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## EMC tests of Precise 200 MC (3 appendices)

### Test object

Product name: Combined Fingerprint and Smart Card reader  
Product number: Precise 200 MC  
Serial number: 0-50037

### Summary

Standard	Compliant	Appendix	Remarks
<b>FCC 47 CFR part 15 B</b>	<b>Yes</b>		
15.107 Conducted emission, class B	Yes	2	Note 1
15.109 Radiated emission, class B	Yes	3	Note 1

Note 1: The measurements were performed with the EUT connected to a minimal system.

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## Appendix 1

### Purpose of test

The tests were performed to verify that the electromagnetic emission from the test object meet the requirements of FCC Part 15 B.

### Test facility

The used anechoic chamber (15:115) is compliant with the requirements of section 2.948 of the FCC rules and listed, registration number 96866, as a facility accepted for certification under parts 15 and 18. The site complies with RSS Gen, Issue 2 and is accepted by Industry Canada for the performance of radiated measurements, file number IC 3482A-2.

### Measurement equipment

Measurement equipment	Calibration Due	SP number
Test site Tesla	2010-10	503 881
Test site Edison	2009-07	504 114
R&S EMI test receiver ESIB 26	2009-07	503 292
R&S EMI test receiver ESIB 26	2009-07	503 885
LISN Schwartzbeck NNLA 8120	2011-04	500 574
LISN Schwartzbeck NNLK 8121	2011-02	502 112
LISN Schwartzbeck NSLK 8126	2011-04	503 114
Chase Bilog antenna CBL 6111A	2011-11	503 182
Antenna Schaffner CBL 6143	2010-03	504 079
EMCO Horn Antenna 3115	2011-02	501 548
EMCO Horn Antenna 3115	2011-01	502 175
EMCO Horn Antenna 3115	2012-03	504 194
Flann Standard gain horn 16240-25	-	503 939
Flann Standard gain horn 18240-25	-	503 900
Flann Standard gain horn 20240-20	-	503 674
MITEQ Low Noise Amplifier	2009-06	503 277
MITEQ Low Noise Amplifier	2009-06	503 285
MITEQ Low Noise Amplifier	2009-08	504 160
Temperature and humidity meter Testo 615	2009-11	503 505
Temperature and humidity meter Testo 625	2009-08	504 117

