

SPACE PASSIVE COMPONENT DAYS

2nd SPCD - International Symposium

ESA/ESTEC

12-14 October 2016



axon'
cable & interconnect



MULTI-MODULAR POWER & RF CONNECTORS

Gilles Rouchaud

- **Connectors range developed for space industry in the frame of an ESA EMITS (TRP)**

Based on micro D connectors

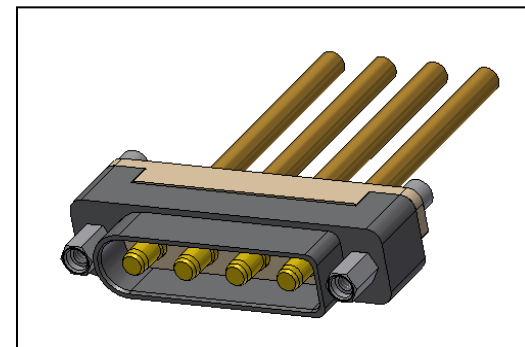
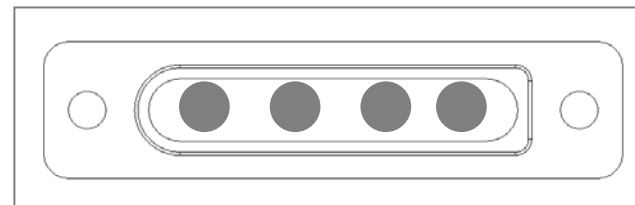
Cavities for Size 12 **power** & **coaxial** contacts

- Available in 4 or 8 ways.
- Power contacts up to 40 A
- Coaxial contacts up to 18 GHz

MMC & MMCA = Military & aeronautical line

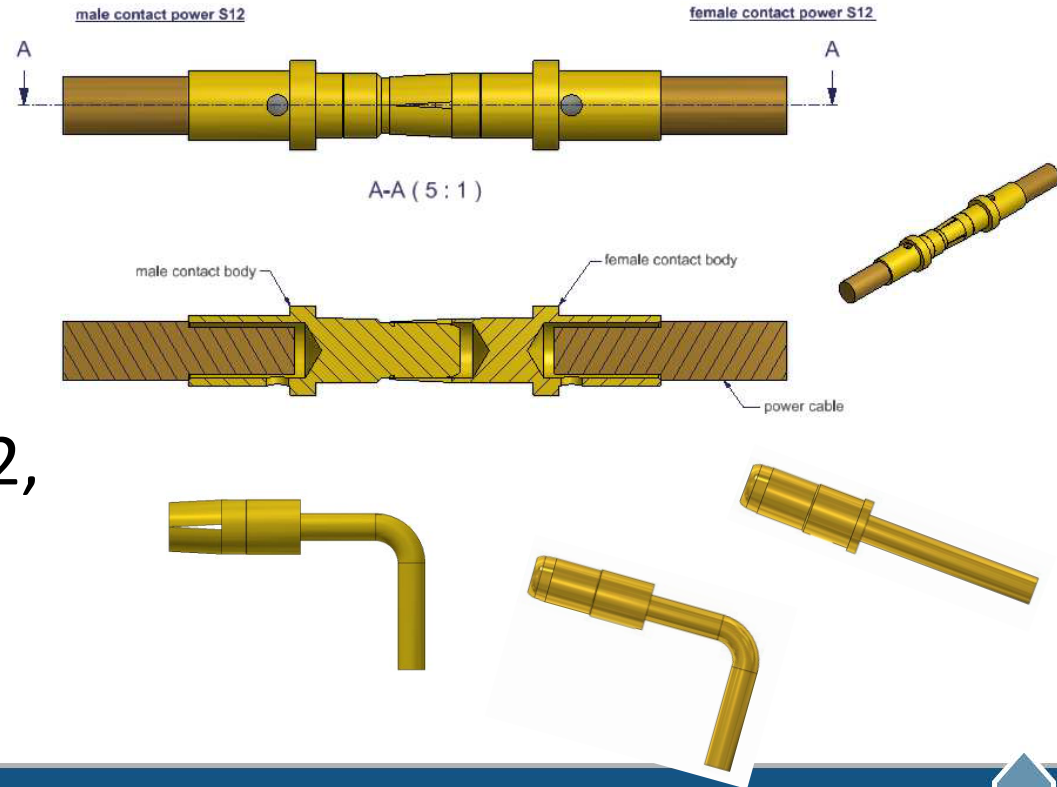
MMCS & MMCSA = Space Line Quality

A for "Amovable" ≈ Removable



MMC / MMCA connectors

- Size 12 power contacts
- Up to 40 A
(20 A using ESA derating)
- Low resistance
- Compatible with AWG12, 14 and 16 wires



