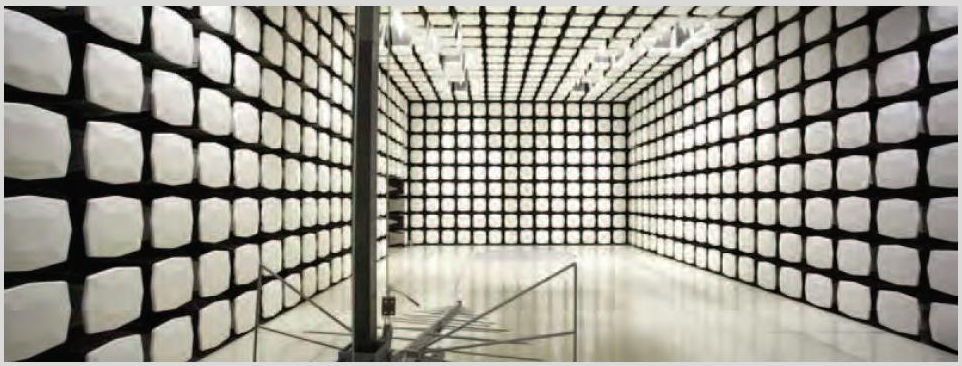
Nuvectra Corporation

Bluetooth Pocket Programmer

FCC 15.249:2018

Low Power SRD Radio

Report # NUVE0027.3



NVLAP LAB CODE: 200881-0

CERTIFICATE OF TEST

Last Date of Test: November 7, 2018
Nuvectra Corporation
Model: Bluetooth Pocket Programmer

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2018	ANSI C63.10:2013
FCC 15.249:2018	

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6	Field Strength of Harmonics and Spurious Radiated Emissions	Yes	Pass	
6.6	Field Strength of Fundamental	Yes	Pass	
7.5	Duty Cycle	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Matt Nuernberg, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY

Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with ISED.

European Union

European Commission – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIT / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

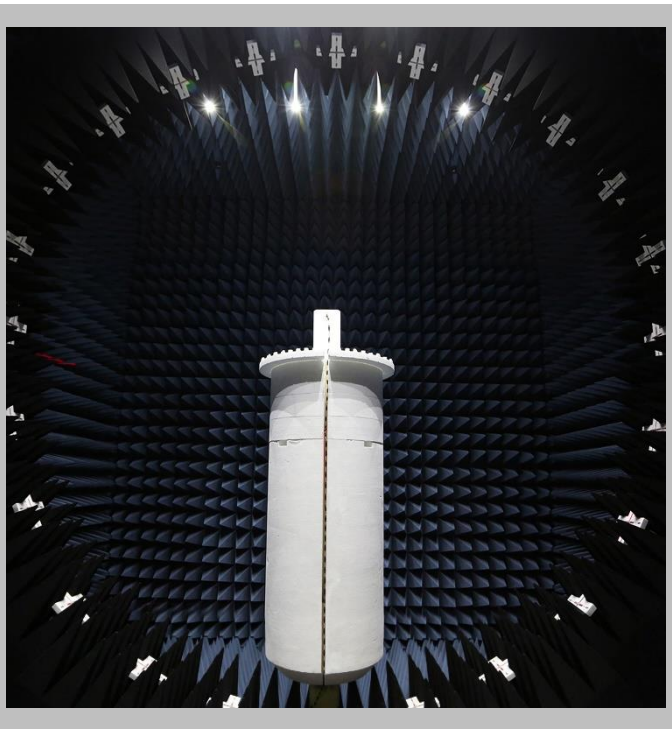
MIC – Recognized by MIC as a CAB for the acceptance of test data.

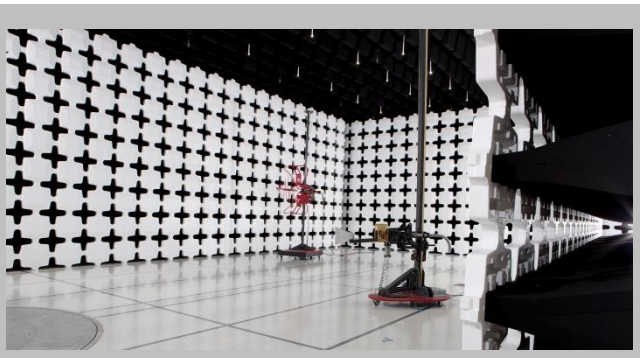
SCOPE

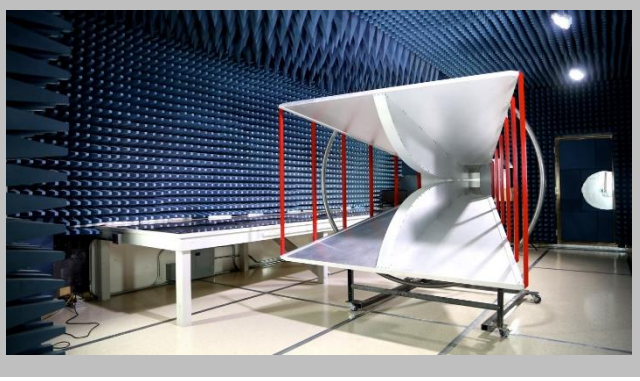
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

FACILITIES

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada					
2834B-1, 2834B-3	2834E-1, 2834E-3	N/A	2834D-1	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157







MEASUREMENT UNCERTAINTY

element
TMU.2015.07.10

Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

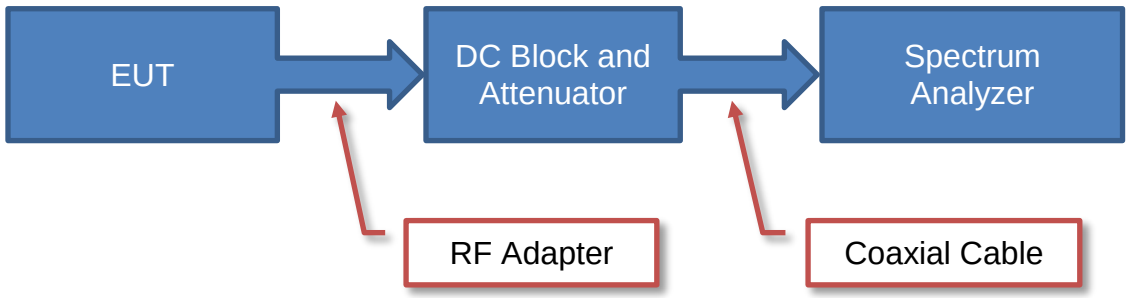
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

