EMC ad hoc
Test Adapter Considerations

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overview

1. Unified test-adapter/measurement setup
2. Proposal for definition of “extended link segment”

motivation and background

- We gathered a lot of valuable input from different vendors, however due to slight differences in the test setup there is still room for optimization.
- Also different vendors showed influences of different parameters of the test setup especially to the balance parameters of connectors or complete harnesses.

- To further improve the measurements and as a common basis for measurements adapter and test setup could be unified.

- ***NOTE: This should NOT be a proposal for a testadapter or measurement setup in this stage, it should be a summary document of measurement experiences and proposals how a common testadapter and test setup could be realized to get reliable results. Everyone can add additional notes to this document, based on his measurement experiences.***

Considerations for a test adapter/test setup

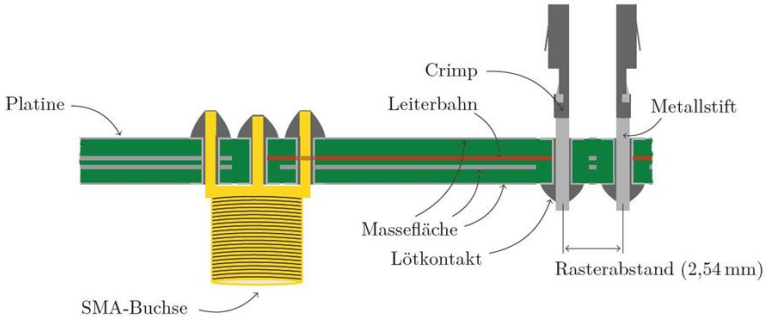
- Identical PCB (till MDI solder pads/pins)
  - Material (Rogers), Multi-Layer (buried traces?)
  - Same trace length and identical trace impedance (width, spacing)
    → simple de-embedding of 50ohm-traces
  - Same SMA-like (3.5mm) connectors (best RF-parameters)
  - RF-characterization of test adapter?
- Possibility to have low impedance GND connection or low-impedance PCB-to-PCB connection.
- Possibility to use it for DUT (cable or connector) tests as well as for system tests (cable and connector, maybe Stripline- or BCI-like test setup)
- Test adapter suitable for measurements of cables/connectors/assemblies and also systems (BCI-like, stripline-like) and vehicle harnesses
- Commonly shared layout (gerber file?)

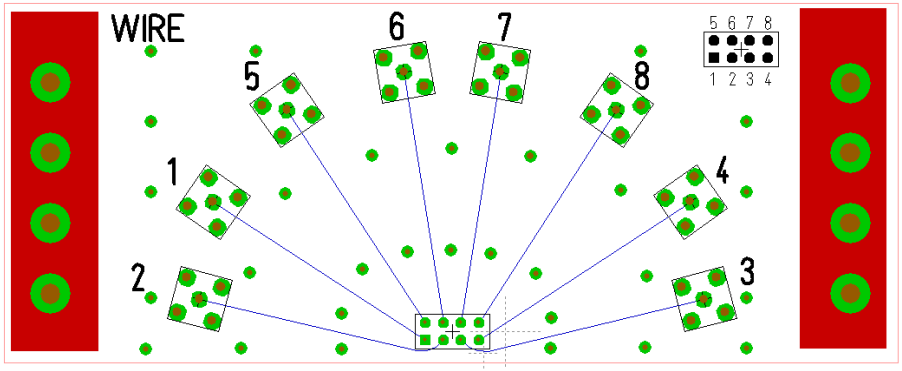
Considerations for a test adapter/test setup

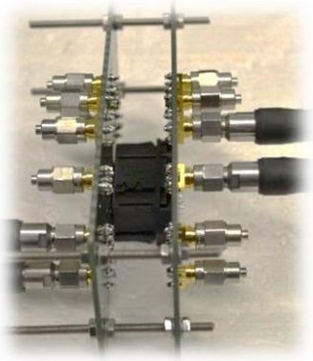
- Test harness has to be placed h=50mm above GND plane
  (one piece of metal!)
- Distance between meander of cables need to have a distance of at least d>3xh=150mm
- Proper GND-connection of test adapter realized by low impedance connection to GND plane.

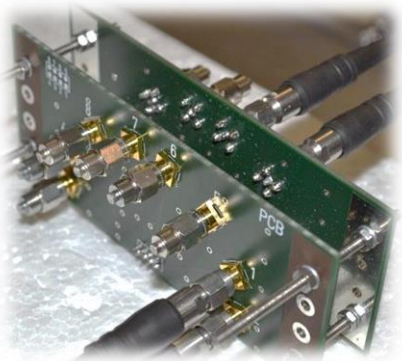
example of a test-adapter (*no proposal*!)

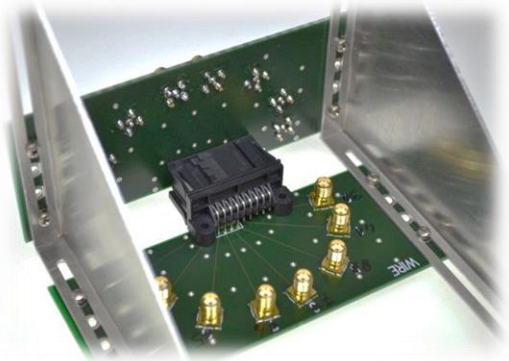
- Usable for connector measurements, but also for cable/system measurements
- Capable of measuring 90°/180° connectors
- Low impedance GND connection possible
- Burried traces
- Identical trace length from SMA to solder pad/pin – however de-embedding due to long traces
- FR4 - could maybe be replaced by Rogers
- Right angeld SMA – high quality needed!





