

FCC Part 15C, Industry Canada Certification Report

for

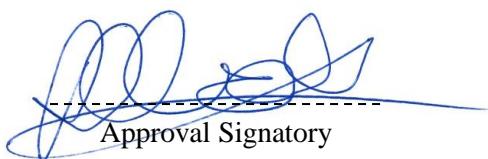
Pronto 100

Card Printer

FCC ID: XDW5000-0001



Project Engineer: R. Pennell


Approval Signatory

Approved signatories: D. Tiroke ☐ A. Coombes ☒

The above named are authorised Eurofins Hursley signatories.

UKAS Accredited
FCC Registered
KC Lab ID: EU0184

Contents

1.0	DECLARATION	3
1.1	FCC PART 15C STATEMENT AND INDUSTRY CANADA (IC) STATEMENT	3
1.2	RELATED SUBMITTAL(S) GRANTS	3
1.3	EUT MANUFACTURER	3
2.0	EUT DESCRIPTION	4
2.1	PRODUCT INFORMATION	4
2.2	PRODUCT OPERATION	4
2.3	SUPPORT EQUIPMENT	5
2.4	EXERCISER PROGRAM	5
3.0	MEASUREMENT PROCEDURE AND INSTRUMENTATION	5
3.1	EMI SITE ADDRESS & TEST DATE	5
3.2	GENERAL OPERATING CONDITIONS	5
3.3	UNCERTAINTY	6
3.4	ENVIRONMENTAL AMBIENT	6
3.5	CONDUCTED EMISSIONS	7
3.6	RADIATED EMISSIONS	8
3.7	H FIELD EMISSIONS	9
4.0	TEST DATA	10
4.1	POWER LINE CONDUCTED EMISSIONS; 0.15 TO 30.0 MHz	10
4.2	RADIATED EMISSIONS 30MHz TO 1GHz	13
4.3	RADIATED EMISSIONS 1 TO 8 GHz	15
4.4	FCC Pt15.225	17
4.5	FCC Pt15.225 A, B, C, D & F. FIELD STRENGTH OF EMISSIONS 9kHz TO 30MHz	21
5.0	PHOTO LOG.....	24

1.0 DECLARATION

1.1 FCC Part 15C Statement and Industry Canada (IC) Statement

The Equipment Under Test (EUT), as described and reported within this document, complies with ISED RSS-Gen Issue 5 March 2019 and IC RSS-210 Issue 10 December 2019 and the parts 15.207, 15.209, 15.225 of the CFR 47:2015 FCC rules. The EUT operates at frequencies of 13.56 MHz and complies with part 15C emission requirements.

For emissions outside the 13.110 – 14.010MHz band the EUT, as described and reported within this document, complies with the parts 15.207 and 15.209 of the CFR 47 FCC rules in accordance with ANSI C63.10:2013 and ANSI C63.4:2014.

1.2 Related Submittal(s) Grants

This is an application for certification of a Pronto 100 (transmitting at 13.56 MHz), described in this report.

The sections of FCC Part 15 that apply to the EUT are:

15.207 Conducted emissions intentional radiator

15.209 Radiated emissions intentional radiator

15.225 Operation within the band 13.110 to 14.010 MHz

1.3 EUT Manufacturer

Trade name:	Magicard Ltd
Company name:	Magicard Ltd
Company address:	Magicard Ltd Waverley House Hampshire Road Weymouth Dorset DT4 9XD
Manufacturing address:	As above.
Company representative:	Timothy Last Tel: +44 (0) 1305 470 263

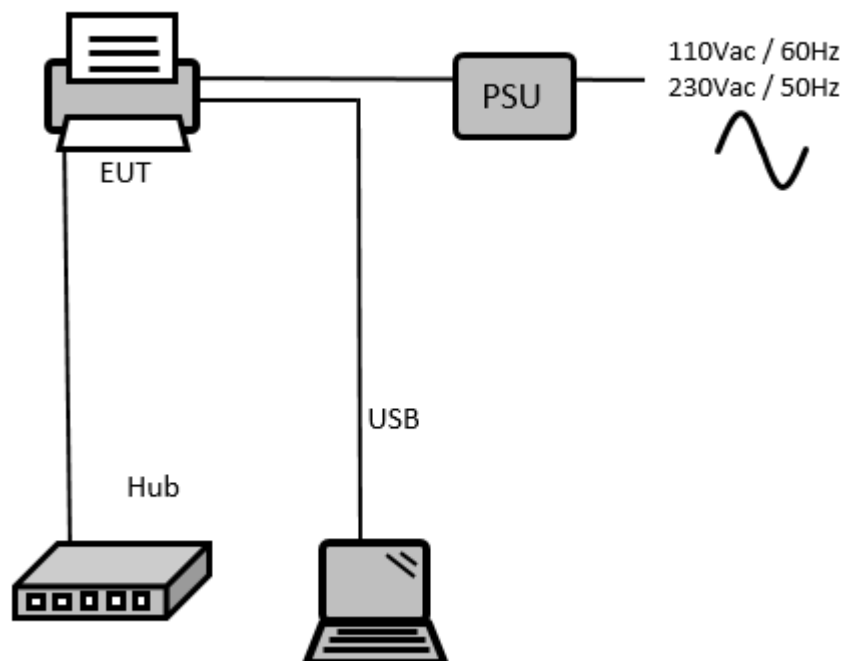
2.0 EUT DESCRIPTION

2.1 Product Information

EUT:	Pronto 100
Model Number:	3100-0001
Serial numbers:	98778910
Sample build:	Production
EUT PSU:	Sunpower
Model Number:	EA10952E
Serial numbers:	EA10952E-240
Sample build:	Production

2.2 Product Operation

The Pronto 100 card printer is a colour card printer. It utilises low power RFID technology for recognition of consumable print film. It operates at a transmit frequency of 13.56 MHz



2.3 Support Equipment

- Dell latitude 3580 laptop s/n: P79G002
- Ethernet Hub Vigor2600g s/n: 5500453507

2.4 Exerciser Program

Laptop running Windows printer driver

The EUT was set to print continuously for non-intentional radiator / general requirements.
The EUT RFID was set to transmit continuously at 13.56 MHz for intentional radiator tests.

3.0 MEASUREMENT PROCEDURE AND INSTRUMENTATION

3.1 EMI Site Address & Test Date

EMI Company Offices	Eurofins Hursley Trafalgar House, Trafalgar Close, Chandlers Ford, Hampshire
EMI Measurement Site	Eurofins Hursley UK Designation number: UK0006 Canada CAB Identifier: UK0005
Test Dates	14 th to 15 th December 2020
Eurofins Hursley Reference:	1920b

3.2 General Operating Conditions

Testing was performed according to the procedures in accordance with ANSI C63.4:2014 and 63.10 2013. Final radiated testing was performed at a EUT to antenna distance of three metres.
Instrumentation, including receiver and spectrum analyser bandwidth, comply with the requirements of ANSI C63.2:2009.

