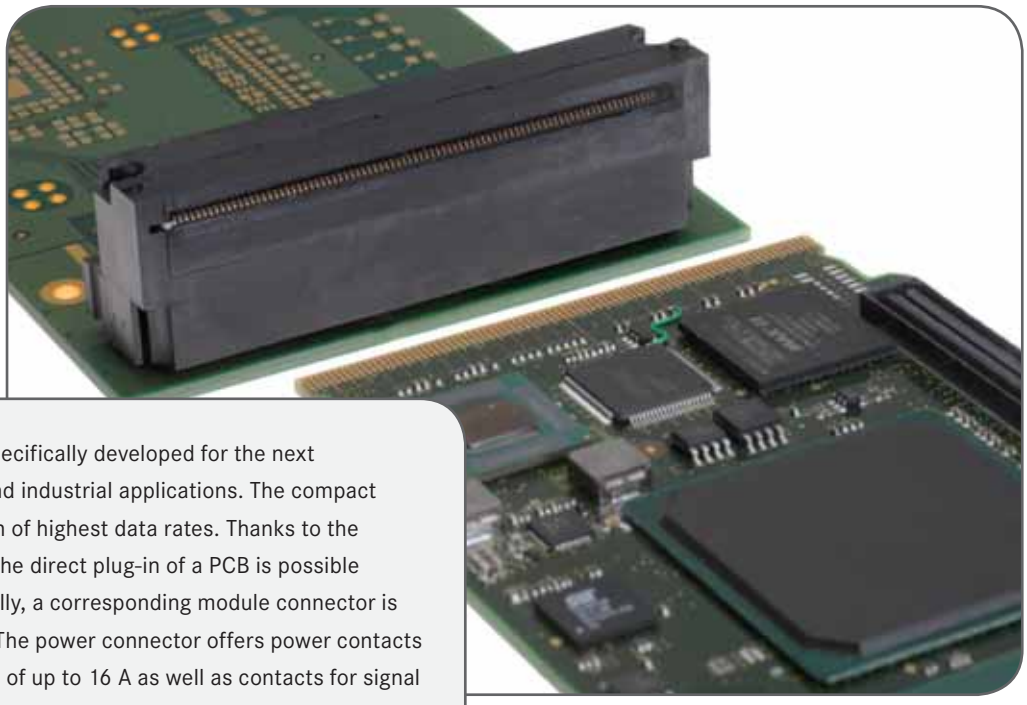


The TCA connectors have been specifically developed for the next generation of telecom, medical and industrial applications. The compact connector allows the transmission of highest data rates. Thanks to the innovative GuideSpring concept, the direct plug-in of a PCB is possible without any safety loss. 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	Nimber of contacts, contact density	Voltage, working current
●		●		●	●	●	●		●	●

