

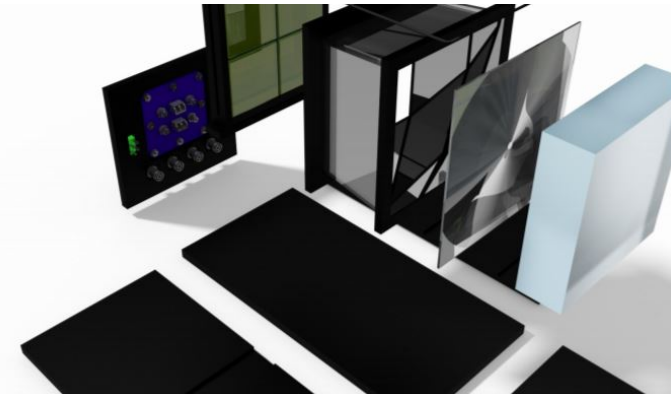
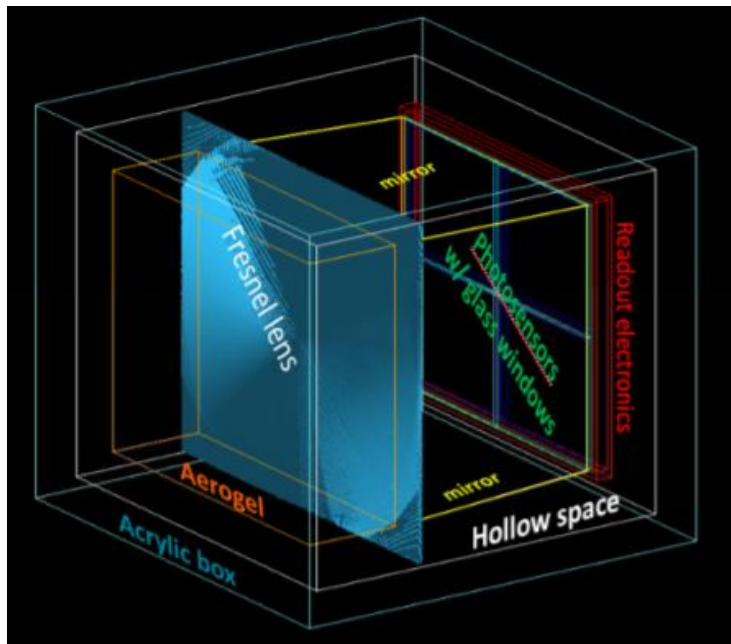
EE499 ModRICH 256- Channel PMT Readout Board

Kevin Kam,

With Mentors: Dr. Gary Varner and Dr. Isar Mostafanezhad

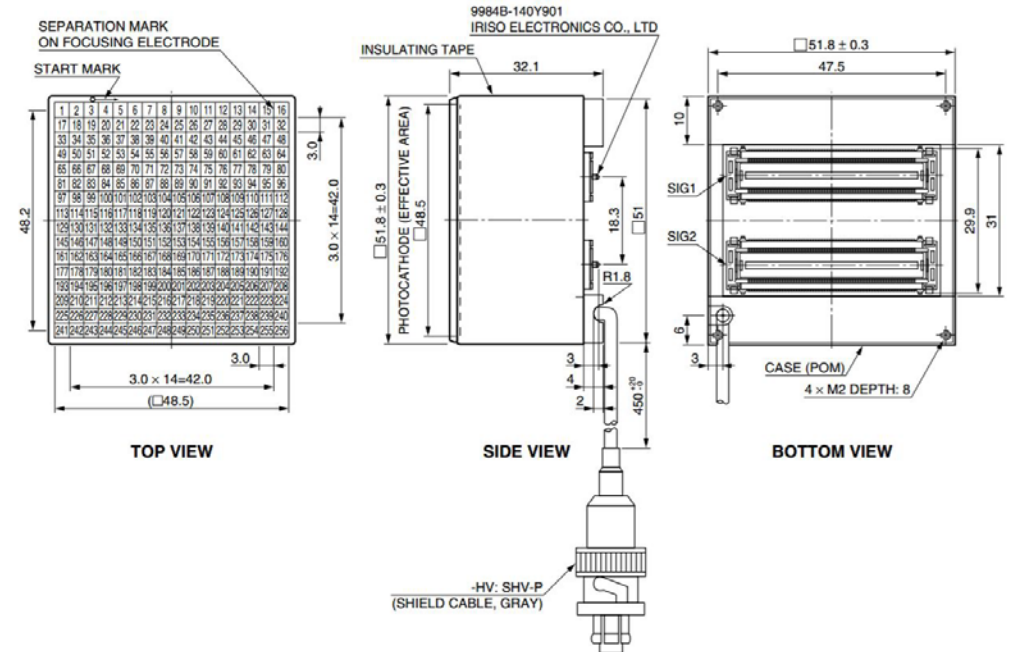
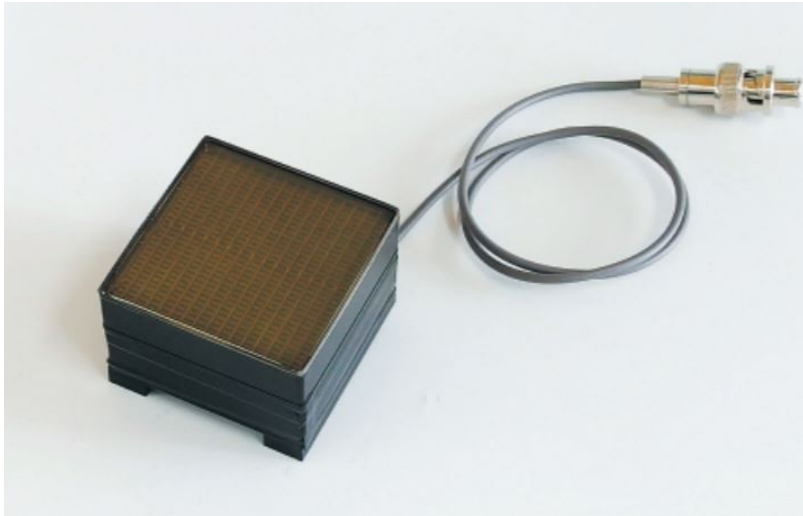
What is the ModRICH Detector?

- A Ring Imaging Cherenkov detector (RICH) with an aerogel radiator



Connecting to the Detector

- Hamamatsu H13700 connector

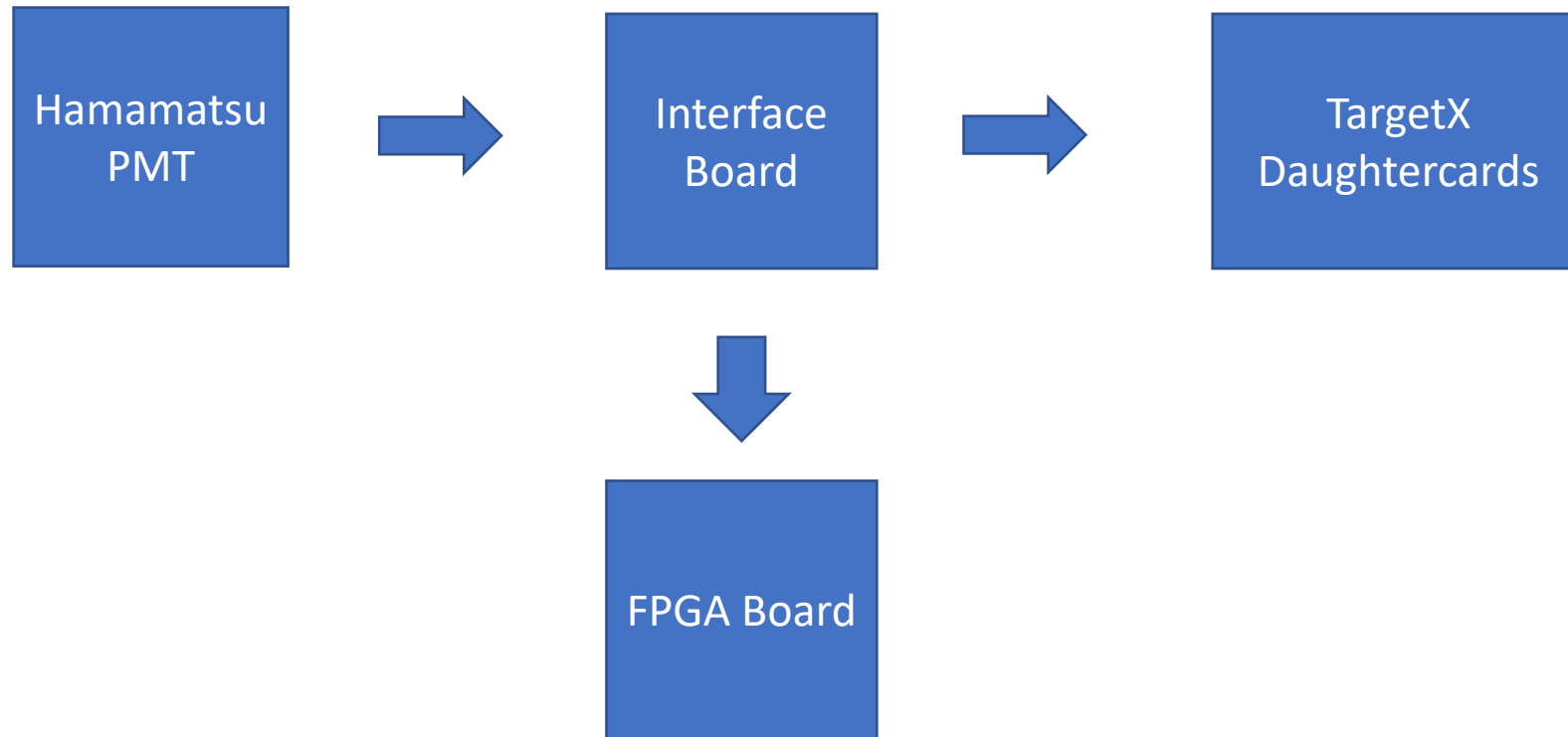


H13700 Pinout (256 Channels)

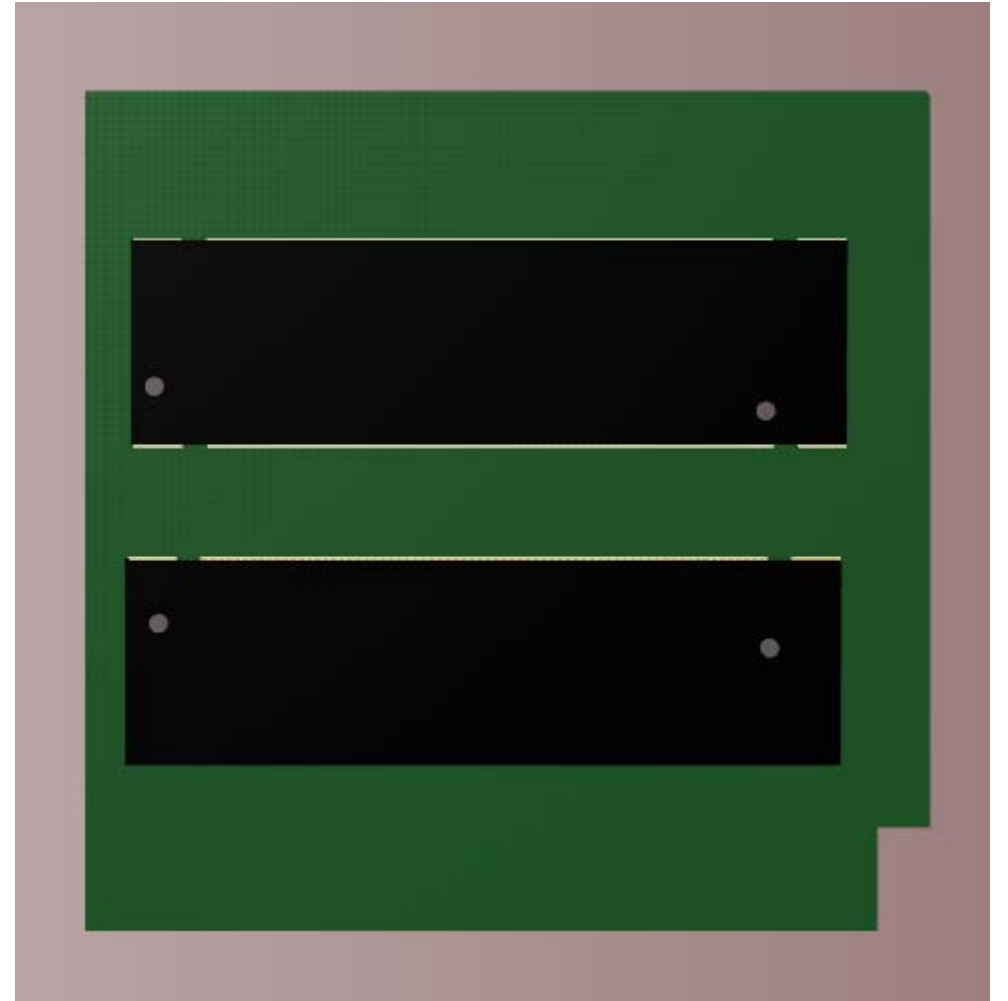
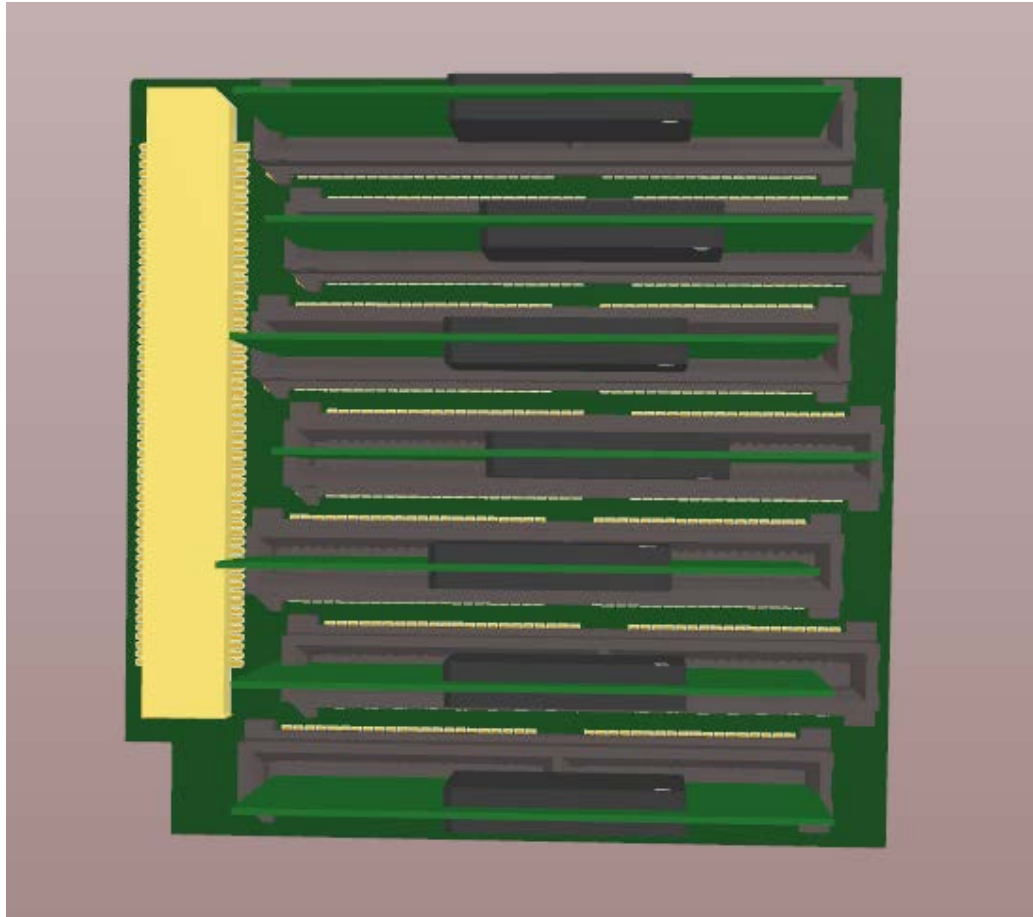
CONNECTION FOR SIGNAL CONNECTORS
(BOTTOM VIEW)

SIG1		SIG2	
PIN ASSIGNMENT FOR PMT ANODE			
GND	1	GND	1
GND	2	GND	2
GND	3	GND	3
P49	4	P177	4
P33	5	P161	5
P17	6	P145	6
P1	7	P129	7
P50	8	P178	8
P34	9	P162	9
P18	10	P146	10
P2	11	P130	11
P51	12	P179	12
P35	13	P163	13
P19	14	P147	14
P3	15	P131	15
P52	16	P180	16
P36	17	P164	17
P20	18	P148	18
P4	19	P132	19
P53	20	P181	20
P37	21	P165	21
P21	22	P149	22
P5	23	P133	23
P54	24	P182	24
P38	25	P166	25
P22	26	P150	26
P6	27	P134	27
P55	28	P183	28
P39	29	P167	29
P23	30	P151	30
P7	31	P135	31
P56	32	P184	32
P40	33	P168	33
P24	34	P152	34
P8	35	P136	35
P9	36	P137	36
P25	37	P153	37
P41	38	P169	38
P57	39	P185	39
P10	40	P138	40
P26	41	P154	41
P42	42	P170	42
P58	43	P186	43
P11	44	P139	44
P27	45	P155	45
P43	46	P171	46
P59	47	P187	47
P12	48	P140	48
P28	49	P156	49
P44	50	P172	50
P60	51	P188	51
P13	52	P141	52
P29	53	P157	53
P45	54	P173	54
P61	55	P189	55
P14	56	P142	56
P30	57	P158	57
P46	58	P174	58
P62	59	P190	59
P15	60	P143	60
P31	61	P159	61
P47	62	P175	62
P63	63	P191	63
P16	64	P144	64
P32	65	P160	65
P48	66	P176	66
P64	67	P192	67
GND	68	GND	68
GND	69	GND	69
DV10	70	GND	70
PIN ASSIGNMENT FOR CONNECTOR (9984B-140Y901)			
71	GND	71	GND
72	GND	72	GND
73	GND	73	GND
74	P65	74	P193
75	P81	75	P209
76	P97	76	P225
77	P113	77	P241
78	P66	78	P194
79	P82	79	P210
80	P98	80	P226
81	P114	81	P242
82	P67	82	P195
83	P83	83	P211
84	P99	84	P227
85	P115	85	P243
86	P68	86	P196
87	P84	87	P212
88	P100	88	P228
89	P116	89	P244
90	P69	90	P197
91	P85	91	P213
92	P101	92	P229
93	P117	93	P245
94	P70	94	P198
95	P86	95	P214
96	P102	96	P230
97	P118	97	P246
98	P71	98	P199
99	P87	99	P215
100	P103	100	P231
101	P119	101	P247
102	P72	102	P200
103	P88	103	P216
104	P104	104	P232
105	P120	105	P248
106	P121	106	P249
107	P105	107	P233
108	P89	108	P217
109	P73	109	P201
110	P122	110	P250
111	P106	111	P234
112	P90	112	P218
113	P74	113	P202
114	P123	114	P251
115	P107	115	P235
116	P91	116	P219
117	P75	117	P203
118	P124	118	P252
119	P108	119	P236
120	P92	120	P220
121	P76	121	P204
122	P125	122	P253
123	P109	123	P237
124	P93	124	P221
125	P77	125	P205
126	P126	126	P254
127	P110	127	P238
128	P94	128	P222
129	P78	129	P206
130	P127	130	P255
131	P111	131	P239
132	P95	132	P223
133	P79	133	P207
134	P128	134	P256
135	P112	135	P240
136	P96	136	P224
137	P80	137	P208
138	GND	138	GND
139	GND	139	GND
140	GND	140	GND
PIN ASSIGNMENT FOR PMT ANODE			

Readout Electronics for ModRICH



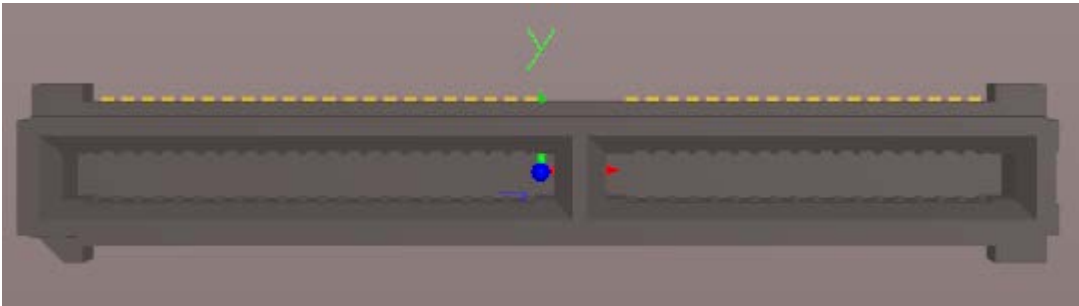
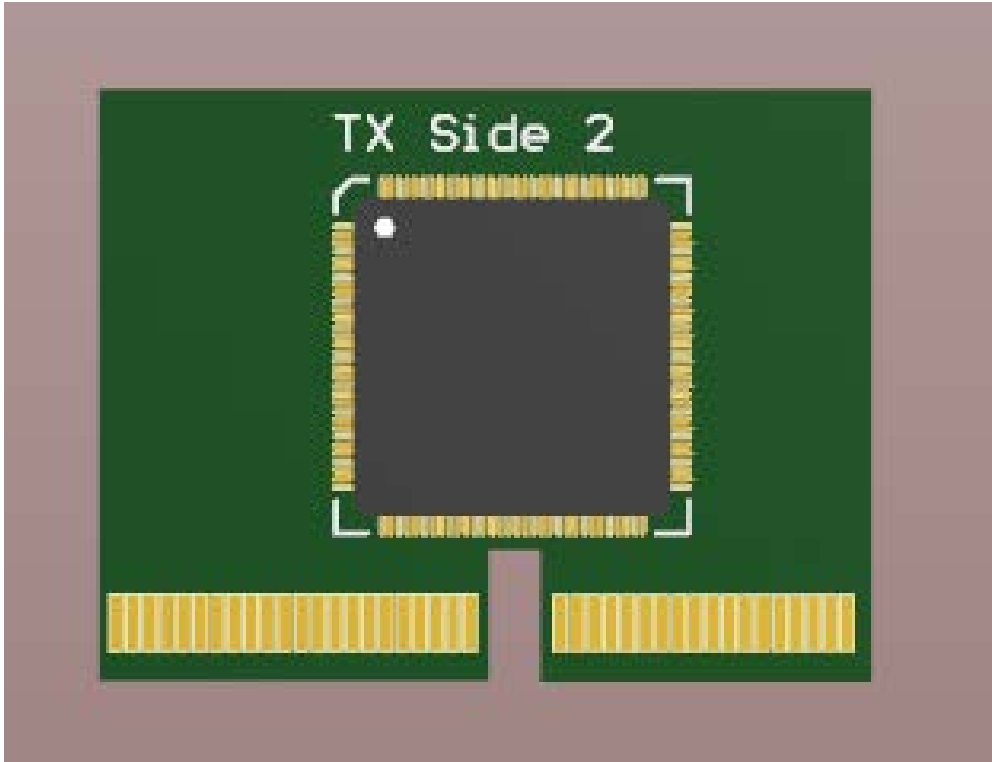
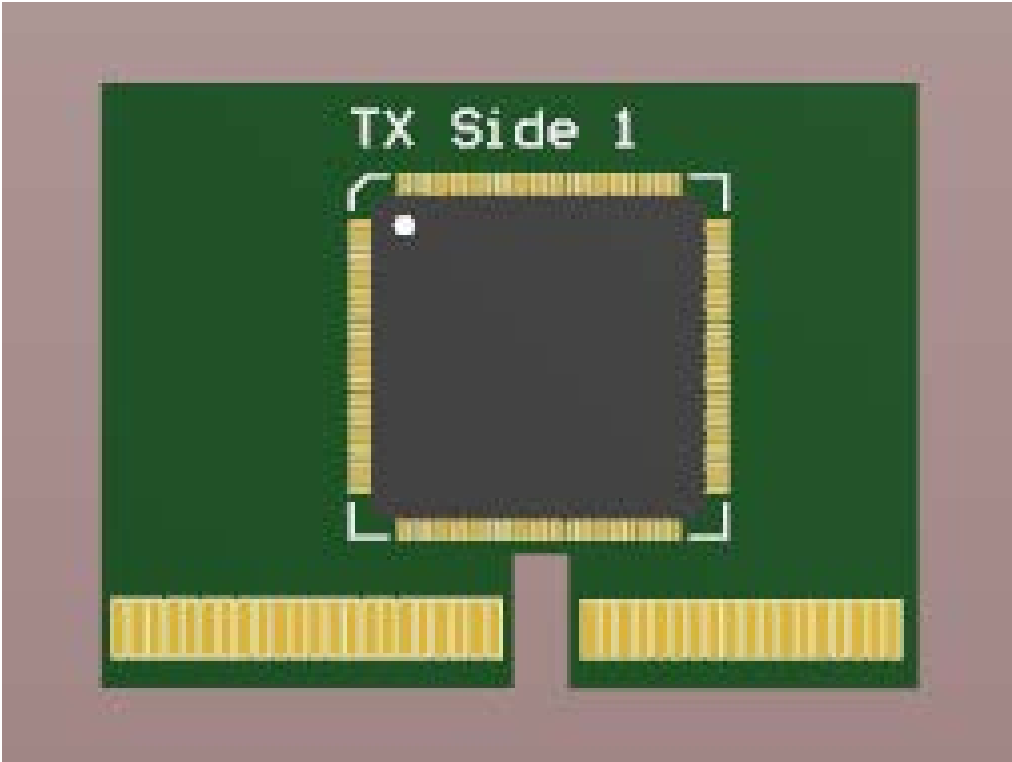
Interface Board



Interface Board

- Connects to the Hamamatsu H13700 PMT connector
- Connects TargetX Daughtercards to the FPGA Board
- Compact (51mm x 51mm)

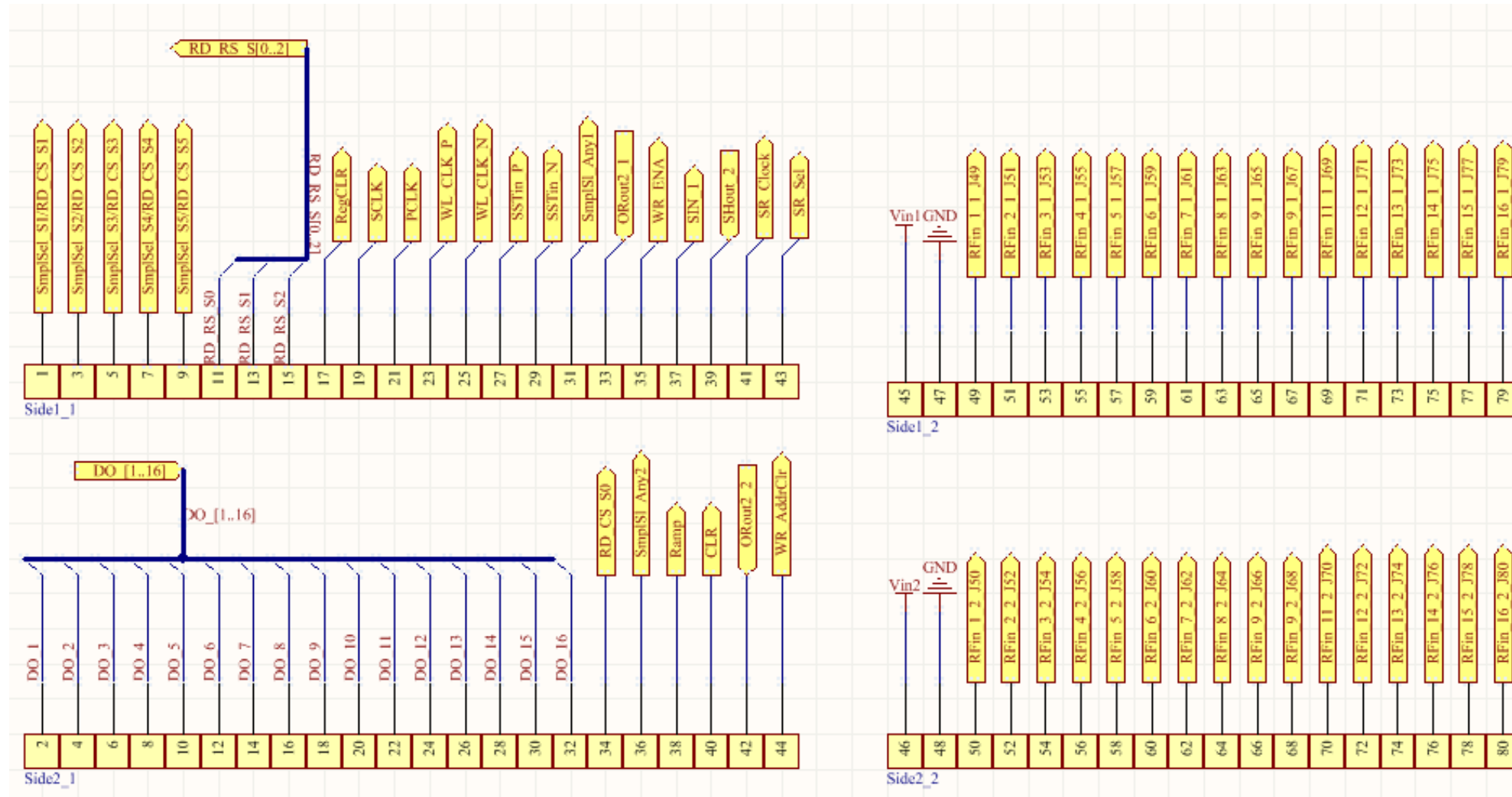
TargetX Daughtercard



TargetX Daughtercard

- 8 Daughtercards connected to the interface board
- Small board area limits connector pins.
 - SPD08 80 pin connector
 - TargetX has 128 pins, $128 * 2 = 256$ pins
- TargetX ASIC has 16 analog inputs, $16 * 2 * 8 = 256$ enough for all 256 channels of the PMT

SPD08 Pinout



Saving Valuable Pins Space

- Bussed digital signals between both ASICs (DO, SmpI Sel, RD_RS ...etc)
- Fed TRG signals into an OR gate
- Sharing SmpI Sel and RD_CS pins
- Using Testpoints for MON_Timing and various analog signals

Future Work

- Continue board layout, want to complete by the end of the summer
- Continue working on FPGA board schematic
- Fabricate TX daughtercard

Questions, Comments, or Advice?