



Nuance Hearing

Brand Name: Starkey Laboratories, Inc.

Table Microphone (Model TM10)

LP0002:2020

Bluetooth Low Energy (DTS) Radio

Report # NUAH0012.1 Rev 2 Issue Date: June 28, 2021



NVLAP LAB CODE: 200881-0



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CERTIFICATE OF TEST

Last Date of Test: February 25, 2021
Nuance Hearing
EUT: Starkey Brand Table Microphone (Model TM10)

Radio Equipment Testing

Standards

Specification	Method
LP0002:2020	LP0002:2020

At the date of some of the testing, only LP0002 2018 was available. However, for this device, the technical requirements remain unchanged from the 2018 version to the current 2020 version. Therefore, the test lab determined that the original test data shows compliance with LP0002 2020

Results

Method Clause	Specification Clause	Test Description	Applied	Results	Comments
Appendix I, II.(II)	3.3	Powerline Conducted Emissions	Yes	Pass	
N/A	4.10.1.2 (C)	Duty Cycle	Yes	Pass	
Appendix II, I	4.10.1.6 (2)(A)	Occupied Bandwidth	Yes	Pass	
Appendix II, II	4.10.1.2 (C)	Output Power	Yes	Pass	
Appendix II, II	4.10.1.3 (3)	Equivalent Isotropic Radiated Power	Yes	Pass	
Appendix II, IIV	4.10.1.6 (2)(B)	Power Spectral Density	Yes	Pass	
Appendix II, III, 1	4.10.1.5	Band Edge Compliance	Yes	Pass	
Appendix II, III, 1	4.10.1.5	Spurious Conducted Emissions	Yes	Pass	
Appendix II, III, 2 / Appendix I, II.(IV)	3.5, 3.6, 4.10.1.5	Spurious Radiated Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:



Eric Brandon, Department Manager

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

REVISION HISTORY

Revision Number	Description	Date (yyyy-mm-dd)	Page Number
01	Corrected LP0002 reference to 2020	2021-05-24	Various
01	Add Internal and External photos with ruler	2021-05-24	Various
01	Removed reference to hearing aids	2021-05-24	8
02	Added USB cable details	2021-06-16	13
02	Added External Photos	2021-06-16	Appendix

ACCREDITATIONS AND AUTHORIZATIONS



United States

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

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

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) 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.

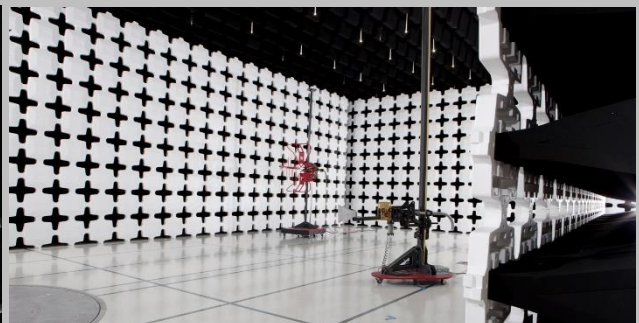
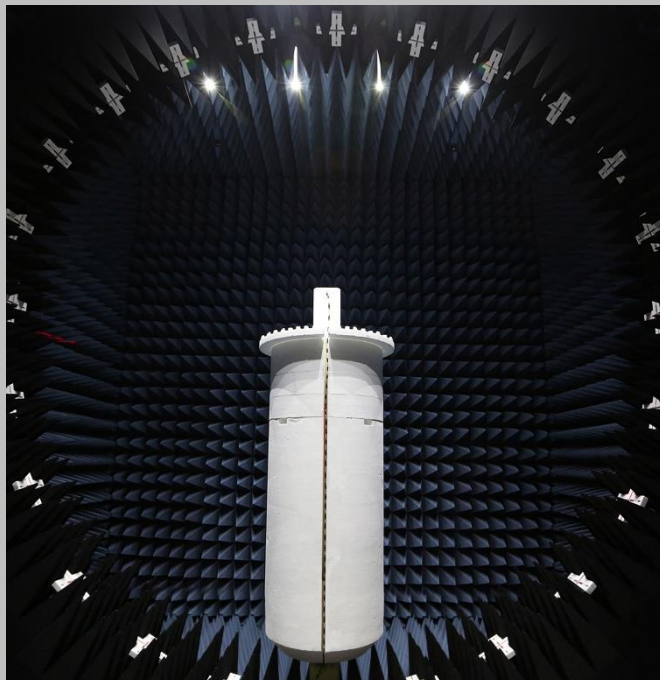
SCOPE

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

FACILITIES



California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-11 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 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: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157



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.

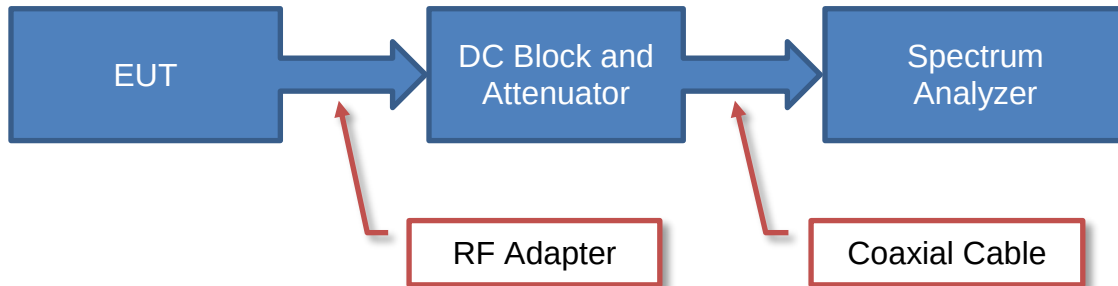
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found in the table below. A lab specific 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.

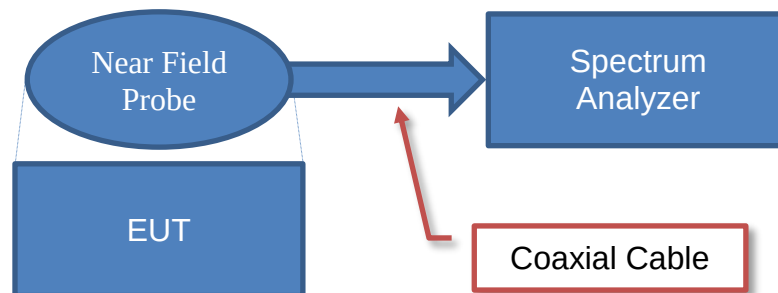
Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.6 dB	-2.6 dB

Test Setup Block Diagrams

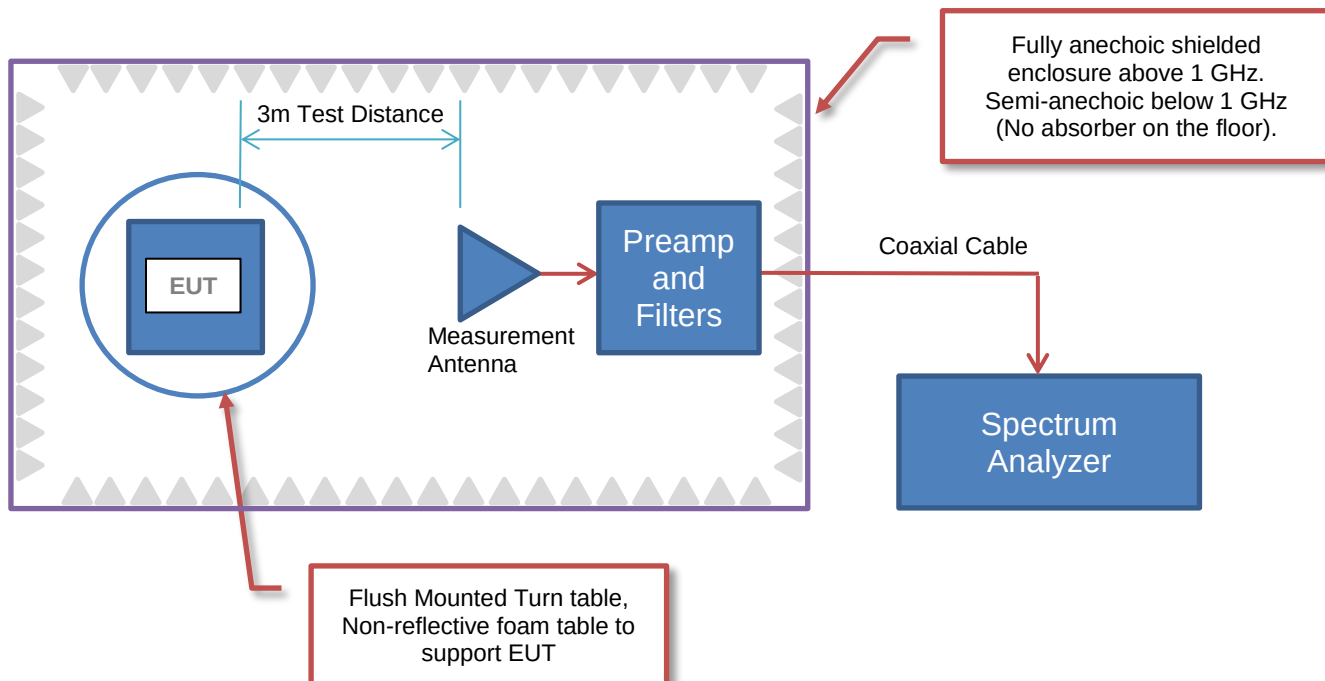
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Nuance Hearing
Address:	24 Raoul Wallenberg, Building A1, Floor 3
City, State, Zip:	Tel Aviv, Tel Aviv 6971920
Test Requested By:	Oran Bertelsen
EUT:	Starkey Brand Table Microphone (Model TM10)
Antenna Details:	Manufacturer: Nuance Hearing Model: ANT-1 Type: PCB trace of inverted F Dimensions: 13.5 x 12.1 mm (531 x 476 mil) Material: Copper on FR4 Gain: 0 dBi
Modulation:	GFSK
First Date of Test:	July 2, 2019
Last Date of Test:	February 25, 2021
Receipt Date of Samples:	July 1, 2019
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Remote microphone device that communicates with Bluetooth Low Energy devices
Testing Objective:
To demonstrate compliance of the Bluetooth radio to LP0002 requirements.

CONFIGURATIONS

Configuration NUAH0001- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Table Microphone	Nuance Hearing	TM10	1

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
USB Hub	D-Link	DUB-H7	R2081B3004766

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Power Supply (USB Hub)	Ault Inc.	PW118RA0503F02	0621C

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB Cable	Yes	1.5 m	No	Table Microphone	USB Hub
AC Cable (USB Hub)	No	1.8 m	No	USB Hub	Power Supply (USB Hub)
DC Cable (USB Hub)	No	1.8 m	No	Power Supply (USB Hub)	AC Mains

CONFIGURATIONS

Configuration NUAH0001- 2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Table Microphone	Nuance Hearing	TM10	1

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Power Supply (Nuance Pod)	Phihong	PSA05F-050Q	DC10003803A2

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB Cable	Yes	0.9 m	Yes	Table Microphone	Power Supply (Nuance Pod)

CONFIGURATIONS



Configuration NUAH0001- 6

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Table Microphone	Nuance Hearing	TM10	EP3.7

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
DC Power Supply	Kikusui	PWR401ML	TQL
USB Interface Board	Starkey Laboratories, Inc.	N/A	N/A

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Lenovo	ThinkPad T430	11306
Power Supply (Laptop)	Lenovo	ADLX90NCT2A	11S45N0311Z1ZLZ633M0T4

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB Cable	Yes	1.0 m	No	Table Microphone	USB Interface Board
USB Cable 2	Yes	1.9 m	No	USB Interface Board	Laptop
DC Leads	No	0.2 m	No	USB Interface Board	BNC Cable
AC Cable	No	1.0 m	No	AC Mains	Power Supply (Laptop)
DC Cable	No	1.8 m	Yes	Power Supply (Laptop)	Laptop
BNC Cable	Yes	0.8 m	No	DC Leads	DC Power Supply

CONFIGURATIONS



Configuration NUAH0004- 2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Table Microphone	Nuance Hearing	TM10	1938AE20010

CONFIGURATIONS

Configuration NUAH0012- 1

Software/Firmware Running during test	
Description	Version
FWE.Spark	1.0.60.0

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Table Microphone	Nuance Hearing	TM10	2027AM20342

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC Adapter (Table Microphone)	Ten Pao Electronics Co. Ltd.	S008ACM0500120	N/A

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB Cable Brand: Wingkei Model: T7C1SZ000114	Yes	1.0m	No	Table Microphone	AC Adapter (Table Microphone)

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2019-07-02	Powerline 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.
2	2019-07-09	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.
3	2019-07-09	Occupied Bandwidth	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	2019-07-09	Output 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.
5	2019-07-09	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.
6	2019-07-09	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	2019-07-09	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.
8	2019-07-09	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.
9	2021-02-25	Spurious Radiated 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
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	3/15/2019	3/15/2020
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAS	3/8/2019	3/8/2020
Cable - Conducted Cable Assembly	Northwest EMC	MNC, HGN, TYK	MNCA	3/13/2019	3/13/2020

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

NUAH0001-2

MODES INVESTIGATED

Charging, Tx on mid channel (2442 MHz), BLE

POWERLINE CONDUCTED EMISSIONS



EUT:	Starkey Brand Table Microphone (Model TM10)	Work Order:	NUAH0001
Serial Number:	EP3.4	Date:	07/02/2019
Customer:	Nuance Hearing	Temperature:	21.9°C
Attendees:	Charlie Esch	Relative Humidity:	62.3%
Customer Project:	None	Bar. Pressure:	1014 mb
Tested By:	Andrew Rogstad	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	NUAH0001-2

TEST SPECIFICATIONS

Specification:	Method:
LP0002:2018	LP0002:2018

TEST PARAMETERS

Run #:	1	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

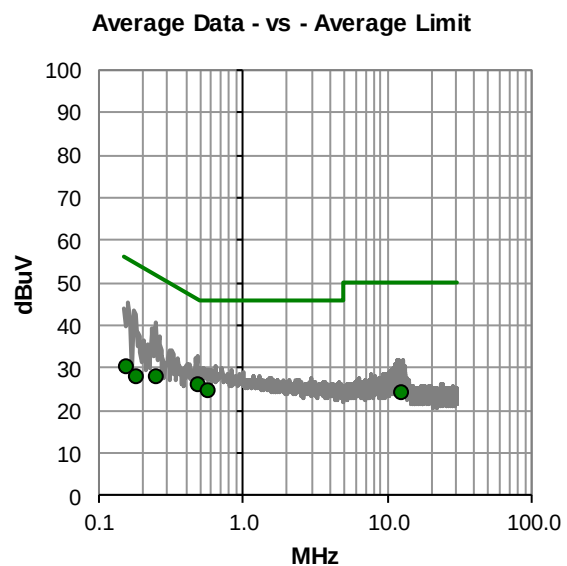
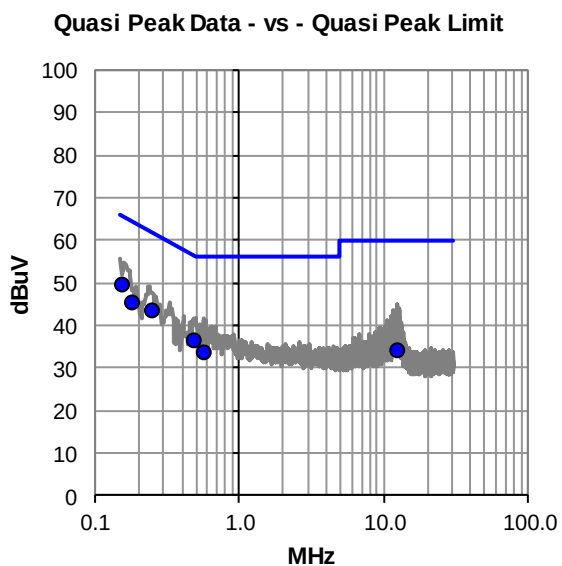
None

EUT OPERATING MODES

Charging, Tx on mid channel (2442 MHz), BLE

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #1

Quasi Peak Data - vs - Quasi Peak Limit

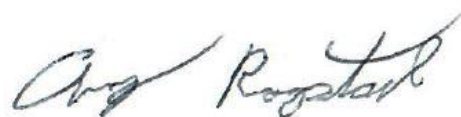
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.155	28.3	21.0	49.3	65.7	-16.4
0.251	22.5	20.7	43.2	61.7	-18.5
0.185	24.1	20.9	45.0	64.3	-19.3
0.490	15.7	20.6	36.3	56.2	-19.9
0.583	13.1	20.5	33.6	56.0	-22.4
12.415	12.9	20.9	33.8	60.0	-26.2

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.490	5.2	20.6	25.8	46.2	-20.4
0.583	4.2	20.5	24.7	46.0	-21.3
0.251	7.3	20.7	28.0	51.7	-23.7
0.155	9.2	21.0	30.2	55.7	-25.5
12.415	3.0	20.9	23.9	50.0	-26.1
0.185	7.1	20.9	28.0	54.3	-26.3

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS



EUT:	Starkey Brand Table Microphone (Model TM10)	Work Order:	NUAH0001
Serial Number:	EP3.4	Date:	07/02/2019
Customer:	Nuance Hearing	Temperature:	21.9°C
Attendees:	Charlie Esch	Relative Humidity:	62.3%
Customer Project:	None	Bar. Pressure:	1014 mb
Tested By:	Andrew Rogstad	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	NUAH0001-2

TEST SPECIFICATIONS

Specification:	Method:
LP0002:2018	LP0002:2018

TEST PARAMETERS

Run #:	2	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

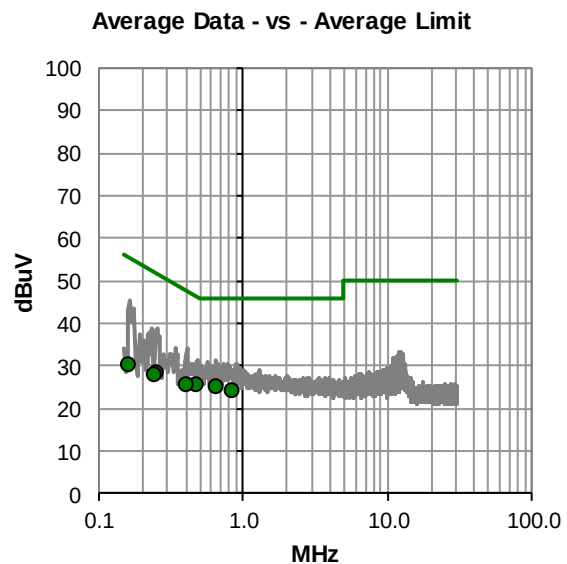
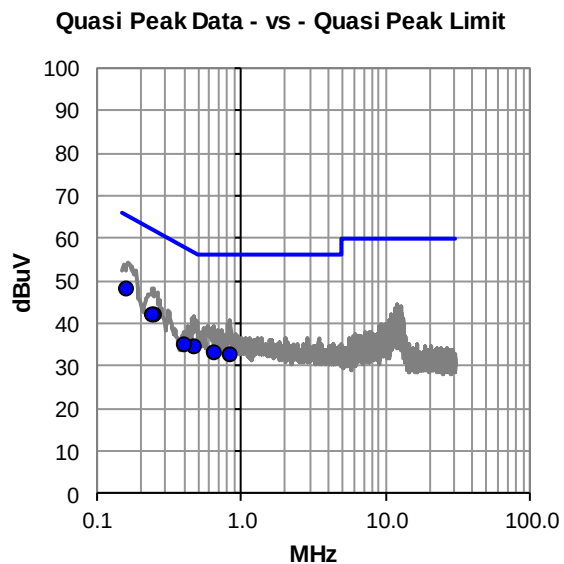
None

EUT OPERATING MODES

Charging, Tx on mid channel (2442 MHz), BLE

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #2

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.161	27.0	21.0	48.0	65.4	-17.4
0.248	21.4	20.7	42.1	61.8	-19.7
0.241	21.1	20.7	41.8	62.0	-20.2
0.484	13.8	20.6	34.4	56.3	-21.9
0.649	12.5	20.6	33.1	56.0	-22.9
0.407	14.1	20.6	34.7	57.7	-23.0
0.836	11.8	20.6	32.4	56.0	-23.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.484	5.1	20.6	25.7	46.3	-20.6
0.649	4.2	20.6	24.8	46.0	-21.2
0.836	3.6	20.6	24.2	46.0	-21.8
0.407	4.9	20.6	25.5	47.7	-22.2
0.248	7.5	20.7	28.2	51.8	-23.6
0.241	7.3	20.7	28.0	52.0	-24.0
0.161	9.3	21.0	30.3	55.4	-25.1

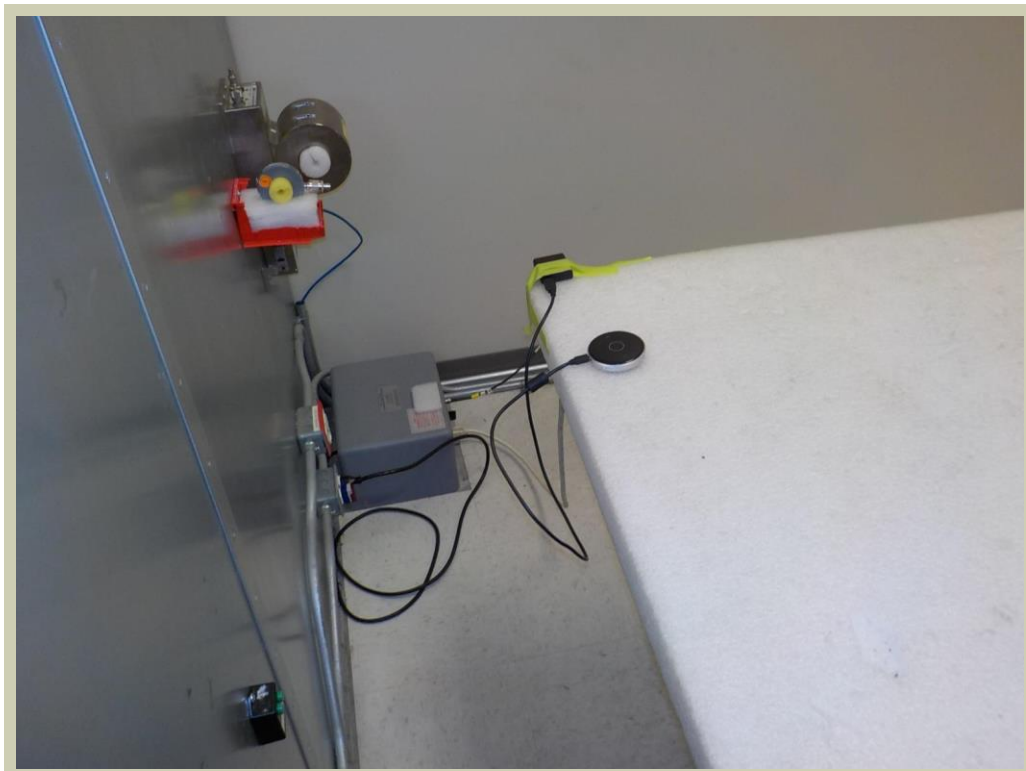
CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS



DUTY CYCLE



XMIT 2019.05.15

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	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-19	13-Feb-20
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNO	7-Jun-19	7-Jun-20
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	13-Dec-18	13-Dec-19

TEST DESCRIPTION

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.

