DTE Power via MDI Task Force
P802.3af
AC Disconnect Detection Ad Hoc

EN55024 Test Results
A.1.4.3

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Objectives

- Determine which EN55024 tests are relevant to assessing the robustness of the AC disconnect detection method
- Investigate the impact of applicable EN55024 tests on the function of the reference circuit

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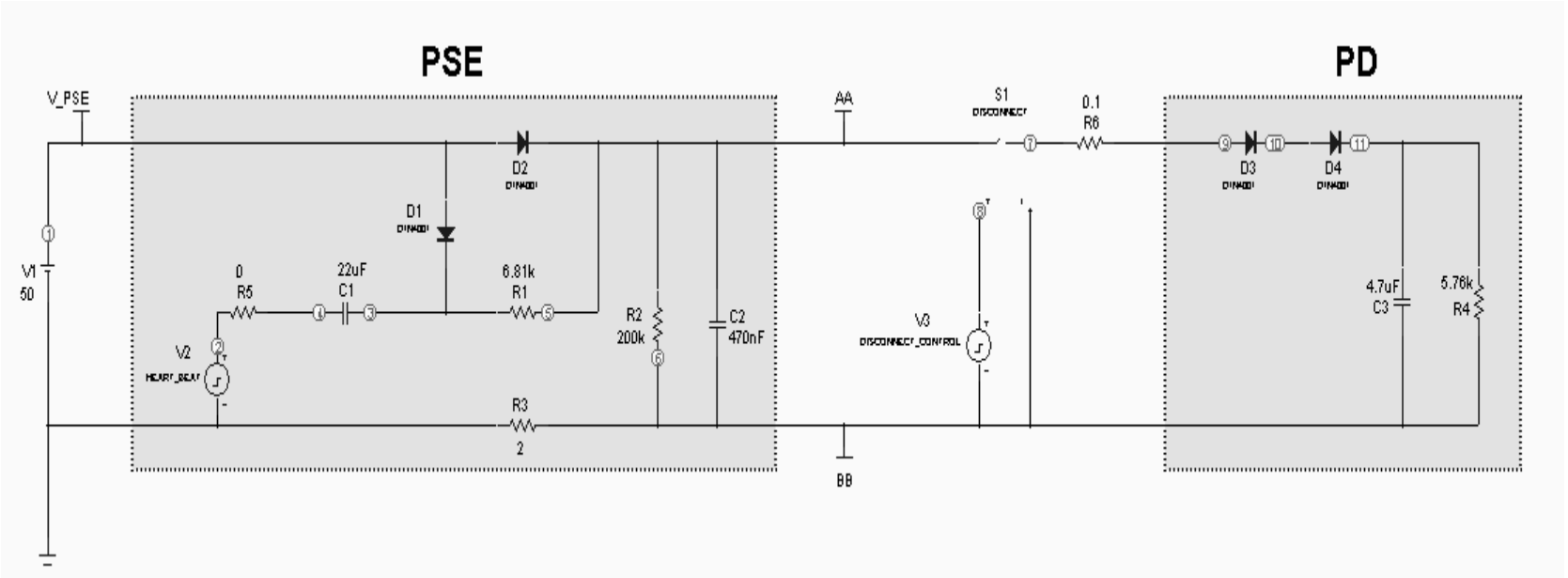
Reference Circuit

- Constructed as shown



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EN55024 Prescribed Tests

IEC1000-4-2 Electrostatic Discharges

- meaningful results require proper, implementation-dependent, ESD safeguards which do not exist with this UUT
- Results - not tested

IEC1000-4-3 Continuous Radiated Disturbances

- 80MHz to 1000MHz RF signal 80% amplitude modulated with a 3.0V/m, 1kHz sinewave
- Results - as indicated

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EN55024 Prescribed Tests (cont'd)

IEC1000-4-4 Electrical Fast Transients

- 500V, 5kHz pulse train of 20ms duration every 250ms capacitively coupled to cable
- Results - as indicated