Cable termination

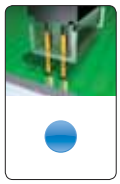
Han-Quick Lock® | *IDC* | *Crimp*

Screw | *Cage clamp* | *Axial screw*

PCB termination

THT | *SMC* | *SMT*

Press-in



Application standard

PICMG® AdvancedTCA® AdvancedMC™ µTCA™

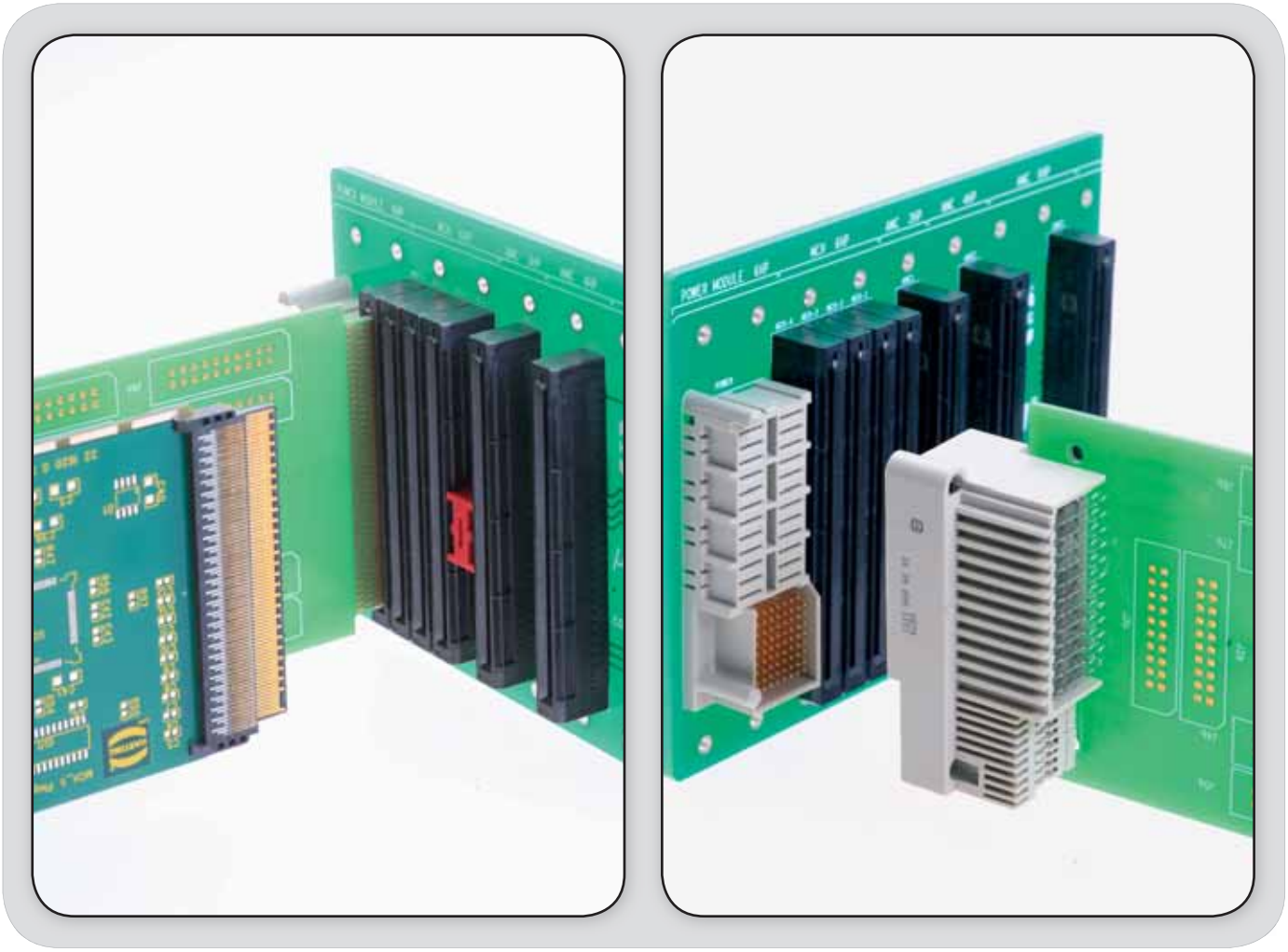
Housing integration

Separate housing | *Integrated housing*

CONTENTS PAGE

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 exisiting 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 apllications.

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.

PICMG®

AdvancedTCA®

AdvancedMC™

µTCA™

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

AdvancedTCA® chassis with backplane

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 it's 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.

The AdvancedMC™ standard covers a wide range of applications:

- AMC.1 PCI Express and advanced switching
- AMC.2 Gigabit Ethernet / 10 Gigabit XAUI Ethernet
- AMC.3 Storage
- AMC.4 Serial RapidIO

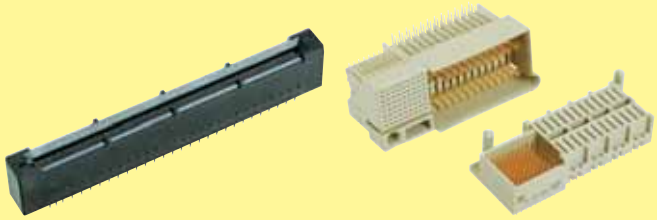
µTCA™

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.

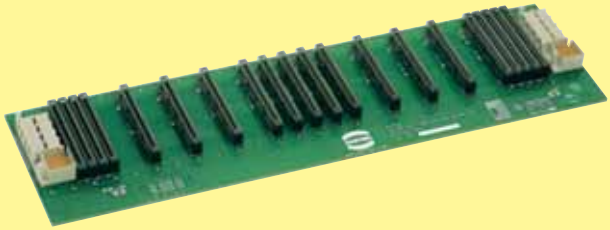
MicroTCA™ double cube system

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™ moduls, 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.

*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 or see at www.concardplus.com.

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 ± 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

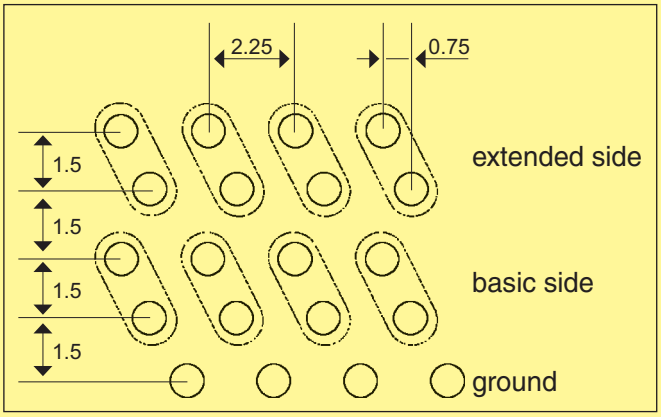
Pcb manufacturers are not capable of meeting the AdvancedMC™ modules' tight tolerances with certainty in the series process today. Just a single card with tolerances slightly larger than allowed by the specifications can lead to a system breakdown.
The ***con:****card****+*** *GuideSpring offsets these 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.

