

EMC TEST REPORT



NVLAP Lab Code 200033-0

Standard(s):

47 CFR FCC Part 15.247 and 15.209
RSS 210, Issue 8, 2010
FCC Parts 15.107 and 15.109
ICES 003, Issue 5, 2012

FCC ID: DGFBCSDG5B1
IC: 458A-BCSDG5B1

Product: 3M™ Drive-Thru Base Station
Model: G5B1
3M Division: Commercial Solutions

Report Number: RE1405035-1
Report Issue Date: April 20, 2015

Report Prepared By:

A handwritten signature in blue ink, which appears to read 'Yuriy Litvinov', is written over a horizontal line.

Signature: _____

Yuriy Litvinov
Lead EMC Engineer

Tested By:
3M EMC Laboratory
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1.0 Test Summary

Based on the results of our investigation, we have concluded the product tested complies with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

	Sections FCC Part 15/RSS 210	Scope of Test	Result	Comments
4.1	15.107/15.207/RSS-Gen	Conducted Emissions	pass	
4.2	15.109/15.209/RSS-Gen	Radiated Emissions	pass	
4.3	15.247(a)(1)/A8.1(b)	Carrier Frequency Separation	pass	
4.4	15.247(a)(1)/A8.1(d)	Number of Hopping Frequencies	pass	
4.5	15.247(a)(1)/A8.1(d)	Time of Occupancy (Dwell Time)	pass	
4.6	15.247(a)(1)/A8.1(a)	20dB Bandwidth	pass	
4.7	15.247(b)(3)/A8.4	Band-edge Compliance	pass	
4.8	15.247(c)/A8.5)	Conducted Output Power	pass	
4.9	15.247(c)/A8.5	Spurious Conducted and Radiated Emissions	pass	
4.10	15.247(2)(h)(i)/RSS102	RF Exposure Compliance	pass	

Note:

1.1 Measurement Uncertainty

The measured value related to the corresponding limit will be used to decide whether the equipment meets the requirements. The measurement uncertainty figures were calculated and correspond to a coverage factor of $k=2$, providing a confidence level of respectively 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian).

Radiated emissions	5.20 dB
Conducted emissions	3.60 dB
Harmonics and Flicker	3.32 dB



2.0 Equipment Description

2.1	Equipment Under Test	
Description:	3M™ Drive Thru Base Station, Model G5B1 works with the 3M™ Wireless Communication Headsets intended to provide 2-way radio-frequency audio communication in quick service drive through restaurants and convenience stores.	
Model(s):	G5B1	
Serial number:	N/A	
Client Contact:	Rhonda DeMike	
Phone:	651 737 5950	
3M Division:	Commercial Solutions Division	
Modifications:	None	
Frequency Range (MHz) :	2401 – 2480MHz	50-75KHz
Modulation Type:	FHSS	
Channel No.:	>75	N/A
Output Power ERP (dBm)	20dBm	N/A
Antenna Type :	Model: RUB09A-2400-SMA, 1/2 wave, Monopole Antenna, 0dBi Model: HG2408P, Round Patch Antenna, 8dBi Model: HGV-2409U, Omni directional Antenna, 8dBi	
Equipment Category:	☐ General ☐ Portable ☒ Indoor Use	
Rated Power:	Voltage: ☒ 120VAC ☐ 230VAC ☐ VDC Frequency: ☒ 50Hz ☐ 60Hz Current: ☒ 1.2A	
Test Dates:	02/01-04/09/2015	
Received Date:	02/01/2015	
Received Conditions:	☐ Poor ☒ Good ☒ Prototype ☐ Production	



3.0 EUT Configuration

3.1 Support Equipment

No.	Product Type	Manufacturer	Model	Comments
1	Power Supply	Sceptre Power	ATS090-P120	
2				

3.2 Cables

No.	Name	Type	Length	Shielding	Comments
1					
2					

3.3 Operating Condition of EUT

	Operation Modes
☐	Stand by
☒	Continuous Monitored Operation
☐	Continuous Unmonitored Operation
☐	

3.4 Exercising of EUT

No.	Description of EUT Exercising
1	Transmitting at lowest, middle and highest channels of operation with un-modulated carrier
2	Transmitting with hopping channels enabled
3	Transmitting un-modulated carrier at maximum rated RF output power
4	Detection Loop operating at 72Khz

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4.0 Test Conditions and Results

4.1	Conducted Emissions Data			
Method:	The AMN was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the AMN. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN.			
Test Verification: ☒		Laboratory Ambient Temperature		23°C
		Relative Humidity		35%
Reference Standard:		☒ ANSI C63.4:2009 ☐ ANSI C63.10:2009 ☒ FCC Part 15.107/15.207 ☐ FCC Part 15.247/RSS 210 ☐		Measurement Point ☒ Mains ☐ Telecommunication ports ☐
Frequency Range:		☐ 150KHz to 30KHz ☐		
Nominal Voltage:		☒ 120VAC ☐ 230VAC ☐		
Tested By:		Mike Schultz <i>MS</i>		Date: 02/25/2015
Limits – Class B				
Frequency (MHz)	Limit dB (µV)			
	Quasi-Peak	Average	Result	Comments
0.15 to 0.50	66 to 56	56 to 46	pass	
0.50 to 5	56	46	pass	
5 to 30	60	50	pass	

Modifications:	
Note:	

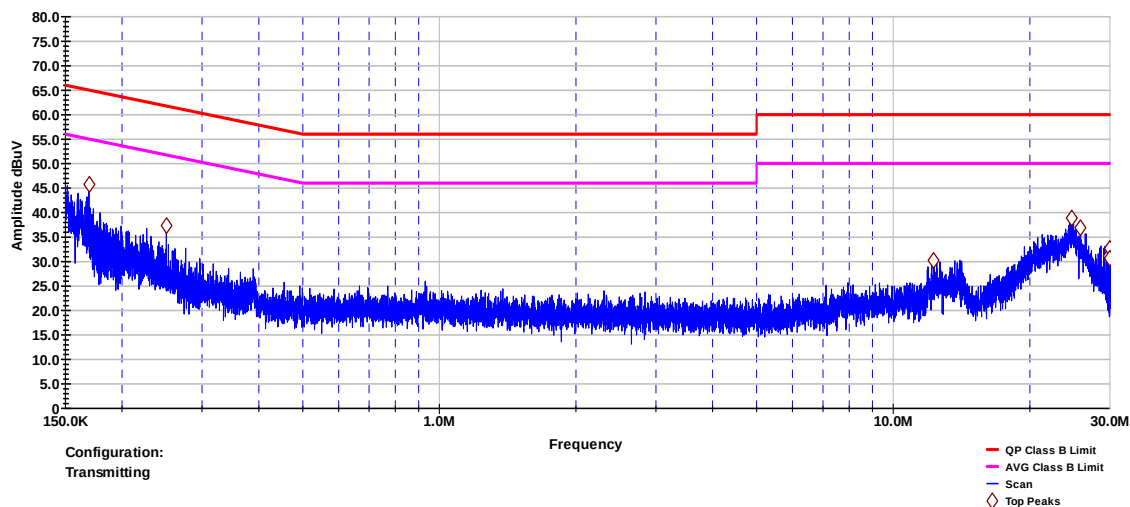


Frequency (MHz)	QP Line 1 dB (μV)	AVG Line 1 dB (μV)	QP Limit dB (μV)	AVG Limit dB (μV)	QP Margin dB	AVG Margin dB
0.235	30.03	23.2	62.26	52.26	-32.23	-29.06
0.29	27.06	17.69	60.53	50.53	-33.47	-32.84
24.96	35.47	29.04	60	50	-24.53	-20.96
28.624	31.55	27.33	60	50	-28.45	-22.67
29.235	34.71	32.18	60	50	-25.29	-17.82
29.235	34.73	32.11	60	50	-25.27	-17.89
29.908	32.33	28.72	60	50	-27.67	-21.28
Frequency (MHz)	QP Line 2 dB (μV)	AVG Line 2 dB (μV)	QP Limit dB (μV)	AVG Limit dB (μV)	QP Margin dB	AVG Margin dB
0.168	36.64	28.4	65.05	55.05	-28.4	-26.64
0.249	28.56	21.09	61.8	51.8	-33.24	-30.71
24.711	34.82	42.42	60	50	-25.18	-7.58
25.575	34.03	27.42	60	50	-25.97	-22.58
29.908	32.53	28.92	60	50	-27.47	-21.08
29.908	32.55	28.84	60	50	-27.45	-21.16
29.967	31.96	28.32	60	50	-28.04	-21.68
Voltage		☒ 120VAC ☐ 230VAC ☐				
Notes						



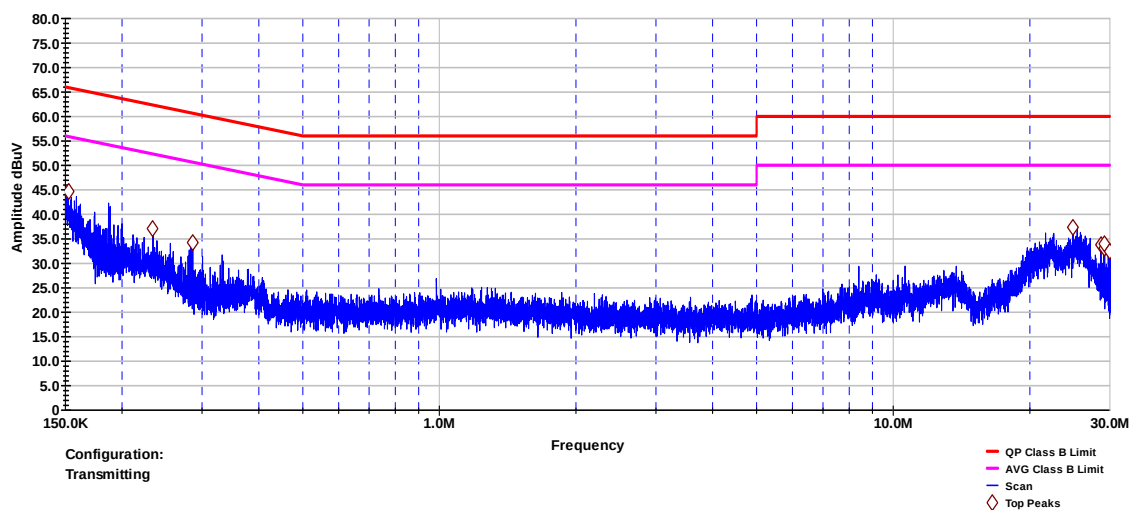
3M Company
Conducted Emissions
CISPR22_FCC Part 15, Class B, Line 2

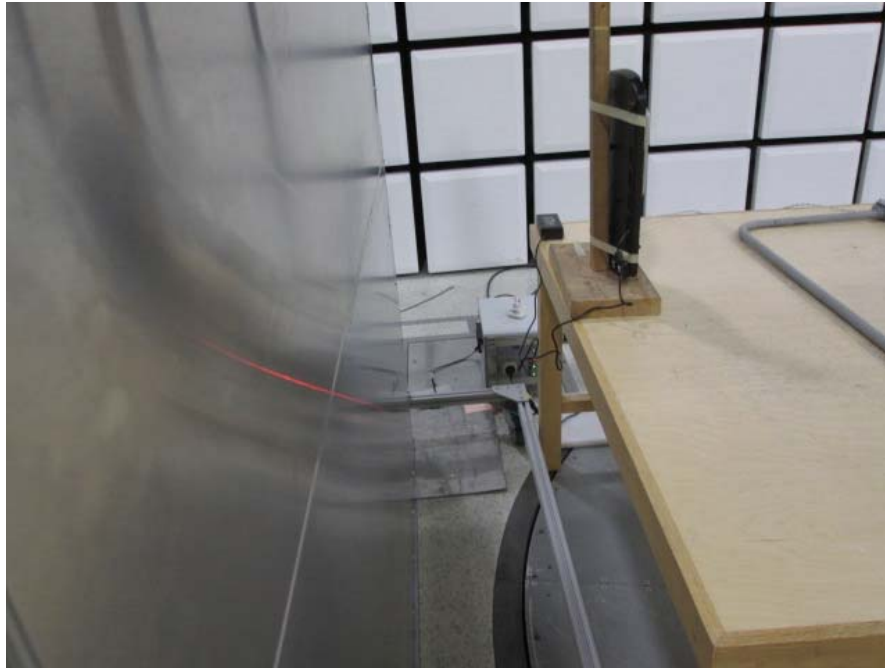
RE Project # - RE1405035
Model # - XT-1 Base Station
EUT Description - 2.4 GHz Base Station
Serial # - prototype
EUT Power - 120 VAC 60 Hz



