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Project Number: 16E6150-1a

Prepared for:

Access Control Technology Ltd

By

Compliance Engineering Ireland Ltd

Clonross Lane

Derrockstown

Dunshaughlin

Co. Meath

FCC Site Registration: 92592

FCC ID: 2AILRRF1050

Date

23rd Jun 2016

FCC EQUIPMENT AUTHORISATION

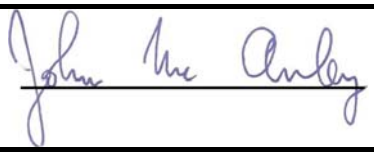
Test Report

EUT Description

RFID Pin and Proximity Reader

Authorised :

John McAuley



TEST SUMMARY

Emissions were assessed to the following standards:

FCC CFR 47 Part 15
Federal Communications Commission: Part 15 Radio Frequency Devices

The equipment complies with the requirements according to the following standards.

FCC Part Section(s)	TEST PARAMETERS	Test Result
15.203	Antenna Requirement	Pass
15.209	Radiated Emissions	Pass
15.207	Conducted Emissions	Pass
	Occupied Bandwidth	Pass

Exhibit A – Technical Report

Table of Contents

1.0 EUT Description

Model:	RF-1050
Type:	RFID pin and proximity reader
FCC ID:	2AILRRF1050
Company:	Access Control Technology Ltd
Contact	Martin McNamara
Address:	Unit C1 South City Business Tallaght Dublin Ireland D24 PN28
Phone:	+353 1 4662570
e-mail:	martin.mcnamara@act.eu
Test Standards:	47 CFR, Part 15.209
Type of radio:	Stand-alone
Transmitter Type:	AM 125KHz
Operating Frequency Range(s):	125KHz
Number of Channels:	125KHz
Antenna:	Integral
Power configuration:	5 v-16v dc
Oper. Temp Range:	-10° C to +50° C
Classification:	DCD
Test Methodology:	Measurements performed according to the procedures in ANSI C63.10-2013

1.1 EUT Operation

Operating Conditions during Test:

The EUT was operated in normal modulated mode for all tests.

In this mode the EUT transmitted with a carrier frequency 125KHz

The 125KHz is transmitted with a period of 118mS with a Ton of 16.5mS within the period.

The equipment under test was operated during the measurement under the following conditions:

The EUT was connected to an ACT Controller ACT 3000 (underneath ground plane) powered from a DC PSU for all Radiated Emissions tests.

The EUT was connected to a 12V dc adapter for conducted Emissions on the mains test.

Cetus International Ltd Model MTP451BX-120 300

Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: +15 to +35 ° C

Humidity: 20-75 %

1.2 Modifications

No modifications were required in order to pass the test specifications.

1.3 Date of Test

The tests were carried out on one sample of the EUT on dates 10th Jun and 21st Jun 2016 .

1.4 Electromagnetic Emissions Testing

The guidelines of CISPR 16-4 were used for all uncertainty calculations, estimates and expressions thereof for EMC testing. A copy of Compliance Engineering Ireland Ltd.'s policy for EMC Measurement Uncertainty is available on request.

RF Requirements: Spurious emissions in accordance with FCC CFR 15.107, 15.109 and 15.209. Tests were carried out to the requirements of CISPR 16-4 and ANSI C63.10-2013.

1.4.1 Measurement Uncertainty

The measurement uncertainty (with a 95% confidence level) for the conducted emissions test was ±3.5 dB.

The measurement uncertainty (with a 95% confidence level) for the radiated emissions test was ±5.3 dB (from 30 to 100 MHz), ±4.7 dB (from 100 to 300 MHz), ±3.9 dB (from 300 to 1000 MHz) and ±3.8 dB (from 1 GHz to 40 GHz).

2.0 Emissions Measurements

2.1 Conducted Emissions Measurements

The EUT host mains adapter was connected to the mains through a LISN and measurements were carried out using a Receiver over the frequency range 150KHz to 30MHz.

2.2 Radiated Emissions Measurements

Radiated Power measurements were made at the Compliance Engineering Ireland Ltd anechoic chamber located in Dunshaughlin, Co. Meath, Ireland to determine the radio noise radiated from the EUT. A "Description of Measurement Facilities" has been submitted to the FCC and approved pursuant to Section 2.948 of CFR 47 of the FCC rules.

The EUT was centred on a motorized turntable, which allows 360 degree rotation. A measurement antenna was positioned at a distance of 3 metres as measured from the closest point of the EUT. The radiated emissions were maximised by configuring the EUT, by rotating the EUT and by raising and lowering the antenna from 1 to 4 meters.

