Radiall™ | SIMPLIFICATION is our INNOVATION

Multifiber interconnect solutions for payload data processing

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ESCCON – March 2023

WHO **WE ARE**

Radiall™

AN INTERCONNECT COMPONENT SPECIALIST FOCUSED ON 3 CORE TECHNOLOGIES

Radio Frequency • Fiber Optics • Multipin Packaging

D-Lightsys — Active Optics

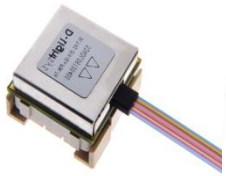
timbercon — Fiber Optics

VanSystem — Industrial Connectors

RAYDIALL — Automotive Connectors

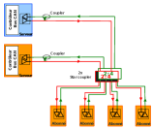
IDMM — High Precision Machining

Optical Interconnect Solutions



Transceivers

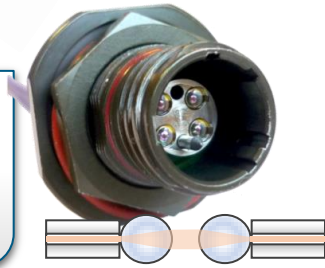
D-Lightsys



Expertise
Training
Kits

PROVIDE
END TO END
OPTICAL
SOLUTIONS
FOR **DEMANDING**
ENVIRONMENTS

Contacts
Connectors
Accessories



Cable assemblies
Harnesses
Integrated solutions

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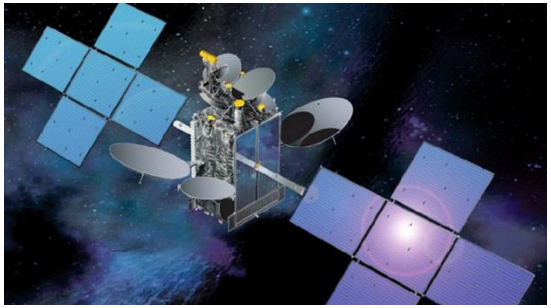
Focus on 3 markets

Commercial Aerospace

Defense

Space



Leveraging OIS range and Radiall space experience

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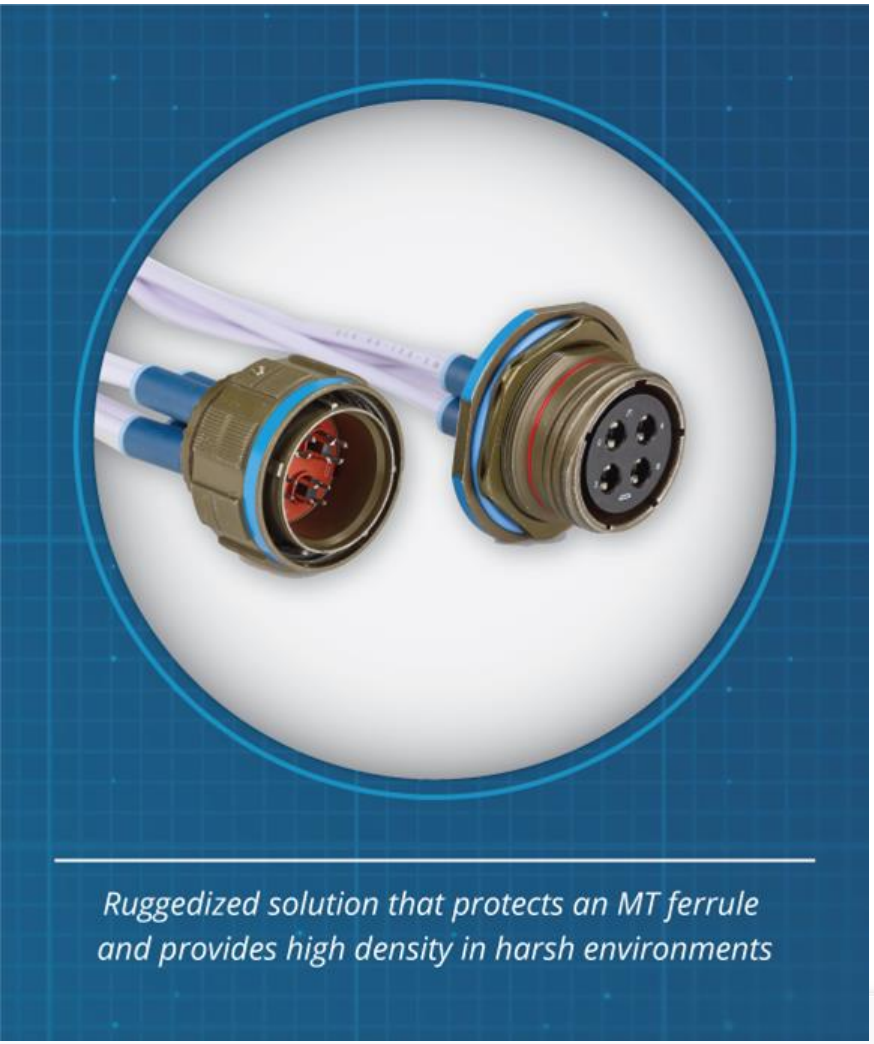
Developing for Space using Aerospace heritage



