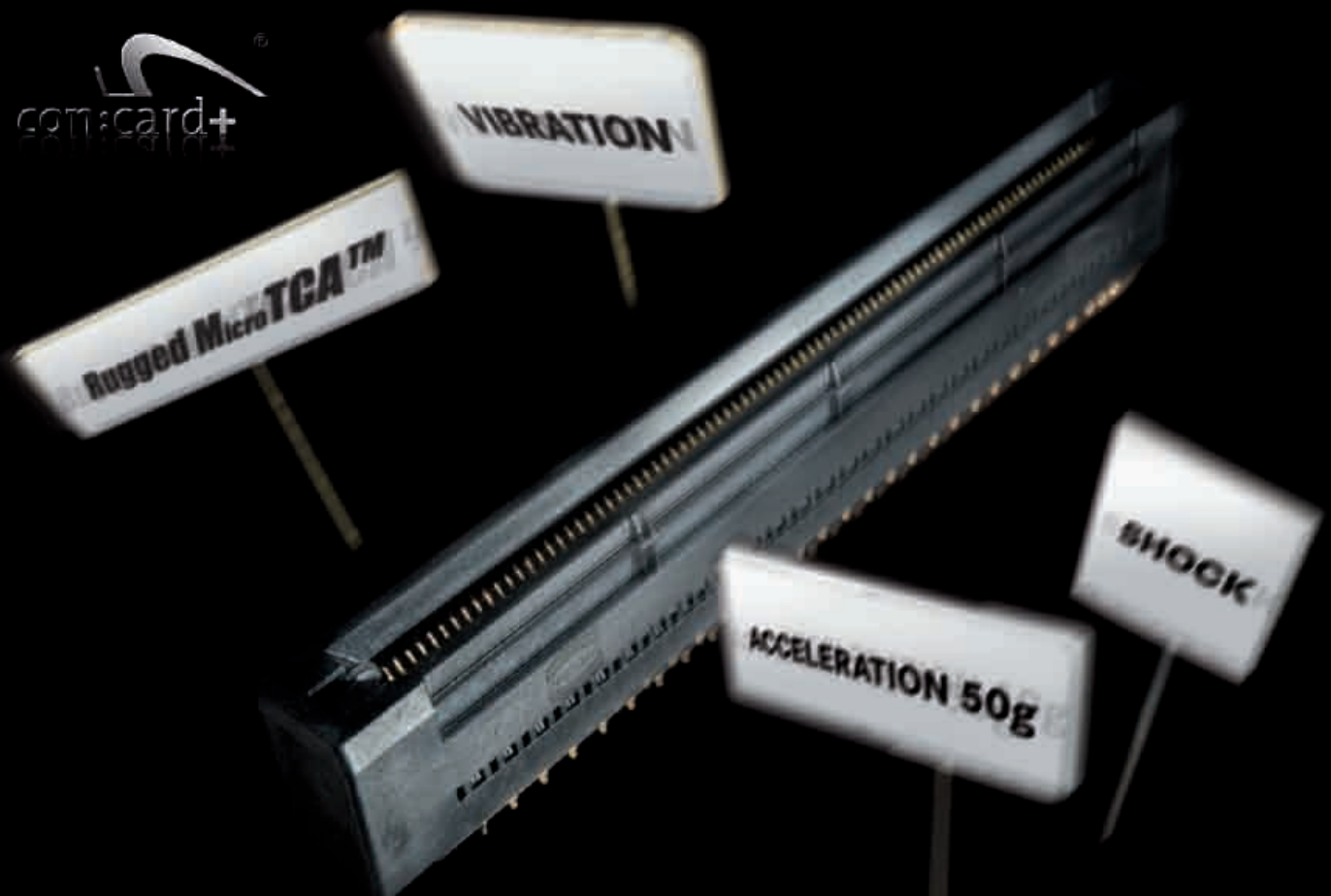




Pushing Performance

HARTING MicroTCA™ for Rugged Applications



People | Power | Partnership



con:card+ is a quality seal for AdvancedMC™ connectors that helps to deliver a significant increase in the reliability of MicroTCA™ and AdvancedTCA® systems. In order to reach the target availability of 99.999%, the selection of the connectors is an essential factor, as today it is virtually impossible for series production to meet the strict tolerances for the AdvancedMC™ modules as defined in the respective specifications.

