Project 18876-15

Hubbell Control Solutions NXSMP-SMI

Wireless Certification Report

Prepared for:

Hubbell Control Solutions 1812 Centre Creek Dr Suite 240 Austin, TX 78754

By

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

16 Feb 2018

Reviewed by

Larry Finn Chief Technical Officer i X

Written by

Eric Lifsey EMC Engineer

Revision History

Revision Number	Description	Date
DRAFT 02	Draft for review.	28 Jul 2017
Final 03	Add 99% BW.	18 Feb 2018

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None.

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Compliance Certificate

Applicant	Device & Test Identification	
Hubbell Control Solutions	FCC ID:	YH9NXSMPSMI
1812 Centre Creek Dr	Industry Canada ID:	9044A-NXSMPSMI
Suite 240	Model(s):	NXSMP-SMI
Austin, TX 78754-3962		
Certificate Date: 16 Feb 2018	Laboratory Project ID:	18876-15

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 Radiofreque Electromagnetic Fields	
RSS-247	Issue 2	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 5	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 o	f 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 / NXSMP-SMI	None	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 is an occupancy/light sensor in support of a building control system. It measures approximately 50 mm x 20 mm x 21 mm.

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.

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		
RSS-247 Issue 2	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-		
K55-247 ISSUE 2	Exempt Local Area Network (LE-LAN) Devices		
RSS-Gen Issue 4	General Requirements and Information for the Certification of Radio Apparatus		
ANSI C63.10 2013	American National Standard of Procedures for Compliance Testing of Unlicensed		
	Wireless Devices		

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

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

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	17 Mar 2017		

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 @ 3 m Vertical Polarity	Measured Peak Power dBμV/m @ 3 m Horizontal Polarity	Maximum Measured Peak Power Restated as EIRP dBm					
2402	88.4	94.3	-0.93					
2440	89.4	95.4	0.17					
2480	89.9	96.7	1.5					

Measured in 1 MHz RBW, 3 MHz VBW.

The EUT was found to be in compliance with the applicable criteria.

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.

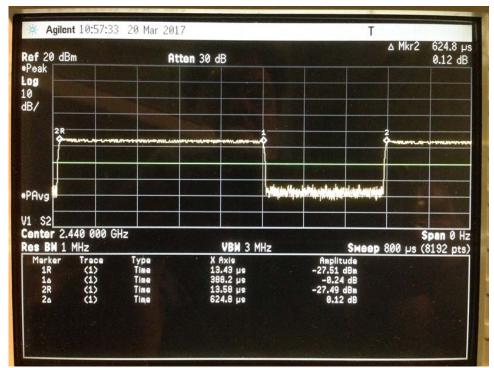
The EUT was placed in the packet transmit mode representing a high transmit duty cycle that likely exceeds that of normal operation but provides a conservative result.

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)			
0.3882	0.6248	= 20 * Log ₁₀ (0.3882 msec / 0.6248 msec)	- 4.1	- 4.1			

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: - 2dB

Plotted results appear below.



Transmit On Time and 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	17 Mar 2017					

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	20 Mar 2017					

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.

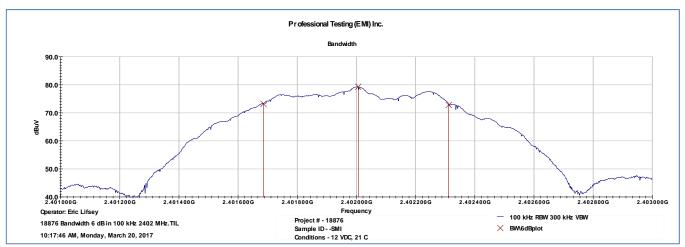
Table 4.3.1 Bandwidth 6 dB, Minimum 500 kHz in 100 kHz RBW								
Low Channel	nel Mid Channel High Channel Reported							
Measured BW	Measured BW	Measured BW	Minimum BW					
(kHz)	(kHz)	(kHz)	(kHz)					
626	616	640	616					

Table 4.3.2 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)					
1076	1076	1094	1094					

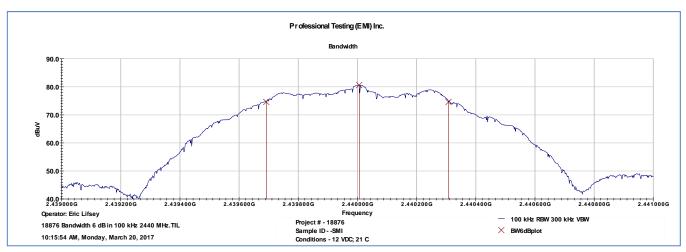
Table 4.3.3 Bandwidth OBW 99%, Measure and Report								
Low Channel	Low Channel Mid Channel High Channel							
Measured BW	Measured BW	Measured BW	Maximum BW					
(kHz)	(kHz)	(kHz)	(kHz)					
1018	1018	1012	1018					

Plotted measurements appear on the following pages.

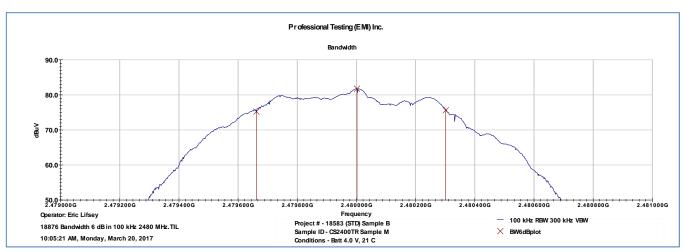
4.3.1 Bandwidth Plots, 6 dB



6 dB, Low Channel

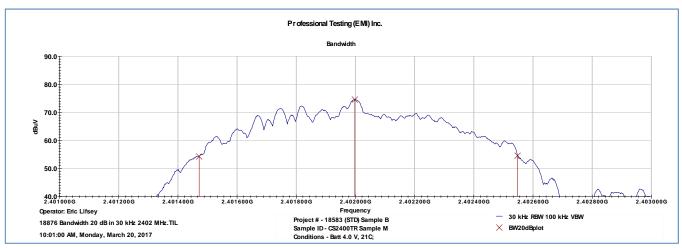


6 dB, Middle Channel

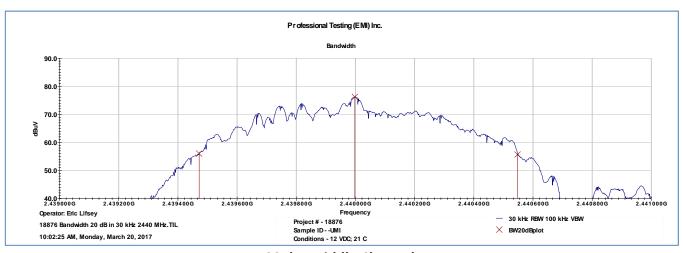


6 dB, High Channel

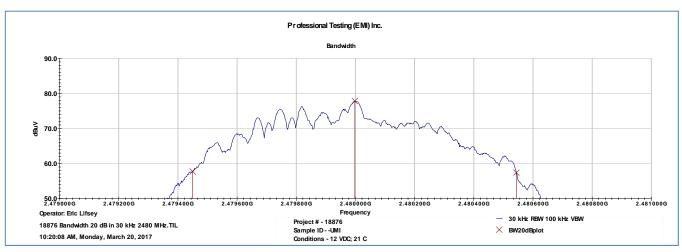
4.3.2 Bandwidth Plots, 20 dB



20 dB, Low Channel

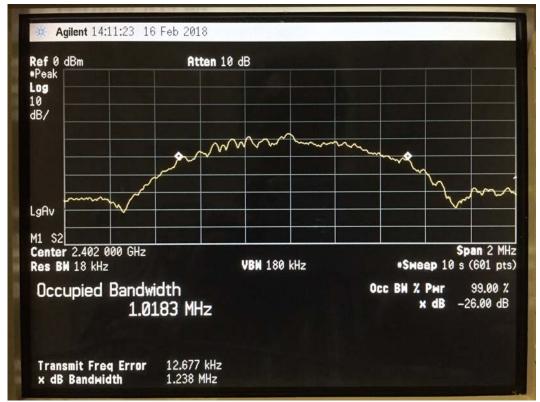


20 dB, Middle Channel

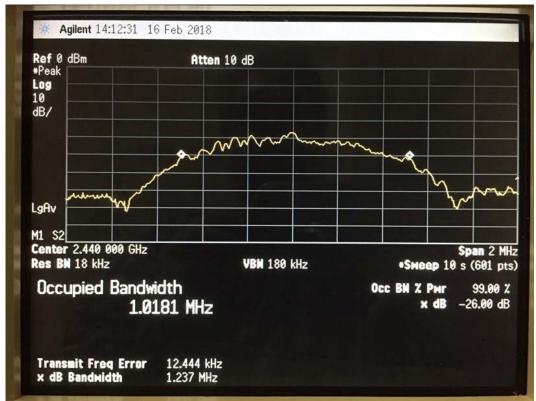


20 dB, High Channel

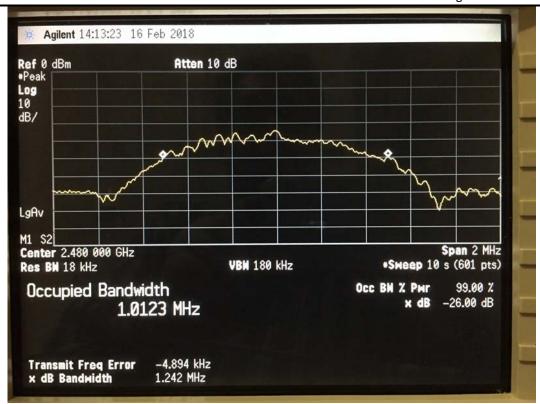
4.3.3 Bandwidth Plots, OBW 99%



Low Channel



Low Channel



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	27 Mar 2017					
RSS-247 5.5, RSS-Gen 4.9	Band, Radiated	27 Mar 2017					

