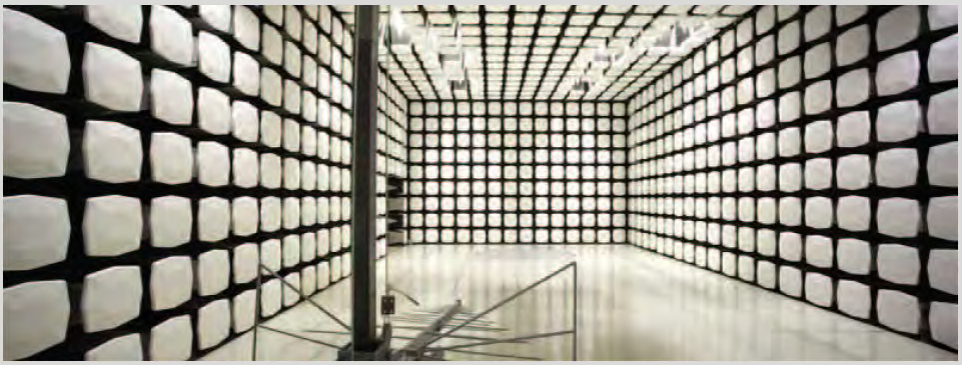
Supra, A Division of UTCFS

WTI SMART

FCC 15.247:2014 (DTS)

Bluetooth Low Energy Radio

Report #: SUPR0115.1



Report Prepared By Northwest EMC Inc.

NORTHWEST EMC – (888) 364-2378 – www.nwemc.com

California – Minnesota – Oregon – New York – Washington

CERTIFICATE OF TEST

Last Date of Test: February 3, 2014
Supra, A Division of UTCFS
Model: WTI SMART

Emissions

Test Description	Specification	Test Method	Pass/Fail
Duty Cycle	FCC 15.247:2014	ANSI C63.10:2009	Pass
Output Power	FCC 15.247:2014	ANSI C63.10:2009	Pass
Occupied Bandwidth	FCC 15.247:2014	ANSI C63.10:2009	Pass
Power Spectral Density	FCC 15.247:2014	ANSI C63.10:2009	Pass
Spurious Conducted Emissions	FCC 15.247:2014	ANSI C63.10:2009	Pass
Band Edge Compliance	FCC 15.247:2014	ANSI C63.10:2009	Pass
Spurious Radiated Emissions	FCC 15.247:2014	ANSI C63.10:2009	Pass

Deviations From Test Standards

None

Approved By:

Kyle Holgate, Operations Manager

NVLAP Lab Code: 200630-0

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

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. This Report may only be duplicated in its entirety. 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.

REVISION HISTORY

REV 2012.08.02

Revision Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

NORTHWEST EMC

REV 2012.05.24

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 Guide 65 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

European Union

European Commission – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

Australia/New Zealand

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

Korea

KCC / 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.

Hong Kong

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

Vietnam

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

Russia

GOST – Accredited by Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC to perform EMC and Hygienic testing for Information Technology products to GOST standards.

SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/

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 WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is on each data sheet. 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 16-4-1 as applicable), and are available upon request.

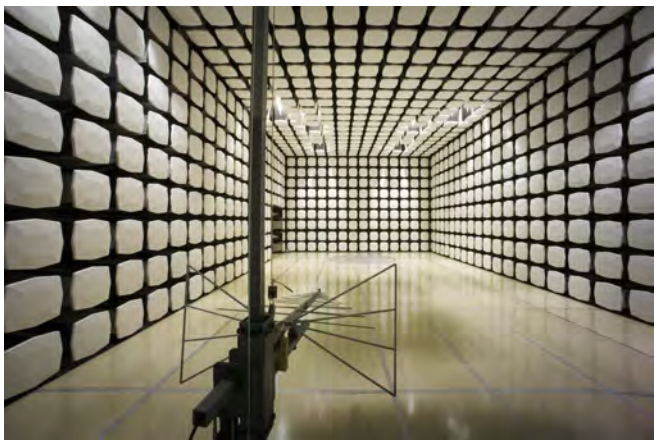
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

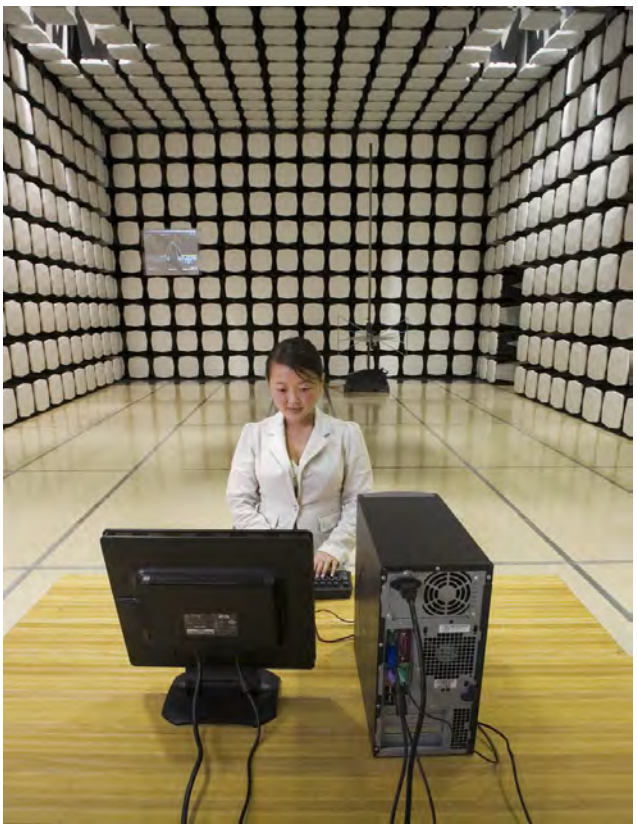
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.12	-0.01
Amplitude Accuracy (dB)	0.49	-0.49
Conducted Power (dB)	0.41	-0.41
Radiated Power via Substitution (dB)	0.69	-0.68
Temperature (degrees C)	0.81	-0.81
Humidity (% RH)	2.89	-2.89
Field Strength (dB)	4.00	-4.00
AC Powerline Conducted Emissions (dB)	2.70	-2.70

FACILITIES

REV 2013.06.28

Oregon	California	New York	Minnesota	Washington
Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 685-0796	Labs MN01-08 9349 W Broadway Ave. Brooklyn Park, MN 55445 (763) 425-2281	Labs NC01-05,SU02,SU07 19201 120th Ave. NE Bothell, WA 98011 (425) 984-6600
VCCI				
A-0108	A-0029		A-0109	A-0110
Industry Canada				
2834D-1, 2834D-*2*	2834B-1, 2834B-2, 2834B-3		2834E-1	2834C-1
NVLAP				
NVLAP Lab Code: 200630-0	NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200629-0





PRODUCT DESCRIPTION

WTD 12.5.23

Client and Equipment Under Test (EUT) Information

Company Name:	Supra, A Division of UTCFS
Address:	4001 Fairview Industrial Drive SE
City, State, Zip:	Salem, OR 97302-0167
Test Requested By:	Dean Sinn
Model:	WTI SMART
First Date of Test:	January 14, 2014
Last Date of Test:	February 3, 2014
Receipt Date of Samples:	January 13, 2014
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):
Wireless interface assembly utilizing a Bluetooth 4.0 radio interface for use on a mechanical lockset for commercial door applications.

Testing Objective:
To demonstrate compliance to FCC 15.247 DTS requirements for the Bluetooth Low Energy portion of the radio.

CONFIGURATIONS

Configuration SUPR0115- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Wireless TRACcess Interface	Supra, A Division of UTCFS	WTI SMART	0074

Configuration SUPR0115- 3

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Wireless TRACcess Interface	Supra, A Division of UTCFS	WTI SMART	0075

Configuration SUPR0115- 4

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Wireless TRACcess Interface	Supra, A Division of UTCFS	WTI SMART	0075

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Programming Station	Supra	None	None
AC/DC Power Adapter	LEI	410905OO3CT	None
Laptop	Dell	Latitude E6410	7V0DTM1
Mouse	Lenovo	M-U0025-O	HS421HD16E1
AC/DC Power Adapter	Dell	AA22850	CN-0T2357-16291-44L-046F

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable	PA	1.5m	PA	AC mains	Programming Station
Serial to USB	Yes	1m	No	Laptop	Programming Station
Mouse USB cable	PA	1.6m	PA	Laptop	Mouse
AC Power Cable	No	1m	No	AC mains	AC/DC Adapter
DC Power Cable	PA	1.7m	Yes	AC/DC Adapter	Laptop
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATIONS

Configuration SUPR0115- 5

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Wireless TRACcess Interface	Supra, A Division of UTCFS	WTI SMART	0075
Door Test Fixture	Supra, A Division of UTCFS	None	None

Configuration SUPR0115- 6

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Wireless TRACcess Interface	Supra, A Division of UTCFS	WTI SMART	0009
Door Test Fixture	Supra, A Division of UTCFS	None	None

MODIFICATIONS

WTD 12.5.23

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	1/14/2014	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	1/14/2014	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	1/14/2014	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	1/14/2014	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	1/14/2014	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	2/3/2014	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

DUTY CYCLE

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 DESCRIPTION

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.

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. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used

The test software provided for operation in a fixed, single channel mode allows the EUT to operate continuously at 100% Duty Cycle.

OUTPUT POWER

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.	Interval
Attenuator, 6dB	S.M. Electronics	18N-06	AWN	3/25/2013	12
MXG Analog Signal Generator	Agilent	N5181A	TIG	NCR	0
Power Meter	Gigatronics	8651A	SPM	11/26/2013	24
Power Sensor	Gigatronics	80701A	SPL	7/8/2011	36
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/30/2013	12
40GHz DC Block	Miteq	DCB4000	AMD	5/16/2013	12
Spectrum Analyzer	Agilent	E4440A	AFD	7/5/2012	24

TEST DESCRIPTION

The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

Method Option 1 found in KDB 558074 DTS D01 Measurement Section 8.1.1 was used because the RBW on the analyzer was greater than the Emission Bandwidth of the radio.

De Facto EIRP Limit: Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36 dBm.

OUTPUT POWER

EUT:	WTI SMART			**Work Order:**	SUPR0115
Serial Number:	0003			**Date:**	01/14/14
Customer:	Supra, A Division of UTCFS			**Temperature:**	22.2°C
Attendees:	None			**Humidity:**	36%
Project:	None			**Barometric Pres.:**	1018
Tested by:	Brandon Hobbs	**Power:**	Battery	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2014	ANSI C63.10:2009

COMMENTS

The EUT was operating at 100% duty cycle.

DEVIATIONS FROM TEST STANDARD

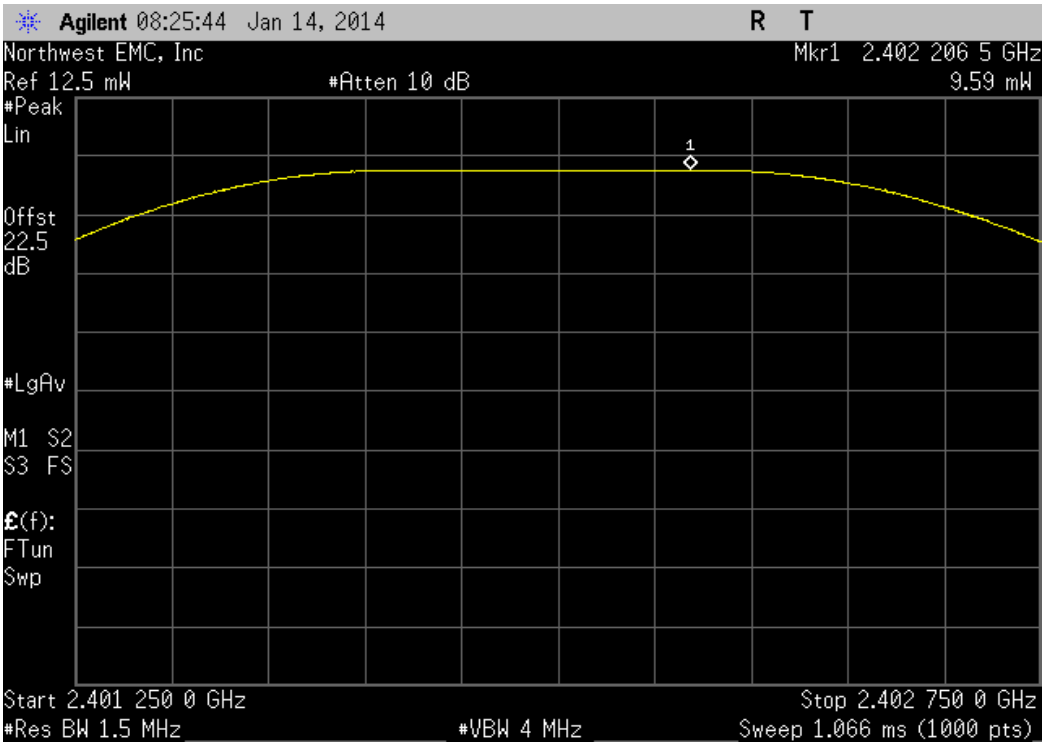
Configuration #	2	Signature

		Value	Limit	Result
BLE - Advertising				
	Low Channel, 2402 MHz	9.592 mW	< 1 W	Pass
	Mid Channel, 2426 MHz	9.552 mW	< 1 W	Pass
	High Channel, 2480 MHz	9.956 mW	< 1 W	Pass
BLE - Data				
	Low Channel, 2404 MHz	9.526 mW	< 1 W	Pass
	Mid Channel, 2442 MHz	9.627 mW	< 1 W	Pass
	High Channel, 2478 MHz	9.92 mW	< 1 W	Pass

OUTPUT POWER

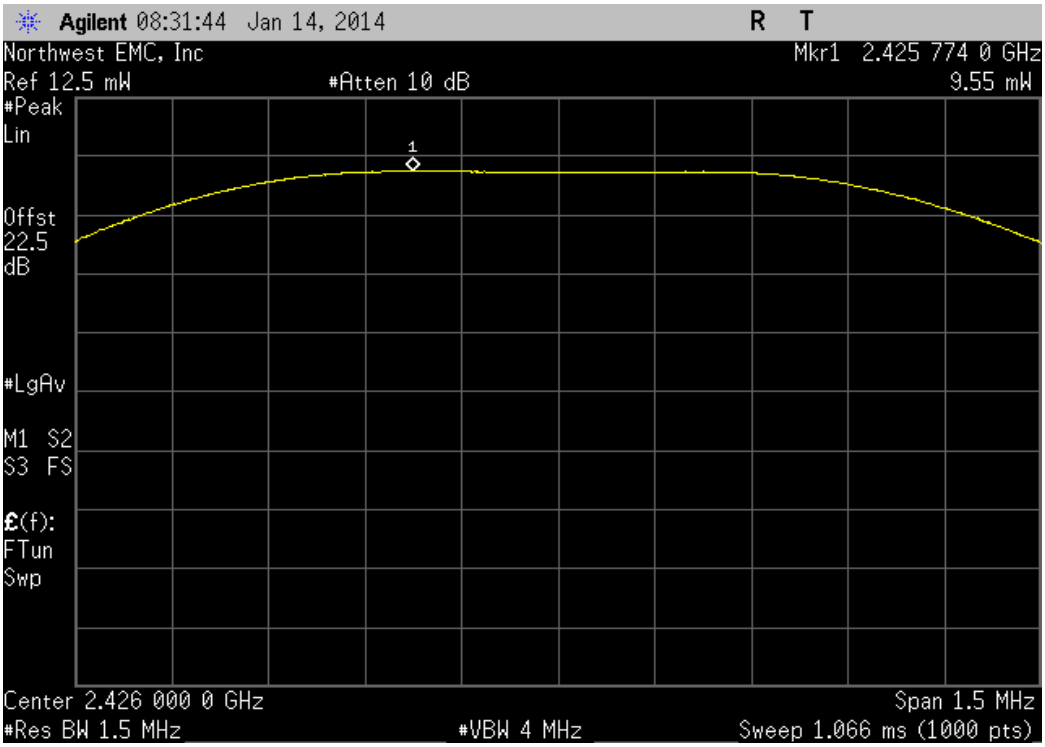
BLE - Advertising, Low Channel, 2402 MHz

				Value	Limit	Result
				9.592 mW	< 1 W	Pass



BLE - Advertising, Mid Channel, 2426 MHz

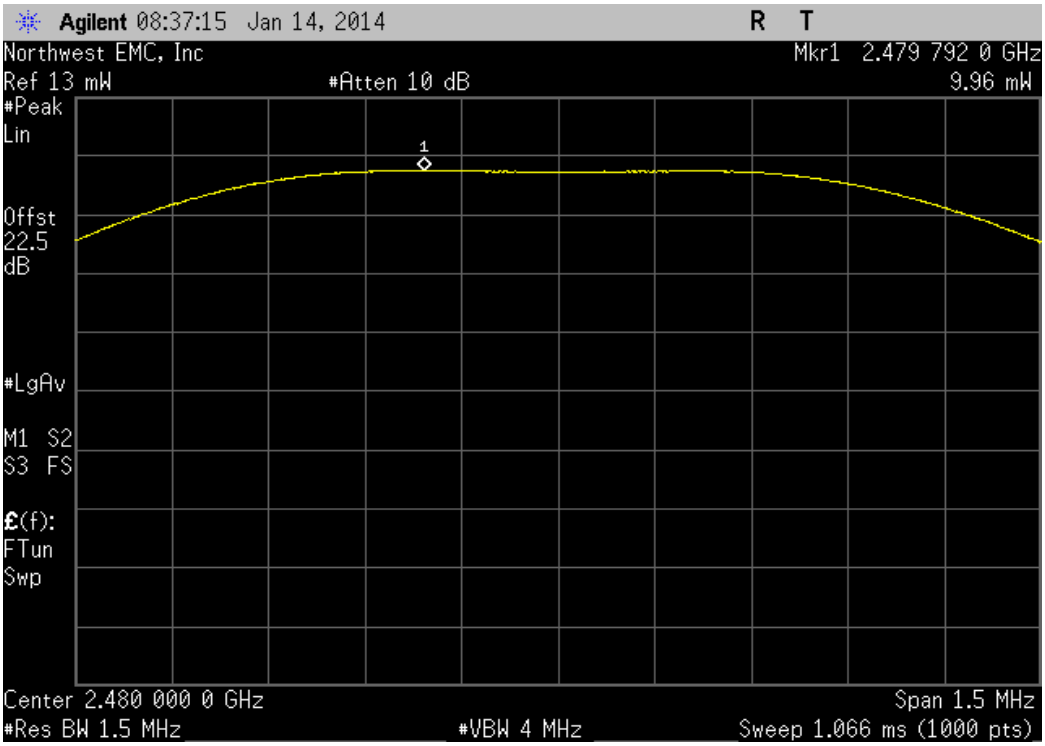
				Value	Limit	Result
				9.552 mW	< 1 W	Pass



