

Industrial style Single Pair Ethernet connector acc. to IEC 61076-3-125

comments #80 & #81 (#75)

IEEE 802.3cg Task Force
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... more in discussion

International SPE connector selection

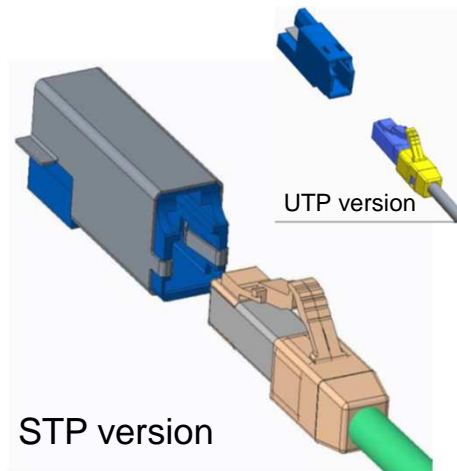


SPE connector mating face selection process results from TIA TR42 and ISO/IEC SC25 WG3:



Variant 1 – LC style for $M_1I_1C_1E_1$ acc. IEC 63171-1

Variant 2 – Industrial style for $M_2I_2C_2E_2$ and $M_3I_3C_3E_3$ acc. IEC 61076-3-125



IP20

M8 IP65/67

M12 IP65/67

The LC - style and the Industrial - style SPE connector mating face

- Will go into the ISO/IEC 11801 documents part 3 and part 6
- Will go via IEC SC65C JWG10 into the IEC 61918 documents by an amendment
 - will go into the IEC 61784-5-x series (Industrial field bus cabling like PROFINET, EtherNet/IP, EtherCAT and so on...)
- Will go into the ISO/IEC 11801-1 documents requested mating interface for SP cabling at the communication outlet (TO, AO, EO...)
- Will be the offer to the industry for implementing any SPE service including remote power into devices or cabling solutions ...

- Will be added to the TIA TR42-1 (TIA 568.1) and TR42-9 (TIA 1005) cabling standards

Summary

The Industrial Style SPE connector mating face

- according to IEC 61076-3-125 will be suitable for M2I2C2E2 / M3I3C3E3 from IEEE802.3cg (10BASE-T1) up to IEEE802.3ch (MultiGigBASE-T1)
- Wide range of possible variants for different cable diameters and special applications from IP20 up to M8 / M12 for IP65/67 with screw and PushPull locking
- Design is open for advanced transmission features up to 3GHz needed for IIoT, vision control and future use cases
- IP free connector standard IEC 61076-3-125 supporting the big variety of SPE applications (will be published in 2019 – proposed to renumbered to IEC 63171-6)

→ The Industrial Style SPE connection system for all MICE 2/3 use cases must be added to IEEE 802.3cg as MDI to complete 802.3cg



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Thank you!



