FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2

CERTIFICATION TEST REPORT

FOR

RFID TAG READER

MODEL NUMBER: ARU3400

FCC ID: WJ9-ARU3400
IC: 5530C-ARU3400

REPORT NUMBER: R11867511-E1

ISSUE DATE: 2018-02-02

Prepared for
KATHREIN SACHSEN GMBH
GEWERBEGEBIET MUEHLAU
LINDENSTRASSE 3
MUEHLAU, 09241 DE

Prepared by
UL LLC
12 LABORATORY DR.
RESEARCH TRIANGLE PARK, NC 27709 USA
TEL: (919) 549-1400

NVLAP TESTING

NVLAP LAB CODE 200246-0

Revision History

Ver.	Issue Date	Revisions	Revised By
1	2017-10-27	Initial Issue	Brian Kiewra
2	2017-12-01	Corrected OBW test data and revised OBW procedure writeup in Section 9.2.1.	Brian Kiewra
3	2017-12-11	Antenna gain was redeclared for the WIRA-40-LINEAR-FCC antenna from +10dBi to +13dBi. Remeasured output and average power using revised antenna gain and power setting.	Brian Kiewra
4	2017-12-18	Corrected internal antenna gain from +5.3 to +5.5.	Brian Kiewra
5	2018-01-10	Added “Upon request, the evidence is available to the FCC.” to Section 10.4.1	Brian Kiewra
6	2018-02-02	Additional testing for WIRA-30-CIRC-FCC antenna with declared gain of +8dBi	Brian Kiewra

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Kathrein Sachsen GMBH
Gewerbegebiet Muehlau
Lindenstrasse 3
Muehlau, 09241 DE

EUT DESCRIPTION: RFID Tag Reader

MODEL: ARU3400

SERIAL NUMBER: G0K2615205

DATE TESTED: 2017-09-20 to 2018-02-01

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Compliant
ISED RSS-247 Issue 2	Compliant
ISED RSS-GEN Issue 4	Compliant

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Approved & Released
For UL LLC By:

Jeffrey Moser
Operations Leader
UL – Consumer Technology Division

Prepared By:

Brian T. Kiewra
Project Engineer
UL – Consumer Technology Division

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, RSS-GEN Issue 4, RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Dr., Research Triangle Park, NC 27709, USA and 2800 Perimeter Park Dr., Suite B, Morrisville, NC 27560, USA.

12 Laboratory Dr., RTP, NC 27709
☐ Chamber A
☐ Chamber C

2800 Suite B Perimeter Park Dr., Morrisville, NC 27560
☒ Chamber NORTH
☐ Chamber SOUTH

The onsite chambers are covered under Industry Canada company address code 2180C with site numbers 2180C -1 through 2180C-4, respectively.

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0. The full scope of accreditation can be viewed at http://www.nist.gov/nvlap/.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY	Required by standard
Occupied Channel Bandwidth	2.00%	±5 %
RF output power, conducted	1.3 dB	±1,5 dB
Power Spectral Density, conducted	2.47 dB	±3 dB
Unwanted Emissions, conducted	2.94 dB	±3 dB
All emissions, radiated	5.36 dB	±6 dB
Temperature	2.26 °C	±3 °C
Supply voltages	2.40%	±3 %
Time	3.39%	±5 %

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an RFID tag reader.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)	Antenna Gain Config.
902.25 - 927.75	RFID	29.57	905.73	< 6 dBi
902.25 - 927.75	RFID	27.07	509.33	8 dBi
902.25 - 927.75	RFID	22.71	186.64	13 dBi

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal patch antenna, with a maximum gain of +5.5 dBi.
Also tested were 3 external antennas. These were chosen to represent worst-case gain for each antenna type. Note – for the Patch type antennas, the worst-case at or below 6 dBi and above 6 dBi were tested.

Below is a full list of external antennas:

Antenna	Gain (dBi)	Type
WIRA-70-CIRC-FCC	+5.3	Patch
WIRA-40-LINEAR-FCC	+13	Patch
SMSH-30-30-ETSI-FCC	-10	Near Field
WIRA-30-CIRC-FCC	+8	Patch

5.4. SOFTWARE AND FIRMWARE

Firmware installed was v3.00.08.

The test utility software used during testing was ReaderStart v3, rev. 3.00.04.2485.

5.5. WORST-CASE CONFIGURATION AND MODE

0.009 - 30MHz radiated emissions and power line conducted emissions were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.
All other radiated emissions ranges were run at low, mid, and high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y, and Z. It was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation. This held true for all antenna types both internal and all 4 external antennas.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	T450	MJ02USWM	NA
Power Supply	Mean Well	GST90A24	NA	NA
PoE	MOXA	INJ-24-T	TAFJB1062137	NA
Antenna	Kathrein Sachsen	SMSH-30-30-ETSI-FCC	G0I3904558	NA
Antenna	Kathrein Sachsen	WIRA-40-LINEAR-FCC	G0J0346936	NA
Antenna	Kathrein Sachsen	WIRA-70-CIRC-FCC	G1G3306562	NA
Antenna	Kathrein Sachsen	WIRA-30-CIRC-FCC	52010089	NA

I/O CABLES

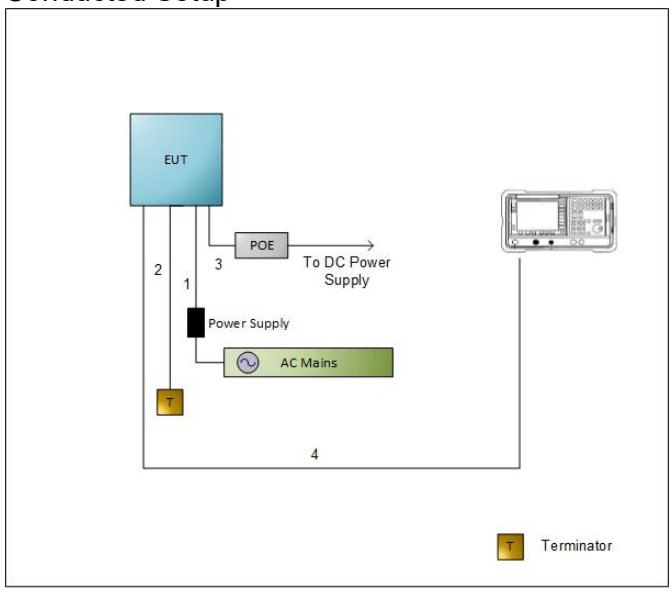
I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC	1	DC	Mains	1	AC/DC power supply
2	Proprietary	1	13-Pin	GPIO	1	Terminated
3	Proprietary	1	Ethernet	Communication	1	To PoE
4	Antenna	3	TNC	Coax	>1m	NA
5	Antenna	3	TNC	Coax	>1m	NA

TEST SETUP

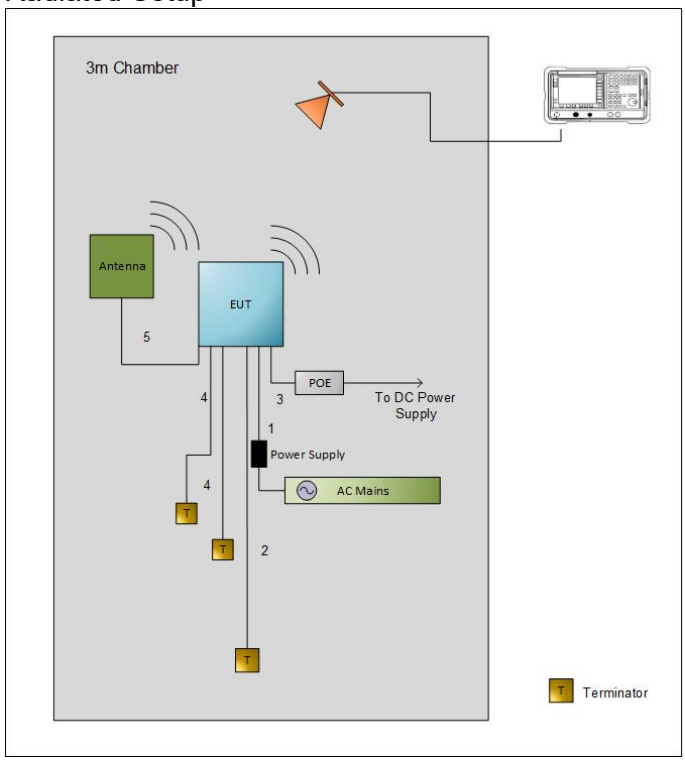
The EUT is setup as a standalone device

SETUP DIAGRAM FOR TESTS

Conducted Setup



Radiated Setup



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - North Chamber)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2016-12-28	2017-12-31
AT0059	Active Loop Antenna	ETS-Lindgren	6502	2017-06-05	2018-06-05
AT0073	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2017-07-18	2018-07-18
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2017-04-05	2018-04-05
N-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2017-09-15	2018-09-15
N-SAC02	Gain-loss string: 30-1000MHz	Various	Various	2017-06-11	2018-06-11
N-SAC03	Gain-loss string: 1-18GHz	Various	Various	2017-08-18	2018-08-18
SA0027	Spectrum Analyzer	Agilent	N9030A	2017-03-16	2018-03-16
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
BRF007	902-928MHz Band-reject Filter	Micro-Tronics	BRC17691	2017-03-03	2018-03-03
HPF009	1GHz High-pass Filter	Micro-Tronics	HPM17672	2017-03-20	2018-03-20
s/n 161024690	Environmental Meter	Fisher Scientific	15-077-963	2016-12-21	2018-12-21

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
SA0026	Spectrum Analyzer	Keysight Technologies	N9030A	2017-02-17	2018-02-28
PWS001	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	E9323A	2016-05-23	2018-05-23
PWS001	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2016-05-23	2018-05-23
s/n 161024690	Environmental Meter	Fisher Scientific	15-077-963	2016-12-21	2018-12-21
MM0168	True RMS Multimeter	Agilent	U1232A	2017-09-21	2018-09-30
76021	DC Regulated Power Supply	CircuitSpecialists .Com	CSI3005X5	N/A	N/A

Test Equipment Used - Line-Conducted Emissions – Voltage

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL076	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3476-240	2017-06-12	2018-06-12
s/n 160938893	Environmental Meter	Fisher Scientific	14-650-118	2016-11-02	2018-11-02
LISN003	LISN, 50-ohm/50-uH, 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50-25-2-01-550V	2017-08-22	2018-08-22
PRE0101521 (75141)	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2017-08-23	2018-08-23
TL001	Transient Limiter, 0.009-30MHz	Com-Power	LIT-930A	2017-06-12	2018-06-12
PS214	AC Power Source	Elgar	CW2501M (s/n 1523A02396)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
MM0167	Multi-meter	Agilent	U1232A	2017-09-21	2018-09-30
LISN008	LISN, 50-ohm/50-uH, 2-conductor, 25A (For support gear only.)	Solar Electronics	8012-50-R-24-BNC	2017-08-22	2018-08-22

7. MEASUREMENT METHODS

Duty Cycle: KDB 558074 Zero-Span Spectrum Analyzer Method

20 dB BW: ANSI C63.10 Section 6.9.2.

99% Occupied Bandwidth: ANSI C63.10-2013, Section 6.9.3

Hopping Frequency Separation: ANSI C63.10 Section 7.8.2

Number of Hopping Channels: ANSI C63.10 Section 7.8.3

Average Time of Occupancy: ANSI C63.10 Section 7.8.4

Output Power: ANSI C63.10 Section 7.8.5

Out-of-band emissions in non-restricted bands: ANSI C63.10 Section 7.8.6 & 7.8.8

Out-of-band emissions in restricted bands: ANSI C63.10:2013 Sections 6.3-6.6

Line Conducted Emissions: ANSI C63.10:2013 Section 6.2

9. ANTENNA PORT TEST RESULTS

Note: All conducted tests were performed at a power setting of 30dBm, except power, which was performed at both 23dBm, 28dBm, and 30dBm.

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

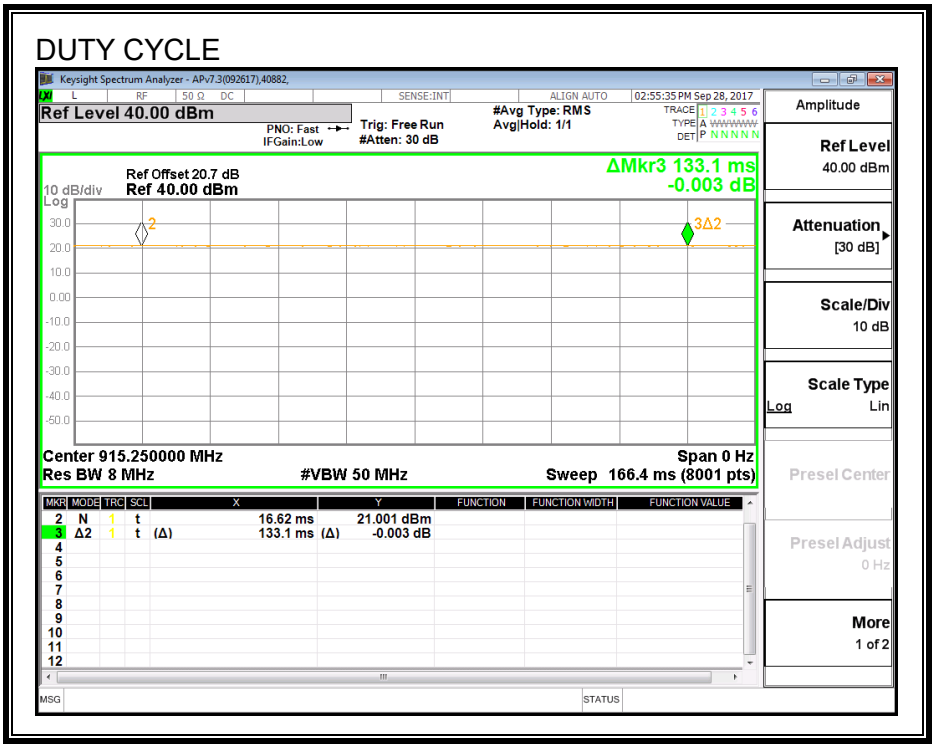
PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
900 MHz band						
	133.000	133	1.000	100.00%	0.00	N/A

DUTY CYCLE PLOTS



Test Information

Date: 2017-09-28
Tester: Jeffrey Cabrera

9.2. RFID

9.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz. Test per FCC §15.247(a)(1)(i); IC RSS-247 5.1 (1), RSS-Gen 6.6.

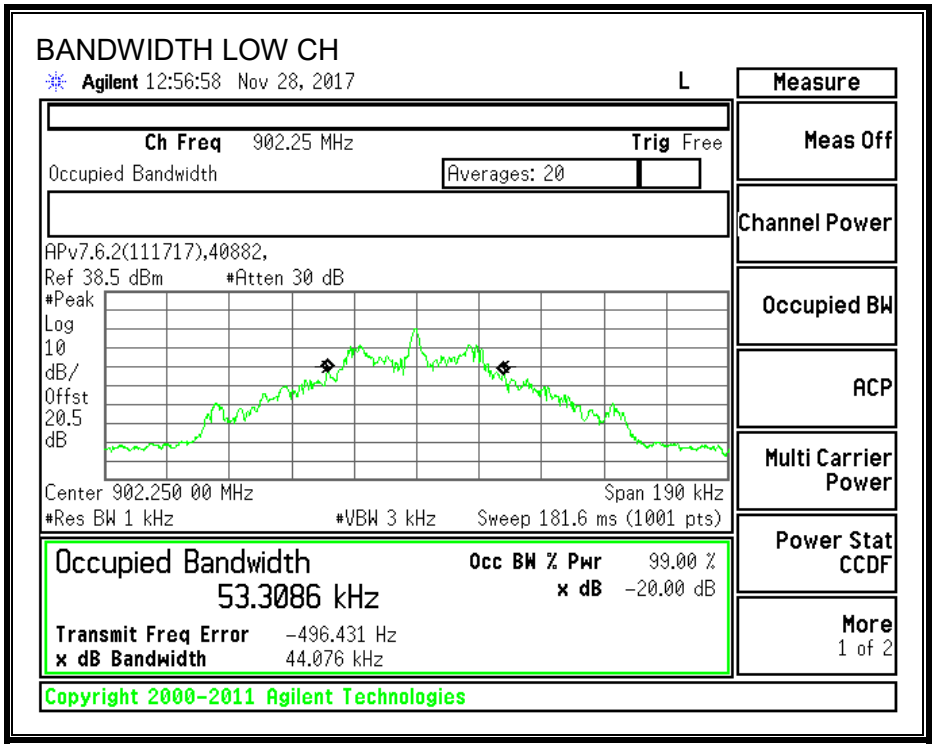
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1-5% of the 20 dB bandwidth and 99% Occupied Bandwidth. The VBW is set to approximately 3x RBW. The sweep time is coupled.

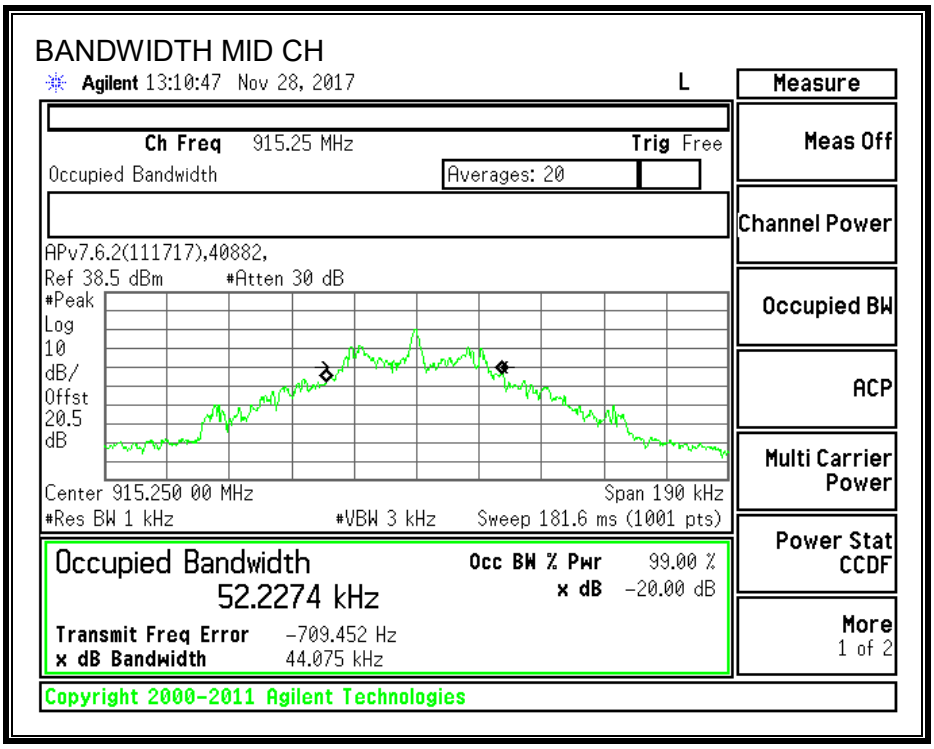
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	902.25	44.076	53.3086
Middle	915.25	44.075	52.2274
High	927.75	43.354	51.1272

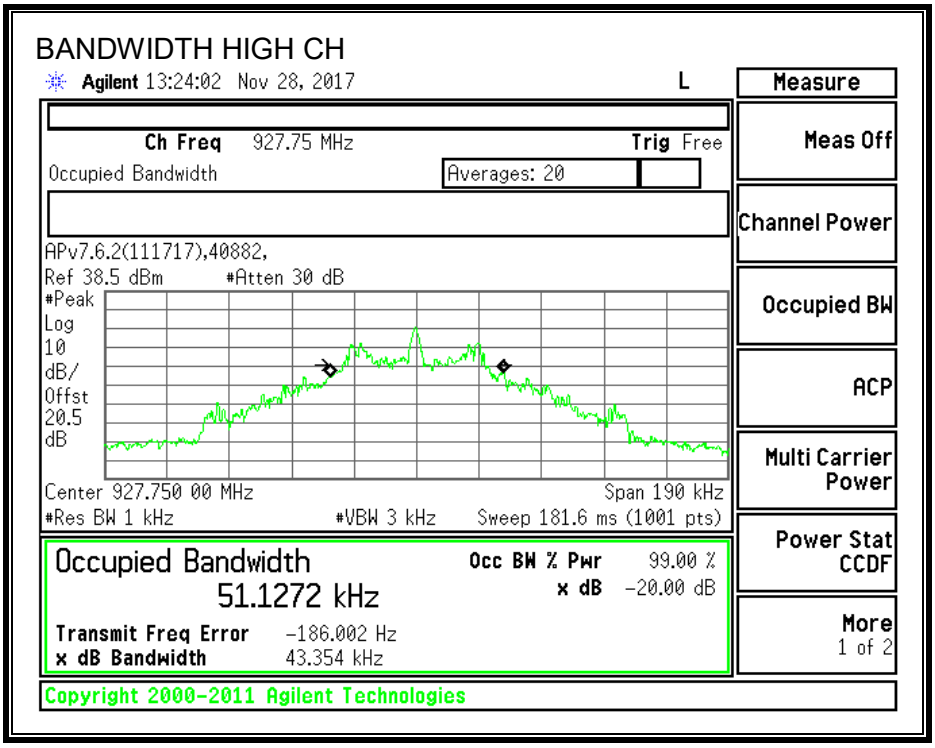
Test Information
Test Date: 2017-11-28
Tested By: Jeffrey Cabrera



BANDWIDTH MID CH



BANDWIDTH HIGH CH



9.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

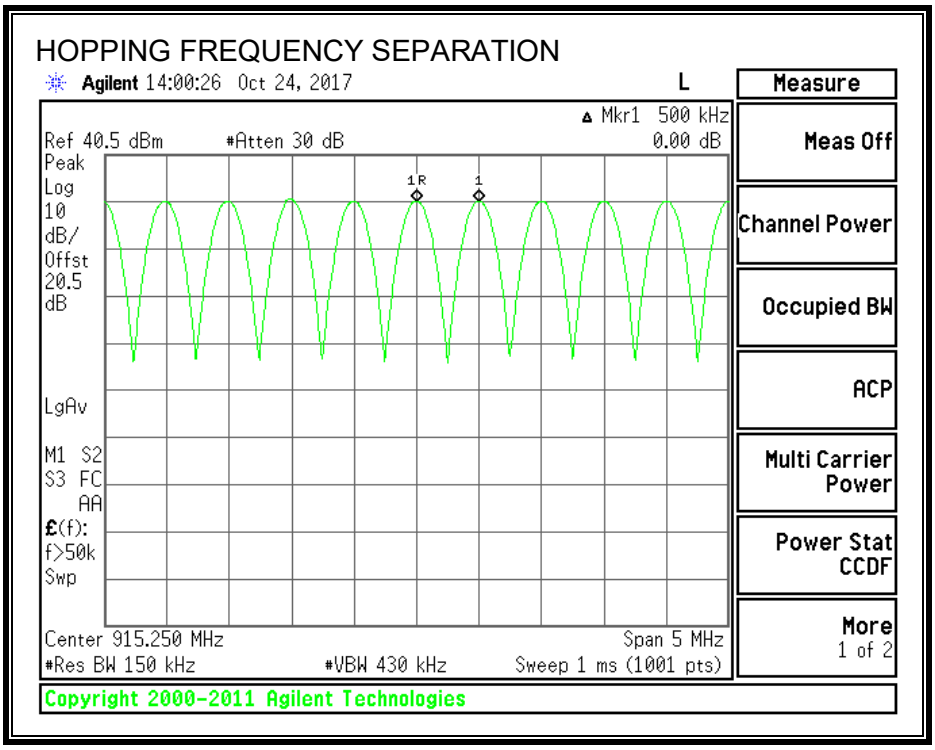
IC RSS-247 5.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 30% of channel spacing (approx.. 150 kHz) and the VBW is set such that VBW ≥ RBW. The sweep time is auto.

HOPPING FREQUENCY SEPARATION



Ch. A (MHz)	Ch. B (MHz)	Ch. 1 to Ch. 2 Sep. (MHz)	Max. 20 dB BW (MHz)	Margin (MHz)
915.25	915.75	0.500	0.044	-0.456

Test Information

Test Date: 2017-10-24
Tested By: Jeffrey Cabrera

9.2.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (i)
IC RSS-247 5.1 (c)

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

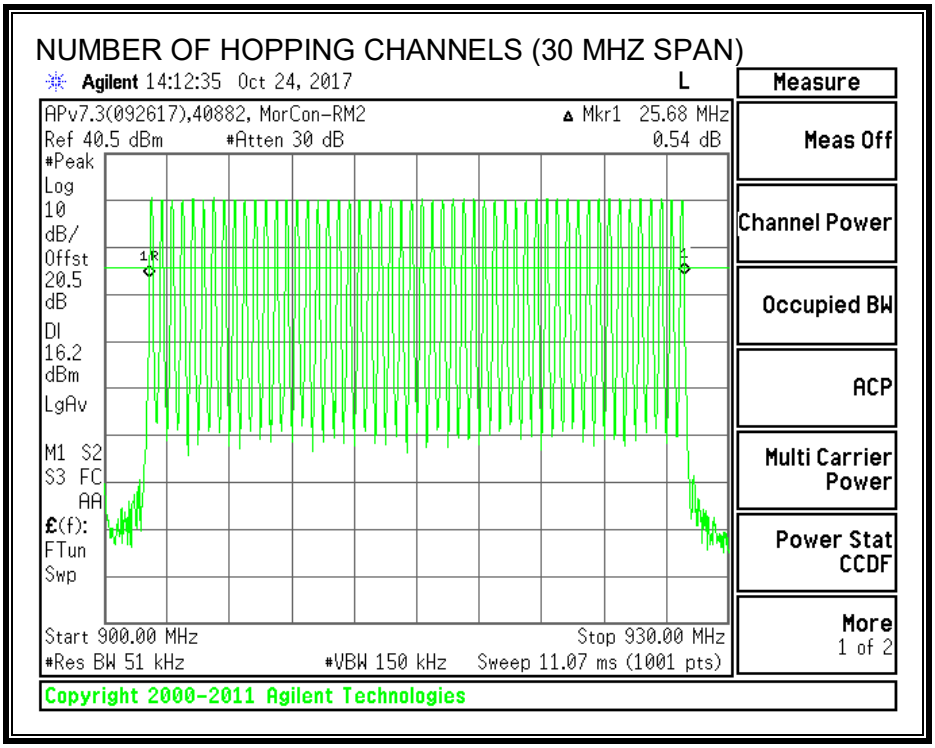
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps for visibility of the entire span. Then, smaller spans are set to more clearly identify the channels. The RBW is set to 30% of the channel spacing or 20 dB BW, whichever is smaller (approx. 15 kHz). The analyzer is set to Max Hold.

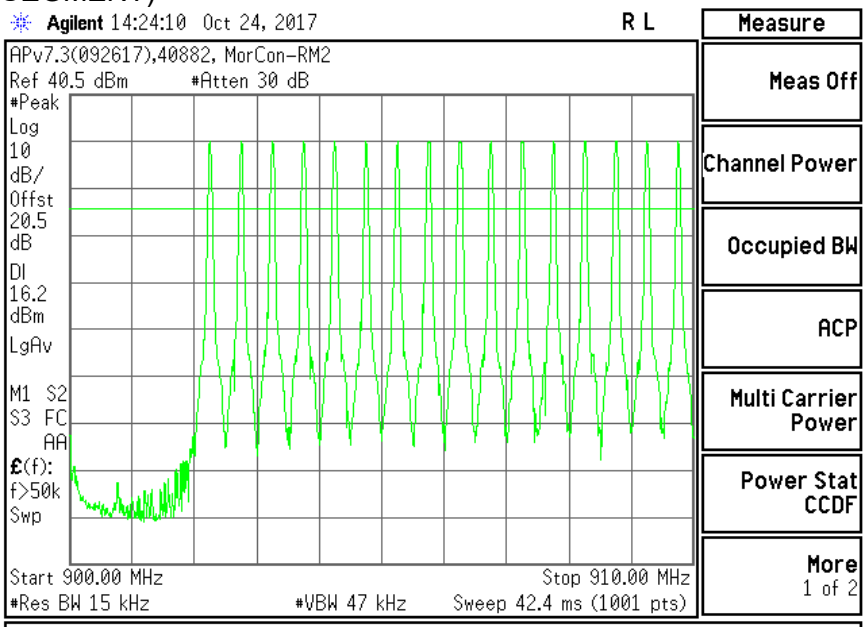
RESULTS

Normal Mode: 52 Channels observed.

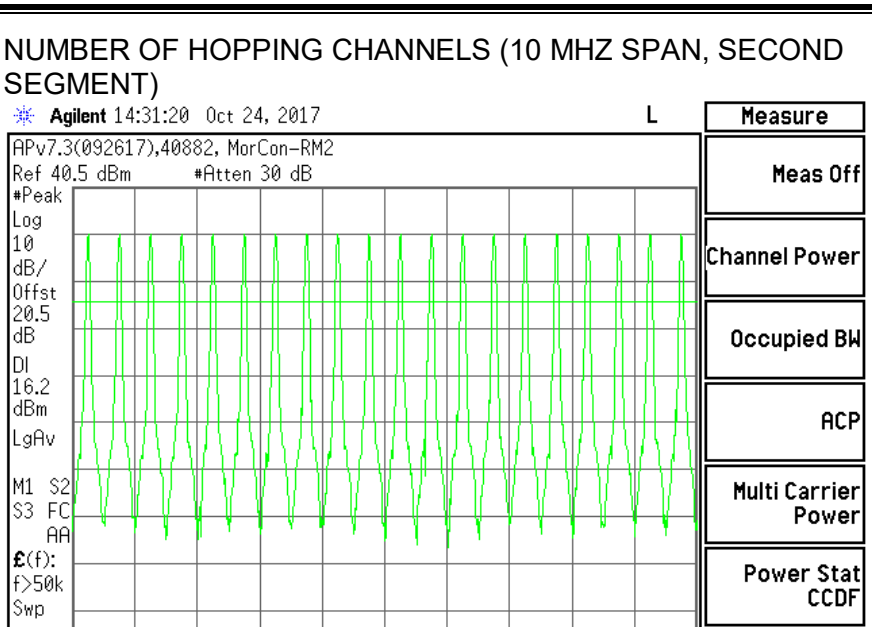
NUMBER OF HOPPING CHANNELS



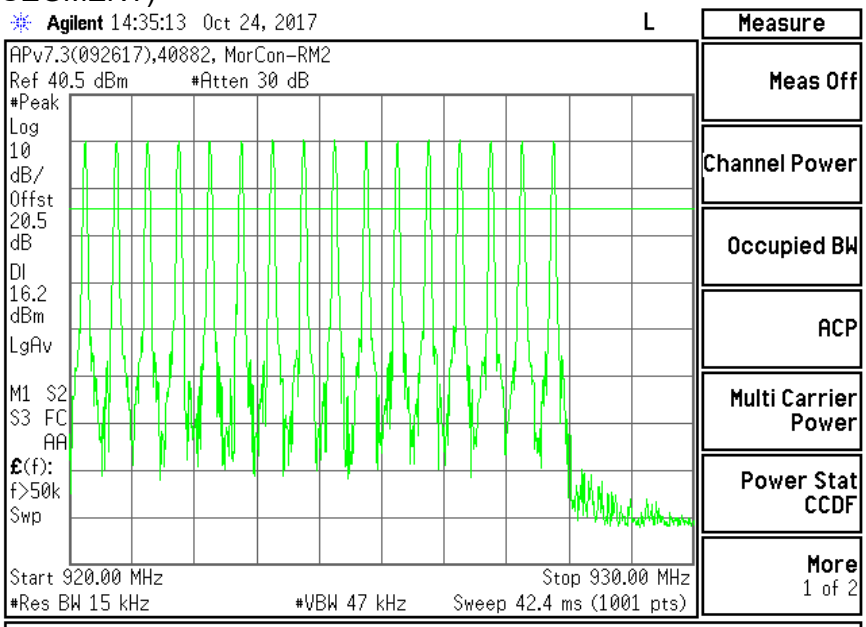
NUMBER OF HOPPING CHANNELS (10 MHZ SPAN, FIRST SEGMENT)



NUMBER OF HOPPING CHANNELS (10 MHZ SPAN, SECOND SEGMENT)



NUMBER OF HOPPING CHANNELS (10 MHZ SPAN, THIRD SEGMENT)



Test Information

Test Date: 2017-10-24
Tested By: Jeffrey Cabrera

9.2.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (i)

IC RSS-247 5.1 (c)

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 20-second period. If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 10 -second period.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 2 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 20 second period is equal to 10 * (# of pulses in 2 s) * pulse width.

