Project 17666-15

Hubbell Building Automation NXBTR

Wireless Certification Report

Prepared for:

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Hubbell Building Automation
9601 Dessau Road
Building 1
Austin, TX 78754

By

Professional Testing (EMI), Inc. 1601 North A.W. Grimes Blvd., Suite B Round Rock, Texas 78665

30 Nov 2015

Reviewed by

Written by

Larry Finn Chief Technical Officer Eric Lifsey EMC Engineer

Revision History

Revision Number	Description	Date
00	Draft for client and internal review.	23 Nov 2015
01	Revised per reviewer comments, revised address.	30 Nov 2015

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None.

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Compliance Certificate

Applicant	Device & Test Identifica	tion
Hubbell Building Automation (Eric Weber)	FCC ID:	YH9NXBTR
9601 Dessau Road	Industry Canada ID:	9044A-NXBTR
Building 1	Model(s):	NXBTR
Austin, TX 78754-3962		
Certificate Date: 23 Nov 2015	Laboratory Project ID:	17666-15

The device named above was tested utilizing the following documents and found to be in compliance with the required criteria:

Requirement	Reference	Detail
FCC 47 CFR Part 15 C	15.247	Operation within the bands 902-928 MHz, <u>2400-2483.5 MHz</u> , and 5725-5850 MHz.
FCC 47 CFR Part 15 C	15.209	Radiated emission limits; general requirements.
FCC 47 CFR Part 15 C	15.107, 15.207	Conducted emission limits.
FCC 47 CFR Part 15 C	15.205	Restricted Bands of Operation
KDB 558074 D01	DR01	DTS Measurement Guidance v03r02
KDB 412172	D01	Guidelines for Determining the ERP and EIRP of an RF Transmitting System
OET Bulletin 65*	Edition 97-01, and Supplement C, Ed. 01-01	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields
RSS-247	Issue 1	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence- Exempt Local Area Network (LE-LAN) Devices
RSS-Gen	Issue 4	General Requirements and Information for the Certification of Radio Apparatus
RSS-102	Issue 4	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

^{*}MPE is reported separately from this document. **Corresponding RSS references are listed in the body of the report.

I, Eric Lifsey, for Professional Testing (EMI), Inc., being familiar with the above requirements and test procedures have reviewed the test setup, measured data, and this report. I believe them to be true and accurate.



This report has been reviewed and accepted by the Applicant. The undersigned is responsible for ensuring that this device will continue to comply with the requirements listed above.

Representative of Applicant	

1.0 Introduction

1.1 Scope

This report describes the extent to which the equipment under test (EUT) conformed to the intentional radiator requirements of the United States and Canada.

Professional Testing (EMI), Inc., (PTI) follows the guidelines of National Institute of Standards and Technology (NIST) for all uncertainty calculations, estimates, and expressions thereof for electromagnetic compatibility testing.

1.2 EUT Description

Table 1.2.1: Equipment Under Test				
Manufacturer / Model Serial # Description				
Hubbell Building Automation / NXBTR	77B275	2400-2483.5 MHz FHSS transceiver; using Bluetooth Low Energy radio protocols.		

Table 1.2.2: Support Equipment				
Manufacturer / Model	Serial #	Description		
none		none		

The EUT designed as a pluggable wireless bridge from the building control system to a wireless personal device with software to monitor/adjust the building control system.

The EUT measures approximately 48 mm x 12 mm x 18 mm. It includes a permanently embedded cable/connector of length 90 mm of modular RJ style. It plugs into a service port of the host system where it exchanges serial data by RS-485 and receives power. Power is 16 to 30 VDC and requires a peak current of 16 mA in operation.

1.3 EUT Operation

The EUT was exercised in a manner consistent with normal operations.

The EUT was tested as a DTS device as its bandwidth satisfies the DTS minimum bandwidth requirements. In the final application it will be also hopping per the Bluetooth protocol.

1.4 Modifications to Equipment

No modifications were made to the EUT during the performance of the test program.

A 2nd cable connector, like the original, was added to allow operating DC voltage to be applied since it could not be provided by the programmer card used to exercise the EUT. Once the EUT was placed into a given operating mode, the programmer card was disconnected and removed from test.

1.5 Test Site

Measurements were made at the PTI semi-anechoic facility designated Site 45 (FCC 459644, IC 3036B-1) in Austin, Texas. The site is registered with the FCC under Section 2.948 and Industry Canada per RSS-GEN, and is subsequently confirmed by laboratory accreditation (NVLAP). The test site is located at 11400 Burnet Road, Austin, Texas 78758, while the main office is located at 1601 North A.W. Grimes Boulevard, Suite B, Round Rock, Texas, 78665.

1.6 Radiated Measurements

Radiated levels are determined as follows:

Raw Measured Level + Antenna Factor + Cable Losses - Amplifier Gain = Corrected Level

Conducted RF levels are determined as follows:

Raw Measured Level + Attenuator Factor + Cable Losses = Corrected Level

Conducted mains levels are determined as follows:

Raw Measured Level + LISN Factor + Cable/Filter/Limiter Losses = Corrected Level

Additionally, measurement distance extrapolation factors are applied and documented where used.

1.7 Applicable Documents and Clauses

Table 1.7.1: Applicable Documents				
Document	Title			
47 CFR	Part 15 – Radio Frequency Devices			
47 CFR	Subpart C -Intentional Radiators			
DCC 247 I 4	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-			
RSS-247 Issue 1	Exempt Local Area Network (LE-LAN) Devices			
RSS-Gen Issue 4	General Requirements and Information for the Certification of Radio Apparatus			
ANGLOGA 4 2000	American National Standard for Methods of Measurement of Radio-Noise Emissions			
ANSI C63.4 2009	from Low Voltage Electrical and Electronic Equipment			

Table 1.7.2: Applicable Clauses						
Parameter	FCC Part 15 Rule Paragraphs	IC RSS References				
Transmitter Characteristics	15.247	RSS-247 5.2 (DTS) & 5.4, RSS-Gen				
Bandwidth	15.247(a)(1), 2.1049, KDB 558074 D01	RSS-Gen 4.6				
Spurious Emission	15.247, 15.209, 15.205	RSS-247 5.5, RSS-GEN 4.9, 4.10				
Band Edge	15.247, 15.205	RSS-247 5.5, RSS-Gen 4.9				
Antenna Requirement	15.203	RSS-Gen 8.3				
Conducted Emissions, Mains	15.207	RSS-Gen 8.8				

2.0 Fundamental Power and Duty Cycle

2.1 Test Procedure

Modulation is disabled and peak power is measured using radiated means. The transmitter hopping sequence is disabled to operate on a single channel for the measurement.

Modulation is enabled and duty cycle measurement is taken based on intervals not to exceed 100 msec. Maximum transmitter on time is divided by the lesser of 100 msec or the actual measured minimum transmitter interval time. The result is converted to dB and applied as needed to peak measurements of transmitter artifacts to determine average power. This is not a pass/fail measurement.

2.2 Test Criteria

47 CFR (USA) // IC (Canada)						
Section Reference	Date					
15.247(a)(3) // RSS-247 5.2	Fundamental Power Conducted Limits 1 W Limit Restated as Field: 125.23 dBμV/m @ 3 m	15 Nov 2015				

2.3 Test Results, Peak Power

The EUT was measured for radiated power in normal position of horizontal orientation. It is not operated hand-held.

Table 2.3.1 Power, Peak, Radiated							
Frequency MHz	Measured Peak Power dBμV/m @ 10 m Vertical Polarity	Measured Peak Power dBμV/m @ 10 m Horizontal Polarity	Maximum Measured Peak Power Restated as EIRP dBm				
2402	86.9	89.4	4.6				
2440	87.6	88.2	3.4				
2480	86.8	84.3	2.0				

Measured in 1 MHz RBW, 3 MHz VBW.

The EUT was found to be in compliance with the applicable criteria. Fundamental field strength was extracted from measurements during spurious tests with an unmodulated carrier.

2.4 Test Results, Duty Cycle

Measurement is based on intervals not to exceed 100 msec. Maximum transmitter on time is divided by the lesser of 100 msec or the actual measured minimum transmitter interval time. The result is converted to dB and applied as needed to peak measurements of transmitter artifacts to determine average power. This is not a pass/fail measurement.

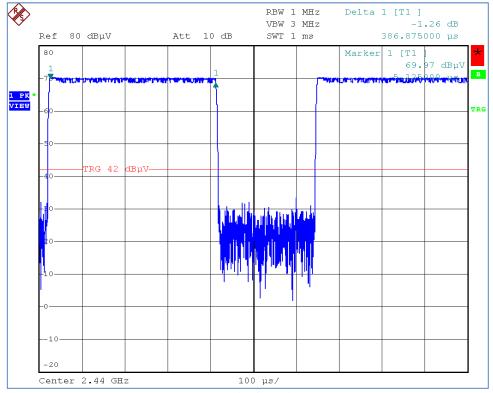
The EUT was placed in the packet transmit mode representing a high transmit duty cycle that likely exceeds that of normal operation but provides a conservative result.

Table 2.4.1 Duty Cycle Factor Result										
Measured On Time (msec)	Measured Time Period (msec)	Duty Cycle Factor Calculation	Result (dB)	Duty Cycle Factor Allowed (dB)						
0.3869	0.624	= 20 * Log ₁₀ (0.3869 msec / 0.624 msec)	-4.15	-4.15						

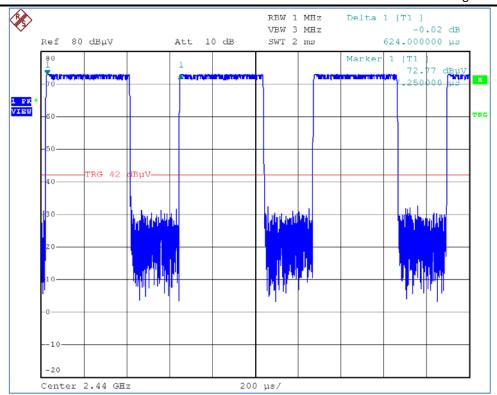
The allowed duty cycle factor is applied to peak measured harmonic signals to find average levels.

The source based factor for exposure is half of the above or: -2.08 dB

Plotted results appear below.



Transmit On Time



Transmit Period

3.0 Power Spectral Density

3.1 Test Procedure

A spectrum analyzer is either connected directly to the EUT or used by radiated means to measure the fundamental emission. It is adjusted to measure the power spectral density in the prescribed resolution bandwidth.

3.2 Test Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date
15.247(e) // RSS-247, 5.2	Power Spectral Density, Conducted Limit: 8 dBm / 3 kHz	23 Nov 2015

3.3 Test Results

The fundamental peak power measured below the 8 dBm limit for this test; the EUT satisfies the criteria without additional measurement.

4.0 Occupied Bandwidth

4.1 Test Procedure

Bandwidth is measured by radiated means. A recording of the results is included.

4.2 Test Criteria

47 CFR (USA) // IC (Canada)										
Section Reference	Parameter	Date(s)								
14.247(a)(2), 2.1049, KDB 558074 D01 // RSS-Gen 4.6	Bandwidth, 6 dB, 20 dB	16 Nov 2015								

4.3 Test Results

The bandwidth measurement is used to verify DTS characteristics and/or for general reporting for agency application.

