

NORTHWEST EMC

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CERTIFICATE OF TEST

Last Date of Test: December 20, 2016
Select Comfort Corporation
Model: 360SIQYYZ

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2016	ANSI C63.10:2013, KDB 558074
FCC 15.247:2016	

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
11.6	Duty Cycle	Yes	N/A	Characterization of radio operation.
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.1.1	Output Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	
11.12.1, 11.13.2, 6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:



Kyle Holgate, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information.

REVISION HISTORY

Revision Number		Description	Date	Page Number
00		None		

ACCREDITATIONS AND AUTHORIZATIONS

United States

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

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

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

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

European Union

European Commission – Validated by the European Commission 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

MSIP / 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:

<http://www.nwemc.com/accreditations/>
<http://gsi.nist.gov/global/docs/cabs/designations.html>

MEASUREMENT UNCERTAINTY

Measurement Uncertainty

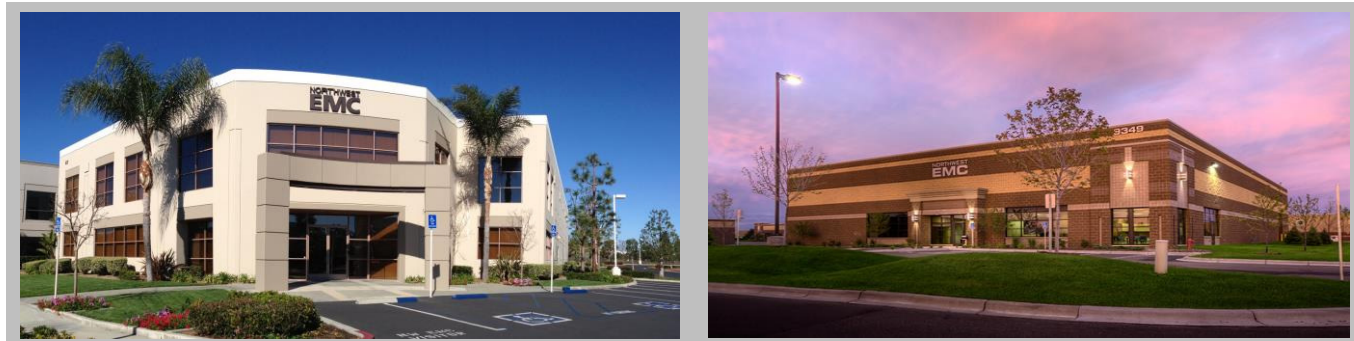
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement 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 included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

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

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

FACILITIES

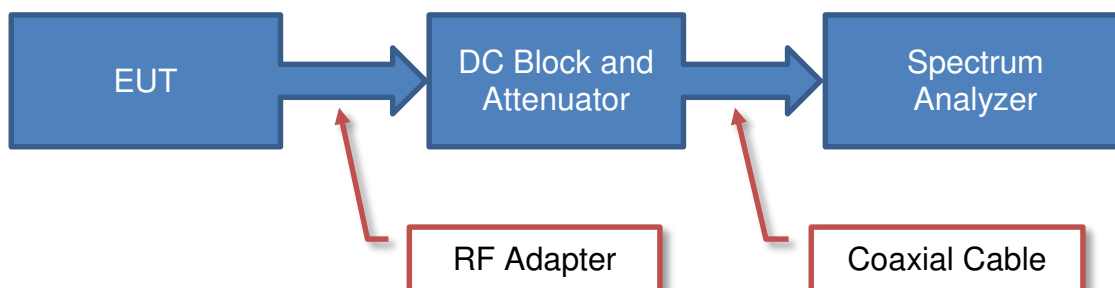


California Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	New York Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Oregon Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-2	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRR, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157

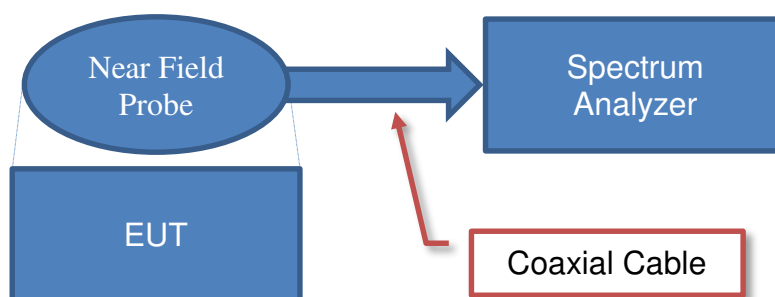


Test Setup Block Diagrams

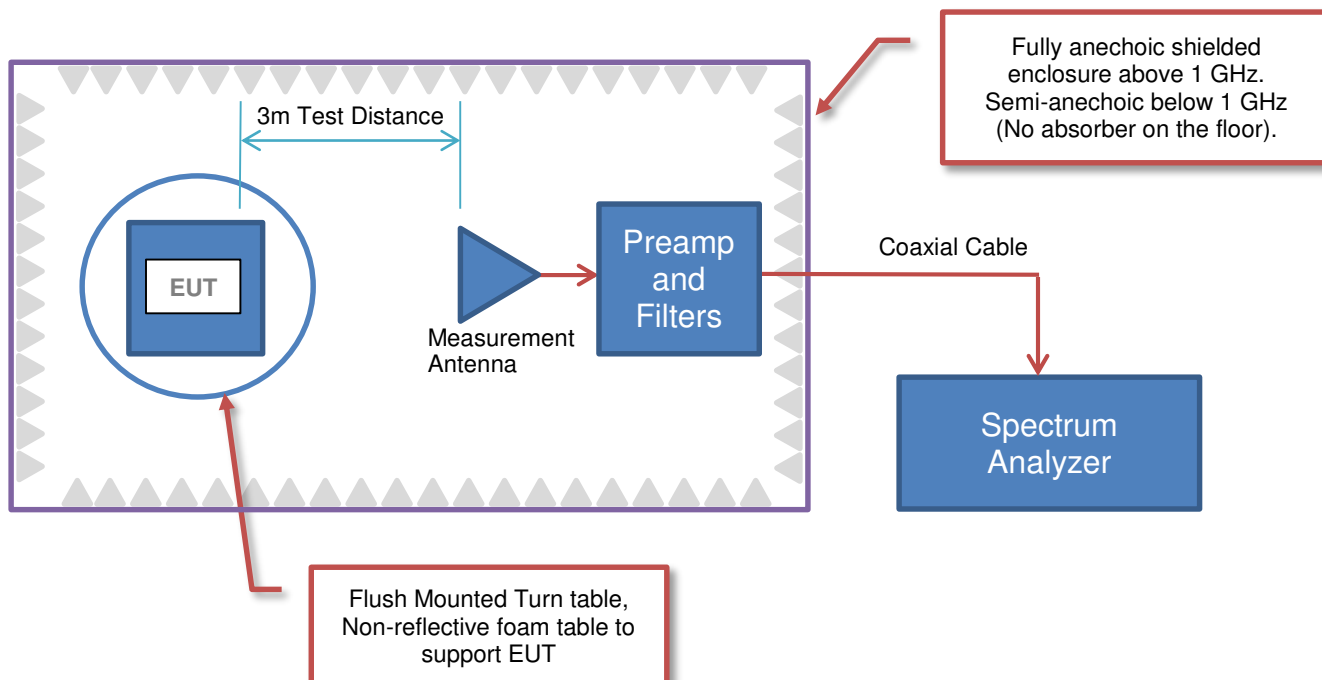
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Select Comfort Corporation
Address:	6105 Trenton Lane North
City, State, Zip:	Plymouth, MN 55442
Test Requested By:	Nick Reynolds
Model:	360SIQYYZ
First Date of Test:	December 19, 2016
Last Date of Test:	December 20, 2016
Receipt Date of Samples:	December 19, 2016
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Bed pump with a Zigbee Radio, Bluetooth Low Energy Radio, and Pre-certified Wi-Fi radio module installed. The pump can be a stand-alone unit or mounted in the base unit.
Testing Objective:
To demonstrate compliance of the Bluetooth Low Energy radio to FCC 15.247 requirements.