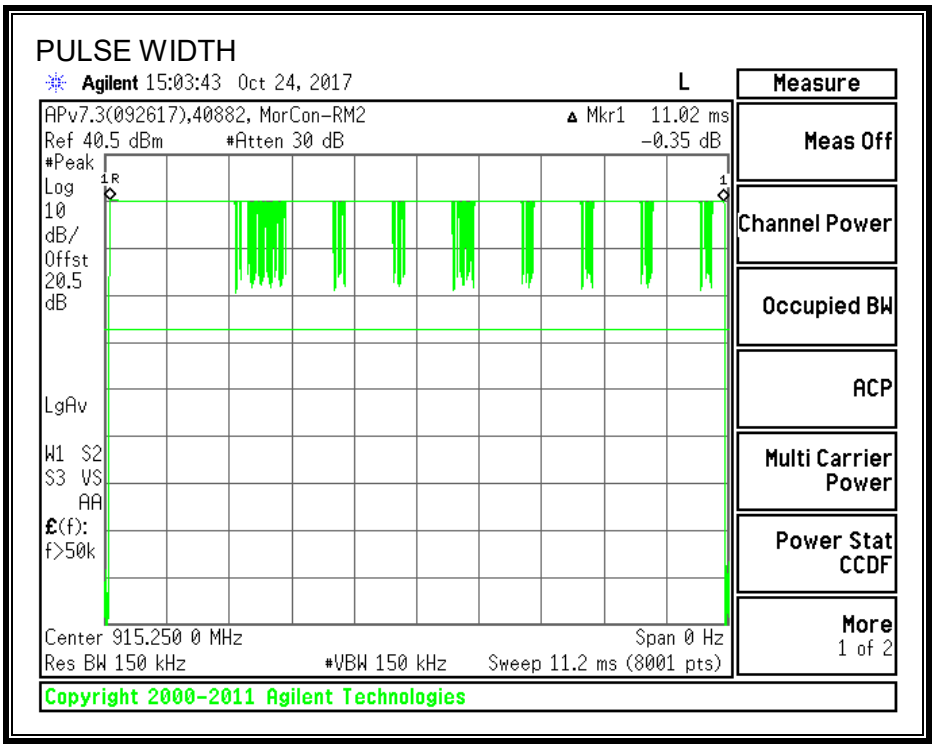
RESULTS

	Pulse Width (msec)	Number of Pulses in 2 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
Normal Mode					
	11.02	1	0.110	0.4	-0.290

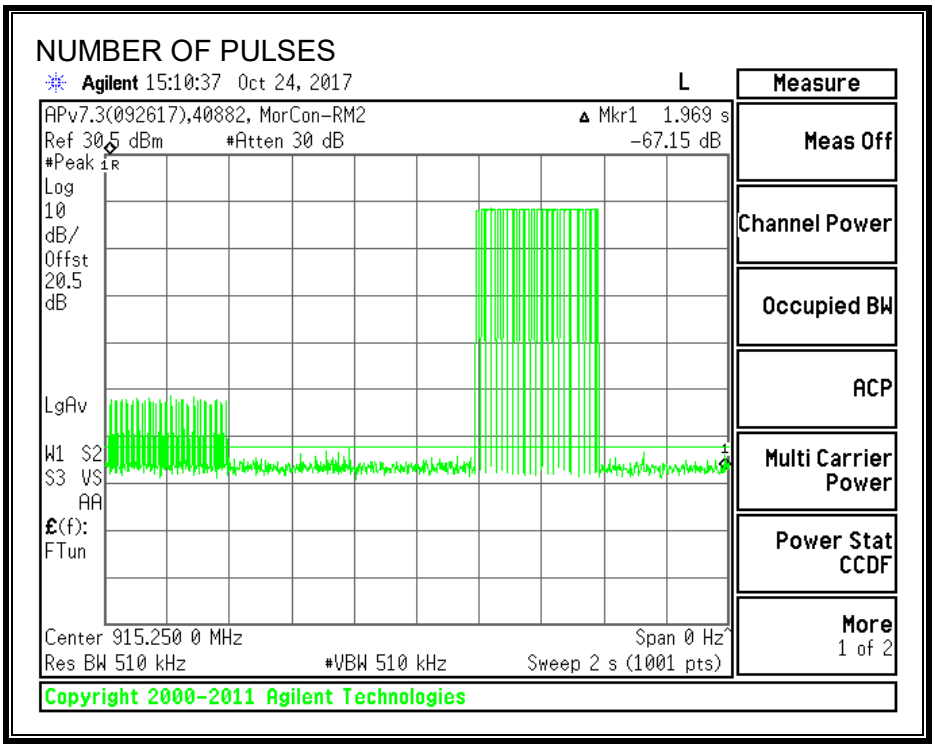
Test Information

Test Date: 2017-10-24
Tested By: Jeffrey Cabrera

PULSE WIDTH



NUMBER OF PULSES IN 2 SECOND OBSERVATION PERIOD



9.2.5. OUTPUT POWER

LIMIT

§15.247 (b) (2) (4)

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels.

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RSS-247 Clause 5.4 (a)

For FHSS operating in the band 902-928 MHz, the maximum peak conducted output power shall not exceed 1.0 W, and the e.i.r.p. shall not exceed 4 W if the hopset uses 50 or more hopping channels; the maximum peak conducted output power shall not exceed 0.25 W and the e.i.r.p. shall not exceed 1 W if the hopset uses less than 50 hopping channels.

TEST PROCEDURE

The transmitter output was connected to a power meter equipped with a power sensor capable of measuring peak power.

RESULTS – 30dBm setting

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	902.25	29.44	5.50	30	-0.56
Middle	915.25	29.57	5.50	30	-0.43
High	927.75	29.50	5.50	30	-0.50

RESULTS – 23dBm setting

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	902.25	22.49	13.00	23	-0.51
Middle	915.25	22.66	13.00	23	-0.34
High	927.75	22.71	13.00	23	-0.29

RESULTS – 28dBm setting

Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	902.25	27.07	8.00	28	-0.93
Middle	915.25	26.97	8.00	28	-1.03
High	927.75	27.27	8.00	28	-0.73

Test Information

Test Date: 2017-09-19, 2017-12-08, 2018-02-02
Tested By: Graham Allen / Niklas Haydon, Jeffrey Cabrera

9.2.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 20.72 dB (including 20 dB pad and 0.72 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Script 30dBm

Channel	Frequency (MHz)	Average Power (dBm)
Low	902.25	29.26
Middle	915.25	29.35
High	927.75	29.33

Script 23dBm

Channel	Frequency (MHz)	Average Power (dBm)
Low	902.25	22.44
Middle	915.25	22.59
High	927.75	22.51

Script 28dBm

Channel	Frequency (MHz)	Average Power (dBm)
Low	902.25	27.01
Middle	915.25	26.63
High	927.75	27.21

Test Information

Test Date: 2017-9-19, 2018-02-02
Tested By: Graham Allen / Niklas Haydon, Jeffrey Cabrera

9.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

IC RSS-247 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

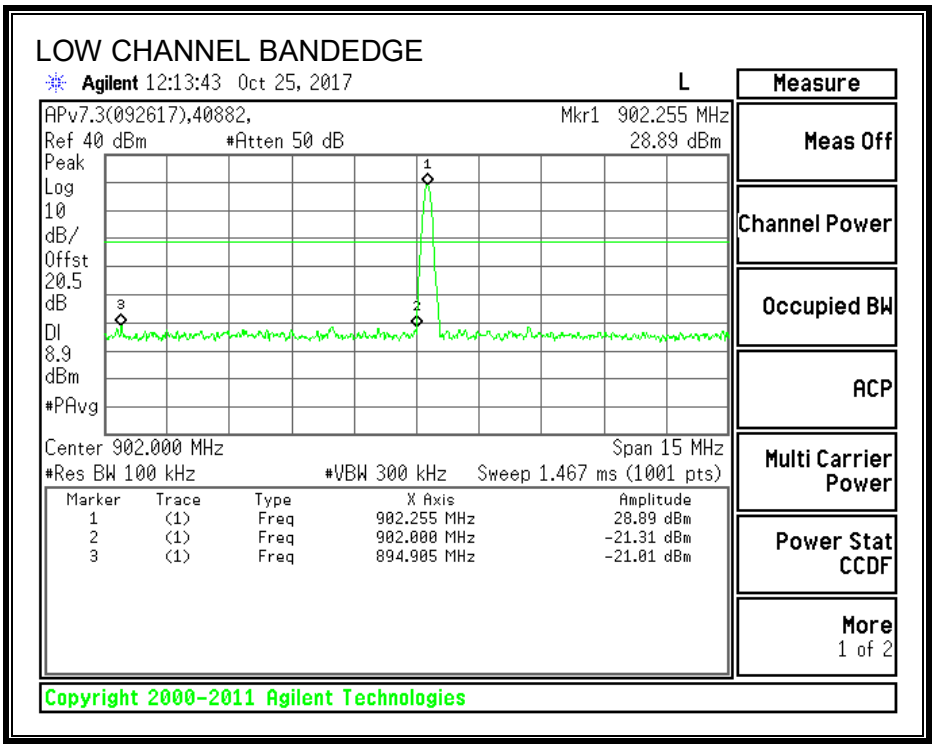
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

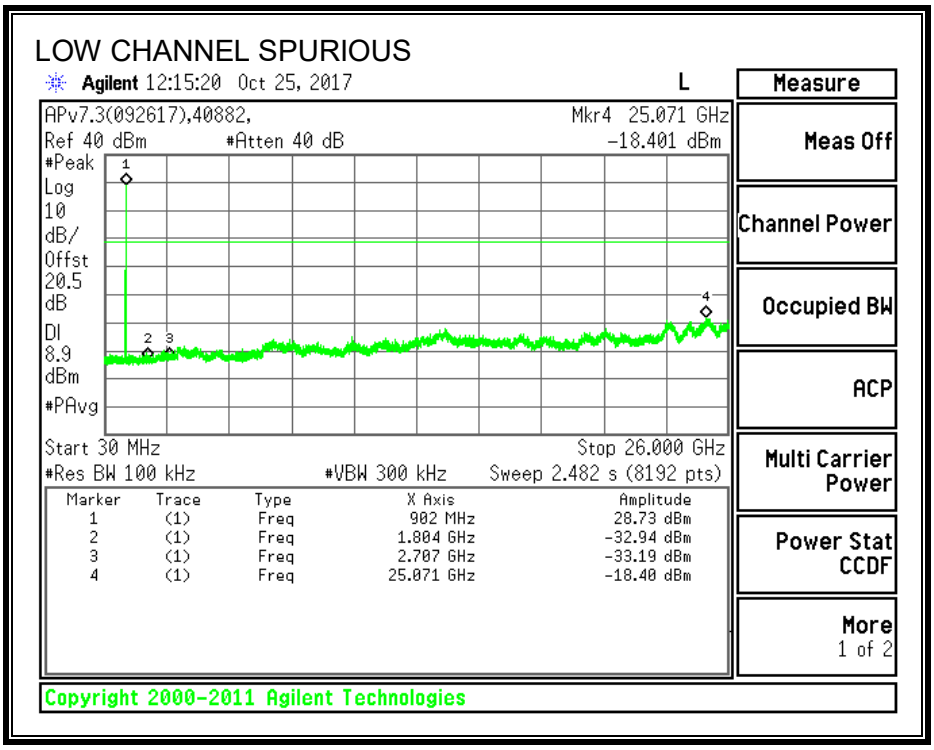
The authorized bandedges at 902 MHz and 928 MHz are investigated with the transmitter set to the non-hopping and normal hopping mode.

Test Information

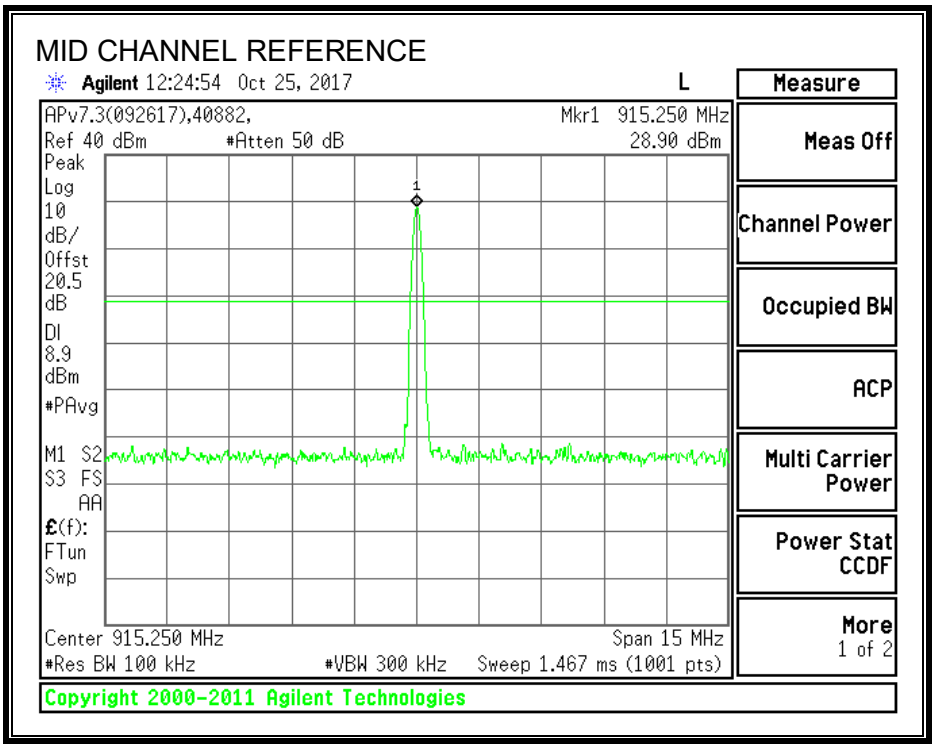
Test Date: 2017-09-28, 2017-10-24, 2017-10-25
Tested By: Jeffrey Cabrera

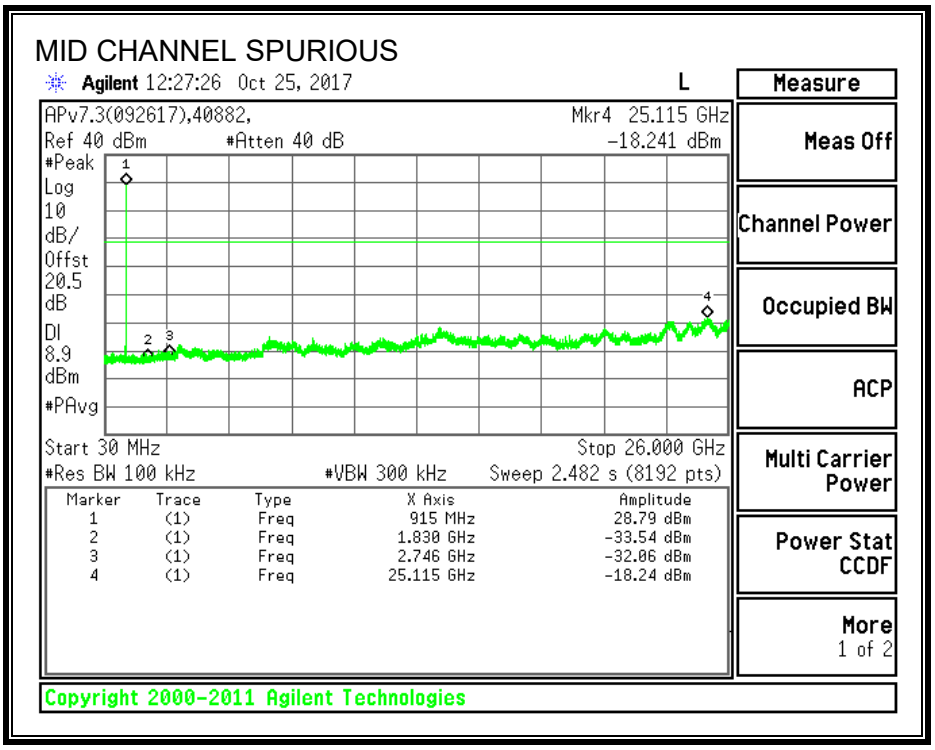
SPURIOUS EMISSIONS, LOW CHANNEL



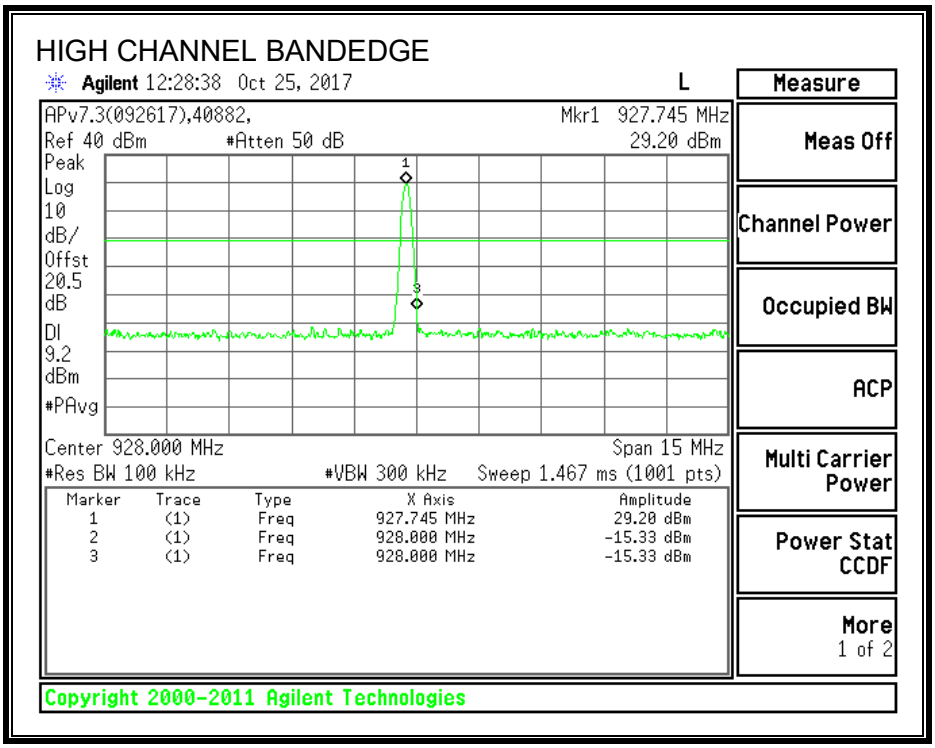


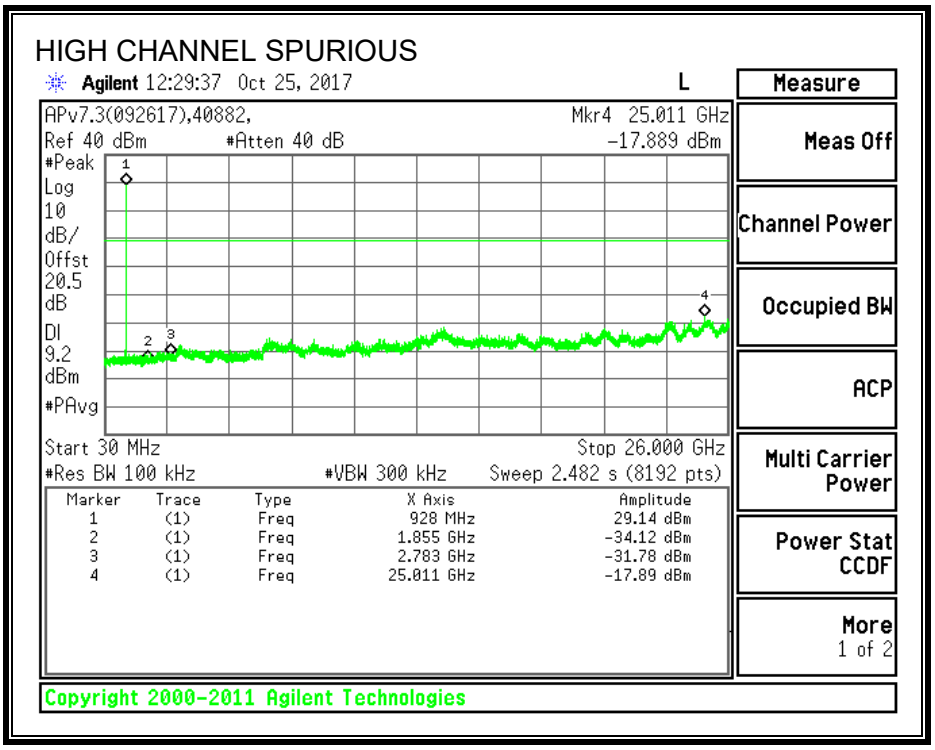
SPURIOUS EMISSIONS, MID CHANNEL





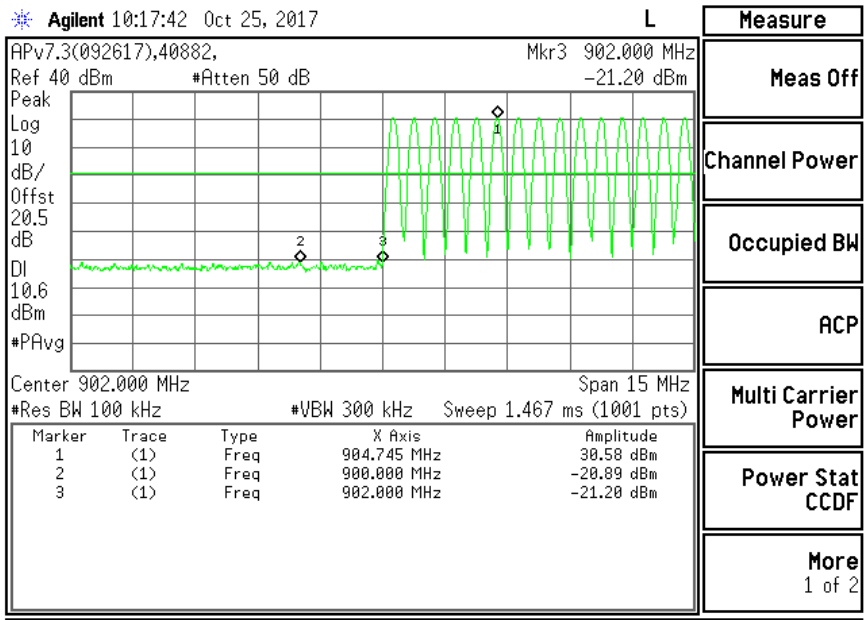
SPURIOUS EMISSIONS, HIGH CHANNEL



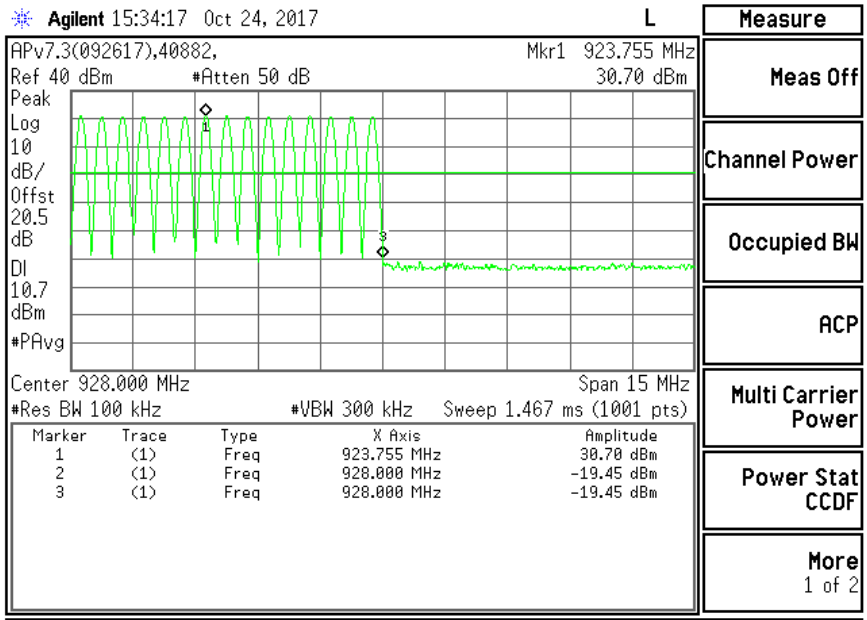


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209
IC RSS-GEN Clause 8.9 (Transmitter)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz measurements and 1.5 m above the ground plane for above 1GHz measurements. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements for the 30-1000 MHz range, 9 kHz for peak detection measurements or 9 kHz for quasi-peak detection measurements for the 0.15-30 MHz range and 200 Hz for peak detection measurements or 200 Hz for quasi-peak detection measurements for the 9 to 150 kHz range. Peak detection is used unless otherwise noted as quasi-peak.

For peak measurements above 1 GHz, the resolution bandwidth is set to 1 MHz and the video bandwidth is set to 3 MHz. For average measurements above 1GHz, the resolution bandwidth and video bandwidth are set as described in ANSI C63.10:2013 for the applicable measurement. The particular averaging method used for this test program was by measuring using a Peak detector with the resolution bandwidth set to 1MHz and a reduced video bandwidth, based on 1/Ton where Ton is the transmit on time.

The spectrum from 30 MHz to 10 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. For 9 kHz to 30 MHz the worst-case channel was selected.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

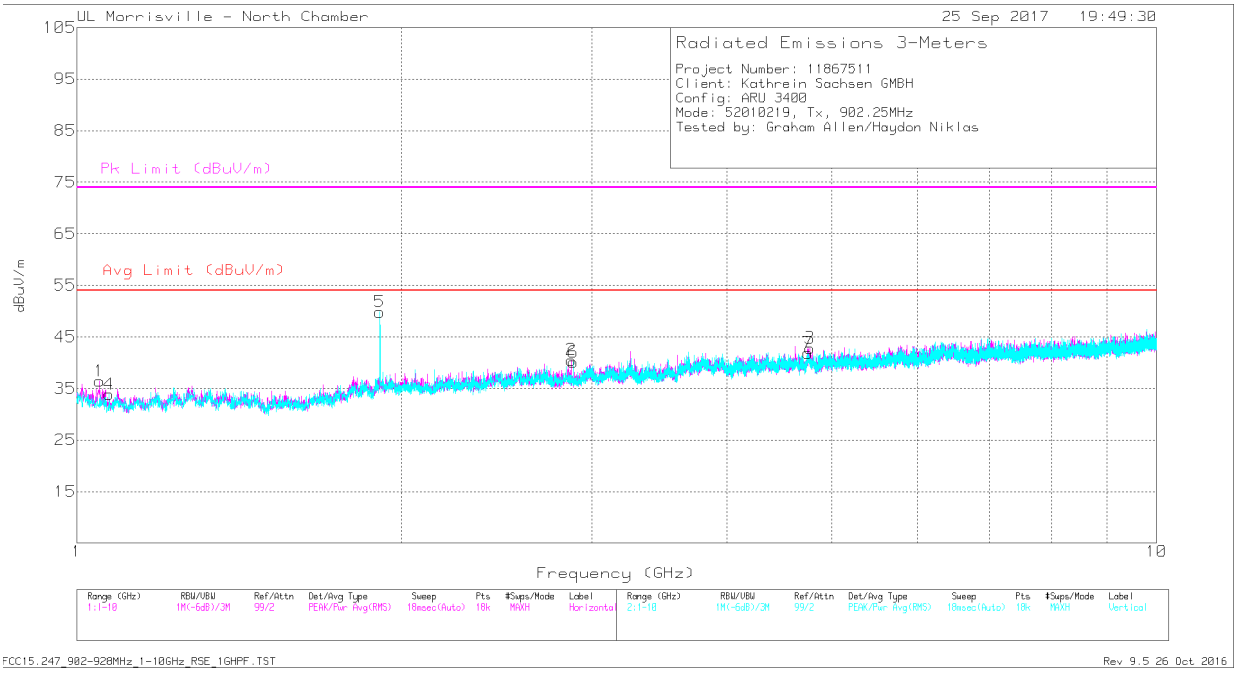
10.2. TX ABOVE 1 GHz

10.2.1. RFID – SMSH-30-30-ETSI-FCC Antenna

HARMONICS AND SPURIOUS EMISSIONS

Note – The gain of this antenna is -10 dBi, therefore the conducted power setting was 30 dBm for this test.