3.3 Uncertainty

The following measurement uncertainties have been calculated in accordance with ANSI C63.23, CISPR 16-4-2 and in line with other available guidance to provide a confidence level of 95% (coverage factor, $k = 2$) in the reported measurements:

For Conducted emissions:

	9 kHz – 150 kHz	150 kHz – 30 MHz
ULAB via AMN	± 3.28 dB	± 3.29 dB

For radiated emissions below 1 GHz:

3 m measurement distance	30 MHz – 200 MHz	200 MHz – 1 GHz
Vertical polarisation	± 3.7 dB	± 5.1 dB
Horizontal polarisation	± 3.9 dB	± 3.8 dB

For radiated emissions below 1 GHz:

10 m measurement distance	30 MHz – 200 MHz	200 MHz – 1 GHz
Vertical polarisation	± 4.4 dB	± 4.8 dB
Horizontal polarisation	± 4.5 dB	± 4.6 dB

For radiated emissions above 1 GHz:

3 m measurement distance	1 GHz – 6 GHz	6 GHz - 18 GHz	18 GHz – 40 GHz
Both polarisations	± 4.5 dB	± 4.4 dB	± 4.3 dB

3.4 Environmental Ambient

Test Type	Temperature	Humidity	Atmospheric Pressure
Emissions	16.3 to 22 degrees Celsius	43 to 55 % relative	1001.6 to 1017.6 millibars

3.5 Conducted Emissions

Test Configuration

A filtered 110V/60Hz supply was fed to the EUT via a 50Ω/50μH Line Impedance Stabilisation Network (LISN). The LISN was directly bonded to a conductive ground plane.

Test Measurement

The worst-case emissions were identified on both the neutral and phase(s) with an RF measurement receiver set to scan from 0.15 MHz to 30.0 MHz.

The worst-case peaks were then identified and measured using a quasi-peak detector and compared to the frequency range and limits of CISPR 22 as specified by ANSI C63.4-2014.

The worst-case results are presented in this report.

Test instrumentation used in the conducted test was as follows:

#ID	CP	Manufacturer	Type	Serial Nø	Description	Calibration due date
674	1	Rohde & Schwarz	ESH3-Z5	838576-018	1 phase LISN	16/09/2021
126	0	Schaffner	NSG1007	55090	Power source (5kW)	Internal
699	2	Gauss	TDEMI30M	1506001	Time Domain Conducted Receiver	18/09/2021
285	1	Huber+Suhner	BNC Cable	0	Cable	Internal
252	1	Rohde & Schwarz	ESH 3 Z2	08970	10dB pulse limiter	27/05/2021
785	0	EH	Ground plane area	0	0	Internal
455	2	Schwarzbeck	8158	cat5-8158-0055	ISN	23/07/2021

CP = Interval period [year] prescribed for external calibrations

Note: 'Calibration due date' means that the instrument is certified with a UKAS or traceable calibration certificate.
'Internal' means internally calibrated using Eurofins Hursley procedures

3.6 Radiated Emissions

Initial Scan

A radiated profile scan was taken at a three metre distance on eight azimuths of the system under test in both vertical and horizontal polarities of the antenna in a semi-anechoic chamber. Instrumentation used in the chamber as below:

#ID	CP	Manufacturer	Type	Serial No	Description	Calibration due date
761	3	Schwarzbeck	VULB9162	128	Trilog Broadband Antenna 30-7000MHz	02/03/2023
761a	3	Schwarzbeck	DGA 9552N	0	6dB attenuator for #761	02/03/2023
456	1	Rohde & Schwarz	ESCI7	1144573407	EMI Test Receiver	26/08/2021
750	1	Global	CISPR16 chamber	1	11 x 7 x 6.2m	11/11/2021
250	1	HP	8449B	3008A01077	Pre-amplifier (1.0-26.5GHz)	26/02/2021
466	3	Schwarzbeck	BBHA 9120 571	571	1-10GHz Horn	28/02/2022
021	1	Rohde & Schwarz	ESIB	100192	Test receiver (40GHz)	12/08/2021

CP = Interval period [year] prescribed for external calibrations

Note: 'Calibration due date' means that the instrument is certified with a UKAS or traceable calibration certificate.
'Internal' means internally calibrated using Eurofins Hursley procedures

The data obtained from the profile scan was used as a guide for the final measurements.

Final Measurements

Final measurements of the system under test were also taken in the semi-anechoic chamber. The data obtained from the chamber profile-scan was used as a guide. Each emission identified from the EUT was maximised by revolving the system on the turntable and moving the antennae in azimuth. Above 30 MHz antenna height was adjusted to give maximum emission. The worst-case data is presented in this report. Test instrumentation used for final measurements is unchanged from the initial scan.

3.7 H field Emissions

Initial Scan

A radiated profile scan was taken at a three metre distance in a semi-anechoic chamber. Prescan measurements were made on eight azimuths of the system under test with the loop antenna oriented at 0 and 90 degrees to the EUT. Adjustments were made for the 3m measuring distance

Instrumentation used in the chamber as below:

#ID	CP	Manufacturer	Type	Serial No	Description	Calibration due date
047	3	Rohde & Schwarz	HFH2-Z2	879021/22	Loop antenna (9kHz-30MHz)	10/07/2022
456	1	Rohde & Schwarz	ESCI7	1144573407	EMI Test Receiver	26/08/2021
750	1	Global	CISPR16 chamber	1	11 x 7 x 6.2m	11/11/2021

CP = Interval period [year] prescribed for external calibrations

Note: 'Calibration due date' means that the instrument is certified with a UKAS or traceable calibration certificate.
'Internal' means internally calibrated using Eurofins Hursley procedures

The data obtained from the profile scan was used as a guide for the final measurements.

Final Measurements

Final measurements of the system under test were also taken in the semi-anechoic chamber. The data obtained from the chamber profile-scan was used as a guide. Each emission identified from the EUT was maximised by revolving the system on the turntable and moving the antennae in azimuth. The worst-case data is presented in this report. Test instrumentation used for final measurements is unchanged from the initial scan.

4.0 TEST DATA

The EUT was tested for radiated and conducted disturbance measurements. The worst-case results are reported within this document.

4.1 Power Line Conducted Emissions; 0.15 to 30.0 MHz

A search was made of the frequency spectrum between 0.15 MHz to 30.0 MHz and the measurements reported here are the highest emissions relative to the CISPR Class B limits. Emissions that meet the average limit on a quasi-peak measurement are deemed to meet both the average and quasi-peak specification.

4.1.1 Data; Mains Neutral; RFID mode

Quasi-peak value (dB μ V)				
Frequency	Measured	Limit	Margin	Status
560.284 kHz	40.58	56.00	15.42	Pass
5.200 MHz	30.72	60.00	29.28	Pass
13.559 MHz	39.05	60.00	20.95	Pass
19.634 MHz	29.08	60.00	30.92	Pass
24.998 MHz	29.25	60.00	30.75	Pass
27.120 MHz	42.30	60.00	17.70	Pass

Average value (dB μ V)				
Frequency	Measured	Limit	Margin	Status
560.284 kHz	38.38	46.00	7.62	Pass
5.171 MHz	25.92	50.00	24.08	Pass
13.559 MHz	36.24	50.00	13.76	Pass
19.805 MHz	23.66	50.00	26.34	Pass
24.998 MHz	23.88	50.00	26.12	Pass
27.120 MHz	39.80	50.00	10.20	Pass

Measurements made according to the FCC rules and Eurofins Hursley test procedure CON-02.

