IEC/PAS 61076-4-115

Edition 1.0
2001-06

Connectors for electronic equipment –

Part 4-115: Printed board connectors – Detail specification for a single-part hybrid connector, with a section of high-speed differential pair connections, and a section of low-speed, power and ground connections between printed boards and backplanes, in accordance with IEC 60917

PUBLICLY AVAILABLE SPECIFICATION

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

A PAS is a technical specification not fulfilling the requirements for a standard, but made available to the public.

IEC-PAS 61076-4-115 has been processed by subcommittee 48B: Connectors, of IEC technical committee 48: Electromechanical components and mechanical structures for electronic equipment.

The text of this PAS is based on the following document:	This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document:
Draft PAS	**Report on voting**
48B/1004/PAS	48B/1055/RVD

Following publication of this PAS, the technical committee or subcommittee concerned will investigate the possibility of transforming the PAS into an International Standard.

The International Electrotechnical Commission (IEC) draws attention to the fact that is claimed that compliance with this PAS may involve the use of patents concerning

a) an electrical connector assembly for establishing electrical contact with contacting devices of external terminals, e.g. with solder points of a circuit board;

b) an electrical connector assembly for establishing electrical contact with external terminals having contacting devices with contact faces, e.g. with solder points of a circuit board;

c) an electrical connector assembly with an electrical connector having a connecting position and contacting devices for establishing electrical contact between a first and a second printed circuit board.

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Harrisburg, PA 17105-3608
USA

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3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.

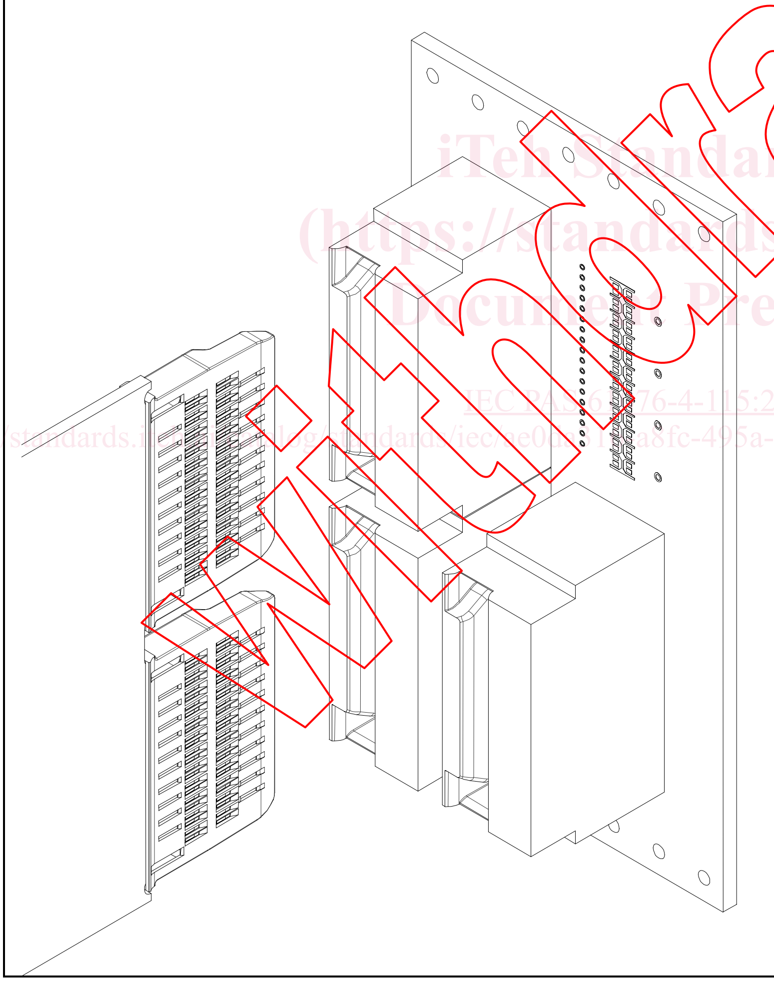
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.

