



# element

**Motorola Solutions Inc**

**HiFi Mic 3.0**

**FCC 15.247:2021**

**Report: WTVD0040.2 Rev. 2, Issue Date: December 7, 2021**



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# CERTIFICATE OF TEST

**Last Date of Test: July 19, 2021**  
**Motorola Solutions Inc**  
**EUT: HiFi Mic 3.0**

## Radio Equipment Testing

### Standards

Specification	Method
FCC 15.247:2021	ANSI C63.10:2013, KDB 558074

### Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	No	N/A	Not required for a battery powered EUT.
11.6	Duty Cycle	Yes	Pass	
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.1.1	Output Power	Yes	Pass	
11.9.1.1	Equivalent Isotropic Radiated 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:



Adam Bruno, Operations Manager

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

# REVISION HISTORY



<b>Revision Number</b>	<b>Description</b>	<b>Date (yyyy-mm-dd)</b>	<b>Page Number</b>
01	Updated company name	2021-11-08	1, 2, 9, 15, 26, 33, 40, 47, 54, 59, 76 and 78
	Updated EUT name	2021-11-08	1, 2, 9, 10, 11, 15, 26, 33, 40, 47, 54, 59, 76 and 78
02	Added attestation of worst case duty cycle calculation to Functional Description Page.	2021-12-06	9

# ACCREDITATIONS AND AUTHORIZATIONS



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## United States

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

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

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## 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.

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## European Union

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

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## United Kingdom

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

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## Australia/New Zealand

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

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## Korea

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

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## Japan

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

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## 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.

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## Singapore

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

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## Israel

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

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## Hong Kong

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

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## Vietnam

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

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## SCOPE

For details on the Scopes of our Accreditations, please visit:

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# FACILITIES



<b>California</b> Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	<b>Minnesota</b> Labs MN01-11 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	<b>Oregon</b> Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	<b>Texas</b> Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	<b>Washington</b> Labs NC01-05 19201 120 <sup>th</sup> Ave NE Bothell, WA 98011 (425)984-6600
<b>A2LA</b>				
Lab Code: 3310.04	Lab Code: 3310.05	Lab Code: 3310.02	Lab Code: 3310.03	Lab Code: 3310.06
<b>Innovation, Science and Economic Development Canada</b>				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
<b>BSMI</b>				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
<b>VCCI</b>				
A-0029	A-0109	A-0108	A-0201	A-0110
<b>Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA</b>				
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.

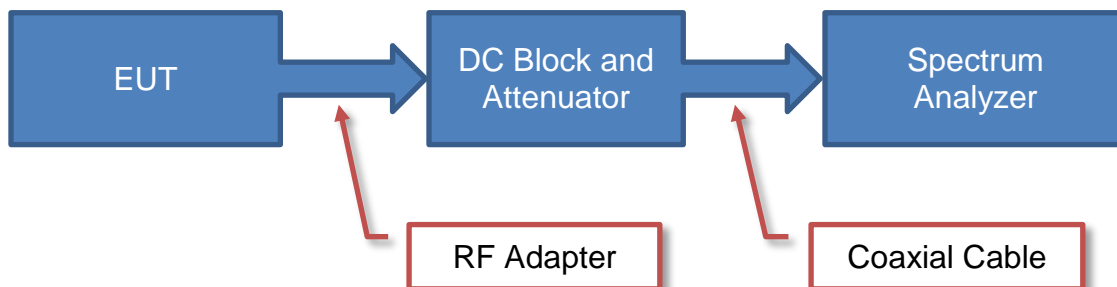
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found in the table below. A lab specific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

<b>Test</b>	<b>+ MU</b>	<b>- MU</b>
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)	5.1 dB	-5.1 dB
AC Powerline Conducted Emissions (dB)	3.1 dB	-3.1 dB

