EMISSIONS TEST REPORT

(FULL COMPLIANCE)

Report Number: 102844873BOX-001
Project Number: G102844873

Report Issue Date: 04/25/2017

Model(s) Tested:	vImpulse
Model(s) Partially Tested:	None
Model(s) Not Tested but declared equivalent by the client:	None

Standards: FCC 47CFR Part 15 Subpart C: 2016
FCC 47CFR Part 15 Subpart B: 2016
RSS-247 Issue 2: 02/2017
ICES-003 Issue 6: 01/2016

Tested by:
Intertek Testing Services NA, Inc.
70 Codman Hill Road
Boxborough, MA 01719
USA

Client:
Vanteon Corporation
250 Cross Keys Office Park
Suite 285
Fairport, NY 14450
USA

Report prepared by Naga Suryadevara

Naga Suryadevara/EMC Engineer

Report reviewed by Kouma Sinn

Kouma Sinn / EMC Staff Engineer

Table of Contents

1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested was found compliant with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test full name	Result
3	Client Information	--
4	Description of Equipment Under Test and Variant Models	--
5	System Setup and Method	--
6	Output Power (FCC 47CFR Part 15 Subpart C 15.247:2016, RSS-247 Issue 2: 02/2017)	Pass
7	Occupied and 20 dB Bandwidth (FCC 47CFR Part 15 Subpart C 15.247:2016, RSS-247 Issue 2: 02/2017)	Pass
8	In-Band, Out of Band and Band Edge Emissions (FCC 47CFR Part 15 Subpart C 15.247:2016, RSS-247 Issue 2: 02/2017)	Pass
9	Number of Hopping Frequencies (FCC 47CFR Part 15 Subpart C 15.247:2016, RSS-247 Issue 2: 02/2017)	Pass
10	Channel Separation (FCC 47CFR Part 15 Subpart C 15.247:2016, RSS-247 Issue 2: 02/2017)	Pass
11	Channel Occupancy Time (FCC 47CFR Part 15 Subpart C 15.247:2016, RSS-247 Issue 2: 02/2017)	Pass
12	Transmitter Spurious Emissions (FCC 47CFR Part 15 Subpart C 15.247:2016, FCC 47CFR Part 15 Subpart B 15.109:2016, RSS-247 Issue 2: 02/2017, ICES-003 Issue 6 January 2016)	Pass
13	Revision History	---

3 Client Information

This EUT was tested at the request of:

Client: Vanteon Corporation
250 Cross Keys Office Park
Suite 285
Fairport, NY 14450
USA

Contact: Jeff Miller
Telephone: (585) 419-9538
Fax: None
Email: JMiller@vanteon.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: Vanteon Corporation
250 Cross Keys Office Park
Suite 285
Fairport, NY 14450
USA

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Radio transceiver module	Vanteon Corporation	vImpulse	0126

Receive Date:	12/21/2016
Received Condition:	Good
Type:	Prototype

Description of Equipment Under Test (provided by client)
The Vanteon vImpulse radio is a software configurable radio transceiver module designed for long range data communications with very low power consumption for battery operated devices. The small form factor and low power allow the module to be utilized in applications that require remote control and sensor data acquisition in industrial environments where frequent battery changes are inconvenient and costly.

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
DC Power (Internal Battery)	2 A	N/A	N/A

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Transmitting at Low, Mid, and High Channels
2	Receive Mode

Software used by the EUT:

No.	Descriptions of EUT Exercising
1	None

Radio/Receiver Characteristics	
Frequency Band(s)	902.3 -927.8 MHz
Modulation Type(s)	GFSK
Data rates	50kbps
Maximum Output Power	27.79 dBm
Test Channels	Channel low – 902.3 MHz Channel middle - 915 MHz Channel high – 927.8 MHz
Occupied Bandwidth	52.69 kHz (OBW) 59.69 kHz (20dB BW)
Frequency Hopper: Number of Hopping Channels	79
Frequency Hopper: Channel Dwell Time	0.1746 seconds
MIMO Information (# of Transmit and Receive antenna ports)	N/A
Equipment Type	DXX
ETSI LBT/Adaptivity	N/A
ETSI Adaptivity Type	N/A
ETSI Temperature Category (I, II, III)	N/A
ETSI Receiver Category (1, 2, 3)	N/A
Antenna Type and Gain	Linx ANT-916-MHW-RPS-S antenna, 5.4 dBi

Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

None

5 System Setup and Method

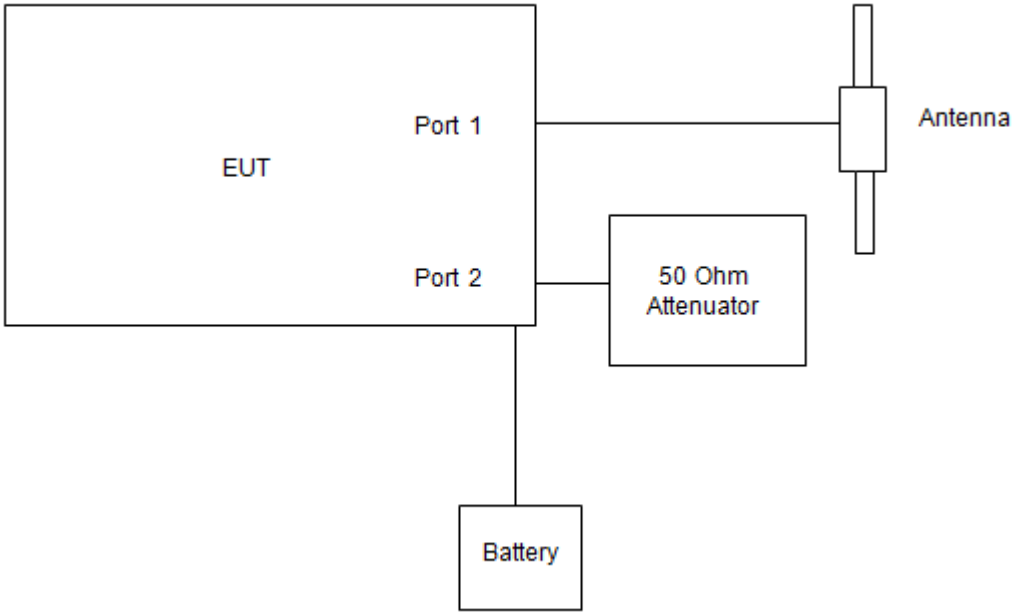
Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
	None				

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Laptop	DELL	E6510	DZKRVM1

5.1 Method:

Configuration as required by FCC 15.247, FCC 15.209, FCC 15.109, RSS-247, ICES-003, ANSI C63.4:2014, and ANSI C63.10:2013.

5.2 EUT Block Diagram:



6 Output Power and Human RF Exposure

6.1 Method

Tests are performed in accordance with FCC Part 15 Subpart C (15.247) and RSS 247.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 380, and 440 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

6.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001'	Weather Station	Davis Instruments	7400	PE80519A61	11/28/2016	11/28/2017
CBLHF2012-2M-1'	2m 9kHz-40GHz Coaxial Cable - SET1	Huber & Suhner	SF102	252675001	02/05/2015	02/05/2016
WEI18'	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017
WEI8'	Attenuator	Weinschel Corp	47-10-34	BD8309	03/30/2016	03/30/2017
ROS005'	ETSI Test System	Rhode & Schwartz	TS8997	N/A	09/15/2016	09/15/2017

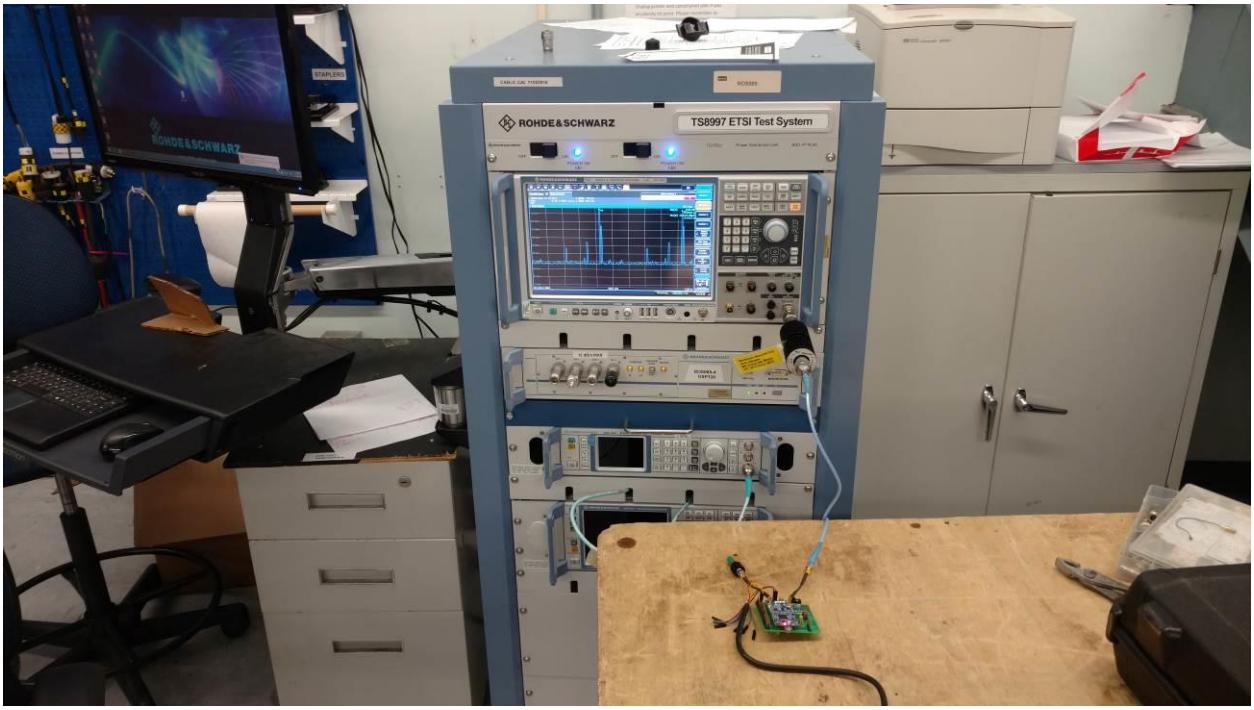
Software Utilized:

Name	Manufacturer	Version
None		

6.3 Results:

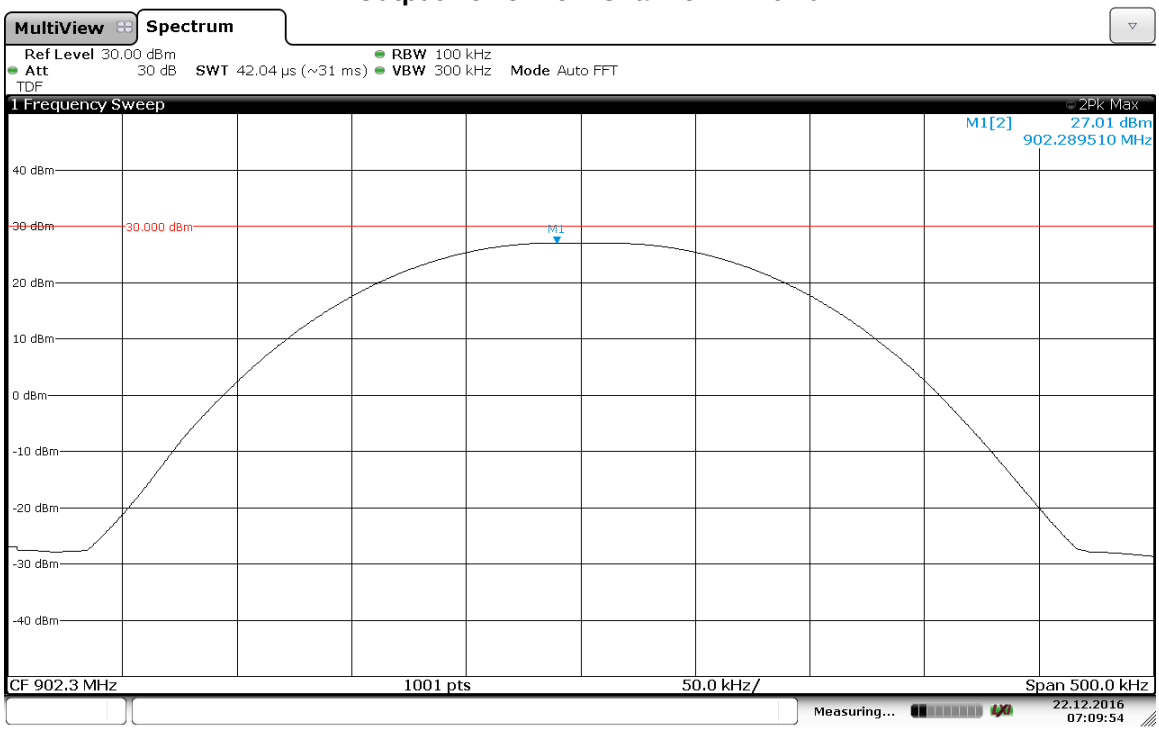
The sample tested was found to Comply. For systems operating in the 902-928 MHz band the maximum peak output power is 1 watt (30 dBm).

6.4 Setup Photograph:



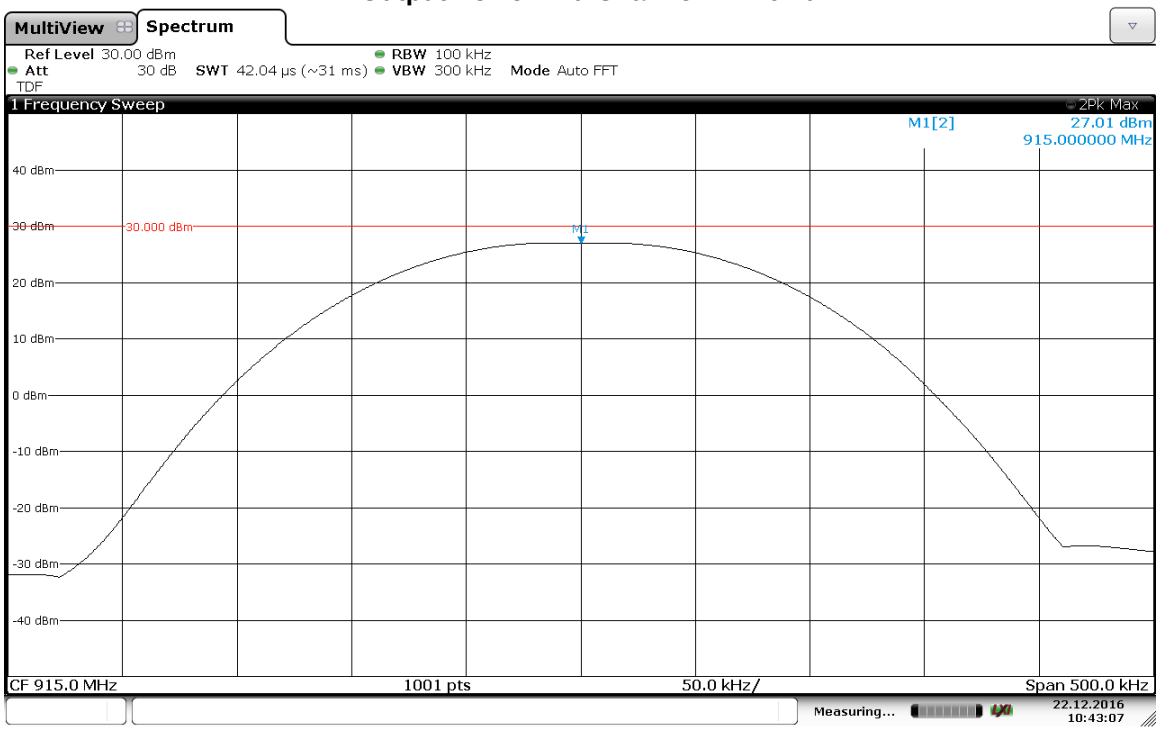
6.5 Plots/Data:

Tx-1 Output Power Low Channel – 27.01 dBm



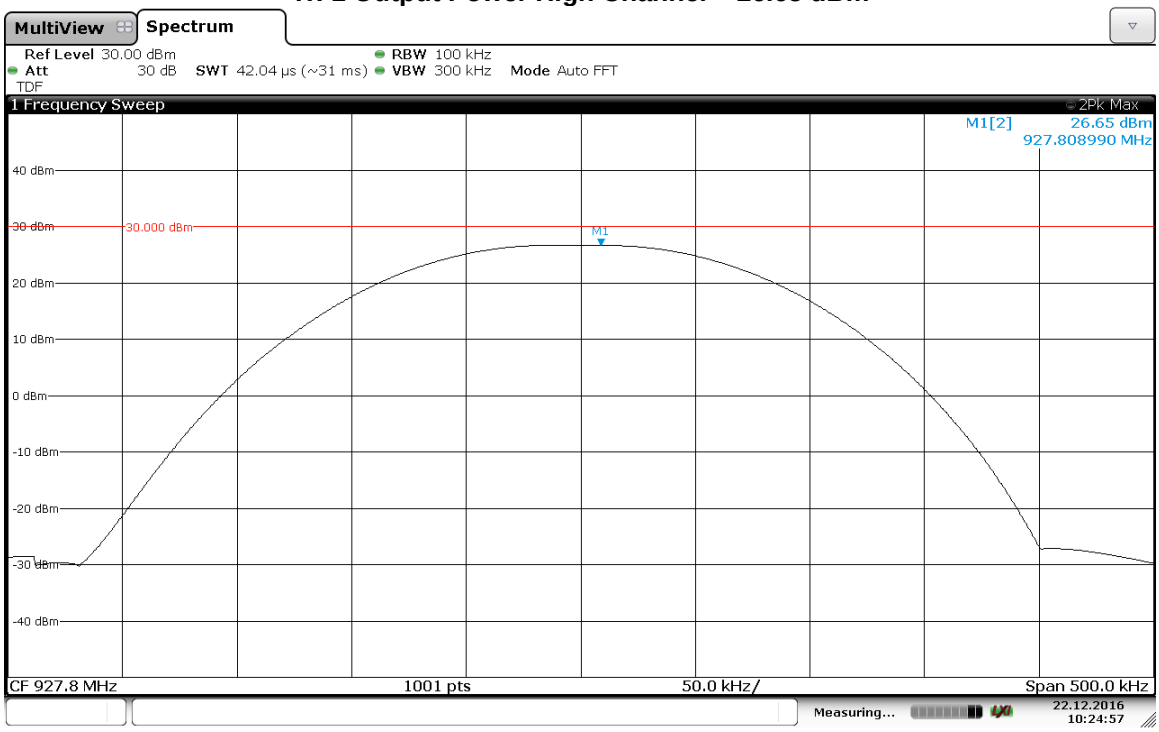
Date: 22.DEC.2016 07:09:55

Tx-1 Output Power Mid Channel – 27.01 dBm



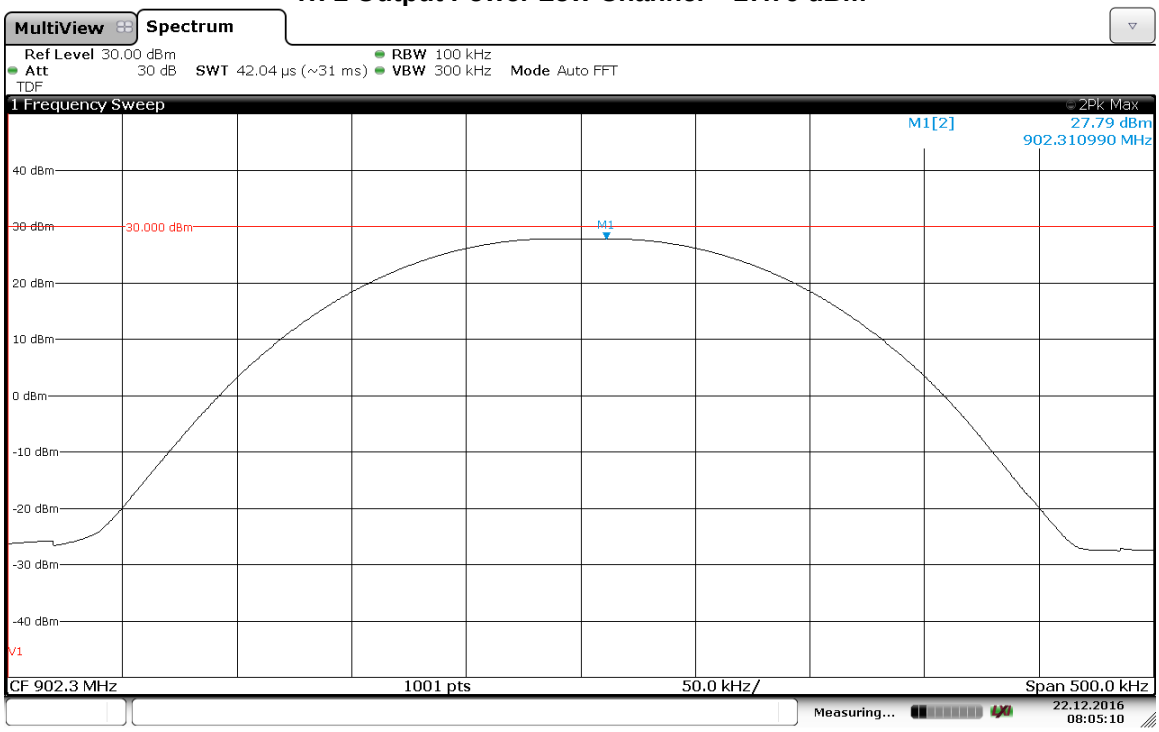
Date: 22.DEC.2016 10:43:07

Tx-1 Output Power High Channel – 26.65 dBm



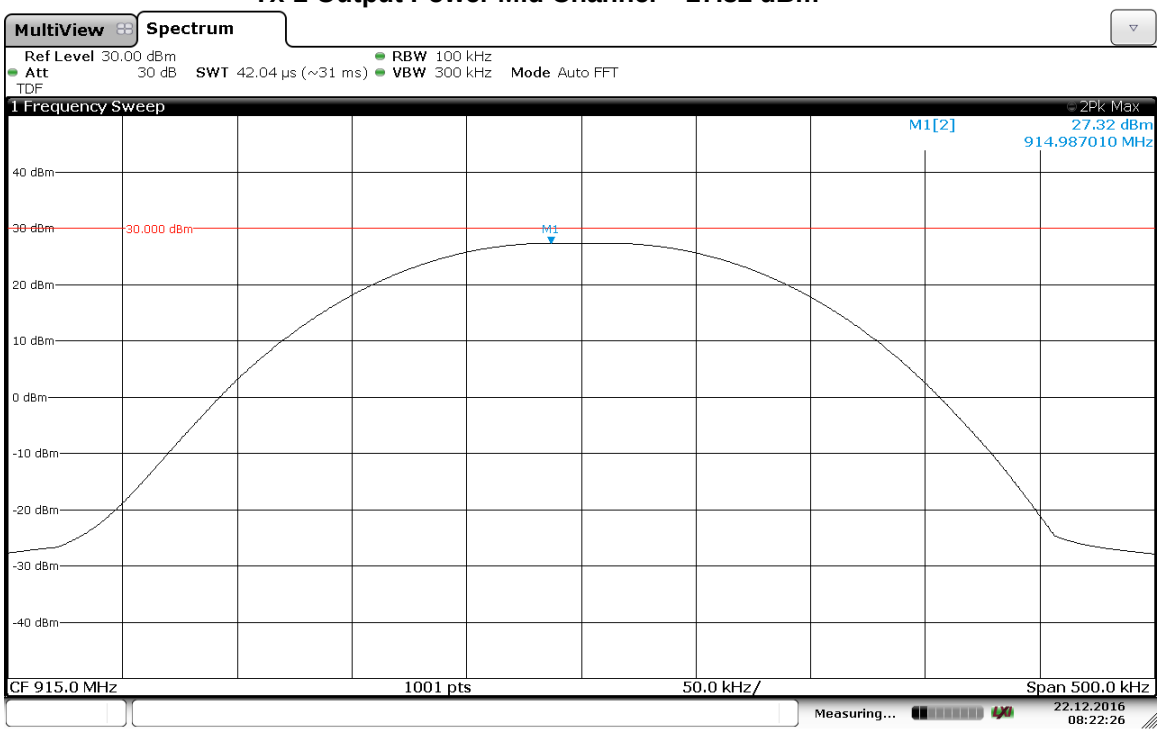
Date: 22.DEC.2016 10:24:56

Tx-2 Output Power Low Channel – 27.79 dBm



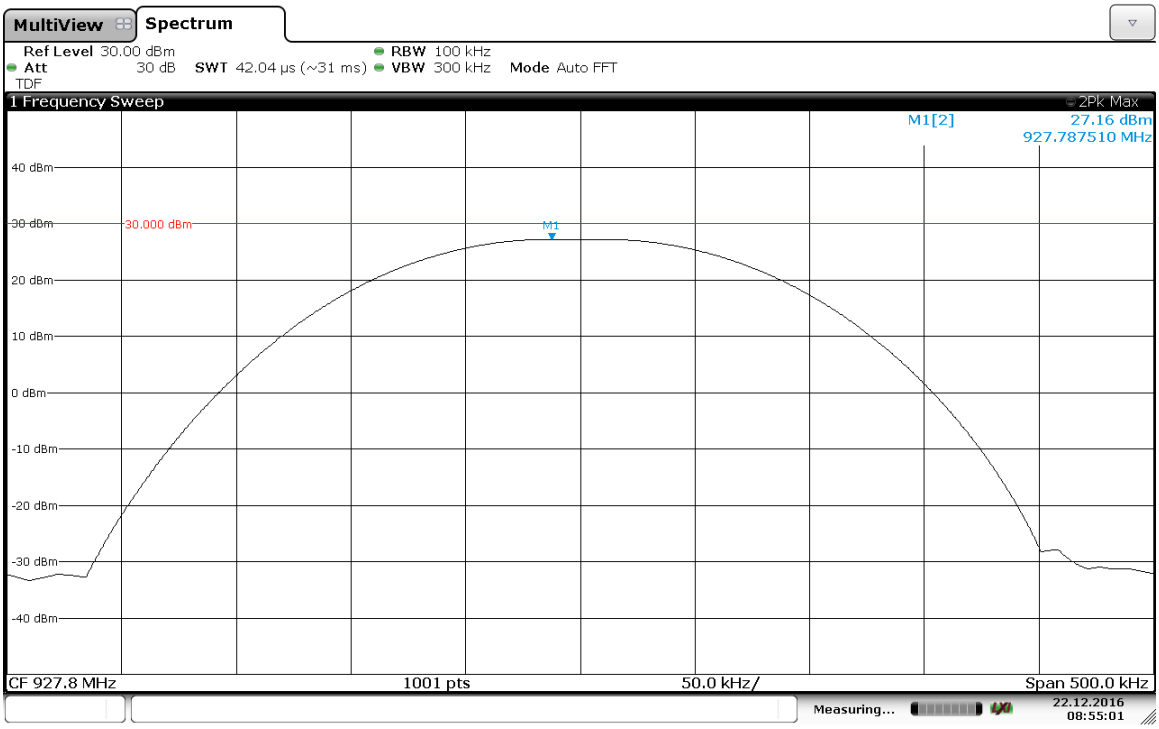
Date: 22.DEC.2016 08:05:10

Tx-2 Output Power Mid Channel – 27.32 dBm



Date: 22.DEC.2016 08:22:25

Tx-2 Output Power High Channel – 27.16 dBm



Date: 22.DEC.2016 08:55:01

Human RF Exposure

The EUT was measured in a radiated fashion. The RF output power was measured using a resolution bandwidth which encompassed the entire emission bandwidth. The data obtained was adjusted for equipment losses and converted from a field strength reading to a power reading using the provisions of FCC KDB 558074 and RSS-Gen 4.6. .

§1.1310 The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices shall be evaluated according to the provisions of §2.1093 of this chapter.

Part §1.1310 Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	$*900/f^2$	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	$*180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

(1) Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when a person is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure. The phrase *fully aware* in the context of applying these exposure limits means that an exposed person has received written and/or verbal information fully explaining the potential for RF exposure resulting from his or her employment. With the exception of *transient* persons, this phrase also means that an exposed person has received appropriate training regarding work practices relating to controlling or mitigating his or her exposure. Such training is not required for *transient* persons, but they must receive written and/or verbal information and notification (for example, using signs) concerning their exposure potential and appropriate means available to mitigate their exposure. The phrase *exercise control* means that an exposed person is allowed to and knows how to reduce or avoid exposure by administrative or engineering controls and work practices, such as use of personal protective equipment or time averaging of exposure.

