Module Testing at Fermilab

Slawomir Tkaczyk
Fermilab
for
Len Christofek
University of Kansas

Working Group

- Module Testing at FNAL
  - Elizaveta Chabalina – University of Illinois at Chicago
  - Len Christofek – University of Kansas
  - Slawomir Tkaczyk - Fermilab

Recent News

- We have received an LED system for the ARC test stand and are using it to look for pinholes.
- We have received two ceramic hybrids that we tested and converted into modules which are presently at CERN.
- We are in the process of upgrading the LT testing software as provided by Antwerp. We are also attempting to migrate to RedHat Linux and W2000 (for the ARCS).
- We have procured all the necessary high voltage for both production sites (FNAL and UCSB).

ARC and DAQ Test Stands

ARC Test Stand

Computer and Memory Expander

SRDAPV, LED controller

Power Supplies

Front End Adaptor and Hybrid/Module, LED test array

FEC, FED, TSC and Fiber Optic Cable

CCU, UTRI and Module Carrier

LV and HV Power Supplies

DAQ Test Bench

HV Supplies

- **We have a total of six SY127 crates along with 41 HV pods for a total of 164 channels.**
  - **6 A128**
  - **23 A132P**
  - **12 A332P**

2 crates will be shipped to UCSB

Vienna Cold Box

- 2 cold boxes have been ordered for the US production sites.
- 1 is on route to UCSB for modification: TOB carrier plates are thicker than TIB carrier plates.
- After modification, the cold box will be shipped to FNAL for thermal cycling of modules with the DAQ (possible ARCS if interface works).
- Plan is only to thermal cycle first 50 modules before rod delivery and burn in begins, then switch to thermal cycling in freezer.

Production Testing Procedure

1. Fast test hybrid on ARC test stand.
2. Create a module using the hybrid and then test the module on the ARC test stand (make possible repairs, if necessary). First 50 modules will be tested on both ARC and DAQ system for quality assurance, after that only ARC will be used.
3. Thermal cycling of first 50 modules using Vienna cold box until rods are delivered.
4. Use modules to construct rods and burn-in/thermal cycling begins in freezer with DAQ.

Defects and Symptom Statistics in 2 FNAL modules

Statistics compiled by Elizaveta Chabalina.

module	Channel (from DAQ data)	noise		Pulse shape				Manufacturer list	
				Rise time		maximum			
		hi	lo	f	s	hi	lo	#	type
652	1	x						188	Rp,C
	2	x						189	Rp, C
	188		x		x		x	304	Id, C
	189		x		x		x	456	Id, C
	256	x							
	304 (found)		x		x		x		
	313	x							
	456 (found)		x		x		x		
	511	x							
	512	x							
653	1	x						55	Id
	2	x						91	Id
	55 (found)		x		x		x	503	C
	511							504	C
	512	x						505	C

- I_d = pinhole, C = coupling capacitance problem between adjacent strips, R_p = non-nominal resistor value
- Channels listed from DAQ could have failed CMN cut, pulse height, etc…
- ARC LED test found all pinholes in manufacture's list, DAQ did not find Module 653/strip 91 (limited statistics)

Summary & Conclusions

- We have constructed 18 Milestone 200 TOB modules + 2 Milestone 800 TOB. All are working well.
- 16 modules were shipped to CERN for test beam studies.
- We are finding 100% of all pinholes using the ARC LED system (limited statistics). We are only finding 90% using the DAQ (overall). Special thanks to Torsten Franke for retesting FNAL TOB modules at CERN.
- We are now preparing our facility for production testing.