IEC1000-4-5 Surges

- AC mains surges applied to primary power source input are beyond scope of P802.3af
- Results - not tested

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EN55024 Prescribed Tests (cont'd)

IEC1000-4-6 Continuous Conducted Disturbances

- 150kHz to 80MHz signal 80% amplitude modulated with a 1kHz 3.0VRMS sinewave
- Results - as indicated

IEC1000-4-8 Power-Frequency Magnetic Fields

- applicable to CRT monitors and similarly sensitive devices
- Results - not tested

IEC1000-4-11 Voltage Dips and Interruptions

- AC mains perturbations applied to primary power source input are beyond scope of P802.3af
- Results - not tested

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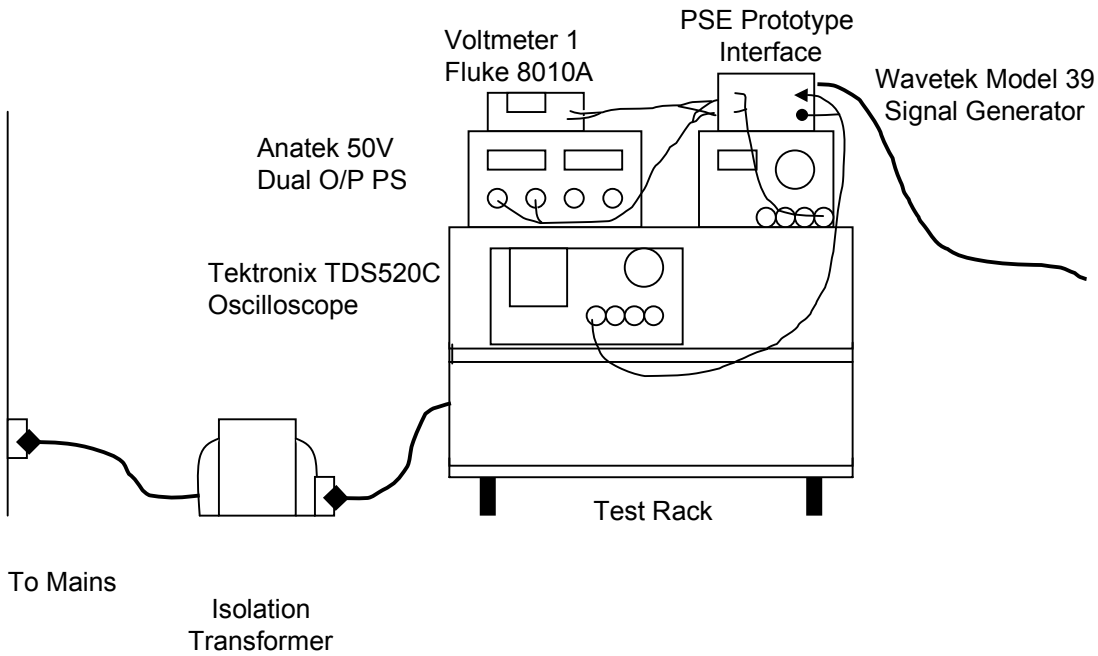
IEC1000-4-X - Source Configuration

