



SMART Technologies ULC

CRXMOD1 / CRX-1

FCC 15.247:2024

RSS-247 Issue 3:2023

RSS-Gen Issue 5:2018+A1:2019+A2:2021

Bluetooth radio

Report: SMTE0015.1 Rev. 1, Issue Date: September 9, 2024



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CERTIFICATE OF TEST

Last Date of Test: July 12, 2024

SMART Technologies ULC

EUT: CRXMOD1 / CRX-1

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	
RSS-Gen Issue 5:2018+A1:2019+A2:2021	

Guidance

FCC KDB 558074 v05r02:2019
Notice 2021 - CEB0001

Results

Test Description	Result	FCC Section(s)	RSS Section(s)	ANSI C63.10 Section(s)	Comments
Powerline Conducted Emissions	N/A	15.207	RSS-Gen 8.8	6.2	Not required for a battery powered EUT.
Duty Cycle	N/A	KDB 558074 -6.0	RSS-Gen 3.2	11.6	See data.
DTS Bandwidth (6 dB)	Pass	15.247(a)(2), KDB 558074 -8.2	RSS-247 5.2(a)	11.8.2	
Occupied Bandwidth (99%)	Pass	KDB 558074 -2.1	RSS-Gen 6.7	6.9.3	
Output Power	Pass	15.247(b)(3), KDB 558074 -8.3.1	RSS-247 5.4(d, f), RSS-Gen 6.12	11.9.1.1	
Equivalent Isotropic Radiated Power	Pass	15.247(b)(3), KDB 558074 -8.3.1	RSS-247 5.4(d, f), RSS-Gen 6.12	11.9.1.1	
Power Spectral Density	Pass	15.247(e), KDB 558074 -8.4	RSS-247 5.2(b)	11.10.2	
Band Edge Compliance	Pass	15.247(d), KDB 558074 -8.5	RSS-247 5.5	11.11	
Spurious Conducted Emissions	Pass	15.247(d), KDB 558074 -8.5	RSS-247 5.5	11.11	
Spurious Radiated Emissions	Pass	15.247(d), KDB 558074 - 8.6, 8.7	RSS-247 5.5, RSS-Gen 6.13, 8.10	11.12.1, 11.13.2, 6.5, 6.6	

Deviations From Test Standards

None

Approved By:



Chuck Heller, Department Manager
Signed for and on behalf of Element

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
01	Fixed Cosmetic issues	2024-09-04	7
01	Combined Power settings pages	2024-09-04	12-13
01	Updated testing dates	2024-09-04	16
01	Added equipment used during testing	2024-09-04	42
01	Updated header to match testing	2024-09-04	44-60
01	Removed photos into separate photos document	2024-09-04	49-52

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 - Each laboratory is accredited by A2LA to ISO / IEC 17025, and as a product certifier to ISO / IEC 17065 which allows Element to certify transmitters to FCC and IC specifications.

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Recognized as an EU Notified Body validated for the EMCD and RED Directives.

United Kingdom

BEIS – Recognized by the UK as an Approved Body under the UK Radio Equipment and UK EMC Regulations.

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:

[California](#)

[Minnesota](#)

[Oregon](#)

[Texas](#)

[Washington](#)

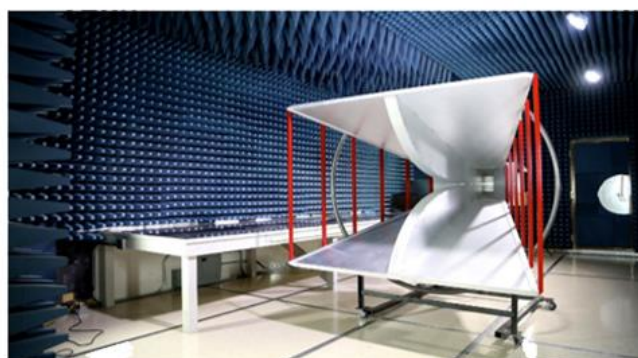
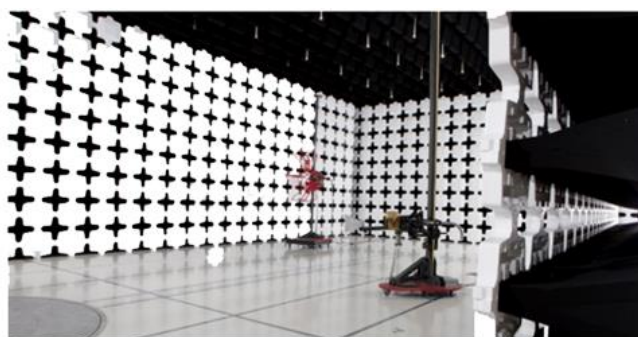
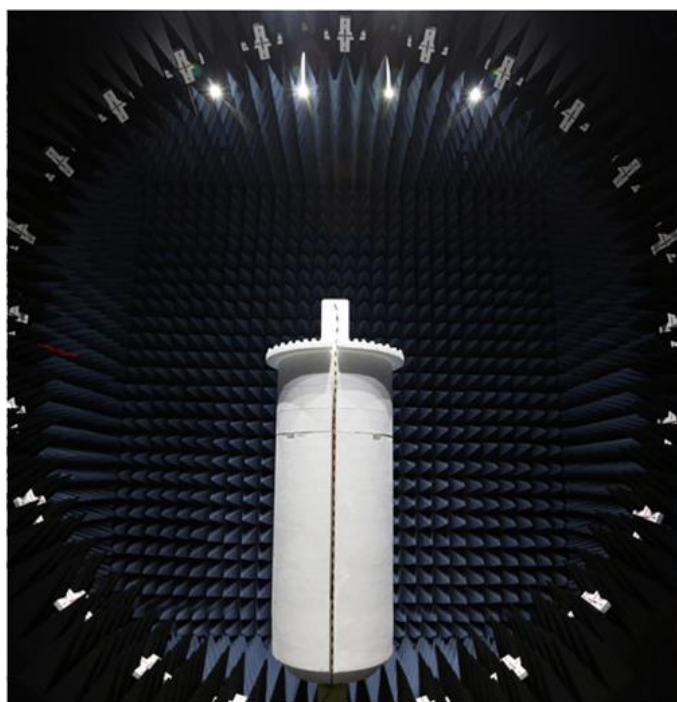
FACILITIES

Testing was performed at the following location(s)

	Location	Labs ⁽¹⁾	Address	A2LA ⁽²⁾	ISED ⁽³⁾	BSMI ⁽⁴⁾	VCCI ⁽⁵⁾	CAB ⁽⁶⁾	FDA ⁽⁷⁾
☐	California	OC01-17	41 Tesla Irvine, CA 92618 (949) 861-8918	3310.04	2834B	SL2-IN-E-1154R	A-0029	US0158	TL-55
☐	Minnesota	MN01-11	9349 W Broadway Ave. Brooklyn Park, MN 55445 (612) 638-5136	3310.05	2834E	SL2-IN-E-1152R	A-0109	US0175	TL-57
☐	Oregon	EV01-12	6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	3310.02	2834D	SL2-IN-E-1017	A-0108	US0017	TL-56
☐	Plano Texas	PT01-15	1701 E Plano Pkwy, Ste 150 Plano, TX 75074 (972) 509-2566	214.19	32637	SL2-IN-E-057R	N/A	US0054	N/A
☐	Texas	TX01-09	3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	3310.03	2834G	SL2-IN-E-1158R	N/A	US0191	TL-54
☒	Washington	NC01-05	19201 120th Ave NE Bothell, WA 98011 (425) 984-6600	3310.06	2834F	SL2-IN-E-1153R	A-0110	US0157	TL-67
☐	Offsite	N/A	See Product Description	N/A	N/A	N/A	N/A	N/A	N/A

See data sheets for specific labs

- (1) The lab designations denote individual rooms within each location. (OC01, OC02, OC03, etc.)
- (2) A2LA Certificate No.
- (3) ISED Company No.
- (4) BSMI No.
- (5) VCCI Site Filing No.
- (6) CAB Identifier. Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA
- (7) FDA ASCA No.



MEASUREMENT UNCERTAINTY

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 in the table below. A lab specific value may also be found in the applicable test description section. 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.

Various Measurements

Test	All Labs (+/-)
Frequency Accuracy (%)	0.0007
Amplitude Accuracy (dB)	1.2
Conducted Power (dB)	1.2
Radiated Power via Substitution (dB)	0.7
Temperature (degrees C)	0.7
Humidity (% RH)	2.5
Voltage (AC) (%)	1
Voltage (DC) (%)	0.7

Field Strength Measurements (dB)

Range	NC01 (+/-)
10kHz-30MHz	1.7
30MHz-1GHz 3m	4.7
1GHz-6GHz	5.1
6GHz-40GHz	5.2

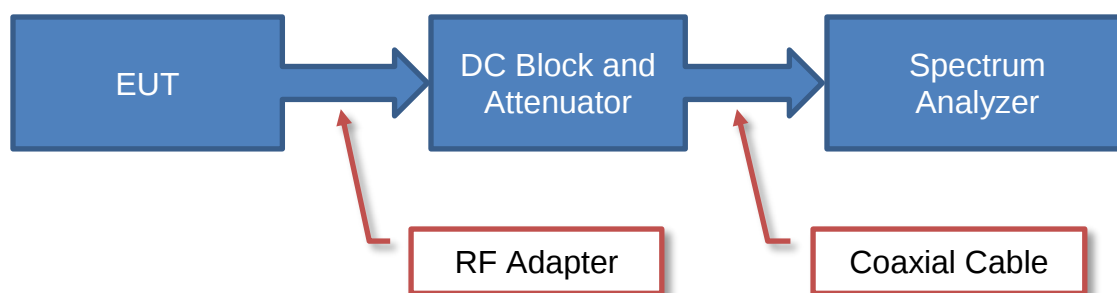
TEST SETUP BLOCK DIAGRAMS

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

Unless otherwise stated, measurements were made using the bandwidths and detectors specified. No video filter was used.

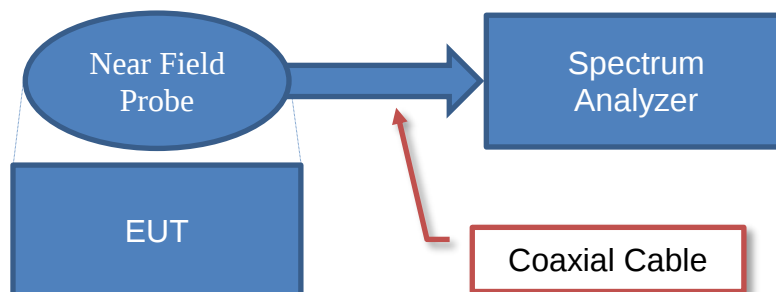
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

Near Field Test Fixture Measurements

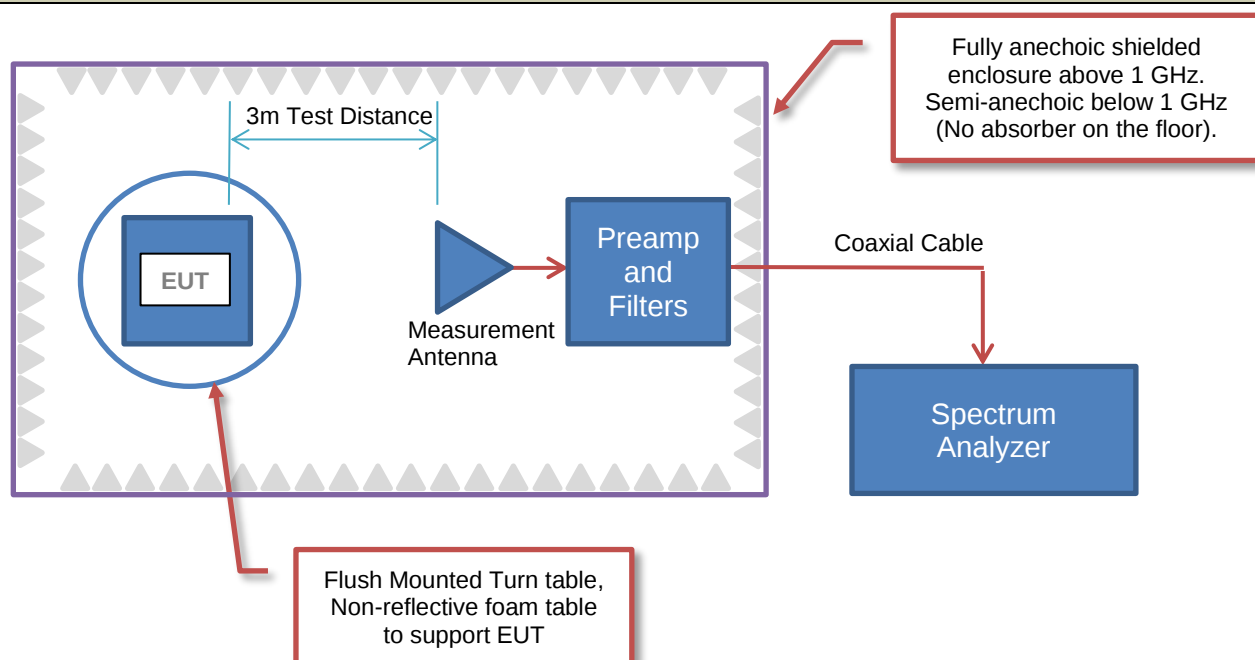


Sample Calculation (logarithmic units)

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

TEST SETUP BLOCK DIAGRAMS

Emissions Measurements



Sample Calculation (logarithmic units)

Radiated Emissions:

Measured Level (Amplitude)	Factor				Distance Adjustment Factor	External Attenuation		Field Strength
	Antenna Factor	Cable Factor	Amplifier Gain					
42.6	28.6	3.1	40.8	+	0.0	+	0.0	= 33.5

Conducted Emissions:

Measured Level (Amplitude)	Factor			External Attenuation		Adjusted Level
	Transducer Factor	Cable Factor				
26.7	0.3	0.1	+	20.0	=	47.1

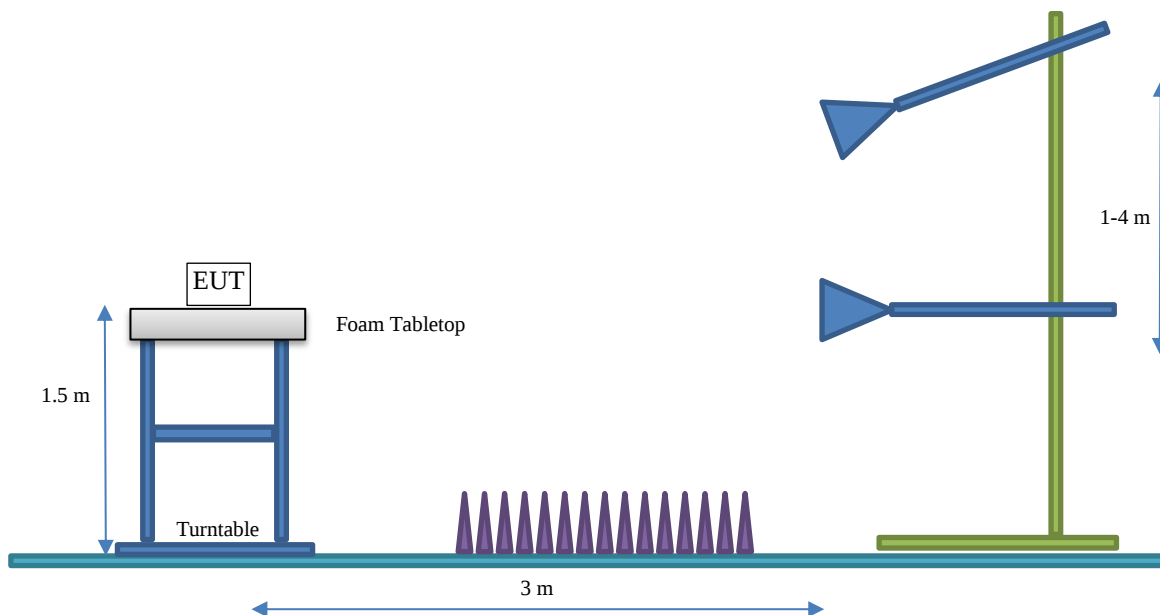
Radiated Power (ERP/EIRP) – Substitution Method:

Measured Level into Substitution Antenna (Amplitude dBm)		Substitution Antenna Factor (dBi)		EIRP to ERP (if applicable)		Measured power (dBm ERP/EIRP)
10.0	+	6.0	-	2.15	=	13.9/16.0

TEST SETUP BLOCK DIAGRAMS

Bore Sighting (>1GHz)

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.