# TEST SETUP BLOCK DIAGRAMS

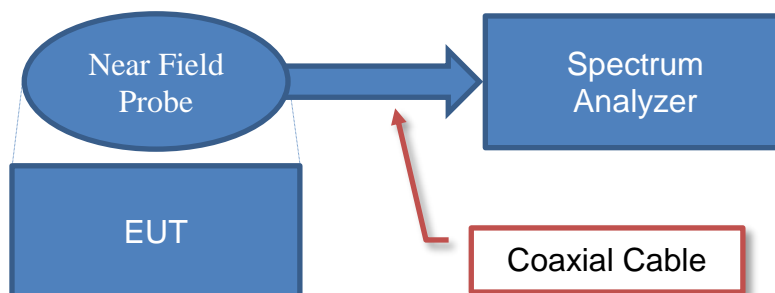
## Antenna Port Conducted Measurements



### Sample Calculation

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

## Near Field Test Fixture Measurements

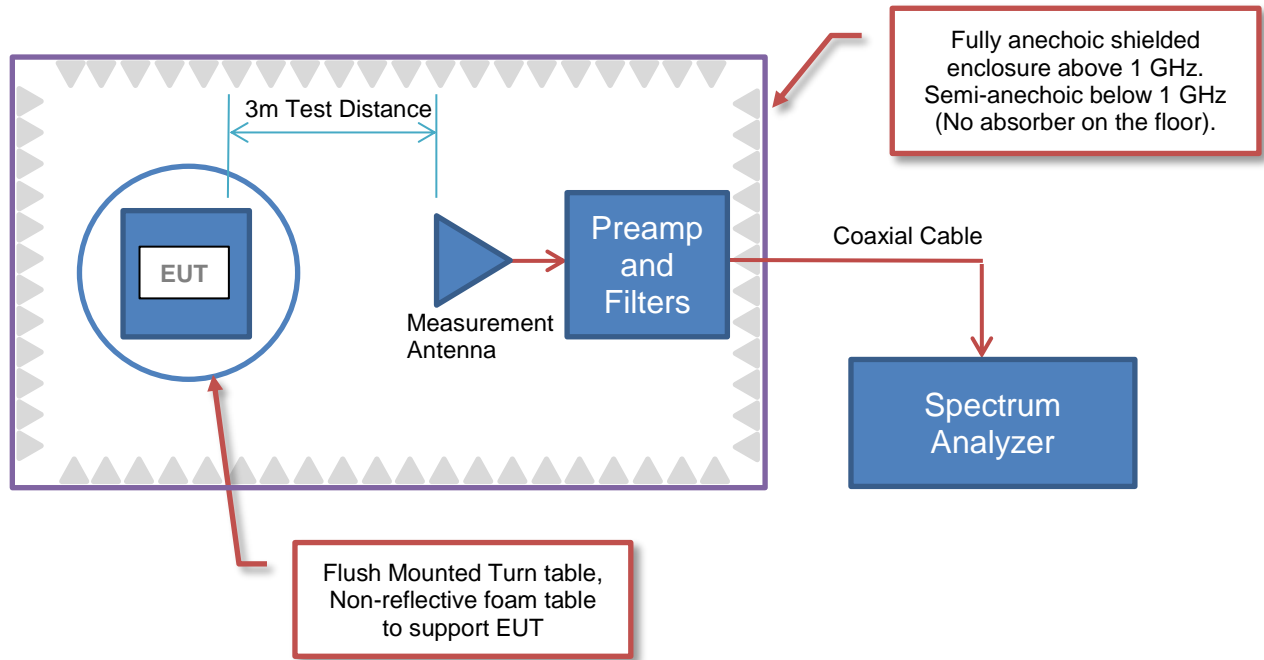


### Sample Calculation

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

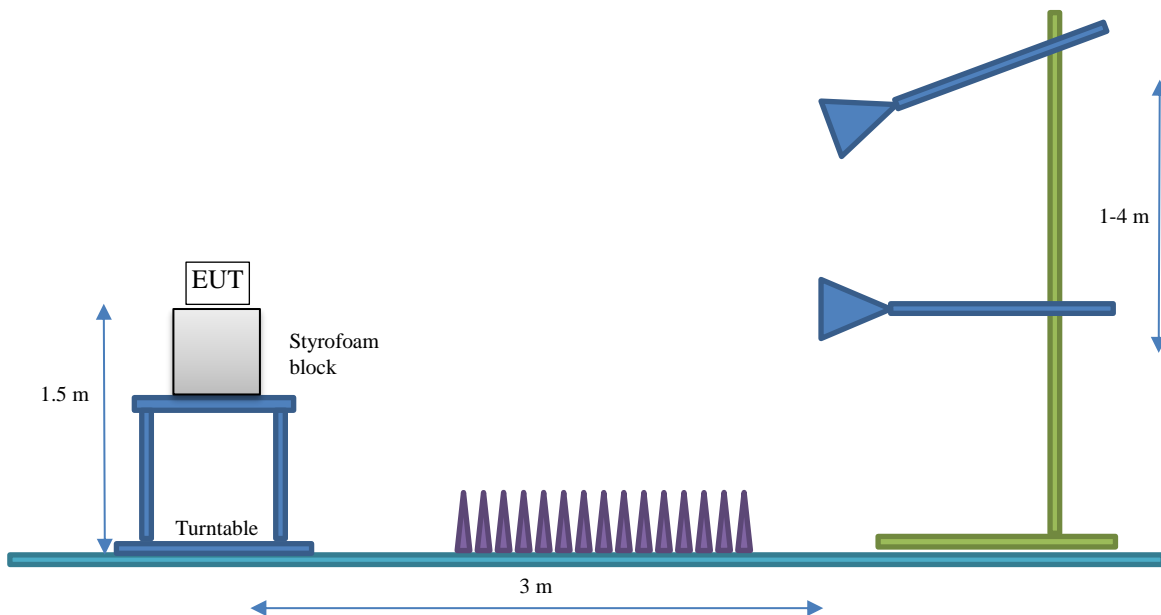
# TEST SETUP BLOCK DIAGRAMS

## Spurious Radiated Emissions



## Bore Sighting (>1GHz)

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





# PRODUCT DESCRIPTION

## Client and Equipment Under Test (EUT) Information

<b>Company Name:</b>	Motorola Solutions Inc
<b>Address:</b>	415 East Exchange Pkwy
<b>City, State, Zip:</b>	Allen, TX 75002
<b>Test Requested By:</b>	Navaid Karimi
<b>EUT:</b>	HiFi Mic 3.0
<b>First Date of Test:</b>	July 8, 2021
<b>Last Date of Test:</b>	July 19, 2021
<b>Receipt Date of Samples:</b>	July 8, 2021
<b>Equipment Design Stage:</b>	Production
<b>Equipment Condition:</b>	No Damage
<b>Purchase Authorization:</b>	Verified

## Information Provided by the Party Requesting the Test

### Functional Description of the EUT:

Microphone system containing a 2.4 GHz DTS radio. EUT uses Motorola Solutions Inc. proprietary protocol using only coded PHY, S=8 and 125 kbps data rate supported.

HiFi Base 3.0 maximum operational duty cycle calculation:

- $1440 \mu\text{s ISO} \times 2 \times 6 \text{ ISO events} = 17280 \mu\text{s}$