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 $V_{r.m.s.}$
Contact resistance	
ground contacts	60 mΩ max.
signal, power, general purpose contacts	90 mΩ max.
Insulation resistance	10 MΩ
Nominal differential impedance	100 Ω ± 10 %
Near end crosstalk (pair-to-pair) @ 30 ps risetime	
basic-to-basic	< 0.6 %
basic-to-extended	< 0.9 %
extended-to-extended	< 0.6 %
diagonal	< 0.3 %
multiline	< 3.0 %

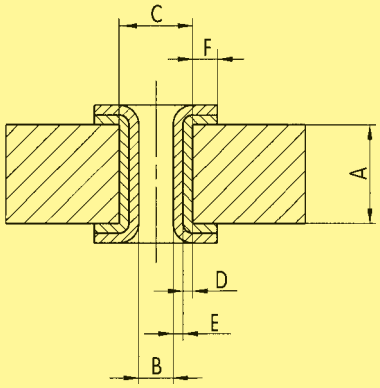


Differential propagation delay	Basic side:	125 ps
	Extended side:	145 ps
Differential skew	Between basic and extended side:	20 ps
	Within basic and extended side:	± 2 ps

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	Palladium nickel plated
Packaging	Card box (other packaging on request)



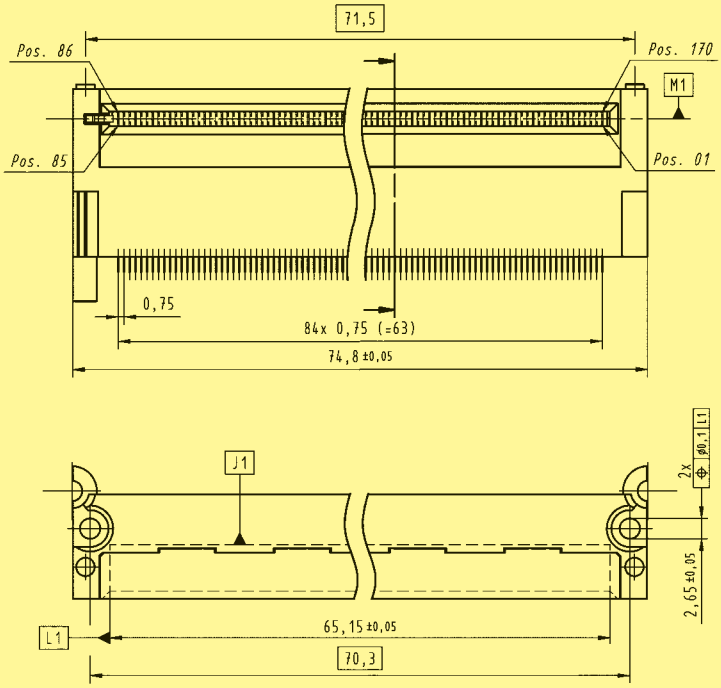
Plated through hole recommendations		
A	pcb thickness	min. 1.4 mm
B	Plated hole-Ø	0.55 ± 0.05 mm
C	Hole-Ø	0.64 ± 0.01 mm
D	Cu	min. 25 µm
E	Plating	- min. 0.8 µm chem. Sn - 0.05 - 0.12 µm Au over 3 - 7 µm Ni - 0.1 - 0.3 µm Ag
F	Pad width	min. 0.15 mm