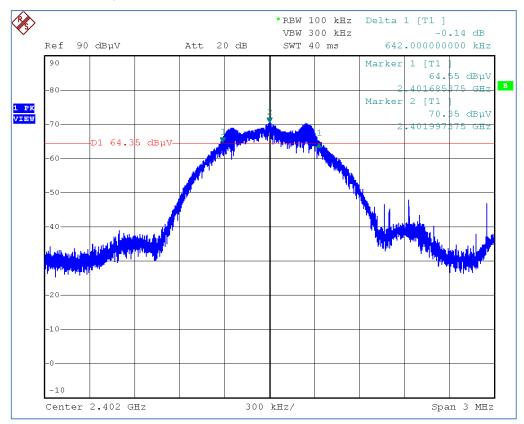
The EUT was found to be in compliance with applicable requirements.

Table 5.3.1 Bandwidth 6 dB, Minimum 500 kHz in 100 kHz RBW										
Low Channel	Mid Channel	High Channel	Reported							
Measured BW	Measured BW	Measured BW	Minimum BW							
(kHz)	(kHz)	(kHz)	(kHz)							
642	666	654	642							

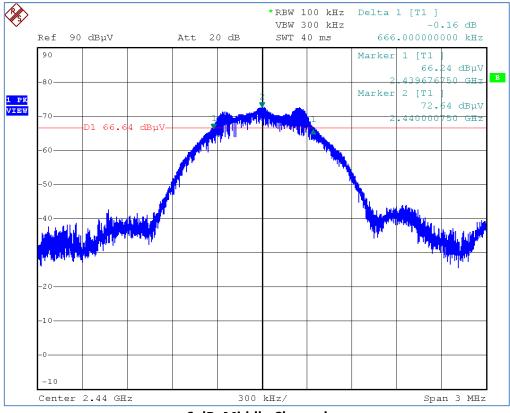
Table 5.3.2 Bandwidth 20 dB, Measure and Report										
Low Channel	Mid Channel	High Channel	Reported							
Measured BW	Measured BW	Measured BW	Maximum BW							
(kHz)	(kHz)	(kHz)	(kHz)							
1080	1062	1086	1086							

Plotted measurements appear on the following pages.

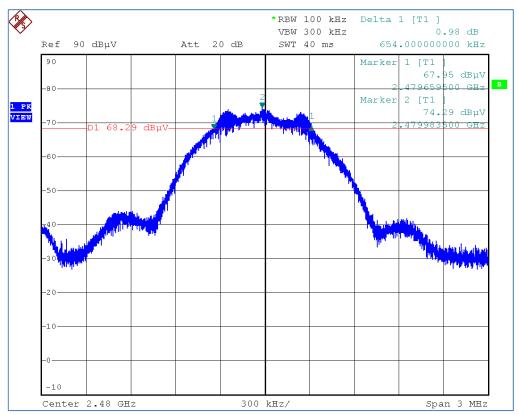
4.3.1 Bandwidth Plots, 6 dB



6 dB, Low Channel

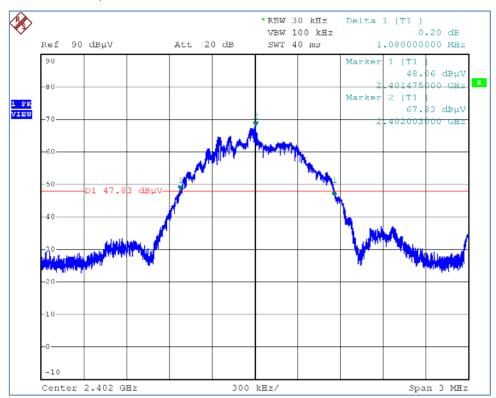


6 dB, Middle Channel

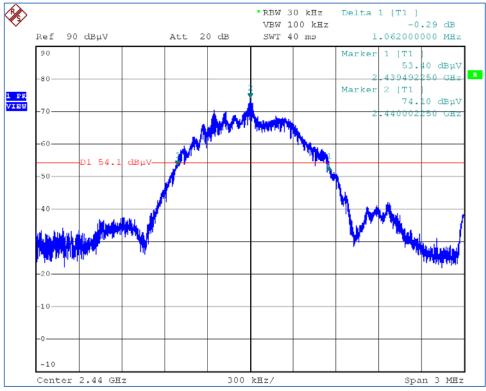


6 dB, High Channel

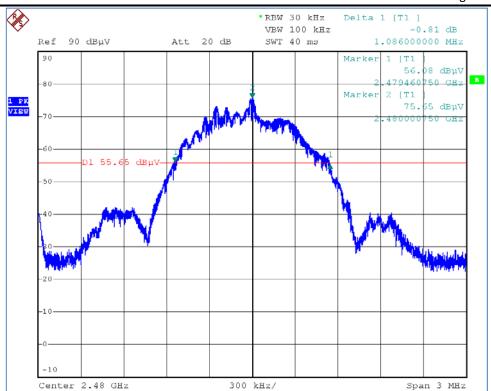
4.3.2 Bandwidth Plots, 20 dB



20 dB, Low Channel



20 dB, Middle Channel



20 dB, High Channel

5.0 Band Edge

5.1 Test Procedure

EUT is placed into normal transmit operation on the nearest band edge channel. The spectrum analyzer is approximately centered on the band edge frequency with span sufficient to include the peak of the adjacent fundamental signal. Measurement includes at least two standard bandwidths from the respective band edge. If required, the band-edge marker-delta method of C63.4 is utilized.

5.2 Test Criteria

47 CFR (USA) // IC (Canada)									
Section Reference	Parameter	Date(s)							
15.247, 15.205 //	Unwanted Emissions Adjacent to Authorized	16 Nov 2015							
RSS-247 5.5, RSS-Gen 4.9	Band, Radiated	16 Nov 2015							

5.3 Test Results

Measurements included more than 2 standard bandwidths (standard bandwidth 1 MHz) from the band edges to provide a clear view of the fundamental and the declining emission levels. Peak detection with max-hold was employed.

Peak detection of emissions at both band edges were below the general emission limits for average limit levels. Also, the duty cycle averaging factor applies -4.15 dB to the peaks recorded.

The EUT satisfied the criteria. Plotted results appears on the following pages.

5.3.1 Low Channel Band Edge

		Profession	nal Testing	g, EMI, Ir	nc.							
Test Method:		2003: "Methods of uipment in the Ran					•	ical and	j			
n accordance with:	FCC Part 15.2 Limits	CC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissimits										
Section:	15.209											
Test Date(s):	11/15/2015	5	EUT S	Serial #:	None							
Customer:	Hubbell Bu	ilding Automati	on EUT F	Part #:	None							
Project Number:	17666-15			Technician:	Eric Li	fsey						
Purchase Order #:	NA		Supe	rvisor:	Lisa A	rndt						
quip. Under Test:	NX Bluetoo	th Bridge Modu		ess' Name:	None							
Radia	ted Emission	s Test Results Da	ata Sheet: Ban	d Edge		Page:	1	of	1			
EUT Line Voltage	8 VDC	EU	EUT Power Frequency:			N/A						
Antenna Orientat	ion:	Vertical		Frequency Range: Above 1GH								
EUT	Mode of Ope	eration:		Trai	nsmit Mode	Low Cha	nnel					
Professional Testing Radiated Emissions, 3m I 1-18GHz Vertical Polarity Me 90 80 (III / 70 60 40 50 60 40 50 60 60 60 60 60 60 60 60 60 60 60 60 60	Distance	And the black of a constitution of a constitution of the black of the			Average Lin Corrected A Peak Limit I Corrected P Edge_Marke	verage Reading Level eak Reading	PROFES	SIONAL				
30 23980G 2.3984G Operator: Spencer Flint 17666 RENXBTRunxx TxM 11:15:06 PM, Monday, Nove	_	2.3992G 2.3996 11615.til Mode: Transmit M Power: Battery Position: Side; Test	Frequency Iodulated, Low Chan	2.4004G	EUT: NX Blu Project Num	2.4012G tetooth Bridege Mo ber: 17666-15 bell Building Autom		2.402	:0G			

							H	lubbell l	Building <i>P</i>	utomat	ion – ľ	AXB	
		Р	rofe	ssional	l Testir	ig, EMI	, Inc.						
Test Method:						nt of Radio-Noise Emissions from Low-Voltage Electrical and o 40 GHz" (incorporated by reference, see §15.38).							
n accordance with:	FCC Par Limits	t 15.209 -	· Code o	of Federal R	egulations	Part 47, Sub	part C - Int	entional	Radiators	, Radiate	d Emiss	sion	
Section:	15.209												
Test Date(s):	11/15/	/2015			EUT	Serial #:	Į.	None					
Customer:	Hubbe	ll Buildi	ng Aut	omation	EUT	Part #:		None					
Project Number:	17666-	·15			Tes	Technicia	n:	Eric Lif	sey				
Purchase Order #:	NA				Sup	ervisor:		Lisa Ar	ndt				
Equip. Under Test:	NX Blu	etooth	Bridge	Module	Wit	ness' Nam	e:	None					
Radia	ted Emis	sions Te	est Res	ults Data	Sheet: Ba	nd Edge			Page:	1	of	1	
EUT Line Voltag	e:	28	VD	С	E	UT Power	су:	0	N/A				
Antenna Orientat		Horiz	ontal		Frequenc	y Range:		Α	bove 10	3Hz			
EUT	Mode of	f Operat	ion:				Transmit	Mode	Low Cha	nnel			
Professional Testin Radiated Emissions, 3m 1 1-18GHz Horizontal Polarity 90 80 70 70	Distance						— Cor	erage Limi rrected Ave ak Limit Le rrected Pea ge_Marker		PROFES	SIONAL		
He do Strength (B μ V (III) 10 (B μ V (III) 1	and the state of t	nalik kalentah lipunga		And the second of		Laboration of the Control of the Con							
23980G 2.3984G Operator: Spencer Flint 17666 RENXBTRunxx Tx.M 11:17:01 PM, Monday, Nov			Power	2.3996G Transmit Modula: Battery n: Side; Test: Band		2.4004G	P	UT: NX Bluet roject Numbe	ooth Bridege Mo		2.402	20G	

5.3.2 High Channel Band Edge

		Pr	ofes	sional	Tes	ting, EMI	l, Inc.					
Test Method:						nt of Radio-No to 40 GHz" (inc				_	rical and	d
In accordance with:	FCC Part Limits	15.209 - (Code of	Federal Re	gulatio	ns Part 47, Sub	part C - In	tentiona	l Radiator	s, Radiate	d Emis	sions
Section:	15.209											
Test Date(s):	11/15/	2015			E	UT Serial #:		None				
Customer:	Hubbe	ll Buildin	g Auto	mation	E	UT Part #:		None				
Project Number:	17666-	15			Т	est Technicia	an:	Eric Li	fsey			
Purchase Order #:	NA				S	upervisor:		Lisa A	rndt			
Equip. Under Test:	NX Bluetooth Bridge Module				V	Vitness' Nam	ne:	None				
Radiated Emissions Test Results Data SI				Sheet:	Band Edge			Page:	1	of	1	
EUT Line Voltage: 28			VDC			EUT Power Frequency:			0	N/A		
Antenna Orientat	ntenna Orientation: Vertical					Frequen	Above 1GHz					
EUT	Mode of	Operation	on:				Transmit	t Mode	High Ch	annel		
Professional Testin Radiated Emissions, 3m I 1-18GHz Vertical Polarity Me	Distance						V Co Pe	rrected Ay ak Limit L rrected Pe lge Markei lge Markei	it Level erage Readir evel ak Reading - 2400MHz - 2483.5MHz	PROFESS	SIONAL	
(m/ 70 (dB μ/ /m) 60 (dB μ/ /m) 40 (dB μ/ /				_					_			
30		epolt followers to see the second type of				the state of the	des lives of					
20 2.4800G 2.4806G Operator: Spencer Flint	2.48110			2.4822G ansmit Modulate	2.4827 Frequen	cy		EUT: NX Blue	4844G etooth Bridge M	2.4850G odule	2.485	5G