1. GuideSpring

The **con:card+** connector GuideSpring represents a tremendous increase in mating reliability due to the fact that it compensates tolerance deviations in the AdvancedMC™ modules. In addition, the GuideSpring secures the module position in the case of shocks and vibrations.

The HARTING Technology Group and ept GmbH & Co. KG have been working together since 2005 to enhance existing AdvancedMC™ connectors in order to improve contact reliability. The result of this collaborative effort is a new generation of AdvancedMC™ signal connectors that were introduced by HARTING and ept and that carry the **con:card+** quality seal. With **con:card+** both companies have ensured a clearly defined quality standard that also offers users the advantages of dual sourcing.

2. Smooth contact surface

Specification for the AdvancedMC™ entails 200 mating cycles for a module. The **con:card+** connector's especially smooth contact surface minimizes wear on the gold pad and ensures high mating cycles. An especially smooth contact surface can only be obtained with the help of high-performance stamping tools and many years of experience in stamping techniques.



Smooth contact surface

3. PdNi contact coating

The palladium/nickel surface with additional gold flash enables wear resistance to be improved by roughly 30%. There is a considerable reduction in contact wear due to friction.



PdNi contact coating

4. Sufficient normal force

As a result of miniaturization, there is only one contact tongue per contact. In order to ensure a permanently reliable contact, this single contact tongue must press against the gold pad with sufficient force throughout the entire lifetime. To meet this challenge, a special contact design with very low relaxation is used for the **con:card+** connector.



Sufficient normal force

5. Press-fit technology

Press-fit technology guarantees a high-quality mechanical and electrical connection. Vibration, bending and frequent temperature changes do not present a risk for press-in connections.



Press-fit technology



MicroTCA™ for rugged applications

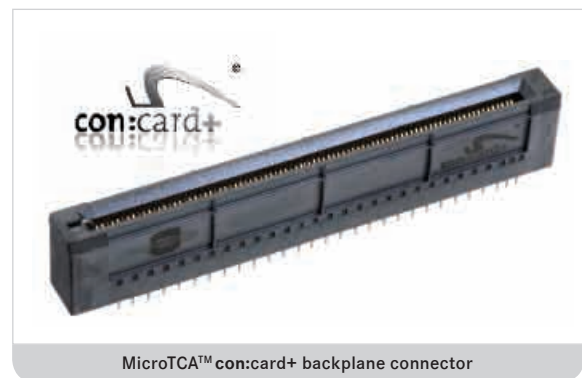
Due to its compact and easily scalable architecture and its high performance MicroTCA™ is interesting for applications beyond telecommunications. The PICMG is currently working on a specification for a „Rugged MicroTCA™“ system. The goal is a specification that extends the existing base specification MTCA.0 with additional requirements and tests for the use in harsh environments.

The MTCA.0 is the base specification of the MicroTCA™. The vibration and shock requirements are moderate and are according to the IEC specifications similar to other standardized hardware architectures.

The MTCA.1 “Rugged Air Cooled” specification covers additional requirements regarding vibration and shock testing and is planned for industrial applications.