Emissions below 30MHz were measured using a loop antenna. In this case the resolution bandwidth was 200Hz for frequencies below 150KHz and RBW was 9KHz for frequencies above 150KHz.

Emissions between 30MHz and 1GHz were measured using a bi-log antenna. In this case the resolution bandwidth was 100KHz.

Antenna Requirements

According to FCC 47 CFR 15.203:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

* The antennas of this E.U.T are permanently attached.

*The E.U.T Complies with the requirement of 15.203

3.0 Results for Conducted emissions

Ambient Temp 21deg C RH =57.3%

Mains Conducted Emissions results

Detector	Frequency	Reading	Margin	Phase
QP/ Ave	MHz	dBuV	dB	L/N
Quasi-Peak	0.1523	42.83	-23.11	Live
Quasi-Peak	0.5078	31.51	-24.49	Live
Quasi-Peak	19.6575	34.60	-25.4	Live
Quasi-Peak	20.4090	35.48	-24.52	Live
Quasi-Peak	23.165	33.53	-26.47	Live
Quasi-Peak	26.921	36.66	-23.34	Live
Quasi-Peak	27.670	36.58	-23.42	Live
Quasi-Peak	28.421	35.07	-24.93	Live
Quasi-Peak	29.173	33.64	-26.36	Live
Quasi-Peak	29.927	33.96	-26.04	Live

Detector	Frequency	Reading	Margin	Phase
QP/ Ave	MHz	dBuV	dB	L/N
Quasi-Peak	0.1545	42.87	-23	Neutral
Quasi-Peak	0.5145	32.21	-23.79	Neutral
Quasi-Peak	18.4088	35.77	-24.23	Neutral
Quasi-Peak	18.6608	35.56	-24.44	Neutral
Quasi-Peak	18.9105	35.99	-24.01	Neutral
Quasi-Peak	21.9165	36.61	-23.39	Neutral
Quasi-Peak	26.9250	37.27	-22.73	Neutral
Quasi-Peak	28.4280	36.36	-23.64	Neutral
Quasi-Peak	29.1773	35.23	-24.77	Neutral
Quasi-Peak	29.4293	34.77	-25.23	Neutral

Ref Appendix 2 for scans

Result: Pass

4.0 Results for Radiated emissions

Ambient Temp 21.2deg C RH =57.6%

4.1 Carrier Power

4.1.1 Carrier Power 125 kHz

Limit as per 15.209

Frequency	Level	Antenna Factor	Cable Loss	Final Field Strength Peak	Detector	Limit	Margin	Pass / Fail
MHz	dBuV	dB	dB	dBuV/m		dBuV/m	dB	P/F
0.125	79.01	9.55	0.1	88.66	Peak	105.67	17.01	Pass

Note as the pulse rate (1/period) is less than 20Hz , a peak detector measurement as per 15.35a is used