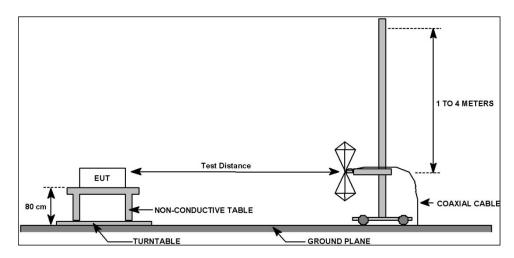
			-•		Building A	utomat	1011 – 1	NAD		
	Pı	ofessional Te	esting, EMI,	lnc.						
Tast Mathad:		ISI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage E ectronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.								
n accordance with:	FCC Part 15.209 - Limits	CC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiato mits								
Section:	15.209									
Test Date(s):	11/15/2015		EUT Serial #:	None						
Customer:	Hubbell Buildir	ng Automation	EUT Part #:	None						
Project Number:	17666-15		Test Technician:	Eric Li	fsey					
Purchase Order #:	NA		Supervisor:	Lisa A	rndt					
Equip. Under Test:	NX Bluetooth E	Bridge Module	Witness' Name:	None						
Radiate	ed Emissions Te	st Results Data Shee	et: Band Edge		Page:	1	of	1		
EUT Line Voltage:	28	VDC	EUT Power Fr	equency:	0	N/A				
Antenna Orientatio	n:	Horizontal	Frequency l	Range:	Above 1GHz					
EUT N	lode of Operati	on:	Tra	ansmit Mode	High Cha	nnel				
Professional Testing, Radiated Emissions, 3m Dist 1-18GHz Horizontal Polarity Med 90 80 10 11 11 12 13 15 15 15 16 17 16 17 17 17 18 18 19 19 19 19 19 19 19 19 19 19 19 19 19	ance			Average Lim Corrected A Peak Limit I Corrected P Corrected P Edge Marke	it Level verage Reading evel ask Reading 7 2400MHz F-2483.5MHz	PROFESS	SIONAL N 6			
/11		17G 2.4822G 2.4	827G 2.4833G	2.4838G 2	.4844G 2	.4850G	2.4855	G		
20# 2.4800G 2.4806G	2.4811G 2.48			prim, xiv m	oto oth Dril M . 1	alo.				
Operator: Spencer Flint			quency		etooth Bridge Mod ber: 17666-15	ule				

6.0 Radiated Spurious Emissions, Receive Mode

6.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The EUT was centered on a rotating turntable. Measurements below 1 GHz were taken at a test distance of 10 meters from the measurement antenna. Above 1 GHz the measurement distance was 3 meters.

Spurious emissions below 1 GHz were measured with quasi-peak detection with a resolution bandwidth of 120 kHz. Above 1 GHz peak measurements were taken and average measured where appropriate and 1 MHz resolution bandwidth. A diagram showing the test setup appears below.



6.2 Test Criteria

47 CFR (USA) // IC (Canada)								
Section Reference	Parameter	Date(s)						
15.247, 15.209 // RSS-247 5.5, RSS-Gen 4.9 & 4.10	Field Strength of Radiated Spurious/Harmonic Emissions Receive Mode	15 Nov 2015						

6.3 Test Results

The EUT was tuned to the middle channel and placed in receive mode.

The EUT satisfied the criteria. Recorded data is presented below.

Table 6.3.:	1: Radiate	d Spu	rious	Emission	s, Receive N	Mode, Beld	ow 1 GHz,	Vertic	cal Po	olarity			
				Profess	sional Te	sting, El	VII, Inc.						
Test Metho	d:				ds of Measurer e Range of 9 kH					_		rical and	ł
In accordance with: FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits												ions	
Section: 15.209													
Test Date(s	s):	11/15	/2015	5		EUT Serial		None					
Customer:				ilding Auto	mation	EUT Part #:		None					
Project Nur		17666	-15			Test Techn		Eric Li					
Purchase O		NA				Supervisor:		Lisa A	rndt				
Equip. Und	er Test:	NX Blu	uetoo	th Bridge N	<u>Iodule</u>	Witness' N	ame:	None					
	F	Results Data	Sheet			Pa	ge:	1	of	1			
EUT Li	EUT Line Voltage: 28 VDC						ver Frequen	cy:	C)	N/A		
Antenna	Antenna Orientation: Vertical						ency Range:			30MH	z to	1GHz	
	EUT N	/lode o	f Ope	eration:			Receive N	/lode C	Center	r Chanr	nel		
Frequency Measured (MHz)	Test Distance (Meters)	EU Direc (Degr	tion	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit I (dBµ\		Marg (dB		Test R	esults
33.6724	10	43	3	2.36	Quasi-peak	23.4	11.887	29	.5	-17.	.6	Pa	SS
134.548	10	19	7	1.68	Quasi-peak	32.4	15.167	33	.1	-17.	9	Pa	ss
137.944	10	29	9	1.33	Quasi-peak	34	16.771	33	.1	-16.	.3	Pa	ss
183.909	10	28	4	1.23	Quasi-peak	29.9	14.775	33	.1	-18.	.3	Pa	SS
317.837	10	10	0	3.07	Quasi-peak	28	18.305	35	.6	-17.	.3	Pa	ss
909.923	10	32	3	3.87	Quasi-peak	21.2	26.312	35	.6	-9.3	3	Pa	SS
Radiated	sional Testing, Emissions, 10m Di GHz Vertical Polarity	istance		hard a second by the second	×	×		asi-peak L rrefted () k Limit L rrefted Pe jiled Low RF Verific		Readin	ROFESS	SIONAL	
0 [±] 30M				100M				TIT. NV Db.				1G	:

Mode: Receive Mode Chan 19 Power: 28 VDC

Frequency

Operator: Eric Lifsey

17666 RE'NXBTRun04 RecMode.til

04:24:48 PM, Sunday, November 15, 2015

 $\hbox{EUT: NX Blue to oth Bridge Module}$

Client: Hubbell Building Automation

Project Number: 17666-15

Table 6.3.2	2: Radiate	d Spu	rious	Emission	s, Receive N	Node, Belo	w 1 GHz,	Horiz	ontal	Polari	ity		
				Profess	sional Te	sting, EN	VII, Inc.						
Test Metho	A ·				ds of Measurer e Range of 9 kH					_		rical and	
In accordan	ce with:	FCC Pa	rt 15.2	09 - Code of I	Federal Regulat	ions Part 47, S	Subpart C - Int	tention	al Radia	ators, Ra	diate	d Emiss	ions
Section:		15.209	,										
Test Date(s):	11/15	/2015			EUT Serial	#:	None					
Customer:				ilding Auto	mation	EUT Part #:		None					
Project Nur		17666	5-15			Test Techni		Eric L					
Purchase O		NA				Supervisor:		Lisa A					
Equip. Und	er Test:	NX BI	<u>uetoo</u>	th Bridge N	<u>lodule</u>	Witness' N	ame:	None	ļ				
	R	adiate	ed Em	issions Test	Results Data	Sheet			Pag	ge:	1	of	1
EUT Li	ne Voltage:		28	8 VDC		EUT Pow	er Frequen	су:	0	N	I/A		
Antenna	Orientatio	n:		Horizor	ntal	Frequ	ency Range:	•		30MHz	to	1GHz	
	EUT N	lode o	of Ope	ration:			Receive N	/lode (Center	Chann	el		
Frequency Measured (MHz)	Test Distance (Meters)	EU Direc (Degr	ction	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit (dBµ\	Level V/m)	Marg (dB)		Test Re	esults
31.3469	10	28	36	1.32	Quasi-peak	24.2	12.715	2 9).5	-16.8	8	Pas	SS
227.989	10	9	7	3.8	Quasi-peak	29.6	15.835	35	5.6	-19.8	8	Pas	SS
404.584	10	48		2.79	Quasi-peak	22.2	15.509		5.6	-20.1		Pas	
702.221	10	19		3.62	Quasi-peak	21.7	19.161		5.6	-16.4		Pas	-
888.857	10	16		3.41	Quasi-peak	21.4	26.173		5.6	-9.4		Pas	
954.761	10	14	16	2.87	Quasi-peak	21.1	26.35	35	5.6	-9.3	,	Pas	SS
Radiated 30MHz-10 60 50 50 (III / M R / M A 40 × 30 10 10	ional Testing, Emissions, 10m Di GHz Horizontal Polari	stance	ed Emissions			×		asi-peak I rrected () k Limit I rrected P rifed Low RF Verifi	imit Levu uss-peak Level Level aak Value -PRF OP cation Lin	Readin	OFESS	××	
30M Operator: I	dric Lifsey			100M	Frequ	uency	E	UT: NX Blu	etooth Brid	ge Module		1G	
	NXBTRun04'RecMoo M,Sunday,Novembe			Mode: Re Power: 28	ceive Mode Chan 19 VDC			•	ber: 17666- oell Building	-15 Automation			

≤ 1GHz Horizontal Antenna Polarity Measured Emissions

Table 6.3.3	3: Radiate	d Spu	rious	Emission	s, Receive M	Mode, Abo	ve 1 GHz,	Vertic	al Po	larity		
				Profess	sional Te	sting, EN	VII, Inc.					
Test Metho	d:				ds of Measurer e Range of 9 kH					_		Ŀ
In accordan	ice with:	FCC Par Limits	rt 15.2	09 - Code of F	ederal Regulat	ions Part 47, S	Subpart C - Int	entiona	Radiat	ors, Radiate	d Emis	sions
Section:		15.209										
Test Date(s):	11/15	/2015	5		EUT Serial	# :	None				
Customer:				ilding Auto	mation	EUT Part #:		None				
Project Nur	nber:	17666	-15			Test Techni	ician:	Eric Lif				
Purchase O		NA				Supervisor:		Lisa Ar	ndt			
Equip. Und	er Test:	NX Blu	uetoo	th Bridge N	lodule	Witness' N	ame:	None				
	F	Radiate	d Em	issions Test	Results Data	Sheet			Page	e: 1	of	1
EUT Li	ne Voltage:		2	8 VDC		EUT Pow	ver Frequen	су:	0	N/A		
Antenna	Orientatio	n:		Vertic	al	Freque	ency Range:			Above 1	GHz	
	EUT N	/lode o	f Ope	ration:			Receive N	/lode C	enter	Channel		
Frequency Measured (MHz)	Test Distance (Meters)	EU Direc (Degr	tion	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit L (dBμV		Margin (dB)	Test R	esults
1150.54	3	12	2	0	Average	35.8	23.9	54.	0	-30.1	Pa	SS
1278.6	3	16	0	0	Average	35.9	23.819	54.	0	-30.1	Pa	ISS
2111.85	3	24	4	0	Average	36.3	27.415	54.	0	-26.5	Pa	SS
7261.42	3	29	5	0	Average	29.3	32.518	54.	0	-21.4	Pa	ISS
11576.5	3	96	5	0	Average	27.4	37.993	54.		-16.0	Pa	ISS
12619.7	3	16	3	0	Average	27.7	38.194	54.	0	-15.8	Pa	ISS
Radiated	sional Testing, Emissions, 3m Dis fertical Polarity Measu	tance					▽ Cor — Pea	erage Limi rrected Ave ak Limit Le rrected Pea	erage Rea evel		SIONAL 7 N 6	
Field Strength (dB LV/m) 809 800 800 800 800 800 800 800 800 800	Y 7	and the second	· ·	V		and the latest the lat		, alth		10G	7 7	G
Operator: 17666 RE	Eric Lifsey NXBI'Run04'RecMo PM, Sunday, Novemb			Mode: Rec Power: 28	eive Mode Chan 19	uency	P	UT: NX Blue Project Numbe Client: Hubbel	er: 17666-1	e Module 5	130	•