TEST ENGINEER: Richard Pennell

4.1.2 Data; Mains Line; RFID mode

Quasi-peak value (dB μ V)				
Frequency	Measured	Limit	Margin	Status
560.284 kHz	40.64	56.00	15.36	Pass
5.200 MHz	30.05	60.00	29.95	Pass
13.559 MHz	30.44	60.00	29.56	Pass
19.329 MHz	28.77	60.00	31.23	Pass
24.998 MHz	29.15	60.00	30.85	Pass
27.120 MHz	43.36	60.00	16.64	Pass

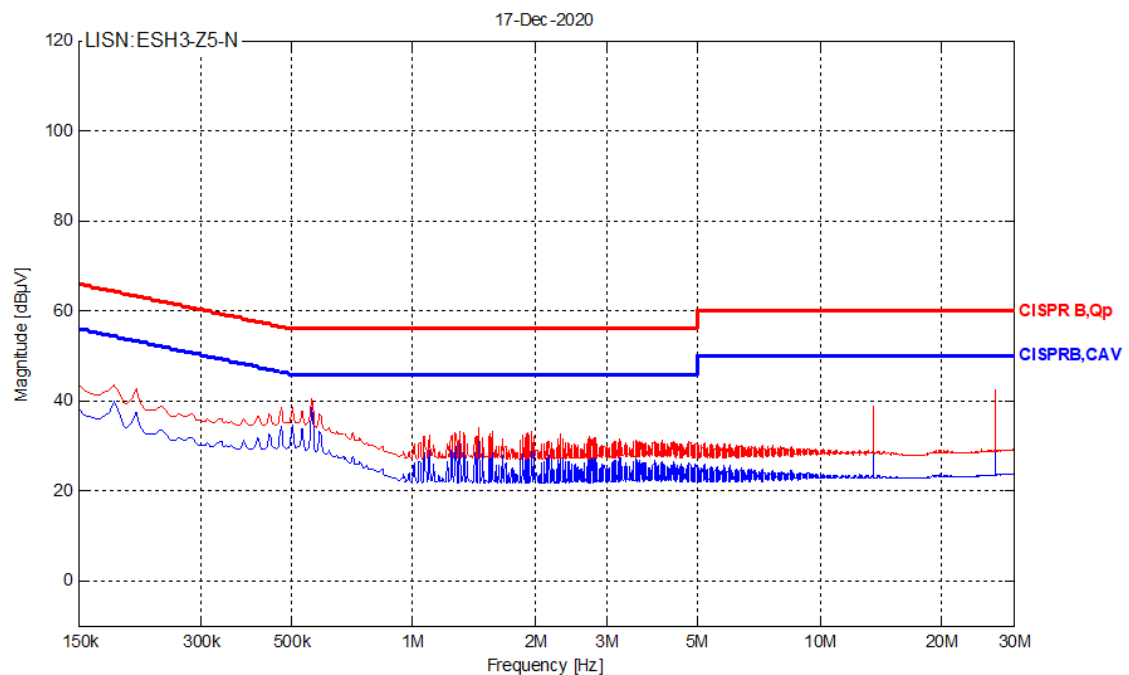
Average value (dB μ V)				
Frequency	Measured	Limit	Margin	Status
560.284 kHz	38.65	46.00	7.35	Pass
5.200 MHz	24.99	50.00	25.01	Pass
13.559 MHz	25.31	50.00	24.69	Pass
19.662 MHz	23.35	50.00	26.65	Pass
24.998 MHz	23.98	50.00	26.02	Pass
27.120 MHz	40.90	50.00	9.10	Pass

Measurements made according to the FCC rules and Eurofins Hursley test procedure CON-02.

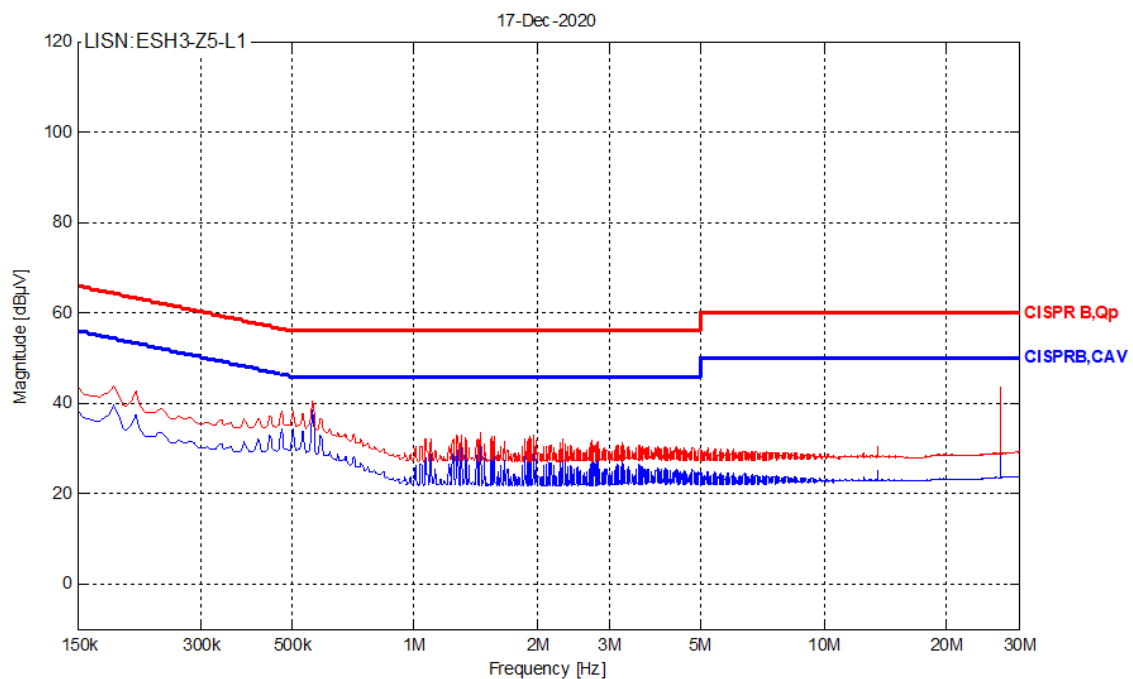
TEST ENGINEER: Richard Pennell

4.1.3 Profiles; RFID mode

Shown here is the Neutral profile.



Shown here is the Line profile.



4.2 Radiated Emissions 30MHz to 1GHz

Radiated emissions pre-scan profile measurements were taken at a distance of three metres on eight azimuths of the EUT in both horizontal and vertical antenna polarities in a semi anechoic chamber for FCC measurements.

