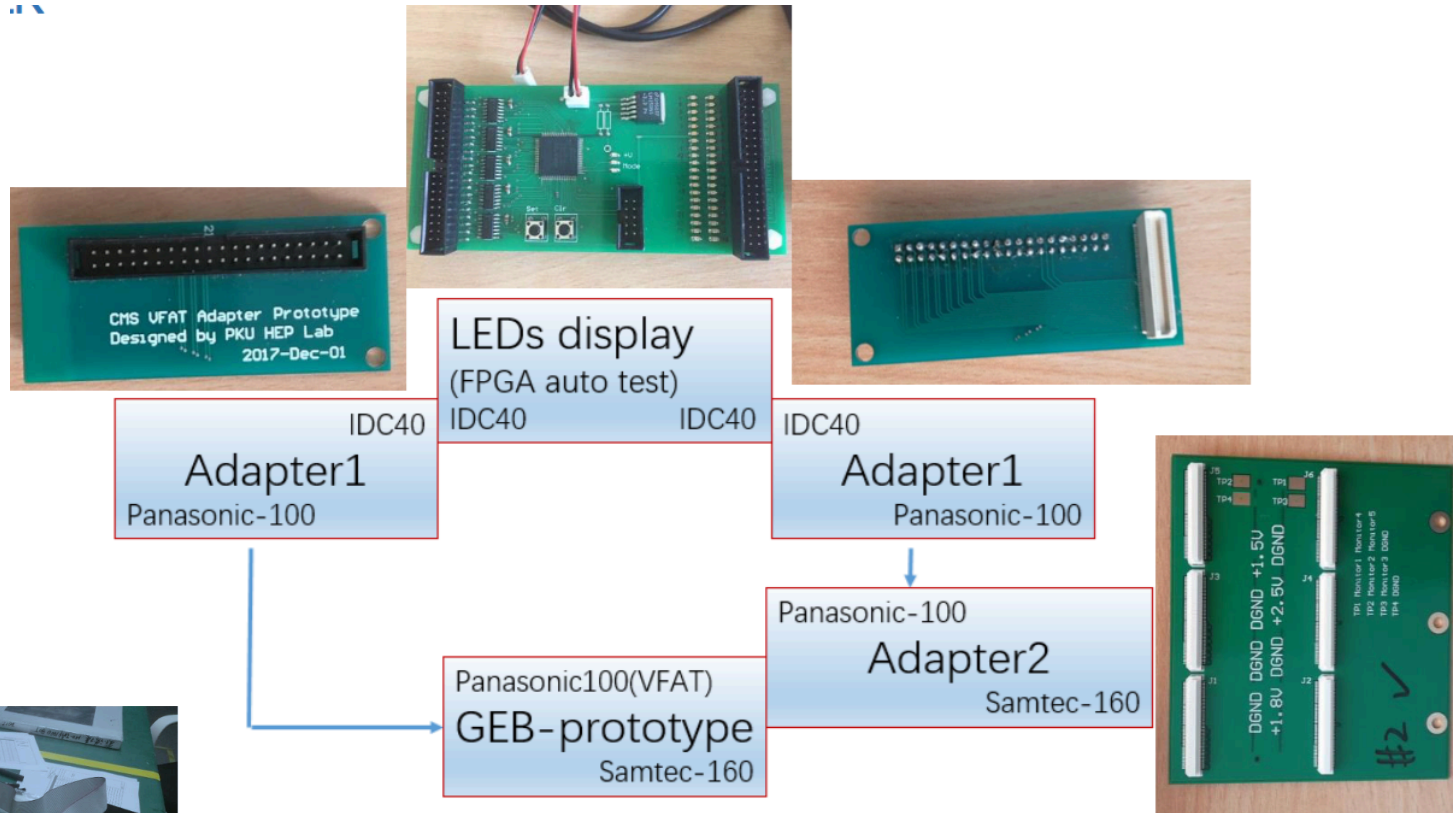
6. Connectivity TEST



Electrical connectivity of 25 signals between 100-pin Panasonic and Samtec 160-pin