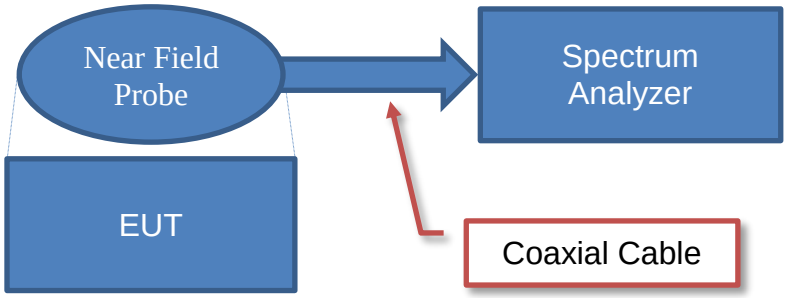
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

Test Setup Block Diagrams

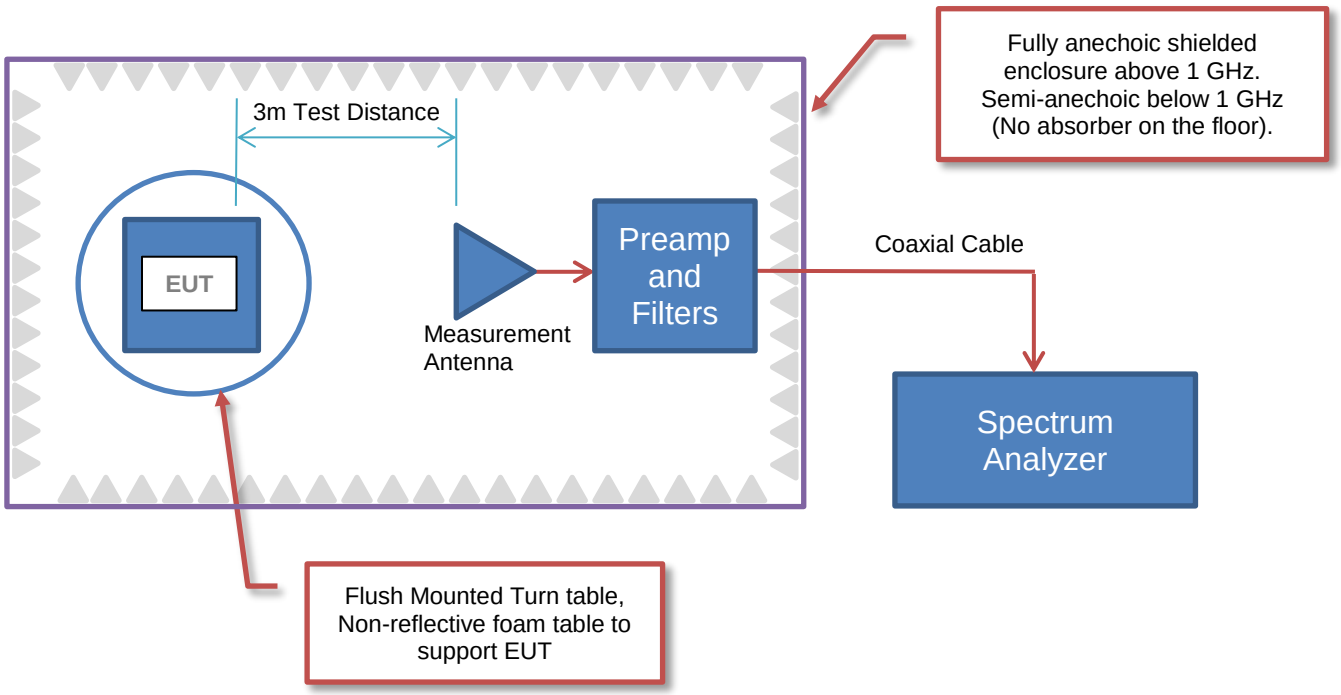
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Nuvectra Corporation
Address:	10675 Naples St. NE
City, State, Zip:	Blaine, MN 55449
Test Requested By:	Peter Valentyik
Model:	Bluetooth Pocket Programmer
First Date of Test:	November 6, 2018
Last Date of Test:	November 7, 2018
Receipt Date of Samples:	November 5, 2018
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Programmer which communicates with Clinician Programmer using Bluetooth and IPG using MICS.

Client Provided Information:
The Bluetooth Pocket Programmer Model 4110 test samples used in testing contain a new PCBA and have reused the mechanical enclosure, buttons, display, battery and labeling from the Pocket Programmer Model 4100. As a result, the label found on the test units contain the label with Model 4100.

Testing Objective:
Seeking to demonstrate compliance under FCC 15.249:2018 for operation in the 2400 – 2483.5 MHz Band.

CONFIGURATIONS

Configuration NUVE0025- 1

Software/Firmware Running during test	
Description	**Version**
EMCTESTINGV2	2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Programmer	Nuvectra Corporation	4110	101018

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Power Supply	SL Power Electronics	ME10A0599B02	None

Configuration NUVE0025- 2

Software/Firmware Running during test	
Description	**Version**
EMCTESTINGV2	2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Bluetooth Pocket Programmer	Nuvectra Corporation	4110	101016

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adapter	SL Power Electronics	ME10A0599B02	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power	No	1.4 m	No	AC Adapter	Bluetooth Pocket Programmer

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2018-11-06	Field Strength of Harmonics and Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2018-11-06	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2018-11-07	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2018-11-07	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWERLINE CONDUCTED EMISSIONS

element
WTD.2017.11.22.1

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESR7	ARI	6/26/2018	6/26/2019
Cable - Conducted Cable Assembly	Northwest EMC	MNC, HGN, TYK	MNCA	3/14/2018	3/14/2019
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	3/15/2018	3/15/2019

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

NUVE0025-2

MODES INVESTIGATED

Transmit on SRD at 2.45 GHz.