(2) General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

RSS-102 Issue 5 Exposure Limits:

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
0.003-10[21]	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

Test Procedure

An MPE evaluation was performed in order to show that the device was compliant with §2.1091. The maximum power density was calculated for each transmitter at a separation distance of 20 cm.

For each transmitter the maximum power RF exposure at a 20 cm distance using the formula:

Maximum Duty cycle (D) = 0.044 or 4.4%

Conducted Peak $Power_{mW} = 10^{Conducted\ Peak\ Power(dBm)/10}$

Maximum Conducted Average $Power_{mW} = D * 10^{Conducted\ peak\ Power\ (dBm)/10}$

Power Density = [Maximum Conducted Average $Power_{mW}$ x Ant.Gain] / [4π x $(20_{cm})^2$] or [EIRP] / [4π x $(20_{cm})^2$]

1.2 Results:

Maximum Peak Output $Power_{mW} = 10^{(27.79/10)}$ or 601.17 mW

Maximum Average Output $Power_{mW}$ = 601.17 * 0.044 = 26.45148 mW

Antenna gain numeric = 10^(dBi/10) = 10^(5.4/10) = 3.467

Power Density = (26.45148*3.467) / 5025.6 or 0.0182 mW/cm^2

Limit at 902 MHz = 0.6 mW/cm^2

RSS-102 Issue 5 Exposure Limit at 902 MHz = 2.73 W/m^2

Power Density = 0.182 W/m^2

The calculated maximum power density at 20 cm distance is less than the limit for general population/ uncontrolled exposure.

Test Personnel:	Naga Suryadevara N.S	Test Date:	12/22/2016
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC 15.247 RSS 247	Limit Applied:	As specified in section 6.3
Input Voltage:	Internal Battery		
Pretest Verification w/ Ambient Signals or BB Source:	Yes- Signal Generator	Ambient Temperature:	22 ºC
		Relative Humidity:	18 %
		Atmospheric Pressure:	1003 mbars

7 Occupied and 20 dB Bandwidth

7.1 Method

Tests are performed in accordance with FCC Part 15 Subpart C (15.247) and RSS 247.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 380, and 440 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

7.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001'	Weather Station	Davis Instruments	7400	PE80519A61	11/28/2016	11/28/2017
CBLHF2012-2M-1'	2m 9kHz-40GHz Coaxial Cable - SET1	Huber & Suhner	SF102	252675001	02/05/2015	02/05/2016
WEI18'	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017
WEI8'	Attenuator	Weinschel Corp	47-10-34	BD8309	03/30/2016	03/30/2017
ROS005'	ETSI Test System	Rhode & Schwartz	TS8997	N/A	09/15/2016	09/15/2017

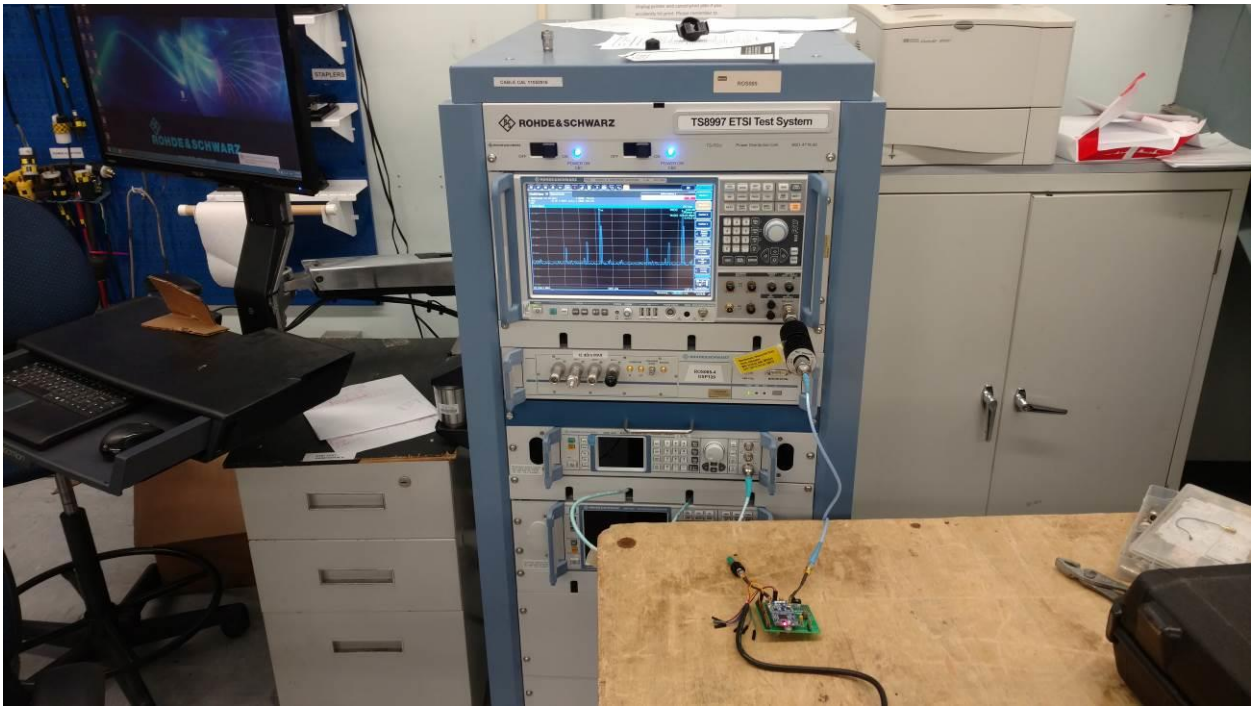
Software Utilized:

Name	Manufacturer	Version
None		

7.3 Results:

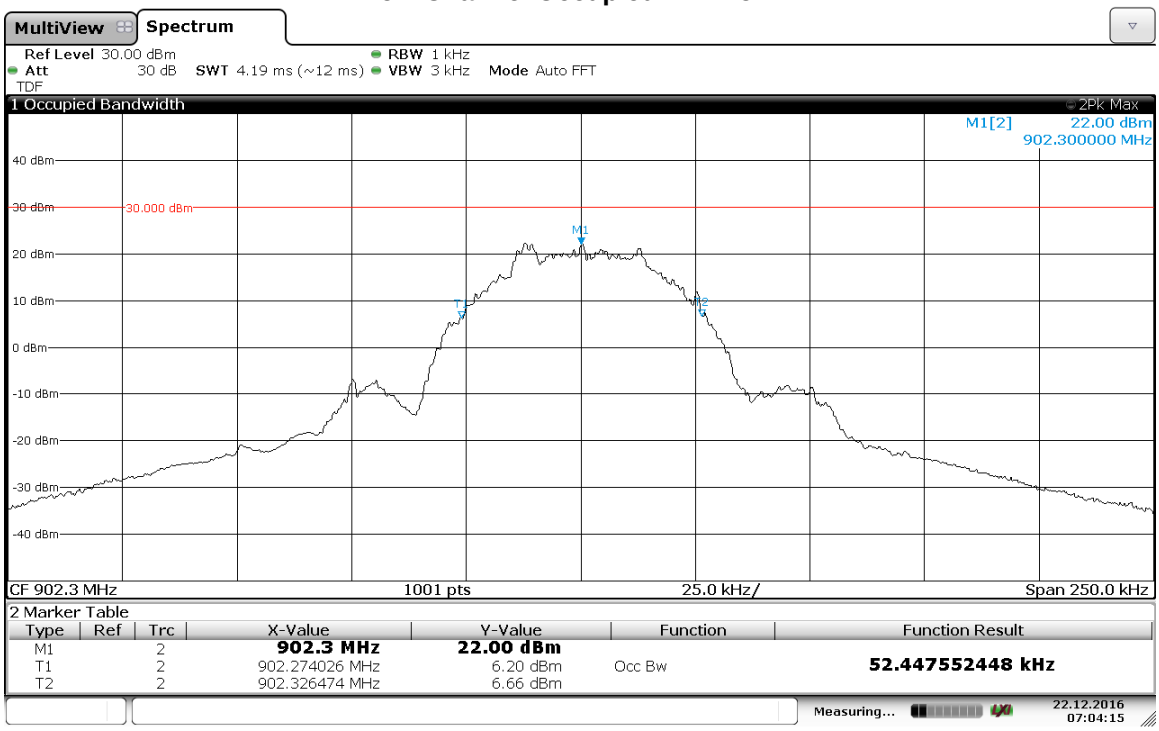
The sample tested was found to Comply. The 20dB BW is lower than 500 kHz.

7.4 Setup Photograph:



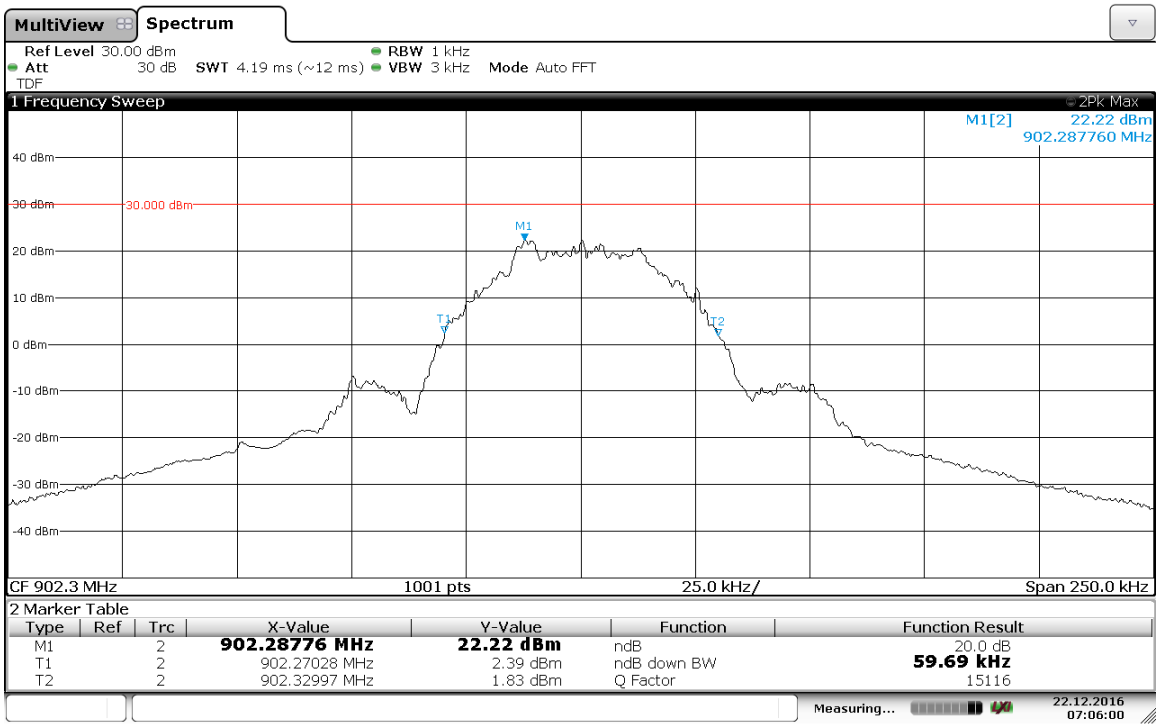
7.5 Plots/Data:

Tx-1 Low Channel Occupied BW – 52.44 kHz



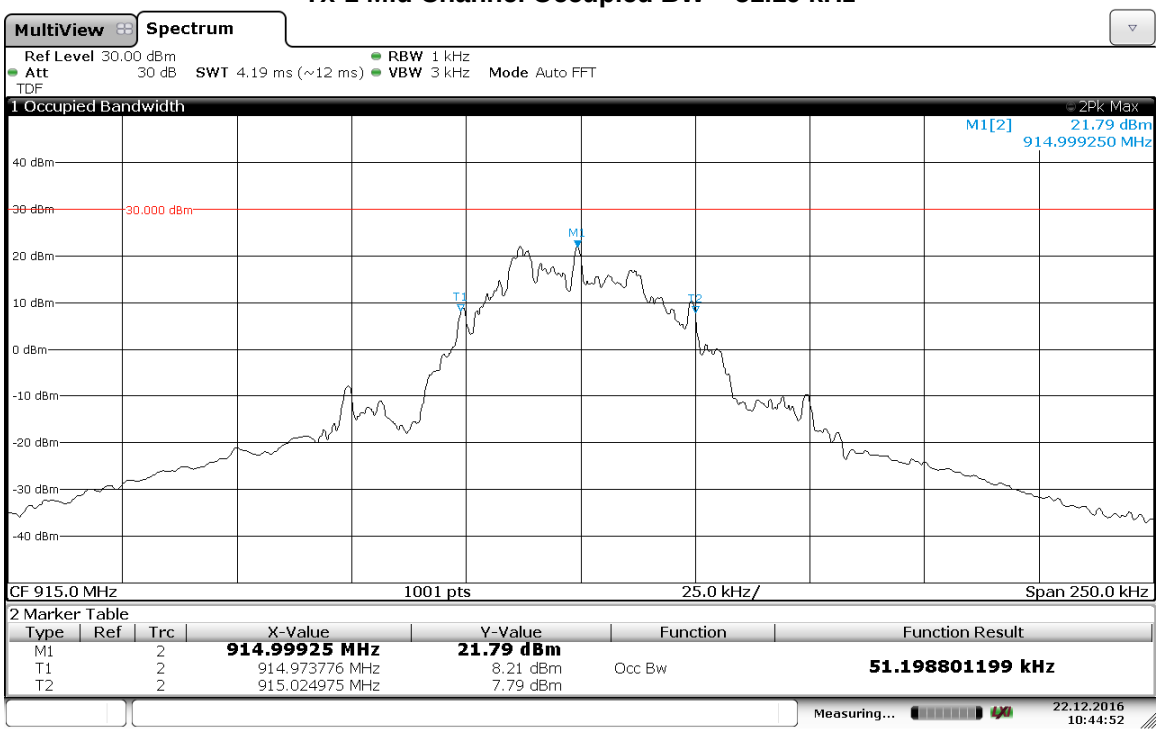
Date: 22.DEC.2016 07:04:14

Tx-1 Low Channel 20dB BW – 59.69 kHz



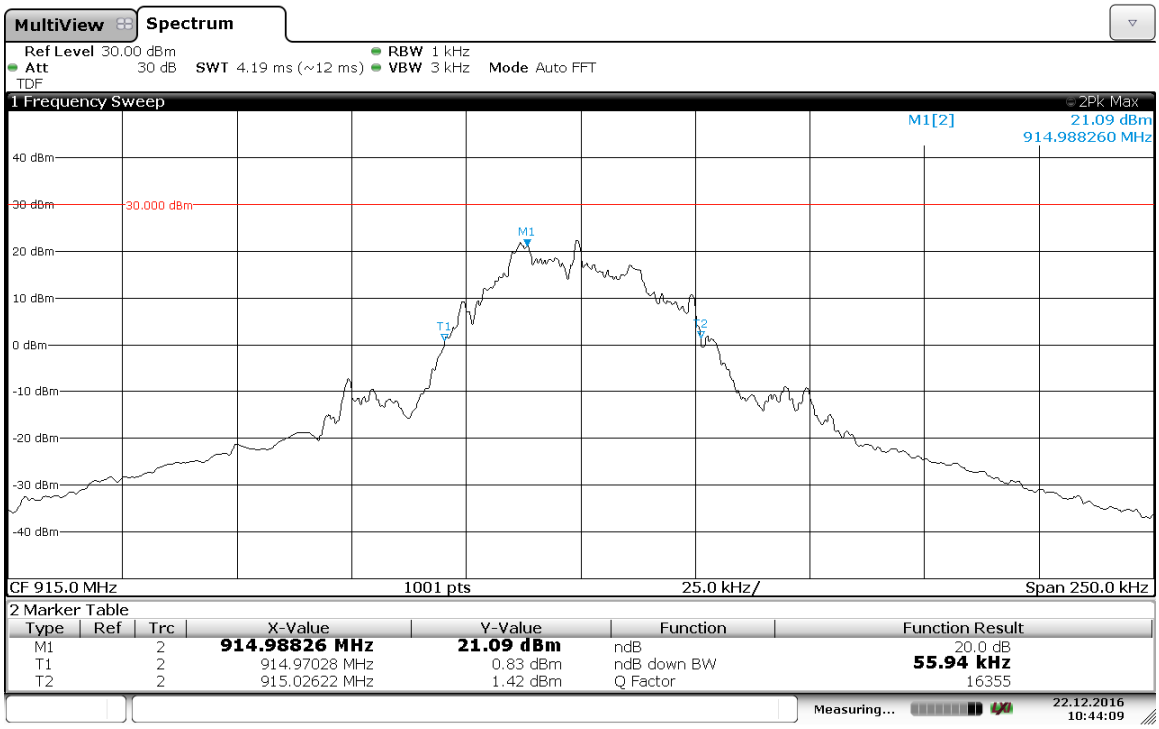
Date: 22.DEC.2016 07:06:00

Tx-1 Mid Channel Occupied BW – 51.19 kHz



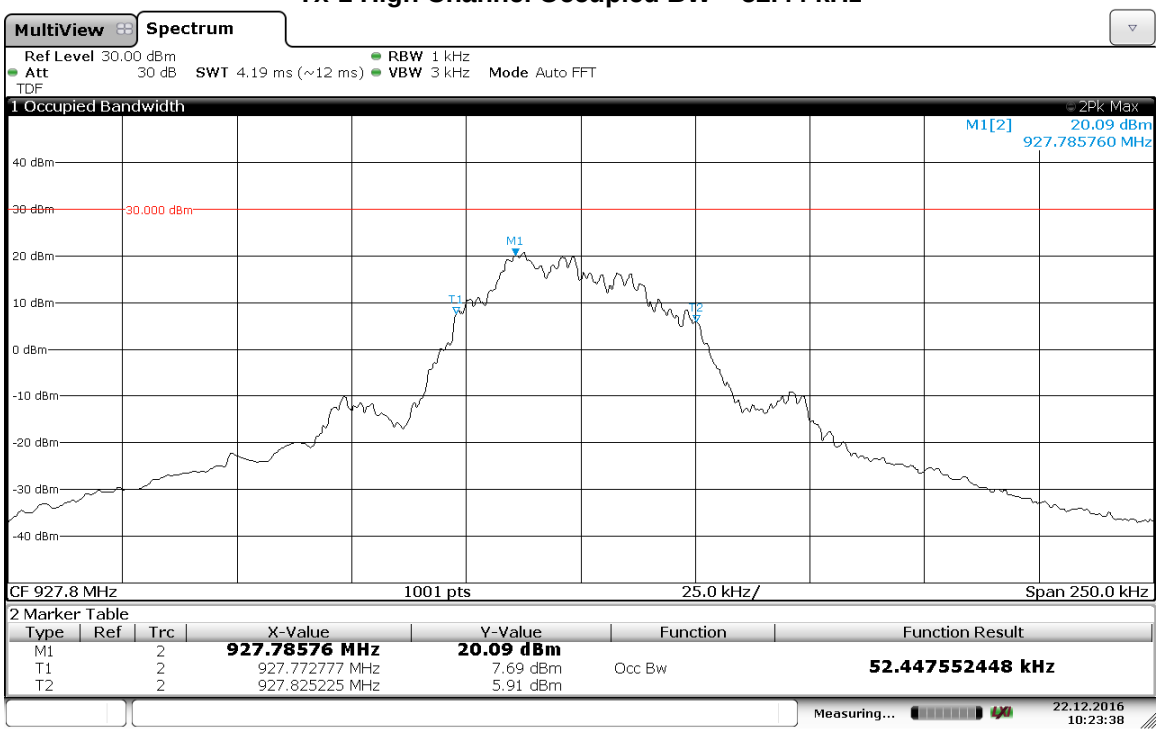
Date: 22.DEC.2016 10:44:52

Tx-1 Mid Channel 20dB BW – 55.94 kHz



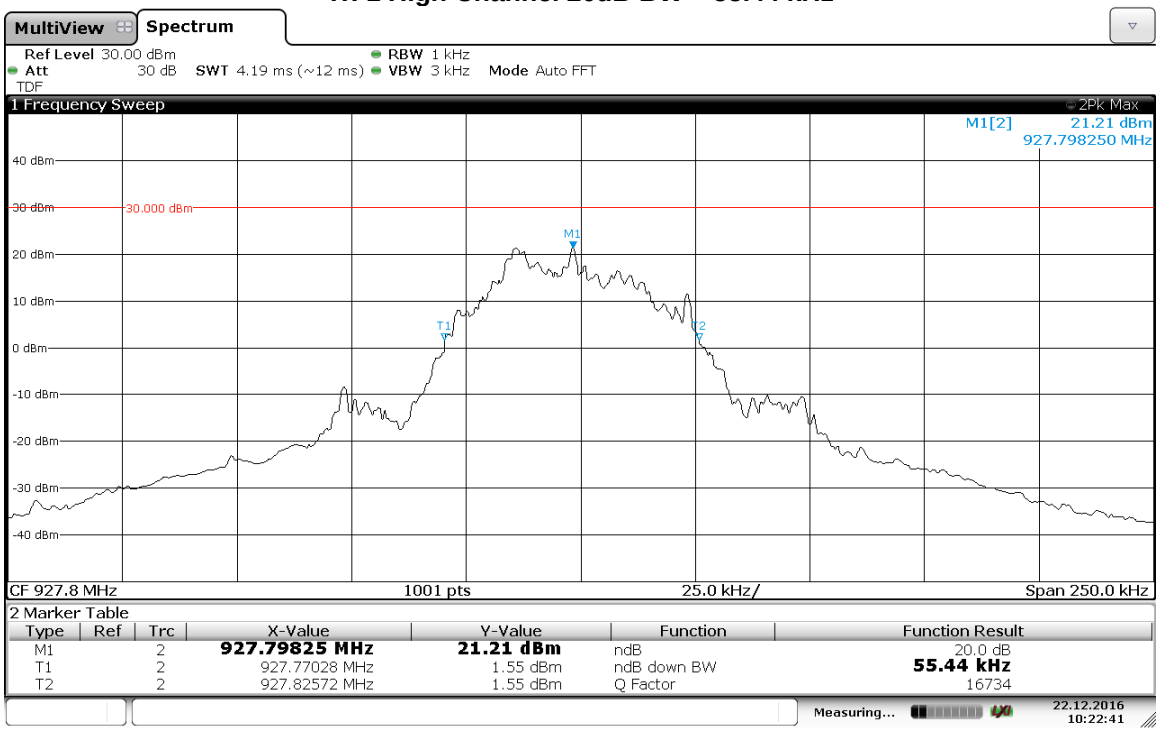
Date: 22.DEC.2016 10:44:09

Tx-1 High Channel Occupied BW – 52.44 kHz



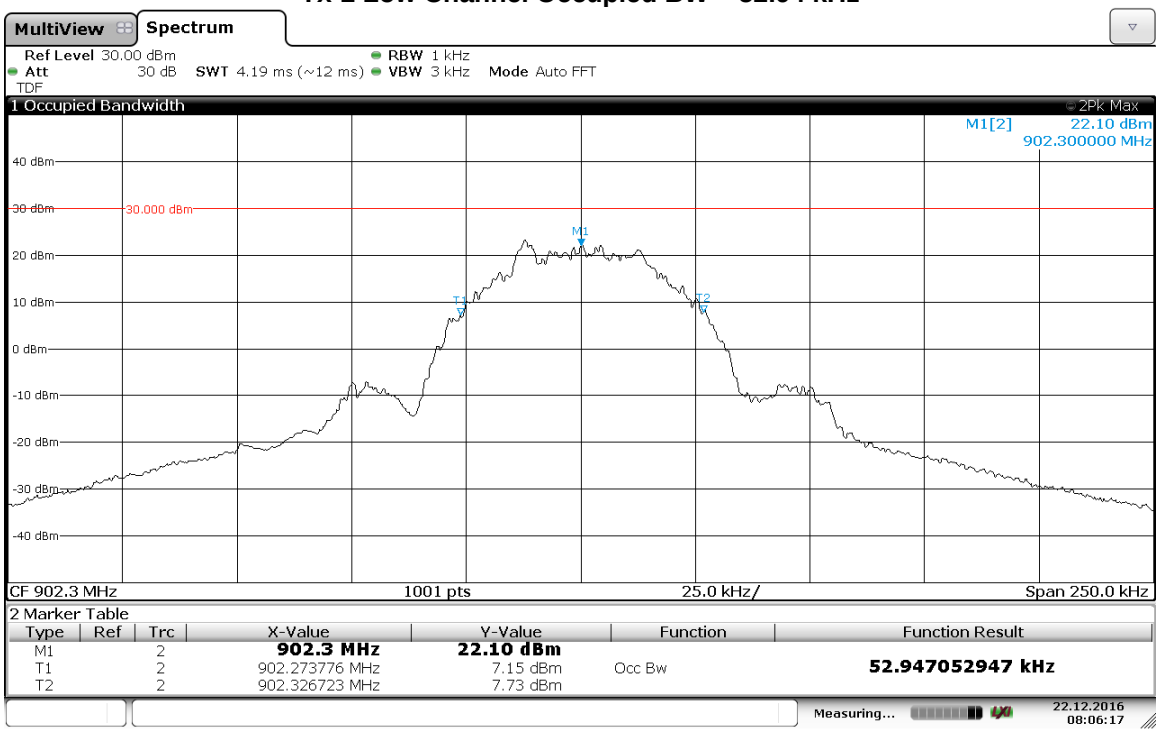
Date: 22.DEC.2016 10:23:37

Tx-1 High Channel 20dB BW – 55.44 kHz



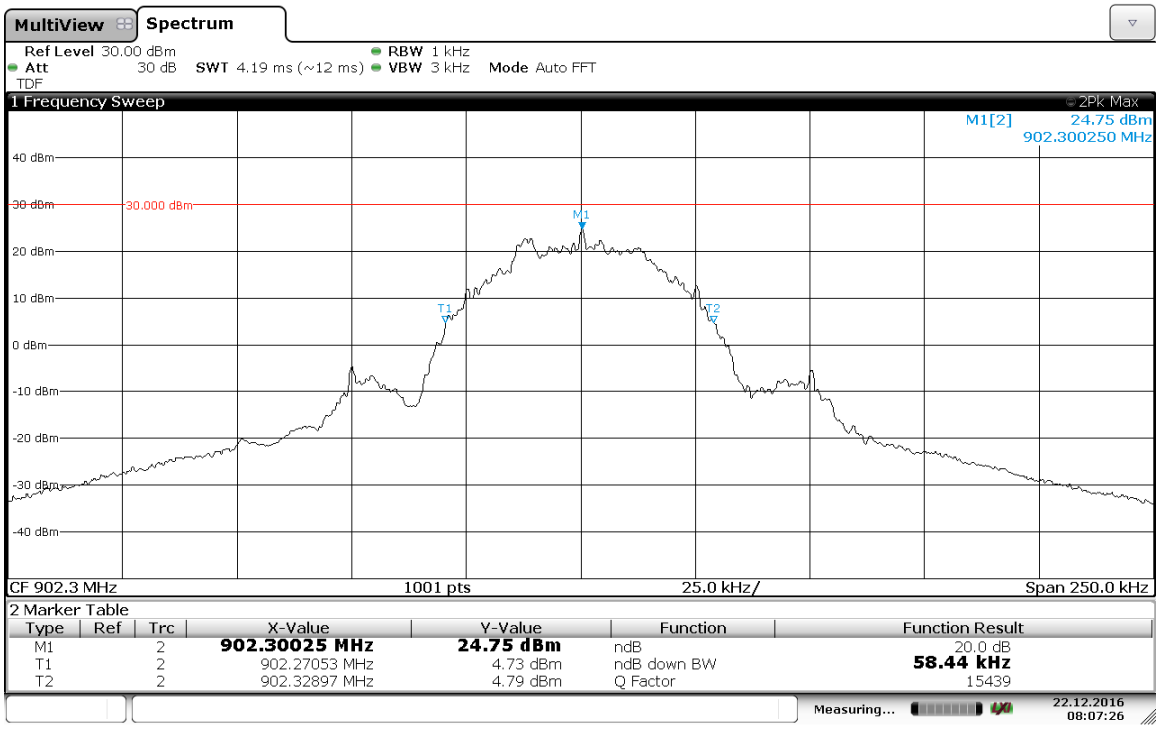
Date: 22.DEC.2016 10:22:41

Tx-2 Low Channel Occupied BW – 52.94 kHz



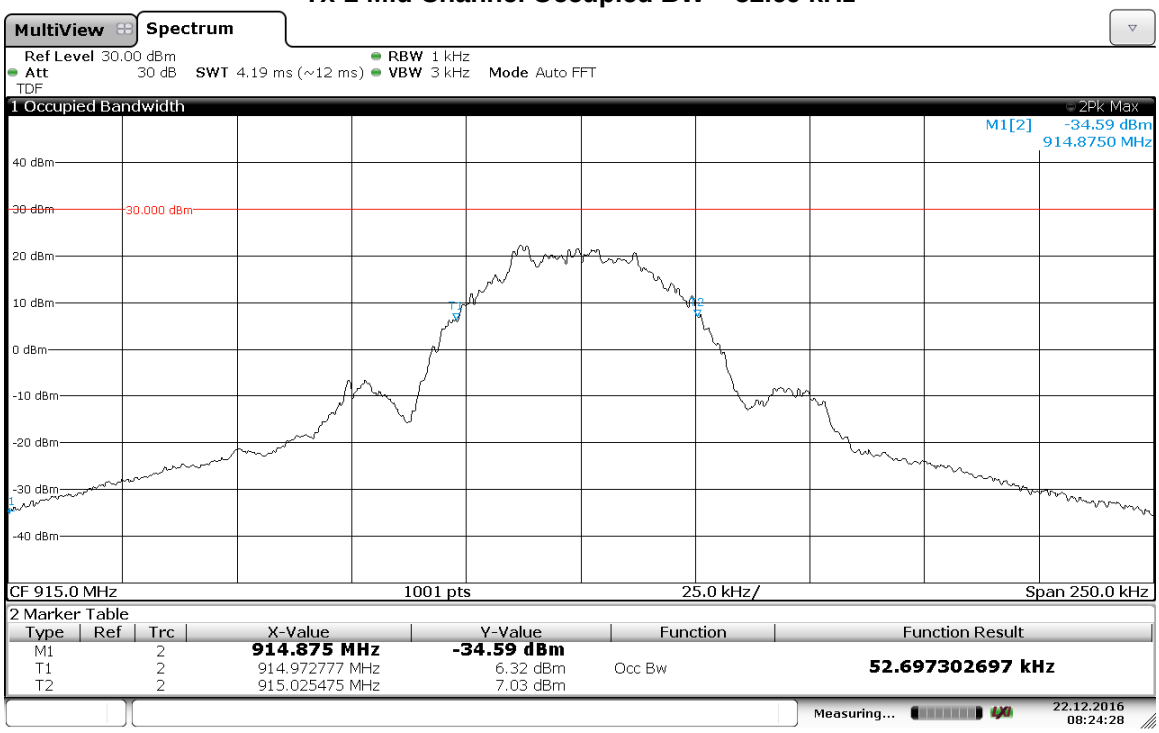
Date: 22.DEC.2016 08:06:17

Tx-2 Low Channel 20dB BW – 58.44 kHz



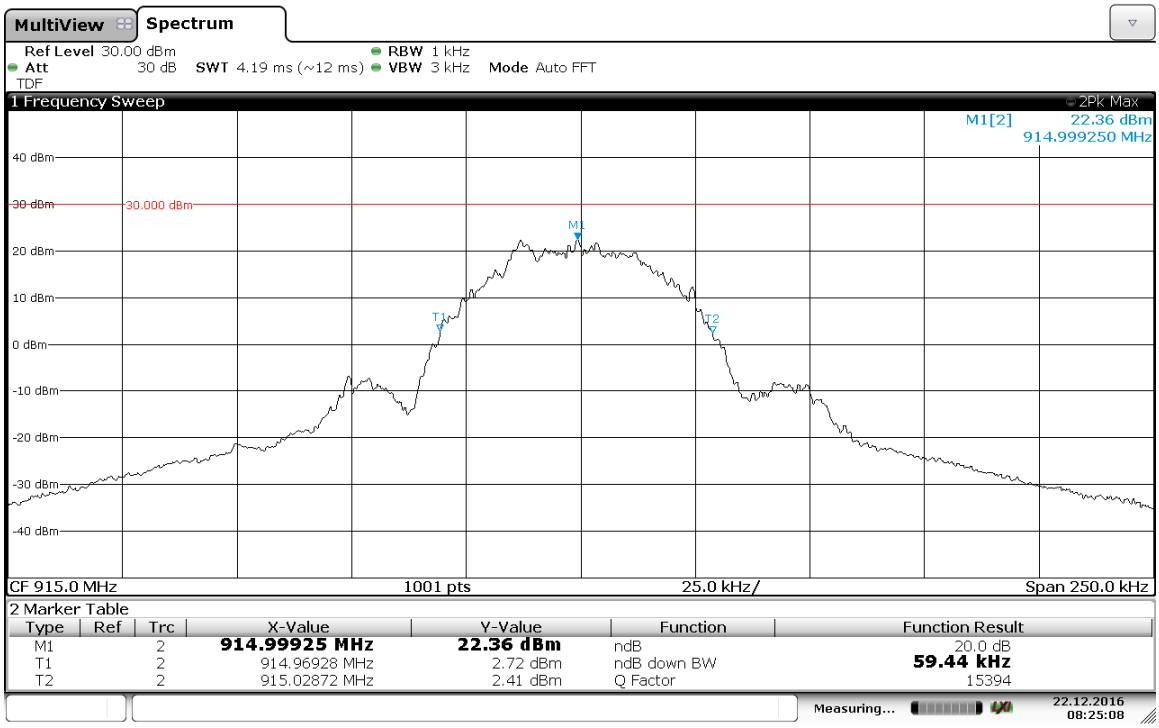
Date: 22.DEC.2016 08:07:26

Tx-2 Mid Channel Occupied BW – 52.69 kHz



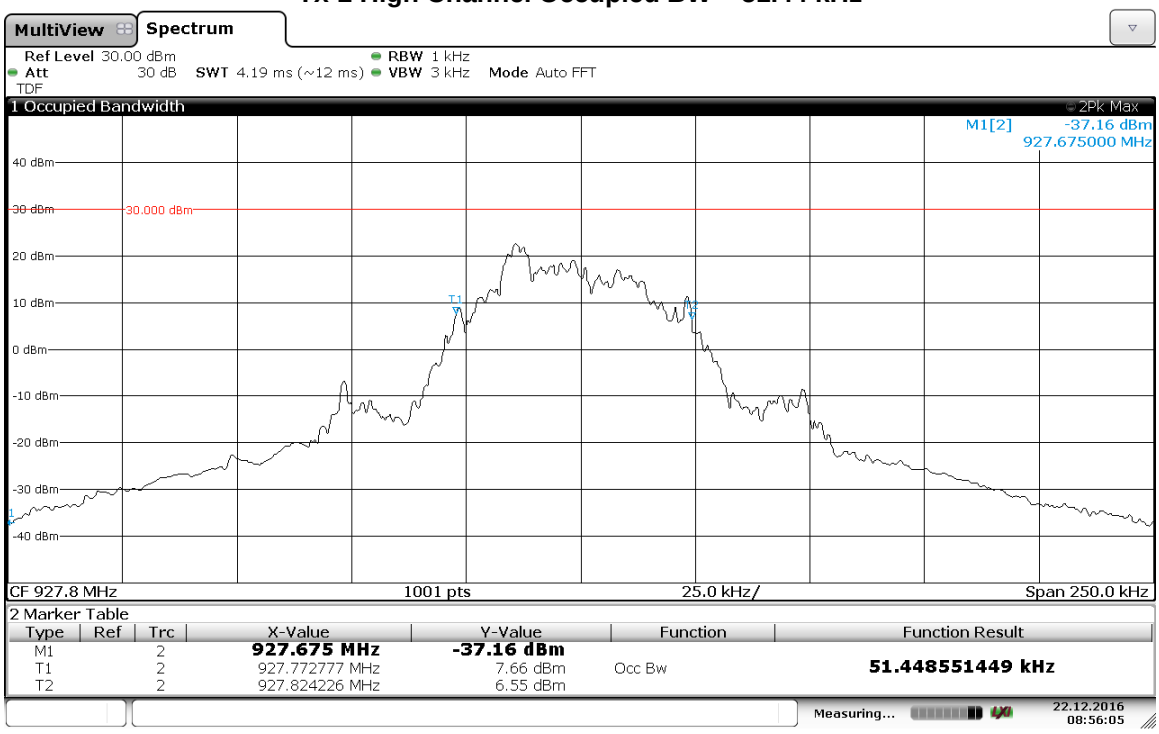
Date: 22.DEC.2016 08:24:28

Tx-2 Mid Channel 20dB BW – 59.44 kHz



Date: 22.DEC.2016 08:25:07

Tx-2 High Channel Occupied BW – 51.44 kHz



Date: 22.DEC.2016 08:56:04

Tx-2 High Channel 20dB BW – 51.44 kHz

Date: 22.DEC.2016 08:56:34

Test Personnel:	Naga Suryadevara N·S	Test Date:	12/22/2016
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC 15.247 RSS 247	Limit Applied:	As specified in section 7.3
Input Voltage:	Internal Battery		
Pretest Verification w/ Ambient Signals or BB Source:	Yes- Signal Generator	Ambient Temperature:	22 ºC
		Relative Humidity:	18 %
		Atmospheric Pressure:	1003 mbars

8 In-Band, Out of Band and Band Edge Emissions

8.1 Method

Tests are performed in accordance with FCC Part 15 Subpart C (15.247) and RSS 247.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 380, and 440 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

8.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001'	Weather Station	Davis Instruments	7400	PE80519A61	11/28/2016	11/28/2017
CBLHF2012-2M-1'	2m 9kHz-40GHz Coaxial Cable - SET1	Huber & Suhner	SF102	252675001	02/05/2015	02/05/2016
WEI18'	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017
WEI8'	Attenuator	Weinschel Corp	47-10-34	BD8309	03/30/2016	03/30/2017
ROS005'	ETSI Test System	Rhode & Schwartz	TS8997	N/A	09/15/2016	09/15/2017

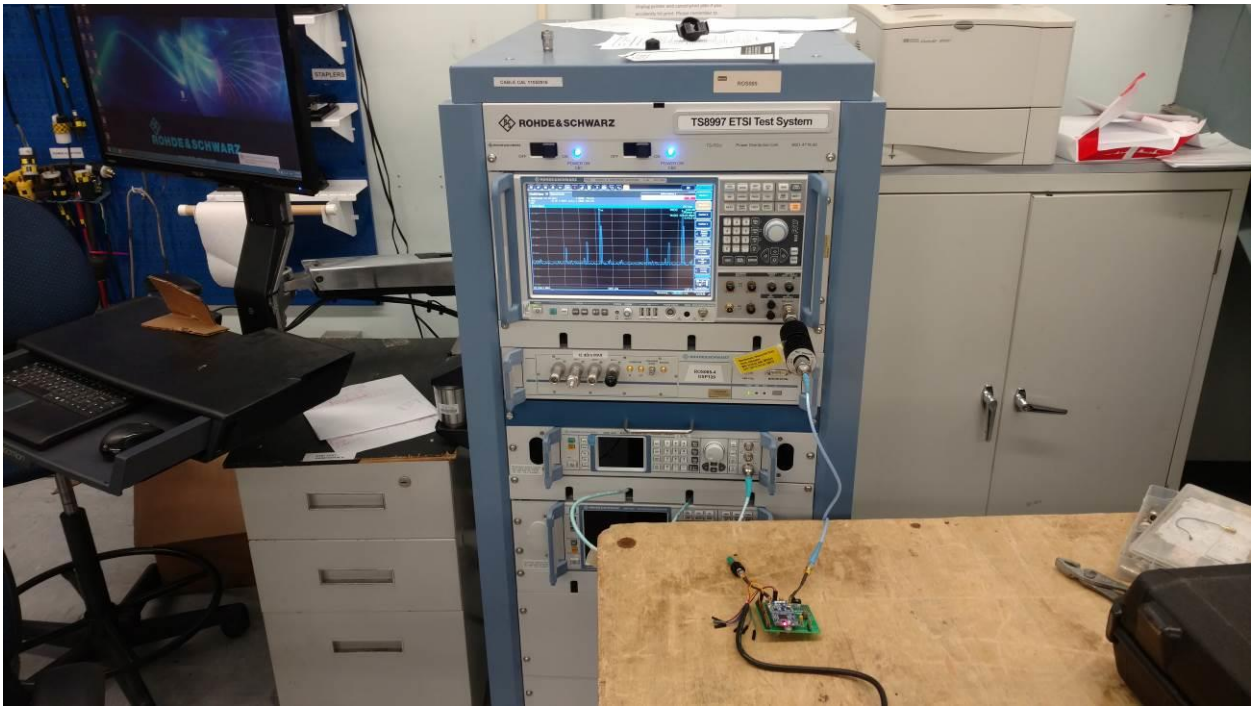
Software Utilized:

Name	Manufacturer	Version
None		

8.3 Results:

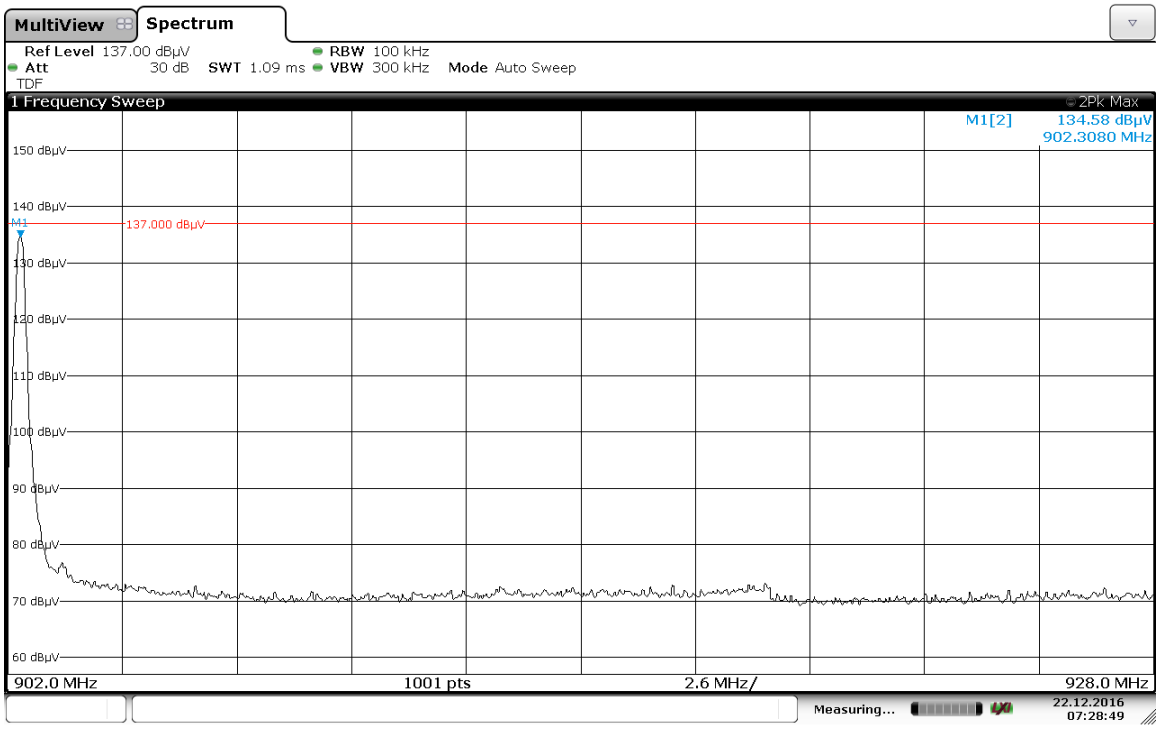
The sample tested was found to Comply. Conducted Spurious Emissions in a 100 kHz bandwidth are 20 dB below the fundamental.

8.4 Setup Photograph:



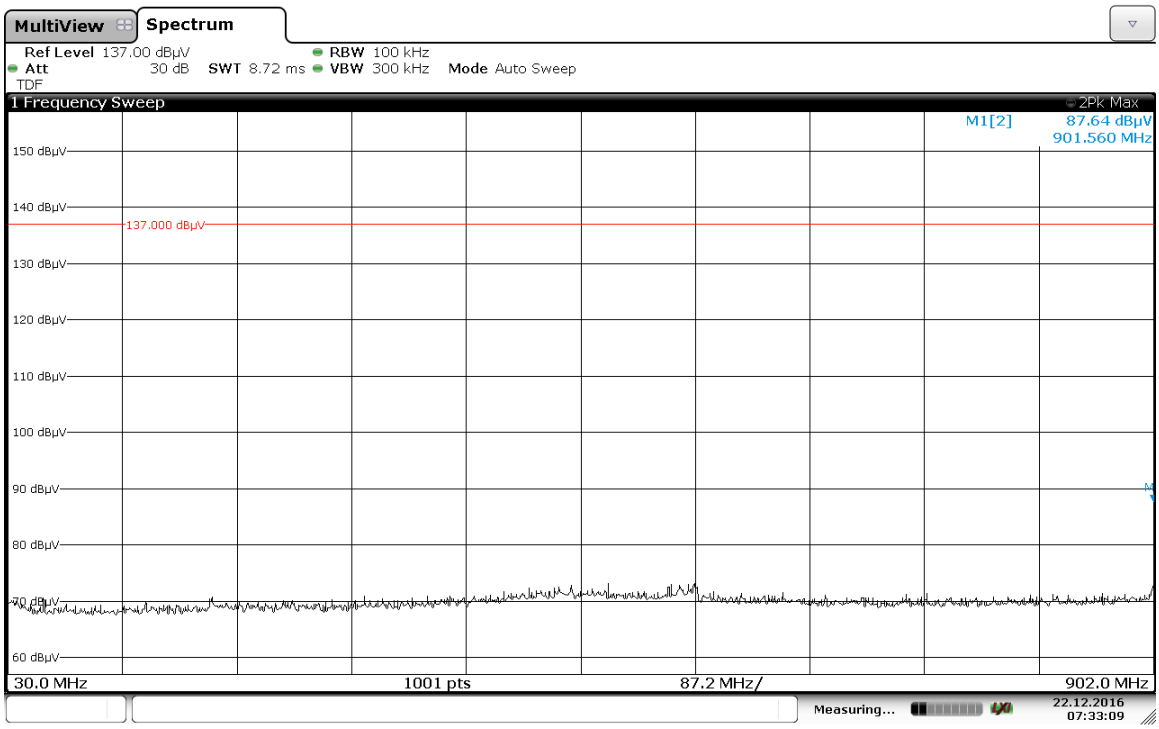
8.5 Plots/Data:

Tx-1 Low Channel In-Band Emissions



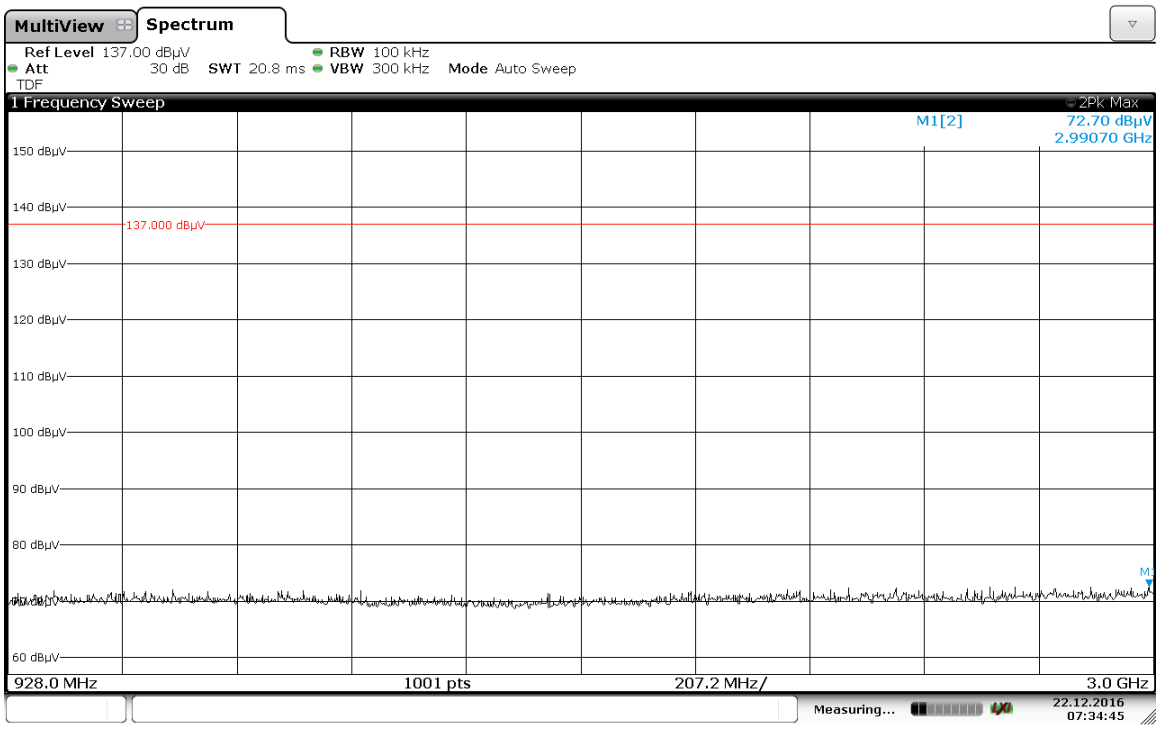
Date: 22.DEC.2016 07:28:49

Tx-1 Low Channel Out of Band Emissions 30 MHz – 902 MHz



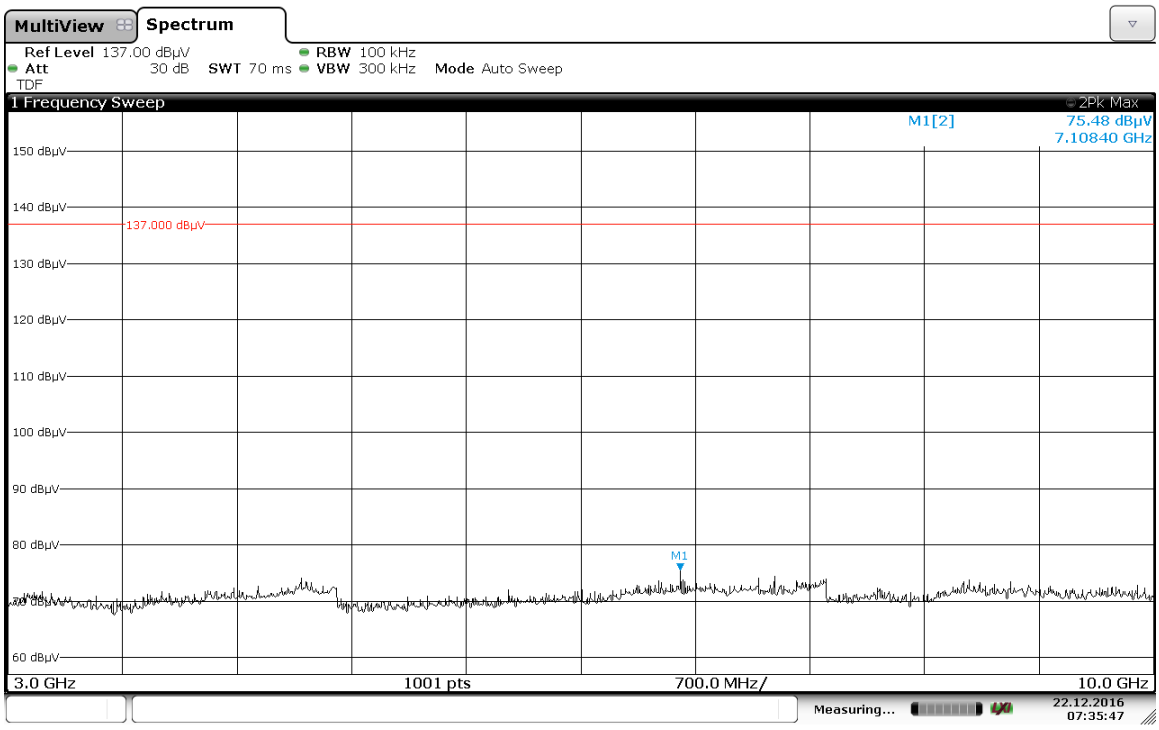
Date: 22.DEC.2016 07:33:08

Tx-1 Low Channel Out of Band Emissions 928 MHz – 3 GHz



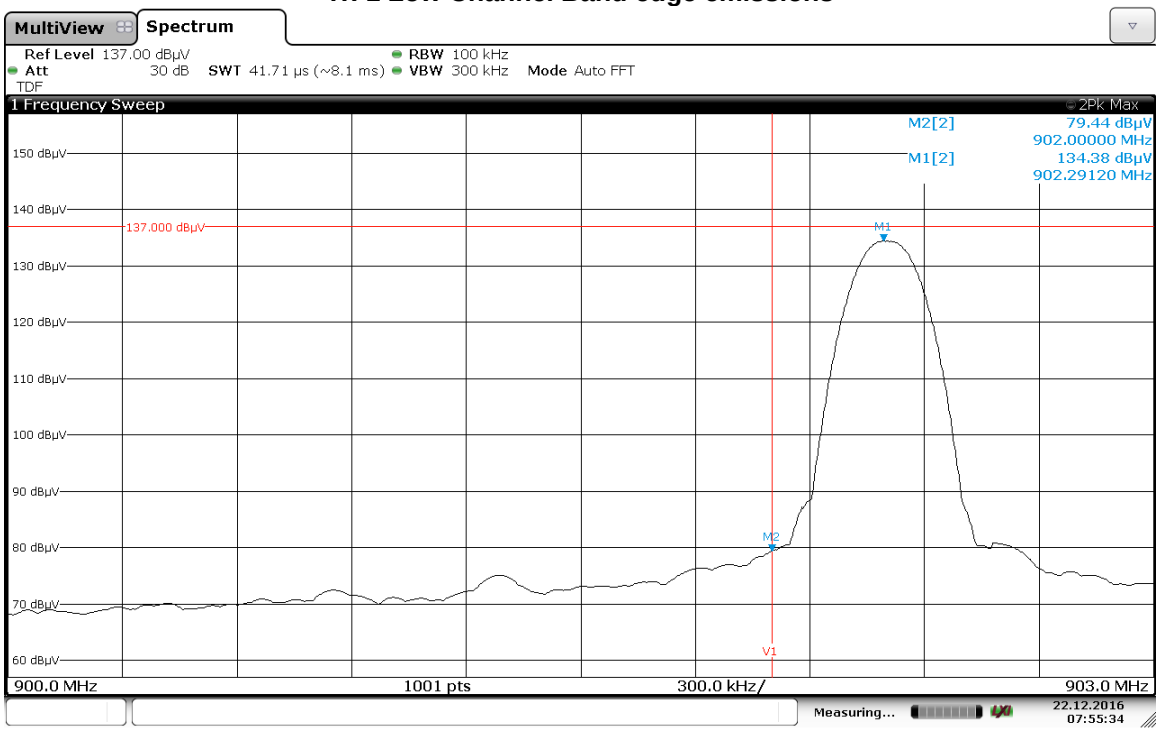
Date: 22.DEC.2016 07:34:45

Tx-1 Low Channel Out of Band Emissions 3 GHz – 10 GHz



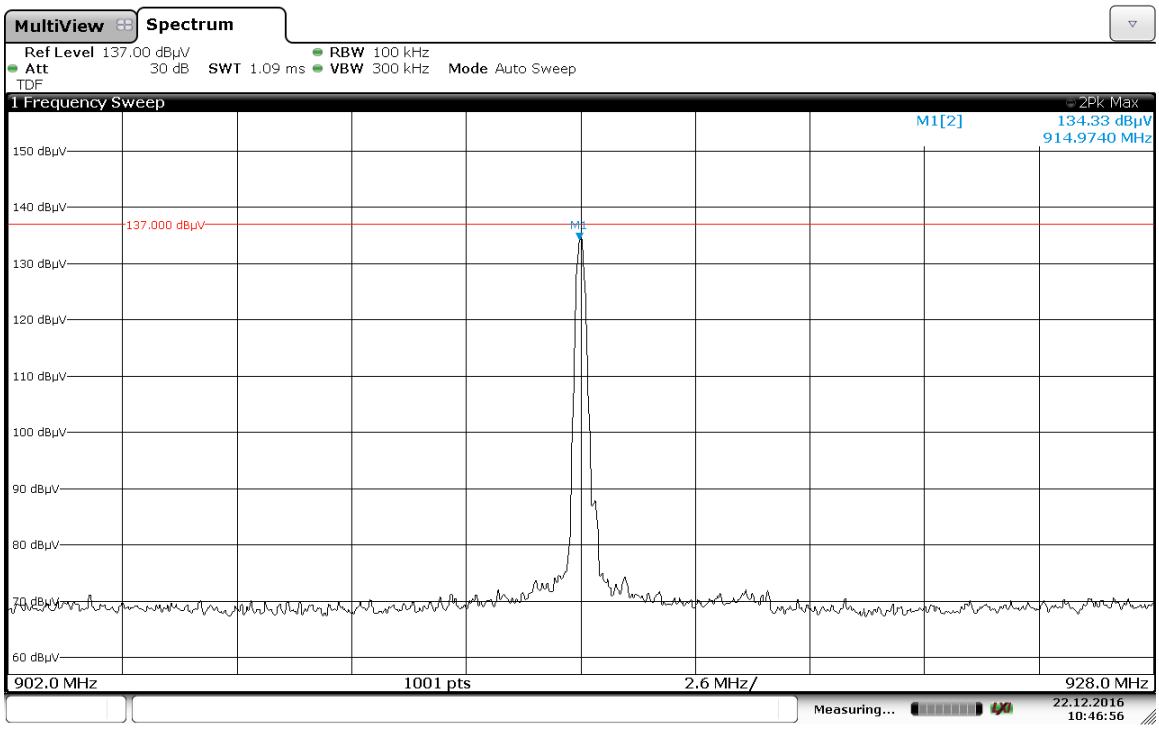
Date: 22.DEC.2016 07:35:46

Tx-1 Low Channel Band edge emissions



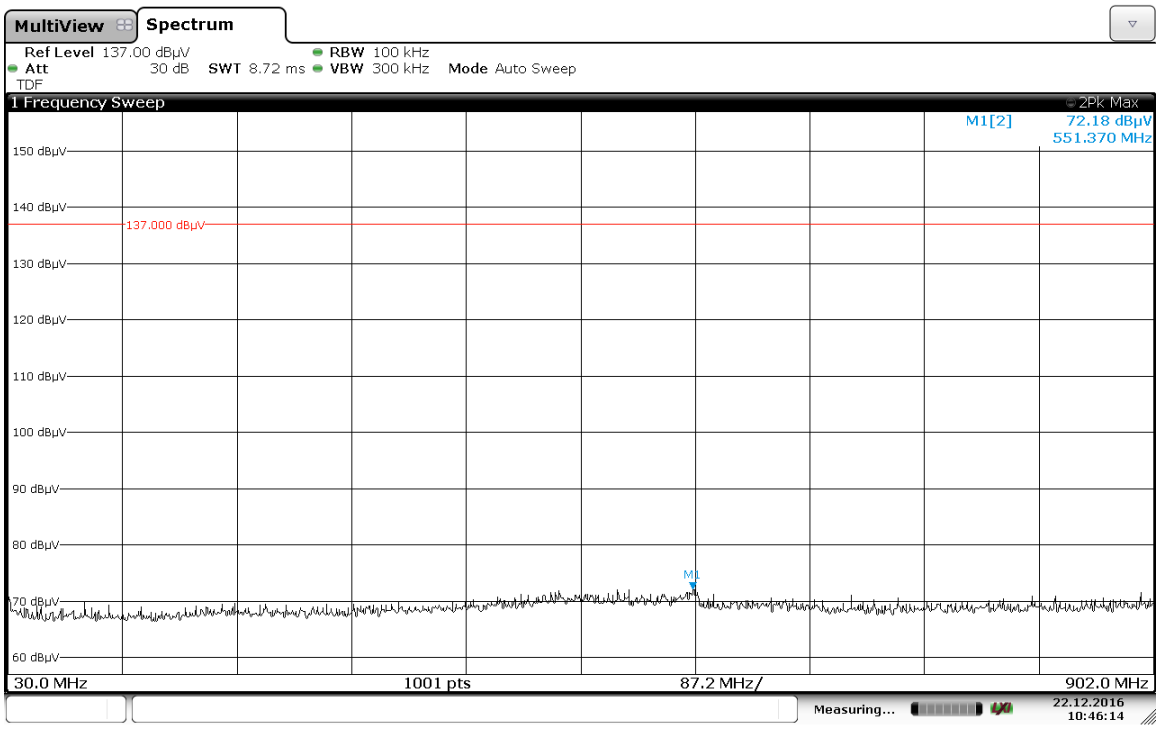
Date: 22.DEC.2016 07:55:34

Tx-1 Mid-Channel In-Band Emissions



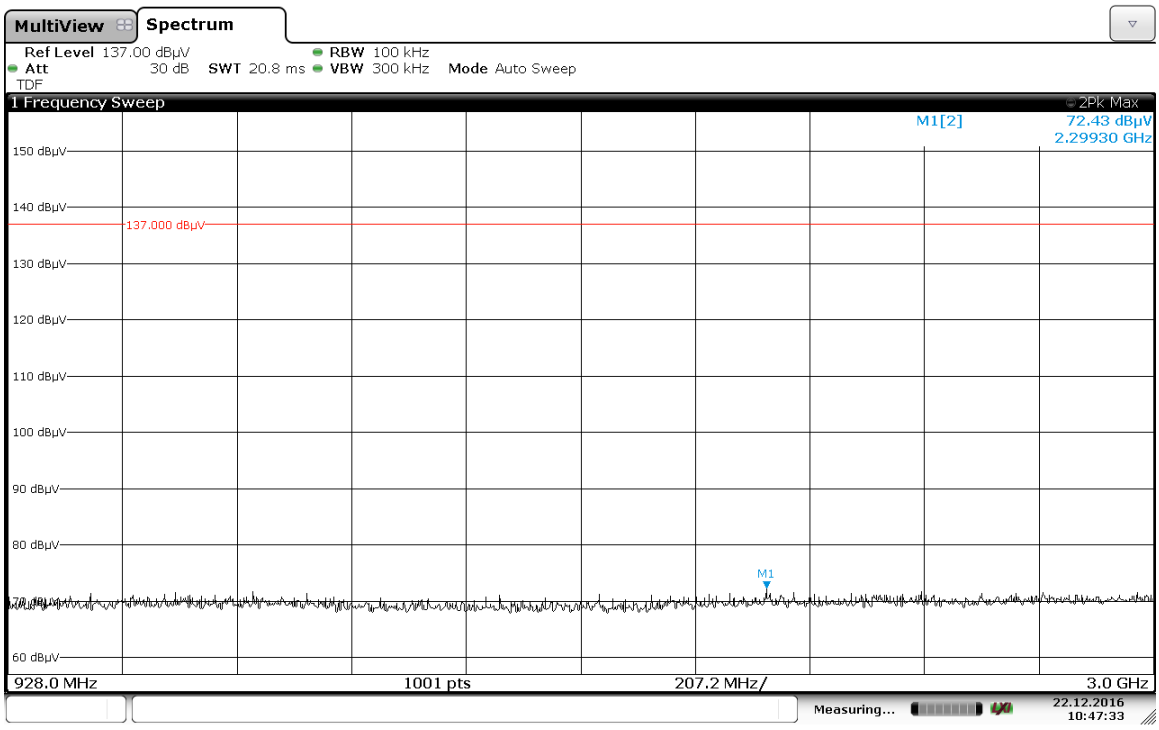
Date: 22.DEC.2016 10:46:56

Tx-1 Mid-Channel Out of Band Emissions 30 MHz – 902 MHz



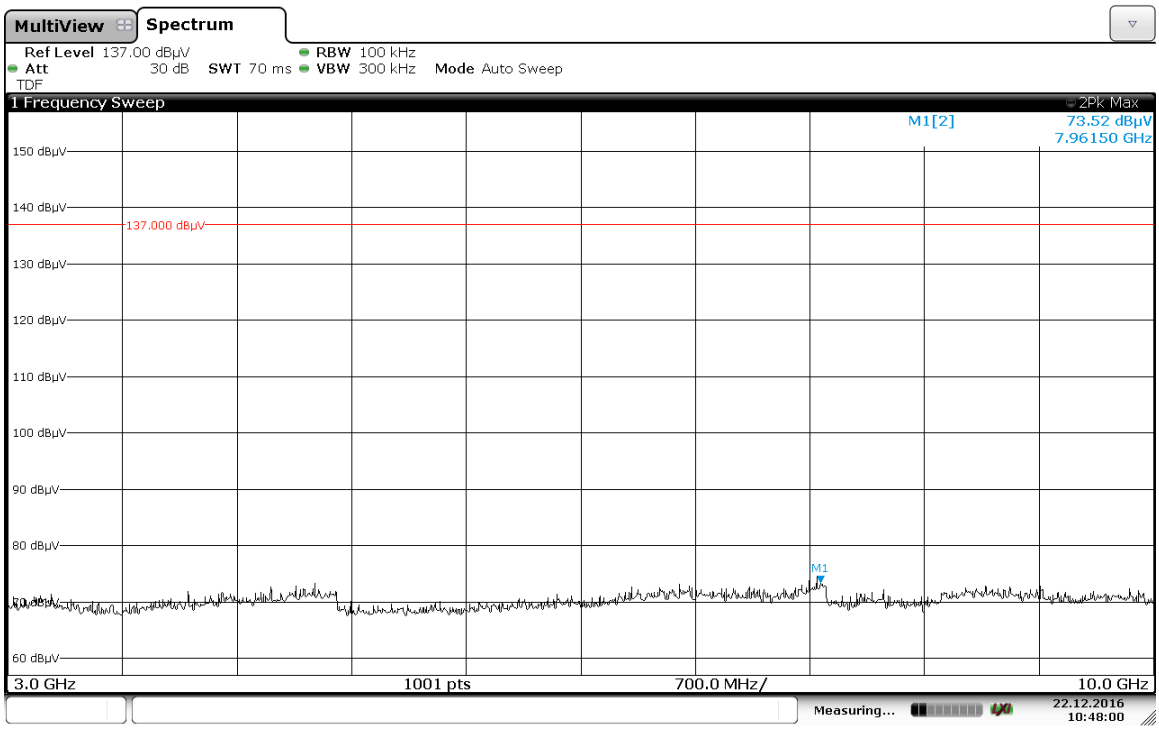
Date: 22.DEC.2016 10:46:13

Tx-1 Mid-Channel Out of Band Emissions 928 MHz – 3 GHz



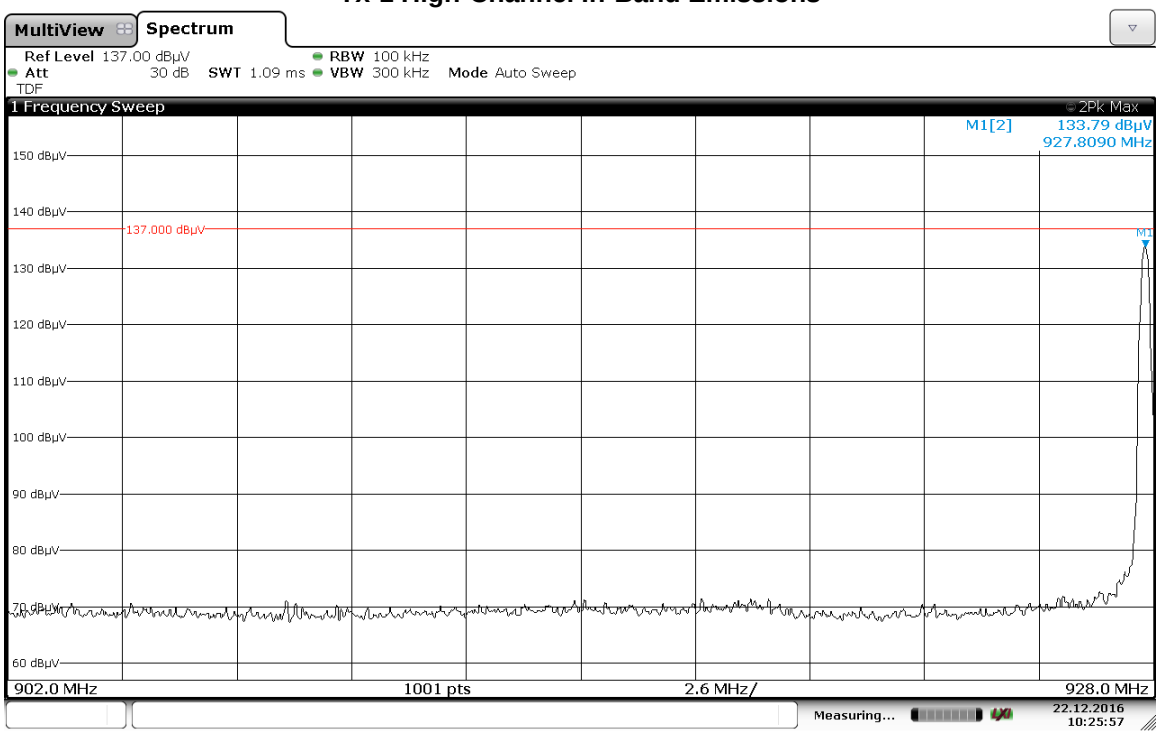
Date: 22.DEC.2016 10:47:32

Tx-1 Mid-Channel Out of Band Emissions 3 GHz – 10 GHz



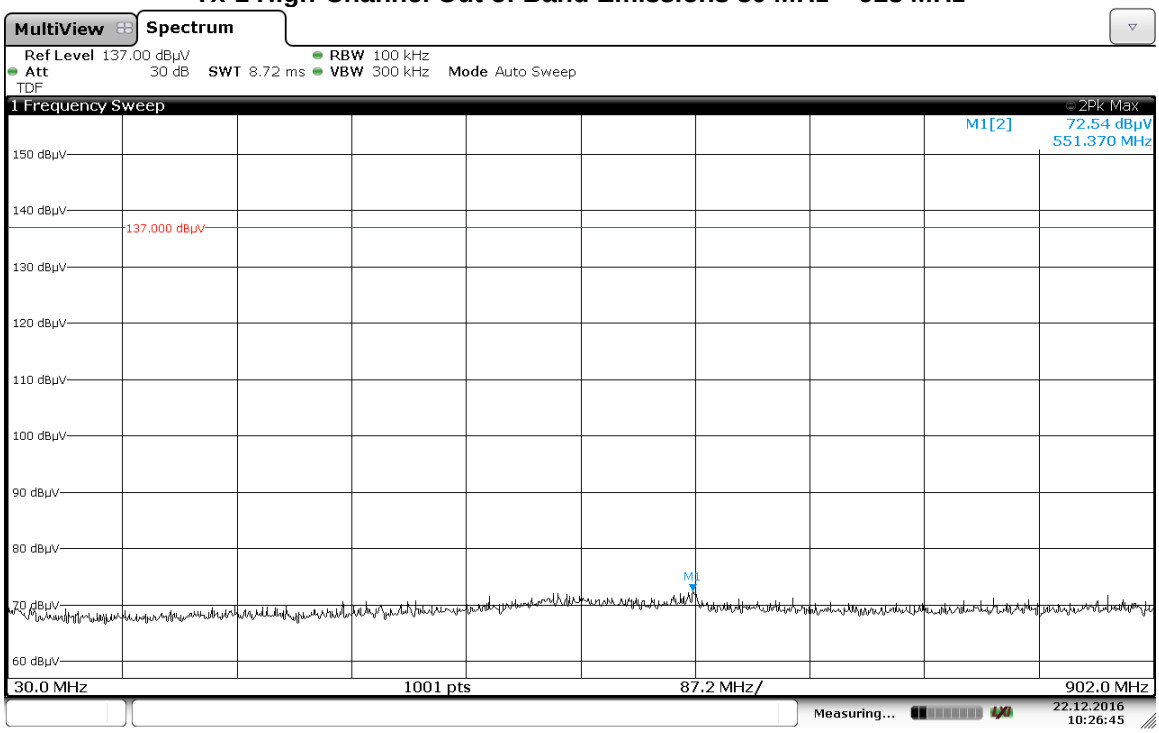
Date: 22.DEC.2016 10:47:59

Tx-1 High-Channel In-Band Emissions



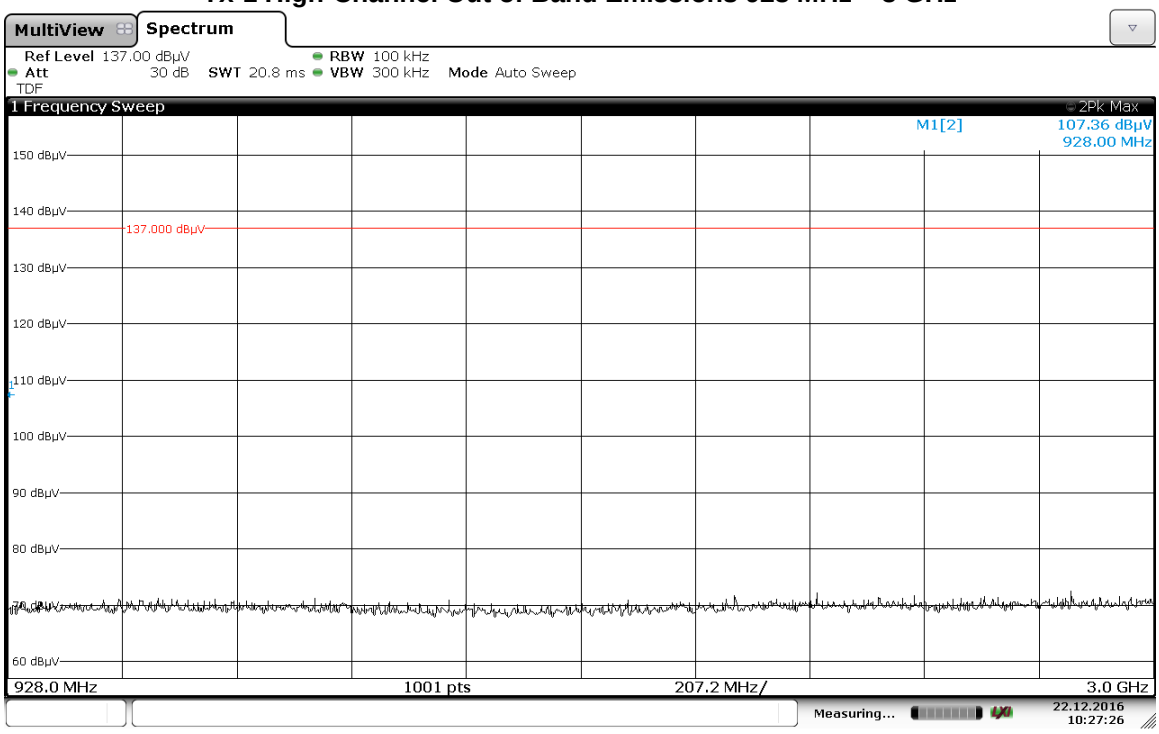
Date: 22.DEC.2016 10:25:56

Tx-1 High-Channel Out of Band Emissions 30 MHz – 928 MHz



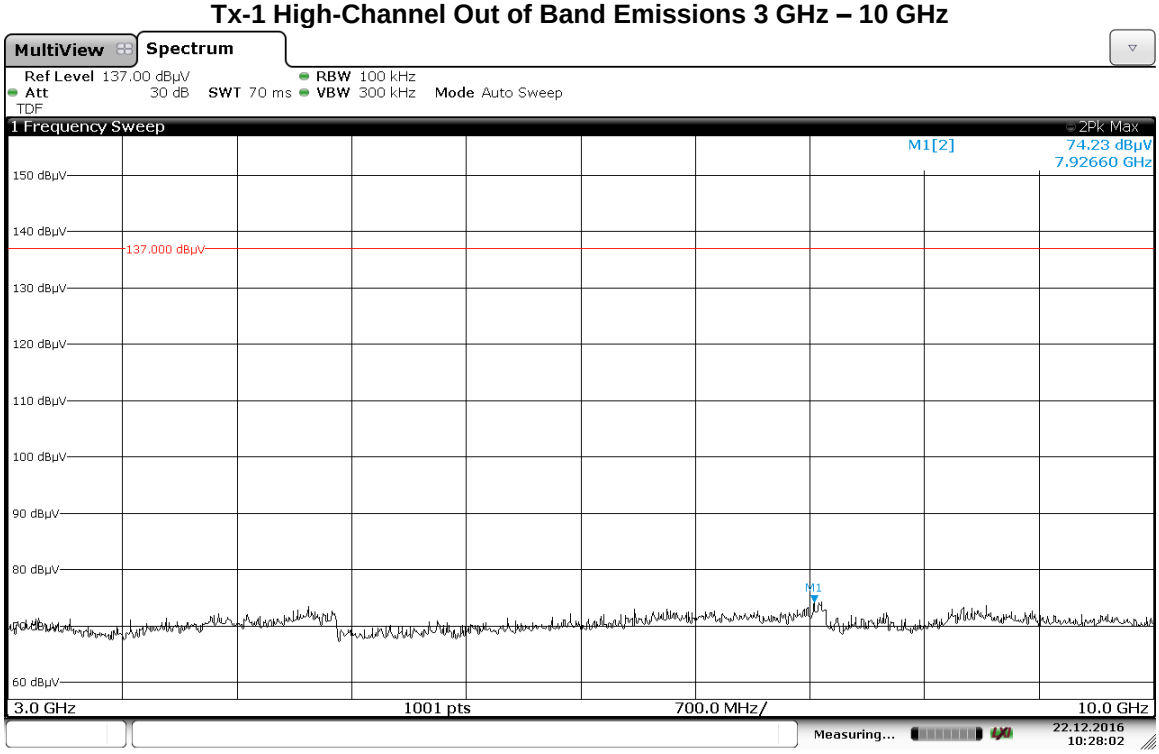
Date: 22.DEC.2016 10:26:45

Tx-1 High-Channel Out of Band Emissions 928 MHz – 3 GHz



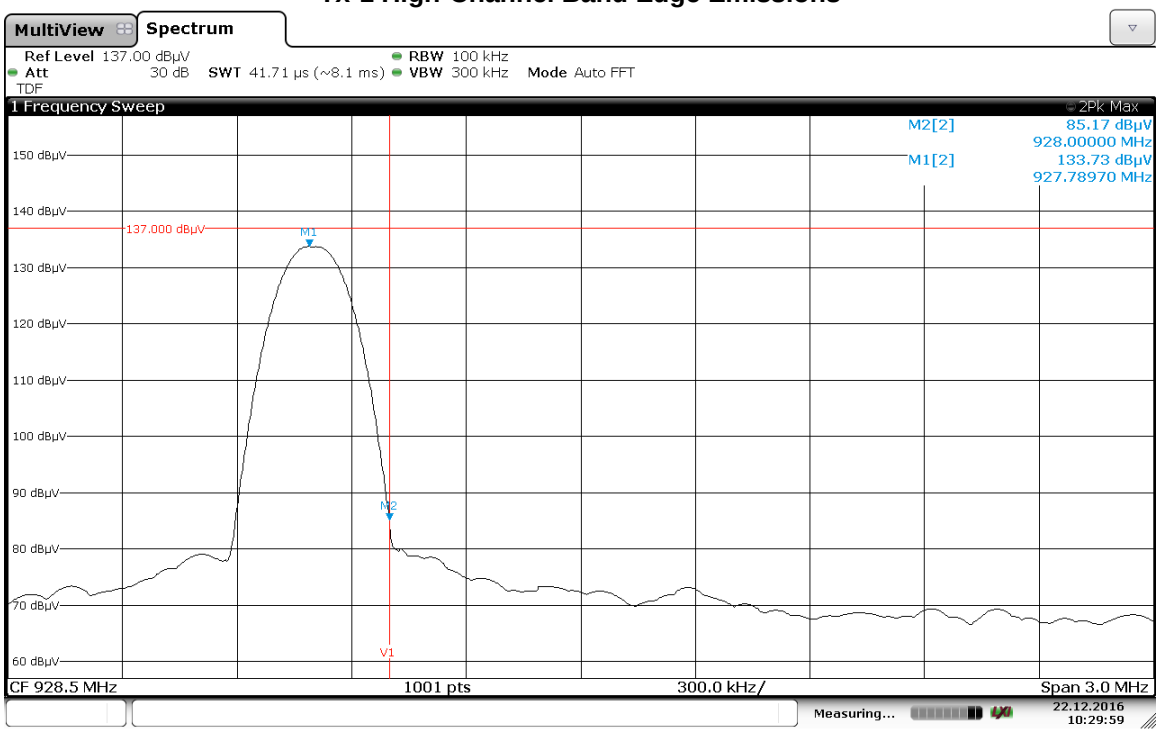
Date: 22.DEC.2016 10:27:26

Tx-1 High-Channel Out of Band Emissions 3 GHz – 10 GHz



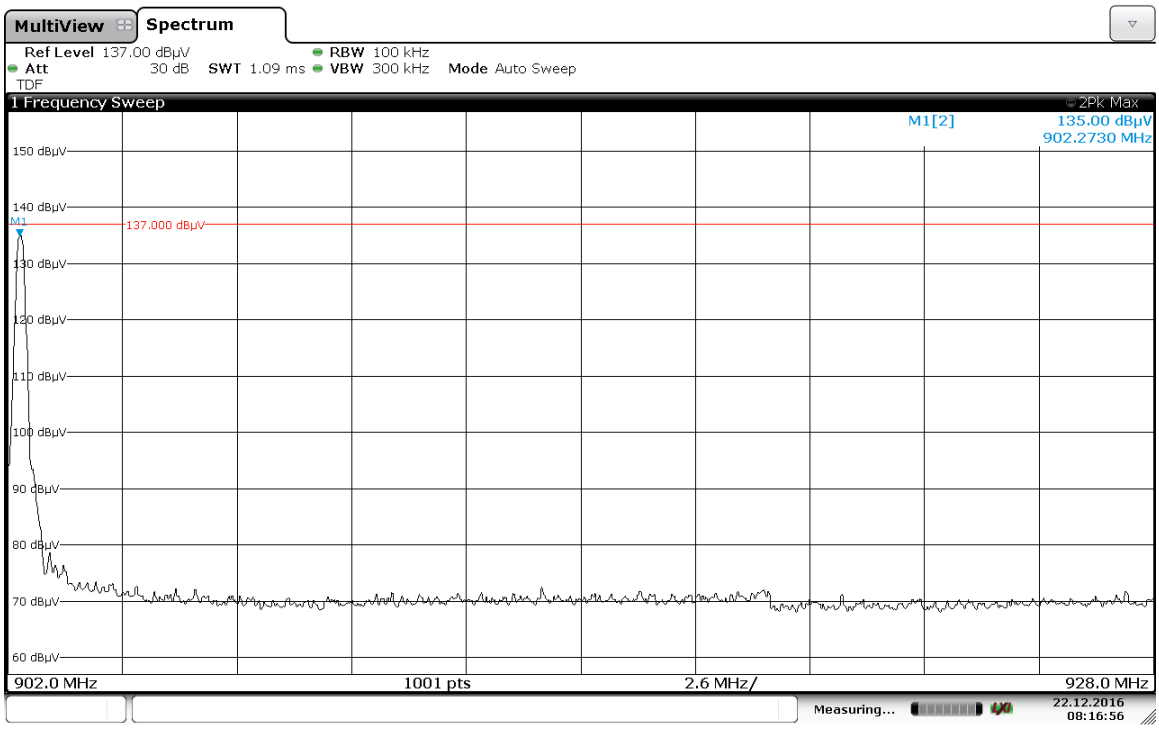
Date: 22.DEC.2016 10:28:03

Tx-1 High-Channel Band Edge Emissions



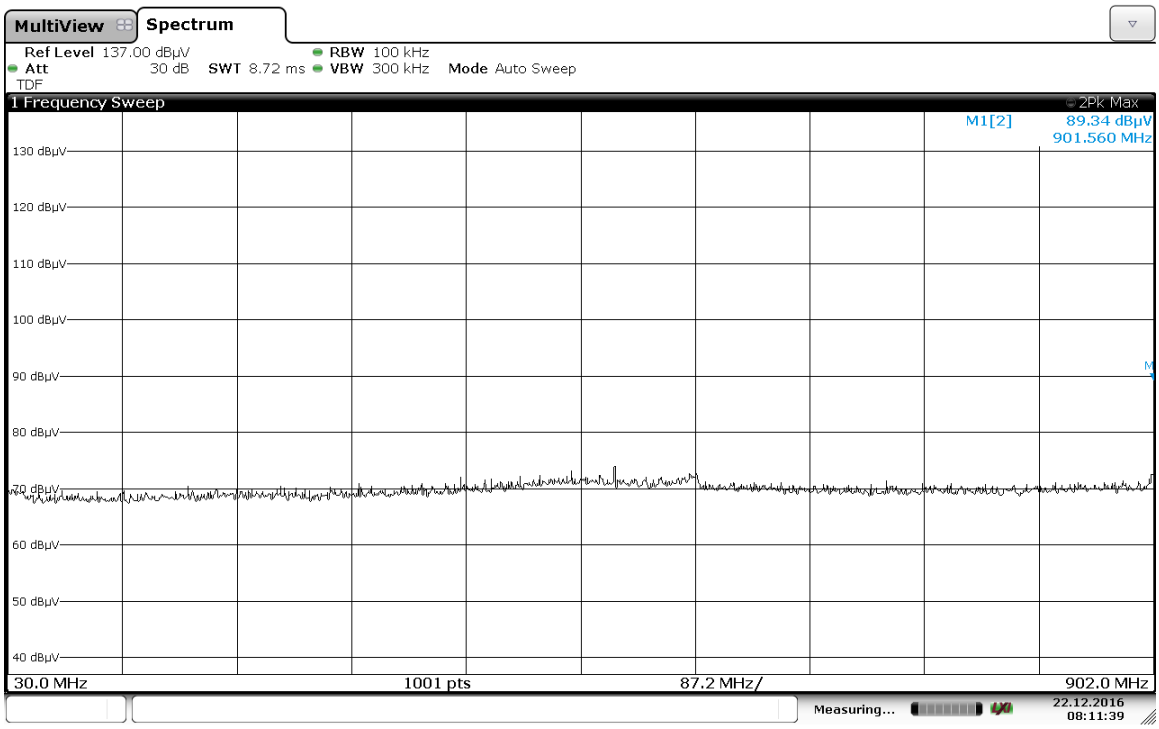
Date: 22.DEC.2016 10:29:59

Tx-2 Low Channel In-Band Emissions



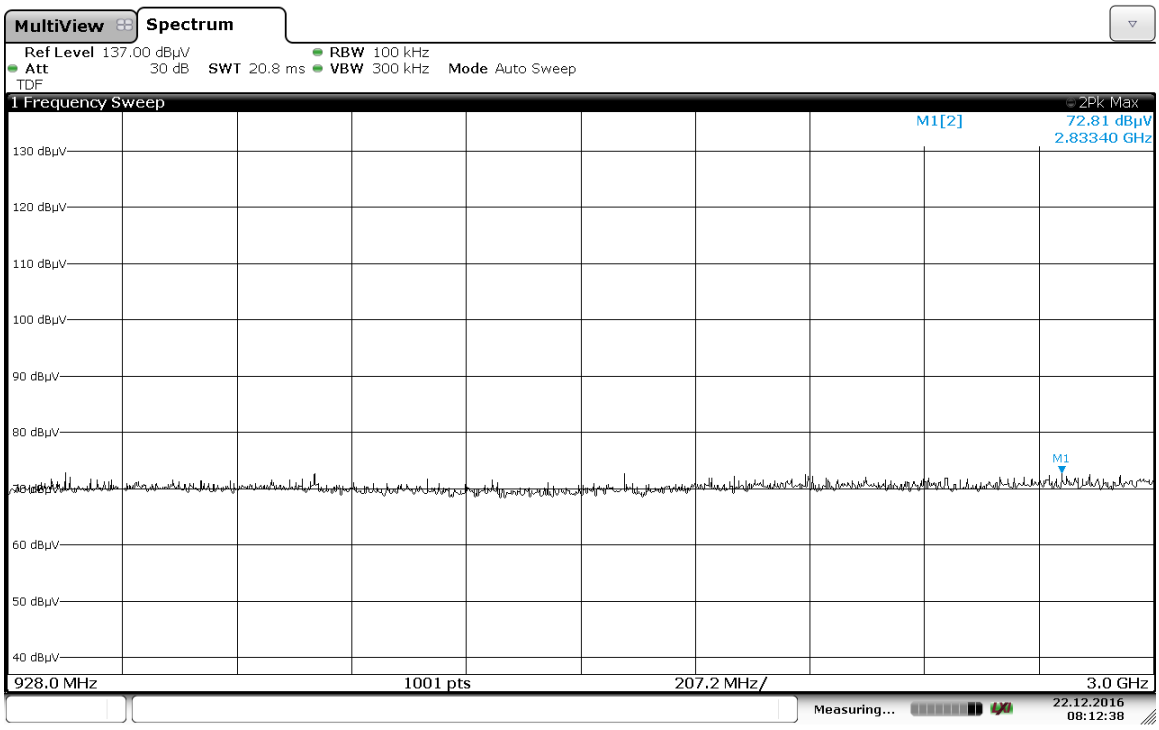
Date: 22.DEC.2016 08:16:55

Tx-2 Low Channel Out of Band Emissions 30 MHz – 902 MHz



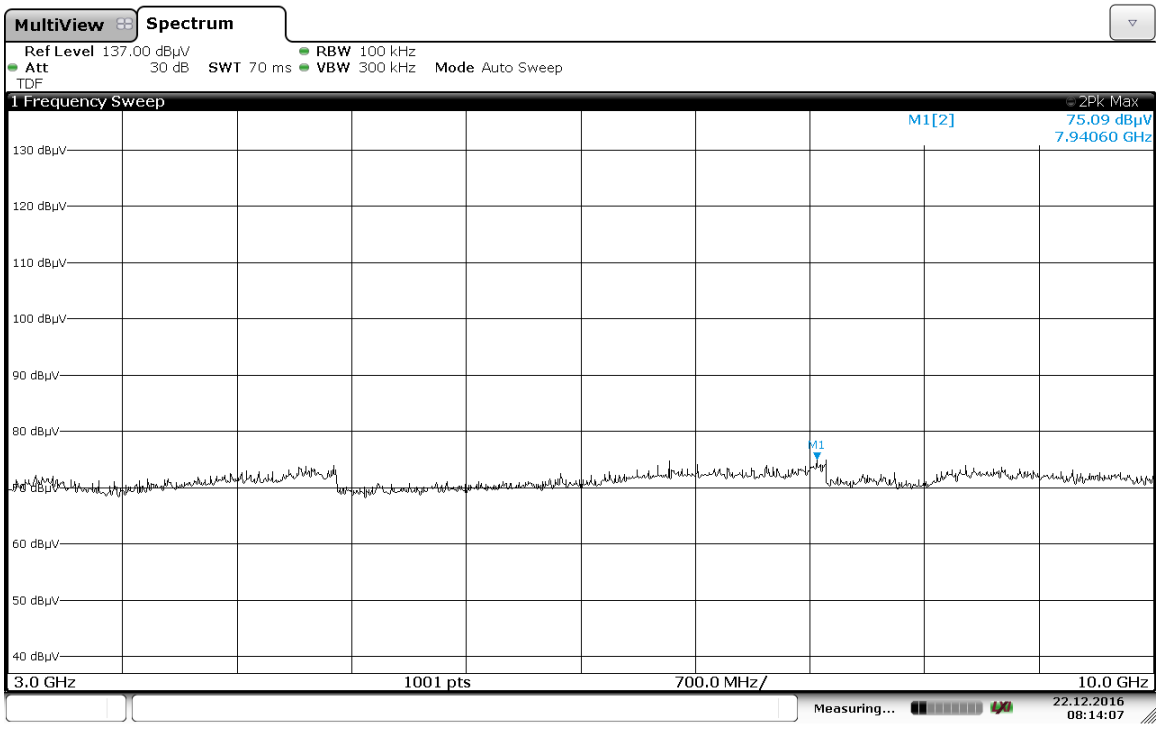
Date: 22.DEC.2016 08:11:40

Tx-2 Low Channel Out of Band Emissions 928 MHz – 3 GHz



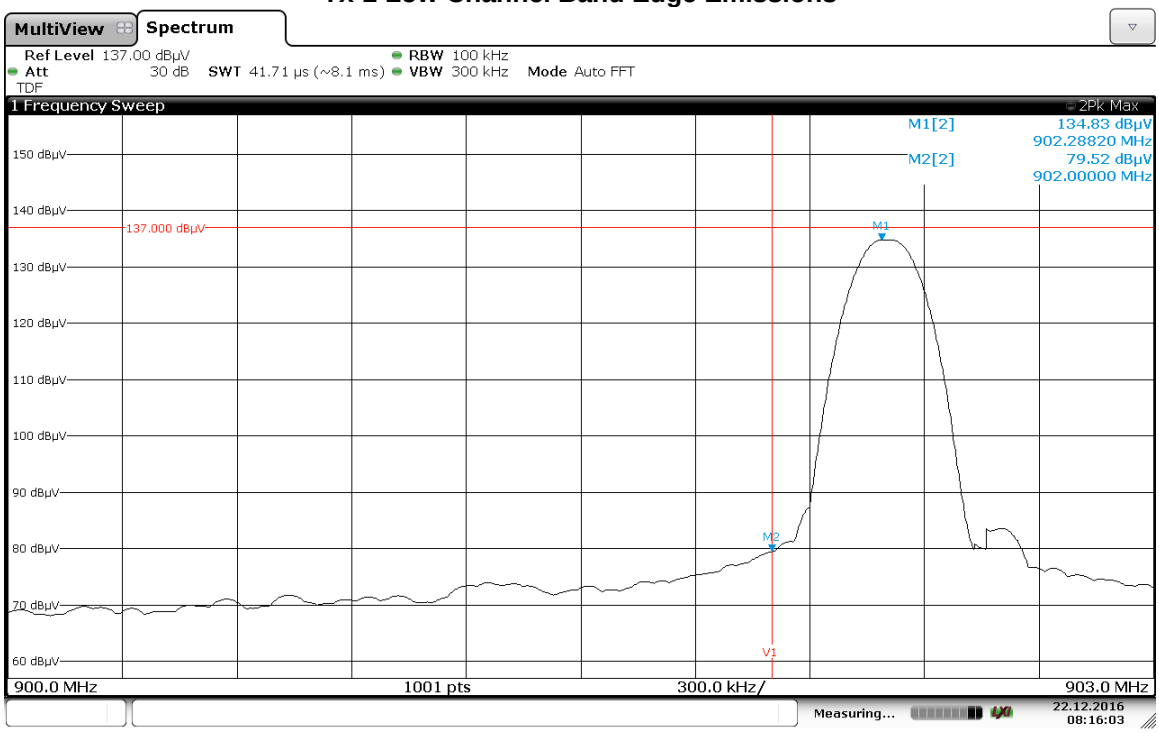
Date: 22.DEC.2016 08:12:38

Tx-2 Low Channel Out of Band Emissions 3 GHz – 10 GHz