CONFIGURATIONS

Configuration SECF0064- 1

Software/Firmware Running during test	
Description	Version
TI IDE	Unknown

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
360 Connect Pump (Pulse Transformer)	Select Comfort Corporation	EVT3.1 830-000021	64DBA00000C0

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Integrated Base	Select Comfort Corporation	Unknown	Unknown

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable	No	2.5m	No	360 Connect Pump	AC Mains

Configuration SECF0064- 2

Software/Firmware Running during test	
Description	Version
TI IDE	Unknown

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
360 Connect Pump	Select Comfort Corporation	EVT3.1 830-000021	64DBA0000136

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Integrated Base	Select Comfort Corporation	Unknown	Unknown

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable	No	2.5m	No	360 Connect Pump	AC Mains

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	12/19/2016	Spurious Radiated 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.
2	12/20/2016	Powerline 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.
3	12/20/2016	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.
4	12/20/2016	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.
5	12/20/2016	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	12/20/2016	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.
7	12/20/2016	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWERLINE CONDUCTED EMISSIONS

TEST DESCRIPTION

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable - Conducted Cable Assembly	Northwest EMC	EVG, HHD, RKA	EVGA	5/10/2016	5/10/2017
Receiver	Rohde & Schwarz	ESCI	ARH	3/21/2016	3/21/2017
LISN	Solar Electronics	9252-50-R-24-BNC	LIP	10/4/2016	10/4/2018

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

SECF0064-2

MODES INVESTIGATED

Bluetooth low energy, transmit middle channel 2400 MHz.

POWERLINE CONDUCTED EMISSIONS

EUT: 360

POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #5

Quasi Peak Data - vs - Quasi Peak Limit

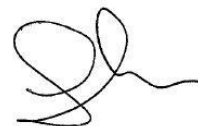
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.184	27.2	19.7	46.9	64.3	-17.4
0.230	24.4	19.7	44.1	62.5	-18.4
0.193	24.8	19.7	44.5	63.9	-19.4
0.275	20.7	19.7	40.4	61.0	-20.6
0.505	11.3	19.6	30.9	56.0	-25.1
0.644	11.0	19.6	30.6	56.0	-25.4

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.230	17.1	19.7	36.8	52.5	-15.7
0.275	14.3	19.7	34.0	51.0	-17.0
0.184	16.6	19.7	36.3	54.3	-18.0
0.505	7.3	19.6	26.9	46.0	-19.1
0.644	6.7	19.6	26.3	46.0	-19.7
0.193	4.0	19.7	23.7	53.9	-30.2

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT: 360SIQ

POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #6

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.155	29.2	19.7	48.9	65.7	-16.8
0.183	27.3	19.7	47.0	64.3	-17.3
0.229	25.1	19.7	44.8	62.5	-17.7
0.274	21.6	19.7	41.3	61.0	-19.7
0.638	15.4	19.6	35.0	56.0	-21.0
0.506	14.4	19.6	34.0	56.0	-22.0

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.229	19.0	19.7	38.7	52.5	-13.8
0.638	12.2	19.6	31.8	46.0	-14.2
0.274	17.0	19.7	36.7	51.0	-14.3
0.506	10.5	19.6	30.1	46.0	-15.9
0.183	17.3	19.7	37.0	54.3	-17.3
0.155	3.6	19.7	23.3	55.7	-32.4

CONCLUSION

Pass



Tested By

DUTY CYCLE

TEST DESCRIPTION

The Duty Cycle (x) were 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.

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

The EUT operates at 100% Duty Cycle.

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

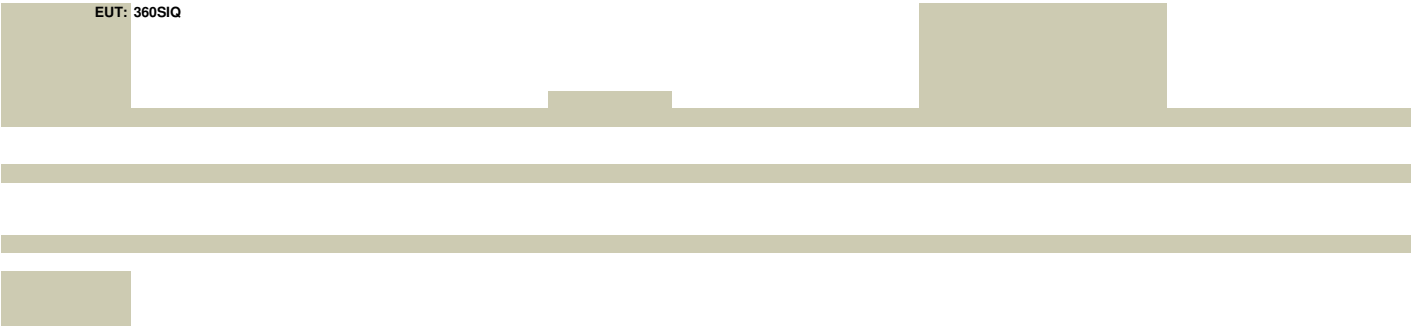
Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	8/10/2016	8/10/2017
Generator - Signal	Keysight	N5182B	TFU	10/27/2015	10/27/2018
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	6/7/2016	6/7/2017
Attenuator	S.M. Electronics	SA26B-20	AWT	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMQ	6/8/2016	6/8/2017

TEST DESCRIPTION

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.

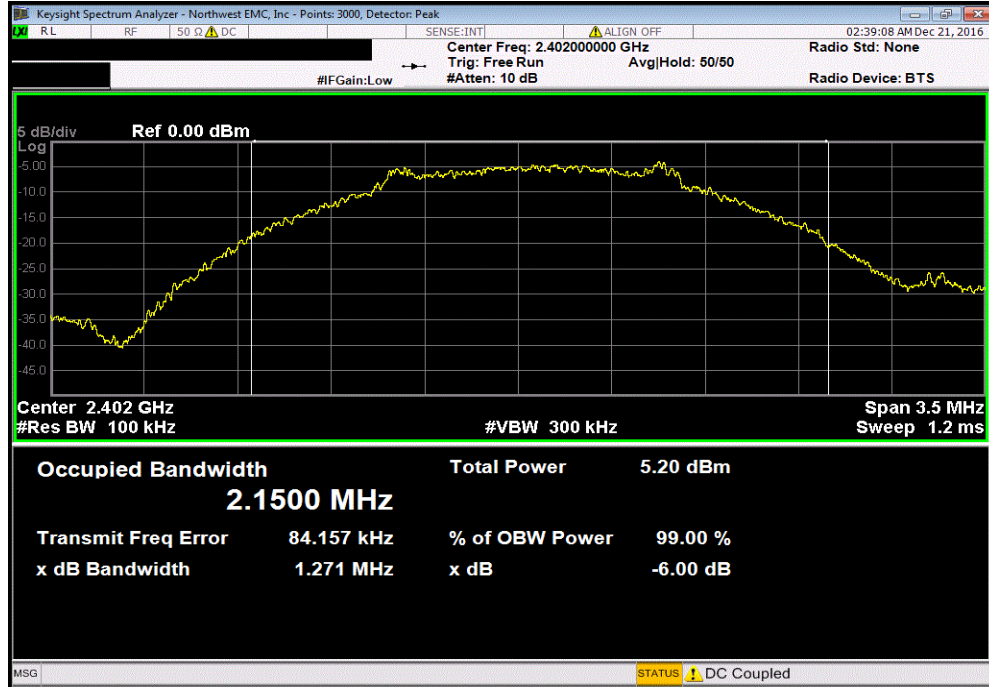
The 6dB occupied bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The 99.0% occupied bandwidth was also measured at the same time which can be needed during Output Power depending on the applicable method.

EUT: 360SIQ

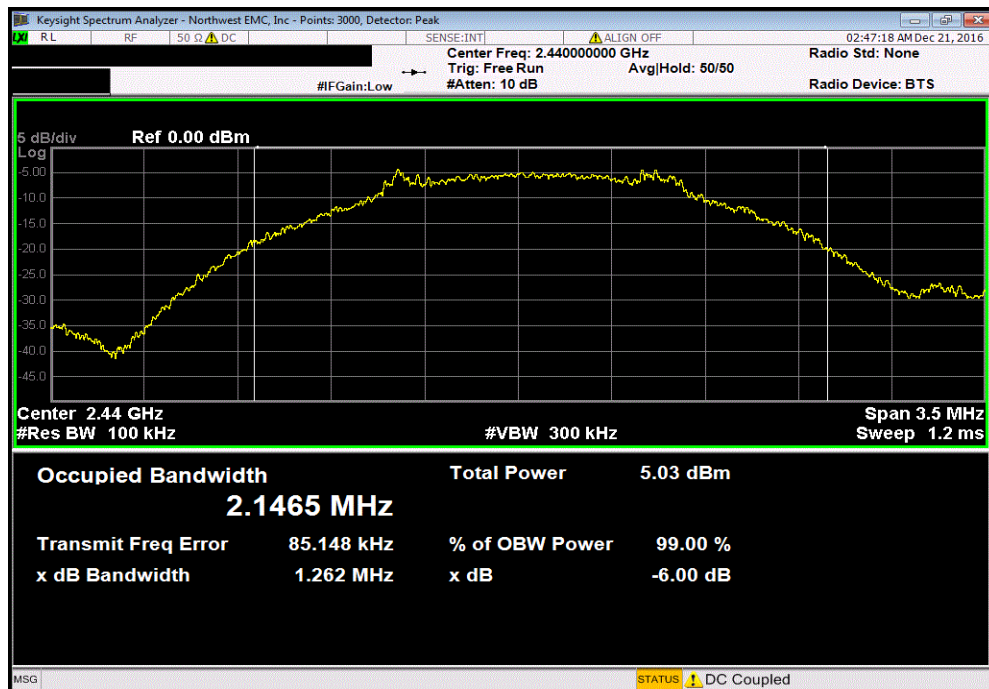


OCCUPIED BANDWIDTH

BLE/GFSK Low Channel, 2402 MHz						
				Value	Limit (≥)	Result
				1.271 MHz	500 kHz	Pass