POWERLINE CONDUCTED EMISSIONS

element
WTD.2017.11.22.1

EUT:	Bluetooth Pocket Programmer	Work Order:	NUVE0025
Serial Number:	101016	Date:	11/07/2018
Customer:	Nuvectra Corporation	Temperature:	21.3°C
Attendees:	Peter Valentyik	Relative Humidity:	28%
Customer Project:	None	Bar. Pressure:	1025 mb
Tested By:	Kyle McMullan	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	NUVE0025-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2018	ANSI C63.10:2013

TEST PARAMETERS

Run #:	14	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

None

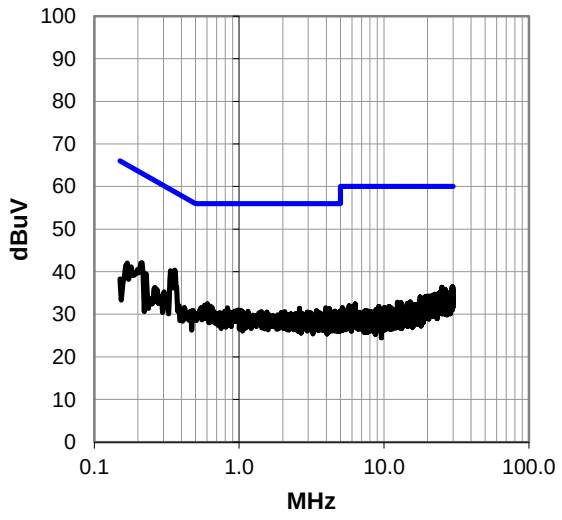
EUT OPERATING MODES

Transmit on SRD at 2.45 GHz.

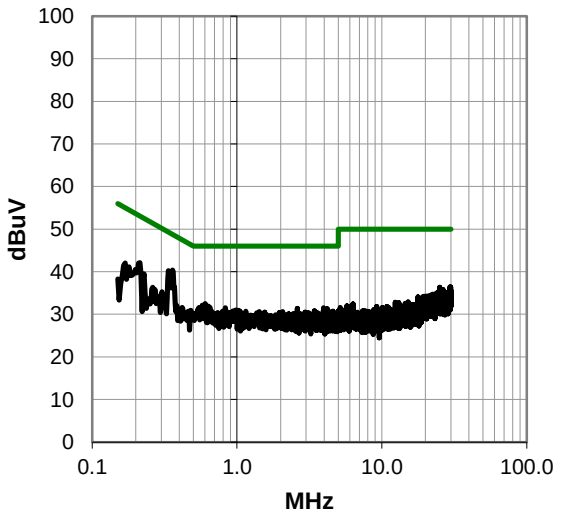
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2017.11.22.1

RESULTS - Run #14

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.359	20.0	20.4	40.4	58.8	-18.4
0.337	19.8	20.4	40.2	59.3	-19.1
0.213	21.5	20.6	42.1	63.1	-21.0
0.169	21.3	20.7	42.0	65.0	-23.0
0.228	18.9	20.6	39.5	62.5	-23.0
0.601	12.1	20.4	32.5	56.0	-23.5
29.578	12.5	23.9	36.4	60.0	-23.6
29.866	12.5	23.9	36.4	60.0	-23.6
25.172	13.0	23.3	36.3	60.0	-23.7
0.575	11.7	20.4	32.1	56.0	-23.9
0.635	11.4	20.5	31.9	56.0	-24.1
29.500	12.0	23.9	35.9	60.0	-24.1
26.407	12.4	23.4	35.8	60.0	-24.2
0.646	11.1	20.5	31.6	56.0	-24.4
0.829	11.0	20.5	31.5	56.0	-24.5
3.967	10.8	20.7	31.5	56.0	-24.5
25.210	12.2	23.3	35.5	60.0	-24.5
25.646	12.2	23.3	35.5	60.0	-24.5
26.034	12.1	23.4	35.5	60.0	-24.5
26.139	12.1	23.4	35.5	60.0	-24.5
29.888	11.6	23.9	35.5	60.0	-24.5
2.609	10.9	20.5	31.4	56.0	-24.6
29.060	11.6	23.8	35.4	60.0	-24.6
4.194	10.6	20.7	31.3	56.0	-24.7
29.716	11.4	23.9	35.3	60.0	-24.7
25.557	11.9	23.3	35.2	60.0	-24.8

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.359	20.0	20.4	40.4	48.8	-8.4
0.337	19.8	20.4	40.2	49.3	-9.1
0.213	21.5	20.6	42.1	53.1	-11.0
0.169	21.3	20.7	42.0	55.0	-13.0
0.228	18.9	20.6	39.5	52.5	-13.0
0.601	12.1	20.4	32.5	46.0	-13.5
29.578	12.5	23.9	36.4	50.0	-13.6
29.866	12.5	23.9	36.4	50.0	-13.6
25.172	13.0	23.3	36.3	50.0	-13.7
0.575	11.7	20.4	32.1	46.0	-13.9
0.635	11.4	20.5	31.9	46.0	-14.1
29.500	12.0	23.9	35.9	50.0	-14.1
26.407	12.4	23.4	35.8	50.0	-14.2
0.646	11.1	20.5	31.6	46.0	-14.4
0.829	11.0	20.5	31.5	46.0	-14.5
3.967	10.8	20.7	31.5	46.0	-14.5
25.210	12.2	23.3	35.5	50.0	-14.5
25.646	12.2	23.3	35.5	50.0	-14.5
26.034	12.1	23.4	35.5	50.0	-14.5
26.139	12.1	23.4	35.5	50.0	-14.5
29.888	11.6	23.9	35.5	50.0	-14.5
2.609	10.9	20.5	31.4	46.0	-14.6
29.060	11.6	23.8	35.4	50.0	-14.6
4.194	10.6	20.7	31.3	46.0	-14.7
29.716	11.4	23.9	35.3	50.0	-14.7
25.557	11.9	23.3	35.2	50.0	-14.8

