FCC / IC Test Report

FOR:

I.D.Systems Inc.

Model Name:

MVAC3.0

Product Description:

OBDII Tracking Device

FCC ID: N5VMVAC30
IC ID: 3802A-MVAC30

Applied Rules and Standards:
47 CFR Part: 15.231
RSS-210 & RSS-Gen Issue 4

REPORT #: EMC_IDSY1-002-17001_15.231

DATE: 2017-11-20

A2LA Accredited

IC recognized # 3462B-2

***CETECOM* Inc.**
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1 Assessment

The following device was evaluated against the applicable criteria specified in FCC rules Parts 15.247 of Title 47 of the Code of Federal Regulations and the relevant ISED Canada standard RSS-247.

No deviations were ascertained.

Company	Description	Model #
I.D.Systems Inc.	OBDII Tracking Device	MVAC3.0

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2017-11-20	Compliance	James Donnellan (Lab Manager)	

Responsible for the Report:

Date	Section	Name	Signature
2017-11-20	Compliance	Kris Lazarov (EMC Engineer)	Digitally signed by Kris Lazarov Date: 2017.11.20 14:24:16 -08'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Director Radio Com. and EMC:	Peter Nevermann
Responsible Project Leader:	Kris Lazarov

2.2 Identification of the Client

Applicant's Name:	I.D.Systems Inc.
Street Address:	123 Tice Blvd, Suite 101
City/Zip Code	Woodcliff Lake, NJ 07677
Country	USA
Contact Person:	Gaurav Sheth
Phone No.	201-996-9000
e-mail:	gsheth@id-systems.com

2.3 Identification of the Manufacturer

Manufacturer's Name:	Creation Technologies
Manufacturers Address:	1001 Klein Suite 100
City/Zip Code	Plano, TX 75074
Country	USA

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Model No:	MVAC3.0
HW Version :	900-00000466
SW Version :	M1.25
FCC-ID :	N5VMVAC30
IC-ID:	3802A-MVAC30
FWIN:	N/A
HVIN:	MVAC3.0
PMN:	MVAC3.0
Product Description:	OBDII Tracking Device
Frequency Range / number of channels:	315 MHz Single Channel 433 MHz Single Channel
Type(s) of Modulation:	FSK
Modes of Operation:	Single carrier frequency 315 MHz or 433 MHz
Antenna Information as declared:	max gain (-5) dBi
Max. Peak Output Power:	Conducted Power = -22.9 dBm (calculated from field strength results)
Power Supply/ Rated Operating Voltage Range:	Vmin: 7.0 VDC/ Vnom: 12 VDC / Vmax: 16 VDC
Operating Temperature Range	-40 ºC to 85 ºC
Other Radios included in the device:	Bluetooth 4.0 Module: TI IC / Model # CC2640F128RHB WCDMA/LTE Module: Telit / Model # R17LE910NAV2 GPS Module: OrginGPS / Model # ORG1410-PM01
Sample Revision	☐Prototype Unit; ■Production Unit; ☐Pre-Production

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	17-MV320570-CTD	900-00000466	M1.25	Radiated Emissions
2	17-MV320577-CTD	900-00000466	M1.25	Conducted RF

3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
1	N/A	N/A	N/A	N/A

3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#2	The radio of the EUT was configured to a fixed channel transmission with highest possible duty cycle using software that is not available to the end user. The measurement equipment was connected to the 50 ohm RF port of the EUT.
2	EUT#1	The radio of the EUT was configured to a fixed channel transmission with highest possible duty cycle using software that is not available to the end user. The internal antenna was connected.

3.5 Justification for Worst Case Mode of Operation

During the testing process, the EUT was tested with transmitter sets on low, mid and high channels, and highest possible duty cycle. For radiated measurements, all data in this report shows the worst case between horizontal and vertical antenna polarizations and for all orientations of the EUT.

4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to assess the performance of the EUT according to the relevant requirements specified in FCC rules Part 15.231 of Title 47 of the Code of Federal Regulations and Radio Standard Specification RSS-210 of ISED Canada.

This test report is to support a request for new equipment authorization under the FCC ID: N5VMVAC3.0, and IC ID: 3802A-MVAC3.0

5 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA	NP	Result
§15.231(c) RSS-210 A1.1.3	Emission Bandwidth	Nominal	Periodic Operation	■	☐	☐	Complies
§15.231(b) RSS-210 A1.1	Field strength	Nominal	Periodic Operation	■	☐	☐	Complies
§15.231(b); §15.205 RSS-210 A1.1	TX Spurious emissions-Radiated	Nominal	Periodic Operation	■	☐	☐	Complies
§15.231(a,2) RSS Gen 210 A1.1.1	5 s Periodic Operation	Nominal	Periodic Operation	☐	☐	■	See Note 2
§15.207(a) RSS Gen 8.8	AC Conducted Emissions	Nominal	Periodic Operation	☐	■	☐	See Note 3

Note1: NA= Not Applicable; NP= Not Performed.
Note2: Compliance statement provided by the manufacturer:
Note3: This device does not connect to AC network; hence the test is not applicable.

6 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=1.

Radiated measurement

9 kHz to 30 MHz	±2.5 dB (Magnetic Loop Antenna)
30 MHz to 1000 MHz	±2.0 dB (Biconilog Antenna)
1 GHz to 40 GHz	±2.3 dB (Horn Antenna)

Conducted measurement

150 kHz to 30 MHz	±0.7 dB (LISN)

RF conducted measurement	±0.5 dB

According to TR 102 273 a multiplicative propagation of error is assumed for RF measurement systems. For this reason the RMS method is applied to dB values and not to linear values as appropriate for additive propagation of error. Also used: http://physics.nist.gov/cuu/Uncertainty/typeb.html. The above calculated uncertainties apply to direct application of the Substitution method. The Substitution method is always used when the EUT comes closer than 3 dB to the limit.