Test Setup - V_{PSE}=40VDC, V_{AA-BB}=2.5Vpp@150Hz



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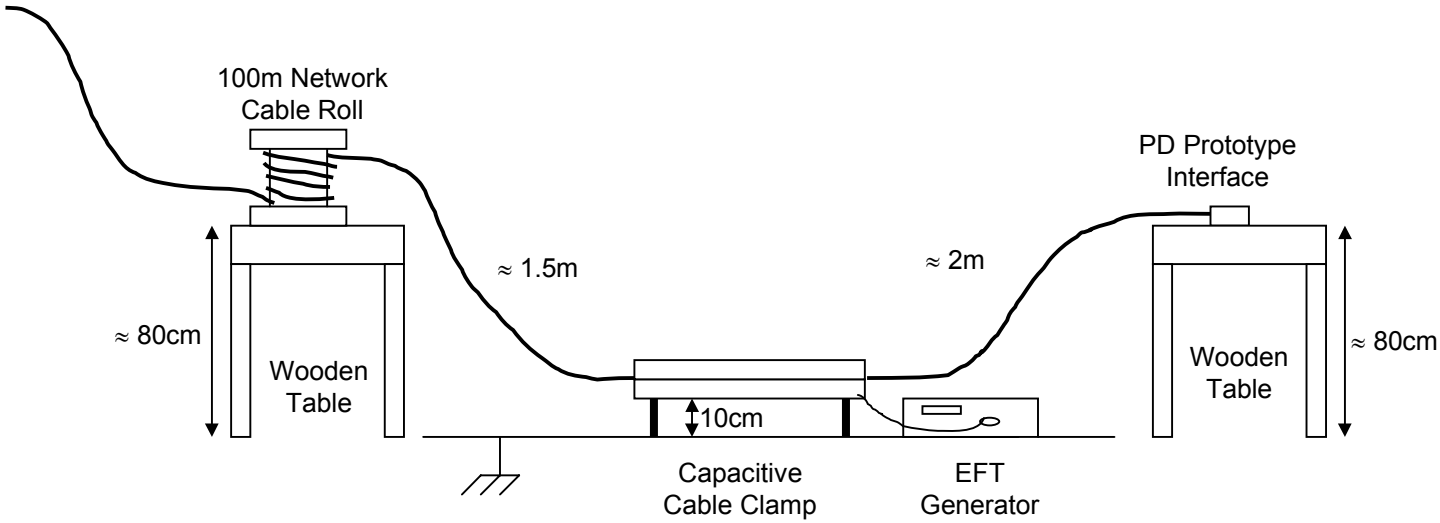
IEC1000-4-4 - Electrical Fast Transient (EFT)

Test Setup



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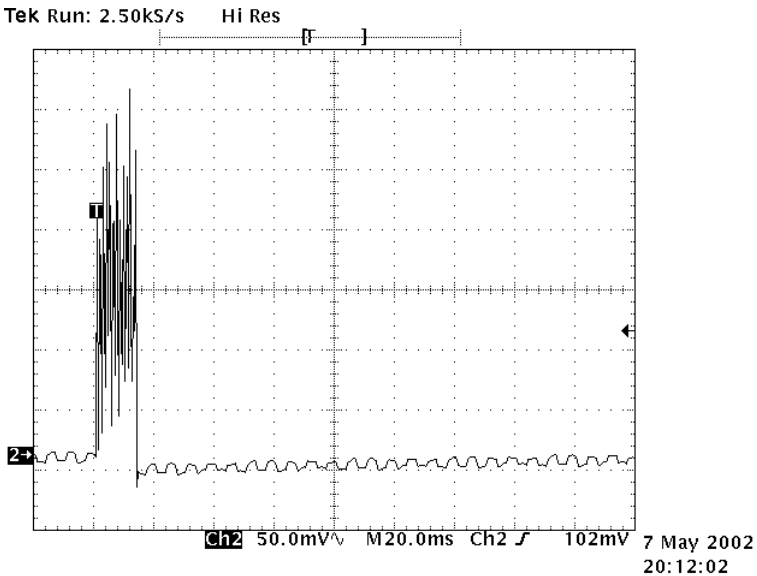
IEC1000-4-4 - Electrical Fast Transient (EFT)