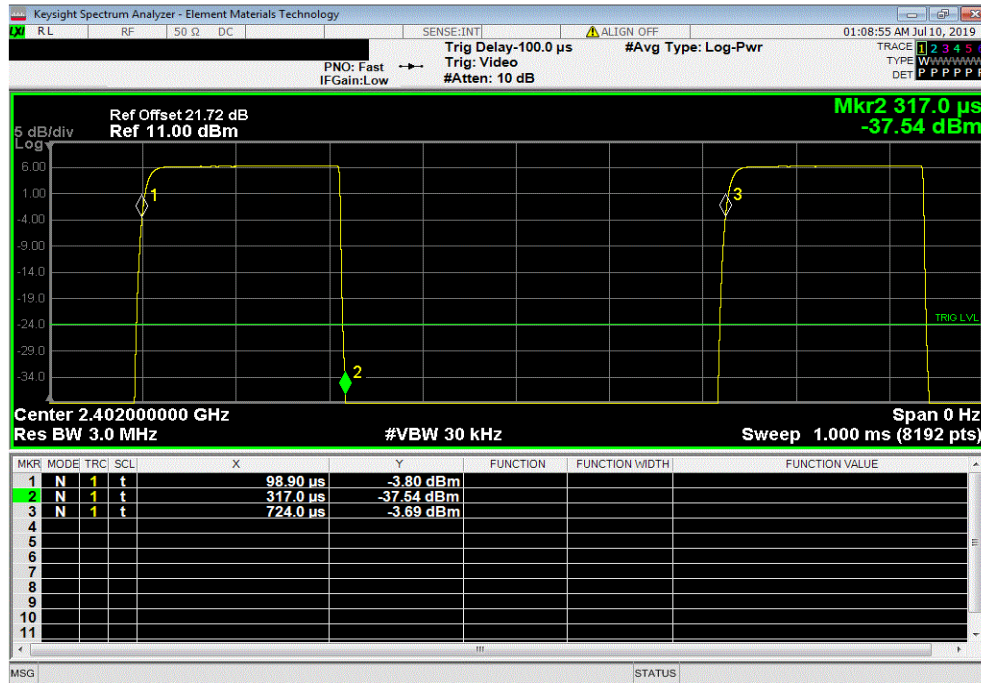
ThiTx 2018.09.13 XMIT 2019.05.15

DUTY CYCLE

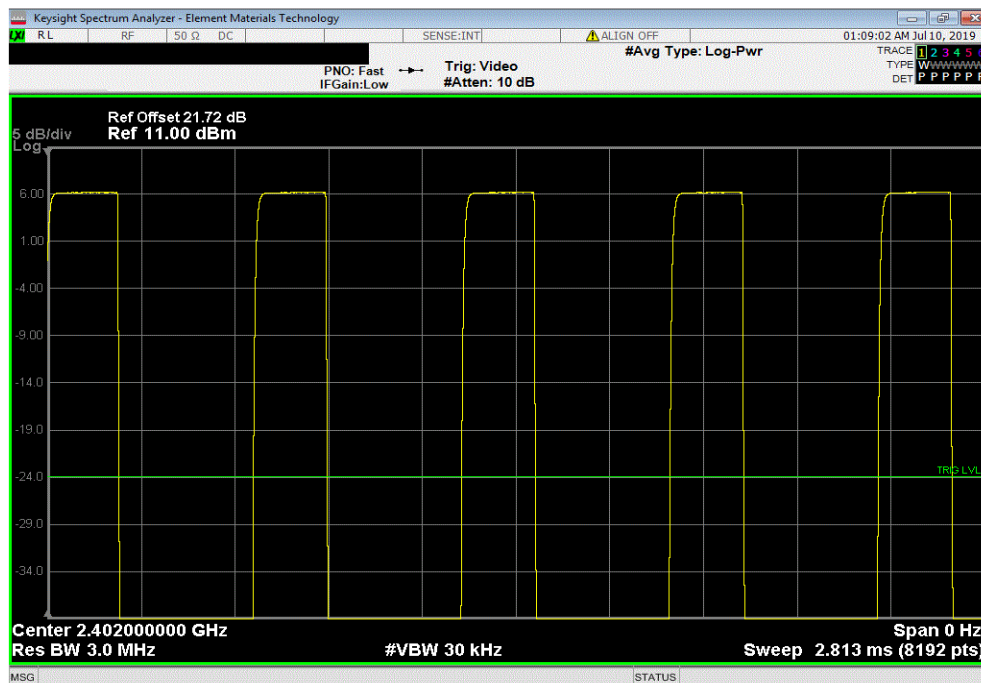


TMTx 2018.09.13 XMt 2019.05.15

BLE/GFSK Low Channel, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
218.071 us	625.1 us	1	34.9	N/A	N/A	



BLE/GFSK Low Channel, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

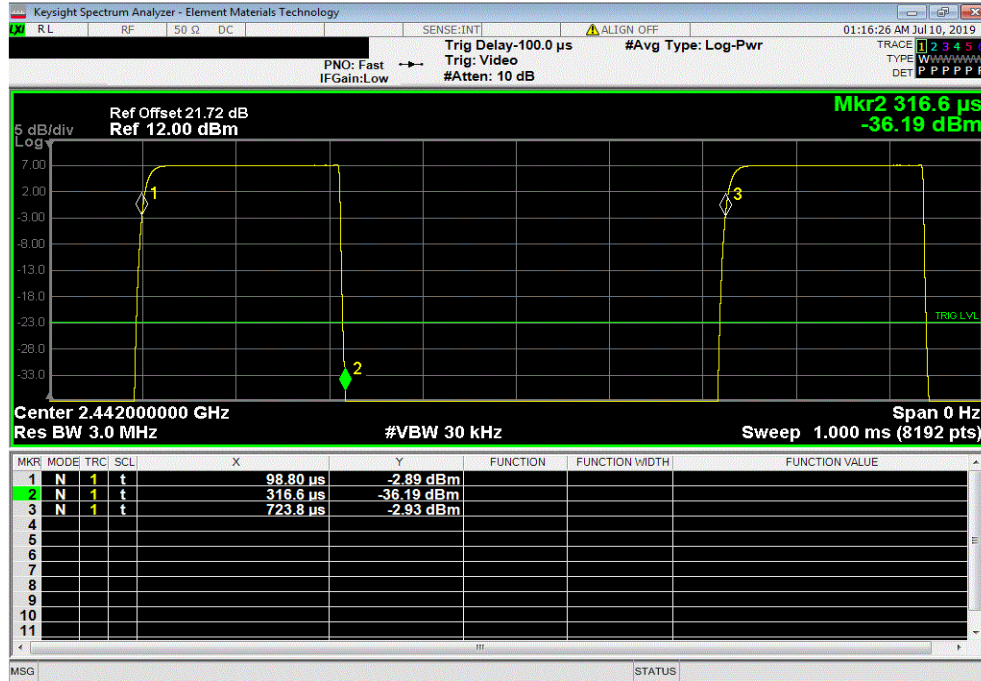


DUTY CYCLE

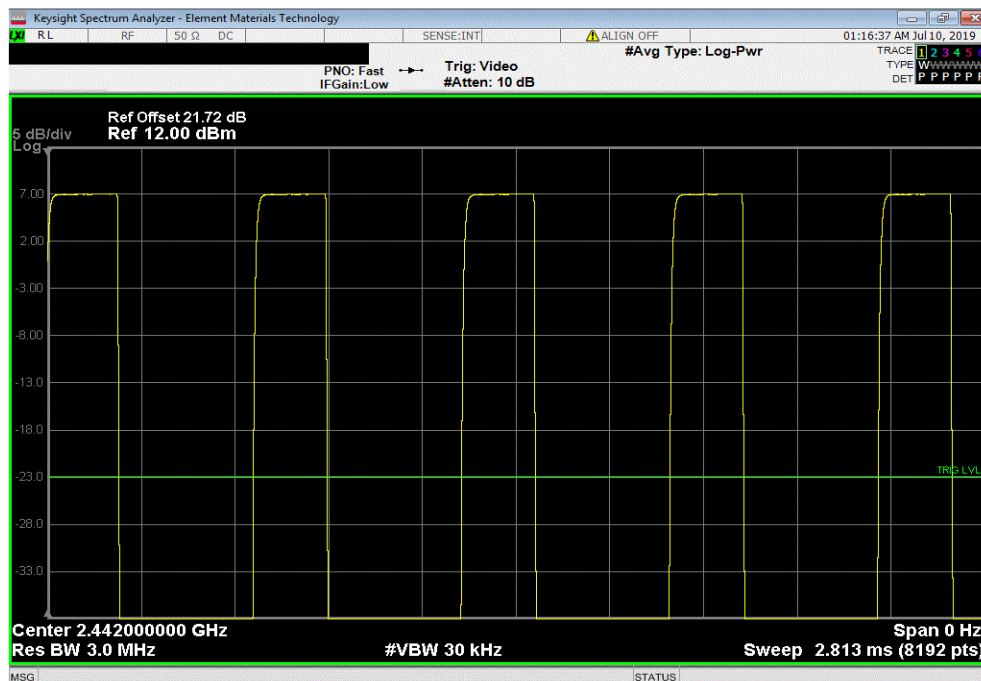


TMTx 2018.09.13 XMI 2019.05.15

BLE/GFSK Mid Channel, 2442 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
217.75 μ s	625 μ s	1	34.8	N/A	N/A	



BLE/GFSK Mid Channel, 2442 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

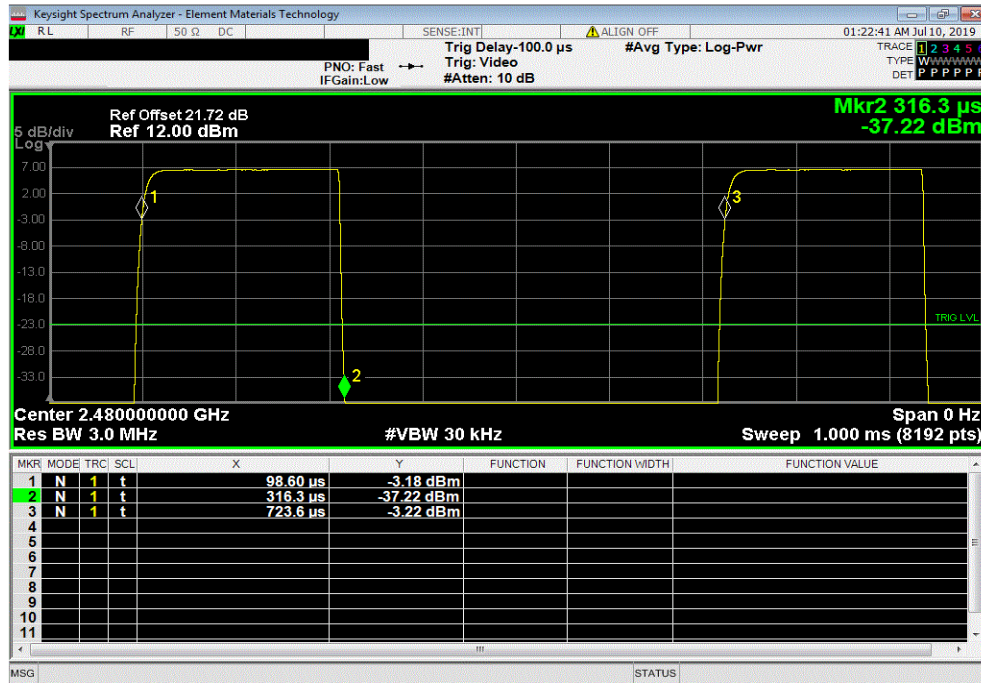


DUTY CYCLE

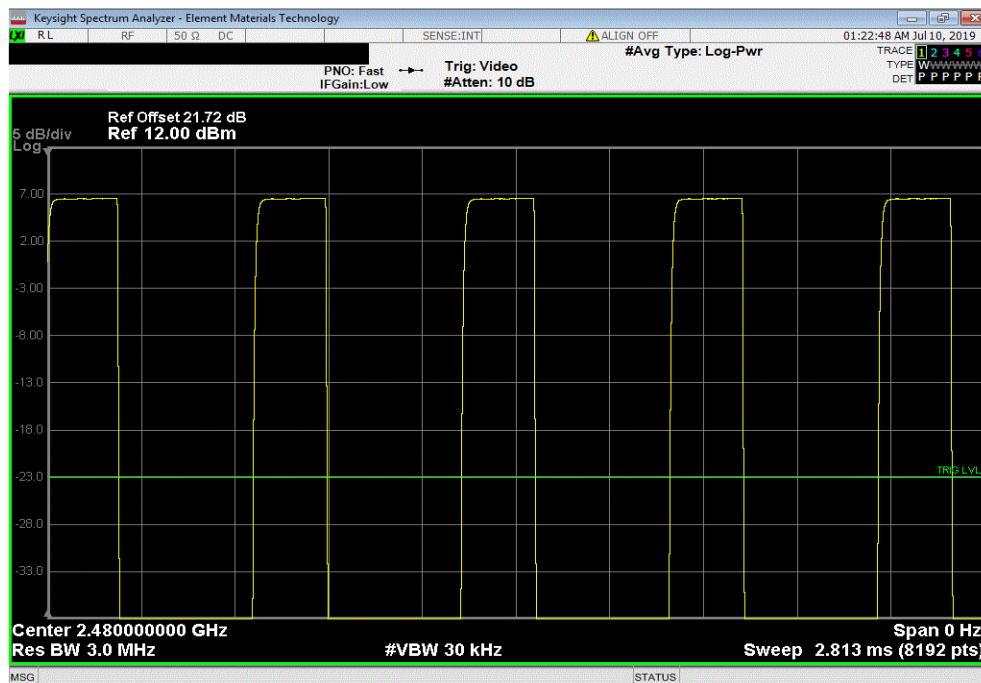


TMTx 2018.09.13 XMI 2019.05.15

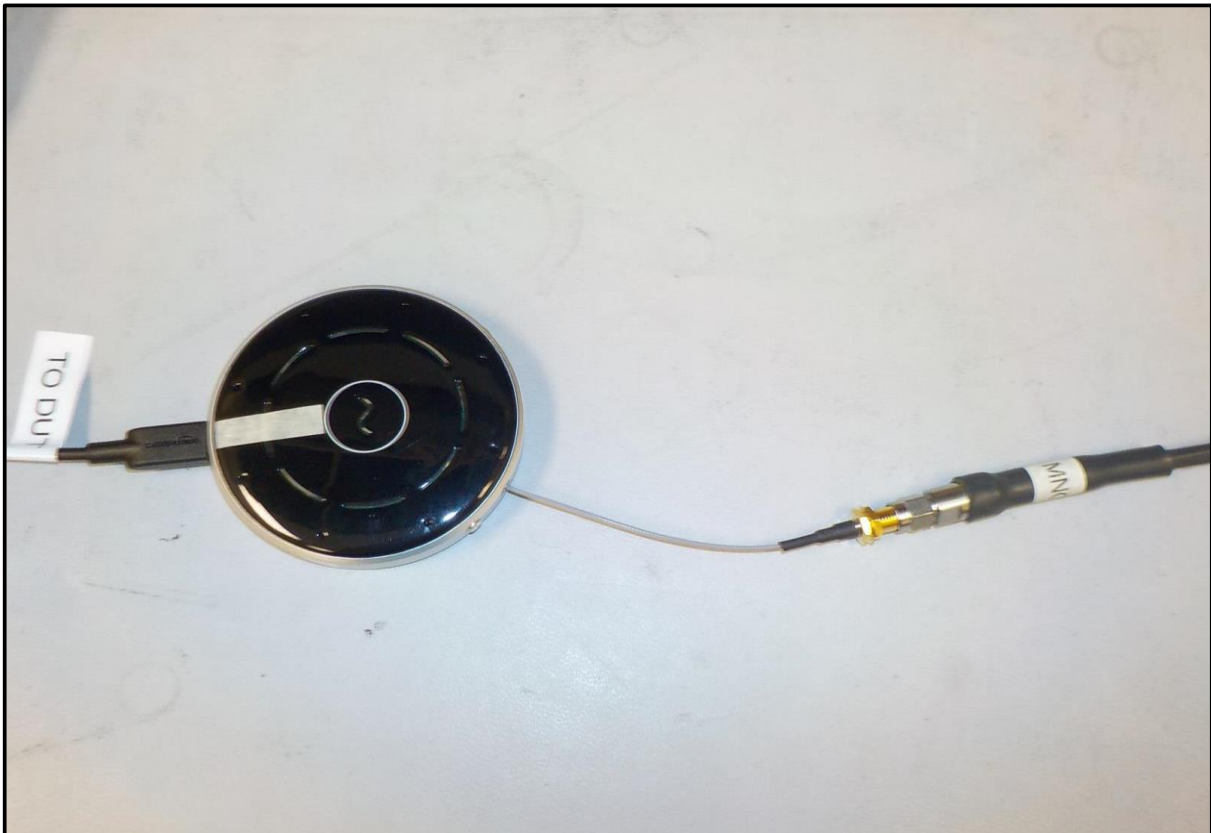
BLE/GFSK High Channel, 2480 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
217.705 us	625 us	1	34.8	N/A	N/A	



BLE/GFSK High Channel, 2480 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	



DUTY CYCLE



OCCUPIED BANDWIDTH



XMR 2019.05.15

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	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-19	13-Feb-20
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNO	7-Jun-19	7-Jun-20
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	13-Dec-18	13-Dec-19

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.

