

The TCA connectors have been specifically developed for the next generation of telecom, medical and industrial applications. The compact connector allows the transmission of highest data rates. Thanks to the innovative GuideSpring concept, the direct plug-in of a PCB is possible without any safety loss. Additionally, a corresponding module connector is available for robust applications. The power connector offers power contacts with the current carrying capacity of up to 16 A as well as contacts for signal transmission. HARTING offers application-specific design-in support for the connectors, as well as the system analysis support.

Application profile:

CONNECTION TYPE		ENVIRONMENT		APPLICATION						
Board to Board	Cable/Wire to Board	IP 20	IP 65 / IP 67	Data	Signal	Power	high performance			
							Data transfer rate	Shielding	Number of contacts, contact density	Voltage, working current
Cable termination			PCB termination			Application standard				
<i>Han-Quick Lock®</i> 	<i>IDC</i> 	<i>Crimp</i> 	<i>THT</i> 	<i>SMC</i> 	<i>SMT</i> 		Advanced TCA® Advanced MC™ μTCA™			
<i>Screw</i> 	<i>Cage clamp</i> 	<i>Axial screw</i> 	<i>Press-in</i> 				Housing integration <i>Separate housing</i> <i>Integrated housing</i>			

CONNECTORS FOR TCA

The TCA connectors have been developed for the open hardware standards AdvancedTCA®, AdvancedMC™ and MicroTCA™.

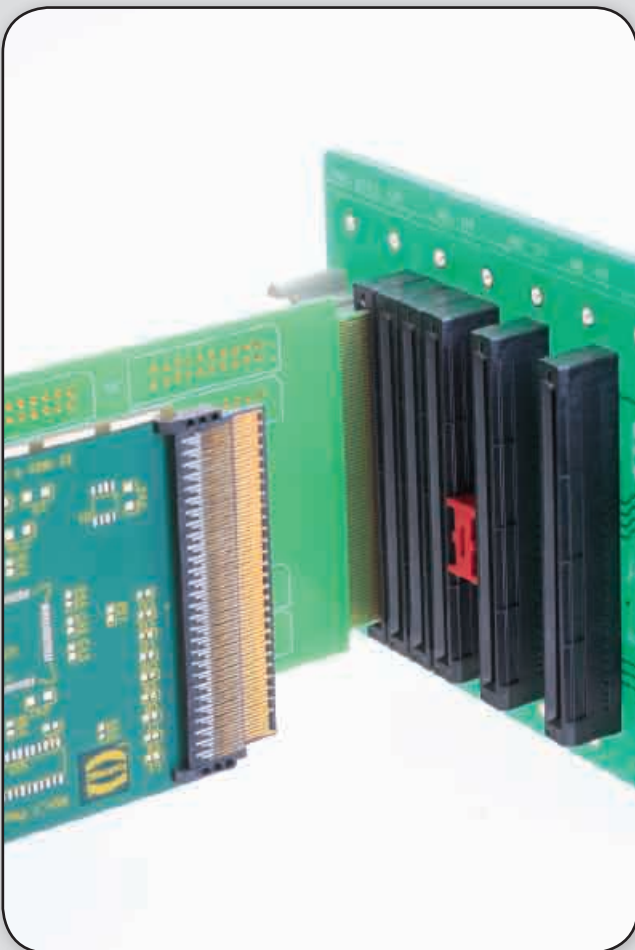
They are specified by the PCI Industrial Computer Manufacturers Group (PICMG), a consortium of more than 450 product suppliers. These innovative systems are finding increasing use for industrial control systems and computer systems.

HARTING is an active member of the PICMG and participated in the standardization process of the connectors for these systems. HARTING offers several connectors for signal and power transmission.

With the new “con:card+” connectors with press-in termination, HARTING has substantially improved the contact reliability of the AdvancedMC™ connector for MicroTCA™ and AdvancedTCA®. The key element of the new “con:card+” connector is the integrated

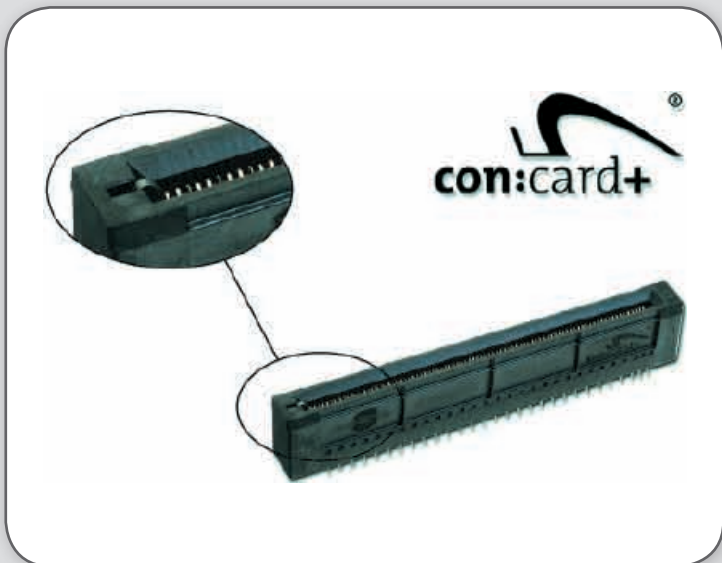
GuideSpring, which is able to compensate any tolerance deviations of the AdvancedMC™ printed circuit boards by centrally positioning the circuit board within the connector slot. The GuideSpring allows HARTING to ensure the reliable connection of the circuit boards, which can be manufactured in large-scale production today.

Other advantages of the “con:card+” technology are the extremely smooth contact surface and a robust contact coating which allows the specified 200 mating cycles between the daughter card and the card edge connector. Especially for rough environments, HARTING offers supplementary to the specification a connector for the AdvancedMC™ module. The plug connector replaces the gold pads of the card edge and offers increased reliability.



HIGH CONTACT RELIABILITY

The "con:card+" technology offers highest contact reliability as required for industry applications.



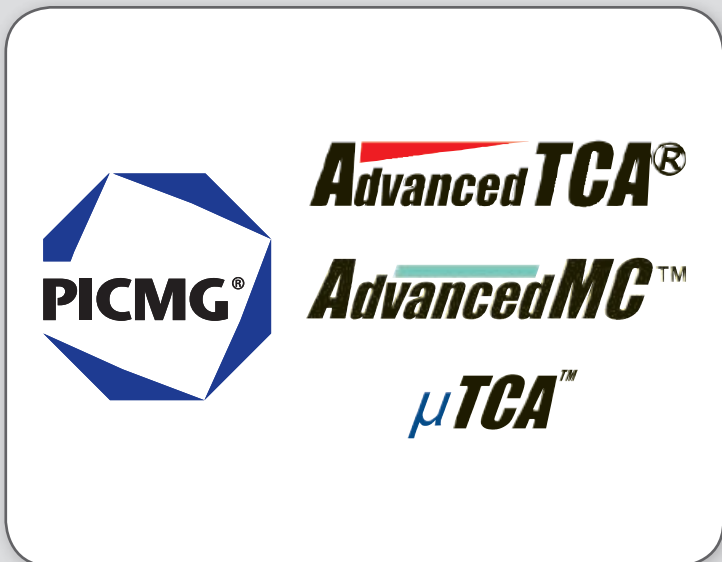
AMC/MCH PLUG CONNECTOR

The HARTING Plug connector supplements the existing MicroTCA™ and AdvancedMC™ specification and can replace the padfield of the AdvancedMC™ module card edge. Thereby the contact reliability is increased especially in the fields of rough environments like in industry applications.



INTERNATIONAL STANDARD

The TCA connectors meet the requirements of the PICMG (PCI Industrial Computers Manufacturers Group) specifications AdvancedMC™, Advanced TCA® and MicroTCA™ and can be used for these applications.