MMC / MMCA connectors

Coaxial contacts

- Size 12: 50 Ω

- Insertion losses:

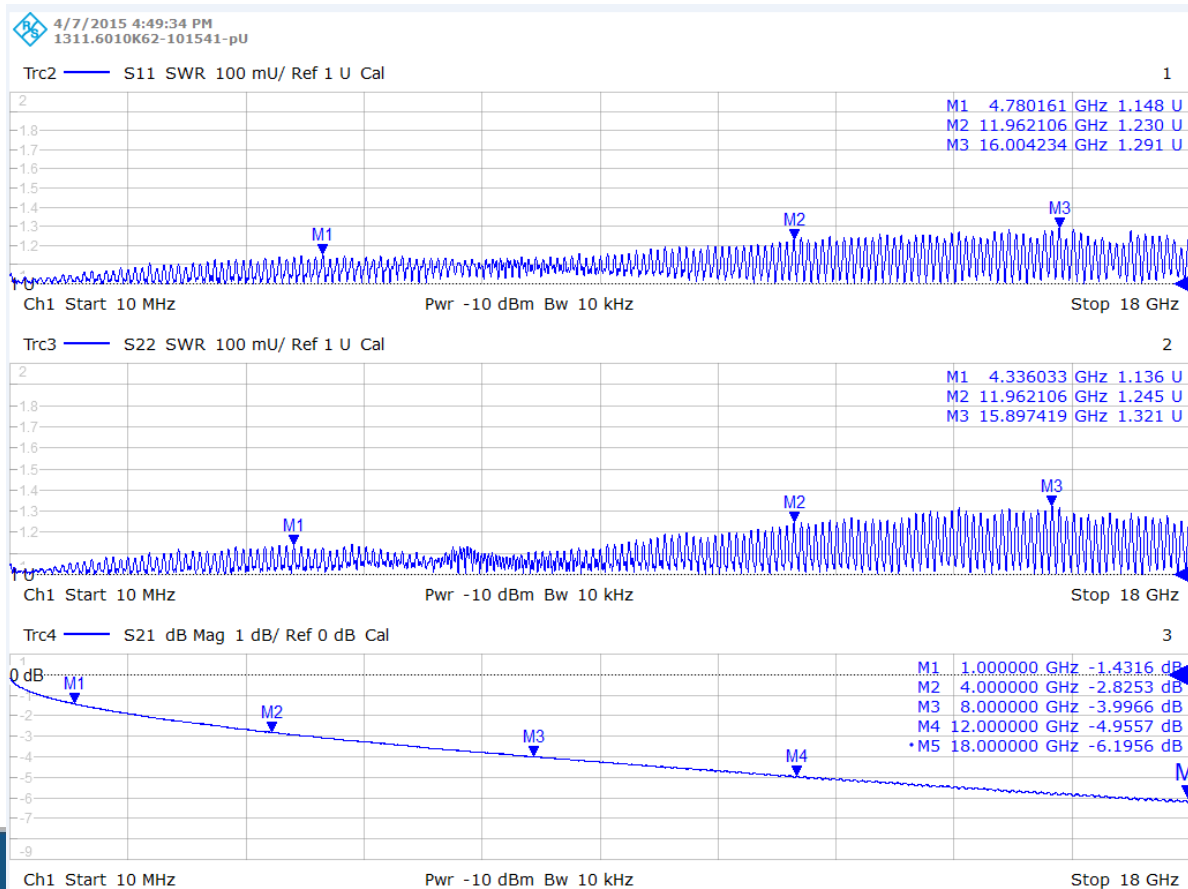
Cable : $0.7v(F) + 0.030F * L + 0.07v(F)$ F in GHz per contact

- VSWR:

- dc to 6GHz: 1.20

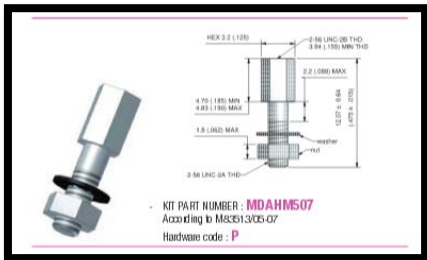
- From 6GHz to 9GHz: 1.30

- Up to 18 Ghz: <1.4



MMC /MMCA Hardwares

□ All standard μ d range



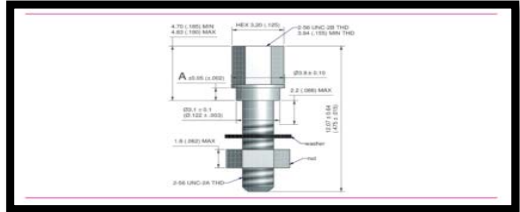
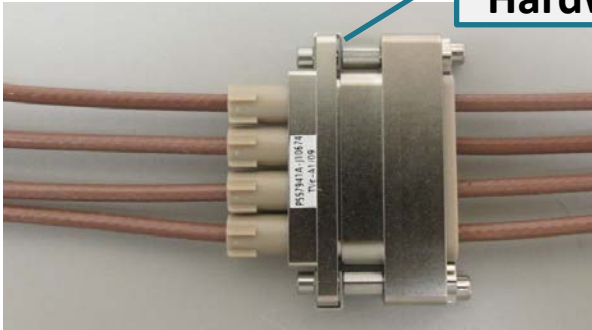
Rear panel mount jackposts