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BACKUP

Industrial SPE Solution

based on the IEC 61076-3-125 project in IEC SC48B

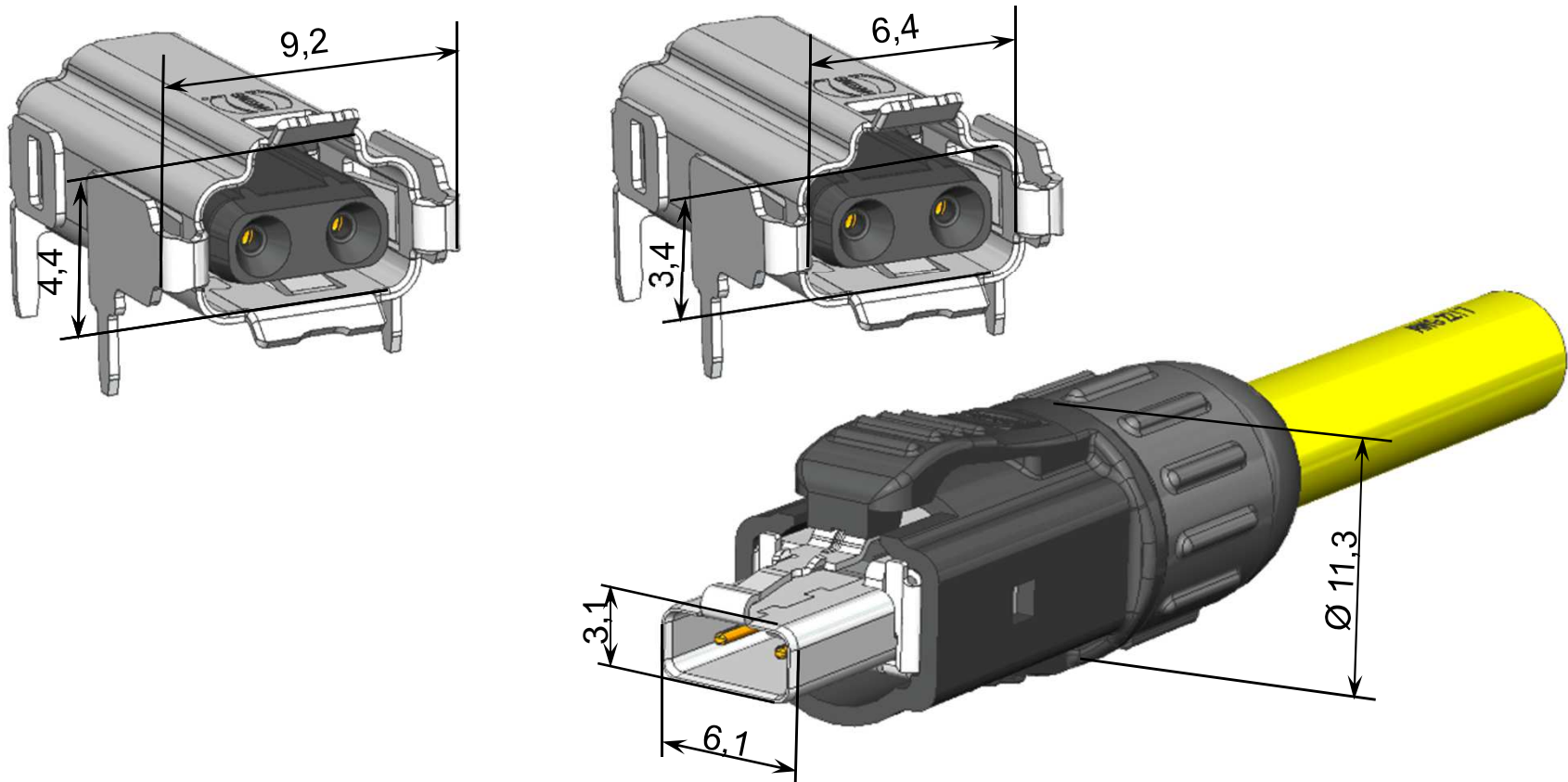


Connector type	Locking mechanism
1 pair core container same container used in all MICE3 connector housings with stainless steel shielding	n.a.
IP20 jack and plug for cables AWG26 up to AWG22 (18) (solid and stranded) Cable diameter 4 – 6 mm	metal latch
IP65/67 jack and plug in M8 housing for cables 26AWG up to AWG22 (18) (solid and stranded) Cable diameter 4 – 6 mm	locking screw, optional: PushPull* *compatible to the locking screw
IP65/67 jack and plug in M12 housing for cables AWG26 up to AWG16 – esp. for IEEE802.3cg (solid and stranded) Cable diameter 4 – 12 mm	locking screw, optional: PushPull* *compatible to the locking screw



HARTING SPE Solution – Main Dimensions

based on the IEC 61076-3-125 project in IEC SC48B



HARTING SPE Solution - Facts

based on the IEC 61076-3-125 project in IEC SC48B



Technical Parameters

Electrical performance

- Rated voltage: 60V DC
- Rated current: 4A@55°C, 1,5A@85°C
- Voltage proof* 1000V pin-to-pin and 1500V pin-to-shield, (*not for the hybrid version within IEC61076-3-125)