PRODUCT DESCRIPTION

Client and Equipment under Test (EUT) Information

Company Name:	SMART Technologies ULC
Address:	Suite 600, 214 11 Ave SW
City, State, Zip:	Calgary, AB T2R 0K1 CANADA
Test Requested By:	Sean MacKellar
EUT:	CRXMOD1 / CRX-1
First Date of Test:	July 8, 2024
Last Date of Test:	July 12, 2024
Receipt Date of Samples:	July 8, 2024
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

CRXMOD1 is a Bluetooth Low Energy radio module integrated on the main board within the SMART RX Series Cube, Model: CRX-1. CRX-1 is an electronic cube (handheld accessory) used in conjunction with SMART QX-V2/RX Series Interactive Flat Panel displays.

Testing Objective:

To demonstrate compliance of the Bluetooth radio to FCC 15.247/RSS-247 requirements.

POWER SETTINGS AND ANTENNAS



The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information. The power settings below reflect the maximum power that the EUT is allowed to transmit at during normal operation.

ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
Multilayer Chip	Wurth Elektronik	2400-2500	3

The EUT was tested using the power settings provided by the manufacturer which were based upon:

- ☐ Test software settings CRX-1 Software / firmware used for testing: 3.1.8.192
- ☒ Rated power settings CRXMOD1 Software / firmware used for testing: 1.6.4

SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types / Data Rates	Type	Channel	Frequency (MHz)	Power Setting
BLE GFSK 1 Mbps	DTS	0	2402	4 dBm
		19	2440	4 dBm
		39	2480	0 dBm

CONFIGURATIONS

Configuration SMTE0015-1

Software/Firmware Running During Test	
Description	Version
TX/RX Firmware	3.1.8.192

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
SMART RX Series Cube	SMART Technologies	CRX-1	Reg2

Configuration SMTE0015-2

Software/Firmware Running During Test	
Description	Version
Atmosic RF Tool	1.6.4
Atmosic SDK	5.1.0

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
SMART CRX Cube BLE radio module	SMART Technologies	CRXMOD1	Conducted sample

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Interface board (CRX)	Atmosic	N/A	2298
Laptop	HP	HSN-124C-4	5CG925B25F

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB-A to mini-USB	Yes	1 m	None	Interface board (CRX)	Laptop
flex cable	No	0.2 m	None	Interface board (CRX)	CRX Cube BLE radio module

CONFIGURATIONS

Configuration SMTE0015-3

Software/Firmware Running During Test					
Description				Version	
Atmosic RF Tool				1.6.4	
Atmosic SDK				5.1.0	

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
SMART CRX Cube BLE radio module	SMART Technologies	CRXMOD1	Radiated sample

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Interface board (CRX)	Atmosic	N/A	2298

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	HP	HSN-124C-4	5CG925B25F

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB-A to mini-USB	Yes	1 m	None	Interface board (CRX)	Laptop
flex cable	No	0.2 m	None	Interface board (CRX)	CRX Cube BLE radio module

MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2024-07-08	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	2024-07-12	Equivalent Isotropic Radiated Power	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	2024-07-12	Band Edge Compliance	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	2024-07-12	DTS Bandwidth (6 Db)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2024-07-12	Occupied Bandwidth (99%)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	2024-07-12	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	2024-07-12	Spurious Conducted 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.
8	2024-07-12	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.
9	2024-07-12	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

DUTY CYCLE

TEST DESCRIPTION

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 measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

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

If the transmit duty cycle < 98 percent, burst gating may have been used during some of the other tests in this report to only take the measurement during the burst duration.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	2023-12-14	2024-12-14
Block - DC	Weinschel Corp.	7006	AMS	2024-01-24	2025-01-24
Attenuator	Fairview Microwave	SA4014-20	QAA	2024-03-08	2025-03-08
Cable	Micro-Coax	UFD150A-1-0720-200200	NCS	2024-03-08	2025-03-08
Generator - Signal	Keysight	N5182B	TFU	2022-12-02	2024-12-02

DUTY CYCLE



EUT:	CRXMOD1	Work Order:	SMTE0015
Serial Number:	Conducted sample	Date:	2024-07-12
Customer:	SMART Technologies ULC	Temperature:	23.5°C
Attendees:	Sean MacKellar	Relative Humidity:	46.4%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mbar
Tested By:	Harry Zhao	Job Site:	NC06
Power:	Battery	Configuration:	SMTE0015-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

Reference level offset: DC Block, 20 dB attenuator, customer's patch cable, and measurement cable.
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DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

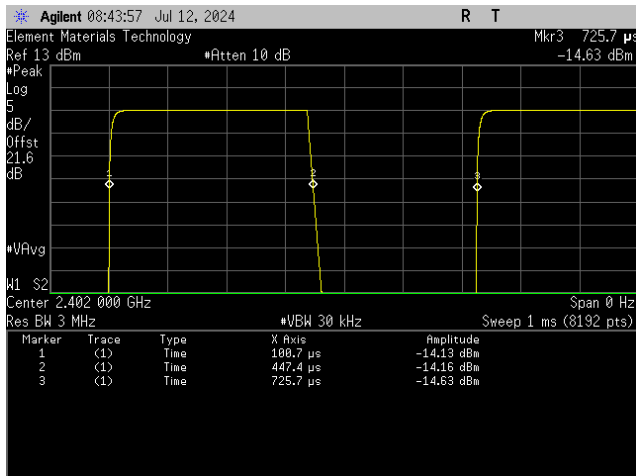
Pass

Tested By

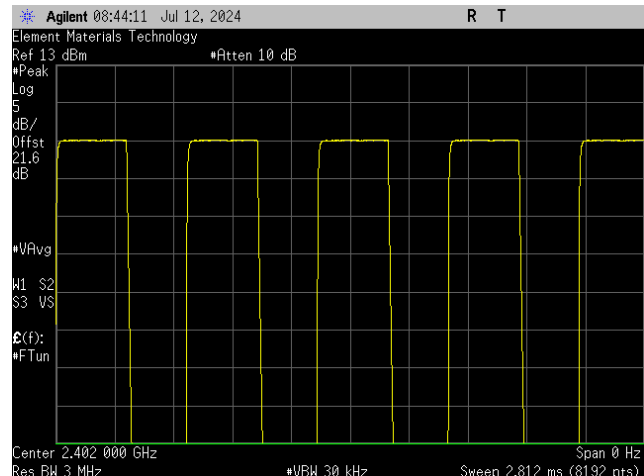
TEST RESULTS

	Pulse Width	Period	Number of Pulses	Value (%)	Limit N/A ()	Results
BLE/GFSK 1 Mbps						
Low Channel, 2402 MHz	346.718 us	625 us	1	55.5	N/A	N/A
	N/A	N/A	5	N/A	N/A	N/A
Mid Channel, 2440 MHz	346.818 us	625 us	1	55.5	N/A	N/A
	N/A	N/A	5	N/A	N/A	N/A
High Channel, 2480 MHz	346.404 us	625 us	1	55.4	N/A	N/A
	N/A	N/A	5	N/A	N/A	N/A

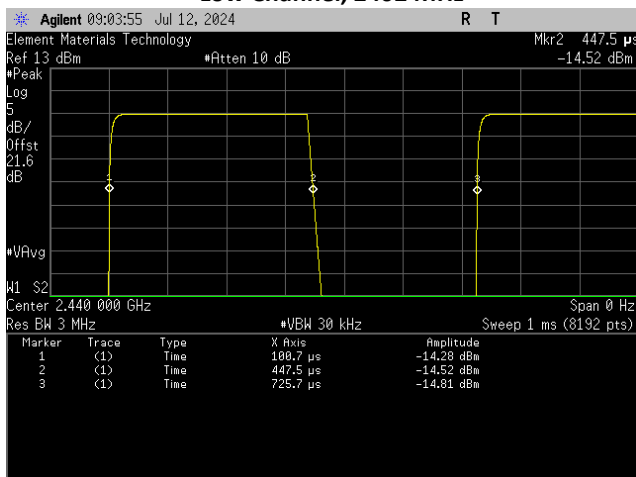
DUTY CYCLE



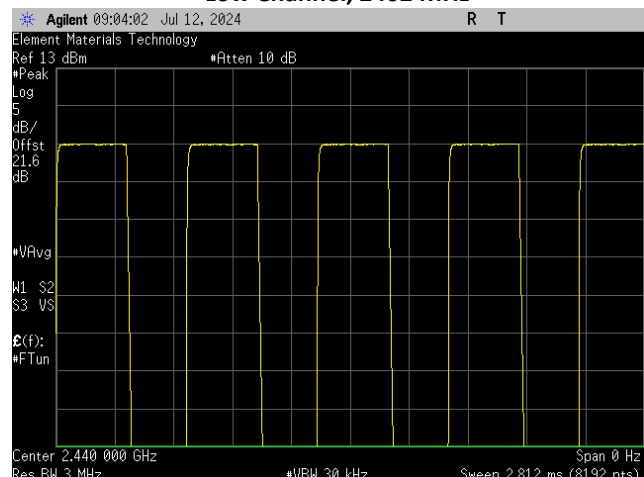
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



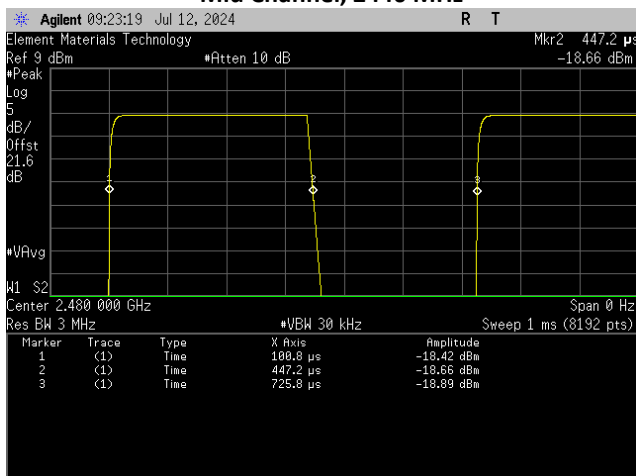
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



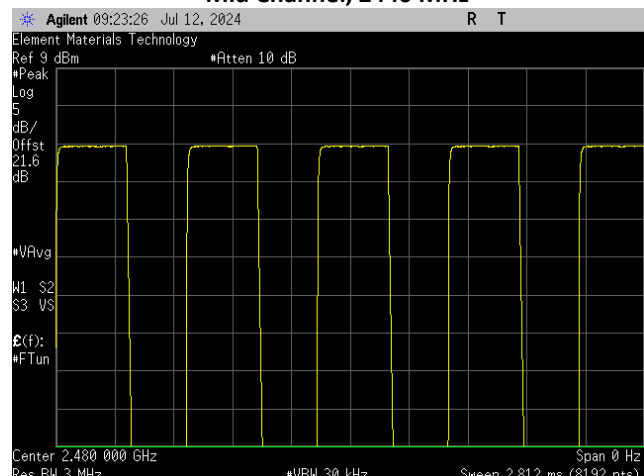
BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz



BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz



BLE/GFSK 1 Mbps
High Channel, 2480 MHz



BLE/GFSK 1 Mbps
High Channel, 2480 MHz

DTS BANDWIDTH (6 dB)

TEST DESCRIPTION

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 measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The EUT was set to the channels and modes listed in the datasheet.

The 6dB DTS bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	2023-12-14	2024-12-14
Block - DC	Weinschel Corp.	7006	AMS	2024-01-24	2025-01-24
Attenuator	Fairview Microwave	SA4014-20	QAA	2024-03-08	2025-03-08
Cable	Micro-Coax	UFD150A-1-0720-200200	NCS	2024-03-08	2025-03-08
Generator - Signal	Keysight	N5182B	TFU	2022-12-02	2024-12-02

DTS BANDWIDTH (6 dB)



EUT:	CRXMOD1	Work Order:	SMTE0015
Serial Number:	Conducted sample	Date:	2024-07-12
Customer:	SMART Technologies ULC	Temperature:	23.6°C
Attendees:	Sean MacKellar	Relative Humidity:	46.5%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mbar
Tested By:	Harry Zhao	Job Site:	NC06
Power:	Battery	Configuration:	SMTE0015-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

Reference level offset: DC Block, 20 dB attenuator, customer's patch cable, and measurement cable.
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DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

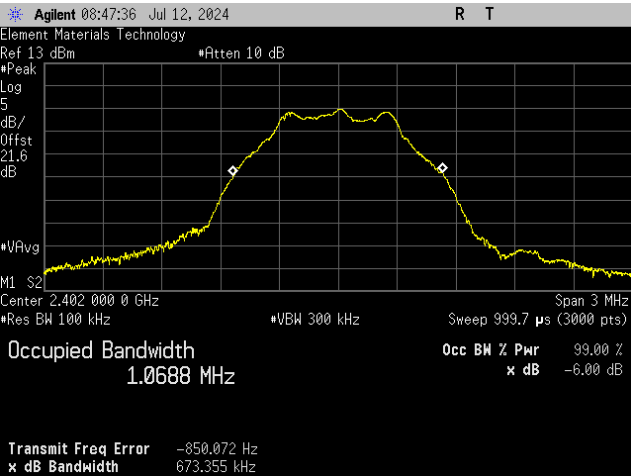
Pass

Tested By

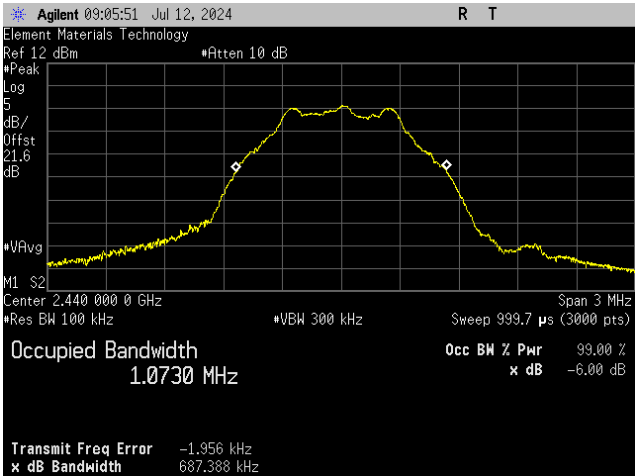
TEST RESULTS

		Value	Limit (≥)	Result
BLE/GFSK 1 Mbps				
	Low Channel, 2402 MHz	673.355 kHz	500 kHz	Pass
	Mid Channel, 2440 MHz	687.388 kHz	500 kHz	Pass
	High Channel, 2480 MHz	714.352 kHz	500 kHz	Pass

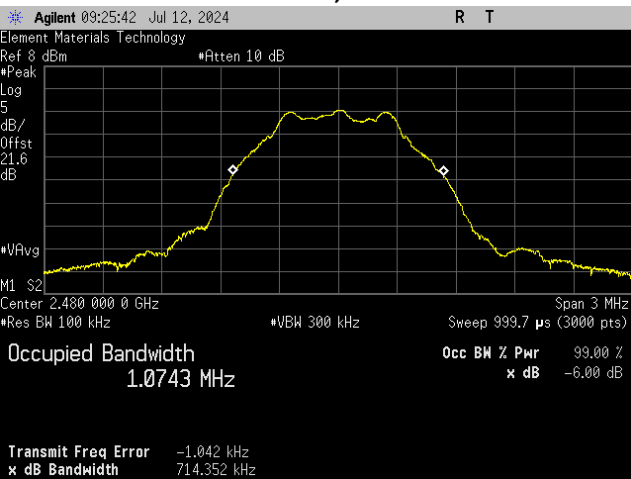
DTS BANDWIDTH (6 dB)



BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz



BLE/GFSK 1 Mbps
High Channel, 2480 MHz

OCCUPIED BANDWIDTH (99%)

TEST DESCRIPTION

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 measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The 99% occupied bandwidth was measured with the EUT configured for continuous modulated operation.