4.3 Duty Cycle

4.3.1 Duty Cycle for 125KHz transmitter

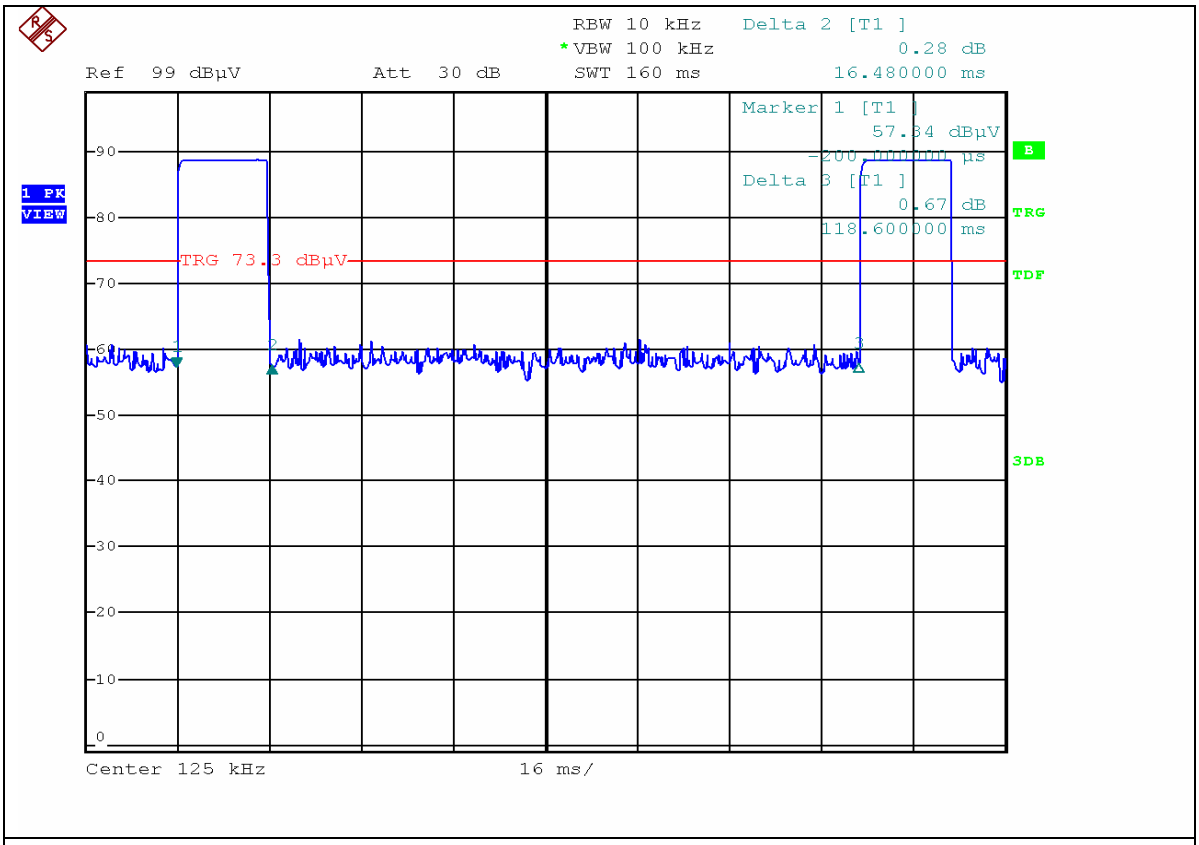


Fig 3 Duty Cycle 125KHz

Pulse repetition rate = 1/ 118mS =8Hz

.4 Spurious Emissions Measurements 9kHz -30MHz

Ambient Temp 21.2deg C RH =57.6%

4.4.1 Spurious Emissions

Frequency	Level	Antenna Factor	Cable Loss	Final Field Strength	Detector	Spurious Emission Limit	Margin	Pass / Fail
MHz	dBuV	dB	dB	dBuV/m		dBuV/m	dB	P/F
0.2018	36.15	9.45	0.1	45.7	Average	101.51	55.81	Pass
0.252	61.51	9.49	0.1	71	Average	99.58	28.58	Pass
0.387	27.25	9.45	0.1	36.7	Average	95.85	59.15	Pass
18.661	4.75	8.35	0.1	13.1	Quasi Peak	69.54	56.44	Pass

* background due to local radio transmitter at 252 KHz

4.5 Measurements with Bilog Antenna (30MHz to 1GHz)

Frequency MHz	Quasi Peak Level dBuV/m	Antenna Polarity	Antenna Factor dB	Cable loss dB	Final Field Strength Quasi Peak dBuV/m	Quasi Peak Limit dBuV/m	Margin dB
39.96	-5.5	Vertical	14.2	0.2	8.9	40.0	31.1
44.988	-2.1	Vertical	12.1	0.2	10.2	40.0	29.8
60.68	14.7	Vertical	5.9	0.2	20.8	40.0	19.2
71.36	10.1	Vertical	6.3	0.2	16.6	40.0	23.4
361.64	-3.7	Vertical	14.1	1.2	11.6	46.0	34.4
438.44	-4.5	Vertical	16.1	1.2	12.8	46.0	33.2
545.24	-5.6	Vertical	18.8	1.2	14.4	46.0	31.6
60.12	28.3	Horizontal	5.9	0.2	34.4	40.0	5.6
63.376	30	Horizontal	5.9	0.2	36.1	40.0	3.9
128.124	14.9	Horizontal	12.1	0.2	27.2	43.5	16.3
140.872	16.2	Horizontal	12	0.2	28.4	43.5	15.1
233.872	15.9	Horizontal	9.8	0.2	25.9	46.0	20.1
335.996	8.7	Horizontal	13.8	1.2	23.7	46.02	22.32
384.248	4.5	Horizontal	14.6	1.2	20.3	46.02	25.72
403.496	4.3	Horizontal	15.6	1.2	21.1	46.02	24.92
514.7	-5.9	Horizontal	17.5	1.2	12.8	46.02	33.22
623.732	9	Horizontal	19.6	1.2	29.8	46.02	16.22

Appendix 2 shows the results of the scans in the anechoic chamber.