Q-MTitan™: baseline for ARINC846, aerospace industry standard for MT contact

- Published in August 2018

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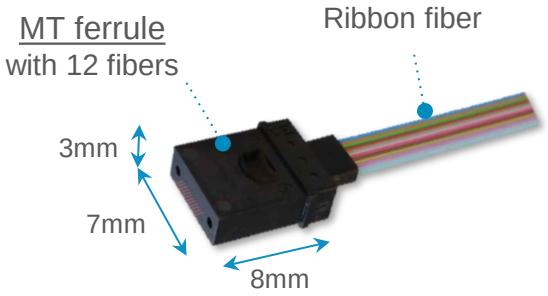
Q-MTitan™ ARINC 846: versatile contact

Q-MTitan™ integrates the widely used MT ferrule in a small & ruggedized body to **fit a variety of connectors**



MIL-DTL-38999

Quick Fusio

ARINC 600

HDQX

Q-MTitan™ ARINC 846 Fiber Optic contact

Versatile FO contact

- Fits standard # 8 Quadrax cavity of Off-The-Shelf connectors
- Suitable for both inside & outside the box: compatible with ribbon fibers and round cable

Ruggedized

- Ruggedized and pull-proof optical solution
- Pre-alignment system
- High vibration level: 41,7 Grms
- Mechanical endurance : 500 mating cycles

Extremely Dense interconnect

- 12 or 24 fibers in 1 Quadrax cavity

Q-MTitan™ based solution for Space

- CNES and Radiall started a study in 2017 to **specify, design & test** multifiber interconnect solutions for Space environments to support high datarate applications such as **payload data processing in VHTS satellites**

Q-MTitan Arinc 846

- Radiall has based the multifiber interconnect solutions on its multifiber optical contact **Q-MTitan™** along with **HDQX connectors** with a few adjustments

