A RADIO TEST REPORT

FOR

GN NETCOM A/S

ON

JABRA PRO 9470 BASE STATION

DOCUMENT NO. TRA-028647-01-47-00A

Element Wireless Test Report: TRA-028647-01-47-00A

Applicant	**:** GN NETCOM A/S
Apparatus	**:** JABRA PRO 9740 BASE STATION
Specification(s)	**:** CFR47 Part 15D
Purpose of Test	**:** Certification
FCCID	**:** BCE-9400BSA
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Issue Date	**:**13th January 2016
Authorised Copy Number	**:** *PDF*

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Section 1: Introduction

1.1 General

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on samples submitted to the Laboratory.

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1.2 Tests Requested By

This testing in this report was requested by :

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1.3 Manufacturer

As Above

1.4 Apparatus Assessed

The following apparatus was assessed between 16th November – 24th December 2015

Jabra Pro 9470 Base Station

The System is made up of two parts, a fixed part and a portable part. The portable part is a cordless headset device. The portable part is capable of operating on a maximum of 60 channels (time / spectrum windows). The fixed part is a desktop transmitter connected to a communication device (telephone / PC).

The system operates in the 1920MHz – 1930MHz band. The system uses 5 different frequency channels 1.728 MHz apart using MC/TDMA/TDD (Multi Carrier / Time Division Multiple Access / Time Division Duplex) using QPSK modulation.

The system employs a 10ms frame, divided into 24 equal time slots numbered 0-23. The base station always transits in the first half of the frame and the portable part always transmits on the duplex mate in the second half of the frame. A physical bearer is composed of a transmit time slot and a receive time slot. The two halves of a given bearer are always exactly half a frame (5ms, 12 slots) apart.

1.5 Test Result Summary

Full details of test results are contained within Appendix A. The following table summarises the results of the assessment.

The statements relating to compliance with the standards below apply ONLY as qualified in the notes and deviations stated in sections 1.6 to 1.7 of this test report.

Full details of test results are contained within Appendix A. The table overleaf summarises the results of the assessment.

Abbreviations used in the overleaf table:

CFR	: Code of Federal Regulations	ANSI	: American National Standards Institution
RSS	: Radio Standards Specification	PLCE	: Power Line Conducted Emissions

TEST/EXAMINATION	Part 15	RSS-213	Result
Cross reference to Subpart B	15.309 (b)	N/A	-
Labelling Requirements	15.311 15.19 (a)(3)	RSP-100 3	-
Measurement Procedures	15.313	3.1	-
Antenna Requirement	15.317 15.203	RSS-GEN 6.7	-
Modulation Techniques	15.319 (b)	5.1	-
Conducted AC Powerline	15.315 15.207	4.2	Pass
Emission Bandwidth	15.323 (a)	5.5	Pass
Peak Transmit Power	15.319 (c)	5.6	Pass
Power Spectral Density	15.319 (d)	5.7	Pass
Antenna Gain	15.319 (e)	5.6	Pass
Automatic Discontinuation of Transmission	15.319 (f)	5.2	Pass
Radio Frequency Radiation Exposure	15.319 (i)	RSS-102	Pass
Monitoring Thresholds	15.323 (c)(2) 15.323 (c)(9)	5.2 (2) 5.2 (9)	Pass
Monitoring of Intended Transmit Window and Maximum Reaction Time	15.323 (c)(1)	5.2 (1)	Pass
Monitoring Bandwidth	15.323 (c)(7)	5.2 (7)	Pass
Access Criteria Functional Test	15.323 (c)(6)	5.2 (6)	Pass
Duration of Transmission	15.323 (c)(3)	5.2 (3)	Pass
Connection Acknowledgement	15.323 (c)(4)	5.2 (4)	Pass
Lower threshold Selected Channel, Power Accuracy, Segment Occupancy	15.323 (c)(5)	5.2 (5)	Pass
Monitoring Antenna	15.323 (c)(8)	5.2 (8)	Pass
Duplex Connections	15.323 (c)(10)	5.2 (10)	Pass
Alternative Monitoring Interval for Co-located Devices	15.323 (c)(11)	5.2 (11)	N/A Note 5
Fair Access to Spectrum Related to (c)(10) & (c)(11)	15.323 (c)(12)	5.2 (12)	Pass
Emission Inside and Outside the Sub-band	15.323 (d)	5.8	Pass
Frame Period	15.323 (e)	5.2 (13)	Pass
Frequency Stability	15.323 (f)	5.2 (13)	Pass

Note:
1. The EUT utilises LIC and implements at least 20 channels.
2. The portable part is battery powered only
3. The EUT utilises control and signalling information
4. Not utilised by this EUT as devices will not be collocated within 1m of each other.
5. The EUT does not use the provisions of 15.323(c)(11) or 5.2 (11)

1.6 Notes Relating To The Assessment

With regard to this assessment, the following points should be noted:

The results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

The apparatus was set up and exercised using the configurations, modes of operation and arrangements defined in this report only.

Particular operating modes, apparatus monitoring methods and performance criteria required by the standards tested to have been performed except where identified in Section 1.7 of this test report (Deviations from Test Standards).

For emissions testing, throughout this test report, “Pass” indicates that the results for the sample as tested were below the specified limit (refer also to Section 2, Measurement Uncertainty).

Where relevant, the apparatus was only assessed using the monitoring methods and susceptibility criteria defined in this report.

All testing with the exception of testing at the Open Area Test Site was performed under the following environmental conditions:

Temperature	: 17 to 23 °C
Humidity	: 45 to 75 %
Barometric Pressure	: 86 to 106 kPa

All dates used in this report are in the format dd/mm/yy.

This assessment has been performed in accordance with the requirements of ISO/IEC 17025.

1.7 Deviations from Test Standards

There were no deviations from the standards tested to.

Section 2: Measurement Uncertainty

2.1 Measurement Uncertainty Values

For the test data recorded the following measurement uncertainty was calculated:

Section 3: Modifications

3.1 Modifications Performed During Assessment

No modifications were performed during the assessment

Section 4 **General Test Procedures**

4.1 Radiated Test Setup and Procedures

Radiated electromagnetic emissions from the EUT are checked first by preview scans. Preview scans for all spectrum and modulation characteristics are checked, using a peak detector and where applicable worst case determined for function, operation, orientation etc for both vertical and horizontal polarisations

If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in ANSI C63.10 are followed. Alternatively, a layout closest to normal use (as declared by the provider) is employed, (see EUT setup photographs for more detail).

For devices with intentional emissions below 30 MHz, a shielded loop antenna is used as the test antenna. It is placed at a 1 meter receive height and appropriate low frequency magnetic field extrapolation to the regulatory limit distance is employed. The EUT is rotated through 360˚in the azimuth.

Emissions between 30 MHz and 1 GHz are measured using calibrated broadband antennas. Emissions above 1 GHz are characterized using standard gain horn antennas. Pre-amplifiers and filters are used where required. Care is taken to ensure that test receiver resolution bandwidth, video bandwidth and detector type(s) meet the regulatory requirements.

For both horizontal and vertical polarizations, the EUT is then rotated through 360˚ in azimuth until the highest emission is detected. At the previously determined azimuth the test antenna is raised and lowered from 1 to 4 m in height until a maximum emission level is detected, this maximum value is recorded.

Where regulations allow for direct measurement of field strength, power values measured on the test receiver / analyzer are converted to dBuV/m at the regulatory distance, using:

$$FS = PR + AF + CL - PA + KG + DC - CF \text{ (dBuV/m)}$$

Where:

PR is the power recorded on receiver / spectrum analyzer (dBuV),
AF is the test antenna factor in dB/m,
CL is the cable loss in dB,
PA is the pre-amplifier gain dB (when applicable),
DC is duty correction factor (when applicable) in dB, and
CF is a distance correction (employed only for measurements at alternate distance to limit) in dB.

This field strength value is then compared with the regulatory limit.

If effective radiated power (ERP) or effective isotropic radiated power (EIRP) is required, it is computed as per ANSI C63.10

$$P = \frac{(Ed)^2}{30G}$$

Where

P is the power, in W
E is the measured peak field strength, in V/m
d is the distance at which the measurement was made, in m
G is the numeric gain of the radiating element

If the gain of the radiating element is not known, then either the effective radiated power (ERP) or the effective isotropic radiated power (EIRP) may be calculated from the measured peak field strength, by using either G = 1.64 or G = 1, respectively.

4.2 AC Powerline Conducted Emissions Test Setup and Procedures

AC Powerline Conducted Emissions from the EUT are checked first by preview scans with Peak and average detectors covering both live and neutral lines. A spectrum analyser is used to determine if any periodic emissions are present. Preview scans are performed in standby or receive mode if the device is subject to these requirements. For transmit mode of operation the device is set to one of the following modes.

- Transmitting operating at full power (single mode device)
- Transmitting at freq / modulation that gives highest output power (multi mode device)
- Transmitter operating in normal TX mode (e.g. FHSS, TDMA etc)

Formal measurements using the correct detector(s) and bandwidth are made on frequencies identified from the preview scans.

Battery Power devices are not subject to power line conducted emissions measurements when it is powered solely by its internal battery.

4.3 Antenna Port Conducted Emissions

Antenna port conducted emissions can include, but are not limited to, Carrier power, Power Spectral Density, Occupied bandwidth and spurious emission.

Spurious Emissions from the EUT are checked first by preview scans. Preview scans for all spectrum and modulation characteristics are checked to identify frequencies to perform formal measurements on.

Formal measurements are made on frequencies identified from the preview scans and fundamental emission(s). Measurements are made using the correct instrumentation (inc. power meter, receiver, spectrum analyser) that operate with the required detector(s) and bandwidth.

Care is taken to ensure the measurement instrument is not overloaded by the presence of the transmitted signal by use of external attenuation and filtering where required.

Measured levels are corrected for cables, attenuators, and filters. If applicable, for the specific measurement, antenna gain is also taken into account.

4.4 Power Supply Variation

Tests at extreme supply voltages are made if required by the procedures specified in the test standard, and results of this testing are detailed in this report.

In the case the EUT is designed for operation from a lead-acid battery power source, the extreme test voltages are evaluated between 90% and 130% of the nominal battery voltage declared by the manufacturer.

For float charge applications using gel-cell type batteries, extreme test voltages are evaluated between 85% and 115% of the nominal battery voltage declared.

For all battery operated equipment, worst case intentional and spurious emissions are re-checked employing a new (fully charged) battery.

4.5 Thermal Variation

Tests at extreme temperatures are made if required by the procedures specified in the test standard, and results of this testing are detailed in this report.

Tests are performed at the upper and lower extremes as required and typically at 10˚ steps between.

Before any temperature measurements are made, the equipment is allowed to reach a thermal balance in the test chamber.

4.6 Time Domain Measurements

Time domain measurements are made for (but not limited to) use in duty cycle correction, to ensure compliance with time restrictions on certain types of devices.

If measurements of a transmitter's on time are required these are performed with a spectrum analyser in the time domain or with an oscilloscope and RF detector. If time on a specific frequency is required (e.g. FHSS timing) the measurement can only be made with a spectrum analyser.

The triggering, timescale and amplitude settings are adjusted according to the signal to be measured on a case by case basis.

For devices with sharp rise/fall times measurements are made between RF reaching full power (T_{on}) and RF dropping to the measurement instrument noise floor (T_{off}). For longer rise times measurements are made for T_{on} and T_{off} at the RF level required by the occupied bandwidth measurement (e.g. 6 dB, 20 dB etc).

Appendix A: Formal Emission Test Results

Abbreviations used in the tables in this appendix:

Spec	: Specification
Mod	: Modification
EUT	: Equipment Under Test
SE	: Support Equipment
L	: Live Power Line
N	: Neutral Power Line
E	: Earth Power Line
Pk	: Peak Detector
QP	: Quasi-Peak Detector
Av	: Average Detector
CDN	: Coupling & decoupling network

ALSR	: Absorber Lined Screened Room
OATS	: Open Area Test Site
ATS	: Alternative Test Site
Ref	: Reference
Freq	: Frequency
MD	: Measurement Distance
SD	: Spec Distance
Pol	: Polarisation
H	: Horizontal Polarisation
V	: Vertical Polarisation

A1 Cross Reference To Subpart B

CFR 47 Part 15.309(b)

The unit contains digital circuitry, which is not directly related to the radio transmitter. See emissions outside the sub-band for results.

A2 Labelling Information

CFR 47 Part 15.311 & 15.19(a)(3) & RSS-RSP100 3

This information is contained in a separate document. See attached exhibit.

A3 Antenna Requirements

CFR 47 Part 15.317 & 15.203 & RSS-213 – 3.1

The unit employs an integral antenna arrangement.

A4 Modulation Techniques

CFR 47 Part 15.139(b) & RSS-213 – 5.1

The GN NETCOM A/S JABRA PRO 9740 BASE STATION is an isochronous device operating in the 1920 MHz – 1930 MHz frequency band.

The GN NETCOM A/S JABRA PRO 9740 BASE STATION modulation technique is based on DECT technology as described in European standards EN 300 175-2 and EN 300 175-3.

The GN NETCOM A/S JABRA PRO 9740 BASE STATION modulation techniques are MC/TDMA/TDD (Multi Carrier / Time Division Multiple Access / Time Division Duplex) using QPSK modulation.

A5 Radio Frequency Radiation Exposure

CFR 47 Part 15.319(i) & RSS-102

This information is contained is a separate document

A6 Transmitter Emission Bandwidth

Test Details:	
Regulation	CFR 47 Part 15.323(a) & RSS-213 – 5.5
Measurement standard	ANSI C63.17 sub-clause 6.1.3
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Test Details: f_l = 1921.536 MHz				
Δ P (dBc)	fl (MHz)	fh (MHz)	Δf (MHz)	Limit
-26	1920.863100	1922.172800	1.310	50kHz> Δf > 2.5MHz
-12	1921.203100	1921.818200	0.615	N/A
-6	1921.217600	1921.811000	0.593	N/A

Test Details: f_c = 1924.992 MHz				
Δ P (dBc)	fl (MHz)	fh (MHz)	Δf (MHz)	Limit
-26	1924.326300	1925.628800	1.303	50kHz> Δf > 2.5MHz
-12	1924.666400	1925.281400	0.615	N/A
-6	1924.680900	1925.274200	0.593	N/A

Test Details: f_h = 1928.448 MHz				
Δ P (dBc)	fl (MHz)	fh (MHz)	Δf (MHz)	Limit
-26	1927.775100	1929.084800	1.310	50kHz> Δf > 2.5MHz
-12	1928.107900	1928.737400	0.630	N/A
-6	1928.129600	1928.723000	0.593	N/A

A7 Peak Transmit Power

Test Details:	
Regulation	CFR 47 Part 15.319(c) & RSS-213 – 5.6
Measurement standard	ANSI C63.17 sub-clause 6.1.2
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Frequency (MHz)	Peak Transmit Power (dBm)		Limit (dBm)
	Antenna 0	Antenna 1	
1921.536	18.58	18.66	20.59
1924.992	18.52	18.41	20.59
1928.448	18.50	18.42	20.59

Note:
1. Permanent antenna was replaced with temporary antenna connector to enable conducted measurement.
2. Antenna gain < 3dBi and so correction of the limit is not required.
3. See Annex E for Peak Transmit Power Plots.
4. Transmit path for Antenna) and Antenna 1 are declared as Identical,.
5. Conducted testing performed on Antenna with highest output power.