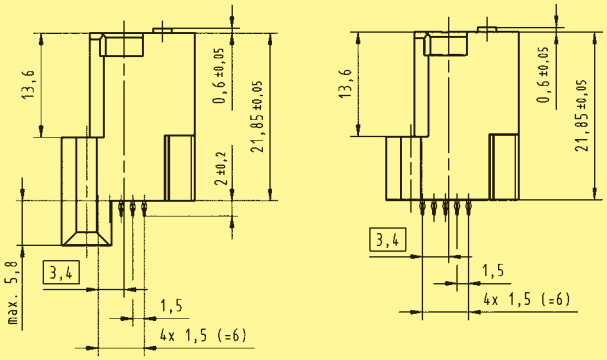
con:card+®

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

With peg Without peg With peg Without peg





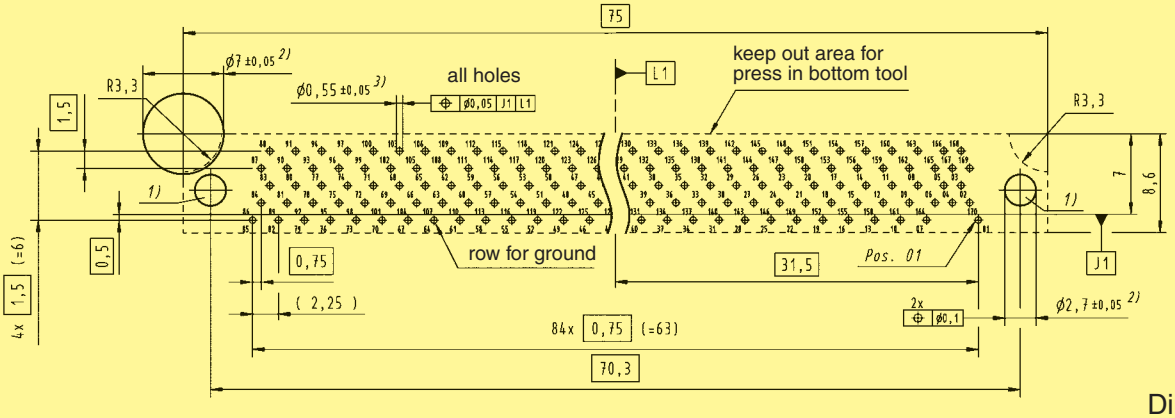
1) fixing-hole optional

2) non-metallized drillings

3) recommended drill hole diameter:
ø 0.64 ± 0.01 mm
through hole diameter (after plating):
ø 0.55 ± 0.05 mm (acc. to IEC 60352-5)

TCA

Board drillings (view magnified)



Dimensions [mm]

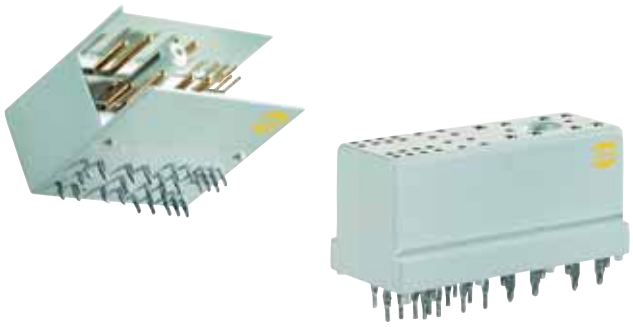
Technical characteristics

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 $V_{r.m.s.}$
Contact resistance	
Power contacts	≤ 3 mΩ
Signal contacts	≤ 10 mΩ
Insulation resistance	≥ 10^8 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.

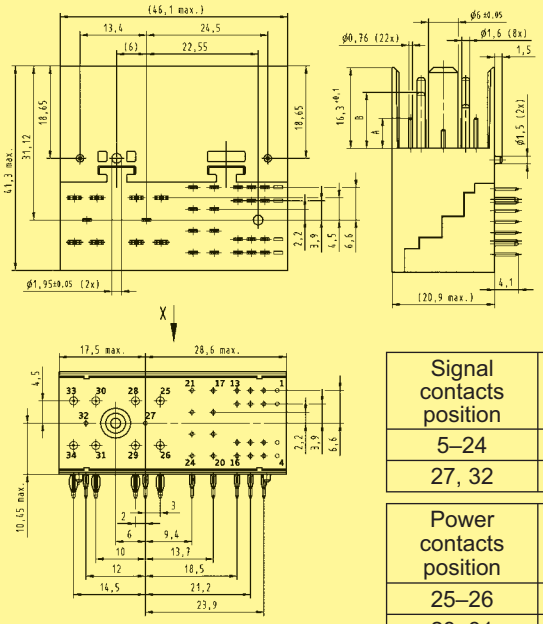
Materials

Moulded parts	PBT, glass-fibre filled, UL 94-V0
Contacts	Copper alloy
Contact surface	Selectively gold plated
Packaging	Tray packaging (other packaging on request)



Identification	No. of contacts	Contact length [mm] termination side	Part number
Power connector for AdvancedTCA®, male	30	4.1	16 32 030 1101 000
Power connector for AdvancedTCA®, female	30	5.3	16 31 030 1201 000

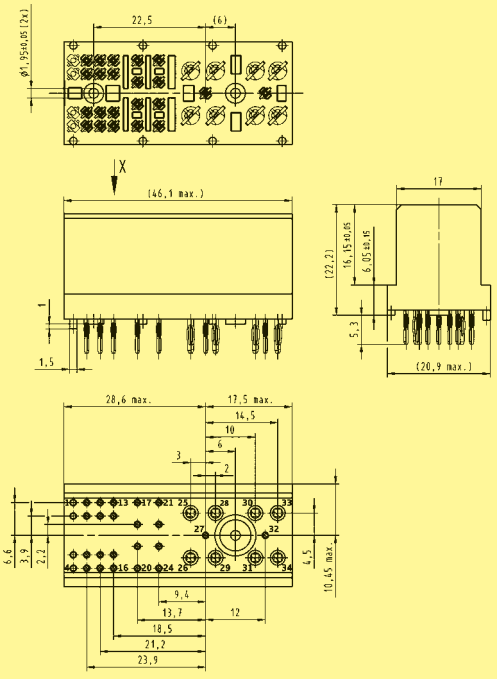
Male connector



Signal contacts position	Dimension A
5–24	6.1
27, 32	3.8

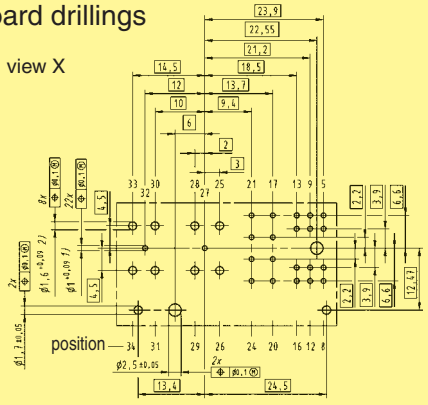
Power contacts position	Dimension B
25–26	14.3
28–31	14.3
33	11.3
34	8.8

