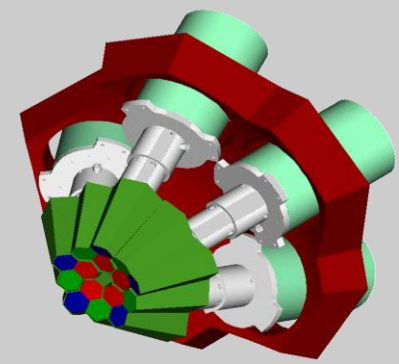


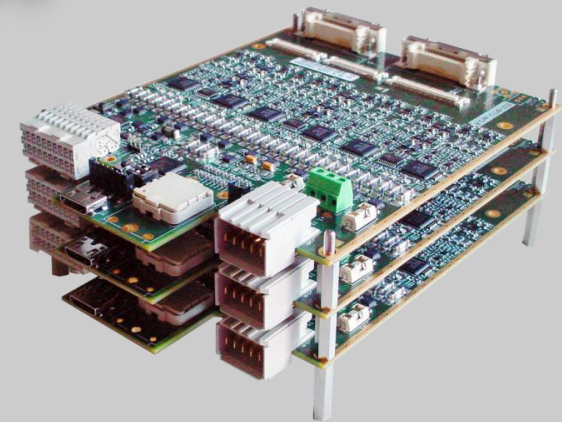


INFN - Milano  
University of Milano  
Department of Physics



## New bunch, maintenance, repairs, Digi-Opt12 digitizer cards

Alberto Pullia



AGATA Week  
11-15 September, 2017  
Milano, Italy

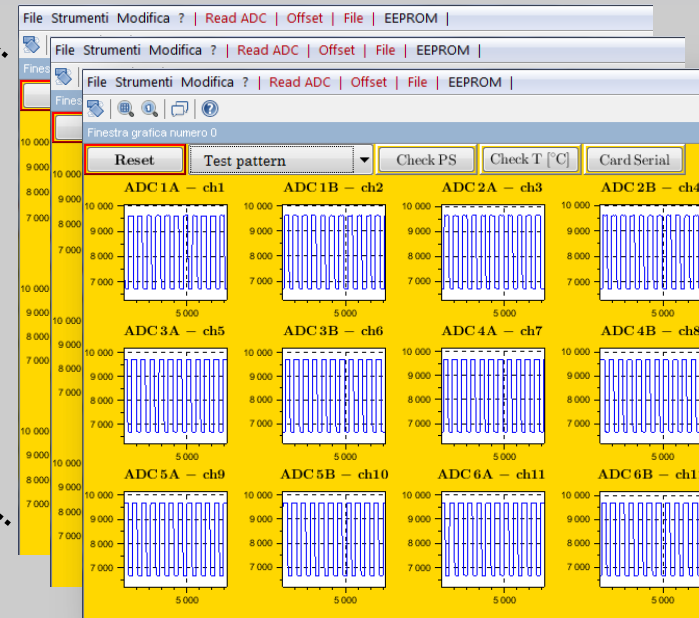
Milano, Italy  
11-15 September 2017

# New bunch of Digi-Opt12 cards (delivered in June 2017)

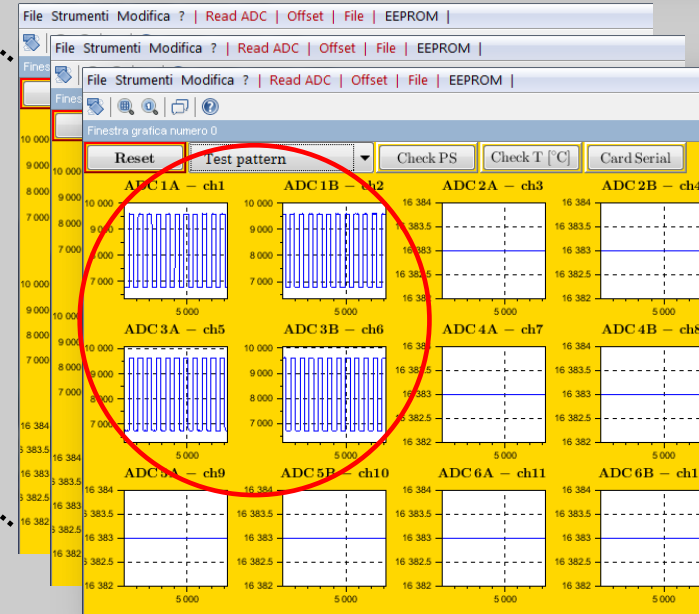
- **14 digitizer chs for AGATA** (14 core cards, 42 segm cards)
- **3 digitizer chs for IKP Koeln** (3 core cards, 9 segment cards)
- **7 digitizer chs for GALILEO** (21 Digi-Opt12 cards)