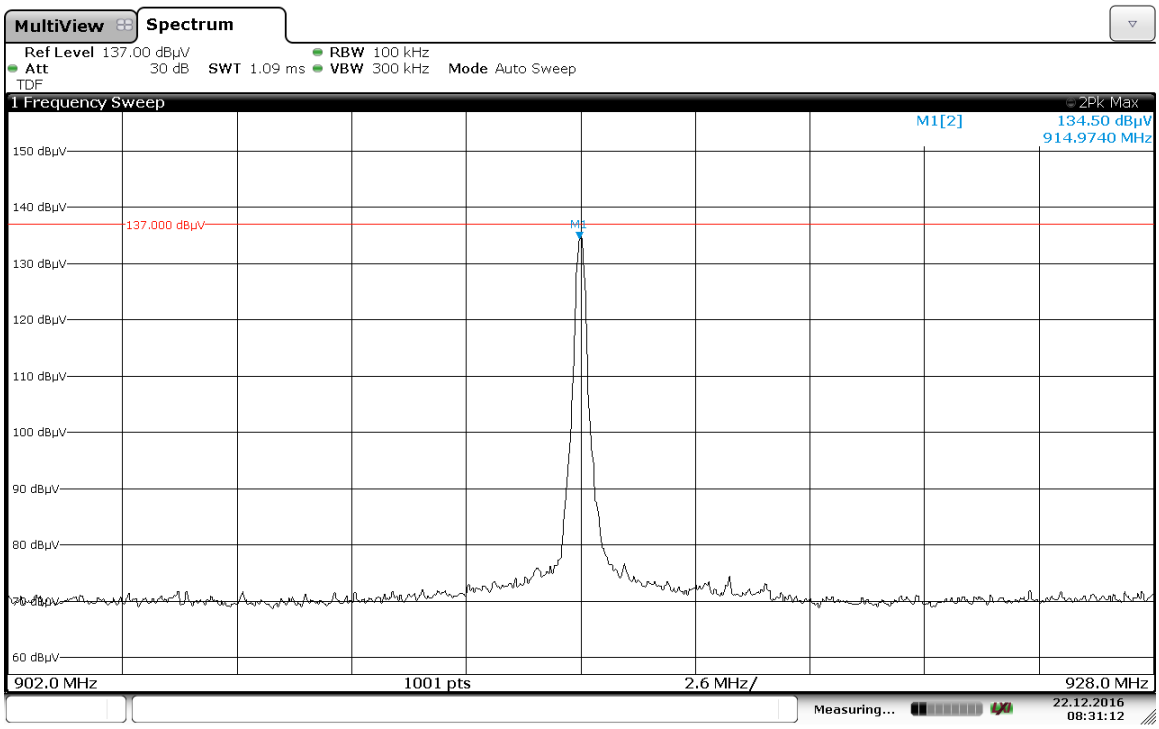
Date: 22.DEC.2016 08:14:07

Tx-2 Low Channel Band Edge Emissions



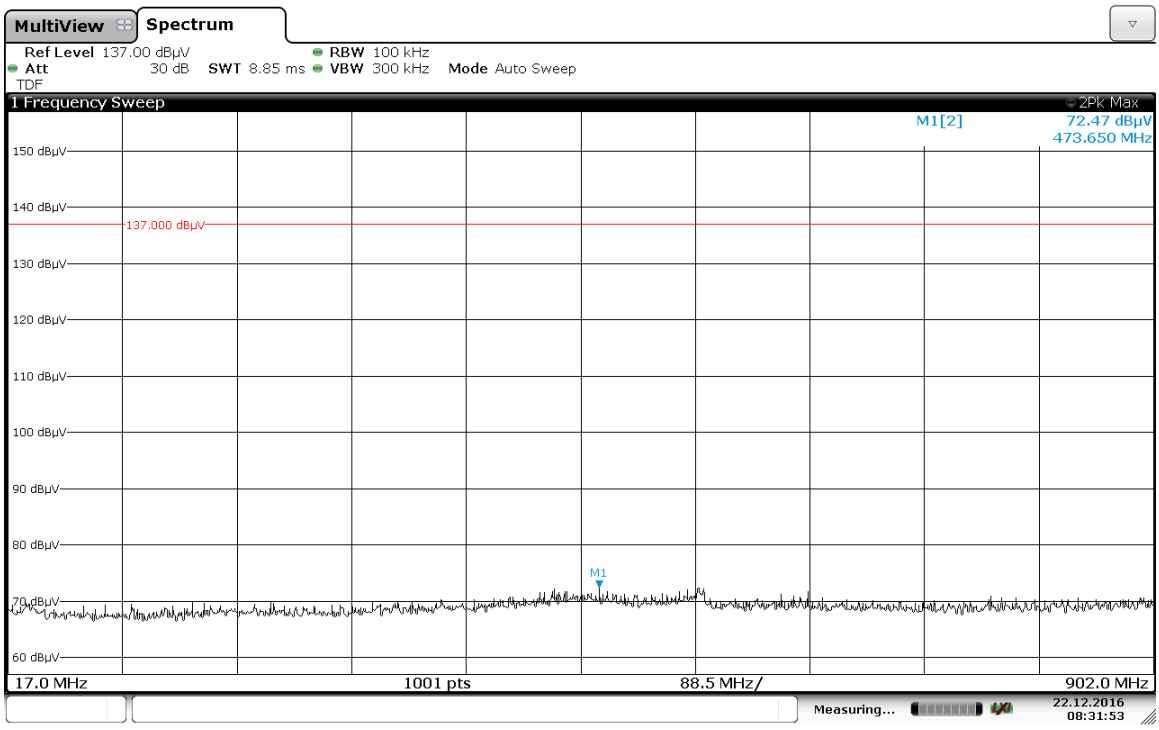
Date: 22.DEC.2016 08:16:03

Tx-2 Mid Channel In-Band Emissions



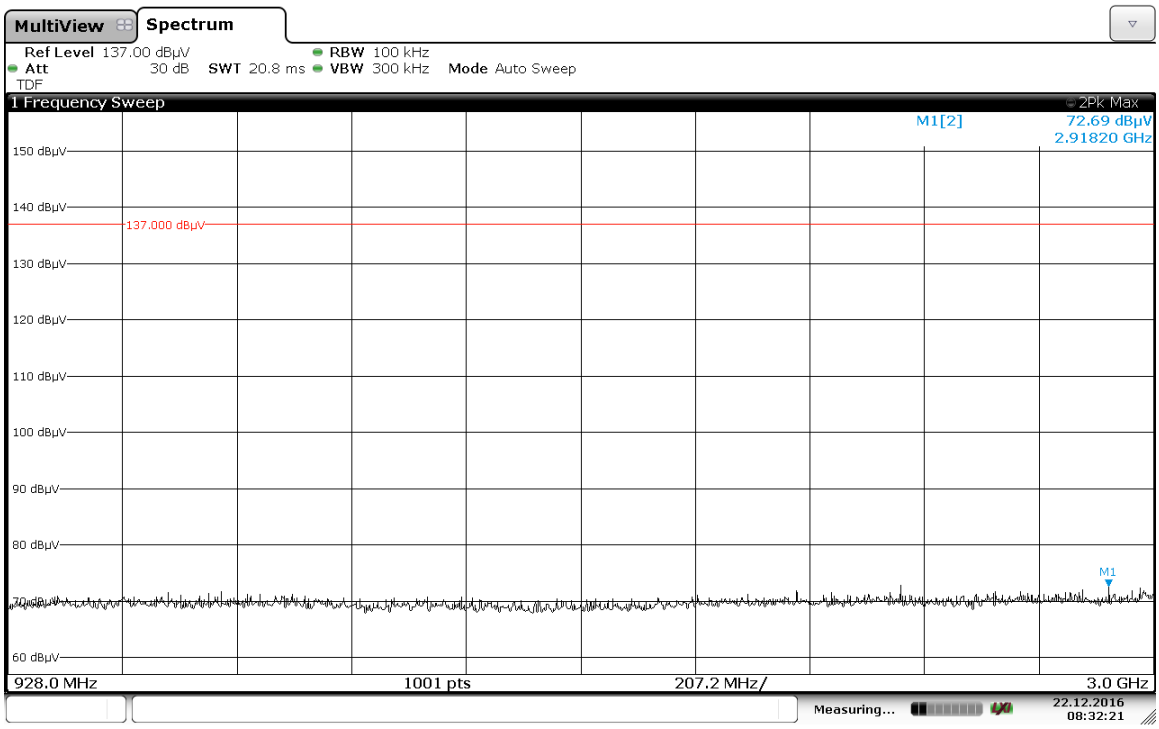
Date: 22.DEC.2016 08:31:11

Tx-2 Mid Channel Out of Band Emissions 30 MHz – 902 MHz



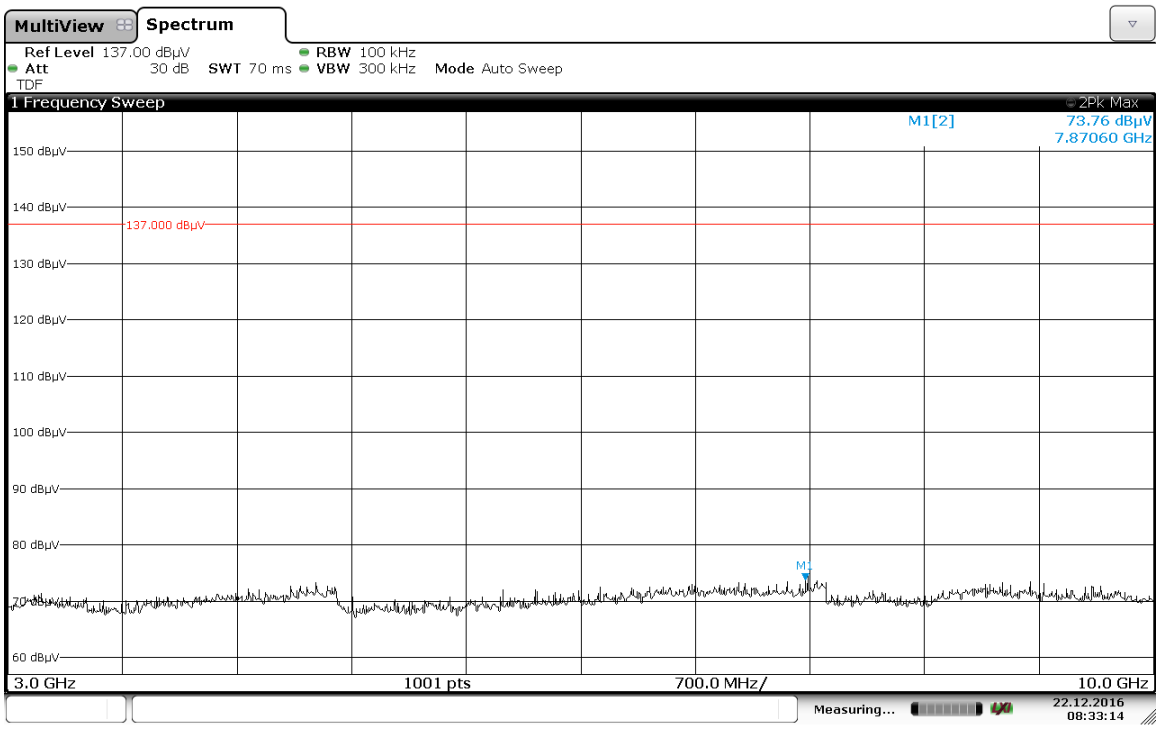
Date: 22.DEC.2016 08:31:53

Tx-2 Mid Channel Out of Band Emissions 928 MHz – 3 GHz



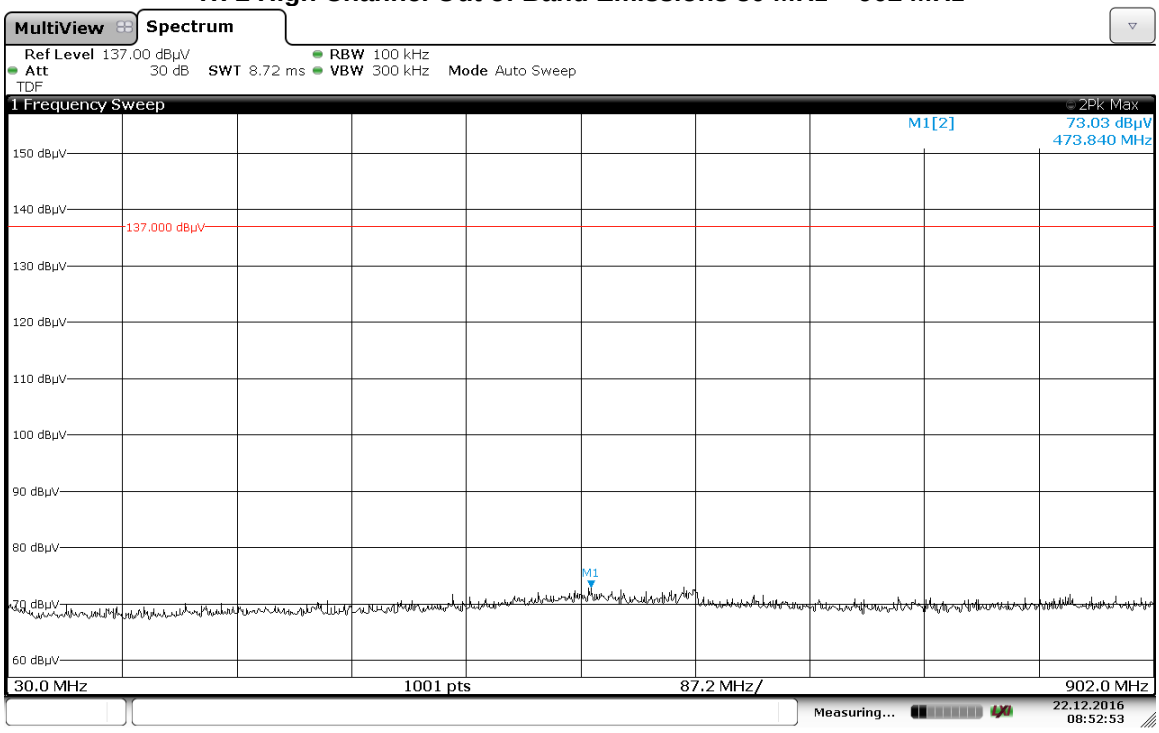
Date: 22.DEC.2016 08:32:21

Tx-2 Mid Channel Out of Band Emissions 3 GHz – 10 GHz



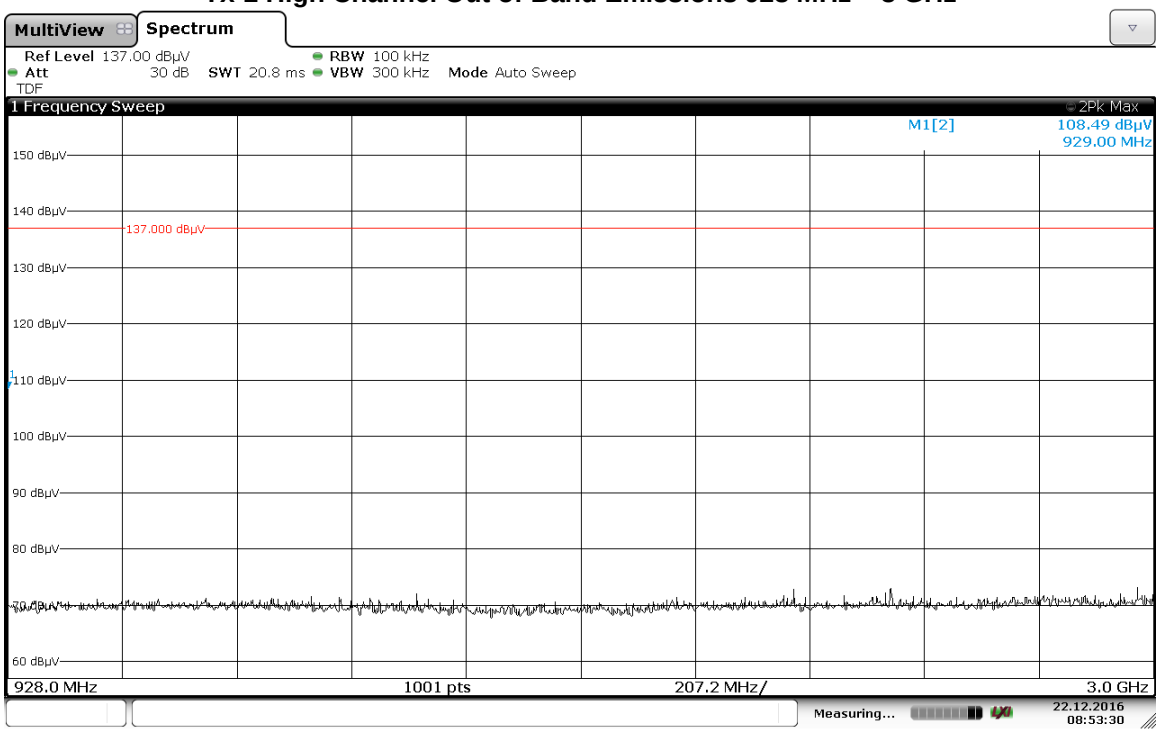
Date: 22.DEC.2016 08:33:13

Tx-2 High Channel Out of Band Emissions 30 MHz – 902 MHz



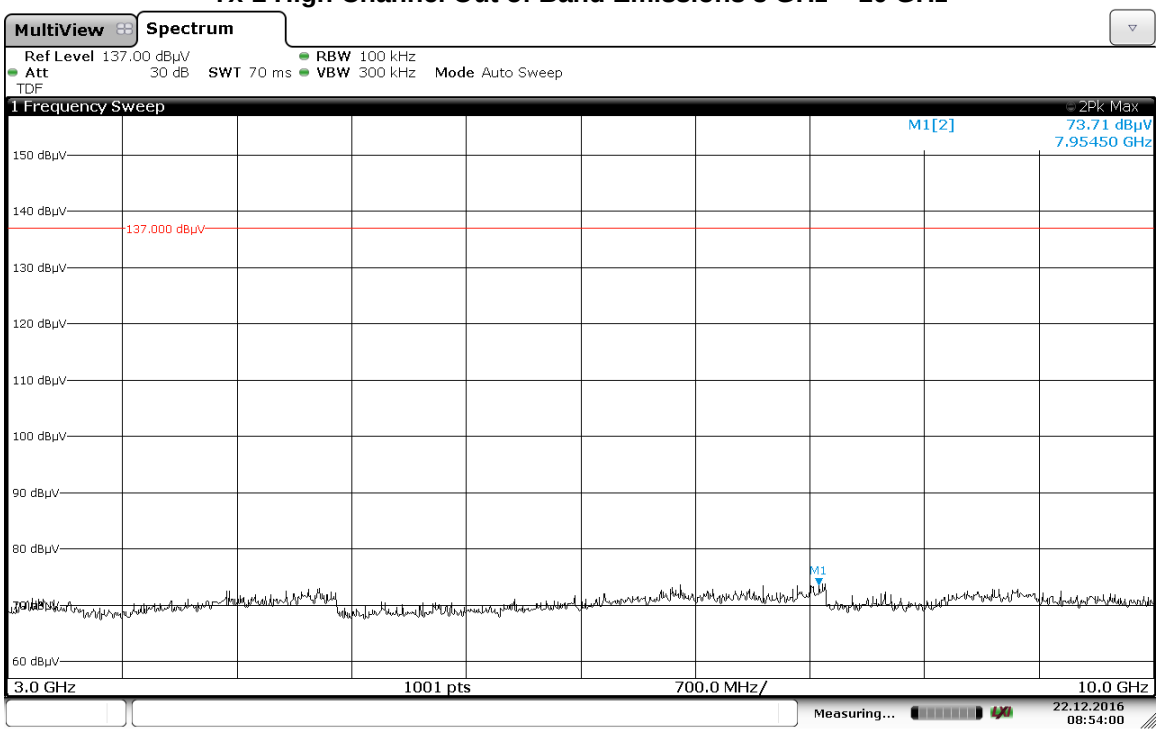
Date: 22.DEC.2016 08:52:53

Tx-2 High Channel Out of Band Emissions 928 MHz – 3 GHz



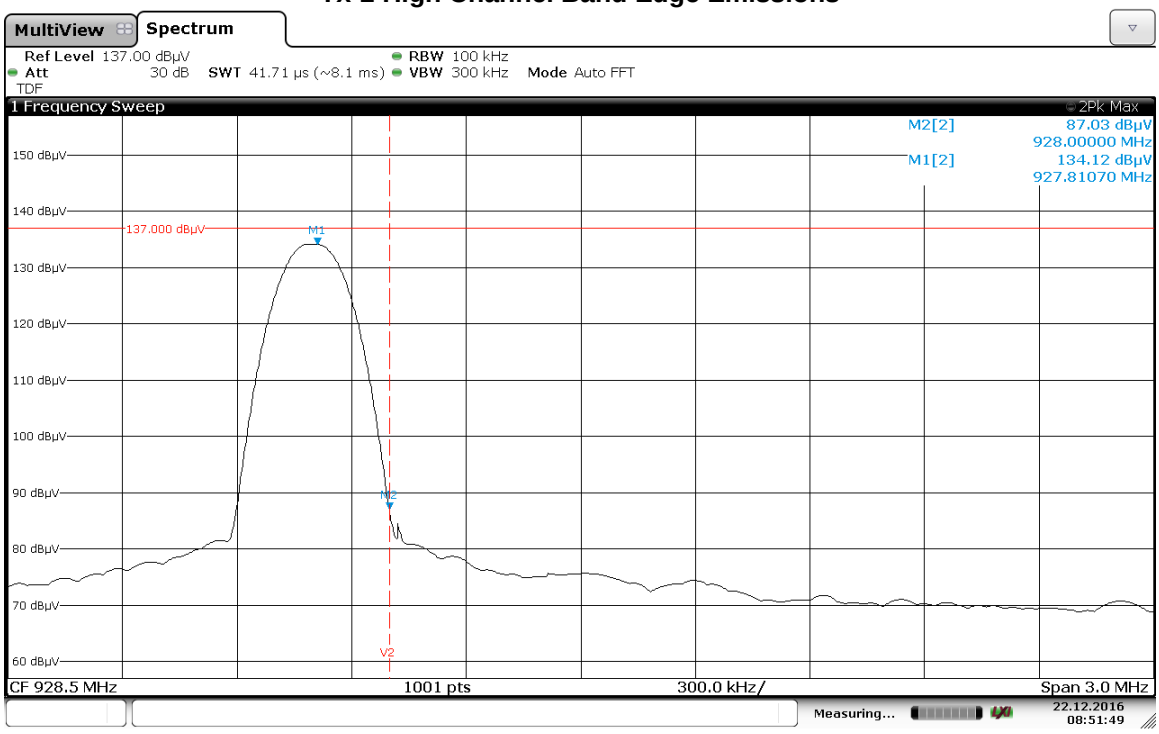
Date: 22.DEC.2016 08:53:30

Tx-2 High Channel Out of Band Emissions 3 GHz – 10 GHz



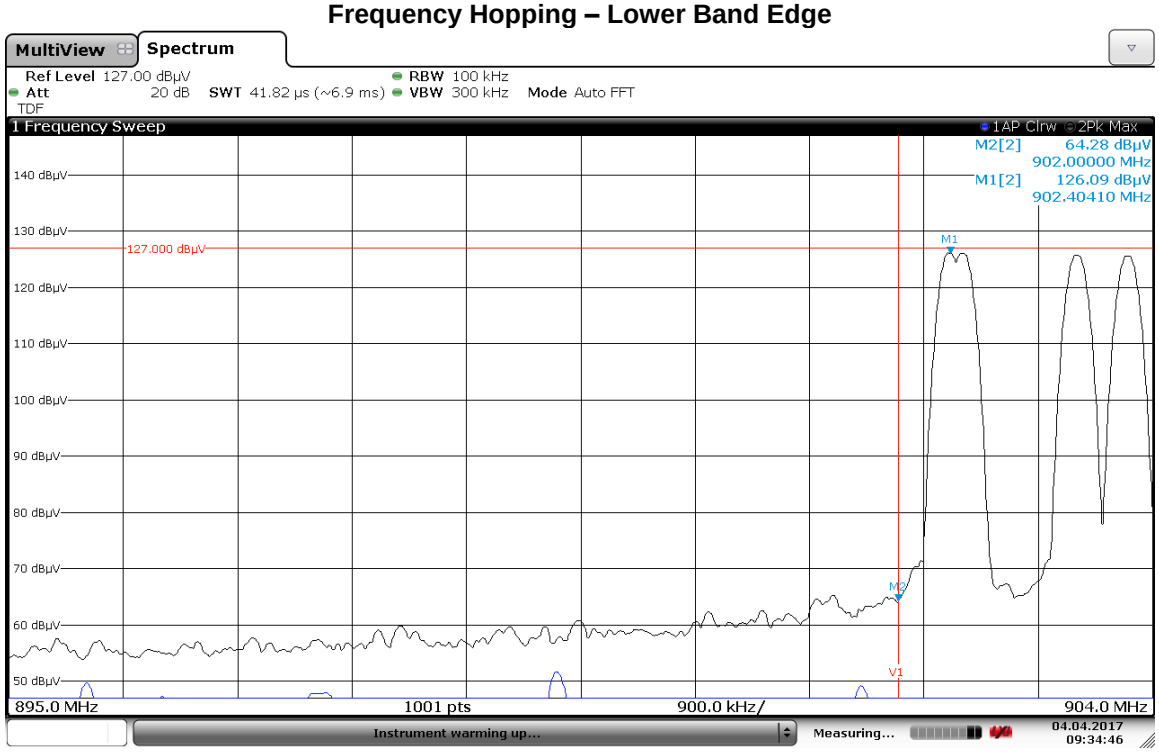
Date: 22.DEC.2016 08:53:59

Tx-2 High Channel Band Edge Emissions

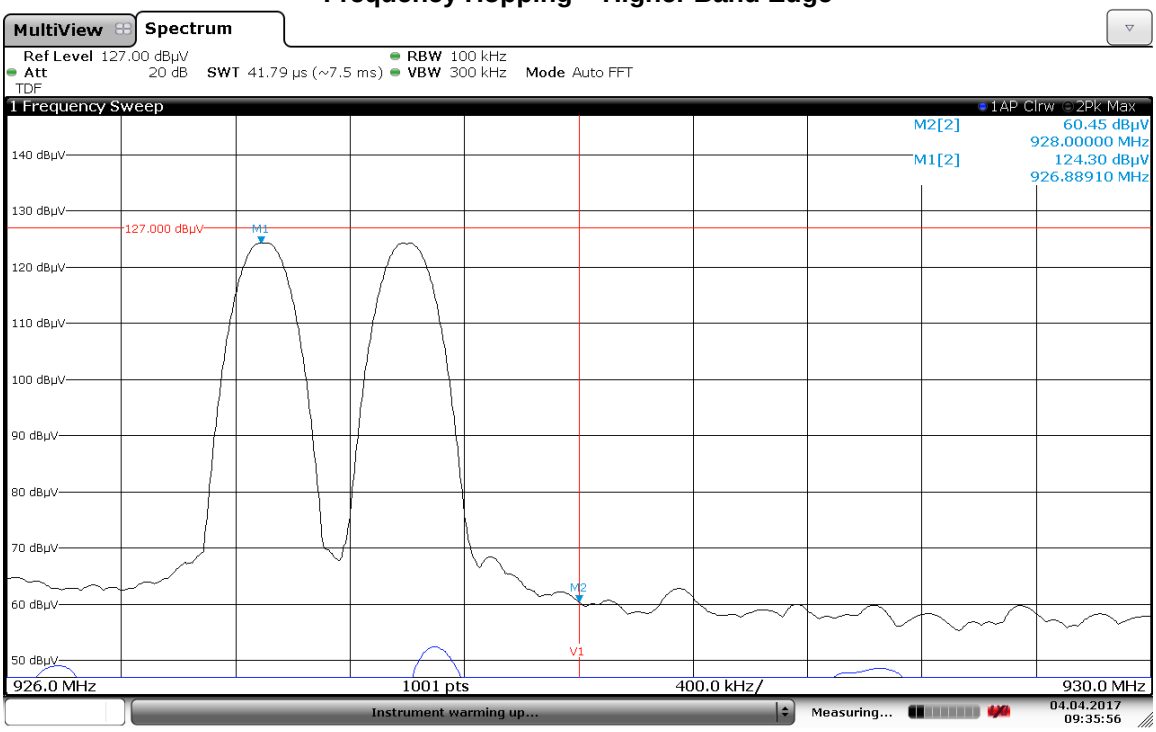


Date: 22.DEC.2016 08:51:48

Frequency Hopping – Lower Band Edge



Frequency Hopping – Higher Band Edge



Test Personnel:	Naga Suryadevara N.S	Test Date:	12/22/2016
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC 15.247 RSS 247	Limit Applied:	As specified in section 8.3
Input Voltage:	Internal Battery		
Pretest Verification w/ Ambient Signals or BB Source:	Yes- Signal Generator	Ambient Temperature:	22 ºC
		Relative Humidity:	18 %
		Atmospheric Pressure:	1003 mbars

9 Number of Hopping Frequencies

9.1 Method

Tests are performed in accordance with FCC Part 15 Subpart C (15.247) and RSS 247.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 380, and 440 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

9.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001'	Weather Station	Davis Instruments	7400	PE80519A61	11/28/2016	11/28/2017
CBLHF2012-2M-1'	2m 9kHz-40GHz Coaxial Cable - SET1	Huber & Suhner	SF102	252675001	02/05/2015	02/05/2016