Results

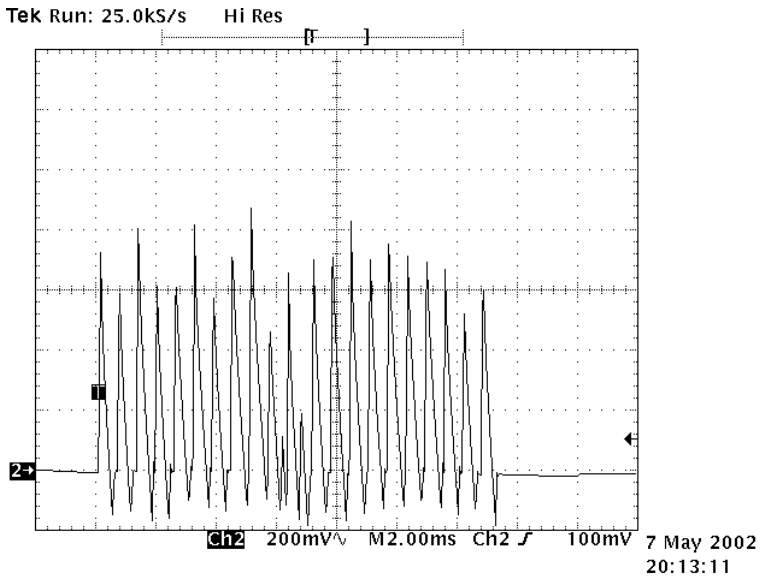
- V_{AA-BB} waveform with transient applied and PD connected
- 100m cable coil



transient >300mVp

150Hz <10mVpp

20ms/div



transient >800mVp

2ms/div

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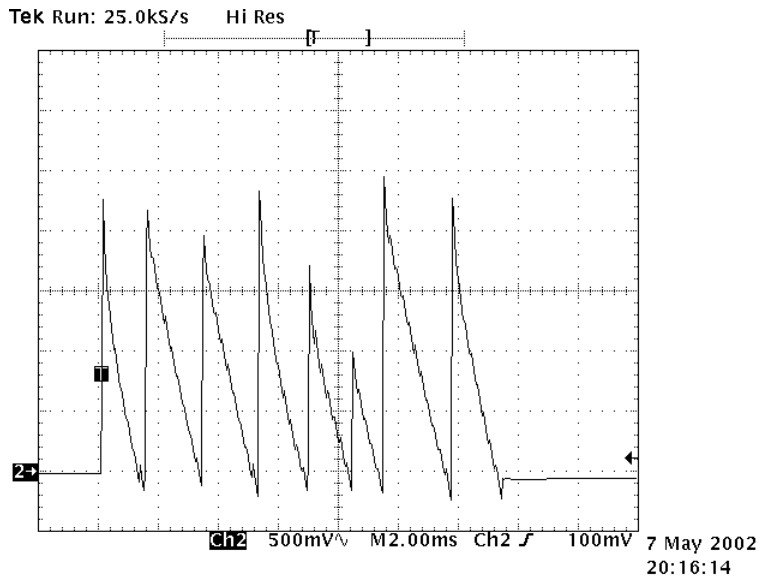
IEC1000-4-4 - Electrical Fast Transient (EFT)

Results

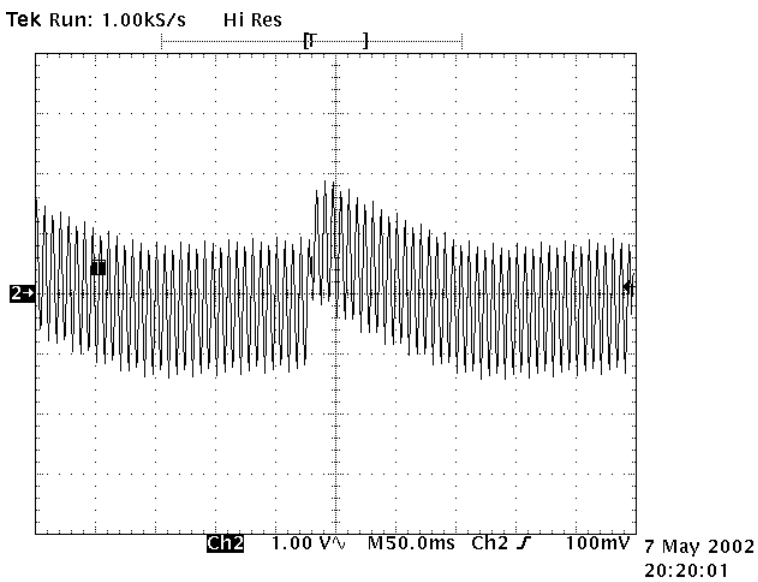
- V_{AA-BB} waveform with transient applied
- 3m straight cable