HF performance

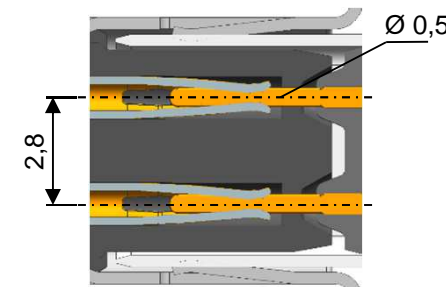
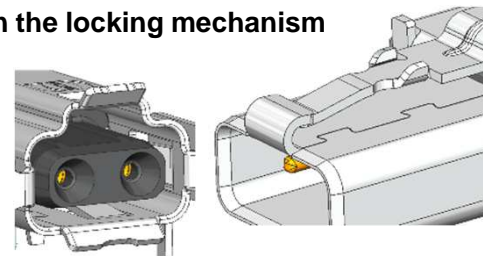
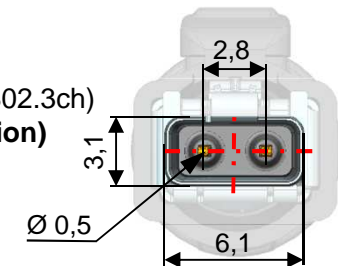
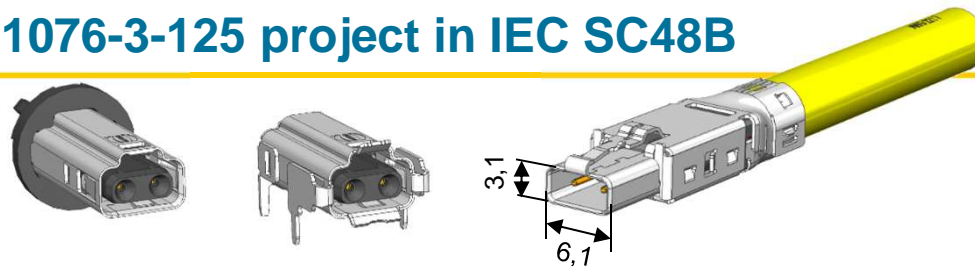
- Bandwidth up to 600MHz* for up to 1Gbit/s
*pin design and size optimized for frequencies up to 3GHz for possible multi gig applications (in discussion by IEEE802.3ch)
- Fully symmetrical design of contacts in relation to the screen for optimal HF performance (coupling attenuation)
- Fully shielded 1 pair core container (360° stainless steel shielding shell)

Mechanical performance

- Typical industrial pin-socket contact design for high reliability and mating security (2 contact points)
- Minimum 1000 mating cycles for the core element and the IP20 version.
For the M8 and M12 versions >100 mating cycles based on the locking mechanism
- Polarization met by design