- The 7th ISO would be overlapped by an extended ACL event.
- Total duty cycle =  $17280 \mu\text{s} + 16784 \mu\text{s} + 256 \mu\text{s for ACL single packet} = 34320 \mu\text{s per 100 ms}$
- Maximum duty cycle is 34.32 ms per 100 ms, therefore, maximum duty cycle is 34.3%

### Testing Objective:

To demonstrate compliance of the (DTS) radio to FCC 15.247 requirements.

# CONFIGURATIONS



## Configuration WTVD0040- 1

Software/Firmware Running during test	
Description	Version
DTM	1.0
TeraTerm	4.105
Windows 10 Pro	20.H2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
HiFi Mic 3.0 (Transmitter)	Motorola Solutions, Inc	MIC-WRL-TRN-500	2

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Keyboard (Tablet PC)	Logitech	Y-U0009	1837CS517YN8
Mouse (Tablet PC)	Logitech	M-U0025	180-002182
Tablet PC	ENTEGR Technologies	940-10-972	CPWC43140066
Tablet Dock	ENTEGR Technologies	DTC-0972	12102AR38140042
AC/DC adaptor (Tablet)	FSP GRUOP INC.	FSP060-DBAE1	9NA0603116-0H-00645-142810
AC/DC adaptor (Base)	AC Adapter	PSA525	None
Programming Base	Motorola Solutions, Inc	None	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC power Cable (Adaptor Tablet)	Yes	2.0m	No	AC/DC adaptor	AC mains
DC power Cable (Adaptor Tablet)	No	1.2m	Yes	AC/DC adaptor	Tablet Dock
DC power Cable (Adaptor Base)	No	1.4m	No	AC/DC adaptor	Base
Keyboard Cable	Yes	1.0m	No	Keyboard	Tablet
Mouse Cable	Yes	1.0m	No	Mouse	Tablet
Base USB Cable	Yes	2.1m	No	Base	Tablet