3M Company
Conducted Emissions
CISPR22_FCC Part 15, Class B, Line 1

RE Project # - RE1405035
Model # - XT-1 Base Station
EUT Description - 2.4 GHz Base Station
Serial # - prototype
EUT Power - 120 VAC 60 Hz





Test Set Up Photo

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4.2	Radiated Emissions Data			
Method:	Measurements were made in a 3-meter semi-anechoic chamber that complies to CISPR 16. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements (quasi-peak) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 m. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.			
Test Verification: ☒	Laboratory Ambient Temperature		23°C	
	Relative Humidity		35%	
Reference Standard:	☒ ANSI C63.4:2009 ☐ ANSI C63.10:2009 ☒ FCC Part 15.109/ICES 003 ☐ FCC Part 15.247/RSS 210 ☒ FCC Part 15.209		Measurement Distance	
			☒ 3 Meters ☐	
Frequency Range:	☒ 9 KHz TO 30 MHz ☒ 30 MHz TO 1000 MHz			
Nominal Voltage:	☒ 120VAC ☐ 230VAC ☐			
Tested By:	Mike Schultz <i>MS</i>		Date: 03/24/2015	
Limits				
Frequency (MHz)	Limit dB (µV/m)			
	Quasi-Peak	Average	Distance	Results
0.009-0.490		2400/F(KHz)	300	pass
0.490-1.705	24000/F(KHz)		30	pass
1.705-30	29.5		30	pass
30 to 88	40		3	pass
88-216	43.5		3	pass
216-960	46		3	pass
Above 960		54	3	pass

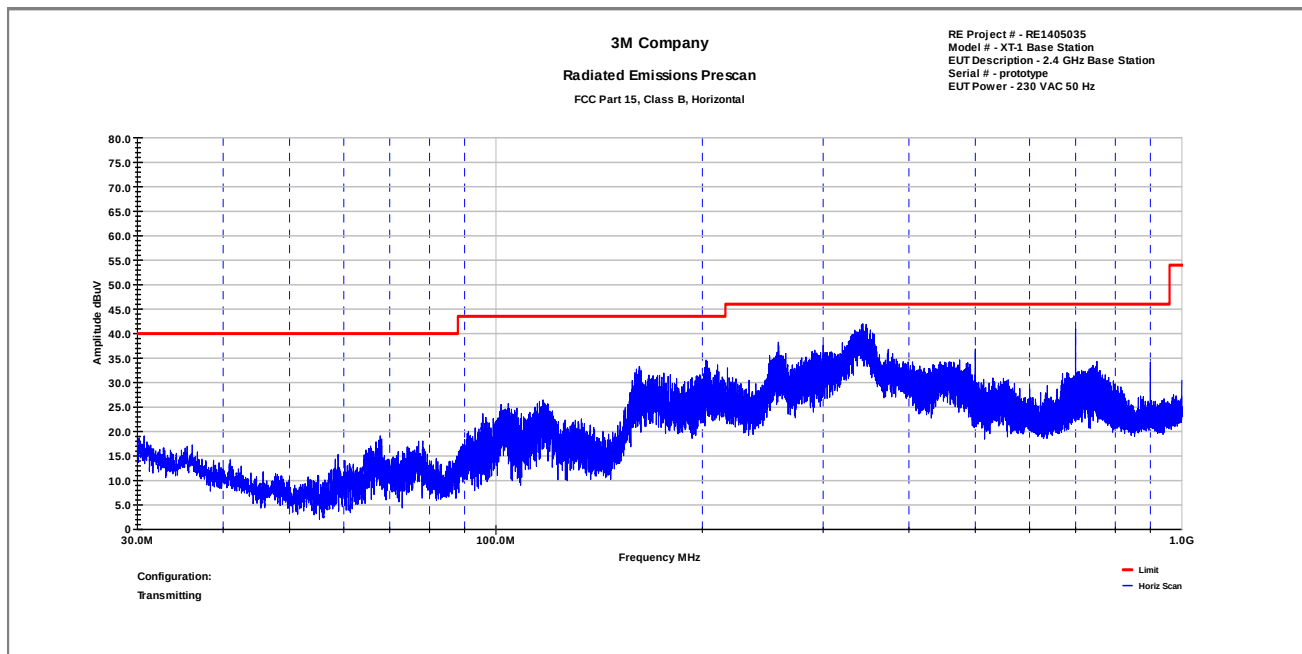
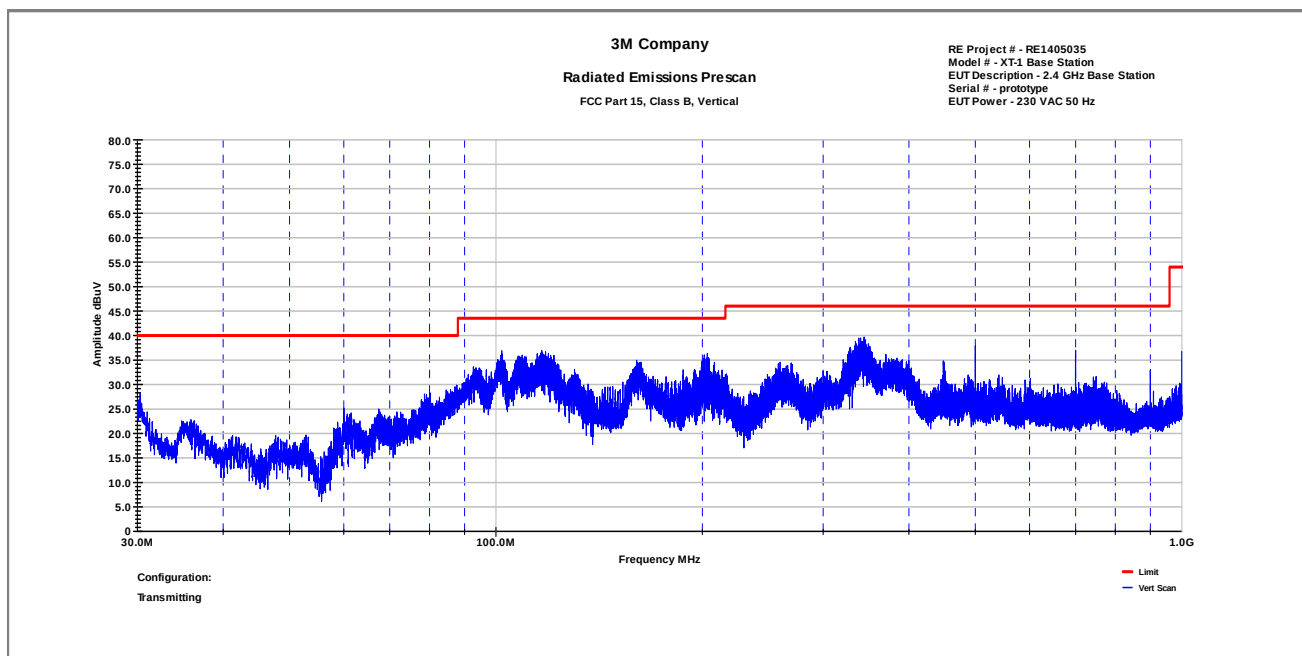
Modifications:	
Note:	For emission in the restricted bands, the limit of 15.209 was used. EUT Loop antenna was position in the vertical orientation as more conservative orientation. 40dB/decade of distance extrapolation factor has been applied according to FCC Rules below 30MHz



Frequency (KHz)	Pos.	Peak Reading dB μ V/m	Total CF dB	Net at 3 m dB μ V/m	Limit (dB μ V/m)	Margin dB
72.10	X	33.79	59.50	93.29	110.45	-17.16
144.20	X	4.19	57.90	62.09	104.43	-42.34
216.29	X	2.30	53.20	55.50	100.90	-45.40
447.00	X	13.90	50.40	64.30	94.60	-30.30
845.90	X	-13.29	49.3	36.01	69.06	-33.05
Notes		Total CF = Antenna Factor + Cable Factor - AMP Gain				

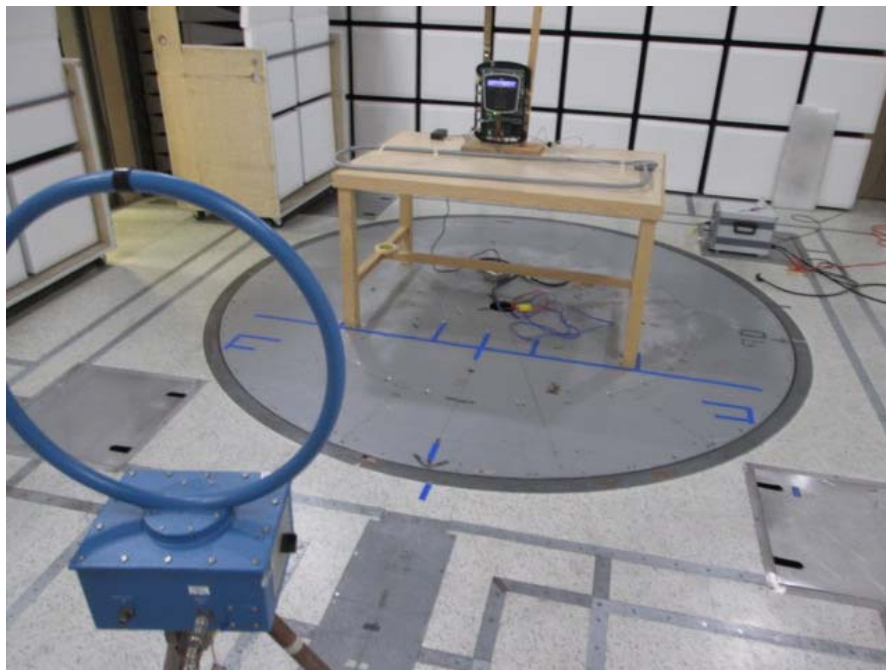
Frequency (KHz)	Pos.	Peak Reading dB μ V/m	Total CF dB	Net at 3 m dB μ V/m	Limit (dB μ V/m)	Margin dB
72.20	Y	48.30 (QPK)	59.50	107.80	110.43	-2.63
144.38	Y	27.92	57.90	85.82	104.41	-18.59
217.20	Y	19.55	53.20	72.75	100.87	-28.12
447.00	Y	29.66	50.40	80.06	94.60	-14.54
598.00	Y	7.13	49.1	56.23	72.07	-15.84
1038.0	Y	-4.31	46.1	41.79	127.28	-85.49
Notes		Total CF = Antenna Factor + Cable Factor - AMP Gain				

Frequency (MHz)	Pol.	QP Reading dB μ V/m	Total CF dB	Net at 3 m dB μ V/m	Limit (dB μ V/m)	Margin dB
101.728	V	18.29	14.86	33.14	43.52	-10.38
116.367	V	16.47	15.93	32.4	43.52	-11.12
160.562	H	17.81	13.88	31.69	43.52	-11.83
201.674	H	15.55	13.44	28.99	43.52	-14.53
258.076	H	20.63	17.38	38.01	46.02	-8.01
341.453	H	19.18	18.22	37.4	46.02	-8.62
500.018	V	16.35	21.61	37.96	46.02	-8.06
700.024	H	15.76	23.21	38.97	46.02	-7.05
Notes		Total CF = Antenna Factor + Cable Factor - AMP Gain				