Result: Pass

4.7 99% Occupied Bandwidth

4.7.1 99% Occupied Bandwidth 125KHz

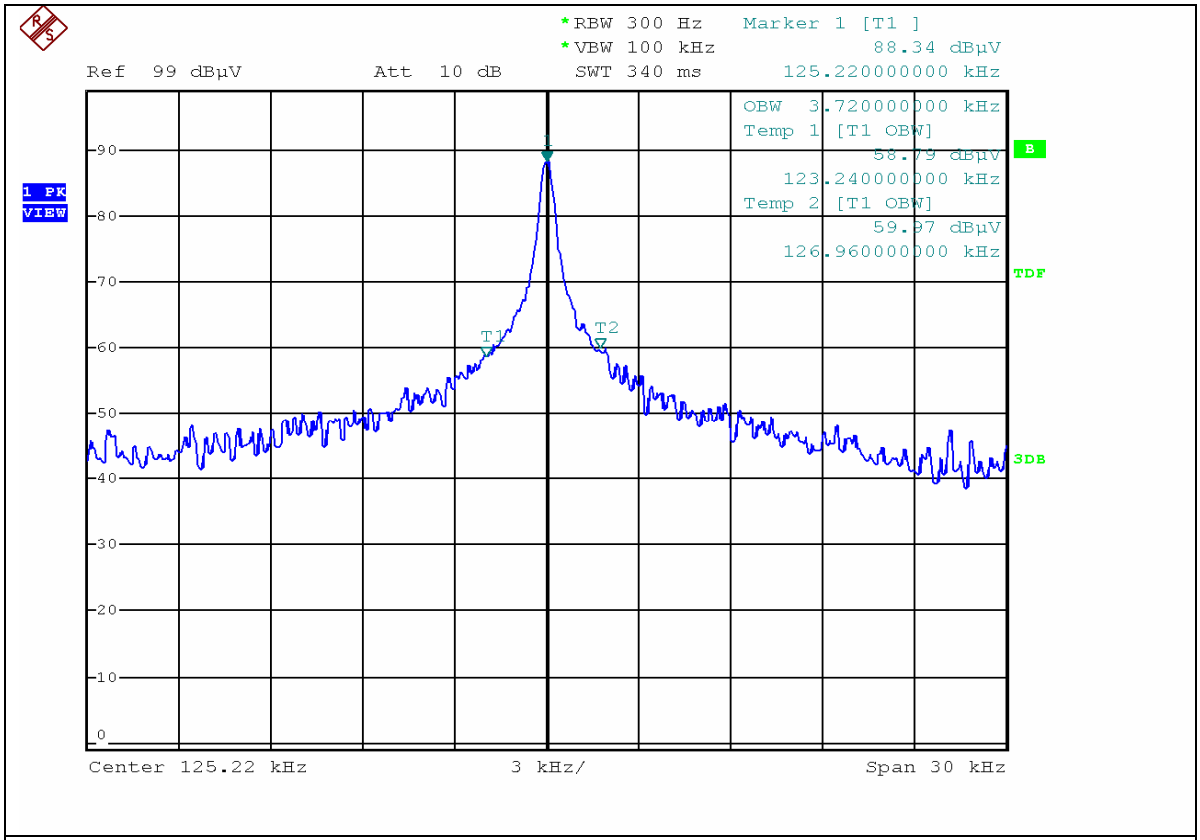


Fig 6 Occupied Bandwidth 125KHz

125KHz Occupied Bandwidth = 4.86 KHz

Appendix 1

List of Test Equipment

Instrument	Manufacturer	Model	Serial Num	CEI Ref	Cal Due Date	Cal Interval Months
Spectrum Analyser 30Hz-40GHz	Rohde& Schwarz	FSP40	100053	850	09/11/2018	36
Test Receiver 3.6GHz	Rohde& Schwarz	ESR	1316.3003k03-101625-s	869	06/06/2017	36
Anechoic Chamber	CEI	SAR 10M	845	845	23/09/2016	36
Antenna Trilog	Schwarzbeck	VULB 9160	9160-3361	889	29/07/2016	24
LISN	Rohde& Schwarz	ESH3-Z5	825460/003	604	21/01/2019	36
Loop Antenna	EMCO	6502	9609-3099	821	27/08/2016	36
Barometric Pressure Humidity & Temp Datalogger	Extech	SD700	Q752722	181	11/09/2016	24