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

element
WTD.2017.11.22.1

EUT:	Bluetooth Pocket Programmer	Work Order:	NUVE0025
Serial Number:	101016	Date:	11/07/2018
Customer:	Nuvectra Corporation	Temperature:	21.3°C
Attendees:	Peter Valentyik	Relative Humidity:	28%
Customer Project:	None	Bar. Pressure:	1025 mb
Tested By:	Kyle McMullan	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	NUVE0025-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2018	ANSI C63.10:2013

TEST PARAMETERS

Run #:	15	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

None

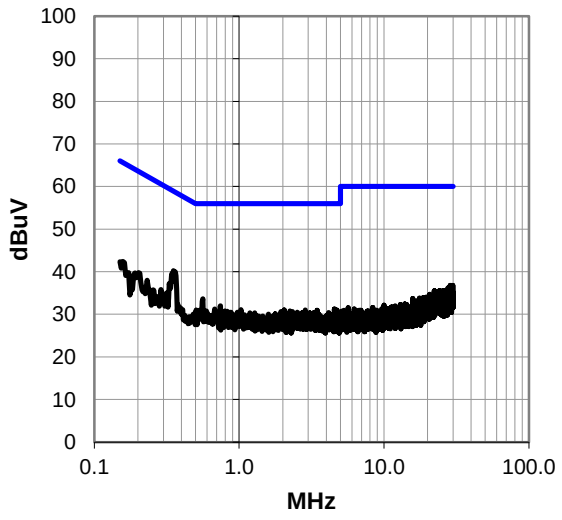
EUT OPERATING MODES

Transmit on SRD at 2.45 GHz.

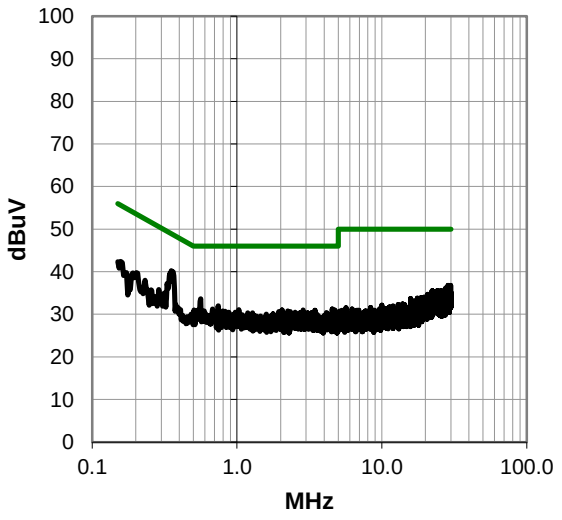
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2017.11.22.1

RESULTS - Run #15

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.351	19.8	20.4	40.2	58.9	-18.7
0.560	13.2	20.4	33.6	56.0	-22.4
0.157	21.7	20.7	42.4	65.6	-23.2
28.713	13.0	23.8	36.8	60.0	-23.2
29.060	13.0	23.8	36.8	60.0	-23.2
29.873	12.9	23.9	36.8	60.0	-23.2
28.336	12.8	23.7	36.5	60.0	-23.5
0.202	19.2	20.6	39.8	63.5	-23.7
27.691	12.5	23.7	36.2	60.0	-23.8
0.743	11.5	20.5	32.0	56.0	-24.0
29.202	12.2	23.8	36.0	60.0	-24.0
28.019	12.0	23.7	35.7	60.0	-24.3
0.232	17.4	20.6	38.0	62.4	-24.4
24.240	12.5	23.1	35.6	60.0	-24.4
25.579	12.3	23.3	35.6	60.0	-24.4
28.773	11.8	23.8	35.6	60.0	-24.4
22.188	12.7	22.8	35.5	60.0	-24.5
22.322	12.7	22.8	35.5	60.0	-24.5
28.810	11.7	23.8	35.5	60.0	-24.5
27.635	11.7	23.7	35.4	60.0	-24.6
29.444	11.6	23.8	35.4	60.0	-24.6
24.389	12.1	23.2	35.3	60.0	-24.7
27.612	11.6	23.7	35.3	60.0	-24.7
29.825	11.4	23.9	35.3	60.0	-24.7
27.497	11.5	23.7	35.2	60.0	-24.8
29.142	11.4	23.8	35.2	60.0	-24.8

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.351	19.8	20.4	40.2	48.9	-8.7
0.560	13.2	20.4	33.6	46.0	-12.4
0.157	21.7	20.7	42.4	55.6	-13.2
28.713	13.0	23.8	36.8	50.0	-13.2
29.060	13.0	23.8	36.8	50.0	-13.2
29.873	12.9	23.9	36.8	50.0	-13.2
28.336	12.8	23.7	36.5	50.0	-13.5
0.202	19.2	20.6	39.8	53.5	-13.7
27.691	12.5	23.7	36.2	50.0	-13.8
0.743	11.5	20.5	32.0	46.0	-14.0
29.202	12.2	23.8	36.0	50.0	-14.0
28.019	12.0	23.7	35.7	50.0	-14.3
0.232	17.4	20.6	38.0	52.4	-14.4
24.240	12.5	23.1	35.6	50.0	-14.4
25.579	12.3	23.3	35.6	50.0	-14.4
28.773	11.8	23.8	35.6	50.0	-14.4
22.188	12.7	22.8	35.5	50.0	-14.5
22.322	12.7	22.8	35.5	50.0	-14.5
28.810	11.7	23.8	35.5	50.0	-14.5
27.635	11.7	23.7	35.4	50.0	-14.6
29.444	11.6	23.8	35.4	50.0	-14.6
24.389	12.1	23.2	35.3	50.0	-14.7
27.612	11.6	23.7	35.3	50.0	-14.7
29.825	11.4	23.9	35.3	50.0	-14.7
27.497	11.5	23.7	35.2	50.0	-14.8
29.142	11.4	23.8	35.2	50.0	-14.8

CONCLUSION

Pass

Tested By

FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

PSA-ESCI 2018.07.27

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting SRD - 2.45 GHz

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

NUVE0025 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Attenuator	Fairview Microwave	SA18E-20	TWZ	24-Sep-2018	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	LFN	24-Sep-2018	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	24-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	13-Sep-2018	12 mo
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	12-Sep-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	13-Feb-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	0 mo
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	12-Jul-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	13-Feb-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	13-Feb-2018	12 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	24-Sep-2018	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJA	27-Jun-2018	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	2-Nov-2018	12 mo
Cable	ESM Cable Corp.	Bilog Cables	MNH	2-Nov-2018	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYD	25-Jan-2018	24 mo
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	27-Apr-2018	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