TCA



PICMG, formally known as the PCI Industrial Computing Manufacturing Group – is an industry consortium of over 450 companies. PICMG’s purpose is to define standard architectures in an effort to reduce system costs and development

cycles and since its 1994 foundation, PICMG has been responsible for the establishment of several of successfully implemented, open, industrial standards. Open standards have proven themselves to be very advantageous for system manufacturers and end-user, because they create multiple vendors of similar parts, low prices at high volumes, and a shortened time-to-market.

Historically, PICMG has created several successful standards.

- PICMG 1.x Series – a passive backplane PCI specification
- PICMG 2.x Series – the CompactPCI® standard

AdvancedTCA®

Today, the AdvancedTCA® series of specifications (PICMG 3.x) targets the requirements of the next generation of carrier grade telecommunications equipment. AdvancedTCA®, short for Advanced Telecom Computing Architecture and sometimes simply abbreviated ATCA®, incorporates an impressive suite of recent technological advancements including the latest trends in high speed interconnect technologies.

Features of AdvancedTCA® include optimization for high-capacity, high-performance telecom and industrial applications, improved reliability, manageability, redundancy, and serviceability. Encompassing a technological growth path valid for up to ten years, AdvancedTCA® has earned a solid position within the telecom systems market.

The rack or chassis, is responsible for housing the backplane and the daughtercards, as well as cooling



AdvancedTCA® chassis with backplane

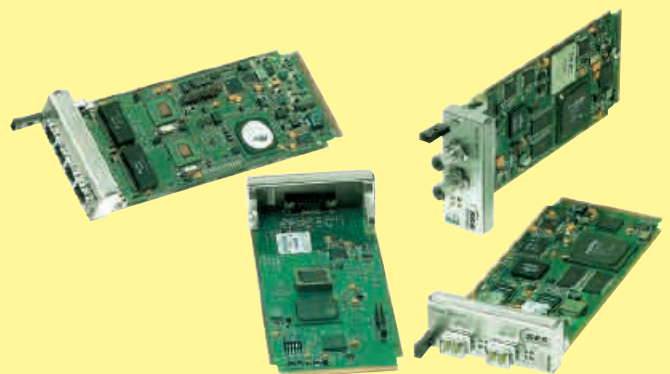
and powering the system. HARTING offers the ATCA® power connector that energises the blades, both the straight backplane and the right angled daughtercard connector.

The backplane, said to be passive, is merely a medium for the daughtercards to communicate with each other. And, the daughtercards, sometimes called blades or boards, provide the system with its functionality and allow for an easy, hot-swappable module exchange from the front of the system.

Initially, many blades were designed with a fixed functionality, and they had to be replaced once their functionality became obsolete or the demands of the system changed. With the continuation of exponential technological growth, concept proved to be a costly endeavour for the end-user.

AdvancedMC™

To extend the functionality and modularity of AdvancedTCA®, blade manufacturers conceived the idea of upgradeable daughtercards, and began to insert mezzanine cards onto the blades when needed. To achieve a common mezzanine concept, PICMG developed the Advanced Mezzanine Card (AdvancedMC™) standard AMC.0.



AdvancedMC™ modules for different applications

For the use of Advanced Mezzanine Cards, as well called AdvancedMC™ modules, a carrier is necessary. A carrier is an ATCA® blade with only little functionality beyond AdvancedMC™ management. It contains the mechanical environment for the AdvancedMC™ modules. Depending on their size, up to eight AdvancedMC™ modules can be hot-swapped in and out of a carrier, this enabled the creation of extremely scalable and upgradeable systems.



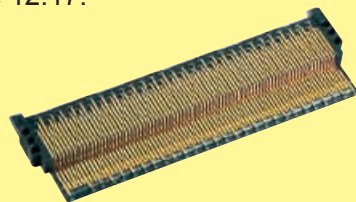
AdvancedTCA[®] carrier board with AdvancedMC[™] modules

To connect AdvancedMC[™] modules to carrier boards PICMG defined a new high-speed mezzanine connector: the AdvancedMC[™] connector – a card edge connector mounted on the carrier board. It contacts directly with the module's PCB gold pads. Although PICMG defined four AdvancedMC[™] connector types (B, B+, AB and A+B+), current market developments focus on type B+.

The HARTING AdvancedMC[™] B+ connector features a new design element that supplements the standard – the GuideSpring. The GuideSpring significantly increases the mating reliability and prevents contact interruptions and surface wear when subjected to shocks or vibrations.

The press-fit termination technology provides significant cost and durability advantages over other termination technologies. The connector design allows for the use of a standard flat rock die. For more press-in process control, HARTING offers a special top and bottom tool (see page 12.22).

The HARTING AdvancedMC[™] Plug Connector can replace the module's PCB gold pads and increase the contact reliability from the module side. Please find more information about the HARTING AdvancedMC[™] Plug Connector on page 12.17.



μTCA[™]

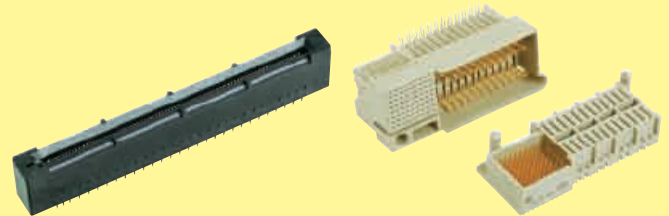
This revolutionary AdvancedMC[™]-based design concept has led to the recent development of a completely mezzanine-based system – MicroTCA[™]. MicroTCA[™], short for Micro Telecom Computing Architecture, is a more cost-efficient platform than AdvancedTCA[®] when dealing with smaller applications, yet powerful enough to address the needs of telecom, enterprise and medical applications.

This newly-implemented PICMG standard, outlined in the MTCA.0 specification, presents a design-concept whereby AdvancedMC[™]s – the same kind used in ATCA[®] systems – plug directly into a passive backplane; this eliminates the need for carrier boards.



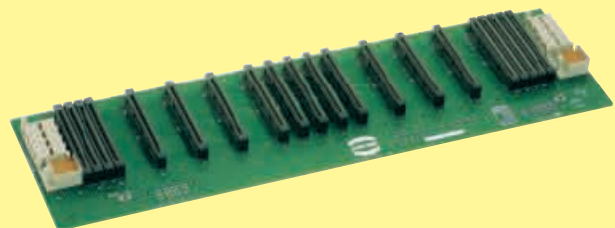
MicroTCA[™] double cube system

Naturally the mating face of the AdvancedMC[™] connector for MicroTCA[™] is the same as for ATCA[®], but with a right angled mating direction. It contains the new GuideSpring and is available in press-in termination. PICMG members voted HARTING's MicroTCA[™] connector footprint as the new MicroTCA[™] standard connector for press-fit termination technology.



AdvancedMC[™] and power connectors for MicroTCA[™]

The MicroTCA[™] backplane is typically powered by special, field replaceable, hot-swappable, redundant Power Supply Units (PSU). The PSU connects to the backplane through a MicroTCA[™] power connector (press-fit termination) also available from HARTING.



MicroTCA[™] backplane

The module management is performed by a MicroTCA[™] Carrier Hub, or MCH. An MCH is connected to the backplane by up to four adjacent card-edge connectors. One MCH can control up to 12 AdvancedMC[™] modules, thus depending on redundancy requirements, workload, or both, one or two MCHs may be used within a single system.

For a precise mechanical alignment of the mating tongues HARTING offers the special Plug Connectors according to MTCA.0. (see page 12.20).

What is con:card+?

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 %, all system components must be carefully coordinated, and they must function reliably. The selection of suitable connectors is an essential, decisive factor here, as today it is virtually impossible for series production to meet the strict tolerances for the AdvancedMC™ modules as defined in the respective specifications. The so-called GuideSpring is ideally suited for compensating here, and represents just one of a total of five key advantages of the con:card+ philosophy. All the advantages are introduced in the following. Please find further information also on the internet at www.concardplus.com.