Appendix 2:

Test Results

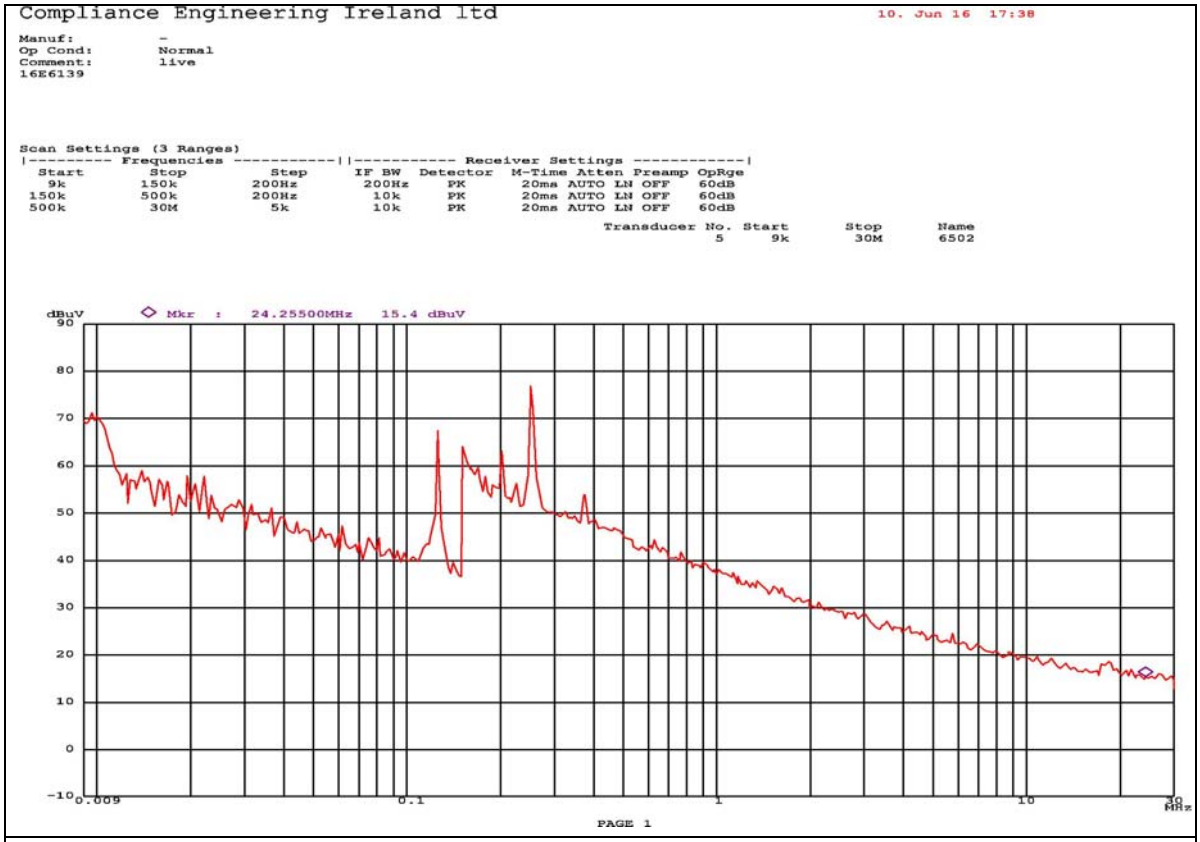


Fig 1 Radiated Emissions 9 KHz -30MHz 3metres Anechoic Chamber