CONNECTORS FOR ELECTRONIC EQUIPMENT –

Part 4-115: Printed board connectors – Detail specification for a single-part hybrid connector, with a section of high-speed differential pair connections, and a section of low-speed, power and ground connections between printed boards and backplanes, in accordance with IEC 60917

PAS 61076-4-115 – Backplane connector for InfiniBand equipment

<table>
<tr><td>International Electrotechnical Commission
IEC SC 48B – Connectors</td><td></td></tr>
<tr><td>Electronic components of assessed quality in accordance with:
GENERIC SPECIFICATION IEC 61076-1, Issue 1 1995</td><td>Blank detail specification:
IEC 61076-4-001, Issue 1 1996</td></tr>
<tr><td rowspan="3">  </td><td>Single-part hybrid connector, with a section for high-speed on a 3 mm grid and a low-speed section with power and ground connections on a 2 mm grid, for printed boards and backplanes in accordance with IEC 60917.</td></tr>
<tr><td>Hybrid connector having one section containing 2 rows of 12 contact pairs for differential pair transmission on a 3 mm pitch and one section with 1 row of 18 contacts for low-speed and power connections on a 2 mm pitch.
The fixed connectors are 50 mm high, pressed-in or surface mount soldered onto the backplane.
The plug-in card interface is protected by a paddle-guard.</td></tr>
<tr><td>Performance levels (PL): 1</td></tr>
</table>

Information on the availability of components qualified to this detail specification is given in the qualified product list.

1. General data

1.1. Recommended method of mounting

Three methods of mounting to the backplane may be adopted.

a. **Press-in / compression connections**
The fixed connector is pressed-in onto the backplane, using 18 press-in low-speed connections and four press-in pins.
The high-speed contacts to the backplane are using compression connections.

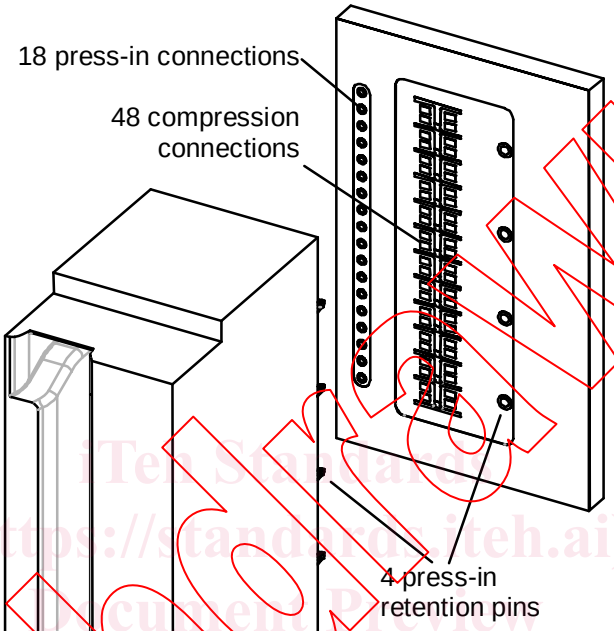


Figure 1 – Press-in / compression method of mounting

b. **Press-in connections only**
Under consideration

c. **Surface mount soldered connections**
Under consideration

The plug-in card
has an extension in the form of a paddle, with contact pads for compression connections.
The paddle shall be protected by a paddle-guard, which may be mounted in a removable or permanent way.

1.1.1. Number of contacts and contact cavities

Table 1 - Number of contacts for fixed connector

Styles	Number of I/O channels	Differential pairs	Low-speed contacts
A	4x I/O channels	4 + 4	18
C	12x I/O channels	12 + 12	18

Table 2 - Number of cavities for paddle guard

Styles	Cavities for differential pair entries	Cavities for low-speed entries
I	12 + 12	18

1.2. Ratings and characteristics

High-speed section

Compression connections	bifurcated contacts with independently operating beams
Creepage and clearance	0,3 mm min. between contacts mutually and ground
Rated voltage	within same pair 100 V r.m.s. pair to ground 100 V r.m.s.
Current rating	0,5 A per contact pair at 70°C (all contacts loaded)
Insulation resistance	1 GΩ min.
Differential impedance	100 Ω ± 10 Ω at 100 ps risetime in the connector

Low-speed section

Compression connections	bifurcated contacts with independently operating beams
Creepage and clearance	0,8 mm min. between contacts mutually and ground
Rated voltage	contact/contact 500 V r.m.s. contact to ground 500 V r.m.s.
Current rating	2,5 A per contact at 70°C (all contacts loaded)
Insulation resistance	5 GΩ min.
Printed board	thickness range for use with same fixed connector = 1,44 mm to 2,64 mm thickness range for a given paddle-guard = ± 10 % of nominal thickness
Backplane	1,6 mm min. plated-through press-in hole for low-speed connections = ∅ 0,6 mm ± 0,05 mm press-in hole diameter for fixed connector retention pins = ∅ 1 mm +0,09/-0,06 mm