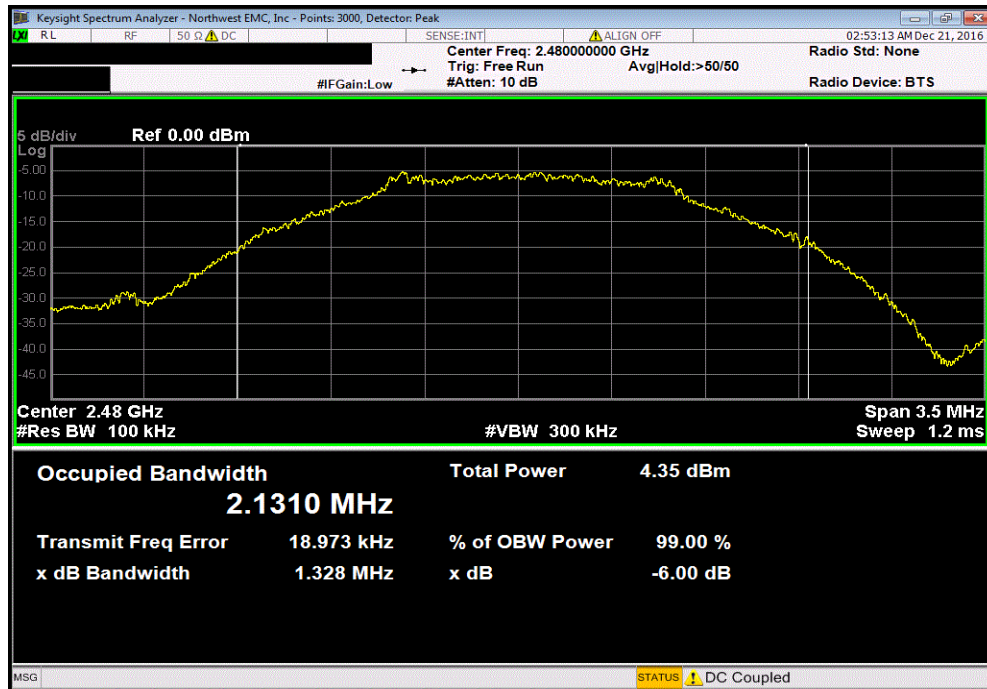


BLE/GFSK Mid Channel, 2440 MHz						
				Value	Limit (≥)	Result
				1.262 MHz	500 kHz	Pass



OCCUPIED BANDWIDTH

BLE/GFSK High Channel, 2480 MHz						
Value				Limit	Result	
1.328 MHz				500 kHz	Pass	



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.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	10/27/2015	10/27/2018
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	6/7/2016	6/7/2017
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	8/10/2016	8/10/2017
Attenuator	S.M. Electronics	SA26B-20	AWT	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMQ	6/8/2016	6/8/2017

TEST DESCRIPTION

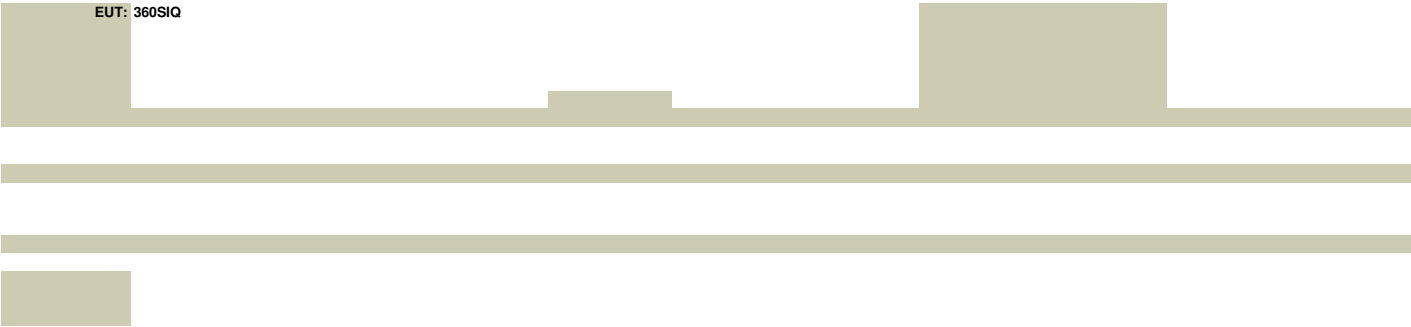
The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

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.

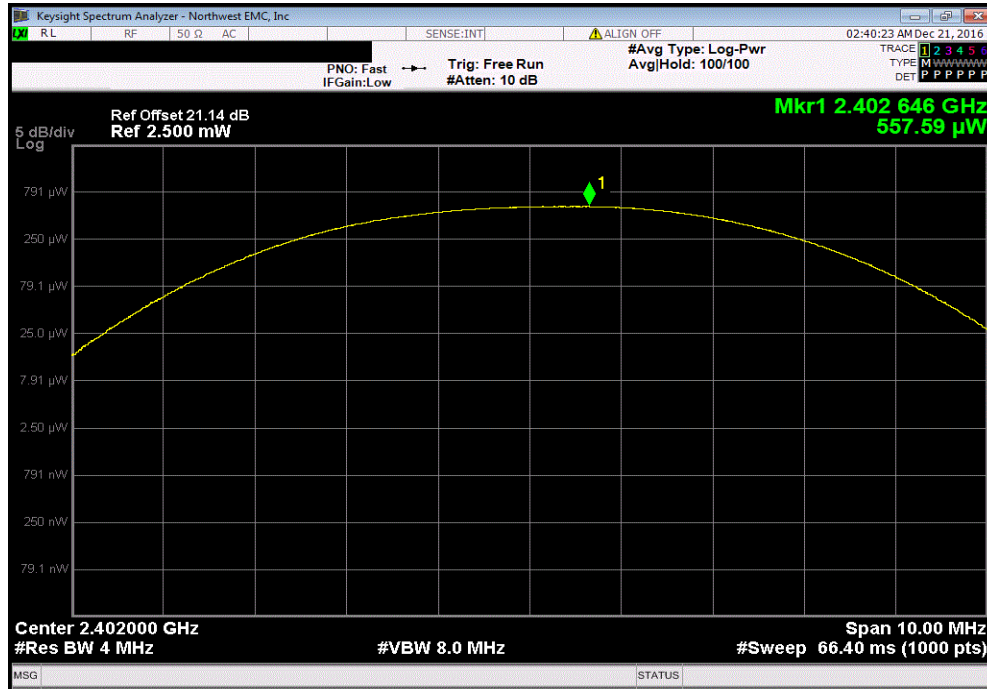
De Facto EIRP Limit: The EUT meets the de facto EIRP limit of +36 dBm.