Limit

The limit for Peak Transmit Power (PTP) is calculated using the following formula:

$$PTP = 5 \log_{10} EBW - 10 \text{ dBm}$$

This limit must be corrected to take into account any gain of the antenna greater than 3dBi.
Where: EBW is the transmitter emission bandwidth in Hz as determined in the previous test.

$$EBW = 1.3097 \text{ MHz}$$

$$PTP = 5 \log_{10} 1.3097\text{MHz} - 10 \text{ dBm}$$

$$PTP = 20.59\text{dBm}$$

A8 Power Spectral Density

Test Details:	
Regulation	CFR 47 Part 15.319(d) & RSS-213 – 5.7
Measurement standard	ANSI C63.17 sub-clause 6.1.2
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Frequency (MHz)	Power Spectral Density (mW/3kHz)	Limit (mW/3kHz)
1921.536	2.29	3
1924.992	2.29	3
1928.448	2.13	3

Note:
1. Permanent antenna was replaced with temporary antenna connector to enable conducted measurement.
2. Antenna gain < 3dBi and so correction of the limit is not required.
3. See Annex E for Power Spectral Density plots.

Limit

The power spectral density shall not exceed 3mW in any 3 kHz bandwidth as measured with a spectrum analyser having a resolution bandwidth of 3 kHz.

A9 Antenna Gain

CFR 47 Part 15.319(e) & RSS-213 – 5.6

Any directional gain of the antenna exceeding 3dBi has an effect on the limit applied to the measurements taken for the peak transmit power test. If the directional gain of the antenna is less than 3dBi it is not required to be taken into account.

Maximum Antenna Gain	Exceeds 3dBi by
+ 2 dBi	N/A

Statement by manufacturer declaring maximum antenna gain.

A10 Automatic Discontinuation of Transmissions

Test Details:	
Regulation	CFR 47 Part 15.319(f) & RSS-213 – 5.2
Measurement standard	ANSI C63.17 sub-clause 6.1.2
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Automatic discontinuation of transmission means break off of transmissions that are not control and signalling information.

The JABRA PRO 9740 BASE STATION is a Portable part and as such does not transmit control and signalling information the counter part device is a fixed part device and does transmit control and signalling information.

Part	Transmits Control and Signalling Information	Equipment Under Test
Fixed Part	X	X
Portable Part		

Results

The following tests were performed after a connection had been established with the counter part device

Number	Test	Reaction of EUT	Pass / Fail
1	Power Removed From EUT	A	Pass
2	Power Removed from Companion Device	B	Pass
3	Companion device powered down	B	Pass
4	Companion device Mounted on EUT	B	Pass

A – Connection breakdown, Cease of all transmissions.
B – Connection breakdown, EUT transmits control and signalling information.
C – Connection breakdown, Counterpart transmits control and signalling information.

A11 Monitoring Thresholds

Test Details:	
Regulation	CFR 47 Part 15.323(c)(2) & (c)(9) & RSS-213 – 5.2 (2)(9)
Measurement standard - Calculation	ANSI C63.17 sub-clause 7.2.1
Calculations	As laid out in ANSI C63.17 sub-clauses 4.3.3 and 4.3.4
Measurement standard	ANSI C63.17 sub-clause 7.3
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Calculation of monitoring threshold limits for isochronous devices:

$$T_L = -174 + 10\text{Log}_{10}B + M_U + P_{MAX} - P_{EUT} \text{ (dBm)}$$

$$T_U = -174 + 10\text{Log}_{10}B + M_U + P_{MAX} - P_{EUT} \text{ (dBm)}$$

Where:
B = Emission bandwidth (Hz)
M_L = dBs the threshold may exceed thermal noise (30 for T_L & 50 for T_U)
P_{MAX} = Output Power Limit (dBm)
P_{EUT} = Transmitted power (dBm)

Monitor Threshold	B (MHz)	M_L (dB)	P_{MAX} (dBm)	P_{EUT} (dBm)	Threshold (dBm)
T_L	1.3097	30	20.59	18.58	-80.82
T_U	1.3097	50	20.59	18.58	-60.82

Note: 1. Threshold levels rounded up/down to nearest whole number

The threshold level was determined following the procedure as laid out in ANSI C63.17 sub-clause 7.3.2 (a) Frequency administration was used to allow operation on the carrier closest to the centre of the band.

Measured Threshold Level
-65.82

This result is recorded for information only.

A12 Monitoring of Intended Transmit Window & Maximum Reaction Time

Test Details:	
Regulation	CFR 47 Part 15.323(c)(1) & RSS-213 – 5.2(1)
Measurement standard	ANSI C63.17 sub-clause 7.5
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

The EUT was frequency administered to two operating frequencies designated f1 and f2. The interference generator set to f1 fed pulses from the function generator to produce a pulsed carrier of the specified time length and the output of the interference generator was set to the required RF level. Additionally a CW signal was set to f2 at the prescribed level to the receiver input of the EUT. The pulse generator and companion device were synchronized so the position of the pulses corresponded to the time-slot pattern in the frame of the EUT. The test is performed with the unit frequency administered to operate only on middle frequency.

For each of the required tests the pulse width and interference level are as below:

Test c)

The interference generator output on f1 has an output level set at $T_L + U_m$ and the width of the pulse interference exceeds the largest of 50µs and $50\sqrt{1.25/B}$ µs. The CW signal on f2 is set to T_L. Verify that the EUT establishes a connection only on f2.

Test d)

The interference generator output on f1 has an output level set at $T_L + U_m + 6$ and the width of the pulse interference exceeds the largest of 35µs and $35\sqrt{1.25/B}$ µs. The CW signal on f2 is set to T_L. Verify that the EUT establishes a connection only on f2.

Where B = Emission bandwidth of the EUT in MHz

Results

Single Slot Configuration

Test Equation (µs)	Pulse Width (µs)	f1 Interferer Level (dBm)	f2 Interferer Level (dBm)	Connection Made	Pass/Fail
$50\sqrt{1.25/B}$	50 µs	$T_L + U_m$	T_L	f2	Pass
$35\sqrt{1.25/B}$	35 µs	$T_L + U_m + 6$	T_L	f2	Pass

Notes:
1. T_L is the calculated threshold (see A11).
2. U_M is Margin of uncertainty in threshold measurements (6dB).

A13 Monitoring Bandwidth & Antenna

Monitoring Bandwidth – CFR 47 Part 15.323(c)(7) & RSS-213 – 5.2(7)

The monitoring bandwidth test was carried out in accordance with ANSI C63.17 sub-clause 7.4.

ANSI C63.17 sub-clause 7.4 states that if the monitoring is made through the radio receiver used by the EUT for communication the intended bandwidth requirements for the monitoring system are met.

As declared by the manufacturer the EUT uses the radio receiver used for communication for monitoring therefore the intended bandwidth requirements for the monitoring system are met of ANSI C63.17 sub-clause 7.4 are met.

Monitoring Antenna – CFR 47 Part 15.323(c)(8) & RSS-213 – 5.2(8)

The antenna of the EUT used for transmitting is the same antenna that is used for monitoring.

A14 Power Accuracy

CFR 47 Part 15.323(c)(5) & RSS-213 – 5.2(5)

The power measurement resolution for the previous comparison must be accurate to within 6dB.

The monitoring threshold test covered in Part 15.323 (c)(2) automatically proves that this requirement is met.

A15 Segment Occupancy

CFR 47 Part 15.323(c)(5) & RSS-213 – 5.2(5)

This section is not applicable as no units will be located within 1 metre of each other.

A16 Access Criteria Test Interval

Test Details:	
Regulation	CFR 47 Part 15.323(c)(1) & RSS-213 – 5.2(1)
Measurement standard	ANSI C63.17 sub-clause 8.1.1
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

These tests are only applied to a EUT capable of transmitting control and signalling information.

The EUT was frequency administered to only one operating frequency. The interference generator was fed pulses from the function generator to produce a pulsed carrier of the specified time length and the output of the interference generator was set to the required level. The pulse generator and EUT were synchronized so the position of the pulses corresponded to the time-slot pattern in the frame of the EUT. The tests were performed to find the following:

Test b)
The interference generator was setup to introduce interference on all but one time slot (single slot). The free slot was set to coincide with slot *2*. The transmissions if any should occur on the free time slot. Verify that the access criteria are checked not less frequently than every 30 seconds

Results

Test	Test Data Required	Test Result	Limit	Pass/Fail
Access Criteria Selection of Channel	Any transmissions and on which time slot	Transmission Occurred On Time Slot 2	Transmit on Time Slot 2	Pass
Repetition of Access Criteria (note 1)	Interval Between Access Criteria	29.948	<30 Seconds	Pass
		29.692		
		28.667		
		28.923		
		28.794		

Note: 1. The interval between access criteria test is checked 5 times.
2. See Annex G for plots of the access criteria test interval.

A17 Access Criteria Functional Test

Test Details:	
Regulation	CFR 47 Part 15.323(c)(6) & RSS-213 – 5.2(6)
Measurement standard	ANSI C63.17 sub-clause 8.1.2 / 8.1.3
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

ANSI C63.17 sub-clause 8.1.2

These tests are only applied to a EUT capable of transmitting control and signalling information. ANSI C63.17 sub-clause 8.1.3 is not applicable the random waiting interval option is not implemented.

The EUT was frequency administered to two operating frequencies. The interference generator was set to the required level. The tests were performed to find the following:

f1 = 1926.720 MHz
f2 = 1923.264 MHz

Test b)
With no interference on, the EUT must transmit on f1 or f2. The interference is then applied to the channel used by the EUT at the appropriate level. Verify that after the application of interference the EUT transmits on the open channel after the next pause.

Results

Test	Before interference EUT transmits on	After interference on f2 EUT transmits on	Limit	Pass/Fail
8.1.2 Test b	f2	f1	Change channel after application of interference	Pass

Notes: 1. Random Waiting Interval option not implemented.

A18 Duration Of Transmission

Test Details:	
Regulation	CFR 47 Part 15.323(c)(3) & RSS-213 – 5.2(3)
Measurement standard	ANSI C63.17 sub-clause 8.2.2
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

The Duration of transmission testing was carried out in accordance with ANS C63.17 Sub-clause 8.2.2

The time /spectrum window occupied by the connection was monitored using a spectrum analyser.
The spectrum analyser was set trigger when the RF for the communications channel was present. It was set to a 1 hour sweep period, counters and markers were used to determine the duration of transmission.

Result

Repetition of Access Criteria	Maximum Transmission Time (H:M:S)	Maximum Transmission Time Limit	Pass/Fail
Period	3:15:52	<8 Hours	Pass

Note: 1. The portable part is the initiating device that repeats the access criteria

A19 Connection Acknowledgement

Test Details:	
Regulation	CFR 47 Part 15.323(c)(4) & RSS-213 – 5.2(4)
Measurement standard	ANSI C63.17 sub-clause 8.2.1
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

The test was carried out in two parts. The first was to verify that with the companion device off the EUT does not transmit a communications channel on the same time/spectrum window for more than the limit. The second was to verify that after connection is established the EUT terminates its transmission on the current communication channel within 30 seconds or less of the acknowledgements being blocked.

Result

Test	Time Taken (seconds)	Limit (seconds)	Pass/Fail
Transmission on communications channel no acknowledgement received (note 1)	N/A note 2	1	Pass
Established communication channel termination, acknowledgements blocked during communication	5.022 seconds	30	Pass

Note:
1. This requirements is only applicable to EUTs than can initiate the communications channel
2. The portable part is the initiating device
3. The EUT does not transmit a control channel.
4. See Appendix B for Acknowledgement plots.

A20 Least Interfered Channel (LIC) Procedure

Test Details:	
Regulation	CFR 47 Part 15.323(c)(5) & RSS-213 -5.2(5)
Measurement standard	ANSI C63.17 sub-clause 7.3.3
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

The EUT utilizes more than 20 channels; therefore the least interfered channel testing is applicable.

The EUT was frequency administered to operating on two frequencies only, f1 and f2.

f1 = 1923.264 MHz
f2 = 1926.720 MHz

Test b)
Interference on f1 was set at $T_L + U_M$ + 7dB and at $T_L + U_M$ on f2. Initiate communication. The EUT should transmit on f2. Repeat 5 times. If the EUT transmits on f1 the test is failed.

Test c)
Interference on f1 was set at $T_L + U_M$ and at $T_L + U_M$ + 7dB on f2. Initiate communication. The EUT should transmit on f1. Repeat 5 times. If the EUT transmits on f2 the test is failed.

Test d)
Interference on f1 was set at $T_L + U_M$ + 1dB and at $T_L + U_M$ - 6dB on f2. Initiate communication. The EUT should transmit on f2. Repeat 5 times. If the EUT transmits on f1 the test is failed.

Test e)
Interference on f1 was set at $T_L + U_M$ - 6dB and at $T_L + U_M$ + 7dB on f2. Initiate communication. The EUT should transmit on f1. Repeat 5 times. If the EUT transmits on f2 the test is failed.

Result

Test	Transmit on f1	Transmit on f2	Wanted Transmit Channel	Pass/Fail
b	No	Yes	f2	Pass
c	Yes	No	f1	Pass
d	No	Yes	f2	Pass
e	Yes	No	f1	Pass

Note: 1. All tests were repeated 5 times.

A21 Selected Channel Confirmation

Test Details:	
Regulation	CFR 47 Part 15.323(c)(1) & (c)(5) & RSS-213 – 5.2(5)
Measurement standard	ANSI C63.17 sub-clause 7.3.4
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

The test is to ensure the EUT monitors the time/spectrum window immediately prior to transmission.

The EUT was frequency administered to operating on two frequencies only, f1 and f2.

f1 = 1923.264 MHz
f2 = 1926.720 MHz

Test a)
Interference is applied on f1 at a level of $T_U + U_M$. Verify a connection is established on f2.

Any connection is terminated.

Test b)
Interference is applied on f2 at a level of $T_U + U_M$ and immediately removed from f1 and the EUT is immediately caused to attempt transmission. In this case the EUT should transmit on f1

The test is applied in both single and long slot configurations.

Result

Test	Transmit on f1	Transmit on f2	Wanted Transmit Channel	Pass/Fail
a	No	Yes	f2	Pass
b	Yes	No	f1	Pass

Note: 1. Results in the above table are applicable for both single and long slot configurations.

A22 Duplex Connections

Test Details:	
Regulation	CFR 47 Part 15.323(c)(10) & RSS-213 – 5.2(10)
Measurement standard	ANSI C63.17 sub-clause 8.3.2
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Before all tests are carried out any connection is terminated.

Test b)
The system is restricted to operation on one frequency (1924.992 MHz) using administration. Verify that a connection between the EUT and its companion device can be made.

Test c) & d)
Apply interference at a level $T_L + U_M$ to all transmit time slots except one which has interference at least 10dB below T_L. Apply interference at a level $T_L + U_M + 7dB$ to all receive time slots except one which has interference at least 10dB below T_L. The interference free receive timeslot should not be the duplex mate of the interference free transmit timeslot. The EUT should establish a connection on the interference free receive slot and its duplex mate.