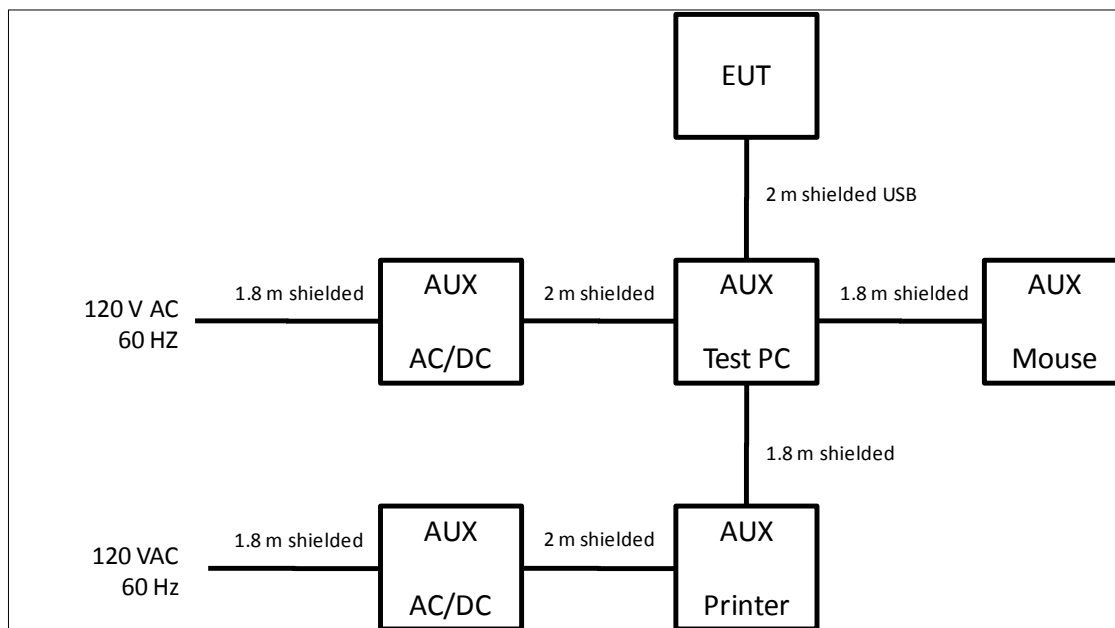
## Appendix 1

### Operational test mode

The EUT was connected to the minimal system through a USB connection.

The highest frequencies generated in the EUT is a 12 MHz clock signal.

The EUT was exercised by a test program called CE-TEST 200 MC running on the test PC



### Connected equipment during the test (“minimum system”)

Laptop Computer IBM 2545-4BG S/N: 5528TVC 02/99	Clients equipment
AC/DC Adapter for Laptop computer IBM 02K6543 S/N: 2M04T7792PF	Clients equipment
Printer HP Deskjet 895 CXi (C6410A) S/N: HU0151N087	Clients equipment
AC/DC Adapter for Printer HP C6409-60014 S/N: T5844428252	Clients equipment
Mouse X05-51692 8851-576-0304842-00000	Clients equipment

## Appendix 1

**Uncertainties**

Measurement and test instrument uncertainties are described in the quality assurance documentation "EL-QD 8.2". The measurement uncertainties can be found in the table below. The uncertainties are calculated with a coverage factor  $k=2$  (95% level of confidence).

The measurement uncertainties can be found in the table below:

Method	Uncertainty
Radiated emission, 30 – 1000 MHz	4.9/5.6 dB (V/H-pol) 4.8/5.6 dB (V/H-pol)
Radiated emission, 1 – 40 GHz	2.6 dB
Conducted emission	3.5 dB

**Reservation**

The test results in this report apply only to the particular test object as declared in the report.

**Delivery of test object**

The test object was delivered 2010-04-08

**Test participant**

Dick Ström

**Test engineers**

Martin Forsberg

## Appendix 2

## Conducted emission measurements according to FCC 47 CFR part 15.107, class B

Date 2010-04-08	Temperature 22 °C ± 3 °C	Humidity 29 % ± 5 %
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### Test set-up and procedure

The measurements were performed according to ANSI C63.4-2003. Measurements were performed on the 120 V AC/60 Hz, phase and neutral conductors of the test PC.

Test set-up during the tests can be found on page 2.

Measurement equipment	SP number
Semi anechoic chamber, Edison	504 114
EMI measurement computer	-
R&S EMI test receiver ESIB 26	503 885
Software: R&S EMC32, ver. 6.10.10	503 897
LISN Schwarzbeck NNLA 8120	500 574
Temperature and humidity meter Testo 625	504 117

### Result

The conducted emission spectra can be found in appendix 2.1:

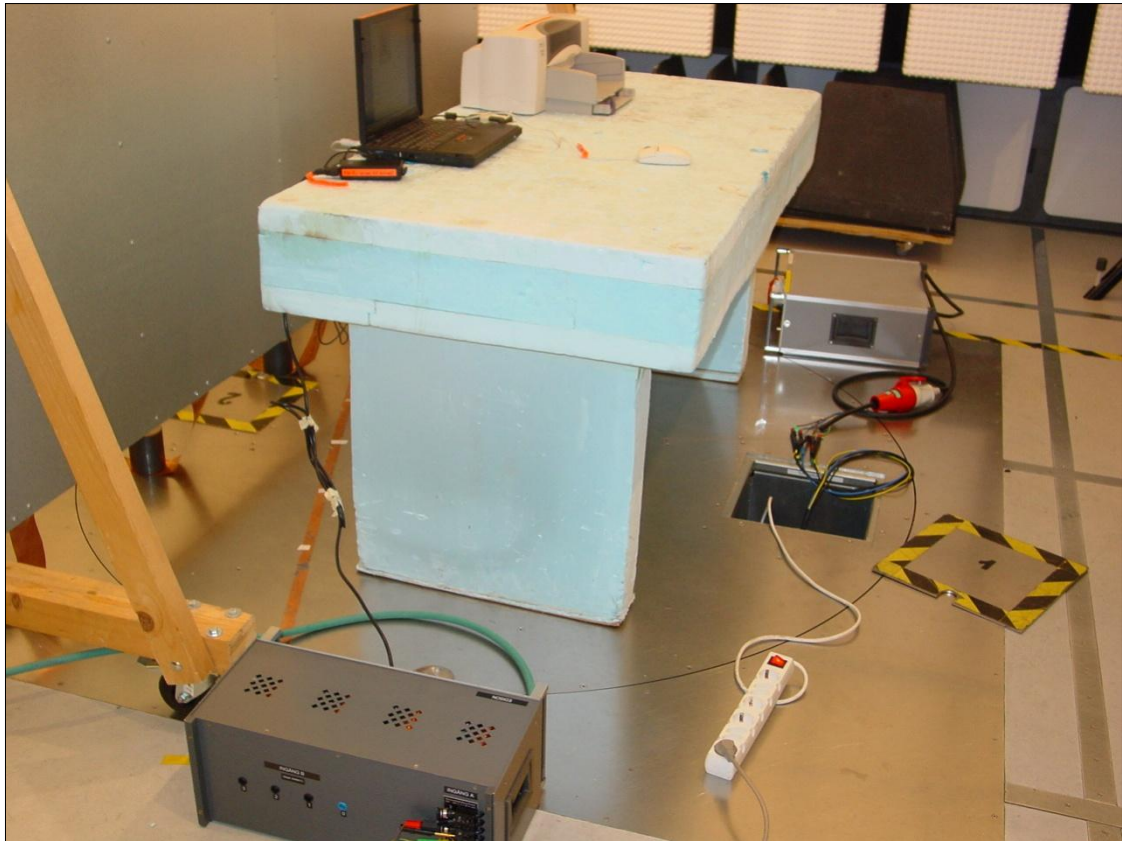
Diagram 1:	Phase conductor
Diagram 2:	Neutral conductor

The limit lines indicated as EN 55022 in the diagrams are the same limit lines as of FCC part 15.