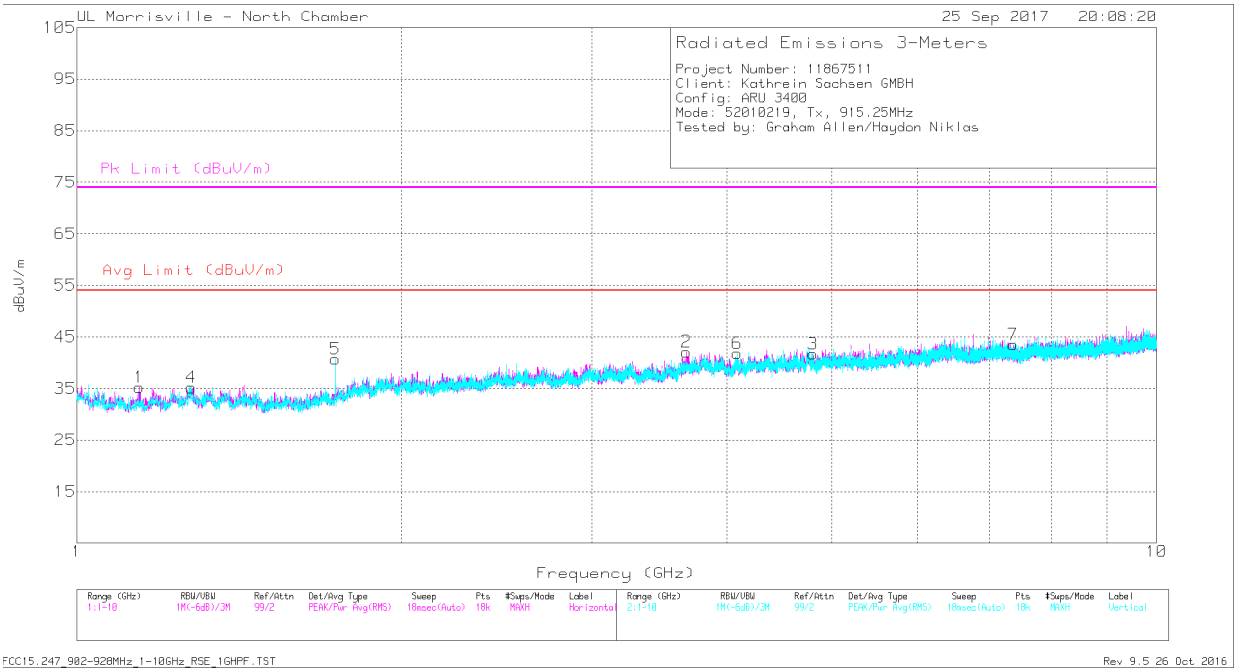
Low Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	HPF009 (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.05	44.73	Pk	27	-36.7	1.4	36.43	54	-17.57	74	-37.57	0-360	299	H
2	* 2.87	41.23	Pk	32.2	-33.3	.4	40.53	54	-13.47	74	-33.47	0-360	299	H
3	* 4.777	40.62	Pk	34.1	-32.2	.3	42.82	54	-11.18	74	-31.18	0-360	399	H
4	* 1.071	42.25	Pk	27.1	-36.7	1.2	33.85	54	-20.15	74	-40.15	0-360	102	V
6	* 2.883	40.78	Pk	32.2	-33.3	.4	40.08	54	-13.92	74	-33.92	0-360	302	V
7	* 4.758	39.59	Pk	34.1	-32.1	.3	41.89	54	-12.11	74	-32.11	0-360	400	V
5	1.909	53.03	Pk	31.3	-34.9	.4	49.83	54	-4.17	74	-24.17	0-360	202	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

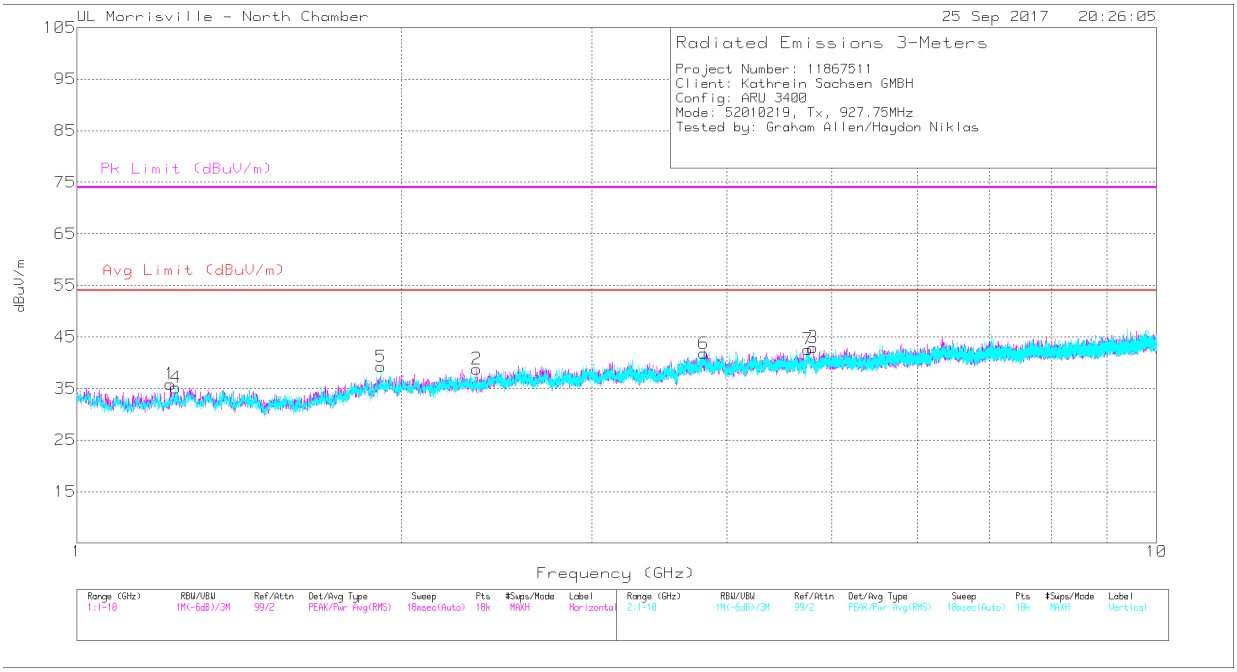
Middle Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	HPF009 (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.143	43.31	Pk	27.8	-36.6	.7	35.21	54	-18.79	74	-38.79	0-360	299	H
2	* 3.67	41.28	Pk	33	-32.6	.4	42.08	54	-11.92	74	-31.92	0-360	199	H
3	* 4.81	39.36	Pk	34.1	-32.1	.3	41.66	54	-12.34	74	-32.34	0-360	299	H
4	* 1.276	41.67	Pk	29.2	-36.2	.5	35.17	54	-18.83	74	-38.83	0-360	400	V
6	* 4.088	40.42	Pk	33.4	-32.5	.5	41.82	54	-12.18	74	-32.18	0-360	400	V
7	* 7.363	37.23	Pk	35.6	-29.6	.3	43.53	54	-10.47	74	-30.47	0-360	102	V
5	1.736	46.22	Pk	29.3	-35.3	.5	40.72	54	-13.28	74	-33.28	0-360	202	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

High Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	HPF009 (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.221	42.95	Pk	28.6	-36.3	.6	35.85	54	-18.15	74	-38.15	0-360	399	H
2	* 2.347	40.88	Pk	31.6	-34.1	.4	38.78	54	-15.22	74	-35.22	0-360	299	H
3	* 4.81	40.63	Pk	34.1	-32.1	.3	42.93	54	-11.07	74	-31.07	0-360	99	H
4	* 1.235	42.17	Pk	28.7	-36.3	.6	35.17	54	-18.83	74	-38.83	0-360	400	V
6	* 3.806	40.41	Pk	33.5	-32.6	.5	41.81	54	-12.19	74	-32.19	0-360	400	V
7	* 4.753	40.3	Pk	34.1	-32.1	.3	42.6	54	-11.4	74	-31.4	0-360	102	V
5	1.913	42.32	Pk	31.4	-34.9	.4	39.22	54	-14.78	74	-34.78	0-360	400	V

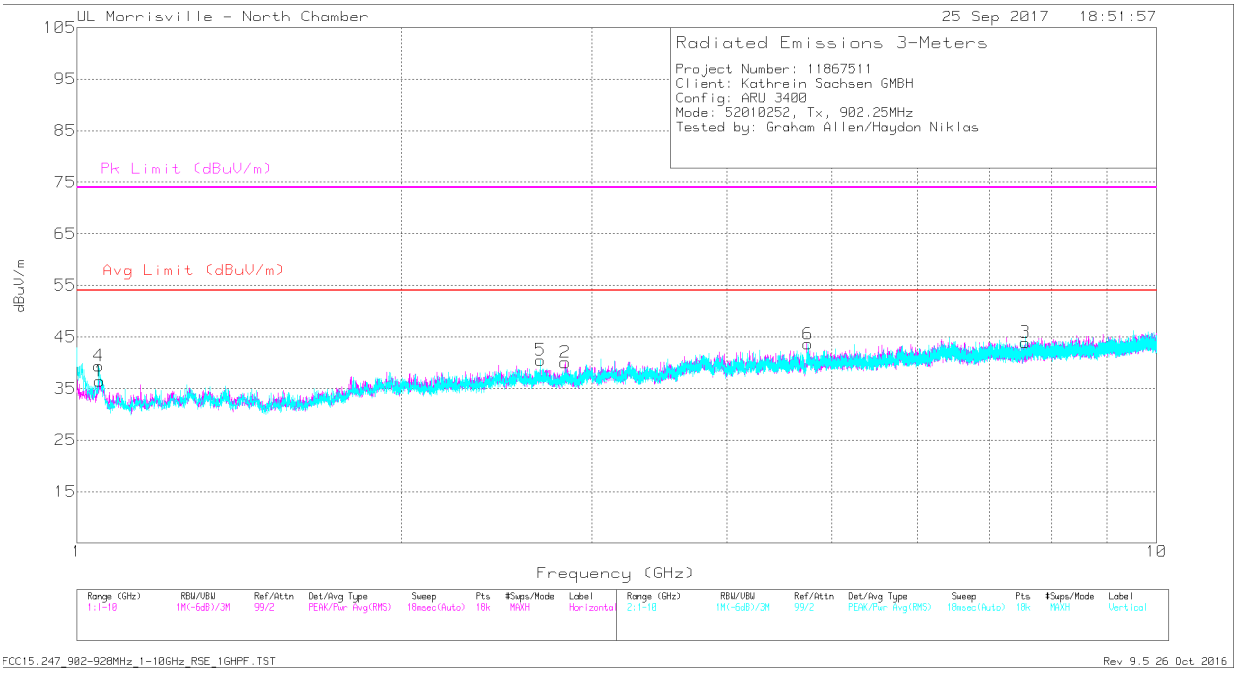
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

10.2.2. RFID – WIRA-40-LINEAR-FCC ANTENNA

HARMONICS AND SPURIOUS EMISSIONS

Note – Antenna gain was redeclared as +13dBi after test, the gain of this antenna was originally declared as +10 dBi, and the higher power setting of 26 dBm was used for this test.

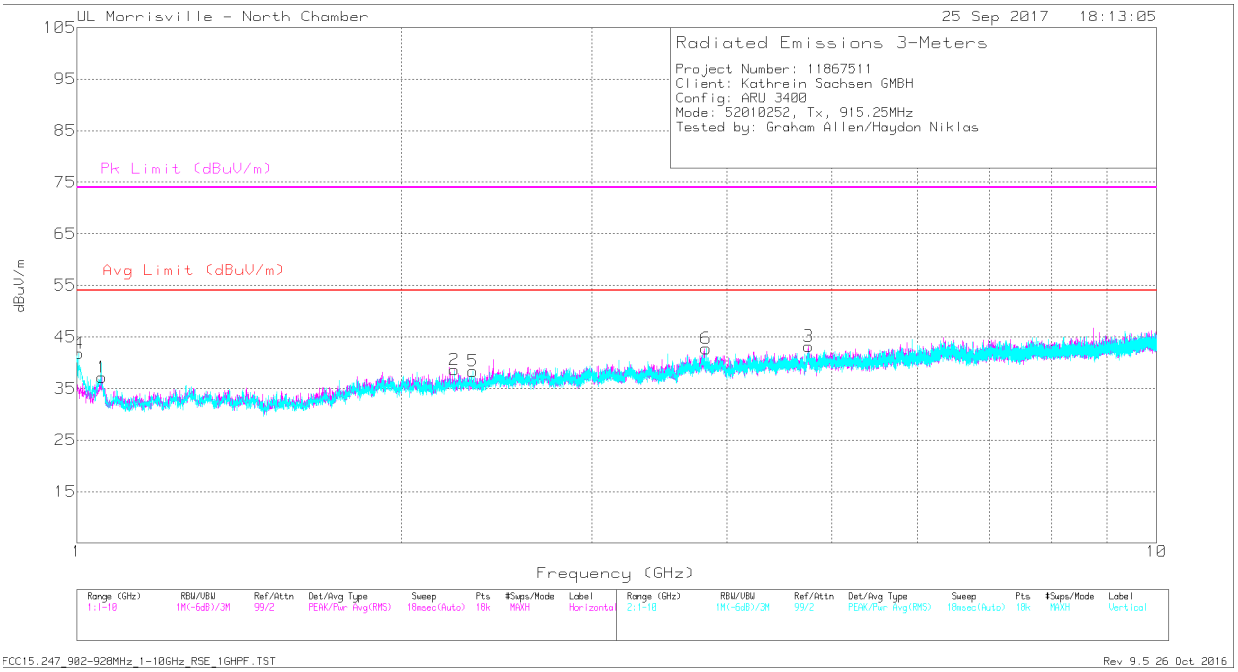
Low Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	HPF009 (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.05	44.73	Pk	27	-36.7	1.4	36.43	54	-17.57	74	-37.57	0-360	199	H
2	* 2.834	41.05	Pk	32	-33.4	.4	40.05	54	-13.95	74	-33.95	0-360	399	H
3	* 7.556	37.02	Pk	35.7	-29.1	.3	43.92	54	-10.08	74	-30.08	0-360	99	H
4	* 1.048	47.7	Pk	27	-36.7	1.4	39.4	54	-14.6	74	-34.6	0-360	202	V
5	* 2.688	41.21	Pk	32.4	-33.5	.4	40.51	54	-13.49	74	-33.49	0-360	399	V
6	* 4.755	41.32	Pk	34.1	-32.1	.3	43.62	54	-10.38	74	-30.38	0-360	102	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

Middle Channel

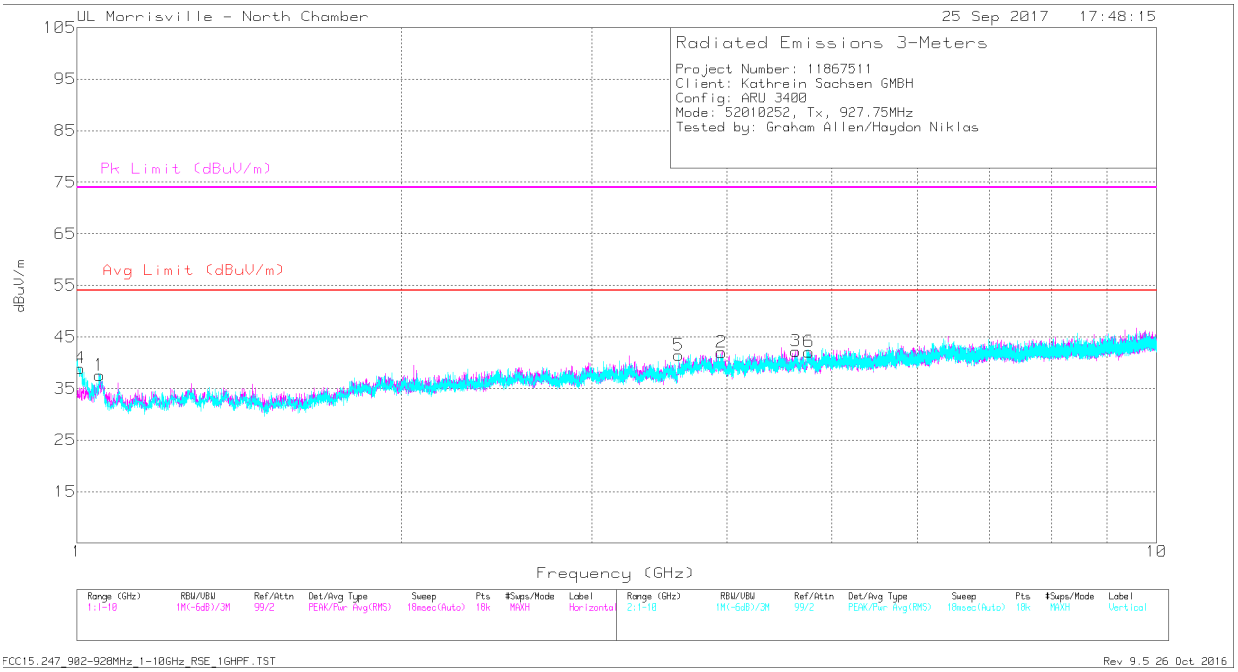


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	HPF009 (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.055	45.56	Pk	27	-36.7	1.3	37.16	54	-16.84	74	-36.84	0-360	199	H
2	* 2.236	40.8	Pk	31.8	-34.3	.3	38.6	54	-15.4	74	-35.4	0-360	99	H
3	* 4.761	40.77	Pk	34.1	-32	.3	43.17	54	-10.83	74	-30.83	0-360	399	H
4	* 1.004	48.8	Pk	27.3	-36.9	2.6	41.8	54	-12.2	74	-32.2	0-360	202	V
5	* 2.327	40.74	Pk	31.5	-34.2	.3	38.34	54	-15.66	74	-35.66	0-360	301	V
6	* 3.827	41.35	Pk	33.4	-32.5	.5	42.75	54	-11.25	74	-31.25	0-360	399	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

High Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	HPF009 (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.05	45.88	Pk	27	-36.7	1.4	37.58	54	-16.42	74	-36.42	0-360	399	H
2	* 3.954	40.5	Pk	33.4	-32.3	.4	42	54	-12	74	-32	0-360	199	H
3	* 4.632	40.23	Pk	34.1	-32.4	.3	42.23	54	-11.77	74	-31.77	0-360	199	H
4	* 1.008	46.04	Pk	27.3	-36.9	2.5	38.94	54	-15.06	74	-35.06	0-360	102	V
5	* 3.61	40.66	Pk	32.9	-32.6	.5	41.46	54	-12.54	74	-32.54	0-360	102	V
6	* 4.765	39.81	Pk	34.1	-32.1	.3	42.11	54	-11.89	74	-31.89	0-360	400	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

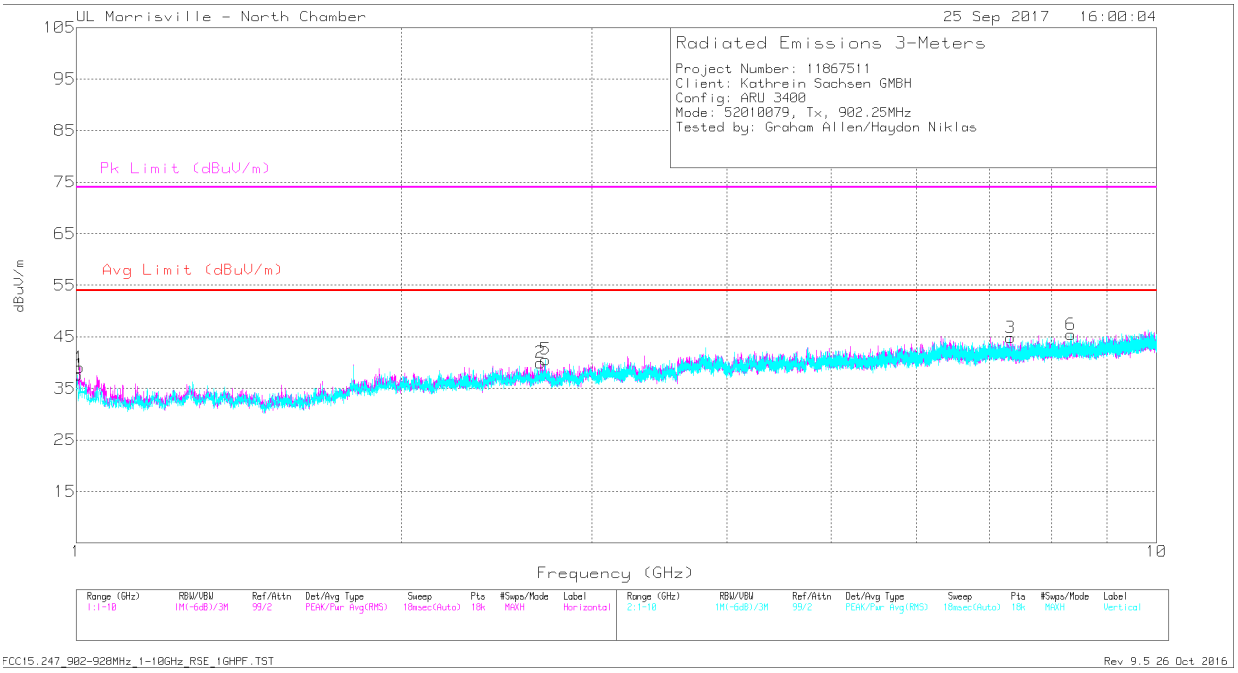
Pk - Peak detector

10.2.3. RFID – WIRA-70-CIRC-FCC Antenna

HARMONICS AND SPURIOUS EMISSIONS

Note – The gain of this antenna is +5.3 dBi, therefore the conducted power setting was 30 dBm for this test.

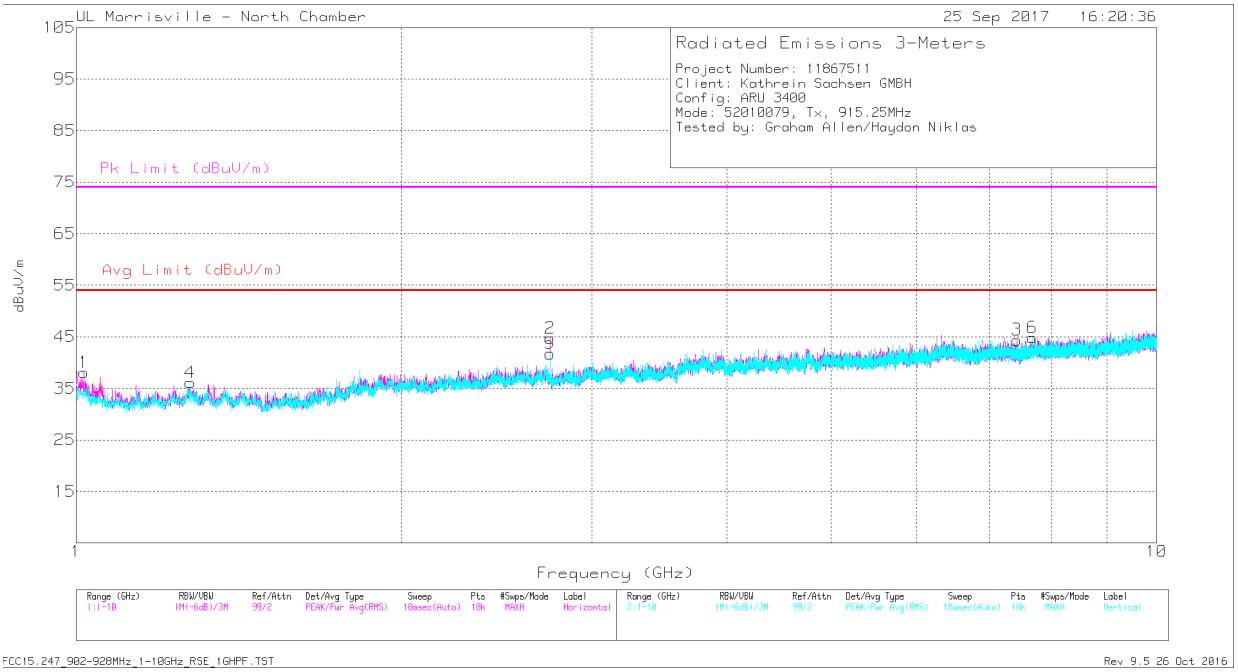
Low Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	HPF009 (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.007	46.19	Pk	27.3	-36.9	2.5	39.09	54	-14.91	74	-34.91	0-360	199	H
2	* 2.689	40.69	Pk	32.4	-33.5	.4	39.99	54	-14.01	74	-34.01	0-360	199	H
3	* 7.328	38.44	Pk	35.6	-29.5	.3	44.84	54	-9.16	74	-29.16	0-360	399	H
4	* 1.002	44.47	Pk	27.3	-36.9	2.7	37.57	54	-16.43	74	-36.43	0-360	302	V
5	* 2.72	41.51	Pk	32.2	-33.5	.4	40.61	54	-13.39	74	-33.39	0-360	400	V
6	* 8.328	38.23	Pk	35.9	-29	.3	45.43	54	-8.57	74	-28.57	0-360	202	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

Middle Channel

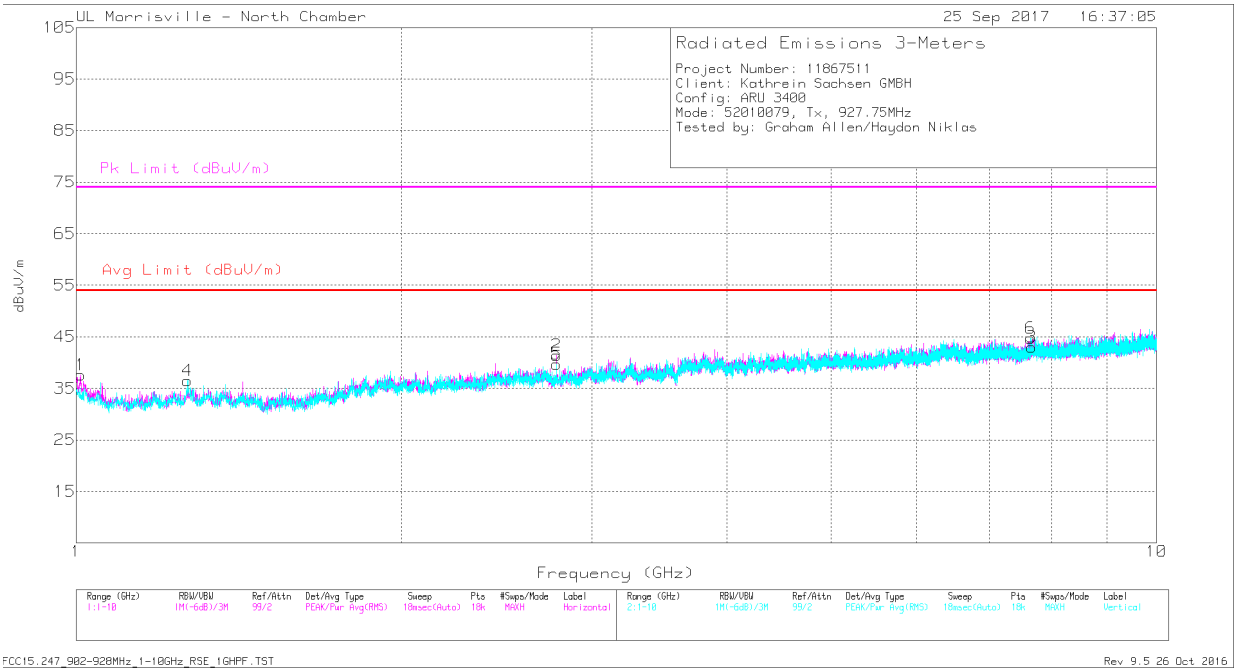


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	HPF009 (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.016	45.47	Pk	27.3	-36.9	2.2	38.07	54	-15.93	74	-35.93	0-360	99	H
2	* 2.745	45.72	Pk	32.2	-33.6	.4	44.72	54	-9.28	74	-29.28	0-360	99	H
3	* 7.426	37.61	Pk	35.6	-29.1	.3	44.41	54	-9.59	74	-29.59	0-360	199	H
4	* 1.275	42.58	Pk	29.2	-36.2	.5	36.08	54	-17.92	74	-37.92	0-360	102	V
5	* 2.745	42.73	Pk	32.2	-33.6	.4	41.73	54	-12.27	74	-32.27	0-360	202	V
6	* 7.67	37.95	Pk	35.7	-29.1	.3	44.85	54	-9.15	74	-29.15	0-360	302	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

High Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	HPF009 (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.009	44.81	Pk	27.3	-36.9	2.4	37.61	54	-16.39	74	-36.39	0-360	199	H
2	* 2.783	42.43	Pk	32.1	-33.5	.4	41.43	54	-12.57	74	-32.57	0-360	199	H
3	* 7.668	36.1	Pk	35.7	-29.1	.3	43	54	-11	74	-31	0-360	399	H
4	* 1.268	43	Pk	29.2	-36.2	.5	36.5	54	-17.5	74	-37.5	0-360	399	V
5	* 2.783	40.74	Pk	32.1	-33.5	.4	39.74	54	-14.26	74	-34.26	0-360	302	V
6	* 7.646	38	Pk	35.7	-29.3	.3	44.7	54	-9.3	74	-29.3	0-360	399	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

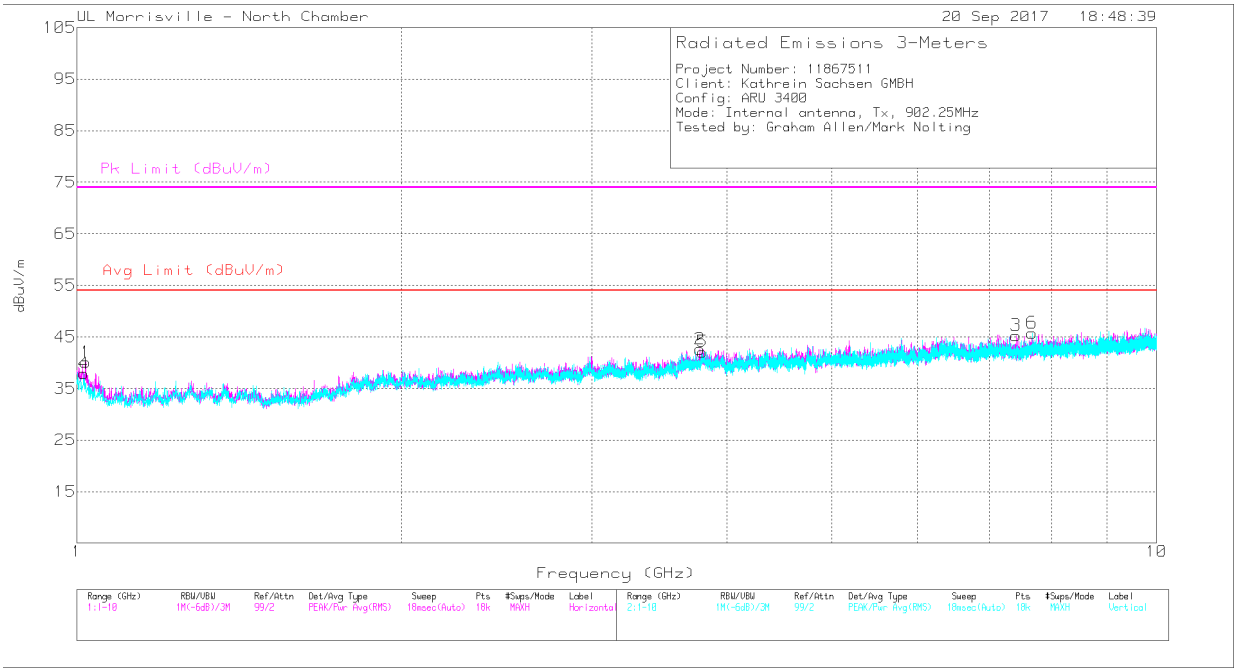
Pk - Peak detector

10.2.4. RFID – Internal WIRA-70-CIRC-FCC Antenna

HARMONICS AND SPURIOUS EMISSIONS

Note – The gain of this antenna is +5.5 dBi, therefore the conducted power setting was 30 dBm for this test.