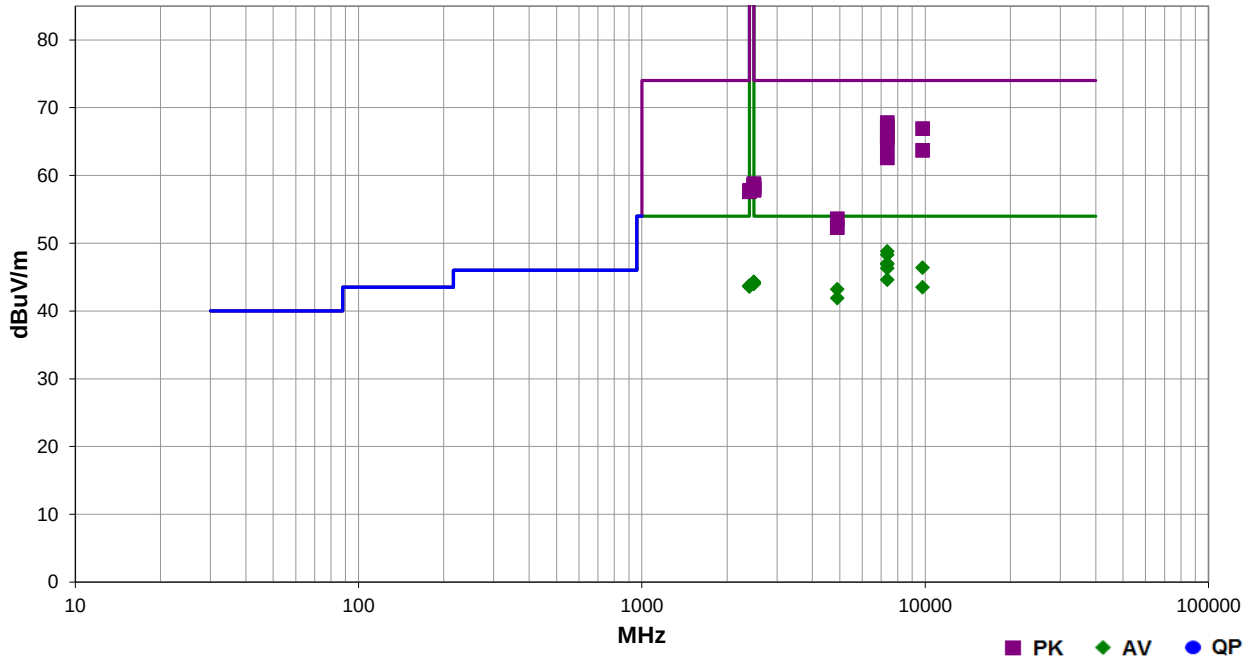
FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	NUVE0025	**Date:**	6-Nov-2018		
Project:	None	**Temperature:**	22.9 °C		
Job Site:	MN09	**Humidity:**	33.7% RH		
Serial Number:	101018	**Barometric Pres.:**	1010 mbar	**Tested by:**	Dustin Sparks
EUT:	Bluetooth Pocket Programmer				
Configuration:	1				
Customer:	Nuvectra Corporation				
Attendees:	Peter Valentyik				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting SRD - 2.45 GHz				
Deviations:	None				
Comments:	Power setting 18 (0xBF) in firmware version 2 (see configuration for more details.). Average points were measured at the normal operating duty cycle (~8.4%).				

Test Specifications	**Test Method**
FCC 15.249:2018	ANSI C63.10:2013

Run #	4	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7349.892	36.6	12.2	1.0	313.0	3.0	0.0	Vert	AV	0.0	48.8	54.0	-5.2	EUT horizontal
7349.908	36.1	12.2	2.9	188.0	3.0	0.0	Horz	AV	0.0	48.3	54.0	-5.7	EUT on side
7349.825	55.6	12.2	1.0	313.0	3.0	0.0	Vert	PK	0.0	67.8	74.0	-6.2	EUT horizontal
7349.792	55.0	12.2	2.9	188.0	3.0	0.0	Horz	PK	0.0	67.2	74.0	-6.8	EUT on side
7349.883	34.8	12.2	1.0	265.0	3.0	0.0	Vert	AV	0.0	47.0	54.0	-7.0	EUT vertical
9799.725	78.1	-11.2	1.8	262.0	3.0	0.0	Vert	PK	0.0	66.9	74.0	-7.1	EUT horizontal
7349.917	34.7	12.2	2.4	240.0	3.0	0.0	Horz	AV	0.0	46.9	54.0	-7.1	EUT vertical
9799.883	57.6	-11.2	1.8	262.0	3.0	0.0	Vert	AV	0.0	46.4	54.0	-7.6	EUT horizontal
7349.883	34.1	12.2	3.3	320.0	3.0	0.0	Horz	AV	0.0	46.3	54.0	-7.7	EUT horizontal
7349.858	53.4	12.2	2.4	240.0	3.0	0.0	Horz	PK	0.0	65.6	74.0	-8.4	EUT vertical
7349.950	53.4	12.2	1.0	265.0	3.0	0.0	Vert	PK	0.0	65.6	74.0	-8.4	EUT vertical
7349.825	52.5	12.2	3.3	320.0	3.0	0.0	Horz	PK	0.0	64.7	74.0	-9.3	EUT horizontal
7349.883	32.4	12.2	1.0	56.0	3.0	0.0	Vert	AV	0.0	44.6	54.0	-9.4	EUT on side
2484.342	28.5	-4.2	3.4	117.0	3.0	20.0	Horz	AV	0.0	44.3	54.0	-9.7	EUT on side