Per ANSI C63.10:2013, 6.9.3, the spectrum analyzer was configured as follows:

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

The resolution bandwidth (RBW) of the spectrum analyzer was set to the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) bandwidth was set to at least 3 times the resolution bandwidth. The analyzer sweep time was set to auto to prevent video filtering or averaging. A sample detector was used unless the device was not able to be operated in a continuous transmit mode, in which case a peak detector was used.

The spectrum analyzer occupied bandwidth measurement function was used to sum the power of the transmission in linear terms to obtain the 99% bandwidth.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	2023-12-14	2024-12-14
Block - DC	Weinschel Corp.	7006	AMS	2024-01-24	2025-01-24
Attenuator	Fairview Microwave	SA4014-20	QAA	2024-03-08	2025-03-08
Cable	Micro-Coax	UFD150A-1-0720-200200	NCS	2024-03-08	2025-03-08
Generator - Signal	Keysight	N5182B	TFU	2022-12-02	2024-12-02

OCCUPIED BANDWIDTH (99%)



EUT:	CRXMOD1	Work Order:	SMTE0015
Serial Number:	Conducted sample	Date:	2024-07-12
Customer:	SMART Technologies ULC	Temperature:	23.7°C
Attendees:	Sean MacKellar	Relative Humidity:	46.2%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mbar
Tested By:	Harry Zhao	Job Site:	NC06
Power:	Battery	Configuration:	SMTE0015-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

Reference level offset: DC Block, 20 dB attenuator, customer's patch cable, and measurement cable.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass

Tested By

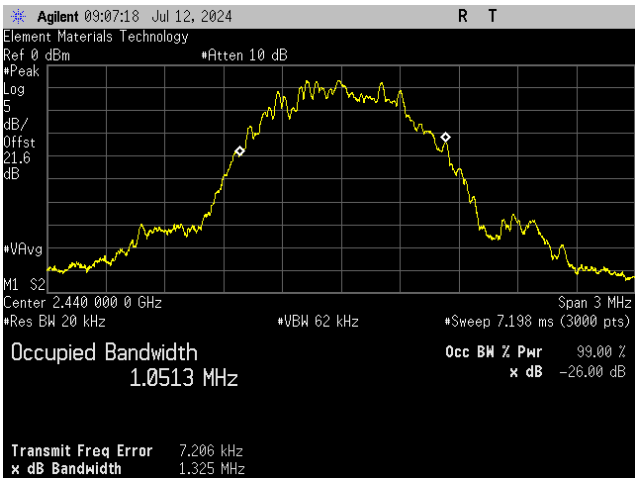
TEST RESULTS

		Value	Limit	Result
BLE/GFSK 1 Mbps				
	Low Channel, 2402 MHz	1.048 MHz	N/A	N/A
	Mid Channel, 2440 MHz	1.051 MHz	N/A	N/A
	High Channel, 2480 MHz	1.057 MHz	N/A	N/A

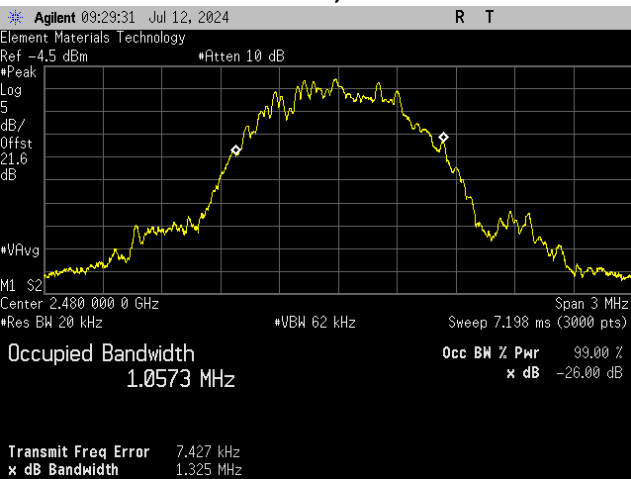
OCCUPIED BANDWIDTH (99%)



BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz



BLE/GFSK 1 Mbps
High Channel, 2480 MHz

OUTPUT POWER

TEST DESCRIPTION

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 measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

Prior to measuring peak transmit power the DTS bandwidth (B) was measured.

The method found in ANSI C63.10:2013 Section 11.9.1.1 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	2023-12-14	2024-12-14
Block - DC	Weinschel Corp.	7006	AMS	2024-01-24	2025-01-24
Attenuator	Fairview Microwave	SA4014-20	QAA	2024-03-08	2025-03-08
Cable	Micro-Coax	UFD150A-1-0720-200200	NCS	2024-03-08	2025-03-08
Generator - Signal	Keysight	N5182B	TFU	2022-12-02	2024-12-02

OUTPUT POWER



EUT:	CRXMOD1	Work Order:	SMTE0015
Serial Number:	Conducted sample	Date:	2024-07-12
Customer:	SMART Technologies ULC	Temperature:	23.7°C
Attendees:	Sean MacKellar	Relative Humidity:	45.4%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mbar
Tested By:	Harry Zhao	Job Site:	NC06
Power:	Battery	Configuration:	SMTE0015-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

Reference level offset: DC Block, 20 dB attenuator, customer's patch cable, and measurement cable.
--

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

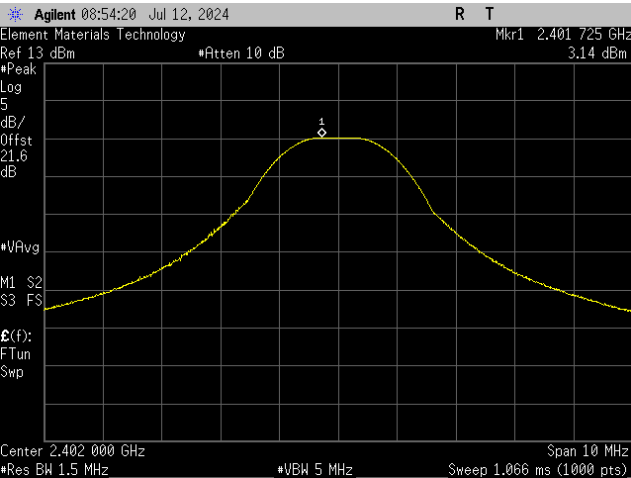
Pass

Tested By

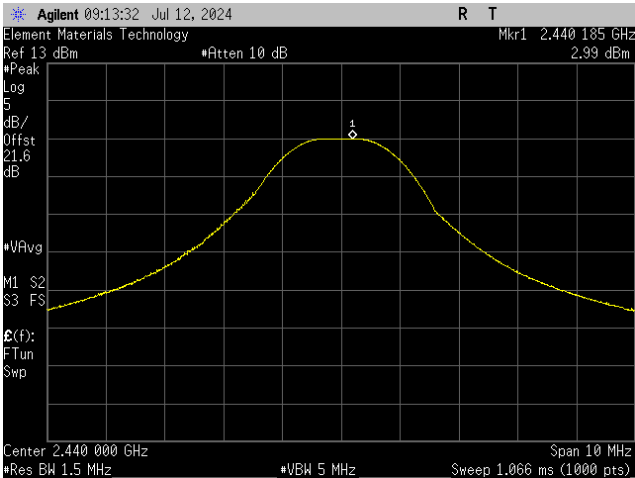
TEST RESULTS

	Out Pwr (dBm)	Limit (dBm)	Result
BLE/GFSK 1 Mbps			
Low Channel, 2402 MHz	3.145	30	Pass
Mid Channel, 2440 MHz	2.995	30	Pass
High Channel, 2480 MHz	-1.239	30	Pass

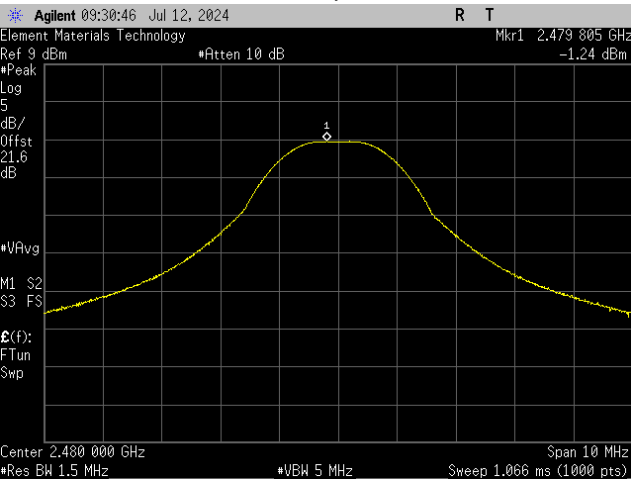
OUTPUT POWER



BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz



BLE/GFSK 1 Mbps
High Channel, 2480 MHz

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TEST DESCRIPTION

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 measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

Prior to measuring peak transmit power the DTS bandwidth (B) was measured.

The method found in ANSI C63.10:2013 Section 11.9.1.1 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio.

Equivalent Isotropic Radiated Power (EIRP) = Max Measured Power + Antenna gain (dBi)

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	2023-12-14	2024-12-14
Block - DC	Weinschel Corp.	7006	AMS	2024-01-24	2025-01-24
Attenuator	Fairview Microwave	SA4014-20	QAA	2024-03-08	2025-03-08
Cable	Micro-Coax	UFD150A-1-0720-200200	NCS	2024-03-08	2025-03-08
Generator - Signal	Keysight	N5182B	TFU	2022-12-02	2024-12-02

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



EUT:	CRXMOD1	Work Order:	SMTE0015
Serial Number:	Conducted sample	Date:	2024-07-12
Customer:	SMART Technologies ULC	Temperature:	23.7°C
Attendees:	Sean MacKellar	Relative Humidity:	45.5%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mbar
Tested By:	Harry Zhao	Job Site:	NC06
Power:	Battery	Configuration:	SMTE0015-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

Reference level offset: DC Block, 20 dB attenuator, customer's patch cable, and measurement cable.
--

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

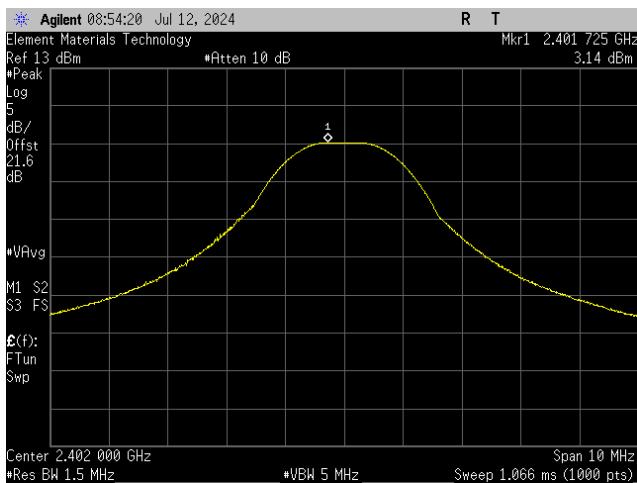
Pass

Tested By

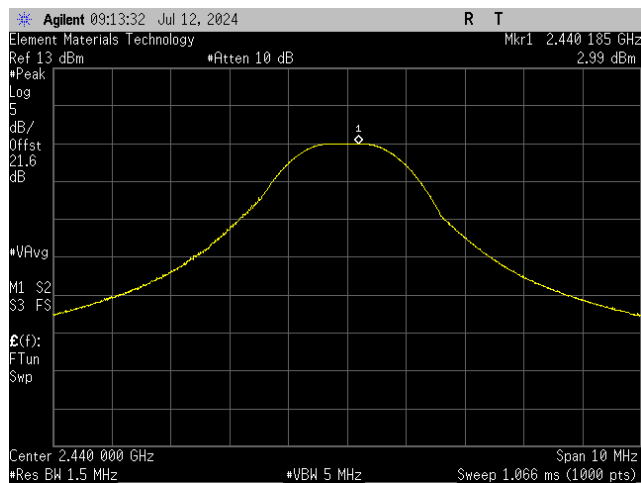
TEST RESULTS

	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
BLE/GFSK 1 Mbps					
Low Channel, 2402 MHz	3.145	3	6.145	36	Pass
Mid Channel, 2440 MHz	2.995	3	5.995	36	Pass
High Channel, 2480 MHz	-1.239	3	1.761	36	Pass

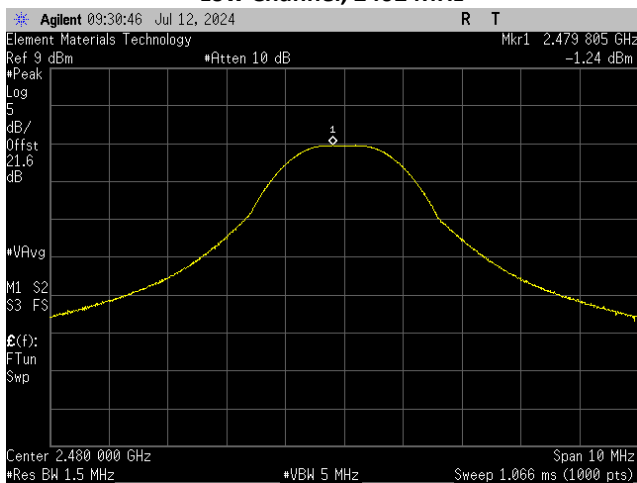
EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz



BLE/GFSK 1 Mbps
High Channel, 2480 MHz

POWER SPECTRAL DENSITY



TEST DESCRIPTION

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 measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The maximum power spectral density measurements was measured using the channels and modes as called out on the following data sheets.