Test e) & f)
Apply interference at a level $T_L + U_M$ to all receive time slots except one which has interference at least 10dB below T_L. Apply interference at a level $T_L + U_M + 7dB$ to all transmit time slots except one which has interference at least 10dB below T_L. The interference free transmit timeslot should not be the duplex mate of the interference free receive timeslot. The EUT should establish a connection on the interference free transmit slot and its duplex mate.

Result

Test	Interference Free Receive Slot	Interference Free Transmit Slot	Requirement	Connection Made	Time Slot Selected	Pass/Fail
b	All	All	Connection Established	Yes	Any	Pass
c & d	7	18	Interference Free RX Slot	Yes	7	Pass
e & f	7	18	Interference Free TX Slot	Yes	18	Pass

This requirement applies to the initiating device, the PP is the initiating device results are recorded based on the PP time slot allocation and are for information only.
Slots number 0-23 (PP RX slots 0-11, TX slots 12-23)

A23 Alternative Monitoring Interval For Co-Located Devices

Test Details:	
Regulation	CFR 47 Part 15.323(c)(11) & RSS-213 – 5.2(11)
Measurement standard	ANSI C63.17 sub-clause 8.4.
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Manufacturer declares this provision is not utilised by the EUT.

A24 Fair Access To Spectrum

CFR 47 Part 15.323(c)(12) & RSS-213 – 5.2(12)

The provisions of (10) & (11) shall not be used to extend the range of spectrum occupied over space or time for the purposes of denying fair access to the spectrum to other devices.

The manufacturer declares that this device does not work in a mode, which denies fair access to the spectrum to others.

(10) Relates to part 15.323(c)(10) and 5.2(10)
(11) Relates to part 15.323(c)(11) and 5.2(11)

A25 Emissions Inside and Outside the Sub-Band - Conducted

Test Details:	
Regulation	CFR 47 Part 15.323(d) & RSS-213 – 5.8
Measurement standard	ANSI C63.17 sub-clause 6.1.6.
EUT sample number	S06, S15
Modification state	0
SE in test environment	S26, S08, S26
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Lowest Carrier Defined by the EUT					
Out-of-Band Emissions from UPCS bandedge	**FREQ. (MHz)**	**MEAS. Rx. (dBm)**	**CABLE & ATTEN. LOSS (dB)**	**EMISSION LEVEL (dBm)**	**LIMIT (dBm)**
> - 2.5MHz	Note 9				
- 1.25 MHz – 2.5 MHz	1918.73333	-73.82	23	-50.82	-29.5
- 1.25 MHz	1919.94490	-66.94	23	-43.94	-9.5
+ 1.25 MHz	1930.77390	-81.88	23	-58.88	-9.5
+ 1.25 MHz – 2.5 MHz	931.89280	-76.77	23	-53.77	-29.5
> + 2.5MHz	Note 9				

Highest Carrier Defined by the EUT					
Out-of-Band Emissions from UPCS bandedge	**FREQ. (MHz)**	**MEAS. Rx. (dBm)**	**CABLE & ATTEN. LOSS (dB)**	**EMISSION LEVEL (dBm)**	**LIMIT (dBm)**
> - 2.5MHz	Note 9				
- 1.25 MHz – 2.5 MHz	1918.62900	-79.59	23	-56.59	-29.5
- 1.25 MHz	1919.28986	-82.25	23	-59.25	-9.5
+ 1.25 MHz	1930.59400	-62.55	23	-39.55	-9.5
+ 1.25 MHz – 2.5 MHz	1931.2957	-76.25	23	-53.25	-29.5
> + 2.5MHz	Note 9				

Limits	**Out-of-Band Emissions From UPCS bandedge**	**Attenuation (dB) required below Reference power of 112mW**
	± 1.25MHz	30
	±1.25 MHz – 2.5 MHz	50
	> ±2.5MHz	60
	In band Emissions from centre of emission bandwidth	**Attenuation (dB) required below permitted peak power for the EUT**
	1B – 2B	30
	2B – 3B	50
	3B – UPCS band edge	60

Notes:
1 EUT fitted with temporary antenna connector.
2 New / Fully Charged batteries used for battery powered products.
3 See Appendix B for out of band emissions compliance plots, offsets <2.5 MHz
4 See Appendix B for in band emissions compliance plots.
5 Resolution bandwidth approximately 1% of emissions bandwidth.
6 Video bandwidth 3 x Resolution bandwidth.
7 Receiver detector = Peak detector, Max Hold Enabled.
8 Only emissions within 20 dB of the limit are recorded.
9 EUT utilises integral antenna, radiated emission at offset >2.5MHz

Test Method:
1 The EUT was connected to a spectrum analyser via suitable attenuation or filter.
2 The Spectrum analyser was tuned to upper and lower offsets in turn.
3 Any emissions found were measured with the required analyser settings.

A26 Emissions Inside and Outside the Sub-Band - Radiated

Test Details:	
Regulation	CFR 47 Part 15.323(d) & RSS-213 – 5.8
Measurement standard	ANSI C63.17 sub-clause 6.1.6.
EUT sample number	S06
Modification state	0
SE in test environment	S26, S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Antenna 0 - Lowest Carrier Defined by the EUT									
Detector	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Pk	3857.37	62.26	4.10	32.10	35.70	62.76	0.00	1374.04	5012
Av	3857.37	36.97	4.10	32.10	35.70	37.47	0.00	74.73	500
Pk	5786.39	54.07	5.60	34.60	36.17	58.10	0.00	803.53	5012
Av	5786.39	33.54	5.60	34.60	36.17	37.57	0.00	75.60	500
Pk	7715.34	53.21	5.80	36.90	36.70	59.21	0.00	913.06	5012
Av	7715.34	33.96	5.80	36.90	36.70	39.96	0.00	99.54	500
Pk	9640.48	50.86	6.50	37.90	37.02	58.24	0.00	816.58	5012
Av	9640.48	34.43	6.50	37.90	37.02	41.81	0.00	123.17	500
Pk	13501.60	50.16	7.70	40.60	34.56	63.90	0.00	1566.75	5012
Av	13501.60	33.24	7.70	40.60	34.56	46.98	0.00	223.36	500
Pk	19284.48	49.54	10.50	37.30	34.74	62.60	-9.54	449.65	5012
Av	19284.48	33.49	10.50	37.30	34.74	46.55	-9.54	70.86	500

Antenna 1 - Lowest Carrier Defined by the EUT									
Detector	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Pk	3857.37	59.75	4.10	32.10	35.70	60.25	0.00	1029.20	5012
Av	3857.37	36.38	4.10	32.10	35.70	36.88	0.00	69.82	500
Pk	5786.39	54.57	5.60	34.60	36.17	58.60	0.00	851.14	5012
Av	5786.39	33.51	5.60	34.60	36.17	37.54	0.00	75.34	500
Pk	7712.41	52.38	5.80	36.90	36.70	58.38	0.00	829.85	5012
Av	7712.41	34.23	5.80	36.90	36.70	40.23	0.00	102.68	500
Pk	9640.48	48.24	6.50	37.90	37.02	55.62	0.00	603.95	5012
Av	9640.48	34.08	6.50	37.90	37.02	41.46	0.00	118.30	500
Pk	13501.60	47.41	7.70	40.60	34.56	61.15	0.00	1141.56	5012
Av	13501.60	32.99	7.70	40.60	34.56	46.73	0.00	217.02	500

Antenna 0 - Highest Carrier Defined by the EUT									
Detector	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Pk	3842.30	61.33	4.10	32.10	35.72	61.81	0.00	1231.69	5012
Av	3842.30	36.62	4.10	32.10	35.72	37.10	0.00	71.61	500
Pk	5764.42	53.76	5.70	34.60	36.16	57.90	0.00	785.24	5012
Av	5764.42	33.76	5.70	34.60	36.16	37.90	0.00	78.52	500
Pk	7687.50	53.84	5.80	36.90	36.70	59.84	0.00	981.75	5012
Av	7687.50	34.05	5.80	36.90	36.70	40.05	0.00	100.58	500
Pk	13453.30	48.23	7.90	40.50	34.60	62.03	0.00	1263.28	5012
Av	13453.30	32.80	7.90	40.50	34.60	46.60	0.00	213.80	500
Pk	19281.44	51.04	10.50	37.30	34.73	64.11	-9.54	535.03	5012
Av	19281.44	33.85	10.50	37.30	34.73	46.92	-9.54	73.94	500

Antenna 1 - Highest Carrier Defined by the EUT									
Detector	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Pk	3842.38	61.08	4.10	32.10	35.72	61.56	0.00	1196.74	5012
Av	3842.38	36.75	4.10	32.10	35.72	37.23	0.00	72.69	500
Pk	5763.61	55.34	5.70	34.60	36.16	59.48	0.00	941.89	5012
Av	5763.61	33.74	5.70	34.60	36.16	37.88	0.00	78.34	500
Pk	7686.17	51.84	5.80	36.90	36.70	57.84	0.00	779.83	5012
Av	7686.17	33.62	5.80	36.90	36.70	39.62	0.00	95.72	500
Pk	13447.11	46.90	7.90	40.50	34.61	60.69	0.00	1082.68	5012
Av	13447.11	32.72	7.90	40.50	34.61	46.51	0.00	211.59	500

Notes:

1 Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.10: section 4.5, Table 1 For emissions below 30MHz the cable losses are assumed to be negligible.
2 As required for above 1 GHz, emissions measured using a peak detector shall not exceed a level 20 dB above the average limit.
3 Testing was performed with the EUT orientated in three orthogonal planes and the maximum emissions level recorded. In addition, the EUT antenna was varied within its range of motion in order to maximise emissions.
4 For Frequencies below 1 GHz, RBW= 120 kHz, testing was performed with CISPR16 compliant test receiver with QP detector. Above 1 GHz tests were performed using a spectrum analyser using the following settings:

Peak	RBW=VBW= 1MHz
Average	RBW=VBW= 1MHz

Radiated emission limits for all emissions:

Frequency of emission (MHz)	Field strength μV/m	Measurement Distance m	Field strength dBμV/m
0.009-0.490	2400/F(kHz)	300	67.6/F (kHz)
0.490-1.705	24000/F(kHz)	30	87.6/F (kHz
1.705-30	30	30	29.5
30-88	100	3	40.0
88-216	150	3	43.5
216-960	200	3	46.0
Above 960	500	3	54.0

(a) Where results have been measured at one distance, and a signal level displayed at another, the results have been extrapolated using the following formula:

$$\text{Extrapolation}\,(\text{dB}) = 20\log_{10}\left(\frac{\text{measurement distance}}{\text{specification distance}}\right)$$

(b) The levels may have been rounded for display purposes.

(c) The following table summarises the effect of the EUT operating mode, internal configuration and arrangement of cables / samples on the measured emission levels :

	See (i)	See (ii)	See (iii)	See (iv)
Effect of EUT operating mode on emission levels	✓	✓	✓	✓
Effect of EUT internal configuration on emission levels	✓	✓	✓	✓
Effect of Position of EUT cables & samples on emission levels	✓	✓	✓	✓

(i) Parameter defined by standard and / or single possible, refer to Appendix D
(ii) Parameter defined by client and / or single possible, refer to Appendix D
(iii) Parameter had a negligible effect on emission levels, refer to Appendix D
(iv) Worst case determined by initial measurement, refer to Appendix D

A27 Frame Repetition Stability

Test Details:	
Regulation	CFR 47 Part 15.323(e) & RSS-213 – 5.2(13)
Measurement standard	ANSI C63.17 sub-clause 6.2.2 & 6.2.3
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Frame Repetition Stability

This is the mean value of the frame repetition rate recorded over 1000 samples. For devices that divide access in time the repetition rate shall not exceed 10ppm.

Result

Frame Repetition Stability (ppm)	Limit (ppm)	Pass/Fail
-1.86 ppm	10ppm	Pass

Frame Period and Jitter

Jitter is the difference in time between the rising edges of consecutive pulses.

Result

Maximum Jitter (µs)	3xSD Jitter (µs)	Frame period (ms)	Limit (µs)		Pass/Fail
			Frame Period (ms)	Jitter (µs)	
0.02	0.06	10.00006	2 or 10/X	12.5	Pass

A28 Frequency Stability

Test Details:	
Regulation	CFR 47 Part 15.323(f) & RSS-213 – 5.2(13)
Measurement standard	ANSI C63.17 sub-clause 6.2.1
EUT sample number	S15
Modification state	0
SE in test environment	S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

This testing is carried out with the following conditions over 5000 samples.

Results

Temperature (^{o}C)	Voltage (Vdc)	Fc (MHz)	offset (kHz)	offset (ppm)	Limit (ppm)
+20	110 Vac	1924.992	-7	-3.64	±10
+20	85% Vnom	1924.992	-10	-5.19	±10
+20	115% Vnom	1924.992	-13.00	-6.75	±10
-20	Vnom	1924.992	1	0.52	±10
+55	Vnom	1924.992	-15	-7.79	±10

A29 Power Line Conducted Emissions

Preview power line conducted emission measurements were performed with a peak detector in a screened room. The effect of the EUT set-up on the measurements is summarised in note (b). Where applicable formal measurements of the emissions were performed with a peak, average and/or quasi peak detector.

Test Details:	
Regulation	CFR 47 Part 15.315 & 15.207 & RSS-213 - 4.2
Measurement standard	ANSI C63.10:2003
Frequency range	150kHz to 30MHz
EUT sample number	S06
Modification state	0
SE in test environment	S26, S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

The worst-case power line conducted emission measurements are listed below:

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.410000	31.7	GND	L1	0.1	26.0	57.6
0.550000	34.6	GND	L1	0.1	21.4	56.0
0.715000	36.2	GND	L1	0.2	19.8	56.0
0.875000	36.7	GND	L1	0.2	19.3	56.0
1.050000	35.0	GND	L1	0.2	21.0	56.0
1.335000	27.4	GND	L1	0.2	28.6	56.0
1.980000	31.3	GND	L1	0.2	24.7	56.0
2.125000	29.2	GND	L1	0.2	26.8	56.0
2.540000	25.5	GND	L1	0.2	30.5	56.0
2.975000	29.9	GND	L1	0.3	26.1	56.0
3.500000	25.0	GND	L1	0.3	31.0	56.0
3.655000	27.0	GND	L1	0.3	29.0	56.0
3.925000	27.9	GND	L1	0.3	28.1	56.0
3.960000	27.4	GND	L1	0.3	28.6	56.0
4.825000	26.4	GND	L1	0.4	29.6	56.0

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.295000	16.9	GND	L1	0.1	33.5	50.4
0.420000	21.3	GND	L1	0.1	26.1	47.4
0.550000	22.8	GND	L1	0.1	23.2	46.0
0.720000	23.6	GND	L1	0.2	22.4	46.0
0.805000	24.2	GND	L1	0.2	21.8	46.0
0.980000	22.9	GND	L1	0.2	23.1	46.0
1.275000	17.4	GND	L1	0.2	28.6	46.0
1.940000	18.2	GND	L1	0.2	27.8	46.0
2.130000	15.6	GND	L1	0.2	30.4	46.0
3.000000	15.9	GND	L1	0.3	30.1	46.0
4.040000	14.0	GND	L1	0.3	32.0	46.0
4.920000	14.3	GND	L1	0.4	31.7	46.0
6.935000	24.0	GND	N	0.5	26.0	50.0
6.955000	17.5	GND	L1	0.6	32.5	50.0
10.400000	22.9	GND	N	0.7	27.1	50.0

Specification limits:

Conducted emission limits (47 CFR 15: Clause 15.207):

Conducted disturbance at the mains ports.