- 18 Differential pairs: D[8..1]+strobe
- 6 Com port signals: RXD+TXD+CLK
- 1 Reset signal





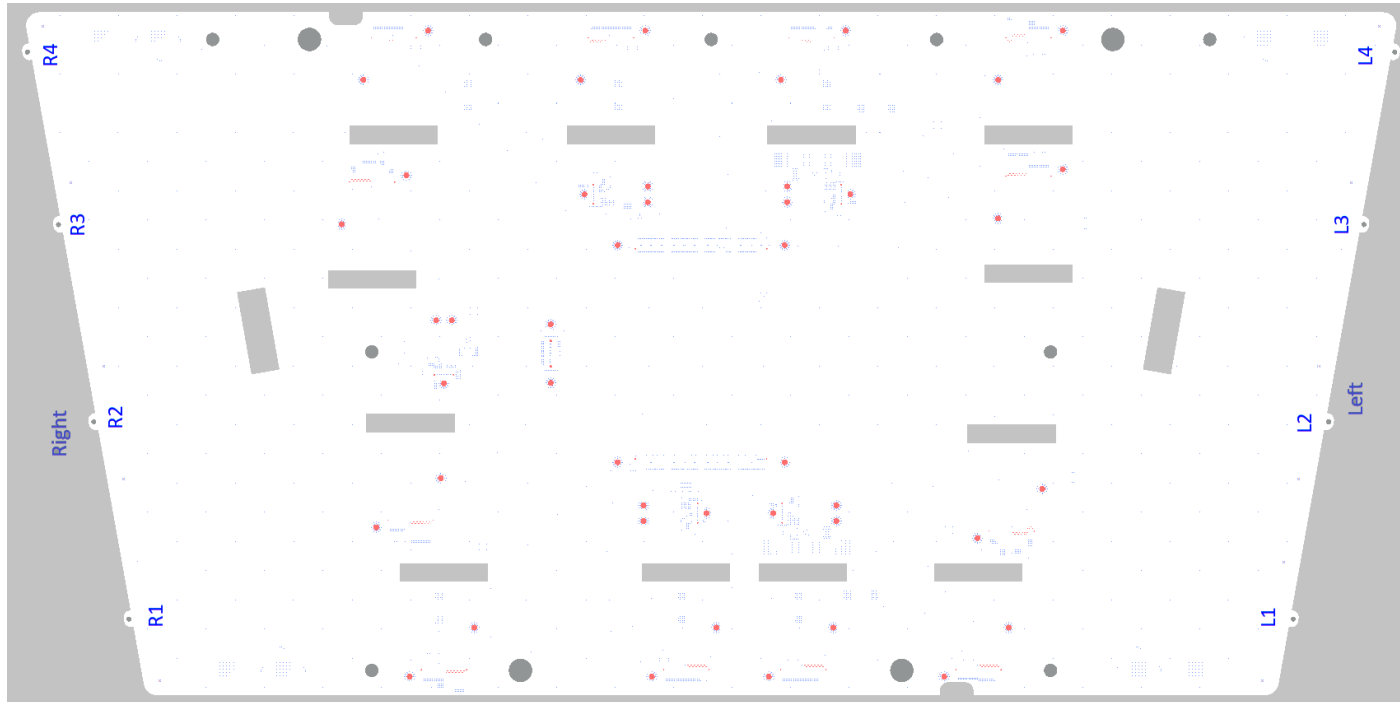
<https://youtu.be/7Nht5Jx7-Q4>



3 GEB21-M2 Connection Checking List (VFAT01-06 & CONN1, VFAT07-12 & CONN2)

ABOUT THE CHECKING BOX:
 : no open circuit : no short circuit

GEB No. M2-P1	DATE:						RESULT:						NOTE:
	VFAT01	VFAT02	VFAT03	VFAT04	VFAT05	VFAT06	VFAT07	VFAT08	VFAT09	VFAT10	VFAT11	VFAT12	
D8_P	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D8_N	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D7_P	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D7_N	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D6_P	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D6_N	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D5_P	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D5_N	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D4_P	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D4_N	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D3_P	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D3_N	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D2_P	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D2_N	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D1_P	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
D1_N	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
CLK_P	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
CLK_N	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
RXD_P	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
RXD_N	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
TXD_P	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