1.3. Normative references

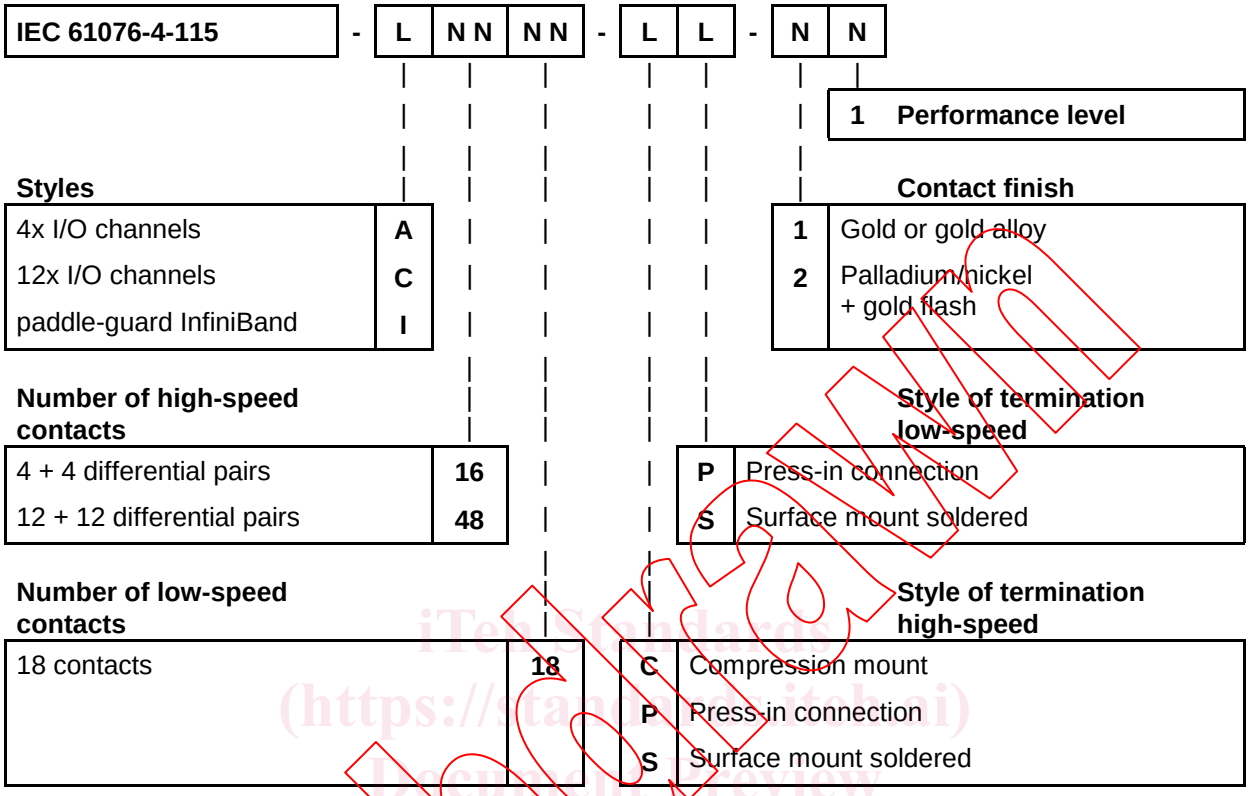
The following normative documents contain provisions, which, through reference in this text, constitute provisions of this part of IEC 61076. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and users of this standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60068-1: 1988	*Environmental testing* *Part 1: General and guidance*
IEC 60352-5: 1995	Solderless connections Part 5: Solderless press-in connections – General requirements, test methods and practical guidance
IEC 60512-1: 1994	Electromechanical components for electronic equipment – Basic testing procedures and measuring methods Part 1: General
IEC 60512-2: 1985	Part 2: General examination, electrical continuity and contact resistance tests, insulation tests and voltage stress tests
IEC 60512-3: 1976	Part 3: Current-carrying capacity tests
IEC 60512-4: 1976	Part 4: Dynamic stress tests
IEC 60512-5: 1992	Part 5: Impact tests (free components), static load tests (fixed components), endurance tests and overload tests
IEC 60512-6: 1984	Part 6: Climatic tests and soldering tests
IEC 60512-7: 1993	Part 7: Mechanical operating tests and sealing tests
IEC 60512-8: 1993	Part 8: Connector tests (mechanical) and mechanical tests on contacts and terminations
IEC 60512-9: 1992	Part 9: Miscellaneous tests
IEC 60512-20-1: 2000	Part 20: Fire hazard tests Test 20a – Flammability, needle-flame
IEC 60512-23-4: 2000	Part 23: Shielding and filtering tests Test 23d – Transmission line reflections of connectors in the time domain
IEC 60512-25-1: 2000	Part 25: Signal integrity tests Test 25a – Crosstalk ratio
IEC 60512-25-2: 2000	Test 25b – Attenuation
IEC 60512-25-4: 2000	Test 25d – Propagation delay
IEC 60917: 1988	Modular order for the development of mechanical structures for electronic equipment practices
IEC 60917-2-2: 1994	Part 2: Sectional specification – Interface co-ordination dimensions for the 25 mm equipment practice Section 2: Detail specification – Dimensions for subracks
IEC 61076-1: 1995	Connectors with assessed quality for use in d.c. low frequency analogue and digital high-speed data applications Part 1: Generic specification
IEC 61076-4: 1995	Part 4: Sectional specification – Printed board connectors
IEC 61076-4-001: 1996	Section 001: Blank detail specification
ISO 1302: 1995	Technical drawings – Method of indicating surface texture