Frequency range MHz	Limits dBμV	
	Quasi-peak	Average
0.15 to 0.5	66 to 56[2]	56 to 46[2]
0.5 to 5	56	46
5 to 30	60	50

Notes:
1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

Notes:

(a) The levels may have been rounded for display purposes.

(b) The following table summarises the effect of the EUT operating mode and internal configuration on the measured emission levels :

	See (i)	See (ii)	See (iii)	See (iv)
Effect of EUT operating mode on emission levels		✓		
Effect of EUT internal configuration on emission levels		✓		

(i) Parameter defined by standard and / or single possible, refer to Appendix C
(ii) Parameter defined by client and / or single possible, refer to Appendix C
(iii) Parameter had a negligible effect on emission levels, refer to Appendix C
(iv) Worst case determined by initial measurement, refer to Appendix C

A30 Unintentional Radiated Emissions

Preliminary scans were performed using a peak detector with the RBW = 100kHz. The radiated electric filed emission test applies to all spurious emissions on directly related to the transmitter. The maximum permitted field strength is listed in Section 15.109. The EUT was set to operate in a transmit standby / receive mode.

The following test site was used for final measurements as specified by the standard tested to:

3m open area test site : [ ] 3m alternative test site : [X]

The effect of the EUT set-up on the measurements is summarised in note (c) below.

Test Details:	
Regulation	CFR 47 Part 15.323(d) & RSS-213 – 5.8
Measurement standard	ANSI C63.17 sub-clause 6.1.6.
Frequency range	30 MHz – 20 GHz
EUT sample number	S06
Modification state	0
SE in test environment	S26, S08
SE isolated from EUT	None
EUT set up	Refer to Appendix C

The worst case radiated emission measurements for spurious emissions are listed below:

Ref No.	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
1	32.0	11.2	0.8	17.9	N/A	29.9	-	31.1	100.0
2	45.6	16.5	1.0	10.5	N/A	28.1	-	25.3	100.0
3	47.0	18.6	1.0	9.9	N/A	29.5	-	29.8	100.0
4	52.0	19.9	1.0	7.4	N/A	28.3	-	26.1	100.0
5	61.9	21.2	1.1	6.0	N/A	28.3	-	26.0	100.0
6	309.0	16.7	2.5	13.1	N/A	32.2	-	40.8	200.0
7	318.0	20.0	2.5	13.3	N/A	35.8	-	61.9	200.0
8	327.1	21.6	2.5	13.7	N/A	37.8	-	77.4	200.0
9	340.5	20.3	2.5	14.1	N/A	36.9	-	69.7	200.0
10	345.5	17.3	2.5	14.1	N/A	33.9	-	49.7	200.0
11	349.4	15.3	2.5	14.2	N/A	32.0	-	39.8	200.0
12	350.3	22.6	2.5	14.2	N/A	39.3	-	92.6	200.0
13	368.8	18.5	2.7	14.3	N/A	35.5	-	59.6	200.0
14	369.5	17.4	2.7	14.3	N/A	34.4	-	52.5	200.0
15	370.6	18.7	2.8	14.3	N/A	35.7	-	61.2	200.0
16	377.9	15.1	2.8	14.6	N/A	32.5	-	42.1	200.0
17	378.5	19.3	2.8	14.6	N/A	36.8	-	68.9	200.0
18	380.9	19.3	2.9	14.8	N/A	36.9	-	69.9	200.0
19	391.9	15.4	2.8	15.4	N/A	33.7	-	48.2	200.0
20	506.7	12.9	3.1	17.7	N/A	33.7	-	48.3	200.0
21	529.3	11.6	3.2	18.2	N/A	33.0	-	44.7	200.0
22	548.4	10.5	3.3	19.9	N/A	33.7	-	48.5	200.0
23	549.2	10.0	3.3	19.8	N/A	33.1	-	45.4	200.0
24	557.1	6.3	3.4	19.5	N/A	29.1	-	28.5	200.0
25	557.9	9.4	3.4	19.4	N/A	32.1	-	40.5	200.0
26	567.3	9.2	3.4	19.2	N/A	31.8	-	38.7	200.0
27	575.8	9.7	3.4	19.0	N/A	32.1	-	40.5	200.0
28	576.6	10.5	3.4	19.0	N/A	32.9	-	44.3	200.0
29	589.6	10.3	3.5	18.8	N/A	32.6	-	42.5	200.0
30	800.1	12.0	4.0	21.7	N/A	37.7	-	76.5	200.0

Notes:

5 Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.10: section 4.5, Table 1 For emissions below 30MHz the cable losses are assumed to be negligible.

6 In accordance with 15.35(b), above 1 GHz, emissions measured using a peak detector shall not exceed a level 20 dB above the average limit.

7 Testing was performed with the EUT orientated in three orthogonal planes and the maximum emissions level recorded. In addition, the EUT antenna was varied within its range of motion in order to maximise emissions.

8 For Frequencies below 1 GHz, RBW = 120 kHz, testing was performed with CISPR16 compliant test receiver with QP detector. Above 1 GHz tests were performed using a spectrum analyser using the following settings:

Peak	RBW=VBW= 1MHz
Average	RBW=VBW= 1MHz

The upper and lower frequency of the measurement range was decided according to 47 CFR Part 15:2008 Clause 15.33(a) and 15.33(a)(1).

Radiated emission limits 47 CFR Part 15: Clause 15.209 for all emissions:

Frequency of emission (MHz)	Field strength μV/m	Measurement Distance m	Field strength dBμV/m
0.009-0.490	2400/F(kHz)	300	67.6/F (kHz)
0.490-1.705	24000/F(kHz)	30	87.6/F (kHz
1.705-30	30	30	29.5
30-88	100	3	40.0
88-216	150	3	43.5
216-960	200	3	46.0
Above 960	500	3	54.0

(a) Where results have been measured at one distance, and a signal level displayed at another, the results have been extrapolated using the following formula:

$$\text{Extrapolation}\,(\text{dB}) = 20\log_{10}\left(\frac{\text{measurement distance}}{\text{specification distance}}\right)$$

(b) The levels may have been rounded for display purposes.

(c) The following table summarises the effect of the EUT operating mode, internal configuration and arrangement of cables / samples on the measured emission levels :

	See (i)	See (ii)	See (iii)	See (iv)
Effect of EUT operating mode on emission levels	✓	✓	✓	✓
Effect of EUT internal configuration on emission levels	✓	✓	✓	✓
Effect of Position of EUT cables & samples on emission levels	✓	✓	✓	✓

(i) Parameter defined by standard and / or single possible, refer to Appendix D
(ii) Parameter defined by client and / or single possible, refer to Appendix D
(iii) Parameter had a negligible effect on emission levels, refer to Appendix D
(iv) Worst case determined by initial measurement, refer to Appendix D

Appendix B: Supporting Graphical Data

This appendix contains graphical data obtained during testing.

Notes:

(a) The radiated electric field emissions and conducted emissions graphical data in this appendix is preview data. For details of formal results, refer to Appendix A and Appendix B.

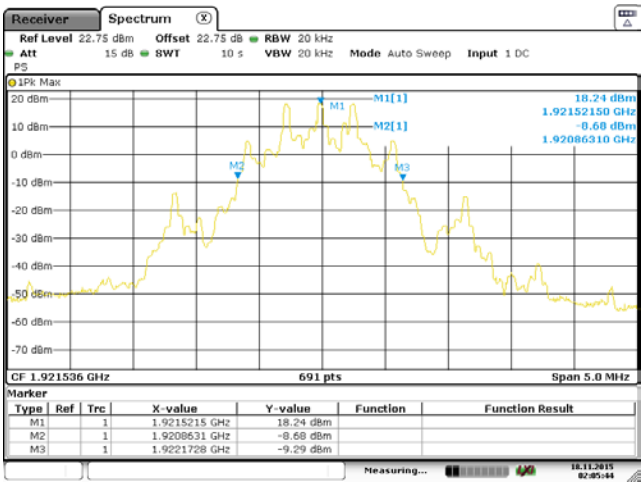
(b) The time and date on the plots do not necessarily equate to the time of the test.

(c) Where relevant, on power line conducted emission plots, the limit displayed is the average limit, which is stricter than the quasi peak limit.

(d) Appendix C details the numbering system used to identify the sample and its modification state.

(e) The plots presented in this appendix may not be a complete record of the measurements performed, but are a representative sample, relative to the final assessment.

Emission Bandwidth



Date: 18.NOV.2015 02:05:44

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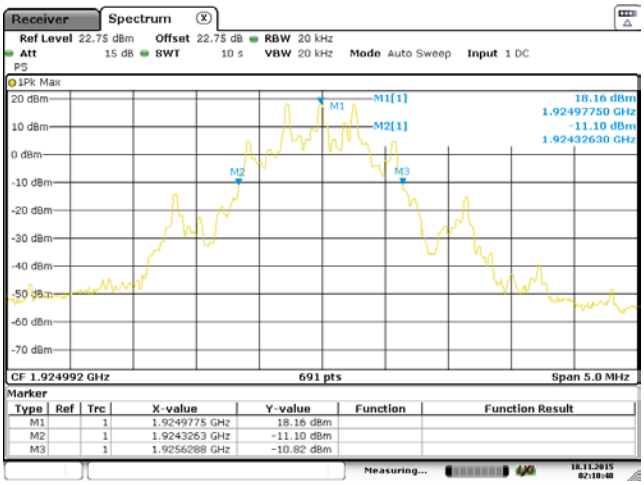

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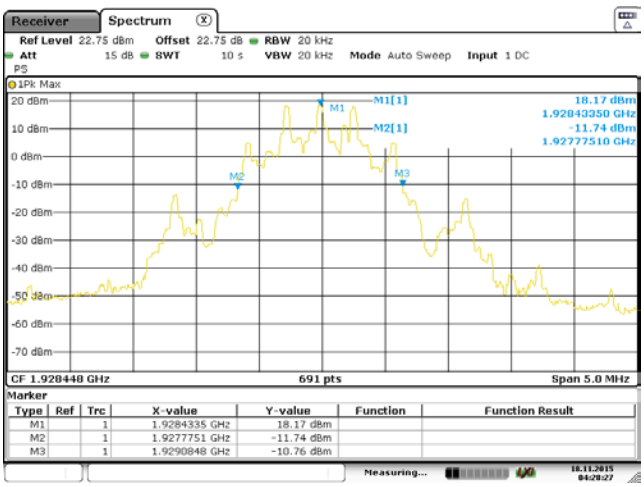
f_c



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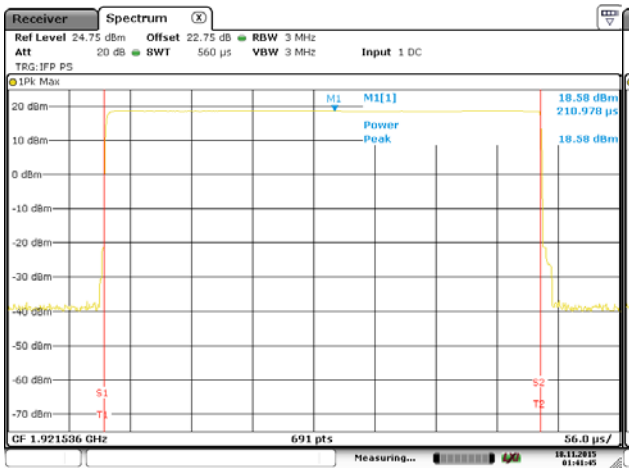
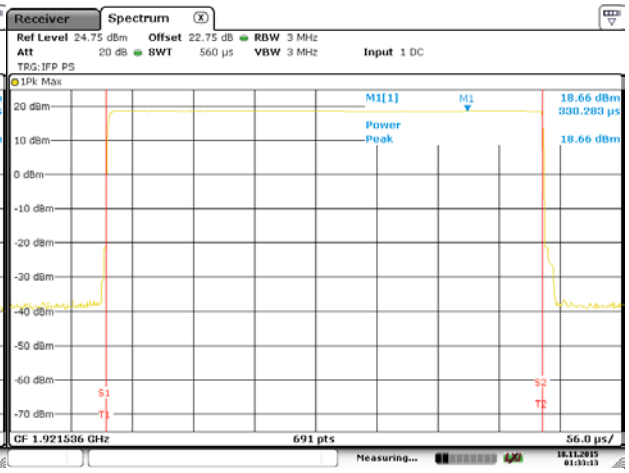
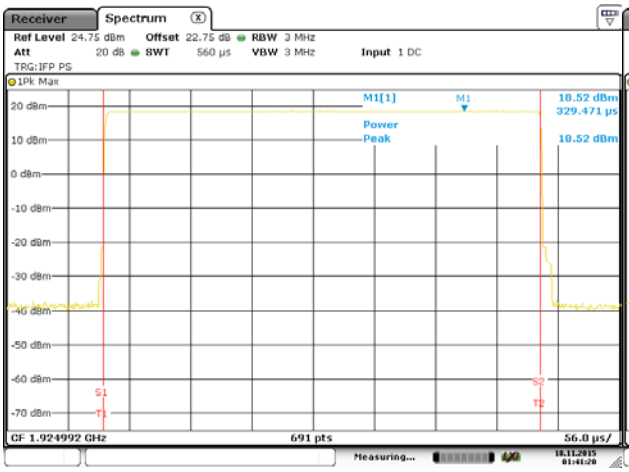
f_h