- 2 sizes of hardware : one version for all shell sizes for 9 to 51 way and a separate version for the 100 way shell size.
- 1 kit consists of 2 posts, 2 washers and 2 nuts.
- Material - passivated 303 stainless steel.

Dimensions are given in millimetres (inches).

PANEL THICKNESS +0.0 / +0.2 (-.000 / +.008)	9mm	1.2	1.6	2	2.4	
inch	.351	.047	.062	.079	.094	
KIT PART NUMBER	MDAHP01	MDAHP02	MDAHP03	MDAHP04	MDAHP05	
100 way	MDAHP11	MDAHP12	MDAHP13	MDAHP14	MDAHP15	
inch	.07	1.1	1.5	1.9	2.3	
DIM. A	inch	.078	.043	.058	.075	.091

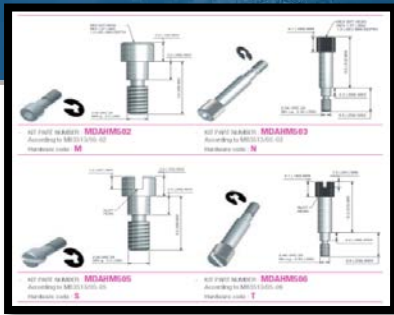
Micro D Hardware



Floating mount - type F

P	d	D1	OH Max	OH Min
Max 4.7	1.0	0.8	4	2.3

Notes:
 1. All dimensions are in mm
 2. Total lateral float 0.4 (typical)
 3. Total axial float 0.4 (typical)

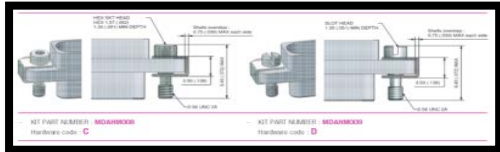


LONG JACKSCREW (SLOT HEAD)

HARDWARE CODE : K

SHORT JACKSCREW (HEX SKT HEAD)

HARDWARE CODE : L



Captive nut - Type E

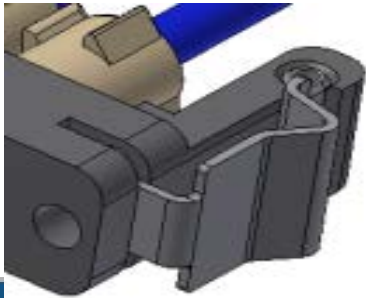
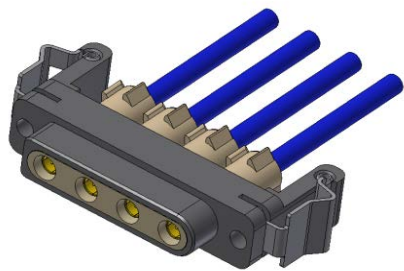
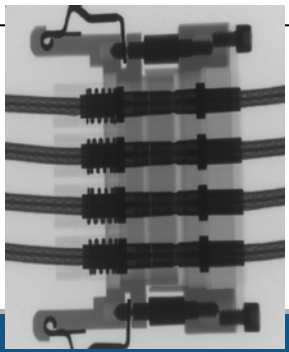
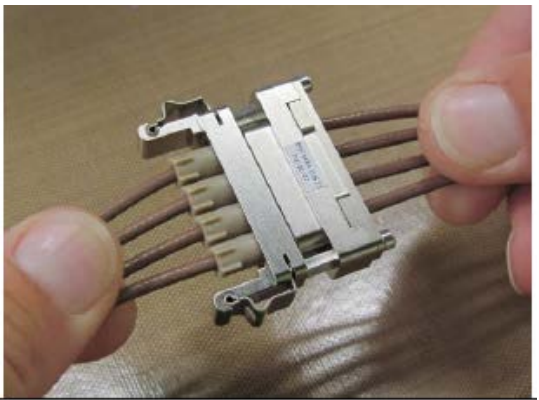
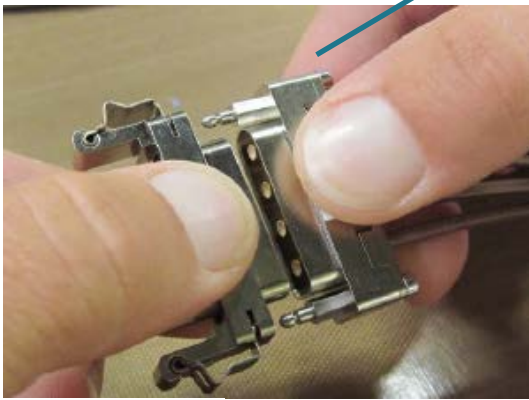
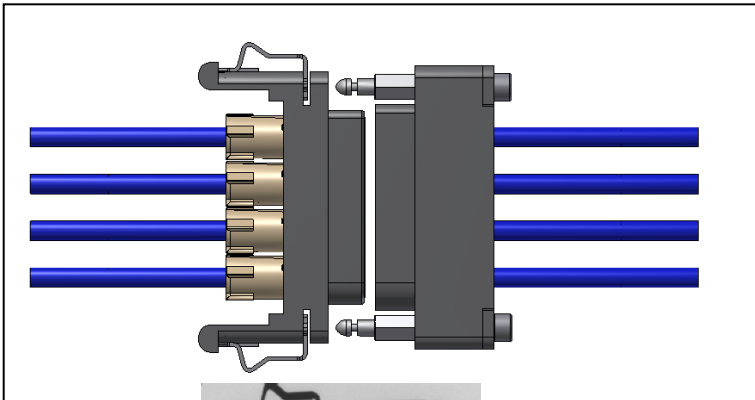
Øg	3 Max	ØH Max
Note 2	2.6	5.1