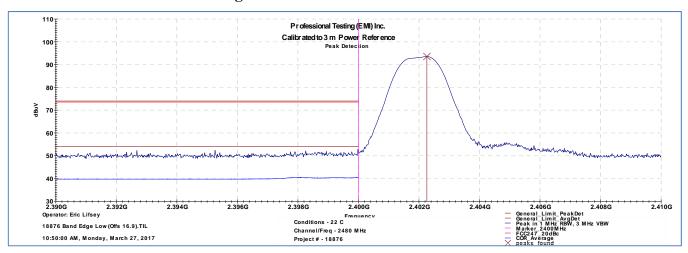
5.3 Test Results

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.

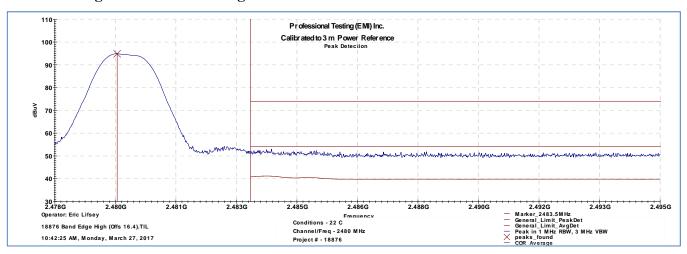
Peak detection of emissions at both band edges were below the general emission limits for average limit levels. Also, the duty cycle averaging factor applies -4.1 dB to the peaks recorded.

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

5.3.1 Low Channel Band Edge



5.3.2 High Channel Band Edge

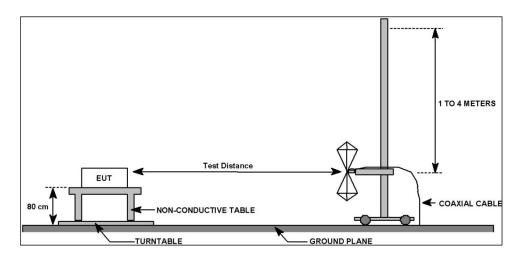


6.0 Radiated Spurious Emissions, Receive Mode

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	31 Mar 2017					

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.

6.3.1 Up to 1 GHz

			Profes	sional Te	sting, EN	MI, Inc.			
Test Metho	d:		•	an National Star Electronic Equi				adio-Noise En	nissions from
In accordar	ice with:	Emissions Lir		Federal Regulat	ions Part 47, S	Subpart B - Ur	intentional R	adiators, Rad	iated
Section:		15.109			1		,		
Test Date(s	s):	3/31/2017			EUT Serial		0		
Customer:		Hubbell			EUT Part #:		0		
Project Nui		18876			Test Techni		Spencer Fli	nt	
Purchase O		0			Supervisor:		Lisa Arndt		
quip. Und	er Test:	NXSMP-SN	11		Witness' N	ame:	None		
	F	Radiated En	nissions Tes	t Results Data	Sheet		Pa	ge: 1	of 1
EUT Li	ne Voltage	: 1	2 VDC		EUT Pow	er Frequen	cy:	0 N/A	
Antenna	Orientatio	n:	Vertic	al	Frequ	ency Range:		30MHz to	1GHz
	EUT N	/lode of Op	eration:			R	eceive Mod	le	
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
29.9838	10	9	1.23	Quasi-peak	30.3	18.197	30.0	-11.8	Pass
60.0296	10	217	3.26	Quasi-peak	31	12.731	29.5	-16.8	Pass
201.937	10	6	4.06	Quasi-peak	22.5	8.105	33.1	-25.0	Pass
216.16	10	29	2.4	Quasi-peak	22.3	7.942	35.6	-27.7	Pass
893.185	10	22	2.08	Quasi-peak	21.3	25.862	35.6	-9.7	Pass
997.018	10	17	3.29	Quasi-peak	21	26.295	43.5	-17.2	Pass
Profess	sional Testing,	EMI Inc				- Quasi	i-peak Limit Level		
Radiated	Emissions, 10m D	istance				▽ Corre	cted Quasi-peak Read	ling	
	GHz V ertical Pola rity	M ea su red Emissio ns				- Corre	cted Peak Value		
60						▽ Verifi	ed Low-PRF QP Read	ling	PROFESSIONAL
50 -			_ _ _			× LPRF	V erification Limit		T E S T I N 6
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Field Strength (dBµV/m) 30 40 40 40 40 40 40 40 40 40 40 40 40 40					× × -	_	And the last of th		Y V
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		Mr. Address	,,						
				-					1G
0 30M			100M						
Operator:	Spencer Flint		THE TAX I	n	luency		UT: NXSMP-SMI an		
Operator: 18876-77_	-			n	uency	P	UT: NXSMP-SMI an roject Number: 1887 lient: Hubbell BLDG.		

≤ 1GHz Vertical Antenna Polarity Measured Emissions

							Hubbe	ell Buildin	g Auto	mation -	- NXSM	P-SM
			Profes	sional Te	sting, El	ΜI, I	Inc.					
Test Metho	d:		•	an National Star Electronic Equi						-Noise Em	issions	from
In accordan	ce with:	FCC Part 15. Emissions Li		Federal Regulat	ions Part 47,	Subpar	rt B - Un	intentiona	al Radia	itors, Radi	ated	
Section:		15.109										
Test Date(s):	3/31/2017			EUT Serial	#:		0				
Customer:		Hubbell			EUT Part #:			0				
Project Nur		18876			Test Techn			Spencer				
Purchase O		0			Supervisor:			Lisa Arn	dt			
Equip. Und	er Test:	NXSMP-SN	11		Witness' N	ame:		None				
	F	Radiated Er	nissions Test	t Results Data	a Sheet				Page:	1	of	1
EUT Li	ne Voltage:	:	12 VDC		EUT Pow	ver Fr	equen	су:	0	N/A		
Antenna	Orientatio	n:	Horizor	ntal	Frequ	ency	Range:	:	30	MHz to	1GHz	
	EUT N	lode of Op	eration:				R	eceive N	lode			
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Le	ected evel iV/m)	Limit Lev (dBµV/r	- 1	Margin (dB)	Test R	esults
33.7091	10	247	3.96	Quasi-peak	23.4	11	.527	29.5		-18.0	Pa	SS
183.978	10	185	3.74	Quasi-peak	29.5	14	1.32	33.1		-18.8	Pa	SS
201.637	10	98	3.44	Quasi-peak	22.5	8.	117	33.1		-25.0	Pa	SS
891.019	10	13	3.61	Quasi-peak	21.3	25	.735	35.6		-9.9	Pa	SS
935.074	10	48	3.59	Quasi-peak	21.2	26	.013	35.6		-9.6	Pa	SS
980.577	10	135	2.81	Quasi-peak	21	26	.174	43.5		-17.3	Pa	SS
Radiated 30MHz-10	Professional Testing, EMI, Inc Radiated Emissions, 10m Distance 30MHz-1GHzHorizontalPolarity Measured Emissions						∇ CorreCorre∇ Verific	-peak Limit Leve cted Quasi-peak cted Peak Value ed Low-PRF QP Verification Lim	Reading Reading		PROFESS	
50 m/N m (m/N m 40 m 40 m m m m m m m m m m m m m m m					×						T E S T	N E
Field Strength (dB w/m)	Manager Land			sando . I akido natibi	X X X X X X X X X X X X X X X X X X X	longitus il anga ti bili	nedistration of the second		and the second		▼	
10	Market as Market Comment	Market Balling and Market Belleville	Marin Control of the State of t	The state of the s	7							
0 [±] 30M	+		100M	F				+	-		1G	
	-		EUT Mod RF_032117.tEUT Powe		uency		P	UT: NXSMP-SM roject Number: 1 lient: Hubbell BL	18876-77	SMP-LMI		