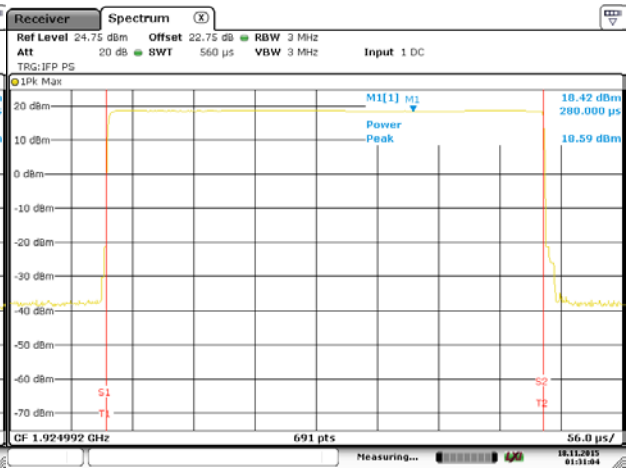
Peak Transmit Power



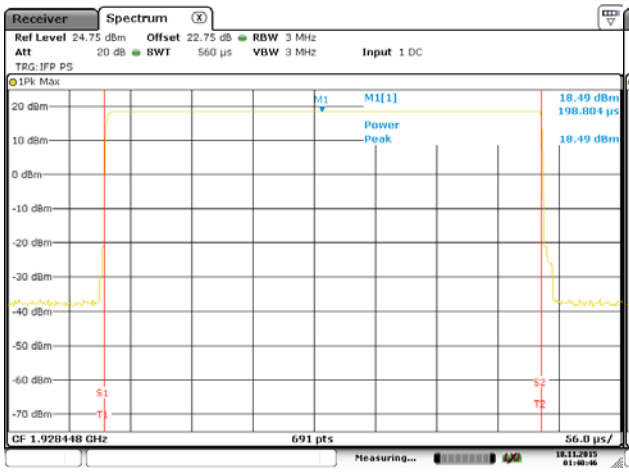


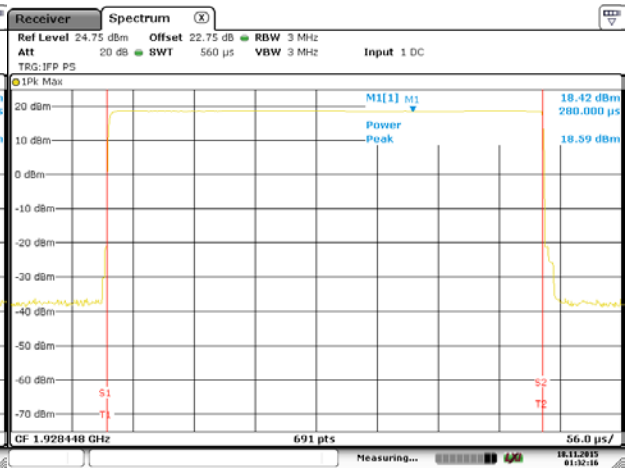
Antenna 0 f_l Antenna 1





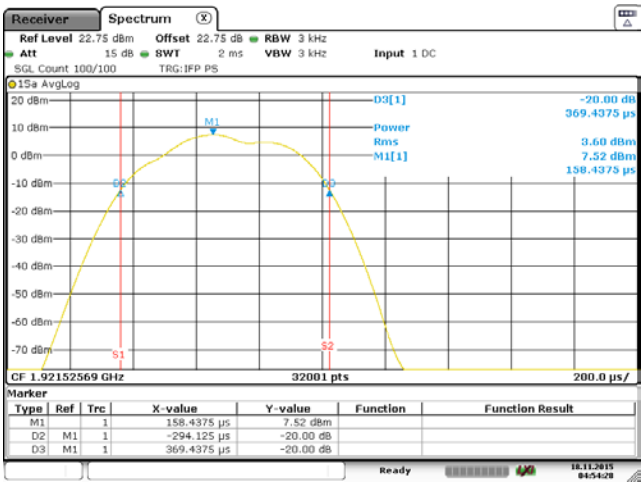
Antenna 0 f_c Antenna 1





Antenna 0 f_h Antenna 1

Power Spectral Density



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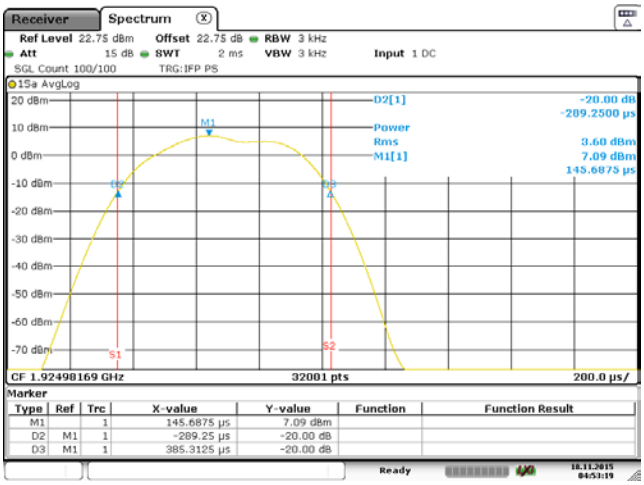

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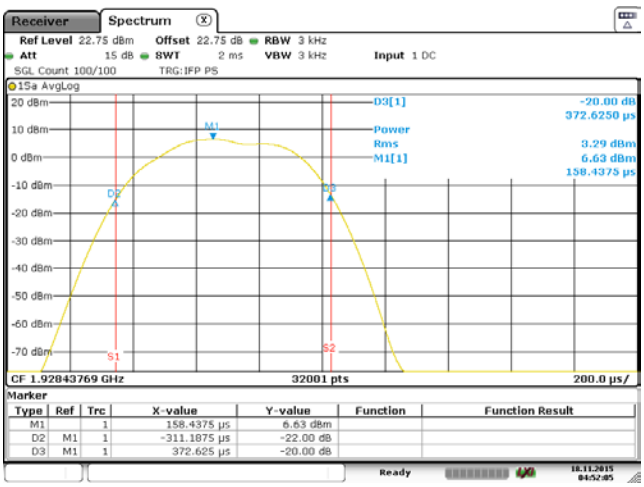

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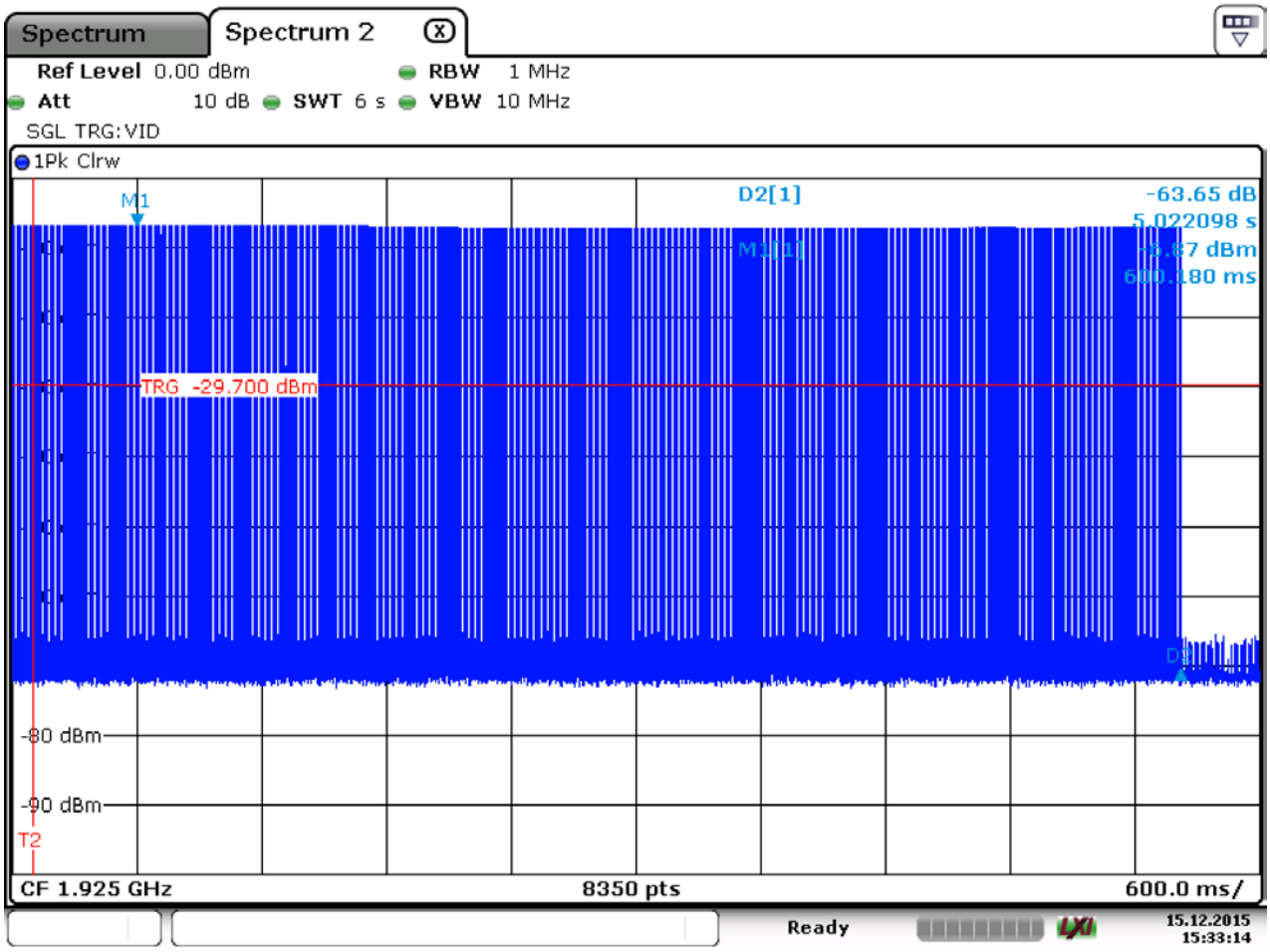
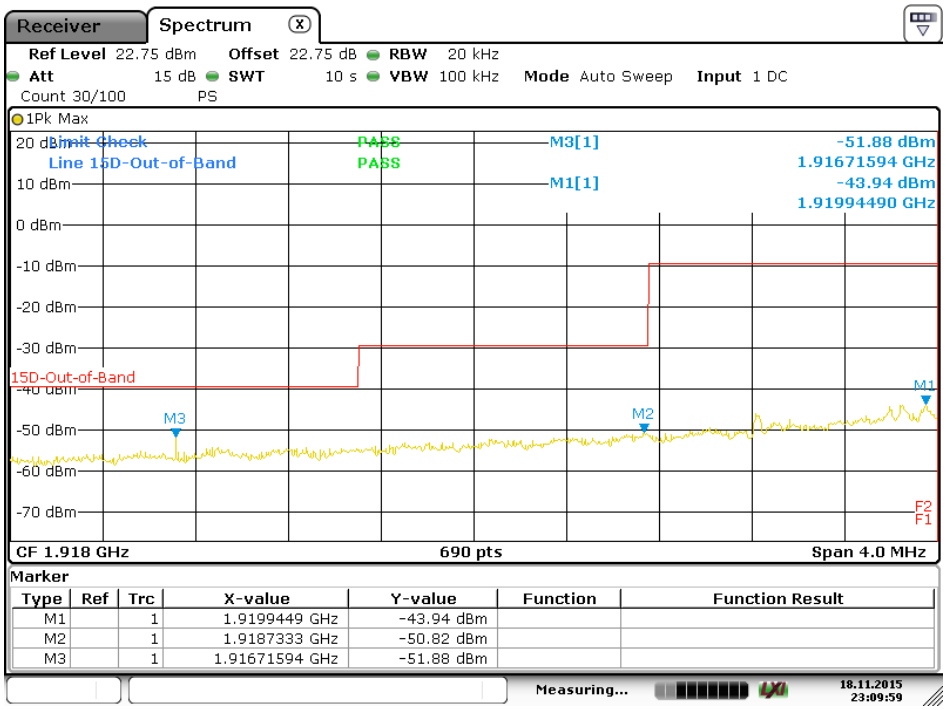
f_h

Acknowledgements



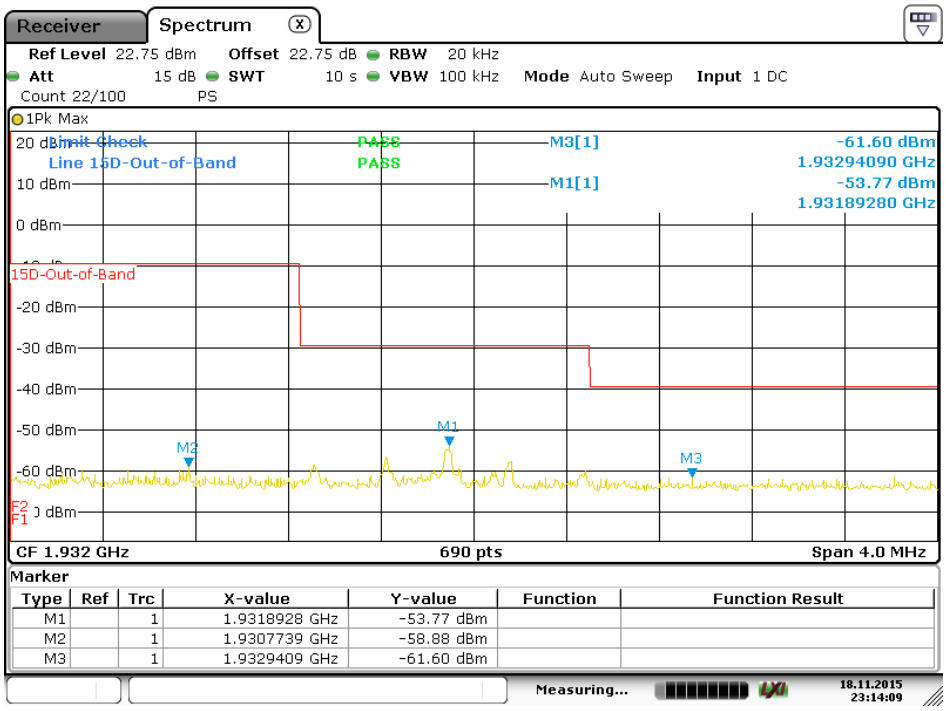
Cease Of Transmissions on Communications Channel - Acknowledgements Blocked

Conducted Emissions outside the Sub-Band RF carrier set to the lowest carrier defined by the EUT



Date: 18.NOV.2015 23:10:00

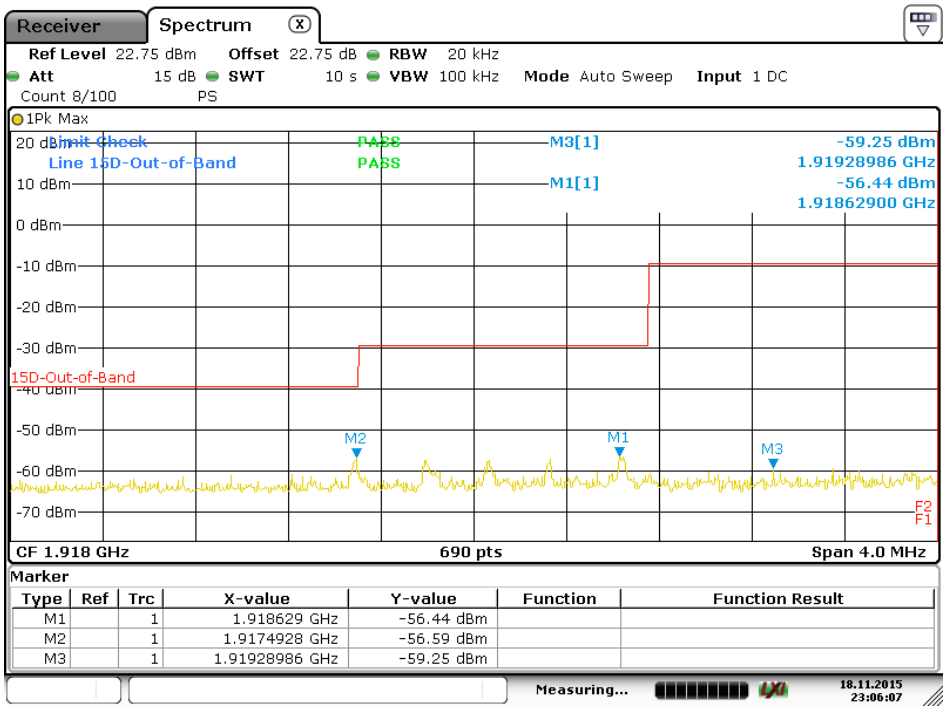
Lower Bandedge - > 2.5MHz



Date: 18.NOV.2015 23:14:10

Upper Bandedge - > 2.5MHz

Conducted Emissions outside the Sub-Band RF carrier set to the highest carrier defined by the EUT



