EMI test board

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What EMI mean?

**EMI (ElectroMagnetic Interference)**
Electromagnetic emissions from a device or system that interfere with the normal operation of another device or system.

**EMC (ElectroMagnetic Compatibility)**
The ability of equipment or system to function satisfactorily in its Electromagnetic Environment (EME) without introducing intolerable electromagnetic disturbance to anything in that environment, means:
- Tolerate a specified degree of interference,
- Not generate more than a specified amount of interference

**EMC importance**
- Lower supply voltages
- Increasing clock frequencies, faster slew rates
- Increasing packaging density
- Demand for smaller, lighter, cheaper, lower-power devices
Interference paths

Two main interference ways:

- Conducted coupling
- Radiated coupling

![Diagram showing interference paths](image)
Is it important?

- $4.4 \text{mV rms @ 400kHz}$
- $-87 \text{dBFS rms @ 400kHz}$
- $FS = 2\text{Vpp} = 0.707 \text{V rms}$
- $\approx 30 \mu \text{Vrms}$
Real interferences

Ground-chassis voltages in working MTCA.4 system are much higher than 4mV

Time trace and spectrum ground-chassis distortion using vendor 1 power supply

Time trace and spectrum ground-chassis distortion using vendor 2 power supply
Reality is more complicated

More AMC & RTM modules

More disturbances sources

More current paths
... actually even more complicated

External signals

other racks

other crates
DAMC-EMI Board Functions

- Power supply voltages measurements (Payload +12V, Management +3.3V)
- +12V power disturbances introduction
- GND to Chassis voltage introduction and measurement
- Low voltage (μV) drop measurements (e.g. on GND plane)
- Vibration measurement
- Measurement of distortions influence on signal quality from DWC
DAMC-EMI board block diagram

Zone 3 connector

Front end cells

12V disturb. in

gnd-chassis disturb. in

12V/3.3V meas. out

gnd-chassis meas. out

differential probe

isolated pwr. supply

vibration sensor

12V/3.3V meas. out

gnd-chassis meas. out

differential probe

external pwr. supply
DAMC-EMI board view

- Front end type selector
- Front end cell out
- Cell selector
- 12V/3.3V out
- 12V disturb. in
- GND-chassis disturb. in
- Vibration sensor
- μV drop meter
- External power
- GND-chassis meas.

Test frontends cells

- Differential Probe
- Isolated power supply and external power entry

GND-chassis meas.

Cell selector

12V disturb. in

Vibration sensor

μV drop meter

External power

GND-chassis meas.
Measurement example 1

no crate disassembly!

slot n

select distortion point as AMC connector

slot n+1

ground-chassis distortion measurement

signal values read by CPU board

DWC

SIS8300
Measurement example 2

Distortion point selection

e.g. AMC or Z3 connector

Ground-chassis distortion measurement

Measurement of distortion influence on front-ends signals

Introduction

Ground-chassis distortion
Measurement example 2

distortion point selection
e.g. AMC or Z3 connector

measurement of voltage drop
between AMC and Z3 connectors

ground-chassis distortion introduction
Measurement example 3

select distortion point as AMC connector

slot n

slot n+1

ground-chassis distortion introduction

measurement of distortion influence on front-ends signals

DWC

EMI

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Summary

The DAMC-EMI board allows to speed up process of

- investigation,
- modeling,
- and fighting against

EMI issues (for conductive coupling) in MTCA.4 based systems.
Thank you for your attention