Female connector

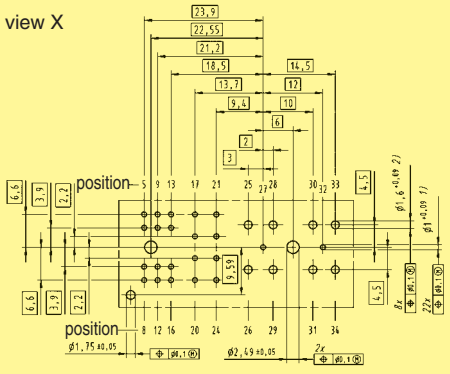


Board drillings

view X



view X



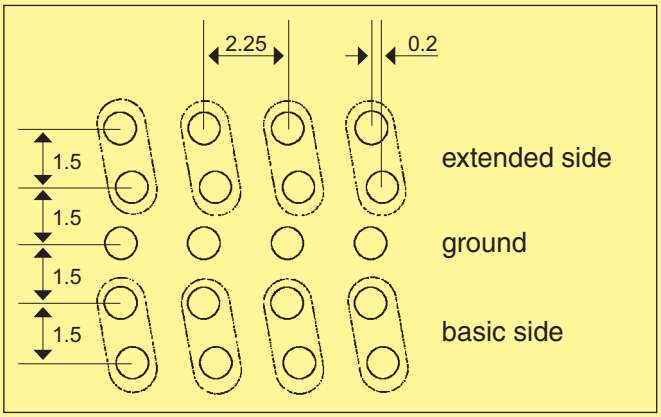
1) recommended drill hole diameter: ø 1.15 ± 0.025 mm
through hole diameter (after plating): ø 1.0 + 0.09 mm

2) recommended drill hole diameter: ø 1.75 ± 0.025 mm
through hole diameter (after plating): ø 1.6 + 0.09 mm

Dimensions [mm]

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 $V_{r.m.s.}$
Contact resistance	25 mΩ max.
Insulation resistance	10 MΩ
Nominal differential impedance	100 Ω ± 10 %
Near end crosstalk (pair-to-pair) @ 30 ps risetime	basic-to-basic < 0.5 % basic-to-extended < 0.2 % diagonal < 0.1 % multiline < 2.0 %

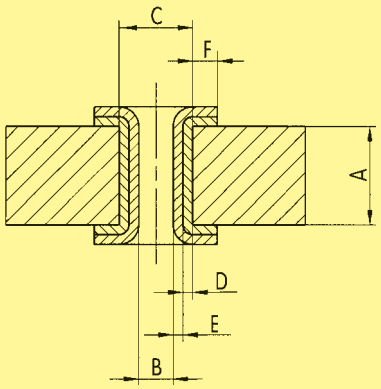


Differential propagation delay	Basic side:	75 ps
	Extended side:	75 ps
Differential skew	Between basic and extended side:	± 2 ps
	Within basic and extended side:	± 2 ps

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	Palladium nickel plated
Packaging	Card box (other packaging on request)