WEI18'	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017
WEI8'	Attenuator	Weinschel Corp	47-10-34	BD8309	03/30/2016	03/30/2017
ROS005'	ETSI Test System	Rhode & Schwartz	TS8997	N/A	09/15/2016	09/15/2017

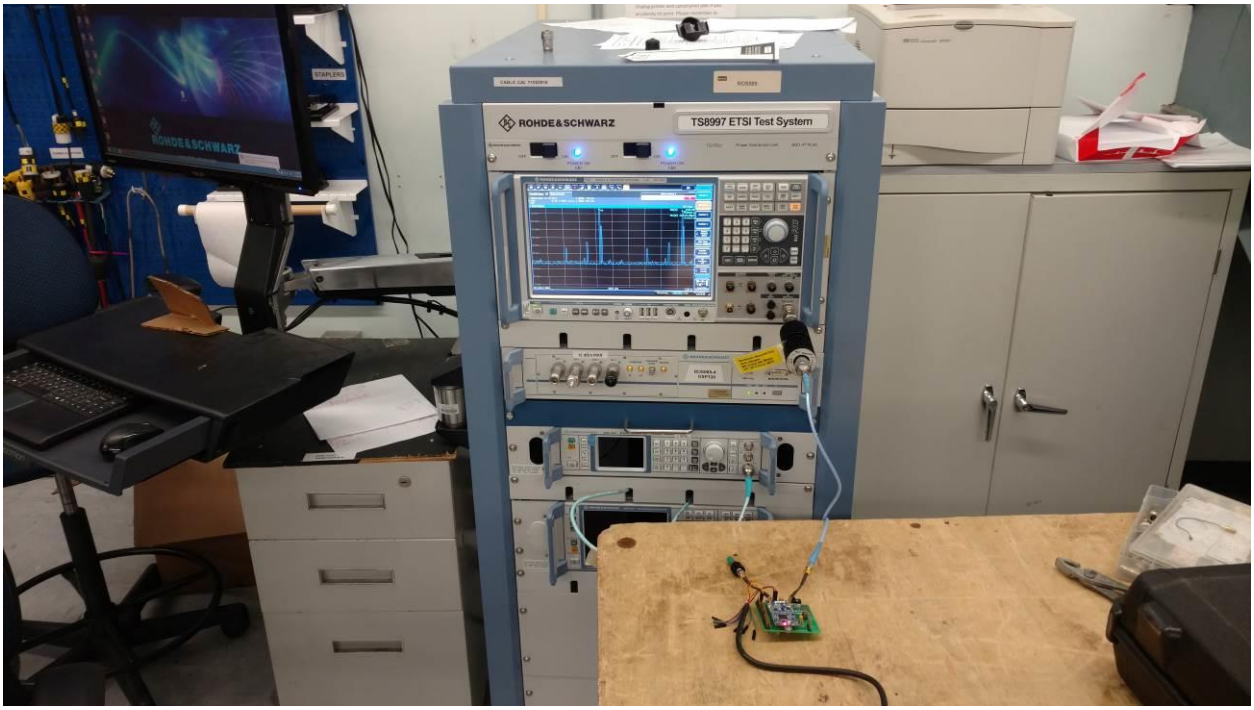
Software Utilized:

Name	Manufacturer	Version
None		

9.3 Results:

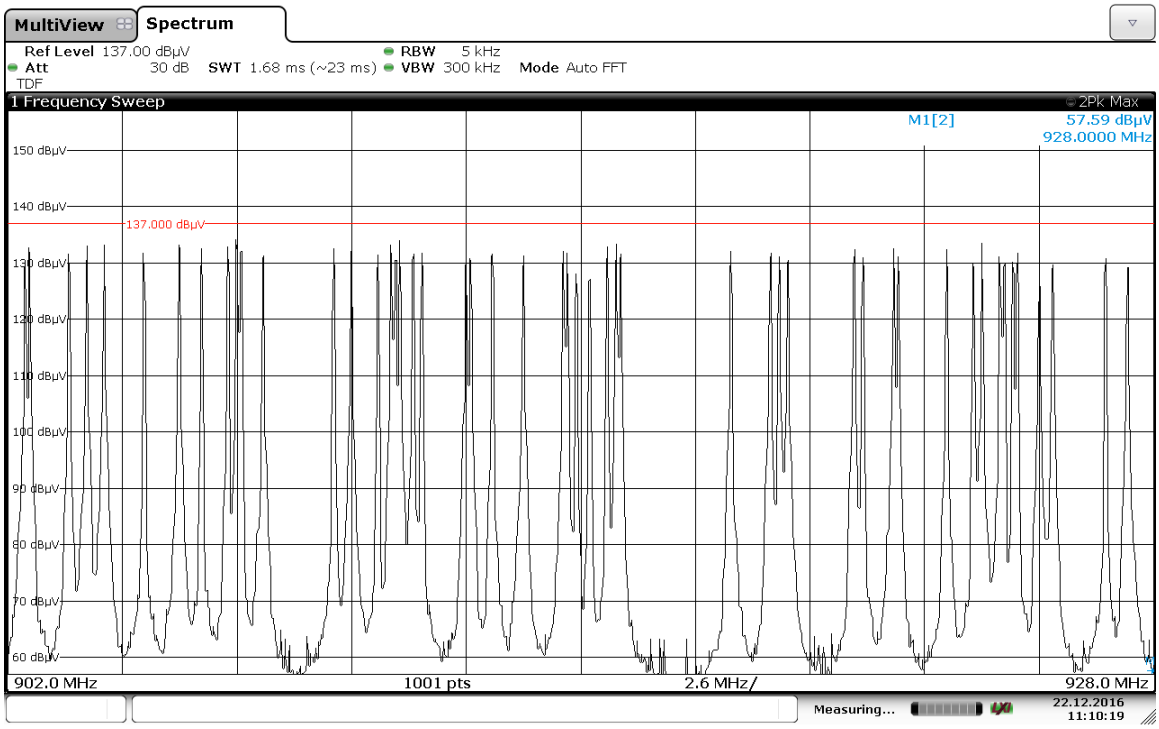
The sample tested was foundto Comply. The system uses 50 hopping channels which is the minimum requirement for modules with 20 dB bandwidth less than 250 kHz.

9.4 Setup Photograph:



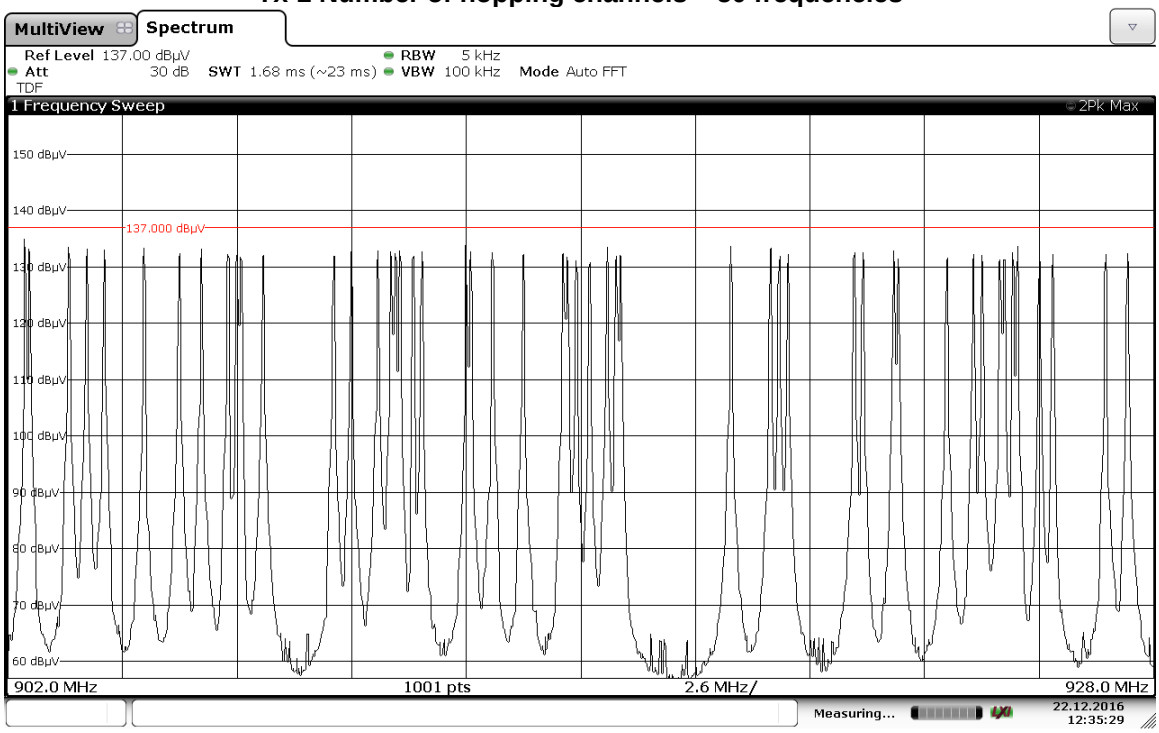
9.5 Plots/Data

Tx-1 Number of hopping channels – 50 frequencies



Date: 22.DEC.2016 11:10:18

Tx-2 Number of hopping channels – 50 frequencies



Date: 22.DEC.2016 12:35:29

Test Personnel:	Naga Suryadevara N·S	Test Date:	12/22/2016
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC 15.247 RSS 247	Limit Applied:	As specified in section 9.3
Input Voltage:	Internal Battery		
Pretest Verification w/ Ambient Signals or BB Source:	Yes- Signal Generator	Ambient Temperature:	22 ºC
		Relative Humidity:	18 %
		Atmospheric Pressure:	1003 mbars

10 Channel Separation

10.1 Method

Tests are performed in accordance with FCC Part 15 Subpart C (15.247) and RSS 247.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 380, and 440 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

10.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001'	Weather Station	Davis Instruments	7400	PE80519A61	11/28/2016	11/28/2017
CBLHF2012-2M-1'	2m 9kHz-40GHz Coaxial Cable - SET1	Huber & Suhner	SF102	252675001	02/05/2015	02/05/2016
WEI18'	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017
WEI8'	Attenuator	Weinschel Corp	47-10-34	BD8309	03/30/2016	03/30/2017
ROS005'	ETSI Test System	Rhode & Schwartz	TS8997	N/A	09/15/2016	09/15/2017

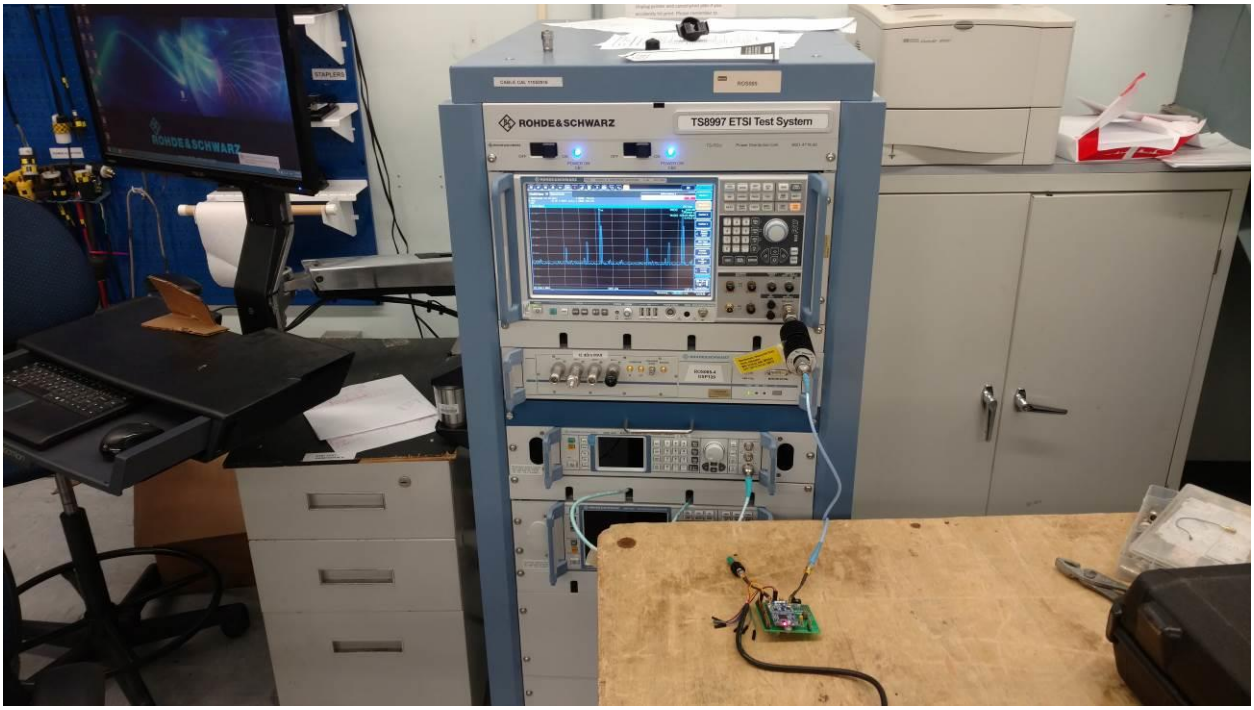
Software Utilized:

Name	Manufacturer	Version
None		

10.3 Results:

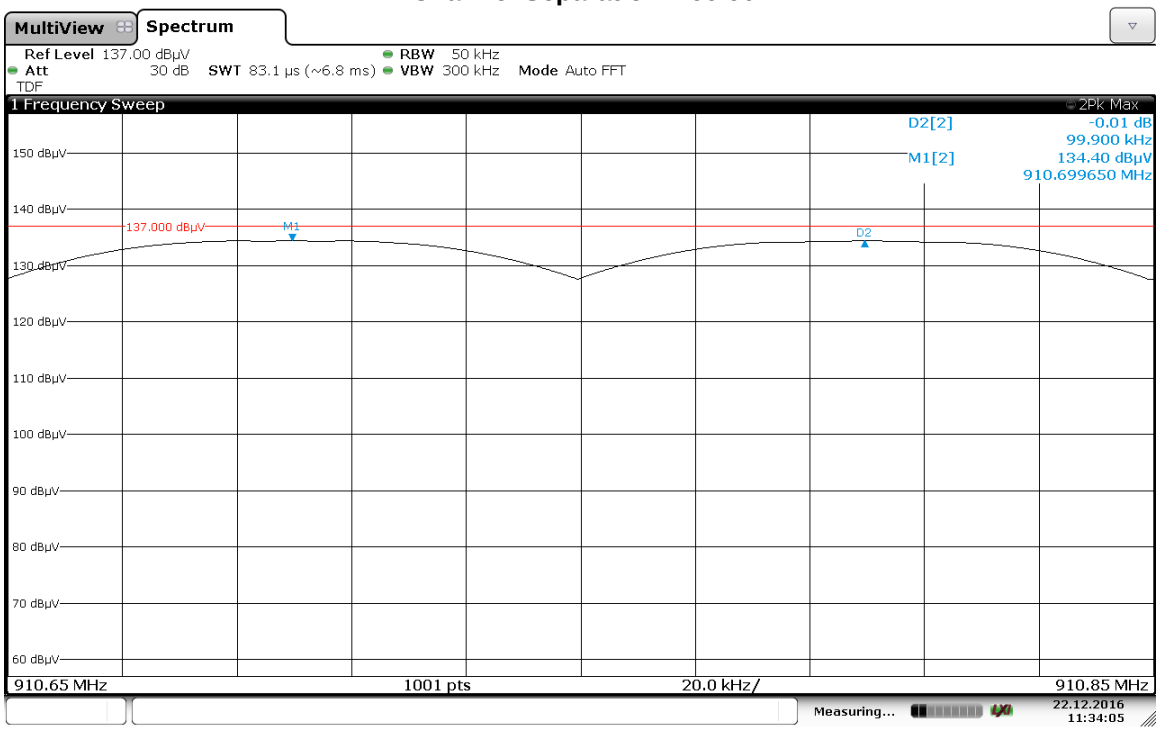
The sample tested was found to Comply. Channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