6.1 Environmental Conditions During Testing:

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25° C
- Relative humidity: 40-60%

6.2 Dates of Testing:

09/19/2017 - 09/27/2017

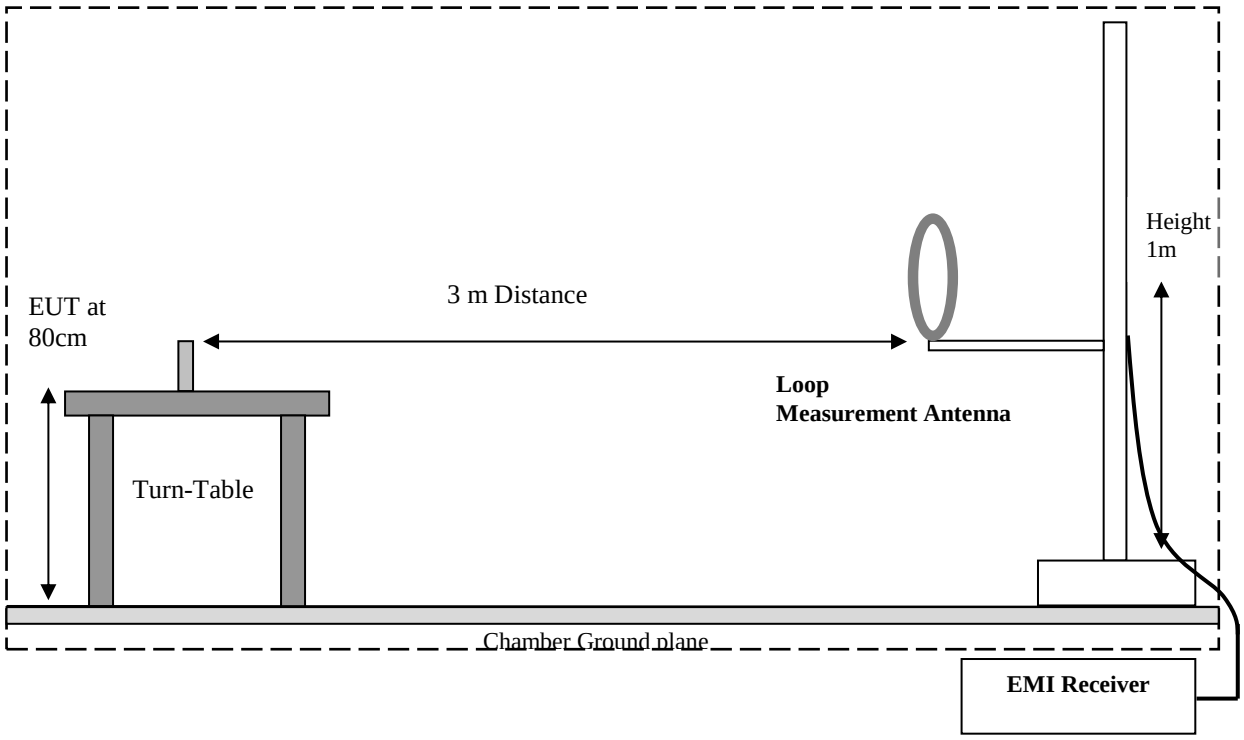
7 Measurement Procedures

7.1 Radiated Measurement

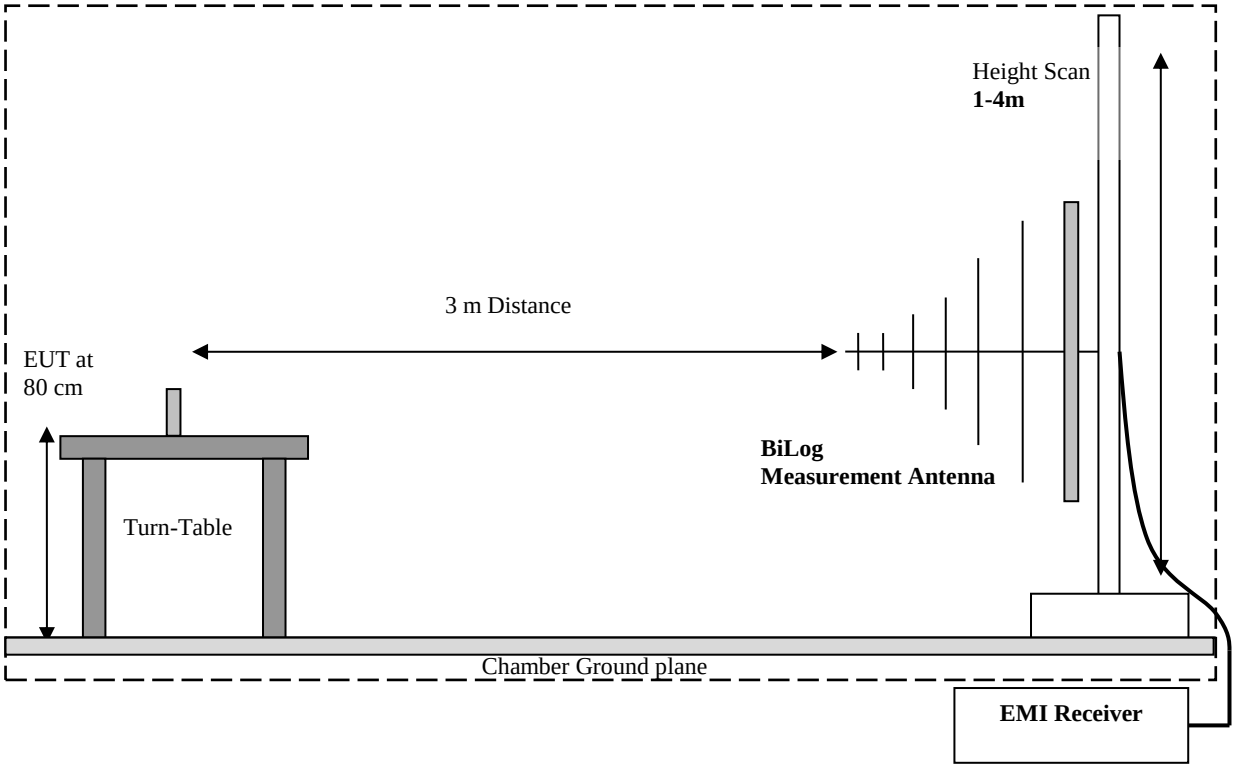
The radiated measurement is performed according to ANSI C63.10 (2013)

