

# SPIRE CS Test Levels for SPT

Ref: SPIRE-RAL-PRC-003041

Issue: 1.0

Date: 20-02-2008

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## 1. Introduction

During the SPIRE SPT, a series of CS tests will be carried out to investigate a CS susceptibility seen during the PFM-5 ILT test campaign on some of the detectors on the PMW detector array.

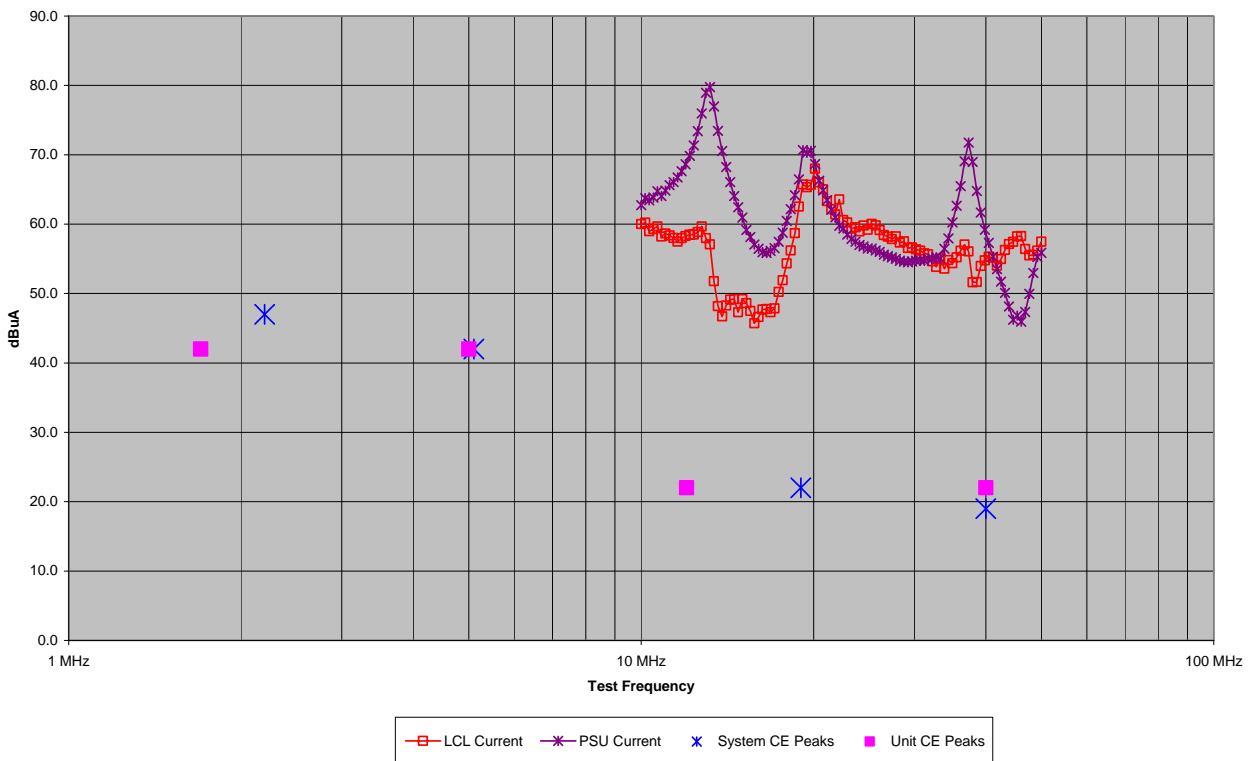
This note outlines the rationale adopted in RD\_1 for the selection of the test levels to inject during the test.

## 2. Reference Documents

RD	Name	Doc Number
RD 1	SPIRE System Level CS Test Procedure	SPIRE-RAL-REP-003040
RD 2	Herschel S/C Level Conducted EMC Test Procedure	HP-2-ASED-TP-0155 As Run Final
RD 3	HSPSU EMC Test Report	HSPIR-PSU-REE-DA0018814-V-ASTR
RD 4	SPIRE SPT EMC CS Pre-calibration test	SPIRE-RAL-REP-003039

## 3. Results Synthesis

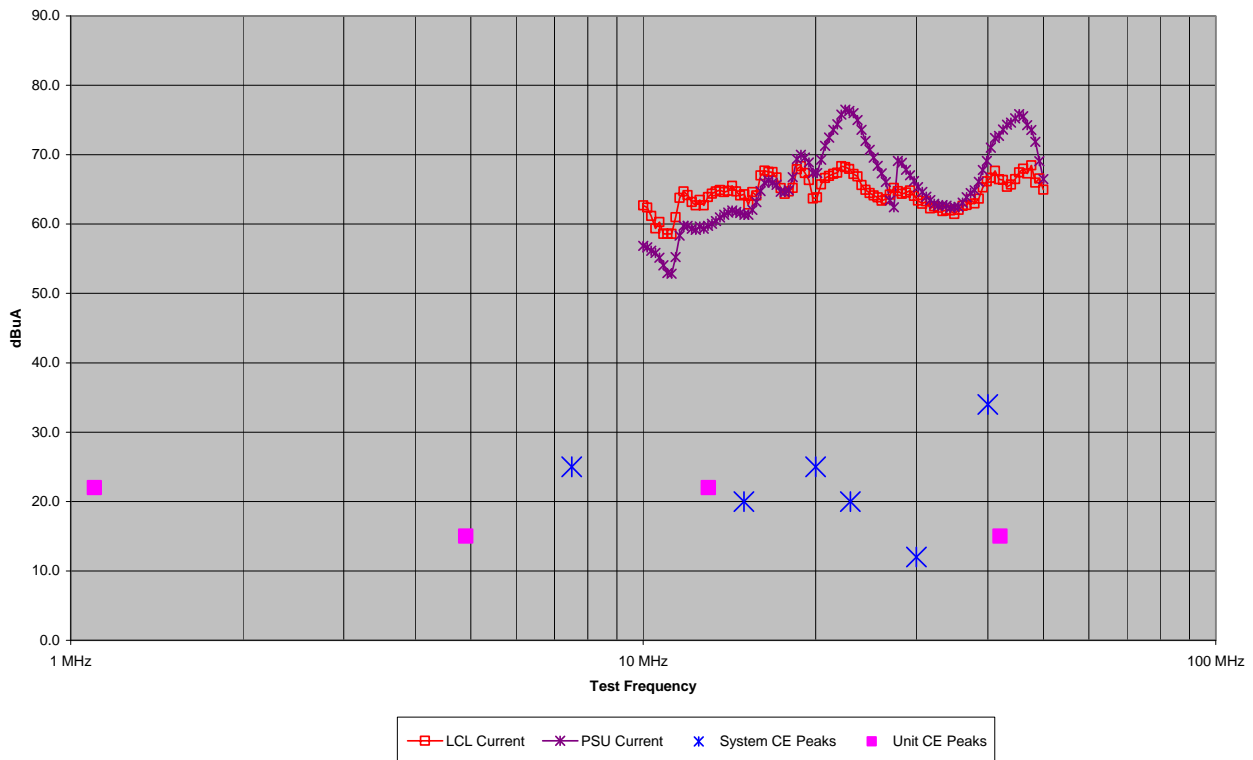
Figure 1 shows the results for the differential mode conducted emissions tests on the PFM PSU prior to delivery to the SPIRE project (from RD\_3), the levels measured during the system level CE test (form RD\_2) and the levels measured during a pre-calibration test (RD\_4).