# CONFIGURATIONS



## Configuration WTVD0040- 2

<b>EUT</b>			
<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>
HiFi Mic 3.0 (Transmitter)	Motorola Solutions, Inc	MIC-WRL-TRN-500	1
Microphone	Motorola Solutions, Inc	WGP00809	None

<b>Cables</b>					
<b>Cable Type</b>	<b>Shield</b>	<b>Length (m)</b>	<b>Ferrite</b>	<b>Connection 1</b>	<b>Connection 2</b>
Microphone Cable	No	1.2m	No	Microphone	HiFi Mic 3.0

# MODIFICATIONS



## Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2021-07-08	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.
2	2021-07-16	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.
3	2021-07-16	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.
4	2021-07-16	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.
5	2021-07-16	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.
6	2021-07-16	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.
7	2021-07-16	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
8	2021-07-19	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

# POWER SETTINGS AND ANTENNAS



The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information.

## ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
Ceramic Antenna	Ethertronics	2400 - 2485	1.39

The EUT was tested using the power settings provided by the manufacturer:

## SETTINGS FOR ALL TESTS IN THIS REPORT

HiFi Mic 3.0	Power Setting
Channels 0-38	3
Channel 39	2



XMIT 2020.12.30.0

# DUTY CYCLE

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3379	AMM	2020-09-21	2021-09-21
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2021-03-11	2022-03-11
Cable	UtiFlex Micro-Coax	UFD1150A-1-0720-200200	TXK	2020-09-22	2021-09-22
Attenuator	Fairview Microwave	SA4018-20	TYE	2020-09-18	2021-09-18

## TEST DESCRIPTION

The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.

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.

# DUTY CYCLE



TelTx 2021.03.19.1 XMI 2020.12.30.0

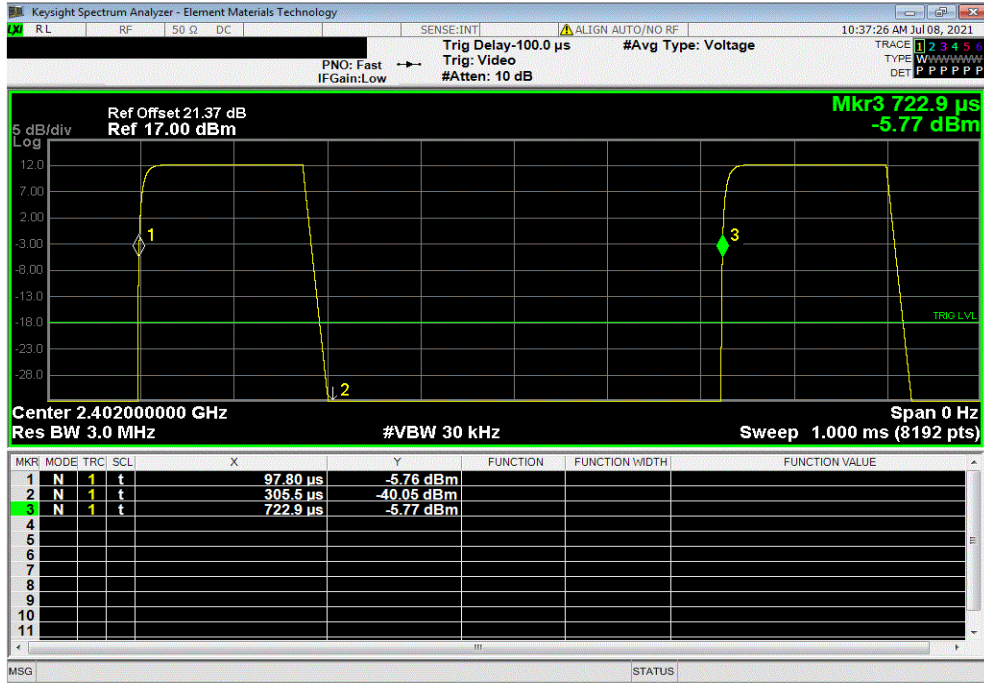
EUT: HiFi Mic 3.0		Work Order: WTVD0040					
Serial Number: 1		Date: 8-Jul-21					
Customer: Motorola Solutions Inc		Temperature: 20.4 °C					
Attendees: Navaid Karimi		Humidity: 57% RH					
Project: None		Barometric Pres.: 1017 mbar					
Tested by: Brandon Hobbs		Power: Battery					
		Job Site: TX09					
TEST SPECIFICATIONS		Test Method					
FCC 15.247:2021		ANSI C63.10:2013					
COMMENTS							
All losses were accounted for down the measurement path: DC block, attenuator and cable. The power level was set to 3 for all channels.							
DEVIATIONS FROM TEST STANDARD							
None							
Configuration #	1	Signature					
		Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
BLE/GFSK							
1Mbps Modulation							
	Low Channel, 2402 MHz	207.7 us	625.1 us	1	33.2	N/A	N/A
	Low Channel, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
	Mid Channel, 2440 MHz	208.7 us	625.1 us	1	33.4	N/A	N/A
	Mid Channel, 2440 MHz	N/A	N/A	5	N/A	N/A	N/A
	High Channel, 2480 MHz	208.6 us	625 us	1	33.4	N/A	N/A
	High Channel, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A
500kbps Modulation							
	Low Channel, 2402 MHz	676.1 us	1.252 ms	1	54.0	N/A	N/A
	Low Channel, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
	Mid Channel, 2440 MHz	676.9 us	1.252 ms	1	54.1	N/A	N/A
	Mid Channel, 2440 MHz	N/A	N/A	5	N/A	N/A	N/A
	High Channel, 2480 MHz	676.6 us	1.25 ms	1	54.1	N/A	N/A
	High Channel, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A
125kbps Modulation							
	Low Channel, 2402 MHz	1.408 ms	1.875 ms	1	75.1	N/A	N/A
	Low Channel, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
	Mid Channel, 2440 MHz	1.409 ms	1.875 ms	1	75.2	N/A	N/A
	Mid Channel, 2440 MHz	N/A	N/A	5	N/A	N/A	N/A
	High Channel, 2480 MHz	1.409 ms	1.875 ms	1	75.1	N/A	N/A
	High Channel, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A