OUTPUT POWER

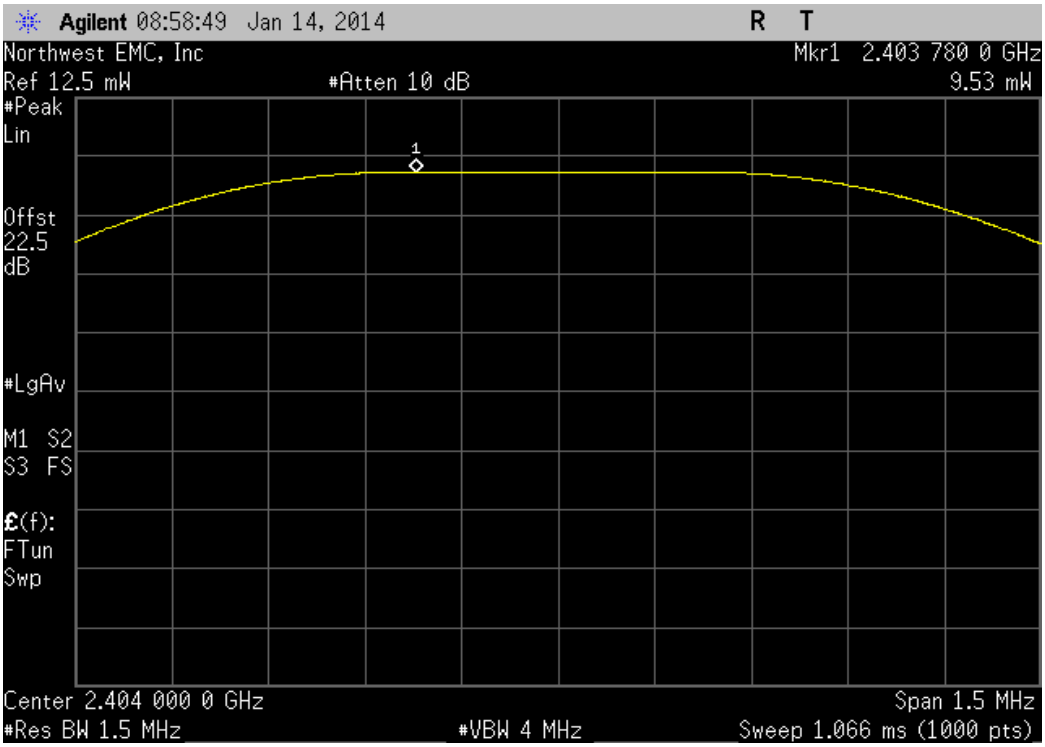
BLE - Advertising, High Channel, 2480 MHz

Value	Limit	Result
9.956 mW	< 1 W	Pass



BLE - Data, Low Channel, 2404 MHz

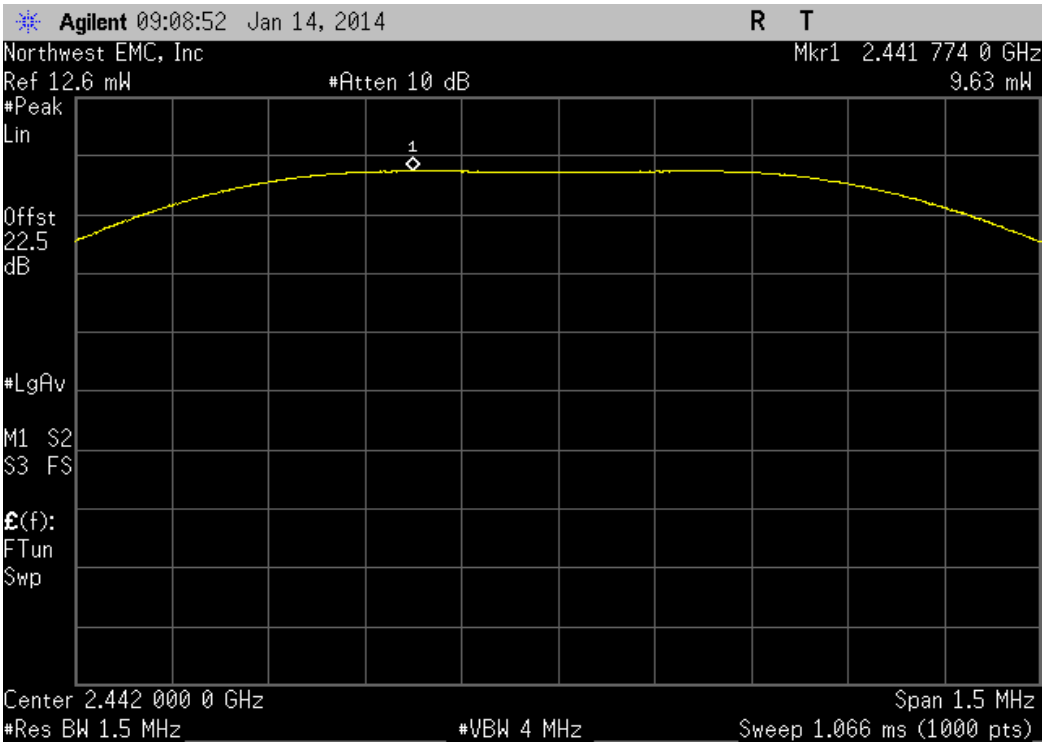
Value	Limit	Result
9.526 mW	< 1 W	Pass



OUTPUT POWER

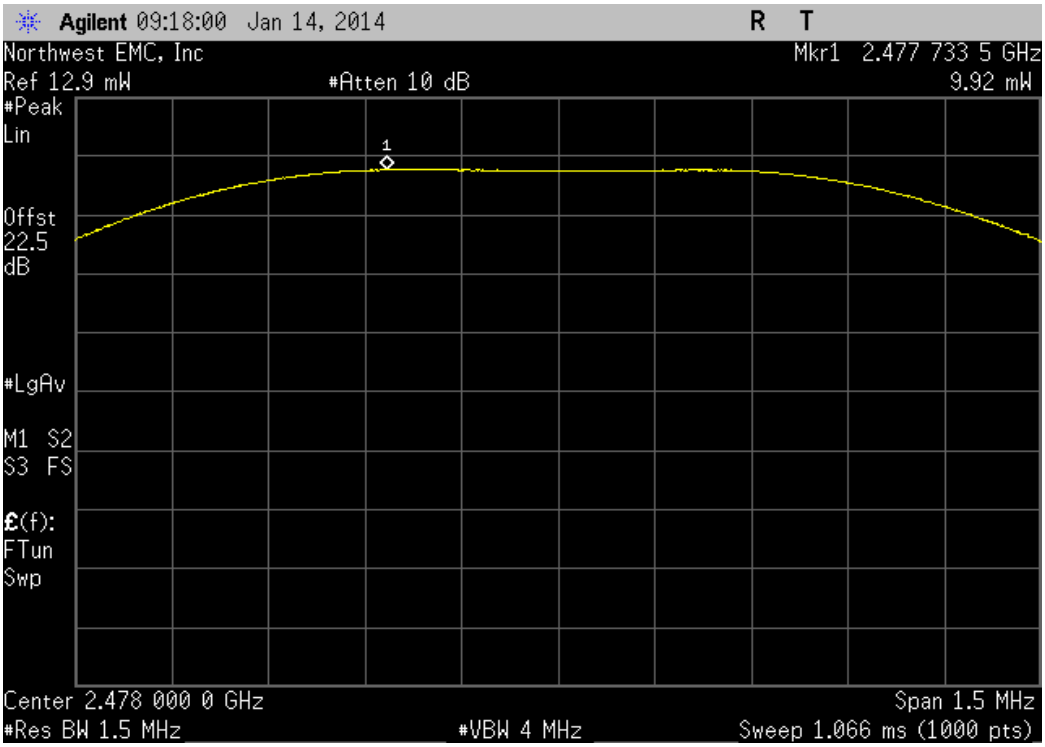
BLE - Data, Mid Channel, 2442 MHz

				Value	Limit	Result
				9.627 mW	< 1 W	Pass



BLE - Data, High Channel, 2478 MHz

				Value	Limit	Result
				9.92 mW	< 1 W	Pass



OCCUPIED BANDWIDTH

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.	Interval
Attenuator, 6dB	S.M. Electronics	18N-06	AWN	3/25/2013	12
MXG Analog Signal Generator	Agilent	N5181A	TIG	NCR	0
Power Meter	Gigatronics	8651A	SPM	11/26/2013	24
Power Sensor	Gigatronics	80701A	SPL	7/8/2011	36
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/30/2013	12
40GHz DC Block	Miteq	DCB4000	AMD	5/16/2013	12
Spectrum Analyzer	Agilent	E4440A	AFD	7/5/2012	24

TEST DESCRIPTION

The 6dB occupied bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The 99.9% (approximate 26 dB) emission bandwidth (EBW) was also measured at the same time.

The EUT was set to low, medium and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet.

OCCUPIED BANDWIDTH

EUT:	WTI SMART			**Work Order:**	SUPR0115
Serial Number:	0003			**Date:**	01/14/14
Customer:	Supra, A Division of UTCFS			**Temperature:**	22.2°C
Attendees:	None			**Humidity:**	36%
Project:	None			**Barometric Pres.:**	1018
Tested by:	Brandon Hobbs	**Power:**	Battery	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2014	ANSI C63.10:2009

COMMENTS

The EUT was operating at 100% duty cycle.

DEVIATIONS FROM TEST STANDARD

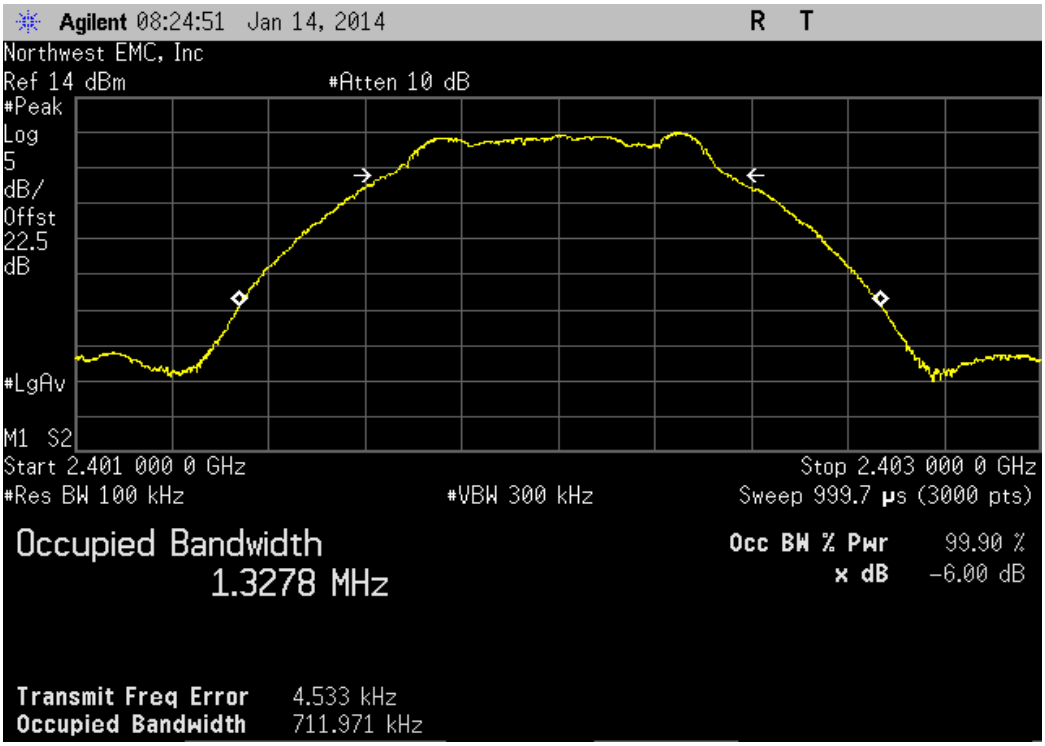
Configuration #	2	Signature

		Value	Limit	Result
BLE - Advertising				
	Low Channel, 2402 MHz	711.971 kHz	≥ 500 kHz	Pass
	Mid Channel, 2426 MHz	712.432 kHz	≥ 500 kHz	Pass
	High Channel, 2480 MHz	702.475 kHz	≥ 500 kHz	Pass
BLE - Data				
	Low Channel, 2404 MHz	707.951 kHz	≥ 500 kHz	Pass
	Mid Channel, 2442 MHz	703.462 kHz	≥ 500 kHz	Pass
	High Channel, 2478 MHz	712.126 kHz	≥ 500 kHz	Pass

OCCUPIED BANDWIDTH

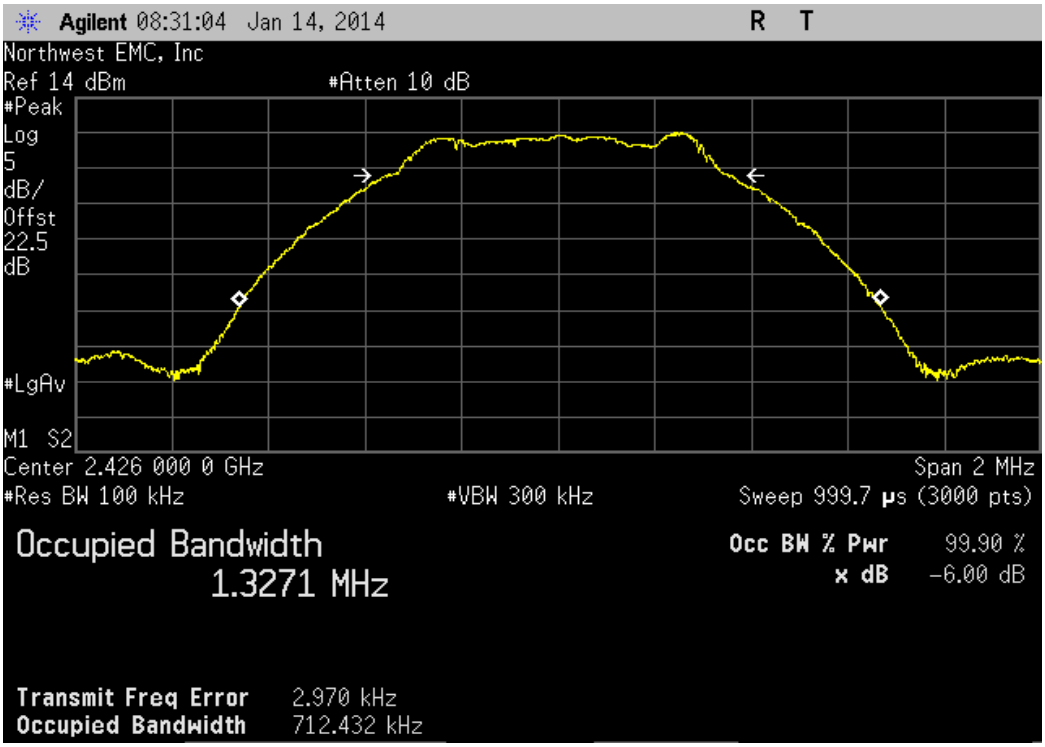
BLE - Advertising, Low Channel, 2402 MHz

				Value	Limit	Result
				711.971 kHz	≥ 500 kHz	Pass



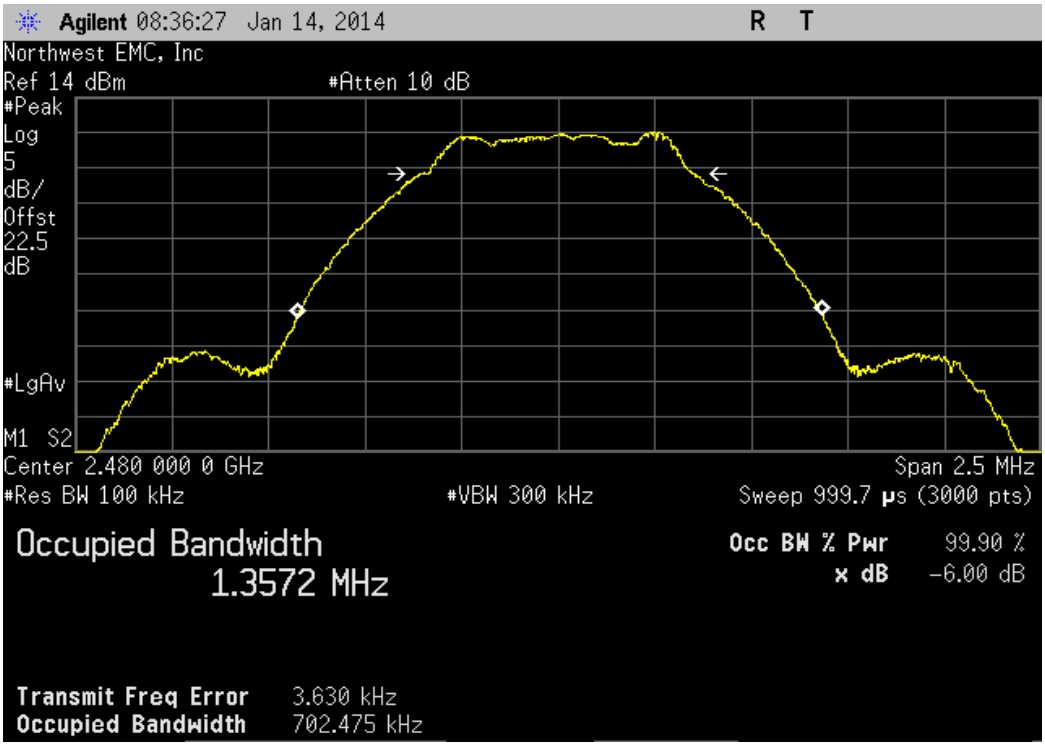
BLE - Advertising, Mid Channel, 2426 MHz

				Value	Limit	Result
				712.432 kHz	≥ 500 kHz	Pass



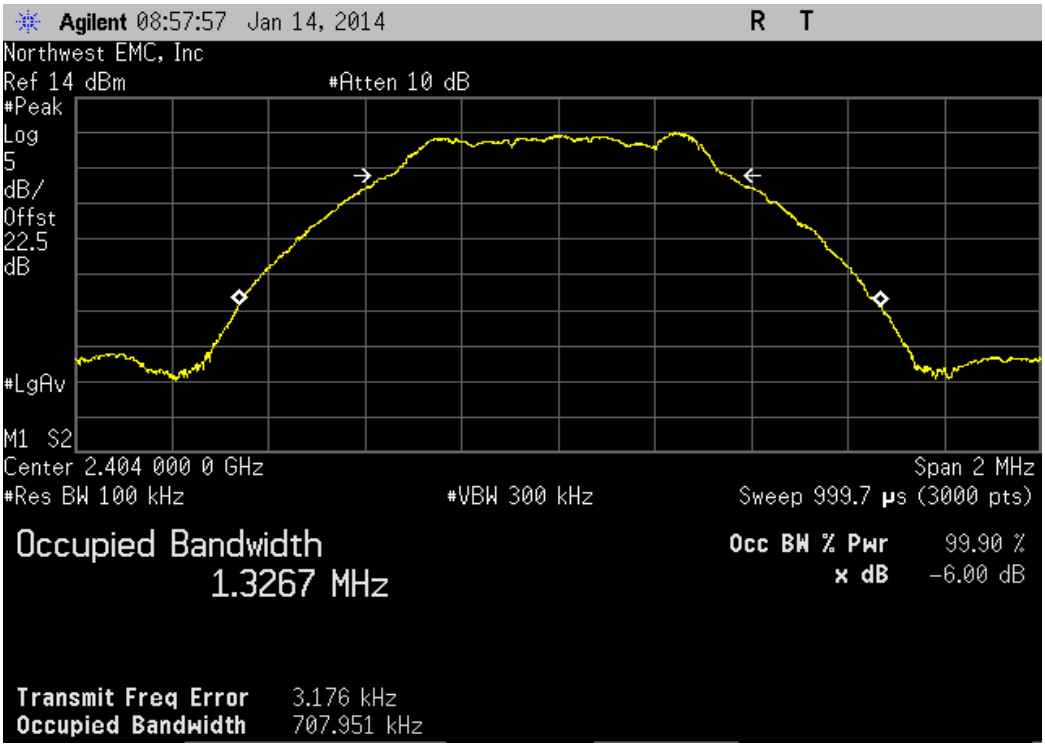
BLE - Advertising, High Channel, 2480 MHz