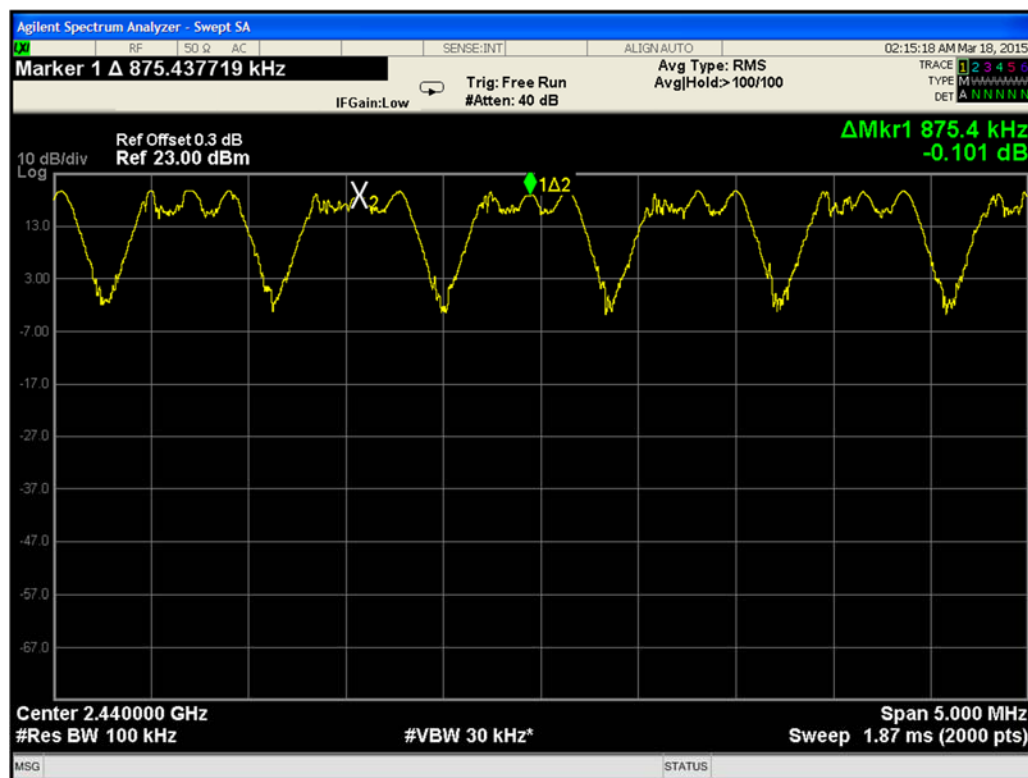
Test Set Up Photo



Test Set Up Photo



4.3	Carrier Frequency Separation		
Method:	The measurements were made with transmitter set to transmit a continuously with hopping function enabled.		
	Laboratory Ambient Temperature	23°C	
	Relative Humidity	35%	
Reference Standard:	☐ ANSI C63.4:2009 ☒ ANSI C63.10:2009 ☐ FCC Part 15.109/ICES 003 ☒ FCC Part 15.247/RSS 210 ☐ FCC Part 15.209	Measurement Point ☒ Conducted ☐ Radiated ☐	
Frequency Range:	☒ 2401-2480MHz		
Antenna Gain:	☐ N/A		
Limit	☒ >25KHz	Result 875.4 KHz	
	☒ >20dB Bandwidth ☒ 688KHz		
Nominal Voltage:	☐ 230VAC ☒ 120VAC		
Tested By:	Yuriy Litvinov		Date: 03/18/2015
Note:			

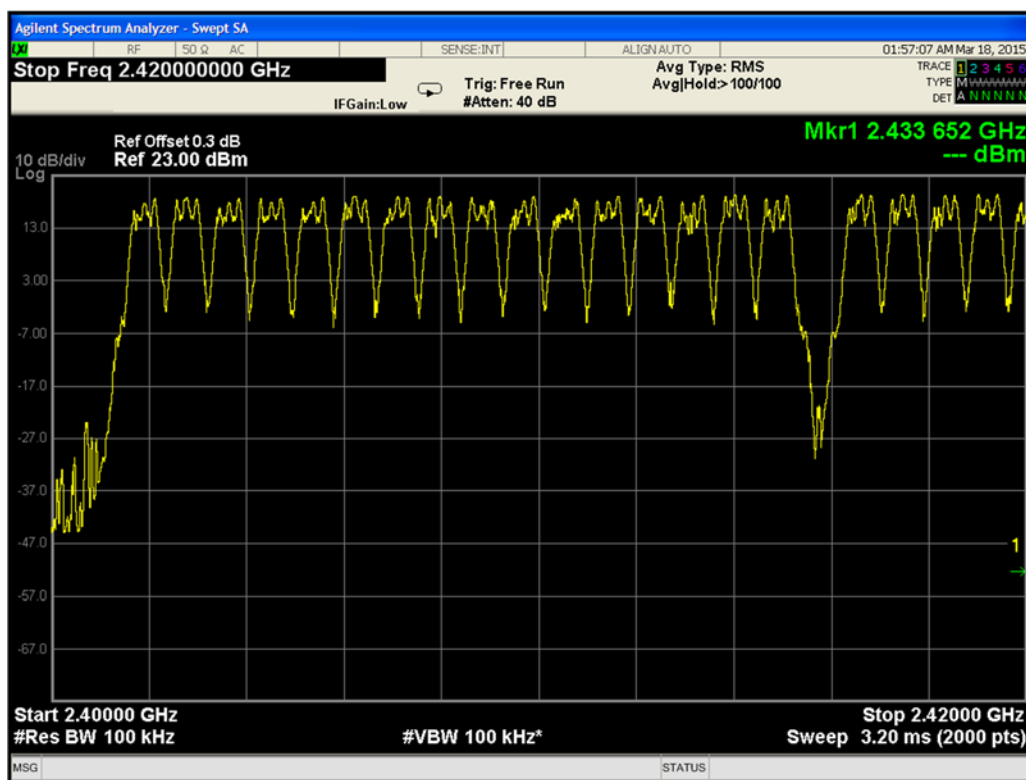


Carrier Frequency Separation

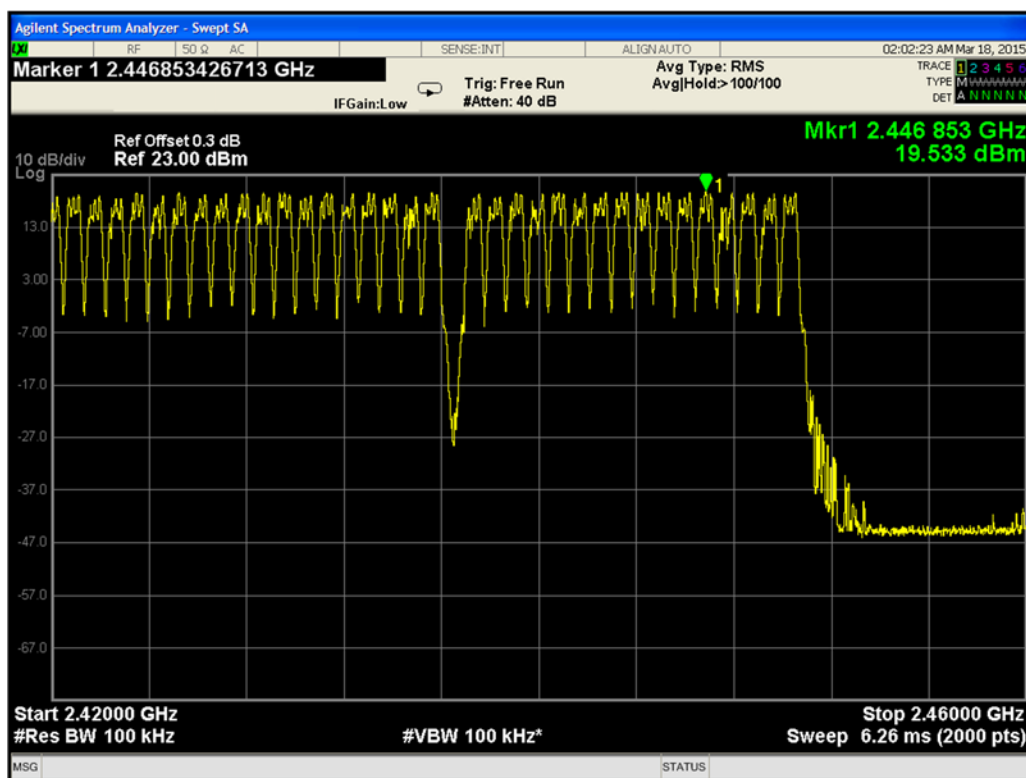
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4.4	Number of Hopping Frequencies		
Method:	The measurements were made with transmitter set to transmit a continuously with hopping function enabled.		
	Laboratory Ambient Temperature	23°C	
	Relative Humidity	35%	
Reference Standard:	☐ ANSI C63.4:2009 ☒ ANSI C63.10:2009 ☐ FCC Part 15.109/ICES 003 ☒ FCC Part 15.247/RSS 210 ☐ FCC Part 15.209	Measurement Point ☒ Conducted ☐ Radiated ☐	
Frequency Range:	☒ 2401-2480MHz		
Antenna Gain:	☐ N/A	Result	
Limit	☒ >15 Hopping Channels	75	
Nominal Voltage:	☐ 230VAC ☒ 120 VAC		
Tested By:	Yuriy Litvinov	Date: 03/18/2015	

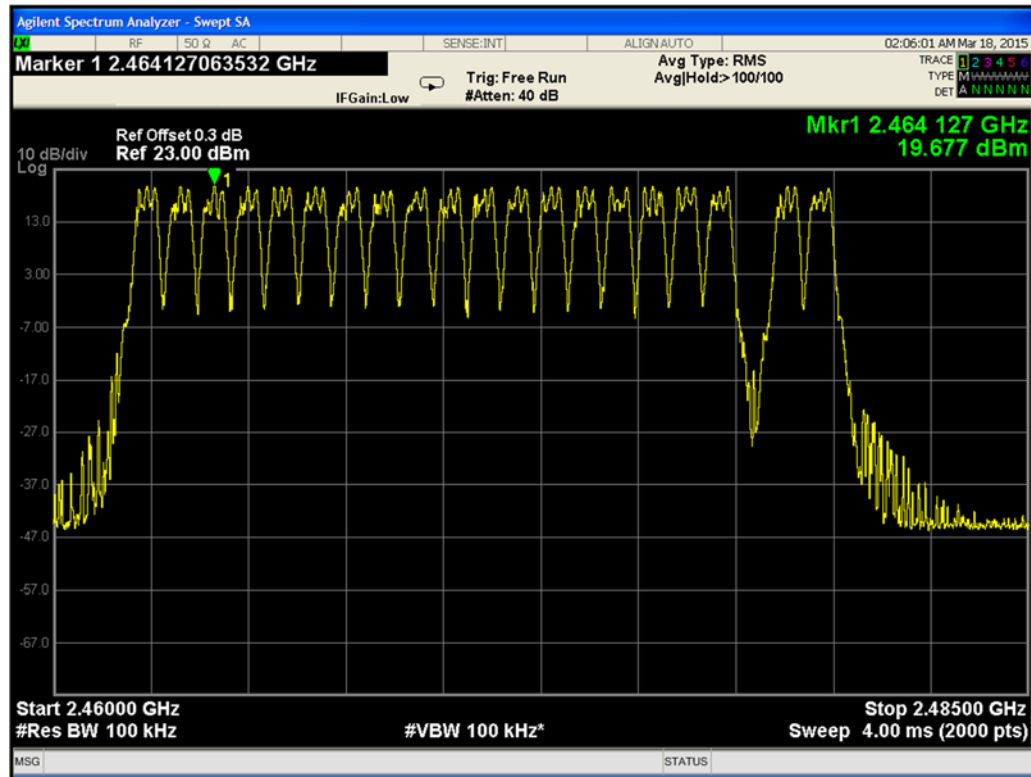
Note:	
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Low Section