> 1GHz Vertical Antenna Polarity Measured Emissions

Table 6.3.	4: Radiate	d Spu	rious	Emission	s, Receive I	Mode, Abo	ve 1 GHz,	Vertic	al Po	larity		
				Profess	sional Te	sting, El	VII, Inc.					
Test Metho	od:				ds of Measurer e Range of 9 kF					•		d
In accordar	nce with:	FCC Pa	rt 15.2	09 - Code of F	ederal Regulat	ions Part 47, S	Subpart C - Int	entiona	l Radiat	tors, Radiate	ed Emis	sions
Section:		15.209)									
Test Date(s	s):	11/15	/2015	5		EUT Serial	#:	None				
Customer:				ilding Auto	mation	EUT Part #:		None				
Project Nur	mber:	17666	-15			Test Techn	ician:	Eric Lif				
Purchase O		NA				Supervisor		Lisa Ar	rndt			
Equip. Und	er Test:	NX BI	uetoo	th Bridge N	lodule	Witness' N	ame:	None				
	F	Radiate	ed Em	issions Test	Results Data	a Sheet			Pag	e: 1	of	1
EUT Li	ne Voltage:		2	8 VDC		EUT Pow	ver Frequen	су:	0	N/A		
Antenna	Orientatio	n:		Horizon	tal	Frequ	ency Range:			Above 1	GHz	
	EUT N	/lode o	f Ope	ration:		-	Receive N	/lode C	enter	Channel		
Frequency Measured (MHz)	Test Distance (Meters)	EU Direc (Degr	tion	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit L (dBμV		Margin (dB)	Test R	esults
1005.86	3	37	7	0	Average	36.3	24.732	54.	0	-29.2	Pa	ISS
1143.27	3	13		0	Average	37.7	25.76	54.		-28.2	Pa	ISS
1282.53	3	7()	0	Average	35	22.97	54.	0	-31.0	Pa	ISS
8712.97	3	33	3	0	Average	27.1	34.475	54.	0	-19.5	Pa	ISS
11453.5	3	10	7	0	Average	27.1	37.793	54.	0	-16.2	Pa	ISS
12789	3	30	3	0	Average	27.6	38.087	54.	0	-15.9	Pa	ISS
Radiated 1-18GHz F 90 80	sional Testing, Emissions, 3m Dis forizontal Polarity Me	tance					▽ Cor — Pea	erage Limi rrected Avo ak Limit Lo rrected Pea	erage Rea evel		SIONAL	
300 Locator:	Tric Lifsey NXBI'Run04'RecMo	de.til	e de les mandres		eive Mode Chan 19	uency		UT: NX Bluet			130	G
	NXBTRun04 RecMoo PM, Sunday, Novembo			Mode: Rec Power: 28				roject Numbe lient: Hubbel				

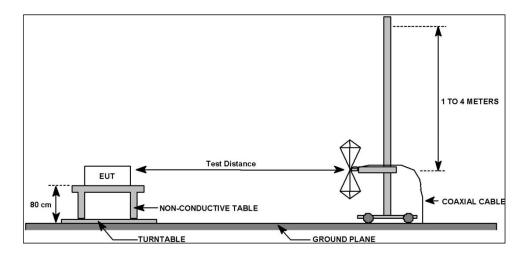
> 1GHz Horizontal Antenna Polarity Measured Emissions

7.0 Radiated Spurious Emissions, Transmit Mode

7.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The EUT was centered on a rotating turntable. Measurements below 1 GHz were taken at a test distance of 10 meters from the measurement antenna. Above 1 GHz the measurement distance was 3 meters.

Spurious emissions below 1 GHz were measured with quasi-peak detection with a resolution bandwidth of 120 kHz. Above 1 GHz peak measurements were taken and average measured where appropriate using 1 MHz resolution bandwidth. A diagram showing the test setup appears below.



7.2 Test Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
15.247, 15.209 // RSS-247 5.5, RSS-Gen 4.9 & 4.10	Field Strength of Radiated Spurious/Harmonic Emissions Transmit Mode	15 Nov 2015

7.3 Test Results

Below 1 GHz measurements were taken for the middle channel. Above 1 GHz measurements were taken for the three standard channels of the band.

Modulation was disabled for this test and the transmitter was placed into continuous transmit mode.

The duty cycle averaging factor applies -4.15 dB to the peaks recorded for the harmonics.

All measurements used peak detection.

Table 7.3.2	L: TX Mod	e, Belov	w 1 GHz, Ver	tical Polarit	y, Mid. Ch	annel					
			Profess	sional Te	sting, El	VII, Inc.					
Test Metho	d:		.4–2003: "Metho c Equipment in th						•	rical and	
In accordan	ce with:	FCC Part :	15.209 - Code of I	Federal Regulat	ions Part 47, S	Subpart C - Int	tentional	l Radia	tors, Radiate	d Emissi	ions
Section:		15.209									
Test Date(s):	11/15/2	2015		EUT Serial	# :	None				
Customer:			Building Auto	mation	EUT Part #:		None				
Project Nur		17666-1	.5		Test Techn	ician:	Eric Lif	sey			
Purchase O	rder #:	NA			Supervisor		Lisa Ar	ndt			
Equip. Und	er Test:	NX Blue	tooth Bridge M	/lodule	Witness' N	ame:	None				
	F	Radiated	Emissions Test	t Results Data	a Sheet			Pag	e: 1	of	1
EUT Li	ne Voltage:		28 VDC		EUT Pow	ver Frequen	ıcy:	0	N/A		
Antenna	Antenna Orientation: Vertical					ency Range	:		30MHz to	1GHz	
	EUT N	lode of (Operation:			Transmit Mode Center Channel					
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degree		Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit L (dBµV		Margin (dB)	Test Re	esults
31.9229	10	219	3.14	Quasi-peak	24	12.514	29.	5	-17.0	Pas	SS
34.505	10	181	3.89	Quasi-peak	23.2	11.638	29.	5	-17.9	Pas	SS
60.0452	10	101	3.9	Quasi-peak	32.4	14.114	29.	5	-15.4	Pas	SS
810.788	10	152	4.05	Quasi-peak	21.5	23.285	35.	6	-12.3	Pas	SS
903.769	10	218	2.31	Quasi-peak	21.2	26.455	35.	6	-9.1	Pas	SS
968.58	10	263	1.28	Quasi-peak	21	26.401	43.	5	-17.1	Pas	SS
Radiated 30MHz-10 60 50 50 50 40 50 50 50 50 50 50 50 50 50 50 50 50 50	cional Testing, Emissions, 10m Di GHz Vertical Polarity	stance	ions			- Qu - Pe: - Co - Ve: - X	asi-peak Li rrected Qu ak Limit Le rrected Per rified Low- RF Verific	mit Leve asi-peak l vel k Value PRF OP ation Lin	Readin PROFES	SIONAL XX	

≤ 1GHz Vertical Antenna Polarity Measured Emissions

Frequency

100M

Mode: Transmit Unmod. Mid Channel Power: 28 VDC

Operator: Eric Lifsey

17666 RE'NXBTRun01 TxMode'ChanMid'Spurious.til

12:54:48 PM, Sunday, November 15, 2015

1G

 $\hbox{EUT: NX Blue to oth Bridge Module}$

Client: Hubbell Building Automation

Project Number: 17666-15

Table 7.3.	2: TX Mod	e, Belo	w 1	GHz, Hor	izontal Pola	rity, Mid.	Channel					
				Profess	sional Te	sting, EN	VII, Inc.					
Test Metho	d:				ds of Measurer e Range of 9 kH							
In accordar	nce with:	FCC Part Limits	15.20	09 - Code of I	Federal Regulat	ions Part 47, S	Subpart C - Int	entional Rad	iators, Radiat	ed Emissions		
Section:		15.209										
Test Date(s	s):	11/15/				EUT Serial	# :	None				
Customer:				Iding Auto	mation	EUT Part #:		None				
Project Nui		17666-	15			Test Techni	ician:	Eric Lifsey				
Purchase O	rder #:	NA				Supervisor:		Lisa Arndt				
Equip. Und	er Test:	NX Blu	etoo	th Bridge N	1odule	Witness' N	ame:	None				
	F	Radiated	d Emi	issions Test	Results Data	a Sheet		Pa	ige: 1	of 1		
EUT Li	ne Voltage		28	3 VDC		EUT Pow	er Frequen	су:	0 N/A			
Antenna	orientation	n:		Horizor	ntal	Frequ	ency Range:		30MHz to	1GHz		
	EUT N	/lode of	Ope	ration:		Transmit Mode Center Channel						
Frequency Measured (MHz)	Test Distance (Meters)	EUT Directi (Degre	ion	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results		
30.8054	10	181		1.92	Quasi-peak	24.2	12.734	29.5	-16.8	Pass		
33.4052	10	247	,	2.91	Quasi-peak	23.6	12.096	29.5	-17.4	Pass		
220.025	10	309		3.25	Quasi-peak	30.9	16.678	35.6	-18.9	Pass		
872.336	10	257	'	1.91	Quasi-peak	21.4	25.146	35.6	-10.5	Pass		
916.579	10	3		3.36	Quasi-peak	21.3	26.322	35.6	-9.3	Pass		
934.242	10	111		1.06	Quasi-peak	21.2	26.193	35.6	-9.4	Pass		
Radiated	sional Testing, Emissions, 10m Di GHz Horizontal Polar	istance				X	— Qu	asi-peak Limit Le rrected Quasi-pea k Limit Level rrected Peak Vali ified Low-PRF (RE Verification I	vel k Readin ne p Readin pagess imit	SSIONAL X		