				Value	Limit	Result
				702.475 kHz	≥ 500 kHz	Pass



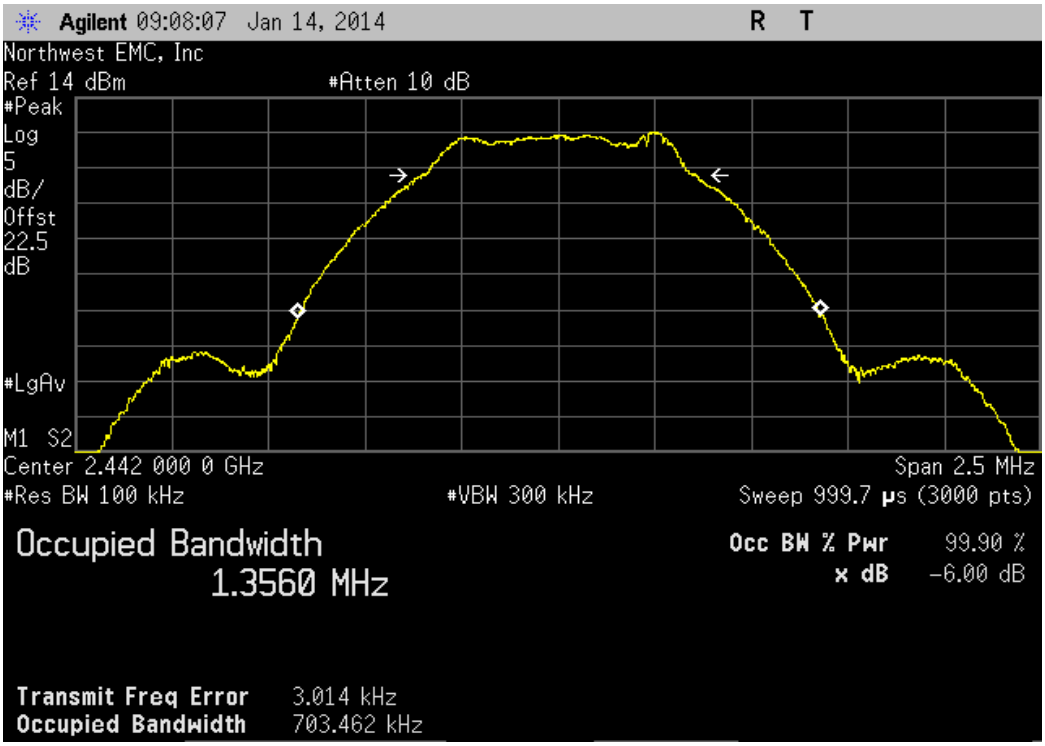
BLE - Data, Low Channel, 2404 MHz

				Value	Limit	Result
				707.951 kHz	≥ 500 kHz	Pass



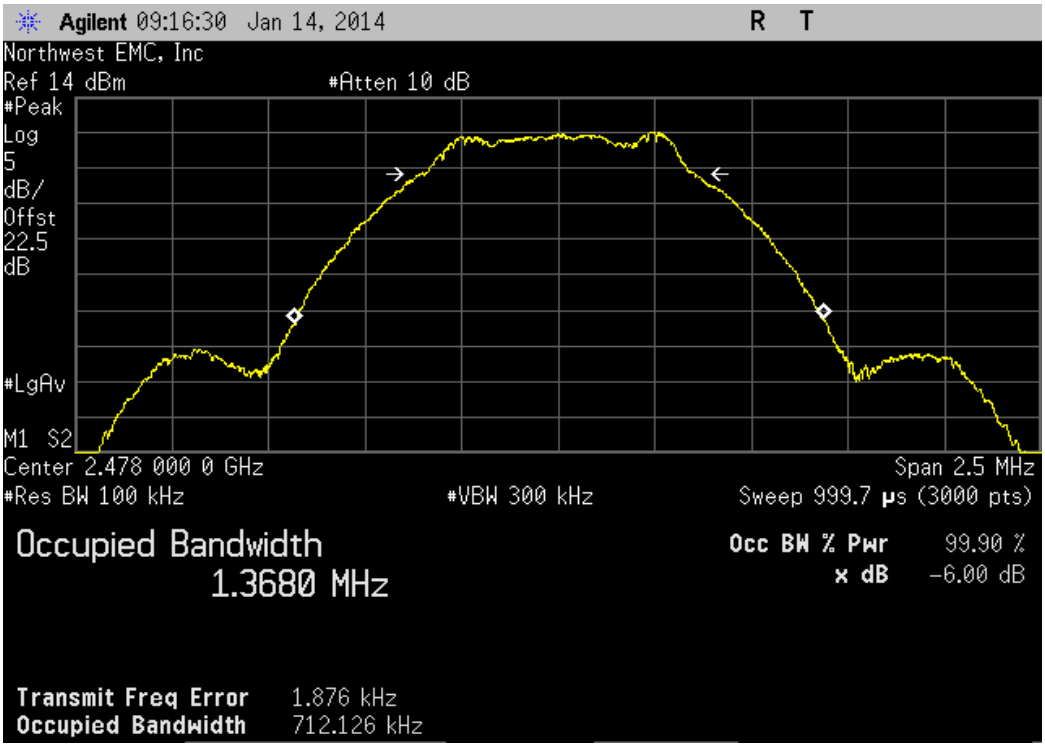
BLE - Data, Mid Channel, 2442 MHz

				Value	Limit	Result
				703.462 kHz	≥ 500 kHz	Pass



BLE - Data, High Channel, 2478 MHz

				Value	Limit	Result
				712.126 kHz	≥ 500 kHz	Pass



POWER SPECTRAL DENSITY

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.	Interval
Attenuator, 6dB	S.M. Electronics	18N-06	AWN	3/25/2013	12
MXG Vector Signal Generator	Agilent	N5182A	TIF	NCR	0
Power Meter	Gigatronics	8651A	SPM	11/26/2013	24
Power Sensor	Gigatronics	80701A	SPL	7/8/2011	36
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/30/2013	12
40GHz DC Block	Miteq	DCB4000	AMD	5/16/2013	12
Spectrum Analyzer	Agilent	E4440A	AFD	7/5/2012	24

TEST DESCRIPTION

The maximum power spectral density measurements were measured with the EUT set to the required transmit frequencies in each band. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the lowest, middle, and maximum data rate for each modulation type available.

Per the procedure outlined in FCC KDB 558074 D01 DTS Measurement Section 5.3.1, the spectrum analyzer was used as follows:

- RBW = 100 kHz
- VBW = 300 kHz
- Detector = Peak (to match method used for power measurement)
- Trace = Max hold

The observed power level is then scaled to an equivalent value in 3 kHz by adding a Bandwidth Correction Factor (BWCF) where:

BWCF = 10*LOG (3 kHz / 100 kHz) = -15.2 dB

POWER SPECTRAL DENSITY

EUT:	WTI SMART			**Work Order:**	SUPR0115
Serial Number:	0003			**Date:**	01/14/14
Customer:	Supra, A Division of UTCFS			**Temperature:**	22.2°C
Attendees:	None			**Humidity:**	36%
Project:	None			**Barometric Pres.:**	1018
Tested by:	Brandon Hobbs	**Power:**	Battery	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2014	ANSI C63.10:2009

COMMENTS

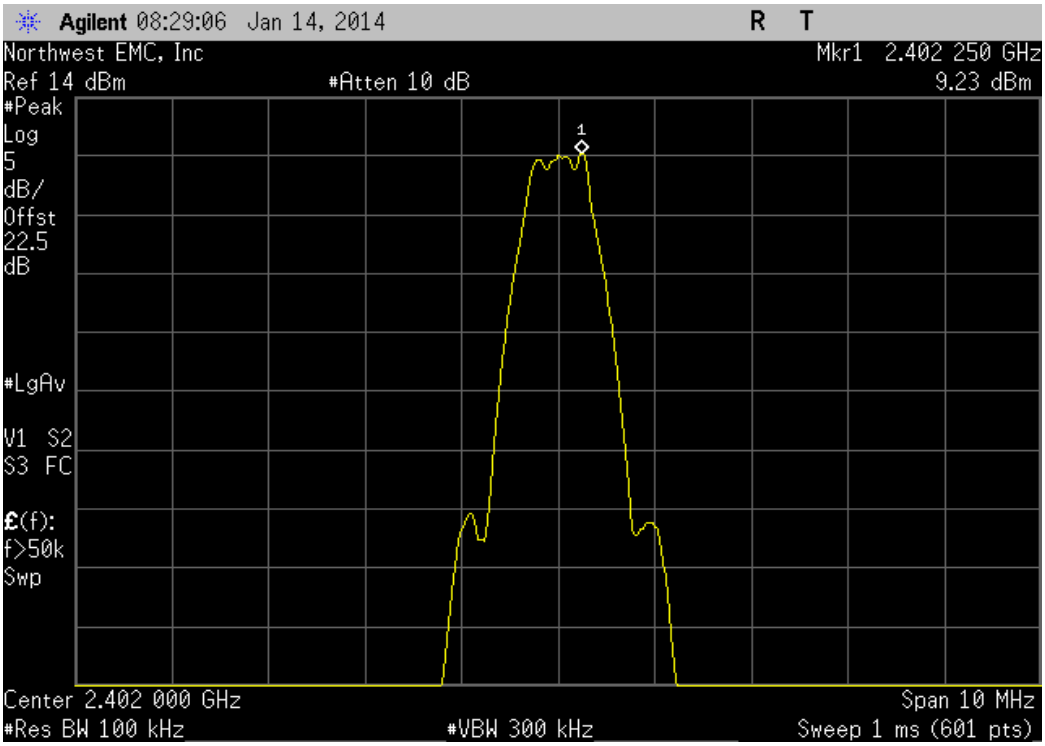
The EUT was operating at 100% duty cycle.

DEVIATIONS FROM TEST STANDARD

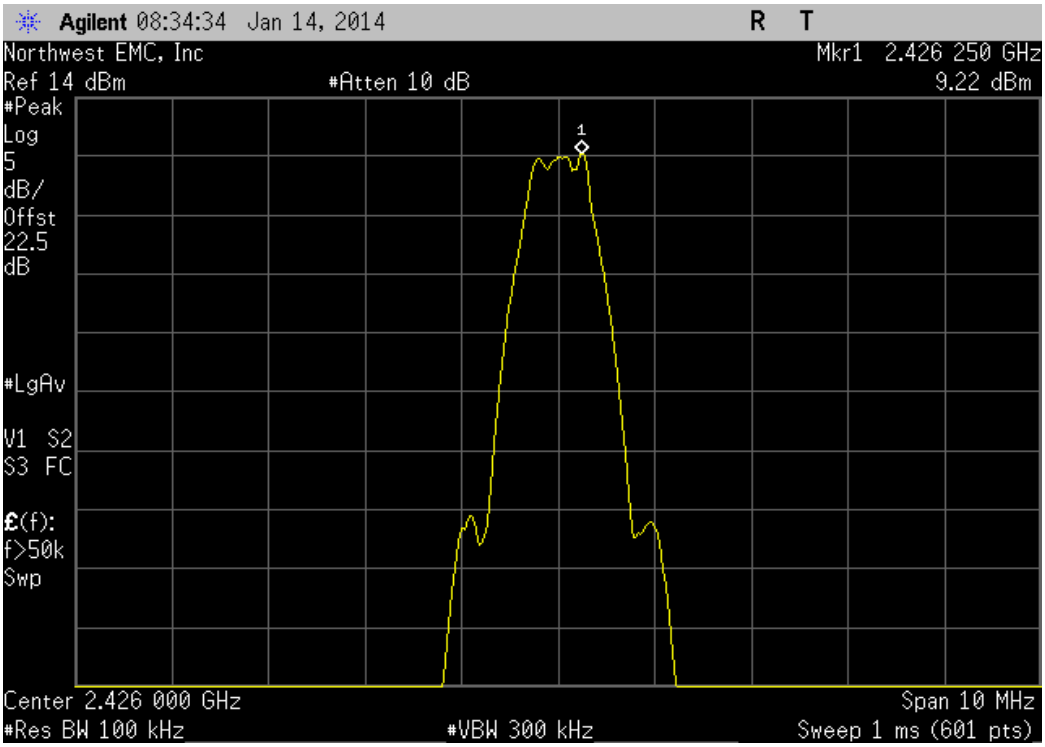
Configuration #	2	Signature

	Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Result
BLE - Advertising					
Low Channel, 2402 MHz	9.225	-15.2	-5.975	8	Pass
Mid Channel, 2426 MHz	9.216	-15.2	-5.984	8	Pass
High Channel, 2480 MHz	9.352	-15.2	-5.848	8	Pass
BLE - Data					
Low Channel, 2404 MHz	9.209	-15.2	-5.991	8	Pass
Mid Channel, 2442 MHz	9.255	-15.2	-5.945	8	Pass
High Channel, 2478 MHz	9.351	-15.2	-5.849	8	Pass

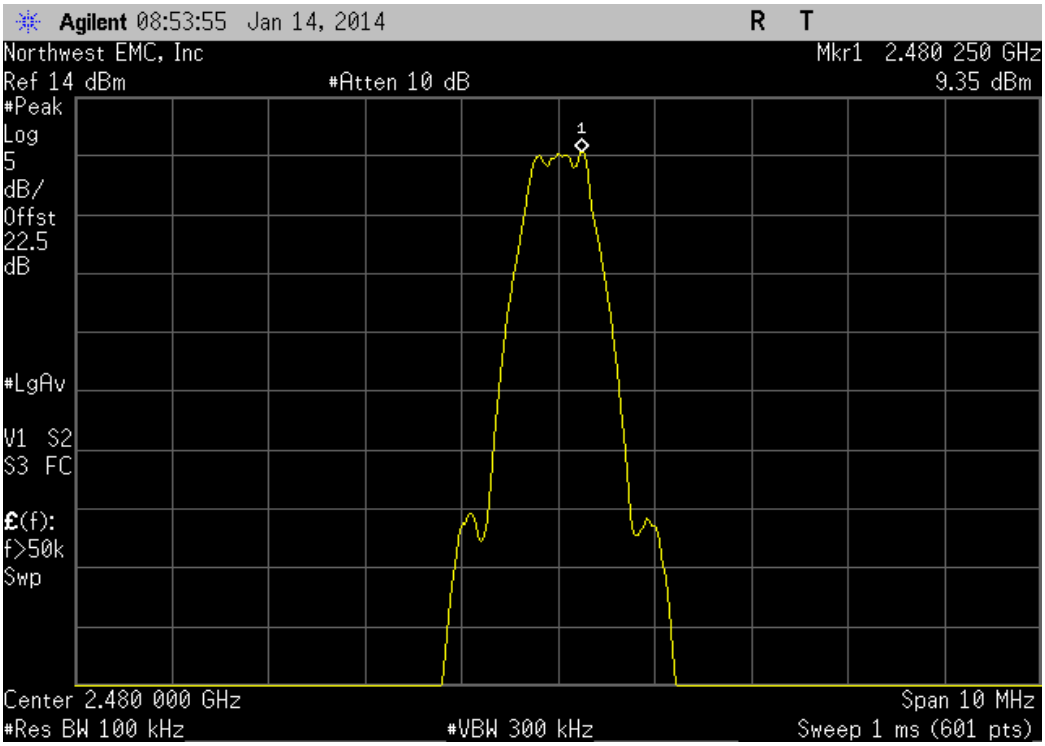
BLE - Advertising, Low Channel, 2402 MHz						
		Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Result
		9.225	-15.2	-5.975	8	Pass



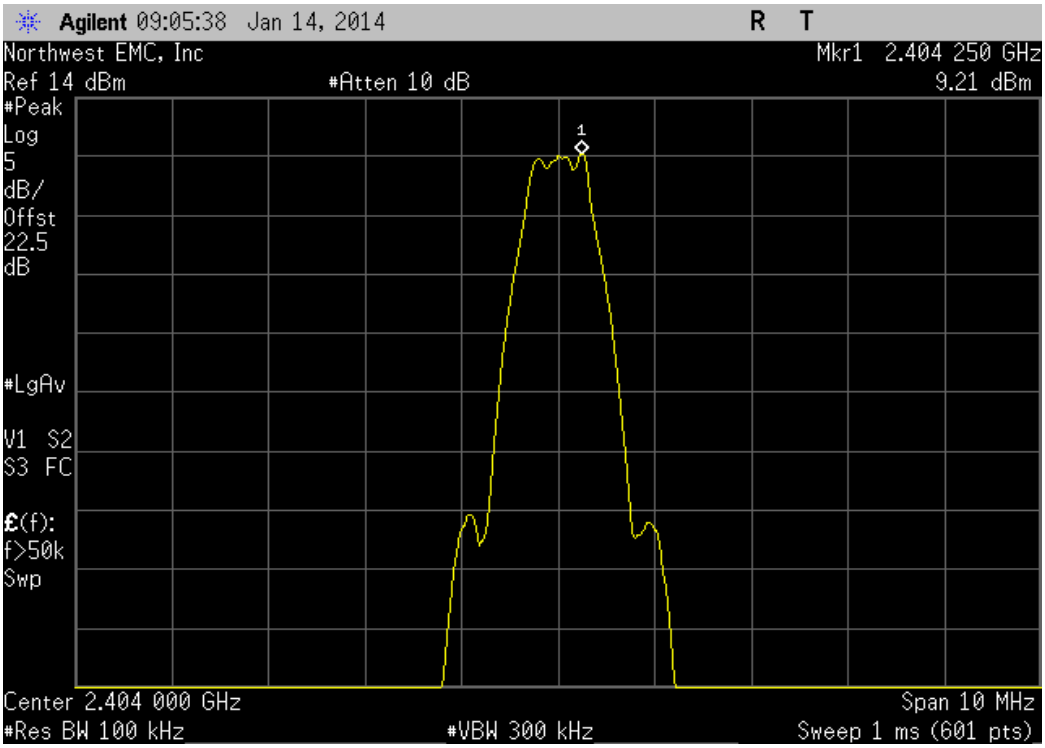
BLE - Advertising, Mid Channel, 2426 MHz						
		Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Result
		9.216	-15.2	-5.984	8	Pass