**Figure 1** – DM Current test results summary. The “LCL Current” and PSU Current” traces refer to measurements carried out during a pre-calibration test (RD\_4) where EMI was injected onto a representative primary power harness.

Figure 2 shows the results for the common mode conducted emissions tests on the PFM PSU prior to delivery to the SPIRE project (from RD\_3), the levels measured during the system level CE test (from RD\_2) and the levels measured during a pre-calibration test (RD\_4).

In both Figure 1 and Figure 2 the points reporting the unit and spacecraft CE results represent the approximate peaks in the emissions as measured from the experimental plots.



**Figure 2** – CM Current test results summary. The “LCL Current” and PSU Current” traces refer to measurements carried out during a pre-calibration test (RD\_4) where EMI was injected onto a representative primary power harness.

## 4. Discussion

The levels injected during the test described in RD\_4 and plotted on Figure 1 and Figure 2 was -6dB from the IID-A levels. It can be seen that there is generally more than 20dB of margin between the levels injected during the pre-calibration tests and the levels seen during unit and system level CE tests. Lowering the levels a further 6dB below the IID-A levels to -12dB from the IID-A levels will demonstrate margin with respect to the levels seen on the spacecraft bus and provide a good safety margin for the flight hardware under test.

## 5. Appendix - Spacecraft CE Test results (SPIRE summary)

### 5.1 CM Reference

PLOT NO:016; PROJECT: Herschel Conducted; OP MODE:ref; COMMENT: Ambient, DATE: 07/11/30

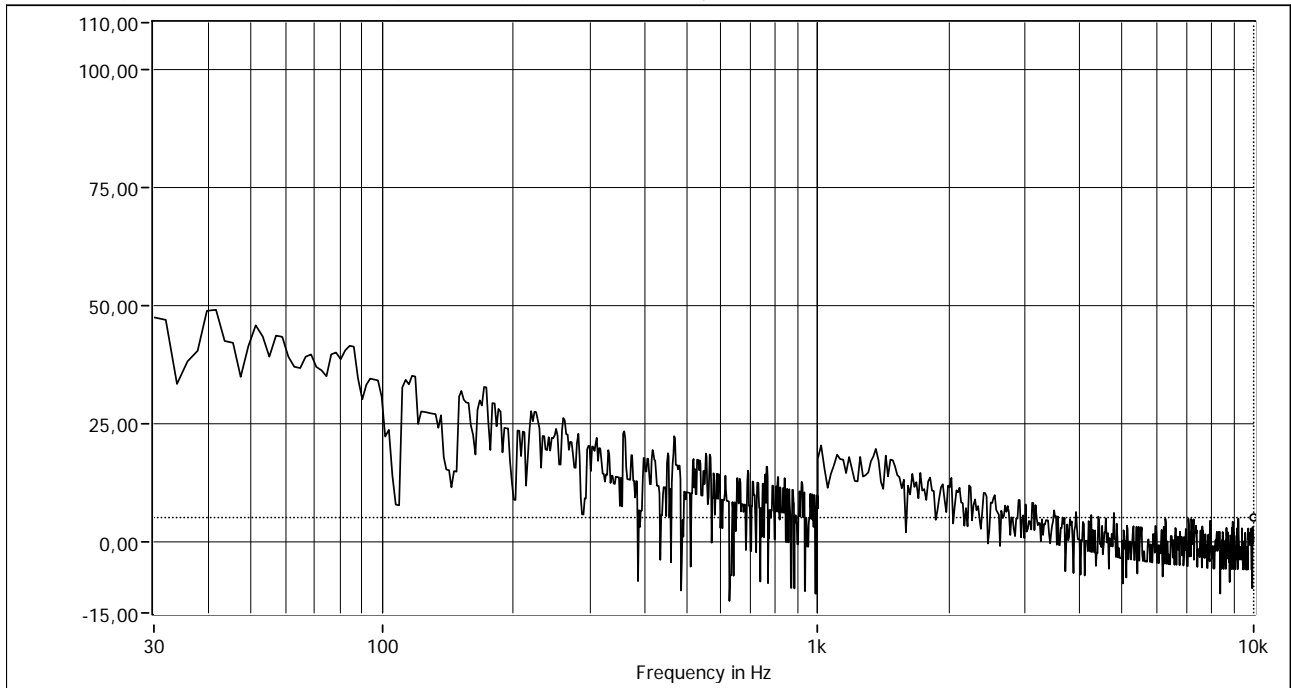


Figure 3 - CM reference (30Hz-10kHz)