≤ 1GHz Horizontal Antenna Polarity Measured Emissions

6.3.1 Above 1 GHz

			Profess	sional Te	sting, El	MI, Inc.			
Test Metho	d:		•	n National Star Electronic Equi				dio-Noise Em	issions from
In accordan	ice with:	FCC Part 15.1 Emissions Lin		Federal Regula	tions Part 47, 9	Subpart B - Un	intentional Ra	adiators, Rad	iated
Section:		15.109							
Test Date(s	<u>): </u>	3/31/2017			EUT Serial		0		
Customer:		Hubbell			EUT Part #:		0		
Project Nur	nber:	18876			Test Techn	ician:	Spencer Fli	nt	
Purchase O	rder #:	0			Supervisor:		Lisa Arndt		
Equip. Und	er Test:	NXSMP-SM	1		Witness' N	ame:	None		
	ı	Radiated Em	issions Test	Results Dat	a Sheet		Pa	ge: 1	of 1
EUT Li	ne Voltage	: 1	2 VDC		EUT Pow	ver Frequen	cy: (N/A	
Antenna	Orientatio	on:	Vertic	al	Frequ	ency Range:		Above 1	GHz
	EUT N	Mode of Ope	eration:			R	eceive Mod	e	
Frequency	Test	EUT	Antenna		Recorded	Corrected			
Measured	Distance	Direction	Height	Detector	Amplitude	Level	Limit Level	Margin	Test Resul
(MHz)	(Meters)	(Degrees)	(Meters)	Function	(dBµV)	(dBµV/m)	(dBµV/m)	(dB)	
1932.08	3	294	3.22	Average	35.2	25.863	54.0	-28.1	Pass
4963.48	3	32	2.63	Average	33.3	29.256	54.0	-24.7	Pass
6621.1	3	188	2.6	Average	31	32.501	54.0	-21.5	Pass
8958.55	3	26	2.87	Average	27.1	34.103	54.0	-19.9	Pass
11431.8	3	290	1.66	Average	27.2	37.954	54.0	-16.0	Pass
12208.7	3	350	2.82	Average	27.5	37.811	54.0	-16.1	Pass
12312.7	3	249	2.42	Average	27.3	37.726	54.0	-16.2	Pass
						— Avera	g e Limit Level		
	sional Testing, Emissions, 3m Dis								
	ertical Polarity Meas					V Corre	cted Average Reading		
90						— Peak l	Limit Level		
80 -						— Corre	cted Peak Reading		PROFESSIONAL TESTINE
Field Strength (d B LVm) 20									
9 60 –							_		
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1S 50 -							e les Contractos de	Marie De La Company	
≅ 40 —		and the state of t	Marie Ma	A PROPERTY OF THE PERSON NAMED IN COLUMN					∇
30	Particular Spring Spring Spring						7	_ 🕌	
20			7						
20± 1G				P	quency			10G	13G
	Spencer Flint		FY/Th. 1	n	quency	E	UT: NXSMP-SMI and	I NXSMP-LMI	
			ELLI Mode	e: Receiving					
18876-77	2016 RE_ClassB - B PM, Friday, March 31	o resit e+Mast_LowPR	F_032117.tEUT Powe	e: Receiving r: 24 VDC			roject Number: 18876 lient: Hubbell BLD G.	-77	

							Hubbe	ell Building	g Auton	nation –	- NXSM	P-SM
			Profess	sional Te	sting, El	MI, I	nc.					
Test Metho	d:			n National Star Electronic Equi						Noise Em	issions	from
In accordan	ice with:	FCC Part 15.1 Emissions Lin		ederal Regula	tions Part 47,	Subpar	t B - Ur	intentiona	l Radiat	ors, Radi	ated	
Section:		15.109										
Test Date(s):	3/31/2017			EUT Serial	#:		0				
Customer:		Hubbell			EUT Part #:			0				
Project Nur		18876			Test Techn	ician:		Spencer				
Purchase O	rder #:	0			Supervisor			Lisa Arno	dt			
Equip. Und	er Test:	NXSMP-SM	1		Witness' N	ame:		None				
	F	Radiated Em	nissions Test	Results Dat	a Sheet			1	Page:	1	of	1
EUT Li	ne Voltage:	: 1	2 VDC		EUT Pov	ver Fre	equen	су:	0	N/A		
Antenna	Orientatio	n:	Horizon	tal	Frequ	ency F	Range		А	bove 10	GHz	
	EUT N	lode of Ope	eration:				R	eceive M	ode			
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	_	ected vel V/m)	Limit Lev (dBµV/m		largin (dB)	Test R	esults
3045.6	3	13	2.97	Average	34.9	27.	713	54.0	-	26.2	Pa	SS
5230.67	3	121	2.14	Average	33.4	30.	728	54.0	-	23.2	Pa	SS
6222.17	3	219	3.65	Average	31.4	31	L.9	54.0	-	22.1	Pa	SS
8656.44	3	209	2.33	Average	27.2	34	.28	54.0	-	19.7	Pa	SS
11506.8	3	236	1.13	Average	27.2		221	54.0		15.7	Pa	
12900.3	3	132	2.34	Average	27.7	37.	808	54.0	-	16.1	Pa	SS
Radiated	sional Testing, Emissions, 3m Dis (orizontal Polarity Mo	tance					∨ Corro	age Limit Level ected Average Rea Limit Level ected Peak Readin			PROFESS	
-	Spencer Flint	and the second s			quency	Y	Ţ	UT: NXSMP-SM	Y III and NXS!	10G MP-LMI	7 7	G
	2016 RE_ClassB-Bo		F_032117.tEUT Powe	e: Receiving r: 24 VDC				Project Number: 1 Client: Hubbell BL				

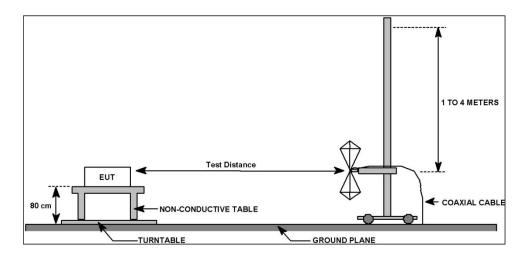
> 1GHz Horizontal Antenna Polarity Measured Emissions

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	10 Mar 2017

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.

The duty cycle averaging factor applies -4.1 dB to the peaks recorded for the harmonics.

All measurements used peak detection.

7.3.1 Up to 1 GHz

			Profes	sional Te	sting, El	VII, Inc.			
Test Metho	od:	ANSI C63.10 Devices	-2013 Americ	an National Star	ndard of Proce	dures for Con	npliance Testii	ng of Unlicen	sed Wireless
In accordan	nce with:	FCC Part 15.	209 - Code of	Federal Regulat	ions Part 47,	Subpart C - Int	entional Radia	ators, Radiate	ed Emissions
Section:		15.209							
Test Date(s	:):	3/10/2017			EUT Serial	#:	0		
Customer:		Hubbell Bu	ilding Auto	mation	EUT Part #:		0		
Project Nur	mber:	18876			Test Techn	ician:	Spencer Fli	nt	
Purchase O	rder #:	0			Supervisor		Lisa Arndt		
Equip. Und	er Test:	NXSMP-SN	11		Witness' N	ame:	None		
	ı	Radiated En	nissions Tes	t Results Data	Sheet		Pa	ge: 1	of 1
EUT Li	ne Voltage	: 2	4 VDC		EUT Pow	ver Frequen	cy: (N/A	
Antenna	Orientation	on:	Vertic	al	Frequ	ency Range:		30MHz to	1GHz
	EUT N	Node of Op	eration:		Tra	ansmitting (Mid Channe	el - 2440 M	Hz)
Frequency	Test	EUT	Antenna		Recorded	Corrected			
Measured	Distance	Direction	Height	Detector	Amplitude	Level	Limit Level	Margin	Test Result
(MHz)	(Meters)	(Degrees)	(Meters)	Function	(dBμV)	(dBµV/m)	(dBµV/m)	(dB)	
30.0266	10	224	2.36	Quasi-peak	28.3	16.537	29.5	-13.0	Pass
32.6181	10	133	1.6	Quasi-peak	24.2	12.459	29.5	-17.0	Pass
60.0305	10	190	3.14	Quasi-peak	31.2	12.735	29.5	-16.8	Pass
765.677	10	227	3.42	Quasi-peak	21.6	21.061	35.6	-14.5	Pass
893.392	10	117	3.78	Quasi-peak	21.4	24.281	35.6	-11.3	Pass
904.804	10	211	1.58	Quasi-peak	21.2	24.425	35.6	-11.2	Pass
922.412	10	347	1.34	Quasi-peak	21.3	24.193	35.6	-11.4	Pass
						— Onasi	-peak Limit Level		<u> </u>
	sional Testing,						cted Quasi-peak Read	ing	
	Emissions, 10m D GHzVerticalPolarity						cted Peak Value		
60 _±							ed Low-PRF OP Readi	nσ	
							V erification Limit		PROFESSIONAL
50 = -									***
Field Strength (dBµV)m) × 30 × × × × × × × × × × × × × × × × ×								_ <u></u> x	
= 30 ×		×							
trem 1								والمرابع المرافع المرا	₩.
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0		- Tanga *	·F.						
30M			100M	15	·				1 G
	Spencer Flint		EUT Mod		quency		UT: NXSMP-SMI		
18876 201	16 RE_2440M_30M	1-26G.til		er: 24V DC		P	roject Number: 18876	-15	
	M, Thursday, March						lient: Hubbell Building		