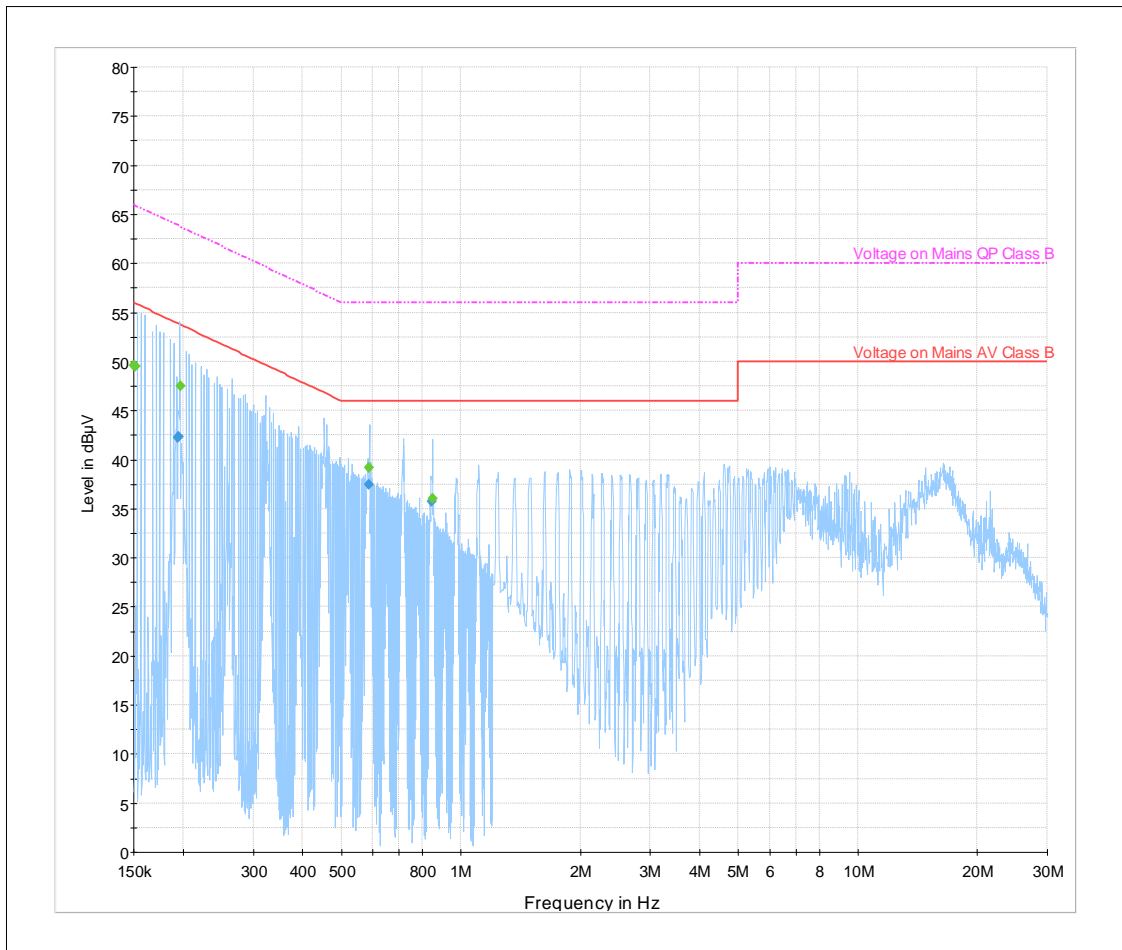
Emission below limit?	Yes
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## Appendix 2