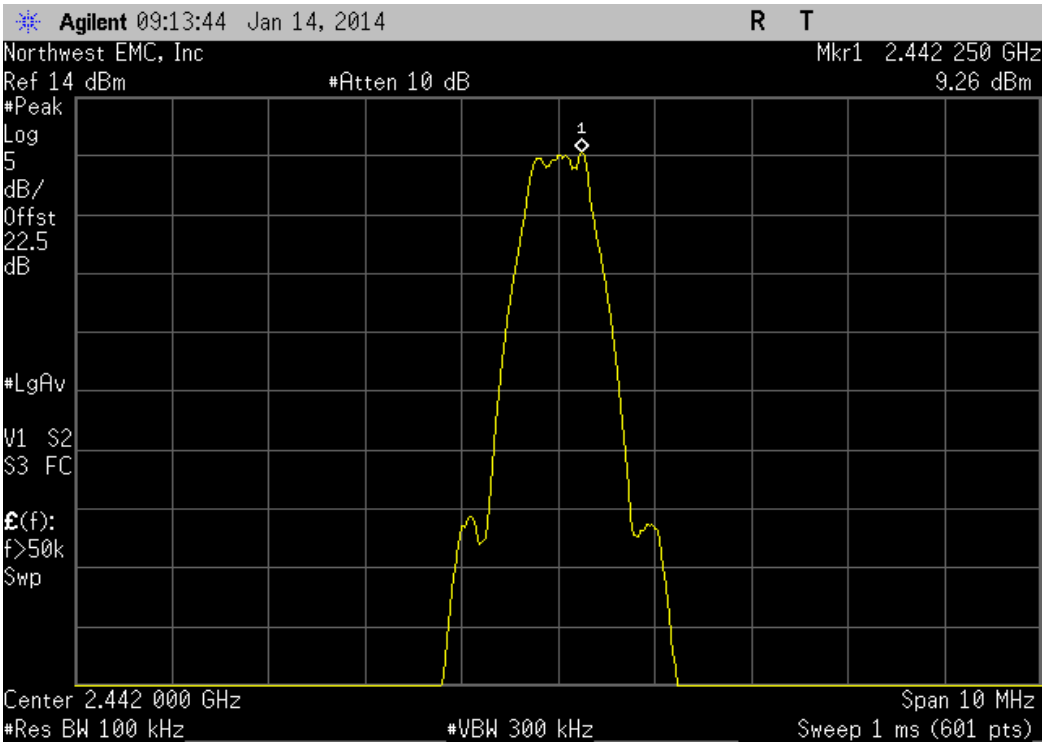
BLE - Advertising, High Channel, 2480 MHz						
		Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Result
		9.352	-15.2	-5.848	8	Pass



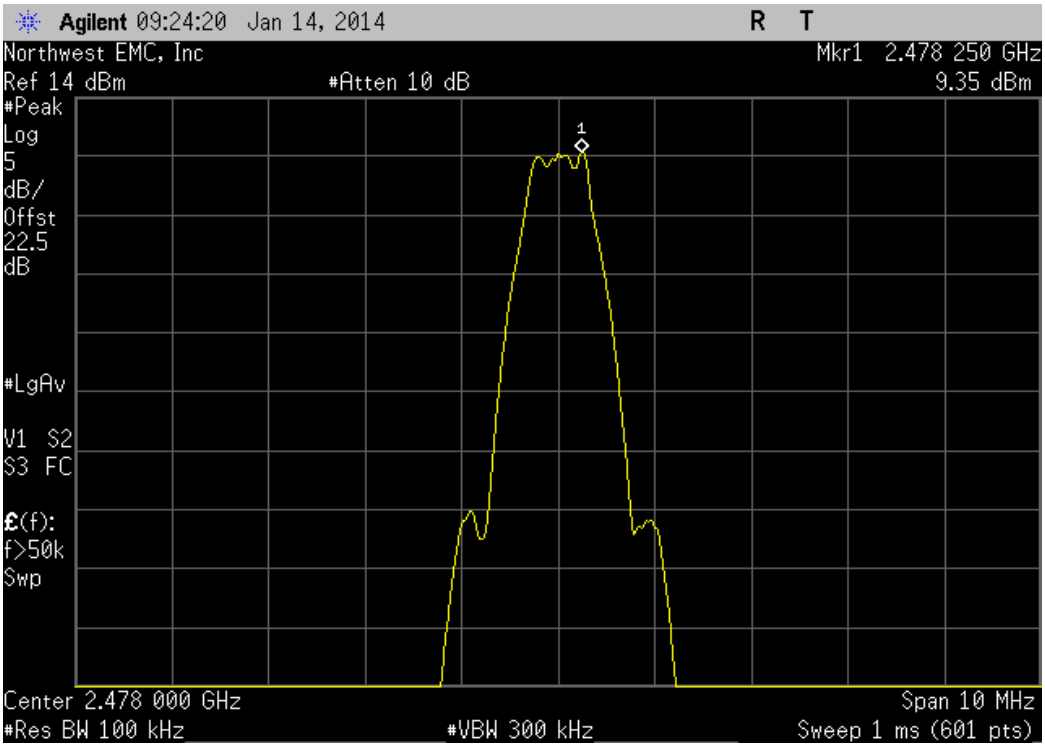
BLE - Data, Low Channel, 2404 MHz						
		Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Result
		9.209	-15.2	-5.991	8	Pass



BLE - Data, Mid Channel, 2442 MHz						
		Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Result
		9.255	-15.2	-5.945	8	Pass



BLE - Data, High Channel, 2478 MHz						
		Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Result
		9.351	-15.2	-5.849	8	Pass



SPURIOUS CONDUCTED EMISSIONS

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.	Interval
Attenuator, 6dB	S.M. Electronics	18N-06	AWN	3/25/2013	12
MXG Analog Signal Generator	Agilent	N5181A	TIG	NCR	0
Power Meter	Gigatronics	8651A	SPM	11/26/2013	24
Power Sensor	Gigatronics	80701A	SPL	7/8/2011	36
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/30/2013	12
40GHz DC Block	Miteq	DCB4000	AMD	5/16/2013	12
Spectrum Analyzer	Agilent	E4440A	AFD	7/5/2012	24

TEST DESCRIPTION

The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

SPURIOUS CONDUCTED EMISSIONS

EUT:	WTI SMART			**Work Order:**	SUPR0115
Serial Number:	0003			**Date:**	01/14/14
Customer:	Supra, A Division of UTCFS			**Temperature:**	22.2°C
Attendees:	None			**Humidity:**	36%
Project:	None			**Barometric Pres.:**	1018
Tested by:	Brandon Hobbs	**Power:**	Battery	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2014	ANSI C63.10:2009

COMMENTS

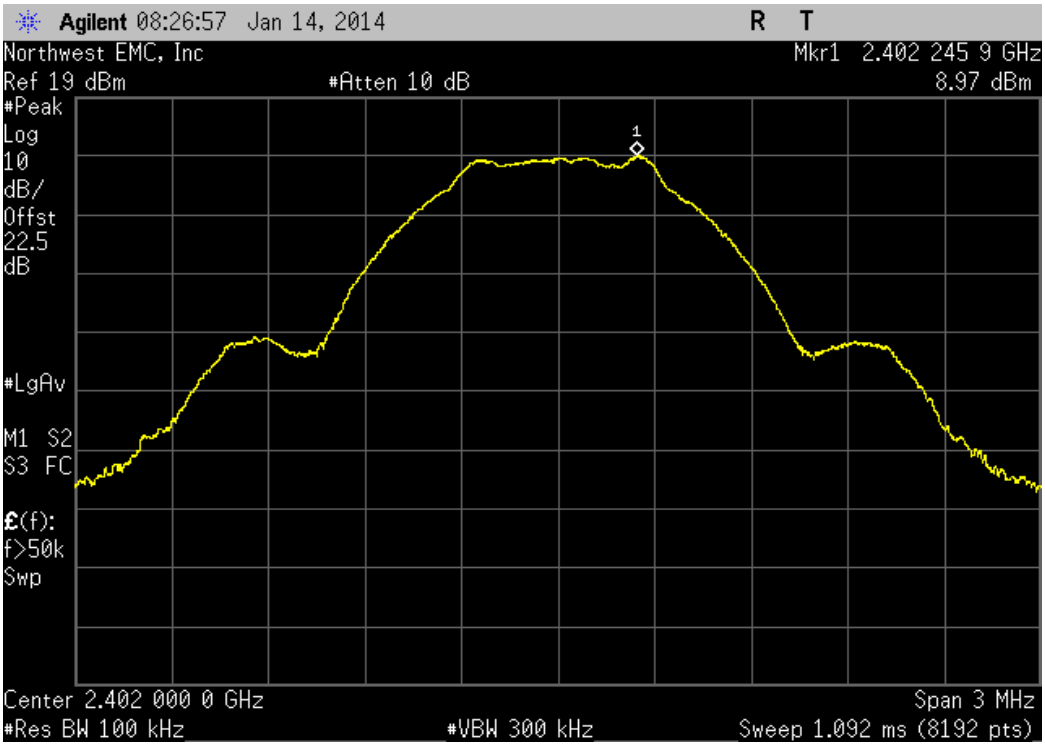
The EUT was operating at 100% duty cycle.

DEVIATIONS FROM TEST STANDARD

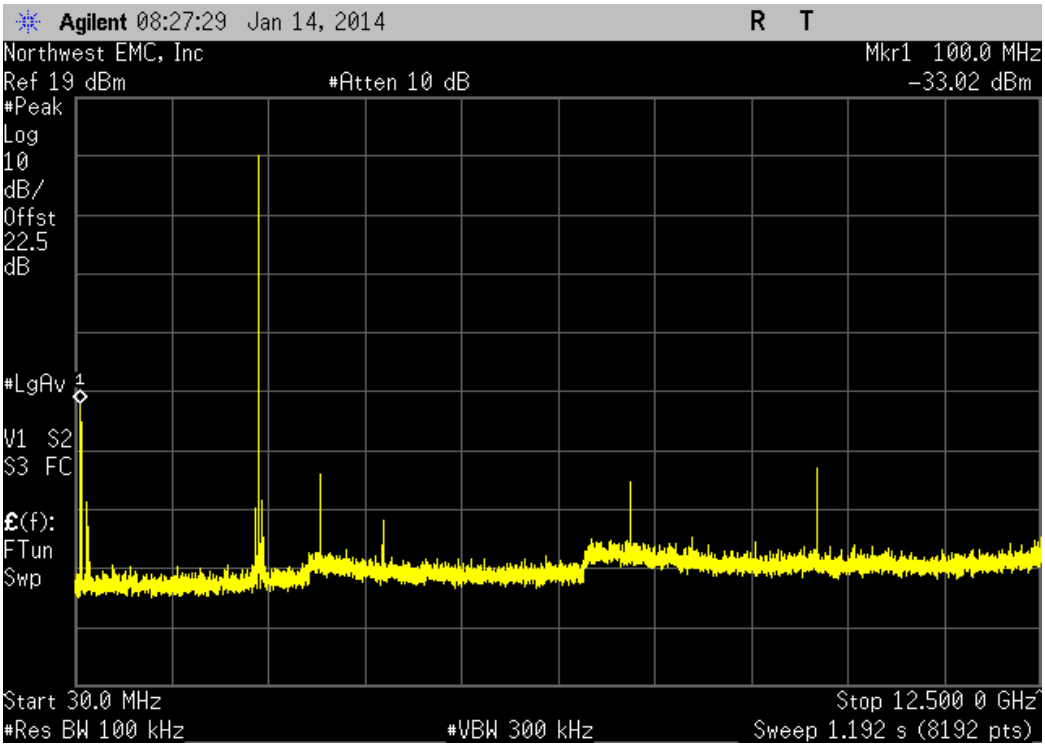
Configuration #	2	Signature

		Frequency Range	Value	Limit	Result
BLE - Advertising					
	Low Channel, 2402 MHz	Fundamental	N/A	N/A	N/A
	Low Channel, 2402 MHz	30 MHz - 12.5 GHz	-41.97 dBc	≤ -20 dBc	Pass
	Low Channel, 2402 MHz	12.5 GHz - 25 GHz	-53.89 dBc	≤ -20 dBc	Pass
	Mid Channel, 2426 MHz	Fundamental	N/A	N/A	N/A
	Mid Channel, 2426 MHz	30 MHz - 12.5 GHz	-45.39 dBc	≤ -20 dBc	Pass
	Mid Channel, 2426 MHz	12.5 GHz - 25 GHz	-52.03 dBc	≤ -20 dBc	Pass
	High Channel, 2480 MHz	Fundamental	N/A	N/A	N/A
	High Channel, 2480 MHz	30 MHz - 12.5 GHz	-47.57 dBc	≤ -20 dBc	Pass
	High Channel, 2480 MHz	12.5 GHz - 25 GHz	-53.74 dBc	≤ -20 dBc	Pass
BLE - Data					
	Low Channel, 2404 MHz	Fundamental	N/A	N/A	N/A
	Low Channel, 2404 MHz	30 MHz - 12.5 GHz	-45.68 dBc	≤ -20 dBc	Pass
	Low Channel, 2404 MHz	12.5 GHz - 25 GHz	-52.03 dBc	≤ -20 dBc	Pass
	Mid Channel, 2442 MHz	Fundamental	N/A	N/A	N/A
	Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	-42.04 dBc	≤ -20 dBc	Pass
	Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	-51.89 dBc	≤ -20 dBc	Pass
	High Channel, 2478 MHz	Fundamental	N/A	N/A	N/A
	High Channel, 2478 MHz	30 MHz - 12.5 GHz	-46.51 dBc	≤ -20 dBc	Pass
	High Channel, 2478 MHz	12.5 GHz - 25 GHz	-52.32 dBc	≤ -20 dBc	Pass

BLE - Advertising, Low Channel, 2402 MHz						
	Frequency Range			Value	Limit	Result
	Fundamental			N/A	N/A	N/A

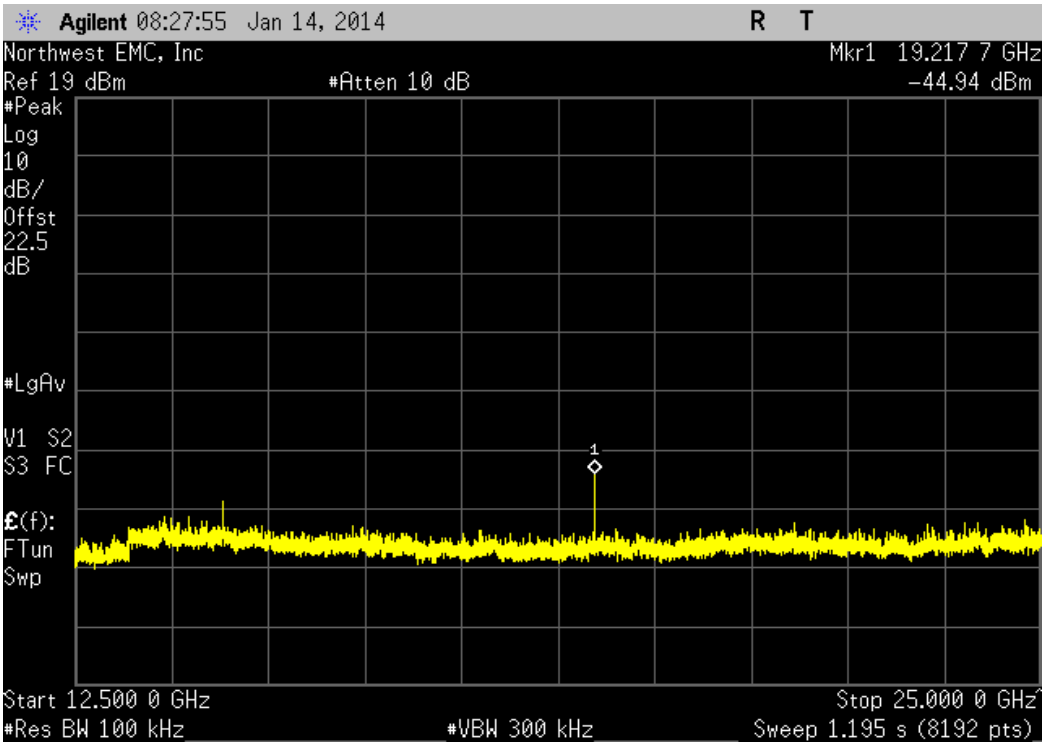


BLE - Advertising, Low Channel, 2402 MHz					
Frequency Range		Value	Limit	Result	
30 MHz - 12.5 GHz		-41.97 dBc	≤ -20 dBc	Pass	



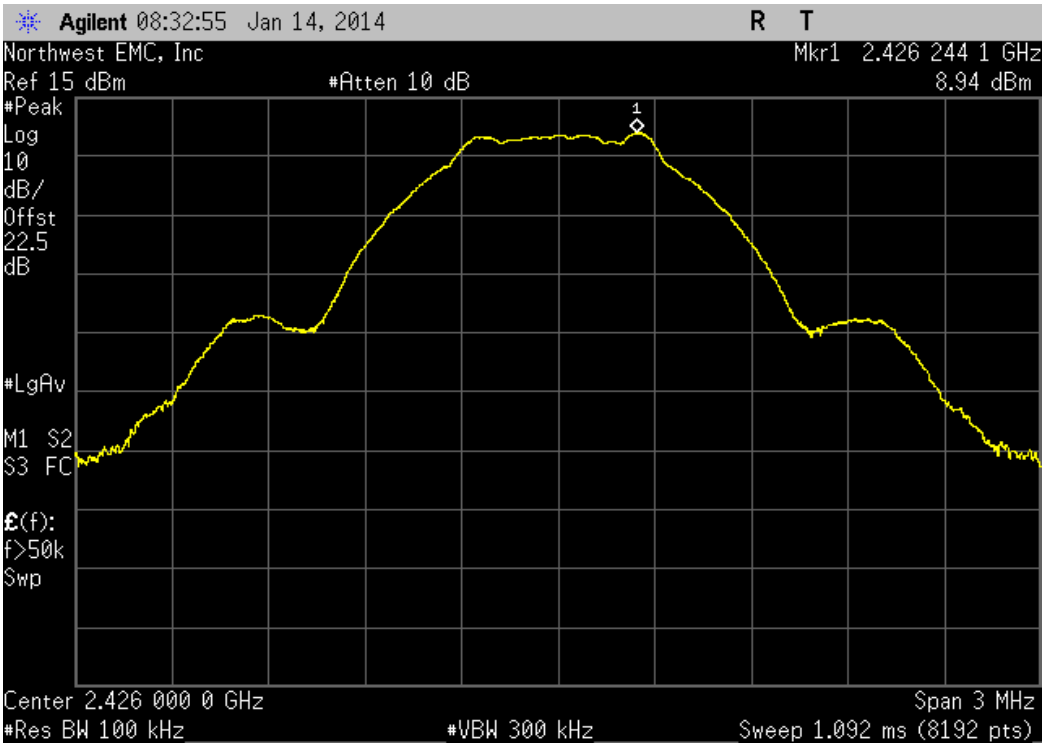
BLE - Advertising, Low Channel, 2402 MHz