## Factory/acceptance tests – May 2017



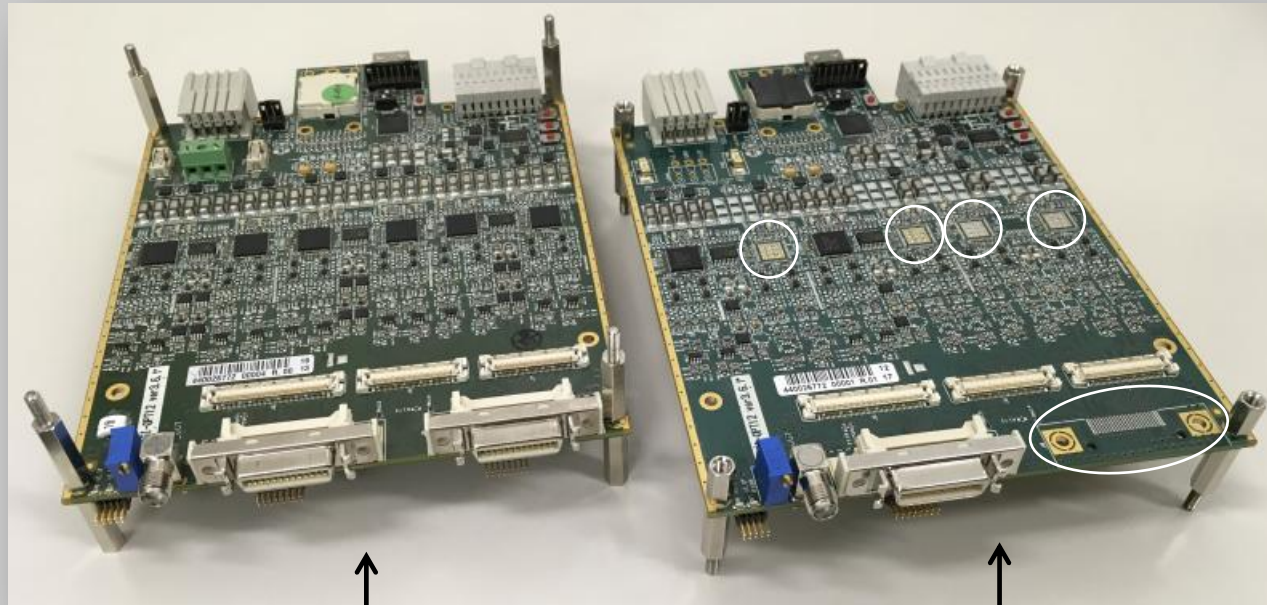
Segment cards



Core cards

# Core cards generations

ADC chips (ADC1413D) **obsolete**: we decided not to waste available chips (stock covers another 32 digitizer chs)



**Previous core card**  
All ADC footprints populated

**Latest core card (run 4)**

- Unused ADC chips not installed,
- Unused MDR connector not installed

# New bunch of DIGI-OPT12 cards

Serial	Bar Code	Version	Type	Fired	Control/Ck	All set*	Location	Owner
Production code: 440026773 – fourth run, type: segment								
4-1/75	01	3.6.1 AGATA	Segm	✓✓	backplane	Y++	Milano	INFN-MI
4-2/75	02	3.6.1 AGATA	segm	✓✓	backplane	Y++	Milano	INFN-MI
4-3/75	03	3.6.1 AGATA	segm	✓✓	backplane	Y++	Milano	INFN-MI
4-4/75	04	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-5/75	05	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-6/75	06	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-7/75	07	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-8/75	08	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-9/75	09	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-10/75	10	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-11/75	11	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-12/75	12	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-13/75	13	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-14/75	14	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-15/75	15	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-16/75	16	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-17/75	17	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-18/75	18	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-19/75	19	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-20/75	20	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-21/75	21	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-22/75	22	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-23/75	23	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-24/75	24	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-25/75	25	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-26/75	26	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-27/75	27	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-28/75	28	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-29/75	29	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-30/75	30	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-31/75	31	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-32/75	32	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-33/75	33	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-34/75	34	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-35/75	35	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-36/75	36	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI

Segment cards

Continue on next page



\*Y++ = all set; Y+ = Antialiasing filter to be adjusted (two resistor change/ADC ch)  
 ✓✓ = new firmware; ✓ = old firmware

# New bunch of DIGI-OPT12 cards

Serial	Bar Code	Version	Type	Fired	Control/Ck	All set*	Location	Owner
Production code: 440026773 – fourth run, type: segment								
4-37/75	37	3.6.1 AGATA	Segm	✓✓	backplane	Y+	Milano	INFN-MI
4-38/75	38	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-39/75	39	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-40/75	40	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-41/75	41	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-42/75	42	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-43/75	43	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	IKP Koeln
4-44/75	44	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	IKP Koeln
4-45/75	45	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	IKP Koeln
4-47/75	46	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	IKP Koeln
4-46/75	47	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	IKP Koeln
4-48/75	48	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	IKP Koeln
4-49/75	49	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	IKP Koeln
4-50/75	50	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	IKP Koeln
4-51/75	51	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	IKP Koeln
4-52/75	52	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-53/75	53	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-54/75	54	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-55/75	55	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-56/75	56	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-57/75	57	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-58/75	58	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-59/75	59	3.6.1 AGATA Ch 5 noisy	segm	✓✓	backplane	Y+	Milano	ASCOM
4-60/75	60	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-61/75	61	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-62/75	62	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-63/75	63	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-64/75	64	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-65/75	65	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-66/75	66	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-67/75	67	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-68/75	68	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-69/75	69	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-70/75	70	3.6.1 GALILEO	segm	✓✓	backplane	Y+	Milano	INFN-MI
4-71/75	71	3.6.1 GALILEO	segm	✓✓	backplane	Y++	LNL	INFN-MI
4-72/75	72	3.6.1 GALILEO	segm	✓✓	backplane	Y++	LNL	INFN-MI
4-73/75	73	3.6.1 GALILEO	segm	✓✓	backplane	Y++	LNL	INFN-MI
4-74/75	74	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	ASCOM
4-75/75	75	3.6.1 AGATA	segm	✓✓	backplane	Y+	Milano	ASCOM

Segment cards

Installed in GALILEO

# New bunch of DIGI-OPT12 cards

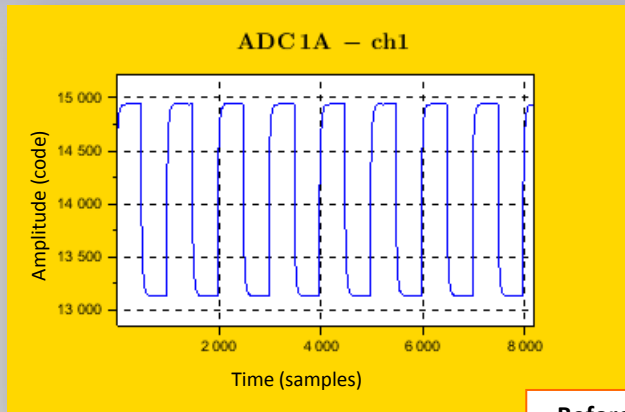
Serial	Bar Code	Version	Type	Fired	Control/Ck	All set*	Location	Owner
Production code: 440026772 – fourth run, type: core								
4-1/19	05	3.6.1 AGATA	core	✓✓	backplane	Y++	Milano	INFN-MI
4-2/19	05	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	INFN-MI
4-3/19	05	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	INFN-MI
4-4/19	05	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	INFN-MI
4-5/19	03	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	INFN-MI
4-6/19	15	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	INFN-MI
4-7/19	13	3.6.1 AGATA ADC 3 noisy	core	✓✓	backplane	Y+	Milano	ASCOM
4-8/19	11	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	INFN-MI
4-9/19	14	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	INFN-MI
4-10/19	10	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	INFN-MI
4-11/19	08	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	INFN-MI
4-12/19	09	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	INFN-MI
4-13/19	12	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	INFN-MI
4-14/19	07	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	INFN-MI
4-15/19	16	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	INFN-MI
4-16/19	05	3.6.1 AGATA	core	✓✓	backplane	Y++	Milano	IKP Koeln
4-17/19	05	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	IKP Koeln
4-18/19	05	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	IKP Koeln
4-19/19	05	3.6.1 AGATA	core	✓✓	backplane	Y+	Milano	ASCOM