HDQX for Space

Commercial HDQX

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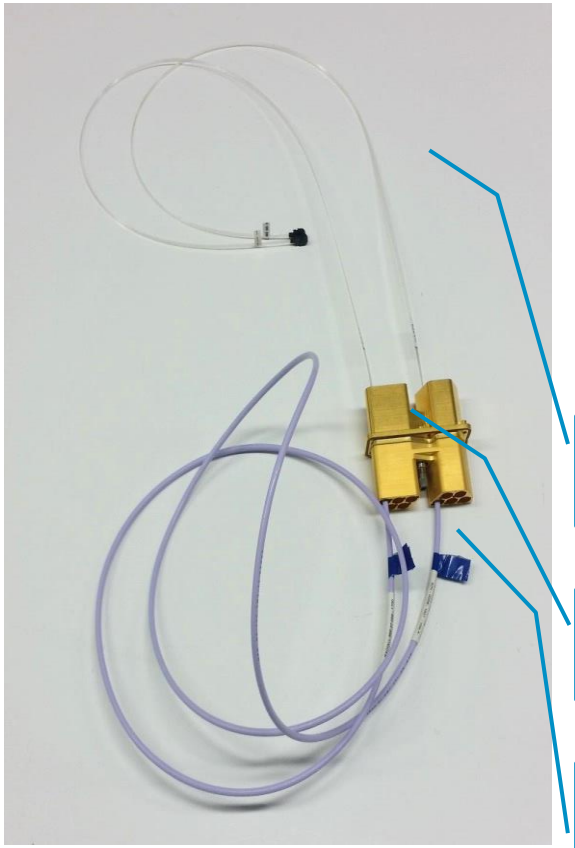
Q-MTitan™ solution for Space – key features

- High **density** solution
- **Optimized weight**
- **EMI** : Shielding effect > 55dB up to 18GHz
- **Low outgassing** materials



Cable assemblies with radiation resistant fibers

Max eol attenuation deeply depends on wavelength, condition of injection, dose rate and temperature

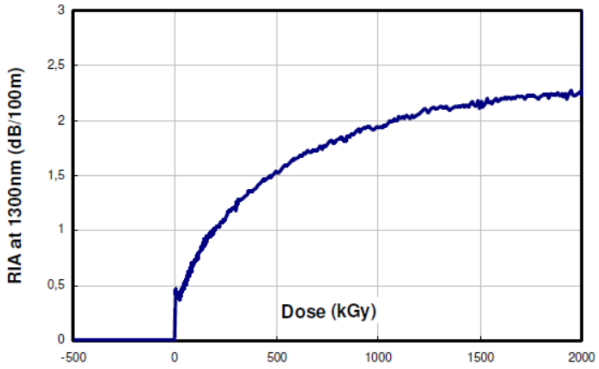
Q-MTitan ruggedized cable assemblies - Length = 5m

- Ruggedized round cable made of PFA external jacket, aramid strength members and PTFE internal tube

  => Keeps its integrity and don't break

- With 12 **Super Hard Rad** fibers
  - OM2 NON bend insensitive (R: 40mm)

  => @ 0-15 MRad RIA: 0,12 dB

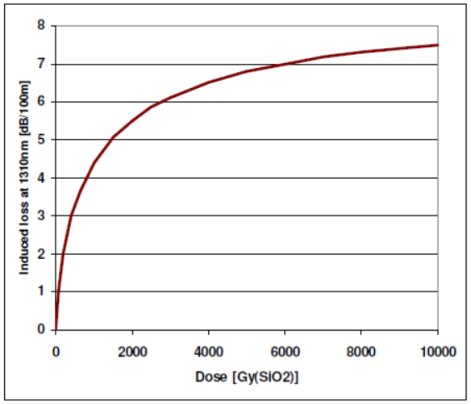


Example of RIA for Draka SRH-MMF at 1300 nm under dose rate of 1.25 Gy/s up to 2 MGy at 45°C

