



AdvancedCMT vs. Pressfit

No Compromise! High Speed with CMT

The advantages of the Compression Mount Technology (CMT) when using AdvancedTCA and MicroTCA connectors

Most of the connector manufacturers use conventional press-fit technology for PCB connectors in rack architectures, but there are several important reasons in favour of the Compression Mount Technology (CMT).

Yamaichi Electronics has decades of specialist experience with CMT for test and burn-in sockets and in 2004 developed the first AdvancedCMT connector for the Advanced Mezzanine Card for ATCA and MicroTCA.

What is Compression Mount Technology (CMT)?

CMT is a contact technology between an electro-mechanical component (e.g. connector or test adapter for semi-conductors) and a printed circuit board (PCB). The electrical contact is established through the compression of the two contact faces by screwing the component to the PCB. Therefore there is no need for a soldering process. The pre-compressed spring contacts of the connector are pressed onto a gold plated contact pad on the PCB by means of a predefined screw force (realised with a cordless screwdriver). At the same time a metallic stiffener is screwed from the backside of the PCB to avoid stress on the PCB and its distortion.

AdvancedCMT

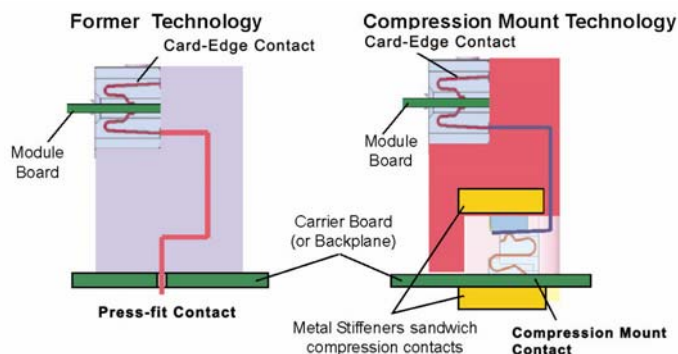
The product family „AdvancedCMT“ from Yamaichi offers solutions for the new telecommunications standards ATCA and MicroTCA. By the way Yamaichi was pioneer in the field of the MCH connectors which are necessary for MicroTCA: Yamaichi was the first manufacturer to supply many different combinations in large-scale production. The MCH connector is used as adapter between the backplane and the MCH controller card (MicroTCA Carrier Hub, formerly called VCM or Virtual Carrier Manager).

There is an essential difference between the Yamaichi AdvancedMC plug connectors for ATCA and MicroTCA design and the competitors' products - this difference lies in the technology used to connect the connector to the carrier board.

Whereas other manufacturers use conventional press-fit technology, Yamaichi use the innovative Compression Mount Technology (CMT).

The AdvancedCMT exceeds the signal integrity requirements from the specification with data rates of 12.5 Gbps. It has excellent high frequency characteristics at even considerably higher data rates. The High Speed characteristics of AdvancedCMT easily outdo those of the press-fit connectors.

The advancedCMT is a reliable and qualified technology used successfully by Yamaichi Electronics for decades in semiconductor test sockets. Using this technology, they became the unchallenged world market leader for these products. In the telecommunications market CMT is certainly an innovation which became mandatory because of the growing high speed transmission demands. And which already became accepted in numerous applications. Also with regard to the mechanical stress and the reliability during extreme temperature, shock, vibrations and other influences AdvancedCMT fulfills all requirements without any compromise.



The innovation in the Yamaichi connector design lies in the AdvancedCMT of the connection to the carrier board (ATCA) respectively backplane (MicroTCA).