Core cards

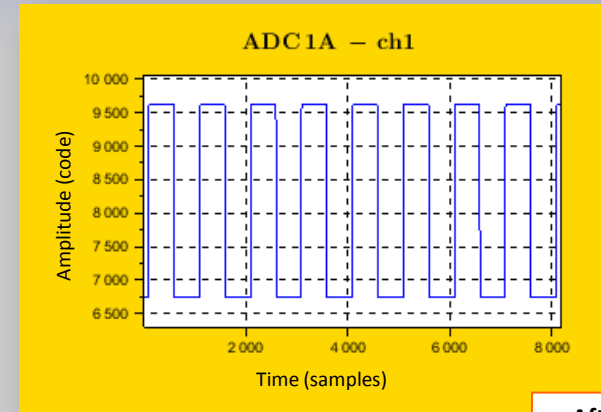
\*Y++ = all set; Y+ = Antialiasing filter to be adjusted (two resistor change/ADC ch)

✓✓ = new firmware; ✓ = old firmware

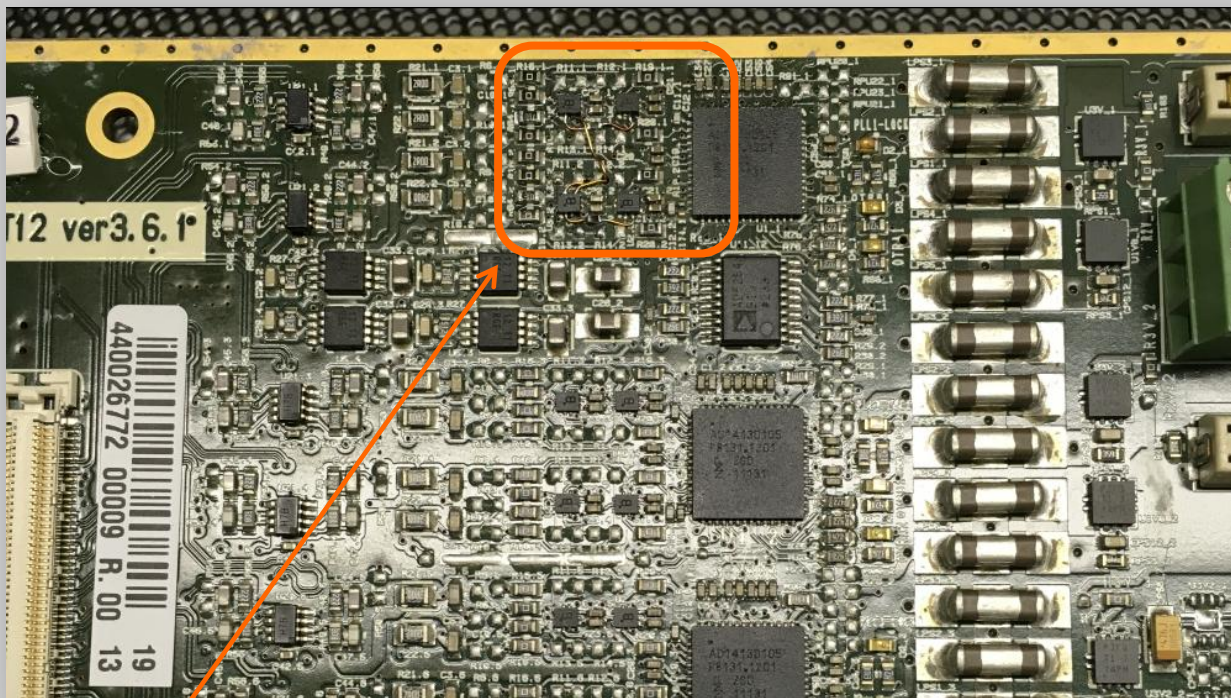
# Core card n. 9 of previous run repaired in March 2017