TXD_N	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Strobe_P	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Strobe_N	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Reset	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
NOTE:					Repaired								<input checked="" type="checkbox"/> : 1 st time is okay <input checked="" type="checkbox"/> : repaired
													SIGNATURE:



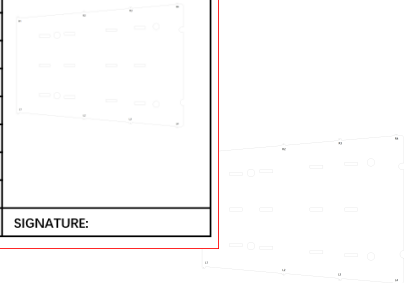
With improved fixation in the oven, the flatness much better than GE11 GEB



4 GEB21-M2 PCB Bending Degree Checking List:

UNITS OF MEASUREMENT:
mm (millimeter)

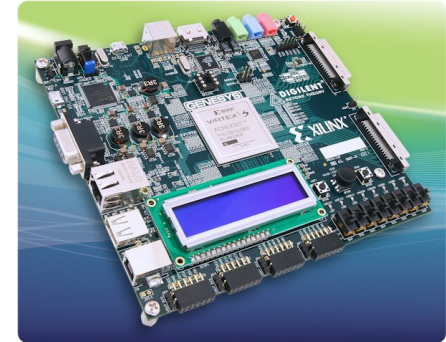
	DATE:				RESULT: mm				NOTE:
	Smaller side		Bigger side						
	Left	Right	Left	Right			Largest	(position)	
	measured data								
GEB: 1	1.25	1.37	1.26	1.35			1.37	R1	Measured the height of the upper side of the board, and then minus the thickness of the board(1.2 mm)
GEB: 2	1.27	1.36	1.26	1.69			1.69	R4	
GEB: 3	1.32	1.35	1.44	1.30			1.44	L4	
GEB: 4	1.16	1.25	1.24	1.65			1.65	R4	
GEB: 5	1.38	1.36	1.30	1.46			1.46	R4	
GEB: 6									
GEB: 7									
GEB: 8									
GEB: 9									
GEB: 0									
	Bending height								
GEB: 1	0.05	0.17	0.06	0.15			0.17	R1	
GEB: 2	0.07	0.16	0.06	0.49			0.49	R4	
GEB: 3	0.12	0.15	0.24	0.10			0.24	L4	
GEB: 4	-0.04	0.05	0.04	0.25			0.25	R4	
GEB: 5	0.18	0.16	0.10	0.26			0.26	R4	
GEB: 6									
GEB: 7									
GEB: 8									
GEB: 9									
GEB: 0									
NOTE:									SIGNATURE:



● For the bending test, the largest degree of M2 GEB is **0.49 mm, which performs good.**

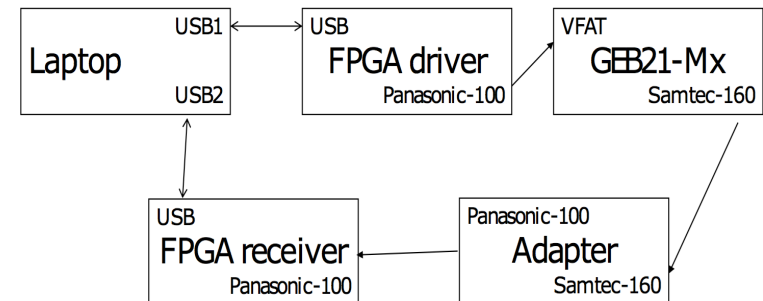
■ There were GE11 discussions for improved QC utility