PLOT NO: 016; PROJECT: Herschel Conducted; OP MODE: ref; COMMENT: Ambient; DATE: 07/11/30

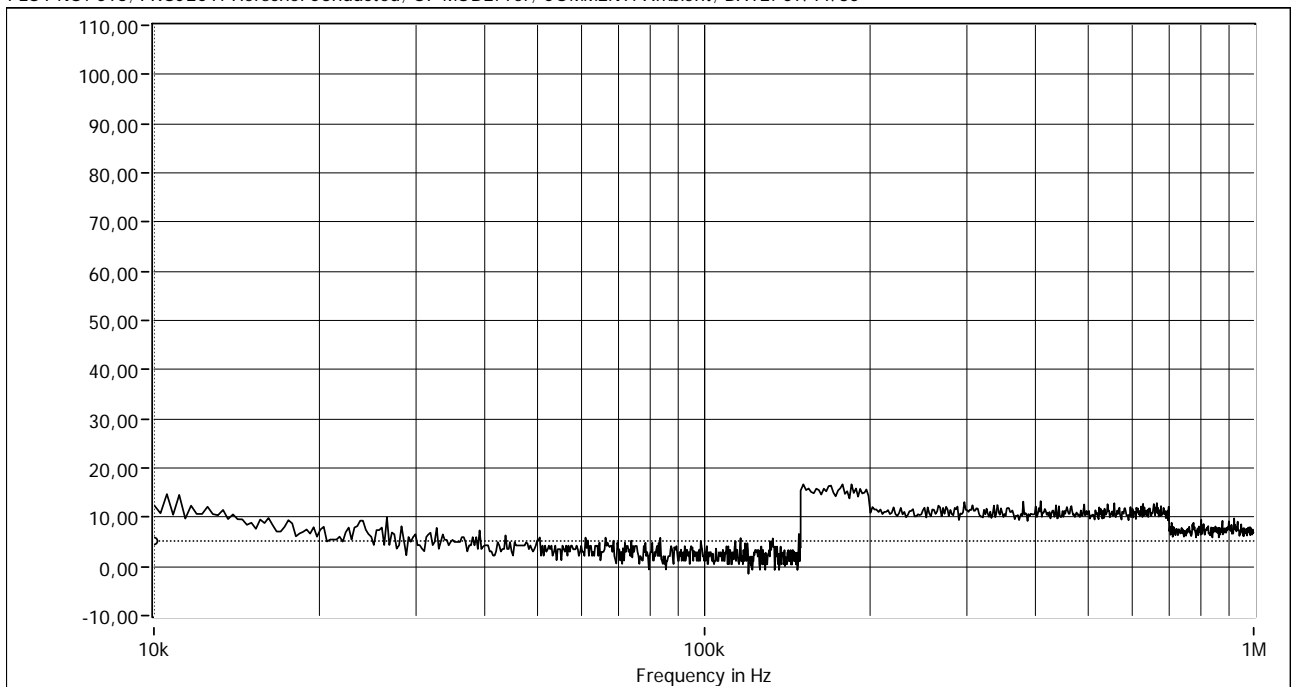


Figure 4 - CM reference (10kHz-1MHz)

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PLOT NO:017; PROJECT: Herschel Conducted; OP MODE: YYY; COMMENT: Ambient, NB; DATE: 07/11/30

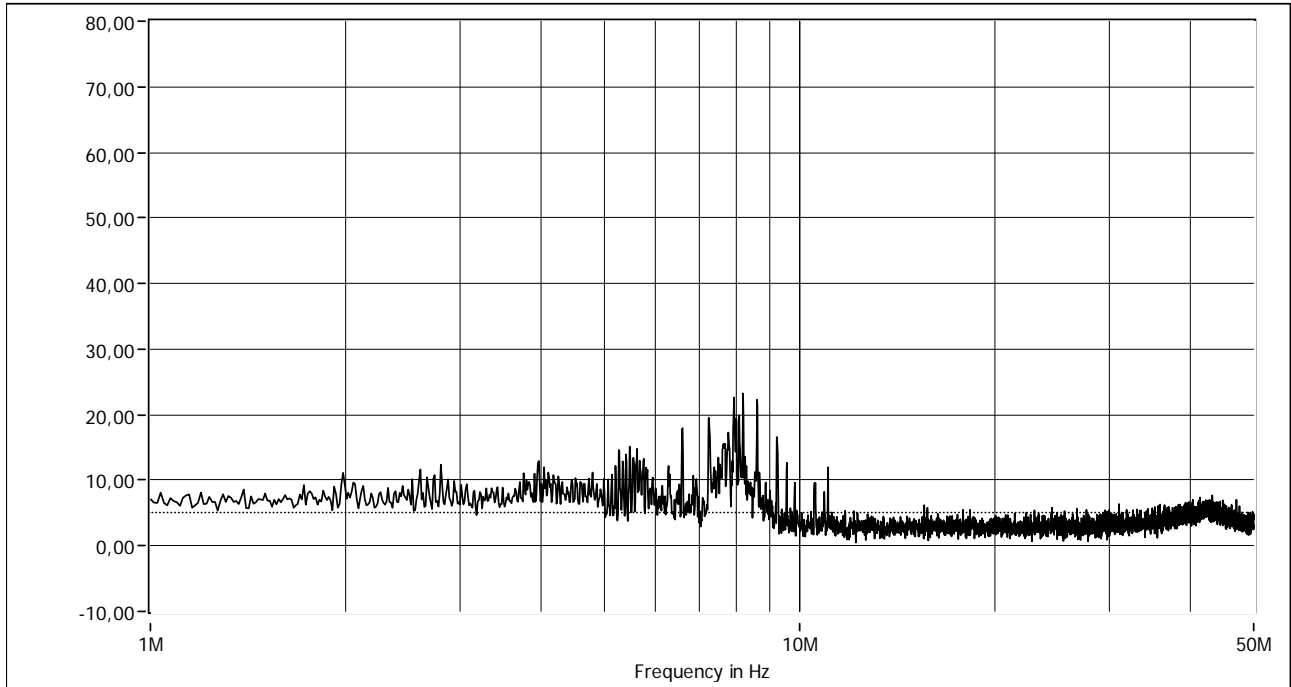


Figure 5- CM reference (1MHz-50MHz)