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

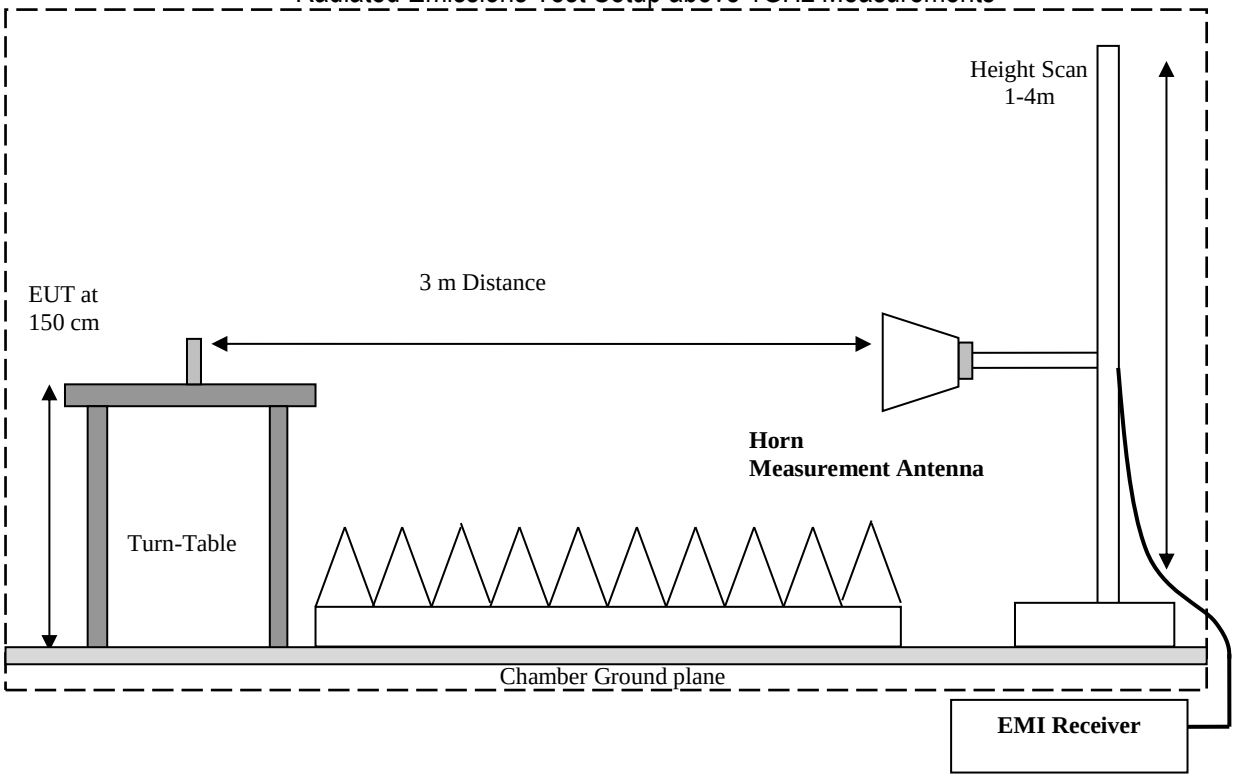
Radiated Emissions Test Setup below 30MHz Measurements



Radiated Emissions Test Setup 30MHz-1GHz Measurements



Radiated Emissions Test Setup above 1GHz Measurements



7.1.1 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

1. Measured reading in dBµV
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

FS (dBµV/m) = Measured Value on SA (dBµV)- Cable Loss (dB)+ Antenna Factor (dB/m)

Example:

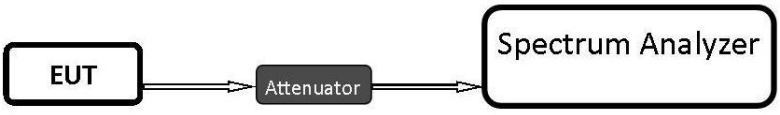
Frequency (MHz)	Measured SA (dBµV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBµV/m)
1000	80.5	3.5	14	98.0

7.2 Power Line Conducted Measurement Procedure

AC Power Line conducted emissions measurements performed according to: ANSI C63.4 (2009)

7.3 RF Conducted Measurement Procedure

Testing procedures are based on 558074 D01 DTS Meas Guidance v04 – "GUIDANCE FOR PERFORMING COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEMS (DTS) OPERATING UNDER SECTION 15.247" - April 5, 2017, by the Federal Communications Commission, Office of Engineering and Technology, Laboratory Division.



- Connect the equipment as shown in the above diagram.
- Adjust the settings of the SA (Rohde-Schwarz Spectrum Analyzer) to connect the EUT at the required mode of test.
- Measurements are to be performed with the EUT set to the low, middle and high channels and for worst case modulation schemes.