Per the procedure outlined in ANSI C63.10 the peak power spectral density was measured in a 3 kHz RBW.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	2023-12-14	2024-12-14
Block - DC	Weinschel Corp.	7006	AMS	2024-01-24	2025-01-24
Attenuator	Fairview Microwave	SA4014-20	QAA	2024-03-08	2025-03-08
Cable	Micro-Coax	UFD150A-1-0720-200200	NCS	2024-03-08	2025-03-08
Generator - Signal	Keysight	N5182B	TFU	2022-12-02	2024-12-02

POWER SPECTRAL DENSITY



EUT:	CRXMOD1	Work Order:	SMTE0015
Serial Number:	Conducted sample	Date:	2024-07-12
Customer:	SMART Technologies ULC	Temperature:	23.7°C
Attendees:	Sean MacKellar	Relative Humidity:	45.5%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mbar
Tested By:	Harry Zhao	Job Site:	NC06
Power:	Battery	Configuration:	SMTE0015-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

Reference level offset: DC Block, 20 dB attenuator, customer's patch cable, and measurement cable.
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DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

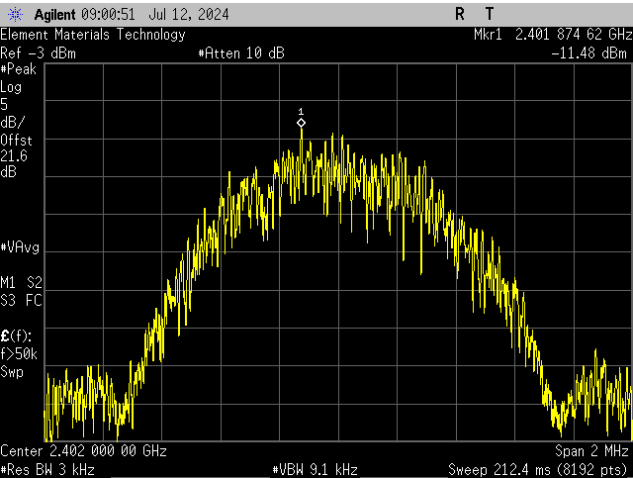
Pass

Tested By

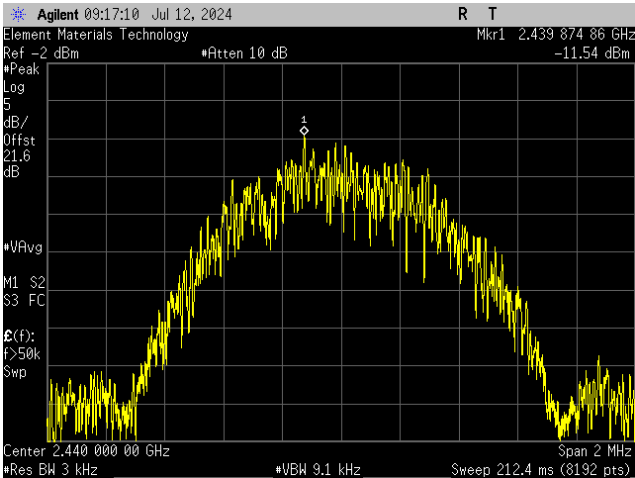
TEST RESULTS

		Value dBm/3kHz	Limit ≤ (dBm/3kHz)	Results
BLE/GFSK 1 Mbps				
	Low Channel, 2402 MHz	-11.476	8	Pass
	Mid Channel, 2440 MHz	-11.543	8	Pass
	High Channel, 2480 MHz	-15.762	8	Pass

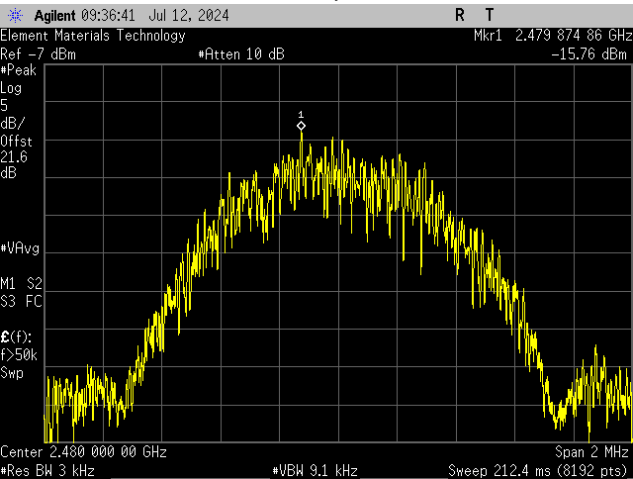
POWER SPECTRAL DENSITY



BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz



BLE/GFSK 1 Mbps
High Channel, 2480 MHz

BAND EDGE COMPLIANCE

TEST DESCRIPTION

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 measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge. The analyzer screen captures for this test show an example of the emission mask for the test mode also used during the radiated spurious emissions at the restricted band edges test.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	2023-12-14	2024-12-14
Block - DC	Weinschel Corp.	7006	AMS	2024-01-24	2025-01-24
Attenuator	Fairview Microwave	SA4014-20	QAA	2024-03-08	2025-03-08
Cable	Micro-Coax	UFD150A-1-0720-200200	NCS	2024-03-08	2025-03-08
Generator - Signal	Keysight	N5182B	TFU	2022-12-02	2024-12-02

BAND EDGE COMPLIANCE



EUT:	CRXMOD1	Work Order:	SMTE0015
Serial Number:	Conducted sample	Date:	2024-07-12
Customer:	SMART Technologies ULC	Temperature:	23.7°C
Attendees:	Sean MacKellar	Relative Humidity:	46%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mbar
Tested By:	Harry Zhao	Job Site:	NC06
Power:	Battery	Configuration:	SMTE0015-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

Reference level offset: DC Block, 20 dB attenuator, customer's patch cable, and measurement cable.
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DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

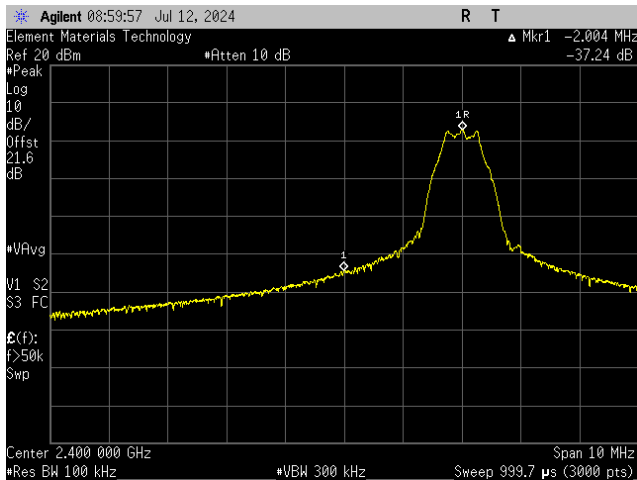
Pass

Tested By

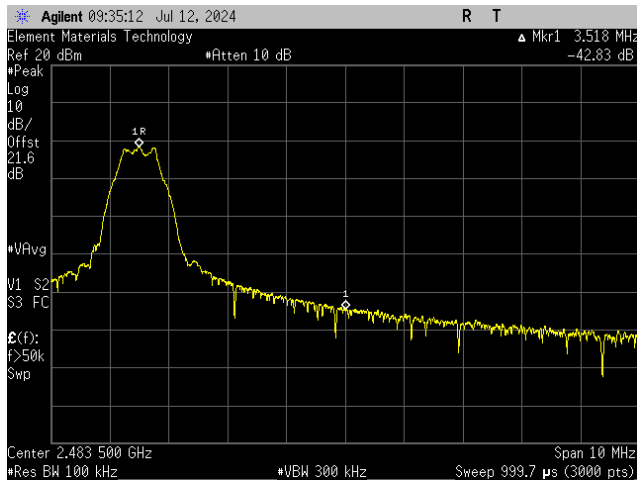
TEST RESULTS

	Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 1 Mbps			
Low Channel, 2402 MHz	-37.24	-20	Pass
High Channel, 2480 MHz	-42.83	-20	Pass

BAND EDGE COMPLIANCE



BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



BLE/GFSK 1 Mbps
High Channel, 2480 MHz

SPURIOUS CONDUCTED EMISSIONS

TEST DESCRIPTION

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 measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the fundamental was measured with a 100 kHz resolution bandwidth and the highest value was recorded. The rest of the spectrum was then measured with a 100 kHz resolution bandwidth and the highest value was found. The difference between the value found on the fundamental and the rest of the spectrum was compared against the limit to determine compliance.

The reference level offset for the fundamental screen capture was based on a measured value of the loss between the spectrum analyzer and the EUT which was verified at the time of test. The remaining screen capture(s) use an internal transducer factor on the analyzer to correct the displayed trace based on the cable loss over frequency. The reference level offset for the additional screen capture(s) is then based on the expected attenuator value and any other losses.

Fundamental Offset = Ref Lvl Offset showing measured composite factor of all losses

Remaining Screen capture(s) Offset = "Internal" cable loss factor not shown on screen capture + Ref Lvl Offset showing expected attenuator value and any other losses

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	2023-12-14	2024-12-14
Block - DC	Weinschel Corp.	7006	AMS	2024-01-24	2025-01-24
Attenuator	Fairview Microwave	SA4014-20	QAA	2024-03-08	2025-03-08
Cable	Micro-Coax	UFD150A-1-0720-200200	NCS	2024-03-08	2025-03-08
Generator - Signal	Keysight	N5182B	TFU	2022-12-02	2024-12-02

SPURIOUS CONDUCTED EMISSIONS



EUT:	CRXMOD1	Work Order:	SMTE0015
Serial Number:	Conducted sample	Date:	2024-07-12
Customer:	SMART Technologies ULC	Temperature:	23.8°C
Attendees:	Sean MacKellar	Relative Humidity:	45.8%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mbar
Tested By:	Harry Zhao	Job Site:	NC06
Power:	Battery	Configuration:	SMTE0015-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

Reference level offset: DC Block, 20 dB attenuator, customer's patch cable, and measurement cable.
--

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

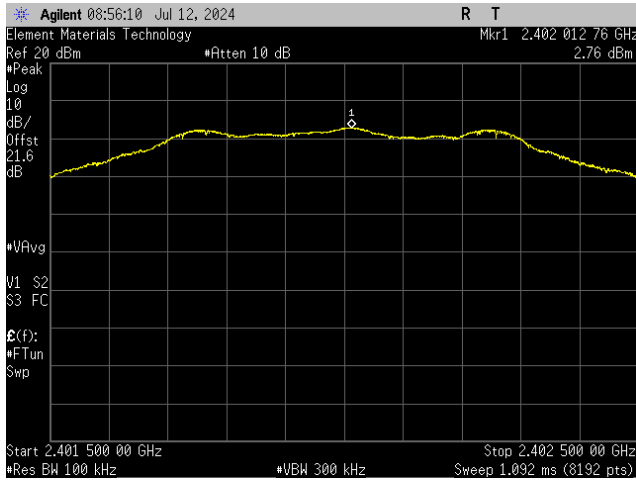
Pass

Tested By

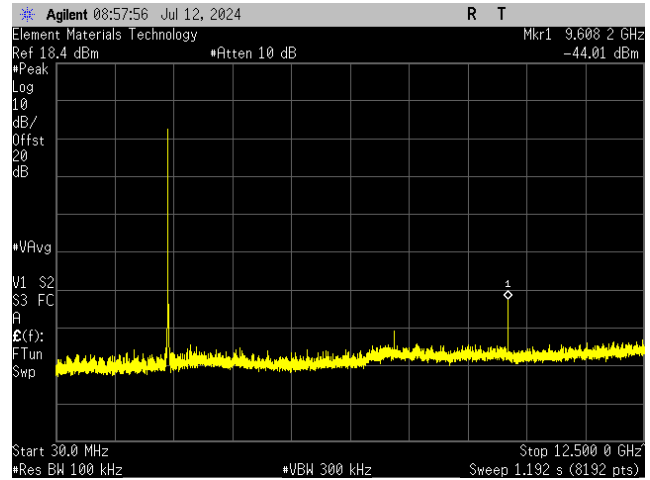
TEST RESULTS

		Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 1 Mbps						
Low Channel, 2402 MHz	Fundamental	2402.01	N/A	N/A	N/A	
	30 MHz - 12.5 GHz	9608.2	-46.77	-20	Pass	
	12.5 GHz - 25 GHz	24859.6	-52.91	-20	Pass	
Mid Channel, 2440 MHz	Fundamental	2440.01	N/A	N/A	N/A	
	30 MHz - 12.5 GHz	9759.7	-44.72	-20	Pass	
	12.5 GHz - 25 GHz	24649	-52.35	-20	Pass	
High Channel, 2480 MHz	Fundamental	2480.01	N/A	N/A	N/A	
	30 MHz - 12.5 GHz	9919.5	-42.7	-20	Pass	
	12.5 GHz - 25 GHz	24815.3	-48.34	-20	Pass	

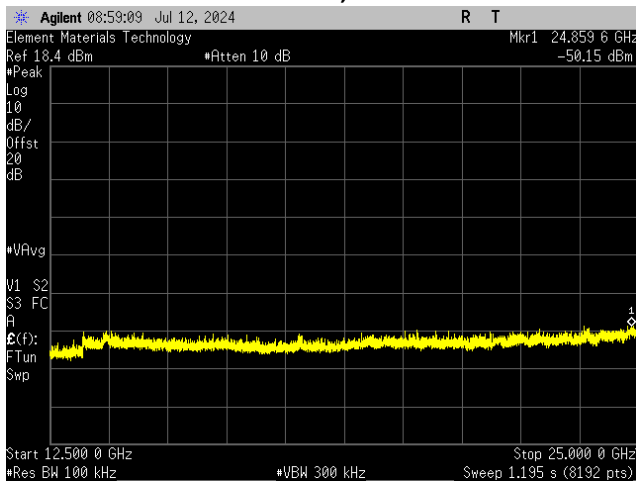
SPURIOUS CONDUCTED EMISSIONS



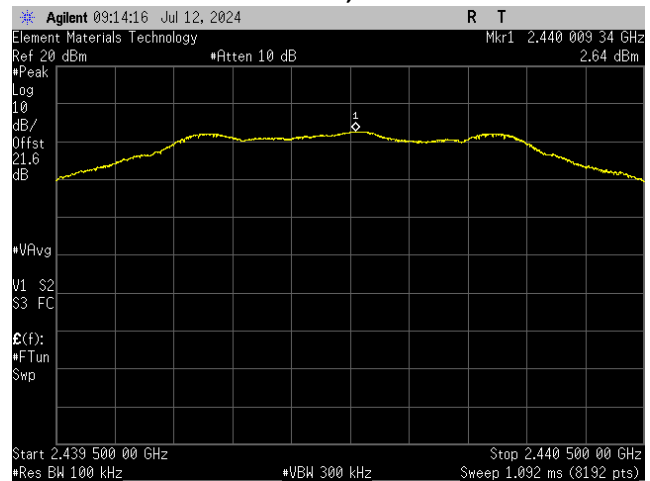
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