Frequency Range		Value	Limit	Result
12.5 GHz - 25 GHz		-53.89 dBc	≤ -20 dBc	Pass

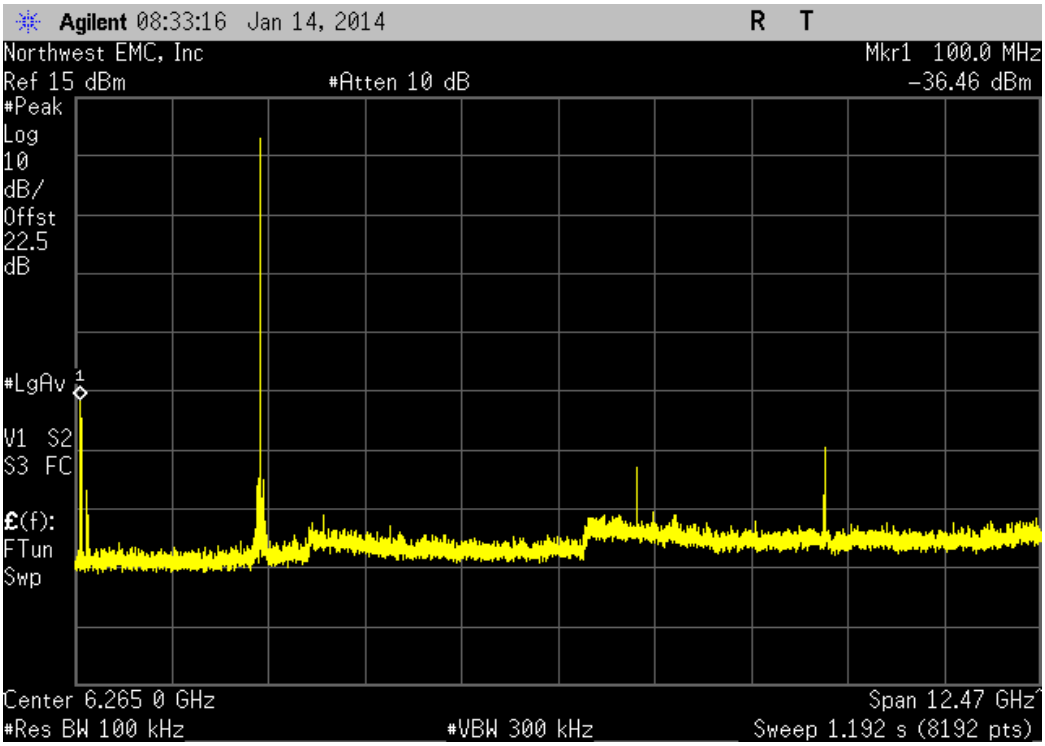


BLE - Advertising, Mid Channel, 2426 MHz

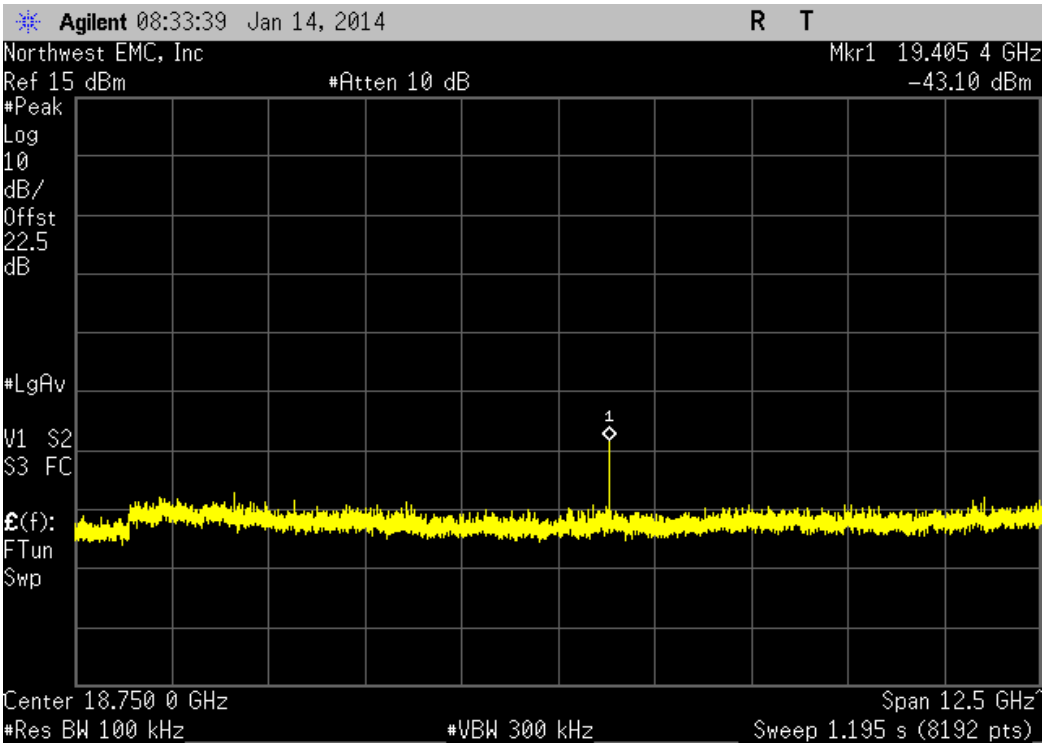
Frequency Range				Value	Limit	Result
	Fundamental			N/A	N/A	N/A



BLE - Advertising, Mid Channel, 2426 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-45.39 dBc	≤ -20 dBc	Pass

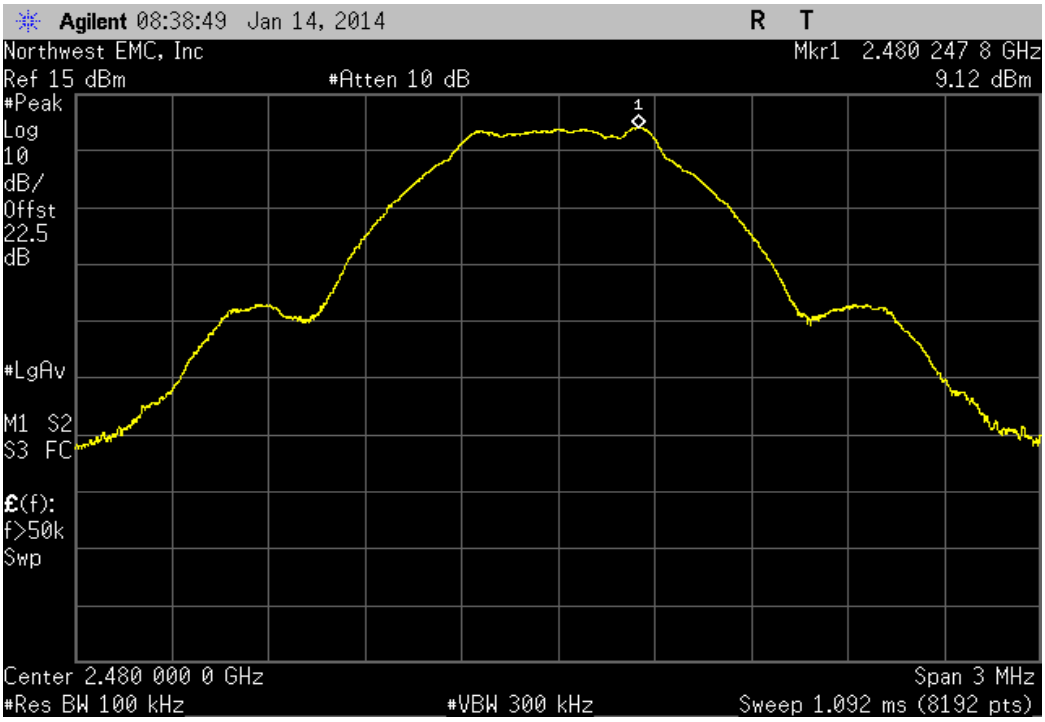


BLE - Advertising, Mid Channel, 2426 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-52.03 dBc	≤ -20 dBc	Pass



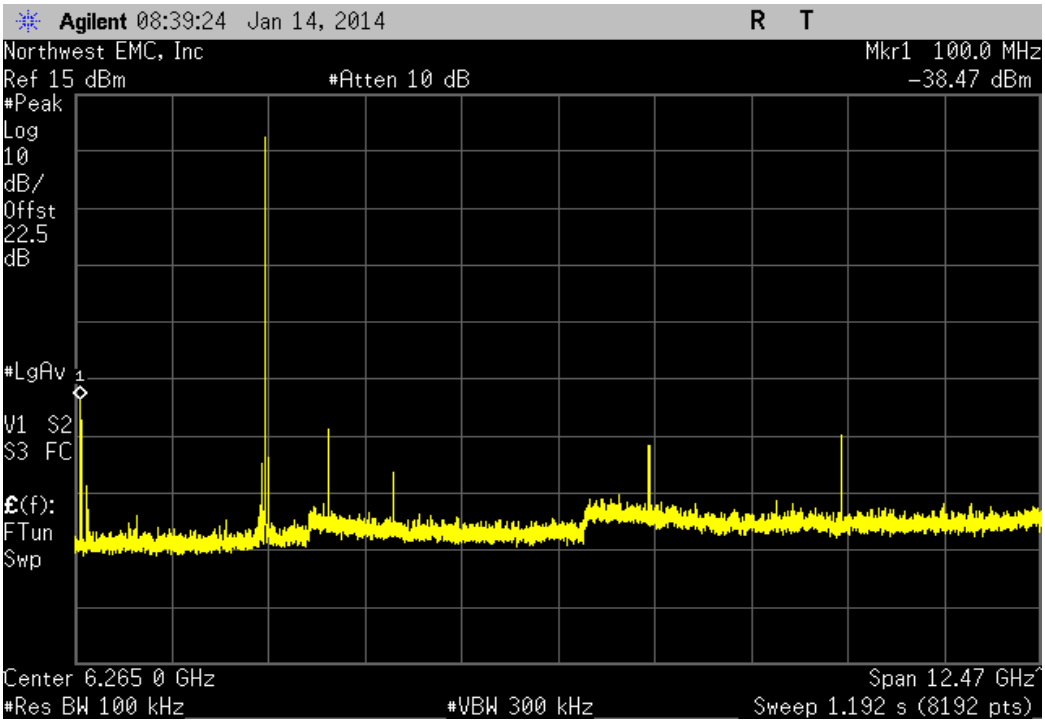
BLE - Advertising, High Channel, 2480 MHz

Frequency Range			Value	Limit	Result
Fundamental			N/A	N/A	N/A



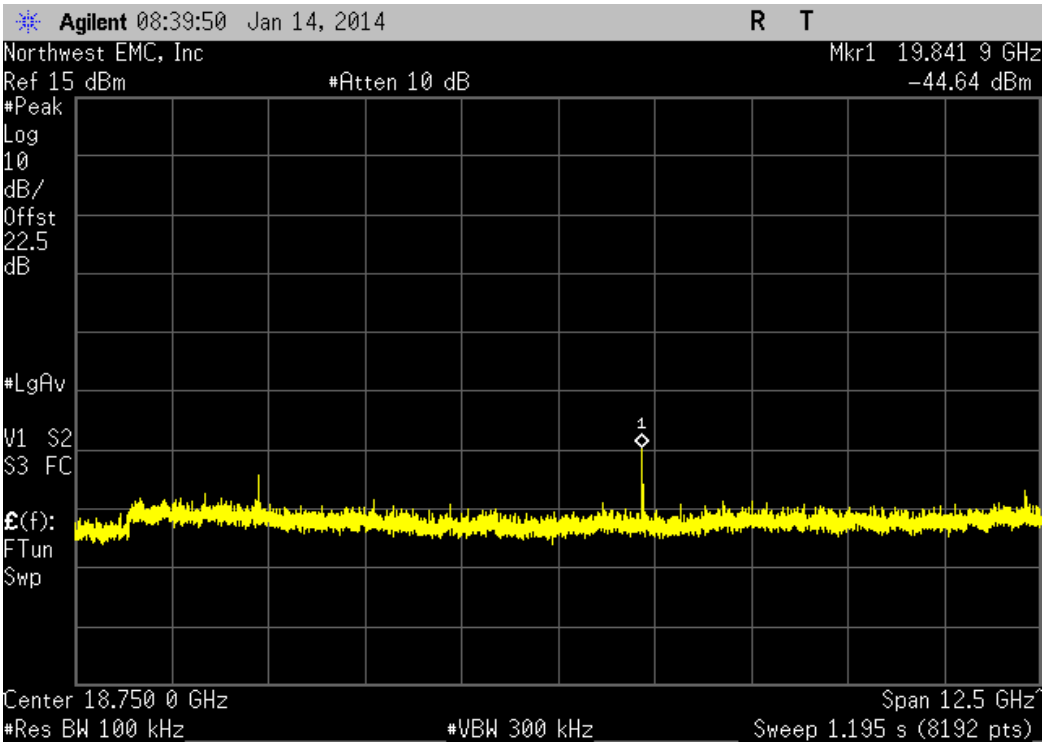
BLE - Advertising, High Channel, 2480 MHz

Frequency Range		Value	Limit	Result
30 MHz - 12.5 GHz		-47.57 dBc	≤ -20 dBc	Pass

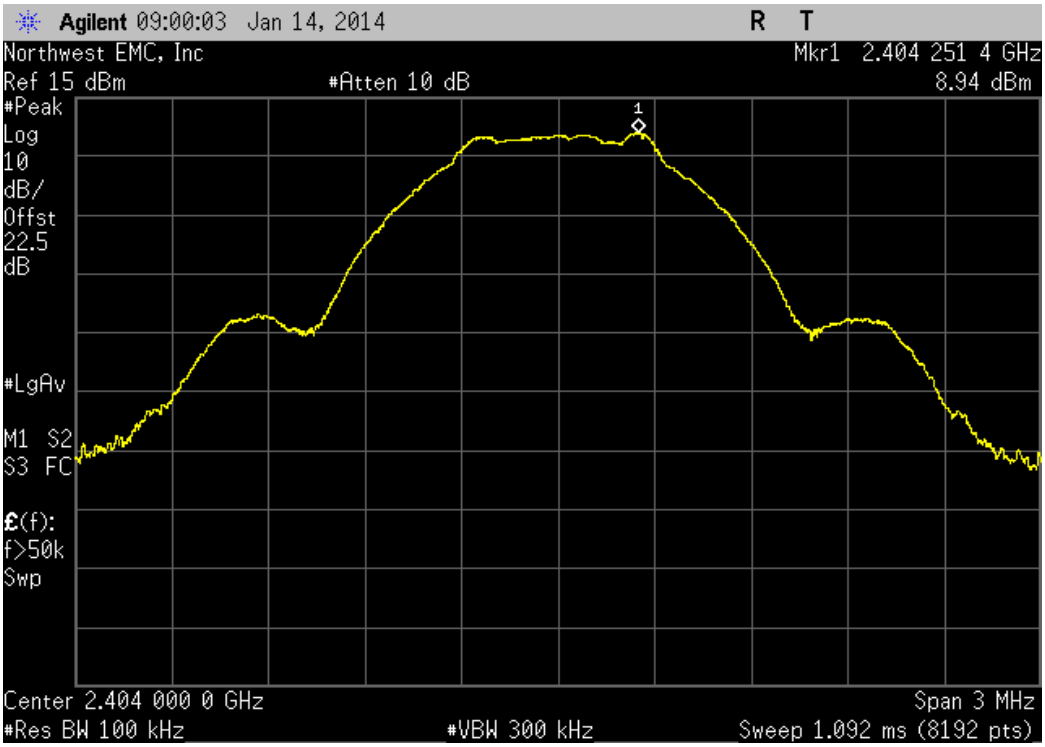


SPURIOUS CONDUCTED EMISSIONS

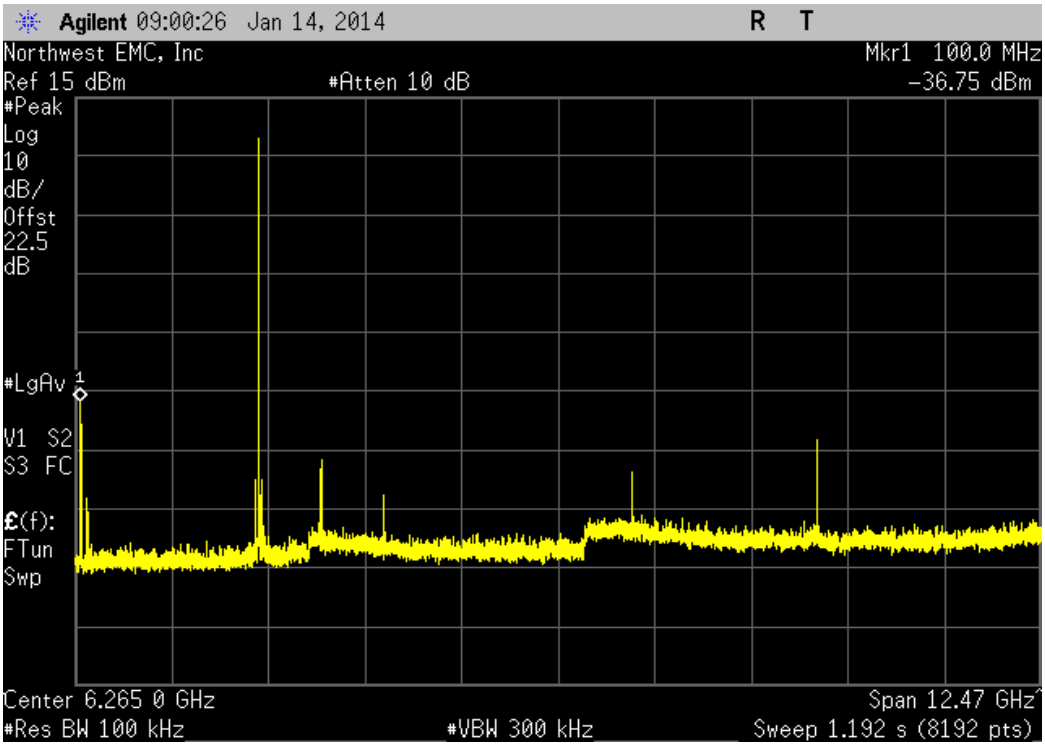
BLE - Advertising, High Channel, 2480 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-53.74 dBc	≤ -20 dBc	Pass



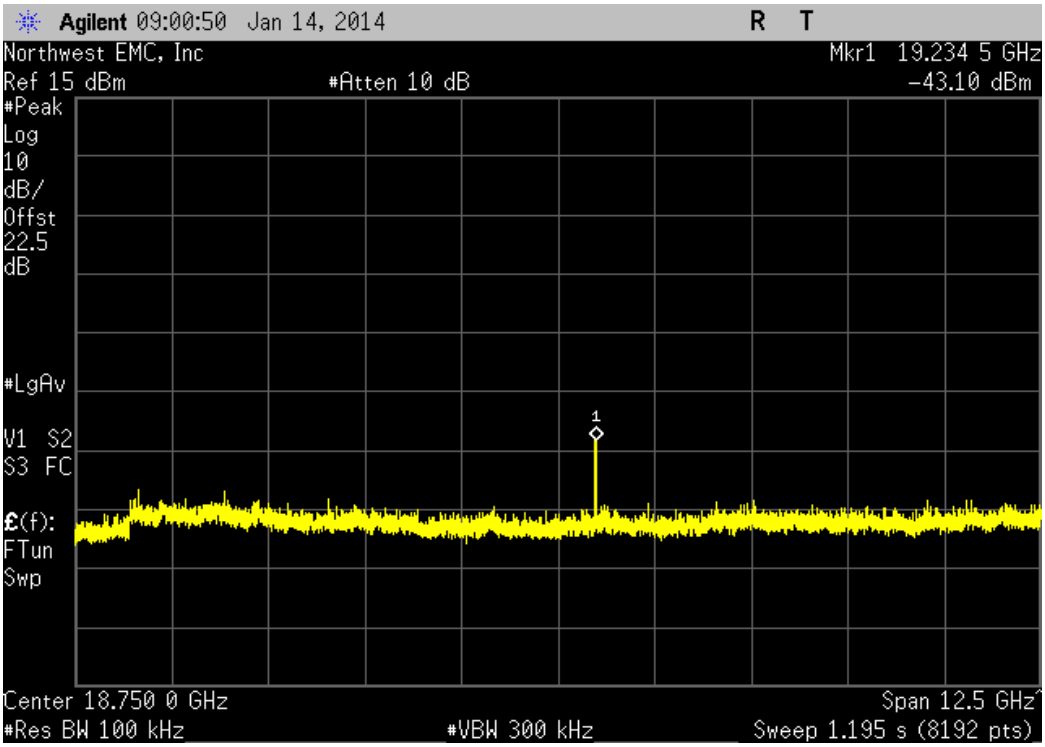
BLE - Data, Low Channel, 2404 MHz						
	Frequency Range			**Value**	**Limit**	**Result**
	Fundamental			N/A	N/A	N/A