8 Test Result Data

8.1 Field strength

8.1.1 Measurement according to FCC 558074 D01 DTS Meas Guidance v04

Spectrum Analyzer settings:

- RBW ≥ DTS bandwidth
- VBW ≥ 3 x RBW
- Span ≥ 3 x RBW
- Sweep = Auto couple
- Detector function = Peak
- Trace = Max hold
- Use peak marker function to determine the peak amplitude level

8.1.2 Limits:

Maximum Peak Output Power:

- §15.231(b) and RSS 210 A1.1: In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)
260-470	3,750 to 12,500 Linear interpolations

8.1.3 Test conditions and setup:

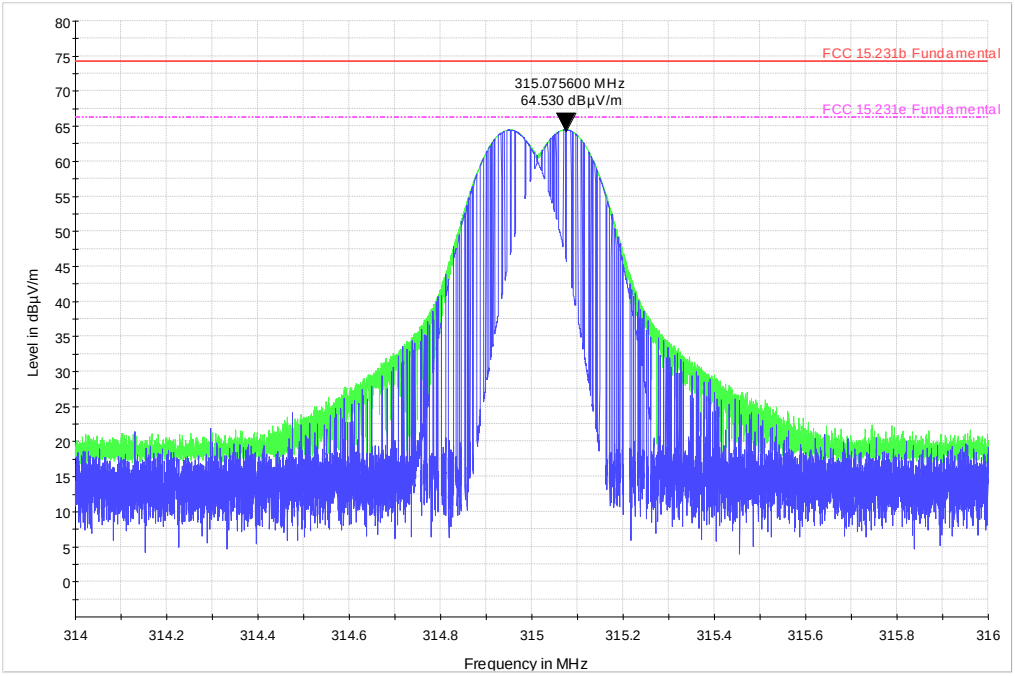
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
23° C	1	315 MHz / 433 MHz	12 VDC

8.1.4 Measurement result:

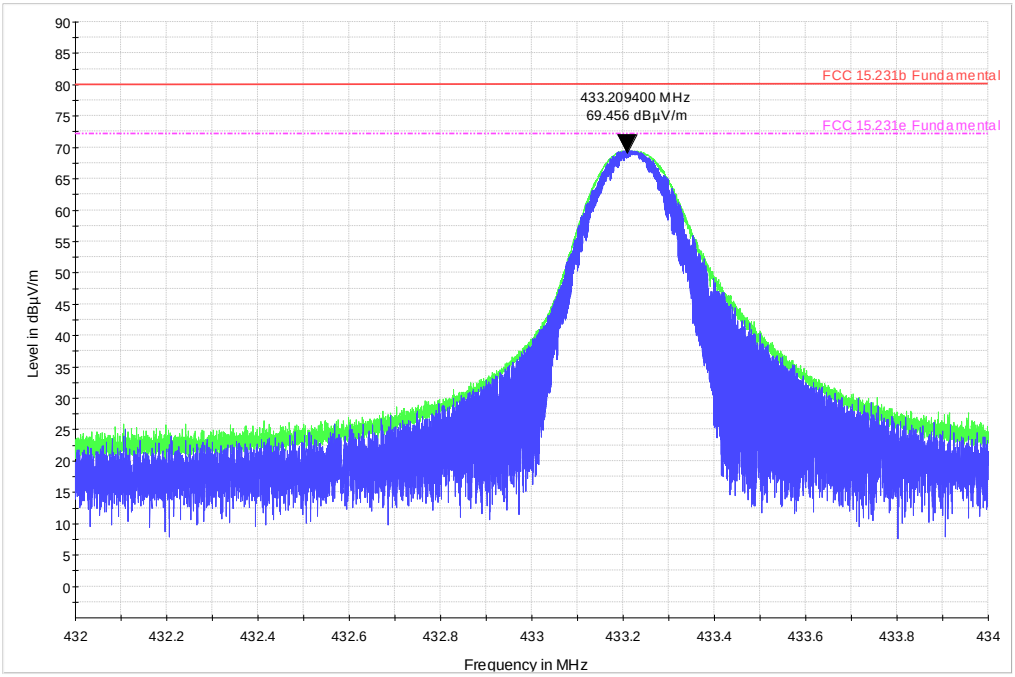
Plot #	Fundamental frequency (MHz)	Fundamental Field Strength (dBµV/m)	Limit (dBµV/m)	Result
1	315	64.53	73.90	Pass
2	433	69.46	80.00	Pass

8.1.5 Measurement Plots:

Plot #1


315.075600 MHz
64.530 dBµV/m
FCC 15.231b Fundamental
FCC 15.231e Fundamental
Level in dBµV/m
Frequency in MHz
RMS_MAXH
RMS_CLRWR
FCC 15.231b Fundamental
FCC 15.231e Fundamental

Plot #2


433.209400 MHz
69.456 dBµV/m
FCC 15.231b Fundamental
FCC 15.231e Fundamental
Level in dBµV/m
Frequency in MHz
RMS_MAXH
RMS_CLRWR
FCC 15.231b Fundamental
FCC 15.231e Fundamental

8.2 Emission Bandwidth

8.2.1 Measurement according to FCC 558074 D01 DTS Meas Guidance v04

Spectrum Analyzer settings:

- Set RBW = 100 kHz
- Set the video bandwidth (VBW) ≥ 3 x RBW
- Detector = Peak
- Trace mode = Max hold
- Sweep = Auto couple
- Allow the trace to stabilize
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

8.2.2 Limits:

- FCC §15.231(c): The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.
- RSS-210 A1.1.3: The 99% bandwidth shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz and 900 MHz.