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Special contact material

Unlike conventional mating systems with male and female connectors, the AdvancedMC™ has only one, not two, contact tongues 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. In addition, the thickness of the AdvancedMC™ modules may fluctuate by $\pm 10\%$. To meet this challenge, HARTING utilizes a special alloy with very low relaxation as the contact material for the con:card+ connector.



PdNi contact coating

In order better to meet the high requirements placed on the connectors, a palladium-nickel surface (PdNi) with additional gold flash is used. As a result, wear resistance is increased by roughly 30 %. Even when applied very thinly, PdNi surfaces offer a quality and corrosion-resistant coating that meets the high requirements placed on the connection far better than pure gold.





Smooth contact surface

The specification for the AdvancedMC™ entails 200 mating cycles for a module. On the PCB, the nickel/hard gold layer on the relatively soft copper can only stand up to this high load if the contact surface is absolutely smooth.

This is the case with the **con:card+** connector. With years of experience in stamping techniques and the utilization of high-performance stamping tools with special process components, HARTING is actively involved in minimizing gold pad wear.



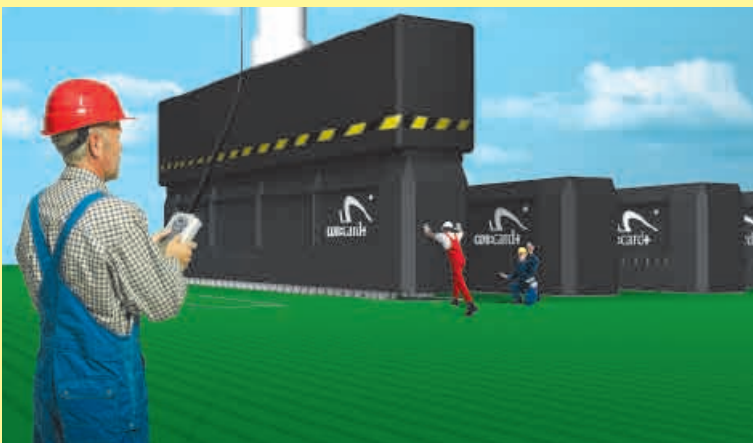
GuideSpring

PCB manufacturers are not capable of meeting the AdvancedMC™ modules' tight tolerances with certainty in the series process today. Just a single card with tolerances slightly larger than allowed by the specifications can lead to a system breakdown.

The **con:card+** GuideSpring offsets these tolerance deviations by constantly pressing the module against the opposite wall. As this is displaced somewhat towards the middle, the slot is optimally designed for the AdvancedMC™ module, and the mating reliability increases tremendously.

In addition, the GuideSpring secures the module position in the case of shocks and vibrations. This prevents loss of contact and surface wear.

TCA



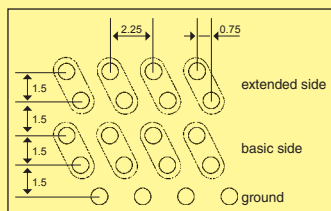
Press-fit technology

Press-fit technology results in a gas-tight, corrosion-resistant, low-ohm quality mechanical connection between the pin and the through contacting of the PCB. This remains reliably in contact and stable, even under conditions of high mechanical and thermal loads, such as vibration, bending and frequent temperature changes. This technology represents a tremendous advantage over other processing techniques. Measurements substantiate that the required transmission rates are easily attained.

Technical characteristics

Design according	PICMG AMC.0 (RoHS compliance)
Number of contacts	170
Contact spacing	0.75 mm
Clearance and creepage distance between contacts	0.1 mm min.
Working current of power contacts as defined in AMC.0 spec.	1.52 A @ 70 °C max. 30 °C temp. rise
Test voltage	80 V _{r.m.s.}
Initial contact resistance	
ground contacts	60 mΩ max.
signal, power, general purpose contacts	90 mΩ max.
Initial insulation resistance	100 MΩ min.
Nominal differential impedance	100 Ω±10 %

Max. crosstalk @ 25 ps risetime	Bottom route
Adjacent	0.55 %
Basic-to-extended (diagonal)	0.68 %
Basic-to-extended (opposite)	0.39 %
Multiline (five multi-aggressor differential pairs)	2.74 % max.



PCB library on request
(PADS/Dx-Designer)

SPICE models and
S-Parameter on request

Differential propagation delay	Basic side: 125 ps Extended side: 145 ps
Differential skew	Between basic and extended side: 20 ps Within basic and extended side: ±2 ps

Temperature range	-55 °C ... +105 °C
Durability as per AMC.0 specification	200 mating cycles

Termination technique	Press-in termination
Mating force	100 N max.
Withdrawal force	65 N max.

Materials

Moulded parts	Liquid Crystal Polymer (LCP), UL 94-V0
Contacts	Copper Alloy
Contact surface	Pd/Ni with Au flash

Packaging	Cardboard box (other packaging on request)
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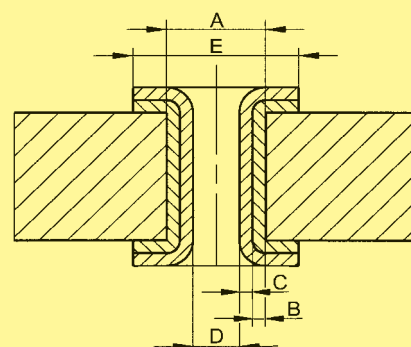
Recommended plated through hole specification

	A	Drill hole-Ø	0.64±0.01 mm
	B	Cu	25 - 35 µm
Tin plated PCB (HAL)	C	Sn	5 - 15 µm
	D	Hole-Ø	0.53 - 0.60 mm
Au / Ni plated PCB	C	Ni	3 - 7 µm
		Au	0.05 - 0.12 µm
	D	Hole-Ø	0.55 - 0.60 mm
Chemical tin plated PCB	C	Sn	0.8 - 1.5 µm
	D	Hole-Ø	0.56 - 0.60 mm
Silver plated PCB	C	Ag	0.1 - 0.3 µm
	D	Hole-Ø	0.56 - 0.60 mm
OSP copper plated PCB	C	---	---
	D	Hole-Ø	0.56 - 0.60 mm
	E	Pad size	min. 0.95 mm

The press-in zone of the AdvancedMC™ connector is tested according to Telcordia/Bellcore GR 1217CORE Part7. It is approved to be used with a plated through hole according IEC 60352-5 with a diameter of 0.55±0.05 mm (drilled hole 0.64±0.01 mm).

Based on our experiences regarding the production process of the PCB manufacturer we recommend a plated through hole configuration like shown in the above spreadsheet. To achieve the recommended plated through hole diameter, it is important to specify especially the drilled hole diameter of 0.64±0.01 mm to your PCB supplier.