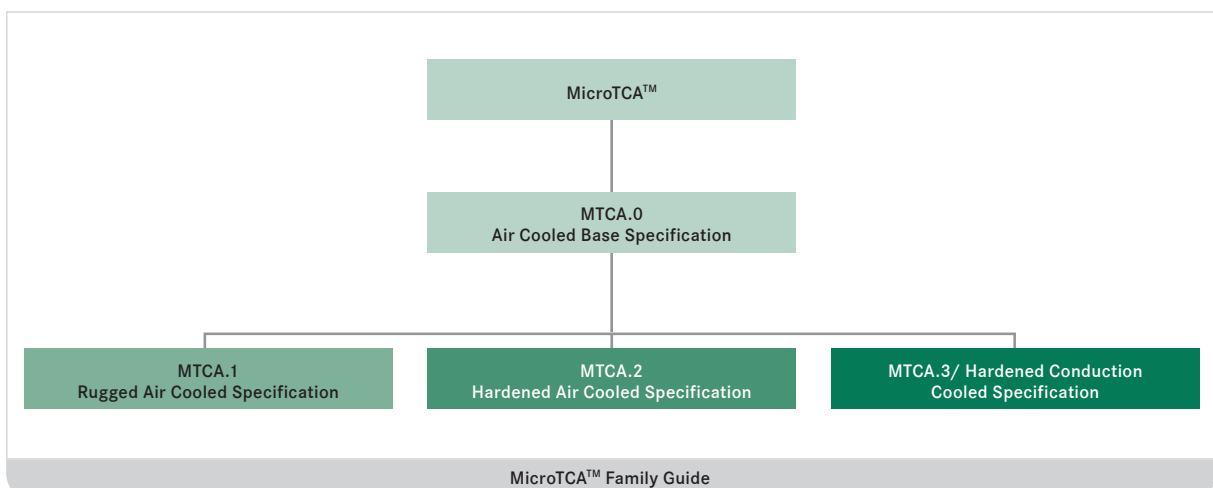
For even more rugged environments the MTCA.2 “Hardened Air Cooled” specification will be used. This standard will also target industrial applications and applications on vehicles in the transportation market.

Rugged MicroTCA™



MicroTCA™ con:card+ backplane connector

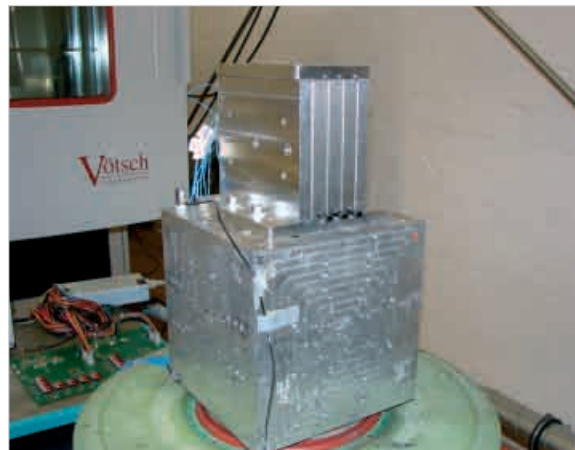
The third specification MTCA.3 will use a conduction cooling. The requirements regarding vibration and shock are defined for the use in aviation and defence applications.



HARTING – first connector manufacturer to pass tests successfully

One of the key components of the Rugged MicroTCA™ specification is the expansion of the shock and vibration requirements. It is therefore absolutely essential that there is no contact interruption during operation between the connector and the AdvancedMC™ module. For MicroTCA™, this is a big challenge due to the card edge connector design being used.

HARTING has recently made several tests in an accredited laboratory based on the requirements of the current development status of the PICMG “Rugged” specifications. The test system was equipped with mechanical components according to the MTCA.0 specification and test modules according to AMC.0 specification.