EUT: 360SIQ

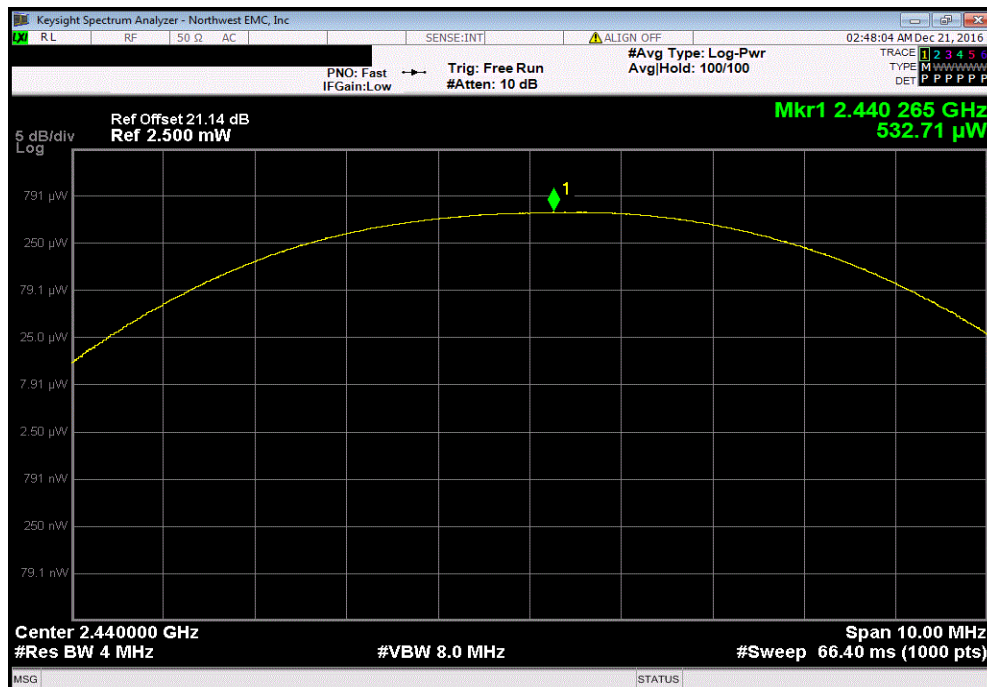


OUTPUT POWER

BLE/GFSK Low Channel, 2402 MHz						
				Value	Limit	Result
				557.59 uW	1 W	Pass

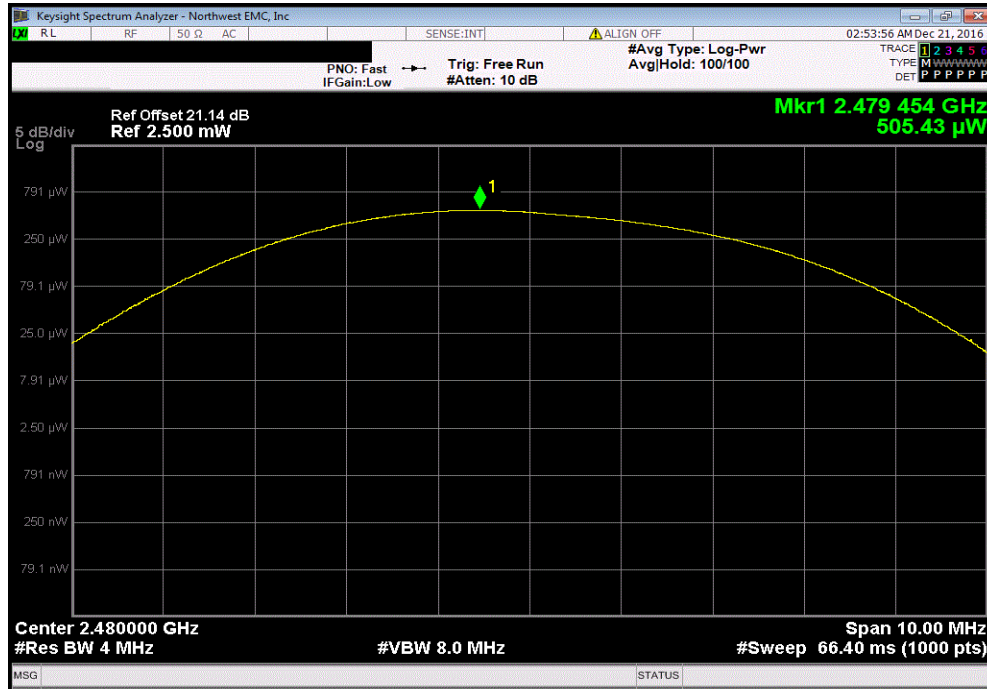


BLE/GFSK Mid Channel, 2440 MHz						
				Value	Limit	Result
				532.71 uW	1 W	Pass



OUTPUT POWER

BLE/GFSK High Channel, 2480 MHz						
				Value	Limit	Result
				505.43 μ W	1 W	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

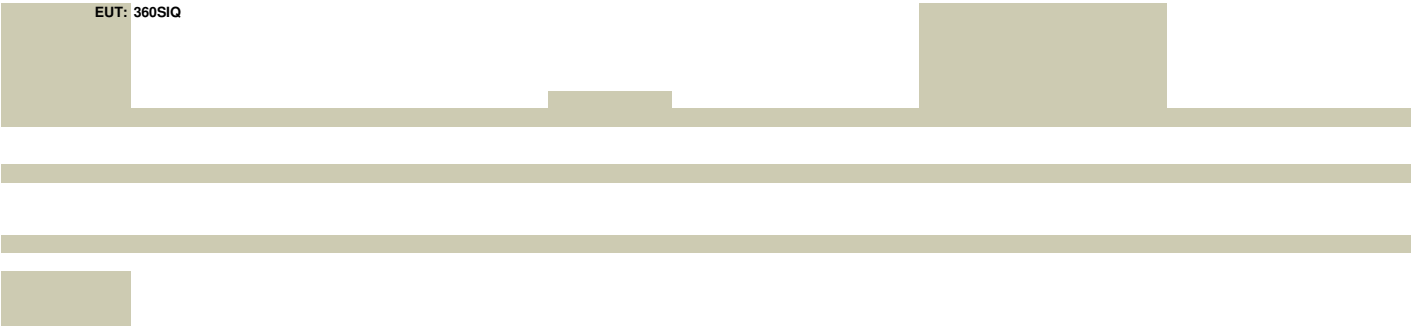
Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	10/27/2015	10/27/2018
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	8/10/2016	8/10/2017
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	6/7/2016	6/7/2017
Attenuator	S.M. Electronics	SA26B-20	AWT	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMQ	6/8/2016	6/8/2017

TEST DESCRIPTION

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.

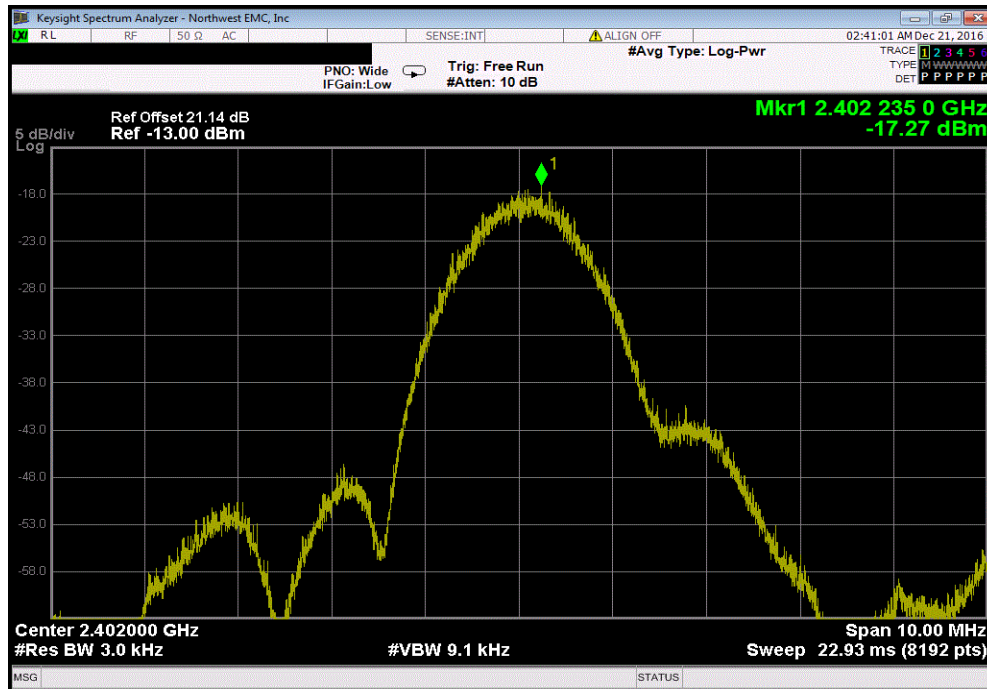
Per the procedure outlined in ANSI C63.10 the peak power spectral density was measured in a 3 kHz RBW.