				Profes	sional Te	sting, El	MI,	lnc.					
Test I	Metho	d:	ANSI C63.10 Devices	-2013 Americ	an National Star	ndard of Proce	dures	for Con	npliance Testi	ing of U	nlicens	ed Wire	less
		ce with:	Limits	209 - Code of	Federal Regulat	ions Part 47, 9	Subpar	t C - Int	entional Rad	iators, F	Radiate	d Emissi	ions
Section			15.209										
	Date(s):	3/10/2017			EUT Serial			0				
Custo		•	_	uilding Auto	mation	EUT Part #:			0				
	ct Nur		18876			Test Techn			Spencer Fl	int			
		rder #:	0			Supervisor			Lisa Arndt				
Equip	. Und	er Test:	NXSMP-SN	/ II		Witness' N	ame:		None				
			Radiated Er	nissions Tes	t Results Data	Sheet			Ра	ge:	1	of	1
	EUT Li	ne Voltage	:	24 VDC		EUT Pow	ver Fr	equen	cy:	0	N/A		
Ar	tenna	Orientatio	on:	Horizoi	ntal	Frequ	ency l	Range:	1	30MI	Hz to	1GHz	
		EUT I	Mode of Op	eration:		Tra	ansm	itting (Mid Chann	el - 24	40 M	Hz)	
Frequ	ency	Test	EUT	Antenna		Recorded	Corr	ected					
Meas		Distance	Direction	Height	Detector	Amplitude	Le	vel	Limit Level		rgin -\	Test Re	sults
(M	Hz)	(Meters)	(Degrees)	(Meters)	Function	(dBµV)	(dBµ	(V/m)	(dBµV/m)	(d	B)		
33.7	142	10	134	3.72	Quasi-peak	24.1	12.	.419	29.5	-17	7.1	Pas	SS
112.	141	10	299	1.5	Quasi-peak	22.9	5.9	973	33.1	-27	7.1	Pas	S
866	.048	10	290	3.12	Quasi-peak	21.3	22	55	35.6	-13	3.1	Pas	S
894	.335	10	251	3.41	Quasi-peak	21.3	24.	266	35.6	-13	1.3	Pas	SS
901	877	10	184	2.82	Quasi-peak	21.3	24	.53	35.6	-13	1.1	Pas	SS
929.	174	10	201	2.5	Quasi-peak	21.2	24.	.094	35.6	-13	1.5	Pas	SS
964	.019	10	310	1.53	Quasi-peak	21	23.	.749	43.5	-19	9.8	Pas	S
	Radiated			s				CorrCorrVerif	i-peakLimit Level ected Q uasi-peak Rea ected Peak Value ied Low-PRF Q P Re			PROFESSI	
		Spencer Flint	hayanik di kanani siyada dan	100M EUT Mod	Free	quency	olite di la contra di		UT: NXSMP-SMI			16	
		RE_2440M_30M-26 I, Thursday, March		EUT Powe	er: 24V DC				roject Number: 1887				

7.3.2 1 GHz to 18 GHz, Bottom Channel

			Profess	sional Te	sting, EN	MI, Inc.			
Test Metho	od:	ANSI C63.10- Devices	-2013 America	ın National Sta	ndard of Proce	dures for Con	npliance Testi	ng of Unlicen	sed Wireless
In accorda	nce with:	Limits	209 - Code of F	ederal Regula	tions Part 47, S	Subpart C - Int	tentional Radi	ators, Radiat	ed Emissions
Section:	•	15.209			I		<u>r.</u>		
Test Date(s	s):	3/10/2017	*1.1* A		EUT Serial		0		
Customer: Project Nu	mh a ri	18876	ilding Auto	mation	EUT Part #:		Spencer Fli		
Purchase C		0			Test Techni Supervisor:		Lisa Arndt	nt	
Equip. Und		NXSMP-SM	ll		Witness' N		None		
		Radiated Em	nissions Test	Results Dat	a Sheet			ge: 1	of 1
EUT L	ine Voltage	: 2	4 VDC		EUT Pow	ver Frequen	icy:) N/A	
Antenna	a Orientatio	n:	Vertic	al	Frequ	ency Range		Above 1	GHz
	EUT N	/lode of Ope	eration:		Tran	smitting (B	ottom Chan	nel - 2402	MHz)
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
3705.99	3	240	3.48	Average	34.3	28.453	54.0	-25.5	Pass
4184.18	3	127	2.66	Average	34	29.207	54.0	-24.8	Pass
4804.04	3	215	1.93	Average	50.6	46.868	54.0	-7.1	Pass
14954.6	3	62	3.75	Average	28.2	40.089	54.0	-13.9	Pass
16311.7 17886.2	3	154 3	2.84 2.49	Average Average	27.3 26.9	41.718 43.104	54.0 54.0	-12.2 -10.9	Pass Pass
17000.2	<u> </u>	,	2.43	Average	20.5	43.104	34.0	10.5	1 433
Radiated	sional Testing, Emissions, 3m Dis Vertical Polarity Measu	stance				▽ Corr	age Limit Level ected Average Reading Limit Level ected Peak Reading		PROFESSIONAL TESTING
Field Strength (d B u Vin) (4 B u Vin) (4 B u Vin) (4 B u Vin) (4 B u Vin) (5 C u Vin) (6									7 7
30	- Control of the control of the			\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Y				
201 G		'		D	aguency	, ,	10G		18 G
	Spencer Flint			Fre	equency	1	EUT: NXSMP-SMI		

						Hub	bell Build	ding Au	tomation -	- NXSM	P-SM
			Profess	sional Te	sting, El	VII, Inc					
Test Metho	od:	ANSI C63.1	0-2013 America	ın National Staı	ndard of Proce	dures for (ompliance	e Testin	g of Unlicen	sed Wire	eless
In accordar	nce with:	FCC Part 15 Limits	.209 - Code of I	ederal Regulat	tions Part 47, 9	Subpart C -	Intention	al Radia	tors, Radiate	ed Emiss	ions
Section:		15.209									
Test Date(s	s):	3/10/201	7		EUT Serial	#:	0				
Customer:			uilding Auto	mation	EUT Part #:		0				
Project Nui		18876			Test Techn			cer Flin	t		
Purchase O		0			Supervisor:		Lisa A				
Equip. Und	er Test:	NXSMP-SI	MI		Witness' N	ame:	None				
	F	Radiated E	missions Test	Results Data	a Sheet			Pag	e: 1	of	1
EUT Li	ine Voltage	:	24 VDC		EUT Pov	er Frequ	ency:	0	N/A		
Antenna	Orientatio	n:	Horizor	ıtal	Frequ	ency Ran	ge:		Above 1	GHz	
	EUT N	/lode of Op	peration:		Tran	smitting	(Bottom	Chanr	nel - 2402 l	MHz)	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Correcte Level (dBµV/n	Limit (dBu)	Level V/m)	Margin (dB)	Test R	esults
4230.51	3	43	3.01	Average	34	29.452	54	1.0	-24.5	Pa	SS
4804.05	3	172	3.19	Average	46.5	42.775	54	1.0	-11.2	Pa	SS
11511.6	3	286	1.36	Average	27.3	38.354	54	1.0	-15.6	Pa	SS
14981	3	158	3.42	Average	28	40.071	54	.0	-13.9	Pa	SS
16047.4	3	232	2.56	Average	27.1	41.516		1.0	-12.4	Pa	SS
17898.9	3	100	2.37	Average	26.9	43.119	54	1.0	-10.8	Pa	SS
Radiated	sional Testing, Emissions, 3m Dis Iorizontal Polarity Mo	tance				▽ C	verage Limit Lev orrected A verage eak Limit Level orrected Peak R	ge Rea ding	7	PROFESS	
-	Spencer Flint 16 RE_2402M_1-26	C 43	EUT Mode EUT Powe	: Tx	quency		EUT: NXSM Project Num		15	180	;