## 5.2 DM Reference

PLOT NO: 018; PROJECT: Herschel Conducted; OP MODE:ref; COMMENT: Ambient, DATE: 07/11/30

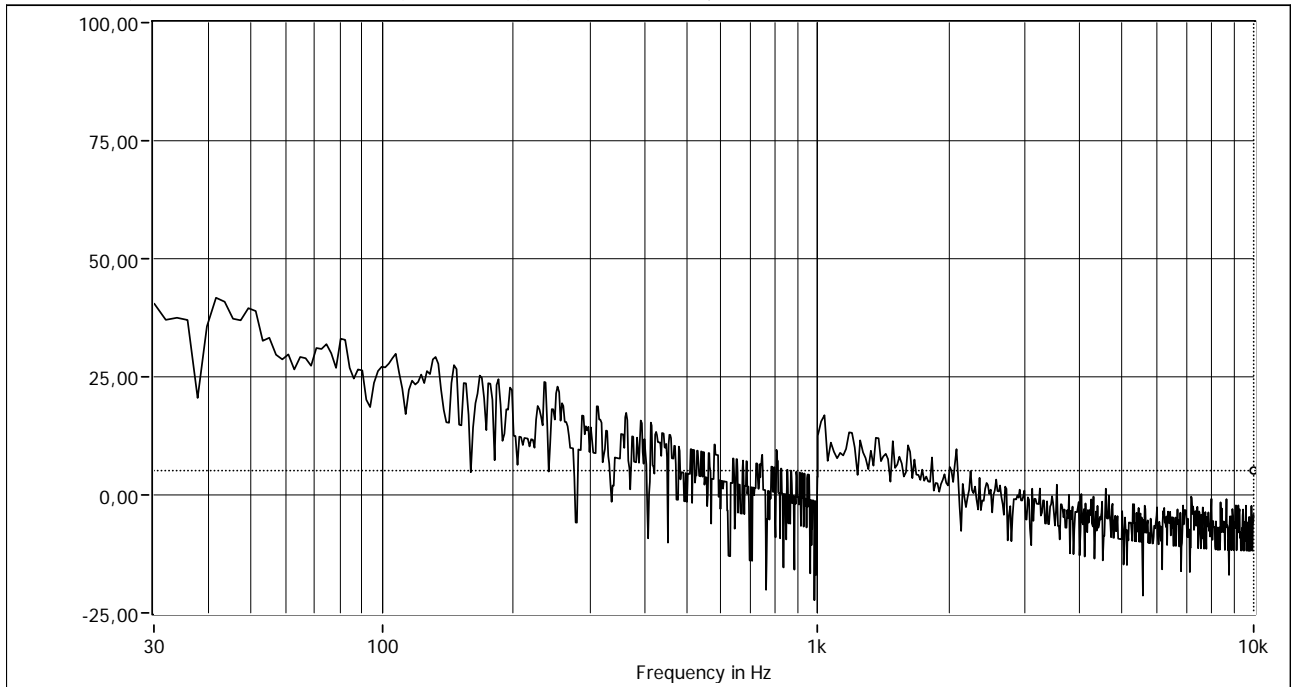


Figure 6 - DM reference (30Hz-10kHz)