EUT: 360SIQ

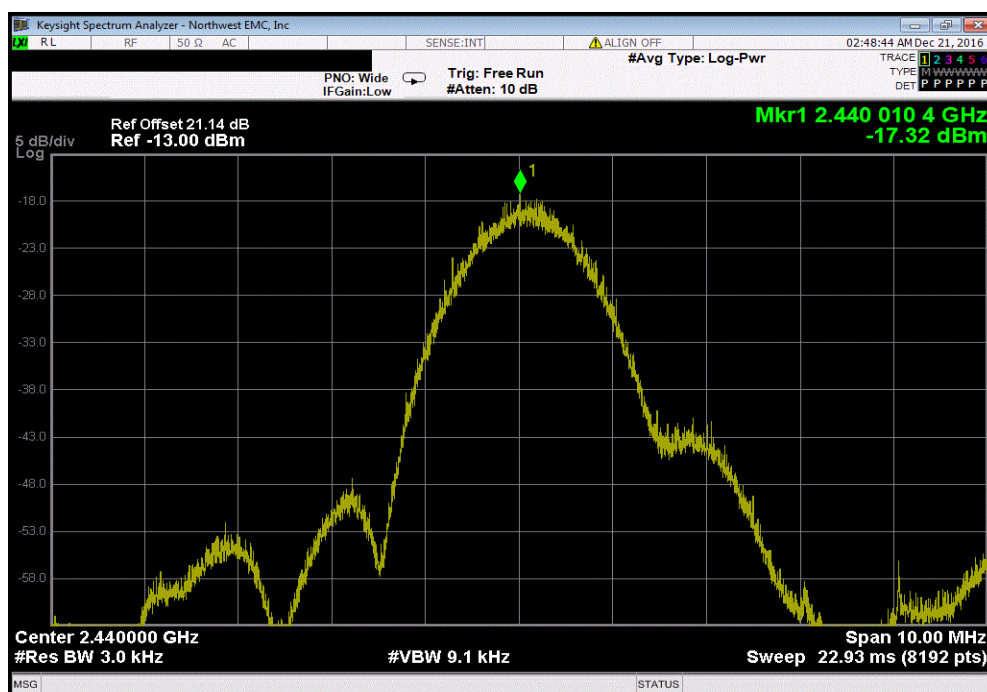


POWER SPECTRAL DENSITY

BLE/GFSK Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-17.268	8	Pass

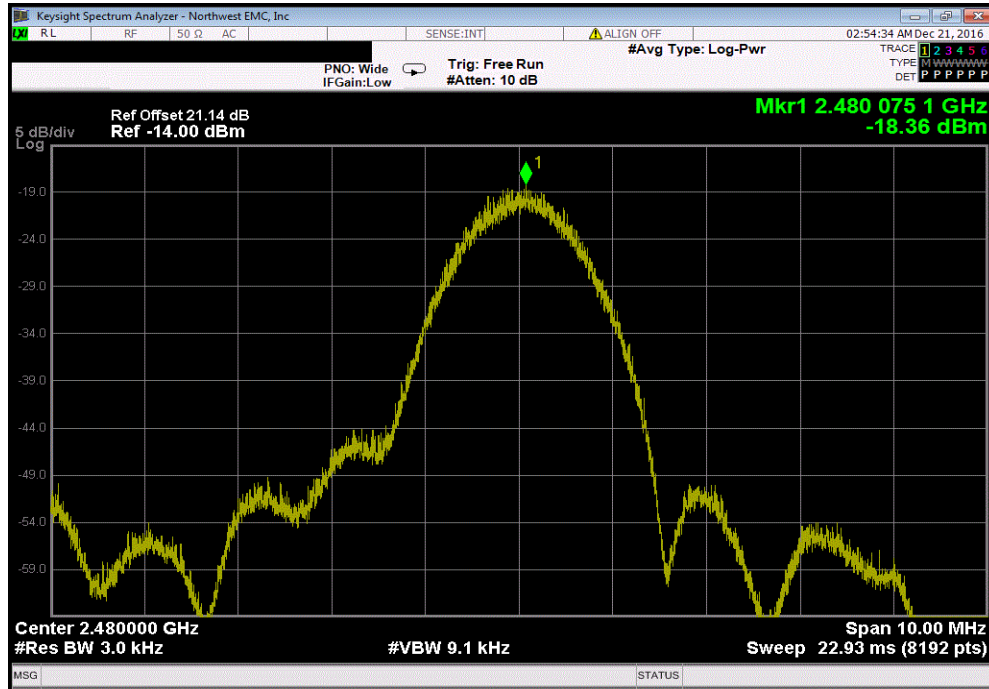


BLE/GFSK Mid Channel, 2440 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-17.317	8	Pass



POWER SPECTRAL DENSITY

BLE/GFSK High Channel, 2480 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-18.36	8	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

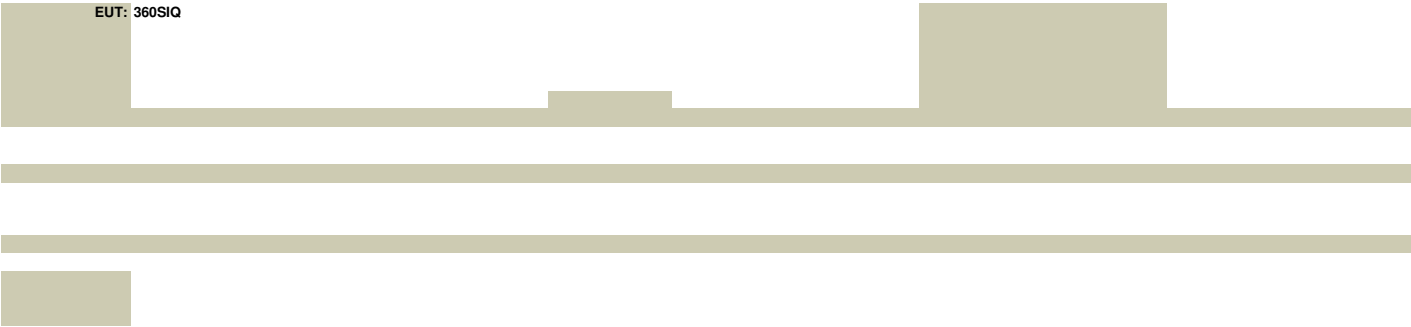
Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	8/10/2016	8/10/2017
Generator - Signal	Keysight	N5182B	TFU	10/27/2015	10/27/2018
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	6/7/2016	6/7/2017
Attenuator	S.M. Electronics	SA26B-20	AWT	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMQ	6/8/2016	6/8/2017

TEST DESCRIPTION

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.

EUT: 360SIQ

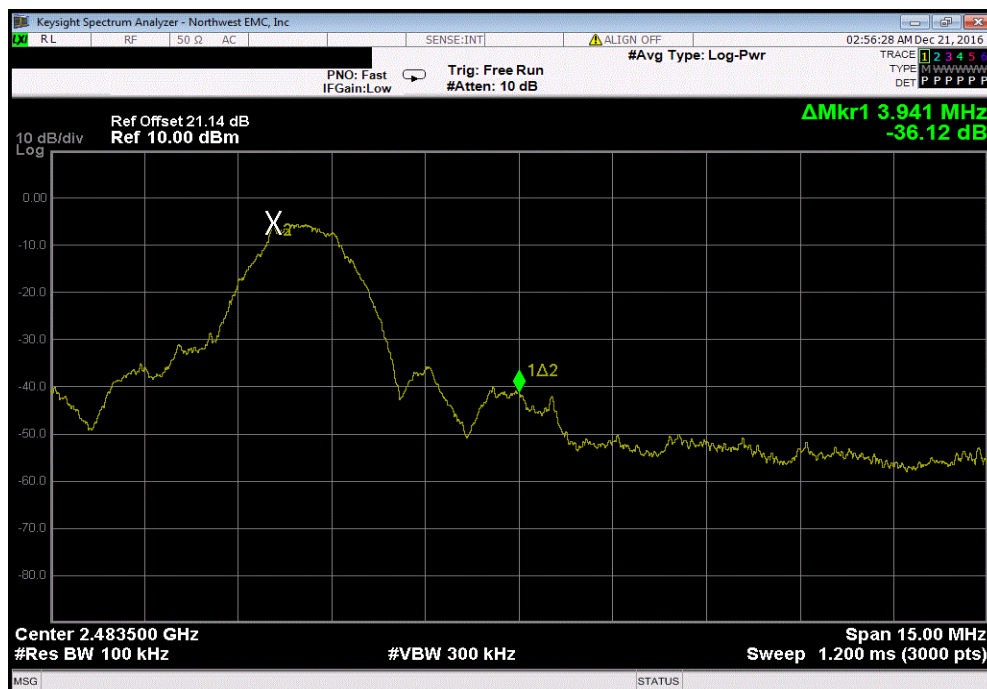


BAND EDGE COMPLIANCE

BLE/GFSK Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-30.09	-20	Pass



BLE/GFSK High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-36.12	-20	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.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	10/27/2015	10/27/2018
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	6/7/2016	6/7/2017
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	8/10/2016	8/10/2017
Attenuator	S.M. Electronics	SA26B-20	AWT	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMQ	6/8/2016	6/8/2017