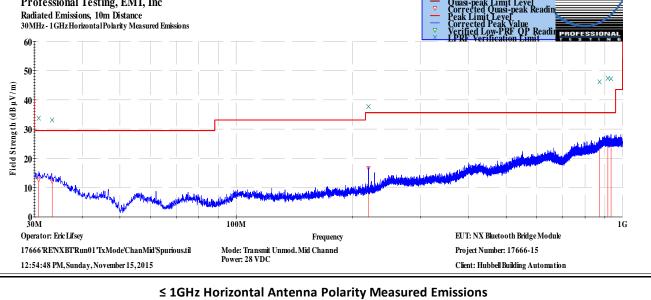


Table 7.3.	3: TX Mod	e, Above 1	GHz, Ver	tical Polarit	ty, Low Cha	annel					
			Profess	sional Te	sting, El	VII, Inc.					
Test Metho	d:			ds of Measurer e Range of 9 kH				_			
In accordar	ice with:	FCC Part 15.2 Limits	09 - Code of I	ederal Regulat	tions Part 47, S	Subpart C - Int	tentional Rad	iators, Radiate	ed Emissions		
Section:		15.209									
Test Date(s):	11/15/2019			EUT Serial	#:	None				
Customer:		Hubbell Bu	ilding Auto	mation	EUT Part #:		None				
Project Nur	mber:	17666-15			Test Techn		Eric Lifsey				
Purchase O		NA			Supervisor		Lisa Arndt				
Equip. Und	er Test:	NX Bluetoo	th Bridge N	<u> 1odule</u>	Witness' N	ame:	None				
	F	Radiated Em	issions Test	Results Data	a Sheet		Pa	ige: 1	of 1		
EUT Li	ne Voltage	: 2	8 VDC		EUT Pov	ver Frequen	cy:	0 N/A			
Antenna	Orientatio	n:	Vertic	al	Frequ	Above 1	LGHz				
	EUT N	/lode of Ope	eration:		Transmit Mode Bottom Channel						
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBμV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results		
4804	3	0	1	Peak	49.9	49.9	74.0	-24.1	Pass		
13360.5	3	162	1	Average	28.5	39.331	54.0	-14.6	Pass		
15567.3	3	19	1	Average	27.7	41.002	54.0	-13.0	Pass		
16819.5	3	114	1	Average	27.7	42.451	54.0	-11.5	Pass		
Radiated	sional Testing, Emissions, 3m Dis fertical Polarity Measu	tance			المال والمراجع المراجع	 ∇ Cor — Per 	erage Limit Leve crected Average l ak Limit Level crected Peak Rea	Reading	SIONAL		

> 1GHz Vertical Antenna Polarity Measured Emissions

Mode: Transmit Unmod. Low Channel Power: 28 VDC

Frequency

Operator: Eric Lifsey

17666 RE'NXBTRun02 TxMode'ChanLow'Spurious'GHz.til

02:01:58 PM, Sunday, November 15, 2015

18G

10G

Project Number: 17666-15

EUT: NX Bluetooth Bridge Module

			F	Profes	sional Te	sting, EN	MI, Inc.					
Test Metho	od:				ds of Measurer e Range of 9 kH					_	rical and	ı
In accorda	nce with:	FCC Par Limits	t 15.209	- Code of I	Federal Regulat	ions Part 47, S	Subpart C - II	ntention	al Radiat	ors, Radiate	d Emiss	ions
Section:		15.209										
Test Date(s	s):	11/15				EUT Serial	#:	None				
Customer:				ing Auto	mation	EUT Part #:		None				
Project Nu		17666	-15			Test Techni	ician:	Eric Li				
Purchase C	Order #:	NA				Supervisor:		Lisa A	rndt			
Equip. Und	ler Test:	NX Blu	ietooth	Bridge N	1odule	Witness' N	ame:	None				
	F	Radiate	d Emiss	sions Test	Results Data	a Sheet			Page	e: 1	of	1
EUT L	ine Voltage		28	VDC		EUT Pow	ver Freque	ncy:	0	N/A		
	a Orientatio			Horizor	ntal		ency Range			Above 10	GHz	
Antenn			f Opera			riequ	Transmit		Pottom			
			-	tion.			TTATISTITE	Ivioue	Jottom	Citatillei		
Frequency	Test	EU		Antenna	Detector	Recorded	Corrected	Limit	Level	Margin		
Measured	Distance	Direct	-	Height	Function	Amplitude	Level	(dBu)		(dB)	Test R	esults
(MHz)	(Meters)	(Degr	ees) (Meters)		(dBμV)	(dBµV/m)	(,,	(/		
4804	3	0		1	Average	54.1	50.05	54	.0	-3.9	Pa	SS
14235.8	3	10:	3	1	Average	28.5	39.681	54	.0	-14.3	Pa	SS
16796.2	3	110	6	1	Average	27.7	42.431	54	.0	-11.5	Pa	SS
17382.1	3	17	1	1	Average	26.9	41.048	54	.0	-12.9	Pa	SS
D 6	sional Testing,						∨ (verage Lim orrected A eak Limit I	verage Read			
Radiated	Emissions, 3m Dis Horizontal Polarity Mo	easured Emiss	ions						eak Reading	PRUFES	SIONAL I N 6	
Radiated 1-18GHz 90 80		easured Emiss	10 ns						eak Reading	PRUFES	SIONAL IN 6	
Radiated 1-18GHz 90		easured Emiss	10 ns						eak Reading	PROFES T E 3	SIONAL 6	
Radiated 1-18GHz 90		easured Emiss	ions						eak Reading	PROFES	SIONAL N 6	
Radiated 1-18GHz 90		easured Emiss	ions						eak Reading	PROFES	SIONAL	
Radiated 1-18GHz 90		easured Emiss	ions						Reading	PROFES	SIONAL 1 × 6	
Radiated 1-18GHz 90 90 90 90 90 90 90 9		easured Emiss	ions	llata managaman ha		his as a Ul decrease of the state of the sta			eak Reading	PRUPES	SIGNAL S	
Radiated 1-18GHz 90		easured Emiss	10018						eak Reading	PROFES	SIGNAL OF THE PROPERTY OF THE	
Radiated 1-18GHz 90		easured Emiss	100 N	in the later of the state of th						PROFES	SIGNAL .	
Radiated 1-18GHz 90	Horizontal Polarity Mo	easured Emiss	10018					orrected P	10G	y	186	ı
Radiated 1-18GHz 90	Horizontal Polarity Mo	n (a. a. a		til Mode: Tra	Frequent Unmod. Low Cha	uency		EUT: NX Blo		Module	79	:

The duty cycle averaging factor was -4.15 dB and applied to the 4804 MHz harmonic.

Table 7.3.5: TX Mode, Above 1 GHz, Vertical Polarity, Middle Channel

	Professional 1	Testing, EMI, Inc	C.
Test Method:	ANSI C63.4–2003: "Methods of Measu Electronic Equipment in the Range of S		issions from Low-Voltage Electrical and ted by reference, see §15.38).
In accordance with:	FCC Part 15.209 - Code of Federal Regularity	ulations Part 47, Subpart C	- Intentional Radiators, Radiated Emissions
Section:	15.209		
Test Date(s):	11/15/2015	EUT Serial #:	None
Customer:	Hubbell Building Automation	EUT Part #:	None
Project Number:	17666-15	Test Technician:	Eric Lifsey
Purchase Order #:	NA	Supervisor:	Lisa Arndt
Equip. Under Test:	NX Bluetooth Bridge Module	Witness' Name:	None

Radiat	ed Emission	ns Test Results Data	a Sheet	Page:	1	of	1
EUT Line Voltage:	28	VDC	EUT Power Frequency:	0	N/A		
Antenna Orientation:		Vertical	Frequency Range:	Ak	ove 10	iHz	

	EUT N	lode of Ope	eration:		Transmit Middle Channel				
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBμV/m)	Margin (dB)	Test Results
4880	3	0	1	Peak	52.5	52.5	74.0	-21.5	Pass
14306.1	3	221	1	Average	28.6	39.917	54.0	-14.0	Pass
16712.3	3	266	1	Average	27.5	42.232	54.0	-11.7	Pass
16929	3	99	1	Average	27.5	42.169	54.0	-11.8	Pass

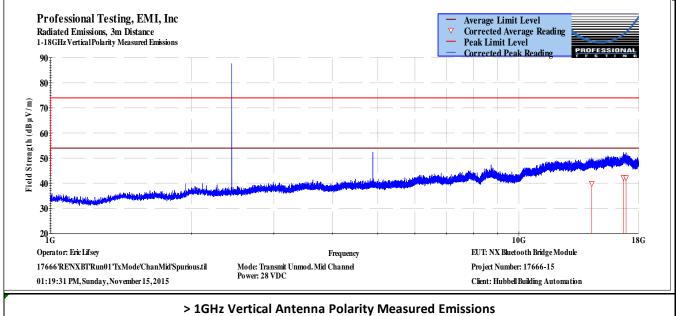


Table 7.3.6: TX Mod	de, Above 1	L GHz, Hor	izontal Pola	arity, Midd	lle Channe	<u> </u>						
		Profess	sional Te	sting, EN	VII, Inc.							
Test Method:			ds of Measurer e Range of 9 kH				•					
In accordance with:	FCC Part 15.2 Limits	209 - Code of I	ederal Regulat	ions Part 47, S	Subpart C - Int	entional Rad	iators, Radiate	ed Emissio	ons			
Section:	15.209											
Test Date(s):	11/15/201	5		EUT Serial	#:	None						
Customer:	Hubbell Bu	ilding Auto	mation	EUT Part #:		None						
Project Number:	17666-15			Test Techn	ician:	Eric Lifsey						
Purchase Order #:	NA			Supervisor: Lisa Arndt								
Equip. Under Test:	NX Bluetoc	th Bridge N	1odule	Witness' N	ame:	None						
	Radiated Em	issions Test	Results Data	a Sheet	ge: 1	of	1					
EUT Line Voltage	2: 2	8 VDC		EUT Pow	ver Frequen	cy:	0 N/A					
Antenna Orientati	on:	Horizor	ıtal	Frequency Range: Above 1GHz								
EUT	Mode of Ope	eration:		Transmit Middle Channel								
Frequency Test Measured Distance (MHz) (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBμV/m)	Limit Level (dBµV/m)	Test Re	sults				
4880 3	0	1	Peak	51.5	51.5	74.0	-22.5	Pas	s			
15435.7 3	269	1	Average	27.9	40.846	54.0	-13.1	Pas	S			
16395.6 3	206	1	Average	27.1	41.451	54.0	-12.5	Pas	s			
16848.7 3	243	1	Average	27.7	42.41	54.0	-11.5	Pas	S			
Professional Testing Radiated Emissions, 3m D	, ,				▽ Cor	erage Limit Level rected Average F ak Limit Level						

> 1GHz Horizontal Antenna Polarity Measured Emissions

Mode: Transmit Unmod. Mid Channel Power: 28 VDC

Frequency

Operator: Eric Lifsey

17666 RE'NXBT'Run01 TxMode'ChanMid'Spurious.til

01:19:31 PM, Sunday, November 15, 2015

10G

Project Number: 17666-15

EUT: NX Bluetooth Bridge Module

Table 7.3.	7: TX Mod	e, Ab	ove 1	. GHz, Ver	tical Polarit	y, High Ch	annel						
				Profess	sional Te	sting, EN	VII, Inc.						
Test Metho	od:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).											
In accordan	FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits												
Section:		15.209)										
Test Date(s	11/15	/2015	5		EUT Serial	None							
Customer:	Hubbell Building Automation				EUT Part #:	None							
Project Nur	mber:	17666-15				Test Techni	Eric Lifsey						
Purchase O	rder #:	NA				Supervisor:	Lisa Arndt						
Equip. Under Test: NX Bluetooth Bridge Module Witness' Name:							ame:	None					
	F	Radiate	ed Em	issions Test	Results Data	Sheet			Page:	1	of 1		
EUT Li	: 28 VDC				EUT Pow	cy:	0	N/A					
Antenna	on: Vertica			al	Frequency Range:			Above 1GHz					
	EUT N	Mode of Operation:				Transmit Middle Top Channel							
Frequency Measured (MHz)	Test Distance (Meters)	EU Direc (Degr	tion	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit L (dBμV			Test Results		
4960	3	0		1	Peak	49.8	49.8	74.	0 -	24.2	Pass		
13334.2	3	128		1	Average	28.5	39.479	54.	54.0 -14.5		Pass		
15330.3	3	9:	3	1	Average	28.1	40.535	54.	0 -	13.4	Pass		
16724	3	17	79 1 Average 27.5 42.268		42.268	54.	0 -	11.7	Pass				
Duofoss	rianal Tacting	EMI I.											