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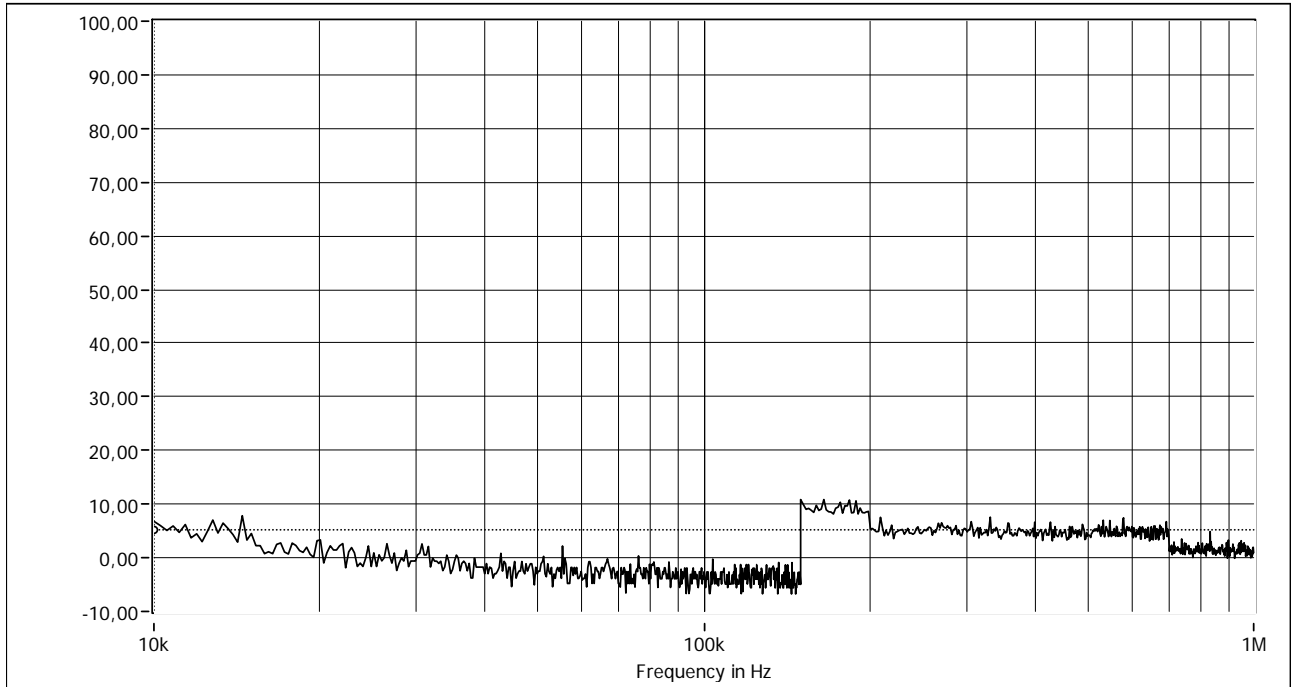
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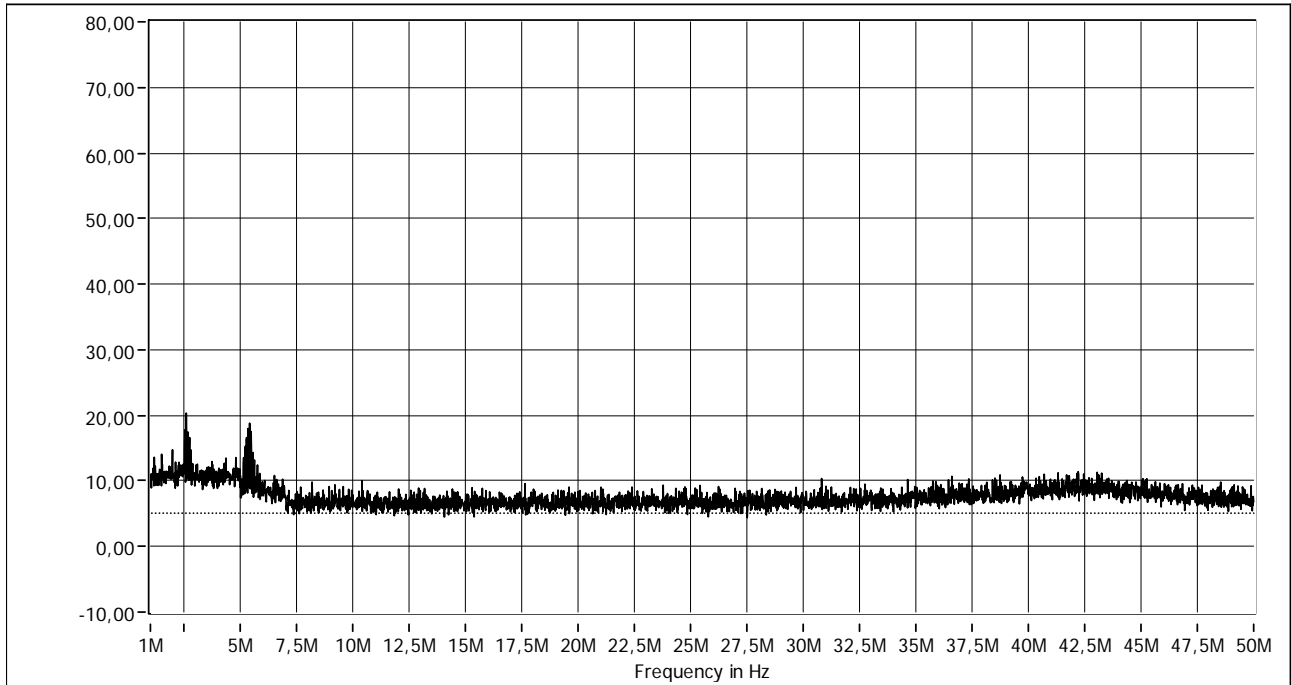
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PLOT NO:019; PROJECT: Herschel Conducted; OP MODE: ref; COMMENT: Ambient, NB; DATE: 07/11/30



**Figure 7 - DM reference (10kHz-1MHz)**

PLOT NO:020; PROJECT: Herschel Conducted; OP MODE: ref; COMMENT: Ambient, NB; DATE: 07/11/30



**Figure 8- DM reference (1MHz-50MHz)**

## 5.3 CM Test

PLOT NO: 57; PROJECT: Herschel Conducted; OP MODE: noisiest; COMMENT: DUT,cm; DATE: 07/12/03