PD Connected

transient ~ 2.5Vp

2ms/div



PD Disconnected

V_{AA-BB}>2Vpp

50ms/div

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IEC1000-4-4 - Electrical Fast Transient (EFT)

Observations

- EFT voltages are within disconnect window with PD connected
- transient amplitudes are greater at 3m than at 100m but long spooled cable may have been a factor
- transient perturbation observed on AC signal with PD disconnected

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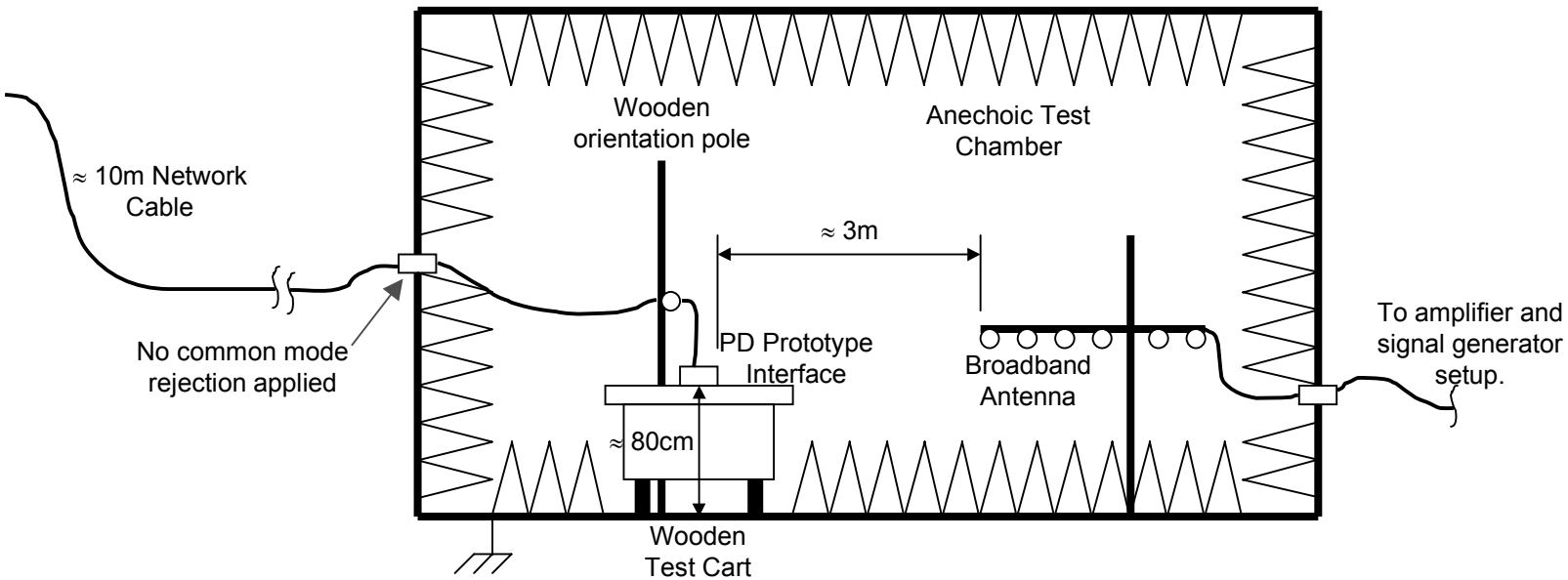
IEC1000-4-3 - Continuous Radiated Disturbances