> 1GHz Horizontal Antenna Polarity Measured Emissions

Client: Hubbell Building

10:40:50 AM, Monday, March 13, 2017

7.3.3 1 GHz to 18 GHz, Middle Channel

			Profess	sional Te	sting, El	VII, Inc.			
Test Metho	od:	ANSI C63.10 Devices	-2013 America	an National Sta	ndard of Proce	dures for Co	ompliance Testi	ng of Unlicen	sed Wireless
In accordar	nce with:	FCC Part 15.2 Limits	209 - Code of I	Federal Regula	tions Part 47,	Subpart C - I	ntentional Radi	iators, Radiat	ed Emissions
Section:		15.209							
Test Date(s	:):	3/10/2017			EUT Serial	#:	O		
Customer:		Hubbell Bu	ilding Auto	mation	EUT Part #:		0		
Project Nur	mber:	18876			Test Techn	ician:	Spencer Fli	nt	
Purchase O	rder #:	0			Supervisor		Lisa Arndt		
Equip. Und	er Test:	NXSMP-SN	l		Witness' N	ame:	None		
	F	Radiated Em	issions Test	Results Dat	a Sheet		Pa	ge: 1	of 1
EUT Li	ne Voltage	: 2	4 VDC		EUT Pov	er Freque	ncy:	0 N/A	
Antenna	Orientatio	n:	Vertic	al	Frequ	ency Rang	e:	Above 1	GHz
	EUT N	/lode of Ope	eration:		Tra	ansmitting	(Mid Chann	el - 2440 M	Hz)
Frequency Measured	Test Distance	EUT Direction	Antenna Height	Detector Function	Recorded Amplitude	Corrected Level	Limit Level	Margin (dB)	Test Result
(MHz)	(Meters)	(Degrees)	(Meters)	•	(dBµV)	(dBµV/m)		11.0	
4887.94	3	184	2.27	Average	42.8	39.371	54.0	-14.6	Pass
7320.35	3	42	3.78	Average	29.8	33.087	54.0	-20.9	Pass
11546.4	3	298	2.86	Average	27.4	38.274	54.0	-15.7	Pass
12497.8	3	84	2.53	Average	27.7	38.499	54.0	-15.5	Pass
14968.2	3	76	1.72	Average	28.2	40.232	54.0	-13.7	Pass
17685.7	3	85	3.38	Average	27.1	42.973	54.0	-11.0	Pass
17852.9	3	28	2.57	Average	27.1	43.214	54.0	-10.7	Pass
Radiated	sional Testing, Emissions, 3m Dis ertical Polarity Meass	stance		-		∇ Co	erage Limit Level rrected Average Readin ık Limit Level	g	
80							rrected Peak Reading		PROFESSIONAL TESTINE
Field Strength (d B µ V/m) 40 40 40 40 40 40 40 40 40 40 40 40 40	Heeking on the second		West of the second					Y Y	7-
30 = - 20 G				Fre	equency		10G		18G
18876_20	Spencer Flint 16 RE_2440M_30M PM, Thursday, March		EUT Mode EUT Powe		aguency		EUT: NXSMP-SMI Project Number: 1887 Client: Hubbell Build in		

						Hubbe	ell Building A	utomation -	- NXSMP-SM
	·		Profess	sional Te	sting, El	VII, Inc.			
Test Metho	od:	ANSI C63.1 Devices	0-2013 America	n National Sta	ndard of Proce	dures for Con	npliance Testi	ing of Unlicens	sed Wireless
In accordar	nce with:	FCC Part 15 Limits	.209 - Code of I	ederal Regula	tions Part 47,	Subpart C - Int	entional Rad	iators, Radiate	d Emissions
Section:		15.209							
Test Date(s	;):	3/10/201			EUT Serial	#:	0		
Customer:		_	Building Auto	mation	EUT Part #:		0		
Project Nur		18876			Test Techn		Spencer Fl	int	
Purchase O		0			Supervisor		Lisa Arndt		
Equip. Und	er Test:	NXSMP-SI	MI		Witness' N	ame:	None		
	F	Radiated E	missions Test	Results Dat	a Sheet		Pa	ige: 1	of 1
EUT Li	ine Voltage	:	24 VDC		EUT Pov	ver Frequen	cy:	0 N/A	
Antenna	a Orientatio	on:	Horizor	ıtal	Frequ	ency Range		Above 1	GHz
	EUT N	Node of O	peration:		Tra	ansmitting (Mid Chann	el - 2440 M	Hz)
Frequency Measured (MHz)	Test Distance	EUT Direction	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
	(Meters)	(Degrees)		A			540	6.2	D
4879.85	3	188	1.61	Average	51.1	47.617	54.0	-6.3	Pass
11573.6 12491.8	3	300 126	2.29 3.88	Average	27.4	38.156 38.463	54.0 54.0	-15.8 -15.5	Pass Pass
14963.3	3	133	1.8	Average Average	28.3	40.262	54.0	-13.7	Pass
16208.6	3	284	3.51	Average	27.6	42.064	54.0	-13.7	Pass
17718.9	3	35	2.7	Average	27.0	42.966	54.0	-11.0	Pass
17847.8	3	253	2.93	Average	27.1	43.24	54.0	-10.7	Pass
17898.6	3	129	2.68	Average	27	43.242	54.0	-10.7	Pass
				J					
Duofogo	sional Testing,	EMI Inc				— Avera	g e Limit Level		
	Emissions, 3m Dis					∇ Corre	cted Average Reading	σ	
	Iorizontal Polarity Mo	easured Emissions						5	
90		$\overline{}$					Limit Level		PROFESSIONAL
80						— Corre	cted Peak Reading		TESTING
<u> </u>									
дВμУ									
e 60 –									
Field Strength (dBp.Vm) 600 400		+			∀		— <u>— — — — — — — — — — — — — — — — — — </u>	A. Marie	
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dajundija	hall builded by the best of the second	on the water of the second							
30									
20 [±] 1G				+		+ + +	10 G		18G
Operator:	Spencer Flint			Fre	quency	E	UT: NXSMP-SMI		

EUT Mode: Tx EUT Power: 24V DC

18876_2016 RE_2440M_30M-26G.til

05:22:10 PM, Thursday, March 09, 2017

Project Number: 18876-15

Client: Hubbell Building

7.3.4 1 GHz to 18 GHz, Top Channel

			Profess	sional Te	sting, El	VII, In	c.				
Test Metho	od:	ANSI C63.10 Devices	0-2013 America	an National Sta	ndard of Proce	dures for	Complianc	e Testing	of Unlicen	sed Wire	eless
In accordar	nce with:	FCC Part 15 Limits	.209 - Code of I	Federal Regula	tions Part 47, S	Subpart C	- Intention	nal Radiat	ors, Radiato	ed Emiss	ions
Section:		15.209									
Test Date(s	<u>s):</u>	3/10/2017			EUT Serial		0				
Customer:			uilding Auto	mation	EUT Part #:		0				
Project Nur		18876			Test Techn			cer Flint	<u>t</u>		
Purchase O		NIVENAD CO	<u></u>		Supervisor: Witness' N			Arndt			
Equip. Und	er rest:	NXSMP-SI	VII		witness in	ame:	None				
	F	Radiated E	missions Test	Results Dat	a Sheet			Page	e: 1	of	1
EUT Li	ne Voltage	:	24 VDC		EUT Pow	ver Freq	uency:	0	N/A		
Antenna	orientation of the contraction o	on:	Vertic	al	Frequ	ency Ra	nge:		Above 1	GHz	
	EUT N	/lode of Op	eration:		Tra	ansmitti	ing (Top (Channel	- 2480 M	Hz)	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Correct Leve (dBµV/	Limit (dBu	Level	Margin (dB)	Test R	esult
4950.38	3	181	1.94	Average	47.2	43.90)8 54	4.0	-10.0	Pa	SS
7440.43	3	105	1.43	Average	29.2	32.96	59 54	4.0	-21.0	Pa	SS
11594.3	3	289	3.98	Average	27.3	37.98	39 54	4.0	-16.0	Pa	SS
12524.1	3	36	3.59	Average	27.7	38.47		4.0	-15.5	Pa	SS
14902.9	3	318	2.78	Average	28.3	40.01		4.0	-13.9	Pa	
16625	3	254	2.91	Average	27.2	41.27		4.0	-12.7	Pa	
17908.9	3	32	2.93	Average	26.9	43.14	18 54	4.0	-10.8	Pa	SS
Radiated	sional Testing, Emissions, 3m Dis erticalPolarity Measu	tance		-		∇	A vera ge Limit Lo Corrected A vera Pea k Limit Level Corrected Peak	ge Reading		PROFESS	IONAL
80							Corrected reak	кеаппд		T E S T	
Field Strength (dBµVm) 409 (400 (dBµVm)									7 7 7		
30	And the same of th	The state of the s					7	_		_	
20 G								10G		18G	<u>.</u>
Operator: \$18876_20	Spencer Flint 16 RE_2480M_1-26 PM, Monday, March		EUT Mode EUT Powe		quency		-		5	100	