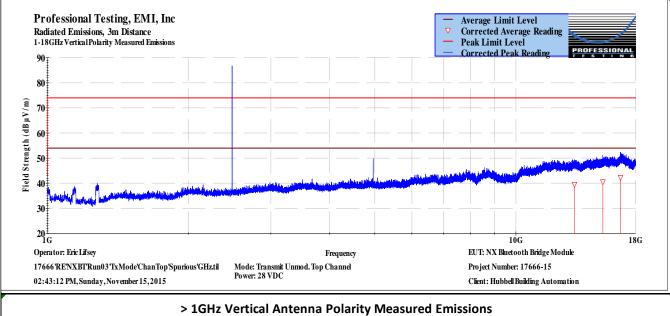
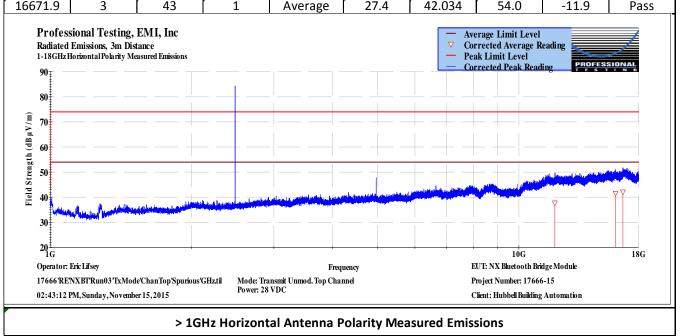


Table 7.3.8: TX Mode, Above 1 GHz, Horizontal Polarity, High Channel

Table 7.3.	8: IX IVIOD	e, Ab	ove 1	. GHz, Hor	izontai Pola	arity, High	Channel						
				Profess	sional Te	sting, El	MI, Inc.						
Test Metho	od:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).											
In accorda	FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits												
Section:		15.209)										
Test Date(s):		11/15	/2015	;		EUT Serial	None						
Customer:	Hubbell Building Automation				EUT Part #	None							
Project Nu	17666	5-15			Test Techn	Eric Lifsey							
Purchase C	rder #:	NA				Supervisor: Lisa			isa Arndt				
Equip. Und	er Test:	NX BI	uetoo	th Bridge N	1odule	Witness' Name: None							
	F	Radiate	ed Em	issions Test	Results Dat	a Sheet			Pag	ge: 1	of	1	
EUT L	ine Voltage	28 VDC				EUT Power Frequency:			0	N/A			
Antenna	n:		Horizor	ntal	Frequ	Above 1	Above 1GHz						
	EUT N	ration:	Transmit Middle Top Channel										
Frequency Measured (MHz)	Test Distance (Meters)	EU Direc (Degi	tion	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Le		Margin (dB)	Test Re	sults	
4960	3	С)	1	Peak	47.8	47.8	74.0)	-26.2	Pas	S	
11932.8	3	29	9	1	Average	27.4	37.685	54.0)	-16.3	Pas	S	
16085.6	3	30)4	1	Average	27.4	41.532	54.0)	-12.4	Pas	S	
16671 9	3	4	3	1	Average	27.4	42 034	54 ()	-11 9	Pas	S	



7.3.9 TX Mode, 18 GHz to 25 GHz, Low Channel

			Profess	sional Te	sting, EN	VII, Inc.					
Test Metho	od:		SI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and ctronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).								
n accorda	nce with:	FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits									
Section:		15.209				_					
Test Date(s	<u>s):</u>	11/15/201			EUT Serial						
Customer:		_	uilding Auto	mation	EUT Part #:		None				
Project Nu		17666-15			Test Techni		Eric Lifsey				
Purchase C		NA			Supervisor:		isa Arndt				
Equip. Und	er Test:	NX Blueto	oth Bridge N	<u> 1odule</u>	Witness' N	Witness' Name: None					
	F	Radiated Er	nissions Test	Results Dat	a Sheet		Pa	ge: 1	of 1		
EUT L	ne Voltage:		28 VDC	VDC EUT Power Frequence			y: (N/A			
Antenna	a Orientatio	on: Ver		al	Frequency Range:			Above 1	GHz		
	EUT N	/lode of Op	eration:		Transmit Mode Bottom Channel						
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	l level l	Limit Level (dBµV/m)	Margin (dB)	Test Resul		
19212.8	3	290	1	Average	37.2	33.372	54.0	-20.6	Pass		
24016.8	3	147	1	Average	34.1	32.521	54.0	-21.4	Pass		
19212.8	3	290	1	Peak	42	38.153	74.0	-35.8	Pass		
24016.8	3	147	1	Peak	43.3	41.74	74.0	-32.2	Pass		
Radiated	sional Testing, Emissions, Measu Hz Vertical Polarity M	red at 1m and Sca	aled to 3m Distance			∇ CorrePeak	age Limit Level ected Average R Limit Level ected Peak Read		SSIONAL T I N 6		
40 L	and the little to be designed to	∀		and the state of t		Marketon Miller Control	Y	and the second second second	laterate buy.		

						Н	lubbell Build	ing Automa	tion – NXBTF
			Profess	sional Te	sting, EN	VII, Inc.			
Test Metho	d:			ds of Measurer e Range of 9 kH				_	
In accordan	ice with:	FCC Part 15.2 Limits	209 - Code of F	ederal Regulat	ions Part 47, S	Subpart C - Int	entional Radia	ators, Radiate	ed Emissions
Section:		15.209							
Test Date(s):	11/15/201	5		EUT Serial	#:	None		
Customer:		Hubbell Bu	ilding Auto	mation	EUT Part #:		None		
Project Nur	nber:	17666-15			Test Techni	ician:	Eric Lifsey		
Purchase O	rder #:	NA			Supervisor:		Lisa Arndt		
Equip. Und	er Test:	NX Bluetoo	th Bridge M	lodule	Witness' Na	ame:	None		
	F	Radiated Em	issions Test	Results Data	a Sheet		Pa	ge: 1	of 1
EUT Li	ne Voltage:	: 2	8 VDC		EUT Pow	er Frequen	су: (N/A	
Antenna	Orientatio	n:	Horizon	ital	Freque	ency Range:		Above 1	GHz
	EUT N	lode of Ope	eration:			Transmit N	/lode Botto	m Channel	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
19221.4	3	119	1	Average	33.1	29.279	54.0	-24.7	Pass
24028.3	3	207	1	Average	34	32.478	54.0	-21.5	Pass
19221.4	3	119	1	Peak	42.9	39.072	74.0	-34.9	Pass
24028.3	3	207	1	Peak	42.5	40.937	74.0	-33.0	Pass
Professional Testing, EMI, Inc Radiated Emissions, Measured at 1m and Scaled to 3m Distance 18-26.5 GHz Horizontal Polarity Measured Emissions 90 Corrected Average Reading Paofessional Professional Testing, EMI, Inc Corrected Average Reading Professional Professional Testing, EMI, Inc Corrected Peak Reading Professional Testing, EMI, Inc Radiated Emissions, Measured Emissions Peak Limit Level Corrected Peak Reading									
Field Strength (dB µV/m) 40 20 20 20 20 20 20 20 20 20 20 20 20 20				in side and the side of the si		A property of the state of the	Y		26.5G
	•	le'ChanLow'Spurious' r 20,2015	GHztil Mode: Tra Power: 28	nsmit Unmod. Low Cha	uency nnel	P	UT: NX Bluetooth Bric roject Number: 17666 lient: Hubbell Building	-15	

> 1GHz Horizontal Antenna Polarity Measured Emissions

7.3.10 TX Mode, 18 GHz to 25 GHz, Middle Channel

				Profess	ional Te	sting, EN	VII, Inc.					
Test Metho	d:				ds of Measurer Range of 9 kH					•		nd
In accordan	ce with:	FCC Pa Limits	Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions s									
Section:		15.209										
Test Date(s):	11/15	/2015	5		EUT Serial #	# :	None				
Customer:		_		ilding Autor	mation	EUT Part #:		None				
Project Nur		17666	-15			Test Techni		Eric L				
Purchase O		NA				Supervisor:		Lisa A				
Equip. Und	er Test:	NX Blu	uetoo	th Bridge N	lodule	Witness' Na	ame:	None)			
	R	Radiate	ed Em	issions Test	Results Data	a Sheet			Pag	e: 1	of	1
EUT Li	ne Voltage:		2	8 VDC		EUT Pow	er Frequen	су:	0	N/A		
Antenna	Orientatio	n:		Vertic	al	Freque	ency Range:	:		Above 1	.GHz	
	EUT N	lode o	f Ope	eration:			Transm	nit Mic	ddle Ch	nannel		
Frequency Measured (MHz)	Test Distance (Meters)	EU Direc (Degr	tion	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit (dBµ	Level V/m)	Margin (dB)	Test	Results
19519.9	3	31	3	1	Average	37.3	33.462	54	1.0	-20.5	Р	ass
24403.3	3	21	5	1	Average	33.9	33.314	54	1.0	-20.6	Р	ass
19519.9	3	31	3	1	Peak	46.4	42.501	74	1.0	-31.5	Р	ass
24403.3	3	21	5	1	Peak	43.5	42.958	74	1.0	-31.0	Р	ass
Radiated	ional Testing, Emissions, Measu Iz Vertical Polarity M	ed at 1m	and Scal	ed to 3m Distance			▽ Cor — Pea	ak Limit 1	verage Re		SSIONAL	
	Eric Lifsey NXBI'Run01 TxMod M, Friday, Novembe		Spurious.t	il Mode: Tra Power: 28	nsmit Unmod. Mid Cha	uency	P	roject Num	uetooth Bridg aber: 17666- pell Building A	15	26	.5G

> 1GHz Vertical Antenna Polarity Measured Emissions

						Н	lubbell Build	ing Automa	ition – NXBTR		
			Profess	sional Te	sting, EN	VII, Inc.					
Test Metho	od:		–2003: "Metho Equipment in the					•			
In accordar	nce with:	FCC Part 15	5.209 - Code of F	ederal Regula	tions Part 47, S	Subpart C - Int	entional Radi	ators, Radiat	ed Emissions		
Section:		15.209									
Test Date(s	s):	11/15/20	15		EUT Serial #	# :	None				
Customer:		Hubbell E	Building Autor	mation	EUT Part #:		None				
Project Nu	mber:	17666-15			Test Techni		Eric Lifsey				
Purchase C	rder #:	NA			Supervisor:		Lisa Arndt				
Equip. Und	er Test:	NX Bluete	uetooth Bridge Module Witness' Name: None								
	F	Radiated E	missions Test	Results Dat	a Sheet		Pa	ge: 1	of 1		
EUT L	ne Voltage:		28 VDC		EUT Pow	er Frequen	cy:	N/A			
Antenna	orientatio	n:	Horizon	tal	Freque	ency Range:		Above 1	GHz		
	EUT N	lode of O	peration:			Transm	it Middle C	hannel			
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)		Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBμV/m)	Margin (dB)	Test Results		
19520.3	3	154	1	Average	33.2	29.363	54.0	-24.6	Pass		
24412.1	3	184	1	Average	33.9	33.282	54.0	-20.7	Pass		
19520.3	3	154	1	Peak	45.6	41.745	74.0	-32.2	Pass		
24412.1	3	184	1	Peak	43	42.417	74.0	-31.5	Pass		
Radiated	sional Testing, Emissions, Measur Hz Horizontal Polarity	red at 1m and S	caled to 3m Distance			∇ CorPea	erage Limit Level erected Average R ak Limit Level erected Peak Read		SSIONAL T. I. N. 6		
80 h (m/Nr (qp h / m/Nr (qp h / m/ n / m / n / n / n / n / n / n / n	Eric Lifsey			Frequency of the state of the s	luck to the latest the latest to the latest	E	UT: NX Bluetooth Br	Ü	26.5G		