OCCUPIED BANDWIDTH



THxTx 2018.09.13 XMt 2019.05.15

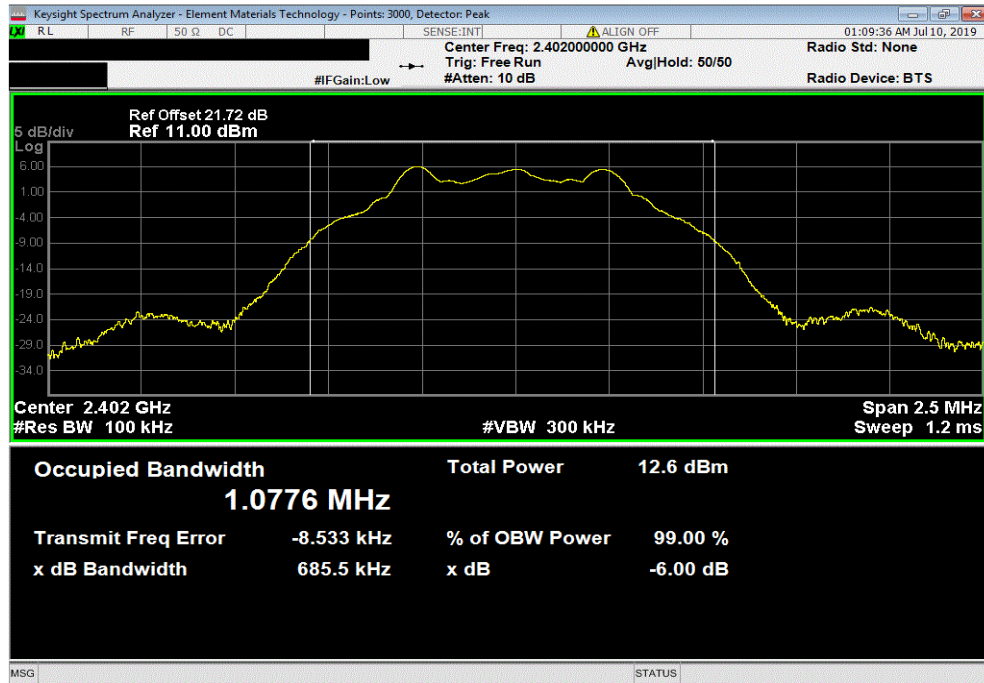
EUT: Starkey Brand Table Microphone (Model TM10)		Work Order: NUAH0001	
Serial Number: EP3.7		Date: 9-Jul-19	
Customer: Nuance Hearing		Temperature: 21.6 °C	
Attendees: Charlie Esch		Humidity: 58.1% RH	
Project: None		Barometric Pres.: 1014 mbar	
Tested by: Andrew Rogstad	Power: 4.8 VDC	Job Site: MN08	
TEST SPECIFICATIONS			
LP0002:2018		Test Method	
LP0002:2018		LP0002:2018	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	6	Signature <i>Andrew Rogstad</i>	
		Value	Limit (±) Result
BLE/GFSK Low Channel, 2402 MHz		685.515 kHz	500 kHz Pass
BLE/GFSK Mid Channel, 2442 MHz		683.164 kHz	500 kHz Pass
BLE/GFSK High Channel, 2480 MHz		689.366 kHz	500 kHz Pass

OCCUPIED BANDWIDTH

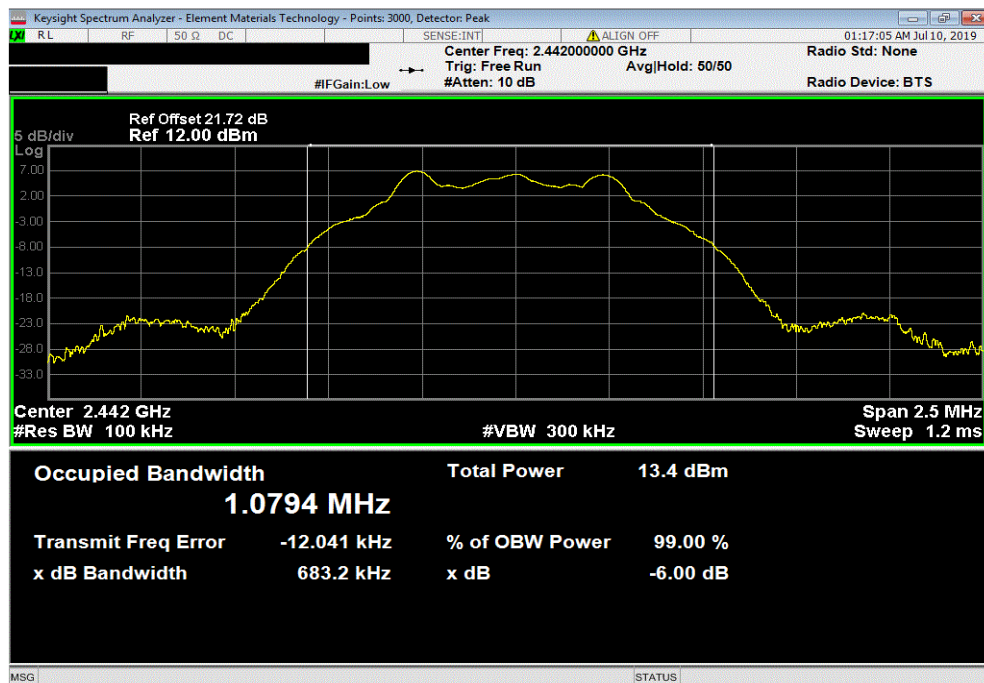


TMTx 2018.09.13 XMI 2019.05.15

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



BLE/GFSK Mid Channel, 2442 MHz						
				Value	Limit (≥)	Result
				683.164 kHz	500 kHz	Pass

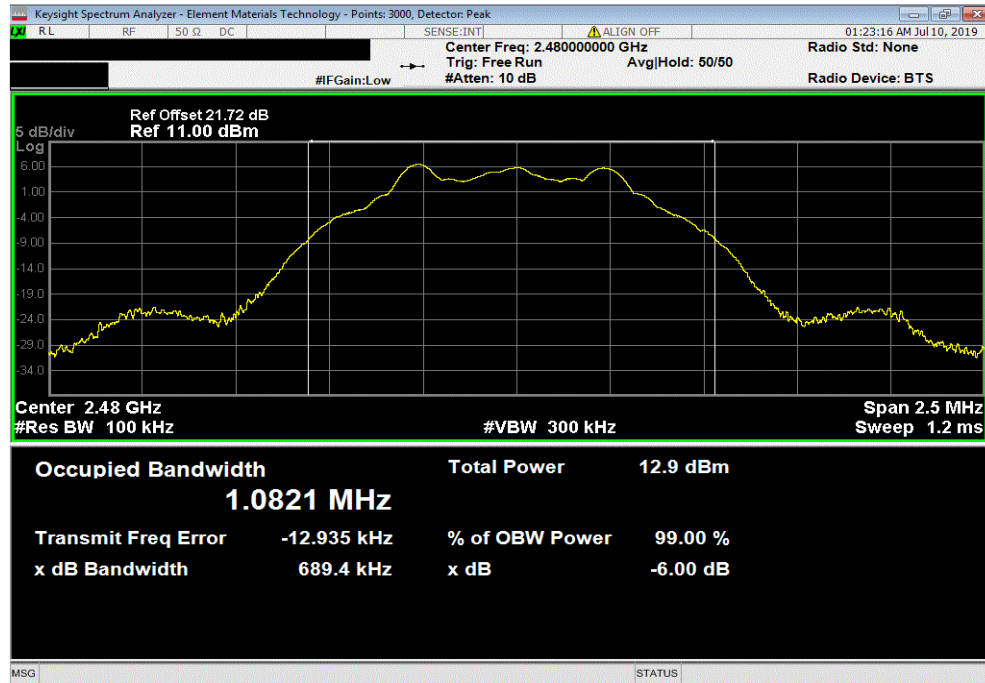


OCCUPIED BANDWIDTH

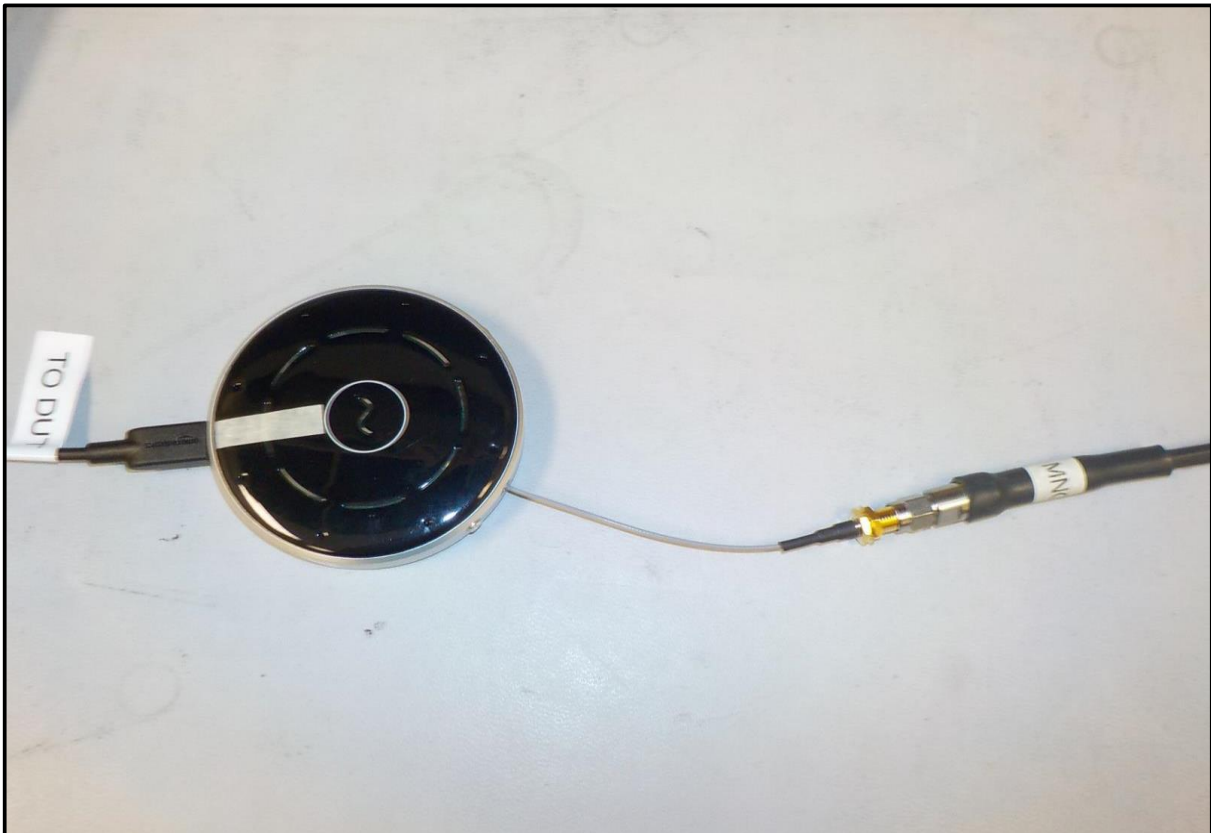


TMTx 2018.09.13 XMt 2019.05.15

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



OCCUPIED BANDWIDTH



OUTPUT POWER



XMI 2019.05.15

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	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-19	13-Feb-20
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNO	7-Jun-19	7-Jun-20
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	13-Dec-18	13-Dec-19

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.

OUTPUT POWER



TMTx 2018.09.13 XMt 2019.05.15

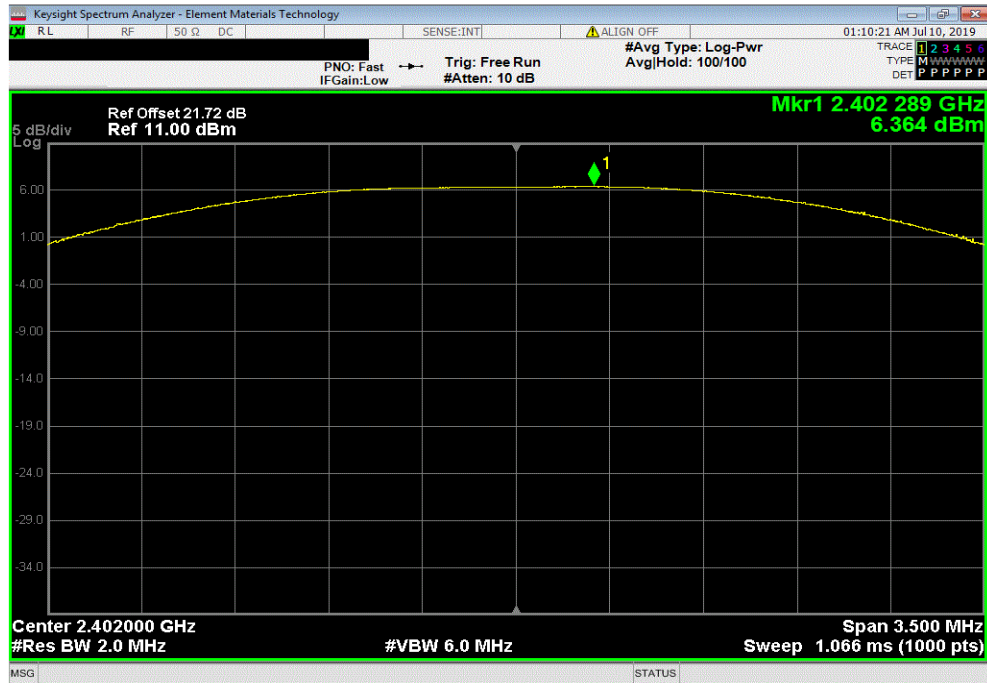
EUT: Starkey Brand Table Microphone (Model TM10)		Work Order: NUAH0001	
Serial Number: EP3.7		Date: 9-Jul-19	
Customer: Nuance Hearing		Temperature: 21.5 °C	
Attendees: Charlie Esch		Humidity: 58.1% RH	
Project: None		Barometric Pres.: 1014 mbar	
Tested by: Andrew Rogstad	Power: 4.8 VDC	Job Site: MN08	
TEST SPECIFICATIONS			
LP0002:2018		Test Method LP0002:2018	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	6	Signature <i>Andrew Rogstad</i>	
		Out Pwr (dBm)	Limit (dBm) Result
BLE/GFSK Low Channel, 2402 MHz		6.364	30 Pass
BLE/GFSK Mid Channel, 2442 MHz		7.136	30 Pass
BLE/GFSK High Channel, 2480 MHz		6.691	30 Pass

OUTPUT POWER

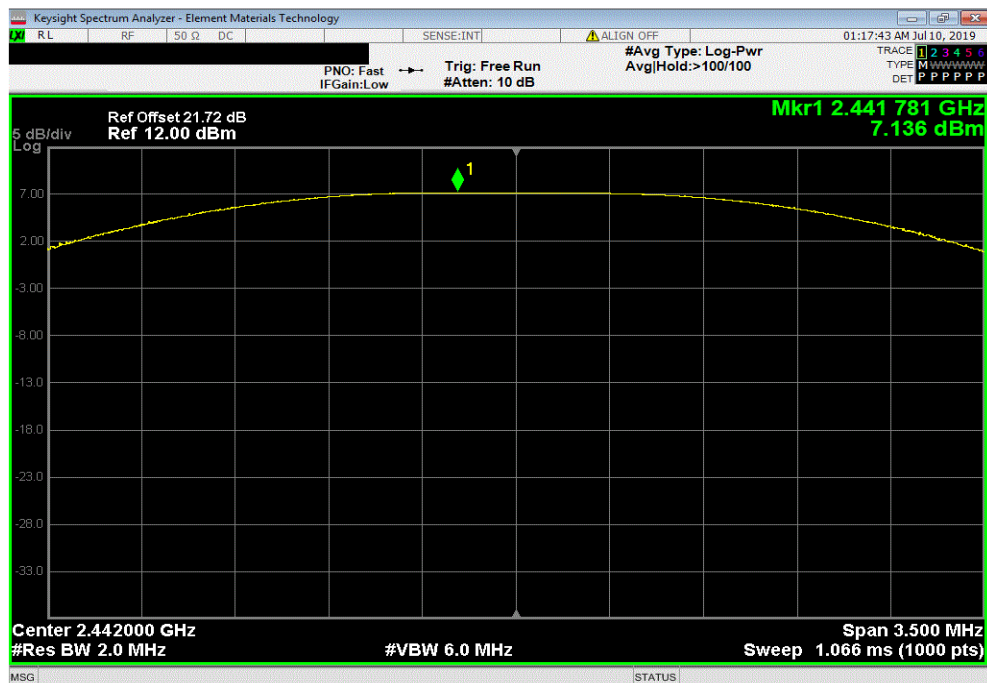


TMTx 2018.09.13 XMt 2019.05.15

BLE/GFSK Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				6.364	30	Pass



BLE/GFSK Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				7.136	30	Pass

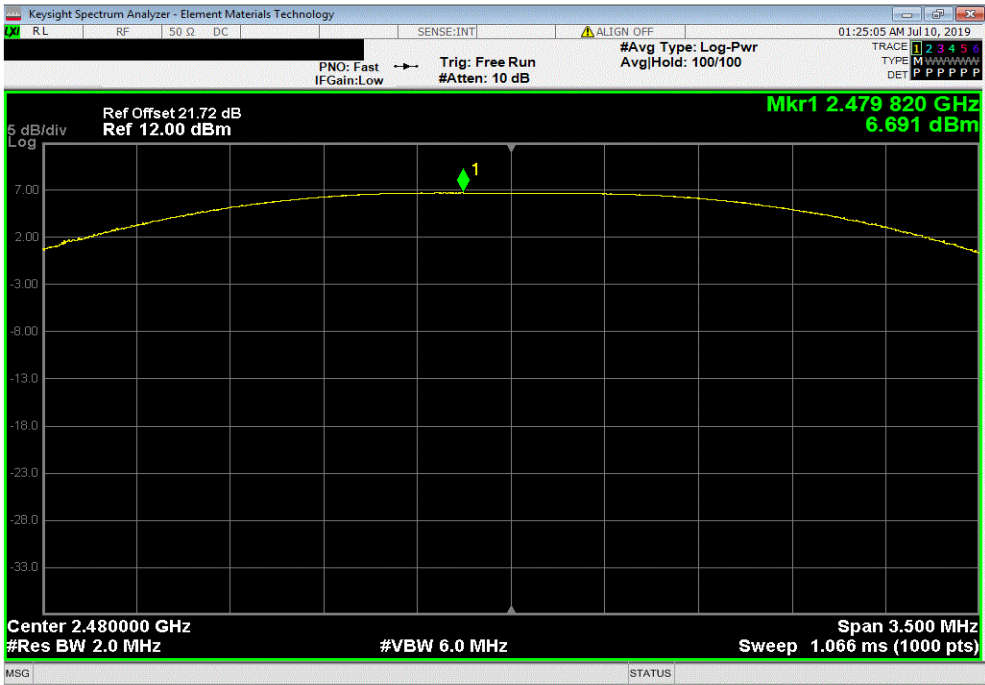


OUTPUT POWER



TMTx 2018.09.13 XMt 2019.05.15

BLE/GFSK High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				6.691	30	Pass



OUTPUT POWER



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



XMIT 2019.05.15

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	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-19	13-Feb-20
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNO	7-Jun-19	7-Jun-20
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	13-Dec-18	13-Dec-19

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. The actual antenna gain of the EUT was added to the conducted output to derive the EIRP values.