						H	ubbell B	uilding A	utomation –	- NXSMP-SM
			Profess	sional Te	sting, El	VII, In	ic.			
Test Metho	d:	ANSI C63.10 Devices	-2013 America	ın National Staı	ndard of Proce	dures fo	r Complia	ance Testi	ng of Unlicens	sed Wireless
In accordan	ice with:	FCC Part 15.	209 - Code of F	ederal Regulat	tions Part 47,	Subpart C	- Intent	ional Radi	ators, Radiate	ed Emissions
Section:		15.209								
Test Date(s):	3/10/2017			EUT Serial	#:	0			
Customer:		_	ilding Autoi	mation	EUT Part #:		O			
Project Nur		18876			Test Techn			encer Fli	nt	
Purchase O		0			Supervisor			a Arndt		
Equip. Und	er Test:	NXSMP-SN	11		Witness' N	ame:	No	ne		
	F	Radiated En	nissions Test	Results Data	a Sheet			Pa	ge: 1	of 1
EUT Li	ne Voltage	: 2	4 VDC		EUT Pov	ver Freq	uency:	(N/A	
Antenna	Orientatio	n:	Horizon	tal	Frequ	ency Ra	nge:		Above 1	GHz
	EUT N	/lode of Op	eration:		Tra	ansmitt	ing (To	p Channe	el - 2480 M	Hz)
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBμV)	Correc Leve (dBµV)	el Lir	mit Level ΒμV/m)	Margin (dB)	Test Results
4959.86	3	226	1.95	Average	45	41.78	39	54.0	-12.2	Pass
8785.39	3	15	1.23	Average	26.6	34.1	3	54.0	-19.8	Pass
11550.3	3	35	2.55	Average	27.3	38.20)3	54.0	-15.8	Pass
12538.7	3	51	3.5	Average	27.7	38.43	35	54.0	-15.5	Pass
14881.6	3	98	1.11	Average	28.4	39.94	16	54.0	-14.0	Pass
16147.4	3	348	3.99	Average	27.1	41.56	55	54.0	-12.4	Pass
17896.9	3	36	1.14	Average	27	43.15	54	54.0	-10.8	Pass
Radiated	sional Testing, Emissions, 3m Dis orizontal Polarity Mo	stance				∇	Peak Limit	Average Reading	Y Y Y	PROFESSIONAL TESTING
18876_20	Spencer Flint 16 RE_2480M_1-26 PM,Monday,March		EUT Mode EUT Powe	:: Tx	quency		Projec	NXSMP-SMI t Number: 1887 Hubbell Building		

> 1GHz Horizontal Antenna Polarity Measured Emissions

7.3.5 18 GHz to 25 GHz, Bottom Channel

Test Meth					- till 6/	MI, Inc.					
	od:	ANSI C63.10 Devices	-2013 America	ın National Sta	ndard of Proce	dures for Co	npliance [·]	Testing	of Unlicens	sed Wir	eless
n accorda	nce with:	FCC Part 15.2 Limits	209 - Code of F	ederal Regula	tions Part 47, S	Subpart C - In	tentional	Radiato	ors, Radiate	ed Emis	sions
Section:		15.209									
Test Date(s):	3/10/2017			EUT Serial	#:	0				
Customer:		Hubbell Bu	ilding Auto	mation	EUT Part #:		O				
Project Nu	mber:	18876			Test Techn	ician:	Spence	r Flint			
Purchase (Order #:	0			Supervisor		Lisa Ar	ndt			
quip. Und	ler Test:	NXSMP-SIV	I		Witness' N	ame:	None				
	F	Radiated Em	issions Test	Results Dat	a Sheet			Page	: 1	of	1
EUT I	ine Voltage	: 2	4 VDC		EUT Pow	er Frequer	ncy:	0	N/A		
Antenn	a Orientatio	n:	Vertic	al	Frequ	ency Range	:		Above 1	GHz	
	EUT N	Node of Ope	eration:		Tran	smitting (B	ottom (Channe	el - 2402 I	MHz)	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Le	_	Margin (dB)	Test R	Results
19215.9	3	84	1	Average	43.9	37.979	54.0)	-16.0	Pa	iss
20444.5	3	24	1	Average	32.8	27.187	54.0)	-26.8	Pa	iss
23768.2	3	93	1	Average	33.7	29.384	54.0)	-24.6	Pa	ass
23988.5	3	58	1	Average	33.9	29.721	54.0)	-24.2	Pa	SS
24324.8	3	275	1	Average	33.7	29.783	54.0)	-24.2	Pa	ass
24859.1	3	70	1	Average	34.3	30.511	54.0)	-23.4	Pa	iss
Radiate	sional Testing, Emissions, Measu Hz Vertical Polarity M	red at 1m and Scal	ed to 3m Distance			▽ Corr	age Limit Level ected Average I Limit Level ected Peak Rea	Reading	Market all annual a	PROFESS	
18876_2	Spencer Flint 116 RE_2402M_1-26 PM, Monday, March		EUT Mode EUT Powe	: Tx	equency	1	EUT: NXSMP- Project Number Client: Hubbell	r: 18876-15		26.5	5 G

							Hubbe	ell Build	ling Au	tomation -	- NXSMP	-SMI
			Profess	sional Te	sting, El	MI, I	lnc.					
Test Metho	d:	ANSI C63.10- Devices	2013 America	n National Sta	ndard of Proce	dures	for Con	npliance	e Testing	g of Unlicen	sed Wirel	ess
In accordan	ice with:	FCC Part 15.2 Limits	209 - Code of I	ederal Regulat	tions Part 47, S	Subpar	t C - Int	entiona	al Radiat	tors, Radiate	ed Emissio	ons
Section:		15.209										
Test Date(s):	3/10/2017			EUT Serial	#:		0				
Customer:			ilding Auto	mation	EUT Part #:			0				
Project Nur		18876			Test Techn				er Flin	t		
Purchase O		0			Supervisor			Lisa A	rndt			
Equip. Und	er Test:	NXSMP-SM	<u> </u>		Witness' N	ame:		None				
	R	Radiated Em	issions Test	Results Dat	a Sheet				Pag	e: 1	of	1
EUT Li	ne Voltage:	2	4 VDC		EUT Pow	ver Fr	equen	су:	0	N/A		
Antenna	Orientatio	n:	Horizor	ıtal	Frequ	ency l	Range:			Above 1	GHz	
	EUT N	lode of Ope	eration:		Tran	ısmitt	ing (B	ottom	Chann	nel - 2402	MHz)	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Le	ected vel V/m)	Limit l (dΒμ\		Margin (dB)	Test Res	sults
19216	3	275	1	Average	43.4	37.	503	54.	.0	-16.5	Pass	S
20762.4	3	293	1	Average	33.6	2	28	54.	.0	-26.0	Pass	5
24037	3	48	1	Average	33.8	29.	719	54.	.0	-24.2	Pass	5
24799	3	347	1	Average	34.4	30.	641	54.		-23.3	Pass	5
24930.3	3	294	1	Average	34.2		428	54.	-	-23.5	Pass	
25056.1	3	318	1	Average	34.5	30.	784	54.	.0	-23.2	Pass	5
Radiated	sional Testing, Emissions, Measun Iz Horizontal Polarity	ed at 1m and Scal	ed to 3m Distance				∨ Corre — Peak I	g e Limit Leve cted A verage Limit Level cted Peak Re	e Reading		PROFESSION TESTI	NAL N 6
Feed Strength (dBp Vm) 300 218 90 C	alay canada da da ana ana ana ana ana ana ana		V	Free	Olency	and the state of t	te net kriste de de se			7	26.5G	
Operator: Spencer Flint EUT Mode: Tx EUT Power: 24V DC 04:39:23 PM, Monday, March 13,2017 EUT: NXSMP-SMI Project Number: 18876-15 Client: Hubbell Building												

> 1GHz Horizontal Antenna Polarity Measured Emissions

7.3.6 18 GHz to 25 GHz, Middle Channel

			Profess	sional Te	sting, El	MI, Inc.				
Test Metho	od:	ANSI C63.10 Devices	-2013 America	n National Sta	ndard of Proce	edures for Con	npliance	Testin	g of Unlicen	sed Wireless
n accorda	nce with:	FCC Part 15. Limits	209 - Code of I	ederal Regula	tions Part 47, S	Subpart C - Int	entiona	Radia	tors, Radiat	ed Emissions
Section:	_	15.209			T		_			
est Date(s	<u>s):</u>	3/10/2017			EUT Serial		0			
ustomer:			uilding Auto	mation	EUT Part #:		0			
roject Nu		18876			Test Techn		Spence		it	
Purchase C		O CALL	A1		Supervisor:		Lisa Ar	ndt		
quip. Und	er rest:	NXSMP-SN	/11		Witness' N	ame:	None			
	F	Radiated En	nissions Test	Results Dat	a Sheet			Pag	e: 1	of 1
EUT L	ine Voltage	: 2	VDC		EUT Pow	ver Frequen	cy:	0	N/A	
Antenna	a Orientatio	on:	Vertic	al	Frequ	ency Range:			Above 1	.GHz
	EUT N	Node of Op	eration:		Tra	ansmitting (Mid Ch	anne	I - 2440 M	lHz)
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBμV)	Corrected Level (dBµV/m)	Limit L (dBμV		Margin (dB)	Test Result
19520	3	251	1	Average	47.2	41.309	54.	0	-12.6	Pass
22072	3	23	1	Average	33.4	28.083	54.	0	-25.9	Pass
24310.5	3	43	1	Average	33.5	29.569	54.	0	-24.4	Pass
24773.8	3	126	1	Average	34.4	30.52	54.	0	-23.4	Pass
Radiated	sional Testing, Emissions, Measu Hz Vertical Polarity M	red at 1m and Sca	led to 3m Distance			▽ Corre — Peak I	ge Limit Leve cted Average Limit Level cted Peak Rea	Reading		PROFESSIONAL TESTING
Field Strength (d B µ V/m) 09 (d B µ V/m)		allers and the same of the sam		Manifeston (Manifeston (Manifeston (Manifeston (Manifeston (Manifeston (Manifeston (Manifeston (Manifeston (Ma		landa and the second and the second				
30 -					Ÿ		Y			26.5G
20± 18.0 G				Fre	quency					
	Spencer Flint		EUT Mode			E	UT: NXSMP	-SMI		