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2485.900	28.4	-4.2	2.7	145.0	3.0	20.0	Vert	AV	0.0	44.2	54.0	-9.8	EUT on side
2485.850	28.3	-4.2	1.0	233.0	3.0	20.0	Horz	AV	0.0	44.1	54.0	-9.9	EUT horizontal
2483.675	28.3	-4.2	1.6	175.0	3.0	20.0	Horz	AV	0.0	44.1	54.0	-9.9	EUT vertical
2483.592	28.2	-4.2	1.3	235.0	3.0	20.0	Vert	AV	0.0	44.0	54.0	-10.0	EUT horizontal
2484.758	28.2	-4.2	1.0	207.0	3.0	20.0	Vert	AV	0.0	44.0	54.0	-10.0	EUT vertical
9799.775	74.9	-11.2	1.7	293.0	3.0	0.0	Horz	PK	0.0	63.7	74.0	-10.3	EUT on side
2395.317	28.2	-4.5	3.2	296.0	3.0	20.0	Horz	AV	0.0	43.7	54.0	-10.3	EUT on side
2396.050	28.1	-4.5	1.8	159.0	3.0	20.0	Vert	AV	0.0	43.6	54.0	-10.4	EUT on side
9799.883	54.7	-11.2	1.7	293.0	3.0	0.0	Horz	AV	0.0	43.5	54.0	-10.5	EUT on side
4900.000	39.3	3.9	1.0	230.0	3.0	0.0	Vert	AV	0.0	43.2	54.0	-10.8	EUT horizontal
7349.850	50.4	12.2	1.0	56.0	3.0	0.0	Vert	PK	0.0	62.6	74.0	-11.4	EUT on side
4900.008	38.0	3.9	2.2	167.0	3.0	0.0	Horz	AV	0.0	41.9	54.0	-12.1	EUT on side
2485.558	43.0	-4.2	2.7	145.0	3.0	20.0	Vert	PK	0.0	58.8	74.0	-15.2	EUT on side
2485.650	42.8	-4.2	1.0	233.0	3.0	20.0	Horz	PK	0.0	58.6	74.0	-15.4	EUT horizontal
2486.508	42.6	-4.2	3.4	117.0	3.0	20.0	Horz	PK	0.0	58.4	74.0	-15.6	EUT on side
2484.633	42.3	-4.2	1.6	175.0	3.0	20.0	Horz	PK	0.0	58.1	74.0	-15.9	EUT vertical
2484.692	42.2	-4.2	1.0	207.0	3.0	20.0	Vert	PK	0.0	58.0	74.0	-16.0	EUT vertical
2488.017	42.1	-4.3	1.3	235.0	3.0	20.0	Vert	PK	0.0	57.8	74.0	-16.2	EUT horizontal
2399.933	42.3	-4.5	3.2	296.0	3.0	20.0	Horz	PK	0.0	57.8	74.0	-16.2	EUT on side
2395.942	42.1	-4.5	1.8	159.0	3.0	20.0	Vert	PK	0.0	57.6	74.0	-16.4	EUT on side
4899.917	49.7	3.9	1.0	230.0	3.0	0.0	Vert	PK	0.0	53.6	74.0	-20.4	EUT horizontal
4899.842	48.4	3.9	2.2	167.0	3.0	0.0	Horz	PK	0.0	52.3	74.0	-21.7	EUT on side

FIELD STRENGTH OF FUNDAMENTAL

PSA-ESCI 2018.07.27

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting SRD - 2.45 GHz

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

NUVE0025 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	2400 MHz	Stop Frequency	2483.5 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	24-Sep-2018	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJA	27-Jun-2018	24 mo
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	27-Apr-2018	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting and while set at the lowest channel, a middle channel, and the highest channel available. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT and EUT antenna in 3 orthogonal planes.

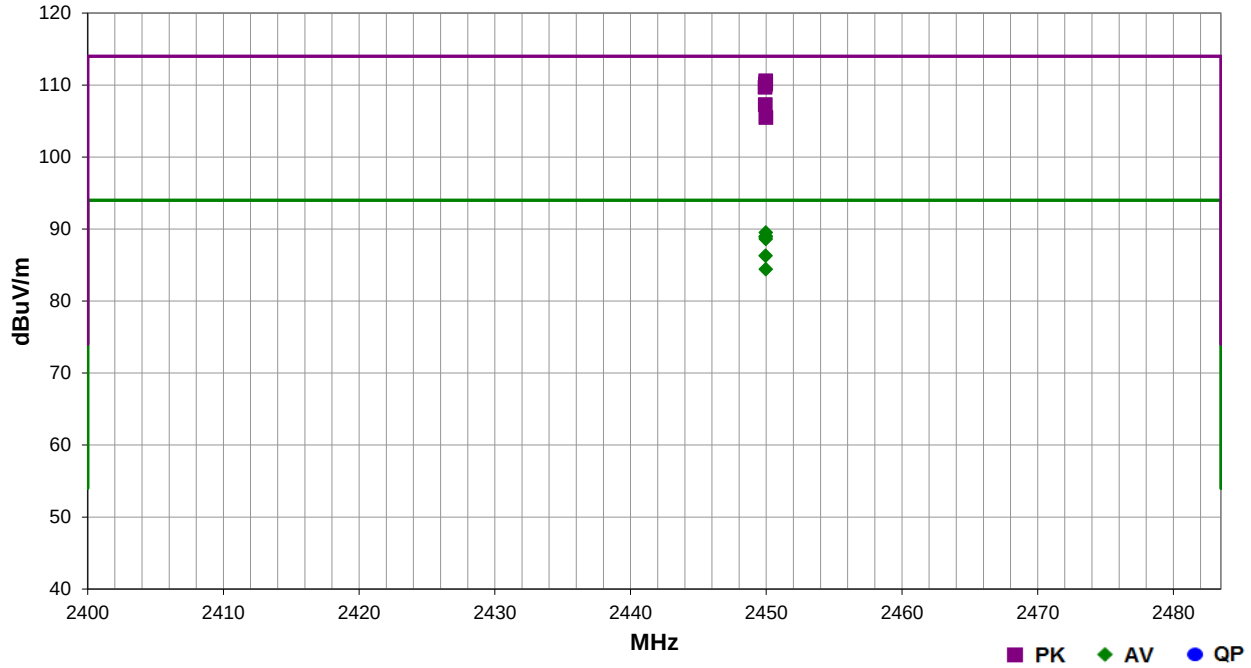
FIELD STRENGTH OF FUNDAMENTAL

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	NUVE0025	**Date:**	6-Nov-2018		
Project:	None	**Temperature:**	22.9 °C		
Job Site:	MN09	**Humidity:**	33.7% RH		
Serial Number:	101018	**Barometric Pres.:**	1010 mbar	**Tested by:**	Dustin Sparks
EUT:	Bluetooth Pocket Programmer				
Configuration:	1				
Customer:	Nuvectra Corporation				
Attendees:	Peter Valentyik				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting SRD - 2.45 GHz				
Deviations:	None				
Comments:	Power setting 18 (0xBF) in firmware version 2 (see configuration for more details.)				