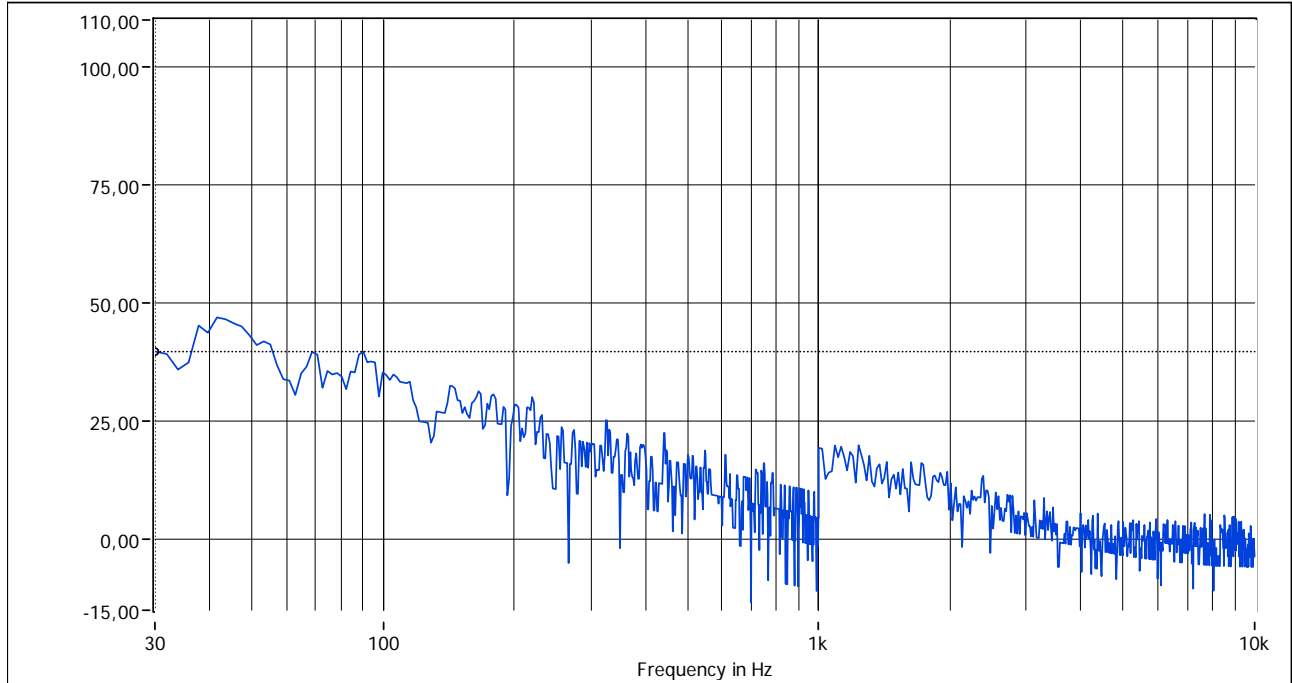


Figure 9 – CM Test (30Hz-10kHz)

PLOT NO: 58; PROJECT: Herschel Conducted; OP MODE: noisiest; COMMENT: DUT, CM; DATE: 07/12/03

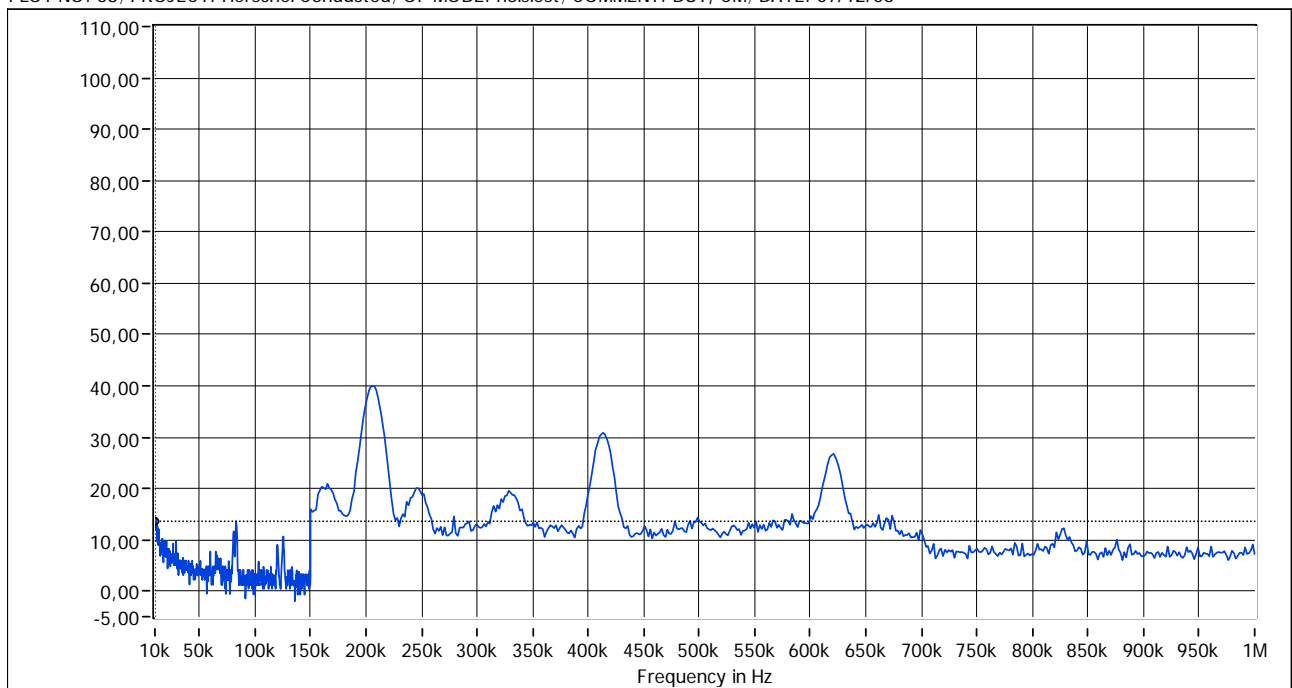


Figure 10 – CM Test (10kHz-1MHz)

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PLOT NO:59; PROJECT: Herschel Conducted; OP MODE: noisiest; COMMENT: DUT, CM; DATE: 07/12/03