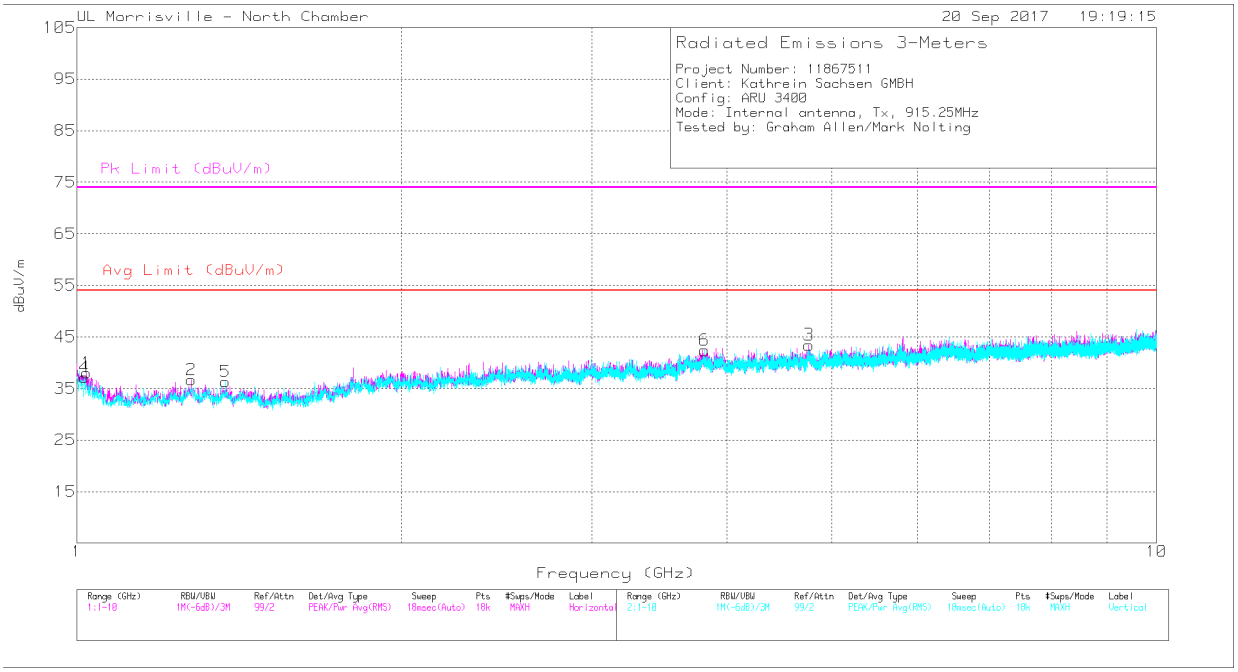
Low Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	HPF009 (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.019	47.61	Pk	27.3	-36.9	2.1	40.11	54	-13.89	74	-33.89	0-360	102	H
2	* 3.777	41.32	Pk	33.4	-32.5	.4	42.62	54	-11.38	74	-31.38	0-360	399	H
3	* 7.411	38.68	Pk	35.6	-29.3	.3	45.28	54	-8.72	74	-28.72	0-360	102	H
4	* 1.015	45.31	Pk	27.3	-36.9	2.2	37.91	54	-16.09	74	-36.09	0-360	102	V
5	* 3.796	40.62	Pk	33.5	-32.5	.5	42.12	54	-11.88	74	-31.88	0-360	400	V
6	* 7.669	38.87	Pk	35.7	-29.1	.3	45.77	54	-8.23	74	-28.23	0-360	301	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

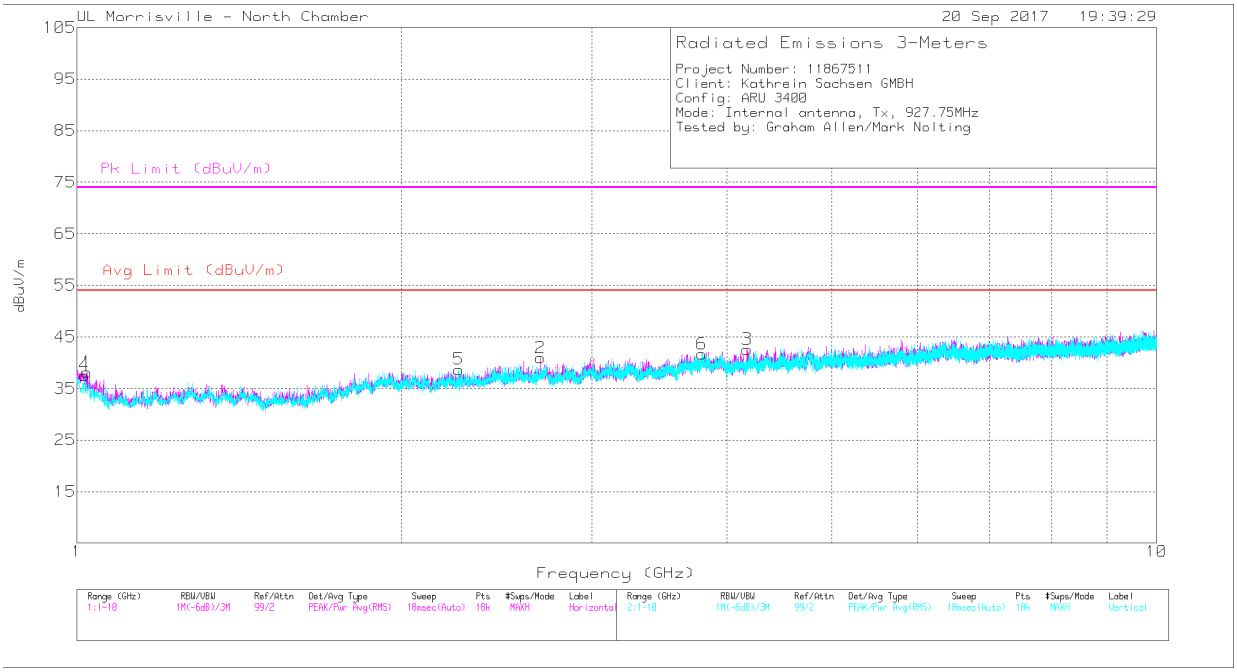
Middle Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	HPF009 (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.02	45.6	Pk	27.3	-36.9	2	38	54	-16	74	-36	0-360	99	H
2	* 1.276	43.19	Pk	29.2	-36.2	.5	36.69	54	-17.31	74	-37.31	0-360	399	H
3	* 4.765	41.13	Pk	34.1	-32.1	.3	43.43	54	-10.57	74	-30.57	0-360	199	H
4	* 1.016	44.56	Pk	27.3	-36.9	2.2	37.16	54	-16.84	74	-36.84	0-360	102	V
5	* 1.373	42.89	Pk	29	-36	.4	36.29	54	-17.71	74	-37.71	0-360	302	V
6	* 3.813	41.17	Pk	33.4	-32.7	.5	42.37	54	-11.63	74	-31.63	0-360	399	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

High Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	HPF009 (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.022	45.73	Pk	27.3	-36.9	2	38.13	54	-15.87	74	-35.87	0-360	99	H
2	* 2.688	41.63	Pk	32.4	-33.5	.4	40.93	54	-13.07	74	-33.07	0-360	99	H
3	* 4.177	40.88	Pk	33.4	-32.2	.5	42.58	54	-11.42	74	-31.42	0-360	99	H
4	* 1.017	45.06	Pk	27.3	-36.9	2.1	37.56	54	-16.44	74	-36.44	0-360	102	V
5	* 2.259	40.89	Pk	31.7	-34.2	.3	38.69	54	-15.31	74	-35.31	0-360	399	V
6	* 3.794	40.06	Pk	33.5	-32.4	.5	41.66	54	-12.34	74	-32.34	0-360	399	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

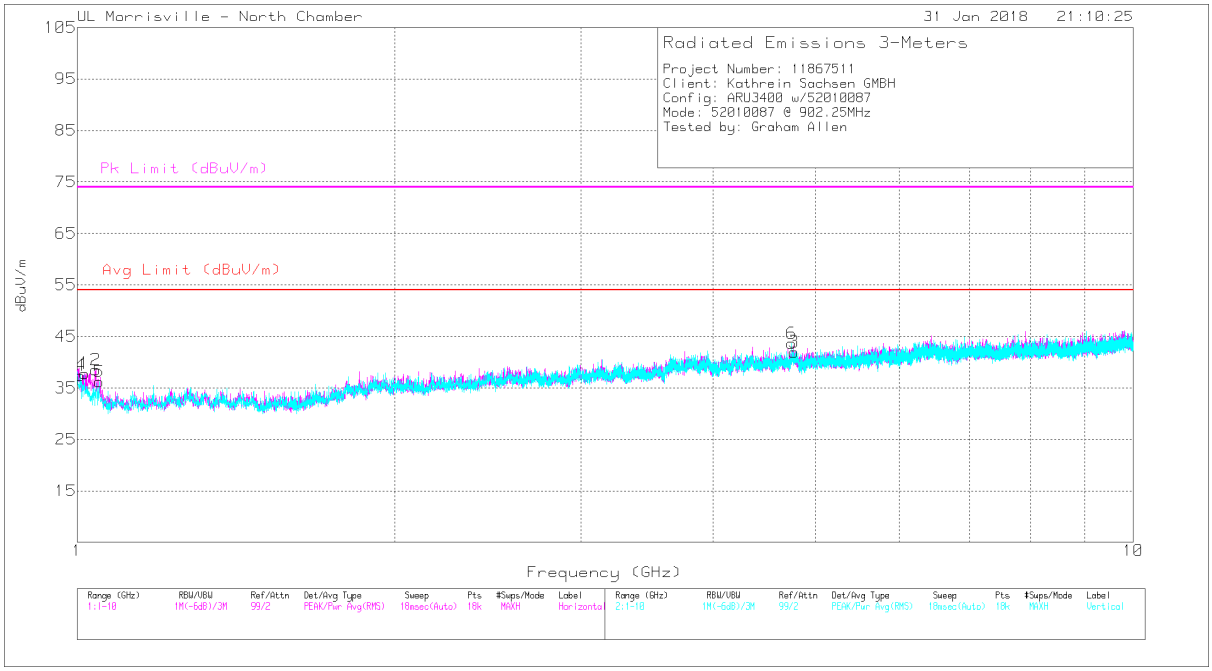
Pk - Peak detector

10.2.5. RFID –WIRA-30-Circular-FCC Antenna

HARMONICS AND SPURIOUS EMISSIONS

Note – The gain of this antenna is +8 dBi, but the power setting was 30 dBm for this test as worst-case.

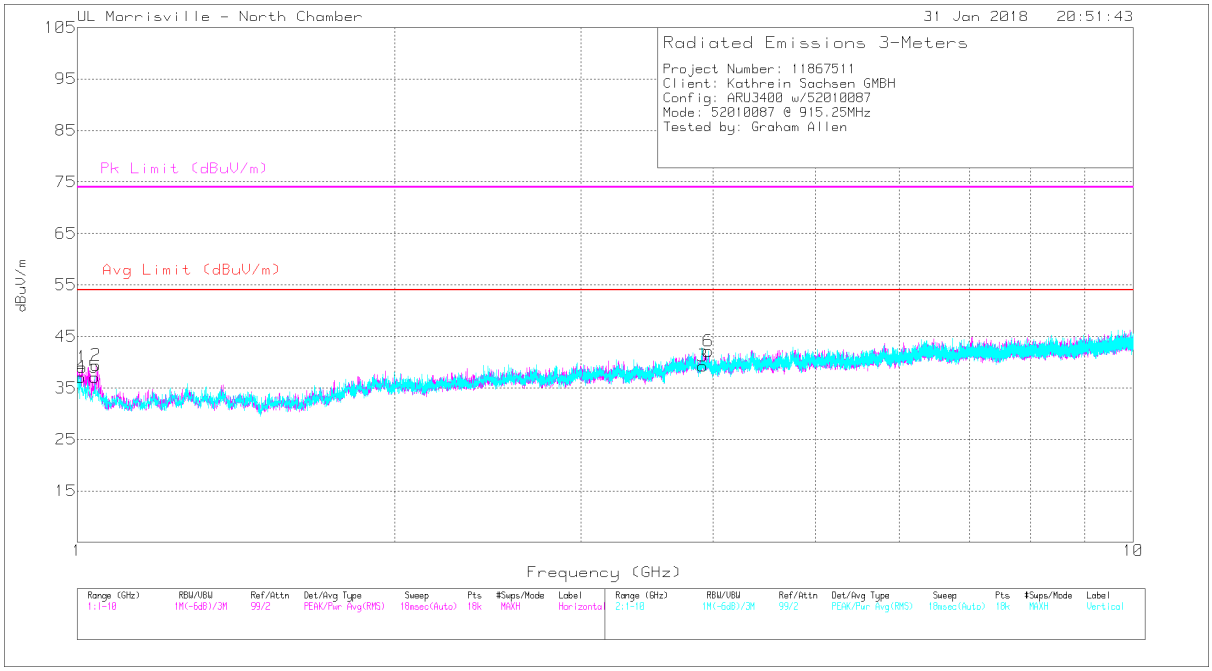
LOW CHANNEL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/ Cbl/Fltr/Pad (dB)	HPF009 (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Pol.
1	* 1.017	45.3	Pk	27.3	-36.9	2.1	37.8	54	-16.2	74	-36.2	0-360	100	H
2	* 1.041	46.61	Pk	27.1	-36.8	1.6	38.51	54	-15.49	74	-35.49	0-360	199	H
3	* 4.776	39.78	Pk	34.1	-32.2	.3	41.98	54	-12.02	74	-32.02	0-360	100	H
4	* 1.008	44.51	Pk	27.3	-36.9	2.5	37.41	54	-16.59	74	-36.59	0-360	102	V
5	* 1.049	44.5	Pk	27	-36.7	1.4	36.2	54	-17.8	74	-37.8	0-360	400	V
6	* 4.748	41.35	Pk	34.1	-32.1	.3	43.65	54	-10.35	74	-30.35	0-360	102	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

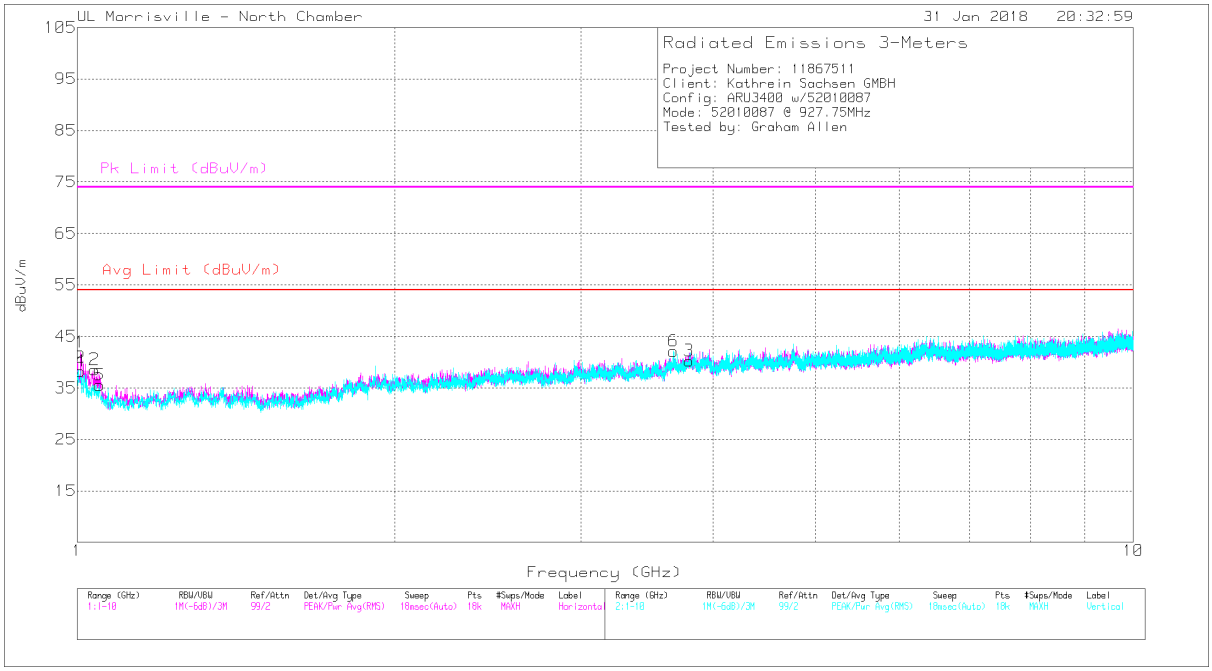
MIDDLE CHANNEL



Marker	Freq. (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/ Cbl/Fltr/Pad (dB)	HPF009 (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.011	46.32	Pk	27.3	-36.9	2.3	39.02	54	-14.98	74	-34.98	0-360	99	H
2	* 1.042	47.59	Pk	27	-36.8	1.6	39.39	54	-14.61	74	-34.61	0-360	199	H
3	* 3.912	37.99	Pk	33.4	-32.6	.5	39.29	54	-14.71	74	-34.71	0-360	299	H
4	* 1.008	44.18	Pk	27.3	-36.9	2.5	37.08	54	-16.92	74	-36.92	0-360	102	V
5	* 1.039	45.18	Pk	27.1	-36.8	1.6	37.08	54	-16.92	74	-36.92	0-360	102	V
6	* 3.96	40.64	Pk	33.4	-32.3	.4	42.14	54	-11.86	74	-31.86	0-360	202	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

HIGH CHANNEL



Marker	Freq. (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/ Cbl/Fltr/ Pad (dB)	HPF009 (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Margin (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.008	49.03	Pk	27.3	-36.9	2.5	41.93	54	-12.07	74	-32.07	0-360	102	H
2	* 1.038	46.64	Pk	27.1	-36.8	1.6	38.54	54	-15.46	74	-35.46	0-360	102	H
3	* 3.798	38.75	Pk	33.5	-32.5	.5	40.25	54	-13.75	74	-33.75	0-360	299	H
4	* 1.007	45.33	Pk	27.3	-36.9	2.5	38.23	54	-15.77	74	-35.77	0-360	102	V
5	* 1.05	43.83	Pk	27	-36.7	1.4	35.53	54	-18.47	74	-38.47	0-360	202	V
6	* 3.671	41.33	Pk	33	-32.6	.4	42.13	54	-11.87	74	-31.87	0-360	302	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

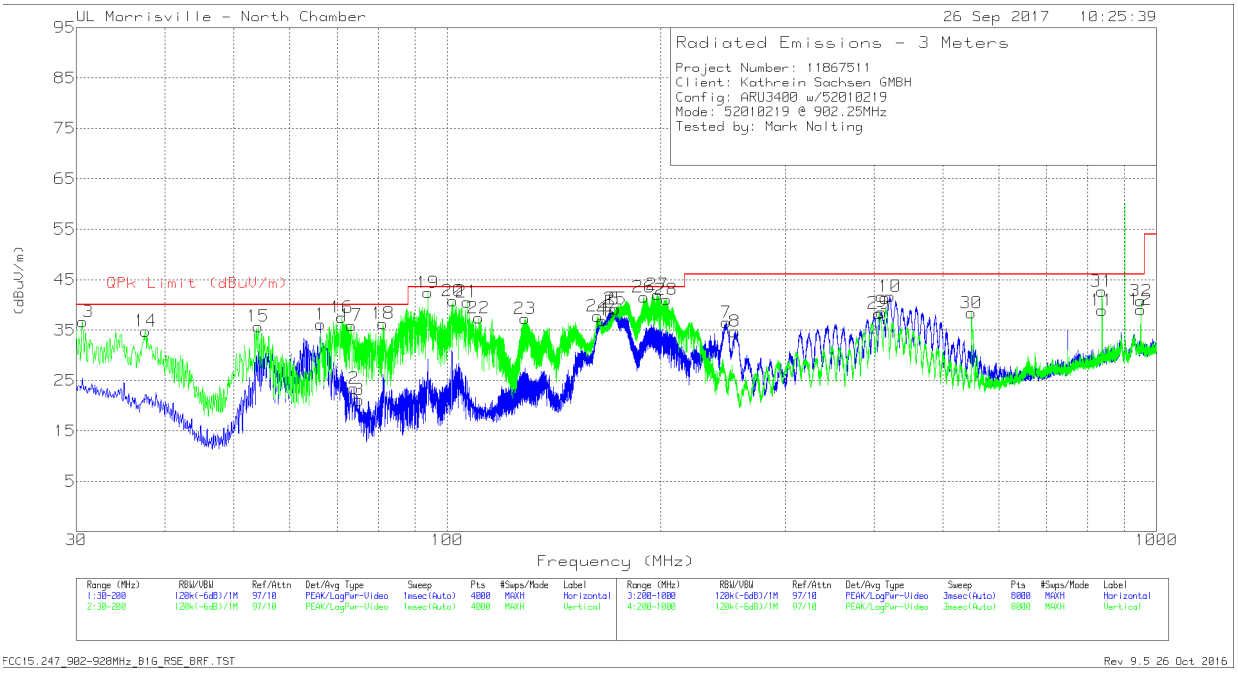
10.3. TX BELOW 1GHz

10.3.1. RFID - SMSH-30-30-ETSI-FCC Antenna

HARMONICS AND SPURIOUS EMISSIONS

Note – The gain of this antenna is -10 dBi, therefore the conducted power setting was 30 dBm for this test.

Low Channel



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 73.9139	41.24	Pk	13.2	-31.2	.2	23.44	40	-16.56	0-360	299	H
3	* 75.1892	39.04	Pk	13.1	-31.2	.2	21.14	40	-18.86	0-360	199	H
4	* 165.3125	49.76	Pk	17.3	-30.4	.3	36.96	43.52	-6.56	0-360	199	H
5	* 170.1078	50.15	Qp	16.9	-30.3	.3	37.05	43.52	-6.47	339	209	H
6	* 172.022	51.15	Qp	16.7	-30.4	.3	37.75	43.52	-5.77	0	208	H
7	* 247.5062	48.72	Pk	17.2	-29.7	.3	36.52	46.02	-9.5	0-360	102	H
8	* 254.5071	47.01	Pk	17.2	-29.8	.3	34.71	46.02	-11.31	0-360	102	H
9	* 409.6272	45.49	Pk	21.4	-28.8	.5	38.59	46.02	-7.43	0-360	199	H
1	66.2619	54.26	Pk	13.1	-31.3	.1	36.16	-	-	0-360	299	H
10	420.8287	48.17	Pk	21.7	-28.7	.5	41.67	-	-	0-360	102	H
11	838.0829	37.89	Pk	27.3	-27	.7	38.89	-	-	0-360	199	H
12	949.9975	35.3	Pk	28.4	-25.8	1.1	39	-	-	0-360	102	H
14	* 37.5363	41.06	Qp	21	-31.7	.1	30.46	40	-9.54	99	104	V
17	* 73.2607	52.53	Qp	13.2	-31.2	.2	34.73	40	-5.27	300	111	V
22	* 110.8134	49.89	Pk	18	-30.8	.3	37.39	43.52	-6.13	0-360	102	V

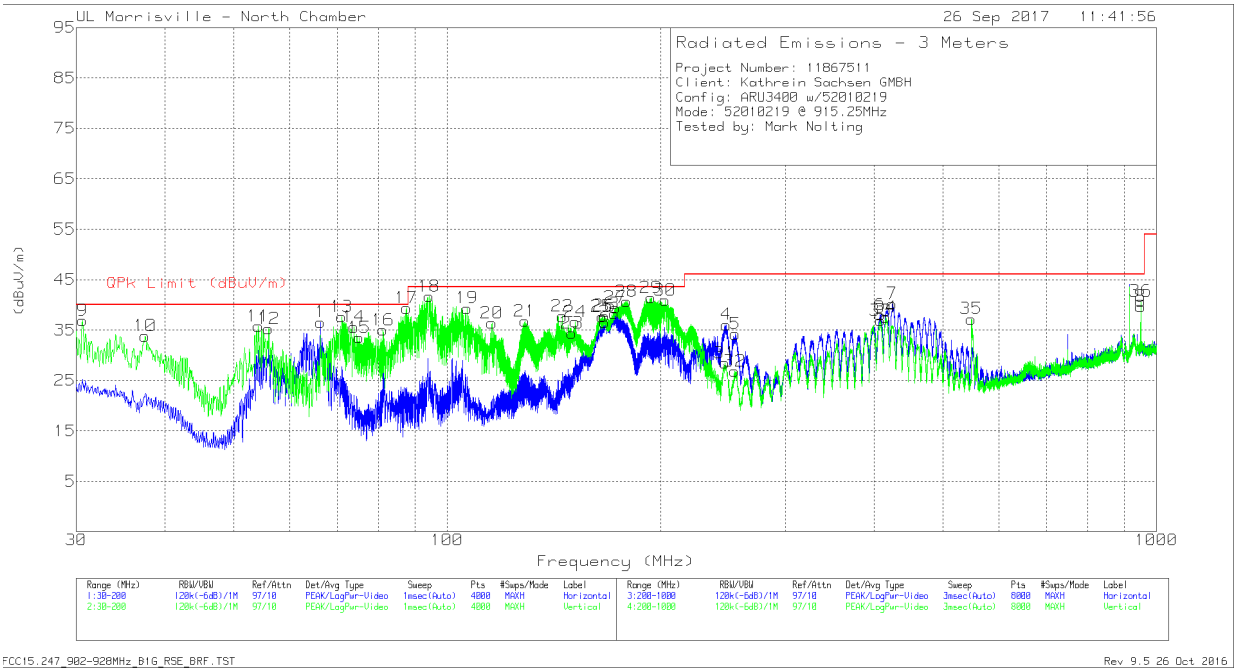
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
23	* 128.7105	48.48	Pk	19.1	-30.6	.3	37.28	43.52	-6.24	0-360	102	V
24	* 163.1223	45.82	Qp	17.5	-30.4	.3	33.22	43.52	-10.3	274	101	V
25	* 172.6662	51.96	Qp	16.6	-30.4	.3	38.46	43.52	-5.06	51	103	V
29	* 406.2268	45.42	Pk	21.2	-28.8	.5	38.32	46.02	-7.7	0-360	102	V
13	30.5952	41.72	Pk	26.5	-31.7	.1	36.62	-	-	0-360	102	V
15	54.1462	54.3	Pk	12.7	-31.4	.1	35.7	-	-	0-360	102	V
16	71.0656	55.31	Pk	13.2	-31.2	.2	37.51	-	-	0-360	102	V
18	81.2258	54.6	Pk	12.6	-31.1	.2	36.3	-	-	0-360	102	V
19	93.9791	59.6	Pk	13.6	-31	.2	42.4	-	-	0-360	102	V
20	101.8861	55.6	Pk	15.8	-30.9	.3	40.8	-	-	0-360	102	V
21	106.6898	54.09	Pk	17.1	-30.9	.3	40.59	-	-	0-360	102	V
26	189.2462	55.15	Pk	16.3	-30.2	.3	41.55	-	-	0-360	102	V
27	197.7909	54.36	Pk	17.6	-30.2	.3	42.06	-	-	0-360	102	V
28	203.6005	54.35	Pk	16.5	-30.1	.3	41.05	-	-	0-360	102	V
30	548.3453	42.73	Pk	23.6	-28.4	.5	38.43	-	-	0-360	102	V
31	837.7829	41.67	Pk	27.3	-27	.7	42.67	-	-	0-360	102	V
32	949.9975	37.09	Pk	28.4	-25.8	1.1	40.79	-	-	0-360	102	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

Middle Channel



Marker	Frequency (MHz)	Meter Reading(dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 166.6304	49.38	Pk	17.2	-30.3	.3	36.58	43.52	-6.94	0-360	199	H
3	* 172.3406	50.6	Qp	16.7	-30.4	.3	37.2	43.52	-6.32	354	212	H
4	* 247.5062	48.28	Pk	17.2	-29.7	.3	36.08	46.02	-9.94	0-360	102	H
5	* 254.9071	46.4	Pk	17.2	-29.7	.3	34.2	46.02	-11.82	0-360	102	H
6	* 407.827	45.02	Pk	21.3	-28.8	.5	38.02	46.02	-8	0-360	199	H
1	66.2619	54.68	Pk	13.1	-31.3	.1	36.58	-	-	0-360	299	H
7	424.2291	46.91	Pk	21.6	-28.8	.5	40.21	-	-	0-360	102	H
8	949.9975	36	Pk	28.4	-25.8	1.1	39.7	-	-	0-360	102	H
10	* 37.5509	41.89	Qp	21	-31.7	.1	31.29	40	-8.71	69	100	V
14	* 73.9096	52.45	Qp	13.2	-31.2	.2	34.65	40	-5.35	296	111	V
15	* 75.1892	51.42	Pk	13.1	-31.2	.2	33.52	40	-6.48	0-360	102	V
20	* 115.6172	48.09	Pk	18.7	-30.7	.3	36.39	43.52	-7.13	0-360	102	V
21	* 128.7105	47.98	Pk	19.1	-30.6	.3	36.78	43.52	-6.74	0-360	102	V
25	* 165.3524	47.14	Qp	17.3	-30.4	.3	34.34	43.52	-9.18	360	102	V
26	* 166.6139	47.62	Qp	17.2	-30.3	.3	34.82	43.52	-8.7	34	100	V
27	* 172.6672	52.04	Qp	16.6	-30.4	.3	38.54	43.52	-4.98	25	100	V
31	* 246.306	40.75	Pk	17.2	-29.8	.3	28.45	46.02	-17.57	0-360	102	V
32	* 254.4071	39.1	Pk	17.2	-29.8	.3	26.8	46.02	-19.22	0-360	199	V
33	* 408.2271	43.92	Pk	21.3	-28.8	.5	36.92	46.02	-9.1	0-360	102	V
9	30.5952	41.97	Pk	26.5	-31.7	.1	36.87	-	-	0-360	102	V
11	54.1888	54.36	Pk	12.7	-31.4	.1	35.76	-	-	0-360	102	V
12	56.0167	53.94	Pk	12.6	-31.4	.1	35.24	-	-	0-360	102	V
13	71.0231	55.42	Pk	13.2	-31.2	.2	37.62	-	-	0-360	102	V
16	81.2258	53.31	Pk	12.6	-31.1	.2	35.01	-	-	0-360	102	V
17	87.6024	57.66	Pk	12.5	-31	.2	39.36	-	-	0-360	102	V

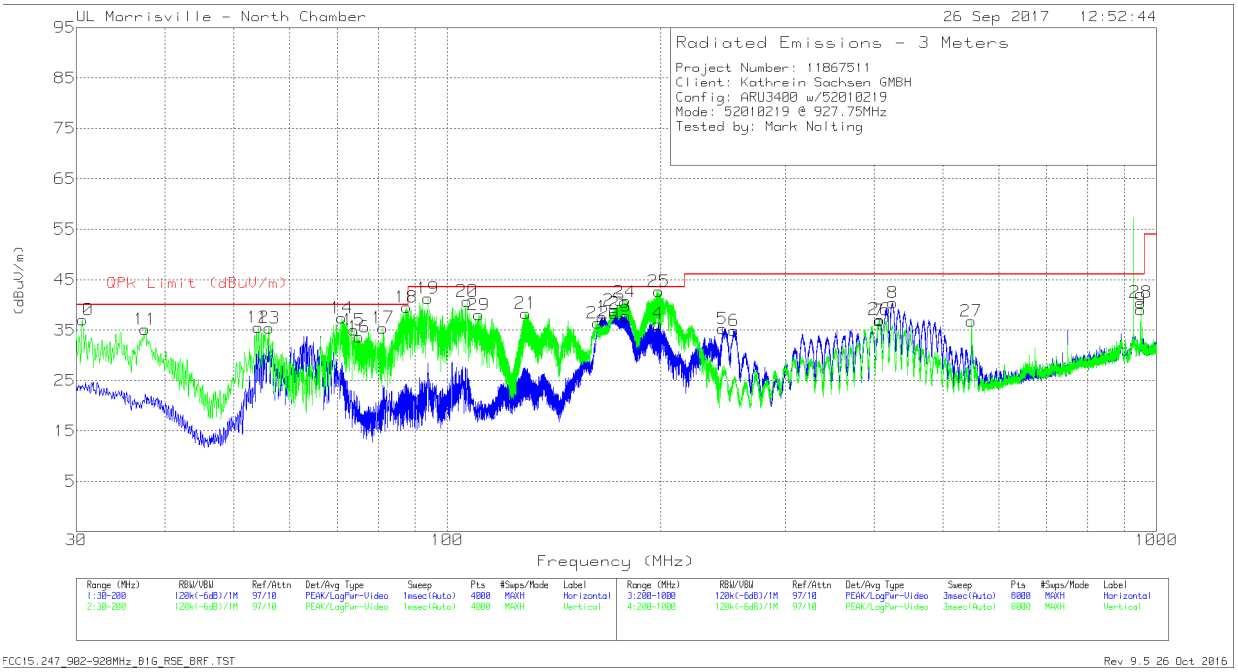
Marker	Frequency (MHz)	Meter Reading(dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
18	94.3191	58.76	Pk	13.7	-31	.2	41.66	-	-	0-360	102	V
19	106.6898	52.84	Pk	17.1	-30.9	.3	39.34	-	-	0-360	102	V
22	145.2898	50.12	Pk	17.9	-30.6	.3	37.72	-	-	0-360	102	V
23	150.0511	46.88	Pk	17.7	-30.5	.3	34.38	-	-	0-360	102	V
24	151.624	49.13	Pk	17.7	-30.5	.3	36.63	-	-	0-360	102	V
28	179.0011	54.36	Pk	16.2	-30.2	.3	40.66	-	-	0-360	102	V
29	193.7099	54.49	Pk	16.7	-30.1	.3	41.39	-	-	0-360	102	V
30	202.9004	53.88	Pk	16.8	-30.1	.3	40.88	-	-	0-360	102	V
34	415.228	44.44	Pk	21.5	-28.9	.5	37.54	-	-	0-360	102	V
35	548.3453	41.51	Pk	23.6	-28.4	.5	37.21	-	-	0-360	102	V
36	949.9975	37.02	Pk	28.4	-25.8	1.1	40.72	-	-	0-360	102	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