Using the pre-scan results as a guide, each emission from the EUT was maximised. Measurements were carried out a distance of three metres in an ANSI C63.4 compliant semi-anechoic chamber. Cable positions were then finally adjusted to produce the maximum emission levels. Below 1 GHz a quasi-peak detector was used.

4.2.1 Data, RFID Mode

Frequency	Quasi Peak	Specified Limit	Margin	Height	Pol	Azimuth	Corr	
MHz	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
40.670000	28.24	40.00	11.76	109.0	V	96.0	20.3	Pass
46.772229	33.41	40.00	6.59	118.0	V	173.0	21.6	Pass
203.403576	25.46	43.50	18.04	253.0	H	6.0	17.3	Pass
512.315660	37.72	46.00	8.28	129.0	H	252.0	24.6	Pass
563.741019	37.17	46.00	8.83	151.0	H	308.0	25.5	Pass
825.144537	37.98	46.00	8.02	352.0	H	3.0	29.6	Pass

The measurements reported are the highest emissions relative to the:

‘FCC CFR 47 Section 15.209 and 15.249 Limits’ at a measuring distance of three metres.

‘ISED RSS-210 issue 10 Annex B section B10’

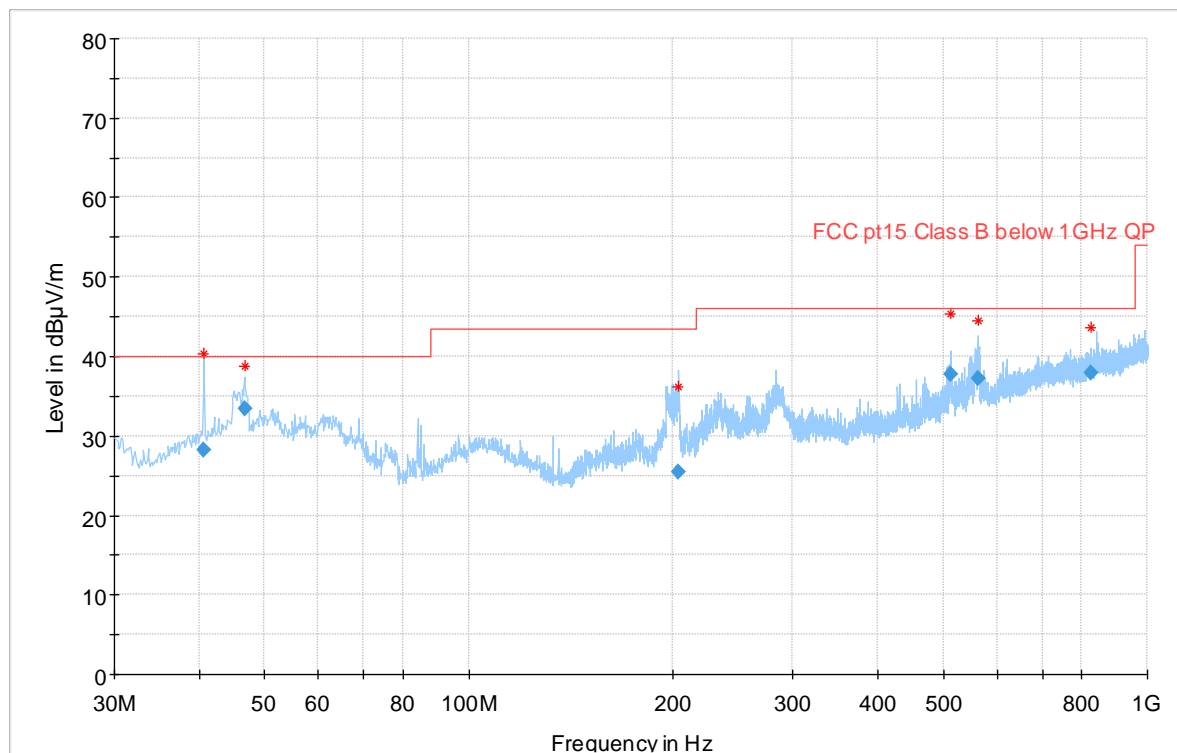
Measurements and take into account the antenna and cable loss factors and are made according to the FCC test standard and Eurofins Hursley test procedure RAD-01.

TEST ENGINEER: Ricahrd Pennell

4.2.2 Profile; RFID Mode

Max hold trace with quasi-peak values (◆)

Peak measurements are shown in red (✱)



4.3 Radiated Emissions 1 to 8 GHz

Radiated emissions pre-scan profile measurements were taken at a distance of three metres on eight azimuths of the EUT in both horizontal and vertical antenna polarities in a semi anechoic chamber for FCC measurements.

Using the pre-scan results as a guide, each emission from the EUT was maximised. Measurements were carried out a distance of three metres in an ANSI C63.4 compliant semi-anechoic chamber. Cable positions were then finally adjusted to produce the maximum emission levels. The worst-case results are recorded below.

4.3.1 Data; RFID Mode

Frequency	Peak	Average	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
2048.548683	38.10	---	74.00	35.90	105.0	H	328.0	-9.0	Pass
2097.021186	38.22	---	74.00	35.78	267.0	H	26.0	-8.9	Pass
2384.433402	---	25.06	54.00	28.94	128.0	H	262.0	-8.3	Pass
2485.678610	38.96	---	74.00	35.04	314.0	H	150.0	-8.1	Pass

The measurements reported take into account the antenna and cable loss factors. The measurements are the highest emissions relative to the:

‘FCC CFR 47 Section 15.209 and 15.249 Limits’ at a measuring distance of three metres.

‘ISED RSS-210 issue 10 Annex B section B10’

Measurements made according to the Eurofins Hursley test procedure RHF-01.

Procedure: In accordance with CISPR 22.

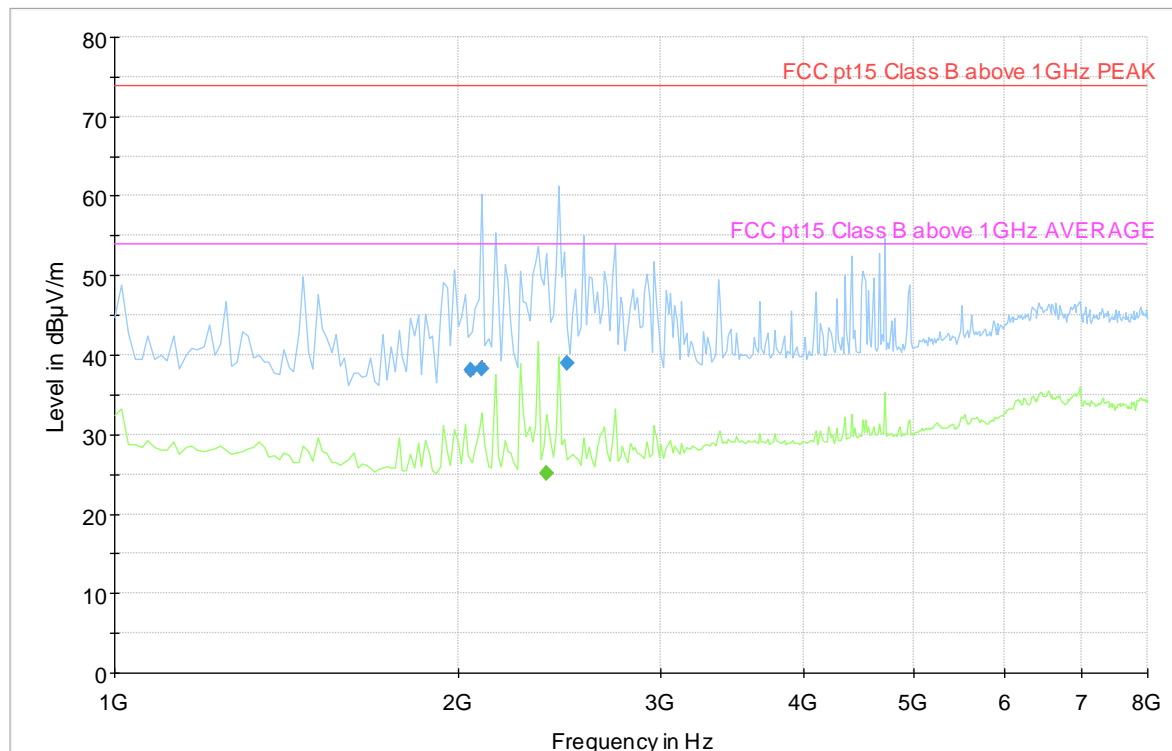
TEST ENGINEER: Richard Pennell

4.3.2 Profile; RFID Mode

Max hold trace with peak values (◆)

Peak measurements are shown in red (✱)

Max hold trace with average values (◆)



4.4 FCC Pt15.225

4.4.1 FCC Pt15.225 e.

The carrier frequency was measured using a near field probe and measuring receiver.

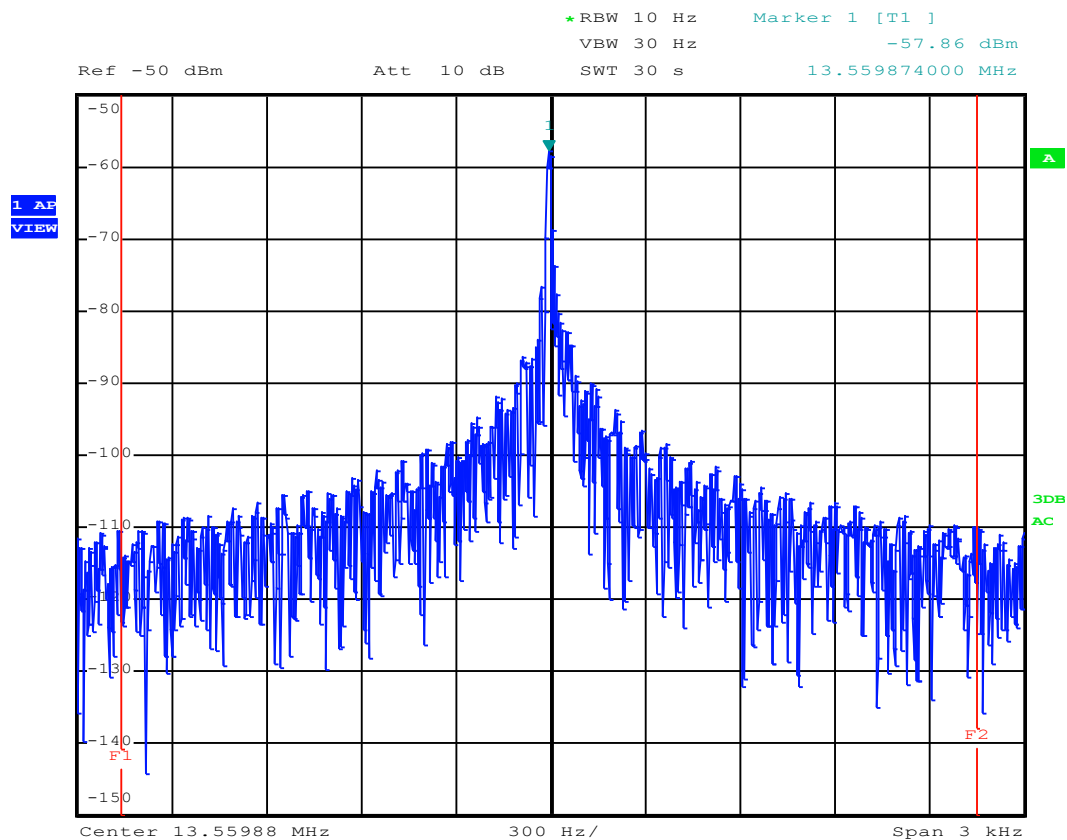
The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C

4.4.1.1 Data; Frequency tolerance +/-0.01%

Temperature 20°C	Frequency (MHz)	Delta (Hz)	Delta %	Limit %	Status Pass / Fail
-20	13.559874	0	0.000575%	0.01%	Pass
-10	13.559898	24	0.000664%	0.01%	Pass
0	13.559904	30	0.000708%	0.01%	Pass
10	13.55991	36	0.000664%	0.01%	Pass
20	13.559874	0	0.000000%	N/A	N/A
30	13.55988	6	-0.000088%	0.01%	Pass
40	13.559868	-6	-0.000177%	0.01%	Pass
50	13.559832	-42	-0.000487%	0.01%	Pass