- ◆ Several discussions with Paul/Gilles etc
- ◆ Genesys Development Board purchased
- ◆ Qiaorong spent one month at ULB trying
- ◆ Not continue due to full-func emulator not ready, and leaving of experts (Thomas et al)



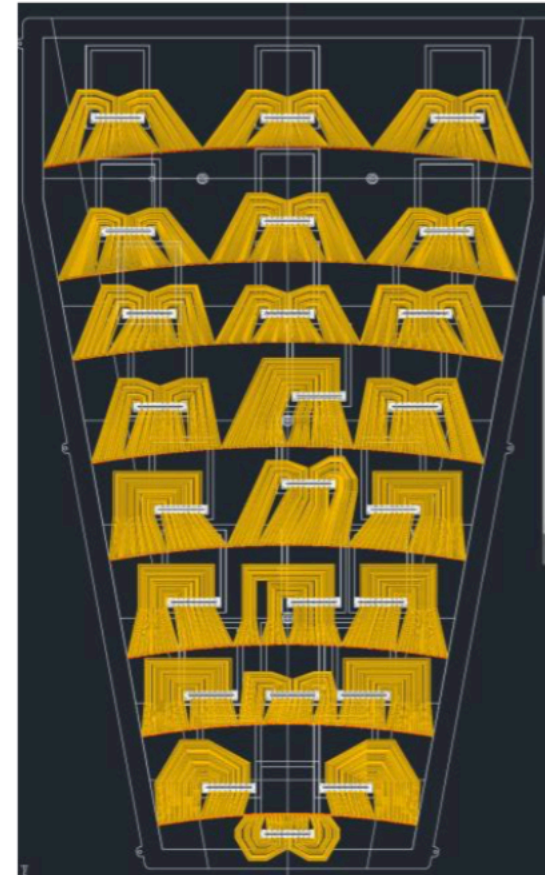
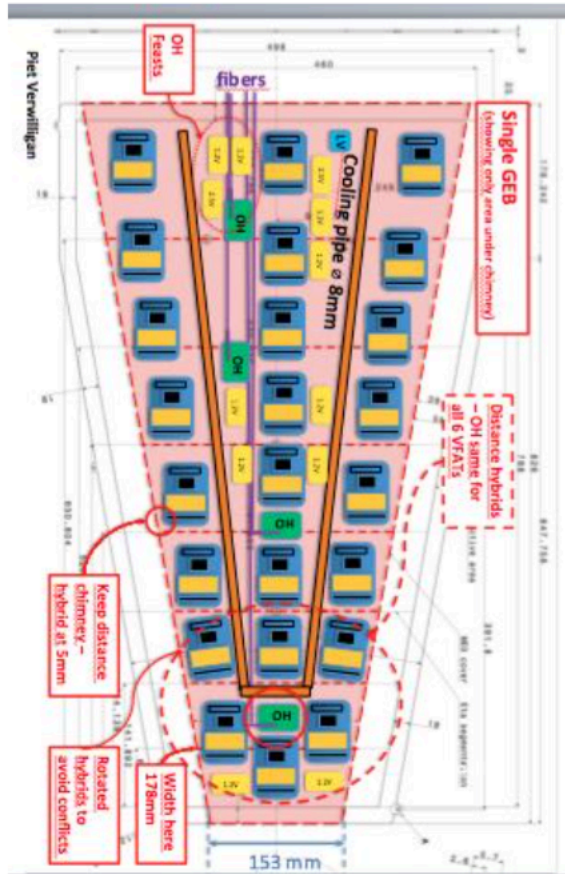
■ PKU team started a new design, aiming for GE21 production QC (also ME0)