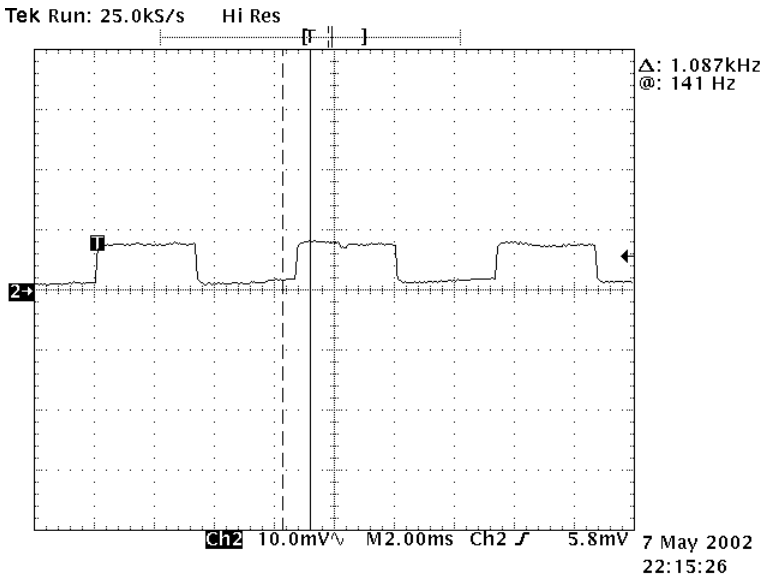
Test Setup



IEC1000-4-3 - Continuous Radiated Disturbances

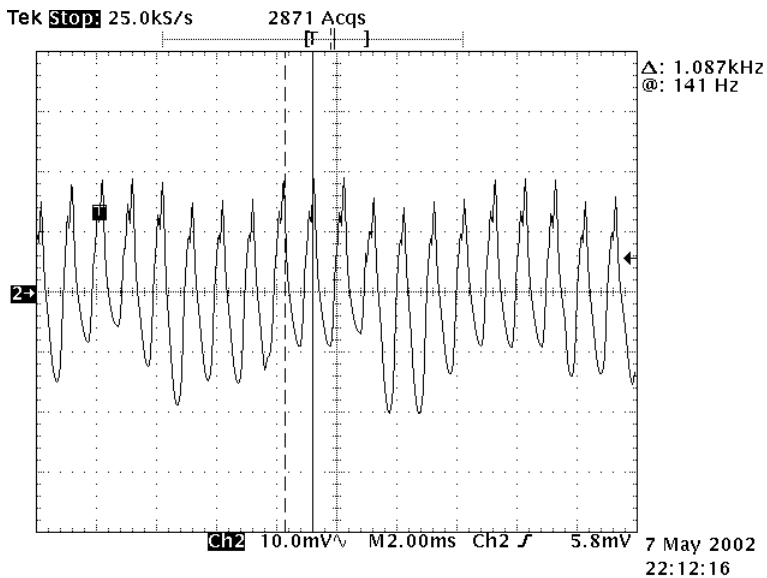
Results

- V_{AA-BB} waveform with(out) disturbance applied and PD connected
- antenna and PD cable in chamber oriented to maximize coupling



no field applied

2ms/div



140MHz carrier

V_{AA-BB}~40mVpp

2ms/div

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IEC1000-4-3 - Continuous Radiated Disturbances

Observations

- no change to V_{AA-BB} observed with PD disconnected
- with PD connected, disturbance does couple on to PSE cable but maximum observed level with this setup was 40mVpp, or same order of magnitude as AC disconnect signal
- disturbance amplitude varied with carrier frequency in a manner suggesting presence of resonance effects