Notes:
 1. All dimensions are in mm.
 2. (Øg: 2.76 LING. DR. Placement tolerance: 0.498 mm)

MMC /MMCA Fast locking hardwares

Fast locking Dclick_{TM} hardwares

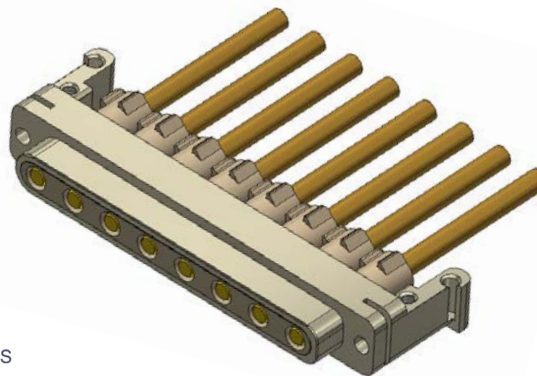
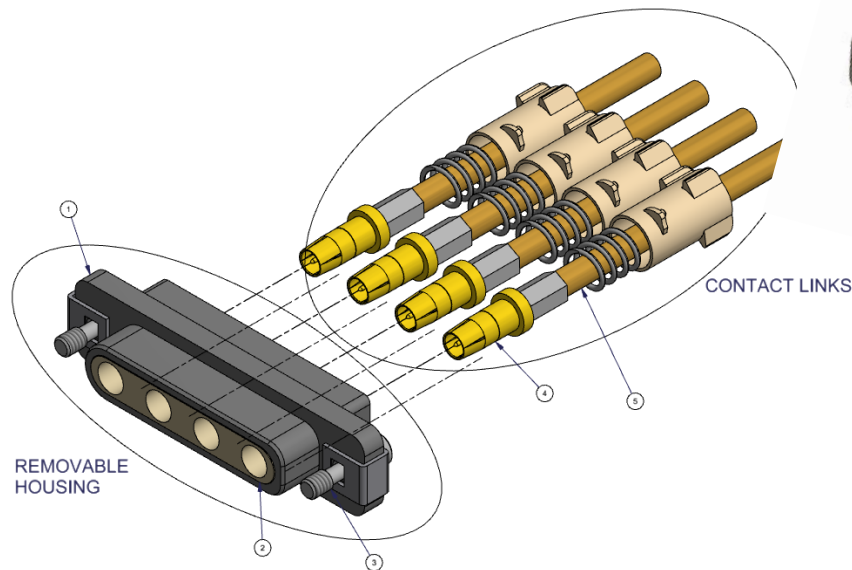
D click



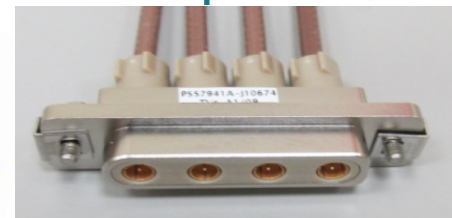
MMC / MMCA connectors

Dismountable (No tooling needed).