- ◆ Mr. Xue with one student working on it
- ◆ Fully computerized
- ◆ With functionality of BER, PRBS etc
- ◆ No clear schedule yet



■ May still need consultation & help of experts from electronics teams

- Reduced space under the chamber cover: challenging
- Foils with double face segmentation layout chosen
- Q1 2020: schedule tight for GEB design & production





- **Follow the same basic design principles as GE21**
 - ◆ Four boards per ME0
 - ◆ Robust routing and shielding
 - ◆ IpGBT compatible

- **The prototyping could only start after GE21 M1-M4 finished**
 - ◆ Start design: ~middle Feb 2020
 - ◆ Design & routing time: 4 weeks/board if external input finalized
 - ◆ Verification and communication with factory ~1 week
 - ◆ Prototype production: ~5 week
 - ◆ QC test and shipment: 1+1 week
 - ◆ Too late for integration for all 4 GEB boards

- **Is staged prototype possible?**
 - ◆ Start with one, to be used for integration test? (May 2020)
 - ◆ Follow by three (Aug-Sep 2020)



Summary



- ❑ GE21 GEBs have many improvements. The prototype design is moving towards final version.
 - ❑ M6-M8 in review; should conclude soon.
 - ❑ M1-M4 needs another IpGBT-compatible version, plus some minor fixings (one short of MONITOR signal short with 2.5Volt in M1, mechanical adjustment of M2 etc)
- ❑ On critical path for ESR, the schedule is tight.
 - ❑ need to streamline the workflow & communication
- ❑ New QC tools in design, aiming to be usable at production
 - ❑ help needed from experts
- ❑ ME0 needs more input and discussion
 - ❑ The prototyping would start immediately after GE21 design finish



1.1 GEB21-M5 Power Checking List (Install All 5 FEASTs, No Power)

ABOUT THE CHECKING BOX:
 : no open circuit : no short circuit



GEB No.	DATE:										RESULT:										NOTE:
	GEB: 1	GEB: 2	GEB: 3	GEB: 4	GEB: 5	GEB: 6	GEB: 7	GEB: 8	GEB: 9	GEB: 0	GEB: 1	GEB: 2	GEB: 3	GEB: 4	GEB: 5	GEB: 6	GEB: 7	GEB: 8	GEB: 9	GEB: 0	
	No short circuit to each other																				<input checked="" type="checkbox"/> : 1 st time is okay <input checked="" type="checkbox"/> : repaired AGND VFAT01-VFAT12
DVDD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR1V5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR1V8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR2V5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1V2AVFAT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1V2DVFAT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
DGND																					
	0 ohm resistance connection																				AGND VFAT01-VFAT12
AGND	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
SHIELD_NET	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
DGND																					
NOTE:																					SIGNATURE:

1.2 GEB21-M5 Power Checking List (Install All 5 FEASTs and OH, Power On)

ABOUT THE CHECKING BOX:
 : no open circuit : no short circuit

GEB No.	DATE:										RESULT:										NOTE:
	GEB: 1	GEB: 2	GEB: 3	GEB: 4	GEB: 5	GEB: 6	GEB: 7	GEB: 8	GEB: 9	GEB: 0	GEB: 1	GEB: 2	GEB: 3	GEB: 4	GEB: 5	GEB: 6	GEB: 7	GEB: 8	GEB: 9	GEB: 0	
	GEB LED(RED)																				<input checked="" type="checkbox"/> : 1 st time is okay <input checked="" type="checkbox"/> : repaired
DVDD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR2V5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	OH LED																				GEB: DVDD OH Board PWR1V5 PWR1V8 PWR2V5 VFAT: 1V2AVFAT 1V2DVFAT
1.0V	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR1V5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR1V8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR2V5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	voltage																				VFAT: 1V2AVFAT 1V2DVFAT
DVDD																					
PWR1V5																					
PWR1V8																					
PWR2V5																					
1V2AVFAT																					
1V2DVFAT																					
NOTE:																					SIGNATURE: