FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-247 ISSUE 1

CERTIFICATION TEST C2PC REPORT

FOR

902-928 MHZ TRANSCEIVER

MODEL NUMBER: A1101R09C

FCC ID: X7J-A10040601
IC: 8975A-A10040601

REPORT NUMBER: R11524600-E1

ISSUE DATE: 2017-04-06

Prepared for
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Revision History

Ver.	Issue Date	Revisions	Revised By
1	2017-02-15	Initial Issue	Richard Jankovics
2	2017-03-01	Updated Test & Measurement Equipment calibration information	Richard Jankovics
3	2017-04-06	Added Line Conducted Emissions to Measurement Methods. Updated device description in 10.1 to “902-928 MHz Transceiver.”	Richard Jankovics

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1. DATA REUSE

1.1. INTRODUCTION

The 15.247 antenna port conducted bandwidth, power spectral density and spurious emissions for FCC ID: X7J-A10040601 are represented by the results of the original grant, test report 10U13329-1C. This report for FCC ID: X7J-A10040601 contains conducted measurements for duty cycle, on time, output power, radiated measurements, and AC power line conducted emissions.

ANAREN MICROWAVE INC takes full responsibility that the data as referenced in FCC ID: X7J-A10040601, test report 10U13329-1C represents compliance for this model.

1.2. DIFFERENCES

According to manufacturer, FCC ID: X7J-A10040601 radio is electrically identical. The only change is the addition of another antenna for use. This antenna is an inverted-F PCB trace antenna with a peak gain of 1.3 dBi, designed to operate in the 800Mhz to 1000Mhz range.

1.3. TESTING PERFORMED

Testing performed under this report for FCC ID: X7J-A10040601 contains conducted measurements for duty cycle, on time, output power, radiated measurements, and AC power line conducted emissions.. All other data is referenced to FCC ID: X7J-A10040601, test report 10U13329-1C.

1.4. REFERENCE DETAIL SECTION

Equipment Class	Reference FCC ID	Type Grant	Grant Date	Report Title
DTS	FCC ID: X7J-A10040601	New	2010-09-08	10U13329-1C

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2. ATTESTATION OF TEST RESULTS

COMPANY NAME: ANAREN MICROWAVE INC.
6635 KIRKVILLE ROAD
EAST SYRACUSE, NEW YORK, 13057, USA

EUT DESCRIPTION: 902-928 MHZ TRANSCEIVER

MODEL: A1101R09C

SERIAL NUMBER: 164408600282 (Conducted Unit), 164408600362 (Radiated Unit)

DATE TESTED: 2016-12-05 to 2017-01-11

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	PASS
INDUSTRY CANADA RSS-247 Issue 1	PASS
INDUSTRY CANADA RSS-GEN Issue 4	PASS

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:

Jeff Moser
EMC Program Manager
UL – Consumer Technology Division

Prepared By:

Richard Jankovics
Wise Engineer
UL – Consumer Technology Division

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3. 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 1.

4. 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 Suite B, Perimeter Park Drive, Morrisville, NC 27560.

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 ISED 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/.

5. CALIBRATION AND UNCERTAINTY

5.1. 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.

5.2. 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

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5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Total RF power, conducted	± 0.45 dB
RF power density, conducted	± 1.5 dB
Spurious emissions, conducted	± 2.94 dB
All emissions, radiated up to 40 GHz	± 5.36 dB
Temperature	± 0.07°C
Humidity	± 2.26% RH
DC and low frequency voltages	± 1.27%
Conducted Emissions (0.150-30MHz)	± 3.65dB

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

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6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is a 902-928 MHz Transceiver, Model Number: A1101R09C

6.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (pk) (dBm)	Output Power (pk) (mW)
902-928	MSK	12.04	16.00
902-928	FSK	12.07	16.11

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an Inverted F antenna with a gain of 1.3 dBi.

6.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Idx: 65535.

The test utility software used during testing was HDLC version 1.0.1.0.

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6.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

Worst-case data rates as provided by the client were:

MSK mode: 500 kBand
2-FSK mode: 250 kBand

Radiated emissions for EUT with antenna was performed and passed; therefore, antenna port spurious was not performed.

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6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	IBM	T60	L3-M9404	N/A
Power Adapter	QCTECH	TTL-232R-3V3	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB	1	USB	N/A	< 1m	Connects EUT to laptop

Note: Interface used to configure test card and is not part of final product.

TEST SETUP

Test software exercised the radio card.

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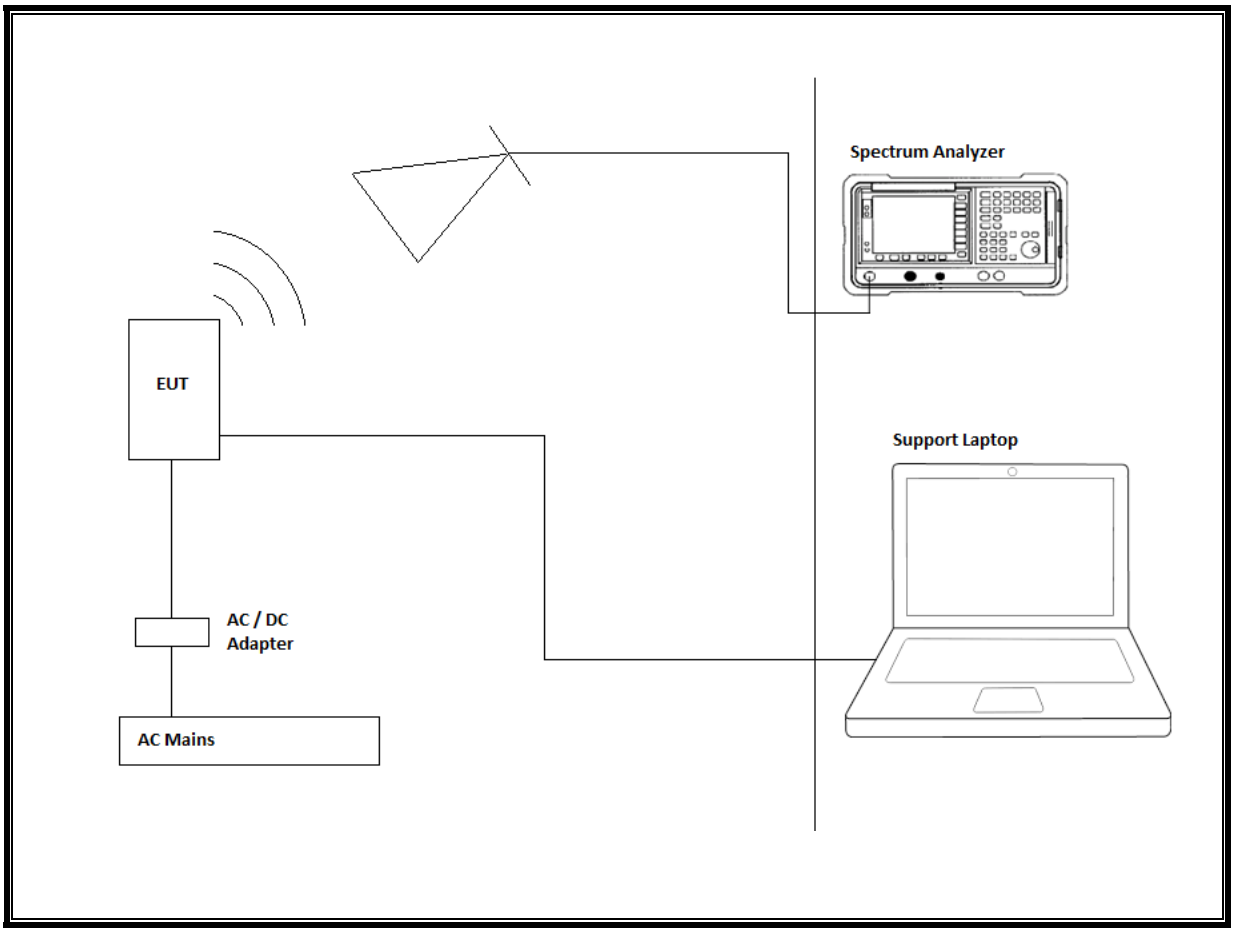
SETUP DIAGRAM FOR TESTS



Note: Laptop removed for testing

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7. 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.
	30-1000 MHz				
AT0073	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2016-06-27	2017-06-30
	1-18 GHz				
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2016-03-07	2017-03-31
	Gain-Loss Chains				
N-SAC02	Gain-loss string: 30-1000MHz	Various	Various	2016-06-26	2017-06-30
N-SAC03	Gain-loss string: 1-18GHz	Various	Various	2016-08-28	2017-08-28
	Receiver & Software				
SA0027	Spectrum Analyzer	Agilent	N9030A	2016-02-08	2017-02-08
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Additional Equipment used				
139844	Temp/Humid/Pressure Meter	Control Co./Fisher	14-650-118	2016-02-19	2017-02-19

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

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	0.009-30MHz	**(Loop Ant.)**			
AT0079*	Active Loop Antenna	ETS-Lindgren	6502	2015-12-08 2016-12-28	2016-12-31 2017-12-31
AT0059	Active Loop Antenna	ETS-Lindgren	6502	2016-04-12	2017-04-30
	30-1000 MHz				
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2016-06-07	2017-06-30
	1-18 GHz				
AT0069	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2016-03-07	2017-03-31
	Gain-Loss Chains				
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2016-10-04	2017-10-04
S-SAC02	Gain-loss string: 30-1000MHz	Various	Various	2016-06-26	2017-06-30
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2016-08-28	2017-08-28
	Receiver & Software				
SA0025	Spectrum Analyzer	Agilent	N9030A	2016-03-17	2017-03-31
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Additional Equipment used				
139843	Temp/Humid/Pressure Meter	Control Co./Fisher	14-650-118	2016-02-19	2017-02-19
	Power Meter				
PWM003	Power Meter	Keysight	N1911A	2016-06-21	2017-06-21
PWS001	Power Sensor	Keysight	N1921A	2016-04-07	2017-04-30

* Calibration of AT0079 occurred during test program. Both original and updated calibration dates are provided.

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8. MEASUREMENT METHODS

Output Power: KDB 558074 D01 v03r05, Section 9.1.2.
Output Power: KDB 558074 D01 v03r05, Section 9.2.3.1.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r05, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v03r05, Section 12.1.

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

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9. ANTENNA PORT TEST RESULTS

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)
902-928 MHz Band						
MSK 500Kbps	13.540	13.540	1.000	100.00%	0.00	0.010
FSK 250Kbps	13.540	13.540	1.000	100.00%	0.00	0.010

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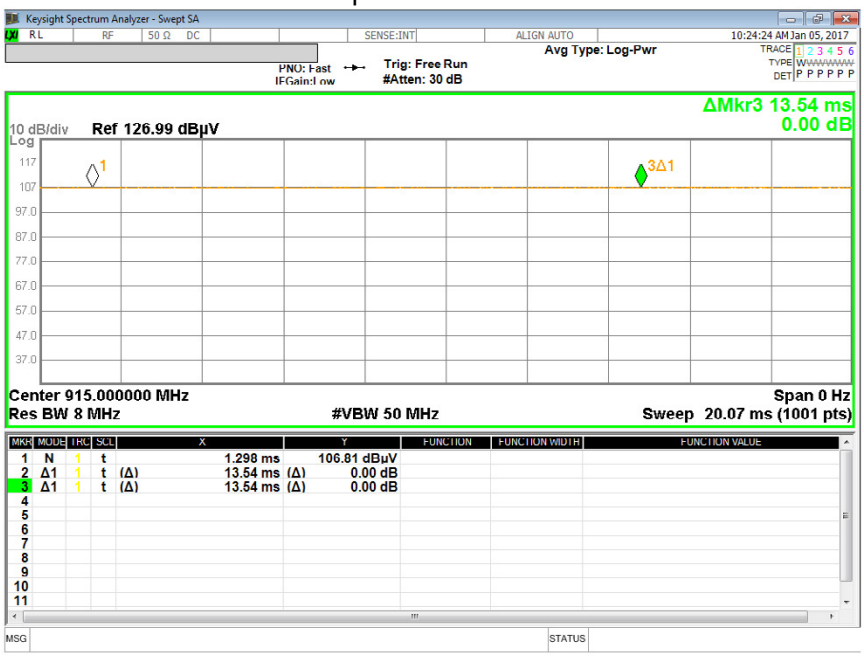
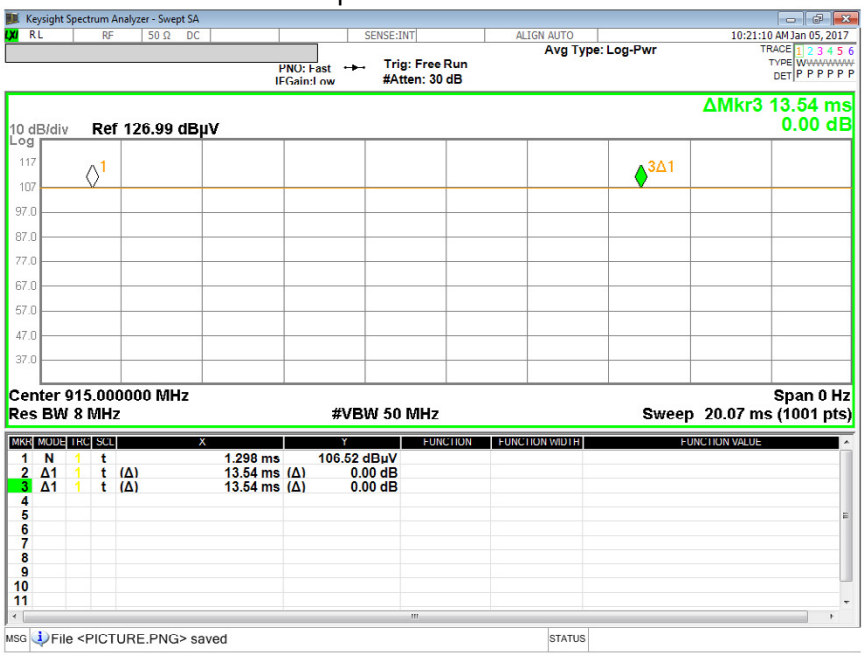
DUTY CYCLE PLOTS

902-928 MHz BAND

DUTY CYCLE MSK 500Kbps MODE



DUTY CYCLE FSK250Kbps MODE



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9.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

RESULTS

MSK

Channel	Frequency (MHz)	Power (dBm)
Low	902.81	11.97
Mid	915.00	11.78
High	927.29	11.52

FSK

Channel	Frequency (MHz)	Power (dBm)
Low	902.81	11.96
Mid	915.00	11.77
High	927.29	11.51

TEST INFORMATION

Date: 2017-01-05
Tester: Niklas Haydon

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9.3. OUTPUT POWER

LIMITS

FCC §15.247

IC RSS-247 5.4 (4)

FCC - For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RSS - For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(5), the e.i.r.p. shall not exceed 4 W.

DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

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RESULTS

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	902.81	1.30	30.00	30	36	30.00
Mid	915	1.30	30.00	30	36	30.00
High	927.29	1.30	30.00	30	36	30.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power

MSK Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	902.81	12.04	12.04	30.00	-17.96
Mid	915	11.87	11.87	30.00	-18.13
High	927.29	11.61	11.61	30.00	-18.39

FSK Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	902.81	12.07	12.07	30.00	-17.93
Mid	915	11.89	11.89	30.00	-18.11
High	927.29	11.60	11.60	30.00	-18.40

TEST INFORMATION

Date: 2017-01-05
Tester: Niklas Haydon

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10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-247 Issue 1 Clause 8.9 (Transmitter)

IC RSS-GEN Issue 4 Clause 7.1.2 (Receiver)

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.
§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the filed strength from uV/m to dBuV/m is:
Limit (dBuV/m) = 20 log limit (uV/m)

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TEST PROCEDURE

ANSI C63.10-2013

KDB 937606 OATS and Chamber Correlation Justification

Device is a 902-928 MHz Transceiver.

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

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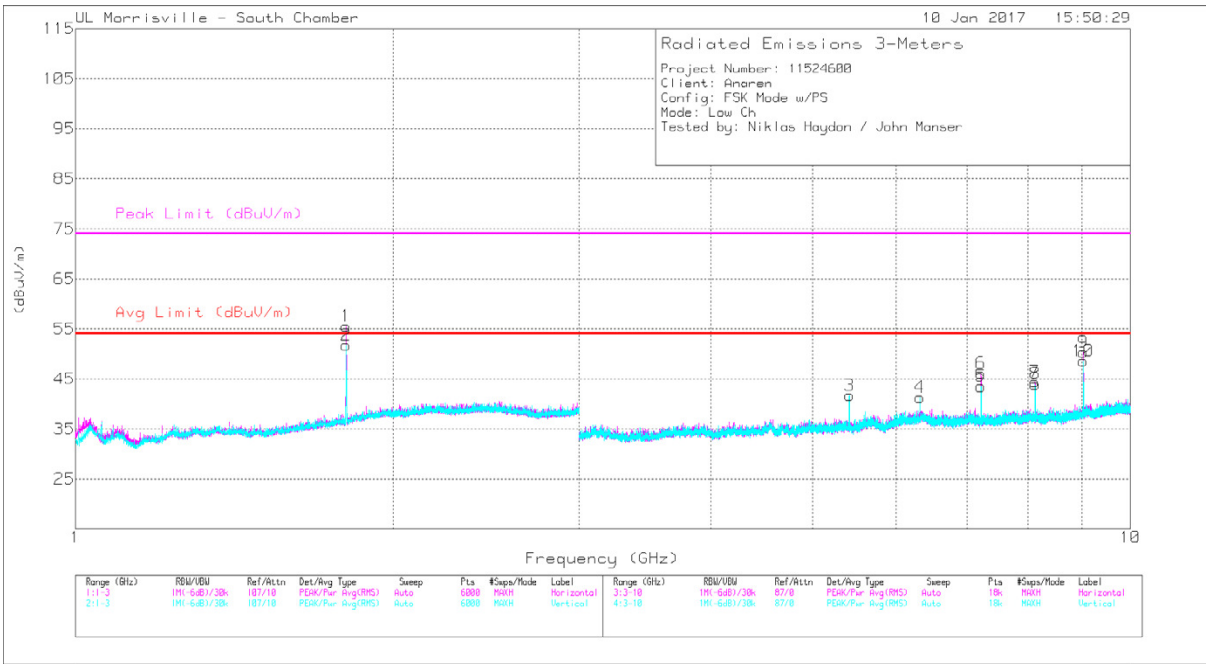
10.2. TRANSMITTER ABOVE 1 GHz

10.3. TX ABOVE 1 GHz FSK MODE IN THE 902-928 MHz BAND

HARMONICS AND SPURIOUS EMISSIONS

Low Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7	* 8.121	41.74	PK2	35.7	-27.4	50.04	-	-	74	-23.96	84	199	H
	* 8.121	33.13	MAv1	35.7	-27.4	41.43	54	-12.57	-	-	84	199	H
8	* 8.124	38.98	PK2	35.7	-27.4	47.28	-	-	74	-26.72	21	188	V
	* 8.124	28.79	MAv1	35.7	-27.4	37.09	54	-16.91	-	-	21	188	V
9	* 9.027	44.77	PK2	35.9	-27	53.67	-	-	74	-20.33	74	187	H
	* 9.027	37.32	MAv1	35.9	-27	46.22	54	-7.78	-	-	74	187	H
3	* 5.416	42.94	PK2	34.5	-30.6	46.84	-	-	74	-27.16	21	101	V
	* 5.416	34.37	MAv1	34.5	-30.5	38.37	54	-15.63	-	-	21	101	V
10	* 9.023	43.86	PK2	35.9	-27	52.76	-	-	74	-21.24	43	186	V
	* 9.023	35.99	MAv1	35.9	-27	44.89	54	-9.11	-	-	43	186	V
1	1.805	47.86	Pk	30	-22.3	55.56	-	-	-	-	0-360	199	H
2	1.805	44.06	Pk	30	-22.3	51.76	-	-	-	-	0-360	199	V
4	6.318	34.16	Pk	35.4	-28.2	41.36	-	-	-	-	0-360	101	V
6	7.219	38.94	Pk	35.5	-28.3	46.14	-	-	-	-	0-360	102	H
5	7.219	36.32	Pk	35.5	-28.3	43.52	-	-	-	-	0-360	199	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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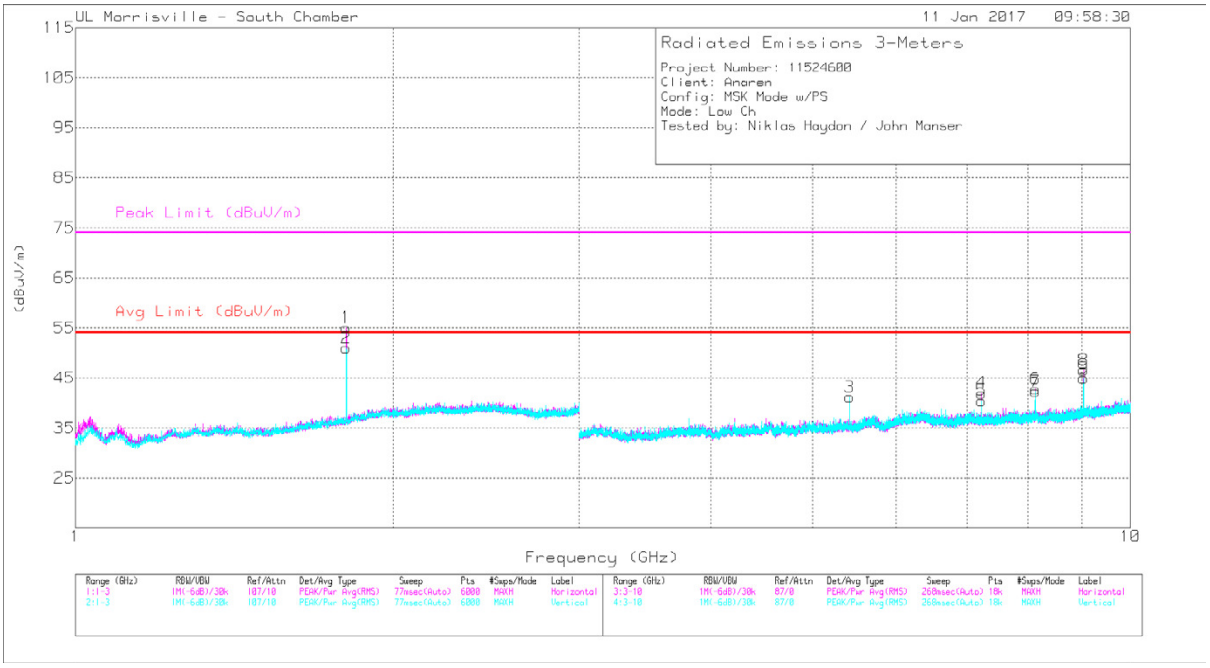
10.4. TX ABOVE 1 GHz MSK MODE IN THE 902-928 MHz BAND

HARMONICS AND SPURIOUS EMISSIONS

Low Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	* 8.125	40.79	PK2	35.7	-27.4	49.09	-	-	74	-24.91	92	112	H
	* 8.125	32.29	MAv1	35.7	-27.4	40.59	54	-13.41	-	-	92	112	H
8	* 9.028	43.47	PK2	35.9	-27	52.37	-	-	74	-21.63	82	261	H
	* 9.028	36.51	MAv1	35.9	-27	45.41	54	-8.59	-	-	82	261	H
3	* 5.417	42.03	PK2	34.5	-30.6	45.93	-	-	74	-28.07	16	112	V
	* 5.417	33.79	MAv1	34.5	-30.6	37.69	54	-16.31	-	-	16	112	V
7	* 8.125	41.08	PK2	35.7	-27.4	49.38	-	-	74	-24.62	187	168	V
	* 8.125	32.53	MAv1	35.7	-27.4	40.83	54	-13.17	-	-	187	168	V
9	* 9.028	42.66	PK2	35.9	-27	51.56	-	-	74	-22.44	38	232	V
	* 9.028	34.96	MAv1	35.9	-27	43.86	54	-10.14	-	-	38	232	V
1	1.805	47.35	Pk	30	-22.3	55.05	-	-	-	-	0-360	199	H
2	1.806	43.29	Pk	30	-22.3	50.99	-	-	-	-	0-360	199	V
5	7.222	33.2	Pk	35.5	-28.2	40.5	-	-	-	-	0-360	101	V
4	7.223	34.7	Pk	35.5	-28.2	42	-	-	-	-	0-360	102	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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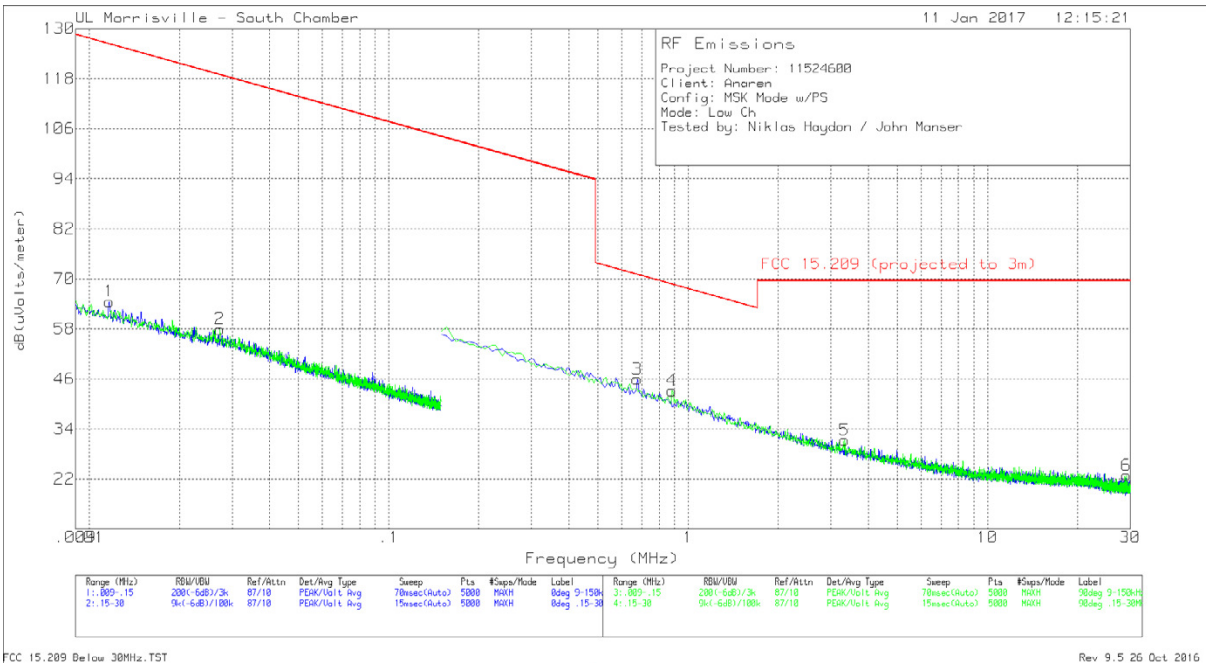
10.5. BELOW 30 MHz Worst Case

SPURIOUS EMISSIONS 9KHz TO 30 MHz

MSK



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)	Rx Antenna
1	.01166	46.87	Pk	17.6	.1	64.57	126.27	-61.7	0-360	Face On
2	.02731	44.24	Pk	13.6	.1	57.94	118.88	-60.94	0-360	Face Off
3	.67545	35.11	Pk	10.7	.1	45.91	71.01	-25.1	0-360	Face On
4	.88443	32.28	Pk	10.8	.1	43.18	68.67	-25.49	0-360	Face Off
5	3.33851	19.88	Pk	11.1	.3	31.28	69.54	-38.26	0-360	Face Off
6	29.09144	13.81	Pk	8.2	.9	22.91	69.54	-46.63	0-360	Face Off

Pk - Peak detector
FCC 15.209 Below 30MHz.TST
Rev 9.5 26 Oct 2016

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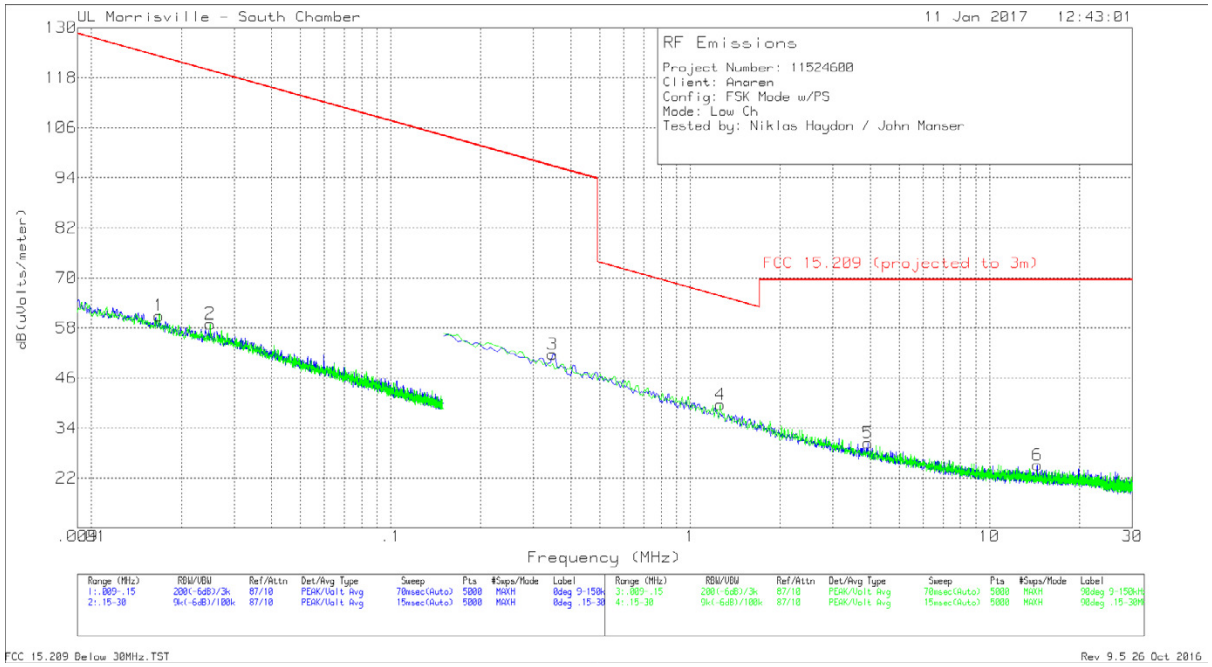
FSK



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)	Rx Antenna
1	.01684	45.45	Pk	15.4	.1	60.95	123.08	-62.13	0-360	Face Off
2	.02496	45.07	Pk	13.8	.1	58.97	119.66	-60.69	0-360	Face Off
3	.34704	41	Pk	10.6	.1	51.7	96.8	-45.1	0-360	Face On
4	1.26061	28.4	Pk	11	.2	39.6	65.59	-25.99	0-360	Face Off
5	3.92964	19	Pk	11.1	.3	30.4	69.54	-39.14	0-360	Face On
6	14.43263	14.17	Pk	10.4	.6	25.17	69.54	-44.37	0-360	Face On

Pk - Peak detector

FCC 15.209 Below 30MHz.TST

Rev 9.5 26 Oct 2016

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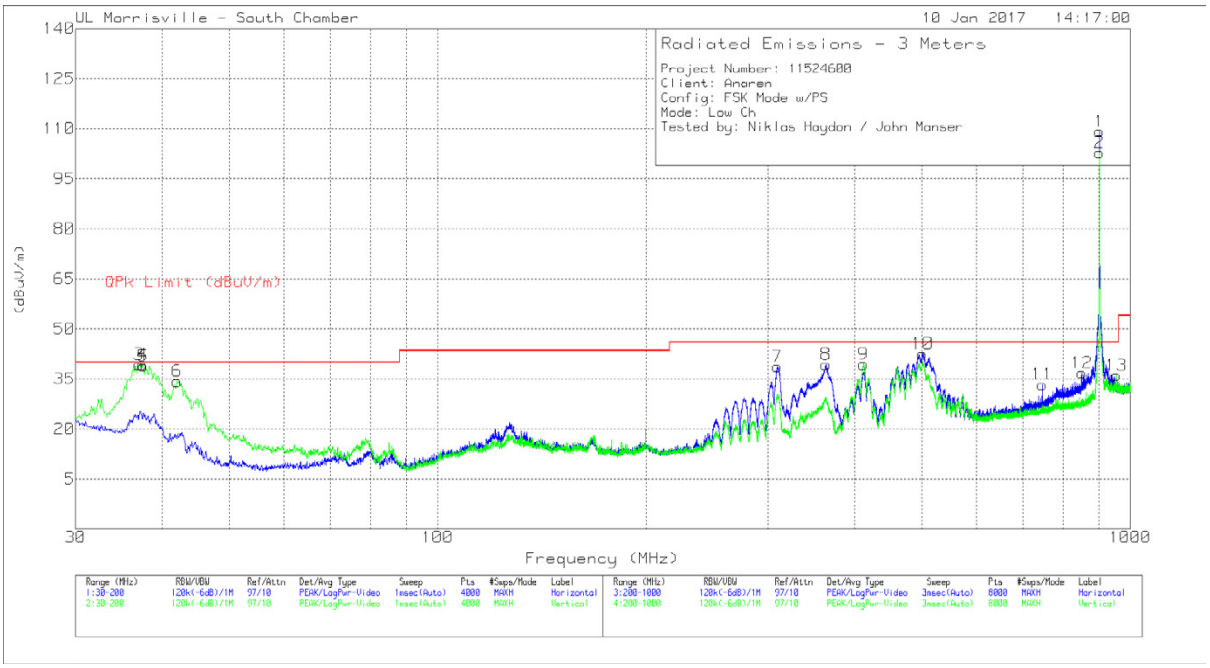
10.6. BELOW 1 GHz FSK Mode

SPURIOUS EMISSIONS 30 TO 1000 MHz

Low Channel



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	37.4998	42.63	Qp	20.3	-31.7	31.23	40	-8.77	162	111	V
3	37.0568	50.43	Pk	20.6	-31.7	39.33	-	-	0-360	101	V
4	37.4819	50.69	Pk	20.3	-31.7	39.29	-	-	0-360	101	V
6	42.0731	49.1	Pk	16.8	-31.6	34.3	-	-	0-360	101	V
7	309.5142	49.86	Pk	18.4	-29.6	38.66	-	-	0-360	102	H
8	363.6213	48.95	Pk	19.7	-29.3	39.35	-	-	0-360	102	H
9	411.6275	47.88	Pk	20.7	-29.2	39.38	-	-	0-360	102	V
10	501.3392	49.23	Pk	22.1	-28.8	42.53	-	-	0-360	198	H
11	746.6711	36.33	Pk	25.2	-28.2	33.33	-	-	0-360	102	H
12	850.6846	37.97	Pk	26.4	-27.6	36.77	-	-	0-360	102	H
1	902.6913	109.54	Pk	26.7	-27.1	109.14	-	-	0-360	102	H
2	902.6913	103.26	Pk	26.7	-27.1	102.86	-	-	0-360	102	V
13	954.298	35.01	Pk	27.5	-26.4	36.11	-	-	0-360	102	V

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

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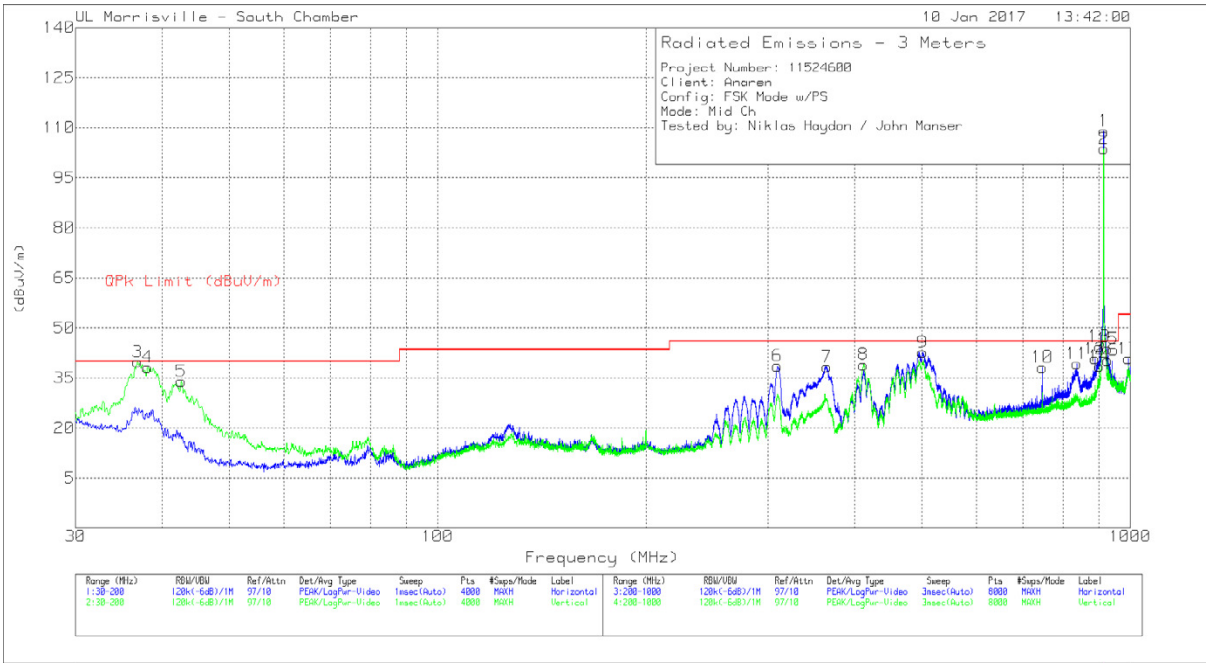
Mid Channel



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	38.3442	42.93	Qp	19.6	-31.7	30.83	40	-9.17	134	116	V
17	* 993.1031	38.78	Pk	27.8	-25.8	40.78	53.97	-13.19	0-360	198	H
3	36.8443	50.86	Pk	20.7	-31.7	39.86	-	-	0-360	101	V
5	42.6258	49.11	Pk	16.5	-31.6	34.01	-	-	0-360	101	V
6	309.3642	49.82	Pk	18.4	-29.6	38.62	-	-	0-360	102	H
7	364.5214	47.83	Pk	19.8	-29.3	38.33	-	-	0-360	102	H
8	411.5275	47.49	Pk	20.7	-29.2	38.99	-	-	0-360	102	V
9	501.4392	49.39	Pk	22.1	-28.8	42.69	-	-	0-360	198	H
10	746.071	41.21	Pk	25.2	-28.2	38.21	-	-	0-360	102	H
11	836.7828	40.44	Pk	26.5	-27.7	39.24	-	-	0-360	102	H
12	888.7895	41.41	Pk	26.6	-27.2	40.81	-	-	0-360	102	H
13	901.7912	44.82	Pk	26.7	-27.1	44.42	-	-	0-360	102	H
14	902.0913	38.93	Pk	26.7	-27.1	38.53	-	-	0-360	102	V
1	915.093	109.17	Pk	26.9	-27	109.07	-	-	0-360	102	H
2	915.093	103.78	Pk	26.9	-27	103.68	-	-	0-360	198	V
15	927.7946	43.23	Pk	27.2	-26.7	43.73	-	-	0-360	102	H
16	928.0946	39.82	Pk	27.2	-26.7	40.32	-	-	0-360	198	V

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

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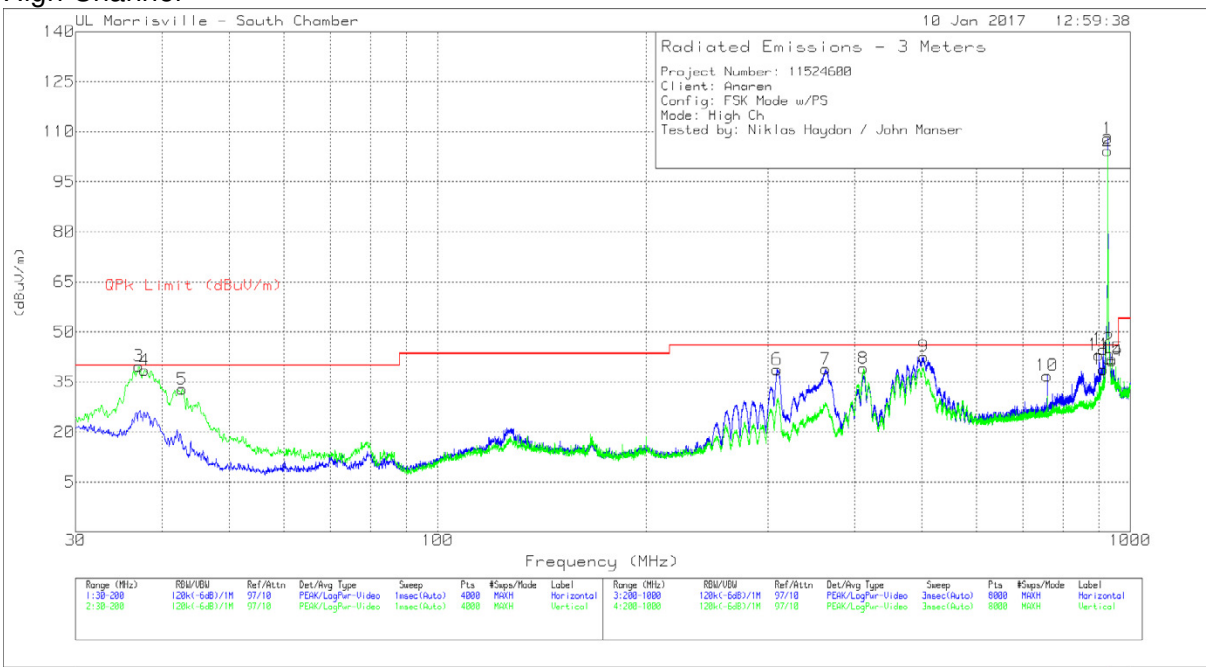
High Channel



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 37.508	42.42	Qp	20.2	-31.7	30.92	40	-9.08	150	109	V
3	37.0143	50.84	Pk	20.6	-31.7	39.74	-	-	0-360	101	V
5	42.7958	48.11	Pk	16.3	-31.6	32.81	-	-	0-360	101	V
6	309.0142	49.98	Pk	18.4	-29.6	38.78	-	-	0-360	102	H
7	363.2212	48.5	Pk	19.7	-29.3	38.9	-	-	0-360	102	H
8	411.7275	47.47	Pk	20.7	-29.1	39.07	-	-	0-360	102	V
9	502.8394	49.17	Pk	22.2	-28.8	42.57	-	-	0-360	198	H
10	758.2726	39.91	Pk	25.2	-28.2	36.91	-	-	0-360	102	H
11	901.2912	43.51	Pk	26.7	-27.1	43.11	-	-	0-360	102	H
12	914.2928	44.9	Pk	26.9	-27	44.8	-	-	0-360	102	H
13	914.6929	38.9	Pk	26.9	-27	38.8	-	-	0-360	199	V
1	927.6946	107.59	Pk	27.2	-26.7	108.09	-	-	0-360	102	H
2	927.6946	103.77	Pk	27.2	-26.7	104.27	-	-	0-360	102	V
15	940.6963	41.17	Pk	27.4	-26.6	41.97	-	-	0-360	102	H
14	940.6963	40.48	Pk	27.4	-26.6	41.28	-	-	0-360	199	V

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

Pk - Peak detector

Qp - Quasi-Peak detector

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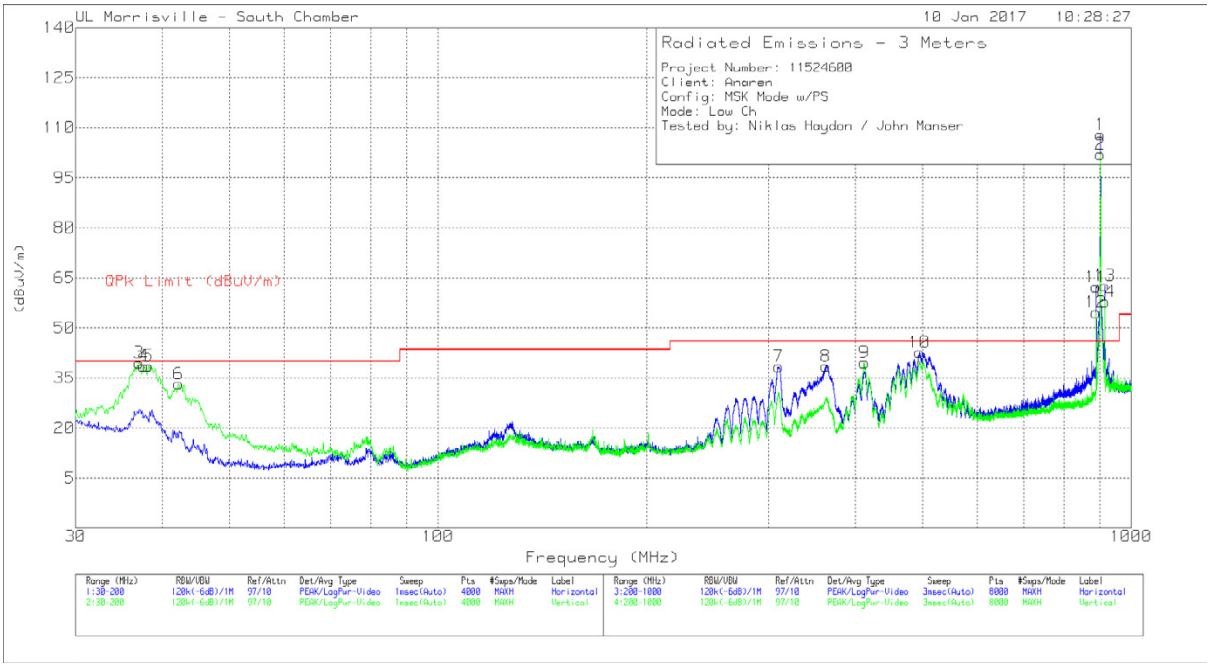
10.7. BELOW 1 GHz MSK Mode

SPURIOUS EMISSIONS 30 TO 1000 MHz

Low Channel



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 37.5999	42.37	Qp	20.2	-31.7	30.87	40	-9.13	313	114	V
5	38.4177	42.99	Qp	19.6	-31.7	30.89	40	-9.11	287	106	V
3	37.0568	50.63	Pk	20.6	-31.7	39.53	-	-	0-360	101	V
6	42.2007	47.99	Pk	16.8	-31.6	33.19	-	-	0-360	101	V
7	310.1143	49.63	Pk	18.4	-29.6	38.43	-	-	0-360	102	H
8	362.2211	48.08	Pk	19.7	-29.3	38.48	-	-	0-360	102	H
9	412.1276	47.98	Pk	20.7	-29.1	39.58	-	-	0-360	102	V
10	495.0384	49.36	Pk	22.1	-28.8	42.66	-	-	0-360	199	H
11	889.8897	62.87	Pk	26.6	-27.2	62.27	-	-	0-360	102	H
12	889.8897	55.24	Pk	26.6	-27.2	54.64	-	-	0-360	102	V
1	902.6913	108.36	Pk	26.7	-27.1	107.96	-	-	0-360	102	H
2	902.8914	102.52	Pk	26.7	-27.1	102.12	-	-	0-360	102	V
13	915.8931	62.7	Pk	26.9	-26.9	62.7	-	-	0-360	102	H
14	915.8931	57.85	Pk	26.9	-26.9	57.85	-	-	0-360	198	V

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

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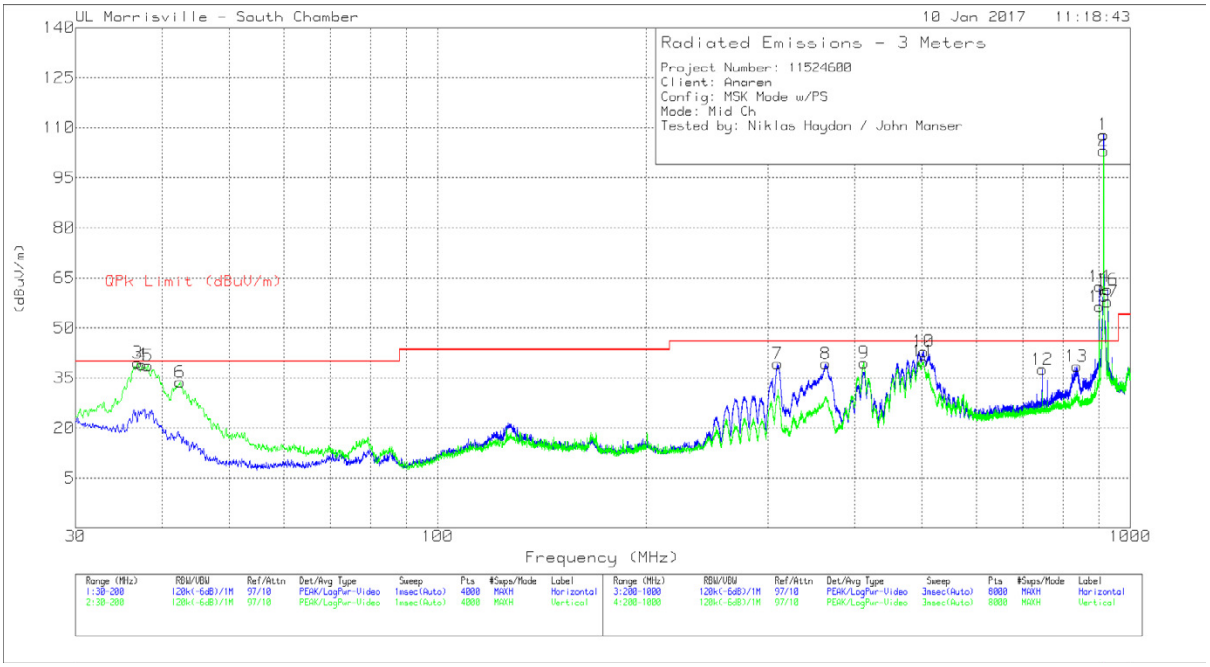
Mid Channel



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	* 38.2423	43.09	Qp	19.7	-31.7	31.09	40	-8.91	153	103	V
3	36.8443	50.51	Pk	20.7	-31.7	39.51	-	-	0-360	102	V
4	37.4394	50.35	Pk	20.3	-31.7	38.95	-	-	0-360	102	V
6	42.4557	48.74	Pk	16.6	-31.6	33.74	-	-	0-360	102	V
7	309.6142	50.44	Pk	18.4	-29.6	39.24	-	-	0-360	102	H
8	363.3212	48.89	Pk	19.7	-29.3	39.29	-	-	0-360	102	H
9	412.6276	47.92	Pk	20.7	-29.1	39.52	-	-	0-360	102	V
11	502.6393	46.54	Pk	22.2	-28.8	39.94	-	-	0-360	102	V
10	502.8394	49.54	Pk	22.2	-28.8	42.94	-	-	0-360	198	H
12	745.871	40.51	Pk	25.2	-28.2	37.51	-	-	0-360	102	H
13	836.4827	39.6	Pk	26.5	-27.6	38.5	-	-	0-360	102	H
15	901.8912	56.77	Pk	26.7	-27.1	56.37	-	-	0-360	102	V
14	902.0913	62.79	Pk	26.7	-27.1	62.39	-	-	0-360	102	H
1	914.8429	108.08	Pk	26.9	-27	107.98	-	-	0-360	102	H
2	914.8929	103.19	Pk	26.9	-27	103.09	-	-	0-360	199	V
16	927.7946	60.99	Pk	27.2	-26.7	61.49	-	-	0-360	102	H
17	928.0946	57.36	Pk	27.2	-26.7	57.86	-	-	0-360	102	V

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

Pk - Peak detector

Qp - Quasi-Peak detector

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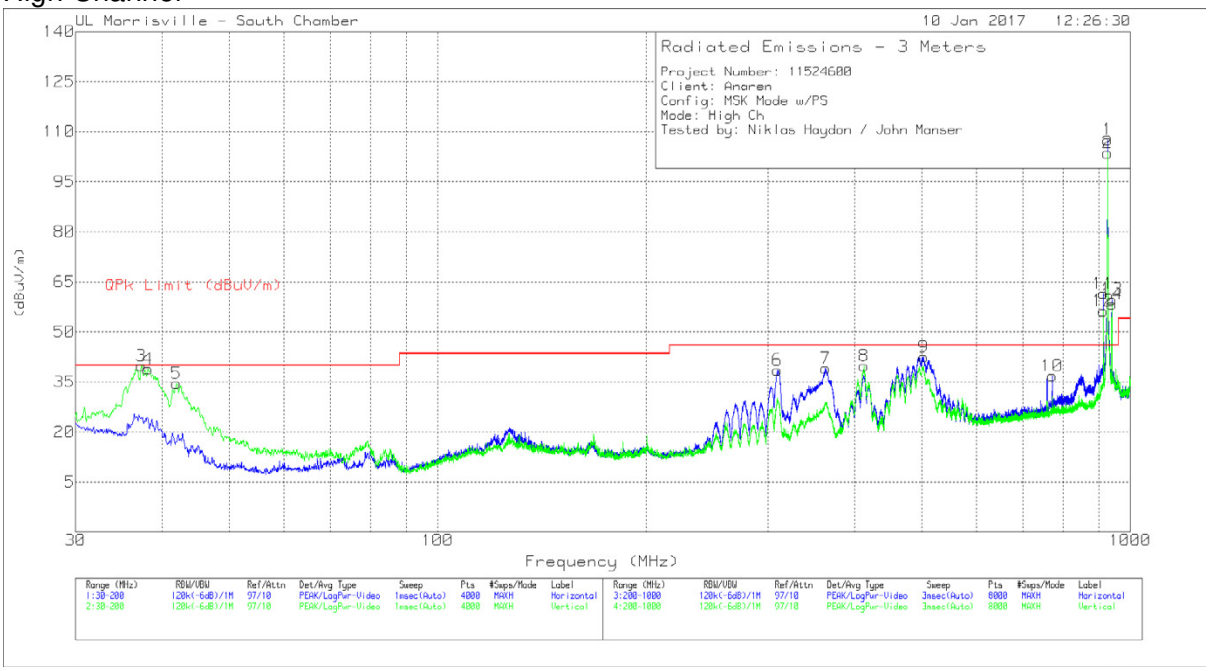
High Channel



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	38.3848	43.37	Qp	19.6	-31.7	31.27	40	-8.73	137	105	V
3	37.3544	51.1	Pk	20.4	-31.7	39.8	-	-	0-360	101	V
5	41.9881	49.22	Pk	16.9	-31.6	34.52	-	-	0-360	101	V
6	309.3142	49.77	Pk	18.4	-29.6	38.57	-	-	0-360	102	H
7	363.3212	48.71	Pk	19.7	-29.3	39.11	-	-	0-360	102	H
8	412.3276	48.18	Pk	20.7	-29.1	39.78	-	-	0-360	102	V
9	502.7394	49.02	Pk	22.2	-28.8	42.42	-	-	0-360	198	H
10	771.0742	39.18	Pk	25.7	-28.1	36.78	-	-	0-360	102	H
11	914.2928	61.64	Pk	26.9	-27	61.54	-	-	0-360	102	H
12	914.2928	56.4	Pk	26.9	-27	56.3	-	-	0-360	198	V
2	927.0945	103.16	Pk	27.2	-26.7	103.66	-	-	0-360	102	V
1	927.2945	107.1	Pk	27.2	-26.7	107.6	-	-	0-360	102	H
13	940.2962	58.92	Pk	27.4	-26.6	59.72	-	-	0-360	102	H
14	940.2962	57.51	Pk	27.4	-26.6	58.31	-	-	0-360	102	V

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

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11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen Issue 4 Clause 8.8

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 NEUTRAL and HOT lines.

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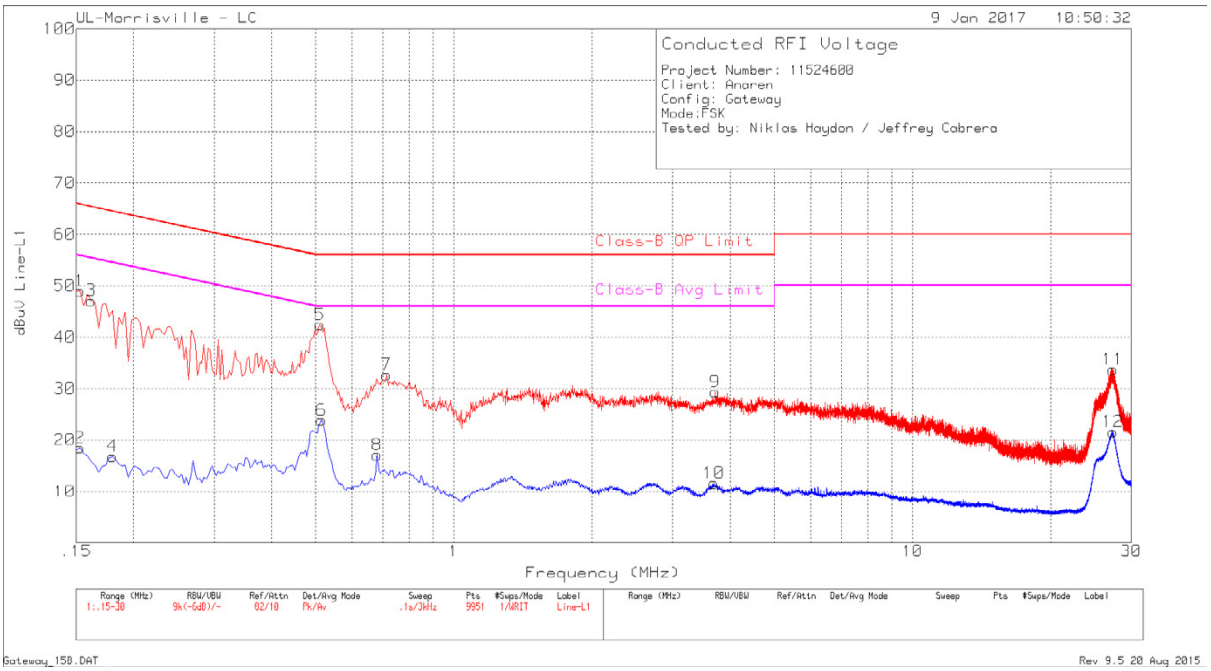
RESULTS

FSK

Line 1



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	.153	38.78	Pk	.2	10	48.98	65.84	-16.86	-	-
2	.153	8.29	Av	.2	10	18.49	-	-	55.84	-37.35
3	.162	36.91	Pk	.2	10	47.11	65.36	-18.25	-	-
4	.18	6.63	Av	.2	10	16.83	-	-	54.49	-37.66
5	.51	32.4	Pk	0	10	42.4	56	-13.6	-	-
6	.5145	13.85	Av	0	10	23.85	-	-	46	-22.15
7	.714	22.67	Pk	0	10	32.67	56	-23.33	-	-
8	.681	7.1	Av	0	10	17.1	-	-	46	-28.9
9	3.717	19.27	Pk	0	10.1	29.37	56	-26.63	-	-
10	3.687	1.49	Av	0	10.1	11.59	-	-	46	-34.41
11	27.357	22.71	Pk	.3	10.7	33.71	60	-26.29	-	-
12	27.351	10.6	Av	.3	10.7	21.6	-	-	50	-28.4

Pk - Peak detector

Av - Average detection

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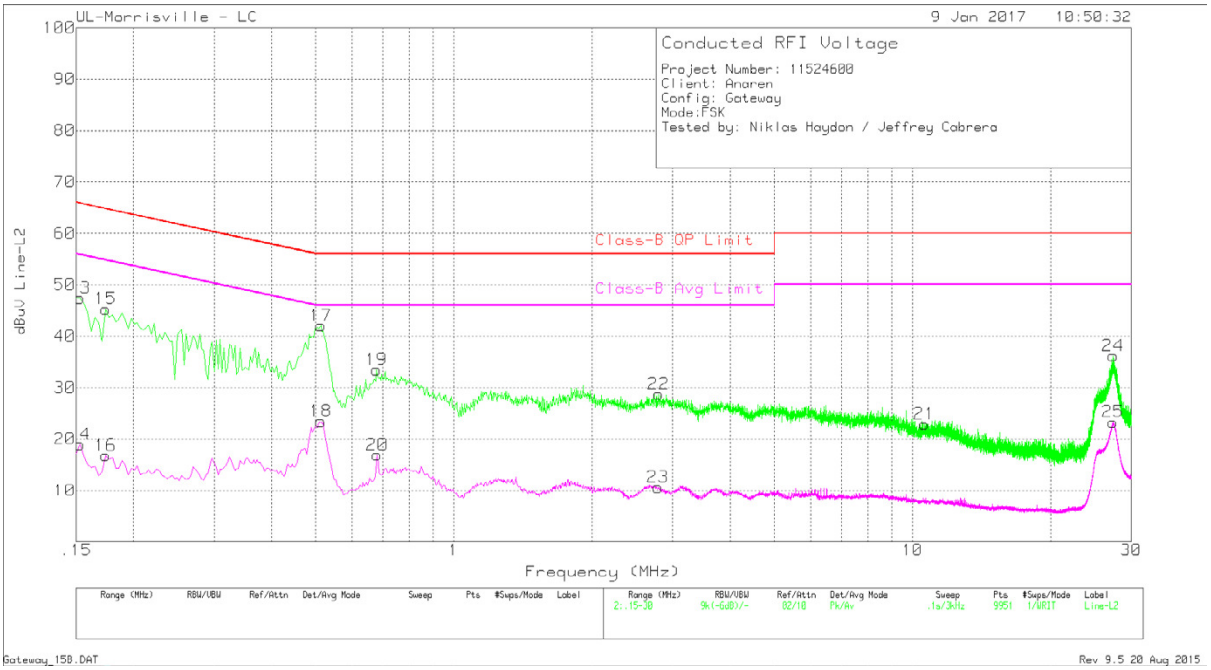
Line 2