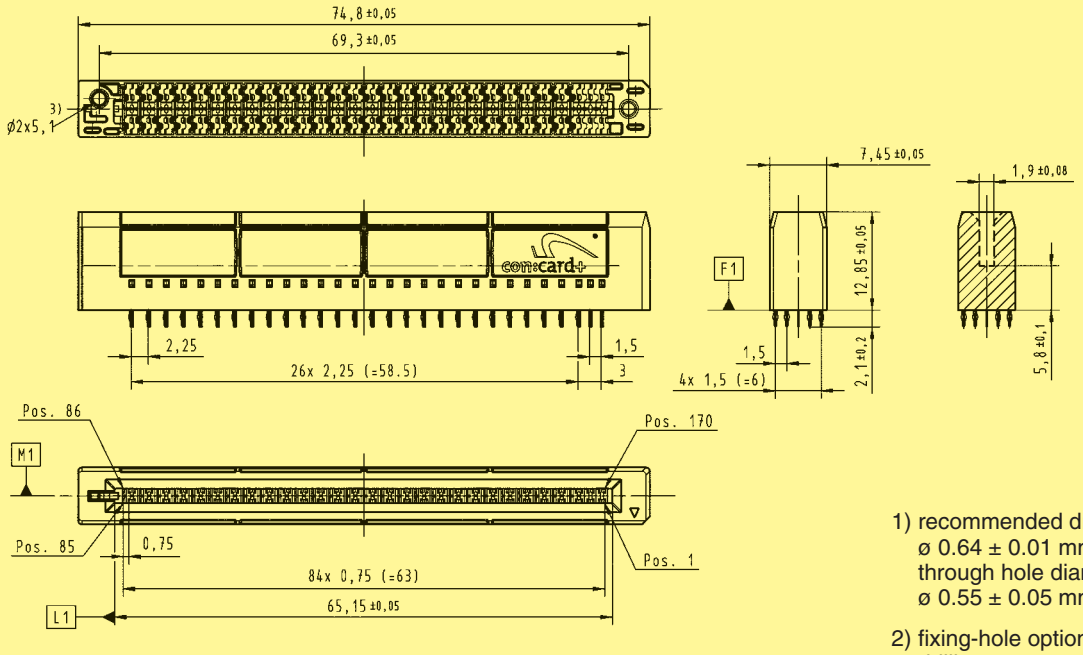


Plated through hole recommendations		
A	pcb thickness	min. 1.4 mm
B	Plated hole-Ø	0.55 ± 0.05 mm
C	Hole-Ø	0.64 ± 0.01 mm
D	Cu	min. 25 µm
E	Plating	- min. 0.8 µm chem. Sn - 0.05 - 0.12 µm Au over 3 - 7 µm Ni - 0.1 - 0.3 µm Ag
F	Pad width	min. 0.15 mm

con:card+

Card edge connector, straight

Identification	No. of contacts	Contact length [mm] termination side	Part number
AdvancedMC™ connector for MicroTCA™ with GuideSpring	170	2.1	16 11 170 5202 000

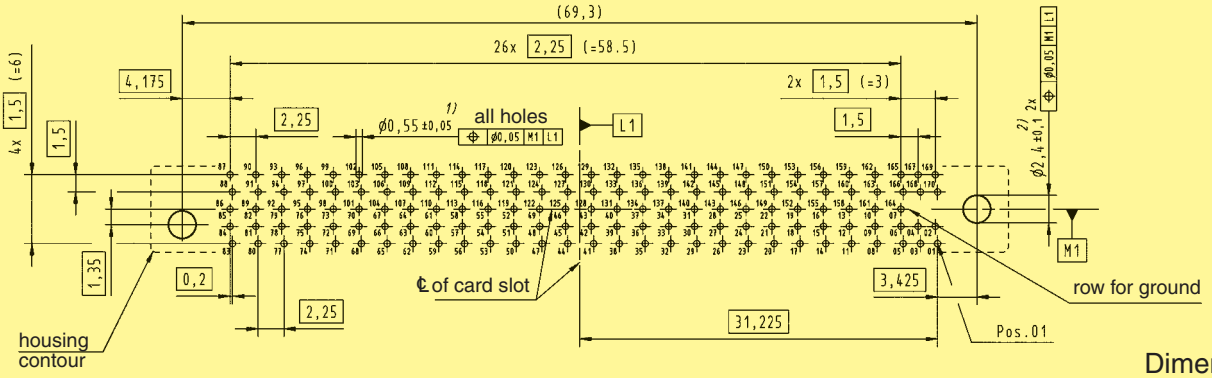


1) recommended drill hole diameter:
ø 0.64 ± 0.01 mm (acc. to IEC 60352-5)
through hole diameter (after plating):
ø 0.55 ± 0.05 mm

2) fixing-hole optional non-metallized drillings

3) use fillister-head tapping screws 2.2 x length, shape C, acc. to ISO 7049 (length = pcb thickness + min. 4 mm)

Board drillings (view magnified)



Dimensions [mm]

TCA

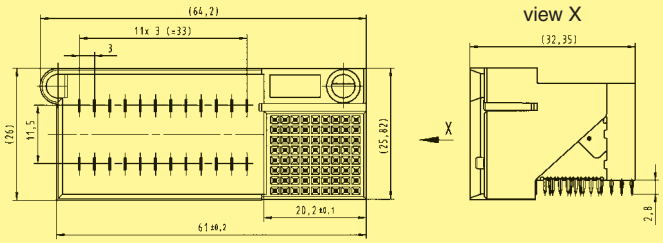
Technical characteristics

Design according	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
Contact resistance	
Power contacts	≤ 10 mΩ
Signal contacts	≤ 35 mΩ
Insulation resistance	≥ 10^8 Ω
Insulation resistance (after moisture)	≥ 10^7 Ω

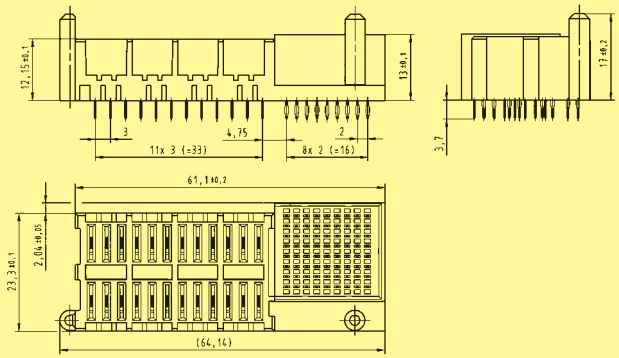
Temperature range	-55 °C … +105 °C
Durability	200 mating cycles
Termination technique	Press-in termination
Mating force	145 N max.
Withdrawal force	110 N max.
Materials	
Moulded parts	PBT, glass-fibre filled, UL 94-V0
Contacts	Copper alloy
Contact surface	
Power contacts	selectively gold plated
Signal contacts	selectively palladium nickel plated
Packaging	Tray packaging (other packaging on request)