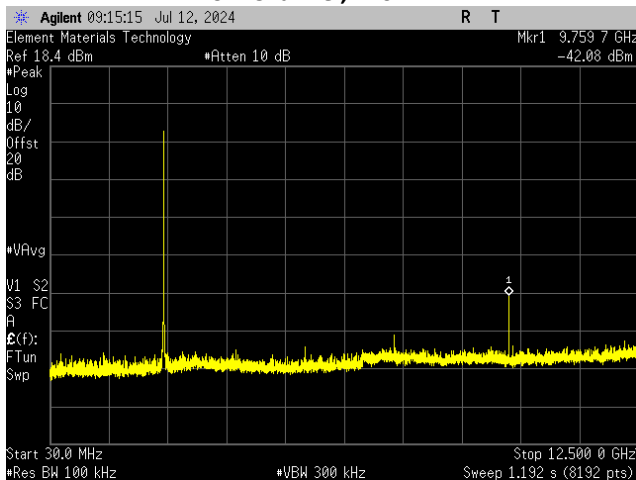
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



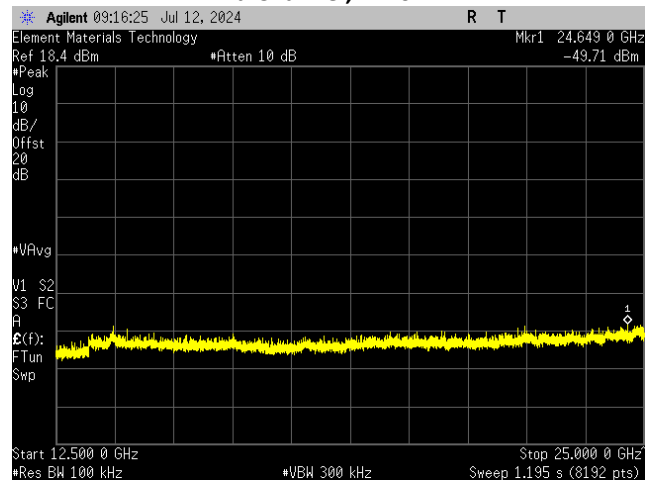
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz

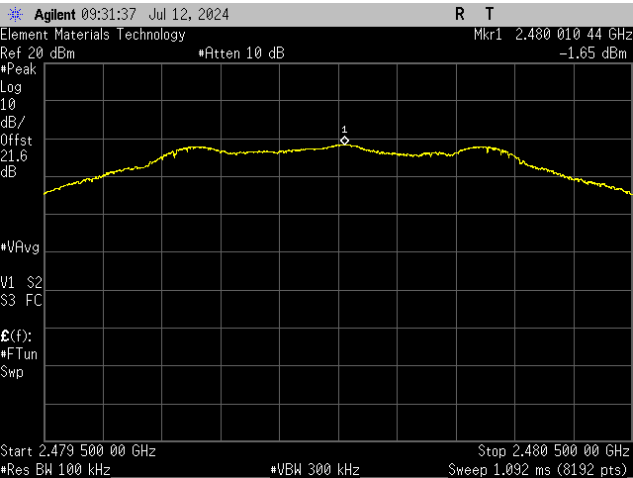


BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz

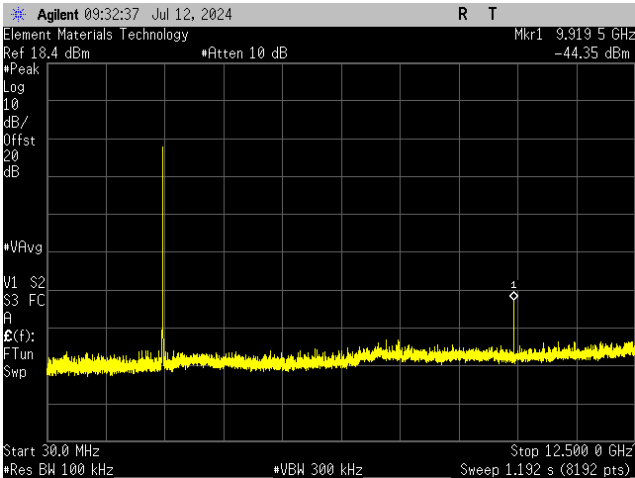


BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz

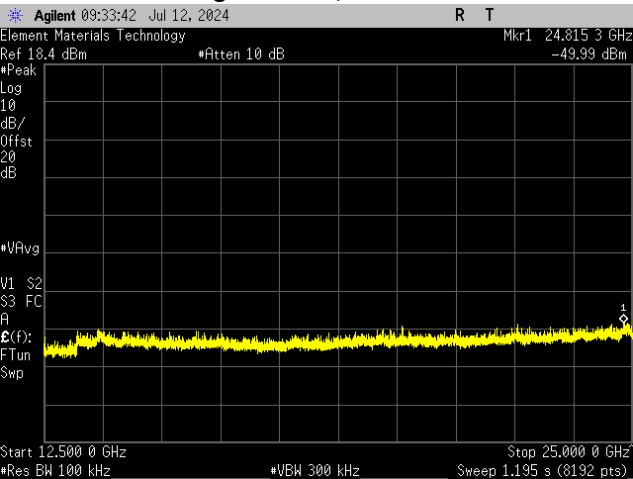
SPURIOUS CONDUCTED EMISSIONS



BLE/GFSK 1 Mbps
High Channel, 2480 MHz



BLE/GFSK 1 Mbps
High Channel, 2480 MHz



BLE/GFSK 1 Mbps
High Channel, 2480 MHz

SPURIOUS RADIATED EMISSIONS (CRX-1)

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 if required, 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 as well as the restricted band requirements.

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

Measurements within 2 MHz of the allowable band may have been taken using the integration method from ANSI C63.10 clause 11.13.3. This procedure uses the channel power feature of the spectrum analyzer to integrate the power of the emission within a 1 MHz bandwidth.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of $10 \cdot \log(1/dc)$.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Double Ridge	EMCO	3115	AHM	2024-06-24	2026-06-24
Cable	Northwest EMC	3115 Horn Cable	NC2	2024-04-25	2025-04-25
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVZ	2024-04-25	2025-04-25
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	2023-08-29	2024-08-29
Antenna - Standard Gain	EMCO	3160-07	AHP	NCR	NCR
Cable	High Speed Interconnects	EW292A-NGNG-300	NC3	2023-09-01	2024-09-01
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOK	2023-08-09	2024-08-09
Antenna - Standard Gain	EMCO	3160-08	AHO	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AOJ	2023-08-09	2024-08-09
Antenna - Standard Gain	ETS Lindgren	3160-09	AIY	NCR	NCR
Cable	Northwest EMC	N/A	NC8	2024-03-08	2025-03-08
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AOD	2024-03-08	2025-03-08
Antenna - Loop	EMCO	6502	AZC	2023-09-05	2025-09-05
Cable	Northwest EMC	NC01 Mag Field Loop / Near Field Probe cable	NC6	2024-03-01	2025-03-01
Filter - High Pass	Micro-Tronics	HPM50111	HHI	2023-10-09	2024-10-09
Filter - Low Pass	Micro-Tronics	LPM50004	LFF	2023-10-09	2024-10-09
Antenna - Biconilog	Teseq	CBL 6141B	AYL	2023-10-18	2025-10-18
Cable	Northwest EMC	Bilog Cables	NC1	2024-01-05	2025-01-05
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	PAB	2024-01-05	2025-01-05

FREQUENCY RANGE INVESTIGATED

9 kHz TO 26.5 GHz

SPURIOUS RADIATED EMISSIONS (CRX-1)



POWER INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

SMTE0015-1

MODES INVESTIGATED

Transmitting BLE, 1 Mbps, Low Channel 0 = 2402 MHz, Middle Channel 19 = 2440 MHz, High Channel 39 = 2480 MHz

SPURIOUS RADIATED EMISSIONS (CRX-1)



EUT:	CRX-1	Work Order:	SMTE0015
Serial Number:	Reg2	Date:	2024-07-08
Customer:	SMART Technologies ULC	Temperature:	24.4°C
Attendees:	Sean MacKellar	Relative Humidity:	43.5%
Customer Project:	None	Bar. Pressure (PMSL):	1013 mb
Tested By:	Harry Zhao	Job Site:	NC01
Power:	Battery	Configuration:	SMTE0015-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	23	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

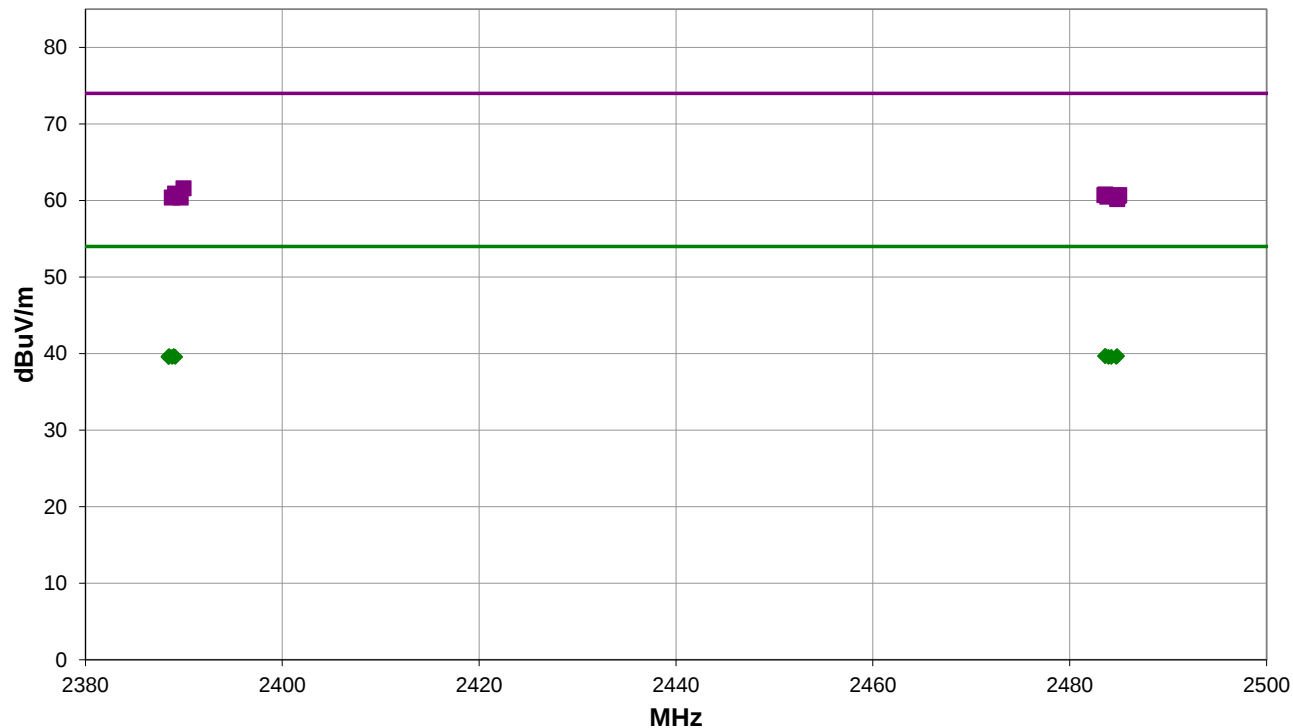
The test mode operates at 85% duty cycle (DC), an upward DC correction factor of $10 \cdot \log(1/DC) = 10 \cdot \log(1/0.85) = 0.705$ dB was applied to the average measurements. When in actual operation, the max operating duty cycle is 9.02%. A downward DC correction factor of $10 \cdot \log(1/0.0902) = -10.448$ dB was applied to the average measurements. Total correction applied = -9.74 dB. See data comments below for channel, and EUT orientation. CRXMOD1 installed in host enclosure.

EUT OPERATING MODES

Transmitting BLE, 1 Mbps, Low Channel 0 = 2402 MHz, Middle Channel 19 = 2440 MHz, High Channel 39 = 2480 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 23

PK AV QP

SPURIOUS RADIATED EMISSIONS (CRX-1)

RESULTS - Run #23

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity/ Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2389.960	41.5	0.1	1.5	296.0	0.0	20.0	Horz	PK	0.0	61.6	74.0	-12.4	Ch.0, EUT in X-axis
2389.110	40.8	0.1	1.5	204.0	0.0	20.0	Horz	PK	0.0	60.9	74.0	-13.1	Ch.0, EUT in Z-axis
2483.630	40.8	0.0	2.4	180.0	0.0	20.0	Horz	PK	0.0	60.8	74.0	-13.2	Ch.39, EUT in Y-axis
2389.293	40.7	0.1	1.3	53.0	0.0	20.0	Horz	PK	0.0	60.8	74.0	-13.2	Ch.0, EUT in Y-axis
2483.523	40.7	0.0	1.9	209.0	0.0	20.0	Horz	PK	0.0	60.7	74.0	-13.3	Ch.39, EUT in X-axis
2485.027	40.7	0.0	1.5	107.0	0.0	20.0	Vert	PK	0.0	60.7	74.0	-13.3	Ch.39, EUT in X-axis
2484.950	40.6	0.0	1.4	117.0	0.0	20.0	Vert	PK	0.0	60.6	74.0	-13.4	Ch.39, EUT in Y-axis
2389.253	40.5	0.1	1.6	221.0	0.0	20.0	Vert	PK	0.0	60.6	74.0	-13.4	Ch.0, EUT in X-axis
2483.827	40.5	0.0	1.5	167.0	0.0	20.0	Vert	PK	0.0	60.5	74.0	-13.5	Ch.39, EUT in Z-axis
2388.770	40.3	0.1	3.4	27.0	0.0	20.0	Vert	PK	0.0	60.4	74.0	-13.6	Ch.0, EUT in Y-axis
2389.670	40.3	0.1	1.5	0.0	0.0	20.0	Vert	PK	0.0	60.4	74.0	-13.6	Ch.0, EUT in Z-axis
2484.833	40.2	0.0	1.5	218.0	0.0	20.0	Horz	PK	0.0	60.2	74.0	-13.8	Ch.39, EUT in Z-axis
2483.633	29.4	0.0	1.4	117.0	-9.7	20.0	Vert	AV	0.0	39.7	54.0	-14.3	Ch.39, EUT in Y-axis
2483.603	29.4	0.0	1.5	218.0	-9.7	20.0	Horz	AV	0.0	39.7	54.0	-14.3	Ch.39, EUT in Z-axis
2484.837	29.4	0.0	1.5	167.0	-9.7	20.0	Vert	AV	0.0	39.7	54.0	-14.3	Ch.39, EUT in Z-axis
2388.970	29.3	0.1	1.5	296.0	-9.7	20.0	Horz	AV	0.0	39.7	54.0	-14.3	Ch.0, EUT in X-axis
2388.510	29.3	0.1	1.6	221.0	-9.7	20.0	Vert	AV	0.0	39.7	54.0	-14.3	Ch.0, EUT in X-axis
2484.240	29.3	0.0	1.9	209.0	-9.7	20.0	Horz	AV	0.0	39.6	54.0	-14.4	Ch.39, EUT in X-axis
2484.750	29.3	0.0	1.5	107.0	-9.7	20.0	Vert	AV	0.0	39.6	54.0	-14.4	Ch.39, EUT in X-axis
2483.967	29.3	0.0	2.4	180.0	-9.7	20.0	Horz	AV	0.0	39.6	54.0	-14.4	Ch.39, EUT in Y-axis
2388.813	29.2	0.1	1.5	204.0	-9.7	20.0	Horz	AV	0.0	39.6	54.0	-14.4	Ch.0, EUT in Z-axis
2388.430	29.2	0.1	3.4	27.0	-9.7	20.0	Vert	AV	0.0	39.6	54.0	-14.4	Ch.0, EUT in Y-axis
2389.133	29.2	0.1	1.3	53.0	-9.7	20.0	Horz	AV	0.0	39.6	54.0	-14.4	Ch.0, EUT in Y-axis
2388.490	29.2	0.1	1.5	0.0	-9.7	20.0	Vert	AV	0.0	39.6	54.0	-14.4	Ch.0, EUT in Z-axis