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



THTx 2018.09.13 XMt 2019.05.15

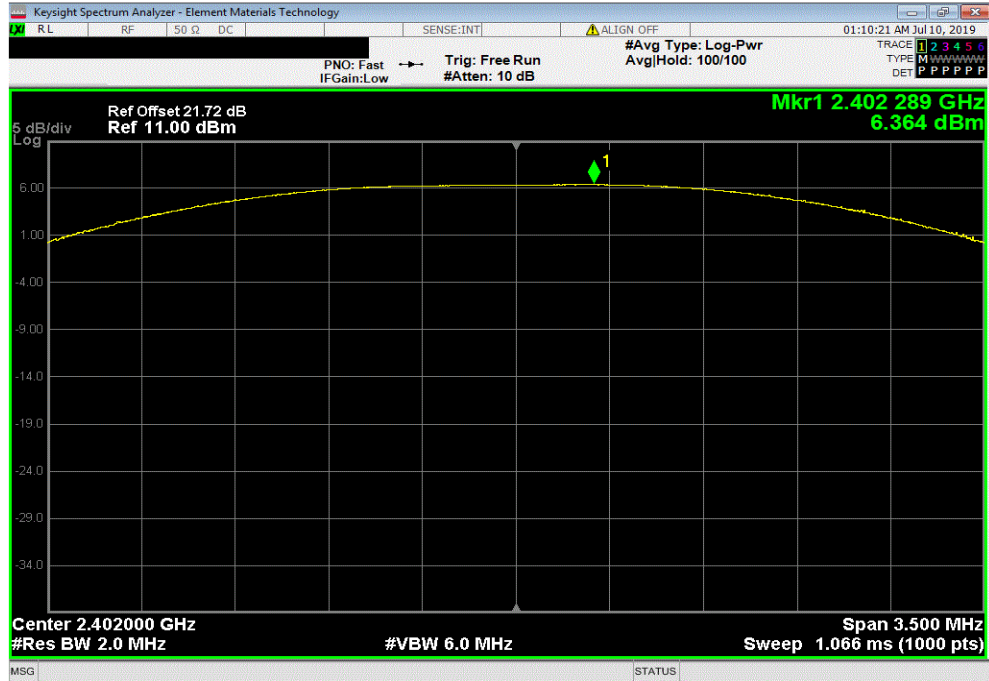
EUT: Starkey Brand Table Microphone (Model TM10)		Work Order: NUAH0001	
Serial Number: EP3.7		Date: 9-Jul-19	
Customer: Nuance Hearing		Temperature: 21.7 °C	
Attendees: Charlie Esch		Humidity: 58.7% RH	
Project: None		Barometric Pres.: 1014 mbar	
Tested by: Andrew Rogstad	Power: 4.8 VDC	Job Site: MN08	
TEST SPECIFICATIONS			
LP0002:2018		Test Method	
LP0002:2018		LP0002:2018	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	6	Signature <i>Andrew Rogstad</i>	
		Pk Cond Pwr (dBm)	Antenna Gain (dBi)
BLE/GFSK Low Channel, 2402 MHz		6.364	0
BLE/GFSK Mid Channel, 2442 MHz		7.136	0
BLE/GFSK High Channel, 2480 MHz		6.691	0
		EIRP (dBm)	EIRP Limit (dBm)
		6.364	36
		7.136	36
		6.691	36
			Result
			Pass
			Pass
			Pass

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

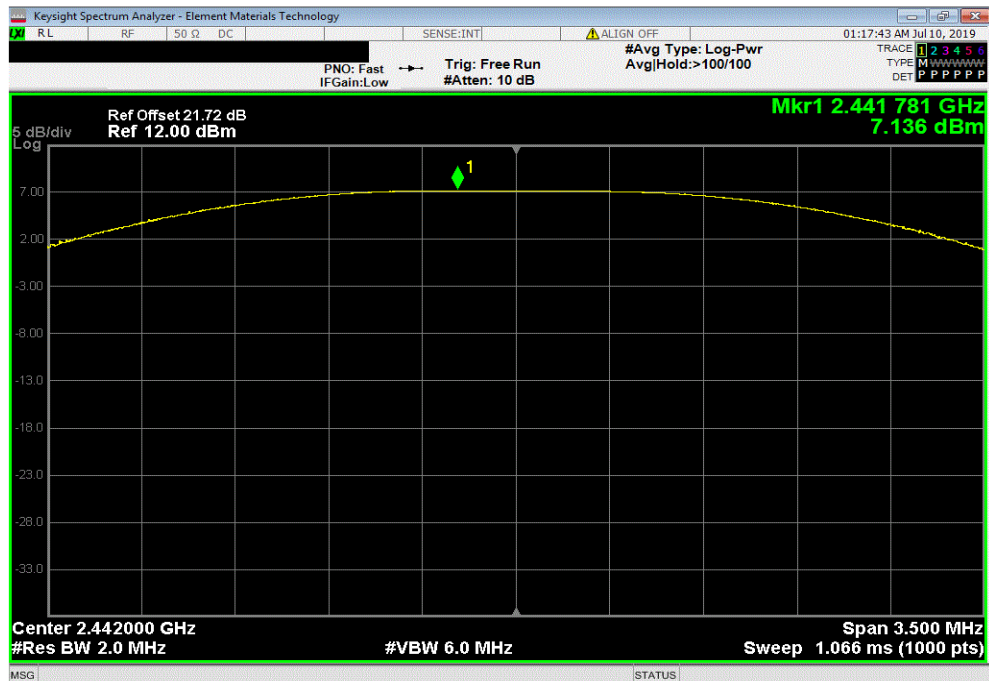


TMTx 2018.09.13 XMI 2019.05.15

BLE/GFSK Low Channel, 2402 MHz						
	Pk Cond Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	6.364	0	6.364	36	Pass	



BLE/GFSK Mid Channel, 2442 MHz						
	Pk Cond Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	7.136	0	7.136	36	Pass	

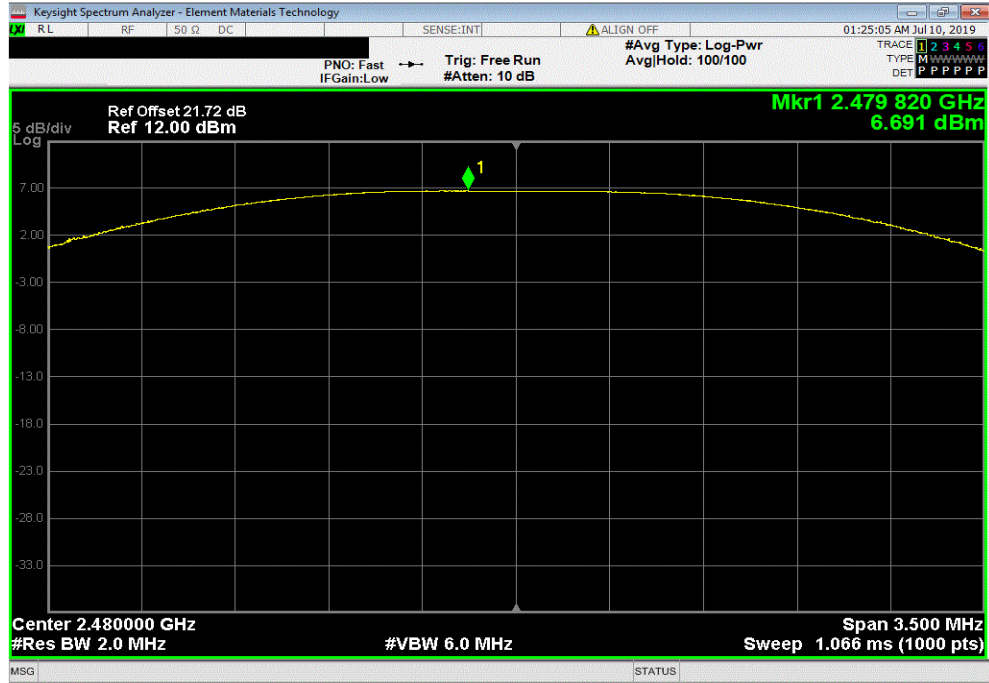


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TMTx 2018.09.13 XMt 2019.05.15

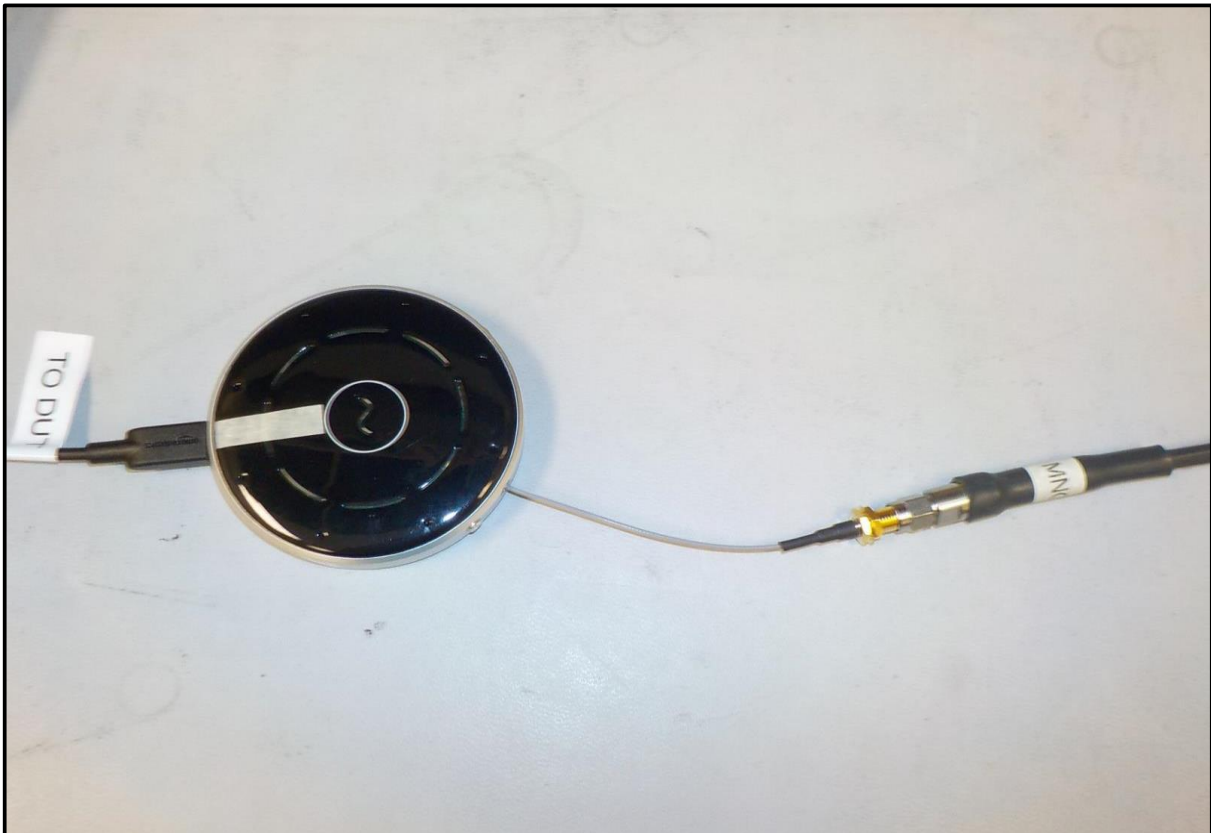
BLE/GFSK High Channel, 2480 MHz						
Pk Cond Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
6.691	0	6.691	36	Pass		



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



XMit 2019.05.15



POWER SPECTRAL DENSITY



XMIT 2019.05.15

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	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-19	13-Feb-20
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNO	7-Jun-19	7-Jun-20
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	13-Dec-18	13-Dec-19

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.

POWER SPECTRAL DENSITY



TMTx 2018.09.13 XMt 2019.05.15

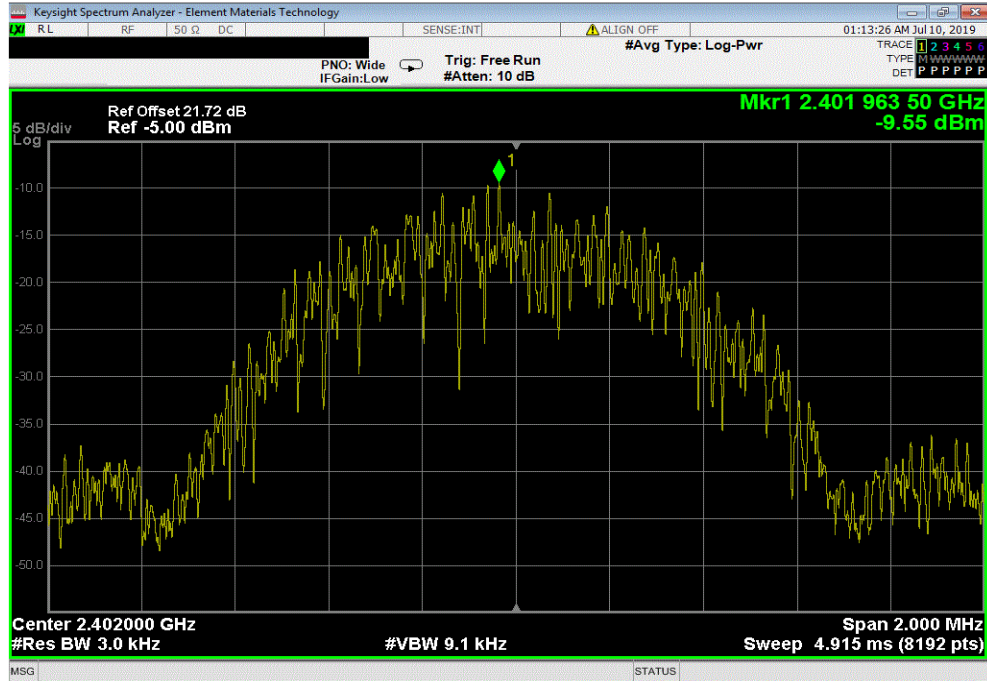
EUT: Starkey Brand Table Microphone (Model TM10)		Work Order: NUAH0001	
Serial Number: EP3.7		Date: 9-Jul-19	
Customer: Nuance Hearing		Temperature: 21.5 °C	
Attendees: Charlie Esch		Humidity: 57.8% RH	
Project: None		Barometric Pres.: 1014 mbar	
Tested by: Andrew Rogstad	Power: 4.8 VDC	Job Site: MN08	
TEST SPECIFICATIONS			
LP0002:2018		Test Method LP0002:2018	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	6	Signature <i>Andrew Rogstad</i>	
		Value dBm/3kHz	Limit < dBm/3kHz
BLE/GFSK Low Channel, 2402 MHz		-9.548	8
BLE/GFSK Mid Channel, 2442 MHz		-8.654	8
BLE/GFSK High Channel, 2480 MHz		-9.015	8
			Results
			Pass
			Pass
			Pass

POWER SPECTRAL DENSITY

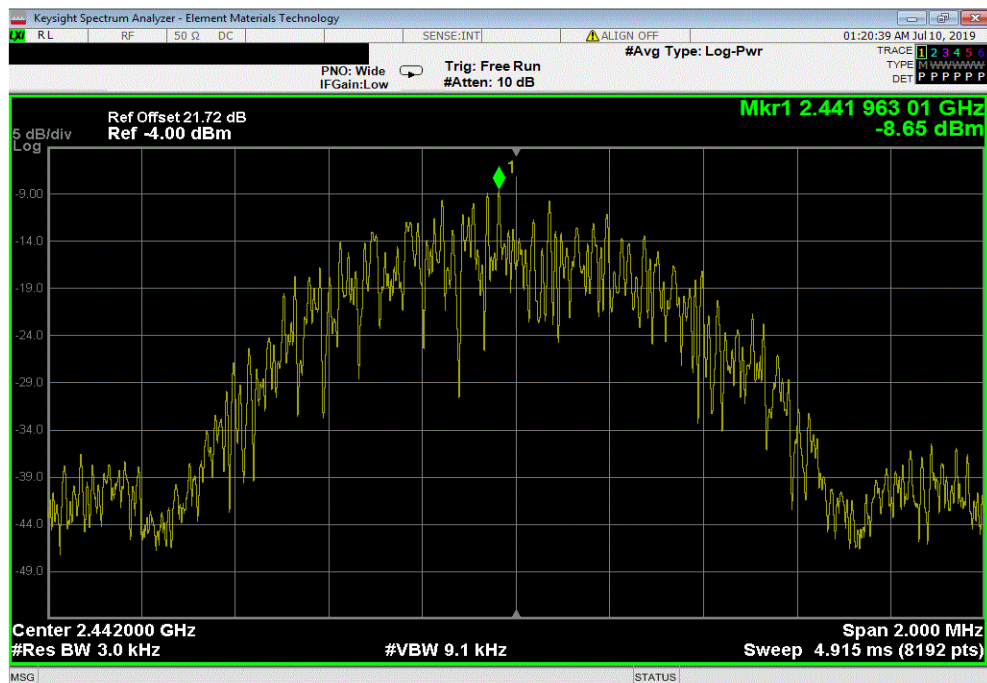


TMTx 2018.09.13 XMt 2019.05.15

BLE/GFSK Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-9.548	8	Pass



BLE/GFSK Mid Channel, 2442 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-8.654	8	Pass

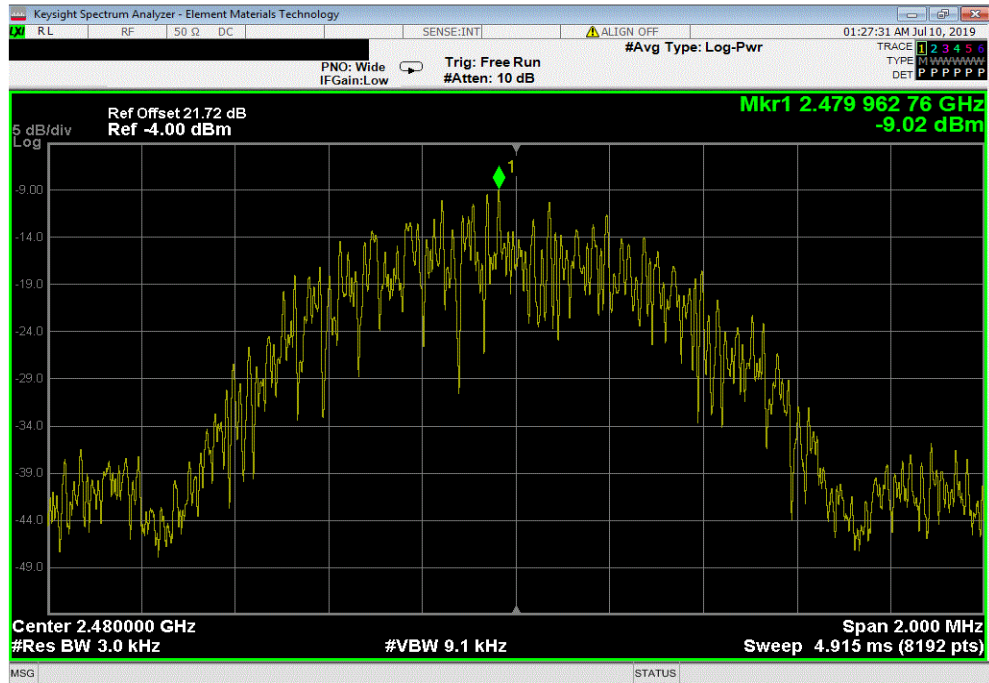


POWER SPECTRAL DENSITY



TMTx 2018.09.13 XMt 2019.05.15

BLE/GFSK High Channel, 2480 MHz						
				Value	Limit	Results
				dBm/3kHz	< dBm/3kHz	
				-9.015	8	Pass



POWER SPECTRAL DENSITY



BAND EDGE COMPLIANCE



XMIT 2019.05.15

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	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-19	13-Feb-20
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNO	7-Jun-19	7-Jun-20
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	13-Dec-18	13-Dec-19

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.