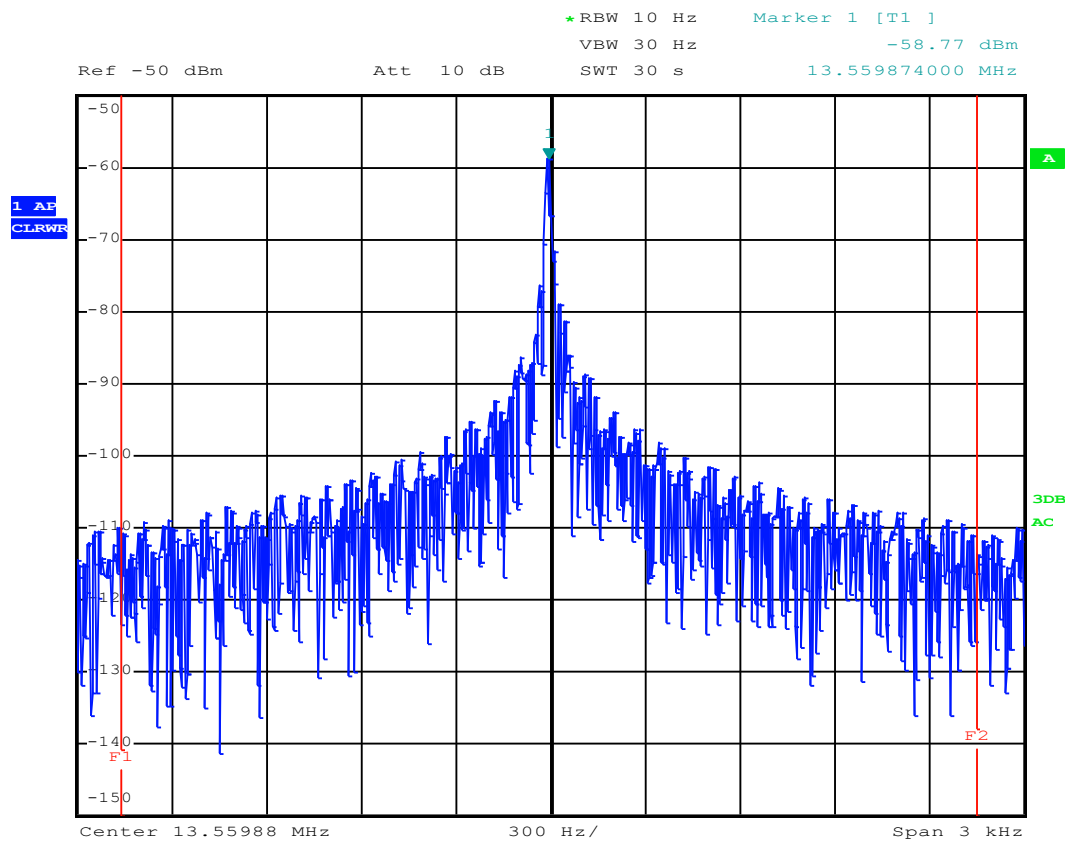
Mains Voltage at 20°C	Frequency (MHz)	Delta (Hz)	Delta %	Limit %	Status Pass / Fail
110v	13.559874	0	0.000000%	N/A	N/A
93.5v (85%)	13.559874	0	0.000000%	0.01%	Pass
126.5v (115%)	13.55988	6	0.000000%	0.01%	Pass

4.4.2 Profile; Nominal temperature and voltage



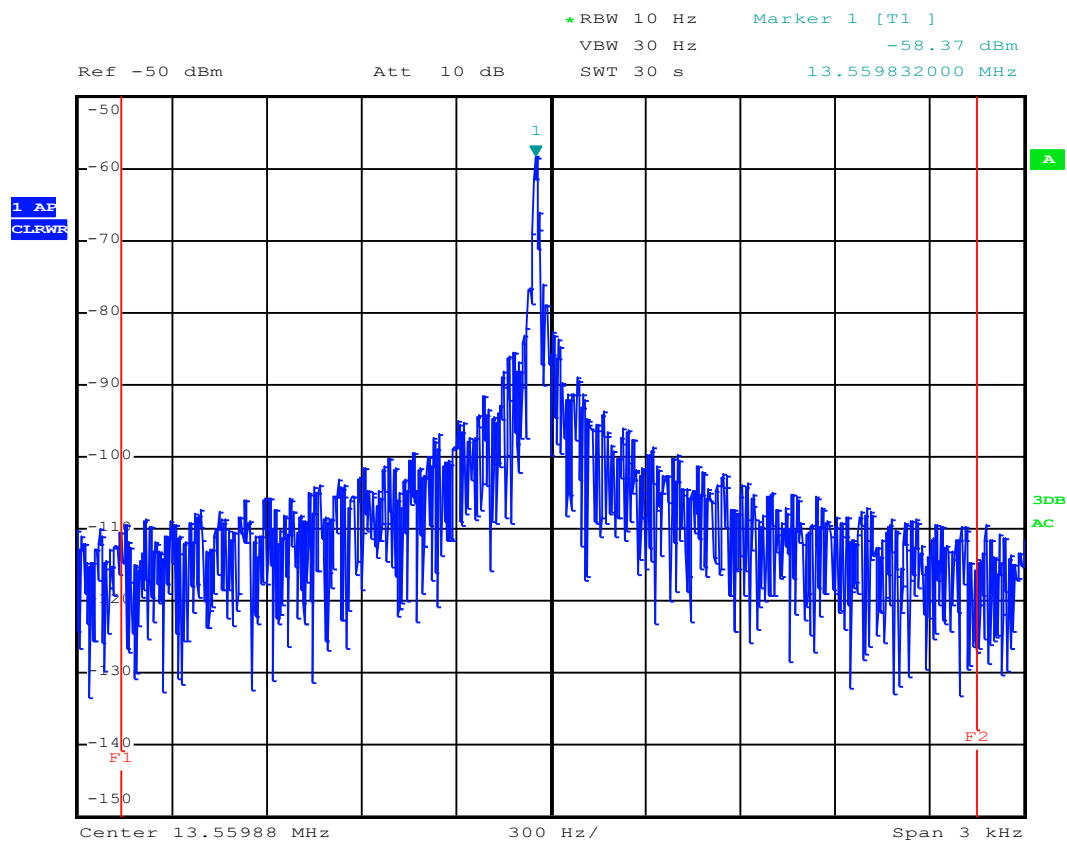
Date: 15.DEC.2020 14:25:41

4.4.3 Profile; -20°C



Date: 15.DEC.2020 15:23:07

4.4.4 Profile; +50°C



Date: 15.DEC.2020 17:01:45

4.5 FCC Pt15.225 a, b, c, d & f. Field strength of emissions 9kHz to 30MHz

Radiated emissions pre-scan profile measurements were taken at a distance of three metres on eight azimuths of the EUT in both horizontal and vertical antenna polarities in a semi anechoic chamber for FCC measurements.

