

Hybrid QA status

Japanese SCT group

1. Production status

2. Inspection flow

3. Results

i) Mechanical tests

ii) Electrical tests (I)

iii) Electrical tests (II)

4. Conclusions

Hybrid pre-series Production Status

atlas id	mfr id	Date	Destination	Comment
20220170100001	k4010	10.02.00	RAL	
20220170100002	k4013	10.02.00	RAL	
20220170100003	k4015		KEK	Irradi. Module
20220170100004	k4024	10.16.00	Uppsalla	
20220170100005	k4026	10.16.00	Uppsalla	
20220170100006	k4014	10.16.00	LBL	
20220170100007	k4019	10.16.00	LBL	
20220170100008	k4017	10.27.00	RAL	
20220170100009	k4018	10.27.00	RAL	
20220170100010	k4021		KEK	stock,no module
20220170100011	k4025		KEK	Double decker module
20220170100012	k4011	11.17.00	RAL	mechanical qualificaton
20220170100013	k4016	11.17.00	RAL	mechanical ->Birmingham
20220170100014	k4020	11.17.00	RAL	mechanical qualificaton
20220170100015	k4023	11.17.00	RAL	mechanical qualificaton
20220170100016	k4105	11.17.00	RAL	
20220170100017	k4106	11.17.00	RAL	
20220170100018	k4108	11.17.00	RAL	
20220170100019	k4110	11.17.00	RAL	
20220170100020	k4109	11.17.00	RAL	
20220170100021	k4111	11.17.00	RAL	
20220170100022	k4107	11.17.00	KEK	Thin-metalized module
20220170100023	k4022	11.17.00	KEK	Neutron Irradi.
20220170100024	k4009	01.11.01	LBNL	mechanical qualificaton
20220170100025	k4112	01.11.01	LBNL	mechanical qualificaton
20220170100026	k4119	01.12.01	KEK	220nF module
20220170100027	k4103	01.23.01	RAL	220nF
20220170100028	k4113	01.23.01	RAL	220nF
20220170100029	k4102	01.23.01	Uppsalla	220nF
20220170100030	k4104	01.23.01	Uppsalla	220nF
20220170100031	k4115	01.26.01	LBNL	220nF
20220170100032	k4116	01.26.01	LBNL	220nF
20220170100033	k4114	02.01.01	KEK	220nF+1ohm. Module

33 hybrids have been registered on the database.

Hybrid Inspection Flow

1. Flex circuit
 - Visual inspection
 - Integrity test
2. Carbon-Bridge Hybrid
 - Visual inspection
 - Mechanical tests
3. Passive-component-stuffed Hybrid
 - Visual inspection
4. Hybrid with Pitch adapter
 - Visual inspection
 - Electrical tests
5. Temperature cycle
 - 30 <-> 60 °C transition 30 min.
 - 5 cycles hold 30 min.
 - Visual inspection
 - Mechanical tests
 - Electrical tests
6. Barcode and Data sheet entry

Mechanical tests

Thickness measurement

Micrometer

Flatness measurement

3D vision Measuring Machine

(Mitsutoyo QUICK VISION PRO)

bow (long) $< 75 \mu\text{m}$

bow (cross) $< 50 \mu\text{m}$

Electrical test (I)

Check for Soldering

C-measurement for from Ground to Vcc and Vdd

$$C_{cc}=C_{dd}=0.22\ \mu\text{F}\times 14 + 0.33\ \mu\text{F}\times 4 = 4.4\ \mu\text{F}$$

$$C_{cc}=C_{dd}=0.1\ \mu\text{F}\times 14 + 0.33\ \mu\text{F}\times 4 = 2.72\ \mu\text{F}$$

C1-28(0.22 μF or 0.1 μF), C51-58 (0.33 μF)

R-measurement for four 100 Ω termination resistances

R27, 28, 29, 30 (100 Ω)

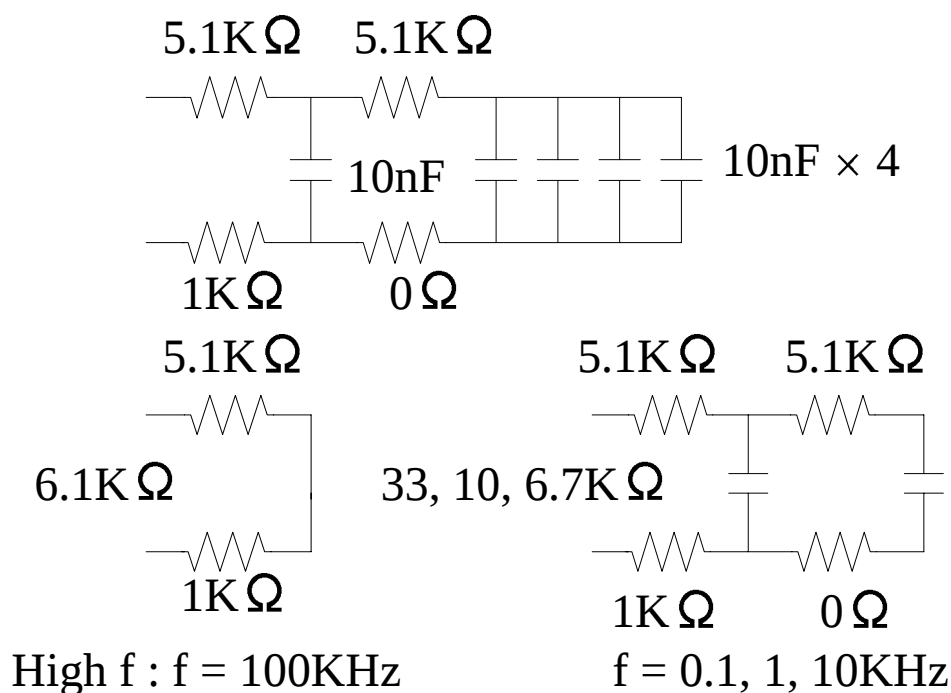
R-measurement for two thermistors

TM1, 2 (10K Ω at 25°C)

Impedance measurement for HV filter network

R33, 34 (5.1K Ω), 35 (1K Ω), 36 (0 Ω)

C71, 72, 73, 74, 75 (10nF)



Electrical test (II)

Check for Adhesion process of Carbon Bridge and Flex

R-measurement between two IC die pads

U1-U6 $< 4\text{m}\Omega$

U7-U12 $< 4\text{m}\Omega$

LV leakage check at 16V (for LV capacitor) $< 10\text{nA}$

Ground - Vcc

Ground - Vdd

HV leakage check at 500V (for HV capacitor) $< 10\text{nA}$

Ground - HV line

Conclusions

- So far produced 37 hybrids
- Applied full QA inspection:
 - 31 passed all criteria.
 - > good quality
 - 3 failed "bow" criteria.
 - 1 had bad bonding pads.
 - 2 had some scratches.
 - > mechanical grade (6 in total)
- So far registered 33 in database, and then delivered to;
 - UK (12 good and 4 mechanical)
 - US (4 good and 2 mechanical)
 - Nordic (4 good)
 - (Total; 20 good and 6 mechanical)
- Accumulating statistics and also gaining experience