MICE3 performance

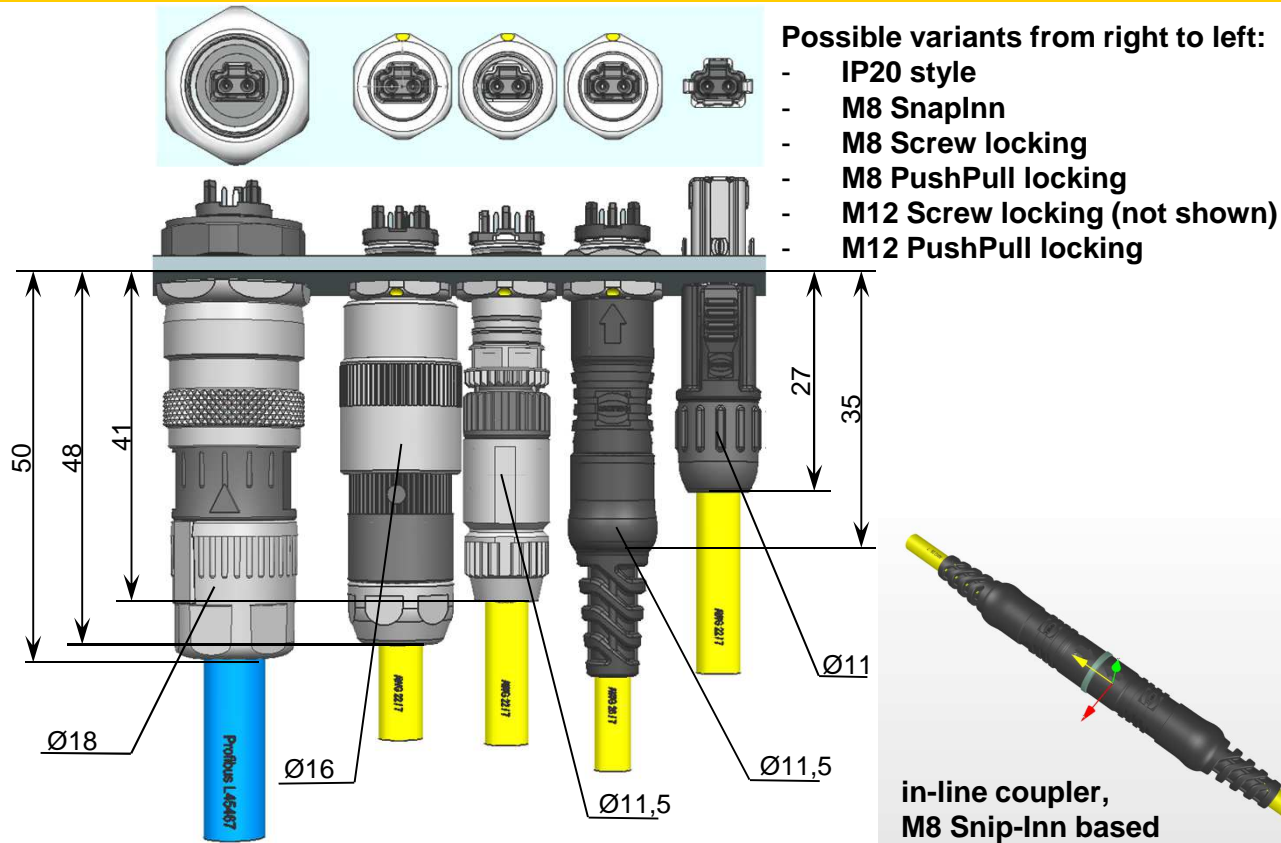
- Temperature range -40°C up to +85°C
- IP degree from IP20 to IP65/67
- EMC resistant according to E₃ for all connector versions



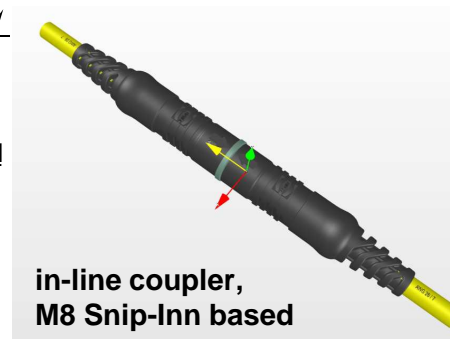
for further technical details pls. refer to IEC61076-3-125 on the IEC website

HARTING SPE Solution - Versions

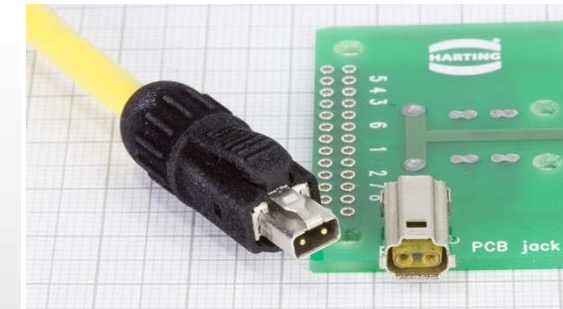
based on the IEC 61076-3-125 project in IEC SC48B



Prototype M8 Snap-Inn style, plug overmolded and straight PCB THR jack with housing



in-line coupler, M8 Snap-Inn based



Prototype IP20 style, plug and angled PCB THR jack

HARTING SPE Solution - Summary

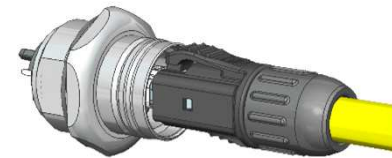
based on the IEC 61076-3-125 project in IEC SC48B



The industrial style balanced Single Pair Copper Connector based on IEC61076-3-125