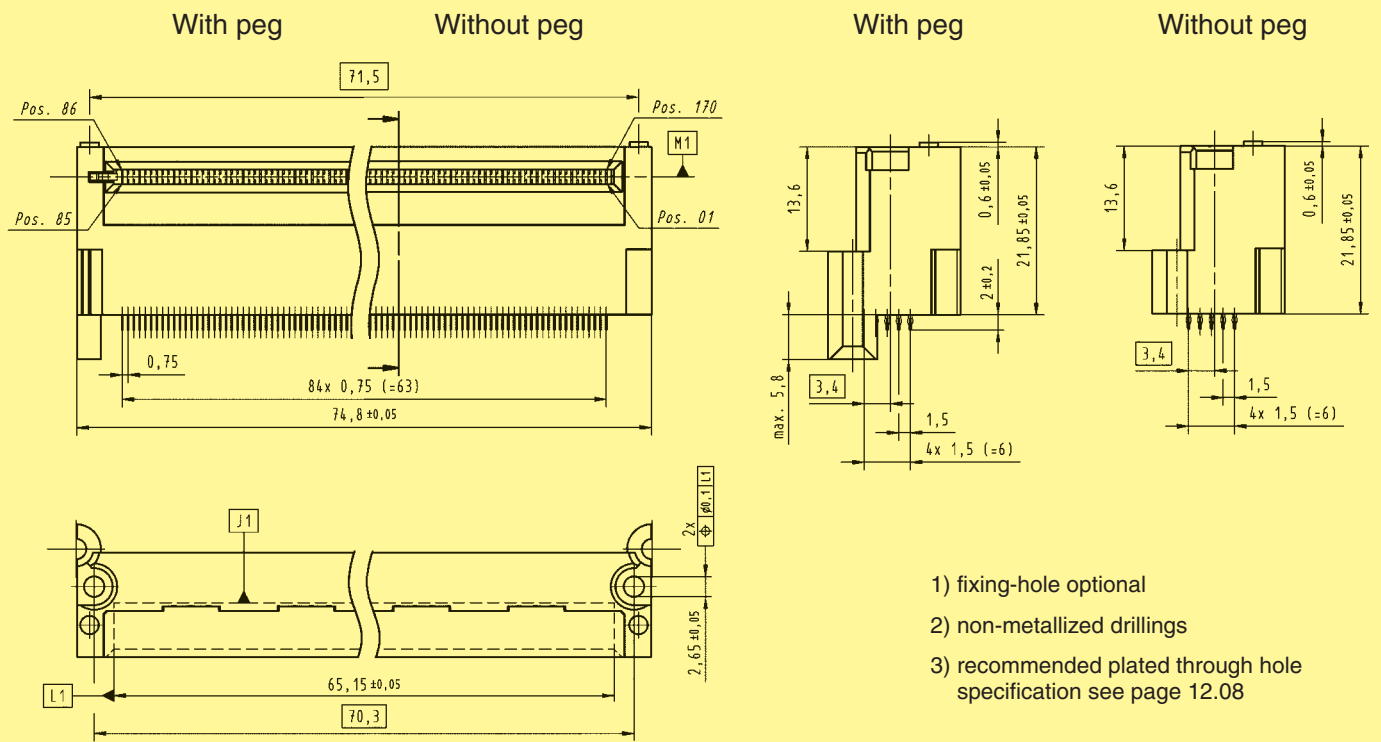
For drillings use e.g. drill bit # 72 (0.025" ≈ 0.64 mm).



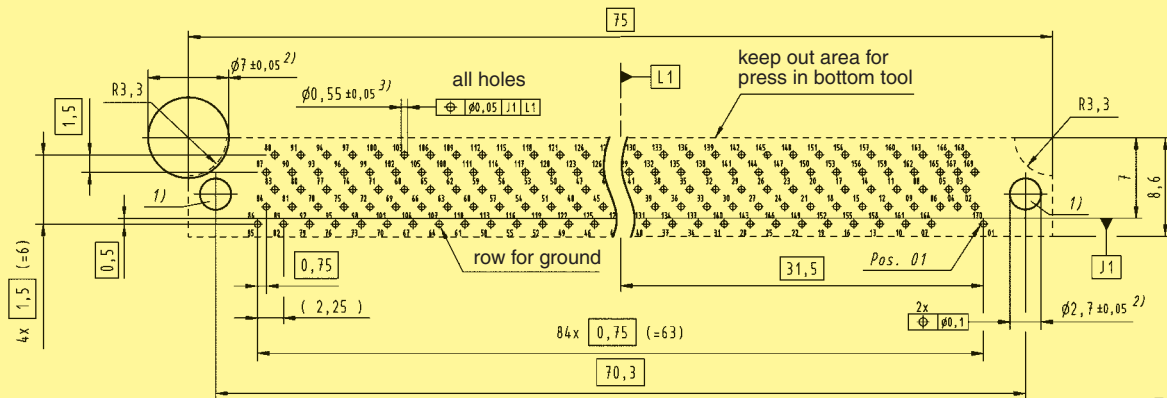


Card edge connectors, angled

Identification	No. of contacts	Contact length [mm] termination side	Part number
AdvancedMC™ connector for ATCA®, type B+ with peg and with GuideSpring	170	2.0	16 04 170 5104 000
AdvancedMC™ connector for ATCA®, type B+ without peg and with GuideSpring	170	2.0	16 04 170 5106 000



Board drillings (view magnified)



Dimensions [mm]

Technical characteristics

Design according PICMG 3.0 R2.0

Total number of contacts 30, max. 34
 Power contacts 8
 Signal contacts 22, max. 26

Clearance and creepage distance between contacts
 Within group 5–16 0.7 mm min.
 Within group 17–24 2.5 mm min.
 25 to 26 5.5 mm min.
 Within group 27–34 1.4 mm min.
 13–16 to 17–20 3.0 mm min.
 21–24 to 25–26 4.0 mm min.
 25–26 to 27–29 2.0 mm min.

Sequential contact engagement
 1st 25, 26, 28, 29, 30, 31
 2nd 33
 3rd 5–24, 34
 4th 27, 32

Working current
 Power contacts 16 A
 Signal contacts 1 A

Test voltage
 Contacts 1–16 1000 V_{r.m.s.}
 Contacts 17–34 2000 V_{r.m.s.}

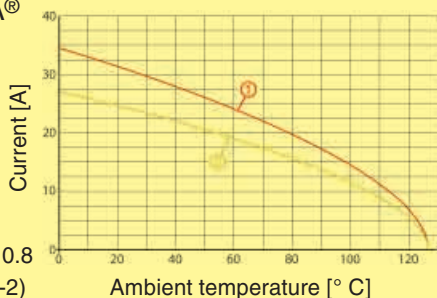
Initial contact resistance
 Power contacts ≤ 2.2 mΩ
 Signal contacts ≤ 8.5 mΩ

Insulation resistance ≥ 10¹⁰ Ω

Temperature range -55 °C ... +125 °C
 Durability 250 mating cycles

Termination technique Press-in termination
 Mating force 67 N max.
 Withdrawal force 67 N max.

Derating for ATCA® power contacts
 Contact loading acc. PICMG 3.0



① Derating
 ② Derating @ I_{max.} x 0.8 (acc. IEC 60512-5-2)

Materials

Moulded parts PBT, glass-fibre filled, UL 94-V0
 Contacts Copper Alloy
 Contact surface Selectively gold plated

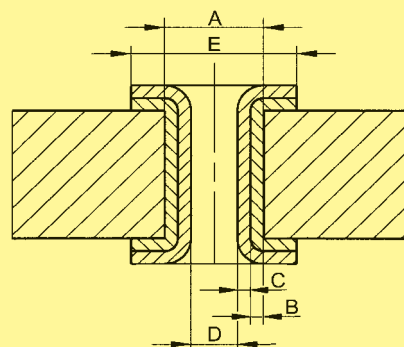
Packaging Tray packaging (other packaging on request)

Recommended plated through hole specification

			Signal contacts	Power contacts
	A	Drill hole-Ø	1.15±0.025 mm	1.75±0.025 mm
	B	Cu	25 - 35 µm	25 - 35 µm
Tin plated PCB (HAL)	C	Sn	5 - 15 µm	5 - 15 µm
	D	Hole-Ø	1.00 - 1.10 mm	1.60 - 1.70 mm
Au / Ni plated PCB	C	Ni	3 - 7 µm	3 - 7 µm
		Au	0.05 - 0.12 µm	0.05 - 0.12 µm
	D	Hole-Ø	1.00 - 1.10 mm	1.60 - 1.70 mm
Chemical tin plated PCB	C	Sn	0.8 - 1.5 µm	0.8 - 1.5 µm
	D	Hole-Ø	1.00 - 1.10 mm	1.60 - 1.70 mm
Silver plated PCB	C	Ag	0.1 - 0.3 µm	0.1 - 0.3 µm
	D	Hole-Ø	1.00 - 1.10 mm	1.60 - 1.70 mm
OSP copper plated PCB	C	---	---	---
	D	Hole-Ø	1.00 - 1.10 mm	1.60 - 1.70 mm
	E	Pad size	min. 1.4 mm	min. 2.0 mm

The press-in zone of the AdvancedTCA® power connector is tested according to Telcordia/Bellcore GR 1217CORE Part7. It is approved to be used with a plated through hole according IEC 60352-5 with a diameter of 1.00^{+0.09}/_{-0.06} mm for signal contacts and 1.60^{+0.09}/_{-0.06} mm for power contacts (drilled hole 1.15±0.025 mm resp. 1.75±0.025 mm).