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

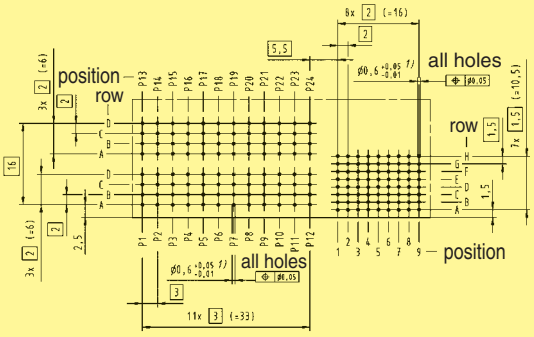
Module version

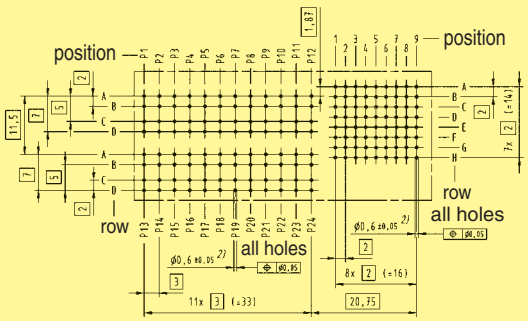


Backplane version



Board drillings





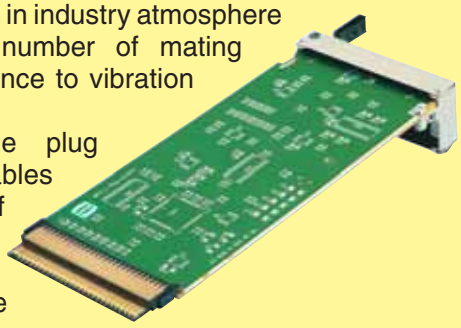
1) recommended drill hole diameter: ø 0.7 ± 0.02 mm
through hole diameter (after plating): ø 0.6 $^{+0.05}_{-0.01}$ mm

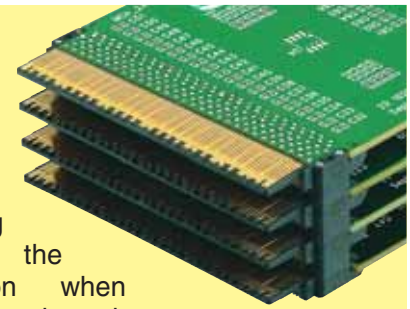
2) recommended drill hole diameter: ø 0.7 ± 0.02 mm
through hole diameter (after plating): ø 0.6 ± 0.05 mm

Dimensions [mm]

General information

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.
Originally developed for the MCH module, the AMC plug connector can be used with every AdvancedMC™ module instead of the gold pad field, there are two connectors again in an indirect connection. By using the plug connector, it's much easier to keep the tolerances of the mating face and the requirements regarding the contact surface. The main requirement is usage of hard gold surface with a defined surface thickness and minimal surface roughness. With the plug the wear of the AdvancedMC™ connector contacts is reduced. The plug connector offers increased contact reliability in industry atmosphere where a high number of mating cycles or resistance to vibration is required.
Furthermore the plug connector enables the usage of PCBs outside the defined thickness range of 1.6 mm ± 10 %.





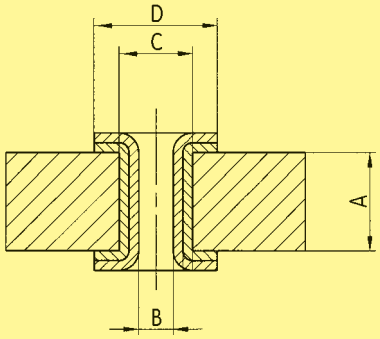
Thanks to the special design of the mating face, the plug halves the mating forces compared to a PCB. The plug connector fits into the AMC.0 specification when mounted to the PCB and can hence be used in both MicroTCA™ and ATCA® environments.
To permit a precise mechanical alignment between the multiple mating tongues of the MicroTCA™ Carrier Hub module (MCH), a plug connector is recommended by the MTCA.0 specification. HARTING fulfills this requirement with the modular plug connector system. The AMC plug is used in any case for the first mating tongue. Depending on the MCH structure, further one to three MCH plugs are combined via plastic pegs to a connector stack.
To keep the alignment to the backplane connectors, the MCH plug has plastic standoffs. For additional stabilization, four metal pins are fixing the stack.
For the connection of the third and fourth PCB (which is the switched fabric) a highspeed adapter is available on request.