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	.153	37.19	Pk	.2	10	47.39	65.84	-18.45	-	-
14	.153	8.73	Av	.2	10	18.93	-	-	55.84	-36.91
15	.174	35.1	Pk	.2	10	45.3	64.77	-19.47	-	-
16	.174	6.59	Av	.2	10	16.79	-	-	54.77	-37.98
17	.513	32.07	Pk	0	10	42.07	56	-13.93	-	-
18	.513	13.44	Av	0	10	23.44	-	-	46	-22.56
19	.678	23.47	Pk	0	10	33.47	56	-22.53	-	-
20	.681	6.89	Av	0	10	16.89	-	-	46	-29.11
21	10.626	12.53	Pk	.1	10.3	22.93	60	-37.07	-	-
22	2.796	18.63	Pk	0	10.1	28.73	56	-27.27	-	-
23	2.787	.51	Av	0	10.1	10.61	-	-	46	-35.39
24	27.402	25.21	Pk	.3	10.7	36.21	60	-23.79	-	-
25	27.384	12.31	Av	.3	10.7	23.31	-	-	50	-26.69

Pk - Peak detector

Av - Average detection

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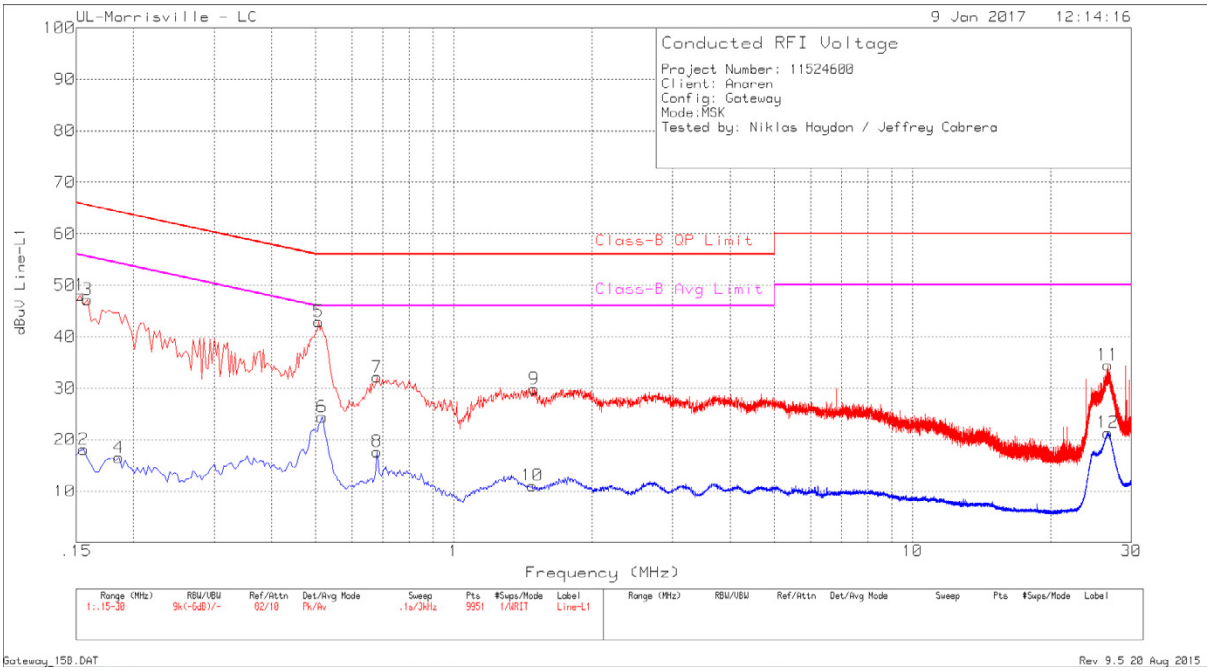
MSK

Line 1



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	.153	37.9	Pk	.2	10	48.1	65.84	-17.74	-	-
2	.156	7.93	Av	.2	10	18.13	-	-	55.67	-37.54
3	.159	37.02	Pk	.2	10	47.22	65.52	-18.3	-	-
4	.186	6.42	Av	.1	10	16.52	-	-	54.21	-37.69
5	.507	32.94	Pk	0	10	42.94	56	-13.06	-	-
6	.516	14.43	Av	0	10	24.43	-	-	46	-21.57
7	.681	22.14	Pk	0	10	32.14	56	-23.86	-	-
8	.681	7.68	Av	0	10	17.68	-	-	46	-28.32
9	1.497	19.86	Pk	0	10	29.86	56	-26.14	-	-
10	1.482	1.09	Av	0	10	11.09	-	-	46	-34.91
11	26.682	23.52	Pk	.3	10.7	34.52	60	-25.48	-	-
12	26.691	10.36	Av	.3	10.7	21.36	-	-	50	-28.64

Pk - Peak detector

Av - Average detection

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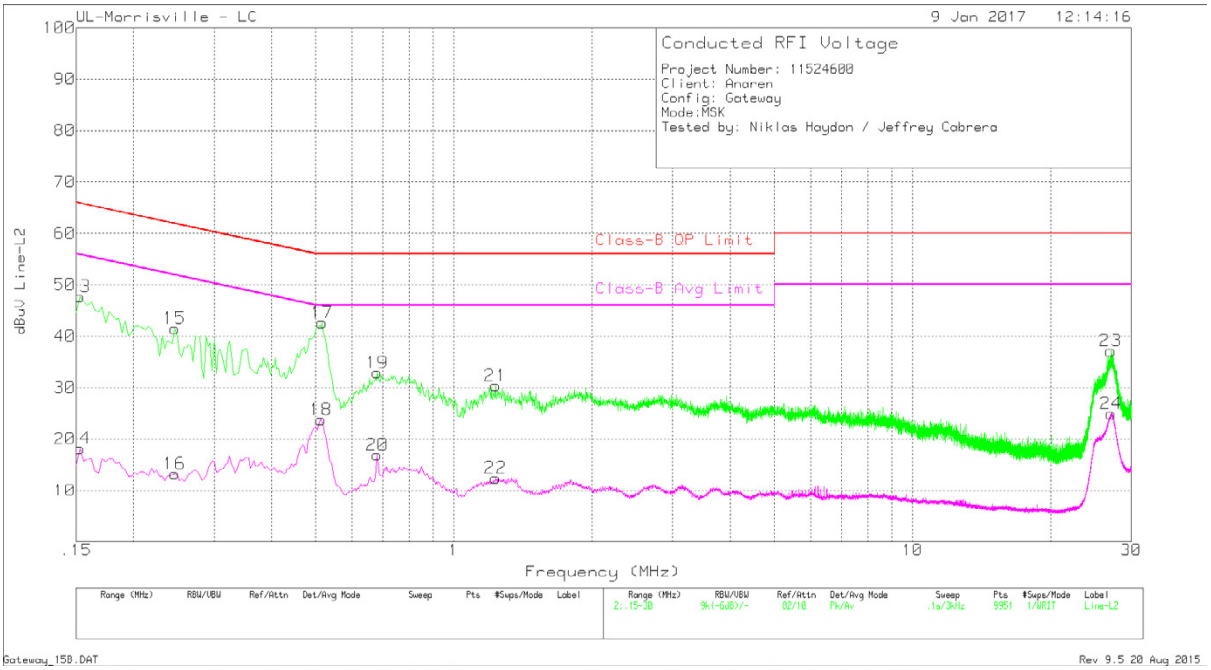
Line 2



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	.153	37.51	Pk	.2	10	47.71	65.84	-18.13	-	-
14	.153	7.98	Av	.2	10	18.18	-	-	55.84	-37.66
15	.246	31.39	Pk	.1	10	41.49	61.89	-20.4	-	-
16	.246	3.15	Av	.1	10	13.25	-	-	51.89	-38.64
17	.516	32.63	Pk	0	10	42.63	56	-13.37	-	-
18	.513	13.76	Av	0	10	23.76	-	-	46	-22.24
19	.681	22.91	Pk	0	10	32.91	56	-23.09	-	-
20	.681	6.9	Av	0	10	16.9	-	-	46	-29.1
21	1.233	20.35	Pk	0	10	30.35	56	-25.65	-	-
22	1.233	2.4	Av	0	10	12.4	-	-	46	-33.6
23	27.066	26.13	Pk	.3	10.7	37.13	60	-22.87	-	-
24	27.126	13.92	Av	.3	10.7	24.92	-	-	50	-25.08

Pk - Peak detector

Av - Average detection

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