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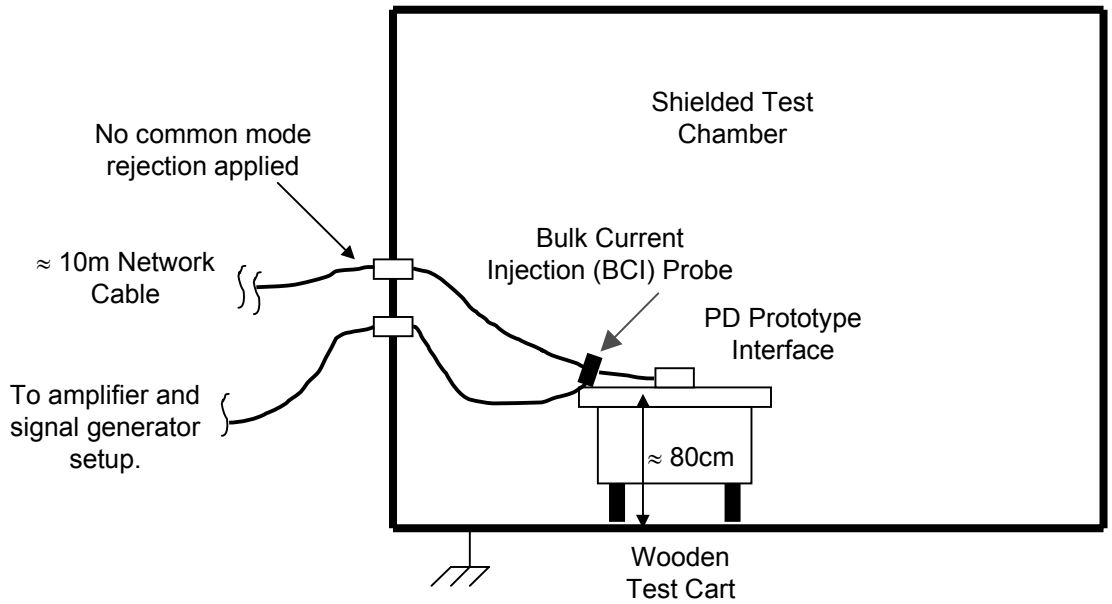
IEC1000-4-6 - Continuous Conducted Disturbances