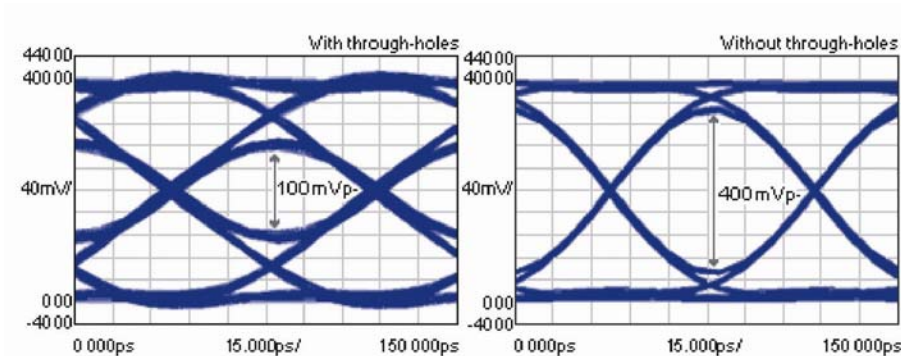
The advantages for the user

There are several arguments in favour of Compression Mount Technology. Three factors in particular distinguish it from press-fit technology and improve application performance significantly: high speed data transmission, flexibility during the PCB design and reliability!

1. Signal integrity at High Speed data transmission

With press-fit technology, contacting of all signal layers is done using plated through-holes. Due to the through-holes these contacts create interference and stub-effects that affect fast signal edges or high-frequency signals.

On the other hand, with Compression Mount Technology, the different PCB signal layers are contacted using micro-vias. Large through-holes and blind vias are avoided, thus resulting in considerably less interference and excellent impedance characteristics: therefore High Speed without compromise!

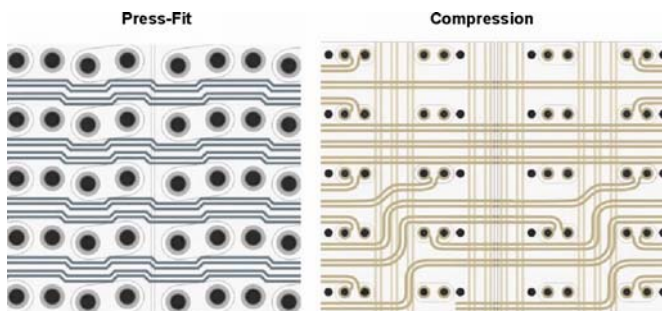


CMT shows significantly better high frequency characteristics compared to press-fit designs. Contacting different signal layers with micro-vias minimises signal disturbance which usually occurs in PCB designs with press-fit holes. The eye diagrams prove this (left for press-fit technology, right for CMT at 12.5 Gbps respectively).

2. Routing Flexibility

Routing of the AdvancedMC connector on the carrier board (ATCA) or the backplane (MicroTCA) is much easier with CMT. This is also possible due to the micro-vias (blind vias and buried vias). These miniaturised contacts between the PCB layers require only minimum space compared to the large diameter of the press-fit drill holes.

The CMT allows easy routing for MicroTCA signal connectors: 3 horizontal and 3 vertical track pairs can be routed between the contact pads as well as even 4 vertical pairs in the MCH module area. Whereas press-fit allows only 2 horizontal track pairs and only 1 track pair in the MCH module area. Vertical routing under the connector is not possible at all. (See the layout drawing.) These advantages yield a simple board layout with CMT, fewer PCB layers, and more reliable data rates.



The routing capabilities of the MicroTCA backplane design are much better with CMT than with press-fit. This is shown by the comparative drawing.

The better board routing capabilities also bring cost savings, with the number of PCB layers cut down by approximately one third. This gives a total cost reduction of up to 20% when a typical MicroTCA backplane is designed according to CMT rules.

3. Reliable Connection

There are also advantages concerning the assembly: the connector can be easily screwed onto the carrier board or the backplane in an easy assembly process. Above all this is a big advantage for repair or field service work in particular because a connector can just be unscrewed and replaced with a new one. Press-fit technology cannot provide this advantage.

As a matter of course AdvancedCMT is in accordance with all specifications for applications in rack architectures, also with regard to the mechanical stability, durability etc.

The card-edge connection of all connectors of the AdvancedCMT family features a high contact reliability, i.e. the connection between the Advanced Mezzanine Card and either the backplane connector (for MicroTCA), or the carrier board connector (for ATCA).

From the very beginning, the contacts in the card-edge connection area were developed wider to compensate for the manufacturing tolerances of the PCB pads. This applies both to the position tolerances of the pads on the PCB and to the pad dimensions.