8.2.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
23° C	1	315 MHz / 433 MHz	12 VDC

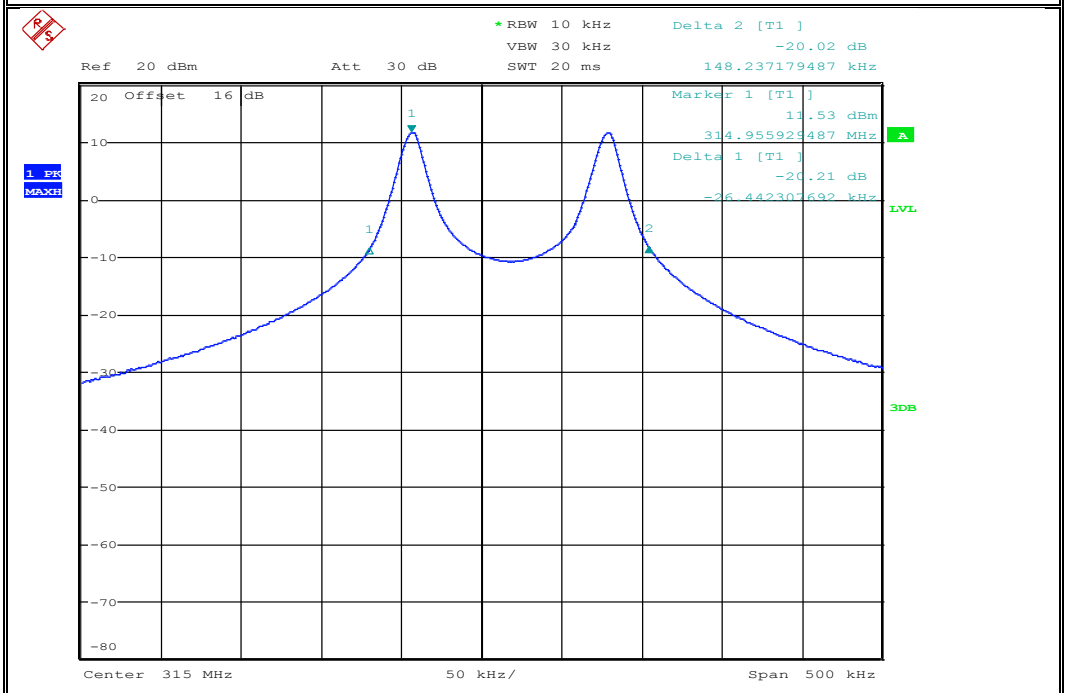
8.2.4 Measurement result:

Plot #	Frequency (MHz)	20dB Emissions Bandwidth (MHz)	Limit (MHz)	Result
1	315	0.175	> 0.787	Pass
2	434	0.038	> 1.082	Pass

Plot #	Frequency (MHz)	99% Emissions Bandwidth (MHz)	Limit (MHz)	Result
3	315	0.179	> 0.787	Pass
4	434	0.235	> 1.082	Pass

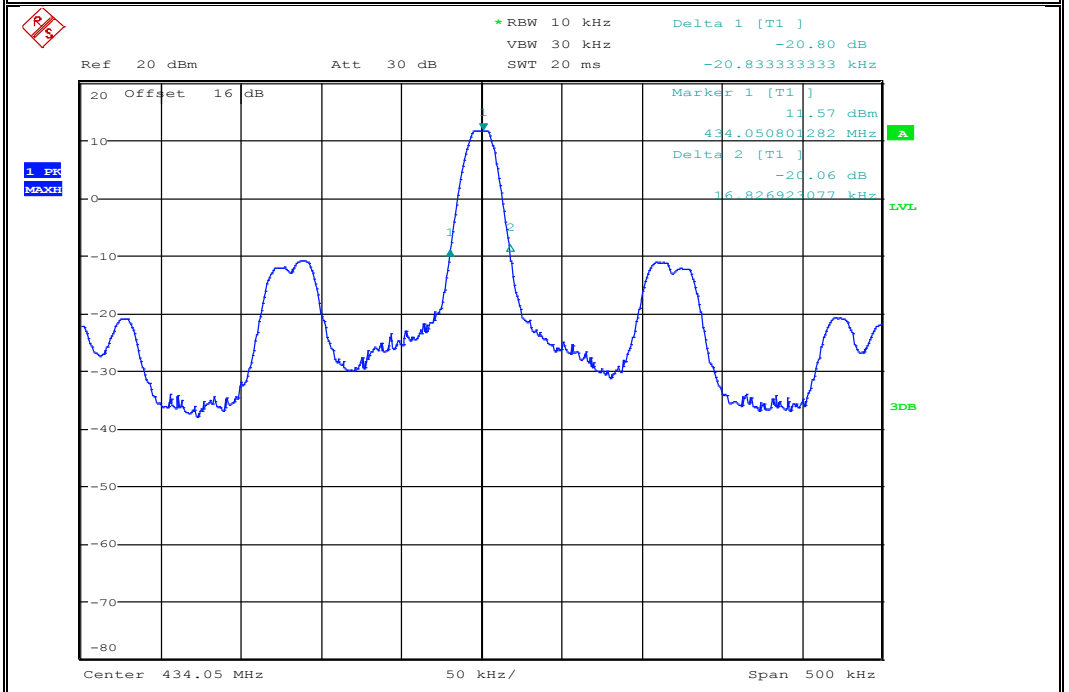
8.2.5 Measurement Plots:

Plot #1



Date: 27.SEP.2017 16:18:32

Plot #2



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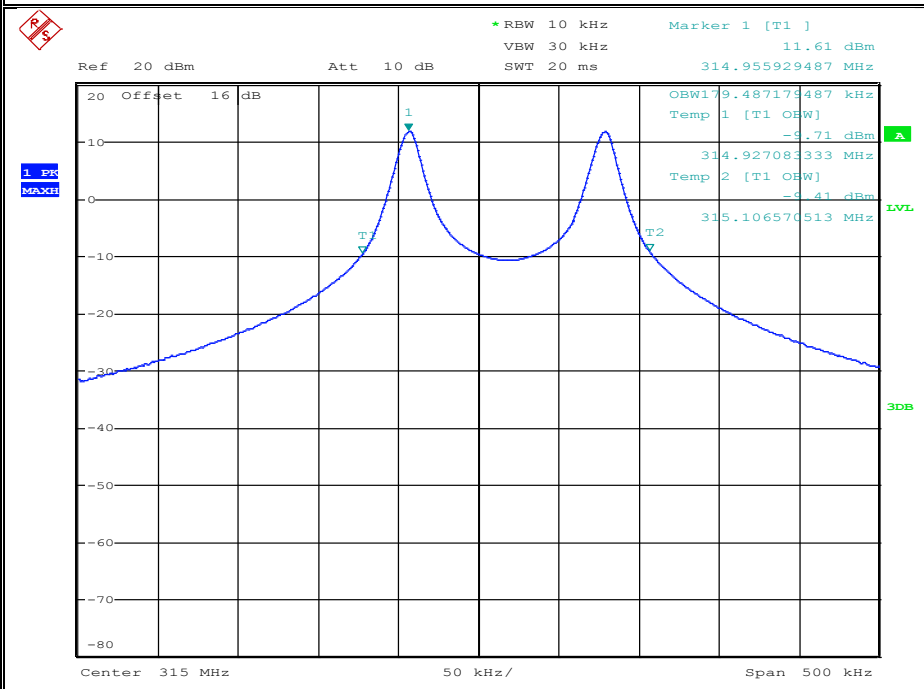
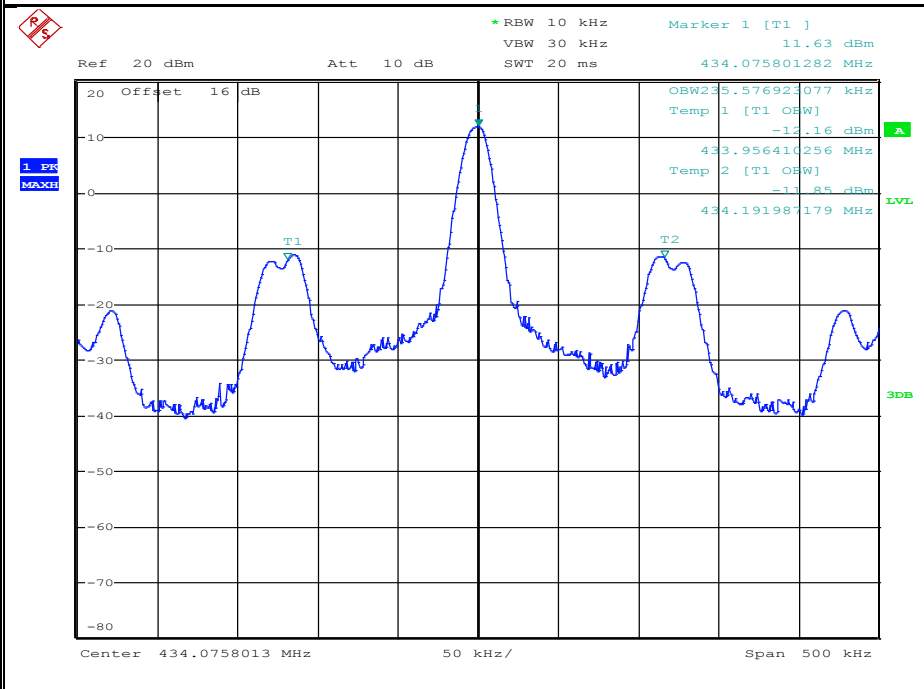
Plot #3



Date: 26.OCT.2017 16:03:37

Plot #4



Date: 26.OCT.2017 16:05:13

8.3 Radiated Transmitter Spurious Emissions and Restricted Bands

8.3.1 Measurement according to ANSI C63.10 (2013)

Spectrum Analyzer Settings:

- Frequency = 9 KHz – 30 MHz
- RBW = 9 KHz
- Detector: Peak

- Frequency = 30 MHz – 1 GHz
- Detector = Peak / Quasi-Peak
- RBW= 120 KHz (<1GHz)

- Frequency > 1 GHz
- Detector = Peak / Average
- RBW = 1 MHz

- Radiated spurious emissions shall be measured for the transmit frequencies, transmit power, and data rate for the lowest, middle and highest channel in each frequency band of operation and for the highest gain antenna for each antenna type, and using the appropriate parameters and test requirements.
- The highest (or worst-case) data rate shall be recorded for each measurement.
- For testing at distance other than the specified in the standard, the limit conversion is calculated by using 40 dB/decade extrapolation factor as follow: Conversion factor (CF) = 40 log (D/d) = 40 log (300m / 3m) = 80dB

8.3.2 Limits:

- §15.231(b) and RSS 210 A1.1: In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of spurious emissions (microvolts/meter)
260-470	375 to 1,250 Linear interpolations

- FCC §15.205 & RSS-Gen 8.10: Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

- 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 (see §15.205(b)).