BAND EDGE COMPLIANCE



TM10 2018.09.13 XMI 2019.05.15

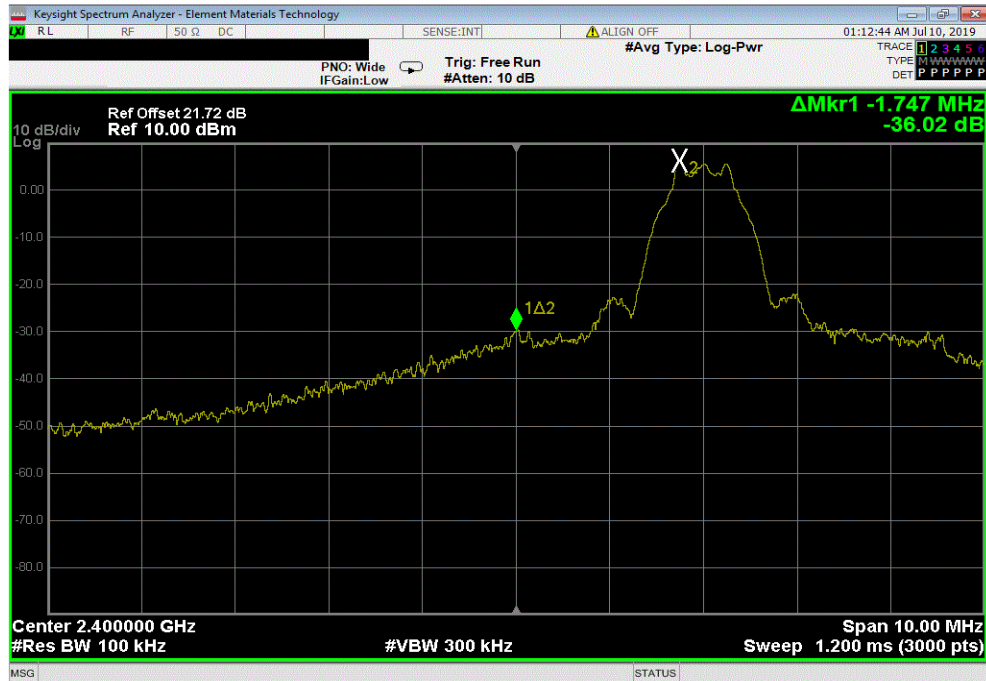
EUT: Starkey Brand Table Microphone (Model TM10)		Work Order: NUAH0001	
Serial Number: EP3.7		Date: 9-Jul-19	
Customer: Nuance Hearing		Temperature: 21.7 °C	
Attendees: Charlie Esch		Humidity: 60.2% RH	
Project: None		Barometric Pres.: 1014 mbar	
Tested by: Andrew Rogstad		Power: 4.8 VDC	
TEST SPECIFICATIONS		Job Site: MN08	
LP0002:2018		Test Method	
LP0002:2018		LP0002:2018	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	6	Signature <i>Andrew Rogstad</i>	
		Value (dBc)	Limit ≤ (dBc)
BLE/GFSK Low Channel, 2402 MHz		-36.02	-20
BLE/GFSK High Channel, 2480 MHz		-46.41	-20
			Result
			Pass
			Pass

BAND EDGE COMPLIANCE

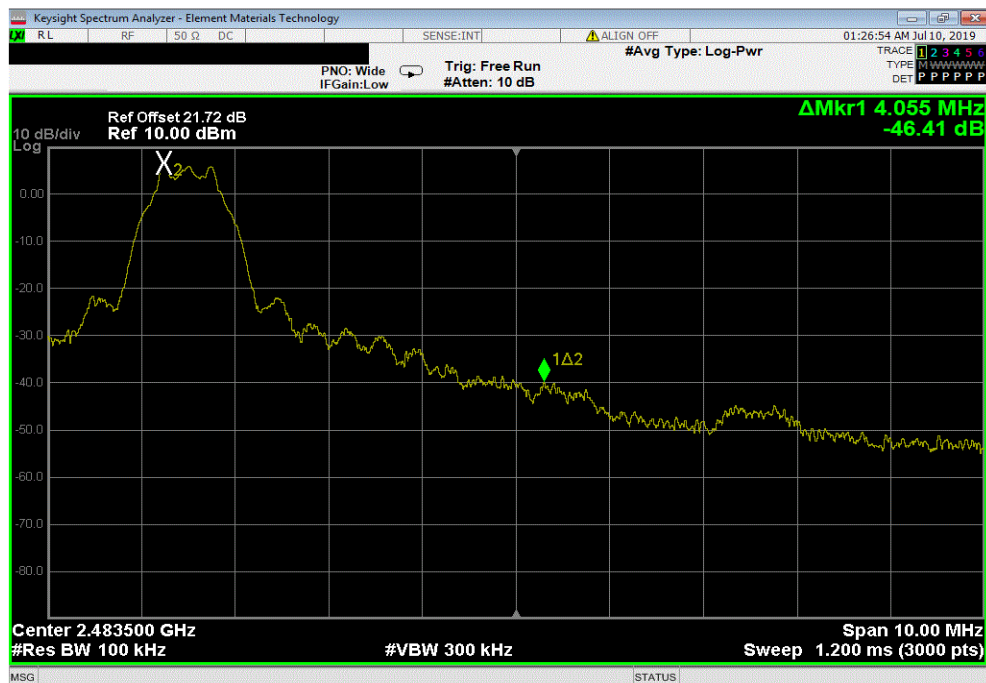


TMTx 2018.09.13 XMt 2019.05.15

BLE/GFSK Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-36.02	-20	Pass



BLE/GFSK High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-46.41	-20	Pass



BAND EDGE COMPLIANCE



SPURIOUS CONDUCTED EMISSIONS



XMIT 2019.05.15

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	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-19	13-Feb-20
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNO	7-Jun-19	7-Jun-20
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	13-Dec-18	13-Dec-19

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.

SPURIOUS CONDUCTED EMISSIONS



THxTx 2018.09.13 XMt 2019.05.15

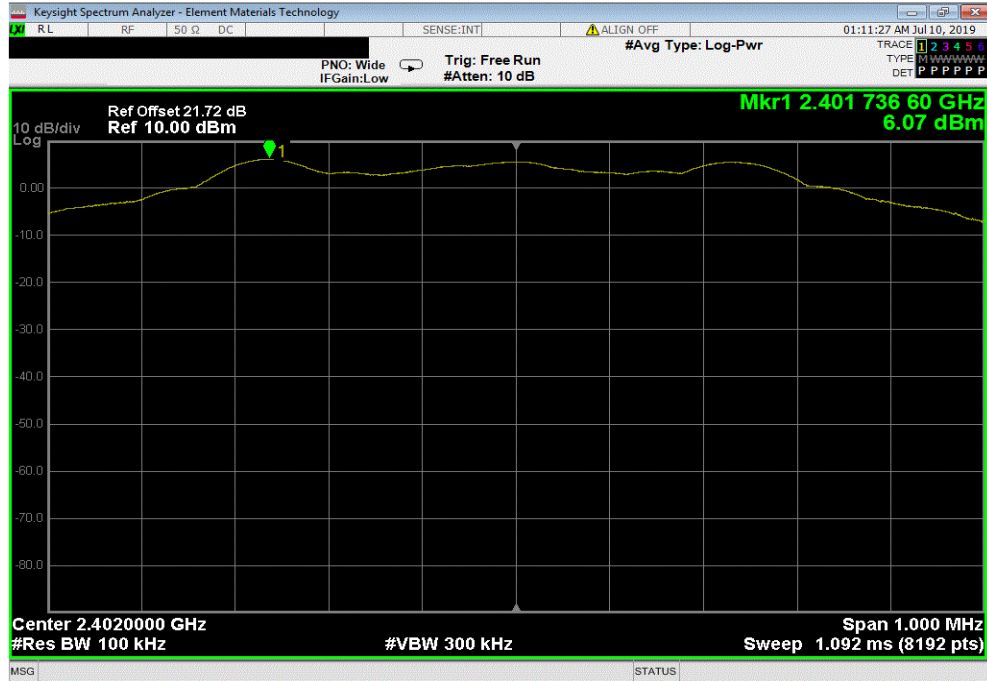
EUT: Starkey Brand Table Microphone (Model TM10)		Work Order: NUAH0001				
Serial Number: EP3.7		Date: 9-Jul-19				
Customer: Nuance Hearing		Temperature: 21.5 °C				
Attendees: Charlie Esch		Humidity: 57.6% RH				
Project: None		Barometric Pres.: 1014 mbar				
Tested by: Andrew Rogstad		Power: 4.8 VDC				
Job Site: MN08						
TEST SPECIFICATIONS						
LP0002:2018		Test Method				
LP0002:2018		LP0002:2018				
COMMENTS						
None						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	6	Signature <i>Andrew Rogstad</i>				
		Frequency Range	Measured Freq (MHz)			
			Max Value (dBc)			
			Limit ≤ (dBc)			
			Result			
BLE/GFSK Low Channel, 2402 MHz		Fundamental	2401.74	N/A	N/A	
BLE/GFSK Low Channel, 2402 MHz		30 MHz - 12.5 GHz	2397.34	-50.09	-20	Pass
BLE/GFSK Low Channel, 2402 MHz		12.5 GHz - 25 GHz	24153.03	-56.22	-20	Pass
BLE/GFSK Mid Channel, 2442 MHz		Fundamental	2441.74	N/A	N/A	N/A
BLE/GFSK Mid Channel, 2442 MHz		30 MHz - 12.5 GHz	3636.57	-60.21	-20	Pass
BLE/GFSK Mid Channel, 2442 MHz		12.5 GHz - 25 GHz	24105.73	-57.21	-20	Pass
BLE/GFSK High Channel, 2480 MHz		Fundamental	2479.74	N/A	N/A	N/A
BLE/GFSK High Channel, 2480 MHz		30 MHz - 12.5 GHz	2487.16	-53.08	-20	Pass
BLE/GFSK High Channel, 2480 MHz		12.5 GHz - 25 GHz	23924.12	-56.21	-20	Pass

SPURIOUS CONDUCTED EMISSIONS

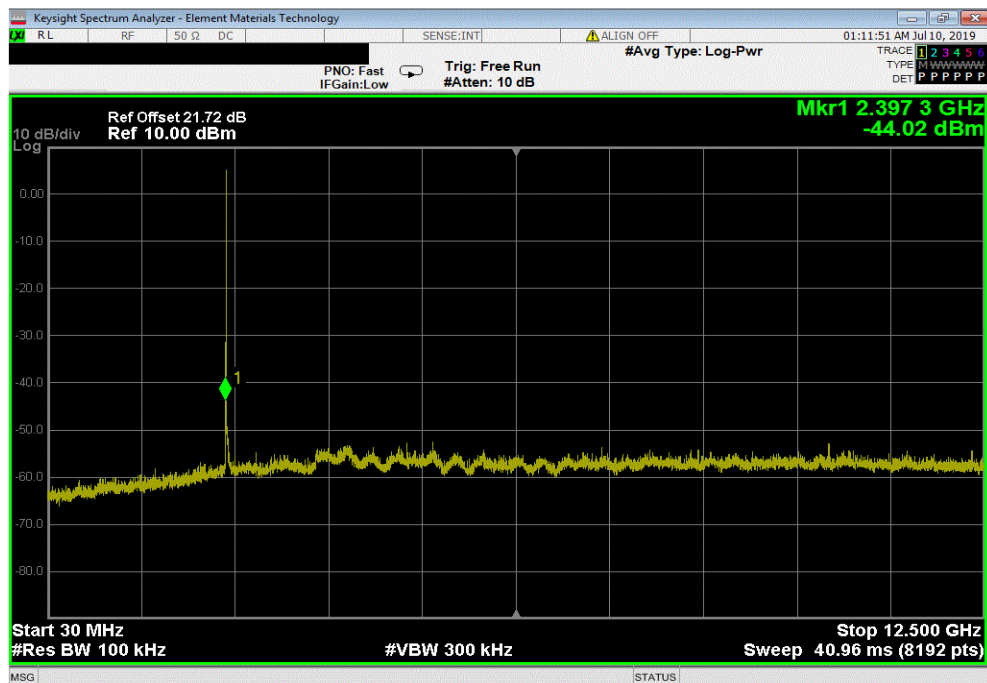


TMTx 2018.09.13 XMI 2019.05.15

BLE/GFSK Low Channel, 2402 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2401.74	N/A	N/A	N/A		



BLE/GFSK Low Channel, 2402 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz	2397.34	-50.09	-20	Pass		

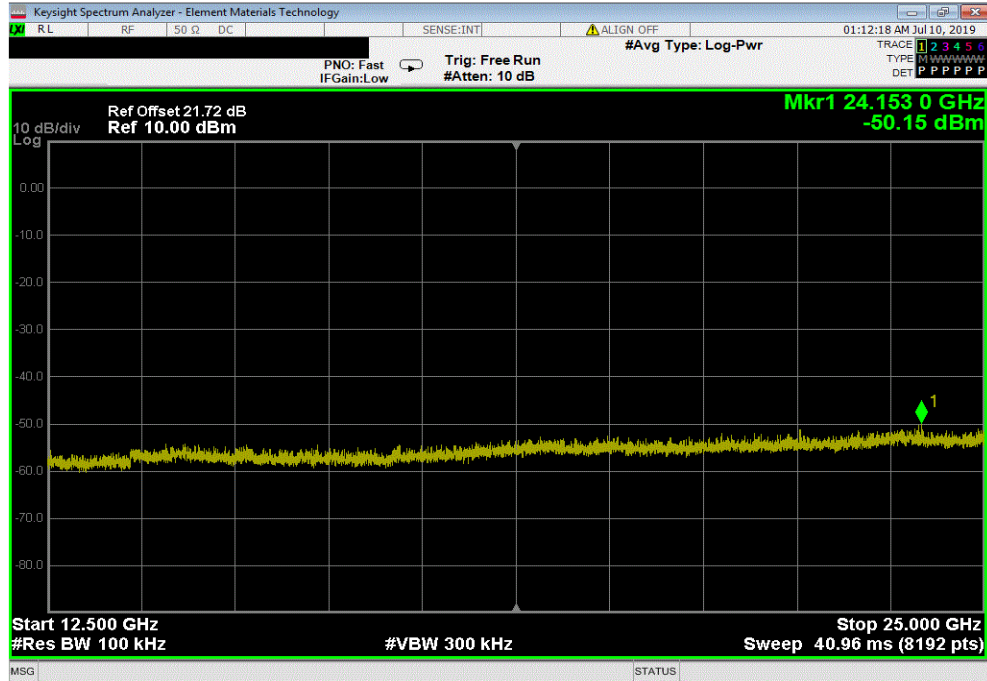


SPURIOUS CONDUCTED EMISSIONS

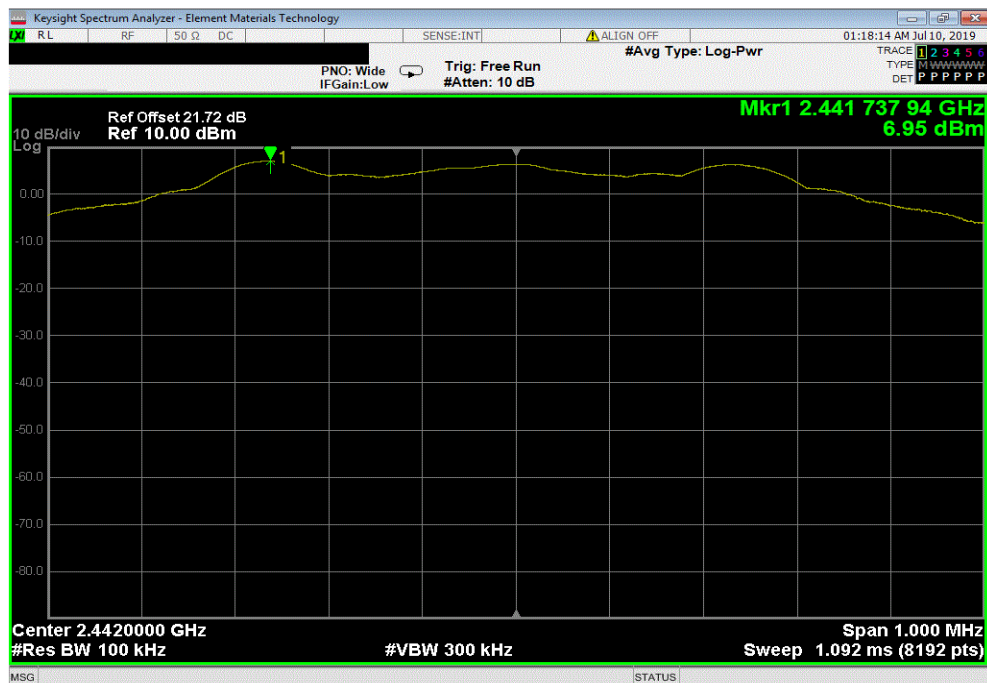


TMTx 2018.09.13 XMt 2019.05.15

BLE/GFSK Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24153.03	-56.22	-20	Pass	



BLE/GFSK Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2441.74	N/A	N/A	N/A	

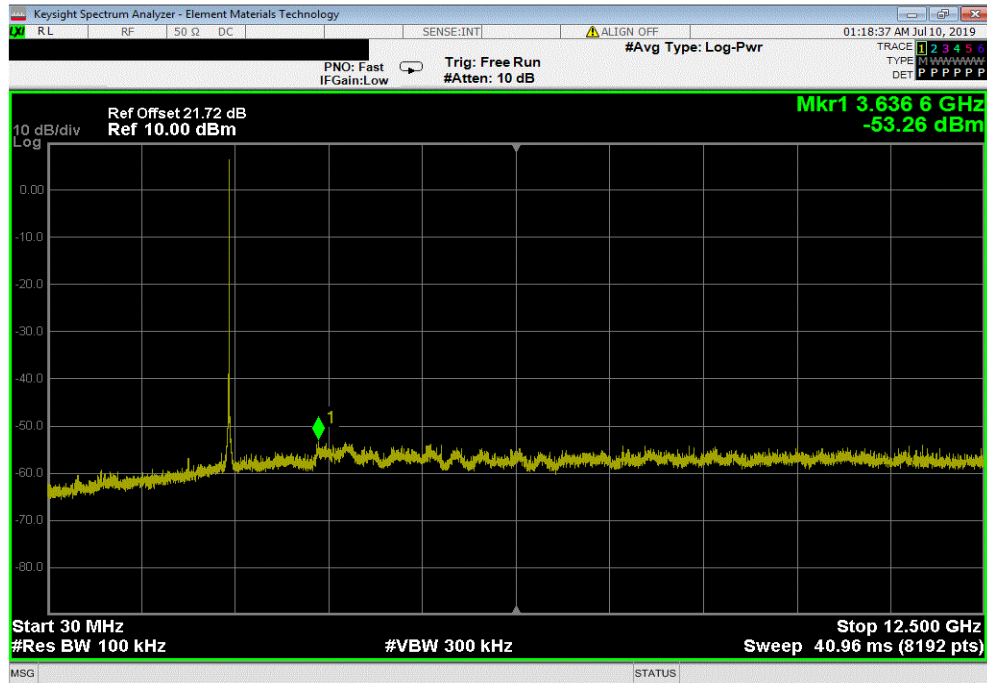


SPURIOUS CONDUCTED EMISSIONS

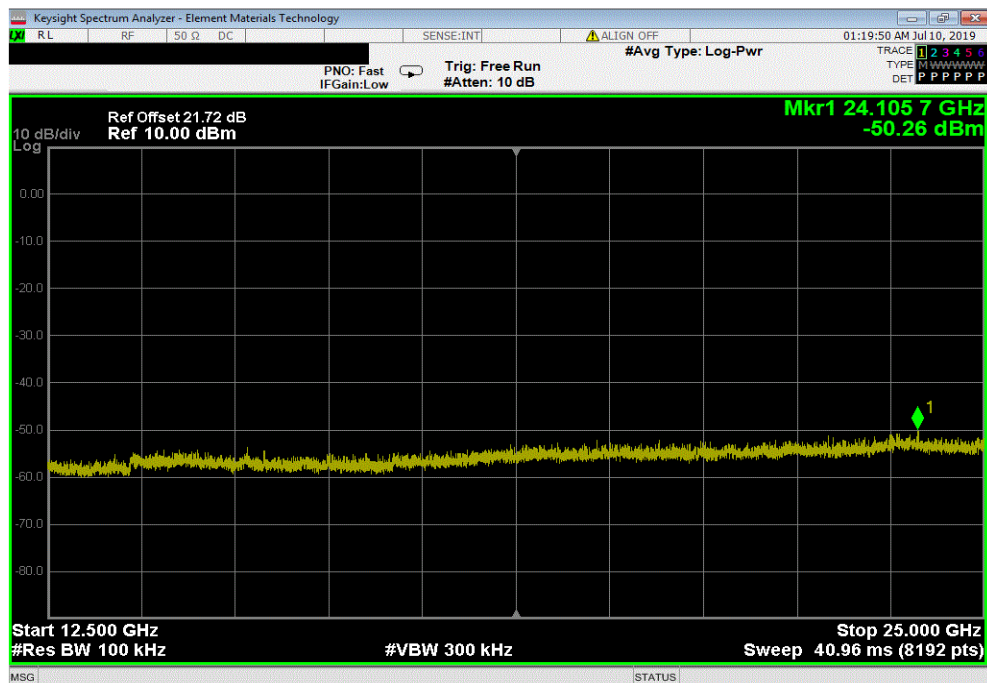


TMTx 2018.09.13 XMt 2019.05.15

BLE/GFSK Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	3636.57	-60.21	-20	Pass	



BLE/GFSK Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24105.73	-57.21	-20	Pass	