Q-MTitan ribbon assemblies – Length = 0.4m

- With 12 **Hard Rad** fibers

  => @ 1 MRad RIA: 0,07 dB



Typical RIA for Draka RH 50 µm MMF at 1300 nm; dose rate 1.67 Gy/s, T=28°C

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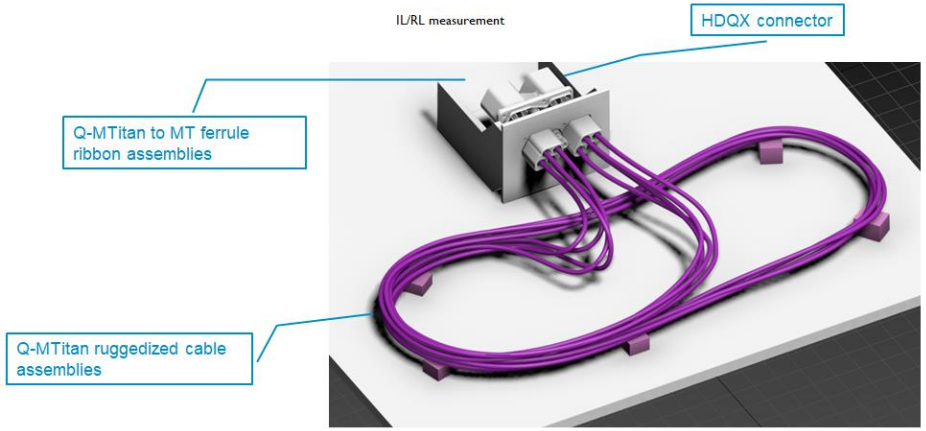
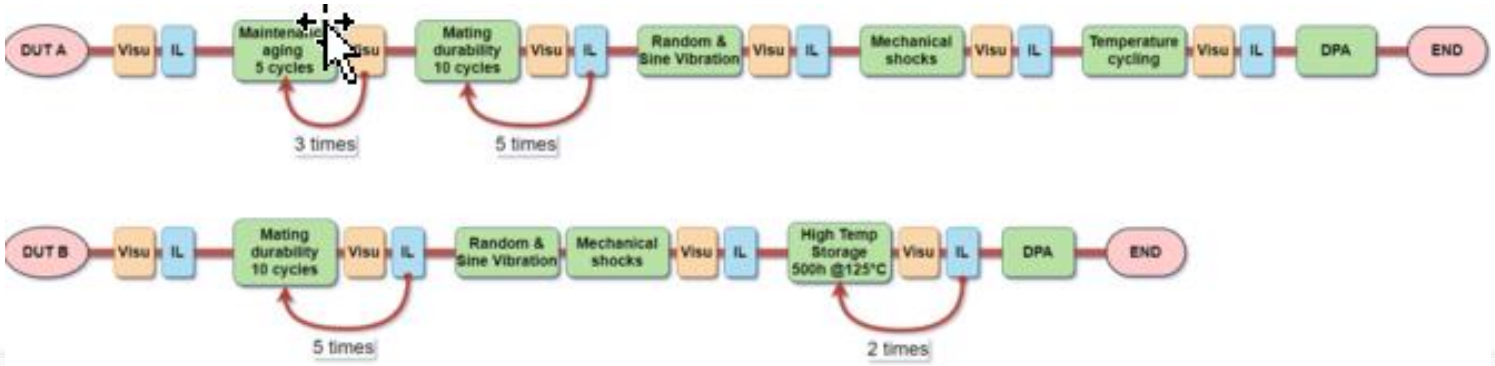
Qualification of the Q-MTitan™ based solution

- With the support of Thales Alenia Space

- Representative DUT



- Test sequences



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Test summary

Test	Standard	Condition & sanctions	DUT	
			A	B
Radiation		On optical fibers	✔ (not on DUTs)	
Visual Inspection	EN2591-101	@ x200: No damage, no contamination	✔	✔
Insertion Loss IL	IEC 61300-3-4 (B)	IL variation after test: <1dB for a full line (1 *Q-MTitan*™: 0,5dB)	✔	✔
Return Loss RL	IEC 61300-3-6	RL < -20dB	✔	✔
Maintenance aging		**15 cycles:** insert/extract Q-MTitan™ on both sides of the connection while unmated	✔	
Mating durability	IEC 61300-2-2 (A)	**50 cycles.** Measurement every 10 cycles with cleaning authorized	✔	✔
Random Vibration		**40Grms** up to 2000Hz. 3min per axis on 3 axis	✔	✔
Sine Vibration		**Level 20G** up to 100Hz. 1 cycle in each of the 3 axis	✔	✔
Mechanical shocks		**2000G** 10000Hz	✔	✔
Temperature cycling	IEC 61300-2-22	**-55/+125°C**, 50 cycles, 5°C/ min, dwell time: 1 h	✔	
High Temperature storage	IEC 61300-2-18	**1000h @125°C**		✔
DPA: contact retention	IEC 61300-2-4	Retention force: 68N for 1min, then up to breakage	✔	✔
Damp heat	IEC 61300-2-46	+25°C / +55°C, dwell time: 9h, number of cycles: 6, 10°C/h- RH:95% (on ribbon)	✔ (not on DUTs)	

Evaluation @850nm with overfilled launch conditions.