High Channel



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 165.3472	48.06	Qp	17.3	-30.4	.3	35.26	43.52	-8.26	339	190	H
2	* 172.0392	50.52	Qp	16.7	-30.4	.3	37.12	43.52	-6.4	4	211	H
5	* 244.4058	47.45	Pk	17.3	-29.8	.3	35.25	46.02	-10.77	0-360	102	H
6	* 253.907	47.16	Pk	17.2	-29.8	.3	34.86	46.02	-11.16	0-360	102	H
7	* 406.8269	43.87	Pk	21.3	-28.8	.5	36.87	46.02	-9.15	0-360	199	H
3	178.7035	51.45	Pk	16.2	-30.2	.3	37.75	-	-	0-360	199	H
4	198.4711	48.4	Pk	17.7	-30.2	.3	36.2	-	-	0-360	100	H
8	425.0293	47.07	Pk	21.6	-28.8	.5	40.37	-	-	0-360	102	H
9	949.9975	35.37	Pk	28.4	-25.8	1.1	39.07	-	-	0-360	102	H
11	* 37.5293	42.69	Qp	21	-31.7	.1	32.09	40	-7.91	130	100	V
15	* 73.266	52.26	Qp	13.2	-31.2	.2	34.46	40	-5.54	332	111	V
16	* 75.1467	51.53	Pk	13.1	-31.2	.2	33.63	40	-6.37	0-360	102	V
29	* 110.8613	49.39	Qp	18	-30.8	.3	36.89	43.52	-6.63	275	100	V
21	* 129.0403	48.37	Qp	19.1	-30.6	.3	37.17	43.52	-6.35	306	102	V
22	* 163.1019	48.96	Pk	17.5	-30.4	.3	36.36	43.52	-7.16	0-360	102	V
23	* 172.3428	51.49	Qp	16.7	-30.4	.3	38.09	43.52	-5.43	97	100	V
26	* 407.1269	44.07	Pk	21.3	-28.8	.5	37.07	46.02	-8.95	0-360	102	V
10	30.5952	42.08	Pk	26.5	-31.7	.1	36.98	-	-	0-360	102	V
12	54.1462	54.1	Pk	12.7	-31.4	.1	35.5	-	-	0-360	102	V
13	56.0592	54.05	Pk	12.6	-31.4	.1	35.35	-	-	0-360	102	V
14	71.0656	55.2	Pk	13.2	-31.2	.2	37.4	-	-	0-360	102	V
17	81.2258	53.72	Pk	12.6	-31.1	.2	35.42	-	-	0-360	102	V
18	87.6024	57.82	Pk	12.5	-31	.2	39.52	-	-	0-360	102	V
19	93.9365	58.52	Pk	13.6	-31	.2	41.32	-	-	0-360	102	V
20	106.7324	54.2	Pk	17.1	-30.9	.3	40.7	-	-	0-360	102	V

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
24	177.7682	54.36	Pk	16.2	-30.3	.3	40.56	-	-	0-360	102	V
25	198.7687	54.75	Pk	17.8	-30.2	.3	42.65	-	-	0-360	102	V
27	548.3453	41.04	Pk	23.6	-28.4	.5	36.74	-	-	0-360	298	V
28	949.9975	36.76	Pk	28.4	-25.8	1.1	40.46	-	-	0-360	102	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

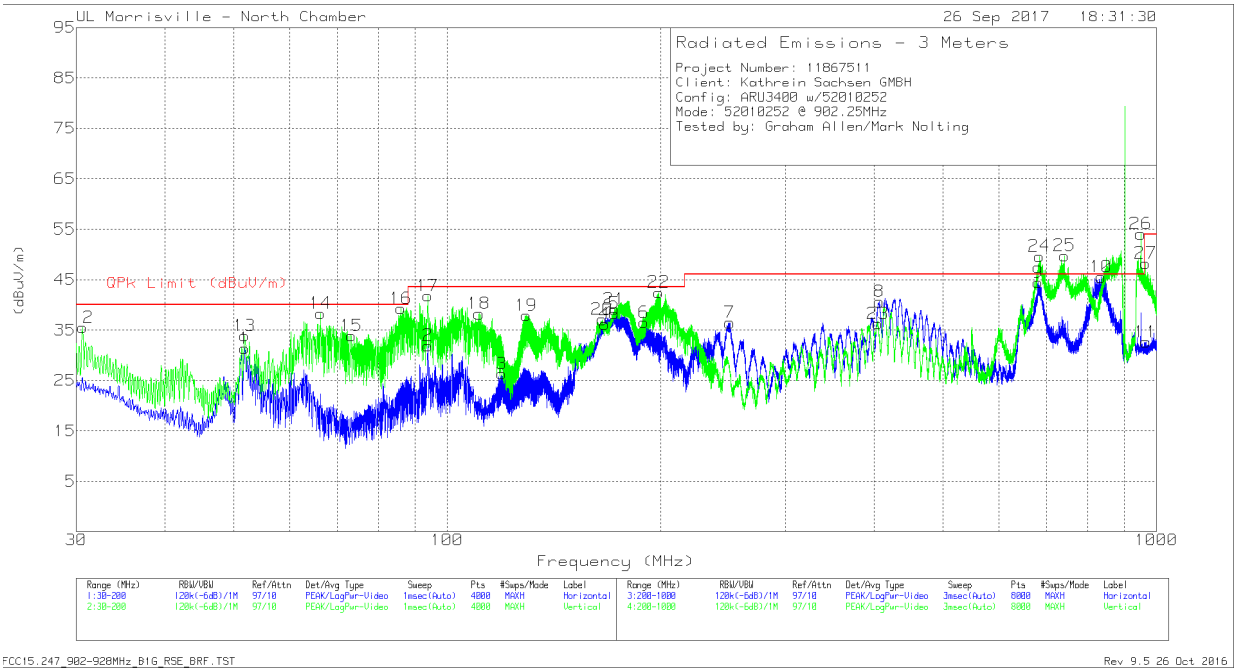
Qp - Quasi-Peak detector

10.3.2. RFID - WIRA-40-LINEAR-FCC Antenna

HARMONICS AND SPURIOUS EMISSIONS

Note – Antenna gain was redeclared as +13dBi after test, the gain of this antenna was originally declared as +10 dBi, and the higher power setting of 26 dBm was used for this test.

Low Channel



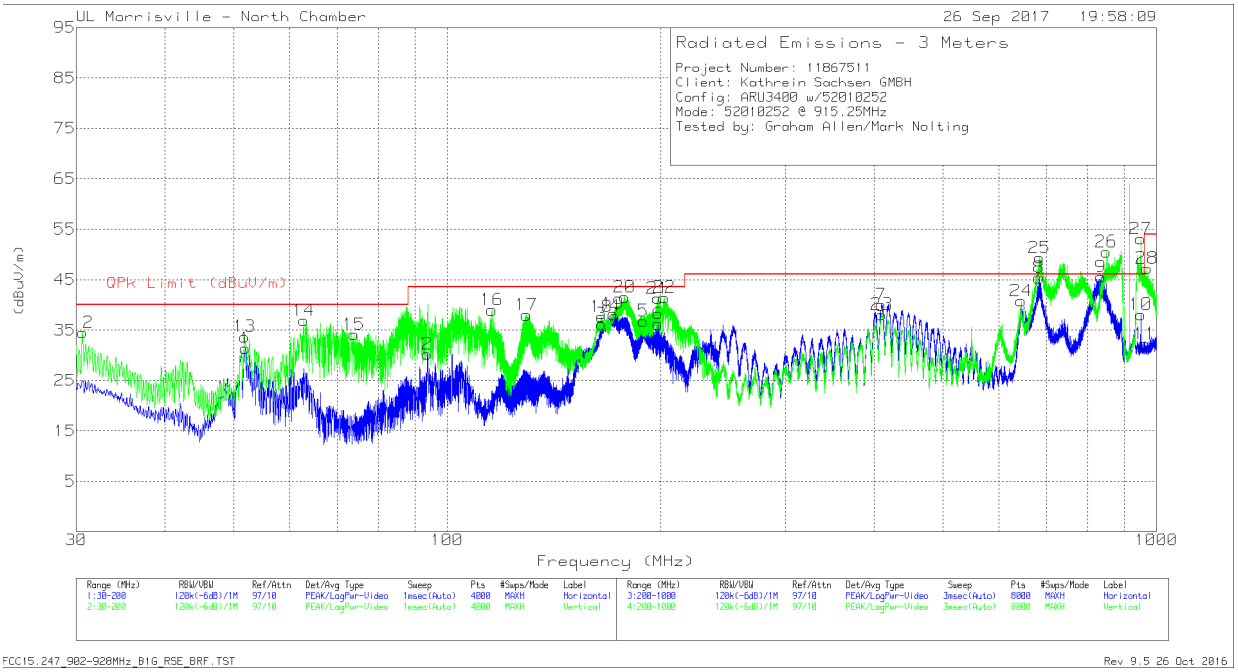
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 119.4857	37.8	Pk	19	-30.8	.3	26.3	43.52	-17.22	0-360	199	H
4	* 166.6729	49.01	Pk	17.2	-30.3	.3	36.21	43.52	-7.31	0-360	199	H
5	* 172.0514	50.05	Qp	16.7	-30.4	.3	36.65	43.52	-6.87	3	210	H
7	* 250.2565	48.86	Pk	17.1	-29.8	.3	36.46	46.02	-9.56	0-360	102	H
8	* 406.7418	38.32	Qp	21.3	-28.8	.5	31.32	46.02	-14.7	321	221	H
1	51.8081	49.84	Pk	12.9	-31.5	.1	31.34	-	-	0-360	398	H
2	93.9365	49.12	Pk	13.6	-31	.2	31.92	-	-	0-360	199	H
6	189.2462	50.12	Pk	16.3	-30.2	.3	36.52	-	-	0-360	199	H
9	681.2626	46.75	Pk	25.1	-28	.6	44.45	-	-	0-360	102	H
10	835.3826	44.51	Pk	27.3	-27	.7	45.51	-	-	0-360	199	H
11	* 965.8996	29.04	Pk	28.4	-25.6	.8	32.64	-	-	0-360	299	H
15	* 73.2733	50.84	Qp	13.2	-31.2	.2	33.04	40	-6.96	312	116	V
18	* 110.8614	48.15	Qp	18	-30.8	.3	35.65	43.52	-7.87	299	106	V
19	* 129.3616	48.11	Qp	19.1	-30.6	.3	36.91	43.52	-6.61	318	106	V
20	* 165.3125	49.89	Pk	17.3	-30.4	.3	37.09	43.52	-6.43	0-360	102	V
21	* 172.0672	50.96	Qp	16.7	-30.4	.3	37.56	43.52	-5.96	114	106	V
23	* 404.9266	43.39	Pk	21.2	-28.8	.5	36.29	46.02	-9.73	0-360	102	V

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
27	* 965.7349	38.23	Qp	28.4	-25.6	.8	41.83	53.97	-12.14	118	133	V
12	30.5952	40.59	Pk	26.5	-31.7	.1	35.49	-	-	0-360	102	V
13	51.8081	52.39	Pk	12.9	-31.5	.1	33.89	-	-	0-360	102	V
14	66.2619	56.41	Pk	13.1	-31.3	.1	38.31	-	-	0-360	102	V
16	86.0295	57.68	Pk	12.4	-31	.2	39.28	-	-	0-360	102	V
17	93.9365	58.97	Pk	13.6	-31	.2	41.77	-	-	0-360	102	V
22	198.8112	54.57	Pk	17.8	-30.2	.3	42.47	-	-	0-360	102	V
24	683.4628	51.84	Pk	25.1	-27.9	.6	49.64	-	-	0-360	102	V
25	741.7704	50.76	Pk	25.9	-27.6	.7	49.76	-	-	0-360	102	V
26	949.9975	50.36	Pk	28.4	-25.8	1.1	54.06	-	-	0-360	102	V

Pk - Peak detector

Qp - Quasi-Peak detector

Middle Channel



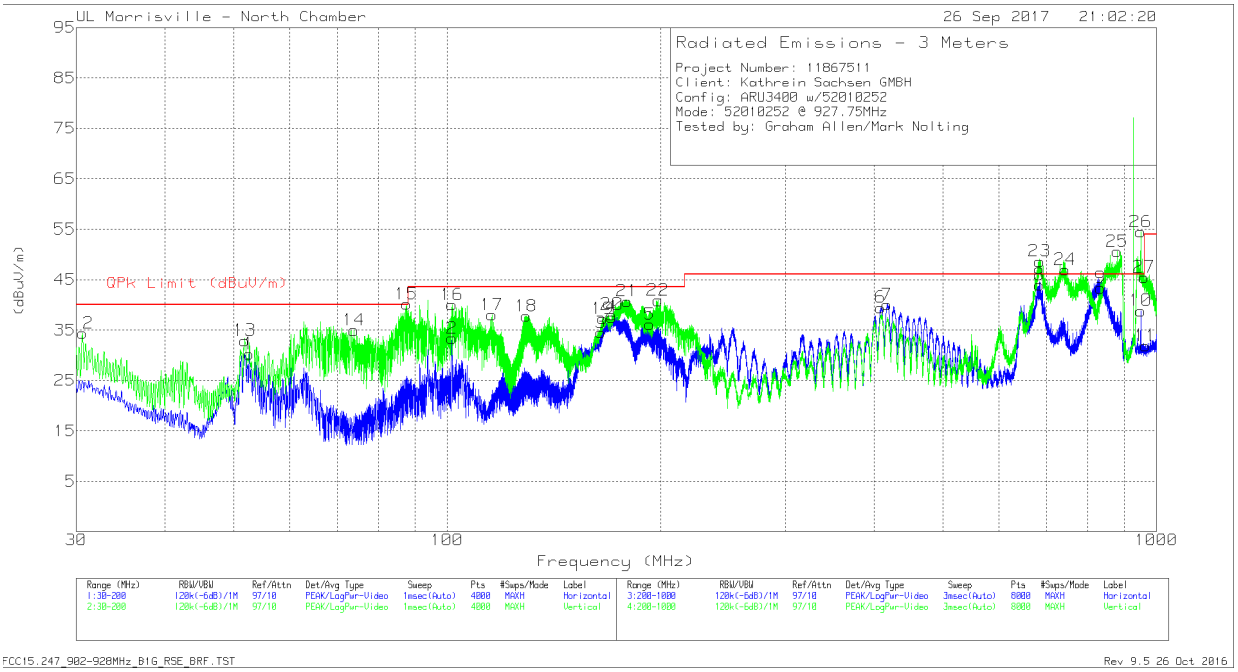
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 165.0574	49.01	Pk	17.3	-30.4	.3	36.21	43.52	-7.31	0-360	199	H
4	* 172.3458	49.52	Qp	16.7	-30.4	.3	36.12	43.52	-7.4	340	226	H
7	* 409.2412	44.55	Qp	21.3	-28.8	.5	37.55	46.02	-8.47	331	217	H
11	* 962.3991	28.68	Pk	28.4	-25.6	.8	32.28	53.97	-21.69	0-360	299	H
1	51.9357	49.86	Pk	12.9	-31.5	.1	31.36	-	-	0-360	398	H
2	93.809	47.52	Pk	13.5	-31	.2	30.22	-	-	0-360	199	H
5	188.9486	50.41	Pk	16.3	-30.2	.3	36.81	-	-	0-360	199	H
6	198.4286	48.42	Pk	17.7	-30.2	.3	36.22	-	-	0-360	102	H
8	683.0628	47.59	Pk	25.1	-27.9	.6	45.39	-	-	0-360	102	H
9	834.6825	44.58	Pk	27.3	-27	.7	45.58	-	-	0-360	198	H
10	949.9975	34.36	Pk	28.4	-25.8	1.1	38.06	-	-	0-360	198	H
15	* 73.9297	50.91	Qp	13.2	-31.2	.2	33.11	40	-6.89	321	118	V
16	* 115.6489	45.59	Qp	18.7	-30.7	.3	33.89	43.52	-9.63	304	105	V
17	* 129.3264	48.53	Qp	19.1	-30.6	.3	37.33	43.52	-6.19	316	103	V
18	* 165.0588	47.42	Qp	17.3	-30.4	.3	34.62	43.52	-8.9	360	107	V
19	* 171.378	50.51	Qp	16.8	-30.4	.3	37.21	43.52	-6.31	107	106	V
28	* 969.8001	43.75	Pk	28.4	-25.6	.7	47.25	53.97	-6.72	0-360	102	V
12	30.5952	39.61	Pk	26.5	-31.7	.1	34.51	-	-	0-360	102	V
13	51.8081	52.19	Pk	12.9	-31.5	.1	33.69	-	-	0-360	102	V
14	62.776	55.16	Pk	12.9	-31.3	.1	36.86	-	-	0-360	102	V
20	177.8107	55.3	Pk	16.2	-30.3	.3	41.5	-	-	0-360	102	V
21	198.131	53.45	Pk	17.7	-30.2	.3	41.25	-	-	0-360	102	V
22	202.3003	54.17	Pk	17.1	-30.1	.3	41.47	-	-	0-360	102	V
23	410.1273	44.98	Pk	21.4	-28.8	.5	38.08	-	-	0-360	102	V
24	644.3578	43.32	Pk	25	-28	.5	40.82	-	-	0-360	199	V

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
25	683.7629	51.51	Pk	25.1	-27.9	.6	49.31	-	-	0-360	102	V
26	849.9845	49.61	Pk	27	-26.9	.8	50.51	-	-	0-360	102	V
27	949.9975	49.39	Pk	28.4	-25.8	1.1	53.09	-	-	0-360	102	V

Pk - Peak detector

Qp - Quasi-Peak detector

High Channel



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 164.6748	47.28	Pk	17.3	-30.4	.3	34.48	43.52	-9.04	0-360	199	H
4	* 170.7573	50.03	Qp	16.8	-30.4	.3	36.73	43.52	-6.79	341	205	H
6	* 408.6271	46.47	Pk	21.3	-28.8	.5	39.47	46.02	-6.55	0-360	199	H
11	* 964.8994	28.3	Pk	28.4	-25.6	.8	31.9	53.97	-22.07	0-360	299	H
1	52.5733	48.79	Pk	12.8	-31.4	.1	30.29	-	-	0-360	399	H
2	101.5885	48.39	Pk	15.7	-30.9	.2	33.39	-	-	0-360	299	H
5	193.0297	49.35	Pk	16.6	-30.1	.3	36.15	-	-	0-360	199	H
7	417.0282	46.75	Pk	21.6	-28.8	.5	40.05	-	-	0-360	199	H
8	683.9629	46.07	Pk	25.1	-27.8	.6	43.97	-	-	0-360	102	H
9	833.8824	42.37	Pk	27.3	-27	.7	43.37	-	-	0-360	199	H
10	949.9975	35.14	Pk	28.4	-25.8	1.1	38.84	-	-	0-360	102	H
14	* 73.9177	51.08	Qp	13.2	-31.2	.2	33.28	40	-6.72	318	118	V
17	* 115.6503	43.59	Qp	18.7	-30.7	.3	31.89	43.52	-11.63	240	105	V
18	* 129.3319	47.94	Qp	19.1	-30.6	.3	36.74	43.52	-6.78	300	103	V
19	* 165.6526	49.98	Pk	17.3	-30.3	.3	37.28	43.52	-6.24	0-360	102	V
20	* 170.7429	50.86	Qp	16.8	-30.4	.3	37.56	43.52	-5.96	123	103	V
27	* 960.2988	41.89	Pk	28.4	-25.6	.8	45.49	53.97	-8.48	0-360	103	V
12	30.5952	39.46	Pk	26.5	-31.7	.1	34.36	-	-	0-360	102	V
13	51.8507	51.43	Pk	12.9	-31.5	.1	32.93	-	-	0-360	102	V
15	87.6024	58.44	Pk	12.5	-31	.2	40.14	-	-	0-360	102	V
16	101.5885	55.05	Pk	15.7	-30.9	.2	40.05	-	-	0-360	102	V
21	179.3411	54.43	Pk	16.2	-30.2	.3	40.73	-	-	0-360	102	V
22	198.1735	53.07	Pk	17.7	-30.2	.3	40.87	-	-	0-360	102	V
23	684.463	50.74	Pk	25.1	-27.8	.6	48.64	-	-	0-360	103	V
24	742.9706	47.98	Pk	25.9	-27.6	.7	46.98	-	-	0-360	103	V

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
25	880.0884	48.66	Pk	27.4	-26.6	1.1	50.56	-	-	0-360	103	V
26	949.9975	50.76	Pk	28.4	-25.8	1.1	54.46	-	-	0-360	103	V

Pk - Peak detector

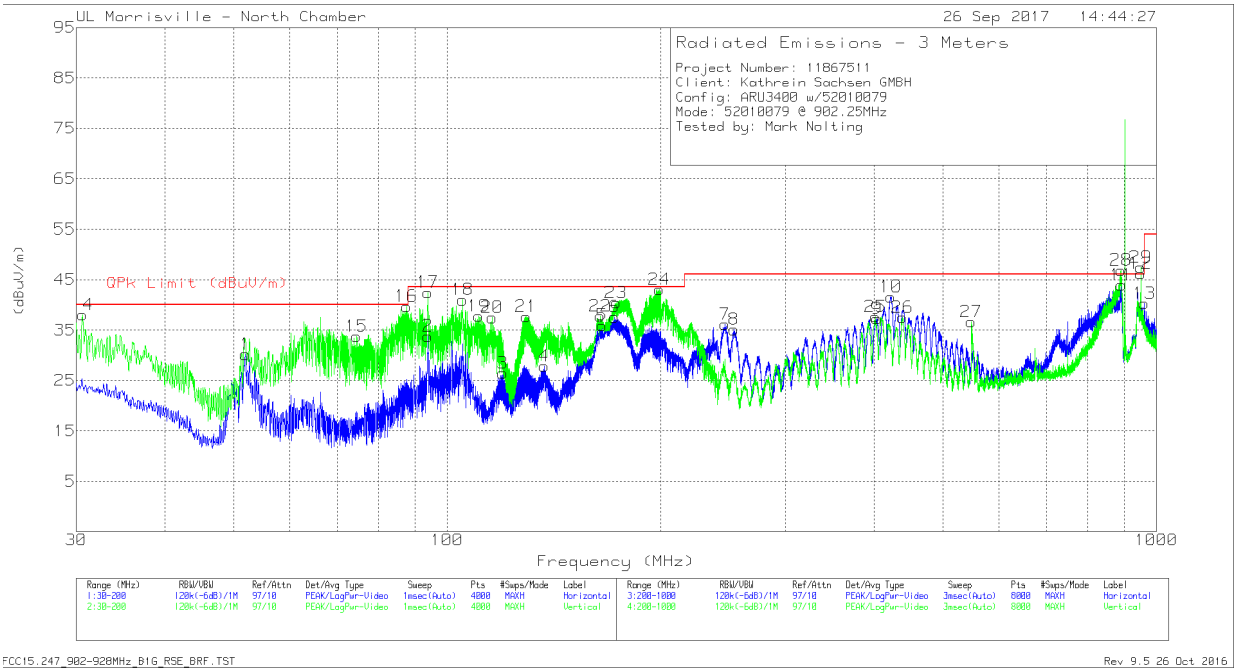
Qp - Quasi-Peak detector

10.3.3. RFID - WIRA-70-CIRC-FCC Antenna

HARMONICS AND SPURIOUS EMISSIONS

Note – The gain of this antenna is +5.3 dBi, therefore the conducted power setting was 30 dBm for this test.

Low Channel



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 119.7832	37.88	Pk	19.1	-30.8	.3	26.48	43.52	-17.04	0-360	198	H
4	* 137.0002	39.57	Pk	18.6	-30.6	.3	27.87	43.52	-15.65	0-360	198	H
5	* 165.355	48.75	Pk	17.3	-30.4	.3	35.95	43.52	-7.57	0-360	299	H
6	* 172.3604	49.84	Qp	16.7	-30.4	.3	36.44	43.52	-7.08	2	217	H
7	* 246.256	48.43	Pk	17.2	-29.8	.3	36.13	46.02	-9.89	0-360	102	H
8	* 253.607	47.39	Pk	17.2	-29.8	.3	35.09	46.02	-10.93	0-360	102	H
9	* 403.6265	44.6	Pk	21.1	-28.9	.5	37.3	46.02	-8.72	0-360	198	H
13	* 961.599	36.71	Pk	28.4	-25.6	.8	40.31	53.97	-13.66	0-360	198	H
1	51.9357	48.68	Pk	12.9	-31.5	.1	30.18	-	-	0-360	399	H
2	93.9791	51	Pk	13.6	-31	.2	33.8	-	-	0-360	198	H
10	422.4289	48.1	Pk	21.7	-28.7	.5	41.6	-	-	0-360	102	H
11	892.19	40.42	Pk	27.5	-26.5	2.5	43.92	-	-	0-360	198	H
12	949.9975	42.48	Pk	28.4	-25.8	1.1	46.18	-	-	0-360	198	H
15	* 74.5515	51.67	Pk	13.1	-31.2	.2	33.77	40	-6.23	0-360	102	V
19	* 110.8465	49.58	Qp	18	-30.8	.3	37.08	43.52	-6.44	272	100	V
20	* 115.6457	45.82	Qp	18.7	-30.7	.3	34.12	43.52	-9.4	259	100	V
21	* 129.3498	48.76	Qp	19.1	-30.6	.3	37.56	43.52	-5.96	302	100	V

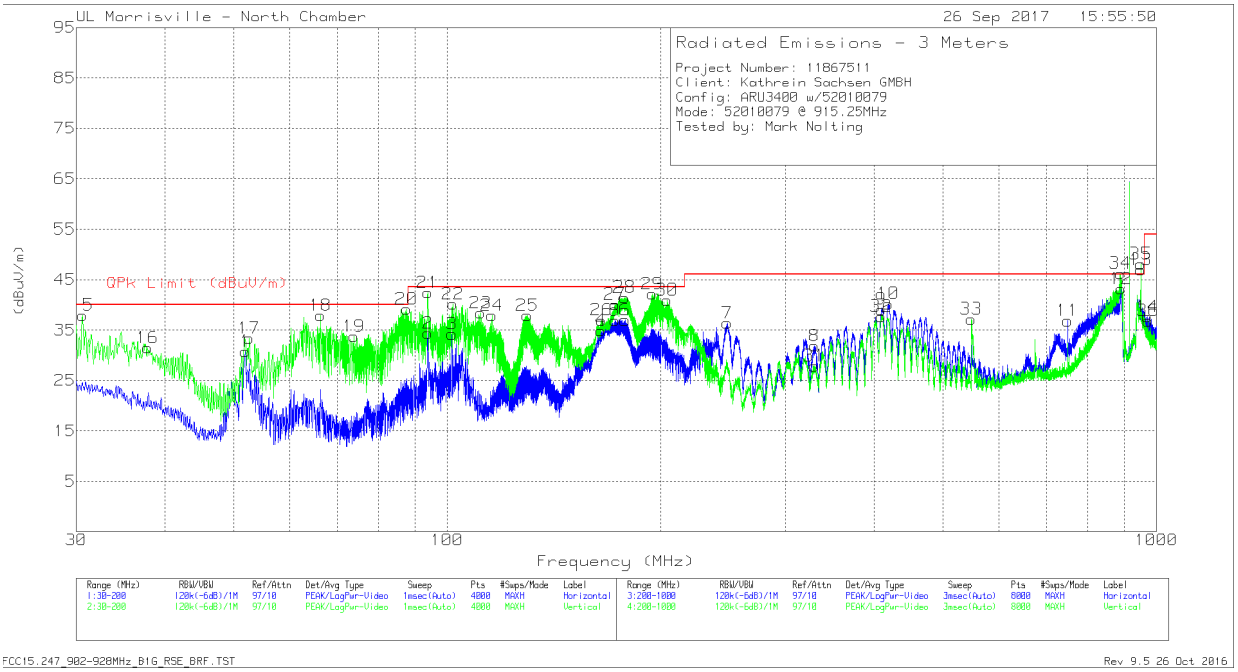
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
22	* 164.6885	48.95	Qp	17.3	-30.4	.3	36.15	43.52	-7.37	359	100	V
23	173.3046	52.59	Qp	16.6	-30.3	.3	39.19	43.52	-4.33	30	100	V
25	* 401.3262	45.22	Pk	20.9	-29	.5	37.62	46.02	-8.4	0-360	103	V
14	30.5952	43.14	Pk	26.5	-31.7	.1	38.04	-	-	0-360	102	V
16	87.6024	58	Pk	12.5	-31	.2	39.7	-	-	0-360	102	V
17	93.9365	59.66	Pk	13.6	-31	.2	42.46	-	-	0-360	102	V
18	105.1169	54.99	Pk	16.6	-30.9	.3	40.99	-	-	0-360	102	V
24	199.1513	55.12	Pk	17.8	-30.2	.3	43.02	-	-	0-360	102	V
26	438.431	44.11	Pk	21.7	-28.8	.5	37.51	-	-	0-360	103	V
27	548.3453	40.96	Pk	23.6	-28.4	.5	36.66	-	-	0-360	298	V
28	891.6899	43.46	Pk	27.5	-26.6	2.5	46.86	-	-	0-360	103	V
29	949.9975	43.73	Pk	28.4	-25.8	1.1	47.43	-	-	0-360	103	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

Middle Channel



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 164.6748	47.75	Pk	17.3	-30.4	.3	34.95	43.52	-8.57	0-360	299	H
5	* 172.3693	50.27	Pk	16.7	-30.4	.3	36.87	43.52	-6.65	0-360	199	H
7	* 248.2063	48.58	Pk	17.2	-29.7	.3	36.38	46.02	-9.64	0-360	103	H
8	* 329.3168	41.27	Pk	19.5	-29.2	.3	31.87	46.02	-14.15	0-360	103	H
9	* 409.5272	45.99	Pk	21.4	-28.8	.5	39.09	46.02	-6.93	0-360	199	H
14	* 971.6003	34.07	Pk	28.4	-25.5	.7	37.67	53.97	-16.3	0-360	199	H
1	51.9357	49.27	Pk	12.9	-31.5	.1	30.77	-	-	0-360	398	H
2	93.9365	51.56	Pk	13.6	-31	.2	34.36	-	-	0-360	299	H
3	101.5885	49.21	Pk	15.7	-30.9	.2	34.21	-	-	0-360	299	H
6	178.1083	50.77	Pk	16.2	-30.3	.3	36.97	-	-	0-360	199	H
10	418.5284	46.82	Pk	21.6	-28.7	.5	40.22	-	-	0-360	103	H
11	749.9715	37.74	Pk	26	-27.6	.7	36.84	-	-	0-360	103	H
12	890.5898	39.97	Pk	27.5	-26.6	2.3	43.17	-	-	0-360	103	H
13	949.9975	43.23	Pk	28.4	-25.8	1.1	46.93	-	-	0-360	199	H
16	* 37.822	42.3	Pk	20.8	-31.7	.1	31.5	40	-8.5	0-360	102	V
19	* 73.9139	51.54	Pk	13.2	-31.2	.2	33.74	40	-6.26	0-360	102	V
23	* 111.53	49.62	Qp	18.1	-30.8	.3	37.22	43.52	-6.3	273	101	V
24	* 115.6504	46.15	Qp	18.7	-30.7	.3	34.45	43.52	-9.07	255	100	V
25	* 129.6606	48.74	Qp	19	-30.6	.3	37.44	43.52	-6.08	299	100	V
26	* 165.0149	49.76	Pk	17.3	-30.4	.3	36.96	43.52	-6.56	0-360	102	V
27	* 172.6688	52.58	Qp	16.6	-30.4	.3	39.08	43.52	-4.44	35	100	V
31	* 329.2168	37.3	Pk	19.5	-29.2	.3	27.9	46.02	-18.12	0-360	103	V
32	* 408.9272	44.7	Pk	21.3	-28.8	.5	37.7	46.02	-8.32	0-360	103	V
36	* 972.5004	33.14	Pk	28.4	-25.4	.7	36.84	53.97	-17.13	0-360	103	V
15	30.5952	43.05	Pk	26.5	-31.7	.1	37.95	-	-	0-360	102	V