Mid Section

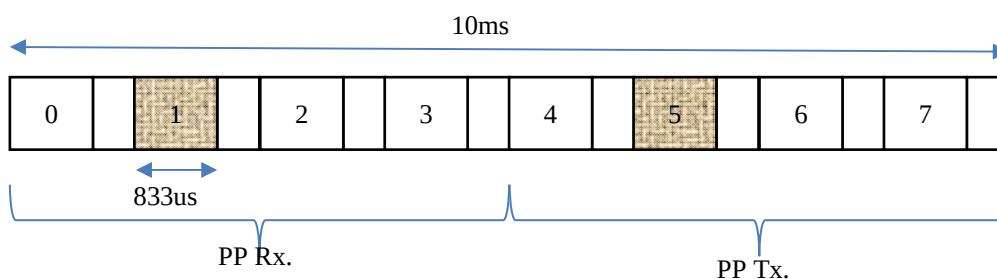


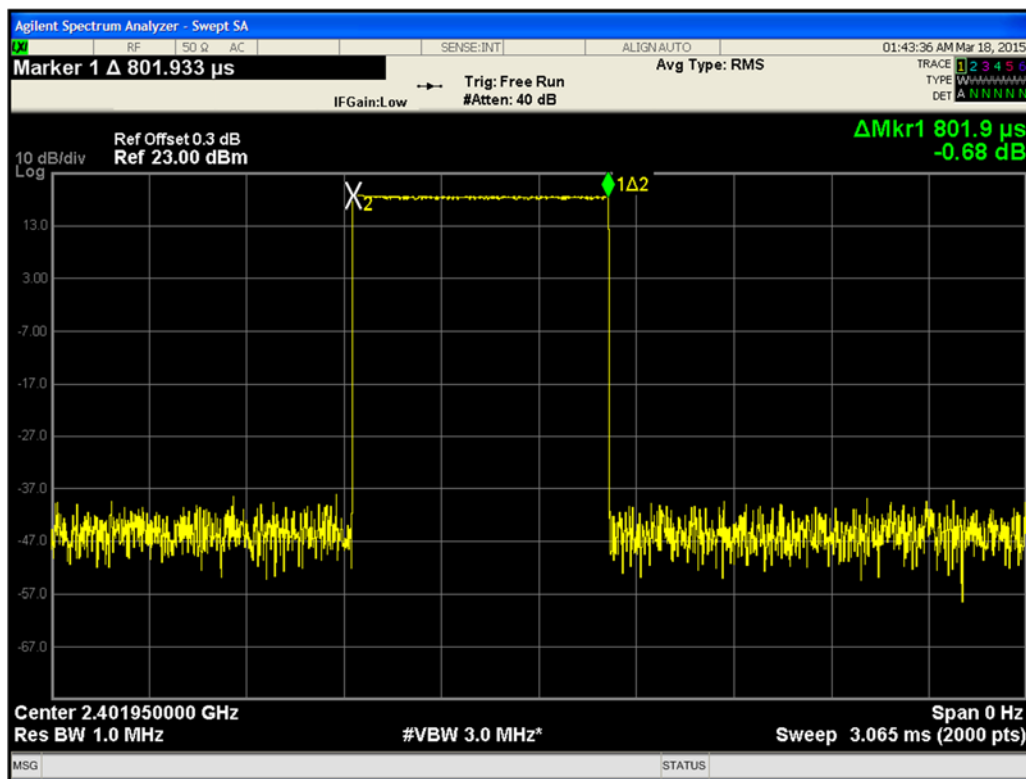
High Section



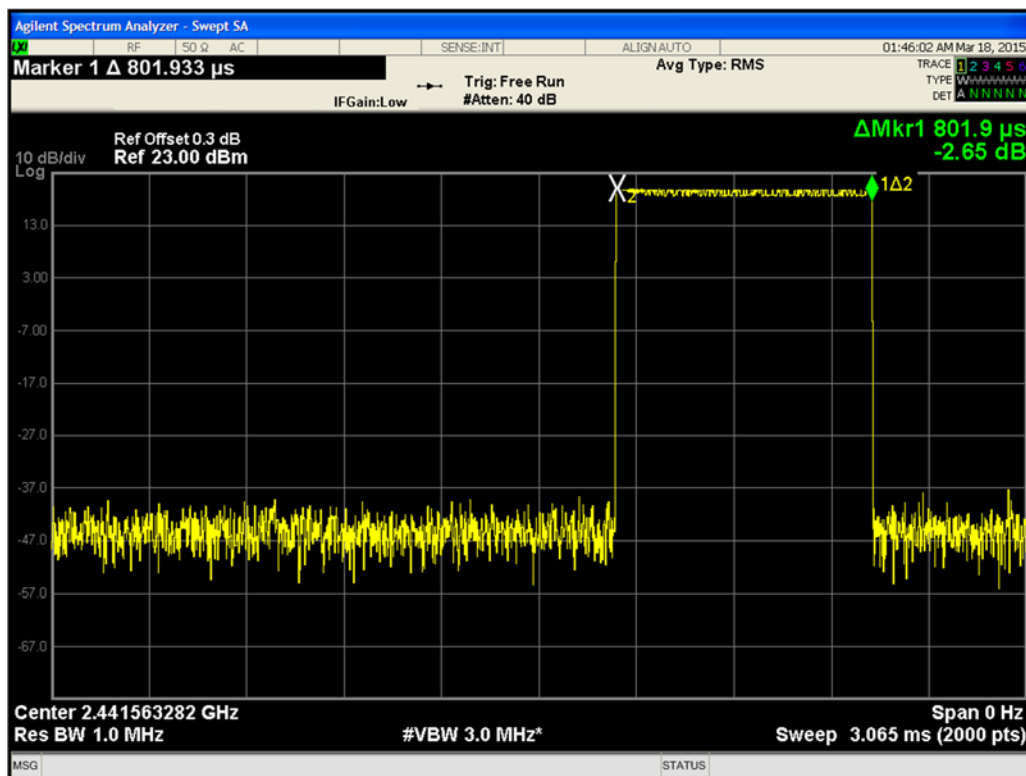
4.5	Time of Occupancy		
Method:	The measurements were made with transmitter set to transmit continuously with hopping function enabled.		
	Laboratory Ambient Temperature	23°C	
	Relative Humidity	35%	
Reference Standard:	☒ ANSI C63.10:2009 ☐ ANSI C63.4:2009 ☒ DA 00-705 ☐ FCC Part 15.109/ICES 003 ☒ FCC Part 15.247/RSS 210 ☐ FCC Part 15.209	Measurement Point ☒ Conducted ☐ Radiated ☐	Results
Frequency Range:	☒ 2401-2480MHz		
Antenna Gain:	☐ N/A		
Limit (dwell time)	☒ <0.4 sec within a period of 0.4 sec x N hopping channels		801.6 μ s/channel
Nominal Voltage:	☐ 230VAC ☒ 120VAC		
Tested By:	Yuriy Litvinov		Date: 03/18/2015

Note:	The timing by channel is 833 μ s. During 75 channels $\times$ 0.4 s = 30sec, 30sec/10ms = 3000 hops in 30sec. Using 75 channels the unit will occupy a given channel 40 times, 3000/75=40 times in 30sec, then 40 $\times$ 833 μ s = 33.32 ms, thus the average time of occupancy on any channel is less than 40 ms within a period of 0.4sec.
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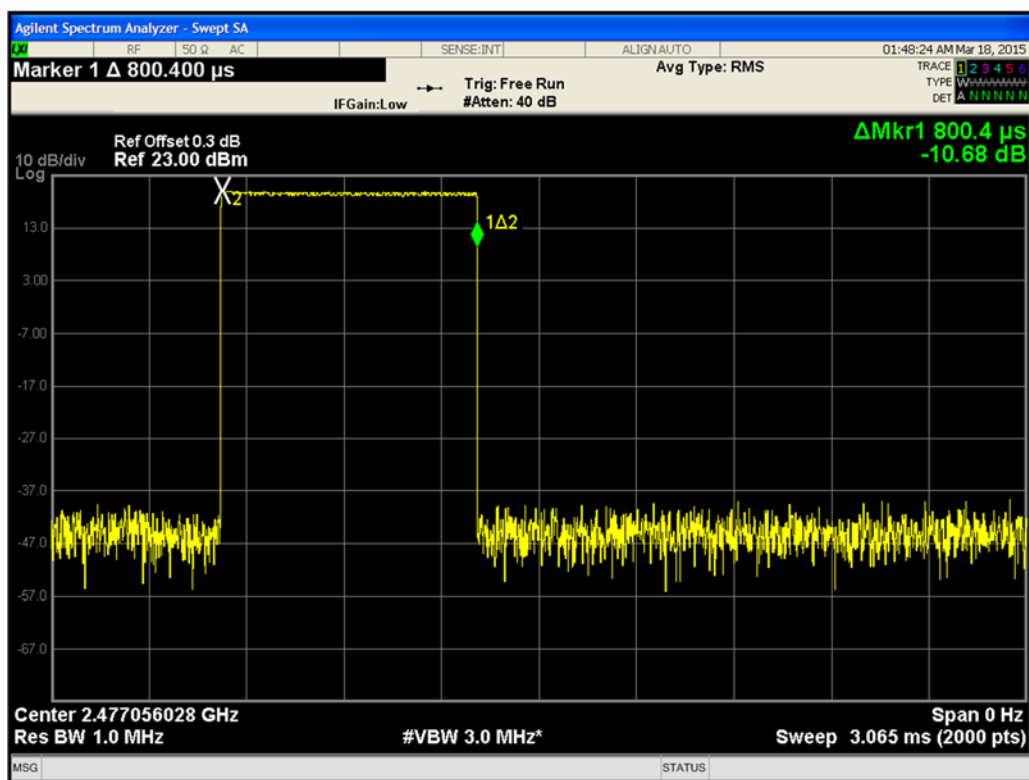




Dwell time low channel



Dwell time mid channel

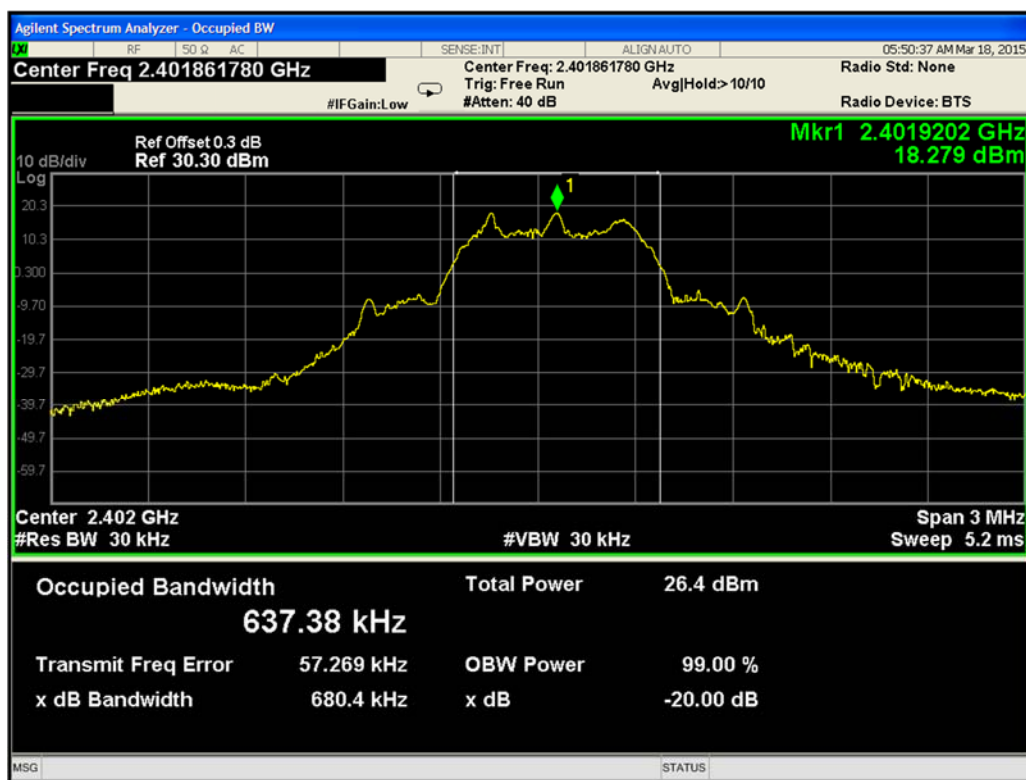


Dwell time high channel

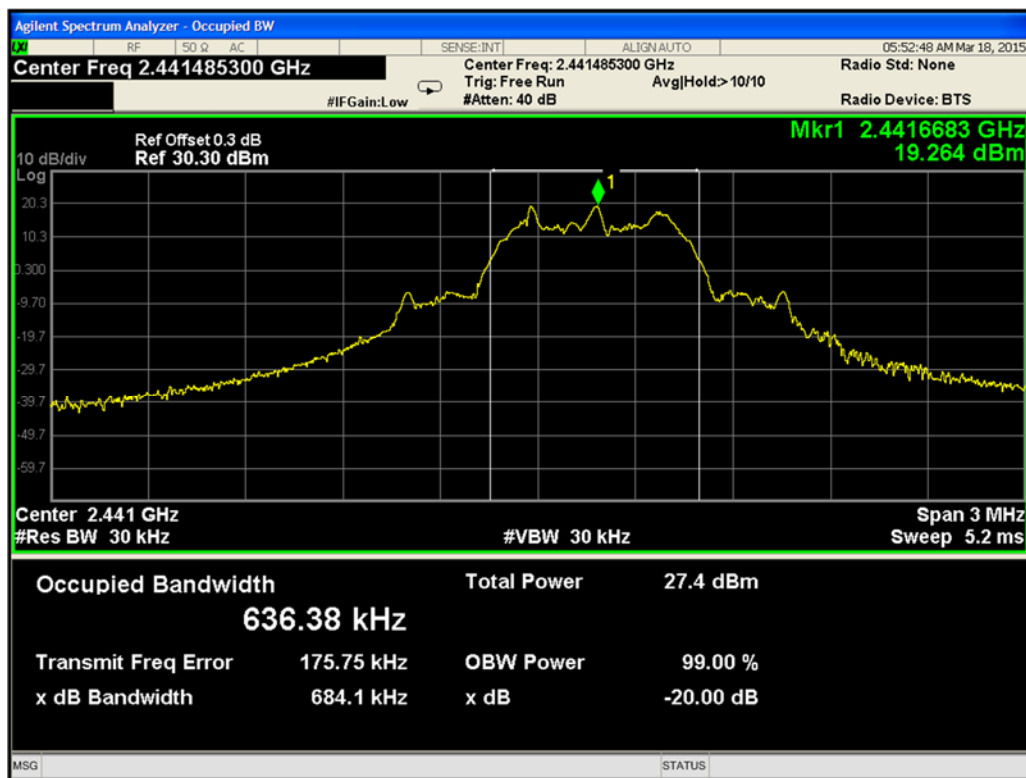


4.6	20dB Bandwidth		
Method:	The measurements were made with transmitter set to transmit continuously un-modulated signal at low, mid and high channels.		
	Laboratory Ambient Temperature	23°C	
	Relative Humidity	35%	
Reference Standard:	☒ ANSI C63.10:2009 ☐ ANSI C63.4:2009 ☒ DA 00-705 ☐ FCC Part 15.109/ICES 003 ☒ FCC Part 15.247/RSS 210 ☐ FCC Part 15.209	Measurement Point ☒ Conducted ☐ Radiated ☐	
Frequency Range:	☒ 2401-2480MHz ☒ 72-75KHz		
Antenna Gain:	☒ N/A	RBW ≥ 1% of the 20 dB bandwidth VBW ≥ RBW	
Nominal Voltage:	☐ 230VAC ☒ 120VAC		
Tested By:	Yuriy Litvinov	Date: 03/18/2015	
Note:			