TEST DESCRIPTION

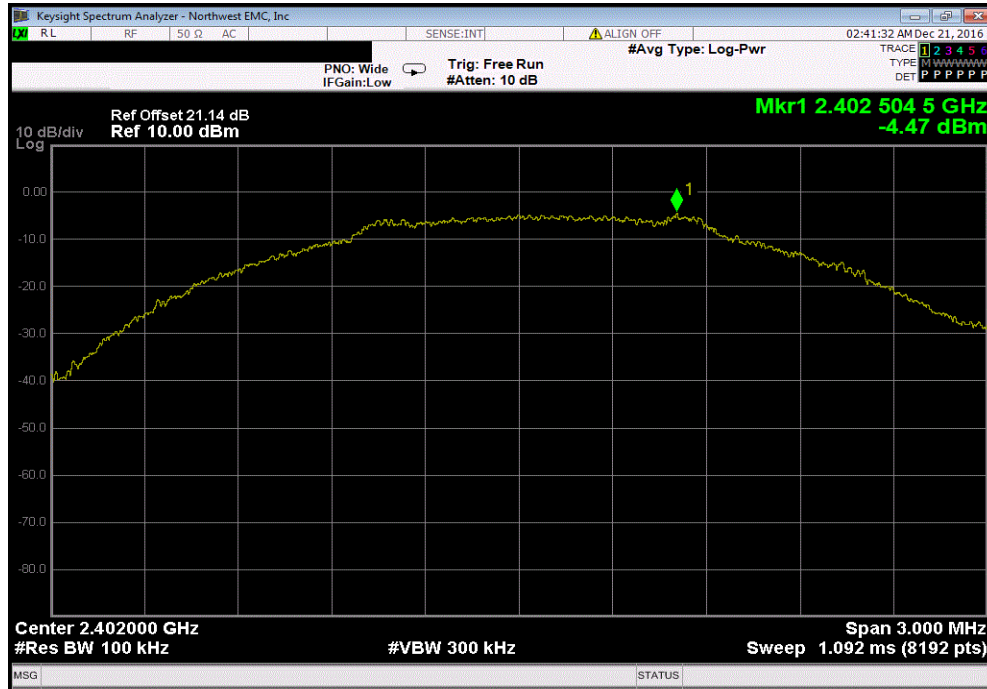
The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet. For each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

EUT: 360SIQ

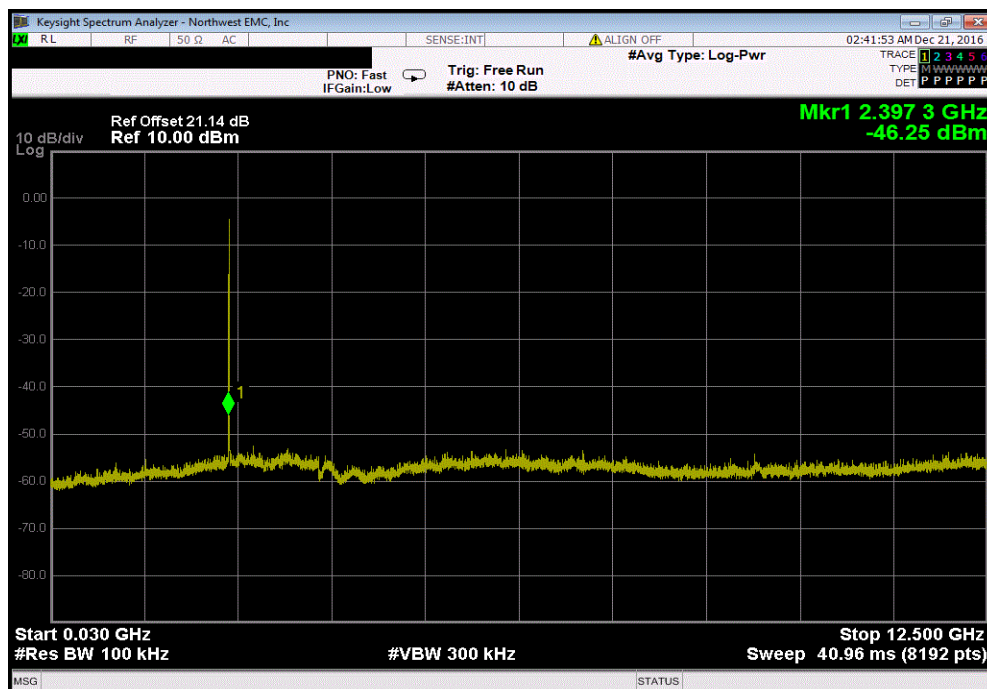


SPURIOUS CONDUCTED EMISSIONS

BLE/GFSK Low Channel, 2402 MHz						
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result			
Fundamental	N/A	N/A	N/A			

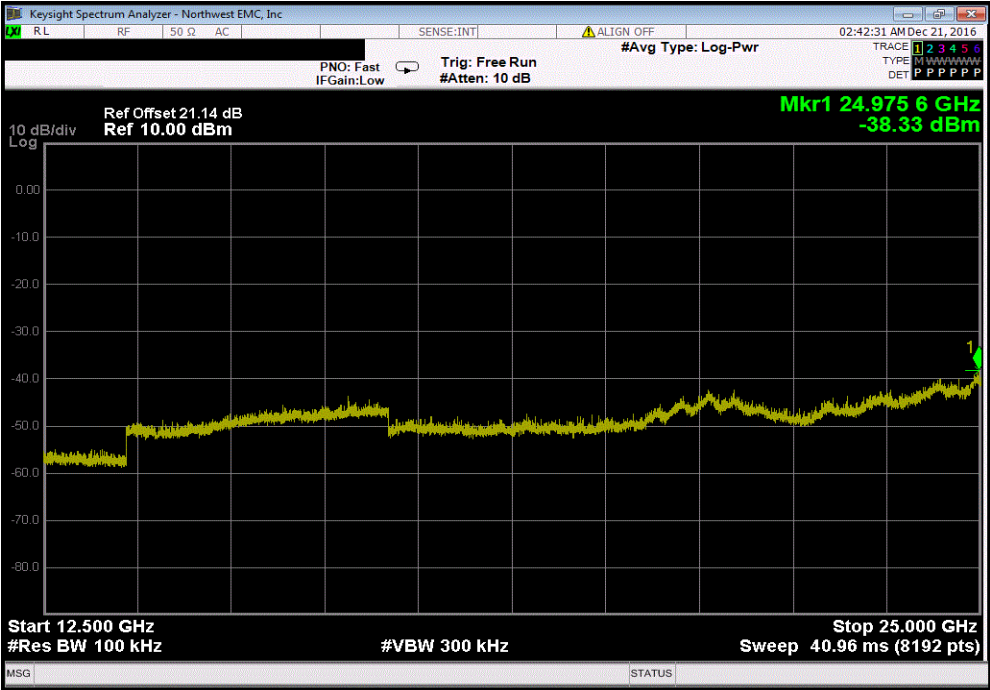


BLE/GFSK Low Channel, 2402 MHz						
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result			
30 MHz - 12.5 GHz	-41.78	-20	Pass			