Potted versions



Dismountable



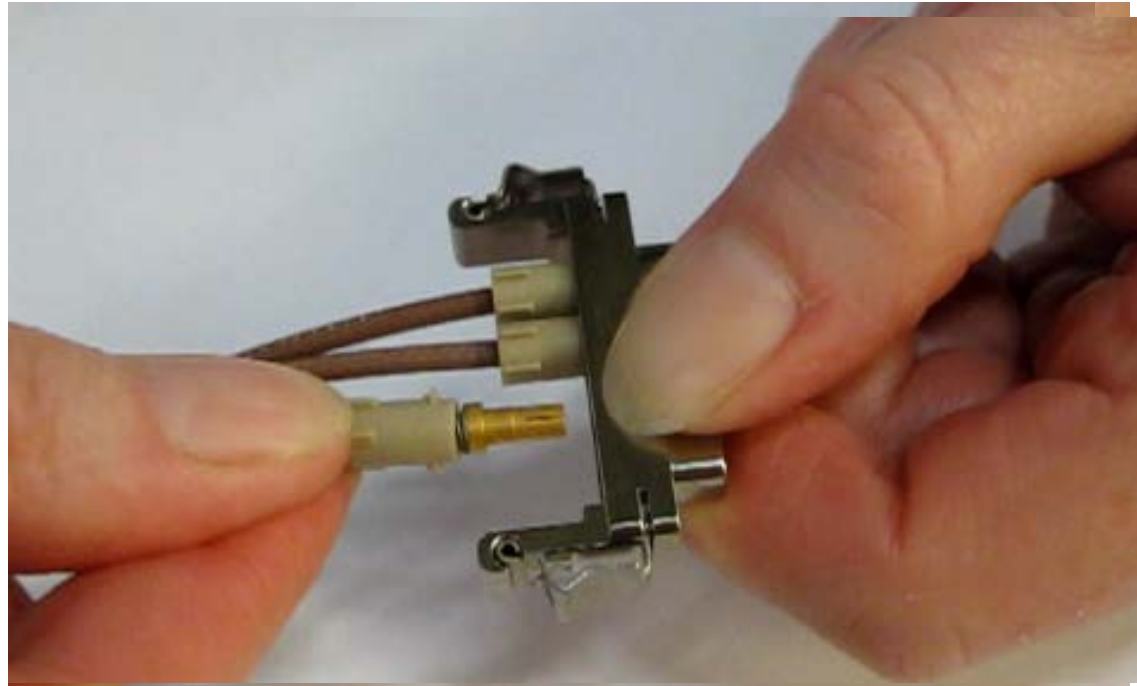
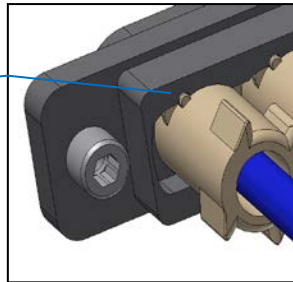
Potted



MMC / MMCA connectors

**Contacts
removal in
three steps.
No tool.**

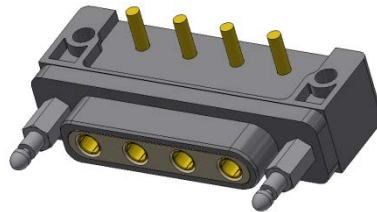
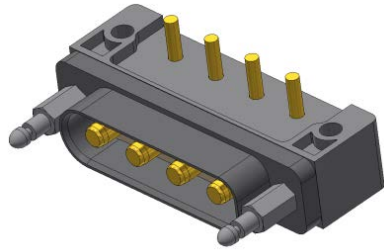
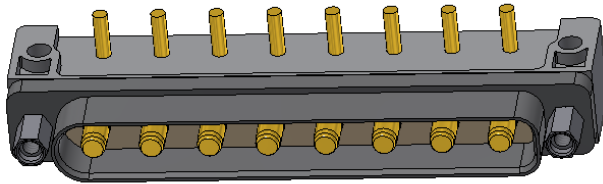
Visual
check
of the
locked
position



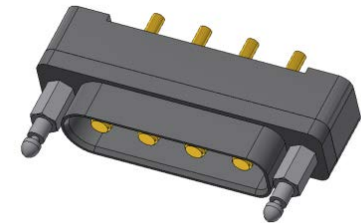
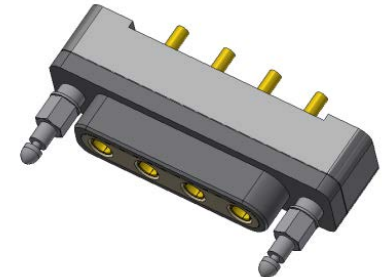
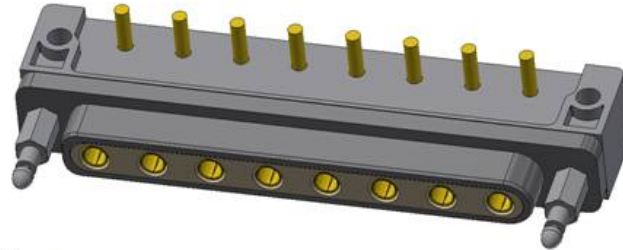
3rd step: Remove the contact

PCB range of connectors: CBR & BS versions.