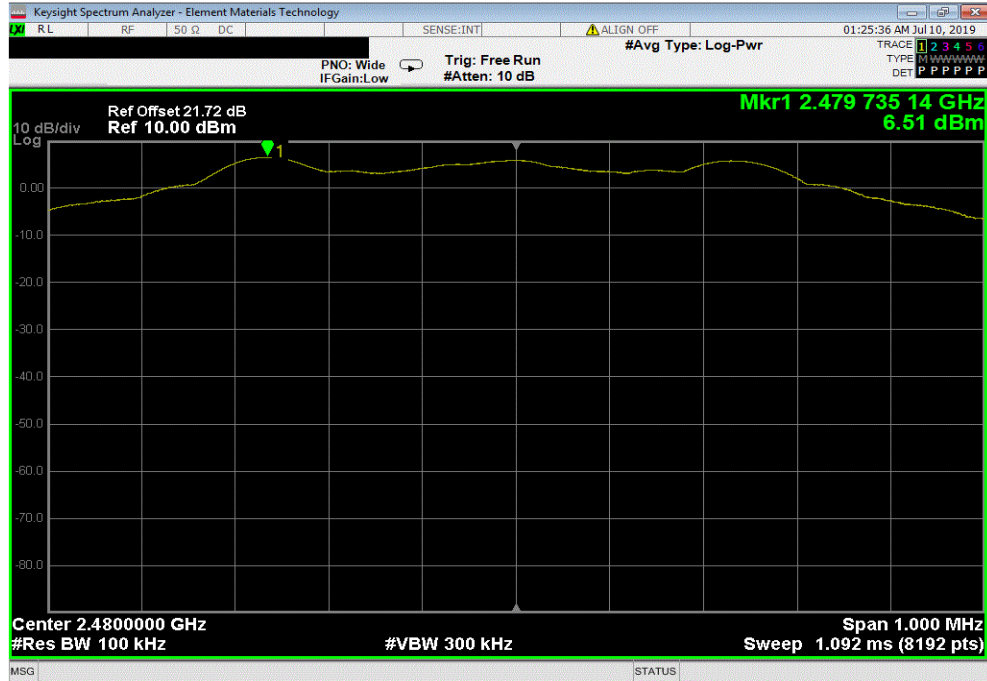


SPURIOUS CONDUCTED EMISSIONS

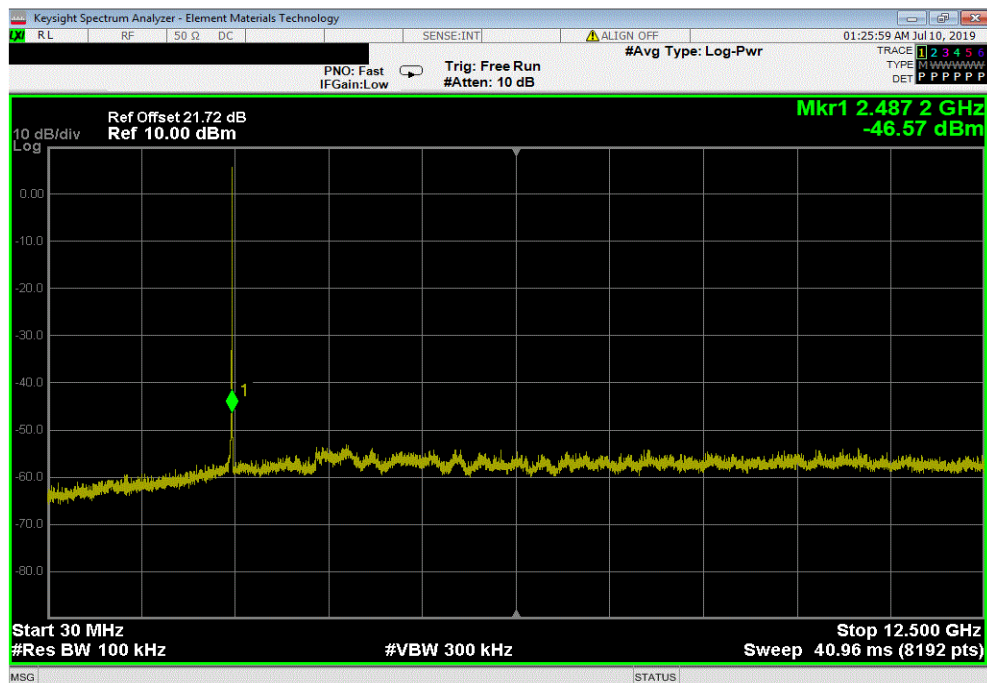


TMTx 2018.09.13 XMI 2019.05.15

BLE/GFSK High Channel, 2480 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2479.74	N/A	N/A	N/A		



BLE/GFSK High Channel, 2480 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz	2487.16	-53.08	-20	Pass		

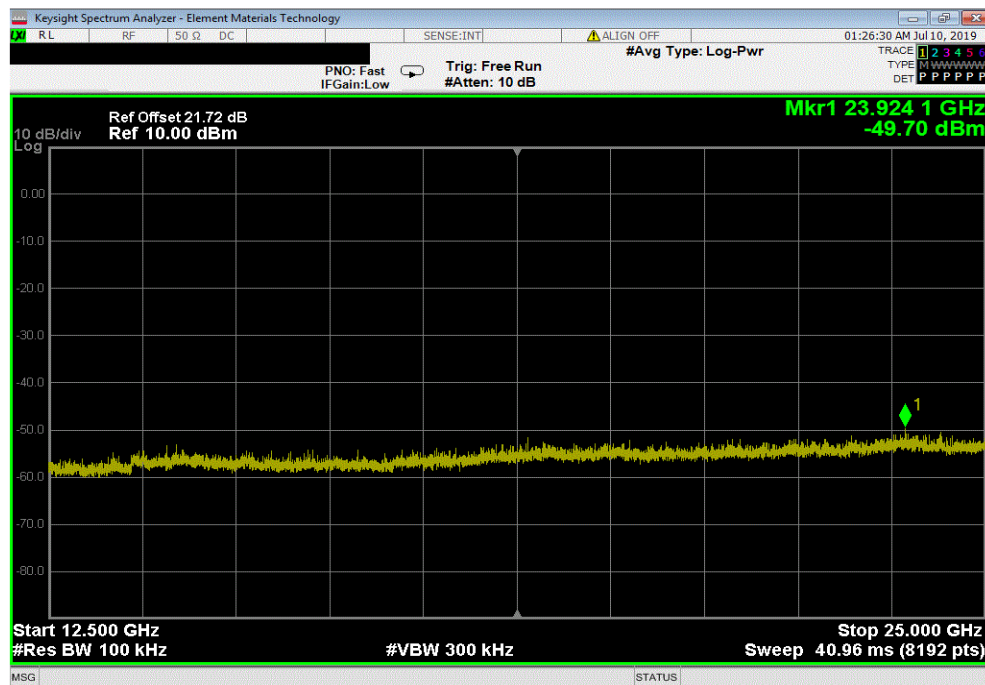


SPURIOUS CONDUCTED EMISSIONS

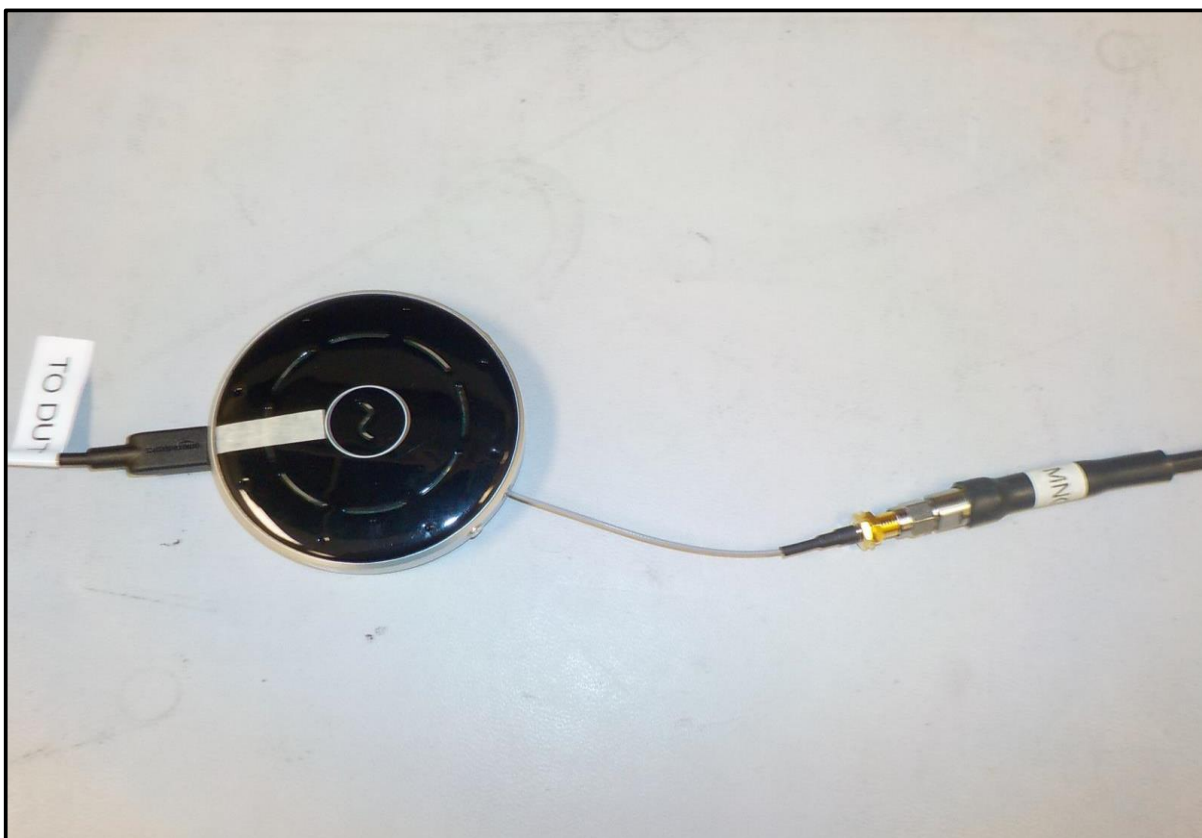
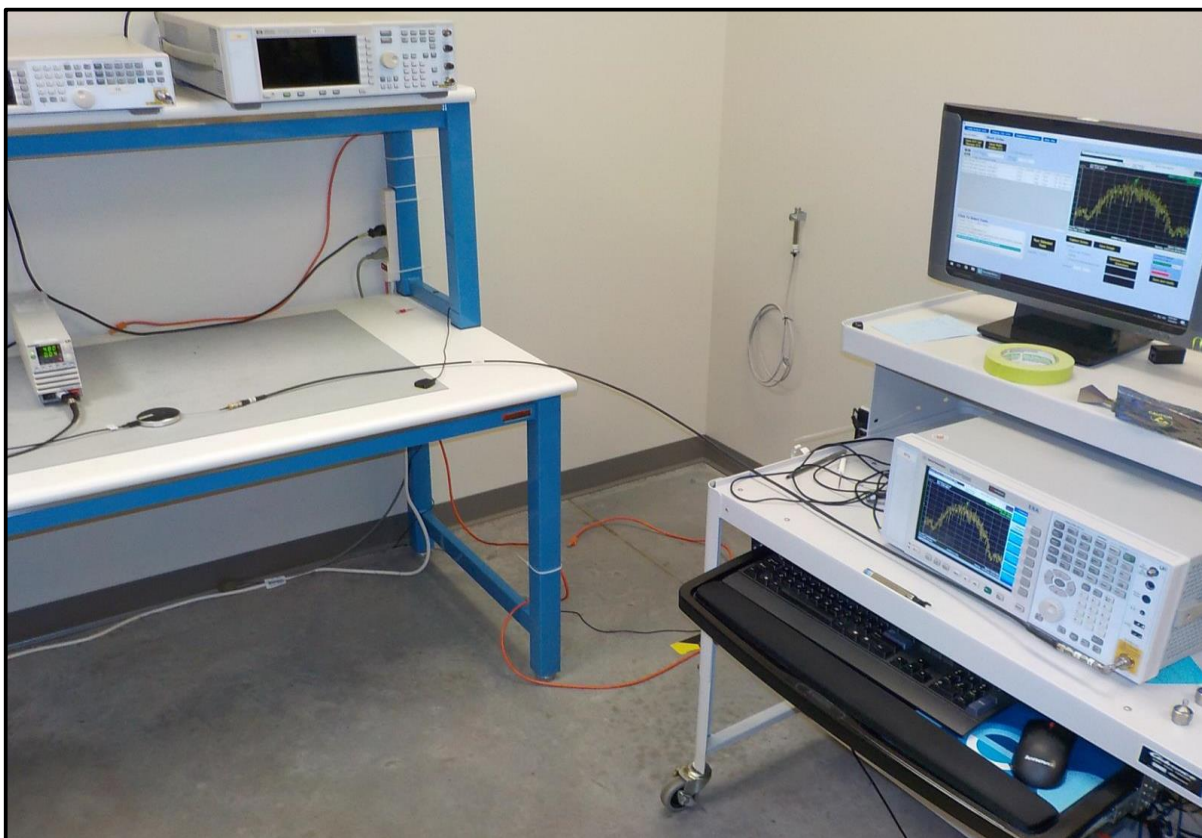


TMTx 2018.09.13 XMt 2019.05.15

BLE/GFSK High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	23924.12	-56.21	-20	Pass	



SPURIOUS CONDUCTED EMISSIONS



SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2019.05.10

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

Tx on low channel (2402 MHz), mid channel (2442 MHz), and high channel (2480 MHz); BLE
Transmitting PAS (2 Mbps) - mid channel (2442 MHz) and high channel (2476 MHz) modulated

POWER SETTINGS INVESTIGATED

DC via 120VAC/60Hz
Battery

CONFIGURATIONS INVESTIGATED

NUAH0001 - 1
NUAH0004 - 2
NUAH0012 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency | 30 MHz | Stop Frequency | 26500 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT (2-JUL-2019)

Description	Manufacturer	Model	ID	Last Cal.	Interval
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-12001800-30-10P	PAP	23-Feb-2019	12 mo
Antenna	ETS-Lindgren	3160-08	AJP	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	23-Feb-2019	12 mo
Cable	Element	Standard Gain Cable	MNW	23-Feb-2019	12 mo
Antenna	ETS-Lindgren	3160-07	AJJ	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	23-Feb-2019	12 mo
Cable	Element	Double Ridge Guide Horn Cables	MNV	23-Feb-2019	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFD	27-Jul-2018	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIB	27-Aug-2018	24 mo
Filter - Low Pass	Micro-Tronics	LPM50004	HGG	17-Sep-2019	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HFM	18-Sep-2019	12 mo
Attenuator	Coaxicom	3910-20	AXY	17-Sep-2019	12 mo

TEST EQUIPMENT (19-NOV-2019)

Description	Manufacturer	Model	ID	Last Cal.	Interval
Filter - High Pass	Micro-Tronics	HPM50111	LFN	12-Sep-2019	12 mo
Attenuator	Fairview Microwave	SA18E-20	TWZ	17-Sep-2019	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	8-Feb-2019	12 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	17-Sep-2019	12 mo
Antenna - Double Ridge	ETS-Lindgren	3115	AJQ	16-Jan-2019	24 mo
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	13-Dec-2018	12 mo

SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2019.05.10

TEST EQUIPMENT (25-FEB-2021)

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Amplifier - Pre-Amplifier	Miteq	AM-1064-9079	AOO	2021-02-01	2022-02-01
Cable	Element	Biconilog Cable	MNX	2021-02-01	2022-02-01
Filter - Low Pass	Micro-Tronics	LPM50004	HGG	2020-09-14	2021-09-14
Antenna - Biconilog	Ametek	CBL 6141B	AYS	2019-03-19	2021-03-19
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2021-01-06	2022-01-06

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

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 $10 \cdot \text{LOG}(\text{dc})$.

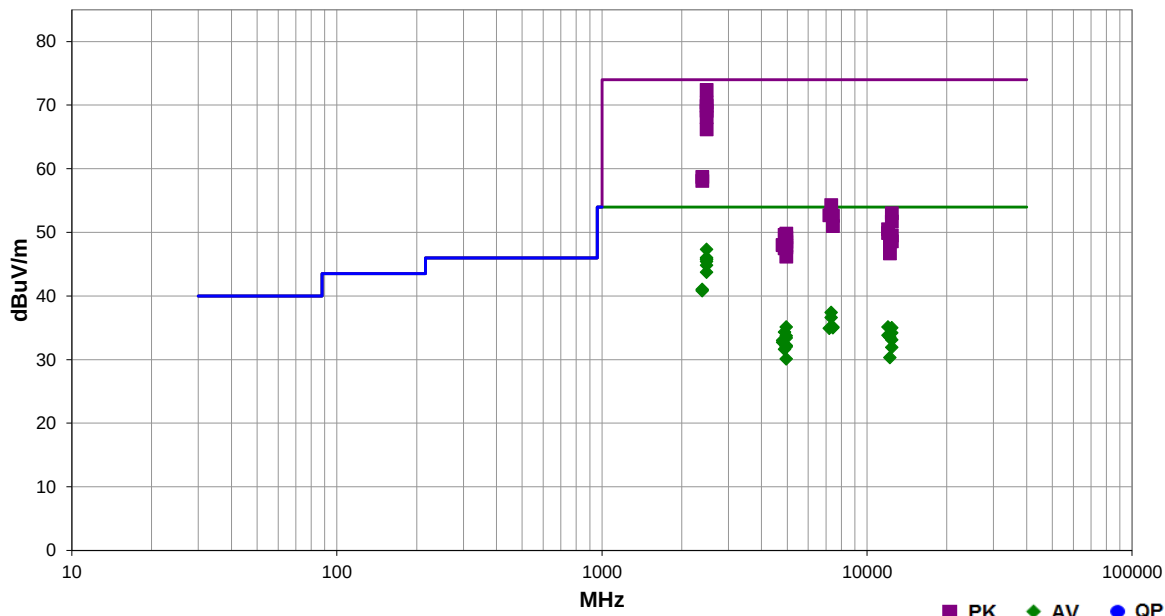
SPURIOUS RADIATED EMISSIONS



EmiRS 2019.05.20 PSA-ESCI 2019.05.10

Work Order:	NUAH0001	Date:	2-Jul-2019	
Project:	None	Temperature:	22 °C	
Job Site:	MN09	Humidity:	70.5% RH	
Serial Number:	EP3.4	Barometric Pres.:	1015 mbar	Tested by: Andrew Rogstad
EUT:	Starkey Brand Table Microphone (Model TM10)			
Configuration:	1			
Customer:	Nuance Hearing			
Attendees:	Charlie Esch			
EUT Power:	DC via 120VAC/60Hz			
Operating Mode:	Tx on low channel (2402 MHz), mid channel (2442 MHz), and high channel (2480 MHz); BLE			
Deviations:	None			
Comments:	Added a Duty Cycle Correction Factor (DCCF) of 4.5 dB due to test mode having a maximum duty cycle of 35.5% and then added a DCCF of -10.4 dB due to the customer stating that the EUT had a fixed operational duty cycle of 30.25%. This resulted in -5.9 dB being added to the raw average data. See data comments for EUT orientation and Tx channel.			
Test Specifications	LP0002:2018		Test Method	LP0002:2018

Run #	14	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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■ PK ◆ AV ● QP

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.580	56.5	-4.1	3.0	89.0		20.0	Horz	PK	0.0	72.4	74.0	-1.6	EUT on side, High ch., BLE
2483.513	54.5	-4.1	4.0	79.0		20.0	Horz	PK	0.0	70.4	74.0	-3.6	EUT horz, High ch., BLE
2483.517	54.0	-4.1	1.3	289.0		20.0	Vert	PK	0.0	69.9	74.0	-4.1	EUT vert, High ch., BLE
2483.707	53.2	-4.1	4.0	290.0		20.0	Horz	PK	0.0	69.1	74.0	-4.9	EUT vert, High ch., BLE
2483.517	52.2	-4.1	3.8	51.0		20.0	Vert	PK	0.0	68.1	74.0	-5.9	EUT horz, High ch., BLE
2483.510	37.3	-4.1	3.0	89.0	-5.9	20.0	Horz	AV	0.0	47.3	54.0	-6.7	EUT on side, High ch., BLE
2483.527	50.3	-4.1	1.5	148.0		20.0	Vert	PK	0.0	66.2	74.0	-7.8	EUT on side, High ch., BLE
2483.500	36.0	-4.1	4.0	79.0	-5.9	20.0	Horz	AV	0.0	46.0	54.0	-8.0	EUT horz, High ch., BLE
2483.540	35.8	-4.1	4.0	290.0	-5.9	20.0	Horz	AV	0.0	45.8	54.0	-8.2	EUT vert, High ch., BLE
2483.500	35.7	-4.1	1.3	289.0	-5.9	20.0	Vert	AV	0.0	45.7	54.0	-8.3	EUT vert, High ch., BLE
2483.510	35.4	-4.1	3.7	134.0	-5.9	20.0	Vert	AV	0.0	45.4	54.0	-8.6	EUT horz, High ch., BLE 2
2483.513	34.8	-4.1	3.8	51.0	-5.9	20.0	Vert	AV	0.0	44.8	54.0	-9.2	EUT horz, High ch., BLE
2483.507	33.7	-4.1	1.5	148.0	-5.9	20.0	Vert	AV	0.0	43.7	54.0	-10.3	EUT on side, High ch., BLE
2389.007	31.1	-4.2	1.5	96.0	-5.9	20.0	Vert	AV	0.0	41.0	54.0	-13.0	EUT vert, Low ch., BLE
2388.310	30.9	-4.2	1.5	225.0	-5.9	20.0	Horz	AV	0.0	40.8	54.0	-13.2	EUT on side, Low ch., BLE
2388.713	42.9	-4.2	1.5	96.0		20.0	Vert	PK	0.0	58.7	74.0	-15.3	EUT vert, Low ch., BLE
2389.330	42.3	-4.2	1.5	225.0		20.0	Horz	PK	0.0	58.1	74.0	-15.9	EUT on side, Low ch., BLE
7325.392	30.6	12.7	1.5	272.0	-5.9	0.0	Horz	AV	0.0	37.4	54.0	-16.6	EUT on side, Mid ch., BLE
7325.375	29.8	12.7	1.5	69.0	-5.9	0.0	Vert	AV	0.0	36.6	54.0	-17.4	EUT horz, Mid ch., BLE
12008.680	42.2	-1.2	1.3	20.0	-5.9	0.0	Horz	AV	0.0	35.1	54.0	-18.9	EUT on side, Low ch., BLE