Vibration and shock test setup

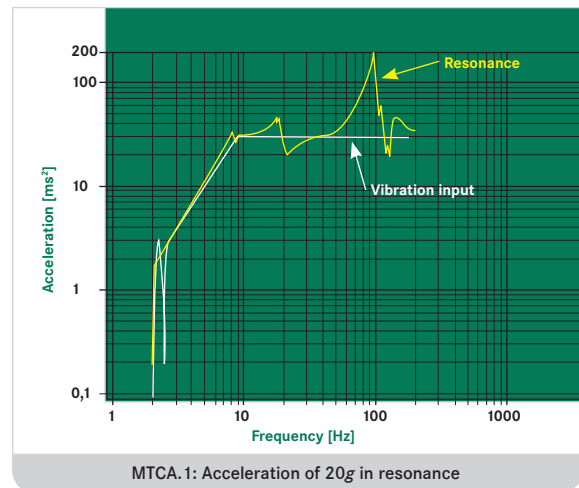
		MTCA.1 * (vibration & shock test)	MTCA.2 * (vibration & shock test)	MTCA.3 * (contact test)
	Test setup	MicroTCA™ test jig with standard guide rails, 3 double full size modules (700grams)	MicroTCA™ test jig with standard guide rails, 3 double full size modules (700grams)	MTCA.3 test setup, the AdvancedMC™ module is fixed to the backplane with screws
Requirements for vibration	According to	IEC 61587-1:2007, Performance Level DL3	EIA-364-28, Test Condition V, Letter E	EIA-364-28, Test Condition V, Letter E (HARTING tested also Letter K)
	Vibration type	Sinusoidal	Random	Random
	Frequency	2 - 200Hz	50Hz to 100Hz increasing at 6dB/Oktave 100Hz to 1000Hz PSD 0.2g ² /Hz 1000Hz to 2000Hz decreasing at 6db/Oktave	50Hz to 100Hz increasing at 6dB/Oktave 100Hz to 1000Hz PSD 0.2g ² /Hz 1000Hz to 2000Hz decreasing at 6db/Oktave (HARTING tested also a PSD level 1.5g ² /Hz)
	Amplitude	10mm		
	Acceleration	30m/s ²		
	Axes	3 axes/10 cycles each axis	3 axis, each axis 60min	3 axis, each axis 60min
	Test requirement	No contact discontinuity > 10Ω/10ns	No contact discontinuity > 10Ω/10ns	No contact discontinuity > 10Ω/10ns
Requirements for shock	According to	IEC 61587-1:2007, Performance Level DL3	ANSI/VITA 47 conduction cooled shock, MIL_STD-810, Method 516, Procedure I	ANSI/VITA 47 conduction cooled shock, MIL_STD-810, Method 516, Procedure I
	Acceleration	25g/15ms	40g/11ms	40g/11ms (HARTING tested also 50g/11ms)
	Axes	3 axes, 3 shocks two directions each axis	3 axes, 3 shocks two directions each axis	3 axes, 3 shocks two directions each axis
	Test requirement	No contact discontinuity > 10Ω/10ns	No contact discontinuity > 10Ω/10ns	No contact discontinuity > 10Ω/10ns

* The Rugged MicroTCA™ specifications are not finalized yet and are still in a draft status. All data and information in this brochure are effective October 2008. The draft specifications are still under development and the final requirements may change.

MTCA.1

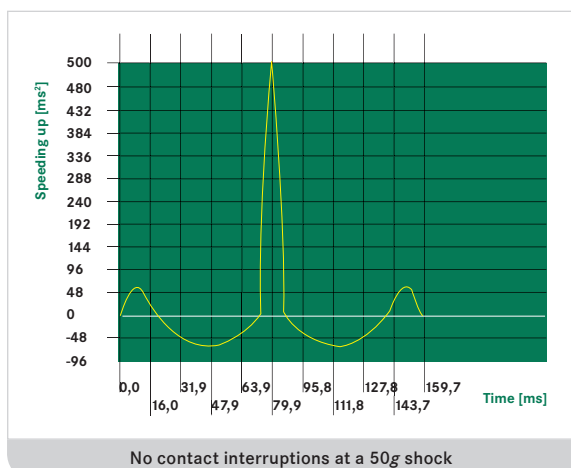
For MTCA.1 a sinusoidal vibration with max. acceleration of 3g is defined. In the same test setup, 6 shocks in each of the 3 axes also have to be performed. No contact interruptions should occur during the tests. The **HARTING con:card+** connector passes these tests successfully.

During the vibration there is a frequency range where the AdvancedMC™ module gets in resonance. An acceleration of 20g was measured on the module close to the connector in this case. Although this represents a tremendous condition, the **con:card+** connector passed these tests.