8.3.3 Test conditions and setup:

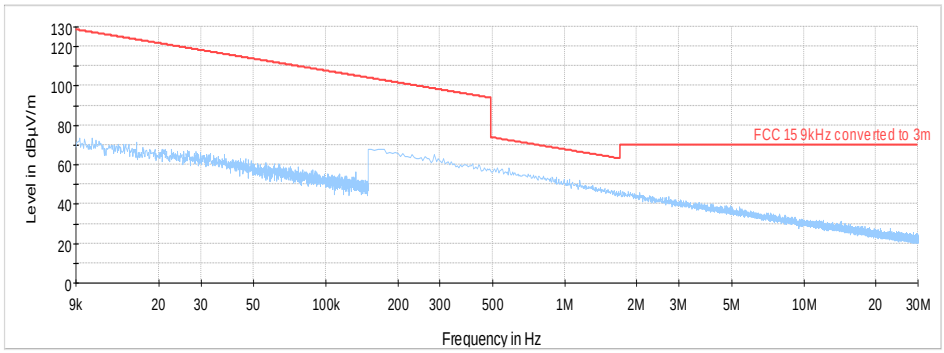
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
23° C	2	315 MHz / 433 MHz	12 VDC

8.3.4 Measurement result:

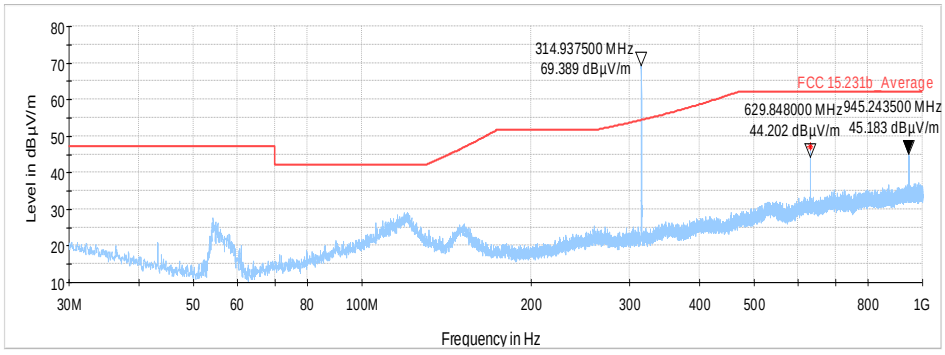
Plot #	Channel #	Scan Frequency	Limit	Result
1-4	315	9 kHz – 5 GHz	See section 8.3.2	Pass
5-9	433	9 kHz – 5 GHz	See section 8.3.2	Pass

8.3.5 Measurement Plots:

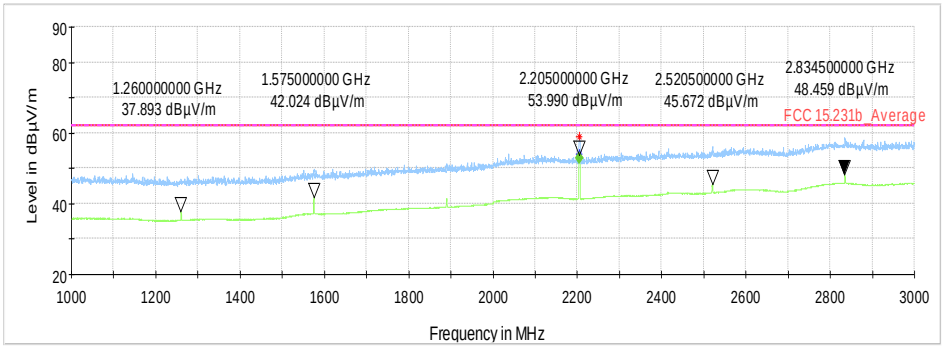
Plot # 1 Radiated Emissions: 9 KHz – 30 MHz		
Modulation:	**315 MHz**	**% Duty Cycle**



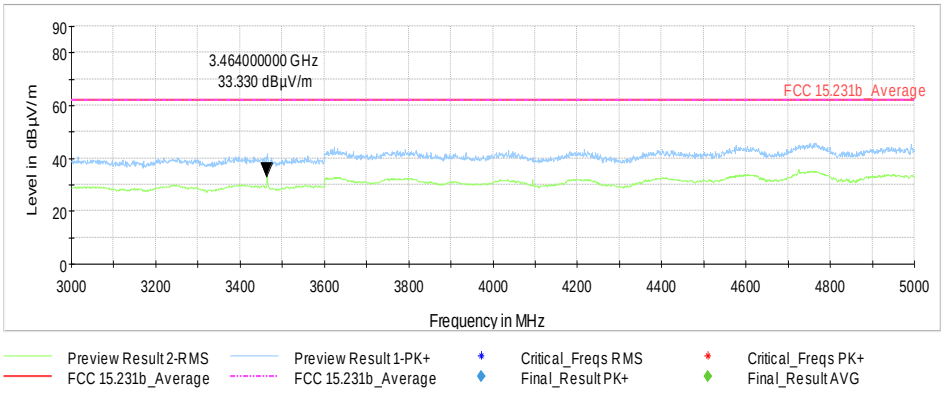
Plot # 2 Radiated Emissions: 30 MHz – 1GHz		
Modulation:	**315 MHz**	**Duty Cycle**