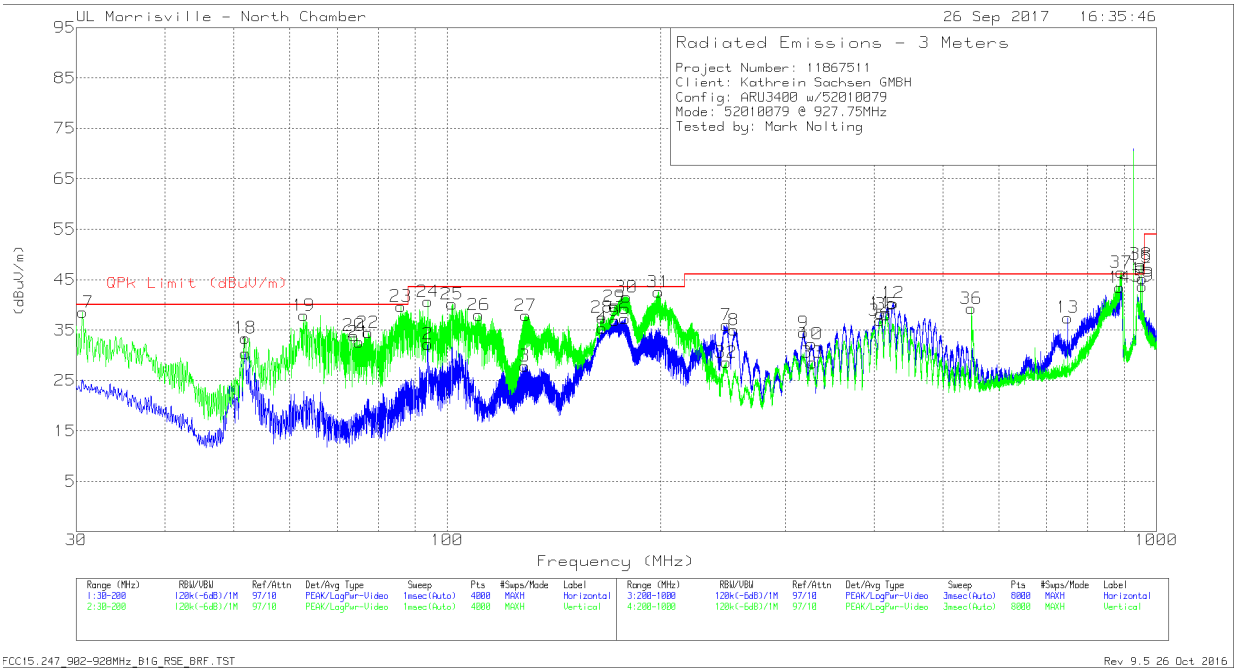
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
17	52.5946	51.88	Pk	12.8	-31.4	.1	33.38	-	-	0-360	102	V
18	66.2619	56	Pk	13.1	-31.3	.1	37.9	-	-	0-360	102	V
20	87.6024	57.46	Pk	12.5	-31	.2	39.16	-	-	0-360	102	V
21	93.9365	59.64	Pk	13.6	-31	.2	42.44	-	-	0-360	102	V
22	101.9286	54.92	Pk	15.8	-30.9	.3	40.12	-	-	0-360	102	V
28	177.7682	55.26	Pk	16.2	-30.3	.3	41.46	-	-	0-360	102	V
29	194.6876	55.07	Pk	16.9	-30.1	.3	42.17	-	-	0-360	102	V
30	204.2005	54.55	Pk	16.2	-30.1	.3	40.95	-	-	0-360	103	V
33	548.3453	41.48	Pk	23.6	-28.4	.5	37.18	-	-	0-360	103	V
34	889.4896	43.55	Pk	27.4	-26.5	1.8	46.25	-	-	0-360	103	V
35	949.9975	44.41	Pk	28.4	-25.8	1.1	48.11	-	-	0-360	103	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

High Channel



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 128.7105	39.09	Pk	19.1	-30.6	.3	27.89	43.52	-15.63	0-360	199	H
4	* 165.355	48.19	Pk	17.3	-30.4	.3	35.39	43.52	-8.13	0-360	299	H
5	* 172.3693	50.32	Pk	16.7	-30.4	.3	36.92	43.52	-6.6	0-360	199	H
7	* 247.5062	48.16	Pk	17.2	-29.7	.3	35.96	46.02	-10.06	0-360	102	H
8	* 253.907	47.28	Pk	17.2	-29.8	.3	34.98	46.02	-11.04	0-360	102	H
10	* 326.2164	41.62	Pk	19.5	-29.2	.3	32.22	46.02	-13.8	0-360	102	H
11	* 408.2271	45.33	Pk	21.3	-28.8	.5	38.33	46.02	-7.69	0-360	198	H
1	51.8932	48.9	Pk	12.9	-31.5	.1	30.4	-	-	0-360	399	H
2	93.9365	49.4	Pk	13.6	-31	.2	32.2	-	-	0-360	199	H
6	178.1083	51.06	Pk	16.2	-30.3	.3	37.26	-	-	0-360	199	H
9	318.1154	44.19	Pk	19.4	-29.4	.3	34.49	-	-	0-360	102	H
12	425.2293	47.15	Pk	21.6	-28.9	.5	40.35	-	-	0-360	102	H
13	749.9715	38.36	Pk	26	-27.6	.7	37.46	-	-	0-360	102	H
14	887.9894	40.93	Pk	27.4	-26.5	1.6	43.43	-	-	0-360	102	H
15	949.9975	43.73	Pk	28.4	-25.8	1.1	47.43	-	-	0-360	198	H
16	955.4982	41.57	Pk	28.5	-25.8	.9	45.17	-	-	0-360	198	H
20	* 73.9217	50.91	Qp	13.2	-31.2	.2	33.11	40	-6.89	291	114	V
21	* 75.1467	50.48	Pk	13.1	-31.2	.2	32.58	40	-7.42	0-360	102	V
26	* 110.8705	49.25	Qp	18	-30.8	.3	36.75	43.52	-6.77	246	101	V
27	* 129.0383	48.58	Qp	19.1	-30.6	.3	37.38	43.52	-6.14	289	100	V
28	* 165.3351	49.48	Qp	17.3	-30.4	.3	36.68	43.52	-6.84	360	100	V
29	* 172.3297	52.05	Qp	16.7	-30.4	.3	38.65	43.52	-4.87	25	100	V
32	* 247.5062	40.76	Pk	17.2	-29.7	.3	28.56	46.02	-17.46	0-360	103	V
33	* 327.1165	37.95	Pk	19.5	-29.2	.3	28.55	46.02	-17.47	0-360	103	V
34	* 407.777	43.92	Pk	21.3	-28.8	.5	36.92	46.02	-9.1	0-360	103	V

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
17	30.5952	43.64	Pk	26.5	-31.7	.1	38.54	-	-	0-360	102	V
18	51.8932	51.93	Pk	12.9	-31.5	.1	33.43	-	-	0-360	102	V
19	62.776	56.18	Pk	12.9	-31.3	.1	37.88	-	-	0-360	102	V
22	77.3998	52.48	Pk	13	-31.2	.2	34.48	-	-	0-360	102	V
23	86.0295	58.1	Pk	12.4	-31	.2	39.7	-	-	0-360	102	V
24	93.9791	57.88	Pk	13.6	-31	.2	40.68	-	-	0-360	102	V
25	101.5885	55.16	Pk	15.7	-30.9	.2	40.16	-	-	0-360	102	V
30	179.0436	55.26	Pk	16.2	-30.2	.3	41.56	-	-	0-360	102	V
31	198.5136	54.67	Pk	17.8	-30.2	.3	42.57	-	-	0-360	102	V
35	416.3281	44.9	Pk	21.5	-28.8	.5	38.1	-	-	0-360	103	V
36	548.3453	43.59	Pk	23.6	-28.4	.5	39.29	-	-	0-360	103	V
37	891.9899	42.96	Pk	27.5	-26.5	2.5	46.46	-	-	0-360	103	V
38	949.9975	44.31	Pk	28.4	-25.8	1.1	48.01	-	-	0-360	103	V
39	955.4982	40.11	Pk	28.5	-25.8	.9	43.71	-	-	0-360	103	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

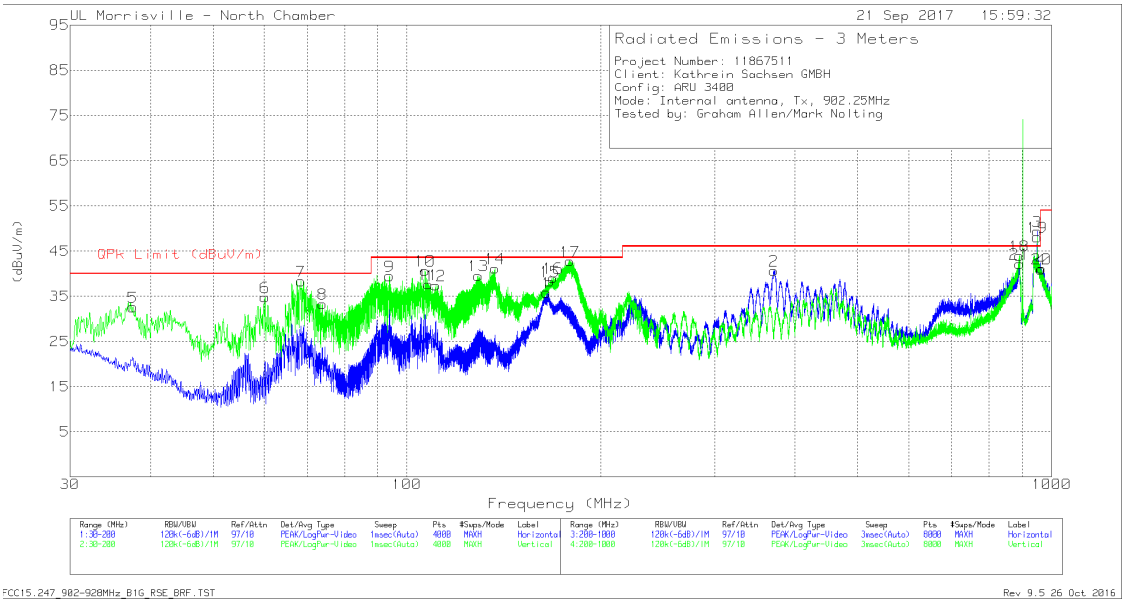
Qp - Quasi-Peak detector

10.3.4. RFID - Internal WIRA-70-CIRC-FCC Antenna

HARMONICS AND SPURIOUS EMISSIONS

Note – The gain of this antenna is +5.5 dBi, therefore the conducted power setting was 30 dBm for this test.

Low Channel



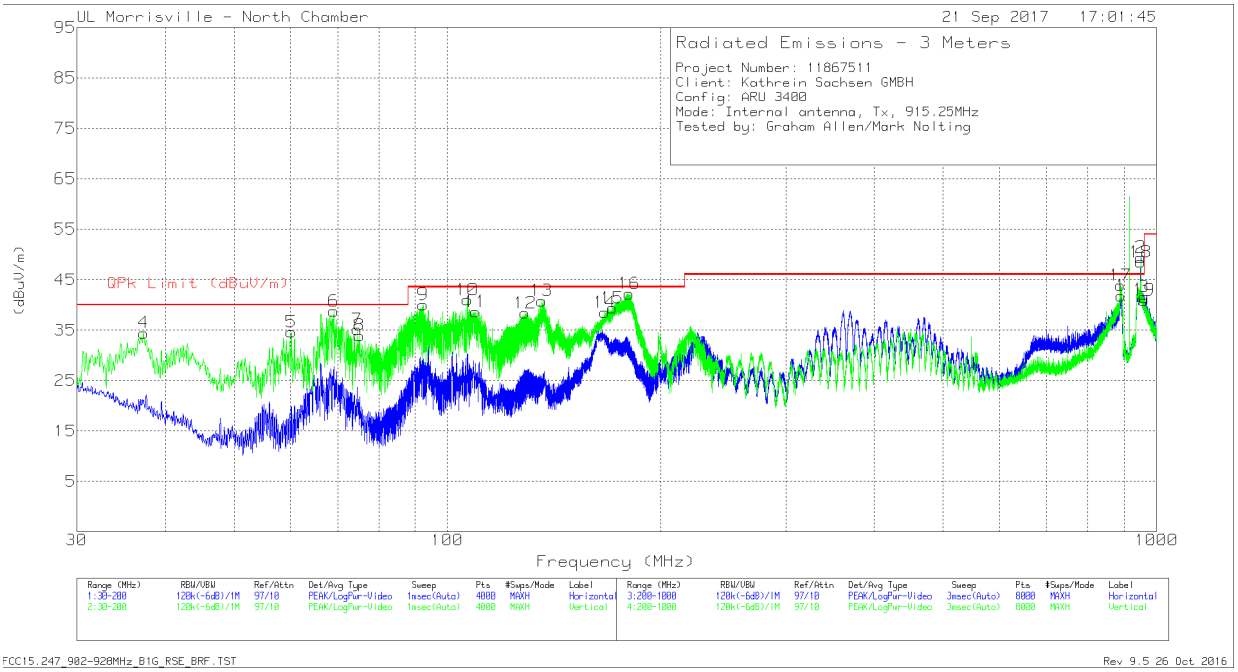
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 164.6748	48.65	Pk	17.3	-30.4	.3	35.85	43.52	-7.67	0-360	199	H
4	* 962.3991	37.37	Pk	28.4	-25.6	.8	40.97	53.97	-13	0-360	199	H
2	370.8722	48.87	Pk	20.5	-29.1	.4	40.67	-	-	0-360	102	H
3	949.9975	45.65	Pk	28.4	-25.8	1.1	49.35	-	-	0-360	199	H
5	* 37.567	43.21	Pk	21	-31.7	.1	32.61	40	-7.39	0-360	102	V
8	* 73.9139	51.12	Pk	13.2	-31.2	.2	33.32	40	-6.68	0-360	102	V
11	* 108.0115	49.98	Qp	17.4	-30.9	.3	36.78	43.52	-6.74	226	104	V
12	* 110.8134	49.91	Pk	18	-30.8	.3	37.41	43.52	-6.11	0-360	102	V
13	* 129.0225	48.52	Qp	19.1	-30.6	.3	37.32	43.52	-6.2	334	102	V
14	* 136.95	50.62	Qp	18.6	-30.6	.3	38.92	43.52	-4.6	334	113	V
15	* 166.6147	49.85	Qp	17.2	-30.3	.3	37.05	43.52	-6.47	245	110	V
16	* 168.507	50.94	Qp	17	-30.3	.3	37.94	43.52	-5.58	240	106	V
20	* 964.6994	37.55	Pk	28.4	-25.6	.8	41.15	53.97	-12.82	0-360	102	V
6	60.2253	53.32	Pk	12.7	-31.3	.1	34.82	-	-	0-360	102	V
7	68.4725	56.25	Pk	13.2	-31.3	.2	38.35	-	-	0-360	102	V
9	93.9365	56.68	Pk	13.6	-31	.2	39.48	-	-	0-360	102	V
10	106.6898	54.19	Pk	17.1	-30.9	.3	40.69	-	-	0-360	102	V
17	179.0011	56.43	Pk	16.2	-30.2	.3	42.73	-	-	0-360	102	V
18	890.6898	40.66	Pk	27.5	-26.6	2.4	43.96	-	-	0-360	102	V
21	892.29	38.69	Pk	27.5	-26.5	2.5	42.19	-	-	0-360	102	H
19	949.9975	44.39	Pk	28.4	-25.8	1.1	48.09	-	-	0-360	102	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

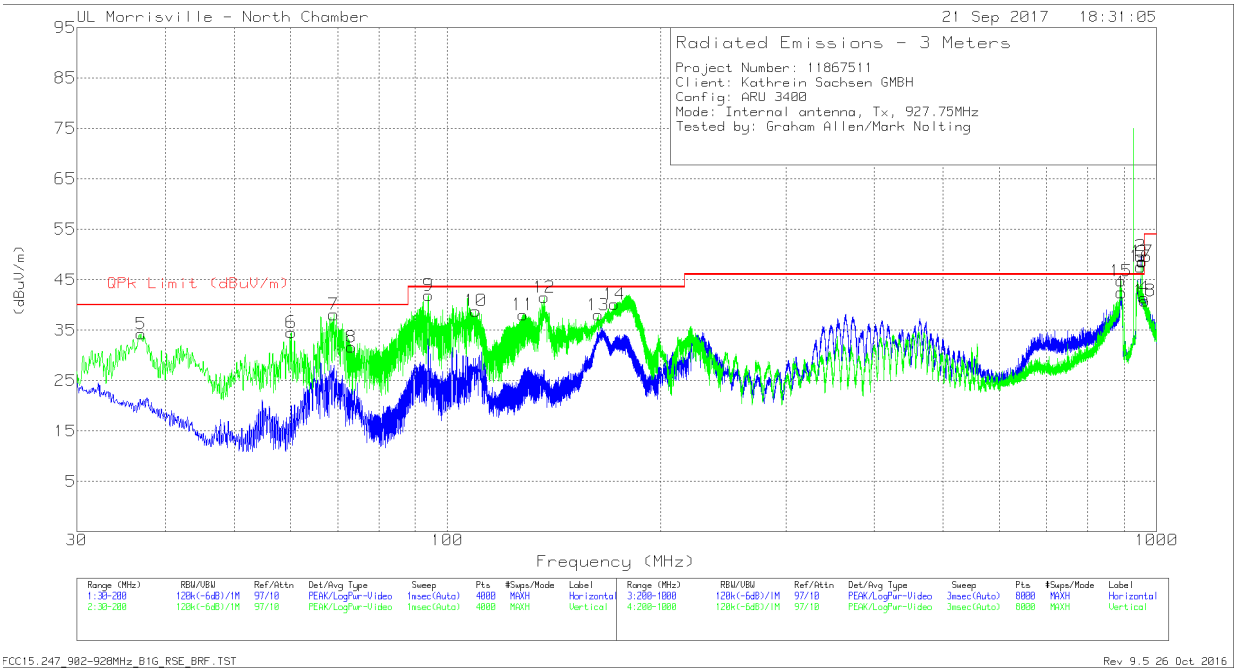
Middle Channel



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 960.5989	38	Pk	28.4	-25.6	.8	41.6	53.97	-12.37	0-360	199	H
1	891.9899	38.32	Pk	27.5	-26.5	2.5	41.82	-	-	0-360	199	H
2	949.9975	45.71	Pk	28.4	-25.8	1.1	49.41	-	-	0-360	199	H
7	* 74.5553	50.62	Qp	13.1	-31.2	.2	32.72	40	-7.28	235	123	V
8	* 75.1726	48.95	Qp	13.1	-31.2	.2	31.05	40	-8.95	10	124	V
11	* 109.6003	49.51	Qp	17.7	-30.9	.3	36.61	43.52	-6.91	275	104	V
12	* 128.7081	47.91	Qp	19.1	-30.6	.3	36.71	43.52	-6.81	352	102	V
13	* 135.7441	50.49	Qp	18.7	-30.6	.3	38.89	43.52	-4.63	313	109	V
14	* 166.6323	50.22	Qp	17.2	-30.3	.3	37.42	43.52	-6.1	234	102	V
15	* 170.7409	50.7	Qp	16.8	-30.4	.3	37.4	43.52	-6.12	238	105	V
19	* 960.3988	37.34	Pk	28.4	-25.6	.8	40.94	53.97	-13.03	0-360	102	V
4	37.2694	44.85	Pk	21.2	-31.7	.1	34.45	-	-	0-360	102	V
5	60.2253	53.11	Pk	12.7	-31.3	.1	34.61	-	-	0-360	102	V
6	69.1101	56.67	Pk	13.2	-31.3	.2	38.77	-	-	0-360	102	V
9	92.4061	57.74	Pk	13.2	-31.1	.2	40.04	-	-	0-360	102	V
10	106.6898	54.48	Pk	17.1	-30.9	.3	40.98	-	-	0-360	102	V
16	180.3189	56.02	Pk	16.1	-30.2	.3	42.22	-	-	0-360	102	V
17	890.0897	40.96	Pk	27.5	-26.6	2	43.86	-	-	0-360	102	V
18	949.9975	44.8	Pk	28.4	-25.8	1.1	48.5	-	-	0-360	102	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
Qp - Quasi-Peak detector

High Channel



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 960.3988	37.83	Pk	28.4	-25.6	.8	41.43	53.97	-12.54	0-360	199	H
1	892.29	38.96	Pk	27.5	-26.5	2.5	42.46	-	-	0-360	199	H
2	949.9975	45.99	Pk	28.4	-25.8	1.1	49.69	-	-	0-360	199	H
3	955.4982	44.91	Pk	28.5	-25.8	.9	48.51	-	-	0-360	199	H
8	* 73.2337	49.46	Pk	13.2	-31.2	.2	31.66	40	-8.34	0-360	102	V
10	* 109.5957	48.99	Qp	17.7	-30.9	.3	36.09	43.52	-7.43	274	105	V
11	* 127.7379	47.96	Qp	19.1	-30.6	.3	36.76	43.52	-6.76	353	103	V
12	* 136.9447	50.2	Qp	18.6	-30.6	.3	38.5	43.52	-5.02	300	102	V
13	* 163.1067	49.11	Qp	17.5	-30.4	.3	36.51	43.52	-7.01	354	103	V
14	* 172.0543	51.24	Qp	16.7	-30.4	.3	37.84	43.52	-5.68	232	103	V
18	* 962.2991	37.21	Pk	28.4	-25.6	.8	40.81	53.97	-13.16	0-360	103	V
5	36.9718	44.46	Pk	21.4	-31.7	.1	34.26	-	-	0-360	102	V
6	60.2253	53.05	Pk	12.7	-31.3	.1	34.55	-	-	0-360	102	V
7	69.1101	55.99	Pk	13.2	-31.3	.2	38.09	-	-	0-360	102	V
9	93.9791	59.14	Pk	13.6	-31	.2	41.94	-	-	0-360	102	V
15	891.5399	41.34	Pk	27.5	-26.6	2.5	44.74	-	-	0-360	103	V
16	949.9975	43.88	Pk	28.4	-25.8	1.1	47.58	-	-	0-360	103	V
17	955.4982	45	Pk	28.5	-25.8	.9	48.6	-	-	0-360	103	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

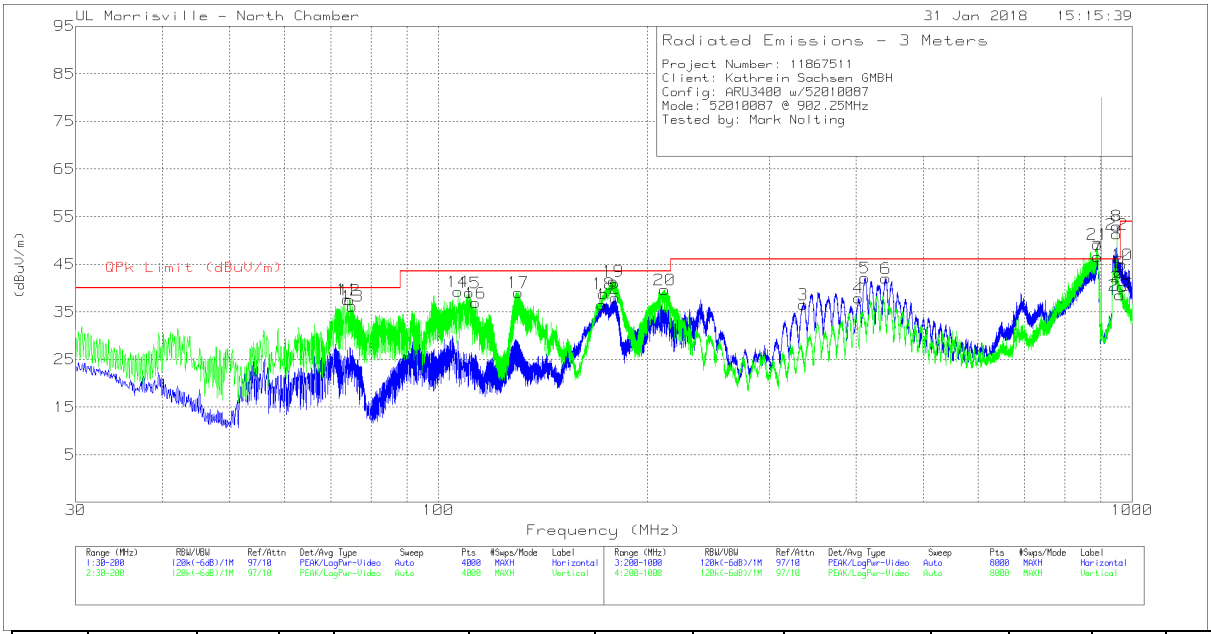
Qp - Quasi-Peak detector

10.3.5. RFID - WIRA-30-CIRC-FCC Antenna

HARMONICS AND SPURIOUS EMISSIONS

Note – The gain of this antenna is +8 dBi, but the power setting was 30 dBm for this test as worst-case.

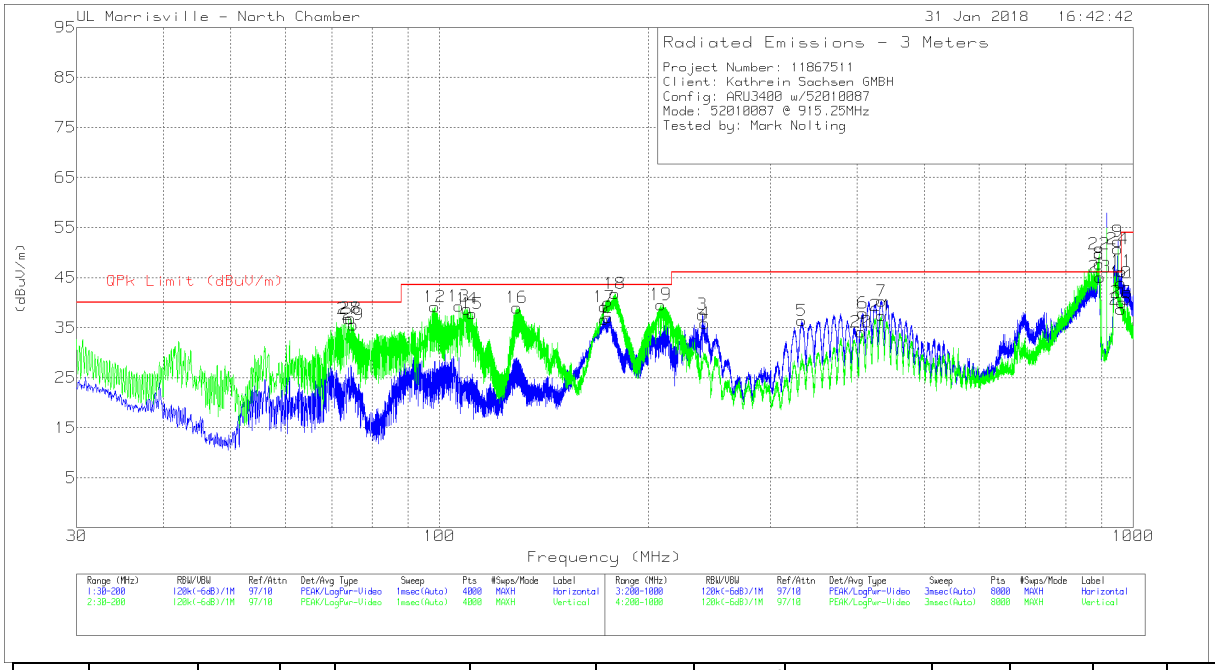
LOW CHANNEL:



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 172.0293	49.98	Pk	16.7	-30.4	.3	36.58	43.52	-6.94	0-360	199	H
3	* 335.3176	45.95	Pk	19.5	-29.3	.4	36.55	46.02	-9.47	0-360	102	H
4	* 403.3264	45.31	Pk	21	-28.9	.5	37.91	46.02	-8.11	0-360	199	H
9	* 960.000	39.27	Qp	28.4	-25.6	.8	42.87	46.02	-3.15	114	109	H
10	* 967.2997	41.4	Pk	28.4	-25.6	.7	44.9	53.97	-9.07	0-360	102	H
2	179.6812	51.71	Pk	16.1	-30.2	.3	37.91	-	-	0-360	199	H
5	411.8275	49.12	Pk	21.4	-28.9	.5	42.12	-	-	0-360	199	H
6	441.5314	48.64	Pk	21.7	-28.8	.5	42.04	-	-	0-360	199	H
7	891.1898	43.16	Pk	27.5	-26.6	2.5	46.56	-	-	0-360	102	H
8	949.9975	49.34	Pk	28.4	-25.8	1.1	53.04	-	-	0-360	102	H
11	* 73.9011	53.67	Qp	13.2	-31.2	.2	35.87	40	-4.13	284	100	V
12	* 74.5457	54.18	Qp	13.1	-31.2	.2	36.28	40	-3.72	270	100	V
13	* 75.1712	52.91	Qp	13.1	-31.2	.2	35.01	40	-4.99	271	100	V
15	* 110.8578	50.24	Qp	18	-30.8	.3	37.74	43.52	-5.78	246	101	V
16	* 113.109	49.11	Pk	18.3	-30.8	.3	36.91	43.52	-6.61	0-360	102	V
17	* 130.2844	49.69	Qp	19	-30.7	.3	38.29	43.52	-5.23	312	101	V
18	* 172.9531	48.88	Qp	16.6	-30.4	.3	35.38	43.52	-8.14	318	101	V
23	* 960.000	35.79	Qp	28.4	-25.6	.8	39.39	46.02	-6.63	116	138	V
24	* 967.8998	36.76	Pk	28.4	-25.6	.7	40.26	53.97	-13.71	0-360	102	V
14	106.7111	52.75	Pk	17.1	-30.9	.3	39.25	-	-	0-360	102	V
19	178.7035	55.16	Pk	16.2	-30.2	.3	41.46	-	-	0-360	102	V
20	211.8015	53.53	Pk	15.9	-30.1	.3	39.63	-	-	0-360	102	V
21	891.0898	45.76	Pk	27.5	-26.6	2.5	49.16	-	-	0-360	102	V
22	949.9975	47.65	Pk	28.4	-25.8	1.1	51.35	-	-	0-360	102	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
Qp - Quasi-Peak detector

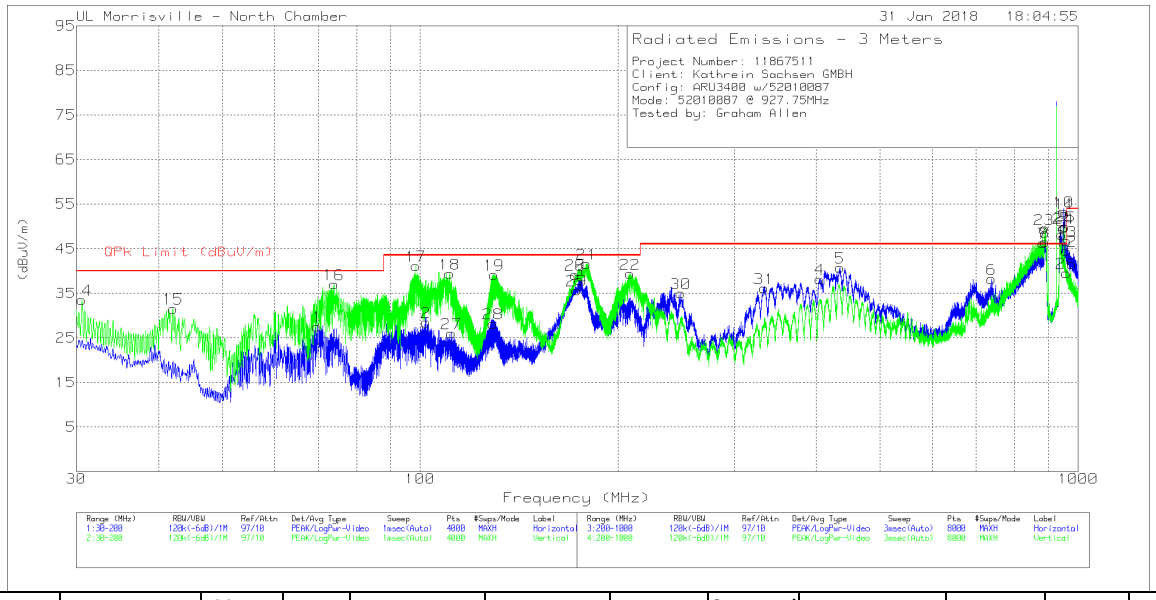
MIDDLE CHANNEL:



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 172.6669	50.11	Pk	16.6	-30.4	.3	36.61	43.52	-6.91	0-360	299	H
4	* 241.2054	48.09	Pk	17.3	-29.8	.3	35.89	46.02	-10.13	0-360	102	H
5	* 332.5172	46	Pk	19.5	-29.4	.3	36.4	46.02	-9.62	0-360	102	H
6	* 407.827	44.86	Pk	21.3	-28.8	.5	37.86	46.02	-8.16	0-360	199	H
10	* 960.000	39.32	Qp	28.4	-25.6	.8	42.92	46.02	-3.1	116	107	H
11	* 962.6991	42.64	Pk	28.4	-25.6	.8	46.24	53.97	-7.73	0-360	102	H
2	174.8775	50.63	Pk	16.4	-30.3	.3	37.03	-	-	0-360	199	H
3	239.3051	50	Pk	17.2	-29.9	.3	37.6	-	-	0-360	102	H
7	433.4303	46.89	Pk	21.6	-28.7	.5	40.29	-	-	0-360	199	H
8	892.7901	44.26	Pk	27.5	-26.5	2.5	47.76	-	-	0-360	102	H
9	949.9975	48.52	Pk	28.4	-25.8	1.1	52.22	-	-	0-360	102	H
27	* 73.9097	53.98	Qp	13.2	-31.2	.2	36.18	40	-3.82	276	101	V
28	* 74.5507	54.37	Qp	13.1	-31.2	.2	36.47	40	-3.53	266	100	V
29	* 75.1753	52.82	Qp	13.1	-31.2	.2	34.92	40	-5.08	271	101	V
14	* 109.5764	50.43	Qp	17.7	-30.9	.3	37.53	43.52	-5.99	301	100	V
15	* 111.503	49.4	Qp	18.1	-30.8	.3	37	43.52	-6.52	252	100	V
16	* 129.3235	49.83	Qp	19.1	-30.6	.3	38.63	43.52	-4.89	321	101	V
17	* 172.6739	52.3	Qp	16.6	-30.4	.3	38.8	43.52	-4.72	253	100	V
20	* 406.0268	41.22	Pk	21.2	-28.8	.5	34.12	46.02	-11.9	0-360	199	V
25	* 960.000	35.53	Qp	28.4	-25.6	.8	39.13	46.02	-6.89	120	137	V
26	* 962.5991	36.49	Pk	28.4	-25.6	.8	40.09	53.97	-13.88	0-360	102	V
12	98.4427	55.07	Pk	14.8	-30.9	.2	39.17	-	-	0-360	102	V
13	106.6898	52.78	Pk	17.1	-30.9	.3	39.28	-	-	0-360	102	V
18	179.0436	55.49	Pk	16.2	-30.2	.3	41.79	-	-	0-360	102	V
19	208.6011	53.58	Pk	15.7	-30	.3	39.58	-	-	0-360	102	V
21	433.4303	43.99	Pk	21.6	-28.7	.5	37.39	-	-	0-360	199	V
22	892.7901	46.17	Pk	27.5	-26.5	2.5	49.67	-	-	0-360	102	V
23	895.9905	41.51	Pk	27.5	-26.4	2.5	45.11	-	-	0-360	102	V
24	949.9975	46.99	Pk	28.4	-25.8	1.1	50.69	-	-	0-360	102	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
Qp - Quasi-Peak detector

HIGH CHANNEL:



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	BRF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	69.7053	45.46	Pk	13.2	-31.3	.2	27.56	-	-	0-360	299	H
2	101.9711	43.28	Pk	15.8	-30.9	.3	28.48	-	-	0-360	299	H
3	174.5799	51.65	Pk	16.4	-30.3	.3	38.05	-	-	0-360	199	H
27	* 111.4936	38.44	Pk	18.1	-30.8	.3	26.04	43.52	-17.48	0-360	199	H
28	* 128.9656	39.41	Pk	19.1	-30.6	.3	28.21	43.52	-15.31	0-360	199	H
29	* 172.8795	49.18	Pk	16.6	-30.4	.3	35.68	43.52	-7.84	0-360	102	H
4	* 404.5266	45.29	Pk	21.2	-28.8	.5	38.19	46.02	-7.83	0-360	199	H
5	434.2304	47.38	Pk	21.6	-28.7	.5	40.78	-	-	0-360	199	H
6	739.0701	39.11	Pk	25.9	-27.5	.7	38.21	-	-	0-360	102	H
7	884.389	44.11	Pk	27.4	-26.5	1.3	46.31	-	-	0-360	199	H
8	891.7899	43.14	Pk	27.5	-26.6	2.5	46.54	-	-	0-360	102	H
9	944.0967	44.52	Pk	28.2	-25.9	1.3	48.12	-	-	0-360	102	H
10	949.8975	49.64	Pk	28.4	-25.8	1.1	53.34	-	-	0-360	102	H
11	955.4982	49.33	Pk	28.5	-25.8	.9	52.93	-	-	0-360	102	H
12	* 960	39.54	Qp	28.4	-25.6	.8	43.14	46.02	-2.88	115	113	H
13	* 960.5989	43.12	Pk	28.4	-25.6	.8	46.72	53.97	-7.25	0-360	102	H
30	* 248.8063	47.2	Pk	17.2	-29.7	.3	35	46.02	-11.02	0-360	102	H
31	* 333.1173	45.72	Pk	19.5	-29.4	.3	36.12	46.02	-9.9	0-360	102	H
14	30.5952	38.65	Pk	26.5	-31.7	.1	33.55	-	-	0-360	102	V
15	42.0731	45.47	Pk	17.6	-31.6	.1	31.57	-	-	0-360	102	V
16	* 73.9206	53.74	Qp	13.2	-31.2	.2	35.94	40	-4.06	280	105	V
17	98.4427	57.06	Pk	14.8	-30.9	.2	41.16	-	-	0-360	102	V
18	* 110.8657	50.45	Qp	18	-30.8	.3	37.95	43.52	-5.57	293	102	V
19	* 129.3413	49.57	Qp	19.1	-30.6	.3	38.37	43.52	-5.15	334	103	V
20	* 172.0432	51.75	Qp	16.7	-30.4	.3	38.35	43.52	-5.17	270	105	V
21	179.0436	55.3	Pk	16.2	-30.2	.3	41.6	-	-	0-360	102	V
22	208.4011	53.39	Pk	15.7	-30	.3	39.39	-	-	0-360	102	V
23	887.9894	46.85	Pk	27.4	-26.5	1.6	49.35	-	-	0-360	102	V
24	949.9975	45.94	Pk	28.4	-25.8	1.1	49.64	-	-	0-360	102	V
25	955.4982	46.35	Pk	28.5	-25.8	.9	49.95	-	-	0-360	102	V
26	959.9988	35.96	Pk	28.4	-25.6	.8	39.56	-	-	0-360	102	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

Qp - Quasi-Peak detector

10.4. WORST-CASE BELOW 30MHz

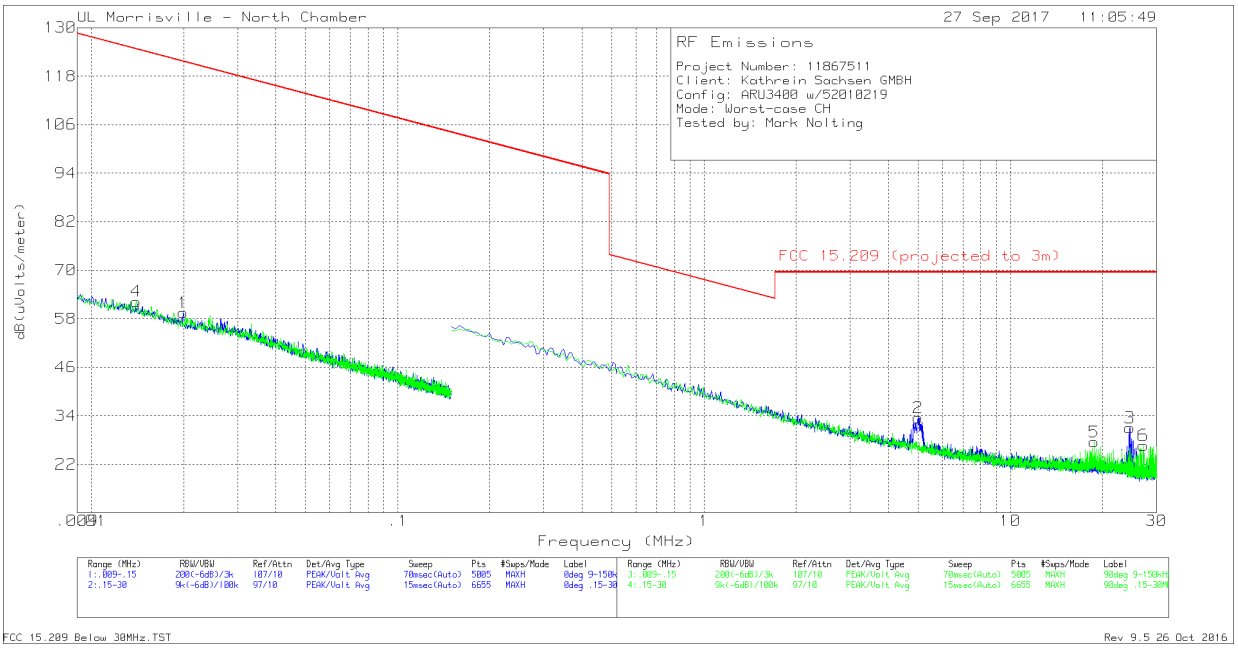
10.4.1. SPURIOUS 0.009 – 30MHz

Note: All measurements were made at a test distance of 3 m. The limits in the plots and tabular data are the FCC/IC limits extrapolated from the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to the measurement distance to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were 40*Log (specification distance / test distance).

Although these tests were performed at a test site other than an open area test site, adequate comparison measurements were confirmed against an open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788. Upon request, the evidence is available to the FCC.

SMSH-30-30-ETSI-FCC Antenna

Note – The gain of this antenna is -10 dBi, therefore the conducted power setting was 30 dBm for this test.

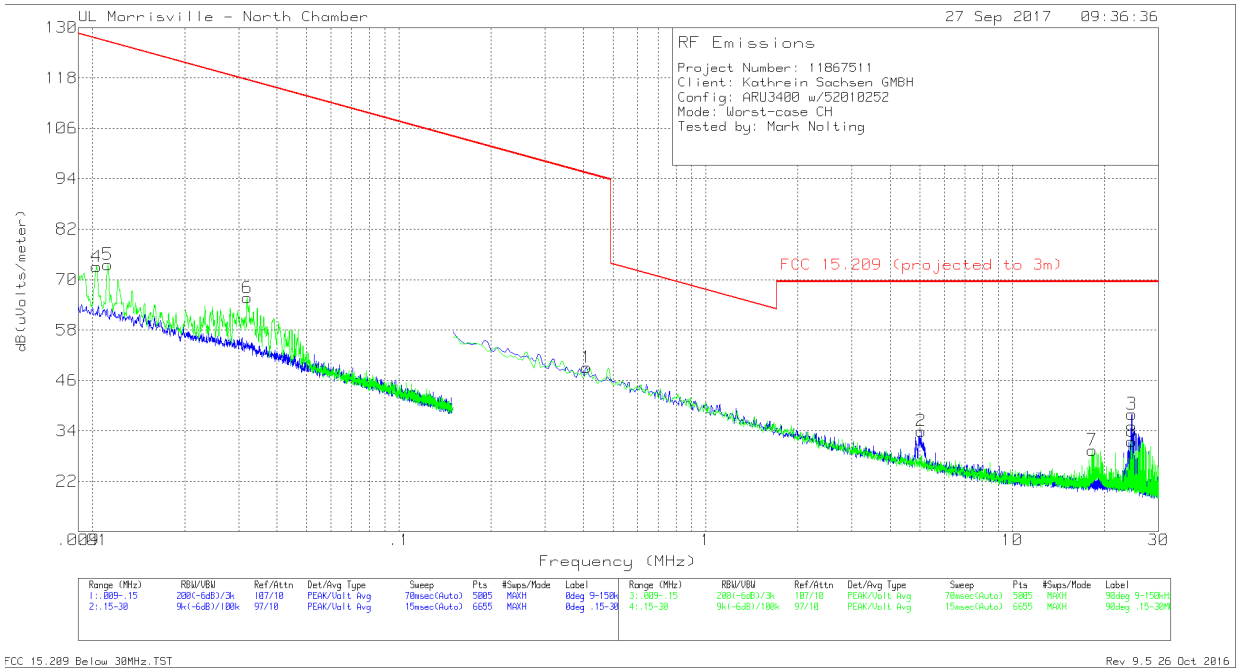


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 (projected to 3m)	Margin (dB)	Azimuth (Degs)
	The following points are for the antenna @ 0 degrees. (Loop normal towards EUT.)								
1	.01998	45.43	Pk	14	.1	59.53	121.59	-62.06	0-360
2	4.99039	22.13	Pk	11	.4	33.53	69.54	-36.01	0-360
3	24.5359	21.16	Pk	9.1	.8	31.06	69.54	-38.48	0-360
	The following points are for the antenna @ 90 degrees. (Loop normal away from EUT.)								
4	.01404	45.61	Pk	16.6	.1	62.31	124.66	-62.35	0-360
5	18.79606	16.87	Pk	10	.7	27.57	69.54	-41.97	0-360
6	27.16021	17.21	Pk	8.6	.9	26.71	69.54	-42.83	0-360

Pk - Peak detector

WIRA-40-LINEAR-FCC Antenna

Note – Antenna gain was redeclared as +13dBi after test, the gain of this antenna was originally declared as +10 dBi, and the higher power setting of 26 dBm was used for this test.

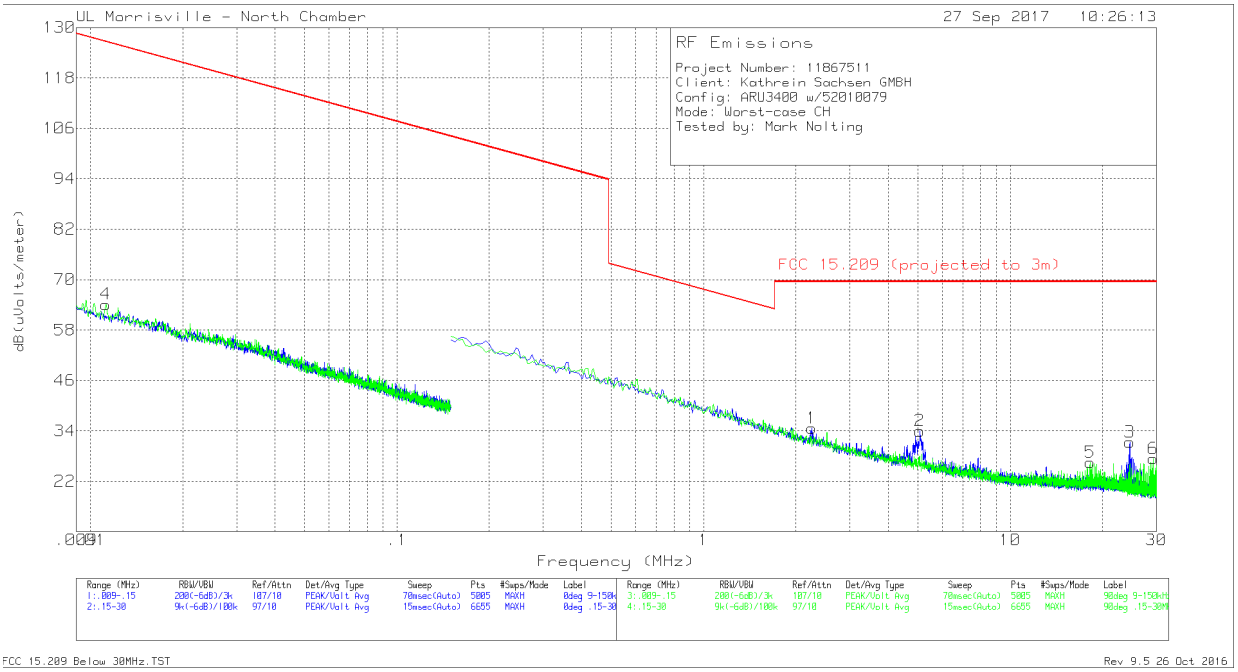


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 (projected to 3m)	Margin (dB)	Azimuth (Degs)
	The following points are for the antenna @ 0 degrees. (Loop normal towards EUT.)								
1	.41019	38.41	Pk	10.6	.1	49.11	95.34	-46.23	0-360
2	5.04871	22.56	Pk	11	.4	33.96	69.54	-35.58	0-360
3	24.5359	28.12	Pk	9.1	.8	38.02	69.54	-31.52	0-360
	The following points are for the antenna @ 90 degrees. (Loop normal away from EUT.)								
4	.01032	54.78	Pk	18.2	.1	73.08	127.33	-54.25	0-360
5	.01121	55.68	Pk	17.8	.1	73.58	126.61	-53.03	0-360
6	.03199	52.29	Pk	13.3	.1	65.69	117.5	-51.81	0-360
7	18.24652	18.62	Pk	10.1	.7	29.42	69.54	-40.12	0-360
8	24.5359	21.57	Pk	9.1	.8	31.47	69.54	-38.07	0-360

Pk - Peak detector

WIRA-70-CIRC-FCC Antenna

Note – The gain of this antenna is +5.3 dBi, therefore the conducted power setting was 30 dBm for this test.

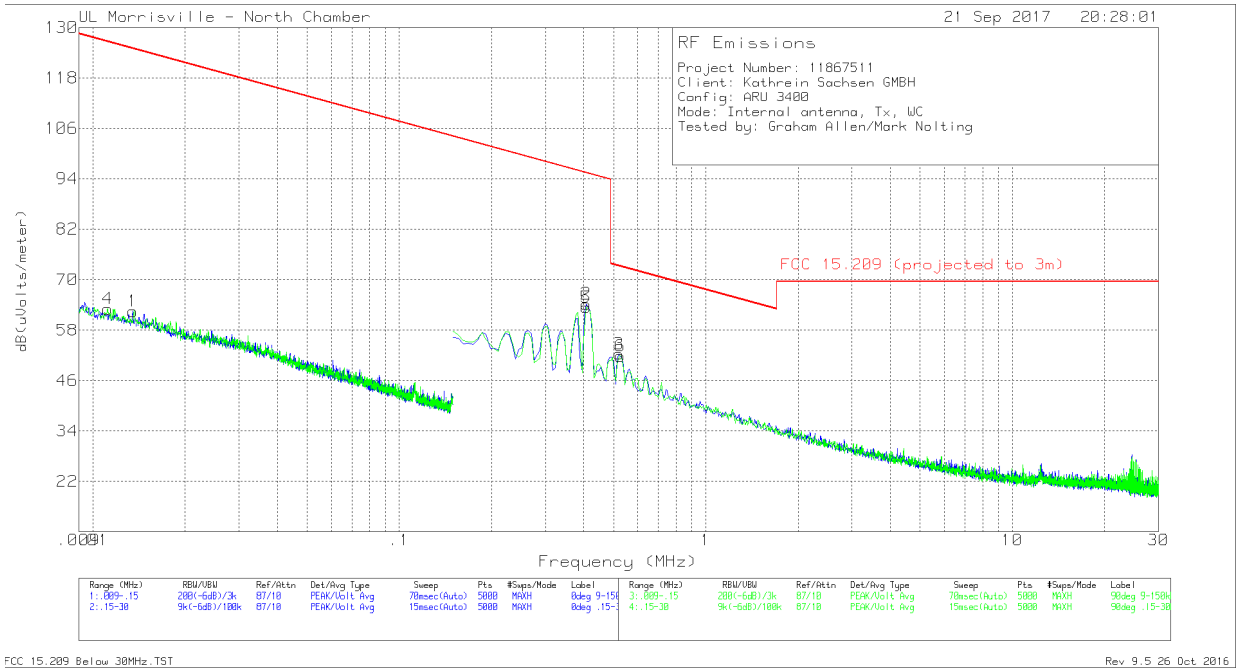


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 (projected to 3m)	Margin (dB)	Azimuth (Degs)
	The following points are for the antenna @ 0 degrees. (Loop normal towards EUT.)								
1	2.25393	23.42	Pk	11	.2	34.62	69.54	-34.92	0-360
2	5.07114	22.57	Pk	11	.4	33.97	69.54	-35.57	0-360
3	24.5359	21.45	Pk	9.1	.8	31.35	69.54	-38.19	0-360
	The following points are for the antenna @ 90 degrees. (Loop normal away from EUT.)								
4	.01124	46.22	Pk	17.8	.1	64.12	126.59	-62.47	0-360
5	18.24652	15.72	Pk	10.1	.7	26.52	69.54	-43.02	0-360
6	29.23274	18.25	Pk	8.2	.9	27.35	69.54	-42.19	0-360

Pk - Peak detector

Internal WIRA-70-CIRC-FCC Antenna

Note – The gain of this antenna is +5.5 dBi, therefore the conducted power setting was 30 dBm for this test.

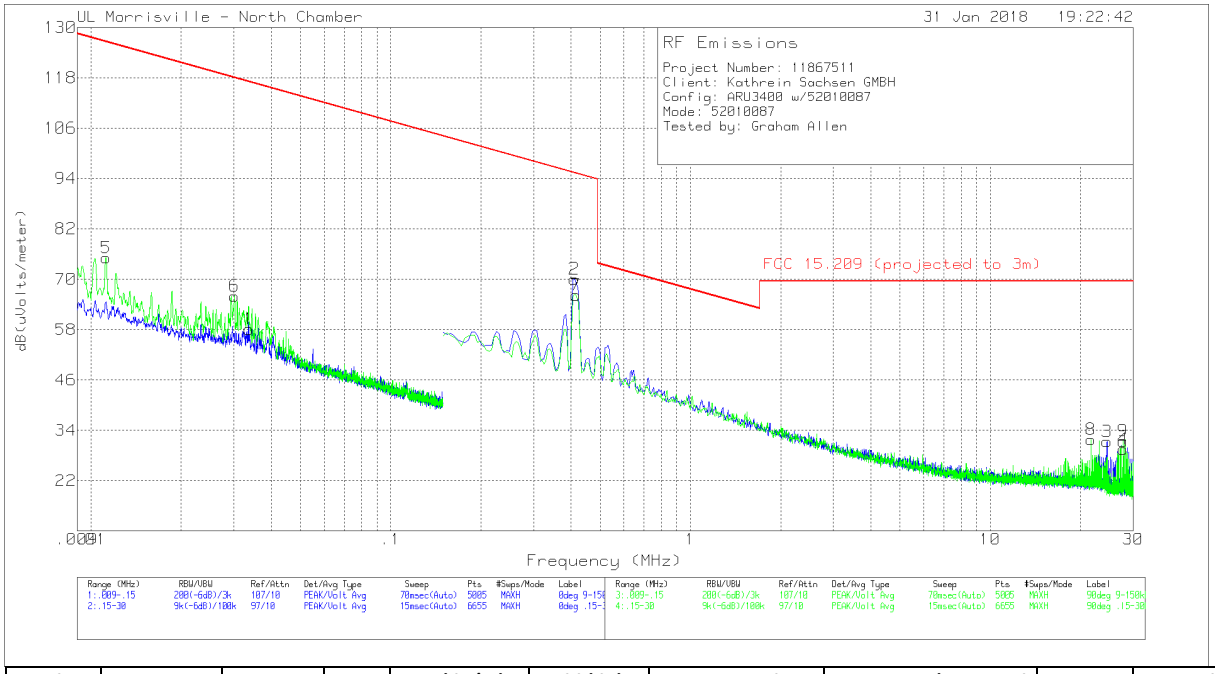


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 (projected to 3m)	Margin (dB)	Azimuth (Degs)
	The following points are for the antenna @ 0 degrees. (Loop normal towards EUT.)								
1	.01351	45.57	Pk	16.8	.1	62.47	124.99	-62.52	0-360
2	.40675	53.49	Pk	10.6	.1	64.19	95.42	-31.23	0-360
3	.5202	41.41	Pk	10.8	.1	52.31	73.28	-20.97	0-360
	The following points are for the antenna @ 90 degrees. (Loop normal away from EUT.)								
4	.01118	45.16	Pk	17.8	.1	63.06	126.63	-63.57	0-360
5	.40675	52.71	Pk	10.6	.1	63.41	95.42	-32.01	0-360
6	.52617	40.93	Pk	10.8	.1	51.83	73.18	-21.35	0-360

Pk - Peak detector

WIRA-30-CIRC-FCC Antenna

Note – The gain of this antenna is +8 dBi, the power setting was 30 dBm for this test as worst-case.



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Cbl (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 (projected to 3m)	Margin (dB)	Azimuth (Degs)	Face
1	.03364	44.82	Pk	13.2	.1	58.12	117.07	-58.95	0-360	On
2	.41019	59.74	Pk	10.2	.1	70.04	95.34	-25.3	0-360	On
3	24.5359	21.05	Pk	9.5	.8	31.35	69.54	-38.19	0-360	On
4	27.7075	20	Pk	8.6	.9	29.5	69.54	-40.04	0-360	On
5	.01124	56.22	Pk	18.8	.1	75.12	126.59	-51.47	0-360	Off
6	.03011	52.23	Pk	13.7	.1	66.03	118.03	-52	0-360	Off
7	.41467	55.92	Pk	10.2	.1	66.22	95.25	-29.03	0-360	Off
8	21.66486	20.91	Pk	10.1	.8	31.81	69.54	-37.73	0-360	Off
9	27.71198	21.94	Pk	8.6	.9	31.44	69.54	-38.1	0-360	Off

Pk - Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

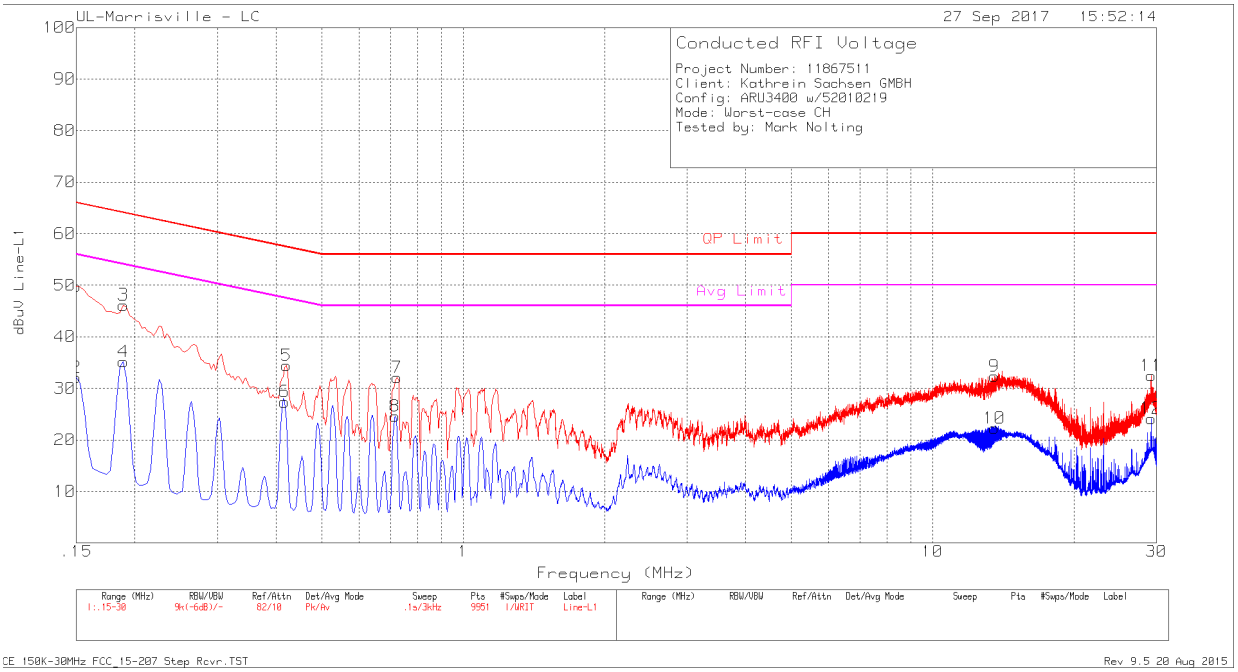
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both lines.

LINE 1 RESULTS – SMSH-30-30-ETSI-FCC Antenna

Note – The gain of this antenna is -10 dBi, therefore the conducted power setting was 30 dBm for this test.

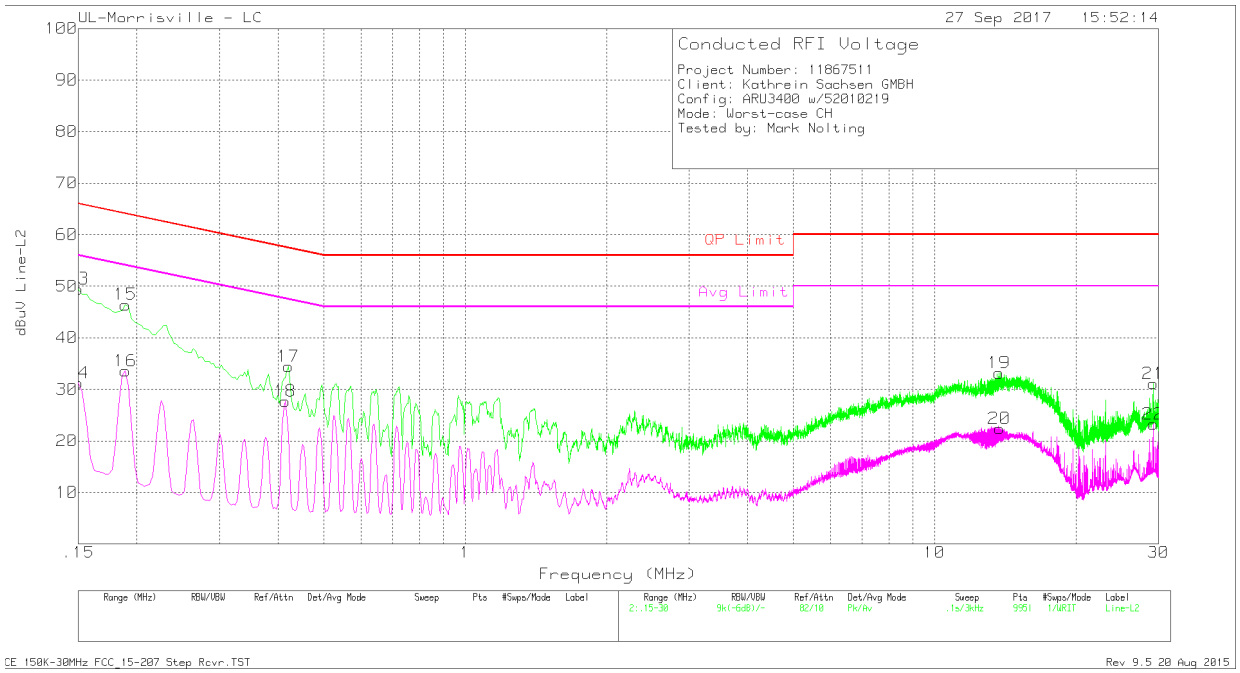


Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
1	.15	39.6	Pk	.2	10	49.8	66	-16.2	-	-
2	.15	21.87	Av	.2	10	32.07	-	-	56	-23.93
3	.189	35.97	Pk	.2	10	46.17	64.08	-17.91	-	-
4	.189	24.95	Av	.2	10	35.15	-	-	54.08	-18.93
5	.42	24.4	Pk	.1	9.9	34.4	57.45	-23.05	-	-
6	.417	17.28	Av	.1	10	27.38	-	-	47.51	-20.13
7	.723	22.17	Pk	0	9.9	32.07	56	-23.93	-	-
8	.717	14.73	Av	0	9.9	24.63	-	-	46	-21.37
9	13.539	22.12	Pk	.1	10.1	32.32	60	-27.68	-	-
10	13.539	12.1	Av	.1	10.1	22.3	-	-	50	-27.7
11	29.235	21.87	Pk	.3	10.3	32.47	60	-27.53	-	-
12	29.235	13.56	Av	.3	10.3	24.16	-	-	50	-25.84

Pk - Peak detector

Av - Average detection

LINE 2 RESULTS – SMSH-30-30-ETSI-FCC Antenna

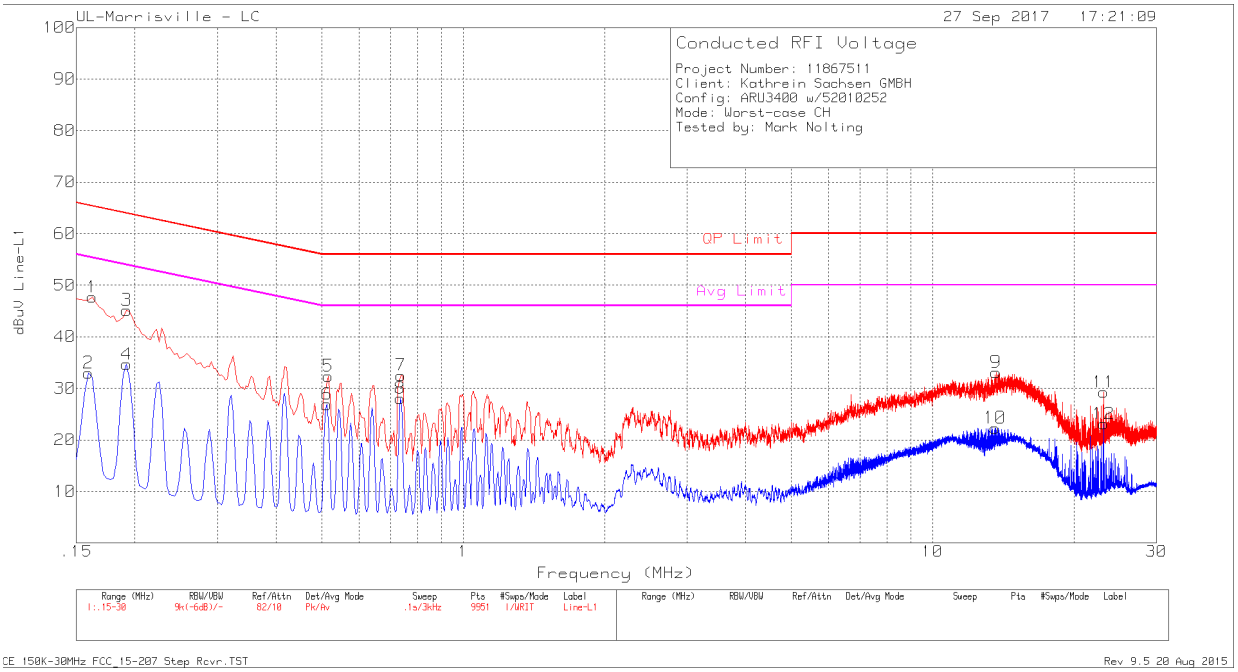


Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
13	.15	39.29	Pk	.2	10	49.49	66	-16.51	-	-
14	.15	21.06	Av	.2	10	31.26	-	-	56	-24.74
15	.189	36.22	Pk	.2	10	46.42	64.08	-17.66	-	-
16	.189	23.37	Av	.2	10	33.57	-	-	54.08	-20.51
17	.42	24.43	Pk	.1	9.9	34.43	57.45	-23.02	-	-
18	.414	17.61	Av	.1	10	27.71	-	-	47.57	-19.86
19	13.734	22.96	Pk	.1	10.1	33.16	60	-26.84	-	-
20	13.746	12.21	Av	.1	10.1	22.41	-	-	50	-27.59
21	29.235	20.49	Pk	.3	10.3	31.09	60	-28.91	-	-
22	29.235	12.67	Av	.3	10.3	23.27	-	-	50	-26.73

Pk - Peak detector
Av - Average detection

LINE 1 RESULTS – WIRA-40-LINEAR-FCC Antenna

Note – Antenna gain was redeclared as +13dBi after test, the gain of this antenna was originally declared as +10 dBi, and the higher power setting of 26 dBm was used for this test.