							Hubbe	ell Build	ling Au	tomation	– NXSN	/IP-SM
			Profes	sional Te	sting, El	MI, I	nc.					
Test Metho	d:	ANSI C63.10 Devices	-2013 America	an National Sta	ndard of Proce	dures	for Con	npliance	Testing	g of Unlicer	nsed Wir	reless
In accordan	ce with:	FCC Part 15.2 Limits	209 - Code of	Federal Regula	tions Part 47,	Subpar	t C - Int	tentiona	l Radiat	tors, Radiat	ed Emis	sions
Section:		15.209										
Test Date(s):	3/10/2017			EUT Serial	#:		0				
Customer:		Hubbell Bu	ilding Auto	mation	EUT Part #:	:		0				
Project Nur	nber:	18876			Test Techn	ician:		Spence	er Flin	it		
Purchase O	rder #:	0			Supervisor			Lisa A	rndt			
Equip. Und	er Test:	NXSMP-SN	ll .		Witness' N	ame:		None				
	F	Radiated Em	nissions Test	t Results Dat	a Sheet				Pag	e: 1	of	1
EUT Li	ne Voltage:	: 2	4 VDC		EUT Pov	ver Fr	equen	су:	0	N/A	1	
Antenna	Orientatio	n:	Horizor	ntal	Frequ	ency l	Range:			Above 1	lGHz	
	EUT N	lode of Ope	eration:		Tra	ansmi	itting ((Mid Cl	hanne	I - 2440 N	1Hz)	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Le	ected vel .V/m)	Limit L (dΒμV		Margin (dB)	Test F	Results
19520.2	3	34	1	Average	43.6	37.	676	54.	.0	-16.3	Pa	ass
20739.8	3	124	1	Average	33.5	27.	913	54.	.0	-26.0	Pa	ass
21956.2	3	168	1	Average	32.8	27.	272	54.	.0	-26.7	Pa	ass
22303.5	3	219	1	Average	33.5	28.	308	54.	.0	-25.6	Pa	ass
23794.7	3	314	1	Average	33.5	29.	187	54.	.0	-24.8	Pa	ass
24347.8	3	267	1	Average	34	30.	053	54.	.0	-23.9	Pa	ass
Radiated 18-26.5 GE 90	cional Testing, Emissions, Measu Iz Horizontal Polarity	red at 1m and Scal	led to 3m Distance				∇ Corre— Peak	age Limit Leve ected Average Limit Level ected Peak Ro	e Reading		PROFES	
Field Strength (dBpV/m) 20 2 20 2 20 2 20 2 20 2 20 2 20 2 20				Fre	quency						26.	.5G
18876_201	Spencer Flint 1.6 RE_2440M_30M PM,Monday,March 1		EUT Mod EUT Pow				I	EUT: NXSMI Project Numb Client: Hubbe	oer: 18876-	-15		

> 1GHz Horizontal Antenna Polarity Measured Emissions

7.3.7 18 GHz to 25 GHz, Top Channel

			Profess	sional Te	sting, EN	ΛI, I	lnc.					
Test Metho	d:	ANSI C63.10 Devices	0-2013 America	an National Sta	ndard of Proce	dures	for Com	npliance 1	Testing	of Unlicen	sed Wirel	less
n accordar	ce with:	Limits	.209 - Code of I	Federal Regula	tions Part 47, 9	Subpar	t C - Int	entional	Radiat	ors, Radiato	ed Emissi	ions
ection:		15.209			T							
est Date(s):	3/10/201			EUT Serial			0				
Customer: Hubbell Building Automation EUT Part #: 0												
Project Number: 18876 Test Technician: Spencer Flint Purchase Order #: 0 Supervisor: Lisa Arndt												
quip. Und		NXSMP-SI	<u></u>		Witness' N			None	iut			
чир. опа			missions Test	Posults Dat	•	uiiic.		None	Page	e: 1	of	1
CUT I			24 VDC	. Results Dat	EUT Pow	or Er	001100	6 111	Page 0	N/A	OI	1
	ne Voltage:		Vertic	al			•	•				
Antenna	Orientatio	node of Op		dI	-	-	Range:		annel	Above 1 - 2480 M		
		·						TOP CIT		2400 141	T.	
Frequency Measured	Test Distance	EUT Direction	Antenna Height	Detector	Recorded Amplitude		ected vel	Limit Le	evel	Margin	Test Re	oculte
(MHz)	(Meters)	(Degrees)	(Meters)	Function	(dBµV)		V/m)	(dBμV/	'm)	(dB)	Test Ne	:SuitS
19840.2	3	246	1	Average	46.8		056	54.0)	-12.9	Pas	
21805.3	3	287	1	Average	33.6	_	984	54.0		-26.0	Pas	
22347.4	3	348	1	Average	33.4	_	278	54.0		-25.7	Pas	
22709.1	3	41	1	Average	33.7	28.	547	54.0)	-25.4	Pas	SS
23517.1	3	185	1	Average	34.1	29.455 54.0)	-24.5	Pas	SS	
24791.5	3	183	1	Average	34.5	30.	731	54.0)	-23.2	Pas	S
											<u> </u>	_
	ional Testing,						— Avera	ge Limit Level				$ ot\equiv$
	Emissions, Measu Iz Vertical Polarity M		aled to 3m Distance				∇ Corre	cted Average I	Reading			ŧ
90= -							— Peak l	Limit Lev el				
80 -							— Corre	cted Peak Rea	ding		PROFESSION TESTI	ONAL IN 6
Field Strength (d B µ V m)					d property and a second		a de la companya de l			and the parties of th	Jan Sharek Mary	
30 -					<u> </u>		γ —					
20 18.0 G											26.5G	G
	Spencer Flint			Fre	equency		E	UT: NXSMP-	SMI			

						Hub	bell Build	ding Au	tomation –	NXSMP-SM
			Profes	sional Te	sting, El	MI, Inc	•			
Test Metho	d:	ANSI C63.10- Devices	2013 America	an National Sta	ndard of Proce	dures for C	omplianc	e Testing	g of Unlicens	sed Wireless
In accordan	ice with:	FCC Part 15.2 Limits	209 - Code of	Federal Regulat	tions Part 47,	Subpart C -	Intention	al Radiat	ors, Radiate	d Emissions
Section:		15.209								
Test Date(s):	3/10/2017	0/2017 EUT Serial #: 0							
Customer:		Hubbell Bu	ilding Auto	mation	EUT Part #:		0			
Project Nur		18876			Test Techn			cer Flin	t	
Purchase O		0			Supervisor		Lisa A			
Equip. Und	er Test:	NXSMP-SM			Witness' N	ame:	None			
	R	Radiated Em	issions Tes	t Results Data	a Sheet			Page	e: 1	of 1
EUT Li	ne Voltage:	2	4 VDC		EUT Pov	ver Frequ	ency:	0	N/A	
Antenna	Orientatio	n:	Horizor	ntal	Frequ	ency Rang	ge:		Above 10	GHz
	EUT N	lode of Ope	eration:		Tra	ansmittin	g (Top C	hannel	- 2480 MI	Hz)
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m	Limit (dBu)		Margin (dB)	Test Results
19839.9	3	3	1	Average	39.4	33.657	54	1.0	-20.3	Pass
20726.7	3	115	1	Average	33.5	27.831	54	1.0	-26.1	Pass
22320.7	3	87	1	Average	33.4	28.266	54	1.0	-25.7	Pass
22659.9	3	339	1	Average	33.6	28.529	_	1.0	-25.4	Pass
24312.7	3	304	1	Average	33.9	29.89	_	1.0	-24.1	Pass
25313.2	3	315	1	Average	34.9	31.219	54	1.0	-22.7	Pass
Radiated	sional Testing, Emissions, Measu Iz Horizontal Polarity	ed at 1m and Scal	ed to 3m Distance			▽ C — Po	verage Limit Le orrected Averag ak Limit Level orrected Peak R	ge Reading		PROFESSIONAL TESTING
Field Strength (d Bp.Vm)	la likulas, terdapak	and the second seco								26.5G
18876_201	Spencer Flint 16 RE_2480M_1-260 PM,Monday,March 1		EUT Mod EUT Powe		quency		EUT: NXSM Project Num Client: Hubb	ber: 18876-1	5	

> 1GHz Horizontal Antenna Polarity Measured Emissions

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	1 Nov 2017

8.3 Results

- Antenna is chip style component surface mounted on board.
- 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	31 Mar 2017

9.3 Test Results

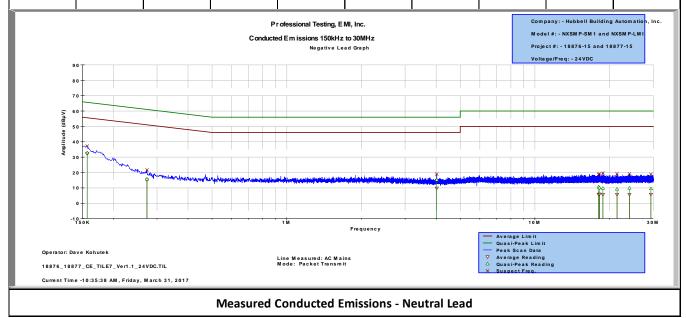
The EUT satisfied the criteria.