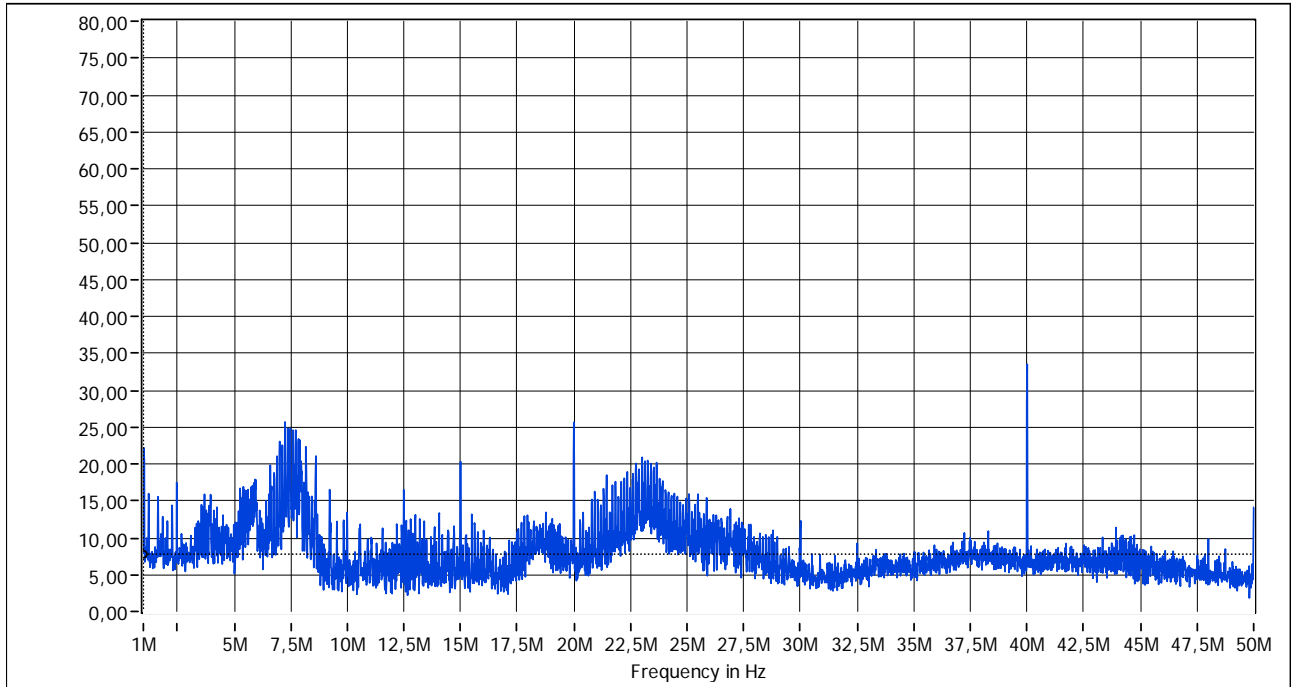


Figure 11 – CM Test (1MHz – 50MHz)

## 5.4 DM Test

PLOT NO:60; PROJECT: Herschel Conducted; OP MODE: noisiest; COMMENT: DUT, DM; DATE: 07/12/03

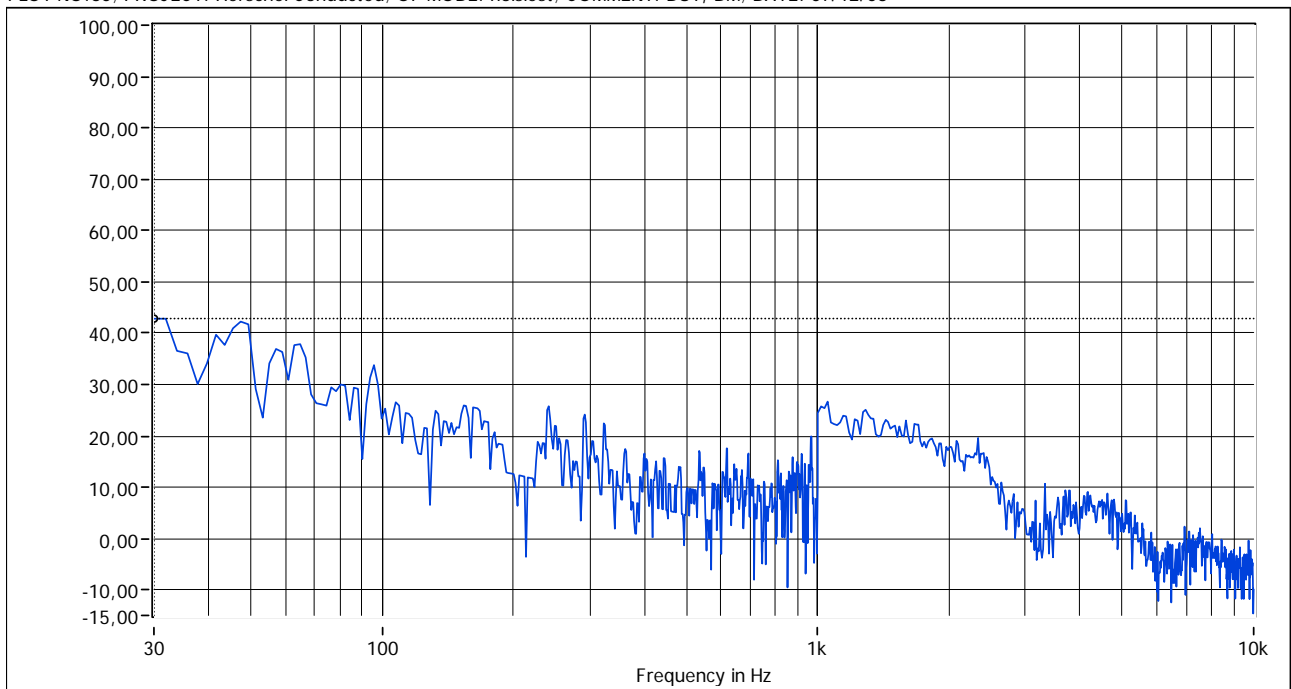


Figure 12 – DM Test (30Hz-10kHz)



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PLOT NO:61; PROJECT: Herschel Conducted; OP MODE: noisiest; COMMENT: DUT, DM; DATE: 07/12/03