> 1GHz Horizontal Antenna Polarity Measured Emissions

7.3.11 TX Mode, 18 GHz to 25 GHz, High Channel

est Methonaccordan			2003: "Metho	sional Te									
			uipment in th	e Range of 9 kl				_		ical and	I		
ection:	ce with:	FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits											
		15.209	5.209										
est Date(s)	:	11/15/201	5		EUT Serial	#:	None						
ustomer:		Hubbell Bu	ilding Auto	mation	EUT Part #:		None						
roject Nun	nber:	17666-15			Test Techn	ician:	Eric Lifsey						
urchase O	rder #:	NA			Supervisor		Lisa Arndt						
quip. Unde	er Test:	NX Blueto	oth Bridge M	<u> 1odule</u>	Witness' N	ame:	None						
	Radiated Emissions Test Results Data Sheet Page: 1 of 1												
EUT Li	ne Voltage:	: 2	8 VDC		EUT Pow	ver Frequen	cy:	0	N/A				
Antenna	Orientatio	n:	Vertic	al	Frequ	ency Range:		Ab	ove 10	3Hz			
	EUT N	lode of Op	eration:			Trans	mit Top Ch	annel					
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)		rgin B)	Test R	esults		
19839.9	3	258	1	Average	42.5	38.145	54.0	-1!	5.8	Pa	ss		
24808.6	3	122	1	Average	34.5	34.852	54.0	-19	9.1	Pa	SS		
19839.9	3	258	1	Peak	47.2	42.837	74.0	-3:	1.1	Pa	ss		
24808.6	3	122	1	Peak	45	45.296	74.0	-28	8.7	Pa	SS		
Radiated I	ional Testing, Emissions, Measur z Vertical Polarity Mo	ed at 1m and Sca	led to 3m Distance			▽ Cor — Pea	erage Limit Level rected Average I ak Limit Level rected Peak Read	Reading	PROFES	SIONAL			

Frequency

Mode: Transmit Unmod. Top Channel Power: 28 VDC

30[±] 18.0G

Operator: Eric Lifsey

17666'RE'NXBTRun03'TxMode'ChanTop'Spurious'GHztil

11:04:25 AM, Friday, November 20, 2015

26.5G

EUT: NX Bluetooth Bridge Module

Client: Hubbell Building Automation

Project Number: 17666-15

	d:			Profess		- -						
	d:				sionai re	sting, EN	VII, Inc.					
est Metho					ds of Measurer e Range of 9 kH							d
n accordan	ce with:	FCC Par	rt 15.2	09 - Code of F	ederal Regulat	ions Part 47, S	Subpart C - Int	entiona	l Radiat	ors, Radiate	ed Emis	sions
ection:		15.209	1									
est Date(s)	:	11/15	/2015	;		EUT Serial	# :	None				
Customer:		Hubb	ubbell Building Automation EUT Part #: None									
Project Num	nber:	17666	-15			Test Techni	ician:	Eric Lif	fsey			
Purchase Oi	rder #:	NA				Supervisor:		Lisa Aı	rndt			
quip. Unde	er Test:	NX Blu	uetoo	th Bridge N	lodule	Witness' Na	ame:	None				
	R	Radiate	ed Em	issions Test	Results Data	a Sheet			Page	e: 1	of	1
EUT Lin	ne Voltage:		28	8 VDC		EUT Pow	er Frequen	су:	0	N/A		
Antenna	Orientatio	n:		Horizon	tal	Freque	ency Range:			Above 1	GHz	
	EUT N	lode o	f Ope	ration:			Trans	mit To	p Cha	nnel		
Frequency Measured (MHz)	Test Distance (Meters)	EU Direc (Degr	tion	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit L (dBμV		Margin (dB)	Test R	esults
19858.6	3	29	5	1	Average	32.9	28.68	54.	0	-25.3	Pa	iss
24798.6	3	32	7	1	Average	34.5	34.902	54.	0	-19.1	Pa	ss
19858.6	3	29	5	1	Peak	42.9	38.694	74.	0	-35.3	Pa	iss
24798.6	3	32	7	1	Peak	44	44.409	74.	0	-29.5	Pa	iss
Radiated E	ional Testing, Emissions, Measur z Horizontal Polarity	ed at 1m	and Scale	ed to 3m Distance			∇ CorPea	erage Limi rected Avo k Limit Lo rected Per	erage Rea evel		SIONAL	
Field Strength (dB µV/m) 202 203 204 204 204 205 205 205 205 205 205 205 205 205 205												
40 40 30 18.0G Operator: E	nic Lifsey				providence de la companya de la comp	nata jump pikijaja duliky		UT: NX Bhe	footh Bridg	e Module	26.5	6G
17666 REN	XBTRun03"TxMod M,Friday,November	_	Spurious'G	Hztil Mode: Tra Power: 28	nsmit Unmod. Top Chai	uency nnel	P	roject Numbe lient: Hubbe	er: 17666-1	5		
			> 1GI	Hz Horizont	al Antenna P	Polarity Mea	sured Emiss	sions				

8.0 Antenna Construction Requirements

The design was investigated for meeting the antenna construction requirements of the applicable rules.

8.1 Procedure

A direct examination of the antenna construction is performed and compared to rule criteria that prevent wireless device antennas from being modified by end users in ways that would void their authorization to use the device.

8.2 Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
15.203 // RSS-Gen 8.3	Antenna Construction	30 Nov 2015

8.3 Results

Table 8.3.1 Anter	nna Construction	Details								
Antenna Manufa	cturer and Mode	I	Specifications							
Manufacturer: Ac	Manufacturer: Advanced Ceramic X Corp.									
Part Number: AT8010-E2R9HAA_										
	Frequency	Book Coin	Averege Cain							

Part Number	Frequency Range (MHz)	Peak Gain (dBi typ.)	Average Gain (dBi typ.)	VSWR	Impedance
AT8010 -E2R9HAA_	2400~2500	2.5 (XZ-V)	0.5 (XZ-V)	2 max.	50 Ω

- Antenna is chip style component.
- There is no external antenna connector.

The antenna design above satisfies the requirements of the rules.

9.0 Conducted Emissions, Mains

9.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the floor and 0.4 meters from the conductive reference plane (wall). The EUT is powered through a line impedance stabilization network (LISN) that provides a measurement tap and a termination approximating 50 Ohms in the measurement range of 150 kHz to 30 MHz. A spectrum analyzer is connected, in turn, to each mains line measurement tap and the measurement is taken.

9.2 Test Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
15.107, 15.207 // RSS-Gen	Mains conducted emissions	Nov 2015

9.3 Test Results

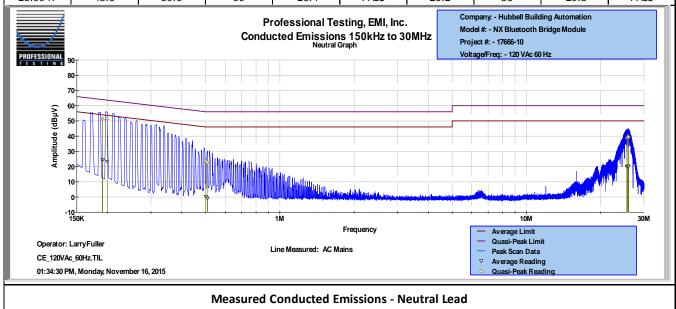
The EUT satisfied the criteria.

Tabular and plotted measurements appear on the following pages.

9.3.1 Mains, Neutral

Professional Testing, EMI, Inc.									
Test Method:	ANSI C63.4–2009: Methods of Measure Equipment in the Range of 9 kHz to 40		ions from Low-Voltage Electrical and Electronic ence, see §15.38).						
In accordance with:	FCC Part 15.107 - Code of Federal Regu Limits	llations Part 47, Subpart B - I	Unintentional Radiators, Conducted Emissions						
Section:	15.107								
Test Date(s):	11/16/2015	EUT Serial #:	None						
Customer:	Hubbell Building Automation	EUT Part #:	None						
Project Number:	17666-15	Test Technician:	Larry Fuller						
Purchase Order #:	NA	Supervisor:	Lisa Arndt						
Equip. Under Test:	NX Bluetooth Bridge Module	Witness' Name:	None						

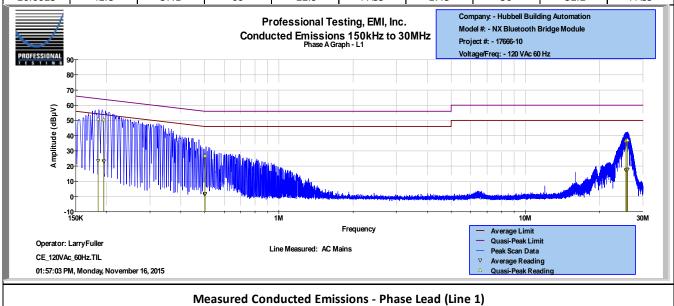
	Conduct	ed Emission	ad	Pa	ge: 1	of 2			
EU	T Line Volta	ge:	120	VAC	EUT Line Frequency:			60	Hz
Frequency Measured (MHz)	Peak Detector Reading (dBµV)	Quasi-peak Detector Reading (dBµV)	Quasi-peak Detector Limit (dBµV)	Quasi-peak Detector Margin (dB)	Quasi-peak Detector Test Results	Average Detector Reading (dBµV)	Average Detector Limit (dBµV)	Average Detector Margin (dB)	Average Detector Test Results
0.19073	58.8	51.6	64	-12.4	PASS	24.3	54	-29.7	PASS
0.19102	57.5	51.5	64	-12.5	PASS	24.2	54	-29.8	PASS
0.19933	57.4	51.7	63.6	-11.9	PASS	23.3	53.6	-30.3	PASS
0.50062	34.6	23.9	56	-32.1	PASS	0.2	46	-45.8	PASS
0.5083	31.9	22.8	56	-33.2	PASS	-0.8	46	-46.8	PASS
25.5849	44.8	39.2	60	-20.8	PASS	19.7	50	-30.3	PASS
25.7236	45.3	39.8	60	-20.2	PASS	20.2	50	-29.8	PASS
25.9158	45.5	39.8	60	-20.2	PASS	20.4	50	-29.6	PASS
25.9947	45.6	39.6	60	-20.4	PASS	20.2	50	-29.8	PASS



9.3.2 Mains, Phase

Professional Testing, EMI, Inc.									
Test Method:	ANSI C63.4–2009: Methods of Measure Equipment in the Range of 9 kHz to 40		ions from Low-Voltage Electrical and Electronic ence, see §15.38).						
In accordance with:	FCC Part 15.107 - Code of Federal Regu Limits	llations Part 47, Subpart B - I	Unintentional Radiators, Conducted Emissions						
Section:	15.107								
Test Date(s):	11/16/2015	EUT Serial #:	None						
Customer:	Hubbell Building Automation	EUT Part #:	None						
Project Number:	17666-15	Test Technician:	Larry Fuller						
Purchase Order #:	NA	Supervisor:	Lisa Arndt						
Equip. Under Test:	NX Bluetooth Bridge Module	Witness' Name:	None						