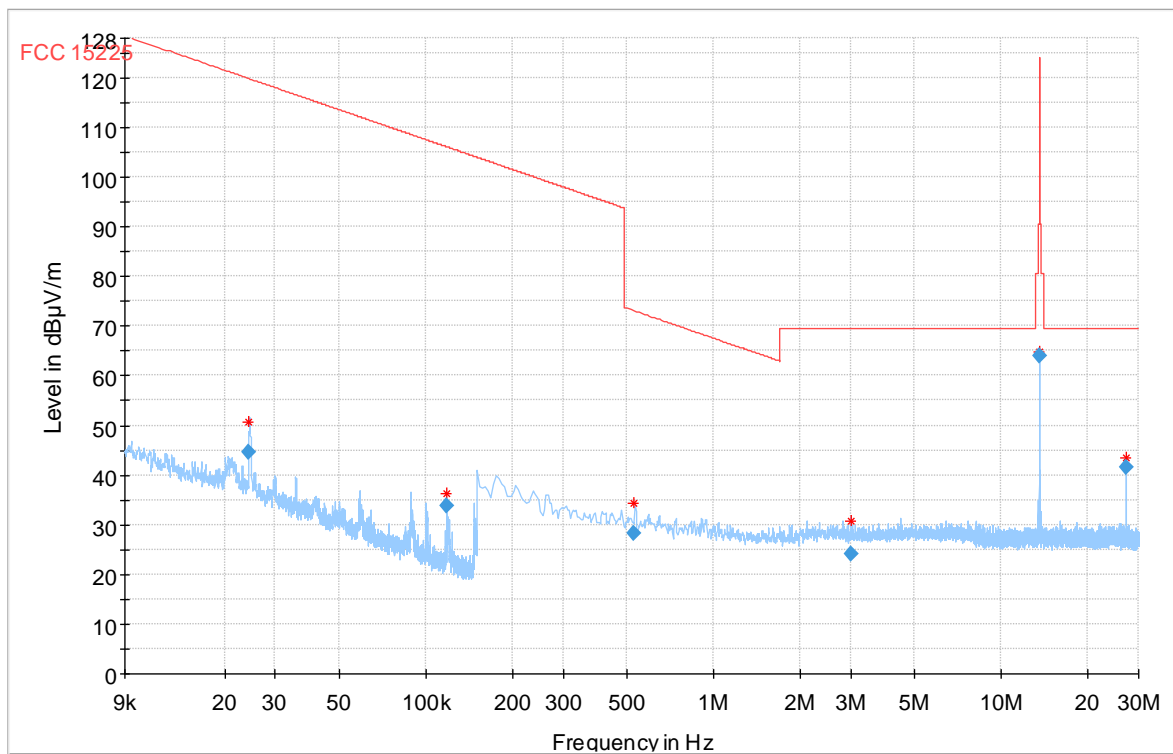
Using the pre-scan results as a guide, each emission from the EUT was maximised. Measurements were carried out a distance of three metres in an ANSI C63.4 compliant semi-anechoic chamber. Cable positions were then finally adjusted to produce the maximum emission levels.

Below 1 GHz a quasi-peak detector was used. Testing was performed with the RFID activated. The worst-case results from all tests are presented here.

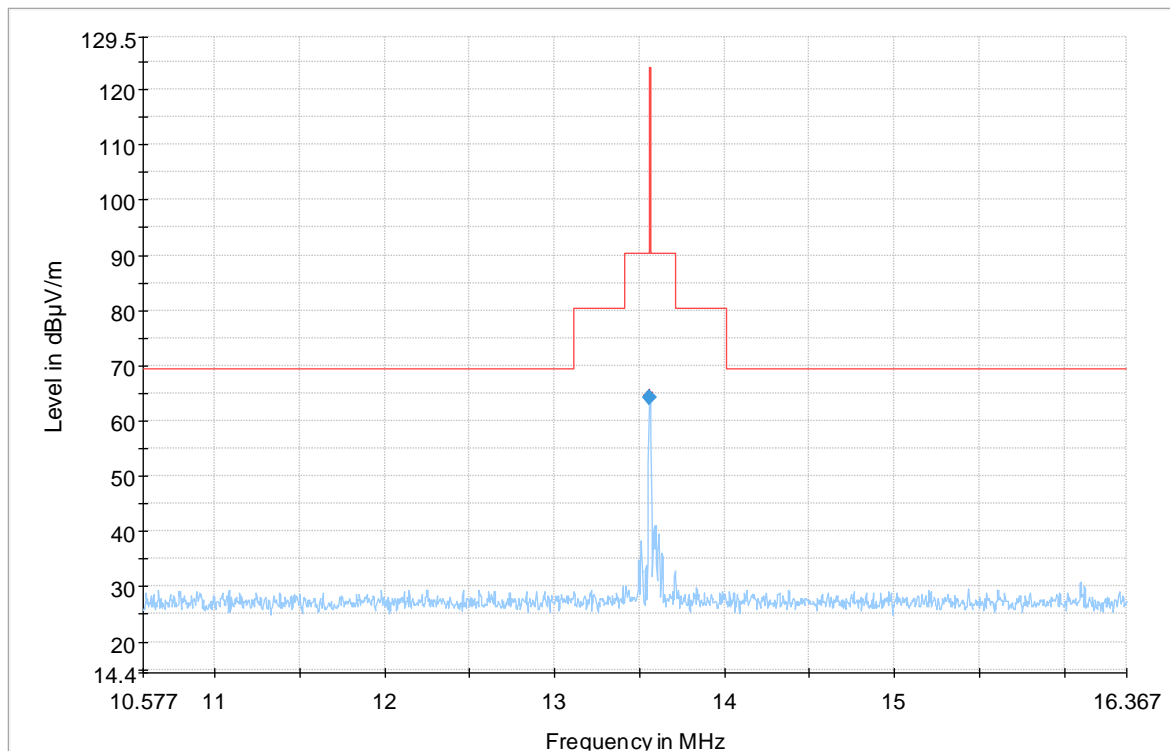
4.5.1 Data, RFID Mode

Frequency	Quasi Peak	Specified Limit	Margin	Height	Antenna orientation	EUT Azimut	Corr	
MHz	dBµV/m	dBµV/m	dB	cm	Deg	Deg	dB/m	Status
0.024359	44.70	119.86	75.16	150.0	H	81.0	21.2	Pass
0.117848	33.90	106.17	72.27	150.0	V	328.0	19.7	Pass
0.531086	28.23	73.10	44.87	150.0	V	119.0	19.5	Pass
2.996847	24.21	69.50	45.29	150.0	V	125.0	19.4	Pass
13.559944	64.11	124.00	59.89	150.0	V	255.0	19.8	Pass
27.120494	41.49	69.50	28.01	150.0	H	197.0	22.8	Pass

4.5.2 Profiles; RFID Mode



4.5.3 Masked Profile; RFID Mode

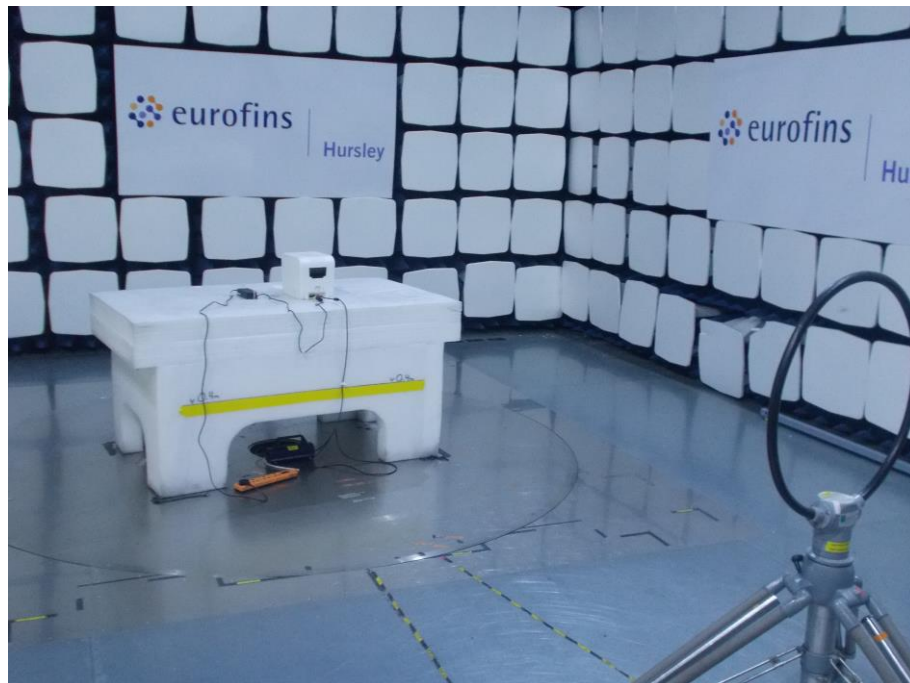


5.0 PHOTO LOG

Emissions:

Radiated emissions

9kHz to 30MHz



30MHz to 1GHz

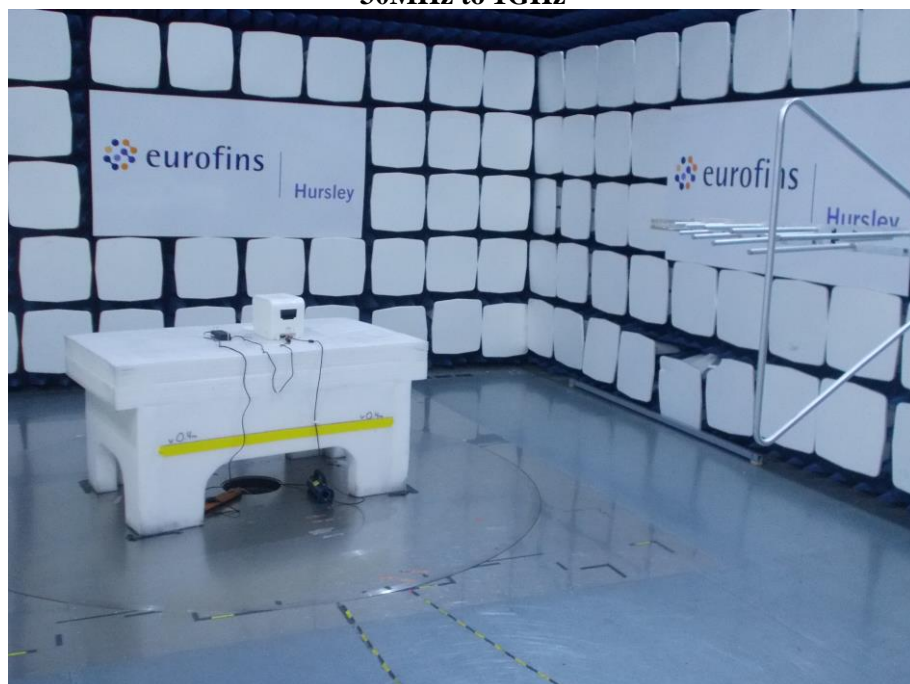


Photo Log (continued)

Radiated emissions 1 to 8GHz

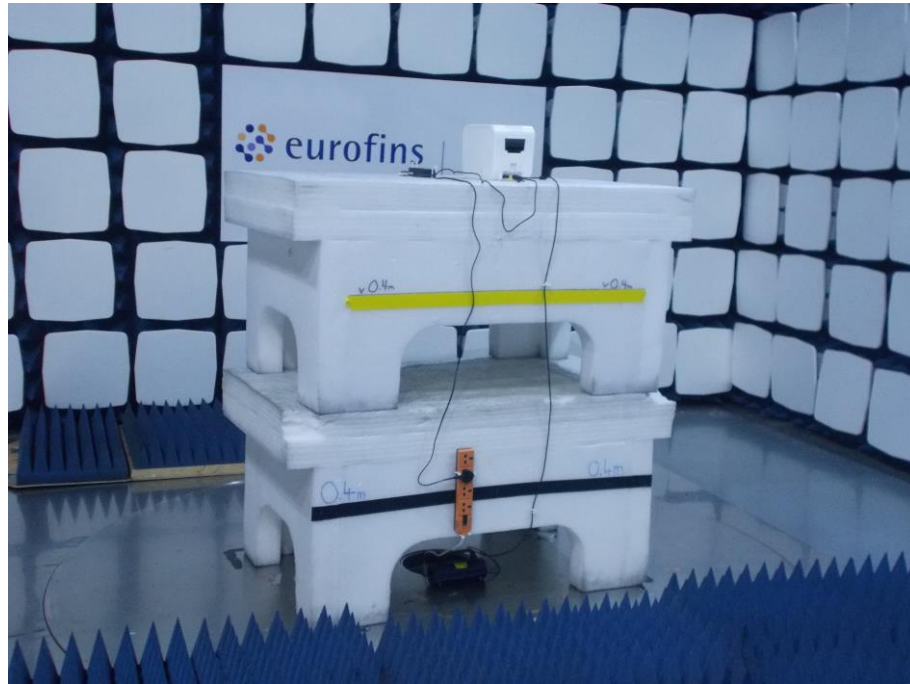
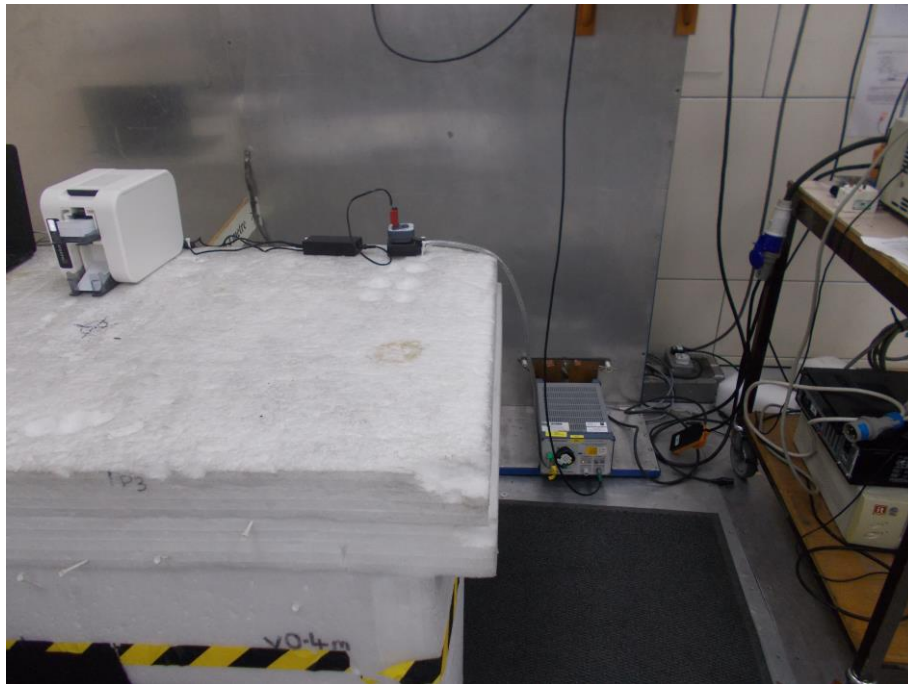


Photo Log (continued)

Conducted Measurements



15.225 temperature extreme Measurements



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