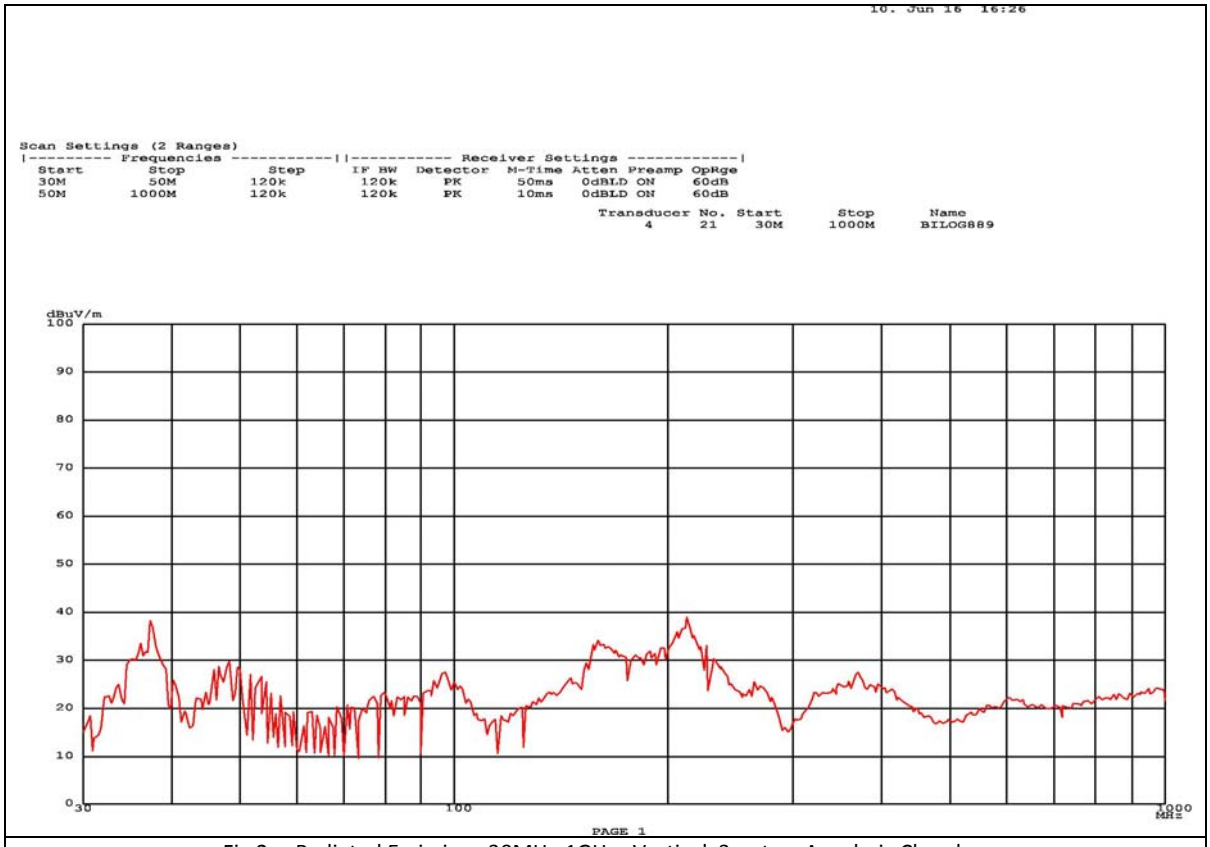


Fig 2 Radiated Emissions 30MHz-1GHz Vertical 3metres Anechoic Chamber

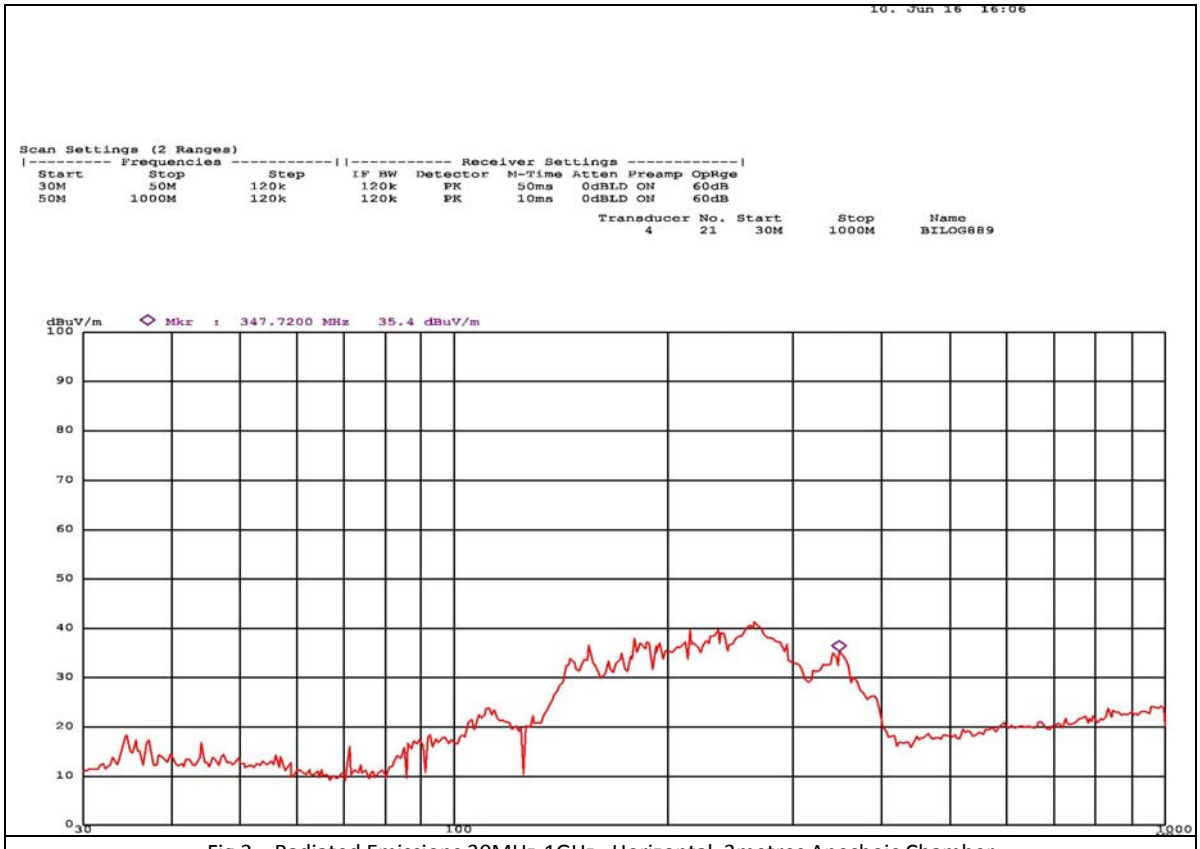