Based on our experiences regarding the production process of the PCB manufacturer we recommend a plated through hole configuration like shown in the above spreadsheet. To achieve the recommended plated through hole diameter, it is important to specify especially the drilled hole diameter of 1.15±0.025 mm resp. 1.75±0.025 mm to your PCB supplier.



Technical characteristics

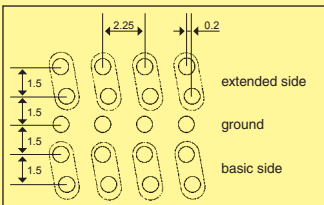
Design according PICMG MTCA.0 R1.0 (RoHS compliance)

Number of contacts 170
 Contact spacing 0.75 mm
 Clearance and creepage distance between contacts 0.1 mm min.

Working current of power contacts as defined in MTCA.0 spec. 1.52 A @ 70 °C max. 30 °C temp. rise
 Test voltage 80 V_{r.m.s.}
 Initial contact resistance 25 mΩ max.
 Initial insulation resistance 100 MΩ min.

Nominal differential impedance 100 Ω±10 %

Max. crosstalk @ 25 ps risetime	Bottom route
Adjacent	0.58 %
Basic-to-extended (diagonal)	0.30 %
Basic-to-extended (opposite)	0.38 %
Multiline (five multi-aggressor differential pairs)	1.91 % max.



PCB library on request (PADS/Dx-Designer)
 SPICE models and S-Parameter on request

Differential propagation delay
 Basic side: 75 ps
 Extended side: 75 ps
 Differential skew
 Between basic and extended side: ±2 ps
 Within basic and extended side: ±2 ps

Temperature range -55 °C ... +105 °C
 Durability as per MTCA.0 spec. 200 mating cycles

Termination technique Press-in termination
 Mating force 100 N max.
 Withdrawal force 65 N max.

Materials

Moulded parts Liquid Crystal Polymer (LCP), UL 94-V0
 Contacts Copper Alloy
 Contact surface Pd/Ni with Au flash

Packaging Cardboard box (other packaging on request)

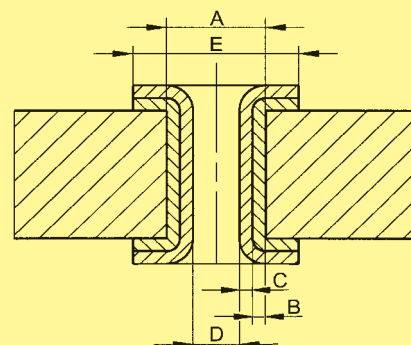
Recommended plated through hole specification

	A	Drill hole-Ø	0.64±0.01 mm
	B	Cu	25 - 35 µm
Tin plated PCB (HAL)	C	Sn	5 - 15 µm
	D	Hole-Ø	0.53 - 0.60 mm
Au / Ni plated PCB	C	Ni	3 - 7 µm
		Au	0.05 - 0.12 µm
	D	Hole-Ø	0.55 - 0.60 mm
Chemical tin plated PCB	C	Sn	0.8 - 1.5 µm
	D	Hole-Ø	0.56 - 0.60 mm
Silver plated PCB	C	Ag	0.1 - 0.3 µm
	D	Hole-Ø	0.56 - 0.60 mm
OSP copper plated PCB	C	---	---
	D	Hole-Ø	0.56 - 0.60 mm
	E	Pad size	min. 0.95 mm

The press-in zone of the AdvancedMC™ connector is tested according to Telcordia/Bellcore GR 1217CORE Part7. It is approved to be used with a plated through hole according IEC 60352-5 with a diameter of 0.55±0.05 mm (drilled hole 0.64±0.01 mm).

Based on our experiences regarding the production process of the PCB manufacturer we recommend a plated through hole configuration like shown in the above spreadsheet. To achieve the recommended plated through hole diameter, it is important to specify especially the drilled hole diameter of 0.64±0.01 mm to your PCB supplier.

For drillings use e.g. drill bit # 72 (0.025" ≈ 0.64 mm).



Technical characteristics

Design according to PICMG MTCA.0 R1.0 (RoHS compliance)

Total number of contacts: 96
 Power contacts: 24
 Signal contacts: 72

Sequential contact engagement:
 1st: Power 4–11
 2nd: Power 1–3, power 12–24
 3rd: Signal A2–H9
 4th: Signal A1

Working current:
 Power contacts: 9.3 A @ 80 % derating acc. IEC 60512 and 70 °C ambient temperature and 30 °C temperature rise
 Signal contacts: 1 A @ 80 % derating acc. IEC 60512 and 70 °C ambient temperature

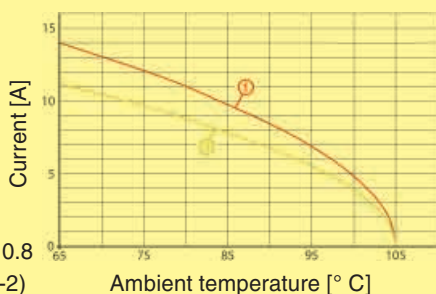
Initial contact resistance:
 Power contacts: ≤ 5 mΩ
 Signal contacts: ≤ 25 mΩ

Initial insulation resistance ≥ 100 MΩ min.

Temperature range: -55 °C ... +105 °C
 Durability: 200 mating cycles

Termination technique: Press-in termination
 Mating force: 145 N max.
 Withdrawal force: 110 N max.

Derating for MicroTCA™ power contacts
 Contact loading acc. MTCA.0



① Derating
 ② Derating @ $I_{max} \times 0.8$ (acc. IEC 60512-5-2)

Materials

Moulded parts: PBT, glass-fibre filled, UL 94-V0
 Contacts: Copper Alloy
 Contact surface:
 Power contacts: selectively gold plated
 Signal contacts: selectively PD/Ni plated

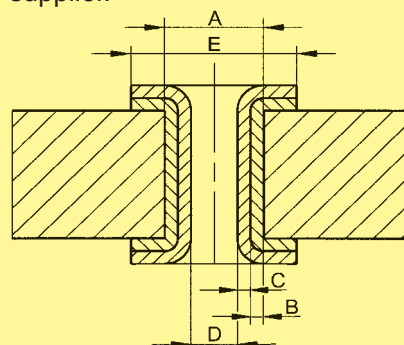
Packaging: Tray packaging (other packaging on request)

Recommended plated through hole specification

	A	Drill hole-Ø	0.7±0.02 mm
	B	Cu	25 - 35 µm
Tin plated PCB (HAL)	C	Sn	5 - 15 µm
	D	Hole-Ø	0.60 - 0.65 mm
Au / Ni plated PCB	C	Ni	3 - 7 µm
		Au	0.05 - 0.12 µm
Chemical tin plated PCB	D	Hole-Ø	0.60 - 0.65 mm
	C	Sn	0.8 - 1.5 µm
Silver plated PCB	D	Hole-Ø	0.60 - 0.65 mm
	C	Ag	0.1 - 0.3 µm
OSP copper plated PCB	D	Hole-Ø	0.60 - 0.65 mm
	C	---	---
	E	Pad size	min. 1.0 mm

The press-in zone of the MicroTCA™ power connector is tested according to Telcordia/Bellcore GR 1217CORE Part7. It is approved to be used with a plated through hole according IEC 60352-5 with a diameter of 0.60+0.05 mm (drilled hole 0.70±0.02 mm).

Based on our experiences regarding the production process of the PCB manufacturer we recommend a plated through hole configuration like shown in the above spreadsheet. To achieve the recommended plated through hole diameter, it is important to specify especially the drilled hole diameter of 0.70±0.02 mm to your PCB supplier.