Successful qualification

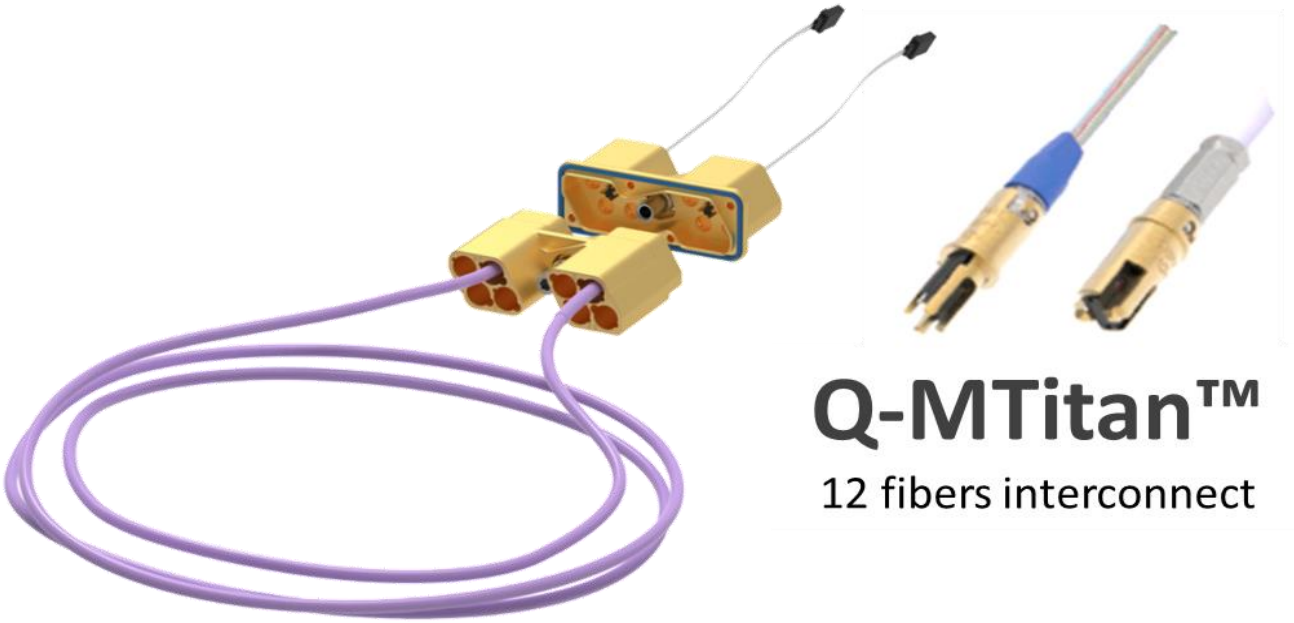
- All tests passed
- EOL value IL < 1 dB (non irradiated conditions)

The full optical link made of Q-MTitan™ cable assemblies and HDQX connectors is qualified for space applications

Now in Space

On board of SES-17

In orbit since October, 24th 2021



Q-MTitan™

12 fibers interconnect

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Coming next

- 24 fiber interconnect solutions to increase fiber counts and density
- Expand connector range

Conclusion

- Multifiber interconnect solution for Space application based on Q-MTitan™ contact and HDQX connector
- Leveraging our aerospace heritage
- Adjusted to meet application requirements
  - Environment
  - Weight & density
  - Ease of integration
- Expanding range for increased density and versatility

Radiall™ | SIMPLIFICATION is our INNOVATION

Thank you for your attention
Any question ?