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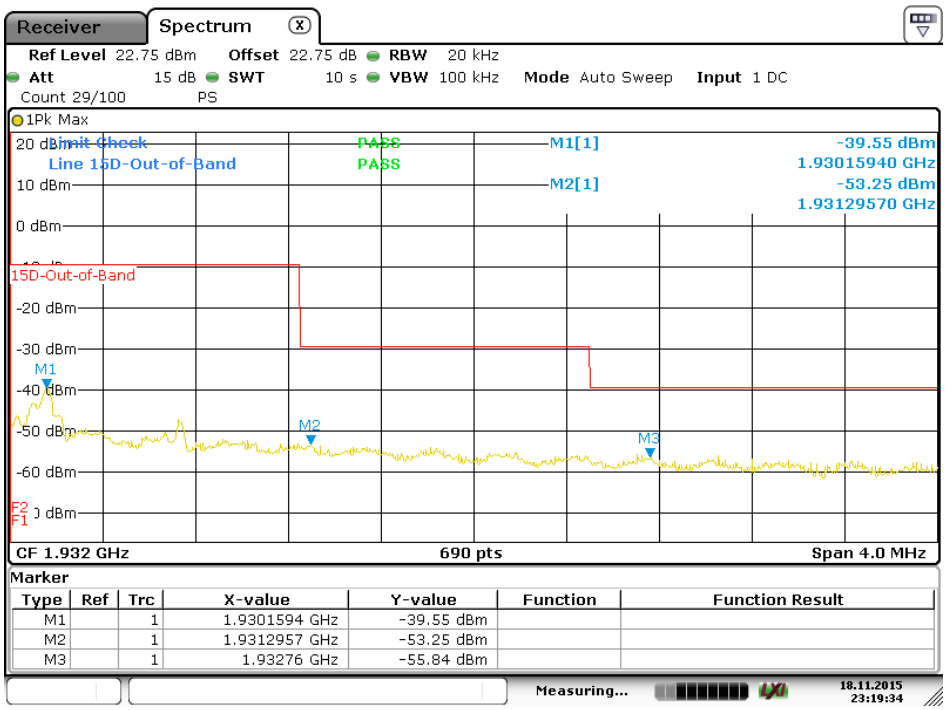
Lower Bandedge - > 2.5MHz



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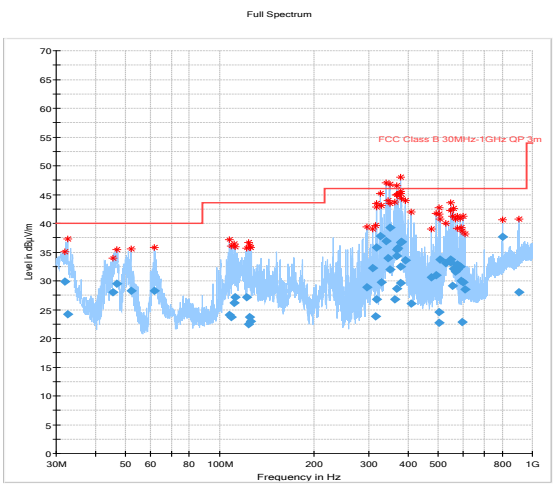
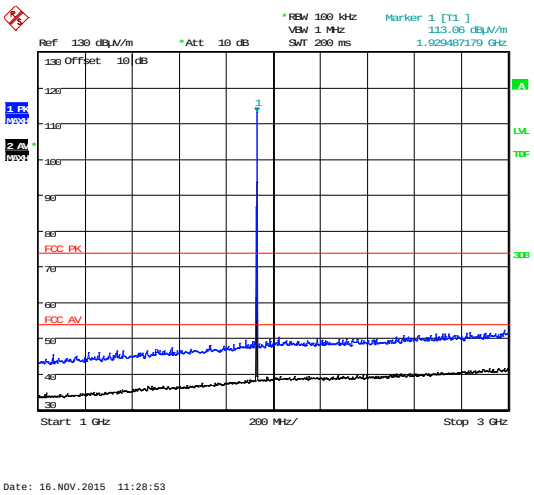
Upper Bandedge - > 2.5MHz

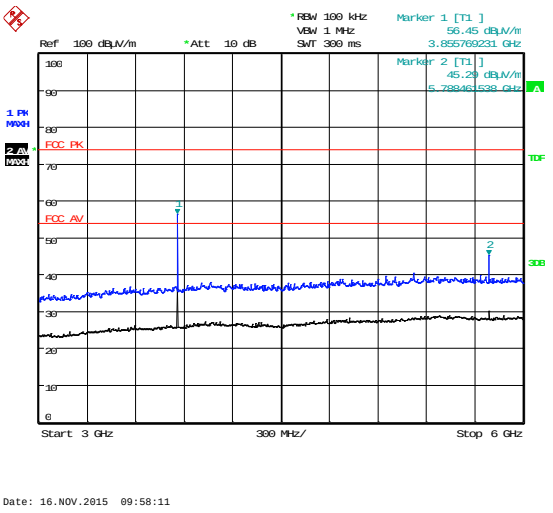
Radiated Emissions outside the Sub-Band RF carrier set to the lowest carrier defined by the EUT



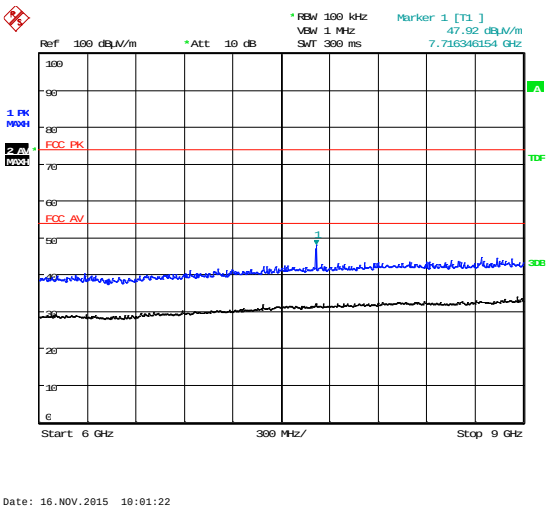
30MHz – 1GHz



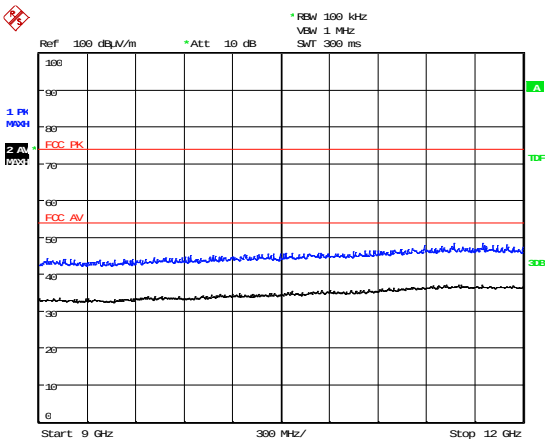
1GHz – 3GHz



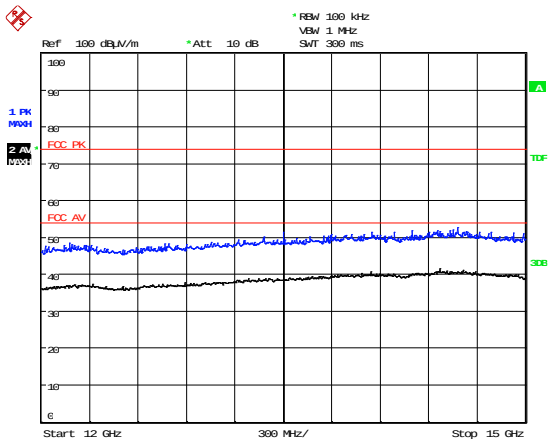
3GHz – 6GHz



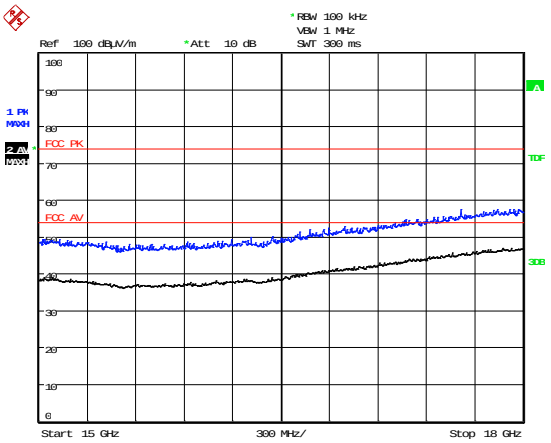
6GHz – 9GHz



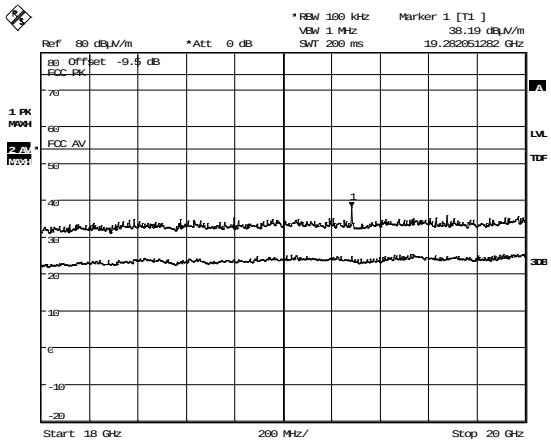
9GHz – 12GHz



12GHz – 15GHz

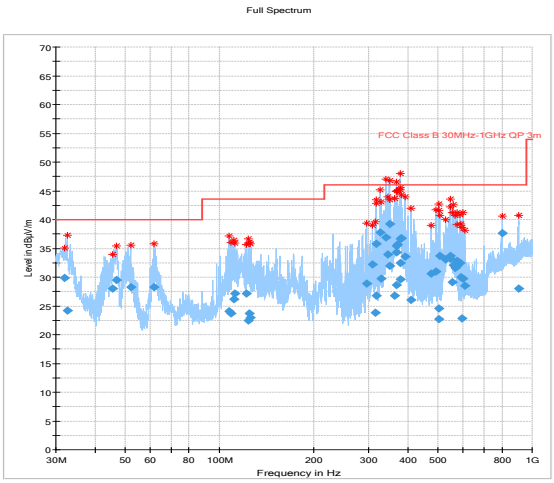


15GHz – 18GHz

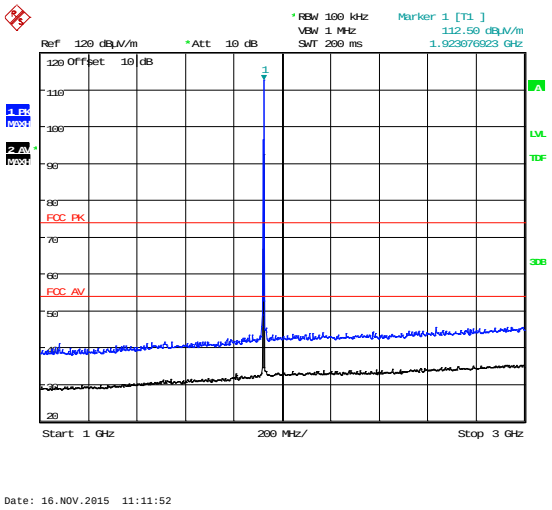


18GHz – 20GHz

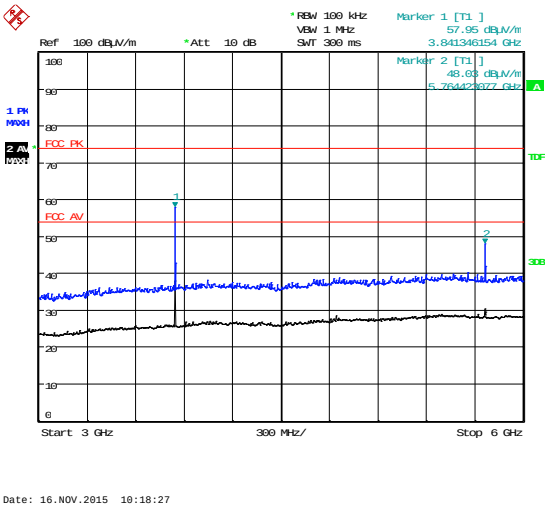
Radiated Emissions outside the Sub-Band RF carrier set to the highest carrier defined by the EUT