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4959.758	37.2	3.8	2.3	50.0	-5.9	0.0	Horz	AV	0.0	35.1	54.0	-18.9	EUT on side, High ch., BLE
7439.392	28.2	12.8	1.5	315.0	-5.9	0.0	Vert	AV	0.0	35.1	54.0	-18.9	EUT horz, High ch., BLE
7437.625	28.1	12.8	1.5	297.0	-5.9	0.0	Horz	AV	0.0	35.0	54.0	-19.0	EUT on side, High ch., BLE
12400.960	28.5	12.4	2.0	11.0	-5.9	0.0	Horz	AV	0.0	35.0	54.0	-19.0	EUT on side, High ch., BLE
7205.308	28.5	12.3	1.5	246.0	-5.9	0.0	Vert	AV	0.0	34.9	54.0	-19.1	EUT horz, Low ch., BLE
4883.817	36.7	3.5	2.1	314.0	-5.9	0.0	Horz	AV	0.0	34.3	54.0	-19.7	EUT on side, Mid ch., BLE
7326.533	41.6	12.7	1.5	272.0	0.0	0.0	Horz	PK	0.0	54.3	74.0	-19.7	EUT on side, Mid ch., BLE
12400.950	27.7	12.4	2.4	17.0	-5.9	0.0	Vert	AV	0.0	34.2	54.0	-19.8	EUT horz, High ch., BLE
12008.710	40.9	-1.2	1.0	47.0	-5.9	0.0	Vert	AV	0.0	33.8	54.0	-20.2	EUT horz, Low ch., BLE
4959.925	35.8	3.8	1.0	153.0	-5.9	0.0	Vert	AV	0.0	33.7	54.0	-20.3	EUT horz, High ch., BLE
12208.670	39.8	-0.4	1.8	13.0	-5.9	0.0	Horz	AV	0.0	33.5	54.0	-20.5	EUT on side, Mid ch., BLE
4959.817	35.5	3.8	2.3	154.0	-5.9	0.0	Horz	AV	0.0	33.4	54.0	-20.6	EUT vert, High ch., BLE
12398.720	39.2	-0.2	1.8	8.0	-5.9	0.0	Horz	AV	0.0	33.1	54.0	-20.9	EUT on side, High ch., BLE
4803.858	35.4	3.5	2.3	341.0	-5.9	0.0	Horz	AV	0.0	33.0	54.0	-21.0	EUT on side, Low ch., BLE
12401.350	40.6	12.4	2.0	11.0	0.0	0.0	Horz	PK	0.0	53.0	74.0	-21.0	EUT on side, High ch., BLE
7326.792	40.2	12.7	1.5	69.0	0.0	0.0	Vert	PK	0.0	52.9	74.0	-21.1	EUT horz, Mid ch., BLE
4803.925	35.1	3.5	1.6	183.0	-5.9	0.0	Vert	AV	0.0	32.7	54.0	-21.3	EUT horz, Low ch., BLE
7208.067	40.4	12.3	1.5	246.0	0.0	0.0	Vert	PK	0.0	52.7	74.0	-21.3	EUT horz, Low ch., BLE
7438.100	39.8	12.8	1.5	315.0	0.0	0.0	Vert	PK	0.0	52.6	74.0	-21.4	EUT horz, High ch., BLE
4959.825	34.3	3.8	1.6	270.0	-5.9	0.0	Vert	AV	0.0	32.2	54.0	-21.8	EUT vert, High ch., BLE
4959.858	34.1	3.8	1.5	127.0	-5.9	0.0	Vert	AV	0.0	32.0	54.0	-22.0	EUT on side, High ch., BLE
12398.640	38.0	-0.2	1.0	61.0	-5.9	0.0	Vert	AV	0.0	31.9	54.0	-22.1	EUT horz, High ch., BLE
12400.860	39.3	12.4	2.4	17.0	0.0	0.0	Vert	PK	0.0	51.7	74.0	-22.3	EUT horz, High ch., BLE
4883.900	34.0	3.5	1.5	192.0	-5.9	0.0	Vert	AV	0.0	31.6	54.0	-22.4	EUT horz, Mid ch., BLE
7439.767	38.2	12.8	1.5	297.0	0.0	0.0	Horz	PK	0.0	51.0	74.0	-23.0	EUT on side, High ch., BLE
12008.480	51.7	-1.2	1.3	20.0	0.0	0.0	Horz	PK	0.0	50.5	74.0	-23.5	EUT on side, Low ch., BLE
12208.710	36.6	-0.4	2.4	137.0	-5.9	0.0	Vert	AV	0.0	30.3	54.0	-23.7	EUT horz, Mid ch., BLE
4959.800	32.2	3.8	1.1	152.0	-5.9	0.0	Horz	AV	0.0	30.1	54.0	-23.9	EUT horz, High ch., BLE
12011.230	51.1	-1.2	1.0	47.0	0.0	0.0	Vert	PK	0.0	49.9	74.0	-24.1	EUT horz, Low ch., BLE
4959.358	46.0	3.8	2.3	50.0	0.0	0.0	Horz	PK	0.0	49.8	74.0	-24.2	EUT on side, High ch., BLE
4884.375	46.1	3.5	2.1	314.0	0.0	0.0	Horz	PK	0.0	49.6	74.0	-24.4	EUT on side, Mid ch., BLE
12399.610	49.7	-0.2	1.8	8.0	0.0	0.0	Horz	PK	0.0	49.5	74.0	-24.5	EUT on side, High ch., BLE
4959.358	45.4	3.8	2.3	154.0	0.0	0.0	Horz	PK	0.0	49.2	74.0	-24.8	EUT vert, High ch., BLE
12399.780	48.8	-0.2	1.0	61.0	0.0	0.0	Vert	PK	0.0	48.6	74.0	-25.4	EUT horz, High ch., BLE
12211.000	49.0	-0.4	1.8	13.0	0.0	0.0	Horz	PK	0.0	48.6	74.0	-25.4	EUT on side, Mid ch., BLE
4960.617	44.7	3.8	1.0	153.0	0.0	0.0	Vert	PK	0.0	48.5	74.0	-25.5	EUT horz, High ch., BLE
4803.633	44.5	3.5	1.6	183.0	0.0	0.0	Vert	PK	0.0	48.0	74.0	-26.0	EUT horz, Low ch., BLE
4803.317	44.5	3.5	2.3	341.0	0.0	0.0	Horz	PK	0.0	48.0	74.0	-26.0	EUT on side, Low ch., BLE
4959.800	44.1	3.8	1.6	270.0	0.0	0.0	Vert	PK	0.0	47.9	74.0	-26.1	EUT vert, High ch., BLE
4960.358	43.8	3.8	1.5	127.0	0.0	0.0	Vert	PK	0.0	47.6	74.0	-26.4	EUT on side, High ch., BLE
4883.675	44.0	3.5	1.5	192.0	0.0	0.0	Vert	PK	0.0	47.5	74.0	-26.5	EUT horz, Mid ch., BLE
12208.700	47.1	-0.4	2.4	137.0	0.0	0.0	Vert	PK	0.0	46.7	74.0	-27.3	EUT horz, Mid ch., BLE
4960.500	42.4	3.8	1.1	152.0	0.0	0.0	Horz	PK	0.0	46.2	74.0	-27.8	EUT horz, High ch., BLE

SPURIOUS RADIATED EMISSIONS



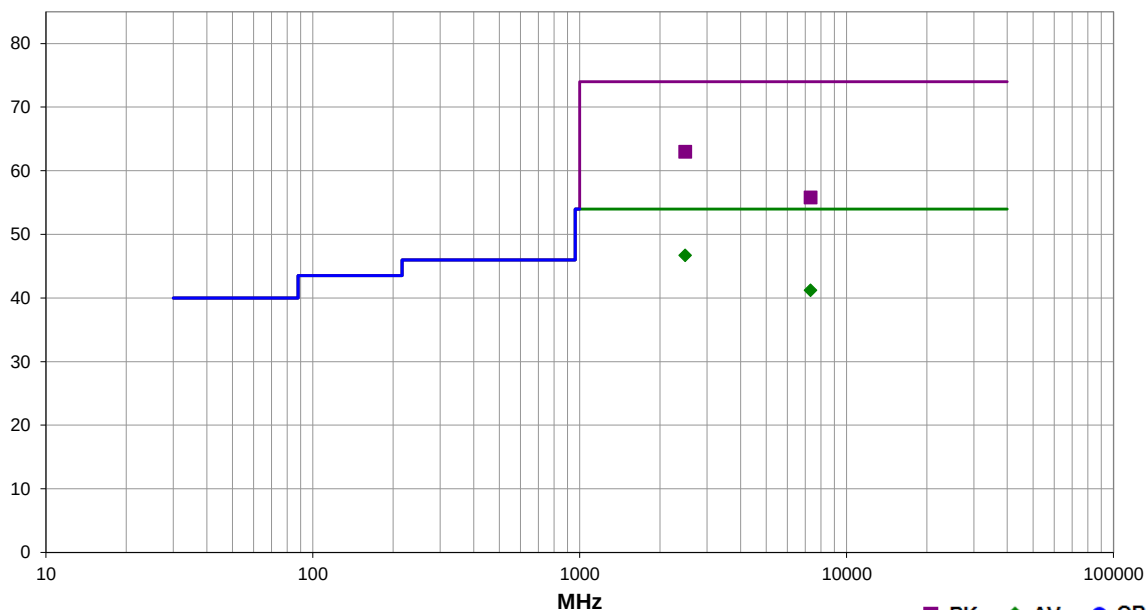
EmiR5 2019.08.15.1

PSA-ESCI 2019.05.10

Work Order:	NUAH0004	Date:	19-Nov-2019	
Project:	None	Temperature:	22.6 °C	
Job Site:	MN05	Humidity:	31.9% RH	
Serial Number:	1938AE20010	Barometric Pres.:	1012 mbar	
EUT: Starkey Brand Table Microphone (Model TM10)				Tested by: Dustin Sparks
Configuration:	2			
Customer:	Nuance Hearing			
Attendees:	John Quach			
EUT Power:	Battery			
Operating Mode:	Transmitting PAS (2 Mbps) - mid channel (2442 MHz) and high channel (2476 MHz) modulated			
Deviations:	None			
Comments:	Duty cycle correction factor (DCCF) of 7.5 dB added to RMS average points, based on a duty cycle of 17.9% and the formula $DCCF = 10 * \log(1/0.179)$. Manufacturer declared that the maximum operating duty cycle is 30.25%, so another DCCF of -10.4 was applied based on the formula $20 * \log(0.3025)$. Total DCCF of -2.9 dB.			

Test Specifications	Test Method
LP0002:2018	LP0002:2018

Run #	1	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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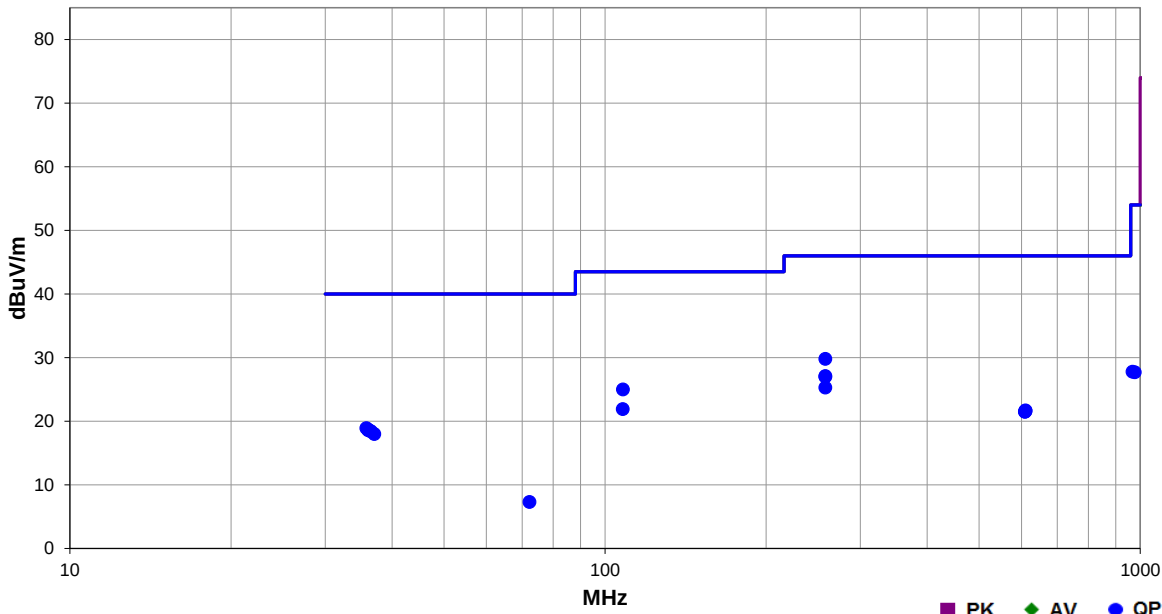
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2485.108	33.4	-3.8	1.5	136.0	-2.9	20.0	Horz	AV	0.0	46.7	54.0	-7.3	EUT on side, High ch., PAS
2483.542	46.8	-3.8	1.5	136.0	0.0	20.0	Horz	PK	0.0	63.0	74.0	-11.0	EUT on side, High ch., PAS
7325.242	30.6	13.5	1.5	348.9	-2.9	0.0	Horz	AV	0.0	41.2	54.0	-12.8	EUT on side, Mid ch., PAS
7324.742	42.3	13.5	1.5	348.9	0.0	0.0	Horz	PK	0.0	55.8	74.0	-18.2	EUT on side, Mid ch., PAS

SPURIOUS RADIATED EMISSIONS



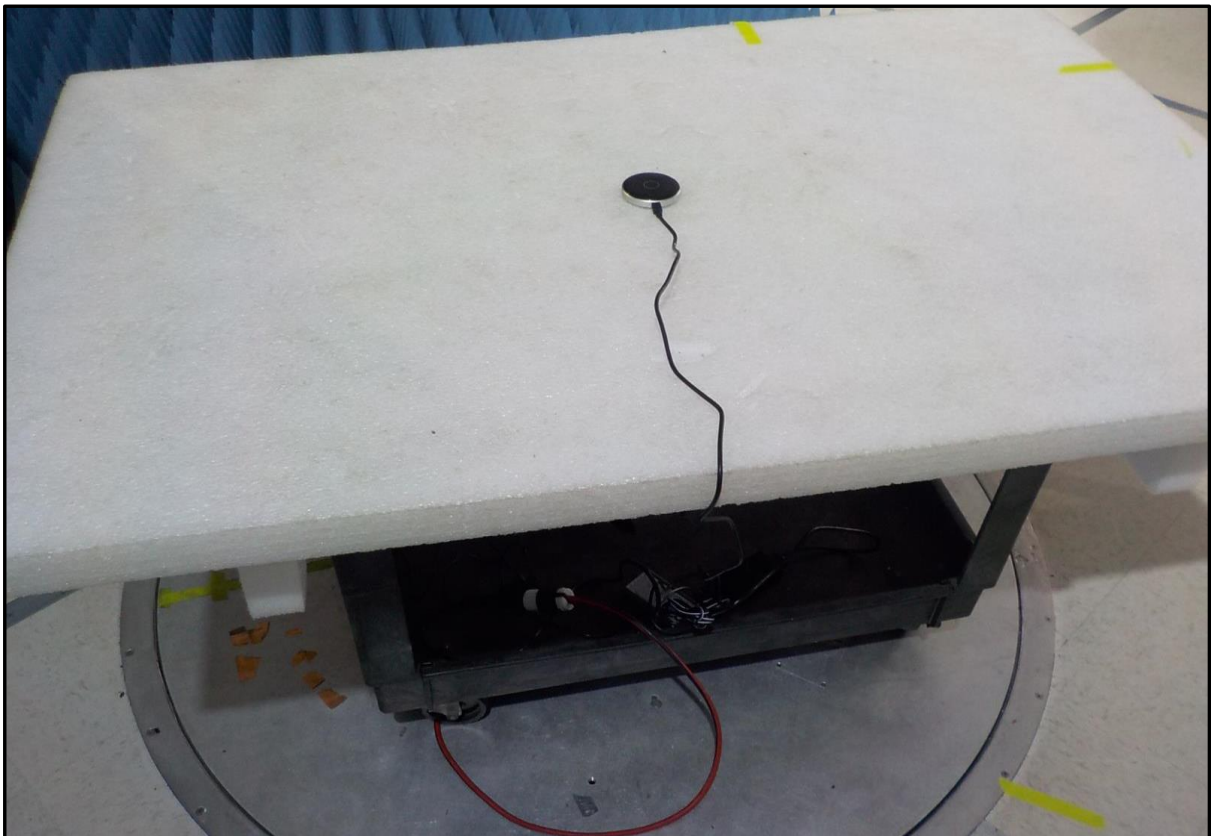
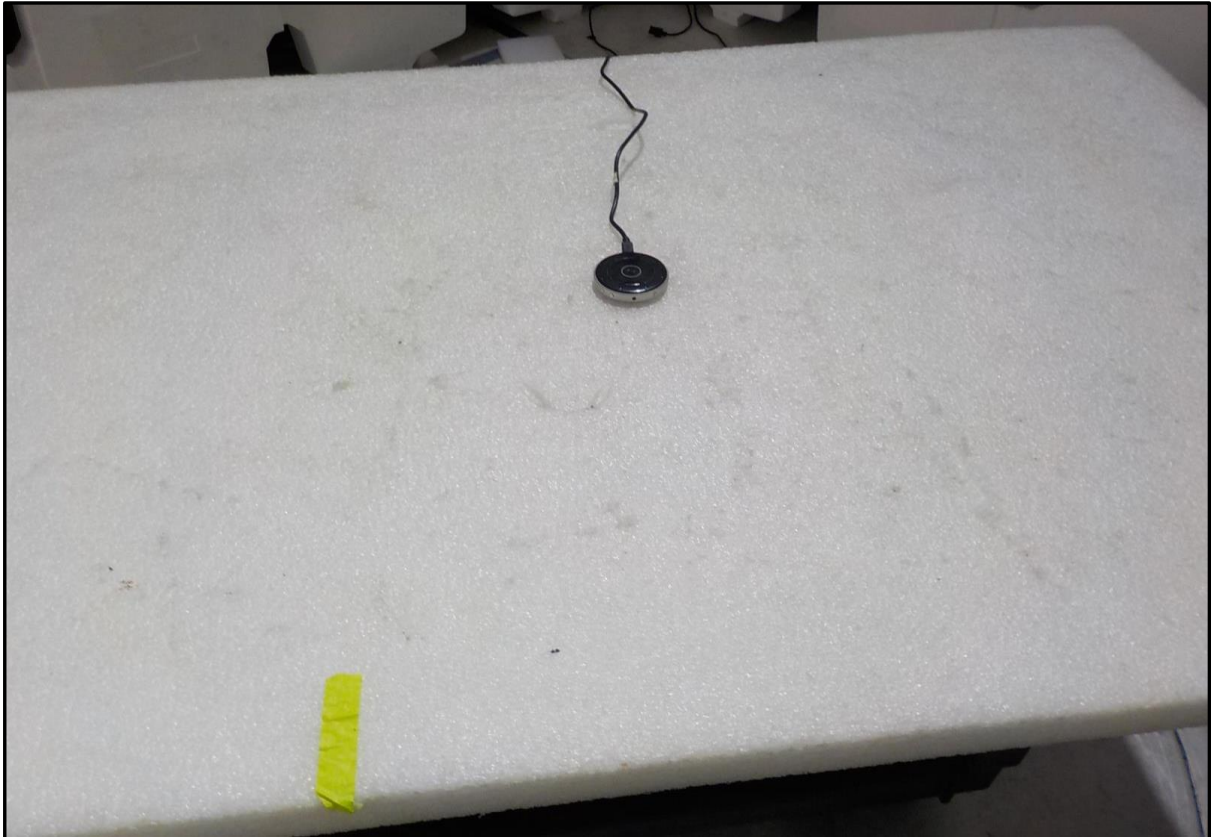
Work Order:	NUAH0012	Date:	2021-02-25	
Project:	None	Temperature:	22.8 °C	
Job Site:	MN09	Humidity:	25.4% RH	
Serial Number:	2027AM20342	Barometric Pres.:	1027 mbar	
EUT:		Starkey Brand Table Microphone (Model TM10)		
Configuration:	1			
Customer:	Nuance Hearing			
Attendees:	None			
EUT Power:	DC via 120VAC/60Hz			
Operating Mode:	Transmitting Bluetooth Low Energy (BLE) - low channel (2402 MHz) mid channel (2442 MHz), and high channel (2480 MHz); 1 Mbps and 2 Mbps (PAS) data rates.			
Deviations:	None			
Comments:	No duty cycle correction factor (DCCF) applied because the emissions measured are not temporally related to the fundamental or its harmonics.			
Test Specifications				Test Method
LP0002:2020				LP0002:2020