Technical characteristics for plug connectors

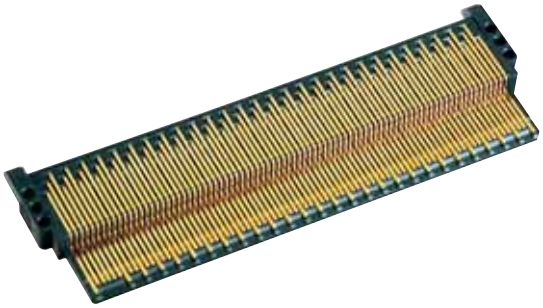
Design according	PICMG MicroTCA.0 R1.0 PICMG AMC.0 R2.0 (RoHS compliance)
Number of contacts	170
Contact spacing	0.75 mm
Clearance and creepage distance between contacts	0.1 mm min.
Working current	1.52 A @ 70 °C max. 30 °C temp. rise acc. to pin configuration in AMC.0 spec.
Test voltage	80 $V_{r.m.s.}$
Nominal differential impedance	100 Ω ± 10 %
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

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)

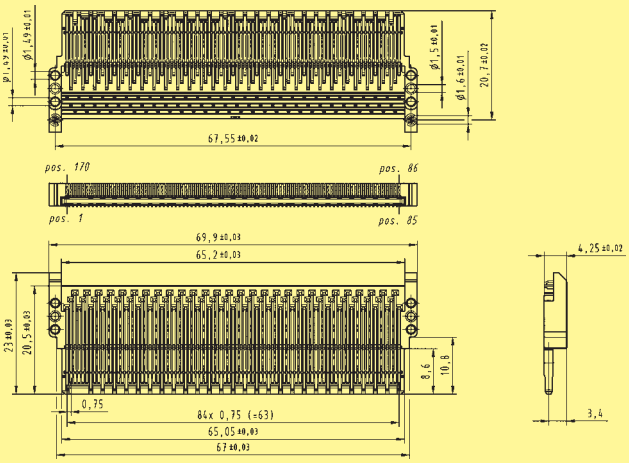


Plated through hole recommendations		
A	pcb thickness	1.6 mm
B	Plated hole-Ø	0.55 ± 0.05 mm
C	Hole-Ø	0.65 ± 0.01 mm
D	Remaining pad	0.95 mm

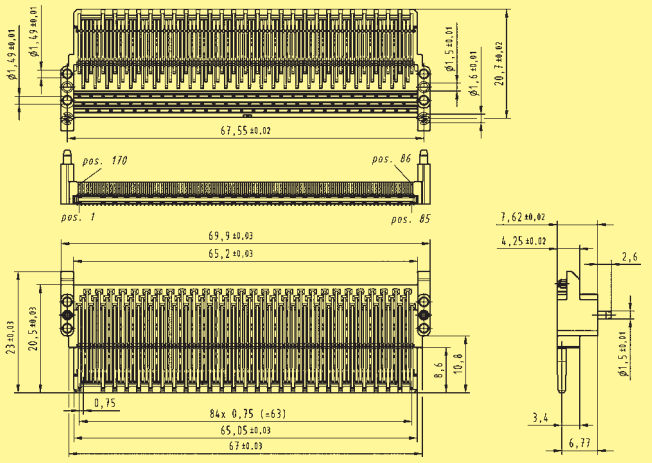


Identification	No. of contacts	Part number
AdvancedMC™ plug connector	170	16 21 170 1301 000
MCH plug connector	170	16 22 170 1301 000
AdvancedMC™ – MCH plug stacking-pin double, length 11.84 mm triple, length 19.46 mm quad, length 27.08 mm		16 79 000 0006 000 16 79 000 0007 000 16 79 000 0008 000

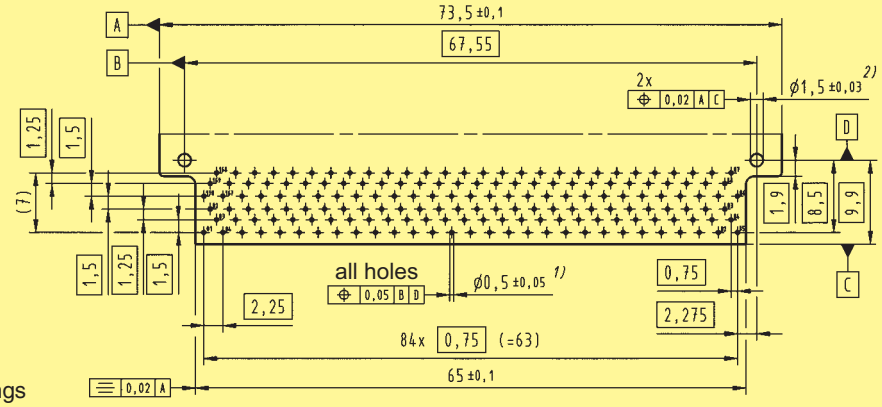
AdvancedMC™ plug connector



MCH plug connector



Board drillings (view magnified)



1) Plated holes

2) Non-metallized drillings

Dimensions [mm]