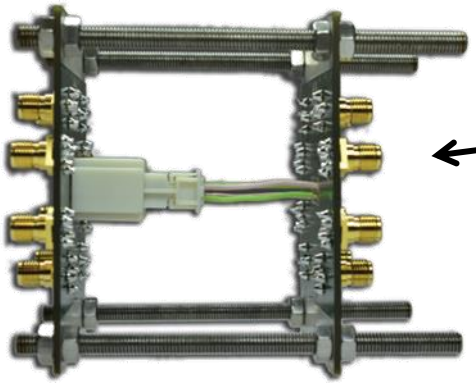




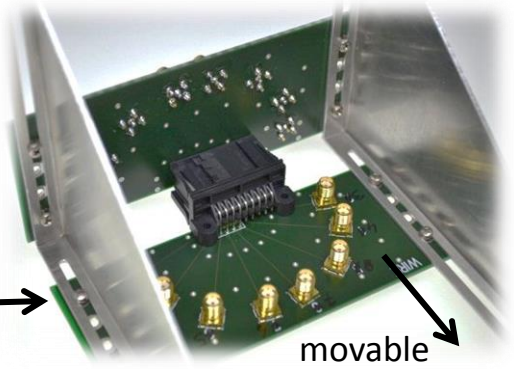


example of a test-adapter

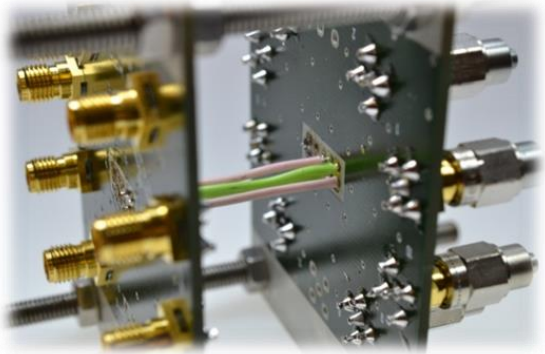
- provides possibility to measure connectors stand-alone as well as complete assemblies

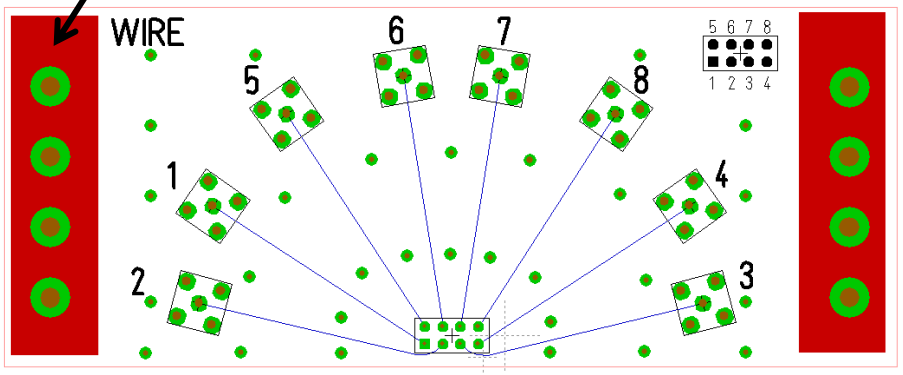


Assembled connector can be measured by increasing the distance between PCBs



No soldersstop on top and bottom to allow GND connection





Round traces would not be allowed in proposed connector

notes

- Edge soldered connectors perform better than 90° angled connectors.
- However, with 90° angled connectors you have more freedom to build a PCB with identical trace length.
- There are hugh differences in the performance of 90° angled SMA connectors. We need to define a connector with good performance.

things to define

- **Size**: t.b.d.
- **Material**: t.b.d. *(proposal: Rogers RO4003)*
- **Layers**: t.b.d. *(proposal: 4 and traces in layer 2)*
- **Trace length of 50ohm traces**: t.b.d. *(proposal: 50mm±0.1mm)*
- **RF connecors**: t.b.d. (proposal: 3.5 Precision Test Connector, see http://www.molex.com/molex/products/datasheet.jsp?part=active/0733870020_RF_COAX_CONNECTORS.xml).
- **Layout specifications**: t.b.d. *e.g. 10mm GND contact edge at left/right/back (no solderstop, holes for screws to enable GND connections)*
- **Layout**: *proposal? (all identical except MDI) or is definition of trace length and design (width, layer, spacing, …) more useful? (different pin – locations of MDI means different position of start of trace.*

Definition of „extended link segment“?

- Definition of „extended link segment“ to clarify our discussion:
- From MDI solder pin/pad on the PCB to the MDI solder pin on the second PCB
- Connector vendors will offer both parts of the MDI, so both is covered in the Link segment measurements.
- CMC and other filtering/termination does still NOT belong to the link segment