Test Specifications	**Test Method**
FCC 15.249:2018	ANSI C63.10:2013

Run #	7	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2449.950	94.9	-4.3	1.0	273.0	3.0	20.0	Horz	PK	0.0	110.6	114.0	-3.4	EUT vertical
2449.950	94.5	-4.3	1.0	145.0	3.0	20.0	Vert	PK	0.0	110.2	114.0	-3.8	EUT on side
2449.942	94.4	-4.3	2.1	291.0	3.0	20.0	Horz	PK	0.0	110.1	114.0	-3.9	EUT horizontal
2449.908	94.0	-4.3	3.3	307.0	3.0	20.0	Vert	PK	0.0	109.7	114.0	-4.3	EUT vertical
2449.975	73.8	-4.3	1.0	273.0	3.0	20.0	Horz	AV	0.0	89.5	94.0	-4.5	EUT vertical
2449.975	73.3	-4.3	1.0	145.0	3.0	20.0	Vert	AV	0.0	89.0	94.0	-5.0	EUT on side
2449.958	73.2	-4.3	2.1	291.0	3.0	20.0	Horz	AV	0.0	88.9	94.0	-5.1	EUT horizontal
2449.967	72.9	-4.3	3.3	307.0	3.0	20.0	Vert	AV	0.0	88.6	94.0	-5.4	EUT vertical
2449.933	91.6	-4.3	2.3	222.0	3.0	20.0	Horz	PK	0.0	107.3	114.0	-6.7	EUT on side
2449.958	70.6	-4.3	2.3	222.0	3.0	20.0	Horz	AV	0.0	86.3	94.0	-7.7	EUT on side
2449.975	89.8	-4.3	1.0	197.0	3.0	20.0	Vert	PK	0.0	105.5	114.0	-8.5	EUT horizontal
2449.967	68.7	-4.3	1.0	197.0	3.0	20.0	Vert	AV	0.0	84.4	94.0	-9.6	EUT horizontal

DUTY CYCLE

XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Attenuator	Fairview Microwave	SA18E-20	TWZ	24-Sep-18	24-Sep-19
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	13-Feb-18	13-Feb-19
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	24-Sep-18	24-Sep-19
Antenna - Double Ridge	ETS Lindgren	3115	AJA	27-Jun-18	27-Jun-20
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	27-Apr-18	27-Apr-19

TEST DESCRIPTION

The measurement was made in a radiated configuration of the fundamental with the carrier fully maximized for its highest radiated power. The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.

There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.

The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum. The duty cycle was measured radiated in the RF chamber.

The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.

DUTY CYCLE

element

XMit 2017.12.13

EUT:	**Bluetooth Pocket Programmer**			**Work Order:**	**NUVE0025**
Serial Number:	**101018**			**Date:**	**7-Nov-18**
Customer:	**Nuvectra Corporation**			**Temperature:**	**21.4 °C**
Attendees:	**Peter Valentyik**			**Humidity:**	**28% RH**
Project:	**None**			**Barometric Pres.:**	**1024 mbar**
Tested by:	**Dustin Sparks**	**Power:**	**110VAC/60Hz**	**Job Site:**	**MN09**

TEST SPECIFICATIONS	**Test Method**
FCC 15.249:2018	ANSI C63.10:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

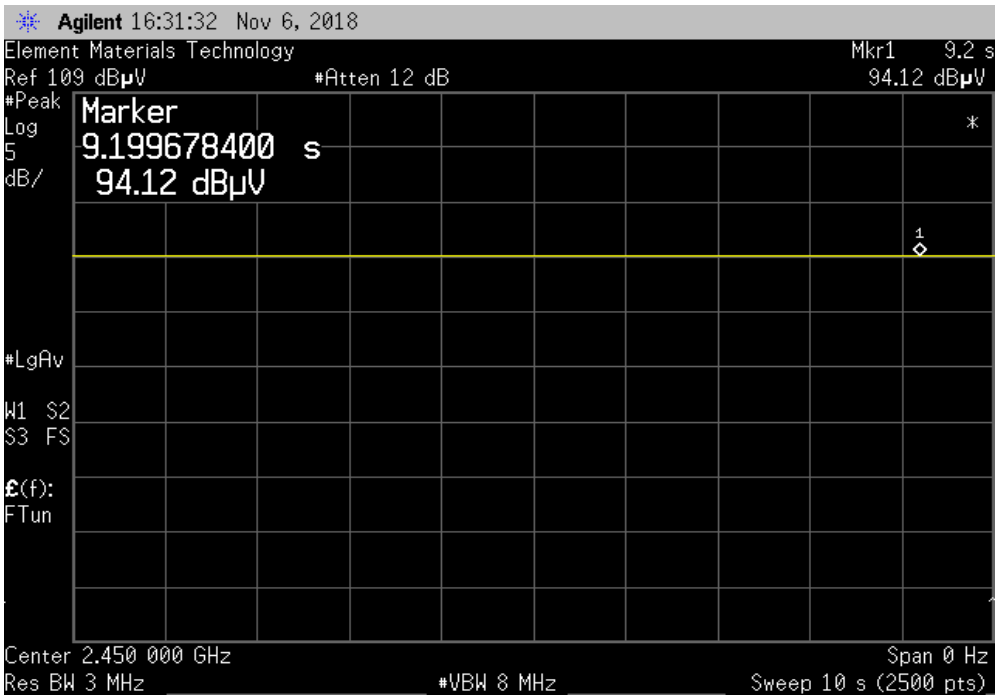
Configuration #	**1**	*Signature* Dustin Sparks