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS (CRX-1)



EUT:	CRX-1	Work Order:	SMTE0015
Serial Number:	Reg2	Date:	2024-07-08
Customer:	SMART Technologies ULC	Temperature:	24.4°C
Attendees:	Sean MacKellar	Relative Humidity:	43.5%
Customer Project:	None	Bar. Pressure (PMSL):	1013 mb
Tested By:	Harry Zhao	Job Site:	NC01
Power:	Battery	Configuration:	SMTE0015-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	22	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

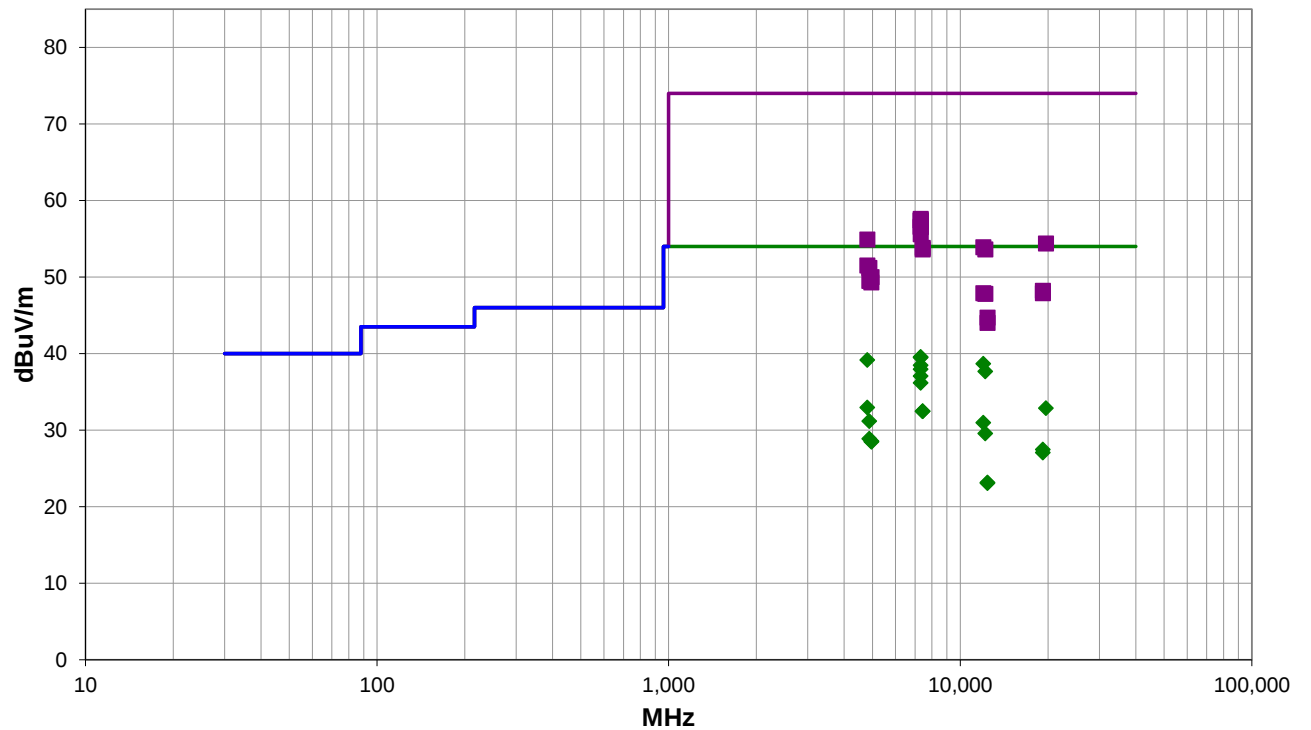
The test mode operates at 85% duty cycle (DC), an upward DC correction factor of $10 \cdot \log(1/DC) = 10 \cdot \log(1/0.85) = 0.705$ dB was applied to the average measurements. When in actual operation, the max operating duty cycle is 9.02%. A downward DC correction factor of $10 \cdot \log(1/0.0902) = -10.448$ dB was applied to the average measurements. Total correction applied = -9.74 dB. See data comments below for channel, and EUT orientation. CRXMOD1 installed in host enclosure.

EUT OPERATING MODES

Transmitting BLE, 1 Mbps, Low Channel 0 = 2402 MHz, Middle Channel 19 = 2440 MHz, High Channel 39 = 2480 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 22

PK AV QP

SPURIOUS RADIATED EMISSIONS (CRX-1)

RESULTS - Run #22

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7320.558	34.8	14.5	3.0	142.0	-9.7	0.0	Horz	AV	0.0	39.6	54.0	-14.4	Ch.19, EUT in X-axis
7320.458	34.7	14.5	3.2	335.0	-9.7	0.0	Vert	AV	0.0	39.5	54.0	-14.5	Ch.19, EUT in Y-axis
4804.025	38.9	10.0	3.6	114.0	-9.7	0.0	Horz	AV	0.0	39.2	54.0	-14.8	Ch.0, EUT in X-axis
12011.080	48.6	-0.2	2.6	146.0	-9.7	0.0	Horz	AV	0.0	38.7	54.0	-15.3	Ch.0, EUT in X-axis
7319.458	33.7	14.5	1.4	42.0	-9.7	0.0	Horz	AV	0.0	38.5	54.0	-15.5	Ch.19, EUT in Z-axis
7320.600	33.2	14.5	1.5	139.0	-9.7	0.0	Vert	AV	0.0	38.0	54.0	-16.0	Ch.19, EUT in X-axis
12198.980	45.2	2.2	3.0	142.0	-9.7	0.0	Horz	AV	0.0	37.7	54.0	-16.3	Ch.19, EUT in X-axis
7320.600	43.1	14.5	3.0	142.0	0.0	0.0	Horz	PK	0.0	57.6	74.0	-16.4	Ch.19, EUT in X-axis
7319.117	42.9	14.5	3.2	335.0	0.0	0.0	Vert	PK	0.0	57.4	74.0	-16.6	Ch.19, EUT in Y-axis
7319.400	42.9	14.5	1.4	42.0	0.0	0.0	Horz	PK	0.0	57.4	74.0	-16.6	Ch.19, EUT in Z-axis
7320.575	32.3	14.5	3.7	284.0	-9.7	0.0	Horz	AV	0.0	37.1	54.0	-16.9	Ch.19, EUT in Y-axis
7319.317	42.1	14.5	3.7	284.0	0.0	0.0	Horz	PK	0.0	56.6	74.0	-17.4	Ch.19, EUT in Y-axis
7320.600	42.0	14.5	1.5	139.0	0.0	0.0	Vert	PK	0.0	56.5	74.0	-17.5	Ch.19, EUT in X-axis
7319.475	31.4	14.5	1.5	276.0	-9.7	0.0	Vert	AV	0.0	36.2	54.0	-17.8	Ch.19, EUT in Z-axis
7319.150	41.1	14.5	1.5	276.0	0.0	0.0	Vert	PK	0.0	55.6	74.0	-18.4	Ch.19, EUT in Z-axis
4803.792	44.9	10.0	3.6	114.0	0.0	0.0	Horz	PK	0.0	54.9	74.0	-19.1	Ch.0, EUT in X-axis
19694.180	46.2	8.2	1.5	351.0	0.0	0.0	Vert	PK	0.0	54.4	74.0	-19.6	Ch. 0, EUT in Z-axis
12011.230	54.1	-0.2	2.6	146.0	0.0	0.0	Horz	PK	0.0	53.9	74.0	-20.1	Ch.0, EUT in X-axis
7439.867	38.5	15.3	1.5	196.0	0.0	0.0	Horz	PK	0.0	53.8	74.0	-20.2	Ch.39, EUT in X-axis
7441.533	38.3	15.3	1.5	232.0	0.0	0.0	Vert	PK	0.0	53.6	74.0	-20.4	Ch.39, EUT in Y-axis
12198.920	51.4	2.2	3.0	142.0	0.0	0.0	Horz	PK	0.0	53.6	74.0	-20.4	Ch.19, EUT in X-axis
4803.792	32.7	10.0	1.0	90.0	-9.7	0.0	Vert	AV	0.0	33.0	54.0	-21.0	Ch.0, EUT in Y-axis
19695.570	34.3	8.3	1.5	351.0	-9.7	0.0	Vert	AV	0.0	32.9	54.0	-21.1	Ch. 0, EUT in Z-axis
7439.808	26.9	15.3	1.5	232.0	-9.7	0.0	Vert	AV	0.0	32.5	54.0	-21.5	Ch.39, EUT in Y-axis
7438.725	26.9	15.3	1.5	196.0	-9.7	0.0	Horz	AV	0.0	32.5	54.0	-21.5	Ch.39, EUT in X-axis
4804.142	41.5	10.0	1.0	90.0	0.0	0.0	Vert	PK	0.0	51.5	74.0	-22.5	Ch.0, EUT in Y-axis
4879.992	40.5	10.7	1.5	140.0	0.0	0.0	Horz	PK	0.0	51.2	74.0	-22.8	Ch.19, EUT in X-axis
4879.958	30.2	10.7	1.5	140.0	-9.7	0.0	Horz	AV	0.0	31.2	54.0	-22.8	Ch.19, EUT in X-axis
12011.120	40.9	-0.2	1.4	308.0	-9.7	0.0	Vert	AV	0.0	31.0	54.0	-23.0	Ch.0, EUT in Y-axis
4961.783	39.8	10.2	1.5	349.0	0.0	0.0	Horz	PK	0.0	50.0	74.0	-24.0	Ch.39, EUT in X-axis
12198.830	37.1	2.2	1.5	28.0	-9.7	0.0	Vert	AV	0.0	29.6	54.0	-24.4	Ch.19, EUT in Y-axis
4879.042	38.8	10.7	1.3	146.0	0.0	0.0	Vert	PK	0.0	49.5	74.0	-24.5	Ch.19, EUT in Y-axis
4958.600	39.1	10.2	3.5	221.0	0.0	0.0	Vert	PK	0.0	49.3	74.0	-24.7	Ch.39, EUT in Y-axis
4879.858	27.9	10.7	1.3	146.0	-9.7	0.0	Vert	AV	0.0	28.9	54.0	-25.1	Ch.19, EUT in Y-axis
4962.058	28.1	10.2	1.5	349.0	-9.7	0.0	Horz	AV	0.0	28.6	54.0	-25.4	Ch.39, EUT in X-axis
4960.408	28.0	10.2	3.5	221.0	-9.7	0.0	Vert	AV	0.0	28.5	54.0	-25.5	Ch.39, EUT in Y-axis
19214.750	46.2	2.0	1.5	330.0	0.0	0.0	Vert	PK	0.0	48.2	74.0	-25.8	Ch. 0, EUT in Z-axis
19217.340	45.8	2.1	1.5	147.0	0.0	0.0	Horz	PK	0.0	47.9	74.0	-26.1	Ch. 0, EUT in X-axis
12011.430	48.1	-0.2	1.4	308.0	0.0	0.0	Vert	PK	0.0	47.9	74.0	-26.1	Ch.0, EUT in Y-axis
12201.040	45.6	2.2	1.5	28.0	0.0	0.0	Vert	PK	0.0	47.8	74.0	-26.2	Ch.19, EUT in Y-axis
19218.070	35.1	2.1	1.5	330.0	-9.7	0.0	Vert	AV	0.0	27.5	54.0	-26.5	Ch. 0, EUT in Z-axis
19217.580	34.7	2.1	1.5	147.0	-9.7	0.0	Horz	AV	0.0	27.1	54.0	-26.9	Ch. 0, EUT in X-axis

SPURIOUS RADIATED EMISSIONS (CRX-1)

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity/ Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12398.170	42.4	2.3	1.5	109.0	0.0	0.0	Horz	PK	0.0	44.7	74.0	-29.3	Ch.39, EUT in X-axis
12397.980	41.7	2.3	1.5	193.0	0.0	0.0	Vert	PK	0.0	44.0	74.0	-30.0	Ch.39, EUT in Y-axis
12398.240	30.6	2.3	1.5	193.0	-9.7	0.0	Vert	AV	0.0	23.2	54.0	-30.8	Ch.39, EUT in Y-axis
12397.800	30.5	2.3	1.5	109.0	-9.7	0.0	Horz	AV	0.0	23.1	54.0	-30.9	Ch.39, EUT in X-axis

CONCLUSION
Pass



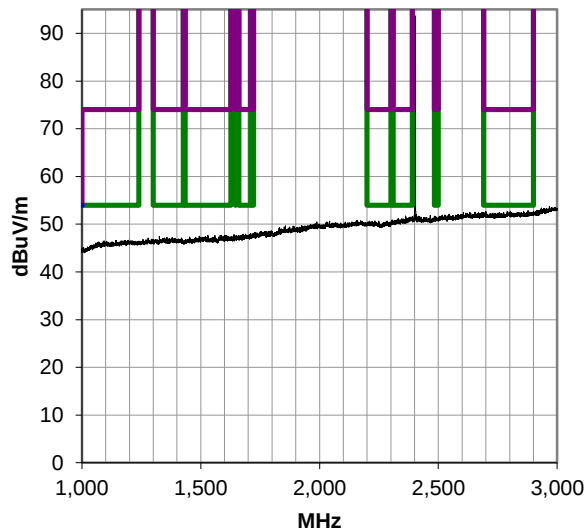
Tested By

SPURIOUS RADIATED EMISSIONS (CRX-1)

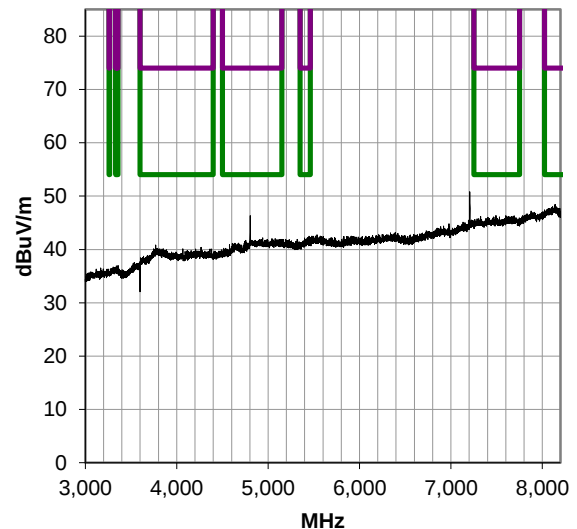
PRESCAN DATA

Radiated spurious emissions from the EUT are initially reviewed with Pre-scans (Preview scans). Pre-scans are performed, with the EUT transmitting on the lowest applicable data rate, for both vertical and horizontal polarizations. The Pre-scan plots below are shown with a peak detector and RBW for the following frequency ranges: 9 kHz RBW (< 30 MHz); 120 kHz RBW (30 - 1000 MHz); 1 MHz RBW (> 1 GHz). In the case where unintentional emissions are observed, an ambient or idle pre-scan with the radio off, will be shown for comparison.