Test set-up, Conducted emission



## Appendix 2.1

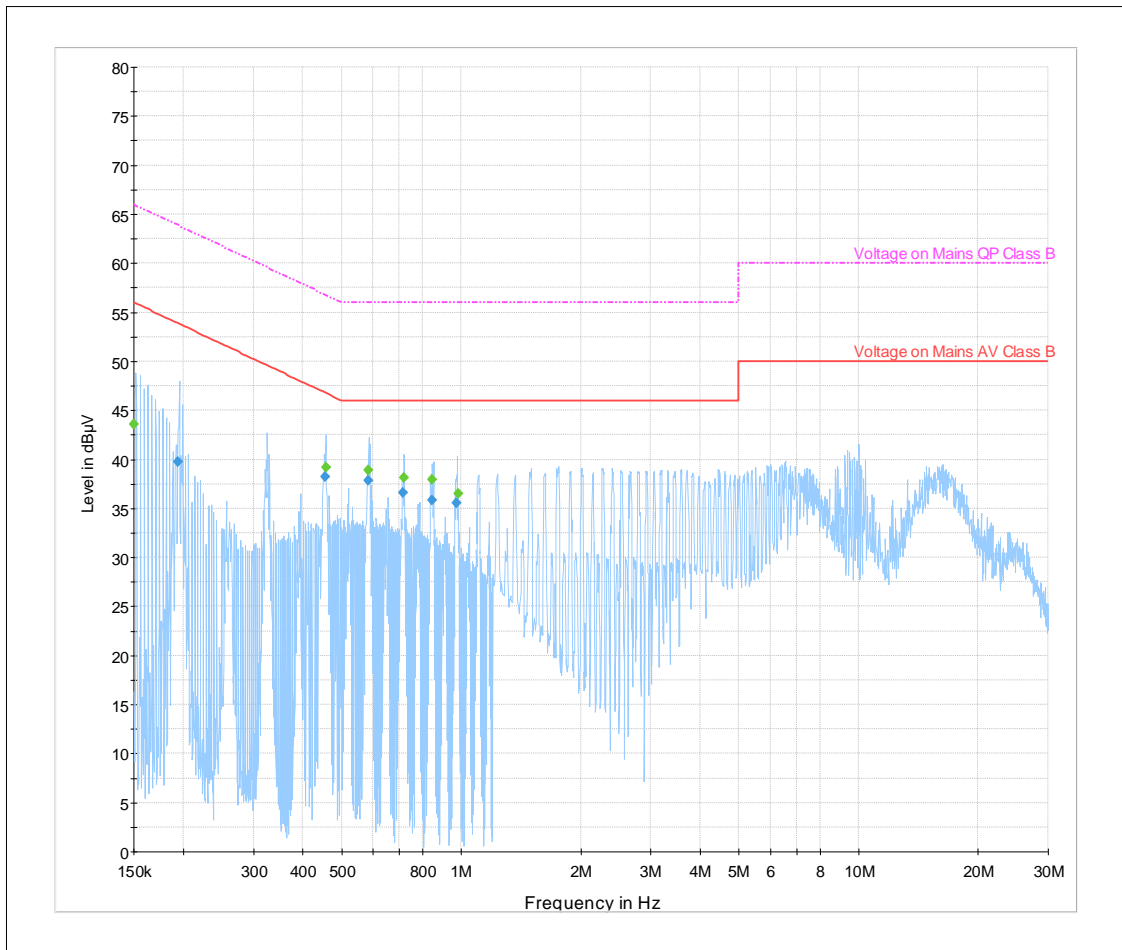
**Diagram 1**


Frequency	Average	Meas. Time	Bandwidth	Corr.	Margin	Limit
MHz	dBμV	ms	kHz	dB	dB	dBμV
0.194	42.22	1000	9	0.07	11.70	53.86
0.195	42.38	1000	9	0.07	11.40	53.83
0.585	37.47	1000	9	0.12	8.50	46.00
0.843	35.79	1000	9	0.13	10.20	46.00

Frequency	QuasiPeak	Meas. Time	Bandwidth	Corr.	Margin	Limit
MHz	dBμV	ms	kHz	dB	dB	dBμV
0.150	49.62	1000	9	0.07	16.40	66.00
0.152	49.47	1000	9	0.07	16.40	65.89
0.197	47.50	1000	9	0.07	16.20	63.75
0.587	39.22	1000	9	0.12	16.80	56.00
0.851	36.03	1000	9	0.13	20.00	56.00



## Appendix 2.1

**Diagram 2**


Frequency	Average	Meas. Time	Bandwidth	Corr.	Margin	Limit
MHz	dBμV	ms	kHz	dB	dB	dBμV
0.194	39.79	1000	9	0.07	14.10	53.86
0.454	38.26	1000	9	0.10	8.50	46.80
0.584	37.81	1000	9	0.12	8.20	46.00
0.715	36.64	1000	9	0.12	9.40	46.00
0.846	35.83	1000	9	0.13	10.20	46.00
0.973	35.56	1000	9	0.14	10.40	46.00

Frequency	QuasiPeak	Meas. Time	Bandwidth	Corr.	Margin	Limit
MHz	dBμV	ms	kHz	dB	dB	dBμV
0.150	43.55	1000	9	0.07	22.40	66.00
0.456	39.16	1000	9	0.10	17.60	56.76
0.584	38.92	1000	9	0.12	17.10	56.00
0.717	38.11	1000	9	0.12	17.90	56.00
0.846	37.97	1000	9	0.13	18.00	56.00
0.981	36.49	1000	9	0.14	19.50	56.00

## Appendix 3

## Radiated emission measurements according to FCC 47 CFR part 15.109, class B

Date 2010-04-09	Temperature 22 °C ± 3 °C	Humidity 29 % ± 5 %
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### Test set-up and procedure

The measurements were performed according to ANSI C63.4-2003.