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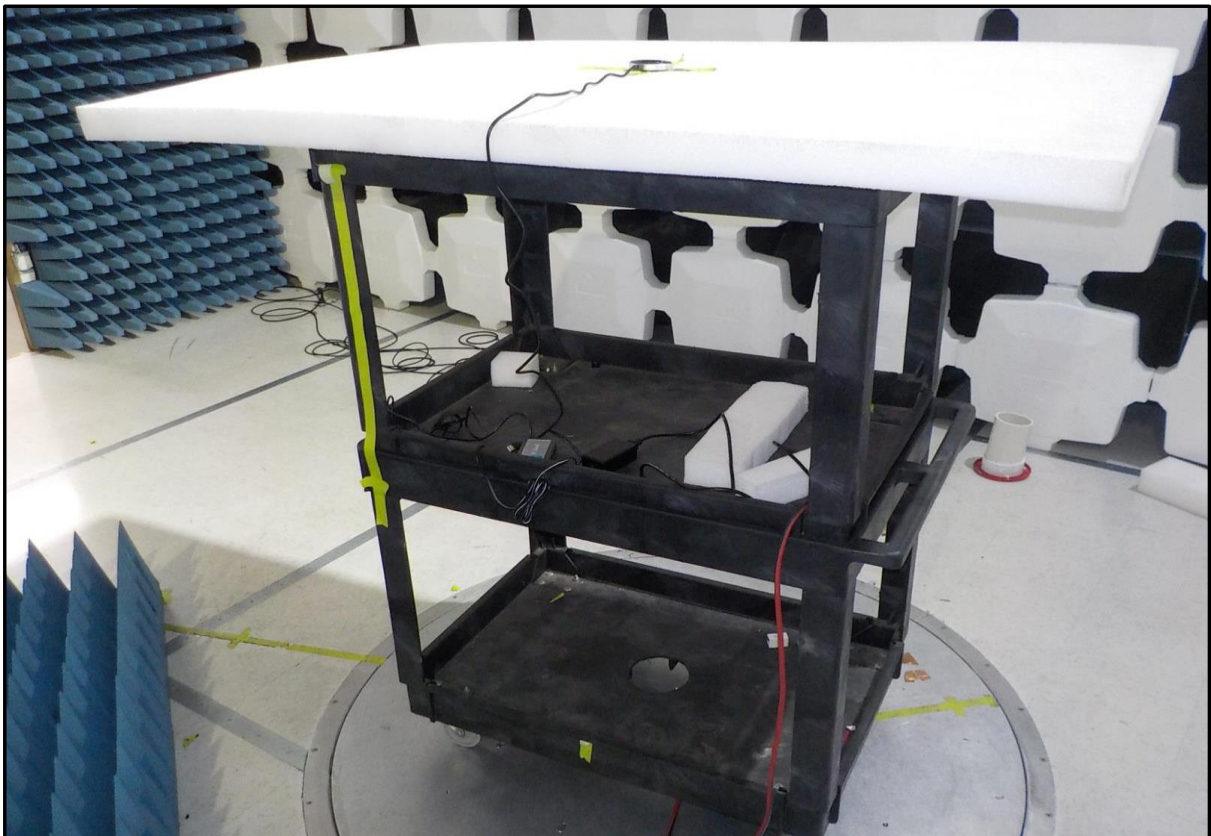


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
258.055	33.6	-3.8	1.3	344.0	3.0	0.0	Horz	QP	0.0	29.8	46.0	-16.2	Low ch, EUT on side, 1 Mbps
107.948	31.2	-6.2	1.2	2.0	3.0	0.0	Vert	QP	0.0	25.0	43.5	-18.5	Mid ch, EUT vert, 1 Mbps
258.058	30.9	-3.8	1.0	151.0	3.0	0.0	Horz	QP	0.0	27.1	46.0	-18.9	Low ch, EUT on side, 2 Mbps
258.056	30.8	-3.8	1.0	92.0	3.0	0.0	Horz	QP	0.0	27.0	46.0	-19.0	Mid ch, EUT on side, 1 Mbps
258.054	29.1	-3.8	2.8	344.0	3.0	0.0	Horz	QP	0.0	25.3	46.0	-20.7	High ch, EUT on side, 1 Mbps
35.810	16.1	2.8	1.5	13.0	3.0	0.0	Vert	QP	0.0	18.9	40.0	-21.1	Mid ch, EUT vert, 1 Mbps
36.032	16.0	2.7	1.5	98.0	3.0	0.0	Vert	QP	0.0	18.7	40.0	-21.3	Low ch, EUT vert, 1 Mbps
36.099	15.9	2.7	4.0	25.0	3.0	0.0	Horz	QP	0.0	18.6	40.0	-21.4	Mid ch, EUT on side, 1 Mbps
36.358	15.9	2.6	3.8	189.0	3.0	0.0	Horz	QP	0.0	18.5	40.0	-21.5	High ch, EUT on side, 1 Mbps
107.911	28.1	-6.2	1.0	342.0	3.0	0.0	Vert	QP	0.0	21.9	43.5	-21.6	High ch, EUT vert, 1 Mbps
36.526	15.9	2.5	1.5	158.0	3.0	0.0	Vert	QP	0.0	18.4	40.0	-21.6	High ch, EUT vert, 1 Mbps
37.060	15.8	2.2	1.0	167.0	3.0	0.0	Horz	QP	0.0	18.0	40.0	-22.0	Low ch, EUT on side, 1 Mbps
610.454	15.8	5.9	3.3	206.0	3.0	0.0	Horz	QP	0.0	21.7	46.0	-24.3	High ch, EUT on side, 1 Mbps
610.571	15.7	5.9	3.8	104.0	3.0	0.0	Horz	QP	0.0	21.6	46.0	-24.4	Low ch, EUT on side, 1 Mbps
609.179	15.8	5.7	3.0	79.0	3.0	0.0	Vert	QP	0.0	21.5	46.0	-24.5	Low ch, EUT vert, 1 Mbps
608.616	15.8	5.7	3.8	313.0	3.0	0.0	Horz	QP	0.0	21.5	46.0	-24.5	Mid ch, EUT on side, 1 Mbps
967.324	15.8	12.0	2.8	179.0	3.0	0.0	Vert	QP	0.0	27.8	54.0	-26.2	Low ch, EUT vert, 1 Mbps
976.591	15.8	11.9	2.7	4.0	3.0	0.0	Vert	QP	0.0	27.7	54.0	-26.3	Mid ch, EUT vert, 1 Mbps
72.232	17.0	-9.7	1.0	176.0	3.0	0.0	Vert	QP	0.0	7.3	40.0	-32.7	High ch, EUT vert, 1 Mbps

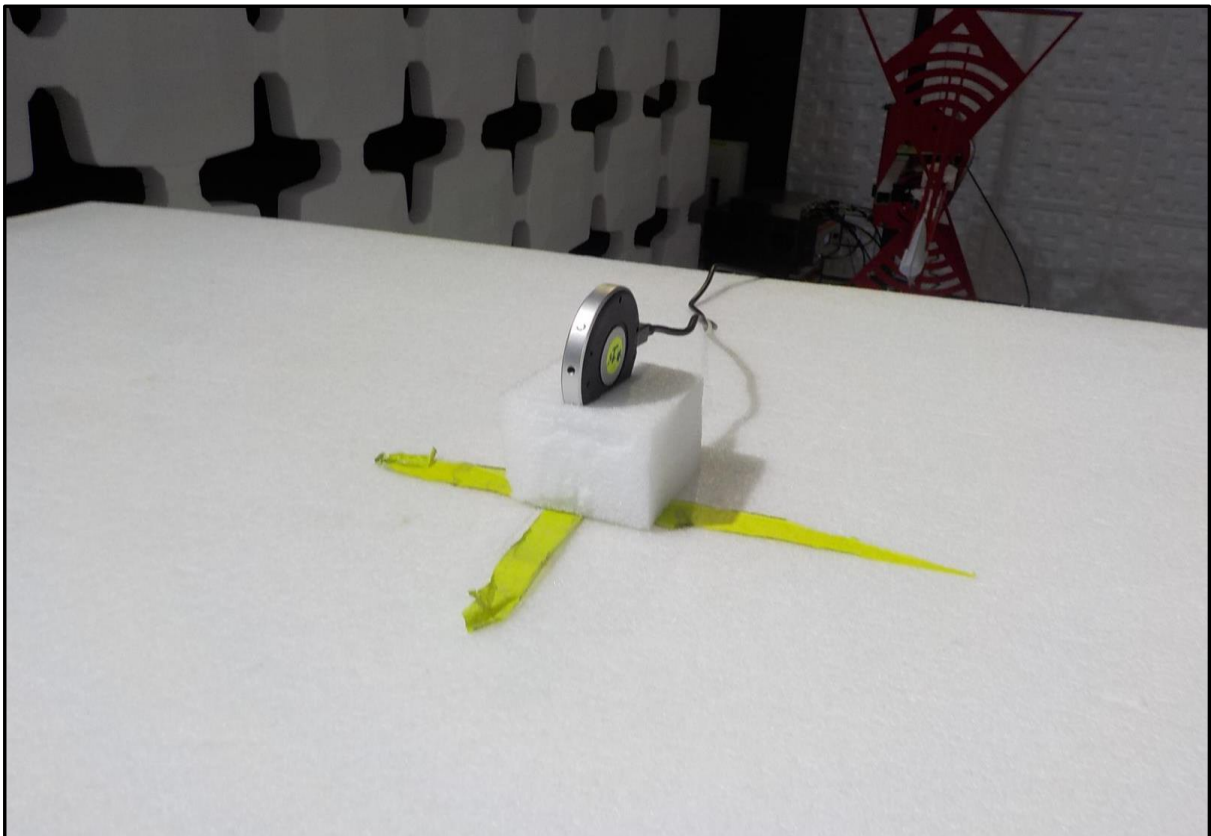
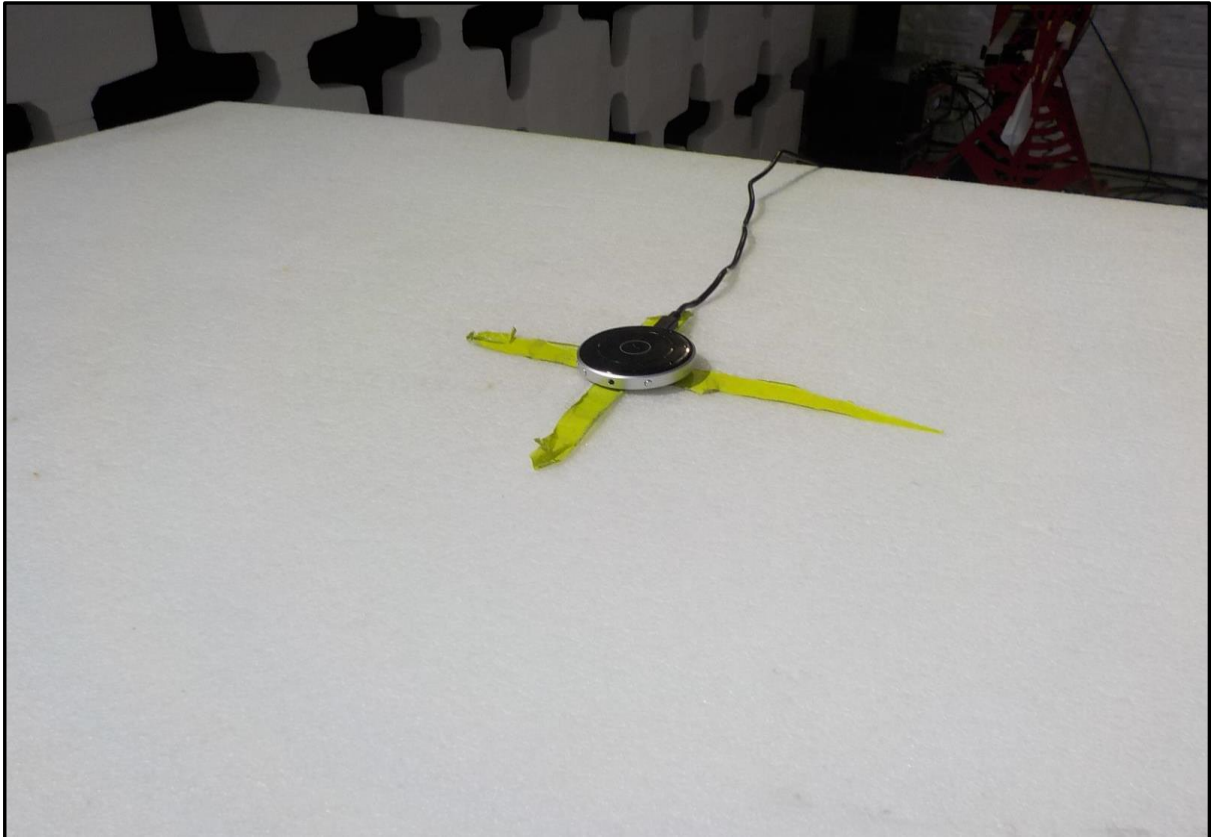
SPURIOUS RADIATED EMISSIONS



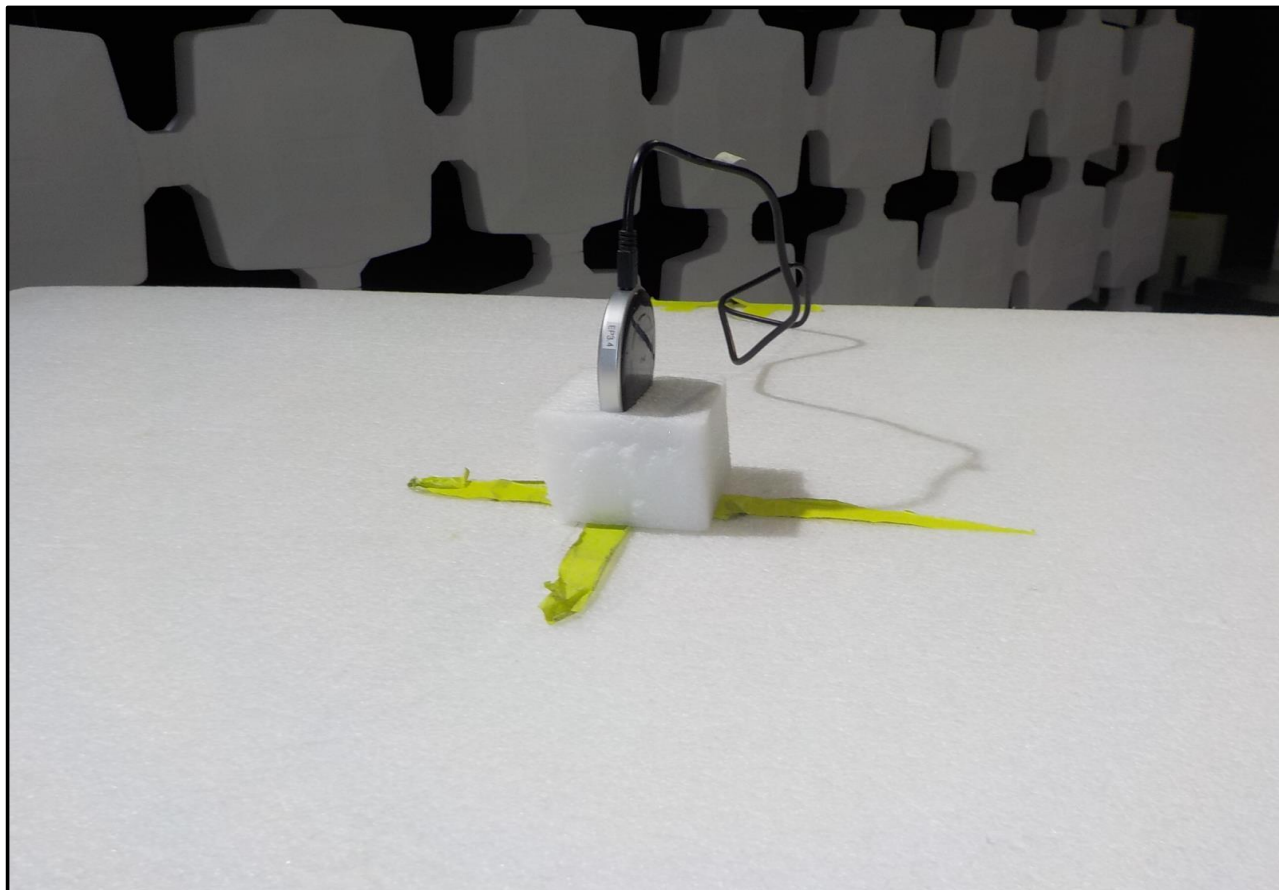
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SPURIOUS RADIATED EMISSIONS



SPURIOUS RADIATED EMISSIONS



APPENDIX

Brand: Starkey Laboratories, Inc. Model TM10



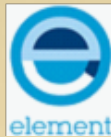
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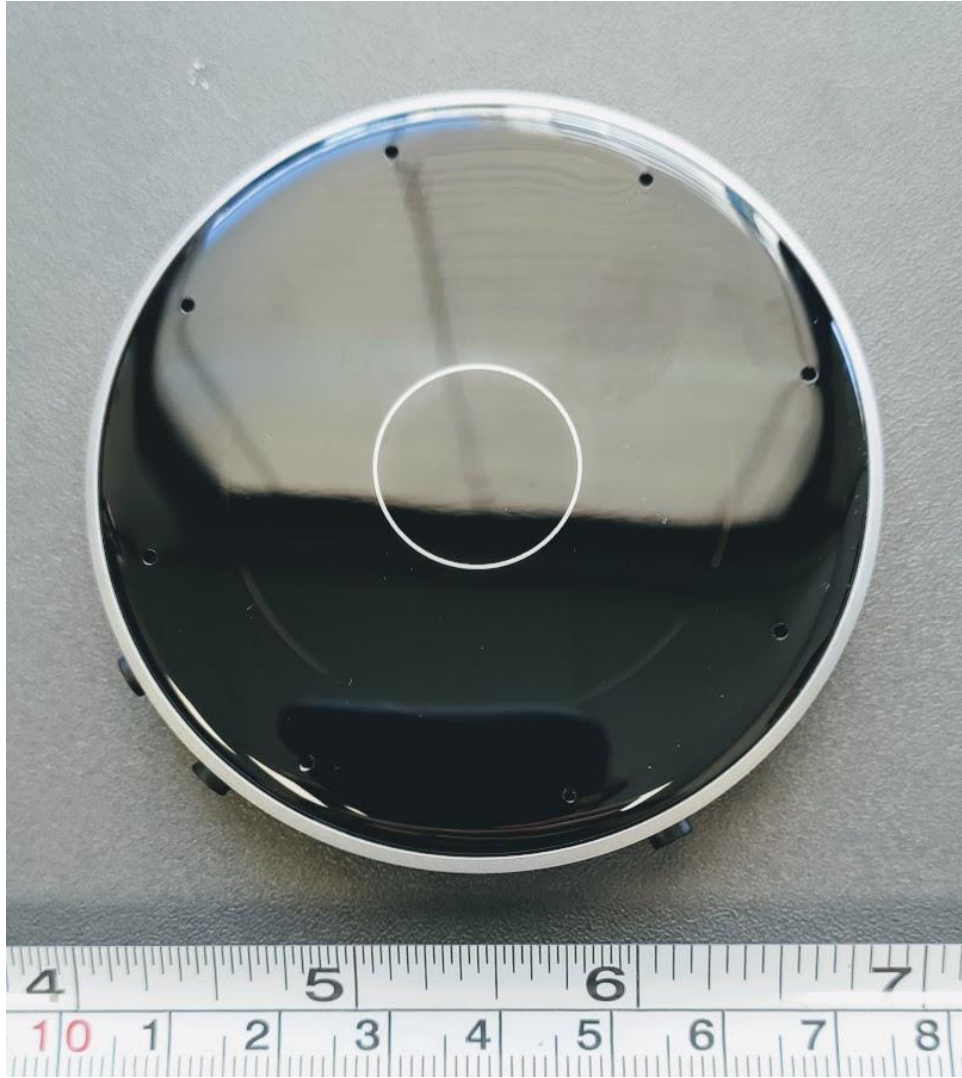


Brand: Wingkei Model: T7C1SZ000114





Brand: Starkey Laboratories, Inc. Model TM10



Brand: Starkey Laboratories, Inc. Model TM10