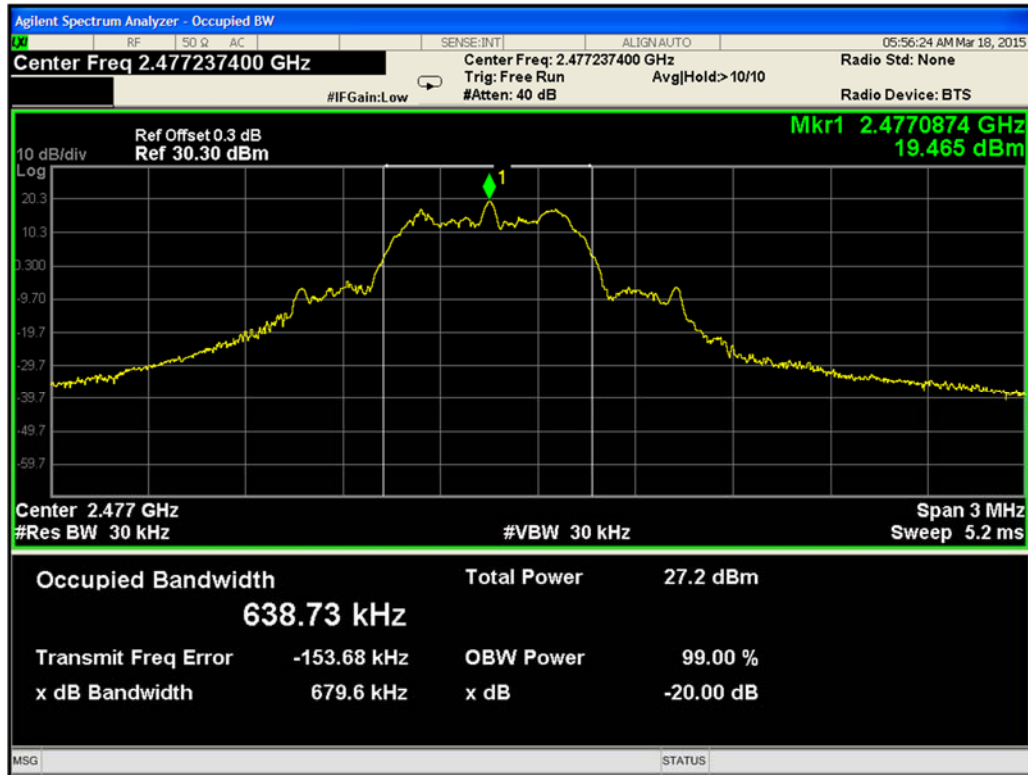
Channels Frequency (MHz)	20 dB Bandwidth (KHz)	Results
2401	680.4	pass
2441	684.1	pass
2477	679.6	pass
Frequency (MHz)	99% Bandwidth (KHz)	Results
73KHz	2.5	pass



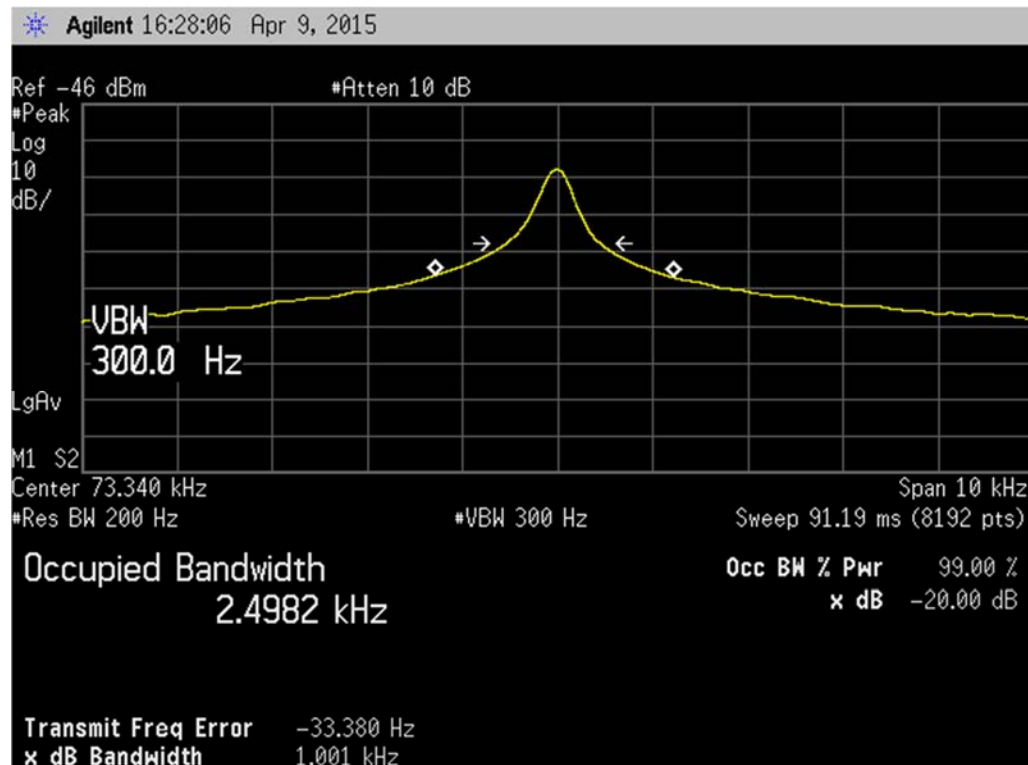
OBW Low channel



OBW Mid channel



OBW High channel

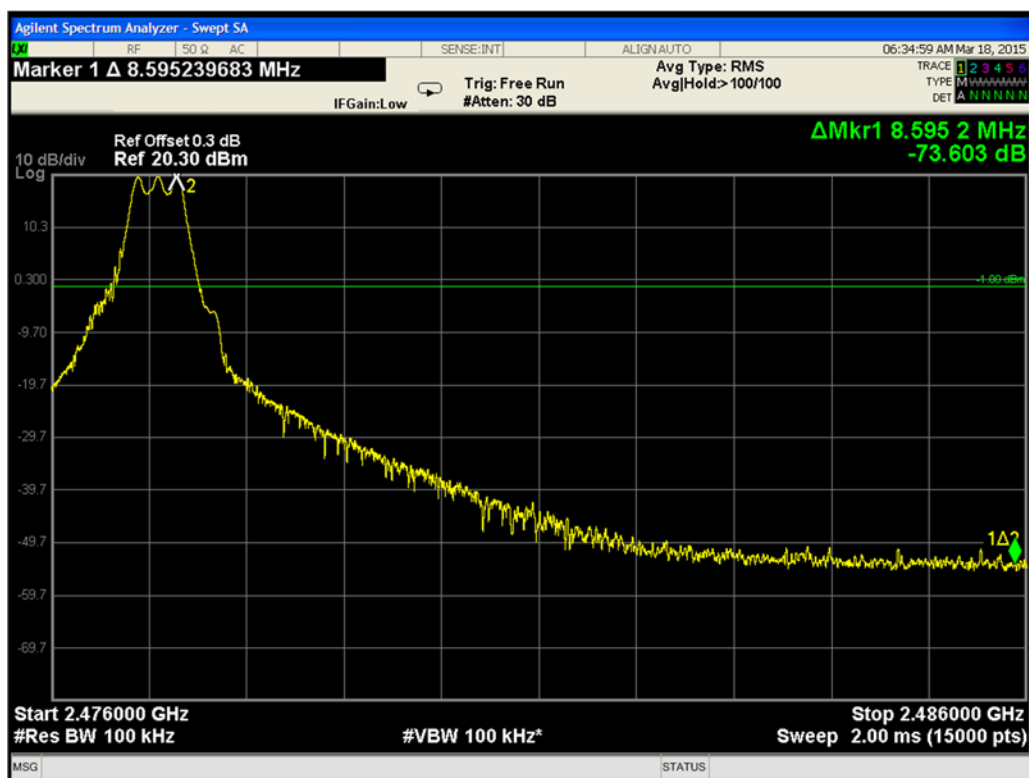
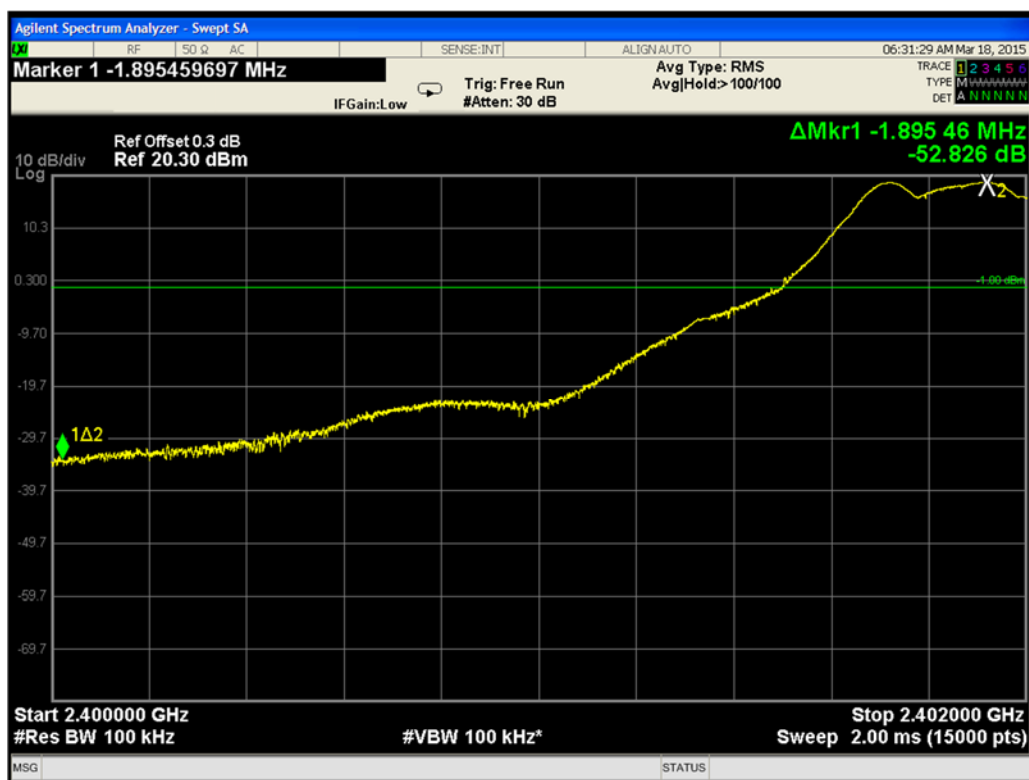


Detection Loop OBW



4.7	Band-Edge Compliance		
Method:	The measurements were made with transmitter set to transmit continuously with un-modulated signal and hopping enabled at low and high channels.		
	Laboratory Ambient Temperature	23°C	
	Relative Humidity	35%	
Reference Standard:	☒ ANSI C63.10:2009 ☐ ANSI C63.4:2009 ☒ DA 00-705 ☐ FCC Part 15.109/ICES 003 ☒ FCC Part 15.247/RSS 210 ☐ FCC Part 15.209	Measurement Point ☐ Conducted ☐ Radiated ☐	
Frequency Range:	☒ 2401-2480MHz		
Antenna Gain:	☒ N/A	Results	
Limit	☒ >20dBc ☐ FCC Part 15.209	>52dBc	
Nominal Voltage:	☒ 120VAC ☐ VDC		
Tested By:	Yuriy Litvinov	Date: 03/18/2015	