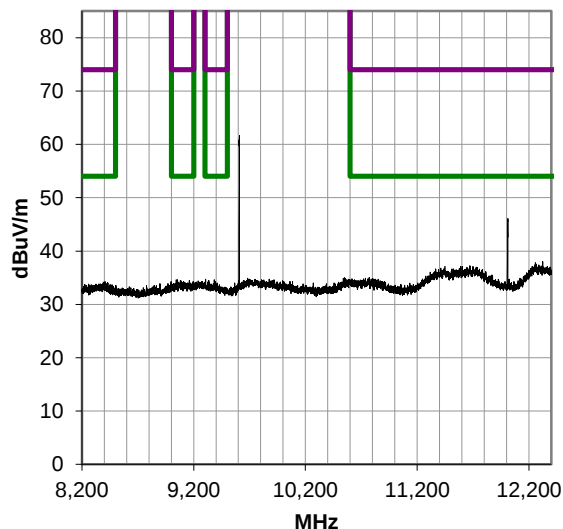
1000-3000 MHz, Run 8



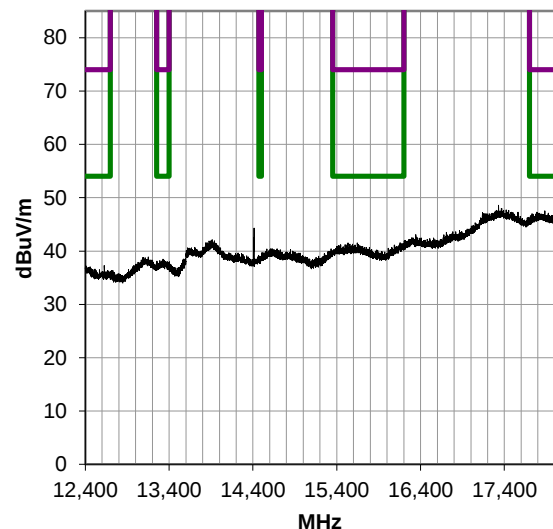
3000-8200 MHz, Run 9



8200-12400 MHz, Run 10

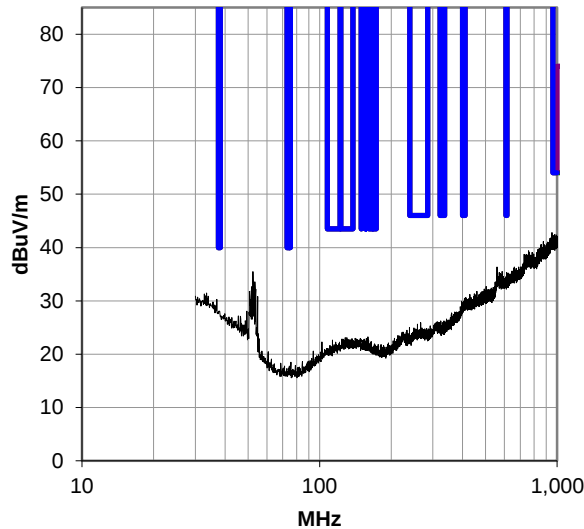


12400-18000 MHz, Run 11

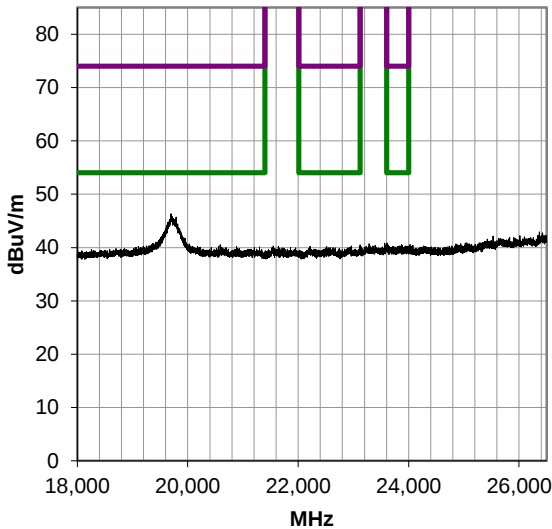


SPURIOUS RADIATED EMISSIONS (CRX-1)

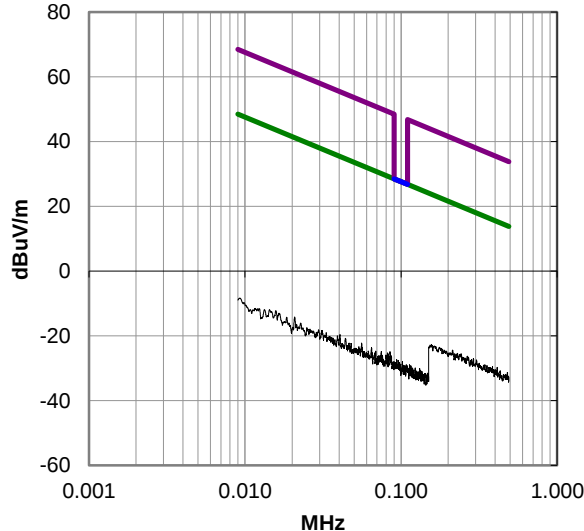
30-1000 MHz, Run 55



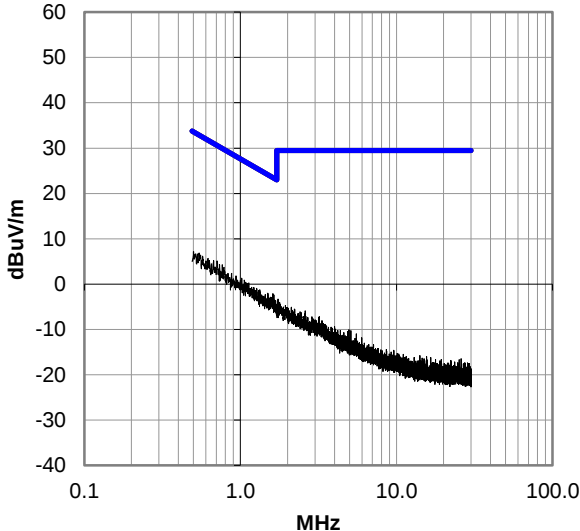
18000-26500 MHz, Run 54



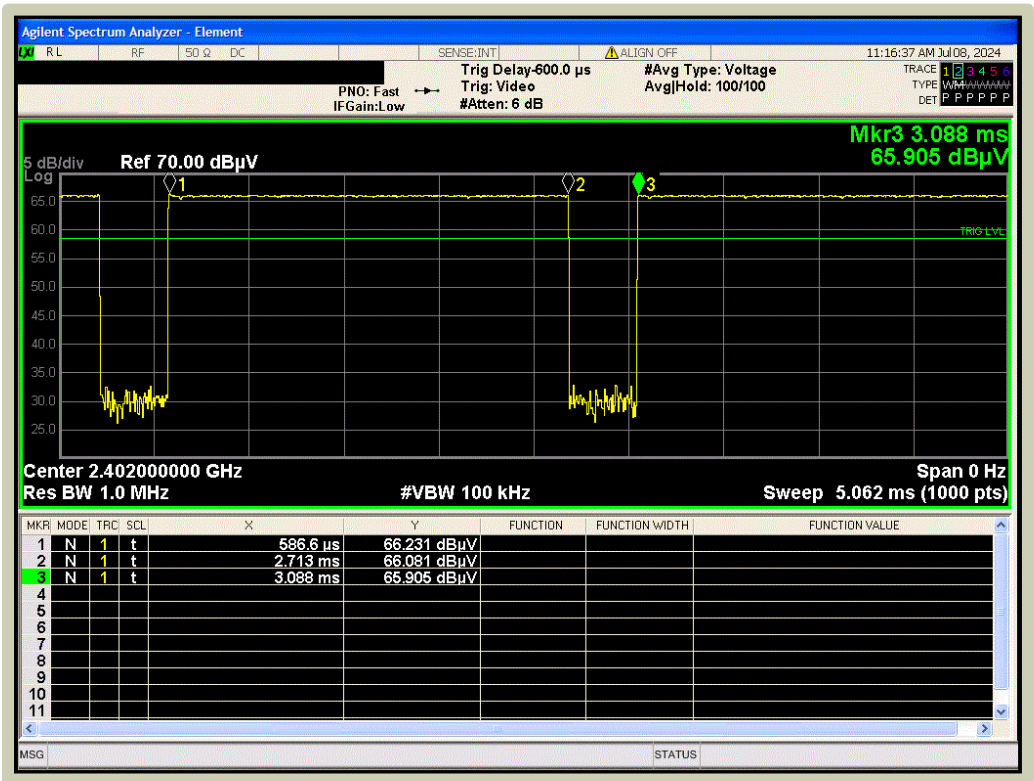
0.009-0.49 MHz, Run 61



0.49-30 MHz, Run 62



SPURIOUS RADIATED EMISSIONS (CRX-1)



Transmission Duty Cycle

SPURIOUS RADIATED EMISSIONS (CRXMOD1 MODULE)

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 if required, 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 as well as the restricted band requirements.

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

Measurements within 2 MHz of the allowable band may have been taken using the integration method from ANSI C63.10 clause 11.13.3. This procedure uses the channel power feature of the spectrum analyzer to integrate the power of the emission within a 1 MHz bandwidth.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of $10 \cdot \log(1/dc)$.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	2023-08-29	2024-08-29
Antenna - Double Ridge	EMCO	3115	AHM	2024-06-24	2026-06-24
Cable	Northwest EMC	3115 Horn Cable	NC2	2024-04-25	2025-04-25
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVZ	2024-04-25	2025-04-25
Filter - High Pass	Micro-Tronics	HPM50111	HHI	2023-10-09	2024-10-09
Attenuator	Fairview Microwave	SA18E-20	AQV	2023-07-31	2024-07-31
Antenna - Standard Gain	EMCO	3160-07	AHP	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOK	2023-08-09	2024-08-09
Cable	High Speed Interconnects	EW292A-NGNG-300	NC3	2023-09-01	2024-09-01
Antenna - Standard Gain	EMCO	3160-08	AHO	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AOJ	2023-08-09	2024-08-09

FREQUENCY RANGE INVESTIGATED

1 GHz TO 18 GHz

POWER INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

SMTE0015-3

MODES INVESTIGATED

Transmitting BLE, 1 Mbps, Low Channel 0 = 2402 MHz, Middle Channel 20 = 2440 MHz, High Channel 39 = 2480 MHz

SPURIOUS RADIATED EMISSIONS (CRXMOD1 MODULE)



EUT:	CRXMOD1	Work Order:	SMTE0015
Serial Number:	Radiated sample	Date:	2024-07-11
Customer:	SMART Technologies (Seattle) Inc	Temperature:	23.6°C
Attendees:	Sean MacKellar	Relative Humidity:	45.1%
Customer Project:	None	Bar. Pressure (PMSL):	1019 mb
Tested By:	Harry Zhao	Job Site:	NC01
Power:	Battery	Configuration:	SMTE0015-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	81	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

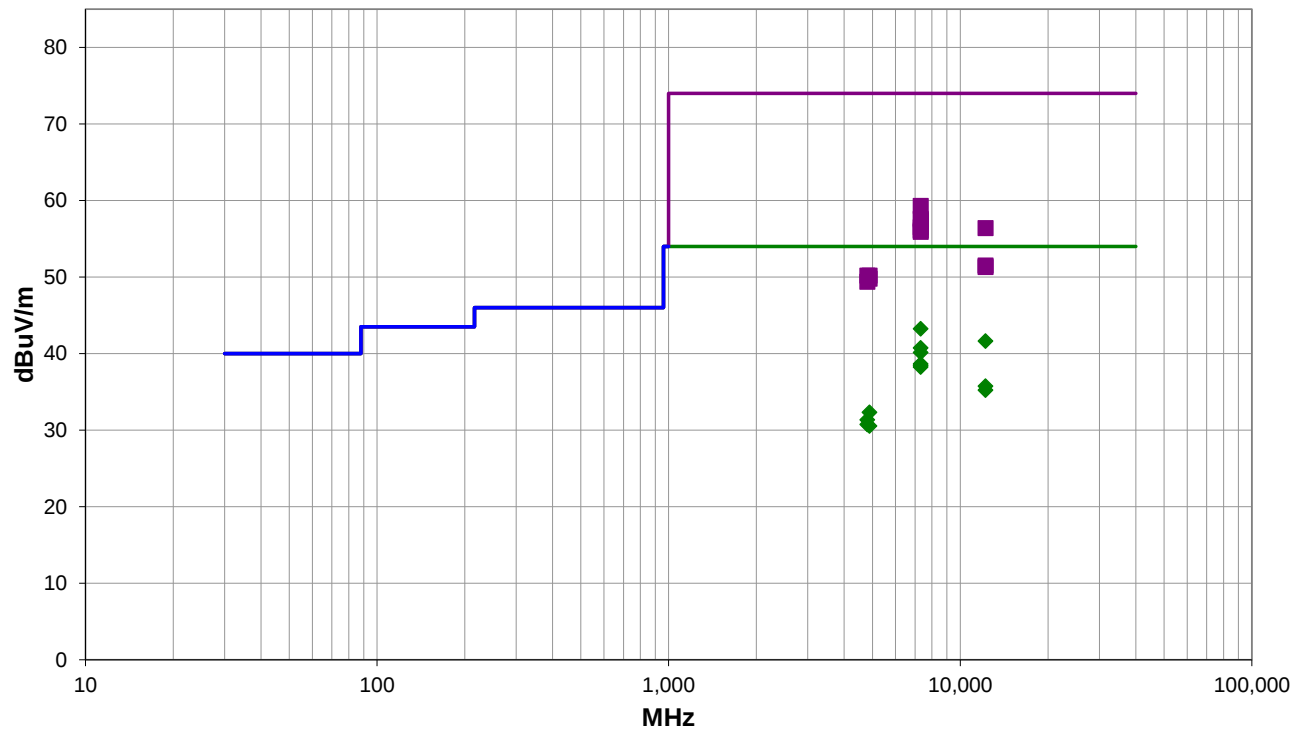
The test mode operates at 54% duty cycle (DC), an upward DC correction factor of $10 \cdot \log(1/DC) = 10 \cdot \log(1/0.54) = 2.676$ dB was applied to the average measurements. When in actual operation, the max operating duty cycle is 9.02%. A downward DC correction factor of $10 \cdot \log(1/0.0902) = -10.448$ dB was applied to the average measurements. Total correction applied = -7.77 dB. CRXMOD1 standalone configuration. See data comments below for channel & EUT orientation.