Fig 3 Radiated Emissions 30MHz-1GHz Horizontal 3metres Anechoic Chamber

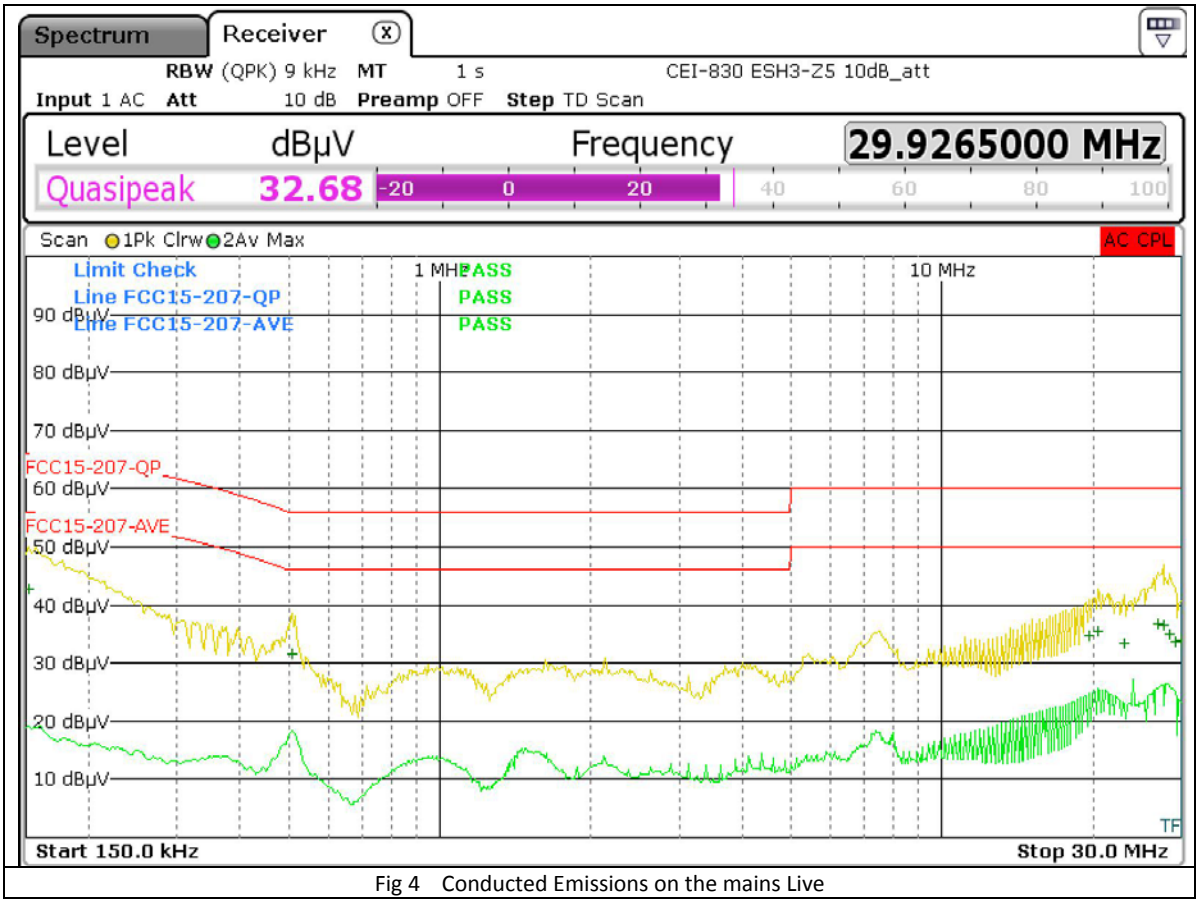