Note:

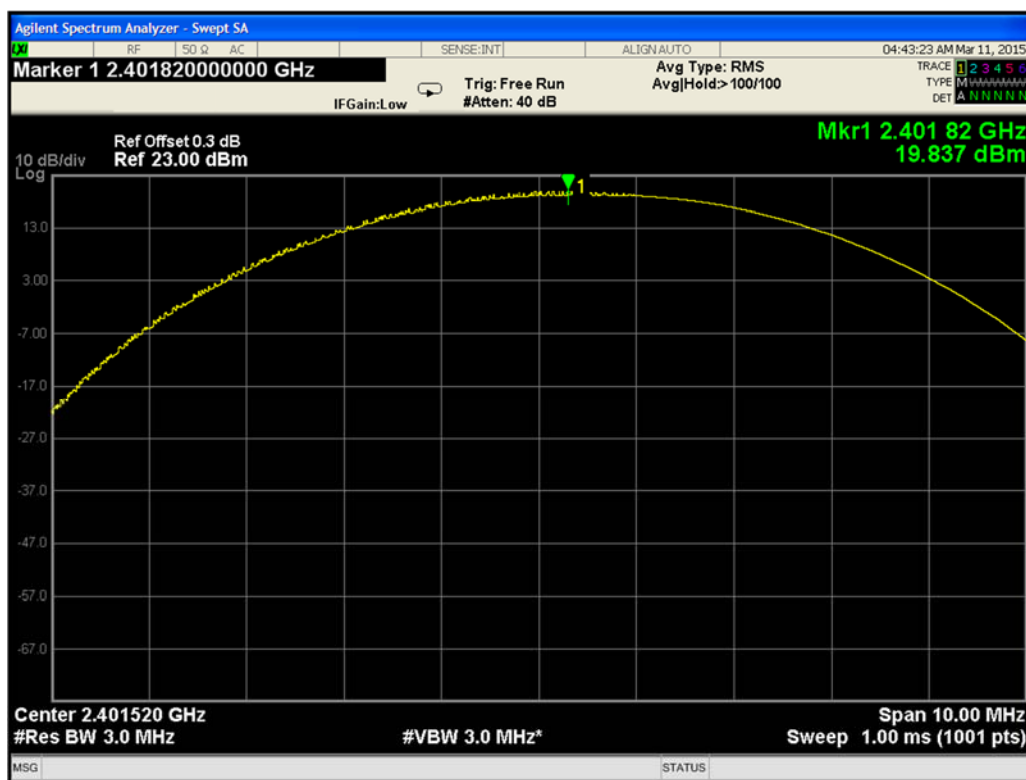




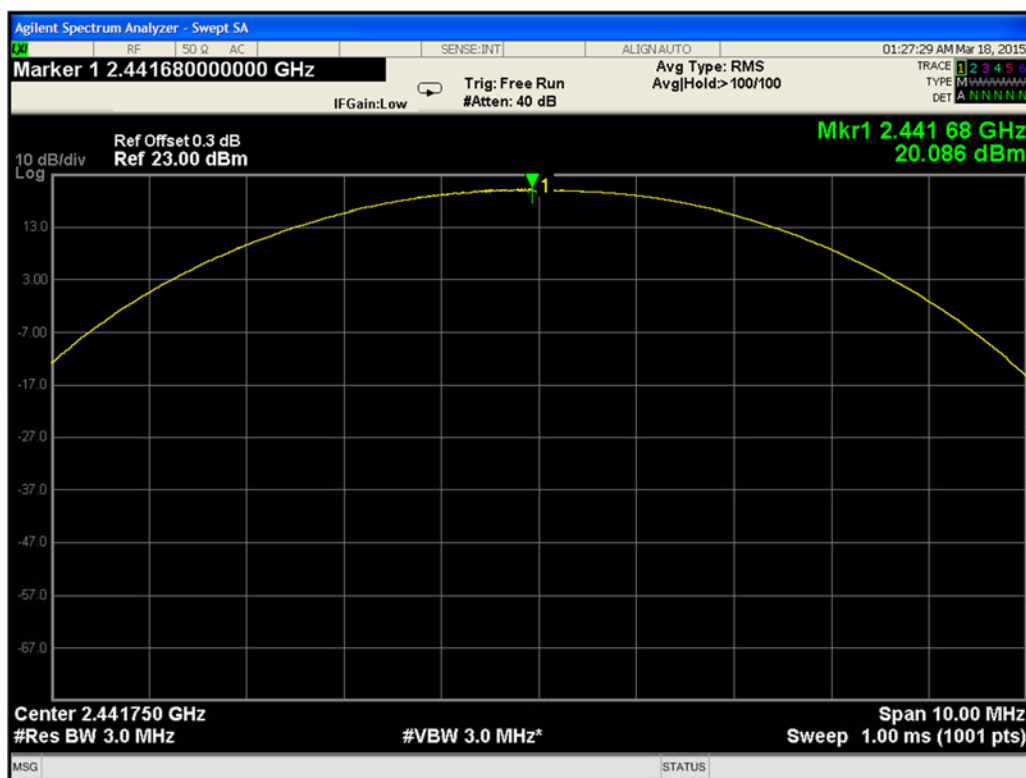
4.8	Conducted Output Power	
Method:	Measurements was performed with an un-modulated carrier at the highest power level at which the transmitter is intended to operate. The transmitter was configured to operate lowest, middle and highest power channels and connected to an antenna port. The carrier or mean power delivered to antenna was measured under normal test conditions. The conducted power was adjusted to take into account the gain of the antenna and stated as EIRP.	
	Laboratory Ambient Temperature	23°C
	Relative Humidity	55%
Reference Standard:	☒ ANSI C63.10:2009 ☐ ANSI C63.4:2009 ☐ FCC Part 15.109/ICES 003 ☒ FCC Part 15.247/RSS 210 ☐ FCC Part 15.209	Measurement Point ☒ Conducted ☐ Radiated ☐
Frequency Range:	☒ 2401-2480MHz	
Antenna Gain:	☒ 8dBi	
Limit	>75 Hopping Channels ☒ 30dBm ☐	<75 Hopping Channels ☐ -9dBm ☐
Nominal Voltage:	☐ 230VAC ☒ 120VAC	
Tested By:	Yuriy Litvinov	Date: 08/20/2013

Channels Frequency (MHz)	Antenna Port	RMS Power (dBm)	Maximum Ant. Gain dBi	Total EIRP Power dBm	Limit (dBm)	Results
2401.5	1	19.8	8	27.8	36	pass
2441	1	20.1	8	28.1	36	pass
2477	1	19.9	8	27.9	36	pass
2401.5	2	18.6	8	26.6	36	pass
2441	2	19.4	8	27.4	36	pass
2477	2	18.9	8	29.9	36	pass

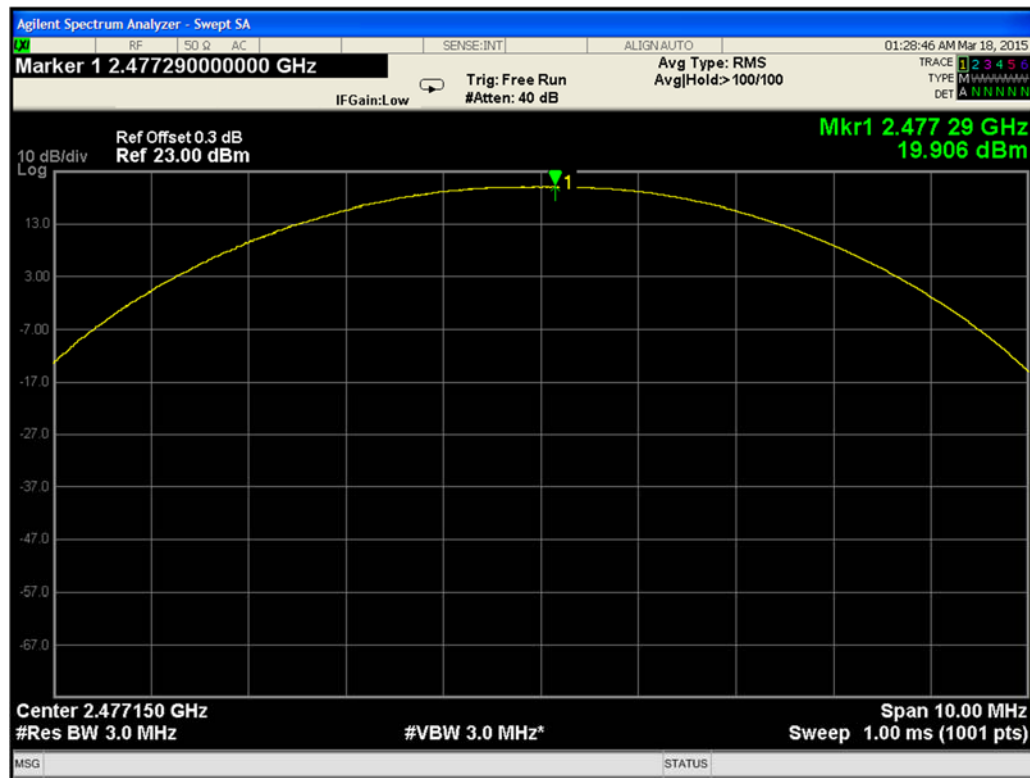
Note:	Total power Includes cable correction factor 0.3dBm. Only one antenna port transmitting at the time from a single RF Module using the antenna diversity switch. Antenna path is identical. EIRP= PdBm + CFdBm + AdBi = 20.1+8=28.1dBm(646mW)
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Low Channel – Ant 1



Mid Channel – Ant 1



High Channel – Ant 1



4.9

Transmitter spurious emissions

Method:

The measurements were made with transmitter set to transmit continuously with un-modulated signal and hopping enabled at low and high channels. The level of spurious emissions was measured as conducted spurious emission and radiated power that falls in a restricted band.

EUT was rotated through three orthogonal axes to determine which attitude (orientation) and arrangement produces the highest emission relative to the limit; the attitude and headset arrangement that produces the highest emission relative to the limit was used in making final radiated emission measurements.

EUT was rotated 360 deg and radiated emissions was measured while the headset situated in three orthogonal planes with the measurement antenna set up in vertical and horizontal polarization. Spurious Radiated emissions measurements were performed with external preamp and a high pass filter.

	Laboratory Ambient Temperature	23°C
	Relative Humidity	35%
Reference Standard:	☒ ANSI C63.10:2009 ☒ ANSI C63.4:2009 ☒ DA 00-705 ☐ FCC Part 15.109/ICES 003 ☒ FCC Part 15.247/RSS 210 ☒ FCC Part 15.209	Measurement Point
		☒ Conducted ☒ Radiated
Frequency Range:	☒ 2401-2480MHz	
Limit	☒ >20dBc	Restricted Band
	☒ FCC Part 15.209	☒ 15.205
Nominal Voltage:	☐ 230VAC ☒ 120VAC	
Tested By:	Mike Schultz <i>MS</i>	Date: 03/23/2015

Limits

Frequency (MHz)	Limit dB (µV/m)			
	Quasi-Peak	Average	Distance	Results
0.009-0.490		2400/F(KHz)	300	N/A
0.490-1.705	24000/F(KHz)		30	N/A
1.705-30	29.5		30	N/A
30 to 88	40		3	N/A
88-216	43.5		3	N/A
216-960	46		3	N/A
Above 960		54	3	pass

Note:

No spurious emissions conducted or radiated were detected in the frequency range above 18GHz.