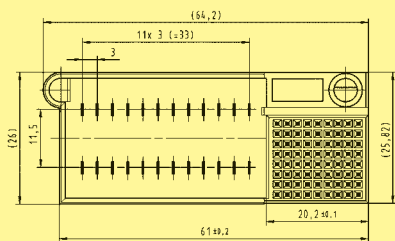




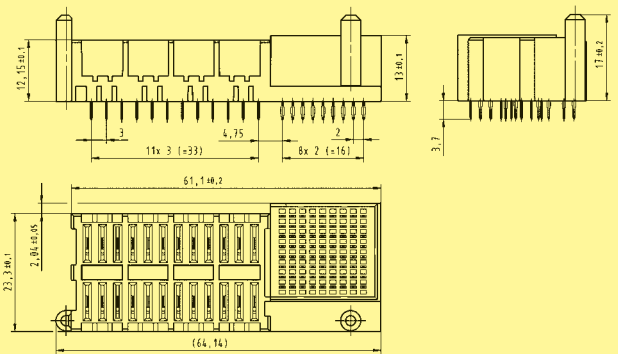
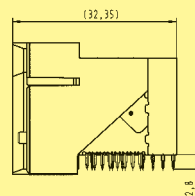
Identification	No. of contacts	Contact length [mm] termination side	Part number
Power output connectors for MicroTCA™			
module version	96	2.8	16 34 096 1101 000
backplane version	96	3.7	16 33 096 1201 000

Module version

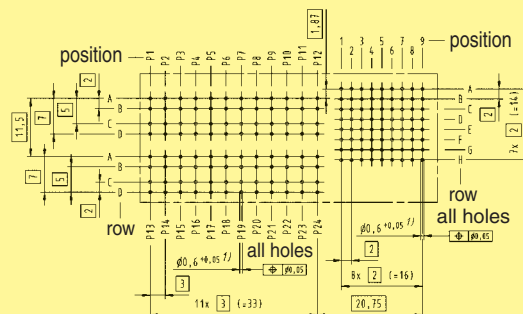
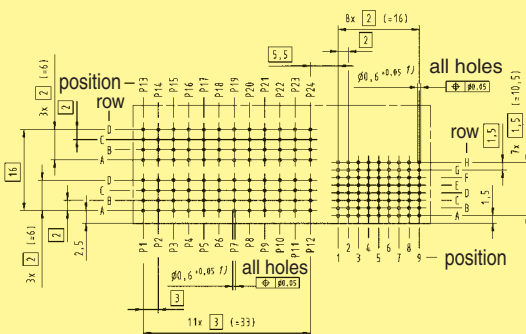
Backplane version



view X



Board drillings



1) recommended plated through hole specification see page 12.14

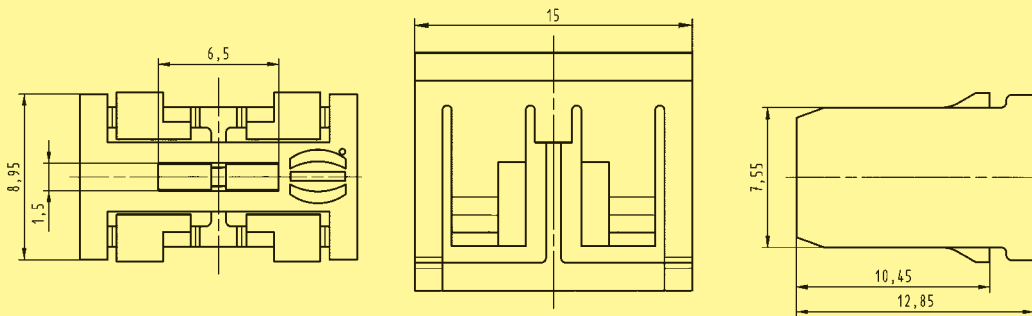


Identification

Part number

MicroTCA™ Protection Block

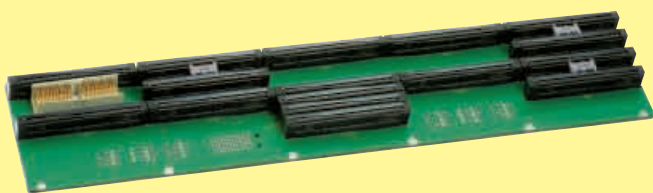
16 79 000 0010 000



The MicroTCA™ specification defines modules with the option of multiple mating interfaces like the MCH module for system management and switching. There are four different pitches defined for the module interfaces and the backplane connectors respectively, the basic unit is called horizontal pitch (HP) and is 5.08 mm (0.2 inch).

Compact-Size	3 HP	15.24 mm
Mid-Size	4 HP	20.32 mm
Full-Size	6 HP	30.48 mm
MCH	1.5 HP	7.62 mm

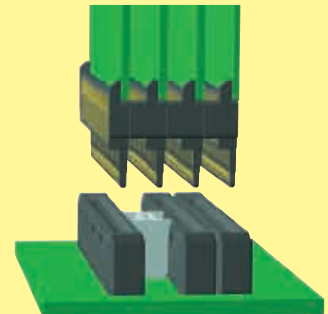
Any MCH (or other multiple mating interface modules) with more than two mating interfaces (2x MCH-pitch 1.5 HP = Compact-Size pitch 3 HP) could unintentional mate with connectors of the adjacent slot or could be plugged into the wrong slot. Even though the pin-assignment and e-keying for the MCH is defined, it can cause system failures or even destroy hardware if a MCH is inserted into two adjacent AMC Compact-Size slots. For other multiple mating interface modules, this situation is even worse, because neither e-keying nor pin assignment is specified in MTCA.0.



MicroTCA™ backplane with protection blocks

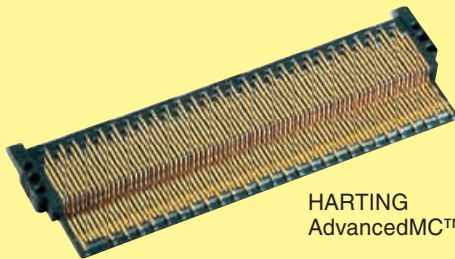
To prevent errors in case of misinsertion, MTCA.0 R1.0 chapter 2.13 outlines protection blocks that occupy the space between two adjacent connectors in a Compact-Size slot. Furthermore this protection block can be used for keying functions of multiple mating interface modules.

HARTING designed a protection block fully independent of the backplane and sub rack design. The HARTING protection block is clipped between two connectors, hence no fixing features (holes, clips...) need to be designed into the backplane or the sub rack mechanics. The assembly is done quick and easy by hand. It can even be installed easily after the backplane is mounted with a simple flat-head screwdriver, an easy removal is possible in a similar way. The keying block can be placed into four different positions, hence a keying of multitongue modules by using tongues with a cutout is possible.



The free space between the backplane connectors is occupied by the protection block

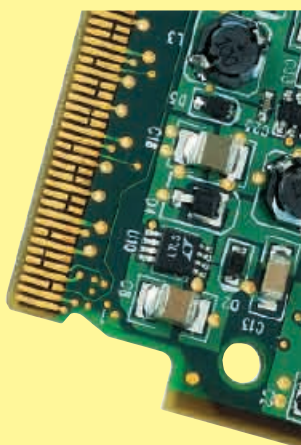
As already explained in the chapter „con:card+“, it is very difficult for a PCB manufacturer to produce the tight tolerances of the AdvancedMC™ module card edge in a consistent process. Furthermore the quality of the card edge gold pads is not well defined in detail by the specification. With the introduction of the con:card+ connectors, HARTING supports the reliable operation of AdvancedMC™ by the different con:card+ features. But some disadvantages of a card edge connection can only be eliminated by a mating half connector.



HARTING
AdvancedMC™ Plug

The most important advantages of the HARTING AdvancedMC™ Plug Connector are the low module insertion forces and enhanced contact surfaces resulting in higher mating cycles with much tighter two piece connector tolerances.