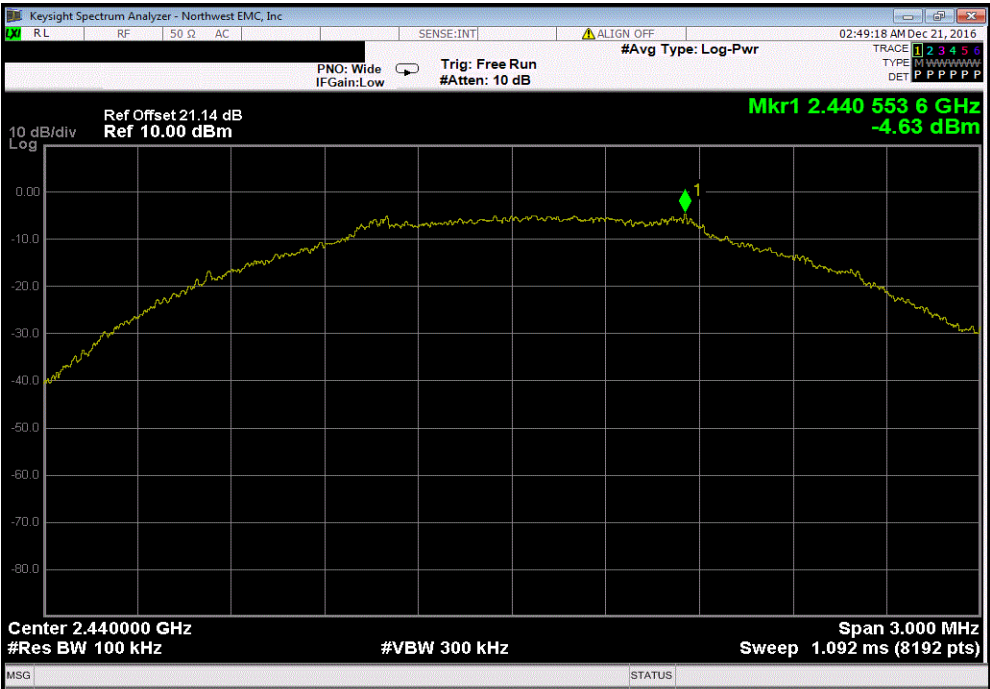


SPURIOUS CONDUCTED EMISSIONS

BLE/GFSK Low Channel, 2402 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-33.86	-20	Pass	

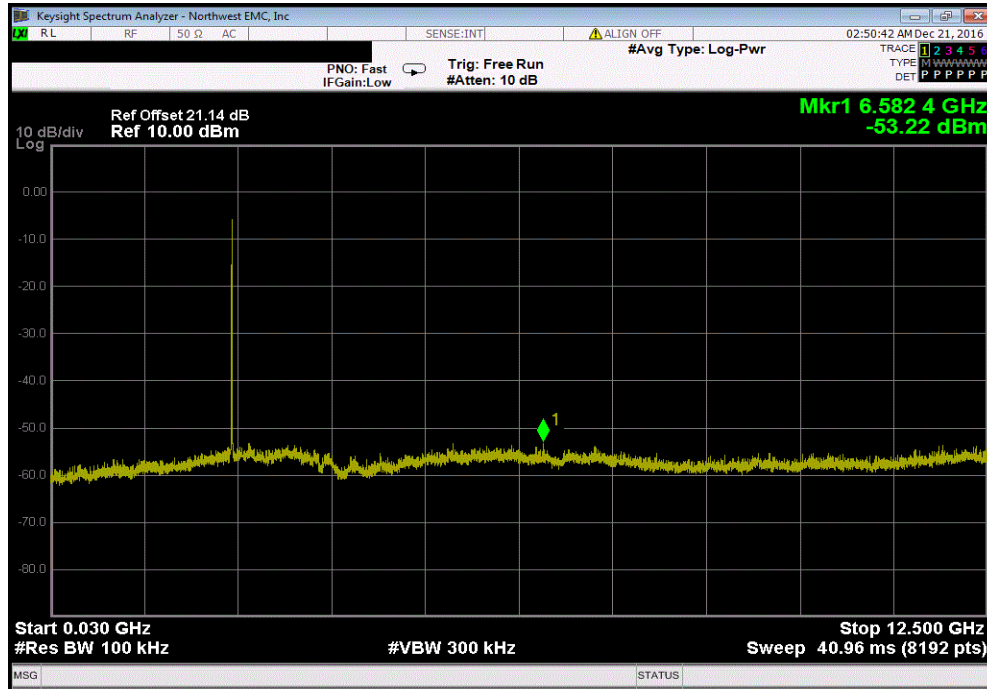


BLE/GFSK Mid Channel, 2440 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

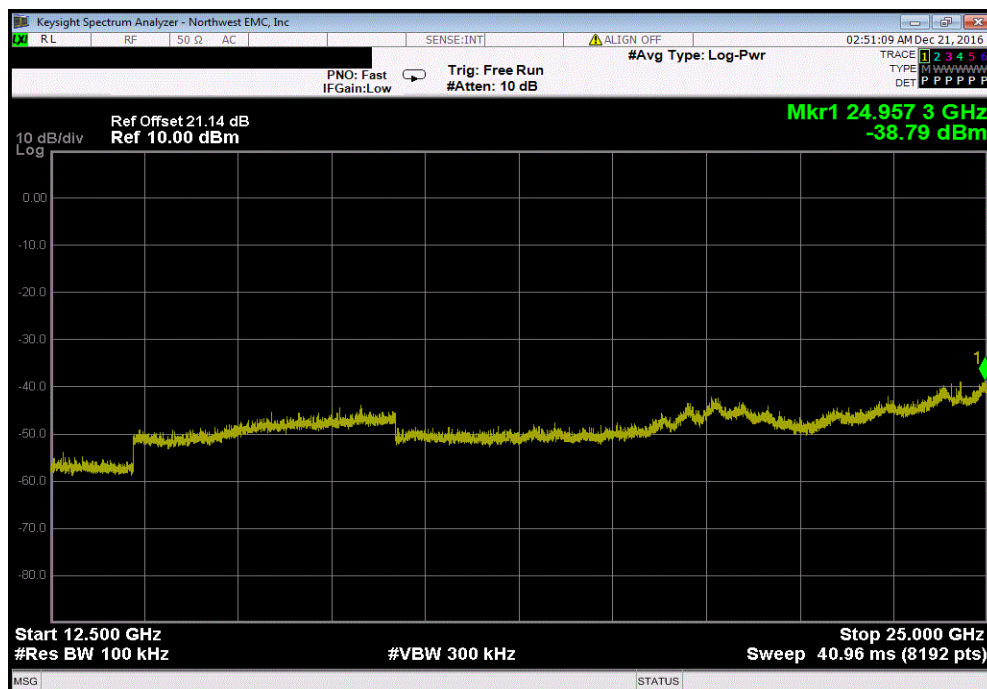


SPURIOUS CONDUCTED EMISSIONS

BLE/GFSK Mid Channel, 2440 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-48.59	-20	Pass	

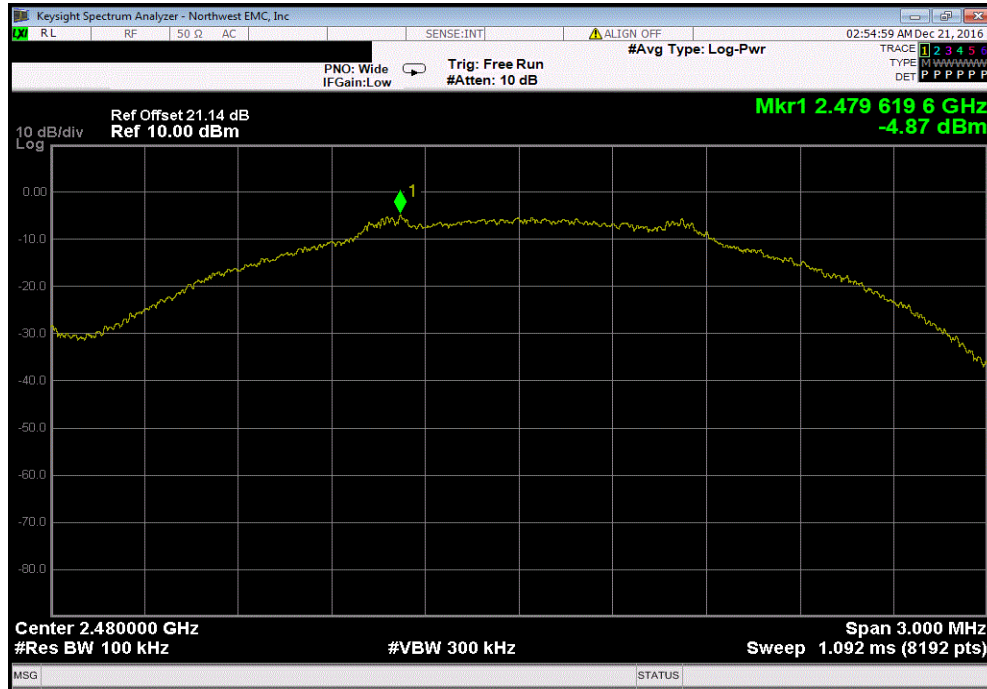


BLE/GFSK Mid Channel, 2440 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-34.16	-20	Pass	