	Number of Pulses	Pulse Length (ms)	Total On-Time (ms)	Duty Cycle (%)	Limit	Result
2.45 GHz SRD						
10 s Sweep	N/A	N/A	N/A	N/A	N/A	N/A
2 ms Sweep	63	0.002707	0.170541	8.53	N/A	N/A
1 ms Sweep	31	0.002707	0.083917	8.39	N/A	N/A
Pulse Width	1	0.002707	N/A	N/A	N/A	N/A

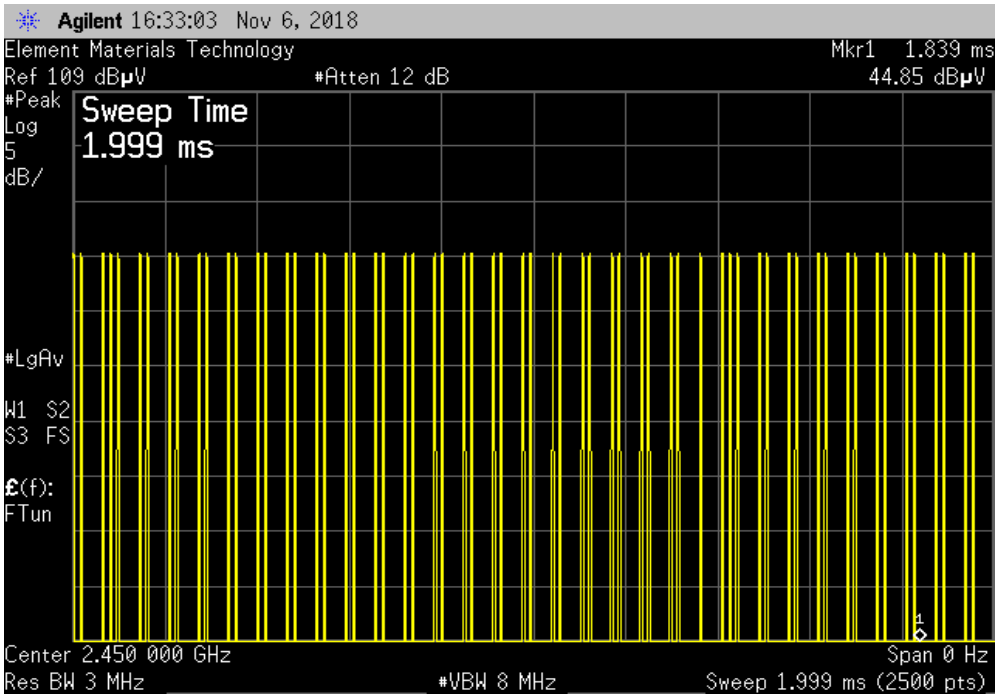
DUTY CYCLE

XMit 2017.12.13

2.45 GHz SRD, 10 s Sweep						
	Number of Pulses	Pulse Length (ms)	Total On-Time (ms)	Duty Cycle (%)	Limit	Result
	N/A	N/A	N/A	N/A	N/A	N/A



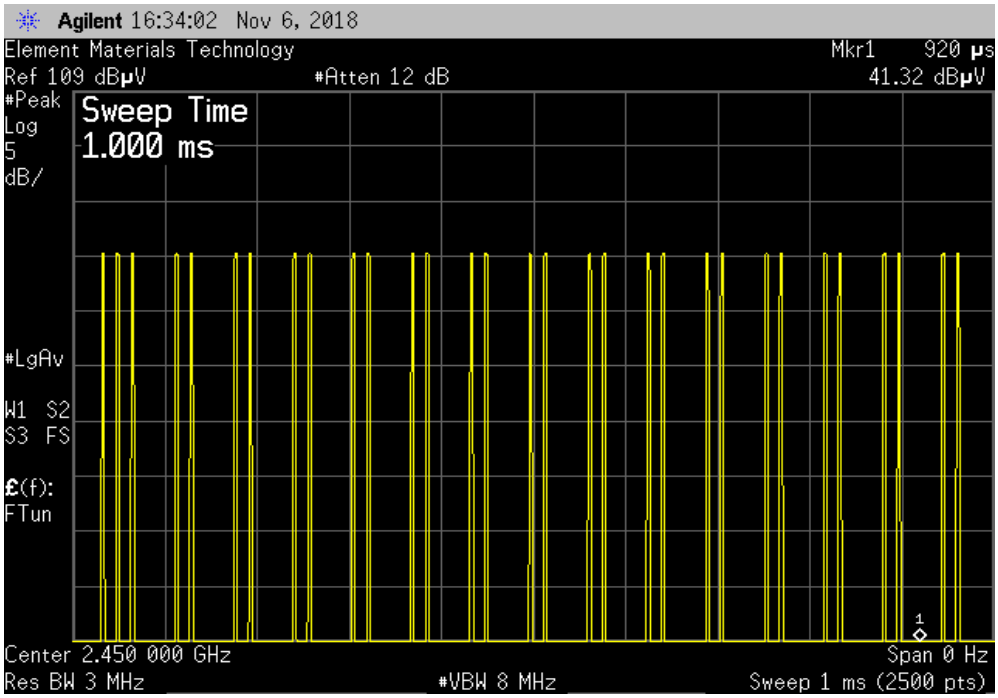
2.45 GHz SRD, 2 ms Sweep						
	Number of Pulses	Pulse Length (ms)	Total On-Time (ms)	Duty Cycle (%)	Limit	Result
	63	0.002707	0.170541	8.53	N/A	N/A



DUTY CYCLE

XMit 2017.12.13

2.45 GHz SRD, 1 ms Sweep						
	Number of Pulses	Pulse Length (ms)	Total On-Time (ms)	Duty Cycle (%)	Limit	Result
	31	0.002707	0.083917	8.39	N/A	N/A



2.45 GHz SRD, Pulse Width						
	Number of Pulses	Pulse Length (ms)	Total On-Time (ms)	Duty Cycle (%)	Limit	Result
	1	0.002707	N/A	N/A	N/A	N/A