- Delivers best **HF performance** and head room for remote powering (up to 1000mtrs.)
- **Future-proof** → prepared for higher bandwidths and bigger loads
- Using existing and already standardized housings/dimensions and locking mechanisms → **simple implementation**, cost effective new device design
- **IP20** interface pluggable with locking to **IP65/67 M8 and M12 connector** versions for testing and configuration set ups (usually non permanent use)

IP20 SPE plug mated
with M12 SPE jack



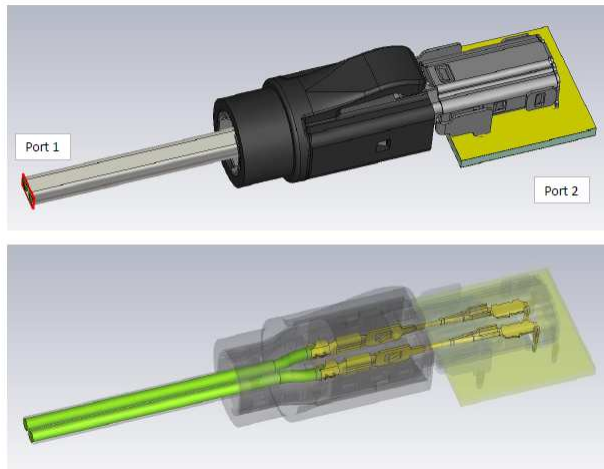
- **Prototypes** and test results for the HARTING single pair copper connector available
- **Connector standard** will be published in 2019
- **First SPE connectivity products** will be launched in 2019

HARTING SPE Solution – HF results (simulations)

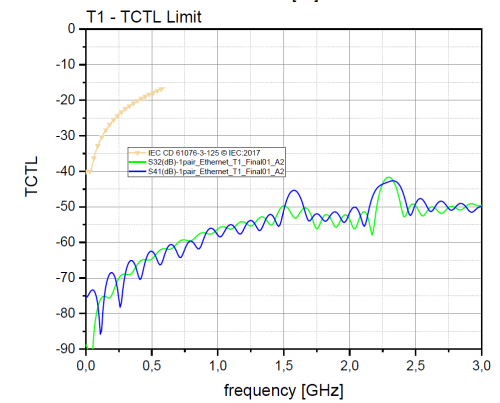
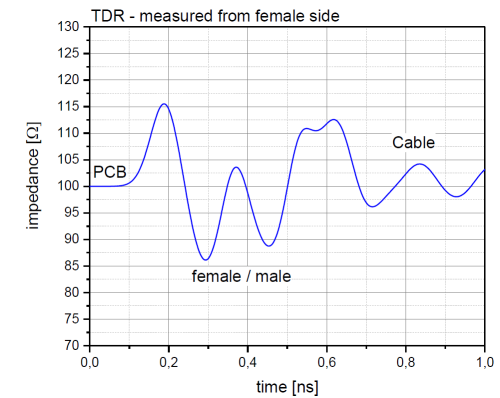
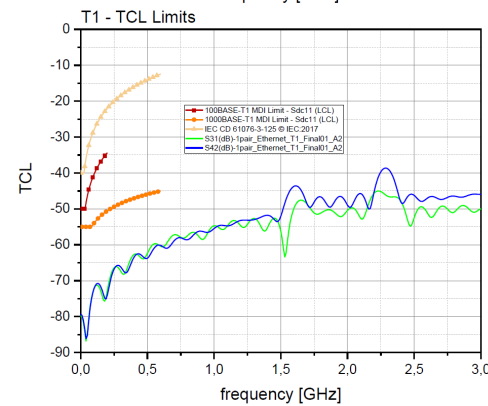
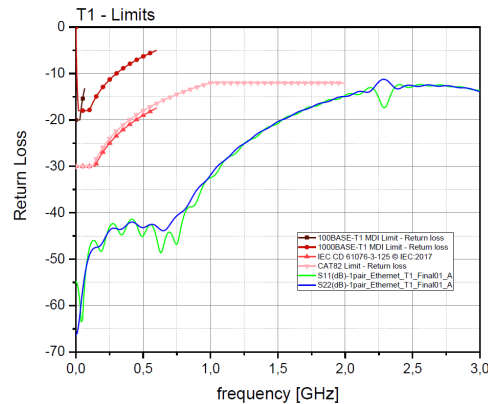
based on the IEC 61076-3-125 project in IEC SC48B