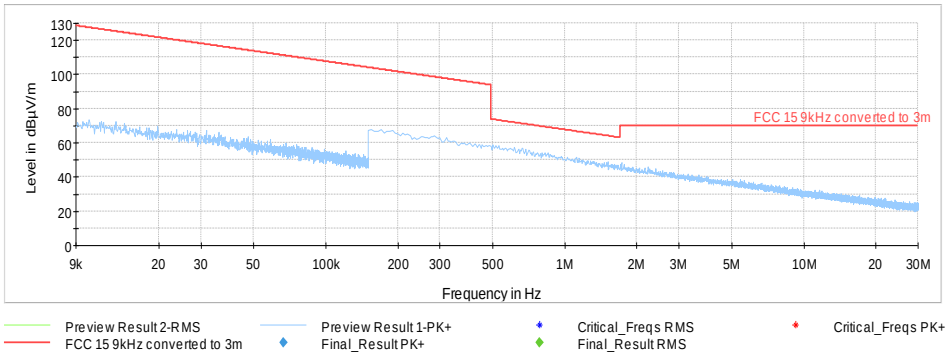
Plot # 3 Radiated Emissions: 1GHz - 3 GHz		
Modulation:	**315 MHz**	**Duty Cycle**



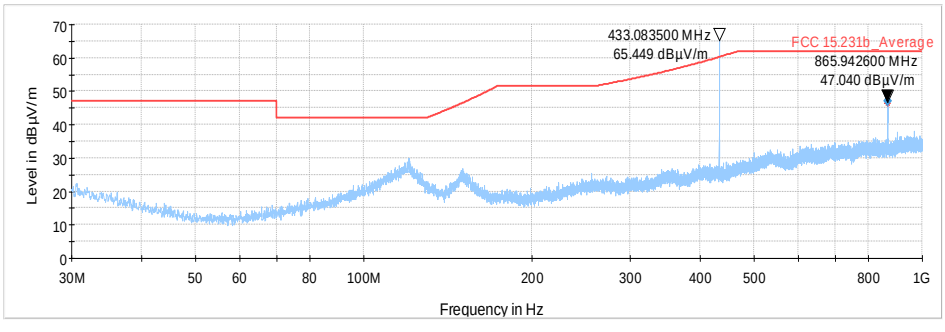
Plot # 4 Radiated Emissions: 3 GHz - 5 GHz		
Modulation:	**315 MHz**	**Duty Cycle**



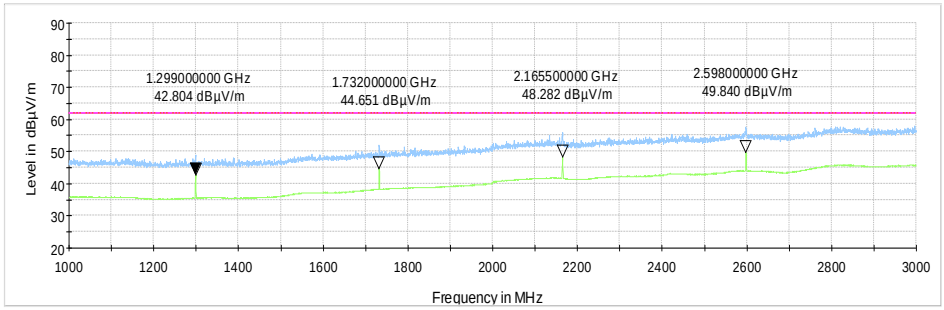
Plot # 5 Radiated Emissions: 9 KHz – 30 MHz		
Modulation:	**433 MHz**	**% Duty Cycle**



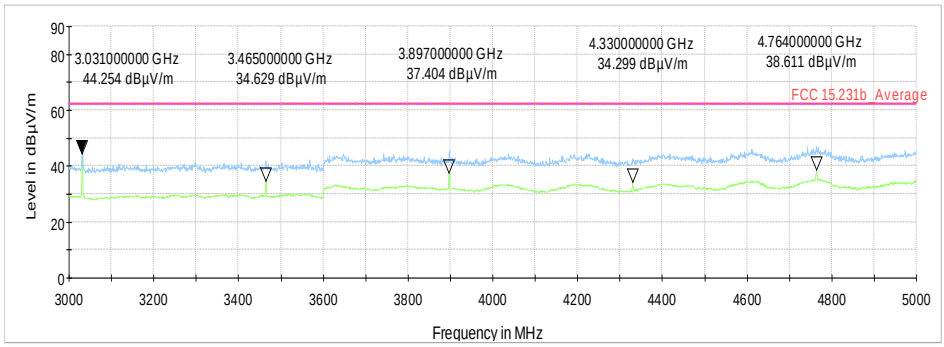
Plot # 6 Radiated Emissions: 30 MHz – 1GHz		
Modulation:	**433 MHz**	**Duty Cycle**



Plot # 8 Radiated Emissions: 1GHz - 3 GHz		
Modulation:	**433 MHz**	**Duty Cycle**



Plot # 9 Radiated Emissions: 3 GHz - 5 GHz		
Modulation:	**433 MHz**	**Duty Cycle**



9 Test setup photos

Setup photos are included in supporting file name: "EMC_IDSY1-002-17001_15.247_BT_DTS_Setup_Photos.pdf"

10 Test Equipment And Ancillaries Used For Testing

Item Name	Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Antenna Biconilog 3142E	Biconlog Antenna	EMCO	3142E	166067	3 years	6/27/2017
Magnetic Loop Antenna	Loop Antenna	ETS Lindgren	6512	164698	3 years	7/8/2017
Antenna Horn 3117-PA	Horn Antenna	ETS Lindgren	3117-PA	169547	3 years	8/8/2017
Digital Barometer	Compact Digital Barometer	Control Company	35519-055	91119547	2 Years	6/8/2017
FSV40	Spectrum Analyzer	R&S	FSV40	101022	2 years	5/7/2017
FSU26	Spectrum Analyzer	R&S	FSU26	200302	2 years	7/5/2017
Thermometer Humidity TM320	Thermometer Humidity	Dickson	TM320	1625369	1 Year	6/1/2017

Note: 1 Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.
Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

11 History

Date	Report Name	Changes to report	Report prepared by
2017-11-20	EMC_IDSY1-002-17001_15.231	Initial Version	Kris Lazarov