MTCA.2

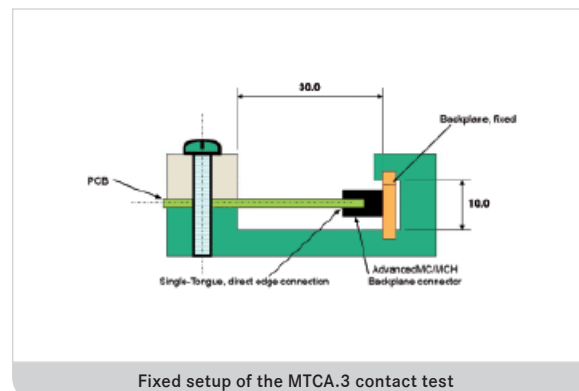
Due this specification targets applications for example in vehicles, a test with random vibration will be defined. The test condition will be a PSD level of $0.1g^2/Hz$. This corresponds to a maximum acceleration of 13g. **HARTING** have already tested at a PSD level of $0.2g^2/Hz$ (up to 18g acceleration) like in MTCA.3 specification. The **con:card+** connectors passed this test successfully.



MTCA.3

The setup of the MTCA.3 vibration test is fixed. The AdvancedMC™ modules are screwed to the backplane. Only the contact system is tested. This test shall be performed with random vibration at a PSD level of $0.2g^2/Hz$. In addition, **HARTING** tested successfully also a PSD level of $1.5g^2/Hz$.

The shock test for MTCA.3 is based on the VITA 47 and the MIL-STD-810 specification with an acceleration of 40g. **HARTING** increased this requirement again and tested successfully with 50g shock acceleration.



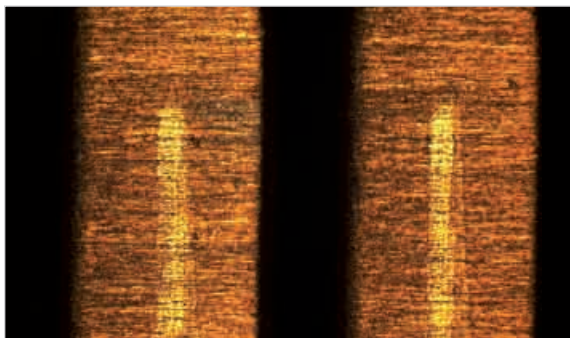


The GuideSpring of the con:card+ connector

con:card+ ensures good test results

The special features of **con:card+** have significantly contributed to the good test results. In the vibration direction lengthwise of the connector slot, the GuideSpring holds the AdvancedMC™ module in position and prevents contact interruptions. Thanks also to the optimized normal force of the contacts, they are able to stabilize the AdvancedMC™ module during these high accelerations.

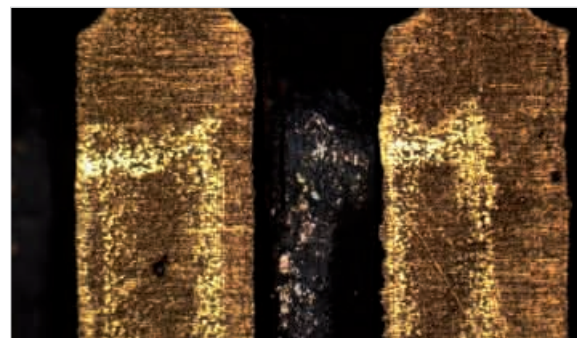
Besides the **HARTING** connectors, two conventional MicroTCA™ connectors without **con:card+** features were tested. This test shows how important these **con:card+** features are for the contact reliability. Several contact interruptions occurred in the longitudinal direction of the connector. An optical evaluation showed that the AdvancedMC™ modules were moving during the test. Finally the contact fell off the gold pad and caused contact interruptions.



Test with HARTING con:card+ connector: The GuideSpring avoids movements of the module



Test without GuideSpring: the gold pads show that the AdvancedMC™ has moved, ...



... as a result the contacts fell off the pads and caused contact interruptions.



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