The AdvancedMC™ Plug Connector replaces the gold pads of the module card edge. The AdvancedMC™ module with a Plug Connector is still within the module envelope of the PICMG AMC.0 specification and is fully mating compatible with AdvancedMC™ card edge connectors. Consequently the Plug Connector can be used in both MicroTCA™ and ATCA® environments.



The PICMG standard AMC.0 defines hard gold for the card edge interface. But a common and unique definition of hard gold does not exist today. As a result the quality of the gold pads in terms of hardness and roughness is highly unsteady. Additionally, the gaps between the pre and functional pad (which are necessary for the hot-swap ability) require a selective hard gold process which is

more complicated than a standard process. This can lead to exposed copper and sharp pad edges.

The contacts of the HARTING AdvancedMC™ Plug Connector are plated all-around and are manufactured in a defined band plating process with controlled quality. There are different performance levels possible as the noble finish thickness can be easily adapted to customer demands.

By using a HARTING AdvancedMC™ Plug Connector, the mating interface of the module is defined by the connector instead of the PCB. This fact leads to decisive advantages and provides a wide scope for the module development.

For the module card edge, the prepads of lagging contacts are required by the Telcordia/Bellcore specification to avoid wearing of the connector contact when sliding on the FR4 base material. The Plug Connector does not need prepads. The four mating steps are realized as real lagging contacts. The sophisticated design of the insulator reduces the mating forces of the module significantly.

The card edge chamfer is important to reduce mating forces and to avoid wearing and damage of the backplane connector. But also the PCB milling process of the chamfer is critical. In contrast to the PCB the Plug Connector has a moulded chamfer with a smooth surface protecting the backplane connector contacts.

As the Plug Connector defines the mating tongue, the restriction of the PCB thickness of 1.6 mm $\pm 10\%$ does not need to be considered anymore. The maximum PCB thickness is only limited by the card guide for the AMC modules. The Plug Connector itself has a thickness of 1.5 ± 0.04 mm to reduce the mating force. The width of the Plug Connector is near the maximum width of the specification to support high mating reliability when the module is plugged into a connector without the GuideSpring con:card+ feature.

The connector is mounted to the PCB with the „pin-in-hole-reflow“ solder technology (PIHR) and is „pick-and-place“ compatible. Another advantages of this efficient and mechanically stable technology, is that the connector can be replaced. This can avoid the scrapping cost of a module if the mating interface is damaged during handling.



AdvancedMC™ module with a
HARTING AdvancedMC™
Plug Connector

Depending on the application, the additional cost of the connector can be compensated by several savings during the production process of the AdvancedMC™ module. Please contact our local sales office for further information about the advantages of the HARTING AdvancedMC™ Plug Connector.

Design according PICMG MicroTCA.0 R1.0
PICMG AMC.0 R2.0
(RoHS compliance)

Number of contacts 170
Contact spacing 0.75 mm
Clearance and creepage distance between contacts 0.1 mm min.

Working current min. 1.52 A @ 70 °C
max. 30 °C temp. rise
acc. to pin configuration
in AMC.0 spec.

Working current tested with HARTING MicroTCA™ backplane connector 2 A min.

Test voltage 80 V_{r.m.s.}

Initial contact resistance 25 mΩ max.
Initial insulation resistance 100 MΩ min.

Nominal differential impedance 100 Ω ± 10 %

Max. crosstalk @ 25 ps risetime	Bottom route
Adjacent	0.48 %
Basic-to-extended (diagonal)	0.35 %
Basic-to-extended (opposite)	0.50 %
Multiline (five multi-aggressor differential pairs)	2.15 % max.

Differential propagation delay

Basic side: 135 ps
Extended side: 164 ps

Differential skew

Between basic and extended side: 29 ps
Within basic and extended side: ± 2 ps

Temperature range -55 °C ... +105 °C
during reflow soldering 220 °C for 2 minutes
270 °C max. short-term

Durability as per AMC.0 specification 200 mating cycles in total

Termination technique Solder termination (Pin in Hole Intrusive Reflow)

Pick-and-place-weight < 7 g

Mating force 100 N max.

Withdrawal force 65 N max.

The mating and withdrawal force is highly depending on the mating half connector, but typically only 50 % to 70 % of the mating force of a PCB card edge.

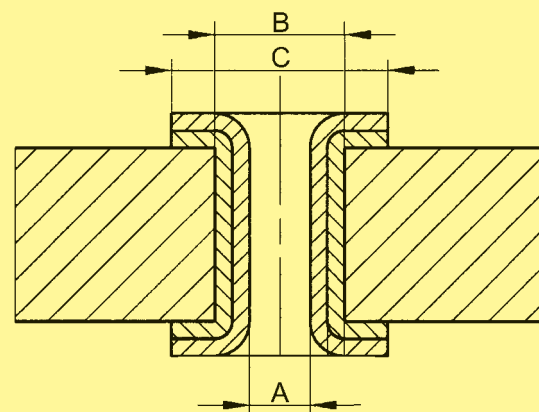
Materials

Moulded parts Liquid Crystal Polymer (LCP), UL 94-V0

Contacts Copper alloy

Contact surface Au over Ni

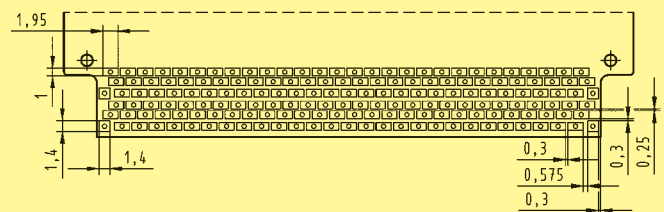
Packaging Tray packaging (other packaging on request)



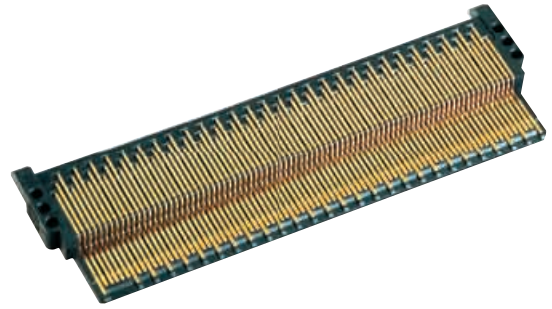
Plated through hole recommendations

A	Plated hole-Ø	0.55 ^{+0.08} _{-0.02} mm
B	Drill hole-Ø	0.65±0.01 mm
C	Pad size	0.95 mm