10.4 Setup Photograph:



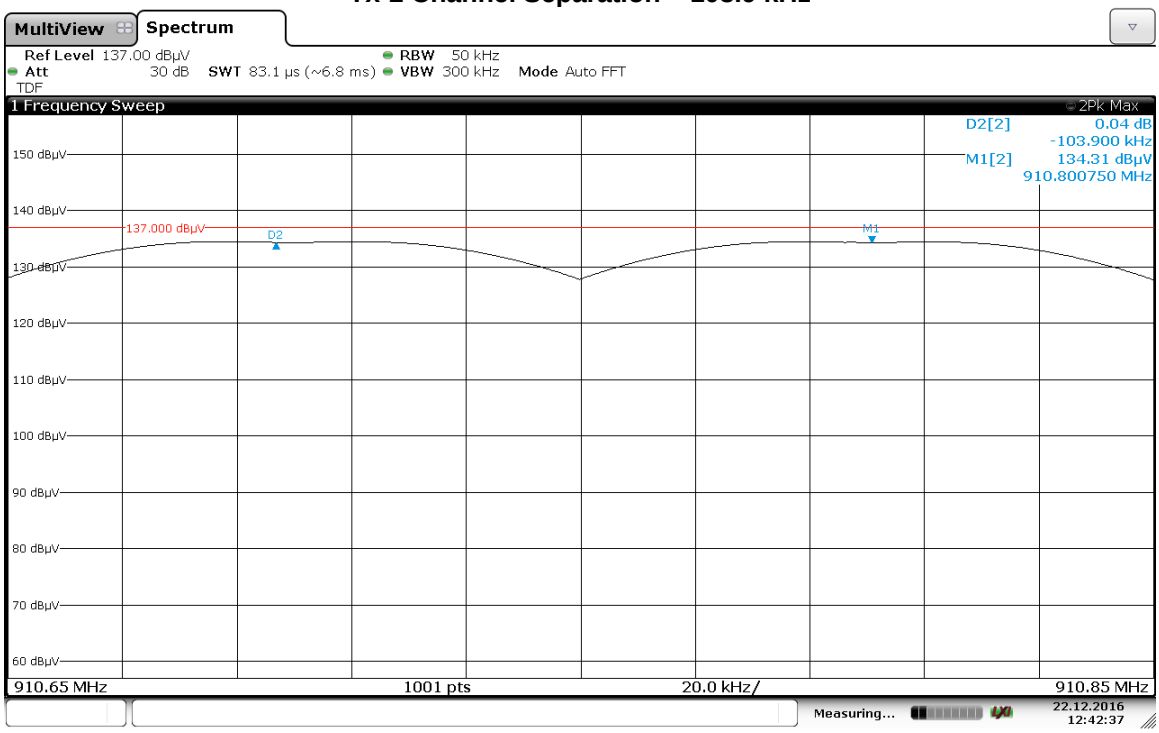
10.5 Plots/Data

Tx-1 Channel Separation – 99.90 kHz



Date: 22.DEC.2016 11:34:05

Tx-2 Channel Separation – 103.9 kHz



Date: 22.DEC.2016 12:42:37

Test Personnel:	Naga Suryadevara N·S	Test Date:	12/22/2016
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC 15.247 RSS 247	Limit Applied:	As specified in section 10.3
Input Voltage:	Internal Battery		
Pretest Verification w/ Ambient Signals or BB Source:	Yes- Signal Generator	Ambient Temperature:	22 ºC
		Relative Humidity:	18 %
		Atmospheric Pressure:	1003 mbars

11 Channel Occupancy Time

11.1 Method

Tests are performed in accordance with FCC Part 15 Subpart C (15.247) and RSS 247.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 380, and 440 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

11.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001'	Weather Station	Davis Instruments	7400	PE80519A61	11/28/2016	11/28/2017
CBLHF2012-2M-1'	2m 9kHz-40GHz Coaxial Cable - SET1	Huber & Suhner	SF102	252675001	02/05/2015	02/05/2016
WEI18'	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017
WEI8'	Attenuator	Weinschel Corp	47-10-34	BD8309	03/30/2016	03/30/2017
ROS005'	ETSI Test System	Rhode & Schwartz	TS8997	N/A	09/15/2016	09/15/2017

Software Utilized:

Name	Manufacturer	Version
None		

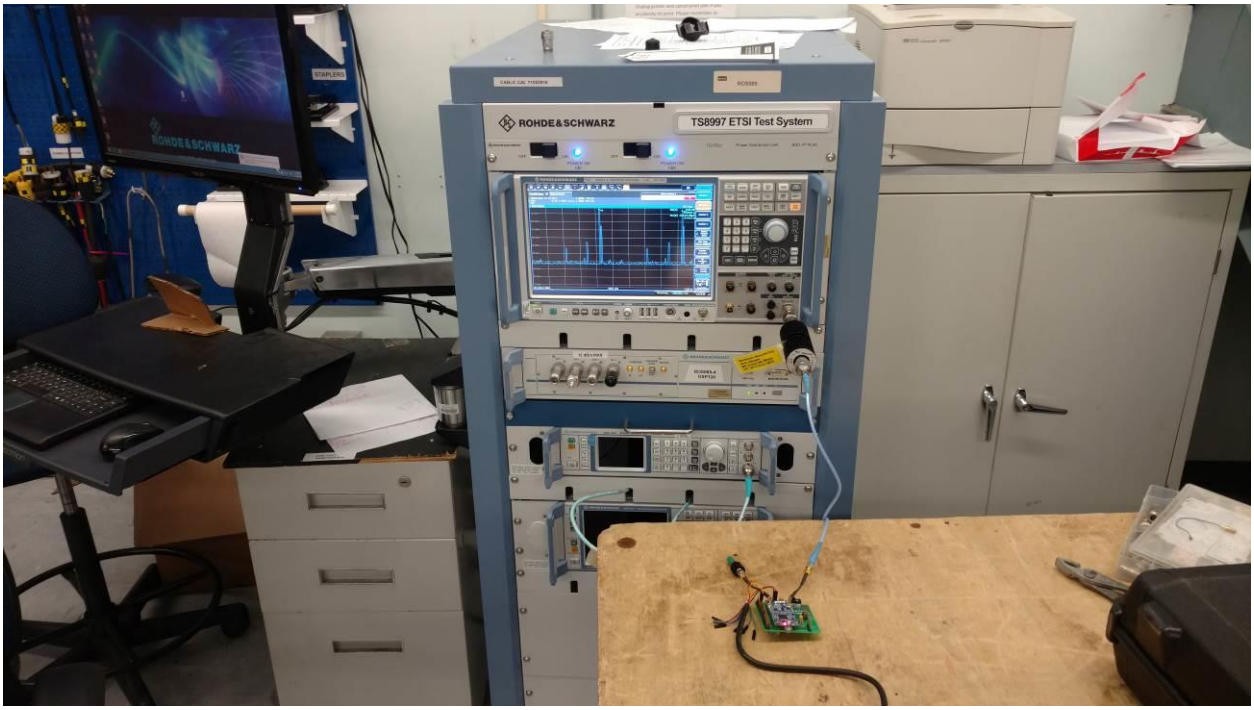
11.3 Results:

The sample tested was found to Comply. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

Tx -1 Channel Occupancy time = 43.65*4 = 174.6 ms = 0.1746 seconds

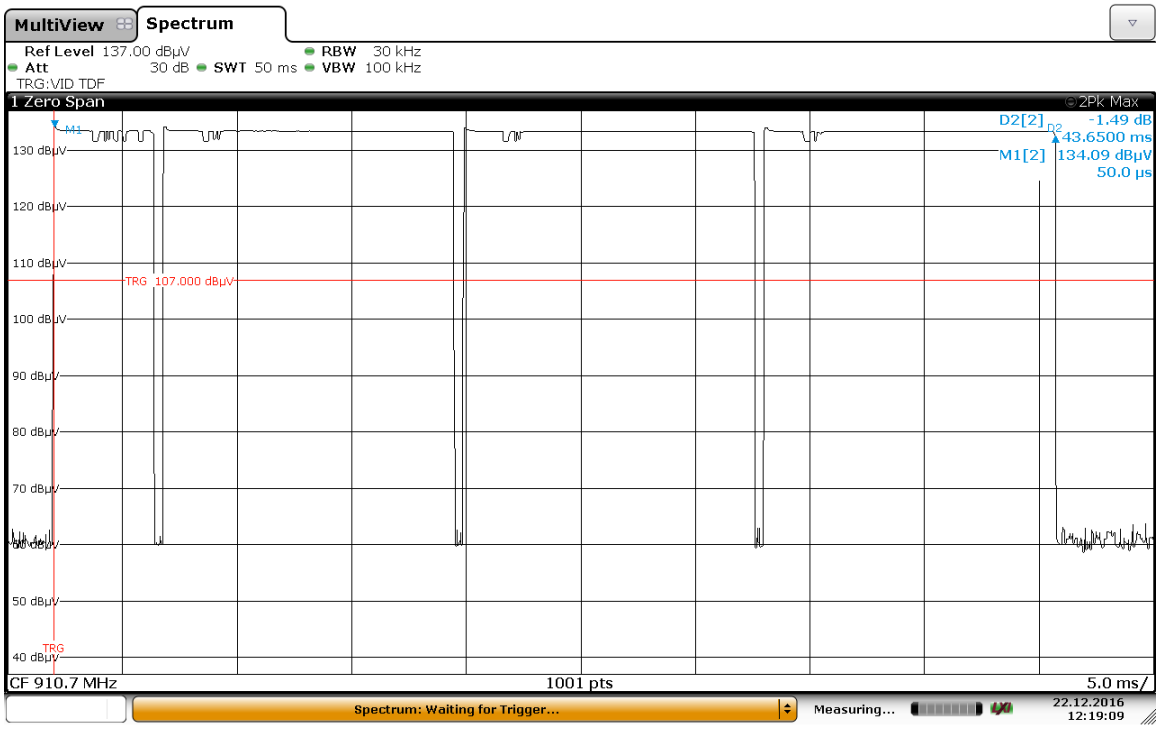
Tx -2 Channel Occupancy time = 43.65*4 = 174.6 ms = 0.1746 seconds

11.4 Setup Photograph:



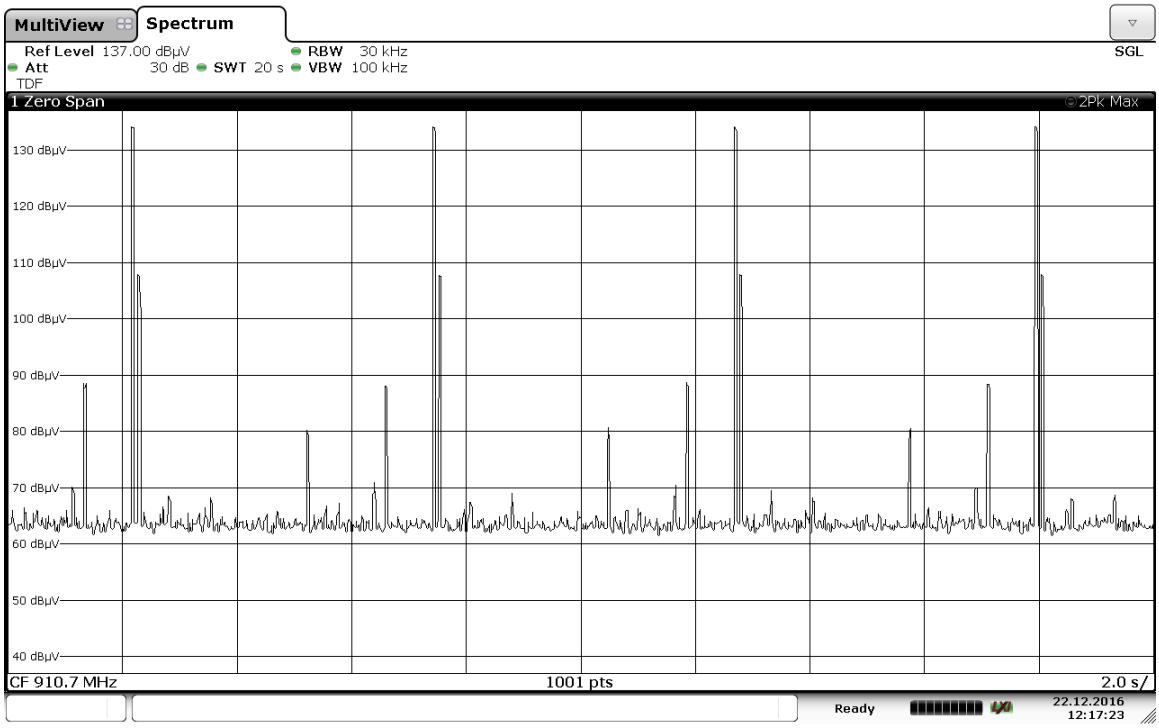
11.5 Plots/Data

Tx -1 Dwell time - 43.65 ms



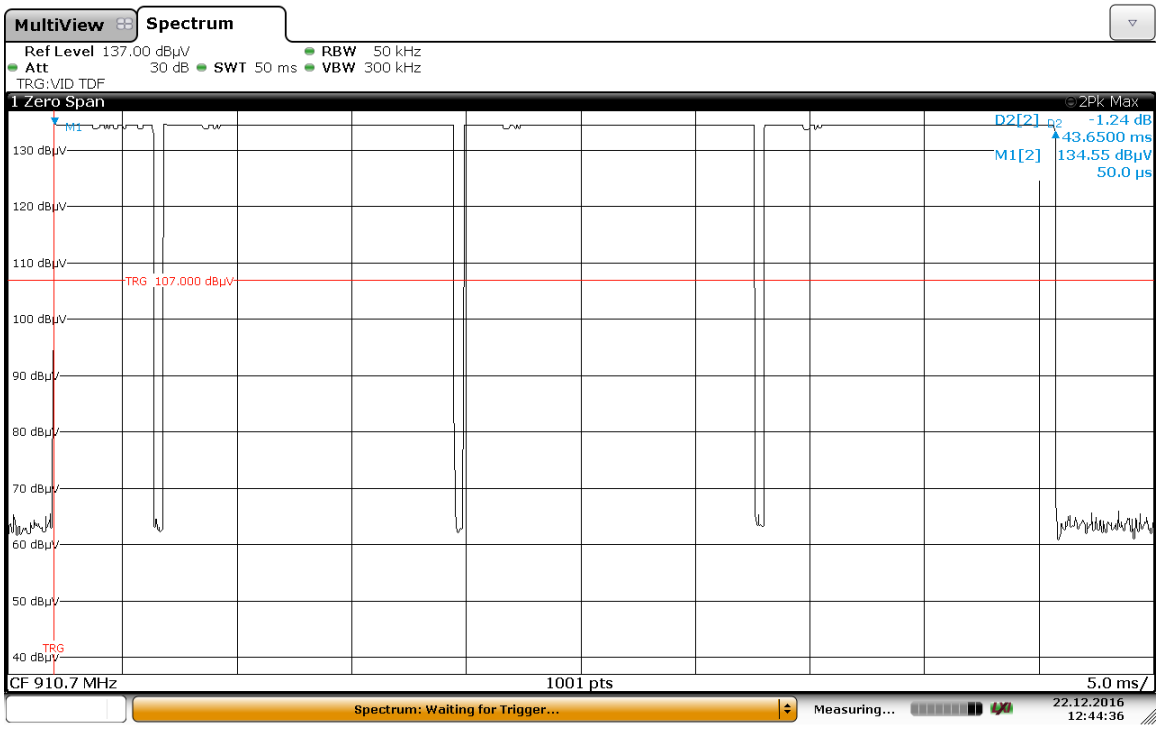
Date: 22.DEC.2016 12:19:08

Tx -1 Number of Bursts in a 20 Second period – 4 bursts



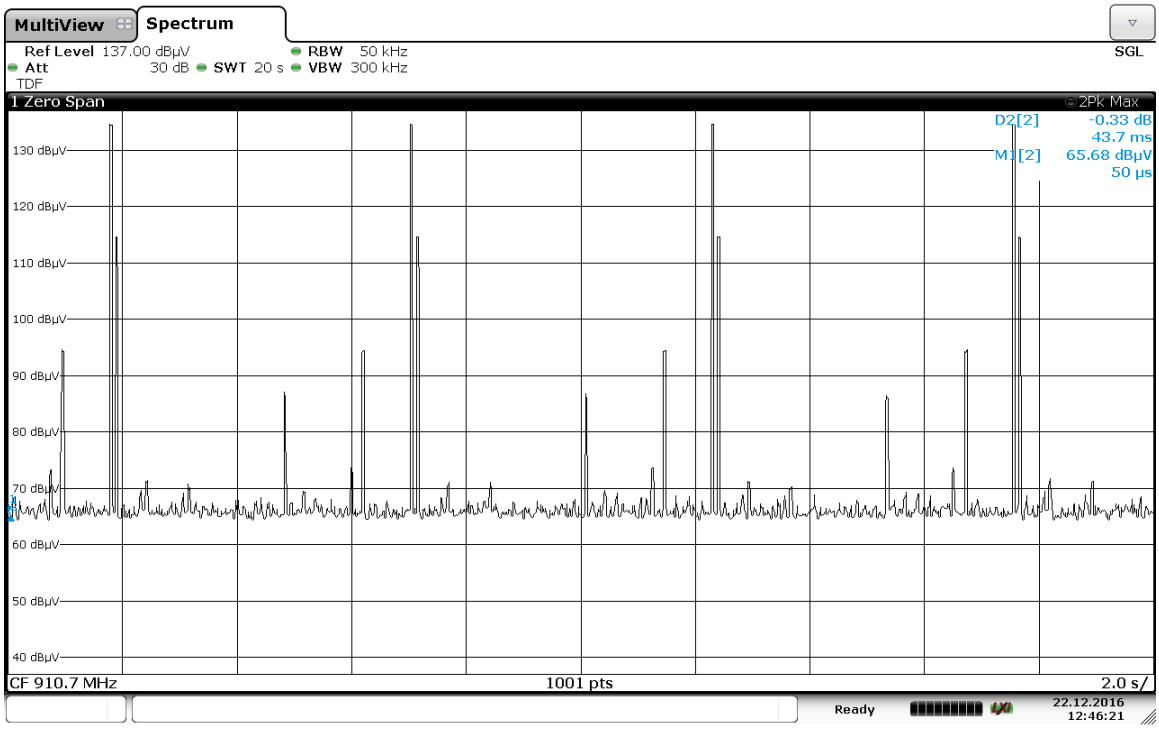
Date: 22.DEC.2016 12:17:23

Tx-2 Dwell time – 43.65 ms



Date: 22.DEC.2016 12:44:35

Tx -1 Number of Bursts in a 20 Second period – 4 bursts



Date: 22.DEC.2016 12:46:21

Test Personnel:	Naga Suryadevara N·S	Test Date:	12/22/2016
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC 15.247 RSS 247	Limit Applied:	As specified in section 11.3
Input Voltage:	Internal Battery		
Pretest Verification w/ Ambient Signals or BB Source:	Yes- Signal Generator	Ambient Temperature:	22 ºC
		Relative Humidity:	18 %
		Atmospheric Pressure:	1003 mbars

12 Transmitter Spurious Emissions

12.1 Method

Tests are performed in accordance with FCC 15.247, FCC 15.209, FCC 15.109, RSS-247, ICES-003, ANSI C63.4:2014, and ANSI C63.10:2013.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.6 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	5.3 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.5 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.2 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	5.0 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	5.0 dB	5.5 dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG
Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

Example:

FS = RA + AF + CF – AG = 52.0 + 7.4 + 1.6 – 29.0 = 32.0
$UF = 10^{(32\ dB\mu V / 20)}$ = 39.8 μV/m

Alternately, when C5 Software is used, the “Level” includes all losses and gains and is compared directly in the “Margin” column to the “Limit”. “AF” is the Antenna Factor; “PA+CL” are Preamp and Cable Loss. These are already accounted for in the “Level” column.

12.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV004'	Weather Station	Davis Instruments	7400	PE80529A61A	05/02/2016	05/02/2017
145-410'	Cables 145-420 145-421 145-422 145-406	Huber + Suhner	10m Track A Cables	multiple	07/30/2016	07/30/2017
145128'	EMI Receiver (20 Hz - 40 Ghz)	Rohde & Schwarz	ESIB 40	839283/001	03/15/2017	03/15/2018
145106'	Bilog Antenna (30MHz - 5GHz)	Sunol Sciences	JB5	A111003	05/03/2016	05/03/2017
145013'	Preamplifier (150 KHz to 1.3 GHz)	Hewlett Packard	8447D	2944A07027	05/02/2016	05/02/2017
145014'	Preamplifier (1 GHz to 26.5 GHz)	Hewlett Packard	8449B	3008A00232	05/27/2016	05/27/2017
FAIR001'	Tunable notch filter 500-1000MHz	Fairview Microwave	SBRF-0500-1000-01-N	DC 1651	03/01/2016	03/01/2017
ETS001'	1-18GHz DRG Horn Antenna	ETS-Lindgren	3117	00143259	02/13/2017	02/13/2018
145-416'	Cables 145-420 145-423 145-424 145-408	Huber + Suhner	3m Track B cables	multiple	07/30/2016	07/30/2017

Software Utilized:

Name	Manufacturer	Version
EMI Boxborough		08/27/2010

12.3 Results:

The sample tested was found to comply.

For emissions in the Restricted Band the device shall meet the emission limits as specified in FCC 15.209.

For emissions in the Non-Restricted Band the emissions shall be attenuated 20dB below the fundamental.

Limit on peak emissions when the device is set to Low Channel @ 3m = 123.04dBuV - 20dB = 103.03 dBuV

@ 10m = 112.59dBuV – 20dB = 92.59 dBuV

Limit on peak emissions when the device is set to mid channel @ 3m = 122.57dBuV - 20dB = 102.57 dBuV

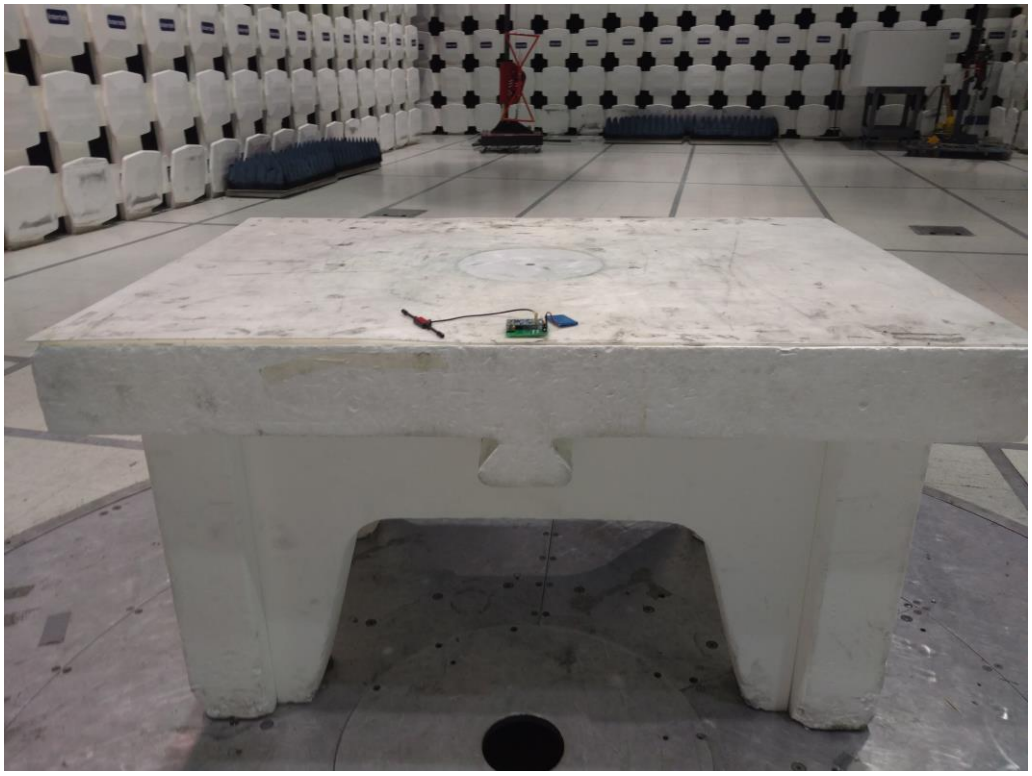
@ 10m = 112.12dBuV – 20dB = 92.12 dBuV

Limit on peak emissions when the device is set to high channel @ 3m = 122.41 dBuV - 20dB = 102.41 dBuV