CBR - Pin & Socket 4 & 8 ways



BS - Pin & Socket 4 & 8 ways



5 Groups

- Group 0: Test of contacts alone according to ESCC3401
- Group 1: **Electrical tests** after storage at low and high temperature).
- Group 2: **Vibrations & thermal**
 - ✓ Random and shocks- ESCC 3408 (cable assemblies specification draft)
 - ✓ Rapid change of Tpte (-55°C to +150°C)
- Group 3: **Endurance:**
 - ✓ Thermal endurance: 2000h at +150°C or 200°C
 - ✓ Mechanical : 1000 mating/demating cycles.
- Group 4: **EMI tests, RF & power performance** at low (-65°C) and High (+200°C)
- Group 5: **Overload current and voltage** in TVAC and ambient pressure.

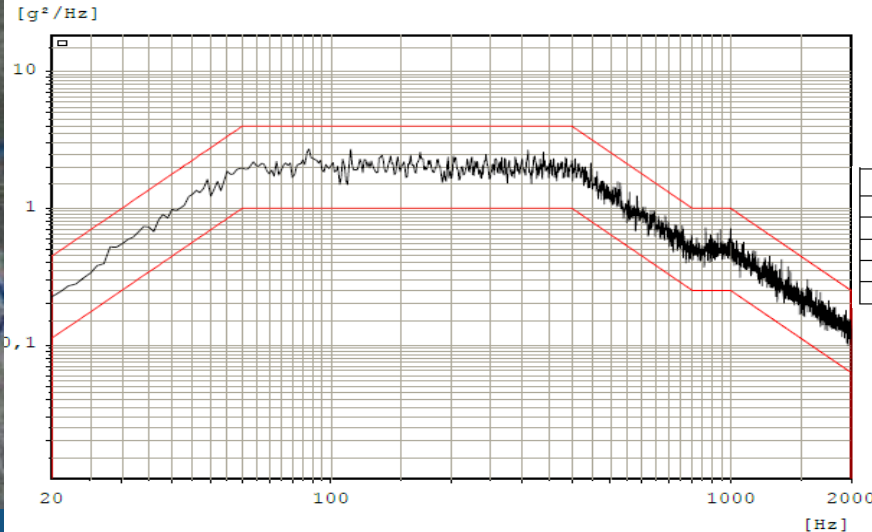
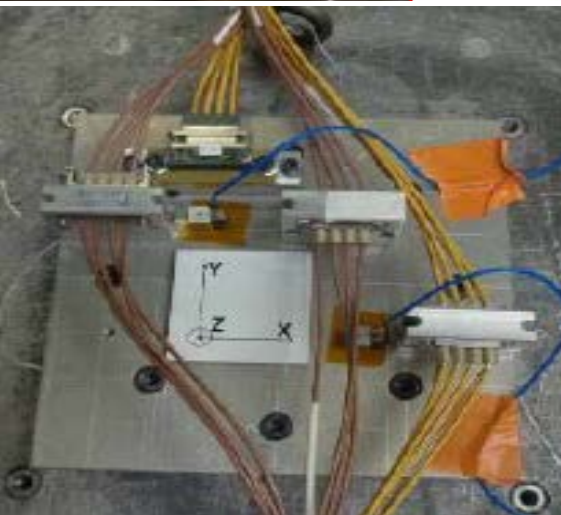
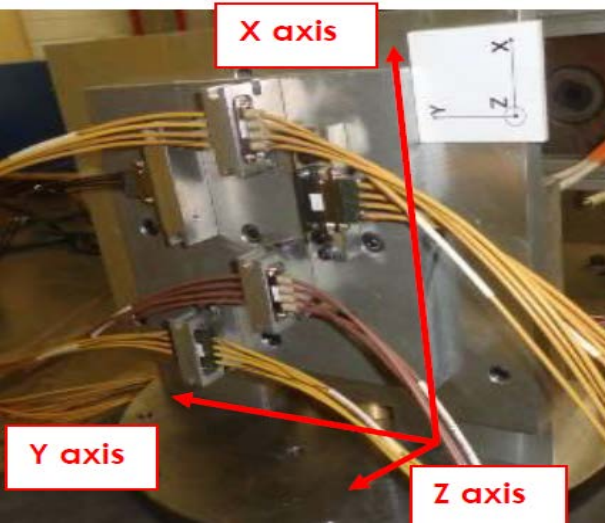
Group 2: G2-01

Random vibrations

According to RF cable assemblies future ESCC3408

Duration: 360s in each of the 3 mutually perpendicular axes.