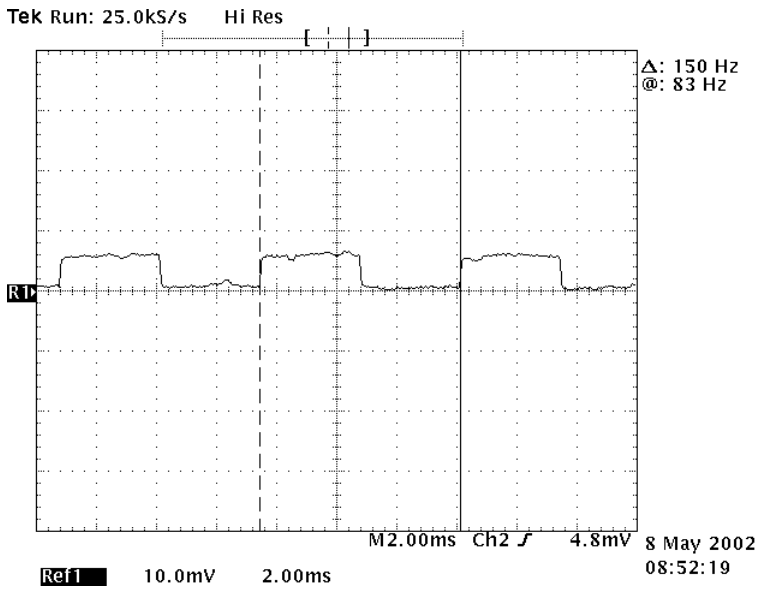
Test Setup

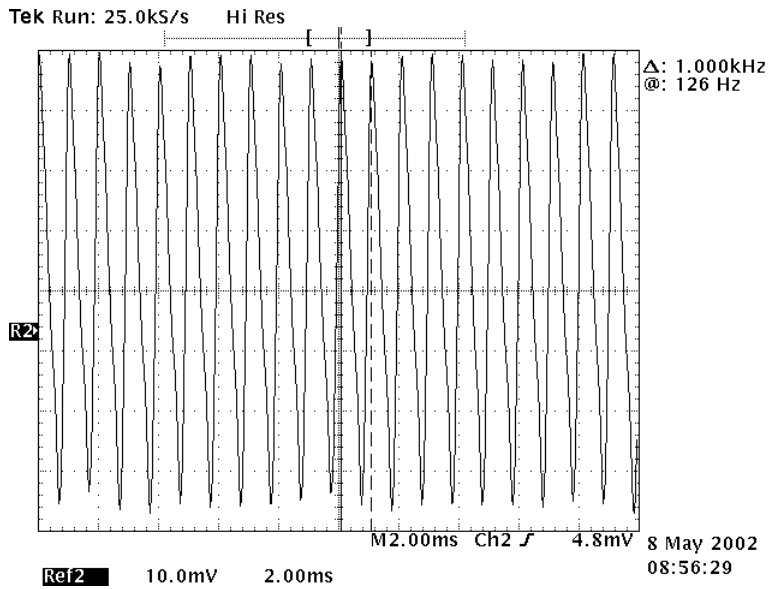


IEC1000-4-6 - Continuous Conducted Disturbances

Results

- V_{AA-BB} waveform with(out) disturbance applied and PD connected





no field applied

2ms/div

80MHz carrier

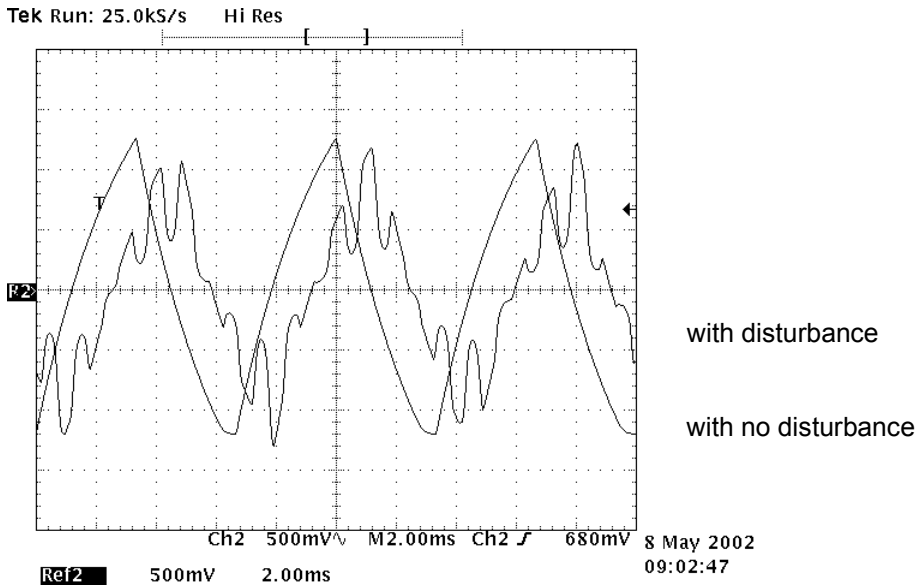
V_{AA-BB}~75mVpp

2ms/div

IEC1000-4-6 - Continuous Conducted Disturbances

Results

- V_{AA-BB} waveform with(out) disturbance applied and PD disconnected



with disturbance

with no disturbance

60MHz carrier

V_{AA-BB}~2.5Vpp

2ms/div

IEC1000-4-6 - Continuous Conducted Disturbances

Observations

- ~1Vpp disturbance observed on V_{AA-BB} with PD disconnected
- with PD connected, disturbance does couple on to PSE cable but maximum observed level with this setup was 75mVpp, or same order of magnitude as AC disconnect signal
- disturbance amplitude again varied with carrier frequency in a manner suggesting presence of resonance effects

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Conclusions

- potential exists for EFT to result in false disconnects; should be considered in AC disconnect signal sensing implementations
- impact of conducted and radiated disturbances appears relatively minor; AC disconnect-specific countermeasures likely not required
- end product should be subjected to full EN55024 test suite

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