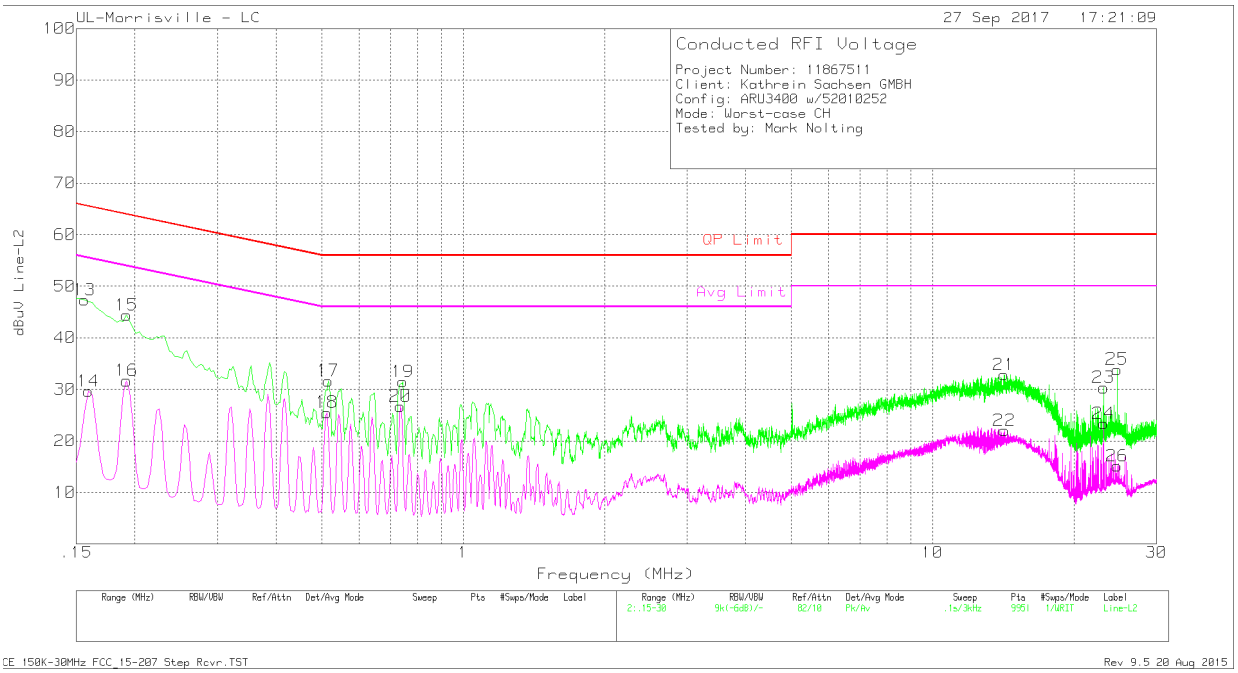


Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
1	.162	37.5	Pk	.2	10	47.7	65.36	-17.66	-	-
2	.159	22.8	Av	.2	10	33	-	-	55.52	-22.52
3	.192	34.98	Pk	.2	10	45.18	63.95	-18.77	-	-
4	.192	24.47	Av	.2	10	34.67	-	-	53.95	-19.28
5	.516	22.48	Pk	0	9.9	32.38	56	-23.62	-	-
6	.513	16.99	Av	0	9.9	26.89	-	-	46	-19.11
7	.738	22.63	Pk	0	9.9	32.53	56	-23.47	-	-
8	.735	18.18	Av	0	9.9	28.08	-	-	46	-17.92
9	13.653	22.93	Pk	.1	10.1	33.13	60	-26.87	-	-
10	13.587	12.11	Av	.1	10.1	22.31	-	-	50	-27.69
11	23.13	18.9	Pk	.2	10.2	29.3	60	-30.7	-	-
12	23.127	12.7	Av	.2	10.2	23.1	-	-	50	-26.9

Pk - Peak detector

Av - Average detection

LINE 2 RESULTS – WIRA-40-LINEAR-FCC Antenna

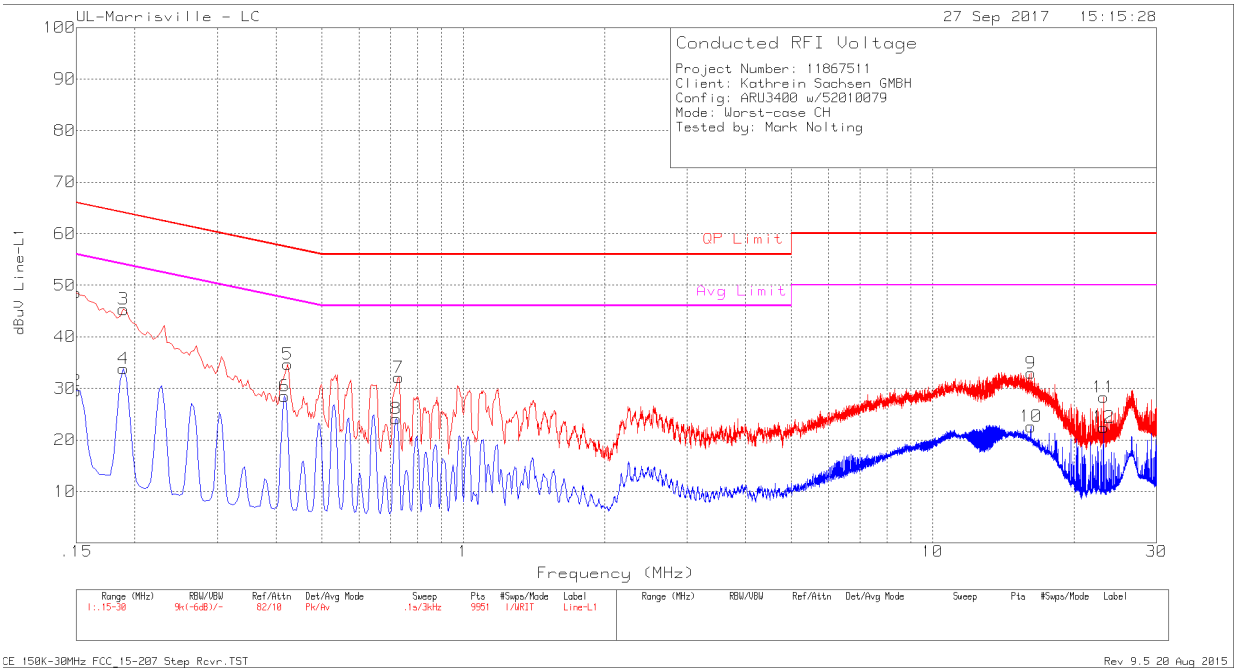


Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
13	.156	37.16	Pk	.2	10	47.36	65.67	-18.31	-	-
14	.159	19.47	Av	.2	10	29.67	-	-	55.52	-25.85
15	.192	34.16	Pk	.2	10	44.36	63.95	-19.59	-	-
16	.192	21.48	Av	.2	10	31.68	-	-	53.95	-22.27
17	.516	21.76	Pk	0	9.9	31.66	56	-24.34	-	-
18	.513	15.61	Av	0	9.9	25.51	-	-	46	-20.49
19	.744	21.6	Pk	0	9.9	31.5	56	-24.5	-	-
20	.735	16.83	Av	0	9.9	26.73	-	-	46	-19.27
21	14.217	22.6	Pk	.1	10.1	32.8	60	-27.2	-	-
22	14.226	11.82	Av	.1	10.1	22.02	-	-	50	-27.98
23	23.13	19.93	Pk	.2	10.2	30.33	60	-29.67	-	-
24	23.13	12.94	Av	.2	10.2	23.34	-	-	50	-26.66
25	24.708	23.47	Pk	.2	10.2	33.87	60	-26.13	-	-
26	24.717	4.74	Av	.2	10.2	15.14	-	-	50	-34.86

Pk - Peak detector
Av - Average detection

LINE 1 RESULTS – WIRA-70-CIRC-FCC Antenna

Note – The gain of this antenna is +5.3 dBi, therefore the conducted power setting was 30 dBm for this test.

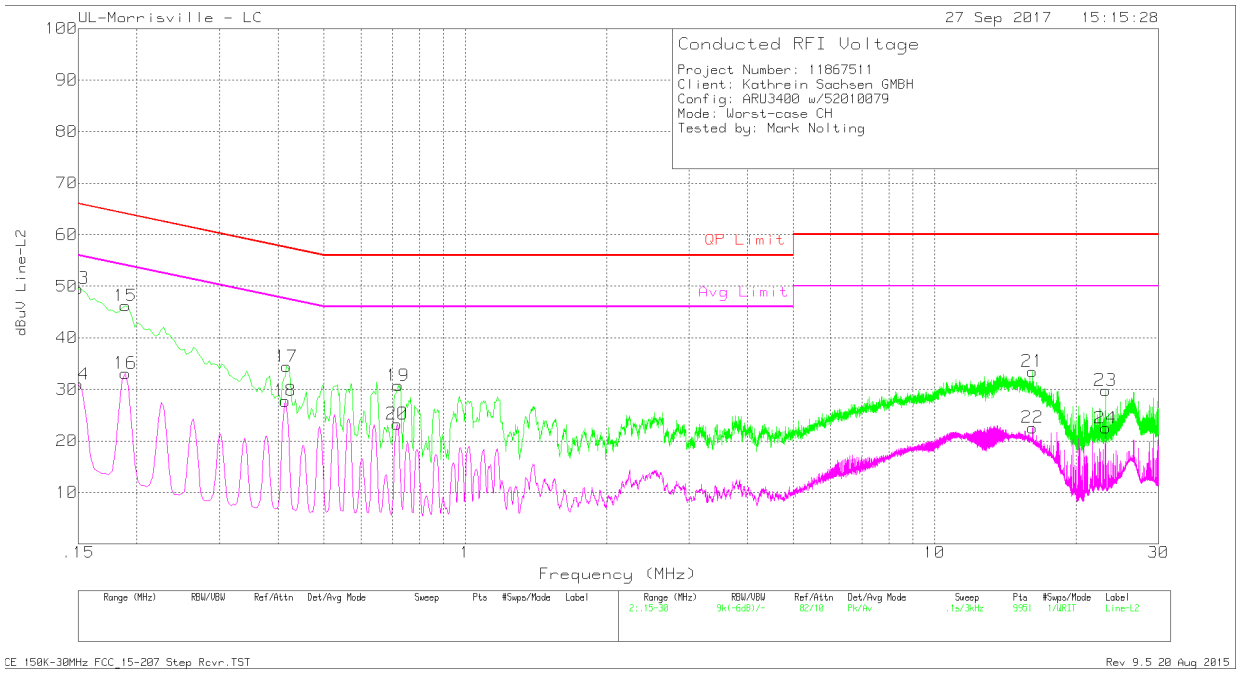


Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
1	.15	38.37	Pk	.2	10	48.57	66	-17.43	-	-
2	.15	19.3	Av	.2	10	29.5	-	-	56	-26.5
3	.189	35.13	Pk	.2	10	45.33	64.08	-18.75	-	-
4	.189	23.59	Av	.2	10	33.79	-	-	54.08	-20.29
5	.423	24.67	Pk	.1	9.9	34.67	57.39	-22.72	-	-
6	.417	18.39	Av	.1	10	28.49	-	-	47.51	-19.02
7	.729	22.22	Pk	0	9.9	32.12	56	-23.88	-	-
8	.72	14.21	Av	0	9.9	24.11	-	-	46	-21.89
9	16.227	22.74	Pk	.1	10.1	32.94	60	-27.06	-	-
10	16.227	12.39	Av	.1	10.1	22.59	-	-	50	-27.41
11	23.127	17.88	Pk	.2	10.2	28.28	60	-31.72	-	-
12	23.13	12.04	Av	.2	10.2	22.44	-	-	50	-27.56

Pk - Peak detector

Av - Average detection

LINE 2 RESULTS – WIRA-70-CIRC-FCC Antenna



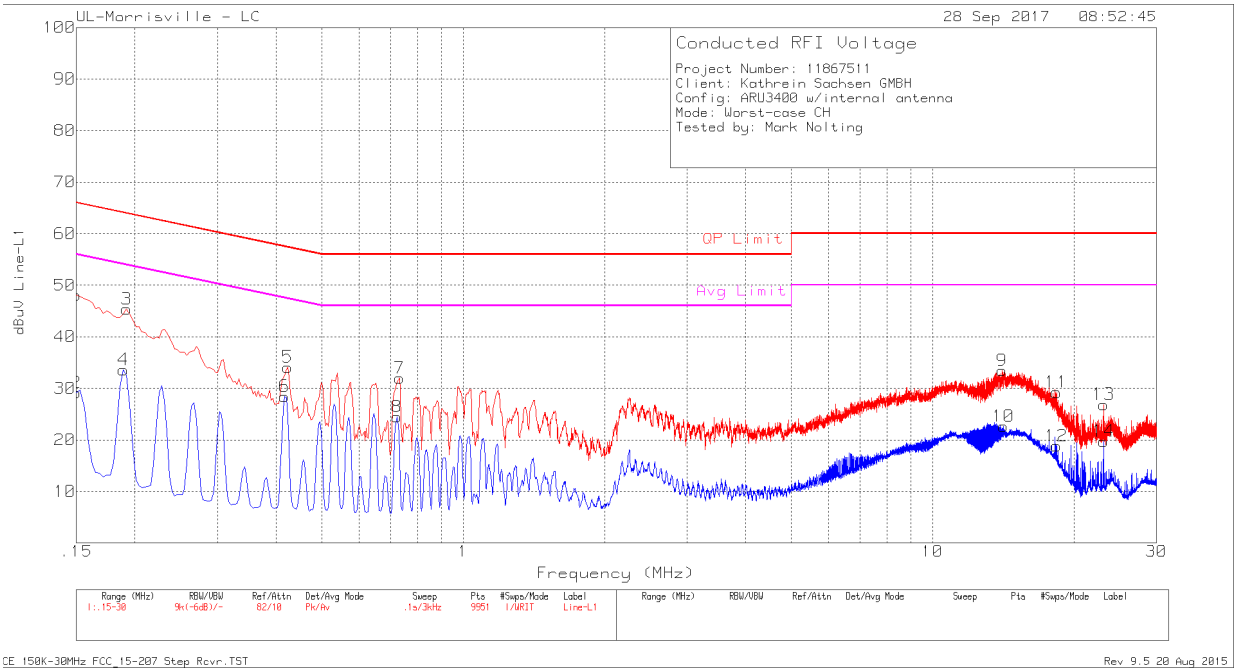
Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
13	.15	39.4	Pk	.2	10	49.6	66	-16.4	-	-
14	.15	20.76	Av	.2	10	30.96	-	-	56	-25.04
15	.189	36.06	Pk	.2	10	46.26	64.08	-17.82	-	-
16	.189	22.94	Av	.2	10	33.14	-	-	54.08	-20.94
17	.417	24.32	Pk	.1	10	34.42	57.51	-23.09	-	-
18	.414	17.65	Av	.1	10	27.75	-	-	47.57	-19.82
19	.72	20.86	Pk	0	9.9	30.76	56	-25.24	-	-
20	.717	13.4	Av	0	9.9	23.3	-	-	46	-22.7
21	16.17	23.3	Pk	.1	10.1	33.5	60	-26.5	-	-
22	16.167	12.38	Av	.1	10.1	22.58	-	-	50	-27.42
23	23.127	19.41	Pk	.2	10.2	29.81	60	-30.19	-	-
24	23.127	12.1	Av	.2	10.2	22.5	-	-	50	-27.5

Pk - Peak detector

Av - Average detection

LINE 1 RESULTS – Internal WIRA-70-CIRC-FCC Antenna

Note – The gain of this antenna is +5.5 dBi, therefore the conducted power setting was 30 dBm for this test.

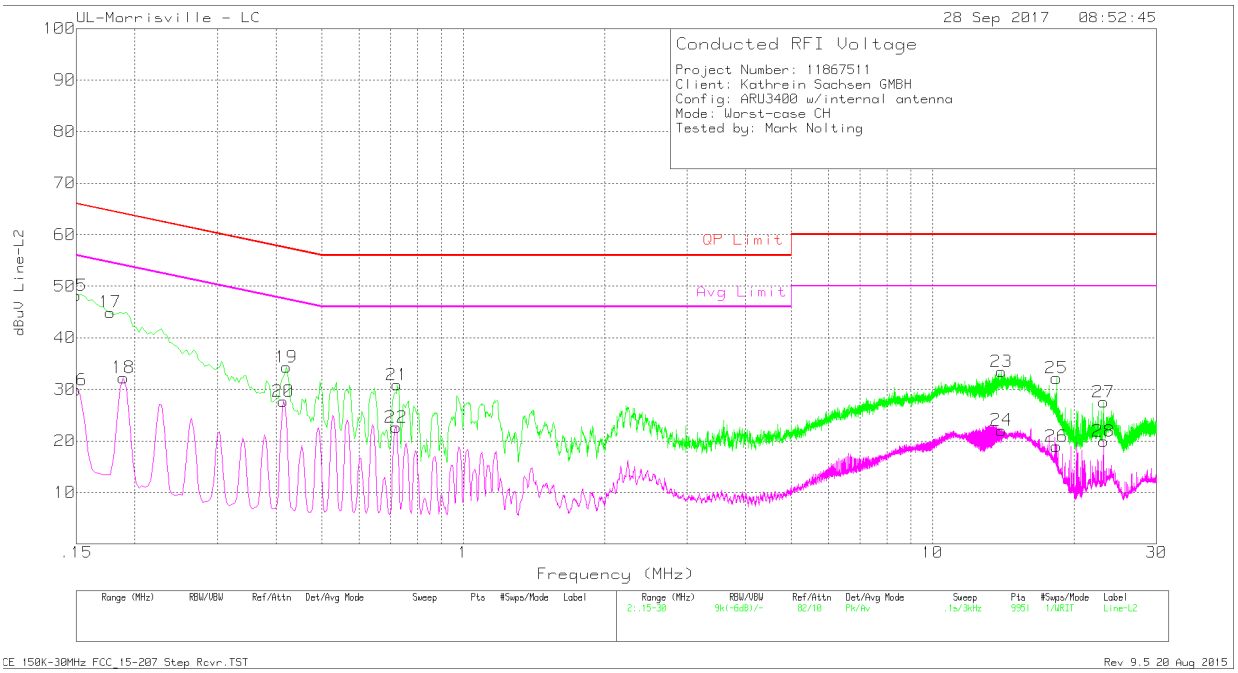


Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
1	.15	37.92	Pk	.2	10	48.12	66	-17.88	-	-
2	.15	18.93	Av	.2	10	29.13	-	-	56	-26.87
3	.192	35.16	Pk	.2	10	45.36	63.95	-18.59	-	-
4	.189	23.42	Av	.2	10	33.62	-	-	54.08	-20.46
5	.423	24.11	Pk	.1	9.9	34.11	57.39	-23.28	-	-
6	.417	18.36	Av	.1	10	28.46	-	-	47.51	-19.05
7	.732	22.08	Pk	0	9.9	31.98	56	-24.02	-	-
8	.723	14.57	Av	0	9.9	24.47	-	-	46	-21.53
9	14.052	23.23	Pk	.1	10.1	33.43	60	-26.57	-	-
10	14.142	12.41	Av	.1	10.1	22.61	-	-	50	-27.39
11	18.366	18.92	Pk	.1	10.2	29.22	60	-30.78	-	-
12	18.366	8.54	Av	.1	10.2	18.84	-	-	50	-31.16
13	23.127	16.47	Pk	.2	10.2	26.87	60	-33.13	-	-
14	23.13	9.33	Av	.2	10.2	19.73	-	-	50	-30.27

Pk - Peak detector

Av - Average detection

LINE 2 RESULTS – Internal WIRA-70-CIRC-FCC Antenna

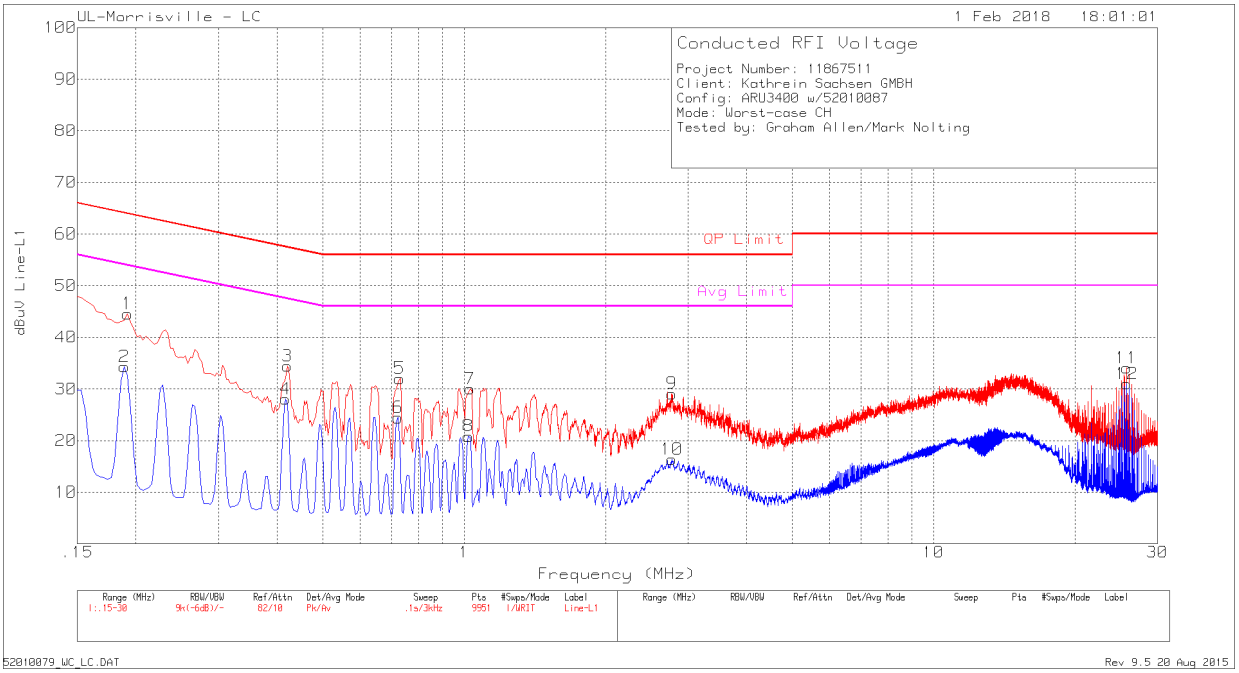


Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
15	.15	38.01	Pk	.2	10	48.21	66	-17.79	-	-
16	.15	19.67	Av	.2	10	29.87	-	-	56	-26.13
17	.177	34.75	Pk	.2	10	44.95	64.63	-19.68	-	-
18	.189	22.07	Av	.2	10	32.27	-	-	54.08	-21.81
19	.42	24.31	Pk	.1	9.9	34.31	57.45	-23.14	-	-
20	.414	17.57	Av	.1	10	27.67	-	-	47.57	-19.9
21	.723	20.95	Pk	0	9.9	30.85	56	-25.15	-	-
22	.72	12.76	Av	0	9.9	22.66	-	-	46	-23.34
23	14.025	23.22	Pk	.1	10.1	33.42	60	-26.58	-	-
24	14.031	11.88	Av	.1	10.1	22.08	-	-	50	-27.92
25	18.363	21.88	Pk	.1	10.2	32.18	60	-27.82	-	-
26	18.366	8.64	Av	.1	10.2	18.94	-	-	50	-31.06
27	23.13	17.12	Pk	.2	10.2	27.52	60	-32.48	-	-
28	23.127	9.53	Av	.2	10.2	19.93	-	-	50	-30.07

Pk - Peak detector
Av - Average detection

LINE 1 RESULTS – WIRA-30-CIRC-FCC Antenna

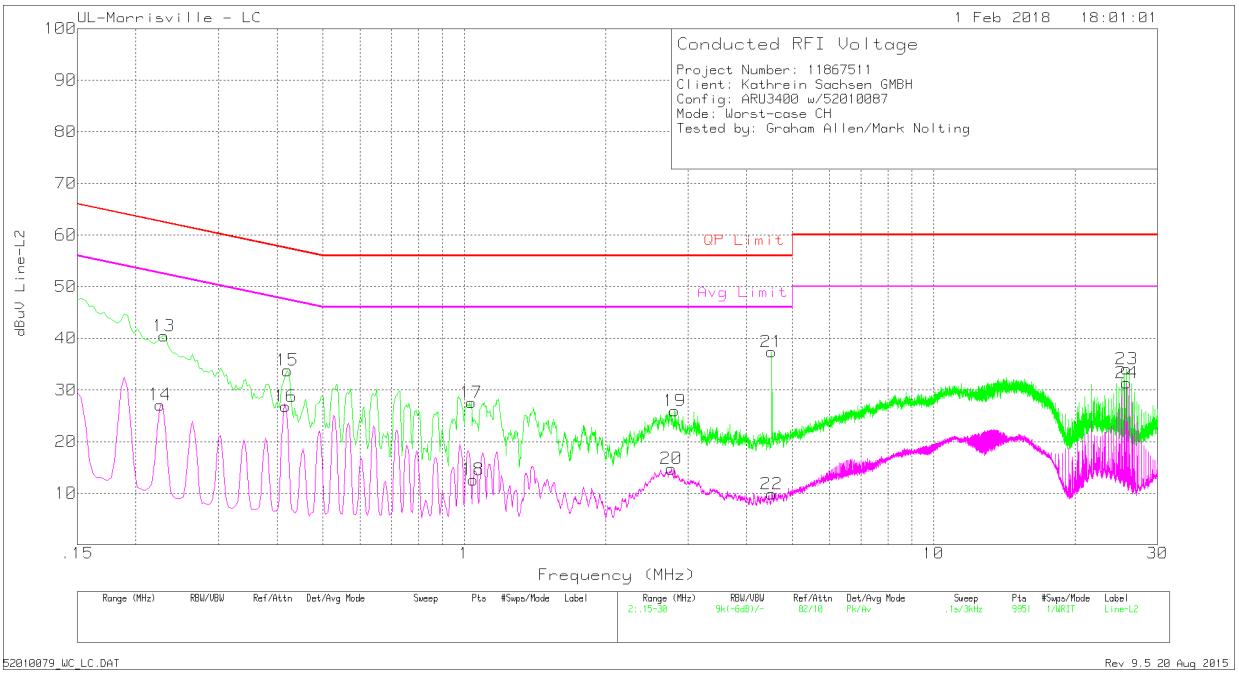
Note – The gain of this antenna is +8 dBi, but the power setting was 30 dBm for this test as worst-case.



Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
1	.192	34.37	Pk	.2	10	44.57	63.95	-19.38	-	-
2	.189	24.13	Av	.2	10	34.33	-	-	54.08	-19.75
3	.42	24.44	Pk	.1	9.9	34.44	57.45	-23.01	-	-
4	.417	17.94	Av	.1	10	28.04	-	-	47.51	-19.47
5	.729	22.12	Pk	0	9.9	32.02	56	-23.98	-	-
6	.723	14.54	Av	0	9.9	24.44	-	-	46	-21.56
7	1.029	20.13	Pk	0	9.9	30.03	56	-25.97	-	-
8	1.0215	10.96	Av	0	9.9	20.86	-	-	46	-25.14
9	2.775	19.09	Pk	0	10	29.09	56	-26.91	-	-
10	2.769	6.38	Av	0	10	16.38	-	-	46	-29.62
11	25.803	23.59	Pk	.3	10.2	34.09	60	-25.91	-	-
12	25.803	20.46	Av	.3	10.2	30.96	-	-	50	-19.04

Pk - Peak detector
Av - Average detection

LINE 2 RESULTS – WIRA-30-CIRC-FCC Antenna



Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
13	.2295	30.48	Pk	.1	9.9	40.48	62.47	-21.99	-	-
14	.225	17.11	Av	.1	9.9	27.11	-	-	52.63	-25.52
15	.42	23.77	Pk	.1	9.9	33.77	57.45	-23.68	-	-
16	.417	16.74	Av	.1	10	26.84	-	-	47.51	-20.67
17	1.035	17.67	Pk	0	9.9	27.57	56	-28.43	-	-
18	1.047	2.71	Av	0	9.9	12.61	-	-	46	-33.39
19	2.811	15.92	Pk	0	10	25.92	56	-30.08	-	-
20	2.766	4.72	Av	0	10	14.72	-	-	46	-31.28
21	4.524	27.36	Pk	0	10	37.36	56	-18.64	-	-
22	4.518	-.16	Av	0	10	9.84	-	-	46	-36.16
23	25.809	23.6	Pk	.2	10.3	34.1	60	-25.9	-	-
24	25.806	20.88	Av	.2	10.3	31.38	-	-	50	-18.62

Pk - Peak detector
Av - Average detection