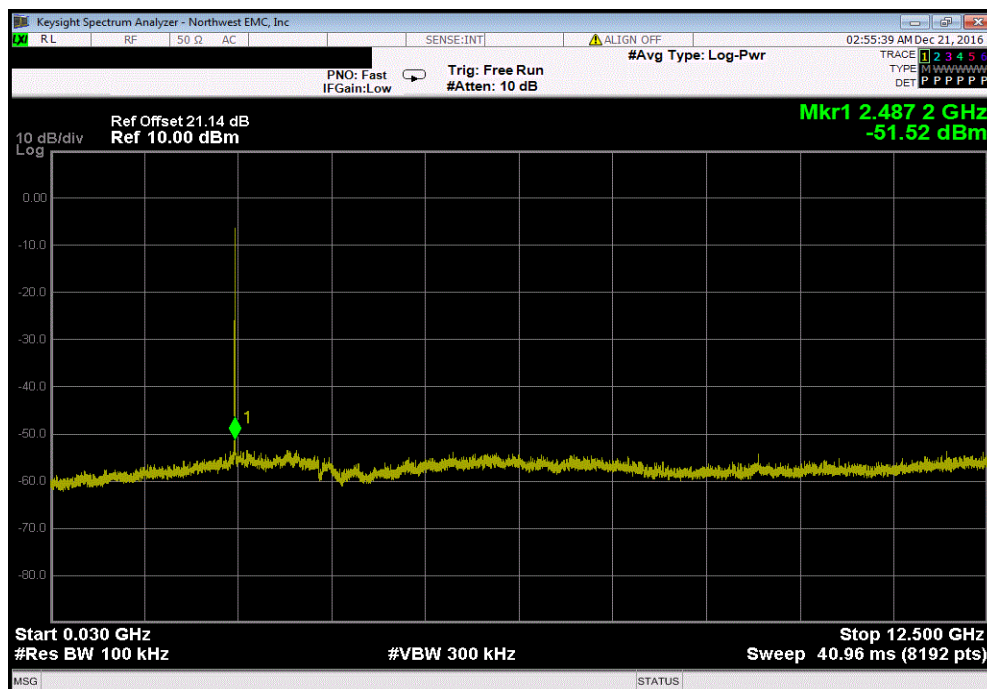


SPURIOUS CONDUCTED EMISSIONS

BLE/GFSK High Channel, 2480 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
Fundamental		N/A		N/A	N/A	

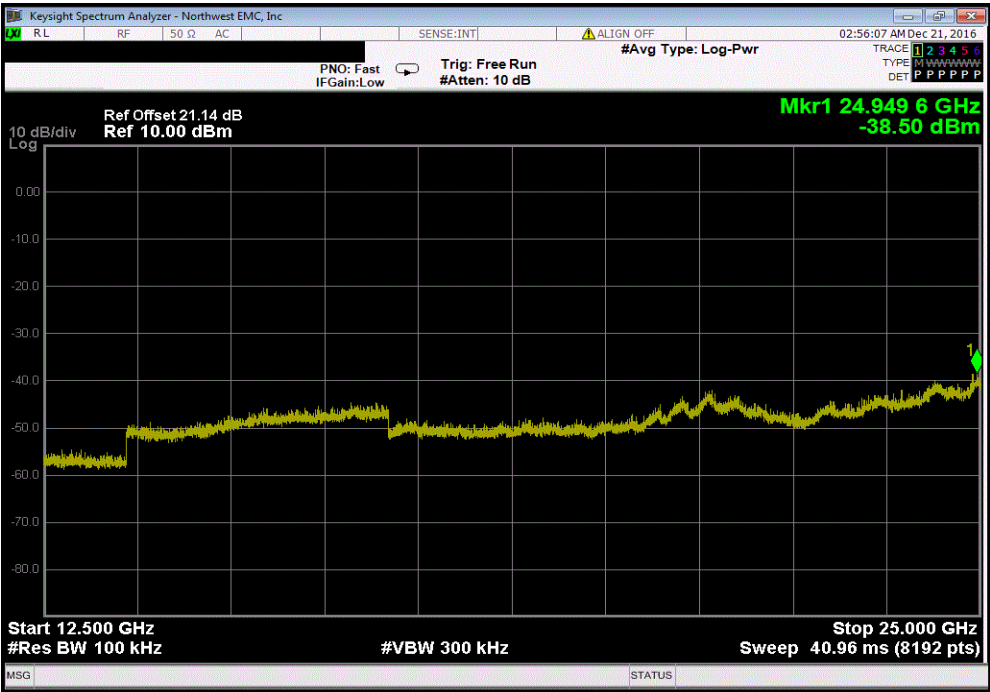


BLE/GFSK High Channel, 2480 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-46.65		-20	Pass	



SPURIOUS CONDUCTED EMISSIONS

BLE/GFSK High Channel, 2480 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-33.63	-20	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

Low Channel 2402 MHz

Middle Channel 2440 MHz

High Channel 2480 MHz

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

SECF0064 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26000 MHz
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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
Filter - High Pass	Micro-Tronics	HPM50111	HFO	3/22/2016	12 mo
Cable	ESM Cable Corp.	KMKM-72	EVY	10/17/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	10/17/2016	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AIV	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	3/11/2016	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHV	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	0 mo
Cable	N/A	Double Ridge Horn Cables	EVB	3/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	3/11/2016	12 mo
Cable	N/A	Bilog Cables	EVA	3/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	3/11/2016	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AXR	6/30/2016	24 mo
Cable	None	Standard Gain Horns Cable	EVF	3/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	3/11/2016	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	4/22/2016	12 mo

MEASUREMENT BANDWIDTHS

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

TEST DESCRIPTION

The highest gain 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.

Work Order:
Project:
Job Site:
Serial Number:
EUT: 360SIQ

Date:
Temperature:
Humidity:

Tested by: Jared Ison

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
4804.075	42.1	9.0	3.9	115.0	3.0	0.0	Horz	PK	0.0	51.1	74.0	-22.9	Low Ch. 2402 MHz, EUT Horz
12010.670	27.7	3.3	3.7	274.0	3.0	0.0	Vert	AV	0.0	31.0	54.0	-23.0	Low Ch. 2402 MHz, EUT Horz
4959.885	41.3	9.4	1.5	98.0	3.0	0.0	Horz	PK	0.0	50.7	74.0	-23.3	High Ch. 2480 MHz, EUT Horz
4879.665	40.9	9.2	1.0	61.0	3.0	0.0	Horz	PK	0.0	50.1	74.0	-23.9	Mid Ch. 2440 MHz, EUT Horz
4960.290	40.1	9.4	2.0	22.0	3.0	0.0	Vert	PK	0.0	49.5	74.0	-24.5	High Ch. 2480 MHz, EUT Horz
4880.000	39.2	9.2	1.0	139.0	3.0	0.0	Vert	PK	0.0	48.4	74.0	-25.6	Mid Ch. 2440 MHz, EUT Horz
19214.960	45.3	1.0	1.7	47.0	3.0	0.0	Horz	PK	0.0	46.3	74.0	-27.7	Low Ch. 2402 MHz, EUT Horz
19215.810	44.8	1.0	1.7	252.0	3.0	0.0	Vert	PK	0.0	45.8	74.0	-28.2	Low Ch. 2402 MHz, EUT Horz
12399.310	38.8	5.0	2.7	351.0	3.0	0.0	Horz	PK	0.0	43.8	74.0	-30.2	High Ch. 2480 MHz, EUT Horz
12398.850	38.4	5.0	2.2	0.0	3.0	0.0	Vert	PK	0.0	43.4	74.0	-30.6	High Ch. 2480 MHz, EUT Horz
12200.560	38.9	4.4	3.5	0.0	3.0	0.0	Vert	PK	0.0	43.3	74.0	-30.7	Mid Ch. 2440 MHz, EUT Horz
12198.700	38.4	4.4	1.0	182.0	3.0	0.0	Horz	PK	0.0	42.8	74.0	-31.2	Mid Ch. 2440 MHz, EUT Horz
12009.300	38.9	3.3	3.7	274.0	3.0	0.0	Vert	PK	0.0	42.2	74.0	-31.8	Low Ch. 2402 MHz, EUT Horz
12009.280	38.8	3.3	1.0	297.0	3.0	0.0	Horz	PK	0.0	42.1	74.0	-31.9	Low Ch. 2402 MHz, EUT Horz

Work Order:
Project:
Job Site:
Serial Number:
EUT: 360SIQ

Date:
Temperature:
Humidity:

Tested by: Jared Ison