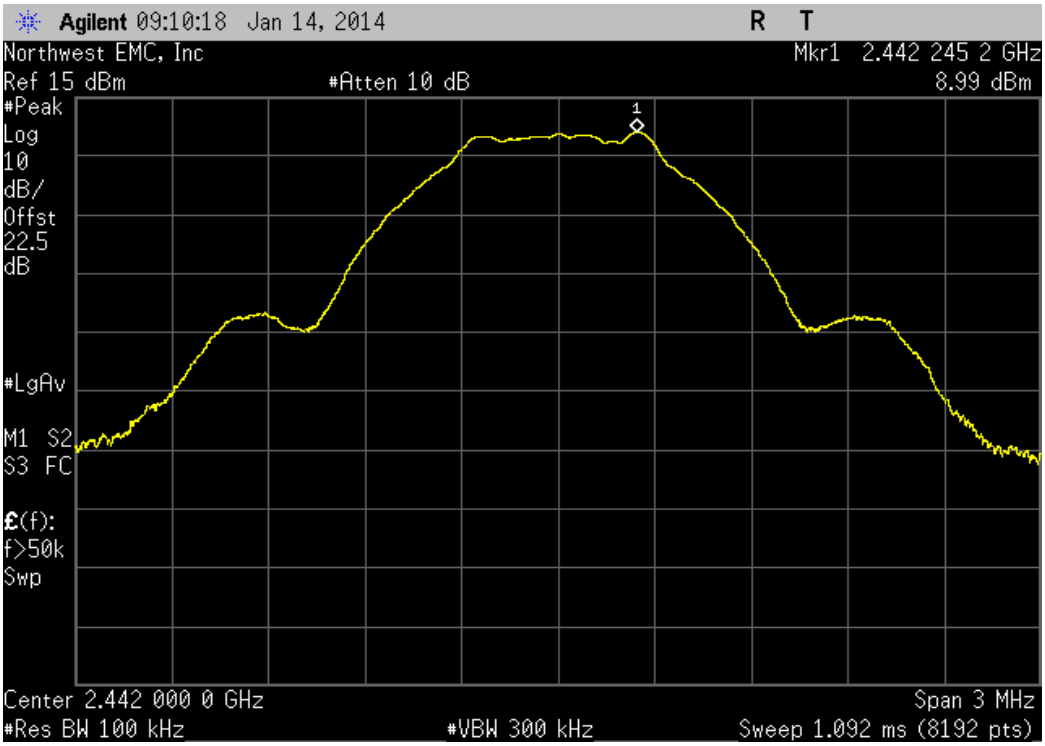
BLE - Data, Low Channel, 2404 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-45.68 dBc	≤ -20 dBc	Pass



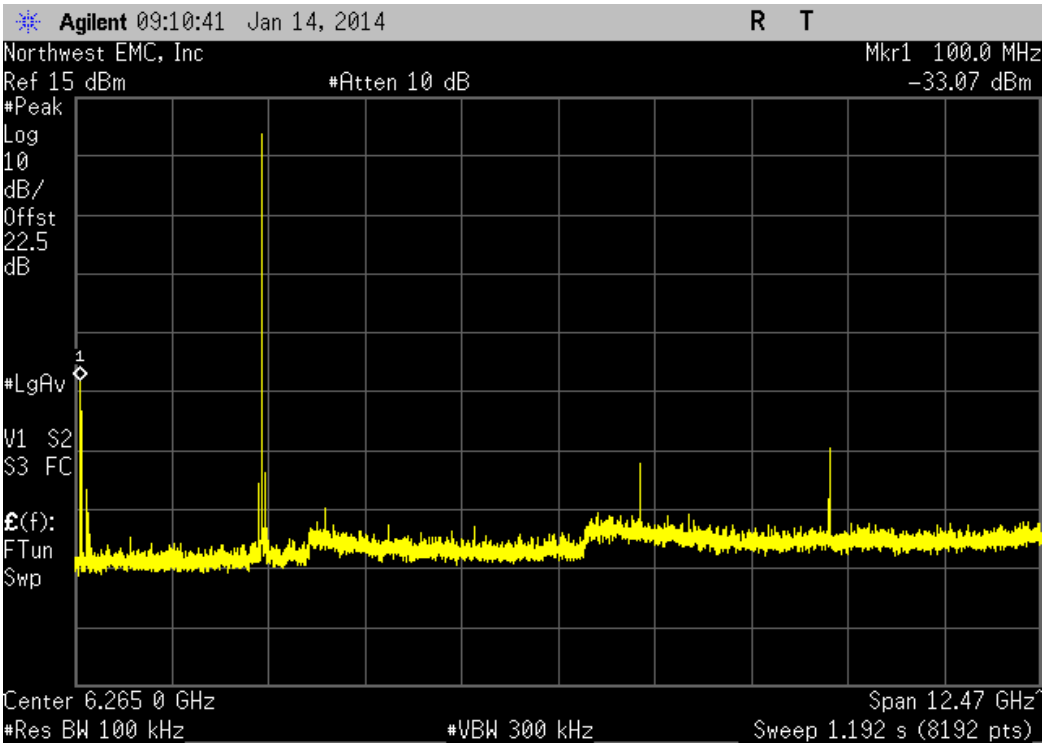
BLE - Data, Low Channel, 2404 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-52.03 dBc	≤ -20 dBc	Pass



BLE - Data, Mid Channel, 2442 MHz						
	Frequency Range			Value	Limit	Result
	Fundamental			N/A	N/A	N/A

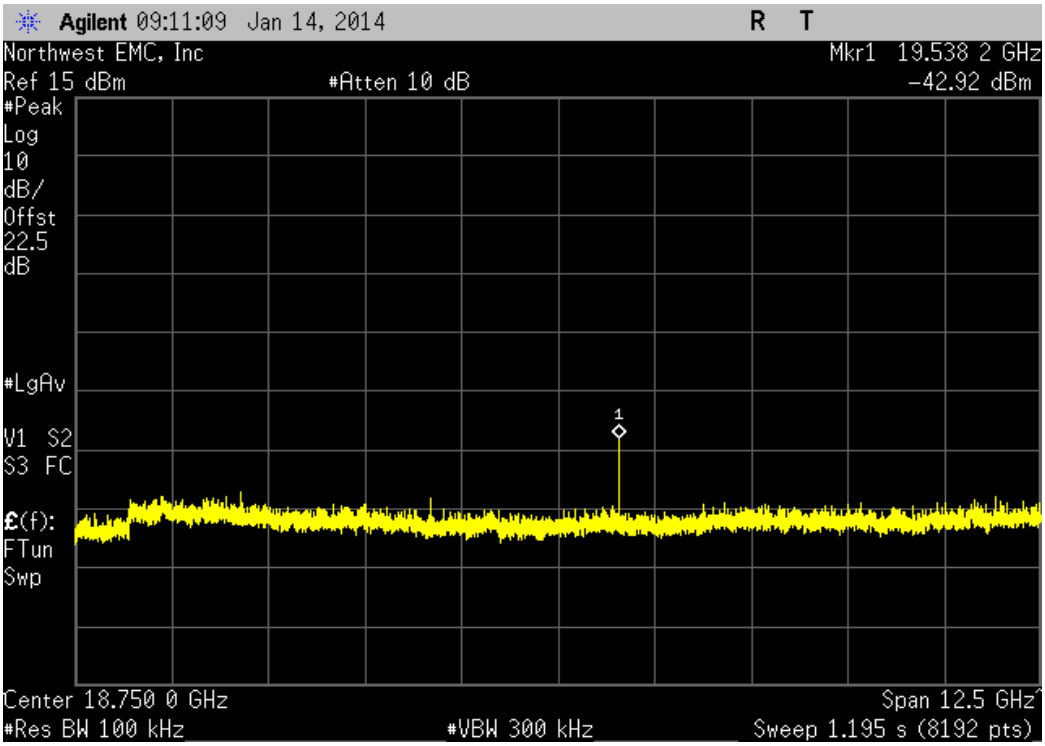


BLE - Data, Mid Channel, 2442 MHz					
Frequency Range		Value	Limit	Result
30 MHz - 12.5 GHz		-42.04 dBc	≤ -20 dBc	Pass

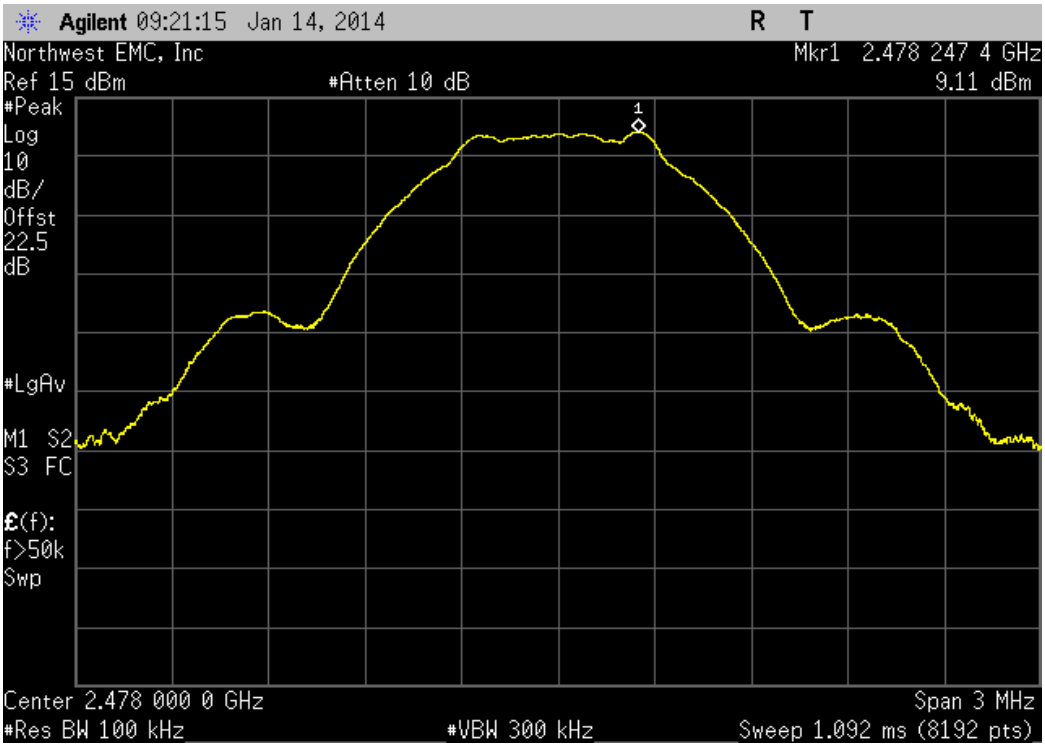


SPURIOUS CONDUCTED EMISSIONS

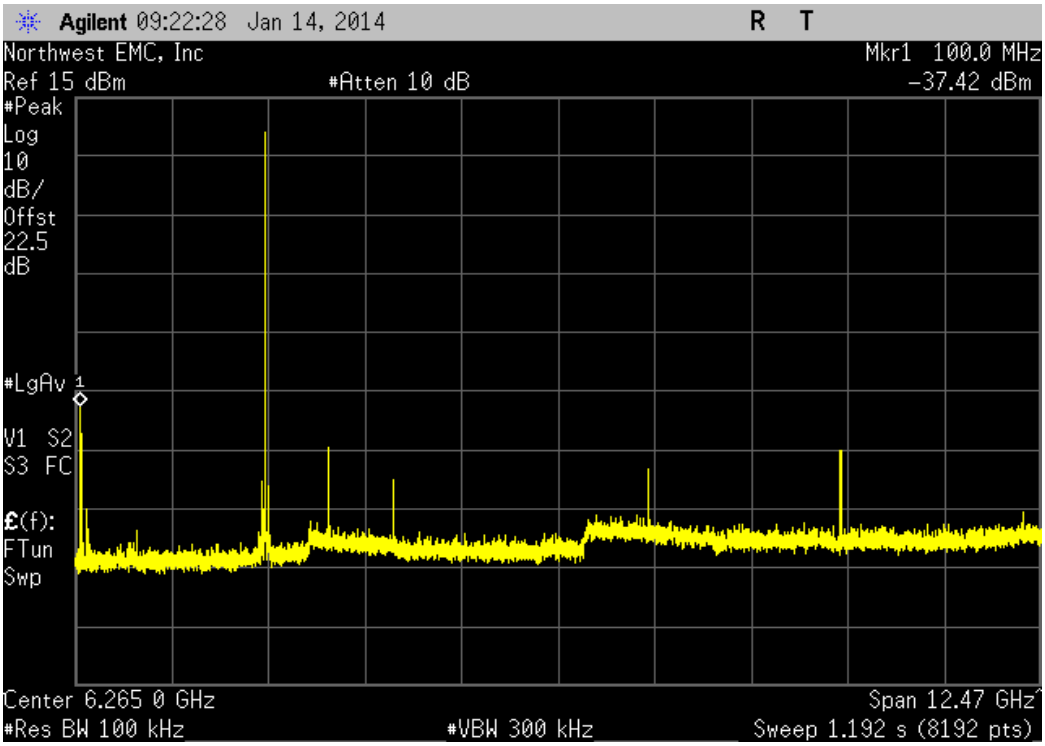
BLE - Data, Mid Channel, 2442 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-51.89 dBc	≤ -20 dBc	Pass



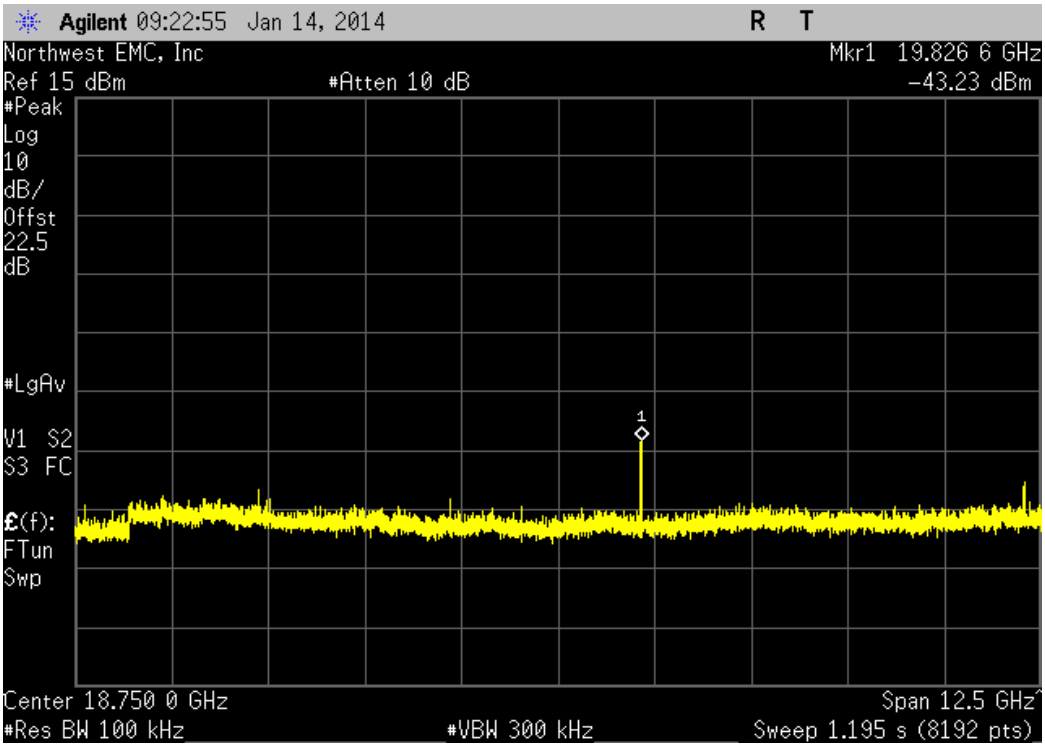
BLE - Data, High Channel, 2478 MHz						
	Frequency Range			**Value**	**Limit**	**Result**
	Fundamental			N/A	N/A	N/A



BLE - Data, High Channel, 2478 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-46.51 dBc	≤ -20 dBc	Pass



BLE - Data, High Channel, 2478 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-52.32 dBc	≤ -20 dBc	Pass



BAND EDGE COMPLIANCE

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.	Interval
Attenuator, 6dB	S.M. Electronics	18N-06	AWN	3/25/2013	12
MXG Analog Signal Generator	Agilent	N5181A	TIG	NCR	0
Power Meter	Gigatronics	8651A	SPM	11/26/2013	24
Power Sensor	Gigatronics	80701A	SPL	7/8/2011	36
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/30/2013	12
40GHz DC Block	Miteq	DCB4000	AMD	5/16/2013	12
Spectrum Analyzer	Agilent	E4440A	AFD	7/5/2012	24

TEST DESCRIPTION

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

BAND EDGE COMPLIANCE

EUT:	WTI SMART			**Work Order:**	SUPR0115
Serial Number:	0003			**Date:**	01/14/14
Customer:	Supra, A Division of UTCFS			**Temperature:**	22.2°C
Attendees:	None			**Humidity:**	36%
Project:	None			**Barometric Pres.:**	1018
Tested by:	Brandon Hobbs	**Power:**	Battery	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2014	ANSI C63.10:2009

COMMENTS

The EUT was operating at 100% duty cycle.