The test of radiated emission was performed in a semi anechoic chamber. The measurements were performed with both horizontal and vertical polarizations of the antenna. The antenna distance was 3 m.

The measurement procedure is as the following:

1. A pre-measurement is performed with peak detector. The test object is measured in eight directions with the antenna at three heights, 1.0 m, 1.5 m and 2.0 m.
2. If the emission is close or above the limit during the pre-measurement, the test object is scanned 360 degrees and the antenna height scanned from 1 to 4 m for maximum response. Then the emission is measured with the quasi-peak detector on frequencies below 1 GHz and with the average detector above 1 GHz.

Test set-up during the tests can be found on page 2.

Measurement equipment	SP number
Anechoic chamber, Edison	504 114
R&S EMI test receiver ESIB 26	503 885
Control computer, Fujitsu Siemens	-
Software: R&S EMC32, ver. 6.10.10	503 899
Antenna Schaffner CBL 6143	504 079
Temperature and humidity meter Testo 615	503 505

### Result

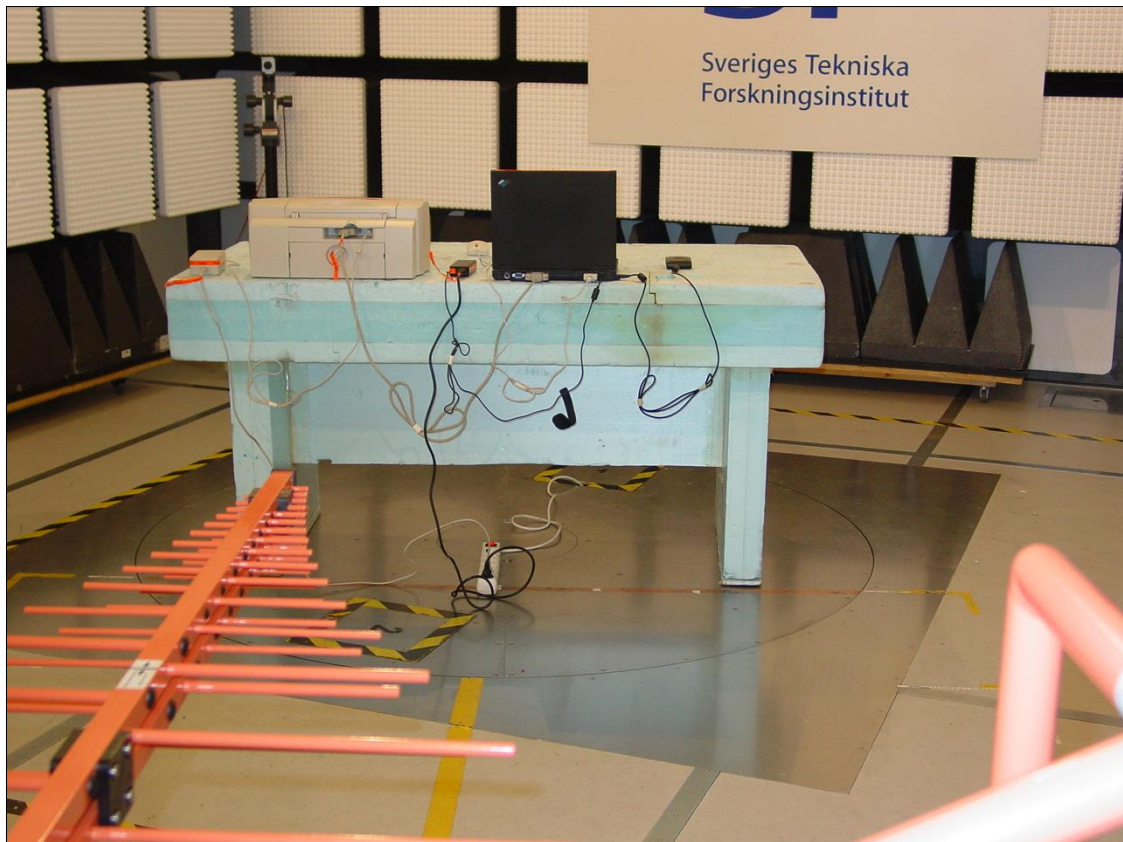
The emission spectrum/spectra can be in found Appendix 3.1:

Diagram 1	Radiated emission 30-1000 MHz vertical and horizontal polarizations
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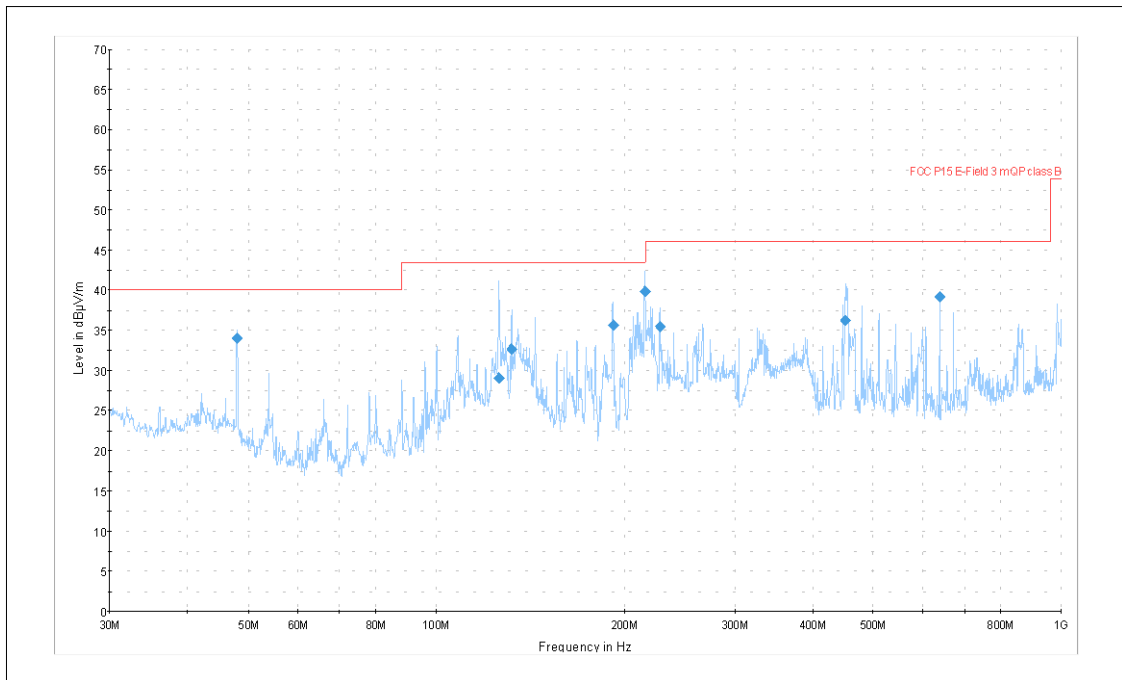
Emission below limit?	Yes
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## Appendix 3

### Test set-up, Radiated emission



## Appendix 3.1

**Diagram 1**


Frequency	QuasiPeak	Antenna height	Polarity	Turntable position	Margin	Limit
MHz	dBµV/m	cm		deg	dB	dBµV/m
48.00	34.0	144	V	314	6.0	40.0
125.88	29.0	100	V	335	14.5	43.5
131.90	32.7	132	V	352	10.8	43.5
192.04	35.7	191	H	356	7.8	43.5
215.82	39.8	138	H	21	3.7	43.5
227.92	35.5	138	H	5	10.5	46.0
451.12	36.3	100	V	15	9.7	46.0
639.08	39.2	109	H	317	6.8	46.0