	Conducted Emissions Test Results Data Sheet - Phase Lead (Line 1) Page: 2 of 2								
EU	EUT Line Voltage:			VAC	EUT Line Frequency:			60	Hz
Frequency Measured (MHz)	Peak Detector Reading (dBµV)	Quasi-peak Detector Reading (dBµV)	Quasi-peak Detector Limit (dBµV)	Quasi-peak Detector Margin (dB)	Quasi-peak Detector Test Results	Average Detector Reading (dBµV)	Average Detector Limit (dBµV)	Average Detector Margin (dB)	Average Detector Test Results
0.1848	57.6	51.1	64.3	-13.2	PASS	23.4	54.3	-30.8	PASS
0.19452	57.2	50.5	63.8	-13.3	PASS	23.2	53.8	-30.6	PASS
0.19494	56.9	50.6	63.8	-13.2	PASS	23.2	53.8	-30.7	PASS
0.50031	34.7	26.9	56	-29.1	PASS	1.2	46	-44.8	PASS
0.50096	34.7	27.1	56	-28.9	PASS	1.7	46	-44.3	PASS
0.50185	34.5	26.8	56	-29.2	PASS	1.7	46	-44.3	PASS
25.594	42	36.7	60	-23.3	PASS	17.1	50	-32.9	PASS
25.6213	42.9	36.7	60	-23.3	PASS	17.3	50	-32.7	PASS
25.8631	42.8	37	60	-23	PASS	17.9	50	-32.1	PASS
26.0023	42.8	37.1	60	-22.9	PASS	17.8	50	-32.2	PASS



10.0 Equipment

10.1 Spurious Radiated Emissions 30 MHz to 25 GHz

		Profes	sional Tes	ting, EMI, Inc.		
Test Metho	d: Electr FCC P	ical and Electronic	Equipment in of Federal Reg	rement of Radio-Noise the Range of 9 kHz to ulations Part 47, Subpa	40 GHz" (incorpora	ated by reference
Section:	15.20					
Test Date(s)): 11/15	5/2015	E	UT Serial #:	None	
Customer:	Hubb	ell Building Autom	nation E	UT Part #:	None	
Project Nun	nber: 17666	5-15	Т	est Technician:	Eric Lifsey	
Purchase O				upervisor:	Lisa Arndt	
Equip. Unde	er Test: NX Bl	uetooth Bridge Mo	odule V	Vitness' Name:	None	
				est Equipment List		
Til	le! Software Version	on: 4.2.A,	, May 23, 2010	, 08:38:52 AM		
	Test Profile:			_ClassA - LowPRF_072 _ClassB - LowPRF_072		
Asset #	Manufacturer	Model	Equipme	ent Nomenclature	Serial Number	Calibration Due Date
1509A	Braden	N/A	TDK 10M Ch	TDK 10M Chamber, NSA < 1 GHz		2/5/2016
1890	HP	8447F	Preamp/Amp, 9kHz-1300MHz, 28/25dB		3313A05298	2/6/2016
1937	Agilent	E4440A	Spectrum Analyzer, 3 Hz - 26.5 GHz		MY44303298	12/2/2015
1926	ETS-Lindgren	3142D	Antenna, Biconilog, 26 MHz - 6 GHz		135454	1/25/2017
C027D	none	RG214	Cable Coax, N-N, 25m		none	10/1/2016
1327	EMCO	1050	050 Controller, Antenna Mast		none	N/A
0942	EMCO	11968D	Tui	Turntable, 4ft.		N/A
1969	HP	11713A	Attenuator/Switch Driver		3748A04113	N/A
1509B	Braden	N/A	TDK 10M Chamber, VSWR > 1 GHz		DAC-012915-005	3/13/2016
2004	Miteq	AFS44-00101800- 2S-10P-44	Amplifie	r, 40dB, .1-18GHz	0	12/29/2015
C030	none	none	Cable	Coax, N-N, 30m	none	10/1/2016
1325	EMCO			er, Antenna Mast	9003-1461	N/A
1780	ETS-Lindgren	3117	Antenna, Double Ridged Guide Horn, 1 - 18 GHz		110313	2/25/2017
1973	Agilent	83017A	' '	icrowave 0.5-26.5 GHz	MY39500497	2/4/2016
1542	A.H. Systems	SAS-572	Antenna, Ho	orn 18-26.5GHz, 20dB gain	225	N/A

10.2 Bandwidth and Duty Cycle

Asset #	Manufacturer	Model #	Description	Calibration Due
ALN-077	Rohde & Schwarz	FSP-30	Spectrum Analyzer	29 Jan 2016

10.3 Mains Conducted Emissions

			Profes	sional Te	esting, EMI, Inc.			
					urement of Radio-Noise			
Test Metho		Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (incorporated by reference,						
In accordance with:		see §15.38). FCC Part 15.107 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Conducted Emissions Limits						
Section:	1	15.107	7					
Test Date(s)): 1	1/16	/2015		EUT Serial #:	None		
Customer:	ŀ	Hubbe	ell Building Autom	ation	EUT Part #:	None		
Project Nun	nber: 1	L 7666	-15		Test Technician:	Larry Fuller		
Purchase O		NA .			Supervisor:	Lisa Arndt		
Equip. Unde	er Test: N	VX Blu	uetooth Bridge Mo	odule	Witness' Name:	None		
			Conduct	ed Emission	s Test Equipment List			
Til	e! Software V	ersio/	n: 4.1.A.	0, April 14, 2	2009, 11:01:00PM			
	Test Profile	e:	CE_20	014_R3_0916	515.TIL or CE_Marine_09	1615.TIL		
Asset #	Manufactui	rer	Model	Equipr	nent Nomenclature	Serial Number	Calibration Due Date	
1145	HP		8568B	Spectrum Analyzer 100Hz-1.5GHz		2517A01821	10/18/2016	
1834	HP		85662A	Spec Anal D	Osply, use with A/N 1145	2349A06182	N/A	
0990	НР		85685A	RF Preselector		3010A01119	12/1/2015	
0085	НР		85650A	Quasi-	Peak Adapter CISPR	3033A01458	10/18/2016	
1173	PTI	TI 100k HPF Filter		Filter,	High Pass, 100kHz	none	1/15/2016	
1087	PTI		PTI-ALF3	Atten	uator Limiter Filter	none	4/28/2016	
C109	НР		none	Cable 19 inch BNC (grey)		none	8/6/2016	
C108	НР		11170 C	Cable 5 ft BNC (Grey)		none	8/6/2016	
C107	Pomona		RG-223	Cable 9	ft BNC RG-223 (black)	none	8/6/2016	
1185	EMCO		3825/2	LISN	I, 10kHz-100MHz	1235	11/12/2016	

11.0 Measurement Bandwidths

Radiated Emissions Spectrum Analyzer Bandwidth and Measurement Time - Peak Scan							
Frequency Band Start (MHz)	Frequency Band Stop (MHz)	6 dB Bandwidth (kHz)	Number of Ranges Used	Measurement Time per Range			
0.009	0.15	0.3	2	Multiple Sweeps			
0.15	30	9	6	Multiple Sweeps			
30	1000	120	2	Multiple 800 mS Sweeps			
1000	6000	1000	2	Multiple Sweeps			
6000	18000	1000	2	Multiple Sweeps			
18000	26500	1000	2	Multiple Sweeps			

*Notes:

- 1. The settings above are specifically calculated for the E4440A series of spectrum analyzers, which have 8,000 data points per range.
- 2. The measurement receiver resolution bandwidth setting was 300 Hz for quasi-peak measurements from 9-150 kHz.
- 3. The measurement receiver resolution bandwidth setting was 9 kHz for quasi-peak measurements from 0.15-30 MHz.
- 4. The measurement receiver resolution bandwidth setting was 120 kHz for quasi-peak measurements from 30-1000 MHz.
- 5. The measurement receiver resolution bandwidth setting was 1 MHz for average measurements from 1-18 GHz.

Conducted Emissions Spectrum Analyzer Bandwidth and Measurement Time							
Frequency Band Start (MHz) Frequency Band Stop		6 dB Bandwidth (kHz)	Number of Ranges Used	Measurement Time per Range			
0.01	0.15	0.3	7	Five 1 second sweeps			
0.15	30	9	20	Five 1 second sweeps			

*Notes

- 1. The settings above are specifically calculated for the HP856X series of spectrum analyzers, which have 1,000 data points per range.
- 2. The measurement receiver resolution bandwidth setting was 300 Hz for quasi-peak measurements from 10-150 kHz.
- 3. The measurement receiver resolution bandwidth setting was 9 kHz for quasi-peak measurements from 0.15-30 MHz.

Appendix: Policy, Rationale, and Evaluation of EMC Measurement Uncertainty

All uncertainty calculations, estimates and expressions thereof shall be in accordance with NIST policy. Since PTI operates in accordance with NIST (NVLAP) Handbook 150-11: 2007, all instrumentation having an effect on the accuracy or validity of tests shall be periodically calibrated or verified traceable to national standards by a competent calibration laboratory. The certificates of calibration or verification on this instrumentation shall include estimates of uncertainty as required by NIST Handbook 150-11.

1. Rationale and Summary of Expanded Uncertainty.

Each piece of instrumentation at PTI that is used in making measurements for determining conformance to a standard (or limit), shall be assessed to evaluate its contribution to the overall uncertainty of the measurement in which it is used. The assessment of each item will be based on either a type A evaluation or a type B evaluation. Most of the evaluations will be type B, since they will be based on the manufacturer's statements or specifications of the calibration tolerances, or uncertainty will be stated along with a brief rationale for the type of evaluation and the resulting stated uncertainties.

The individual uncertainties included in the combined standard uncertainty for a specific test result will depend on the configuration in which the item of instrumentation is used. The combination will always be based on the law of propagation of uncertainty. Any systematic effects will be accommodated by including their uncertainties, in the calculation of the combined standard uncertainty; except that if the direction and amount of the systematic effect cannot be determined and separated from its uncertainty, the whole effect will be treated as uncertainty and combined along with the other elements of the test setup.

Type A evaluations of standard uncertainty will usually be based on calculating the standard deviation of the mean of a series of independent observations, but may be based on a least-squares curve fit or the analysis of variance for unusual situations. Type B evaluations of standard uncertainty will usually be based on manufacturer's specifications, data provided in calibration reports, and experience. The type of probability distribution used (normal, rectangular, a priori, or u-shaped) will be stated for each Type B evaluation.

In the evaluation of the uncertainty of each type of measurement, the uncertainty caused by the operator will be estimated. One notable operator contribution to measurement uncertainty is the manipulation of cables to maximize the measured values of radiated emissions. The operator contribution to measurement uncertainty is evaluated by having several operators independently repeat the same test. This results in a Type A evaluation of operator-contributed measurement uncertainty.

A summary of the expanded uncertainties of PTI measurements is shown as Table 1. These are the worst-case uncertainties considering all operative influence factors.

Table 1: Summary of Measurement Uncertainties for Site 45

Type of Measurement	Frequency Range	Meas. Dist.	Expanded Uncertainty U, dB (k=2)
Mains Conducted Emissions	150 kHz to 30 MHz	N/A	2.9
Telecom Conducted Emissions	150 kHz to 30 MHz	N/A	2.8
Padiated Emissions	30 to 1,000 MHz	10 m	4.8
Radiated Emissions	1 to 18 GHz	3 m	5.7

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