2.1 T1 connector model



All simulation results are up to 3GHz bandwidth to meet the requirements of IEEE802.3ch for MultiGigBASE-T1

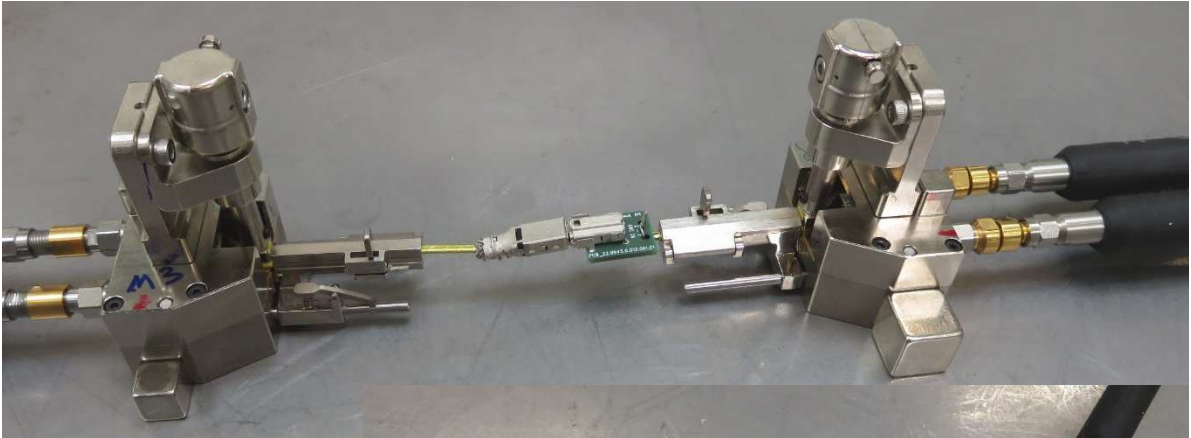


HARTING SPE Solution – HF Measurement results

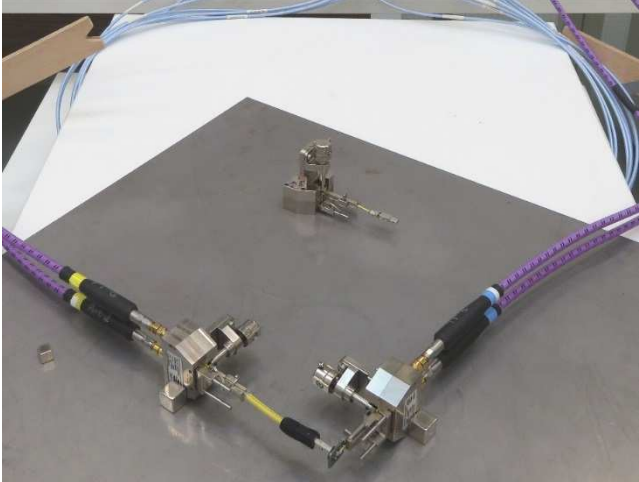
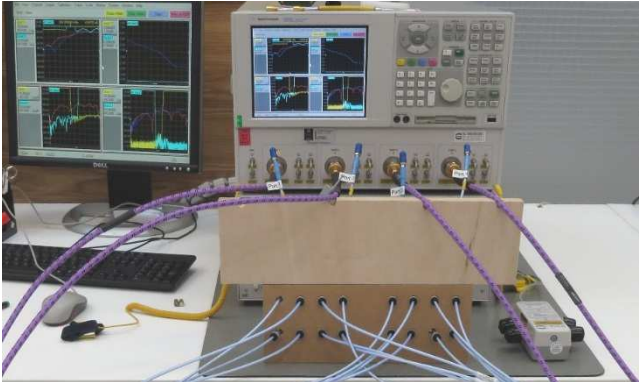
based on the IEC 61076-3-125 project in IEC SC48B



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Test setup with prototypes (not the final contact design and serial plastic material) and HARTING BCCTF-40GHz test fixture and network analyzer



HARTING SPE Solution – HF Measurement results

based on the IEC 61076-3-125 project in IEC SC48B