Pol.	Frequency (MHz)	Peak dBμV/m	AVG dBμV/m	Total CF dB	Net at 3 m dBμV/m.	PK Limit dBμV/m	AVG Limit dBμV/m	AVG Margin dB
H	4804.00	72.30	50.10	-4.20	45.90	74.00	54.00	-8.10
V	4804.00	67.20	45.60	-4.30	41.30	74.00	54.00	-12.70
H	7206.00	43.80	30.80	-1.00	29.80	74.00	54.00	-24.20
V	7206.00	46.90	31.70	-0.90	30.80	74.00	54.00	-23.20
H	1201.25	40.93	28.40	7.60	36.00	74.00	54.00	-18.00
V	1201.25	40.60	28.30	7.50	35.80	74.00	54.00	-18.20
Notes		Total CF = Antenna Factor + Cable Factor - AMP Gain						
		Low Channel. Average readings obtained with the 10Hz VBW Model:RUB09A-2400-SMA, 1/2 wave, Monopole Antenna, 0dBi						

Pol.	Frequency (MHz)	Peak dBμV/m	AVG dBμV/m	Total CF dB	Net at 3 m dBμV/m.	PK Limit dBμV/m	AVG Limit dBμV/m	AVG Margin dB
H	4883.26	67.40	45.8	-4.20	41.60	74.00	54.00	-12.40
V	4883.26	67.40	45.8	-4.30	41.50	74.00	54.00	-12.50
H	7324.47	63.00	41.6	-1.00	40.60	74.00	54.00	-13.40
V	7324.47	64.30	42.5	-1.00	41.50	74.00	54.00	-12.50
H	12208.15	56.20	34.8	6.90	41.70	74.00	54.00	-12.30
V	12208.15	52.4	32.5	6.90	39.40	74.00	54.00	-14.60
Notes		Total CF = Antenna Factor + Cable Factor - AMP Gain						
		Mid Channel. Average readings obtained with the 10Hz VBW Model:RUB09A-2400-SMA, 1/2 wave, Monopole Antenna, 0dBi						

Pol.	Frequency (MHz)	Peak dBμV/m	AVG dBμV/m	Total CF dB	Net at 3 m dBμV/m.	PK Limit dBμV/m	AVG Limit dBμV/m	AVG Margin dB
H	4954.22	66.80	45.2	-4.20	41.00	74.00	54.00	-13.00
V	4954.22	67.10	45.4	-4.30	41.10	74.00	54.00	-12.90
H	7431.33	63.70	42.2	-1.00	41.20	74.00	54.00	-12.80
V	7431.33	69.50	46.9	-0.90	46.00	74.00	54.00	-8.00
H	12385.55	59.80	38.5	7.10	45.60	74.00	54.00	-8.40
V	12385.55	59.40	38.1	7.20	45.30	74.00	54.00	-8.70
Notes		Total CF = Antenna Factor + Cable Factor - AMP Gain						
		High Channel. Average readings obtained with the 10Hz VBW Model:RUB09A-2400-SMA, 1/2 wave, Monopole Antenna, 0dBi						

Pol.	Frequency (MHz)	Peak dBμV/m	AVG dBμV/m	Total CF dB	Net at 3 m dBμV/m.	PK Limit dBμV/m	AVG Limit dBμV/m	AVG Margin dB
H	4804.00	69.80	47.80	-4.20	43.60	74.00	54.00	-10.40
V	4804.00	67.40	45.50	-4.30	41.20	74.00	54.00	-12.80
H	7206.00	53.40	35.40	-1.00	34.40	74.00	54.00	-19.60
V	7206.00	57.90	37.90	-0.90	37.00	74.00	54.00	-17.00
H	1201.25	43.20	30.00	7.60	37.60	74.00	54.00	-16.40
V	1201.25	45.50	31.00	7.50	38.50	74.00	54.00	-15.50
Notes		Total CF = Antenna Factor + Cable Factor - AMP Gain						
		Low Channel. Average readings obtained with the 10Hz VBW Model: HG2408P, Round Patch Antenna, 8dBi						

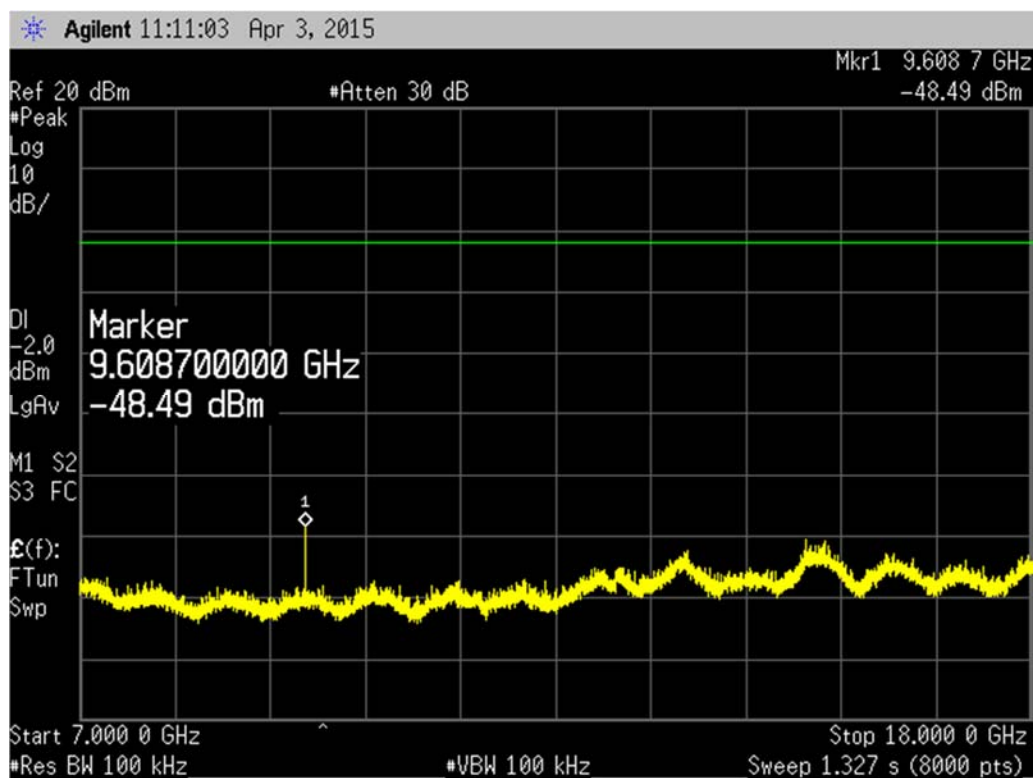
Pol.	Frequency (MHz)	Peak dBμV/m	AVG dBμV/m	Total CF dB	Net at 3 m dBμV/m.	PK Limit dBμV/m	AVG Limit dBμV/m	AVG Margin dB
H	4883.26	68.90	46.7	-4.20	42.50	74.00	54.00	-11.50
V	4883.26	66.90	44.9	-4.30	40.60	74.00	54.00	-13.40
H	7324.47	60.90	40.0	-1.00	39.00	74.00	54.00	-15.00
V	7324.47	62.00	40.8	-1.00	39.80	74.00	54.00	-14.20
H	12208.15	41.20	29.2	6.90	36.10	74.00	54.00	-17.90
V	12208.15	43.1	29.1	6.90	36.00	74.00	54.00	-18.00
Notes		Total CF = Antenna Factor + Cable Factor - AMP Gain						
		Mid Channel. Average readings obtained with the 10Hz VBW Model: HG2408P, Round Patch Antenna, 8dBi						

Pol.	Frequency (MHz)	Peak dBμV/m	AVG dBμV/m	Total CF dB	Net at 3 m dBμV/m.	PK Limit dBμV/m	AVG Limit dBμV/m	AVG Margin dB
H	4954.22	64.50	43.2	-4.20	39.00	74.00	54.00	-15.00
V	4954.22	62.90	41.9	-4.30	37.60	74.00	54.00	-16.40
H	7431.33	65.10	43.2	-1.00	42.20	74.00	54.00	-11.80
V	7431.33	69.20	46.6	-0.90	45.70	74.00	54.00	-8.30
H	12385.55	56.00	35.2	7.10	42.30	74.00	54.00	-11.70
V	12385.55	56.60	35.6	7.20	42.80	74.00	54.00	-11.20
Notes		Total CF = Antenna Factor + Cable Factor - AMP Gain						
		High Channel. Average readings obtained with the 10Hz VBW Model: HG2408P, Round Patch Antenna, 8dBi						

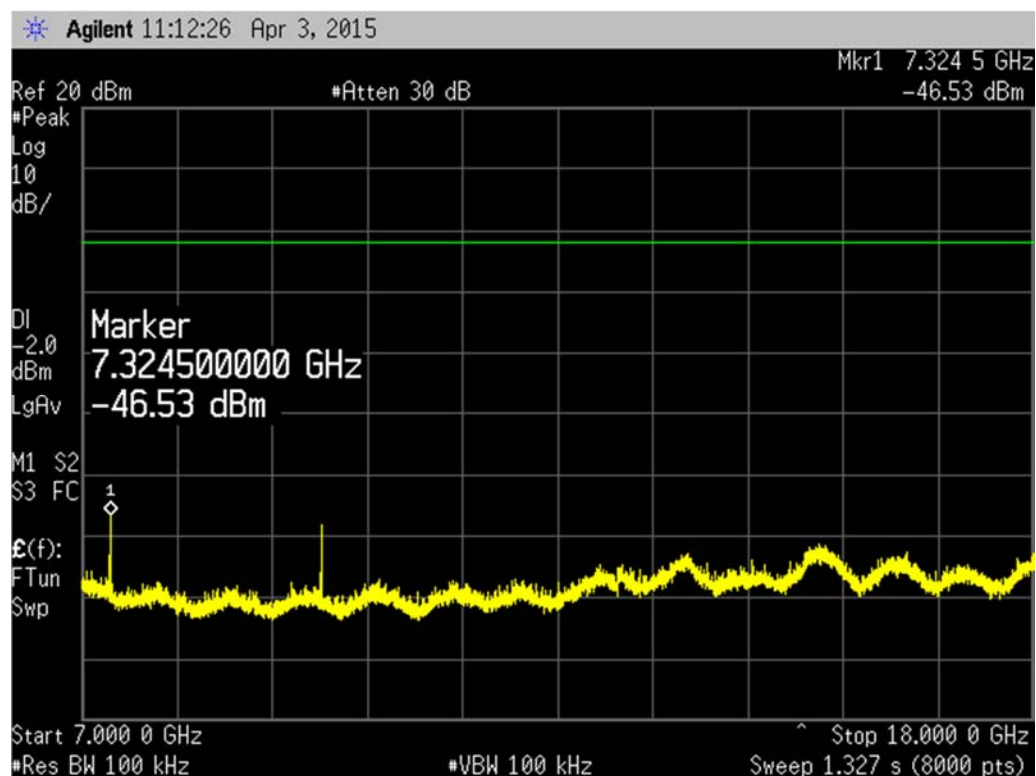
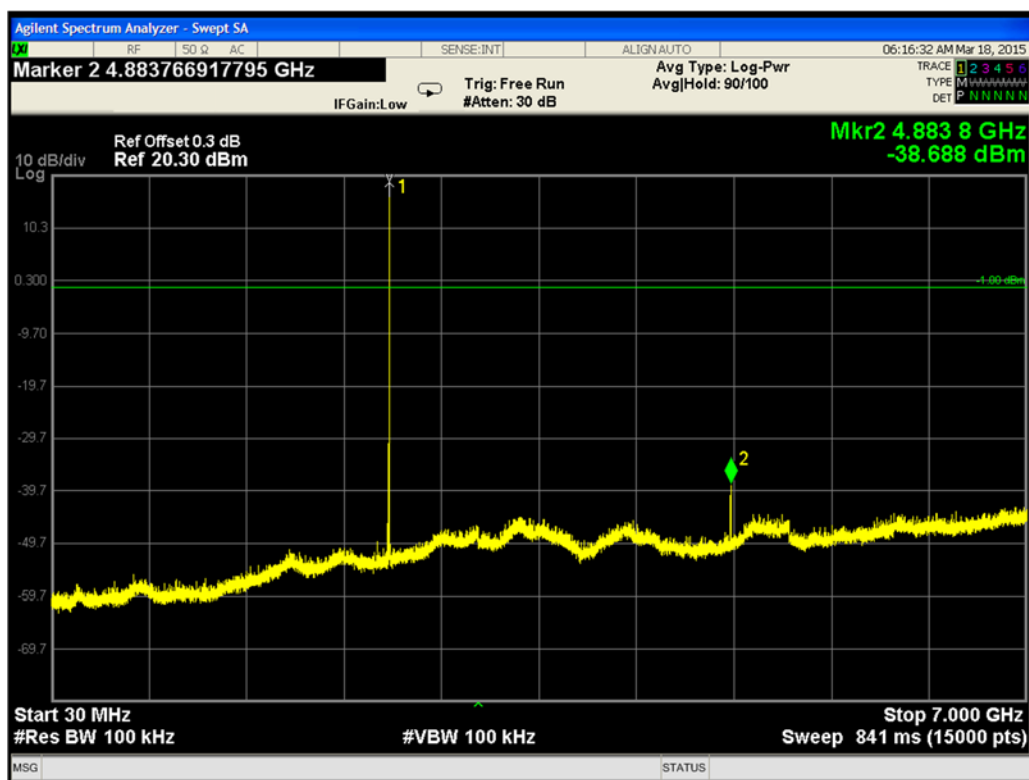
Pol.	Frequency (MHz)	Peak dBμV/m	AVG dBμV/m	Total CF dB	Net at 3 m dBμV/m.	PK Limit dBμV/m	AVG Limit dBμV/m	AVG Margin dB
H	4804.00	71.40	49.00	-4.20	44.80	74.00	54.00	-9.20
V	4804.00	68.30	46.20	-4.30	41.90	74.00	54.00	-12.10
H	7206.00	51.90	33.80	-1.00	32.80	74.00	54.00	-21.20
V	7206.00	55.60	36.00	-0.90	35.10	74.00	54.00	-18.90
H	1201.25	48.60	31.10	7.60	38.70	74.00	54.00	-15.30
V	1201.25	46.60	29.90	7.50	37.40	74.00	54.00	-16.60
Notes		Total CF = Antenna Factor + Cable Factor - AMP Gain						
		Low Channel. Average readings obtained with the 10Hz VBW Model: HGV-2409U, Omni directional Antenna, 8dBi						