The card-edge contacts are also specially designed with regard to contact strength and surface wear. Due to the contact shape, the contact point is not in the punching area, but rather in the bending area of the contact material. This prevents surface damage when plugging and removing the AdvancedMC. The contact force can also be defined precisely and is ensured throughout the contact life.

The benefits of the card-edge connecting area can be summarised as follows:

- no additional guiding is needed for the AdvancedMC card
- stable contact force throughout the entire service lifetime
- no damage to the contact surface und therefore stable contact resistance

The CMT connector can be simply screwed onto the carrier board or backplane. Screw mounting also means no elaborate or expensive equipment is needed other than a suitable device for positioning the connectors and a torque wrench to mount the plug connectors with the specified torque.

Part #	Connector Style	Interface to AMC Module	# of Module Slots	No. of Pins	Carrier Type
CN074-085-0003	B	Basic	1	85	Conventional
CN074-170-0005	B+	Extended	1	170	Conventional
CN074-170-0006	AB	Basic	2	170	Cutaway
CN074-340-0001	A+B+	Extended	2	340	Cutaway

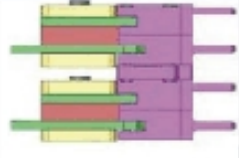
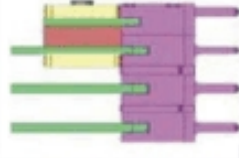



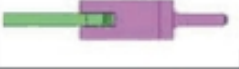

Table of AdvancedCMT connector types.

MCH controller module stabilised with MCH plug

The MCH plug series CN084 are also in large-scale production (MicroTCA Carrier Hub). Within the MicroTCA rack architecture these plugs serve as card-edge adapters between the MicroTCA backplane (via the backplane connector CN080) and the MCH controller card. There are three different tongue designs, whose combination enables different MCH module arrangements. The MCH adapters are connected with the backplane via the MicroTCA connectors. For MCH adapters and also for AdvancedMC cards for MicroTCA, an identical card edge connector is used (Yamaichi series CN080 in 170-pin design).

Various MCH plug combinations are available as a standard - with options from 170 up to max. 680 contacts for the CN084 series. The design of the MCH plug is distinguished by a high flexibility and allows for customised configurations.

Overview of possible variations

Type	Part Number		MCH Module Type
1	CN084-630 -1232-1010-0		Full Height Four Tongue MCH MCH-1 + MCH-2 + MCH-3 + MCH-2
2	CN084-630 -1332-1110-0		Full Height Four Tongue MCH MCH-1 + MCH-3 + MCH-3 + MCH-2
3	CN084-630 -1432-1010-0		Full Height Four Tongue MCH MCH-1 + MCH-4 + MCH-3 + MCH-2
4	CN084-340 -1200-1000-0		Full Height and Half Height Two Tongue MCH MCH-1 + MCH-2
5	CN084-340 -0032-0010-0		Full Height and Half Height Two Tongue MCH MCH-3 + MCH-2
6	CN084-170 -1000-1000-0		Full Height and Half Height Single Tongue MCH MCH-1
7	CN084-170 -0030-0010-0		Full Height and Half Height Single Tongue MCH MCH-3

Overview of the combination possibilities of the MCH connector.

The use of the MCH connectors offers a further advantage in that it compensates the mechanical tolerances during installation of the MCH module and significantly reduces the insertion and extraction forces. The undesired clearance between individual MCH modules is eliminated by mounting the module with the adapter using assembly tools, thus stabilising the system. This enables a precise and parallel guiding during installation of up to 4-tongue modules.

The CN084 series is, like all Yamaichi AdvancedCMT connectors, high speed capable according to the MicroTCA specification for data transfer rates of up to 12.5 Gbps. In addition, tests have shown that high speed characteristics are outstanding and there is still headroom for future applications of higher frequencies. The high speed characteristics are excellent as they are for all Yamaichi products for high frequency applications.

For simple assembly and handling of the CN084 series, special and easily operated tools are available.

Summary

As demonstrated, the Compression Mount Technology (AdvancedCMT) has many valuable advantages compared to conventional press-fit technology. It is assumed that the CMT will become widely accepted

Technical article



on the telecommunication market in the next years, notably in AdvancedTCA and MicroTCA system architectures.

www.advanced-cmt.com
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