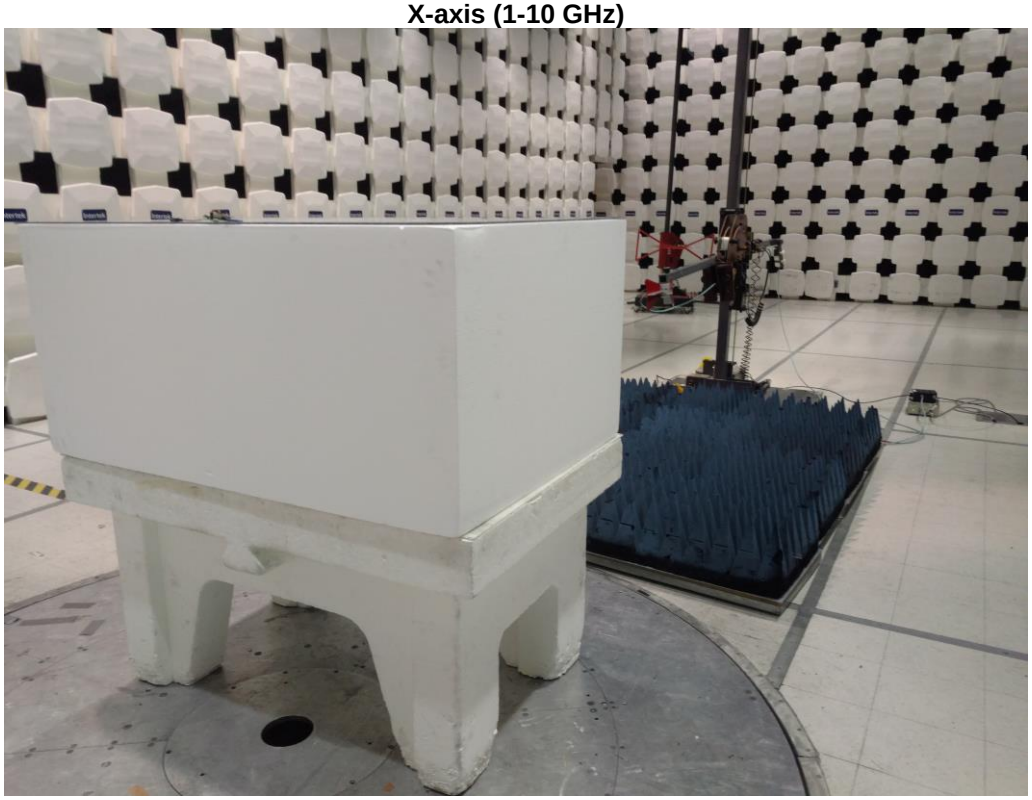
@ 10m = 111.96 – 20dB = 91.96 dBuV

12.4 Setup Photographs:

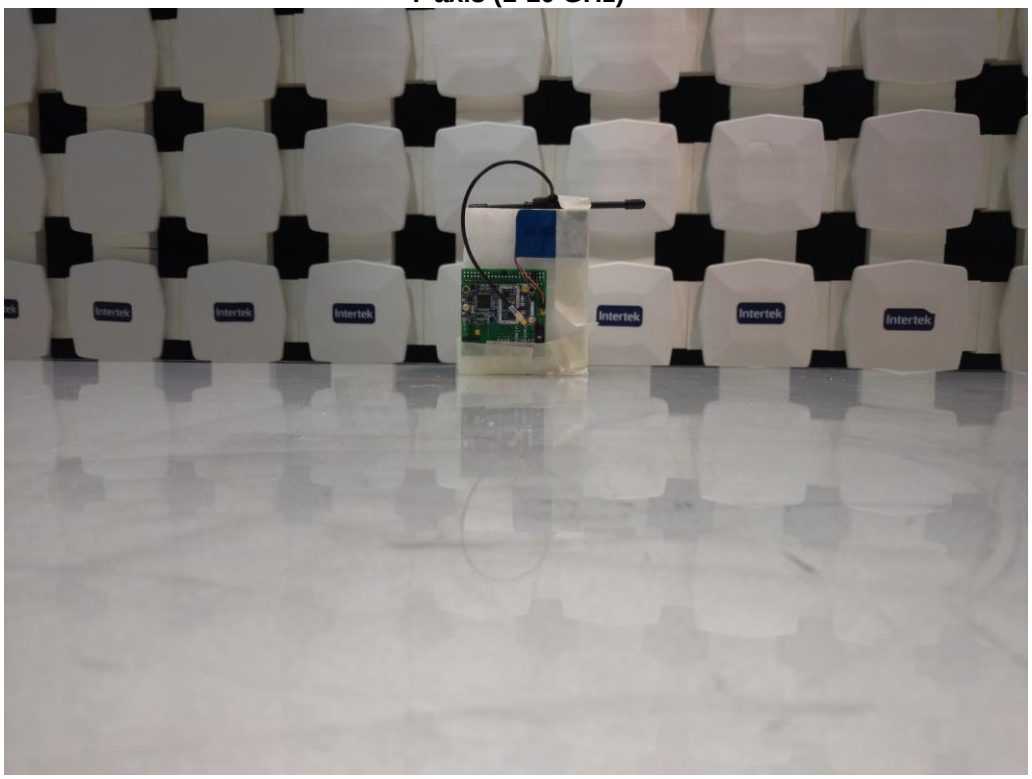
30-1000 MHz



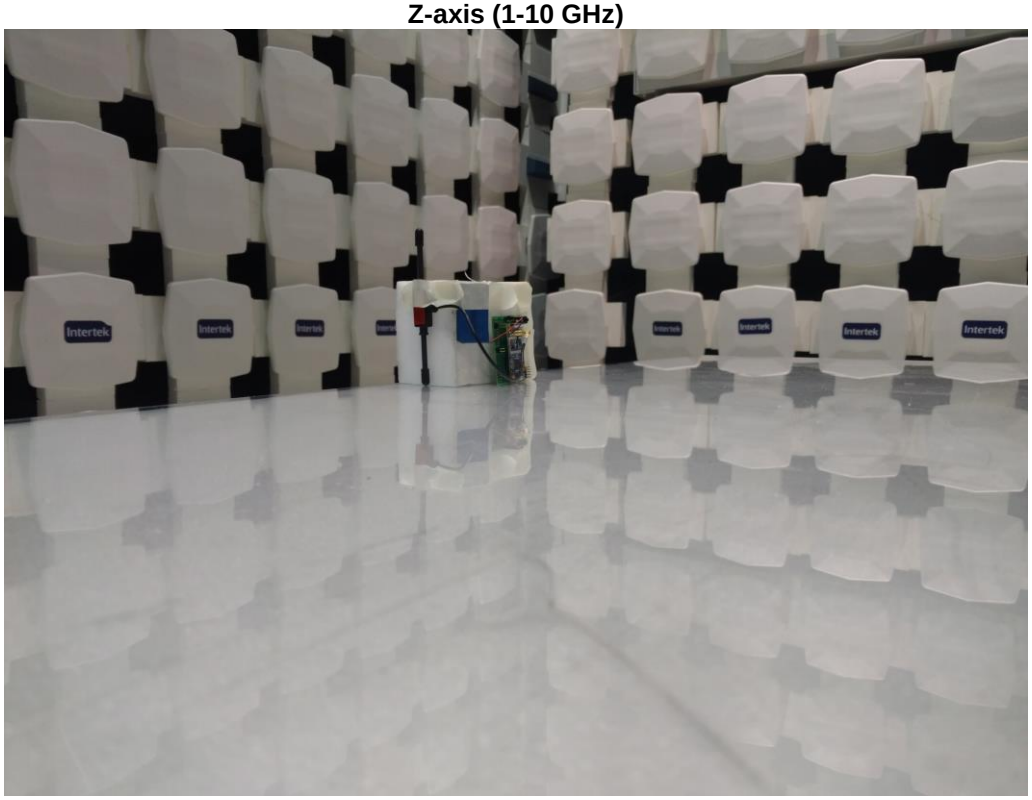
X-axis (1-10 GHz)



Y-axis (1-10 GHz)

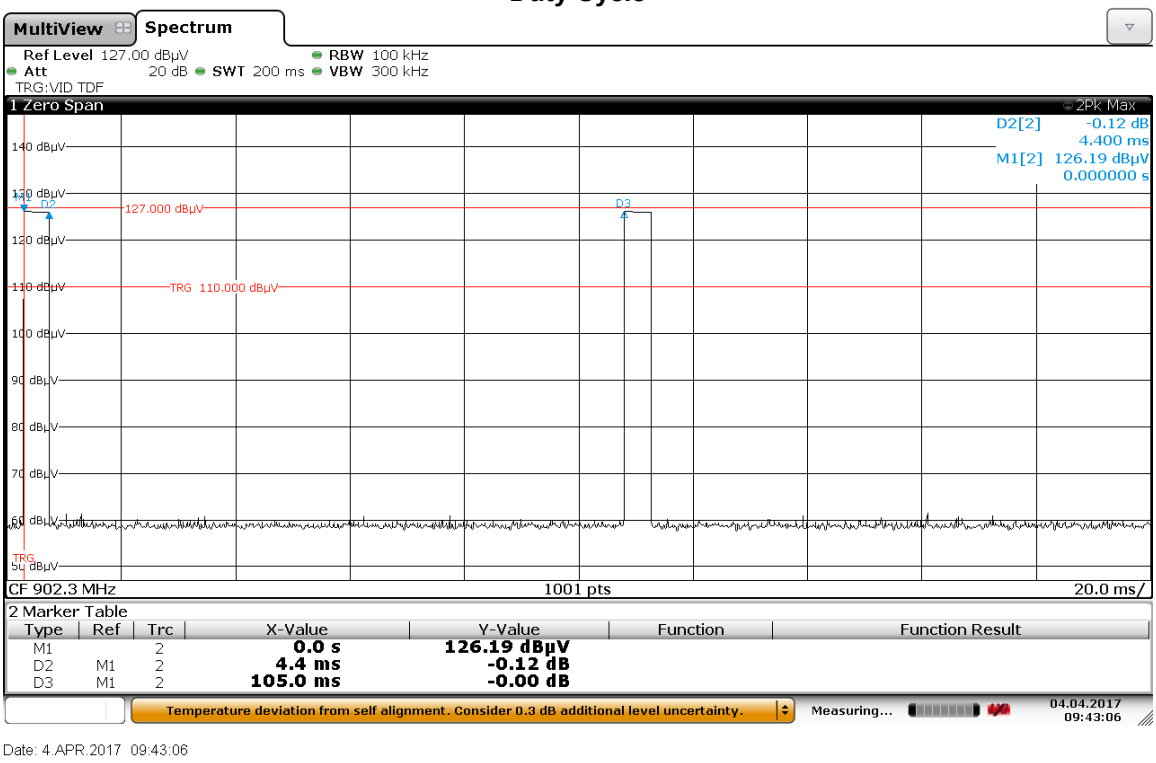


Z-axis (1-10 GHz)



12.5 Plots/Data:

Duty Cycle



Date: 4.APR.2017 09:43:06

Duty cycle factor(dB) = 20*log(4.4/100) = -27.301

Note: Though the time period of the Tx signal is 105.0 ms, a maximum of 100 ms is chosen per ANSI C 63.10 for calculation of duty cycle.

30-1000 MHz Tx mode (Low, Mid and High Channels)

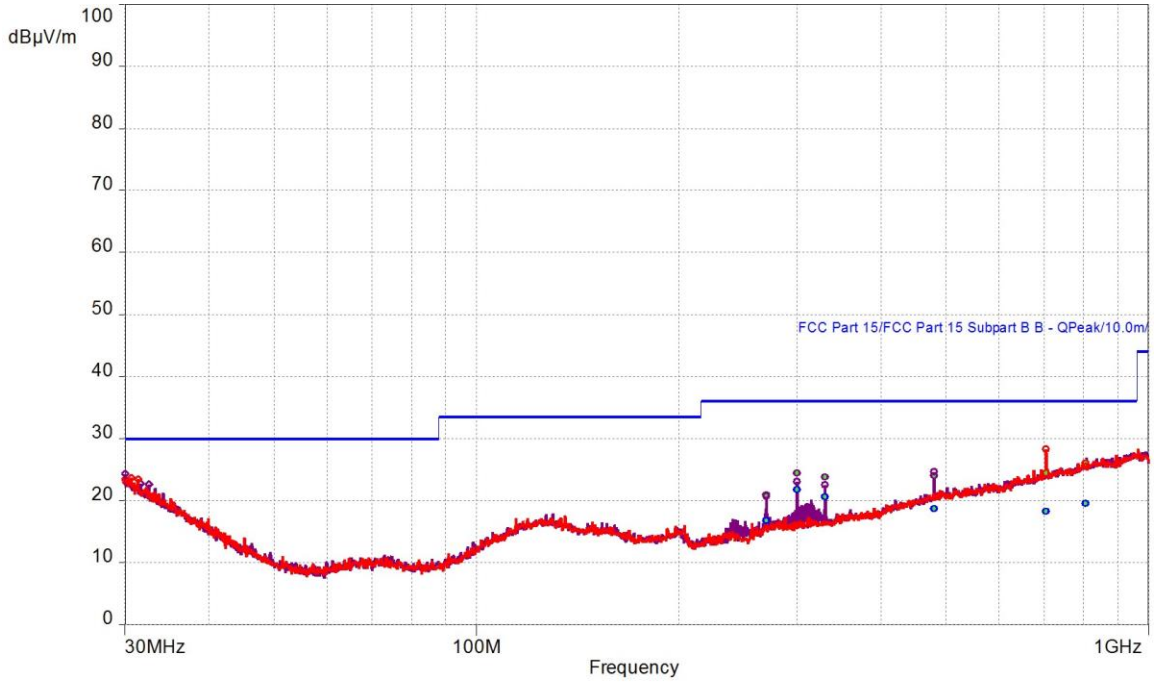
Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
					Low Channel						
QP	H	39.900	25.81	21.38	0.82	40.72	-10.46	7.29	30.00	-22.71	120/300 kHz
QP	H	722.280	38.18	27.85	4.01	40.07	-10.46	29.97	36.00	-6.03	120/300 kHz
QP	H	782.280	38.74	28.25	4.22	40.02	-10.46	31.19	36.00	-4.81	120/300 kHz
PK	H	812.280	54.25	28.65	4.30	39.97	-10.46	47.22	92.59	-45.37	120/300 kHz
PK	H	842.280	51.00	29.35	4.33	39.91	-10.46	44.78	92.59	-47.81	120/300 kHz
PK	H	872.280	50.62	29.20	4.37	39.84	-10.46	44.36	92.59	-48.23	120/300 kHz
QP	H	891.540	38.65	29.10	4.40	39.80	-10.46	32.35	36.00	-3.65	120/300 kHz
					Mid Channel						
QP	H	765.000	33.13	28.00	4.16	40.03	-10.46	25.26	36.00	-10.74	120/300 kHz
QP	H	774.900	28.62	28.10	4.19	40.02	-10.46	20.89	36.00	-15.11	120/300 kHz
QP	H	809.940	37.24	28.60	4.29	39.98	-10.46	30.15	36.00	-5.85	120/300 kHz
QP	H	840.000	34.66	29.40	4.33	39.92	-10.46	28.47	36.00	-7.53	120/300 kHz
QP	H	867.000	40.61	29.20	4.37	39.85	-10.46	34.33	36.00	-1.67	120/300 kHz
QP	H	899.100	37.43	29.18	4.41	39.79	-10.46	31.23	36.00	-4.77	120/300 kHz
PK	H	825.000	54.06	28.90	4.31	39.95	-10.46	47.33	92.12	-44.79	120/300 kHz
PK	H	855.000	51.36	29.20	4.35	39.88	-10.46	45.04	92.12	-47.08	120/300 kHz
PK	H	885.000	53.85	29.10	4.39	39.82	-10.46	47.53	92.12	-44.59	120/300 kHz
					High Channel						
QP	H	779.900	37.89	28.20	4.21	40.02	-10.46	30.28	36.00	-5.72	120/300 kHz
QP	H	807.780	38.28	28.60	4.29	39.98	-10.46	31.19	36.00	-4.81	120/300 kHz
QP	H	837.840	39.60	29.36	4.33	39.92	-10.46	33.36	36.00	-2.64	120/300 kHz
QP	H	871.800	37.38	29.20	4.37	39.84	-10.46	31.12	36.00	-4.88	120/300 kHz
QP	H	883.800	40.40	29.12	4.39	39.82	-10.46	34.09	36.00	-1.91	120/300 kHz
QP	H	897.780	41.46	29.16	4.41	39.79	-10.46	35.23	36.00	-0.77	120/300 kHz

30-1000 MHz Rx mode

Test Information:

Date and Time	04/03/2017
Client and Project Number	Vanteon G102844873
Engineer	Naga Suryadevara
Temperature	20C
Humidity	27%
Atmospheric Pressure	1008mbars
Comments	Rx mode

Graph:



Results:

QuasiPeak (PASS) (6)

Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
704.94	1	18.27	36.00	-17.73	324.00	2.48	Vertical	0.10	-8.64
805.68	1	19.55	36.00	-16.45	143.00	1.52	Vertical	0.10	-7.10
270	2	16.77	36.00	-19.23	18.00	2.35	Horizontal	0.10	-17.93
300	2	21.77	36.00	-14.23	7.00	2.50	Horizontal	0.10	-17.42
330	2	20.63	36.00	-15.37	0.00	2.35	Horizontal	0.10	-16.65
480	2	18.65	36.00	-17.35	122.00	1.00	Horizontal	0.10	-12.59

1-10 GHz Tx Low Channel (X, Y, Z axis)

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Duty Cycle Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth	FCC	IC
Tx Low Channel X axis (EUT Flat on its back)														
PK	H	1804.600	72.36	30.26	4.54	33.08	0.00	0.00	74.08	103.04	-28.96	1/3 MHz		
AVG	H	1804.600	72.36	30.26	4.54	33.08	-27.13	0.00	46.95	54.00	-7.05	1/3 MHz		
PK	H	2706.900	53.12	32.44	5.43	33.49	0.00	0.00	57.50	74.00	-16.50	1/3 MHz	RB	RB
AVG	H	2706.900	53.12	32.44	5.43	33.49	-27.13	0.00	30.37	54.00	-23.63	1/3 MHz	RB	RB
PK	H	3609.200	47.76	33.00	6.68	33.74	0.00	0.00	53.70	74.00	-20.30	1/3 MHz	RB	RB
AVG	H	3609.200	47.76	33.00	6.68	33.74	-27.13	0.00	26.57	54.00	-27.43	1/3 MHz	RB	RB
PK	H	4511.500	51.17	34.07	7.79	33.84	0.00	0.00	59.19	74.00	-14.81	1/3 MHz	RB	RB
AVG	H	4511.500	51.17	34.07	7.79	33.84	-27.13	0.00	32.06	54.00	-21.94	1/3 MHz	RB	RB
Tx Low Channel Y axis (EUT on its long edge)														
PK	H	1804.600	75.44	30.26	4.54	33.08	0.00	0.00	77.16	103.04	-25.88	1/3 MHz		
AVG	H	1804.600	75.44	30.26	4.54	33.08	-27.13	0.00	50.03	54.00	-3.97	1/3 MHz		
PK	H	2706.900	56.67	32.44	5.43	33.49	0.00	0.00	61.05	74.00	-12.95	1/3 MHz	RB	RB
AVG	H	2706.900	56.67	32.44	5.43	33.49	-27.13	0.00	33.92	54.00	-20.08	1/3 MHz	RB	RB
PK	H	3609.200	49.98	33.00	6.68	33.74	0.00	0.00	55.92	74.00	-18.08	1/3 MHz	RB	RB
AVG	H	3609.200	49.98	33.00	6.68	33.74	-27.13	0.00	28.79	54.00	-25.21	1/3 MHz	RB	RB
PK	H	4511.500	53.19	34.07	7.79	33.84	0.00	0.00	61.21	74.00	-12.79	1/3 MHz	RB	RB
AVG	H	4511.500	53.19	34.07	7.79	33.84	-27.13	0.00	34.08	54.00	-19.92	1/3 MHz	RB	RB
Tx Low Channel Z axis (EUT on its short edge)														
PK	H	1804.600	81.19	30.26	4.54	33.08	0.00	0.00	74.08	103.04	-28.96	1/3 MHz		
AVG	H	1804.600	81.19	30.26	4.54	33.08	-27.13	0.00	46.95	54.00	-7.05	1/3 MHz		
PK	H	2706.900	61.12	32.44	5.43	33.49	0.00	0.00	57.50	74.00	-16.50	1/3 MHz	RB	RB
AVG	H	2706.900	61.12	32.44	5.43	33.49	-27.13	0.00	30.37	54.00	-23.63	1/3 MHz	RB	RB
PK	H	3609.200	53.19	33.00	6.68	33.74	0.00	0.00	53.70	74.00	-20.30	1/3 MHz	RB	RB
AVG	H	3609.200	53.19	33.00	6.68	33.74	-27.13	0.00	26.57	54.00	-27.43	1/3 MHz	RB	RB
PK	H	4511.500	55.27	34.07	7.79	33.84	0.00	0.00	59.19	74.00	-14.81	1/3 MHz	RB	RB
AVG	H	4511.500	55.27	34.07	7.79	33.84	-27.13	0.00	32.06	54.00	-21.94	1/3 MHz	RB	RB

1-10 GHz Tx Mid Channel (X, Y, Z axis)

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Duty Cycle Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth	FCC	IC
Tx Mid Channel X axis (EUT Flat on its back)														
PK	H	1830.000	73.12	30.47	4.56	33.07	0.00	0.00	75.08	102.57	-27.49	1/3 MHz		
AVG	H	1830.000	73.12	30.47	4.56	33.07	-27.13	0.00	47.95	54.00	-6.05	1/3 MHz		
PK	H	2745.000	56.37	32.43	5.47	33.52	0.00	0.00	60.75	74.00	-13.25	1/3 MHz	RB	RB
AVG	H	2745.000	56.37	32.43	5.47	33.52	-27.13	0.00	33.62	54.00	-20.38	1/3 MHz	RB	RB
PK	H	3660.000	49.12	33.21	6.76	33.74	0.00	0.00	55.34	74.00	-18.66	1/3 MHz	RB	RB
AVG	H	3660.000	49.12	33.21	6.76	33.74	-27.13	0.00	28.21	54.00	-25.79	1/3 MHz	RB	RB
PK	H	4575.000	53.12	34.16	7.88	33.85	0.00	0.00	61.31	74.00	-12.69	1/3 MHz	RB	RB
AVG	H	4575.000	53.12	34.16	7.88	33.85	-27.13	0.00	34.18	54.00	-19.82	1/3 MHz	RB	RB
Tx Mid Channel Y axis (EUT on its long edge)														
PK	H	1830.000	76.72	30.47	4.56	33.07	0.00	0.00	78.68	102.57	-23.89	1/3 MHz		
AVG	H	1830.000	76.72	30.47	4.56	33.07	-27.13	0.00	51.55	54.00	-2.45	1/3 MHz		
PK	H	2745.000	60.19	32.43	5.47	33.52	0.00	0.00	64.57	74.00	-9.43	1/3 MHz	RB	RB
AVG	H	2745.000	60.19	32.43	5.47	33.52	-27.13	0.00	37.44	54.00	-16.56	1/3 MHz	RB	RB
PK	H	3660.000	57.18	33.21	6.76	33.74	0.00	0.00	63.40	74.00	-10.60	1/3 MHz	RB	RB
AVG	H	3660.000	57.18	33.21	6.76	33.74	-27.13	0.00	36.27	54.00	-17.73	1/3 MHz	RB	RB
PK	H	4575.000	59.12	34.16	7.88	33.85	0.00	0.00	67.31	74.00	-6.69	1/3 MHz	RB	RB
AVG	H	4575.000	59.12	34.16	7.88	33.85	-27.13	0.00	40.18	54.00	-13.82	1/3 MHz	RB	RB
PK	H	5490.000	53.20	34.62	8.85	34.06	0.00	0.00	62.61	74.00	-11.39	1/3 MHz		
AVG	H	5490.000	53.20	34.62	8.85	34.06	-27.13	0.00	35.48	54.00	-18.52	1/3 MHz		
Tx Mid Channel Z axis (EUT on its short edge)														
PK	H	1830.000	78.87	30.47	4.56	33.07	0.00	0.00	80.83	102.57	-21.74	1/3 MHz		
AVG	H	1830.000	78.87	30.47	4.56	33.07	-27.13	0.00	53.70	54.00	-0.30	1/3 MHz		
PK	H	2745.000	65.60	32.43	5.47	33.52	0.00	0.00	69.98	74.00	-4.02	1/3 MHz	RB	RB
AVG	H	2745.000	65.60	32.43	5.47	33.52	-27.13	0.00	42.85	54.00	-11.15	1/3 MHz	RB	RB
PK	H	3660.000	65.03	33.21	6.76	33.74	0.00	0.00	71.25	74.00	-2.75	1/3 MHz	RB	RB
AVG	H	3660.000	65.03	33.21	6.76	33.74	-27.13	0.00	44.12	54.00	-9.88	1/3 MHz	RB	RB
PK	H	4575.000	56.03	34.16	7.88	33.85	0.00	0.00	64.22	74.00	-9.78	1/3 MHz	RB	RB
AVG	H	4575.000	56.03	34.16	7.88	33.85	-27.13	0.00	37.09	54.00	-16.91	1/3 MHz	RB	RB
PK	H	5490.000	59.30	34.62	8.85	34.06	0.00	0.00	68.71	74.00	-5.29	1/3 MHz		
AVG	H	5490.000	59.30	34.62	8.85	34.06	-27.13	0.00	41.58	54.00	-12.42	1/3 MHz		
PK	H	6405.000	63.12	35.61	9.27	34.32	0.00	0.00	73.69	74.00	-0.31	1/3 MHz		
AVG	H	6405.000	63.12	35.61	9.27	34.32	-27.13	0.00	46.56	54.00	-7.44	1/3 MHz		

1-10 GHz Tx High Channel (X, Y, Z axis)

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Duty Cycle Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth	FCC	IC
Tx Low Channel X axis (EUT Flat on its back)														
PK	H	1804.600	72.36	30.26	4.54	33.08	0.00	0.00	74.08	103.04	-28.96	1/3 MHz		
AVG	H	1804.600	72.36	30.26	4.54	33.08	-27.13	0.00	46.95	54.00	-7.05	1/3 MHz		
PK	H	2706.900	53.12	32.44	5.43	33.49	0.00	0.00	57.50	74.00	-16.50	1/3 MHz	RB	RB
AVG	H	2706.900	53.12	32.44	5.43	33.49	-27.13	0.00	30.37	54.00	-23.63	1/3 MHz	RB	RB
PK	H	3609.200	47.76	33.00	6.68	33.74	0.00	0.00	53.70	74.00	-20.30	1/3 MHz	RB	RB
AVG	H	3609.200	47.76	33.00	6.68	33.74	-27.13	0.00	26.57	54.00	-27.43	1/3 MHz	RB	RB
PK	H	4511.500	51.17	34.07	7.79	33.84	0.00	0.00	59.19	74.00	-14.81	1/3 MHz	RB	RB
AVG	H	4511.500	51.17	34.07	7.79	33.84	-27.13	0.00	32.06	54.00	-21.94	1/3 MHz	RB	RB
Tx Low Channel Y axis (EUT on its long edge)														
PK	H	1804.600	75.44	30.26	4.54	33.08	0.00	0.00	77.16	103.04	-25.88	1/3 MHz		
AVG	H	1804.600	75.44	30.26	4.54	33.08	-27.13	0.00	50.03	54.00	-3.97	1/3 MHz		
PK	H	2706.900	56.67	32.44	5.43	33.49	0.00	0.00	61.05	74.00	-12.95	1/3 MHz	RB	RB
AVG	H	2706.900	56.67	32.44	5.43	33.49	-27.13	0.00	33.92	54.00	-20.08	1/3 MHz	RB	RB
PK	H	3609.200	49.98	33.00	6.68	33.74	0.00	0.00	55.92	74.00	-18.08	1/3 MHz	RB	RB
AVG	H	3609.200	49.98	33.00	6.68	33.74	-27.13	0.00	28.79	54.00	-25.21	1/3 MHz	RB	RB
PK	H	4511.500	53.19	34.07	7.79	33.84	0.00	0.00	61.21	74.00	-12.79	1/3 MHz	RB	RB
AVG	H	4511.500	53.19	34.07	7.79	33.84	-27.13	0.00	34.08	54.00	-19.92	1/3 MHz	RB	RB
Tx Low Channel Z axis (EUT on its short edge)														
PK	H	1804.600	76.26	30.26	4.54	33.08	0.00	0.00	77.98	103.04	-25.06	1/3 MHz		
AVG	H	1804.600	76.26	30.26	4.54	33.08	-27.13	0.00	50.85	54.00	-3.15	1/3 MHz		
PK	H	2706.900	61.12	32.44	5.43	33.49	0.00	0.00	65.50	74.00	-8.50	1/3 MHz	RB	RB
AVG	H	2706.900	61.12	32.44	5.43	33.49	-27.13	0.00	38.37	54.00	-15.63	1/3 MHz	RB	RB
PK	H	3609.200	53.19	33.00	6.68	33.74	0.00	0.00	59.13	74.00	-14.87	1/3 MHz	RB	RB
AVG	H	3609.200	53.19	33.00	6.68	33.74	-27.13	0.00	32.00	54.00	-22.00	1/3 MHz	RB	RB
PK	H	4511.500	55.27	34.07	7.79	33.84	0.00	0.00	63.29	74.00	-10.71	1/3 MHz	RB	RB
AVG	H	4511.500	55.27	34.07	7.79	33.84	-27.13	0.00	36.16	54.00	-17.84	1/3 MHz	RB	RB

1-10 GHz Rx mode

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Duty Cycle Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
Rx mode												
PK	V	1123.220	55.27	27.67	3.39	33.48	0.00	0.00	52.85	74.00	-21.15	1/3 MHz
AVG	V	1123.220	33.18	27.67	3.39	33.48	0.00	0.00	30.76	54.00	-23.24	1/3 MHz
PK	H	2398.910	53.18	32.11	5.10	33.27	0.00	0.00	57.13	74.00	-16.87	1/3 MHz
AVG	H	2398.910	40.08	32.11	5.10	33.27	0.00	0.00	44.03	54.00	-9.97	1/3 MHz
PK	H	3318.190	50.94	32.76	6.27	33.73	0.00	0.00	56.25	74.00	-17.75	1/3 MHz
AVG	H	3318.190	37.76	32.76	6.27	33.73	0.00	0.00	43.07	54.00	-10.93	1/3 MHz
PK	H	7627.320	50.05	35.82	11.38	34.97	0.00	0.00	62.28	74.00	-11.72	1/3 MHz
AVG	H	7627.320	33.27	35.82	11.38	34.97	0.00	0.00	45.50	54.00	-8.50	1/3 MHz

Test Personnel: Naga Suryadevara N 5
Test Date: 04/02/2017
04/03/2017

Supervising/Reviewing Engineer: (Where Applicable) N/A

Product Standard: FCC 15.247, FCC 15.209, FCC 15.109, RSS-247, ICES-003

Limit Applied: As specified in section 12.3

Input Voltage: Internal Battery

Ambient Temperature: 20, 19 ºC

Pretest Verification w/ Ambient Signals or BB Source: BB Source

Relative Humidity: 27, 21 %

Atmospheric Pressure: 1008, 1003 mbars

Deviations, Additions, or Exclusions: None

13 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	04/25/2017	102844873BOX-001	NS	KPS KPS	Original Issue
1	09/21/2017	102844873BOX-001	NS	KPS KPS	Updated the RSS 247 standard version and date
2	10/24/2017	102844873BOX-001	NS	KPS KPS	Updated RF Exposure Calculation