Fig 4 Conducted Emissions on the mains Live

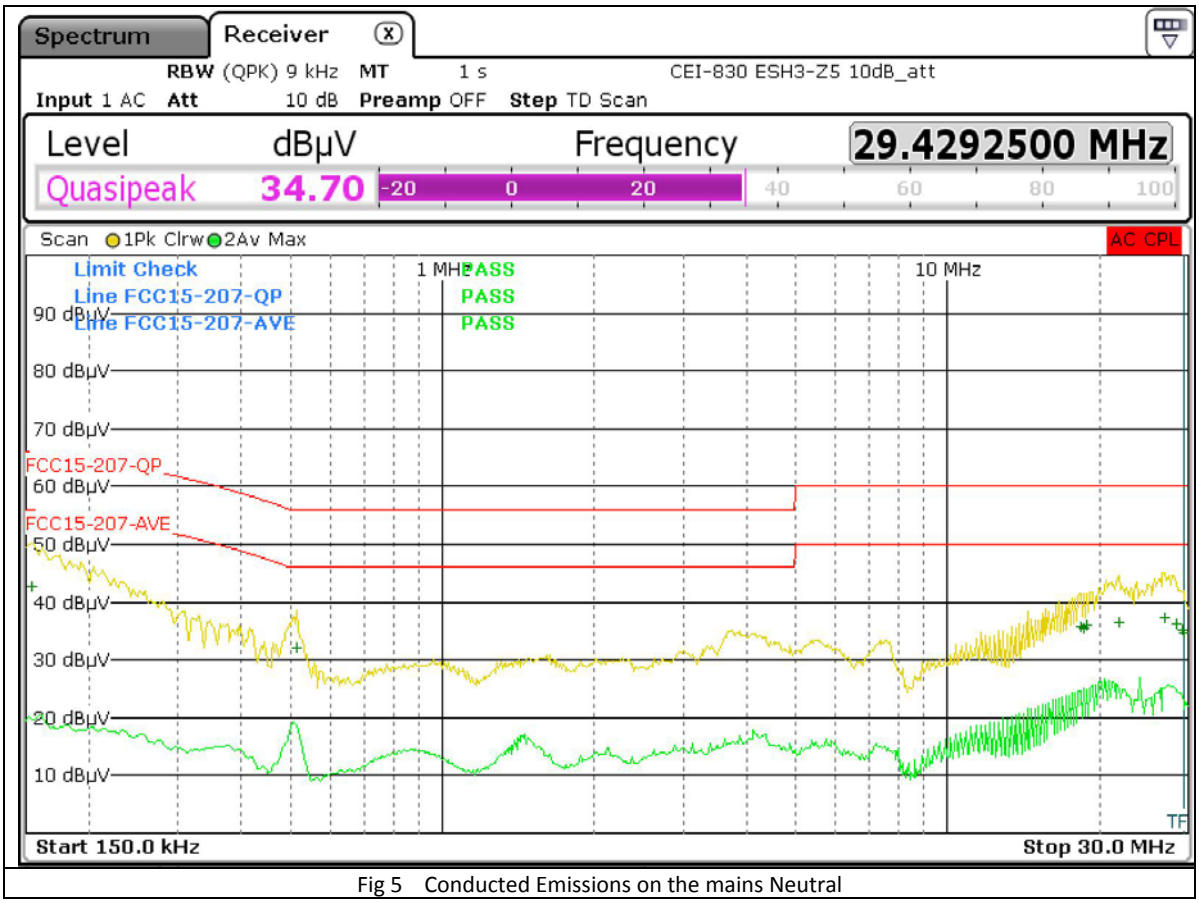


Fig 5 Conducted Emissions on the mains Neutral

End of Report