Pol.	Frequency (MHz)	Peak dBμV/m	AVG dBμV/m	Total CF dB	Net at 3 m dBμV/m.	PK Limit dBμV/m	AVG Limit dBμV/m	AVG Margin dB
H	4883.26	68.20	45.8	-4.20	41.60	74.00	54.00	-12.40
V	4883.26	67.80	45.6	-4.30	41.30	74.00	54.00	-12.70
H	7324.47	59.20	38.2	-1.00	37.20	74.00	54.00	-16.80
V	7324.47	60.90	39.6	-1.00	38.60	74.00	54.00	-15.40
H	12208.15	40.30	26.9	6.90	33.80	74.00	54.00	-20.20
V	12208.15	42.4	27.5	6.90	34.40	74.00	54.00	-19.60
Notes		Total CF = Antenna Factor + Cable Factor - AMP Gain						
		Mid Channel. Average readings obtained with the 10Hz VBW Model: HGV-2409U, Omni directional Antenna, 8dBi						

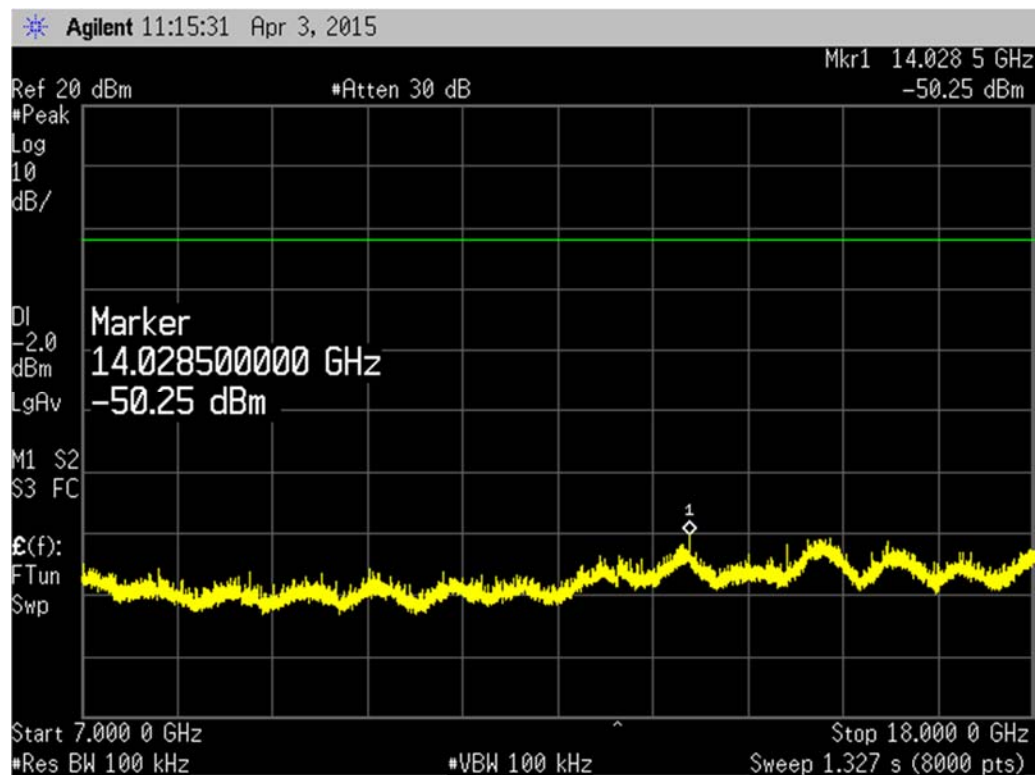
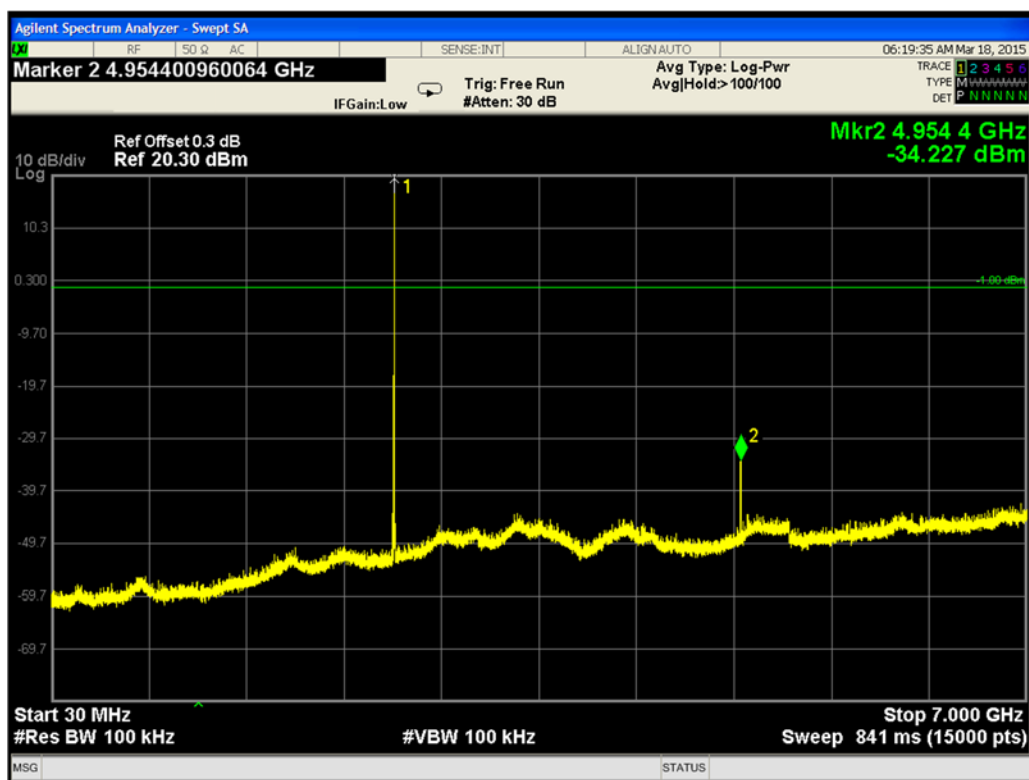
Pol.	Frequency (MHz)	Peak dBμV/m	AVG dBμV/m	Total CF dB	Net at 3 m dBμV/m.	PK Limit dBμV/m	AVG Limit dBμV/m	AVG Margin dB
H	4954.22	63.30	42.1	-4.20	37.90	74.00	54.00	-16.10
V	4954.22	64.60	43.2	-4.30	38.90	74.00	54.00	-15.10
H	7431.33	65.60	43.6	-1.00	42.60	74.00	54.00	-11.40
V	7431.33	69.00	46.5	-0.90	45.60	74.00	54.00	-8.40
H	12385.55	56.90	35.7	7.10	42.80	74.00	54.00	-11.20
V	12385.55	57.80	36.3	7.20	43.50	74.00	54.00	-10.50
Notes		Total CF = Antenna Factor + Cable Factor - AMP Gain						
		High Channel. Average readings obtained with the 10Hz VBW Model: HGV-2409U, Omni directional Antenna, 8dBi						



Conducted Spurious Emissions low channel



Conducted Spurious Emissions mid channel



Conducted Spurious Emissions High channel



Test Set Up Photo



4.10

RF Exposure Compliance

Reference Standard:	☒ IEEE Std 1528a	
	☒ RSS 102, Issue 5	
	☒ KDB 447498	
	☐ KDB	☒ MPE
	☒ FCC Parts 2.1091 and 2.1093	☐ SAR Evaluation
	☐ OET 65	
Frequency Range:	☒ 2401-2480MHz	
Antenna Separation Distance	>20cm	
Duty Cycle	7.63%	
Time-Averaged Output power (EIRP)	49.3 mW	
SAR Test Exclusion Threshold for 100MHz – 6GHz @25mm		
FCC	96 mW (>50mm)	
RSS 102, Issue 5	309 mW (>50mm)	

Note:

There active transmission is 736 μ s within a 833 μ s slot a 10ms period, the duty cycle will be around 7.36%. To be absolutely accurate the base station does transmit an extended preamble which add a further 16bits (total of 440bits at 576 Kbits/s every 10ms) thus taking the figure of duty cycle to 7.63%.



5.0

Test Equipment

Test Equipment Used

Description	Manufacturer	Model	Identifier	Cal. Due	Check
Biconilog Antenna	Schaffner	CBL6112B	27491	10/2015	☒
Horn Antenna	AH Systems	SAS 571	1010	10/2015	☒
Loop Antenna	EMCO	ALR25M	1011	10/2015	☐
EMI Receiver	Rohde & Schwarz	ESIB 40	100235	10/2015	☐
EMI Receiver	Agilent	E4448A	1530975	10/2015	☒
Signal Analyzer	Agilent	N9000A	MY53031040	10/2015	☒
LISN	TESEQ	NNB51	1130	10/2015	☒
Harmonic/Flicker Source	Cal. Instruments	C4-5001iX	57162	10/2015	☐
Amplifier	AR	250W1000AM	14354	10/2015	☐
Amplifier	AR	25S1G4A	4003	10/2015	☐
Signal Generator	HP	8656A	2326A05125	10/2015	☐
Signal Generator	Agilent	E8257D	160895	10/2015	☐
Field Probe	AR	FL7006	25019	10/2015	☐
Field Monitor	AR	FM2000	14292	10/2015	☐
AC CDN	Schaffner	M316,	21937	10/2015	☐
AC CDN	Teseq	M016,	26131	10/2015	☐
ISN	Teseq	T4	25652	10/2015	☐
Current Injection Coil	A.H. Systems	ICP-200/521	149	10/2015	☐
RF Conducted System	TESEQ	NSG 4070-75	1141	10/2015	☐
ESD Generator	KeyTek	MZ-15/EC	609325	10/2015	☐
EFT/Surge Generator	ThermoFisher	EMC Pro Plus	1146	10/2015	☐
EMF Meter	NARDA	ELT400	1139	10/2015	☐
Absorbing Clamp	Rhode & Schwarz	MDS-21	1001	10/2015	☐
EMF Test Generator	FCC	F-1000-4-8-G	9940	10/2015	☐
AC Power System	Titan	MAC-03	6619921	10/2015	☐
EMC Software	ETS-Lindgren	TILE 6		10/2015	☒

6.0

Report revision history

Revision Level	Date	Report Number	Notes
0	04/20/2015	RE1405035-1	Original Issue



3M EMC Laboratory

Report Number: RE1405035-1
Date: April 20, 2015

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Certificate of Conformity

3M EMC Laboratory

SEMS Global Regulatory Engineering
Building 76-01-01
St. Paul, MN 55144-1000, USA

MANUFACTURER'S NAME
NAME OF EQUIPMENT
MODEL NUMBER(S)
TEST REPORT NUMBER
DATE OF ISSUE

3M COMPANY
3M™ Drive Thru Base Station
G5B1
RE1405035-1
April 20, 2015

Referring to the performance criteria and operating mode during the tests specified in this report the equipment complies with the essential requirements herein specified:

47 CFR Part 15 - Subpart C -
Intentional Radiator

FCC Parts 15.247 and 15.209

License-exempt Radio Apparatus (All
Frequency Bands): Category I
Equipment

RSS 210, Issue 8, 2010

Emissions

FCC Parts 15.107 and 15.109
ICES-003, Issue 5, 2012

Comments:

Yuriy Litvinov

Yuriy Litvinov
Lead EMC Engineer



NVLAP Lab Code 200033-0