Tabular and plotted measurements appear on the following pages.

9.3.1 Mains, Neutral

Professional Testing, EMI, Inc.										
ANSI C63.4: 2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz										
In accordance with:	In accordance with: FCC Part 15.107 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Conducted Limits									
Section:	15.107									
Test Date(s):	3/31/2017	EUT Serial #:	None							
Customer:	Hubbell Building Automation, Inc.	EUT Part #:	None							
Project Number:	18876-15 and 18877-15	Test Technician:	Dave Kohutek							
Purchase Order #:	N/A	Supervisor:	Lisa Arndt							
Equip. Under Test:	NXSMP-SM1 and NXSMP-LMI	Witness' Name:	None							

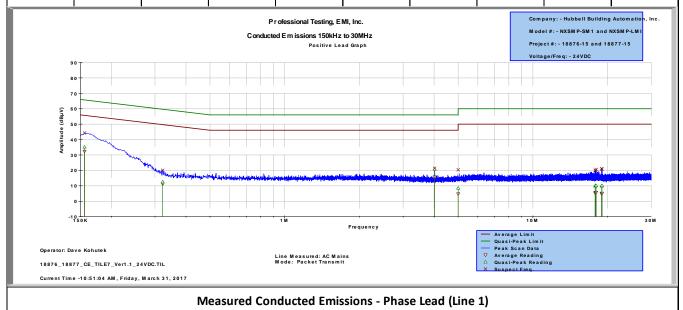
	Conducted Emissions Test Results Data Sheet - Neutral Lead								of 2
EU	T Line Volta	ge:	24	VDC	EUT Line Frequency:			N/A	Hz
Frequency Measured (MHz)	Peak Detector Reading (dBµV)	Quasi-peak Detector Reading (dBµV)	Quasi-peak Detector Limit (dBµV)	Quasi-peak Detector Margin (dB)	Quasi-peak Detector Test Results	Average Detector Reading (dBµV)	Average Detector Limit (dBµV)	Average Detector Margin (dB)	Average Detector Test Results
0.157	39.9	32.9	65.6	-32.7	PASS	32.3	55.6	-23.4	PASS
0.2734	22.1	15.8	61	-45.3	PASS	15.2	51	-35.8	PASS
4.0215	23.2	15.2	56	-40.8	PASS	9.8	46	-36.2	PASS
18.066	18.7	10.7	60	-49.3	PASS	5.7	50	-44.3	PASS
18.2013	18.8	10.1	60	-49.9	PASS	5.9	50	-44.1	PASS
18.7963	18.5	9.8	60	-50.2	PASS	5.6	50	-44.4	PASS
21.4241	18.5	9.3	60	-50.7	PASS	5.6	50	-44.4	PASS
24.03	20.4	9.9	60	-50.1	PASS	5.6	50	-44.4	PASS
29.3353	18.7	9.5	60	-50.5	PASS	5.8	50	-44.2	PASS
	1	1		1					I



9.3.2 Mains, Phase

Professional Testing, EMI, Inc.										
Test Method: ANSI C63.4: 2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz										
In accordance with:	In accordance with: FCC Part 15.107 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Conducted Limits									
Section:	15.107									
Test Date(s):	3/31/2017	EUT Serial #:	None							
Customer:	Hubbell Building Automation, Inc.	EUT Part #:	None							
Project Number:	18876-15 and 18877-15	Test Technician:	Dave Kohutek							
Purchase Order #:	N/A	Supervisor:	Lisa Arndt							
Equip. Under Test:	NXSMP-SM1 and NXSMP-LMI	Witness' Name:	None							

	Conducted	Emissions Te	est Results D	ata Sheet - P	hase Lead (L	ine 1)	Pa	ge: 2	of 2
EU	EUT Line Voltage:			VDC	EUT	Line Freque	ncy:	N/A	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
0.156	41.7	35.1	65.7	-30.5	PASS	32.3	55.7	-23.3	PASS
0.3221	20.3	12.6	59.7	-47.1	PASS	11.2	49.7	-38.5	PASS
4.0186	24.7	20.8	56	-35.2	PASS	15.7	46	-30.3	PASS
5.001	17.6	8.5	60	-51.5	PASS	4.7	50	-45.3	PASS
17.8252	19.9	9.8	60	-50.2	PASS	5.4	50	-44.6	PASS
17.8759	20.2	10.2	60	-49.8	PASS	5.5	50	-44.5	PASS
17.9784	19.9	10.1	60	-49.9	PASS	5.7	50	-44.3	PASS
18.9316	18.6	9.9	60	-50.1	PASS	4.8	50	-45.2	PASS
18.9913	20.1	10.2	60	-49.8	PASS	5.1	50	-44.9	PASS
		I	ĺ		1		l		



10.0 Equipment

10.1 Spurious Radiated Emissions 30 MHz to 25 GHz

	Radiated Emissions Test Equipment List										
Ti	le! Software Version	on: 4.2.A,	May 23, 2010, 08:38:52 AM								
	Test Profile:		RE_ClassA - Boresite+Mast_LowPRF_ RE_ClassB - Boresite+Mast_LowPRF_0								
Asset #	Manufacturer	Model	Equipment Nomenclature	Serial Number	Calibration Due Date						
1509A	Braden	N/A	TDK 10M Chamber, NSA < 1 GHz	DAC-012915-005	7/10/2017						
1890	НР	8447F	Preamp/Amp, 9kHz-1300MHz, 28/25dB	3313A05298	2/1/2018						
1937	Agilent	E4440A	Spectrum Analyzer, 3 Hz - 26.5 GHz, Opt. AYZ	MY44808298	11/15/2017						
2172	ETS-Lindgren	3142C	Antenna, Biconilog, 26 MHz-3GHz	49383	11/27/2018						
C027D	PTI	None	Relay	none	N/A						
1327	EMCO	1050	Controller, Antenna Mast	none	N/A						
0942	EMCO	11968D	Turntable, 4ft.	9510-1835	N/A						
1969	HP	11713A	Attenuator/Switch Driver	3748A04113	N/A						
1509B	Braden	N/A	TDK 10M Chamber, VSWR > 1 GHz	DAC-012915-005	6/19/2017						
2004	Miteq	AFS44-00101800- 2S-10P-44	Amplifier, 40dB, .1-18GHz	0	1/11/2018						
C030	none	none	Cable Coax, N-N, 30m	none	10/1/2017						
1325	EMCO	1050	Controller, Antenna Mast	9003-1461	N/A						
819	EMCO	3115	Antenna, Horn, DRG, 1-18GHz	113	8/4/2018						
1542	A.H. Systems	SAS-572	Antenna, Horn 18-26.5GHz, 20dB gain	225	11/20/2018						
1973	Agilent	83017A	Amplifier, Microwave 0.5-26.5 GHz	MY39500497	11/17/2018						

10.2 Bandwidth and Duty Cycle

Asset #	Manufacturer	Model #	Description	Calibration Due
2295	Agilent	E4440A	Spectrum Analyzer	30 Sep 2017
1831	НР	6622A	Power Supply	CIU
0472	Tektronix	THS730A	DMM/Scope	15 Nov 2017
C241	Pasternack	PE300-120	RG type cable	21 Jan 2018
None	ETS	5211	Shielded Enclosure	CIU
None	PTI	None	2 GHz Sleeve Sense Antenna	CIU

10.3 Mains Conducted Emissions

	Conducted Emissions Test Equipment List						
Til	Tile! Software Version: Version: 7.1.2.17 (Jan 08, 2016 - 02:12:48 PM) or 4.1.A.0, April 14, 2009, 11:01:00PM						
	Test Profile: 2017_CE_TILE7_Ver1.1.TIL or CE_Marine_100616.TIL						
Asset #	Manufacturer	Model	Equipment Nomenclature	Serial Number	Calibration Due Date		
1145	НР	8568B	Spectrum Analyzer 100Hz-1.5GHz	2517A01821	7/20/2017		
1834	НР	85662A	Spec Anal Dsply, use with A/N 1145	2349A06182	N/A		
0990	НР	85685A	RF Preselector	3010A01119	7/20/2017		
0085	НР	85650A	Quasi-Peak Adapter CISPR	3033A01458	7/20/2017		
1173	PTI	100k HPF	Filter, High Pass, 100kHz	none	2/2/2018		
1088	PTI	PTI-ALF4	Attenuator Limiter Filter	none	10/6/2017		
C171	НР	08444-60018	Cable, RF, BNC-BNC, 18", Grey	none	6/13/2018		
C303	Coleman Cable	RG-58A/U	Cable, BNC-BNC, 36" Black	None	3/25/2018		
C107	Pomona	RG-223	Cable 9 ft BNC RG-223 (black)	none	8/4/2018		
1185	EMCO	3825/2	LISN, 10kHz-100MHz	1235	8/1/2017		

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 (MHz)	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

End of Report

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