DEVIATIONS FROM TEST STANDARD

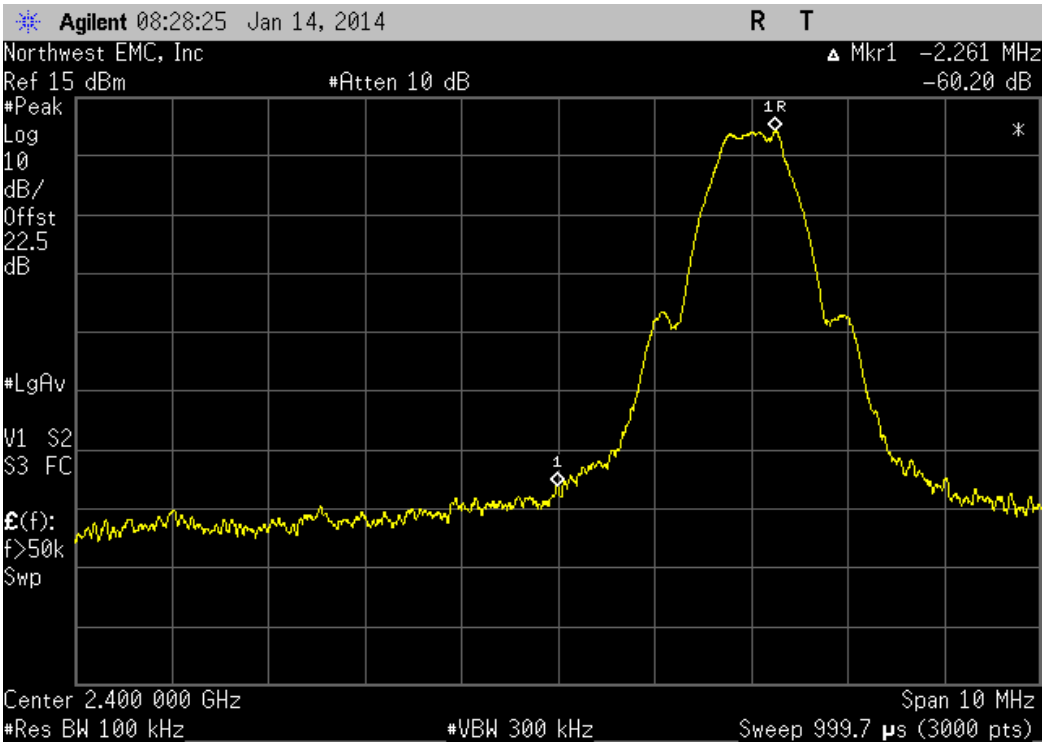
Configuration #	2	Signature

		Value	Limit	Result
BLE - Advertising				
	Low Channel, 2402 MHz	-60.2 dBc	≤ -20 dBc	Pass
	High Channel, 2480 MHz	-57.24 dBc	≤ -20 dBc	Pass
BLE - Data				
	Low Channel, 2404 MHz	-63.81 dBc	≤ -20 dBc	Pass
	High Channel, 2478 MHz	-59 dBc	≤ -20 dBc	Pass

BAND EDGE COMPLIANCE

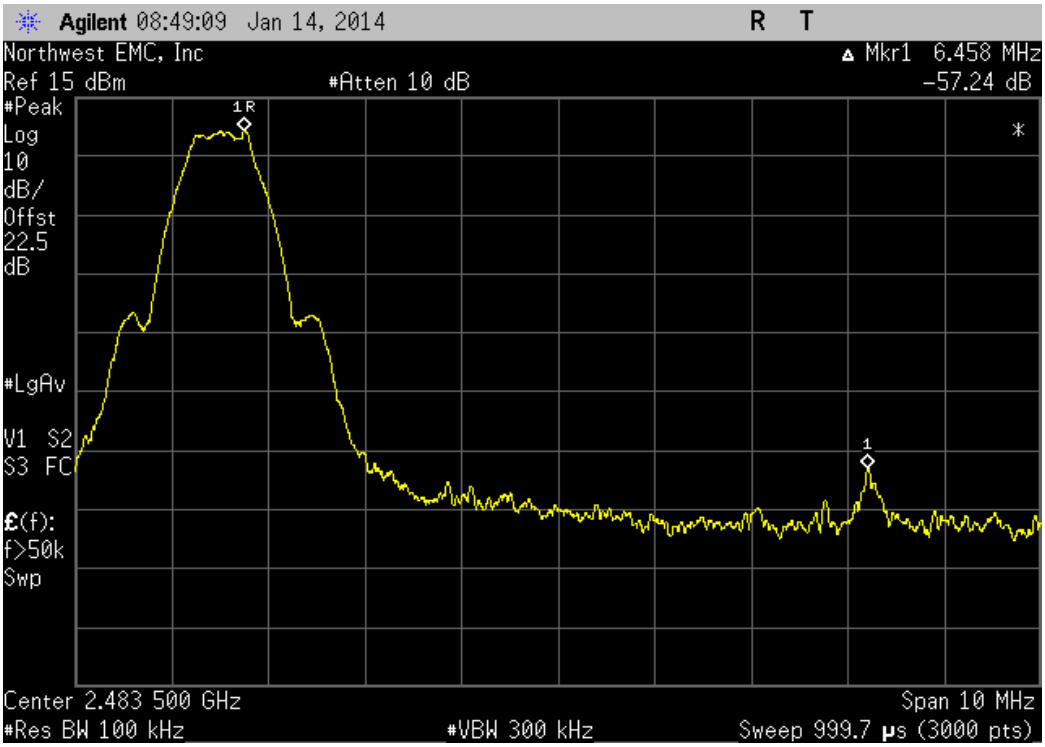
BLE - Advertising, Low Channel, 2402 MHz

				Value	Limit	Result
				-60.2 dBc	≤ -20 dBc	Pass



BLE - Advertising, High Channel, 2480 MHz

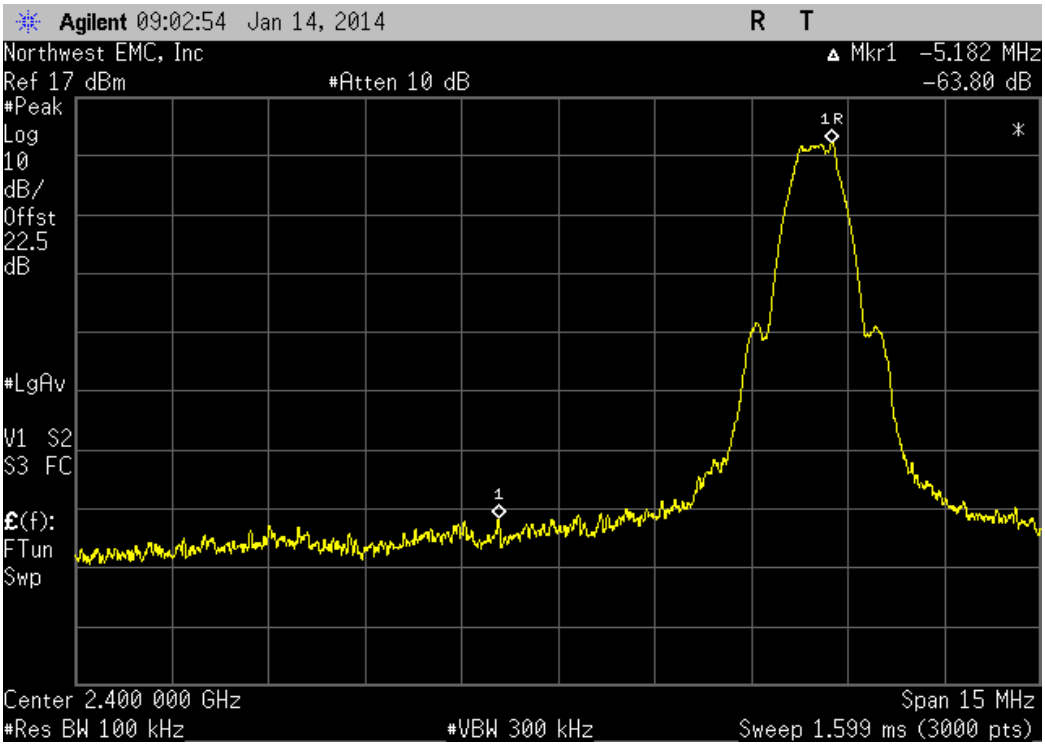
				Value	Limit	Result
				-57.24 dBc	≤ -20 dBc	Pass



BAND EDGE COMPLIANCE

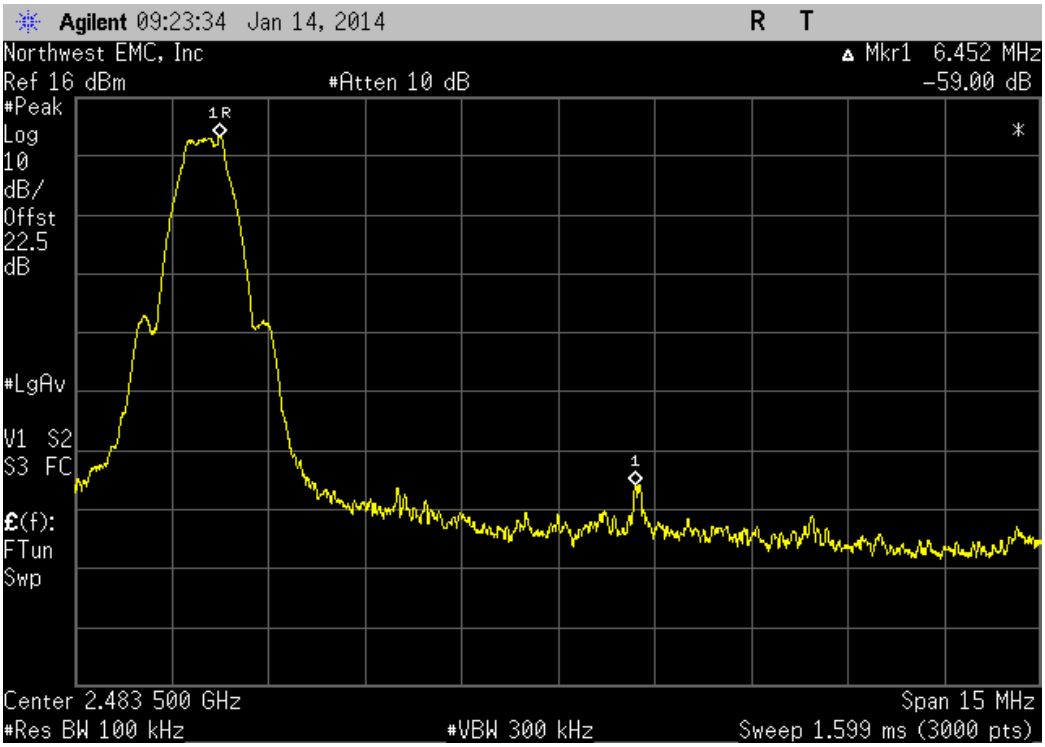
BLE - Data, Low Channel, 2404 MHz

				Value	Limit	Result
				-63.81 dBc	≤ -20 dBc	Pass



BLE - Data, High Channel, 2478 MHz

				Value	Limit	Result
				-59 dBc	≤ -20 dBc	Pass



SPURIOUS RADIATED EMISSIONS

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

Continuous Transmit, Bluetooth Low Energy, Low Channel, 2402 MHz, ADV
Continuous Transmit, Bluetooth Low Energy, Low Channel, 2404 MHz, DATA
Continuous Transmit, Bluetooth Low Energy, Mid Channel, 2426 MHz, ADV
Continuous Transmit, Bluetooth Low Energy, Mid Channel, 2442 MHz, DATA
Continuous Transmit, Bluetooth Low Energy, High Channel, 2478 MHz, DATA
Continuous Transmit, Bluetooth Low Energy, High Channel, 2480 MHz, ADV

POWER SETTINGS INVESTIGATED

Internal Battery

CONFIGURATIONS INVESTIGATED

SUPR0115 - 1
SUPR0115 - 3
SUPR0115 - 5
SUPR0115 - 6

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 - 20dB, HF (1000MHz - 18000MHz)	Coaxicom	3910-20	AXZ	6/20/2013	12 mo
HP Filter	Micro-Tronics	HPM50111	HFO	7/6/2013	24 mo
Cable	ESM Cable Corp.	KMKM-72	EVY	9/10/2013	12 mo
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	9/10/2013	12 mo
Antenna, Horn	ETS Lindgren	3160-09	AIV	NCR	0 mo
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	10/21/2013	12 mo
Antenna, Horn	ETS	3160-08	AHV	NCR	0 mo
EV01 Cables	N/A	Standard Gain Horns Cables	EVF	10/21/2013	12 mo
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	10/21/2013	12 mo
Antenna, Horn	ETS	3160-07	AHU	NCR	0 mo
EV01 Cables	N/A	Double Ridge Horn Cables	EVB	9/2/2013	12 mo
Pre-Amplifier	Miteq	AMF-4D-010100-24-10P	APW	6/20/2013	12 mo
Antenna, Horn	EMCO	3115	AHC	6/20/2012	24 mo
EV01 Cables	N/A	Bilog Cables	EVA	6/20/2013	12 mo
Pre-Amplifier	Miteq	AM-1616-1000	AOL	6/20/2013	12 mo
Antenna, Biconilog	EMCO	3141	AXG	4/10/2012	36 mo
Spectrum Analyzer	Agilent	E4446A	AAT	6/28/2012	24 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

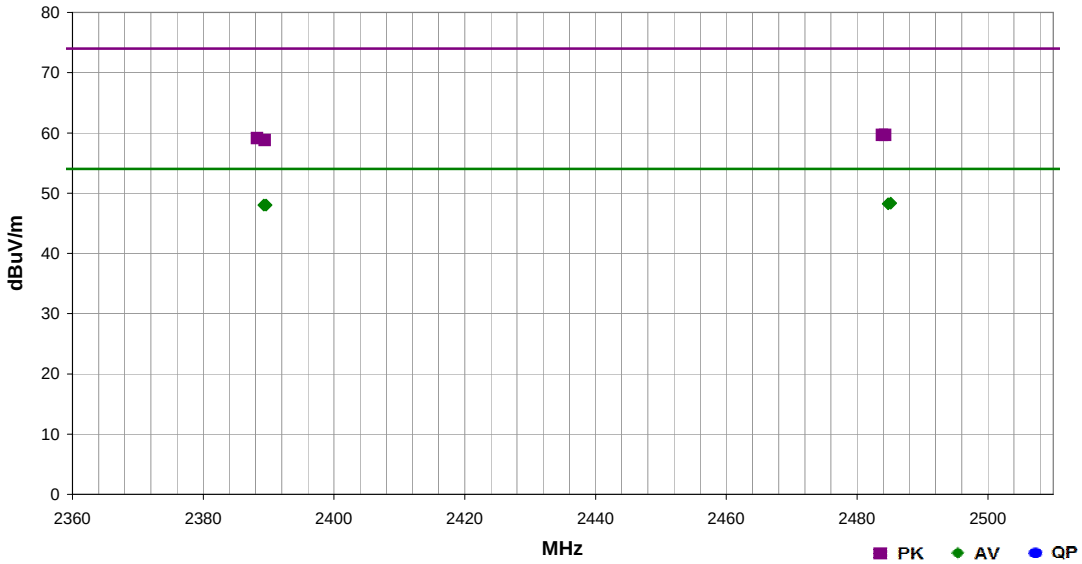
The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization. A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

SPURIOUS RADIATED EMISSIONS

Work Order:	SUPR0115	**Date:**	01/14/14		
Project:	None	**Temperature:**	22.5 °C		
Job Site:	EV01	**Humidity:**	38% RH		
Serial Number:	0074	**Barometric Pres.:**	1037 mbar	**Tested by:**	Carl Engholm
EUT:	WTI SMART				
Configuration:	1				
Customer:	Supra, A Division of UTCFS				
Attendees:	None				
EUT Power:	Internal Battery				
Operating Mode:	Continuous Transmit, Bluetooth Low Energy				
Deviations:	None				
Comments:	See comments below for channel, frequency, modulation type, and EUT orientation.				

Test Specifications	**Test Method**
FCC 15.247:2014	ANSI C63.10:2009

Run #	12	**Test Distance (m)**	3	**Antenna Height(s)**	1-4m	**Results**	Pass



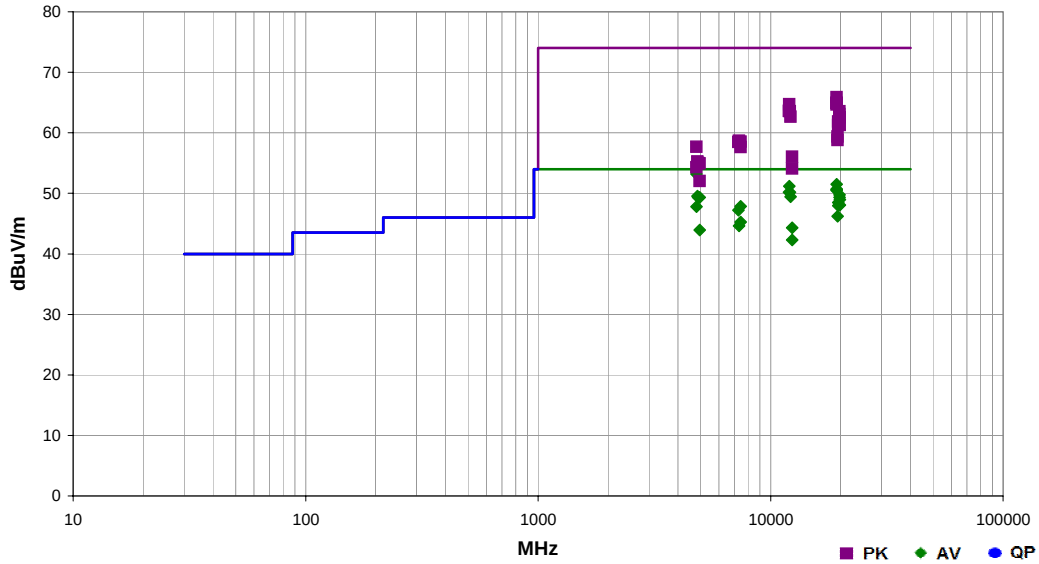
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2485.127	26.5	1.9	1.0	18.0	3.0	20.0	Horz	AV	0.0	48.4	54.0	-5.6	High Ch, 2480 MHz, ADV, EUT on Side
2484.723	26.4	1.9	1.0	1.0	3.0	20.0	Vert	AV	0.0	48.3	54.0	-5.7	High Ch, 2480 MHz, ADV, EUT on Side
2389.247	26.5	1.5	1.0	311.0	3.0	20.0	Vert	AV	0.0	48.0	54.0	-6.0	Low Ch, 2402 MHz, ADV, EUT on Side
2389.597	26.5	1.5	1.0	235.0	3.0	20.0	Horz	AV	0.0	48.0	54.0	-6.0	Low Ch, 2402 MHz, ADV, EUT on Side
2484.300	37.8	1.9	1.0	1.0	3.0	20.0	Vert	PK	0.0	59.7	74.0	-14.3	High Ch, 2480 MHz, ADV, EUT on Side
2483.807	37.8	1.8	1.0	18.0	3.0	20.0	Horz	PK	0.0	59.6	74.0	-14.4	High Ch, 2480 MHz, ADV, EUT on Side
2388.230	37.6	1.5	1.0	235.0	3.0	20.0	Horz	PK	0.0	59.1	74.0	-14.9	Low Ch, 2402 MHz, ADV, EUT on Side
2389.430	37.3	1.5	1.0	311.0	3.0	20.0	Vert	PK	0.0	58.8	74.0	-15.2	Low Ch, 2402 MHz, ADV, EUT on Side

SPURIOUS RADIATED EMISSIONS

Work Order:	SUPR0115	**Date:**	01/21/14		
Project:	None	**Temperature:**	20.9 °C		
Job Site:	EV01	**Humidity:**	26.6% RH		
Serial Number:	0074, 0075	**Barometric Pres.:**	1026 mbar	**Tested by:**	Brandon Hobbs, Jared Ison
EUT:	WTI SMART				
Configuration:	1, 3				
Customer:	Supra, A Division of UTCFS				
Attendees:	None				
EUT Power:	Internal Battery				
Operating Mode:	Continuous Transmit, Bluetooth Low Energy				
Deviations:	None				
Comments:	See comments below for channel, frequency, modulation type, and EUT orientation.				