Stencil recommendation

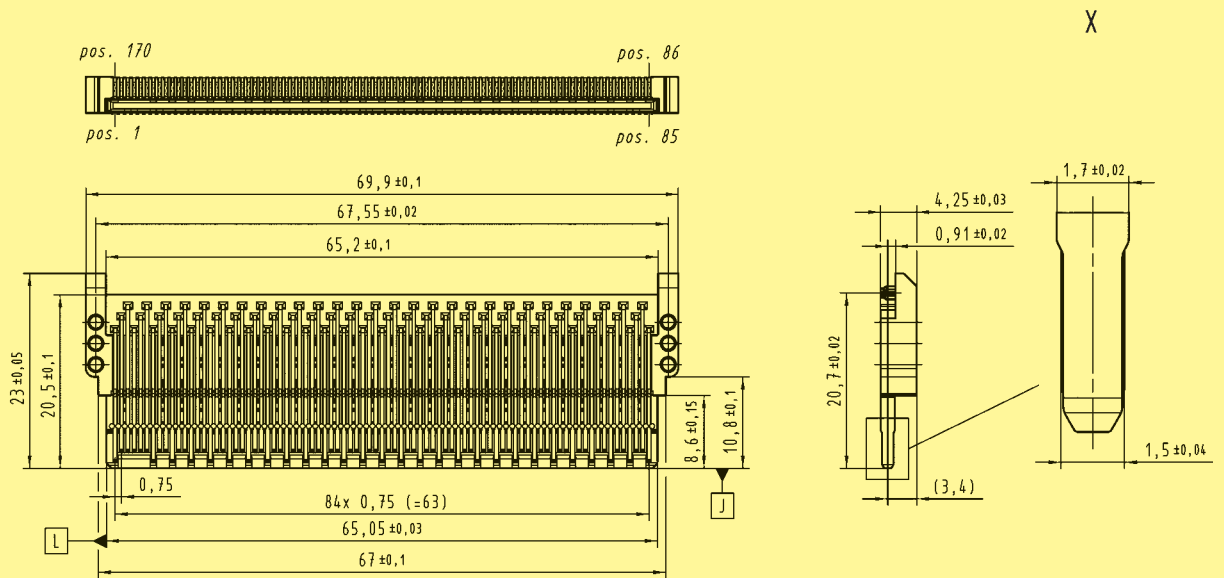


Each termination requires a solder paste volume of 0.57 mm³. Since the stencil can only provide fractions of this volume (0.29 mm³ at 0.15 mm stencil thickness), the remaining solder paste must be pressed into the plated through hole. For a nominal AMC card (1.6 mm PCB thickness, 0.55 mm plated hole diameter) the paste must penetrate the hole by 0.7 mm.

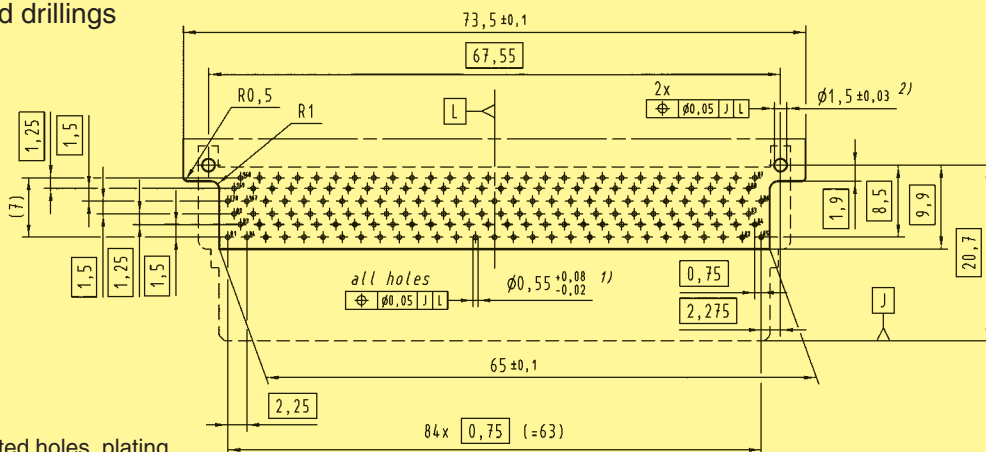


Identification	No. of contacts	Part number
AdvancedMC™ Plug Connector	170	16 21 170 1301 000
AdvancedMC™ Plug Connector with nozzle pad for pick and place assembly	170	16 21 170 1302 000

AdvancedMC™ Plug Connector



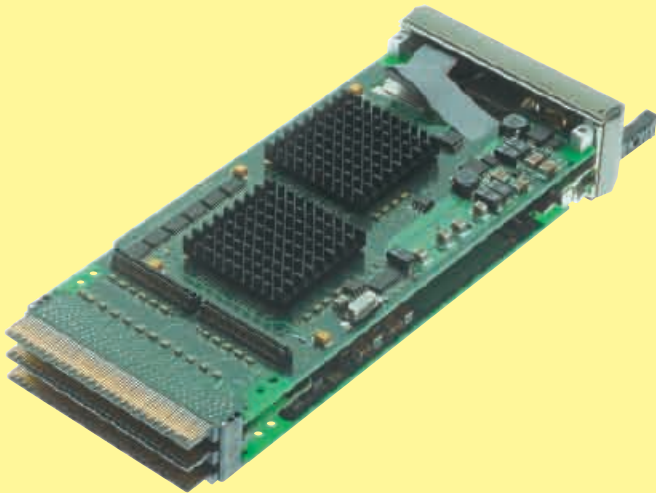
Board drillings



1) Plated holes, plating recommendations see page 12.18

2) Non-metallized drillings

One important component of a MicroTCA™ system is the so called „MicroTCA™ Carrier Hub“, abbreviated MCH. The main functions of an MCH module are the hardware platform management and the management of the fabric connectivity. As the MCH module needs many more connections than a standard AdvancedMC™ module, an MCH can have up to 4 mating tongues each with 170 contacts.



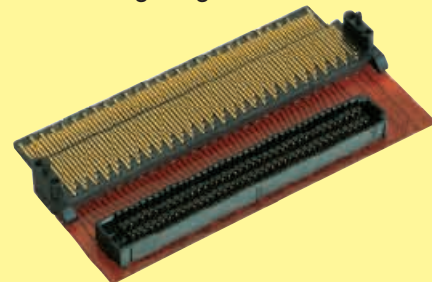
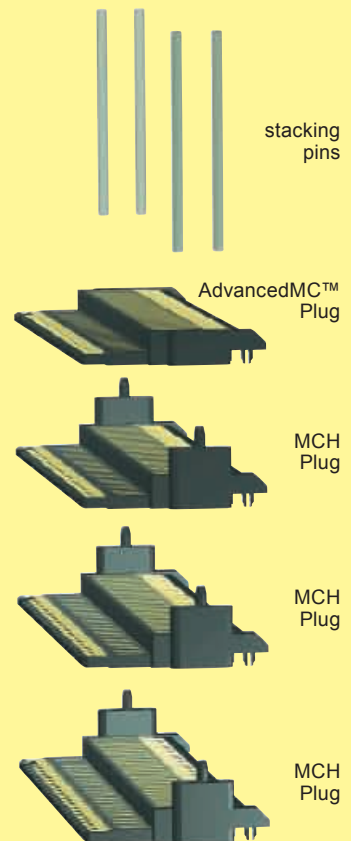
The MTCA.0 specification recommends the use of a special Plug Connector to reduce the insertion force of the module and to solve the tolerance stack-up problem between the multiple tongues and the backplane connectors.

The HARTING Plug Connector system consists of a configuration with two different Plug Connectors. The AdvancedMC™ Plug Connector is mated with the backplane MCH connector. MCH connector 1 is needed for the base function of the system. Furthermore it can be used for any conventional AdvancedMC™ module to replace the PCB gold pads.

The MCH Plug Connector is mated with the backplane MCH connectors 2, 3, 4 depending on the MicroTCA™ configuration. Compared to the AdvancedMC™ Plug, the MCH Plug insulator has standoffs securing the right distance for the slot width between two tongues or backplane connectors respectively. The MCH and AdvancedMC™ Plugs have different contact staggering on the basic side, the extended side is equal.

To build a connector stack for two, three or four mating tongues, the HARTING Plug Connectors are mounted like building blocks via pegs and holes of the adjacent Plugs. For additional mechanical stability, the connector stack is fixed by up to four metal stacking pins. The complete connector stack can be easily installed without any special tooling by only handling three different parts (AdvancedMC™ Plug Connector, MCH Plug Connector and the corresponding stacking pins).

For a MicroTCA™ system with more than 6 AdvancedMC™ modules using the switched fabric fat pipe, an MCH module with 4 mating tongues has to be used. Depending on the application, the switched fabric is located only on the third board, so a high speed connection is needed between the mating tongue 4 and the PCB 3.



For this purpose, HARTING offers a special high speed adapter. The MCH Flex Adapter offers high speed characteristics with mechanical flexibility. HARTING delivers the complete assembly consisting of one MCH Plug and a mezzanine connector soldered to a flexible PCB. The mating half of the mezzanine connector can be delivered by HARTING also.



MCH modules can have up to 4 mating tongues. HARTING offers two versions of the Plug and a special Flex Adapter.

