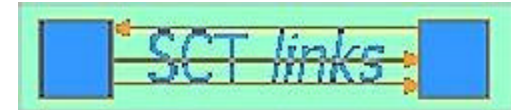




Dog Leg Status



- **Mechanical Design.**
- **Layout for next iteration of dog-leg.**
- **Radiation lengths.**
- **Solder connection to Al tape.**
- **Mechanical tests with dummy harnesses.**

Mechanical Design

- See proposal by Eric Perrin
- Fibre loop from harness to opto-package. Simplify this by rotating opto-package.
- Clips to ensure opto-package is in good thermal contact with the cooling pipe.
- Dog-legs fastened on the bracket. This is adjustable. Use module template to make precision adjustment. Ideally one fixed template for all modules. If necessary have adjustable template and set it differently for each module
- Dog-leg adjustment to allow for lower and upper modules.

Mechanical Design(2)

- Compliance in the bend sufficient to allow for the contraction of the Al tape (0.5mm worst case). This will be tested with ESPI and dummy harness on a carbon fibre sector in an environmental chamber.
- If this is a problem need to provide loops in low mass tape along barrel to take out contraction.
- Open questions:
 - opto-package protection.
 - protection for bare fibres near package.
 - attaching fibres to tapes and dog-leg.

Layout

- **Remove unused lines on module connector**
 - Select and return (duplicate)
 - Vi1 and return (not used)
 - 2 returns (duplication)
 - remove separate PIN bias return.
- **Simplify analogue V_{CC} and return.**
- **Use 30 pin module connector (cf 36).**
- **Use thinner kapton and reduce widths of control lines to 100 μ m.**
- **More flexible and less material ==> Figure**

Radiation Length Calculation

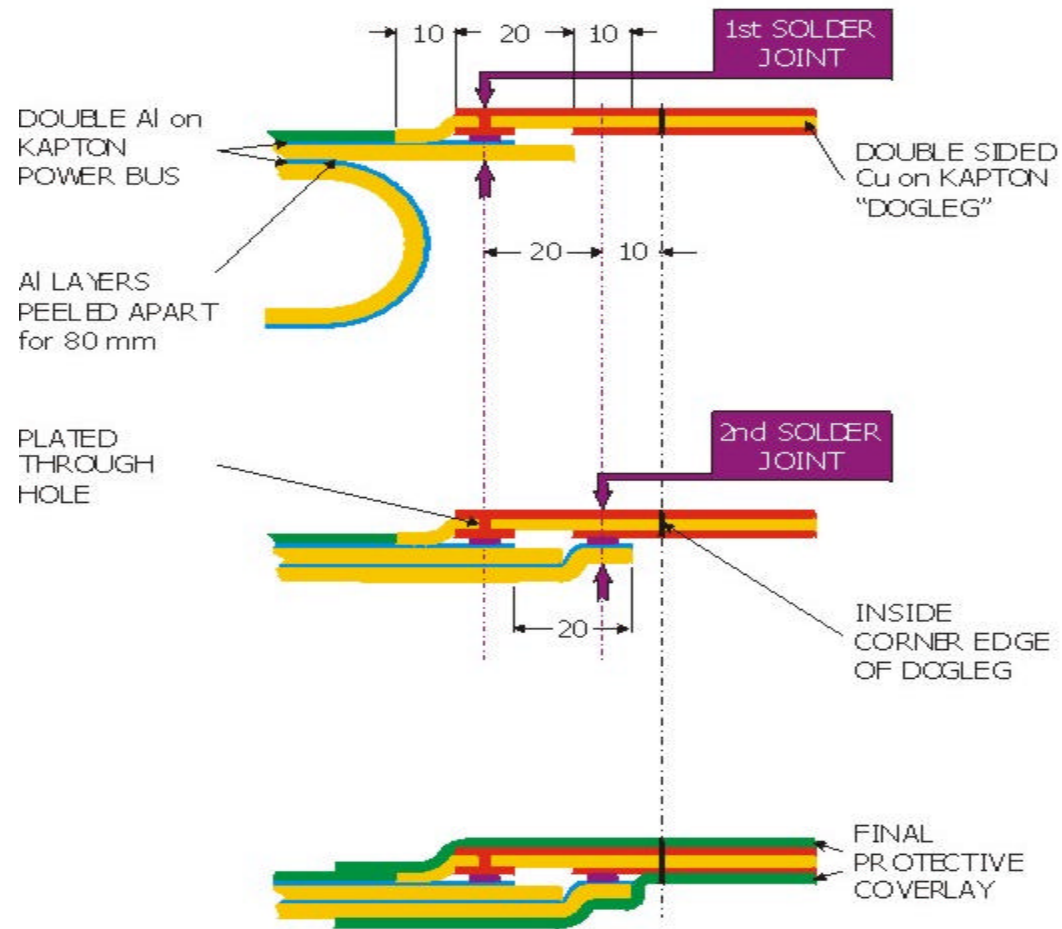
Item	material	radiation length	thickness (mm)	packing fraction	X0
VDC	Si	93.6	0.3	4.58E-04	1.47E-06
DORIC	Si	93.6	0.3	6.10E-04	1.96E-06
Opto-package	Si	93.6	1.34	4.20E-03	6.01E-05
Opto flex kapton+coverlay	kapton	280.6	0.1	4.80E-01	0.000171
Opto flex adhesive	glue (TDR)	120	0.1	4.80E-01	0.0004
Opto flex Cu	Cu	14.3	0.044	2.77E-01	0.000852
Opto flex rigid	FR4	330	0.8	4.17E-02	0.000101
Bridge Connection	kapton	280.6	0.5	1.17E-01	0.000208
Bridge Connection	Cu	14.3	0.022	5.83E-02	8.97E-05
2 capacitors	BaTiO3	18.54	1	7.32E-04	3.95E-05
fixations	Al	89	1	1.22E-04	1.37E-06
fibre core	SiO2	270.5	0.125	1.38E-02	6.38E-06
fibre clad	plastic	450	0.25	2.07E-02	1.15E-05
Total r.l.					0.001945

Solder Connection to Al tape

- **Simplify connection by eliminating bridge piece (==> Figure).**
- **Develop methods for production (RAL)**
- **Solder plate test pieces OK**
- **solderability tests OK**
- **bonding trials**
- **Temperature cycling**
- **Equipment selection (pulsed thermode)**
- **Jigs and tooling design**
- **High statistics study (150 short lengths of Al tape available)**



Suggested sequence for joining Al power bus to Cu dogleg harness VERSION II



PD. Shield
9Nov-99

Mechanical Tests

- Make up dummy fibre part of harness. Includes splitting 12 way into two 6 way ribbons and putting fibres into lids.
- Mechanical trails with new dog-legs (flexibility and compliance)
- Mechanical tests of fibre and cable harness.

Harness Schedule

- Thermal tests of harness on carbon fibre sector: December '99.
- Build barrel harness-1 for system-1 test Nov 99 – Feb 00
- Build endcap harness-1 for system-1 test March 00 - June 00
- Build barrel harness-0 for system test-0 Mar 00 – Jun 00
- Build endcap harness-0 for system-0 April 00- July 00
- Harness FDR Aug 00