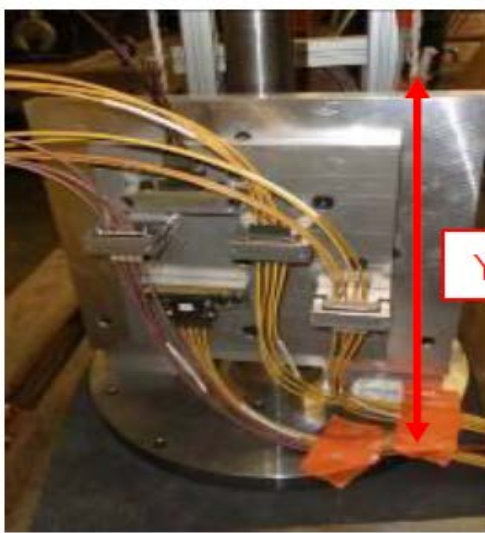
Micro-cut detection during test.



RMS (

Envelope: Grms = 38.5	
20 to 60 Hz	+6dB / Octave
60 to 400 Hz	2g ² /Hz
400 to 800 Hz	-6dB / Octave
800 to 1000 Hz	0.5g ² /Hz
1000 to 2000 Hz	-6dB / Octave

Group 2 : G2-02



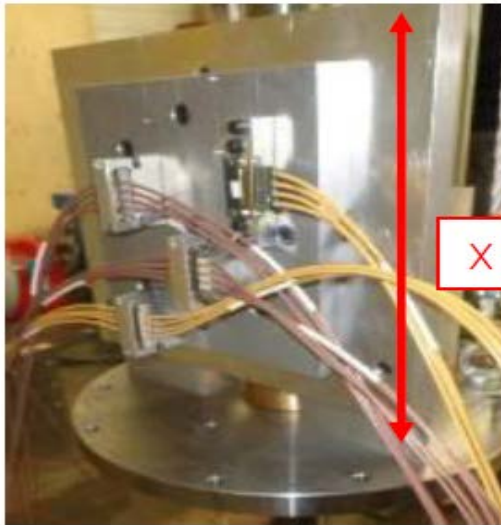
Y axis

Shape of shock pulse: Half-sine

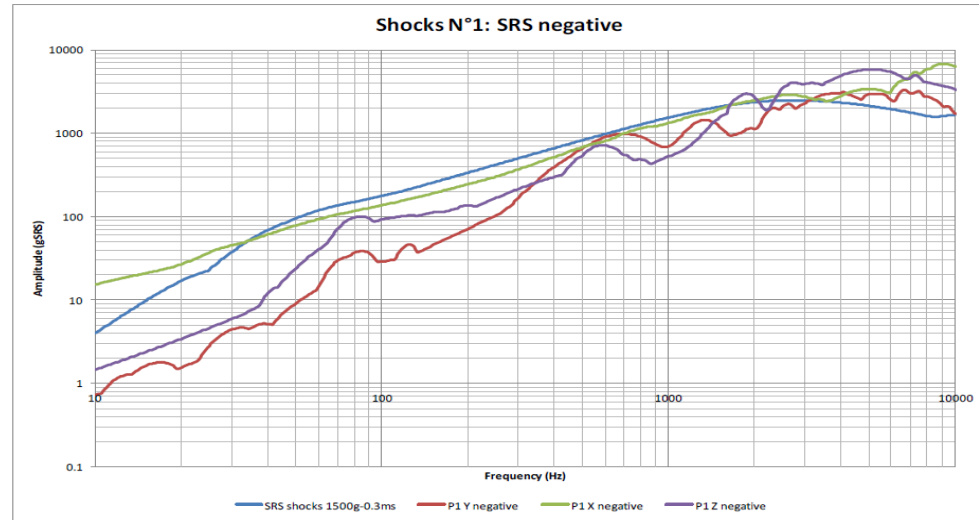
Peak acceleration: 1500g.

Duration of pulse: 0.3ms.