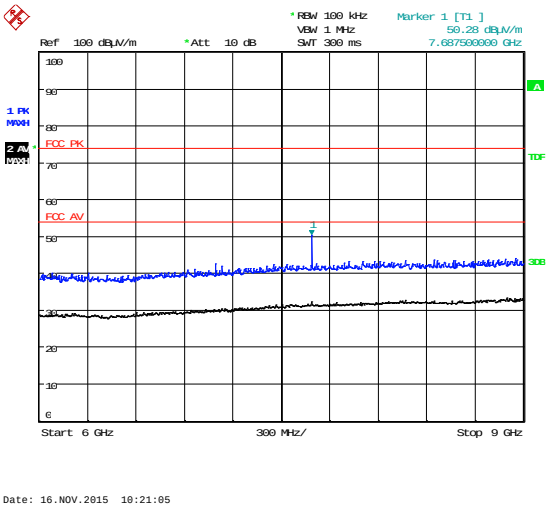
30MHz – 1GHz



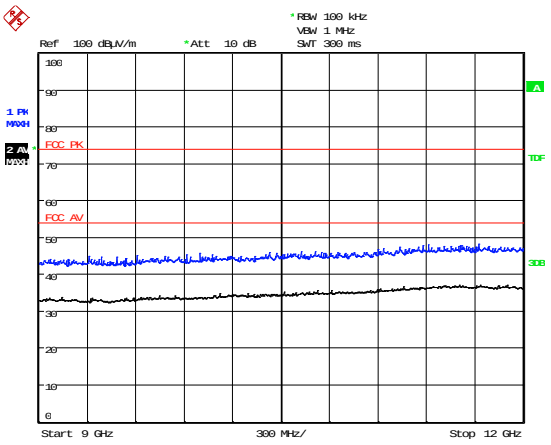
1GHz – 3GHz



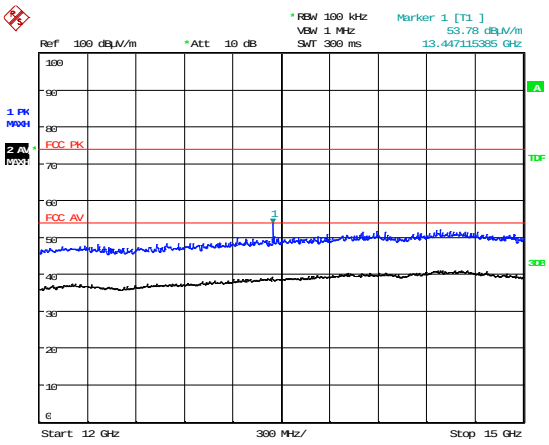
3GHz – 6GHz



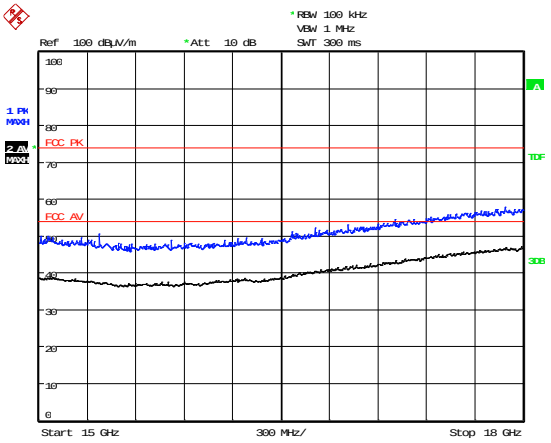
6GHz – 9GHz



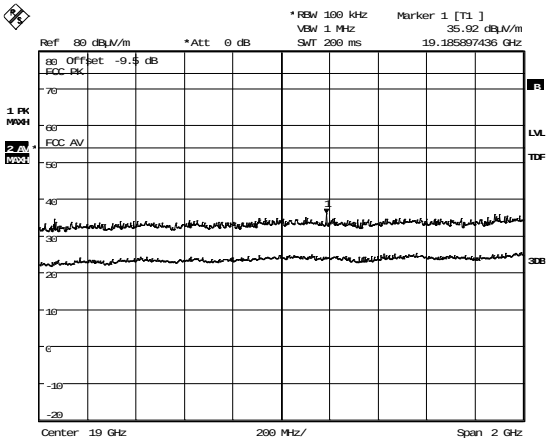
9GHz – 12GHz



12GHz – 15GHz

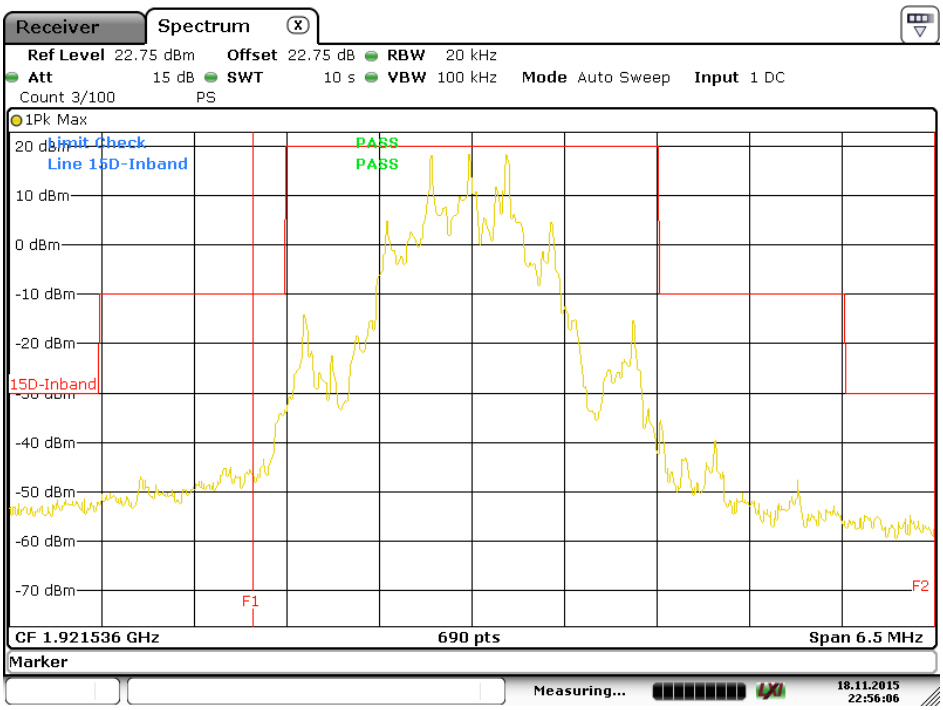


15GHz – 18GHz



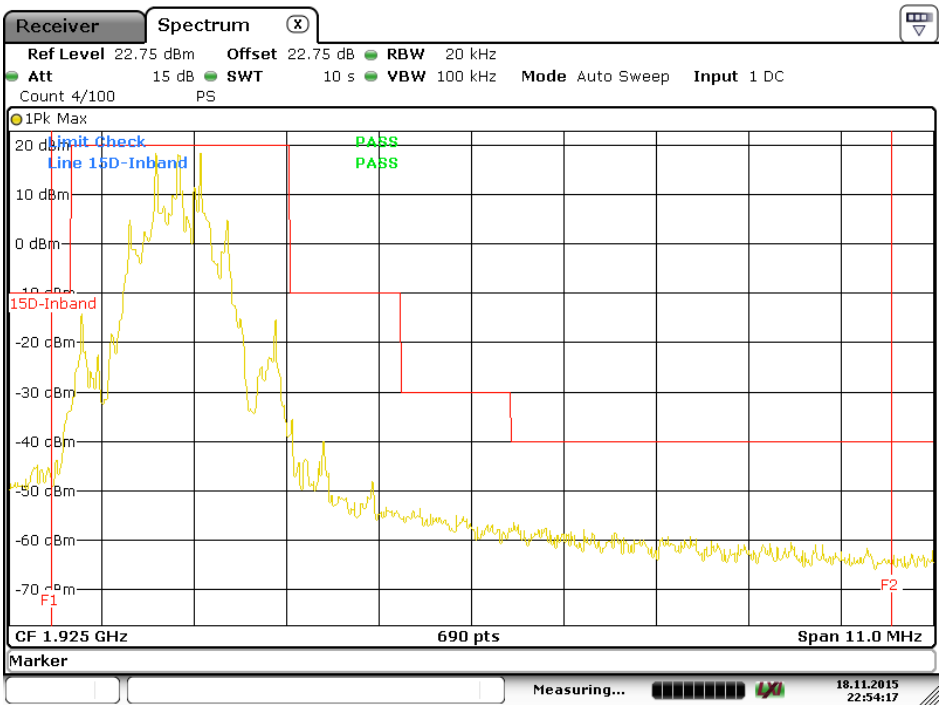
18GHz – 20GHz

Emissions inside the Sub-Band RF carrier set to the highest carrier defined by the EUT



Date: 18.NOV.2015 22:56:07

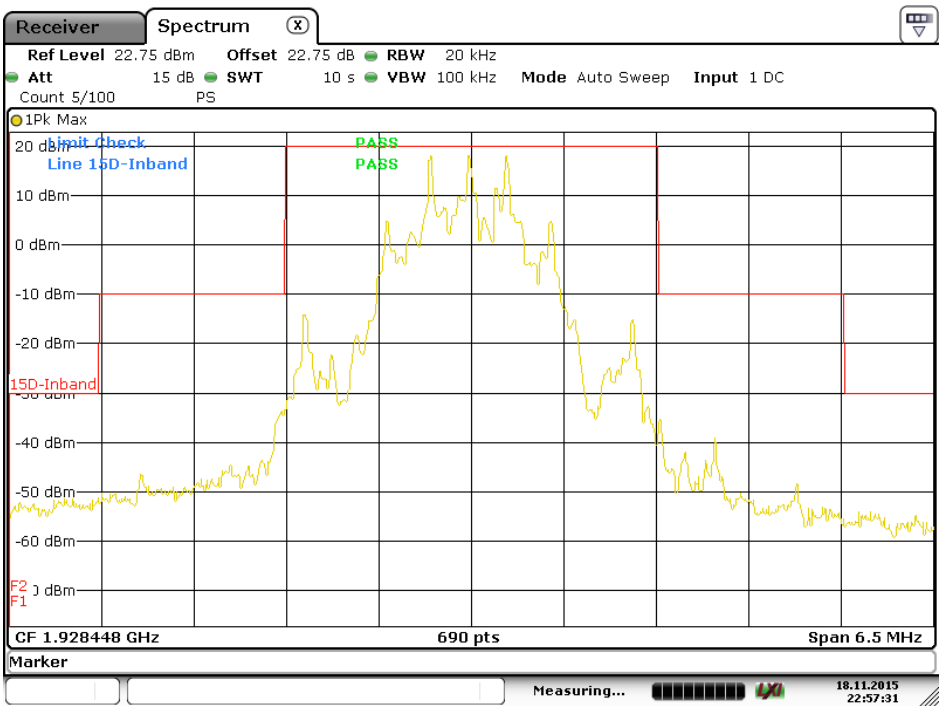
Centred On lowest carrier



Date: 18.NOV.2015 22:54:18

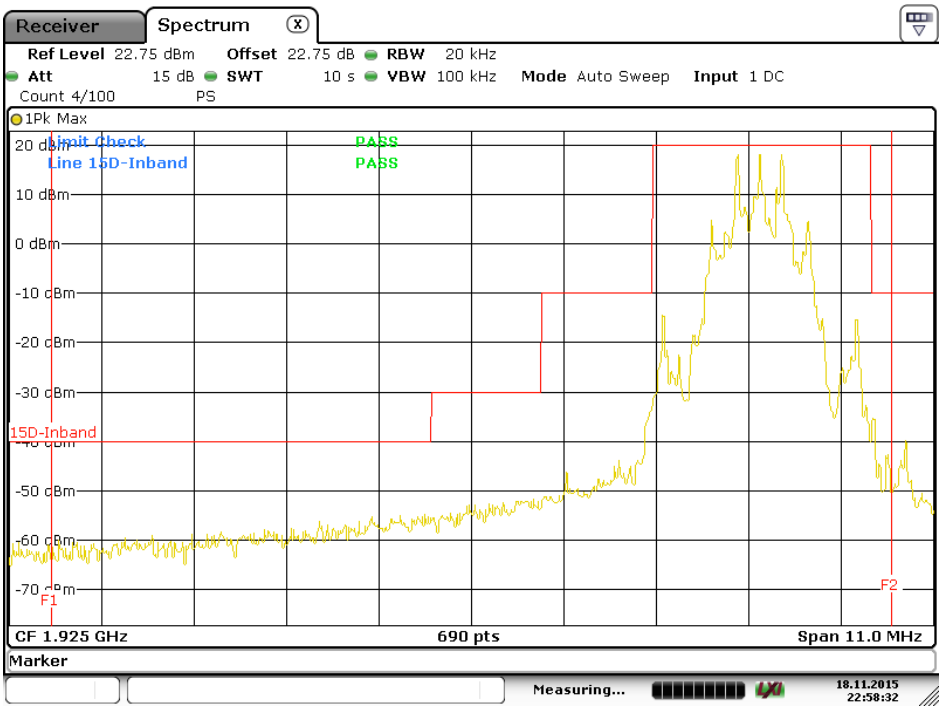
Full band

Emissions inside the Sub-Band RF carrier set to the highest carrier defined by the EUT



Date: 18.NOV.2015 22:57:31

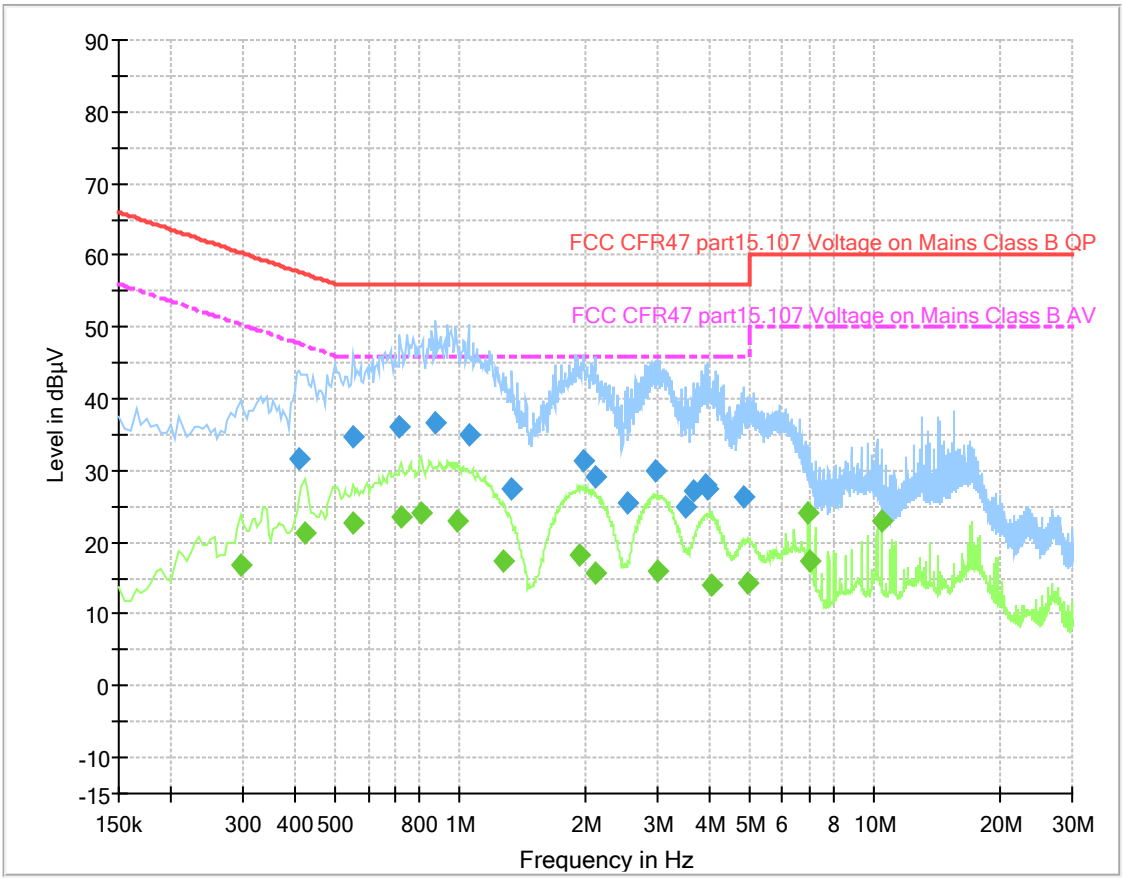
Centred On lowest carrier



Date: 18.NOV.2015 22:58:32

Full band

Conducted emissions on Mains 9kHz-30MHz ESHS10 + UH195



AC Powerline Conducted Emissions

Appendix C: **Additional Test and Sample Details**

This appendix contains details of:

1. The samples submitted for testing.
2. Details of EUT operating mode(s)
3. Details of EUT configuration(s) (see below).
4. EUT arrangement (see below).

Throughout testing, the following numbering system is used to identify the sample and it's modification state:

Sample No: Sxx Mod w

where:

xx = sample number eg. S01
w = modification number eg. Mod 2

The following terminology is used throughout the test report:

Support Equipment (SE) is any additional equipment required to exercise the EUT in the applicable operating mode. Where relevant SE is divided into two categories:

SE in test environment: The SE is positioned in the test environment and is not isolated from the EUT (e.g. on the table top during REFE testing).