Test Specifications	**Test Method**
FCC 15.247:2014	ANSI C63.10:2009

Run #	29	**Test Distance (m)**	3	**Antenna Height(s)**	1-4m	**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
4804.050	42.5	10.7	1.0	9.0	3.0	0.0	Vert	AV	0.0	53.2	54.0	-0.8	Low Ch., 2402 MHz, ADV, EUT Vert
19217.720	53.1	-1.6	1.0	232.0	3.0	0.0	Horz	AV	0.0	51.5	54.0	-2.5	10 Hz Avg, Low Ch., 2402 MHz, ADV, EUT On Side
12020.030	57.9	-6.7	1.2	345.0	3.0	0.0	Vert	AV	0.0	51.2	54.0	-2.8	Low Ch., 2404 MHz, DATA, EUT Vert
19233.680	52.3	-1.6	1.0	222.0	3.0	0.0	Vert	AV	0.0	50.7	54.0	-3.3	10 Hz Avg, Low Ch., 2404 MHz, DATA, EUT Vert
19233.670	52.2	-1.6	1.0	202.0	3.0	0.0	Horz	AV	0.0	50.6	54.0	-3.4	10 Hz Avg, Low Ch., 2404 MHz, DATA, EUT On Side
19217.640	52.1	-1.6	1.0	222.0	3.0	0.0	Vert	AV	0.0	50.5	54.0	-3.5	10 Hz Avg, Low Ch., 2402 MHz, ADV, EUT Vert
12130.030	55.7	-5.5	1.1	45.0	3.0	0.0	Vert	AV	0.0	50.2	54.0	-3.8	Mid Ch., 2426 MHz, ADV, EUT Vert
12010.020	57.0	-6.8	1.2	348.0	3.0	0.0	Vert	AV	0.0	50.2	54.0	-3.8	Low Ch., 2402 Mhz, ADV, EUT Vert
19825.660	50.7	-0.9	1.0	202.0	3.0	0.0	Horz	AV	0.0	49.8	54.0	-4.2	10 Hz Avg, High Ch., 2478 MHz, DATA, EUT On Side
4852.055	38.7	10.9	1.0	4.0	3.0	0.0	Vert	AV	0.0	49.6	54.0	-4.4	Mid Ch., 2426 MHz, ADV, EUT Vert
12210.030	54.1	-4.7	0.8	349.0	3.0	0.0	Vert	AV	0.0	49.4	54.0	-4.6	Mid Ch., 2442 MHz, DATA, EUT Vert
19825.660	50.3	-0.9	1.0	222.0	3.0	0.0	Vert	AV	0.0	49.4	54.0	-4.6	10 Hz Avg, High Ch., 2478 MHz, DATA, EUT Vert
4884.058	38.4	10.9	1.0	207.0	3.0	0.0	Vert	AV	0.0	49.3	54.0	-4.7	Mid Ch., 2442 MHz, DATA, EUT Vert
4956.050	38.1	11.2	1.2	16.0	3.0	0.0	Vert	AV	0.0	49.3	54.0	-4.7	High Ch., 2478 MHz, DATA, EUT Vert
19838.660	49.9	-0.9	1.0	202.0	3.0	0.0	Horz	AV	0.0	49.0	54.0	-5.0	10 Hz Avg, High Ch., 2480 MHz, ADV, EUT On Side
19537.690	49.6	-1.1	1.0	222.0	3.0	0.0	Vert	AV	0.0	48.5	54.0	-5.5	10 Hz Avg, Mid Ch., 2442 MHz, DATA, EUT Vert
19841.730	49.0	-0.9	1.0	222.0	3.0	0.0	Vert	AV	0.0	48.1	54.0	-5.9	10 Hz Avg, High Ch., 2480 MHz, ADV, EUT Vert
19537.770	49.1	-1.1	1.0	202.0	3.0	0.0	Horz	AV	0.0	48.0	54.0	-6.0	10 Hz Avg, Mid Ch., 2442 MHz, DATA, EUT On Side
7434.055	29.4	18.5	1.0	48.0	3.0	0.0	Vert	AV	0.0	47.9	54.0	-6.1	High Ch., 2478 MHz, DATA, EUT Vert
4808.045	37.1	10.7	1.0	208.0	3.0	0.0	Vert	AV	0.0	47.8	54.0	-6.2	Low Ch., 2404 MHz, DATA, EUT Vert
7278.065	29.4	17.8	1.9	49.0	3.0	0.0	Vert	AV	0.0	47.2	54.0	-6.8	Mid Ch., 2426 MHz, ADV, EUT Vert
19409.690	47.5	-1.3	1.0	222.0	3.0	0.0	Vert	AV	0.0	46.2	54.0	-7.8	10 Hz Avg, Mid Ch., 2426 MHz, ADV, EUT Vert
19214.180	67.5	-1.6	1.0	232.0	3.0	0.0	Horz	PK	0.0	65.9	74.0	-8.1	Low Ch., 2402 MHz, ADV, EUT On Side
7439.790	26.8	18.5	1.3	55.0	3.0	0.0	Vert	AV	0.0	45.3	54.0	-8.7	High Ch., 2480 MHz, ADV, EUT Vert
19230.120	66.5	-1.6	1.0	222.0	3.0	0.0	Vert	PK	0.0	64.9	74.0	-9.1	Low Ch., 2404 MHz, DATA, EUT Vert
19230.080	66.5	-1.6	1.0	202.0	3.0	0.0	Horz	PK	0.0	64.9	74.0	-9.1	Low Ch., 2404 MHz, DATA, EUT On Side
12021.330	71.4	-6.7	1.2	345.0	3.0	0.0	Vert	PK	0.0	64.7	74.0	-9.3	Low Ch., 2404 MHz, DATA, EUT Vert
19214.150	66.3	-1.6	1.0	222.0	3.0	0.0	Vert	PK	0.0	64.7	74.0	-9.3	Low Ch., 2402 MHz, ADV, EUT Vert
7326.345	26.5	18.1	1.0	265.0	3.0	0.0	Vert	AV	0.0	44.6	54.0	-9.4	Mid Ch., 2442 MHz, DATA, EUT Vert
12400.900	39.0	5.3	1.0	337.0	3.0	0.0	Vert	AV	0.0	44.3	54.0	-9.7	High Ch., 2480 MHz, ADV, EUT Vert
4960.035	32.7	11.2	1.2	338.0	3.0	0.0	Vert	AV	0.0	43.9	54.0	-10.1	High Ch., 2480 MHz, ADV, EUT Vert
12011.340	70.4	-6.8	1.2	348.0	3.0	0.0	Vert	PK	0.0	63.6	74.0	-10.4	Low Ch., 2402 Mhz, ADV, EUT Vert
12128.830	69.1	-5.5	1.1	45.0	3.0	0.0	Vert	PK	0.0	63.6	74.0	-10.4	Mid Ch., 2426 MHz, ADV, EUT Vert
19822.180	64.5	-0.9	1.0	202.0	3.0	0.0	Horz	PK	0.0	63.6	74.0	-10.4	High Ch., 2478 MHz, DATA, EUT On Side

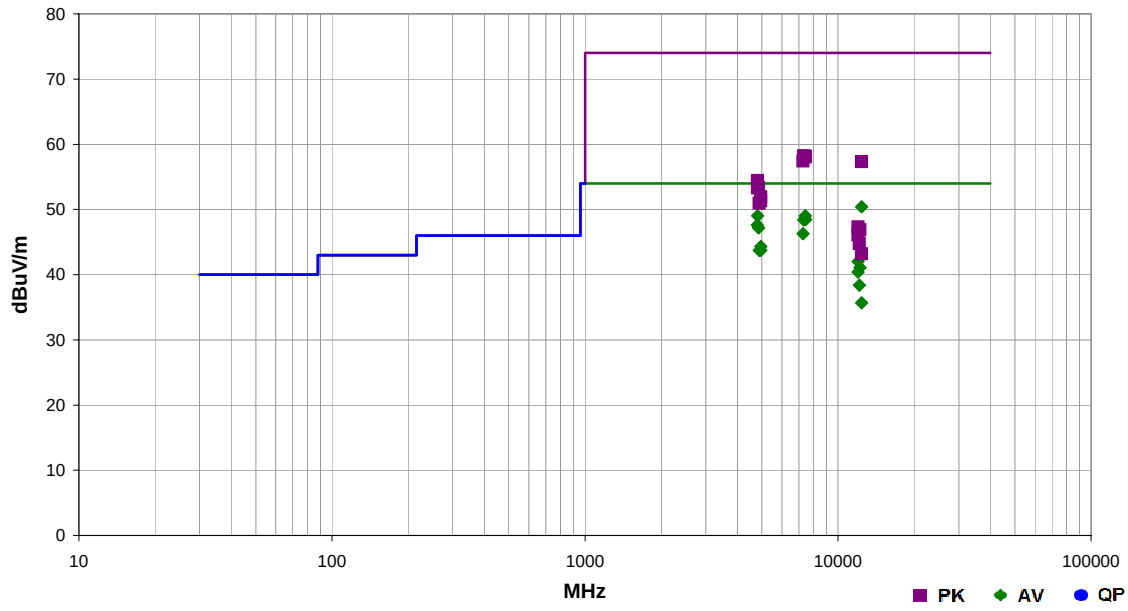
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
19822.080	64.0	-0.9	1.0	222.0	3.0	0.0	Vert	PK	0.0	63.1	74.0	-10.9	High Ch., 2478 MHz, DATA, EUT Vert
12208.810	67.3	-4.7	0.8	349.0	3.0	0.0	Vert	PK	0.0	62.6	74.0	-11.4	Mid Ch., 2442 MHz, DATA, EUT Vert
19838.170	63.5	-0.9	1.0	202.0	3.0	0.0	Horz	PK	0.0	62.6	74.0	-11.4	High Ch., 2480 MHz, ADV, EUT On Side
12390.860	45.0	-2.7	1.0	351.0	3.0	0.0	Vert	AV	0.0	42.3	54.0	-11.7	High Ch., 2478 MHz, DATA, EUT Vert
19538.000	63.0	-1.1	1.0	222.0	3.0	0.0	Vert	PK	0.0	61.9	74.0	-12.1	Mid Ch., 2442 MHz, DATA, EUT Vert
19538.110	62.4	-1.1	1.0	202.0	3.0	0.0	Horz	PK	0.0	61.3	74.0	-12.7	Mid Ch., 2442 MHz, DATA, EUT On Side
19838.050	62.2	-0.9	1.0	222.0	3.0	0.0	Vert	PK	0.0	61.3	74.0	-12.7	High Ch., 2480 MHz, ADV, EUT Vert
19406.100	60.7	-1.3	1.0	222.0	3.0	0.0	Vert	PK	0.0	59.4	74.0	-14.6	Mid Ch., 2426 MHz, ADV, EUT Vert
19409.950	60.1	-1.3	1.0	202.0	3.0	0.0	Horz	PK	0.0	58.8	74.0	-15.2	Mid Ch., 2426 MHz, ADV, EUT Horz
7325.470	40.6	18.1	1.0	265.0	3.0	0.0	Vert	PK	0.0	58.7	74.0	-15.3	Mid Ch., 2442 MHz, DATA, EUT Vert
7434.875	40.1	18.5	1.0	48.0	3.0	0.0	Vert	PK	0.0	58.6	74.0	-15.4	High Ch., 2478 MHz, DATA, EUT Vert
7277.325	40.7	17.8	1.9	49.0	3.0	0.0	Vert	PK	0.0	58.5	74.0	-15.5	Mid Ch., 2426 MHz, ADV, EUT Vert
4804.485	47.0	10.7	1.0	9.0	3.0	0.0	Vert	PK	0.0	57.7	74.0	-16.3	Low Ch., 2402 MHz, ADV, EUT Vert
7439.540	39.2	18.5	1.3	55.0	3.0	0.0	Vert	PK	0.0	57.7	74.0	-16.3	High Ch., 2480 MHz, ADV, EUT Vert
12401.230	50.7	5.3	1.0	337.0	3.0	0.0	Vert	PK	0.0	56.0	74.0	-18.0	High Ch., 2480 MHz, ADV, EUT Vert
4851.420	44.4	10.8	1.0	4.0	3.0	0.0	Vert	PK	0.0	55.2	74.0	-18.8	Mid Ch., 2426 MHz, ADV, EUT Vert
4884.450	44.1	10.9	1.0	207.0	3.0	0.0	Vert	PK	0.0	55.0	74.0	-19.0	Mid Ch., 2442 MHz, DATA, EUT Vert
4956.405	43.7	11.2	1.2	16.0	3.0	0.0	Vert	PK	0.0	54.9	74.0	-19.1	High Ch., 2478 MHz, DATA, EUT Vert
4807.760	43.6	10.7	1.0	208.0	3.0	0.0	Vert	PK	0.0	54.3	74.0	-19.7	Low Ch., 2404 MHz, DATA, EUT Vert
12388.930	56.8	-2.7	1.0	351.0	3.0	0.0	Vert	PK	0.0	54.1	74.0	-19.9	High Ch., 2478 MHz, DATA, EUT Vert
4960.185	40.8	11.2	1.2	338.0	3.0	0.0	Vert	PK	0.0	52.0	74.0	-22.0	High Ch., 2480 MHz, ADV, EUT Vert

SPURIOUS RADIATED EMISSIONS

Work Order:	SUPR0115	**Date:**	02/03/14		
Project:	None	**Temperature:**	22.5 °C		
Job Site:	EV01	**Humidity:**	29% RH		
Serial Number:	0075, 0009	**Barometric Pres.:**	1019 mbar	**Tested by:**	Carl Engholm
EUT:	WTI SMART				
Configuration:	5, 6				
Customer:	Supra, A Division of UTCFS				
Attendees:	None				
EUT Power:	Internal Battery				
Operating Mode:	Continuous Transmit, Bluetooth Low Energy				
Deviations:	None				
Comments:	See comments below for channel, frequency, and modulation type. EUT vertical in test fixture. Two devices were used for this testing. The second device was swapped in when the battery lost charge on the device shown.				

Test Specifications	**Test Method**
FCC 15.247:2014	ANSI C63.10:2009

Run #	72	**Test Distance (m)**	3	**Antenna Height(s)**	1-4m	**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
12401.140	45.1	5.3	1.1	208.0	3.0	0.0	Horz	AV	0.0	50.4	54.0	-3.6	High Ch., 2480 MHz, ADV, EUT Vert
7433.390	30.6	18.5	1.0	174.0	3.0	0.0	Horz	AV	0.0	49.1	54.0	-4.9	High Ch., 2478 MHz, DATA, EUT Vert
4808.055	38.3	10.7	1.0	299.0	3.0	0.0	Horz	AV	0.0	49.0	54.0	-5.0	Low Ch., 2404 MHz, DATA, EUT Vert
7439.500	30.0	18.5	1.0	213.0	3.0	0.0	Horz	AV	0.0	48.5	54.0	-5.5	High Ch., 2480 MHz, ADV, EUT Vert
7325.500	30.3	18.1	1.0	180.0	3.0	0.0	Horz	AV	0.0	48.4	54.0	-5.6	Mid Ch., 2442 MHz, DATA, EUT Vert
4804.045	36.9	10.7	1.2	208.0	3.0	0.0	Horz	AV	0.0	47.6	54.0	-6.4	Low Ch., 2402 MHz, ADV, EUT Vert
4852.030	36.3	10.9	1.1	254.0	3.0	0.0	Horz	AV	0.0	47.2	54.0	-6.8	Mid Ch., 2426 MHz, ADV, EUT Vert
7277.695	28.5	17.8	1.0	202.0	3.0	0.0	Horz	AV	0.0	46.3	54.0	-7.7	Mid Ch., 2426 MHz, ADV, EUT Vert
4956.045	33.1	11.2	1.4	164.0	3.0	0.0	Horz	AV	0.0	44.3	54.0	-9.7	High Ch., 2478 MHz, DATA, EUT Vert
4884.000	32.8	10.9	1.0	66.0	3.0	0.0	Horz	AV	0.0	43.7	54.0	-10.3	Mid Ch., 2442 MHz, DATA, EUT Vert
4959.975	32.5	11.2	1.0	163.0	3.0	0.0	Horz	AV	0.0	43.7	54.0	-10.3	High Ch., 2480 MHz, ADV, EUT Vert
12011.160	48.8	-6.8	1.0	233.0	3.0	0.0	Horz	AV	0.0	42.0	54.0	-12.0	Low Ch., 2402 MHz, ADV, EUT Vert
12211.170	45.7	-4.6	1.0	186.0	3.0	0.0	Horz	AV	0.0	41.1	54.0	-12.9	Mid Ch., 2442 MHz, DATA, EUT Vert
12021.210	47.1	-6.7	1.0	234.0	3.0	0.0	Horz	AV	0.0	40.4	54.0	-13.6	Low Ch., 2404 MHz, DATA, EUT Vert
12131.130	43.9	-5.5	1.0	159.0	3.0	0.0	Horz	AV	0.0	38.4	54.0	-15.6	Mid Ch., 2426 MHz, ADV, EUT Vert
7326.767	40.1	18.1	1.0	180.0	3.0	0.0	Horz	PK	0.0	58.2	74.0	-15.8	Mid Ch., 2442 MHz, DATA, EUT Vert
7434.355	39.7	18.5	1.0	174.0	3.0	0.0	Horz	PK	0.0	58.2	74.0	-15.8	High Ch., 2478 MHz, DATA, EUT Vert
7439.810	39.6	18.5	1.0	213.0	3.0	0.0	Horz	PK	0.0	58.1	74.0	-15.9	High Ch., 2480 MHz, ADV, EUT Vert
7279.075	39.6	17.8	1.0	202.0	3.0	0.0	Horz	PK	0.0	57.4	74.0	-16.6	Mid Ch., 2426 MHz, ADV, EUT Vert
12401.440	52.0	5.3	1.1	208.0	3.0	0.0	Horz	PK	0.0	57.3	74.0	-16.7	High Ch., 2480 MHz, ADV, EUT Vert
12389.020	38.4	-2.7	1.8	210.0	3.0	0.0	Horz	AV	0.0	35.7	54.0	-18.3	High Ch., 2478 MHz, DATA, EUT Vert
4808.565	43.7	10.7	1.0	299.0	3.0	0.0	Horz	PK	0.0	54.4	74.0	-19.6	Low Ch., 2404 MHz, DATA, EUT Vert
4852.640	42.5	10.9	1.1	254.0	3.0	0.0	Horz	PK	0.0	53.4	74.0	-20.6	Mid Ch., 2426 MHz, ADV, EUT Vert
4804.380	42.6	10.7	1.2	208.0	3.0	0.0	Horz	PK	0.0	53.3	74.0	-20.7	Low Ch., 2402 MHz, ADV, EUT Vert
4955.845	40.7	11.2	1.4	164.0	3.0	0.0	Horz	PK	0.0	51.9	74.0	-22.1	High Ch., 2478 MHz, DATA, EUT Vert
4959.530	40.1	11.2	1.0	163.0	3.0	0.0	Horz	PK	0.0	51.3	74.0	-22.7	High Ch., 2480 MHz, ADV, EUT Vert
4883.583	40.0	10.9	1.0	66.0	3.0	0.0	Horz	PK	0.0	50.9	74.0	-23.1	Mid Ch., 2442 MHz, DATA, EUT Vert

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
12011.300	54.1	-6.8	1.0	233.0	3.0	0.0	Horz	PK	0.0	47.3	74.0	-26.7	Low Ch., 2402 MHz, ADV, EUT Vert
12211.470	51.5	-4.6	1.0	186.0	3.0	0.0	Horz	PK	0.0	46.9	74.0	-27.1	Mid Ch., 2442 MHz, DATA, EUT Vert
12021.230	52.8	-6.7	1.0	234.0	3.0	0.0	Horz	PK	0.0	46.1	74.0	-27.9	Low Ch., 2404 MHz, DATA, EUT Vert
12129.000	50.3	-5.5	1.0	159.0	3.0	0.0	Horz	PK	0.0	44.8	74.0	-29.2	Mid Ch., 2426 MHz, ADV, EUT Vert
12388.790	45.9	-2.7	1.8	210.0	3.0	0.0	Horz	PK	0.0	43.2	74.0	-30.8	High Ch., 2478 MHz, DATA, EUT Vert