Number of shocks: 18



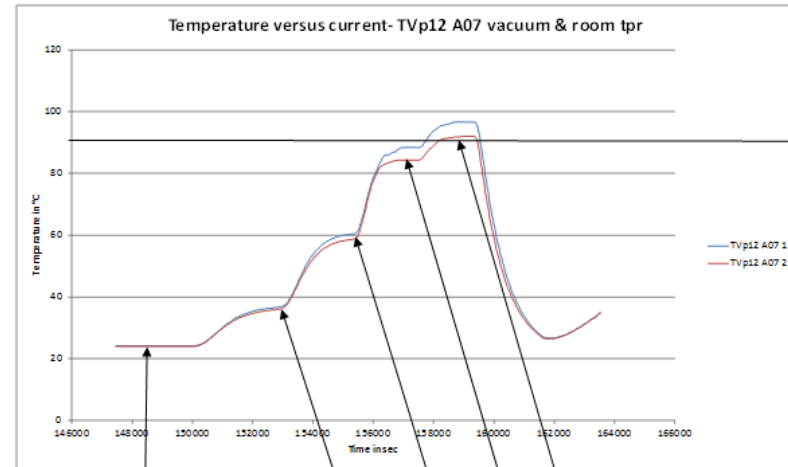
X axis



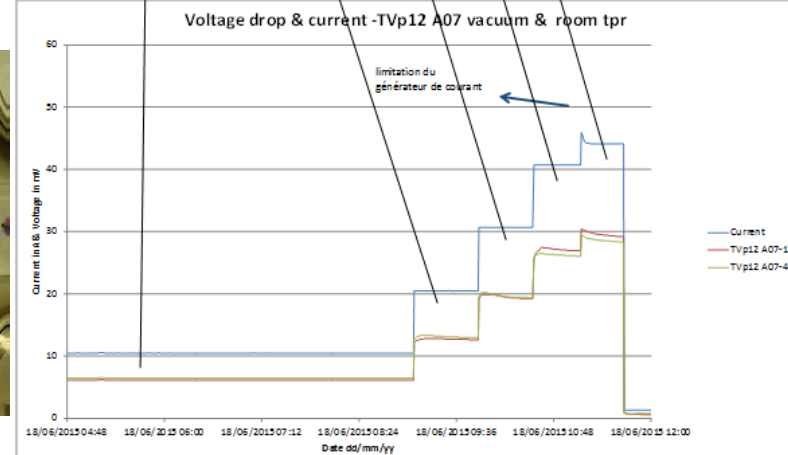
MMC : Group 5

TVAC: Overload current

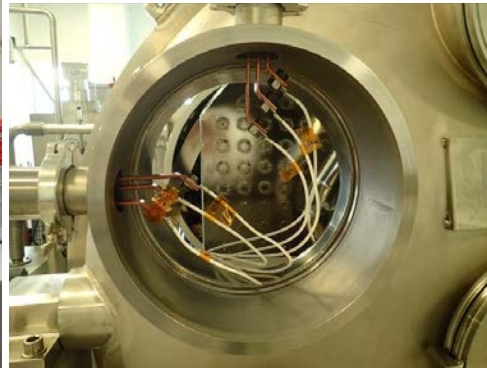
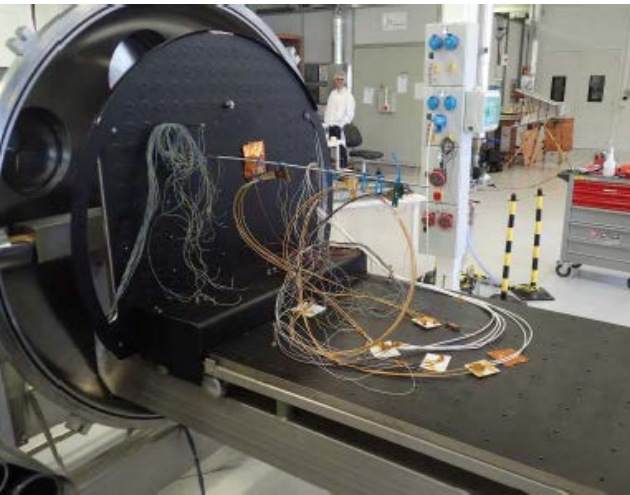
T on connectors=25°C	- T ambient=20°C	- Δt = 5°C	for	I= 10A
T on connectors=35°C	- T ambient=20°C	- Δt = 15°C	for	I= 20A
T on connectors=60°C	- T ambient=20°C	- Δt = 40°C	for	I= 30A
T on connectors=85°C	- T ambient=20°C	- Δt = 65°C	for	I= 40A
T on connectors=95°C	- T ambient=20°C	- Δt = 75°C	for	I= 45A



Ox scale=200=34mm



T on connectors=25°C	- T ambient=20°C	- Δt = 5°C	for	I= 10A
T on connectors=35°C	- T ambient=20°C	- Δt = 15°C	for	I= 20A
T on connectors=60°C	- T ambient=20°C	- Δt = 40°C	for	I= 30A
T on connectors=85°C	- T ambient=20°C	- Δt = 65°C	for	I= 40A
T on connectors=95°C	- T ambient=20°C	- Δt = 75°C	for	I= 45A



- Development achieved.
- Extensive evaluation done and positive
- ESCC specifications are under review process
- First orders on Satellite Constellation batteries and PCDU/PLIU equipments.