SE isolated from the EUT: The SE is isolated via filtering from the EUT. (e.g. equipment placed externally to the ALSR during REFE testing).

EUT configuration refers to the internal set-up of the EUT. It may include for example:

Positioning of cards in a chassis.
Setting of any internal switches.
Circuit board jumper settings.
Alternative internal power supplies.

Where no change in EUT configuration is **possible**, the configuration is described as “single possible configuration”.

EUT arrangement refers to the termination of EUT ports / connection of support equipment, and where relevant, the relative positioning of samples (EUT and SE) in the test environment.

For further details of the test procedures and general test set ups used during testing please refer to the related document "EMC Test Methods - An Overview", which can be supplied by Element Materials Technology upon request.

C1) Test samples

The following samples of the apparatus were submitted by the client for testing :

Sample No.	Description	Identification
S15	Jabra 9470 (Conducted Sample)	None Available
S06	Jabra 9470 (Radiated Sample)	ORDH02083GA

The following samples of apparatus were submitted by the client as host, support or drive equipment (auxiliary equipment):

Sample No.	Description	Identification
S07	Power Supply	None Available
S26	Power Supply	None Available
S08	Headset (Normal for port loading)	None Available
S30	Headset (companion for Conducted Measurements)	None Available

The following samples of apparatus were supplied by Element Skelmersdale as support or drive equipment (auxiliary equipment):

Identification	Description
IT-0146	Test Laptop

C2) EUT Operating Mode During Testing.

During testing, the EUT was exercised as described in the following tables :

Test	Description of Operating Mode:
RF Parameter Testing Conduced	The EUT was set to transmit on the required channel using the DECT commander software. A communications type channel was activated. The unit was transmitting a burst pulse with timings typical of normal use in the 10ms time frame. Commands to set antenna and channel were as per Dolphin test instructions version 4.0 section 4 (ie channel 0 – 1928.448MHz; ANT 0) Carrie power was measured from each antenna Full RF parameter testing was on the antenna which produced the highest carrier power

Test	Description of Operating Mode:
RF Parameter Testing Radiated	The EUT was set to transmit on the required channel using GN Protocol Manager software to send commands to active a communications type channel. The unit was transmitting a burst pulse with timings typical of normal use in the 10ms time frame. Preview scans were performed using the Antenna which produced the highest carrier power Frequencies determined from preview scans were measured using both Antenna 0 and Antenna 1 All ports were populated and loaded as instructed.

Test	Description of Operating Mode:
Etiquette	The EUT was transmitting either the control and signalling information or using a communication link with a companion device as required. The unit was frequency administered as required to the number of frequencies defined in the specific test. Etiquette testing was performed using the antenna which produced the highest carrier power.

Test	Description of Operating Mode:
PLCE	The EUT was set to transmit on the required channel using GN Protocol Manager software to send commands to active a communications type channel. The unit was transmitting a burst pulse with timings typical of normal use in the 10ms time frame. Measurements were performed using the Antenna which produced the highest carrier power. All ports were populated and loaded as instructed by the manufacturer.

Test	Description of Operating Mode:
Unintentional radiated emissions	During the RF Parameter Testing Radiated any frequency determined not to be directly associated with the radio transmitter were subjected to the requirements for unintentional radiators

C3) EUT Configuration Information.

The EUT was submitted for testing in one single possible configuration.

C4) List of EUT Ports

The tables below describe the termination of EUT ports:

Sample : S15
Tests : Conducted

Port	Description of Cable Attached	Cable length	Equipment Connected
Antenna 0 / 1	Coaxial or 50 ohm Load	>1m	Measurement System
Power	2 wire	>1m	PSU
USB	USB Cable	1m	PC
UART (Temporary)	None	N/A	USB – Serial converter PCB
CLK 100	2 wire	>1m	Measurement system Sync
Headset Mount	3 wire	10cm	Headset when required

Sample : S06
Tests : Radiated Emissions

Port	Description of Cable Attached	Cable length	Equipment Connected
Telephone	Pre Coiled Telephone Cable	<1m	*Deskphone*
Handset	Pre Coiled Telephone Cable	<1m	*Deskphone handset*
AUX	RJ11 cable	<1m	*Load*
USB	USB Cable	1m	*PC*
Power	2 wire	1m	*PSU*
BUSY Light Indicator	2 wiire	<1m	*Busy Light*

* Only connected during setup.

C5 Details of Equipment Used

Element No	Equipment Type	Equipment Description	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
U003	ESHS10	Receiver	R&S	25/06/2016	12	25/06/2017
U004	ESVS10	Receiver	R&S	24/03/2015	12	24/03/2016
U191	CBL611/A	Bilog	Chase	26/02/2015	24	26/02/2017
U195	ESH3-Z5.831.5	Lisn	R&S	04/06/2015	12	04/06/2016
U281	FSU46	Spectrum Analyser	R&S	24/04/2015	12	24/04/2016
U387	ATS	Chamber 1	Rainford EMC	06/09/2014	24	06/09/2016
U387	ATS	IC Reg - Chamber 1	Rainford EMC	19/11/2014	36	19/11/2017
U388	ATS	Chamber 2	Rainford EMC	05/09/2014	24	05/09/2016
U388	ATS	IC Reg Chamber 2	Rainford EMC	19/11/2014	36	19/11/2017
U396	ENV216	Lisn	R&S	01/07/2015	12	01/07/2016
U405	FSU26	Spectrum Analyser	R&S	11/05/2015	12	11/05/2016
U420	CBL6112	Bilog	Chase	25/07/2014	24	25/07/2016
U456	ESR7	EMI Receiver	R&S	22/04/2015	12	22/04/2016
U489	ESR26	EMI Receiver	R&S	21/04/2015	12	21/04/2016
L139	3115	1-18GHz Horn	EMCO	25/09/2015	24	25/09/2017
L300	20240-20	Horn 18-26GHz (&U330)	Flann	10/02/2014	24	10/02/2016
L317	ESVS10	Receiver	R&S	26/02/2015	12	26/02/2016
L352	ESVS10	Receiver	R&S	07/08/2015	12	07/08/2016
L426	52 Series II	Temperature Indicator	Fluke	30/05/2015	12	30/05/2016
L572	8449B	Pre Amp	Agilent	10/02/2015	12	10/02/2016
RFG441	D-3000A	Singal Generator	Agilent	08/10/2014	24	08/10/2016
RFG449	33120A	Arbitary Waveform Gen	HP	26/02/2014	24	26/02/2016
REF844	E4438C	Singal Generator	Agilent	14/04/2015	12	14/04/2016
REF909	FSU26	Spectrum Analyser	R&S	13/02/2015	12	13/02/2016
REF910	FSU46	Spectrum Analyser	R&S	28/05/2015	12	28/05/2016
REF940	ATS	Radio Chamber - PP	Rainford EMC	08/09/2014	24	08/09/2016
REF940	ATS	IC Reg Radio Chamber - PP	Rainford EMC	19/11/2014	36	19/11/2017
REF976	34405a	Multimeter	Agilent	03/06/2015	12	03/06/2016
REF977	SH4141	High Pass Filter	BSC	25/02/2015	24	25/02/2017
RFG433	CMD 60	Radiocommunication Tester	R&S	01/04/2012	12	01/04/2016

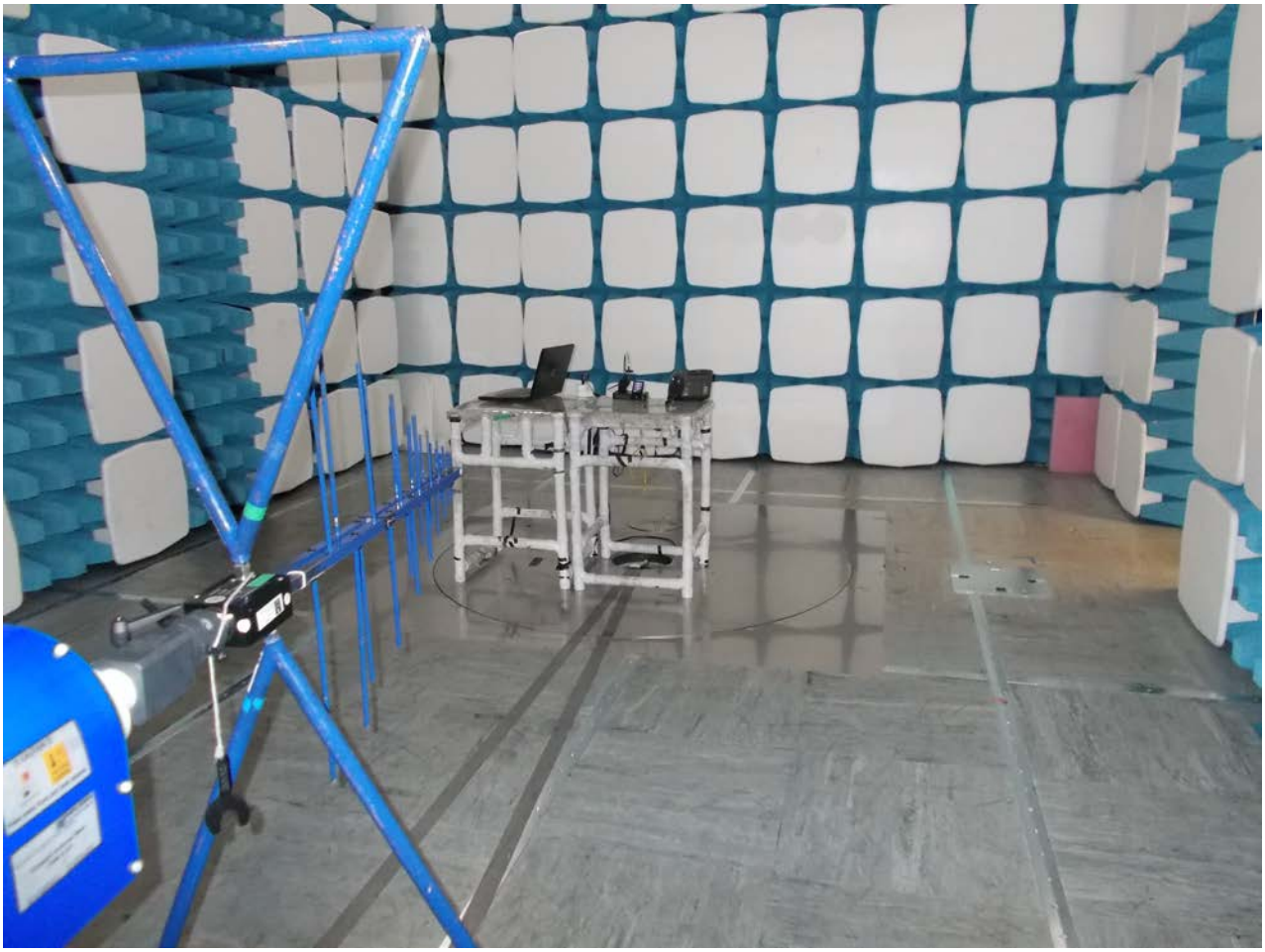
Appendix D: Additional Information

No additional information is included within this test report.

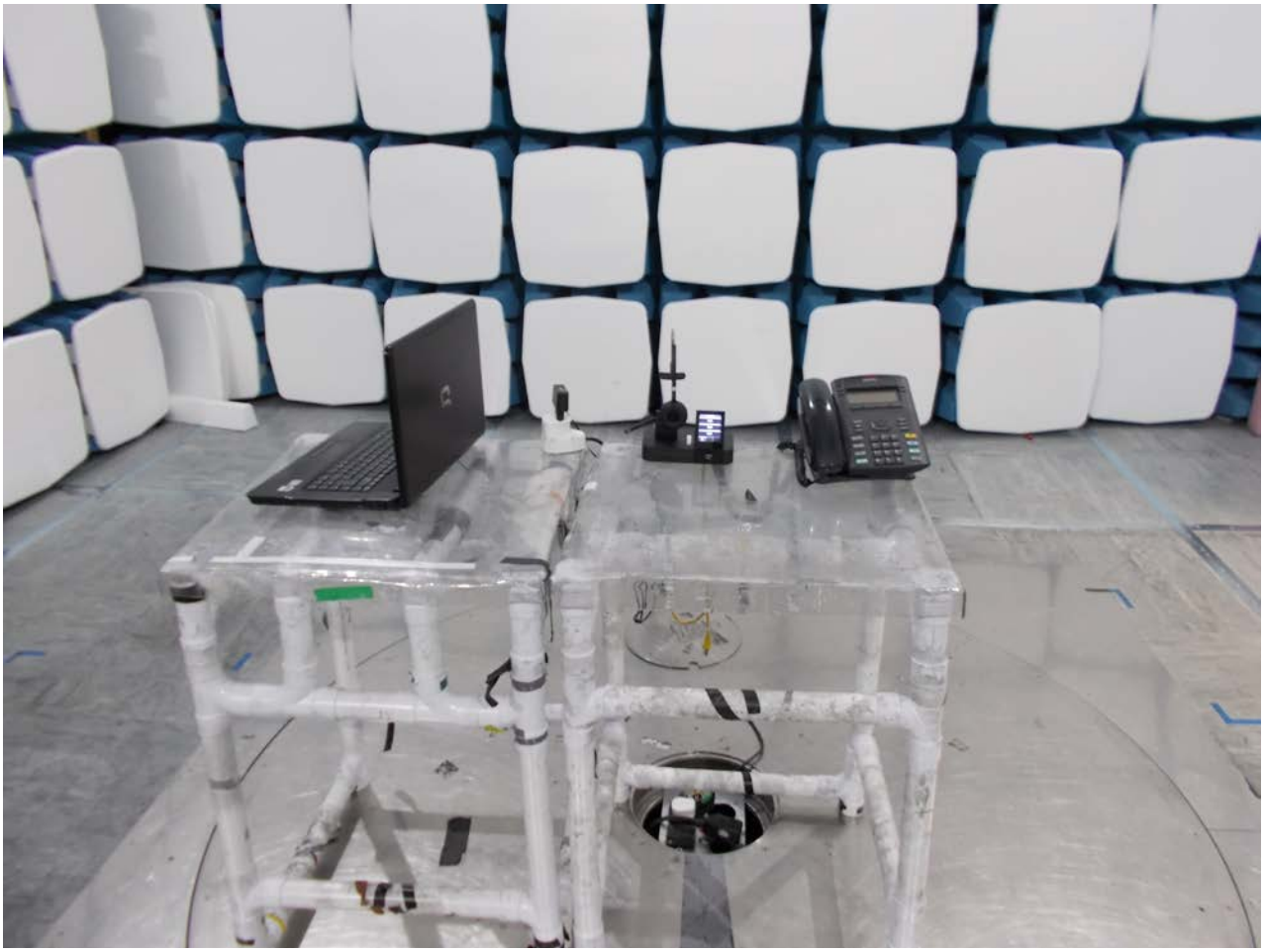
Appendix E: Photographs and Figures

The following photographs were taken of the test samples:

1. Radiated electric field emissions arrangement: Overview.
2. Radiated electric field emissions arrangement: Close up.
3. AC Powerline Conducted emissions arrangement: Overview.



Photograph 1



Photograph 2

Photograph 3