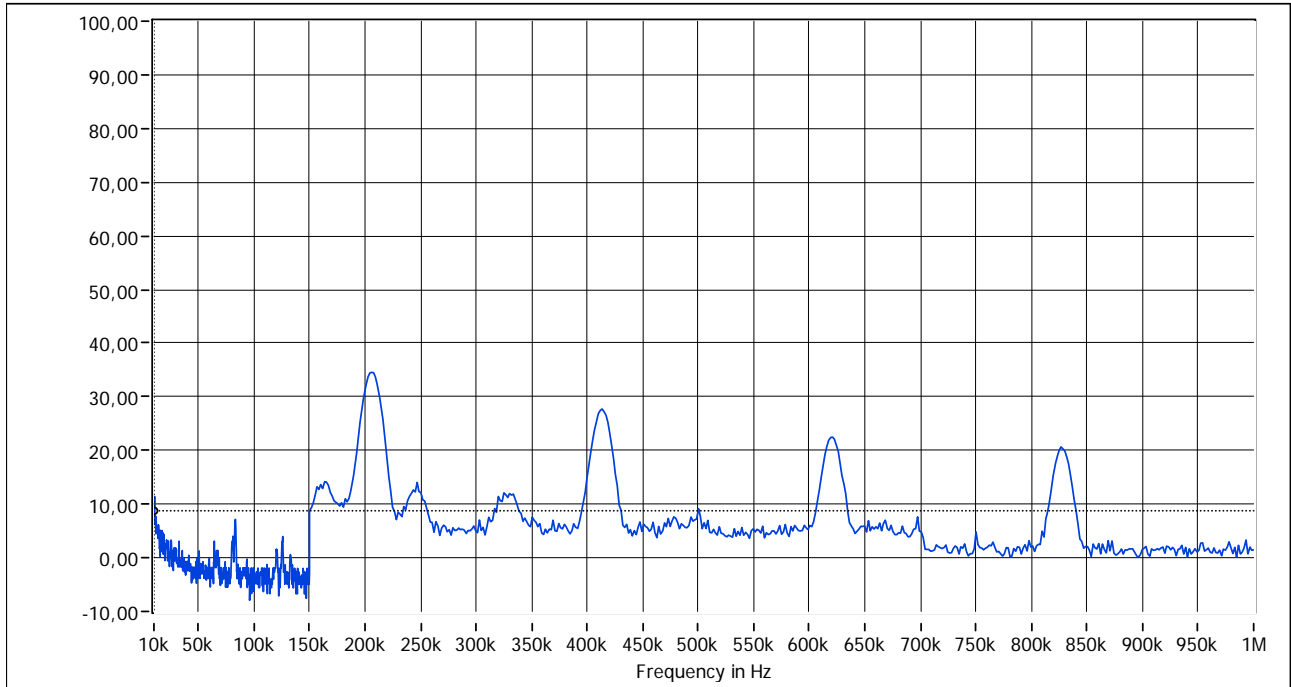


Figure 13 - DM Test (10 kHz – 1 MHz)

PLOT NO: 62; PROJECT: Herschel Conducted; OP MODE: noisiest; COMMENT: DUT, DM; DATE: 07/12/03

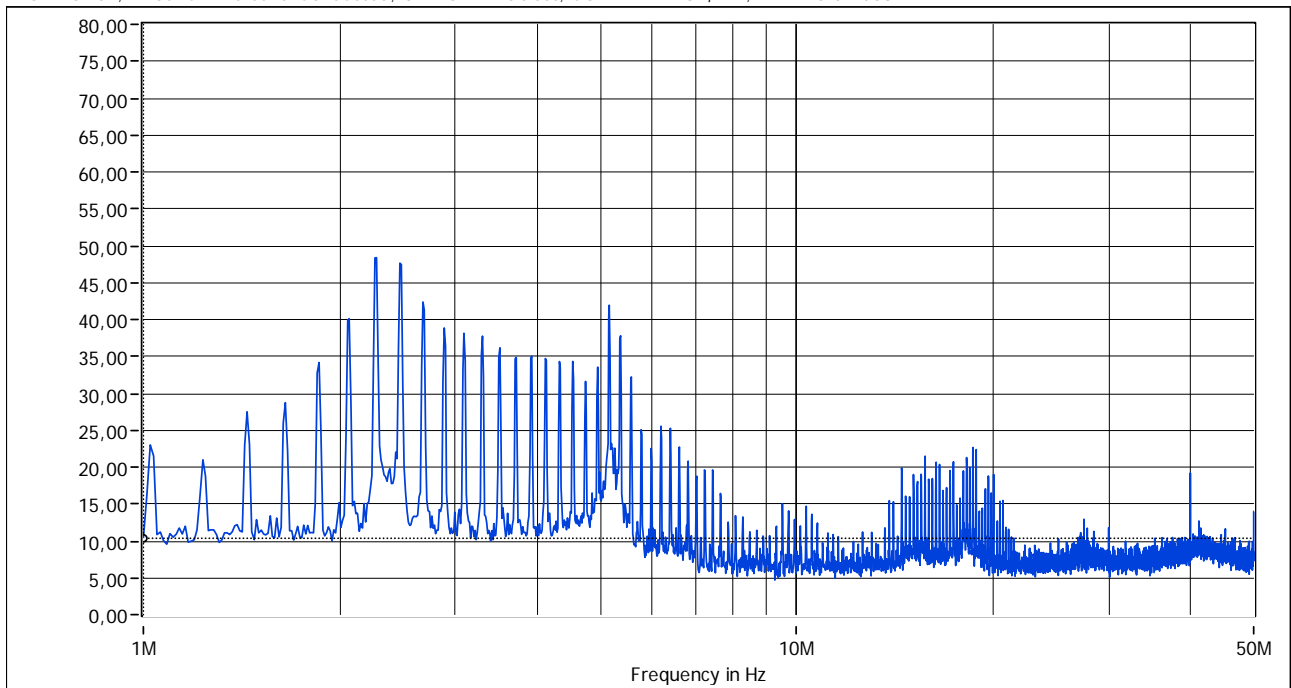


Figure 14 – DM Test (1MHz-50MHz)