1.4. Marking

The marking of the connector and the package shall be in accordance with 2.6 of IEC 61076-4.

1.5. IEC type designation



See 2.1 for definitions and 2.2 for designation of styles and variants.
The designation shall be derived in accordance with 2.5 of IEC 61076-4.

Example for fixed connector

A style C fixed connector, press-in / compression mounted, with 2 x 12 differential pairs and 18 low-speed contacts, gold plated, meeting performance level 1, is designated as follows:

IEC 61076-4-115 – C4818 – CP – 11

Example for paddle-guard

A style I paddle-guard, with apertures for 2 x 12 differential pairs and 18 low-speed contacts, meeting performance level 1, is designated as follows:

IEC 61076-4-115 – I4818 – CP – 11

1.6. Ordering information

For ordering connectors according to this detail specification, the IEC type designation described in 1.5 shall be used.

2. Technical data

2.1. Definitions

For the purpose of this section the following definitions apply:

2.1.1. Mechanical features

paddle-guard – Protective plastic glove that covers the milled edges of the board paddle at the plug-in unit. It is a robust and accurate interface to the fixed connector; it aligns the contact beams to the pads and activates the mating movement of the high-speed section during insertion and withdrawal of the plug-in unit.

2.1.2. Contacts and terminations

contact range - The range from minimum to maximum distance between the reference planes of the fixed and free boards, within which the specified contact resistance is met.

contact beam – Part of the contact that makes the contact to the pad on the board, this part is usually plated and shaped like the back of a spoon.

compression connection – Solderless connection between a contact beam and a contact pad on the board, accomplished through a specific pressure in the contact area, generated by a continuous compression force and a spherical shape of the beam.

dual compression connection – Connection between a bifurcated contact beams and one contact pad on the board.

2.1.3. Engagement sequence

contact level - set of contacts which engage/separate simultaneously, taking the accuracy required by the engaging sequence into account.

engaging sequence - given order of engagement/separation of contacts belonging to different contact levels, which assures that all contacts of a given level do close/open after the previous level and before the next level.

2.2. Survey of styles and variants

2.2.1. Styles of connectors

Table 3 – Survey of fixed connectors

Style	Colour	I/O Channels	Length
A	Peddle grey	4x	50 mm
C	Blue	12x	50 mm

Table 4 – Survey of paddle-guards

Style	Engagement sequence low-speed
I	InfiniBand configuration (see 3.7.2)

2.2.2. Styles of termination

Termination to the backplane

Table 5 – Survey of terminations to the backplane

Method of mounting	Section	Style of termination	Dimensions
Press-in / compression	High-speed	Dual compression connection	-
	Low-speed	Press-in connection, according to IEC 60352 – 5	∅ 0,6 ± 0,05 mm
Press-in only	High-speed	Under consideration	Under consideration
	Low-speed	Press-in connection, according to IEC 60352 – 5	∅ 0,6 ± 0,05 mm
Surface mount soldered	High-speed	Under consideration	-
	Low-speed	Under consideration	-

Termination to the plug-in card

All bifurcated contacts shall make a dual compression connection to the contact pads at the plug-in card.

2.2.3. Variants of the paddle-guard

Thickness of the plug-in card

Table 6 – Survey of paddle-guard variants

Variant	Thickness of plug-in card	Tolerance range on thickness
1	1,6 mm	1,44 mm – 1,76 mm
2	2 mm	1,8 mm – 2,2 mm
3	2,4 mm	2,16 mm – 2,64 mm