EUT OPERATING MODES

Transmitting BLE, 1 Mbps, Low Channel 0 = 2402 MHz, Middle Channel 20 = 2440 MHz, High Channel 39 = 2480 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 81

PK AV QP

SPURIOUS RADIATED EMISSIONS (CRXMOD1 MODULE)

RESULTS - Run #81

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7325.467	36.4	14.6	1.5	230.0	-7.8	0.0	Horz	AV	0.0	43.2	54.0	-10.8	Ch. 20, EUT in Z-axis
12209.000	47.0	2.4	3.7	287.0	-7.8	0.0	Horz	AV	0.0	41.6	54.0	-12.4	Ch. 20, EUT in Y-axis
7325.433	33.9	14.6	2.3	228.0	-7.8	0.0	Horz	AV	0.0	40.7	54.0	-13.3	Ch. 20, EUT in Y-axis
7325.442	33.3	14.6	3.1	14.0	-7.8	0.0	Horz	AV	0.0	40.1	54.0	-13.9	Ch. 20, EUT in X-axis
7325.275	44.7	14.6	1.5	230.0	0.0	0.0	Horz	PK	0.0	59.3	74.0	-14.7	Ch. 20, EUT in Z-axis
7325.550	31.8	14.6	1.5	346.0	-7.8	0.0	Vert	AV	0.0	38.6	54.0	-15.4	Ch. 20, EUT in Z-axis
7325.342	31.6	14.6	3.0	119.0	-7.8	0.0	Vert	AV	0.0	38.4	54.0	-15.6	Ch. 20, EUT in X-axis
7325.567	31.4	14.6	1.7	103.0	-7.8	0.0	Vert	AV	0.0	38.2	54.0	-15.8	Ch. 20, EUT in Y-axis
7325.592	43.0	14.6	2.3	228.0	0.0	0.0	Horz	PK	0.0	57.6	74.0	-16.4	Ch. 20, EUT in Y-axis
7326.708	42.8	14.6	3.1	14.0	0.0	0.0	Horz	PK	0.0	57.4	74.0	-16.6	Ch. 20, EUT in X-axis
7325.358	41.9	14.6	3.0	119.0	0.0	0.0	Vert	PK	0.0	56.5	74.0	-17.5	Ch. 20, EUT in X-axis
12209.630	54.0	2.4	3.7	287.0	0.0	0.0	Horz	PK	0.0	56.4	74.0	-17.6	Ch. 20, EUT in Y-axis
7325.175	41.5	14.6	1.5	346.0	0.0	0.0	Vert	PK	0.0	56.1	74.0	-17.9	Ch. 20, EUT in Z-axis
7326.300	41.3	14.6	1.7	103.0	0.0	0.0	Vert	PK	0.0	55.9	74.0	-18.1	Ch. 20, EUT in Y-axis
12209.020	41.1	2.4	4.0	17.0	-7.8	0.0	Vert	AV	0.0	35.7	54.0	-18.3	Ch. 20, EUT in Z-axis
12208.960	40.6	2.4	2.4	150.0	-7.8	0.0	Horz	AV	0.0	35.2	54.0	-18.8	Ch. 20, EUT in Z-axis
4883.892	29.4	10.7	1.5	359.0	-7.8	0.0	Horz	AV	0.0	32.3	54.0	-21.7	Ch. 20, EUT in Z-axis
12209.860	49.1	2.4	4.0	17.0	0.0	0.0	Vert	PK	0.0	51.5	74.0	-22.5	Ch. 20, EUT in Z-axis
4803.860	29.1	10.0	1.5	155.0	-7.8	0.0	Horz	AV	0.0	31.3	54.0	-22.7	Ch. 0, EUT in Z-axis
12211.030	48.9	2.4	2.4	150.0	0.0	0.0	Horz	PK	0.0	51.3	74.0	-22.7	Ch. 20, EUT in Z-axis
4803.943	28.5	10.0	1.5	358.0	-7.8	0.0	Vert	AV	0.0	30.7	54.0	-23.3	Ch. 0, EUT in Z-axis
4884.492	27.6	10.7	4.0	358.0	-7.8	0.0	Vert	AV	0.0	30.5	54.0	-23.5	Ch. 20, EUT in Z-axis
4883.817	39.5	10.7	1.5	359.0	0.0	0.0	Horz	PK	0.0	50.2	74.0	-23.8	Ch. 20, EUT in Z-axis
4804.743	40.1	10.1	1.5	155.0	0.0	0.0	Horz	PK	0.0	50.2	74.0	-23.8	Ch. 0, EUT in Z-axis
4885.183	39.1	10.7	4.0	358.0	0.0	0.0	Vert	PK	0.0	49.8	74.0	-24.2	Ch. 20, EUT in Z-axis
4803.877	39.4	10.0	1.5	358.0	0.0	0.0	Vert	PK	0.0	49.4	74.0	-24.6	Ch. 0, EUT in Z-axis

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS (CRXMOD1 MODULE)



EUT:	CRXMOD1	Work Order:	SMTE0015
Serial Number:	Radiated sample	Date:	2024-07-16
Customer:	SMART Technologies (Seattle) Inc	Temperature:	23.1°C
Attendees:	Sean MacKellar	Relative Humidity:	51.5%
Customer Project:	None	Bar. Pressure (PMSL):	1015 mb
Tested By:	Harry Zhao	Job Site:	NC01
Power:	Battery	Configuration:	SMTE0015-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	84	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

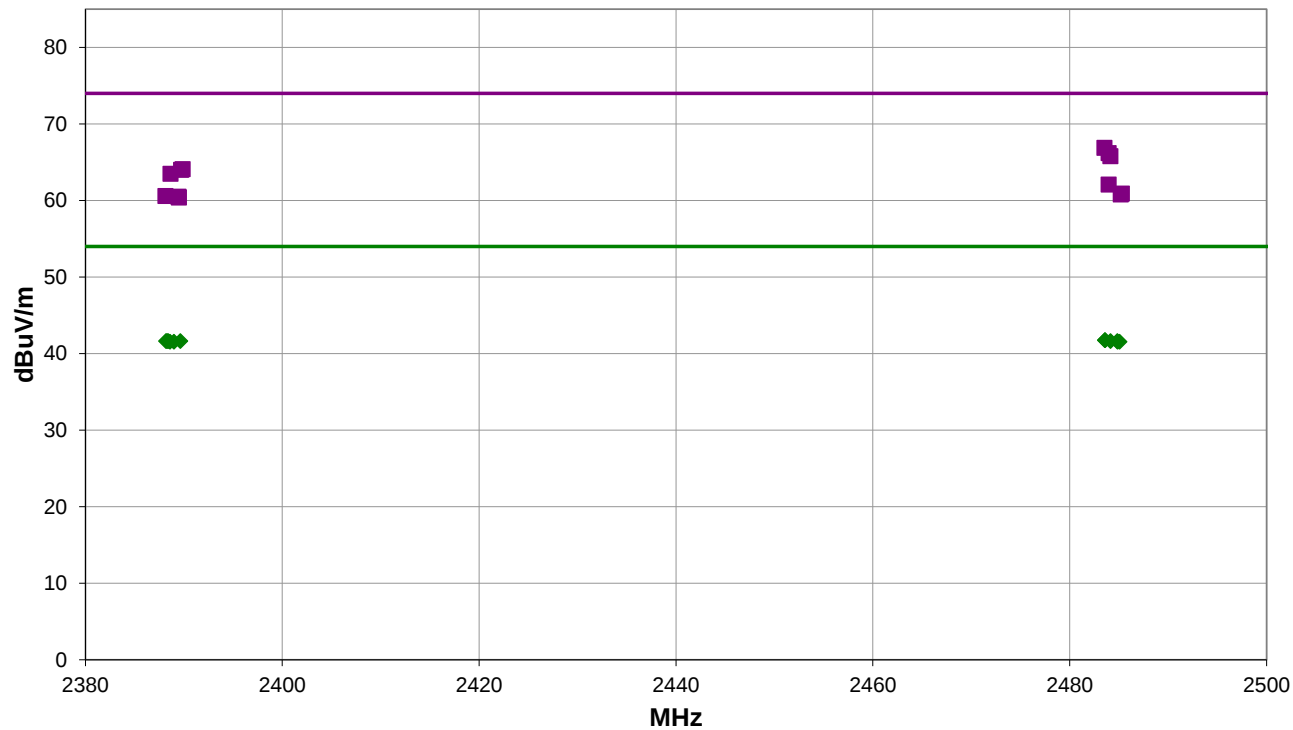
The test mode operates at 54% duty cycle (DC), an upward DC correction factor of $10 \cdot \log(1/DC) = 10 \cdot \log(1/0.54) = 2.676$ dB was applied to the average measurements. When in actual operation, the max operating duty cycle is 9.02%. A downward DC correction factor of $10 \cdot \log(1/0.0902) = -10.448$ dB was applied to the average measurements. Total correction applied = -7.77 dB. CRXMOD1 standalone configuration. See data comments below for channel & EUT orientation.

EUT OPERATING MODES

Transmitting BLE, 1 Mbps, Low Channel 0 = 2402 MHz, Middle Channel 20 = 2440 MHz, High Channel 39 = 2480 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 84

PK AV QP

SPURIOUS RADIATED EMISSIONS (CRXMOD1 MODULE)

RESULTS - Run #84

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity/ Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.523	46.9	0.0	1.0	247.0	0.0	20.0	Horz	PK	0.0	66.9	74.0	-7.1	Ch. 39, EUT in X-axis
2483.967	46.2	0.0	1.0	125.0	0.0	20.0	Vert	PK	0.0	66.2	74.0	-7.8	Ch. 39, EUT in Z-axis
2484.140	45.8	0.0	3.9	82.0	0.0	20.0	Horz	PK	0.0	65.8	74.0	-8.2	Ch. 39, EUT in Y-axis
2389.863	44.0	0.1	1.5	107.0	0.0	20.0	Vert	PK	0.0	64.1	74.0	-9.9	Ch. 0, EUT in Z-axis
2389.710	43.9	0.1	1.5	249.0	0.0	20.0	Horz	PK	0.0	64.0	74.0	-10.0	Ch. 0, EUT in Y-axis
2388.637	43.4	0.1	1.5	230.0	0.0	20.0	Horz	PK	0.0	63.5	74.0	-10.5	Ch. 0, EUT in X-axis
2483.963	42.1	0.0	1.5	317.0	0.0	20.0	Horz	PK	0.0	62.1	74.0	-11.9	Ch. 39, EUT in Z-axis
2483.597	29.5	0.0	1.0	247.0	-7.8	20.0	Horz	AV	0.0	41.7	54.0	-12.3	Ch. 39, EUT in X-axis
2483.590	29.5	0.0	3.9	82.0	-7.8	20.0	Horz	AV	0.0	41.7	54.0	-12.3	Ch. 39, EUT in Y-axis
2484.857	29.4	0.0	1.5	317.0	-7.8	20.0	Horz	AV	0.0	41.6	54.0	-12.4	Ch. 39, EUT in Z-axis
2484.160	29.4	0.0	1.0	125.0	-7.8	20.0	Vert	AV	0.0	41.6	54.0	-12.4	Ch. 39, EUT in Z-axis
2388.197	29.3	0.1	1.5	160.0	-7.8	20.0	Horz	AV	0.0	41.6	54.0	-12.4	Ch. 0, EUT in Z-axis
2389.643	29.3	0.1	1.5	107.0	-7.8	20.0	Vert	AV	0.0	41.6	54.0	-12.4	Ch. 0, EUT in Z-axis
2388.410	29.3	0.1	1.5	249.0	-7.8	20.0	Horz	AV	0.0	41.6	54.0	-12.4	Ch. 0, EUT in Y-axis
2388.300	29.3	0.1	1.5	230.0	-7.8	20.0	Horz	AV	0.0	41.6	54.0	-12.4	Ch. 0, EUT in X-axis
2485.067	29.3	0.0	2.7	336.0	-7.8	20.0	Vert	AV	0.0	41.5	54.0	-12.5	Ch. 39, EUT in X-axis
2484.870	29.3	0.0	1.5	227.0	-7.8	20.0	Vert	AV	0.0	41.5	54.0	-12.5	Ch. 39, EUT in Y-axis
2389.003	29.2	0.1	1.5	183.0	-7.8	20.0	Vert	AV	0.0	41.5	54.0	-12.5	Ch. 0, EUT in Y-axis
2388.597	29.2	0.1	1.5	264.0	-7.8	20.0	Vert	AV	0.0	41.5	54.0	-12.5	Ch. 0, EUT in X-axis
2485.310	40.9	0.0	1.5	227.0	0.0	20.0	Vert	PK	0.0	60.9	74.0	-13.1	Ch. 39, EUT in Y-axis
2485.197	40.8	0.0	2.7	336.0	0.0	20.0	Vert	PK	0.0	60.8	74.0	-13.2	Ch. 39, EUT in X-axis
2388.130	40.5	0.1	1.5	264.0	0.0	20.0	Vert	PK	0.0	60.6	74.0	-13.4	Ch. 0, EUT in X-axis
2389.450	40.4	0.1	1.5	183.0	0.0	20.0	Vert	PK	0.0	60.5	74.0	-13.5	Ch. 0, EUT in Y-axis
2389.490	40.3	0.1	1.5	160.0	0.0	20.0	Horz	PK	0.0	60.4	74.0	-13.6	Ch. 0, EUT in Z-axis

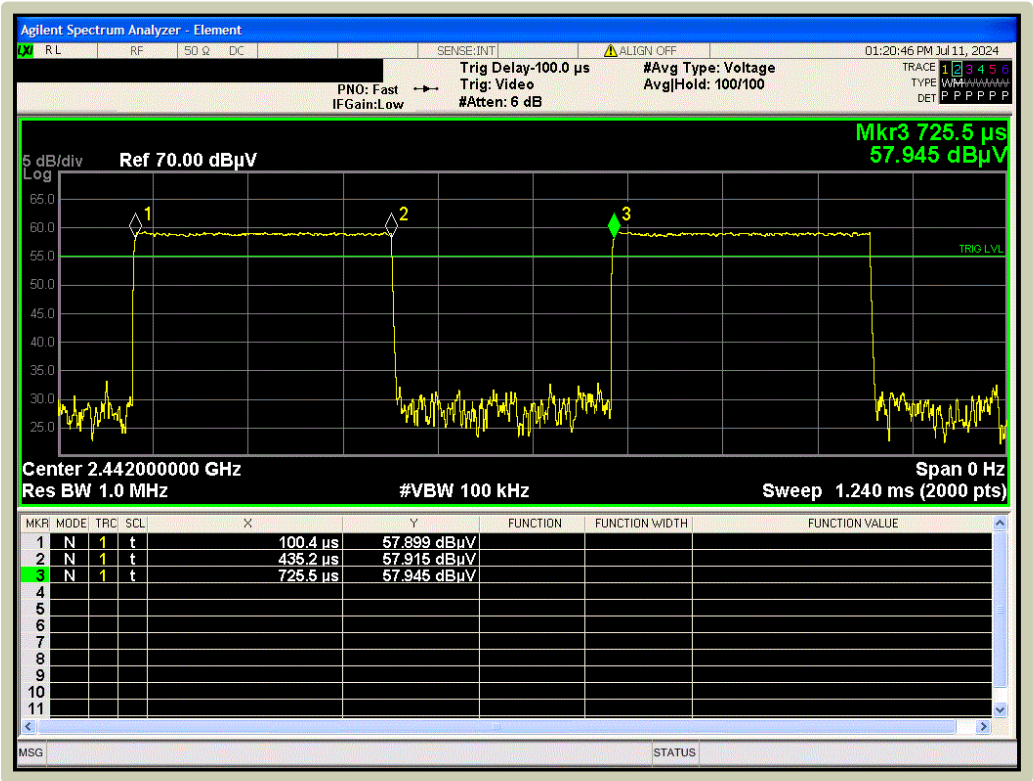
CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS (CRXMOD1 MODULE)



Transmission Duty Cycle

End of Test Report