Before repair

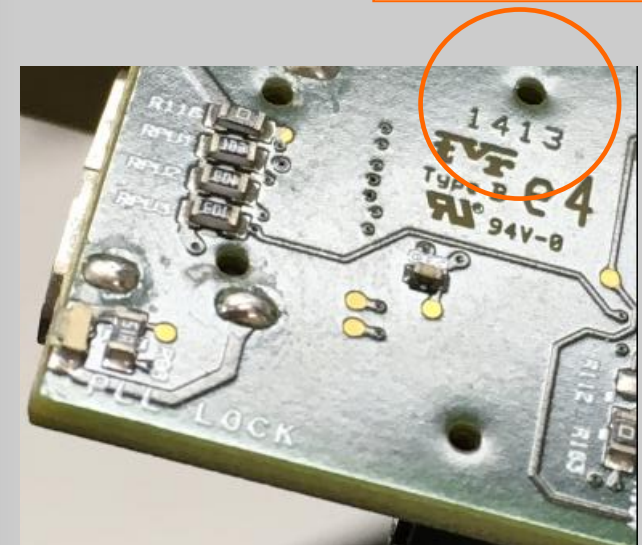


After repair

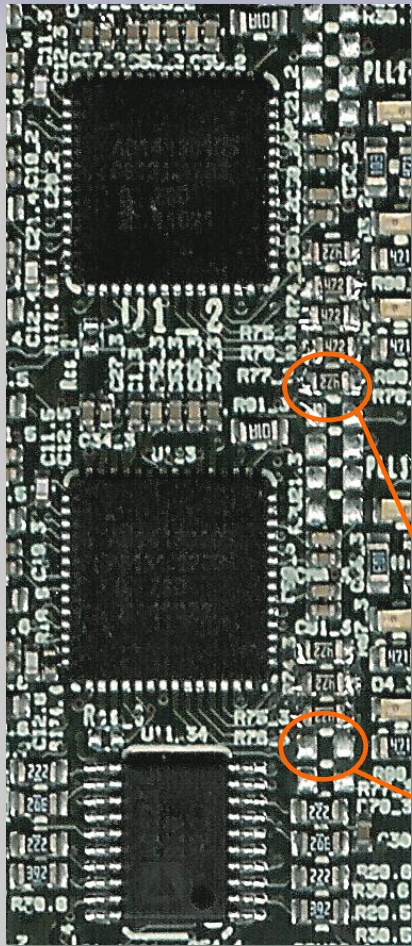


Card 9 core – Missing vias shorted by “flying” wires

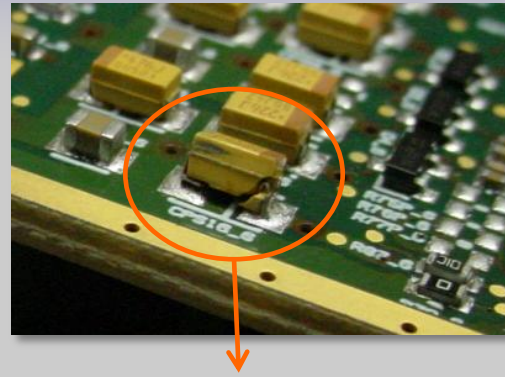
Defective lot: cards with this ID typically show problems with vias



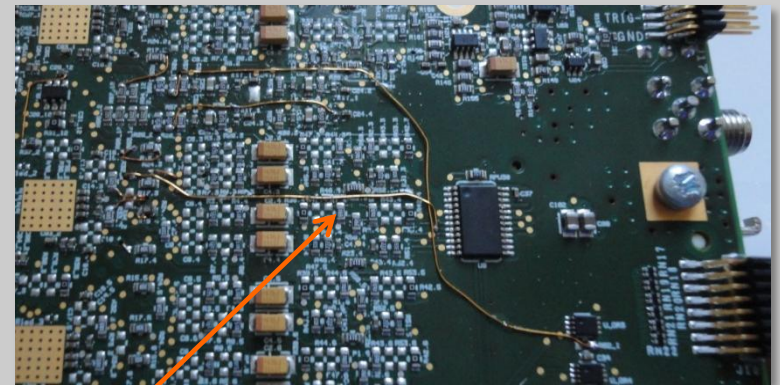
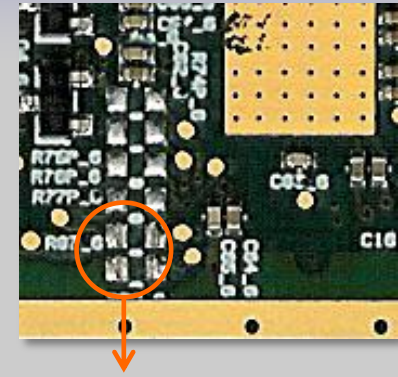
# Other repaired cards (previous run)



**Card 40 segm** – A missing resistor and a wrong resistor installed



**Card 37 segm** – Cap cracked from a hit; two resistors detached (hit?)



**Card 3 core** – Missing vias shorted by “flying” wires

## Note

Some of the screws used to fix the optical TXs were wrong (metric) and have been changed with the proper ones #2-56 x 1/4"