XP Power

XPerts in Power – Module 18
Conducted & Radiated Noise

Steve Dodson

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- How to read an emissions plot
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- Class A and B equipment
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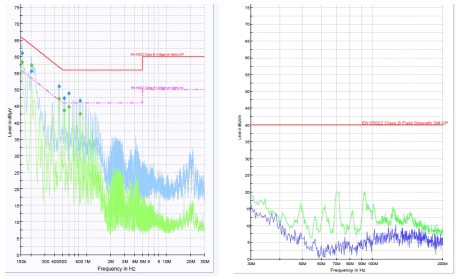
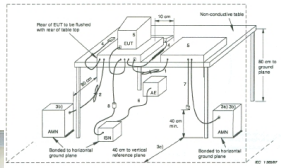
EN55022 Conducted & Radiated



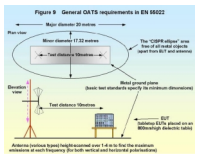
Conducted test set-up and equipment used

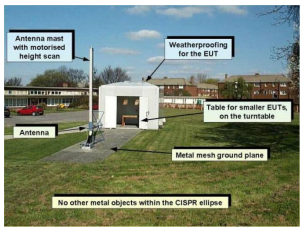
- Artificial mains network
- Coupling device
- Receiver / spectrum analyser
- Mains room filter
- Transient suppressor
- Ground plane & non conductive bench



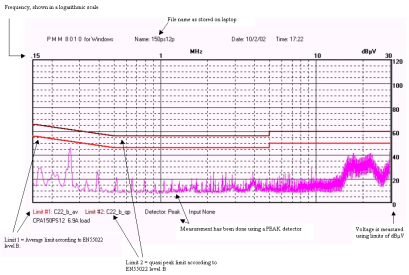
Radiated test set-up and equipment used

- Artificial mains network
- Antenna
- Receiver / spectrum analyser
- Transient suppressor
- Ground plane & non conductive bench





How to read an emissions plot



How to read an emissions plot

The deciBel (dB)

Logarithmic ratio which needs to have a reference.
For conducted emissions, the reference is one micro volt (µV)
Hence the vertical axis is scaled in dBµV.

Relationship between volts and dBµV:

V = log-1(dBV/20) Volts
µV = log-1(dBµV/20) microvolts

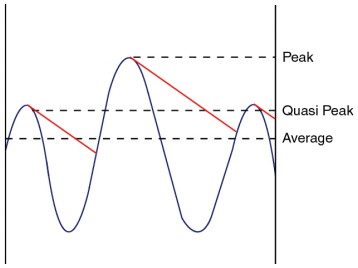
What does 60dBµV mean?

µV = log-1(60/20) microvolts
=1000microvolts or 1millivolt

Note, a reduction of 6dBµV equates to:

µV = log-1(54/20) microvolts
=500microvolts or 0.5millivolt

Detectors: peak, quasi peak, average



Detectors: peak, quasi peak, average

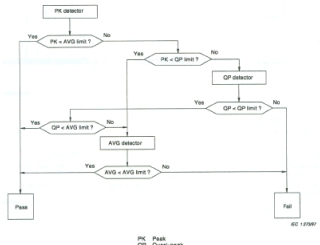
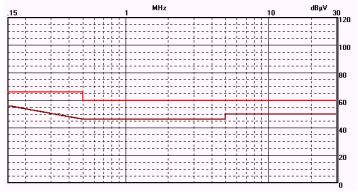


Figure B.1 — Decision tree for peak detector measurements

Class A and class B equipment

- Class A — Equipment designed to be used in commercial, light industrial or industrial environments where the mains supply is not connected directly to a residential area
- Class B — Equipment designed to be used in residential environments, and commercial and light industrial environments where the mains supply is connected directly to a residential area

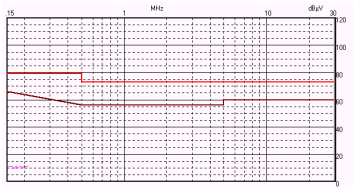
Standards: EN55022 / EN55011



55022 A average
55011 A average
55022 B average
55011 B average

Average limit lines

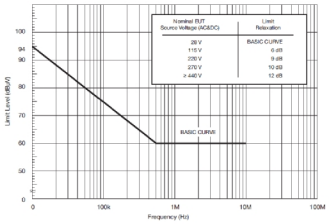
Standards: EN55022 / EN55011



55022 A quasi peak
55011 A quasi peak
55022 B quasi peak
55011 B quasi peak

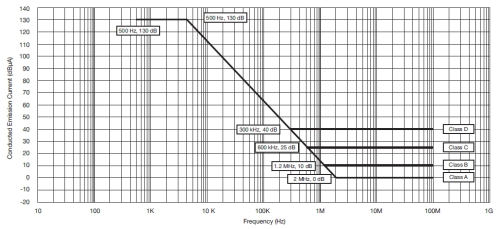
Quasi-peak limit lines

Standards: MIL-STD 461F



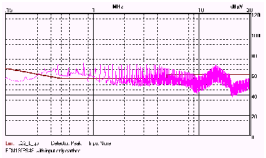
MIL-STD 461F conducted emissions limits

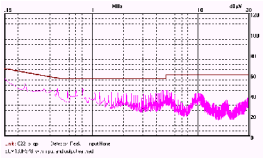
Standards: DEF STAN 59-41 & 59-411



DEF STAN 59-41 & 59-411 limits for land service use

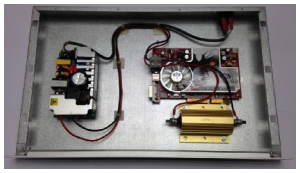
Importance of Earthing





Practical

- 1U box, containing PSU and 'load'
- First test to show how poor assembly and construction gives poor results
- Second test with revised wiring and assembly to achieve a pass



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