# DUTY CYCLE

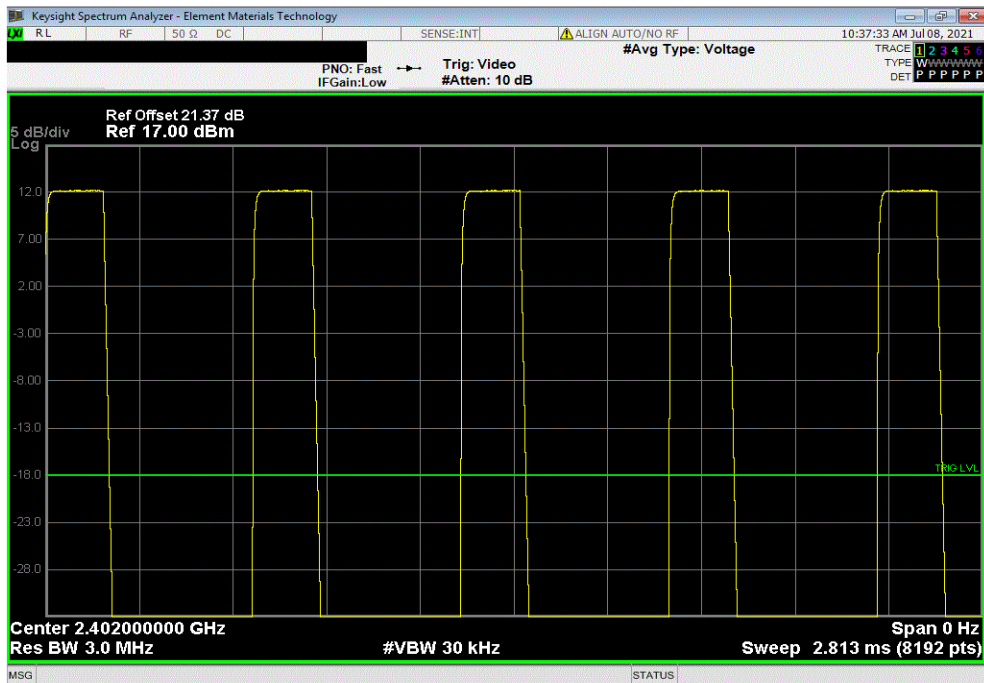


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 1Mbps Modulation, Low Channel, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
207.7 us	625.1 us	1	33.2	N/A	N/A	



BLE/GFSK , 1Mbps Modulation, Low Channel, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	



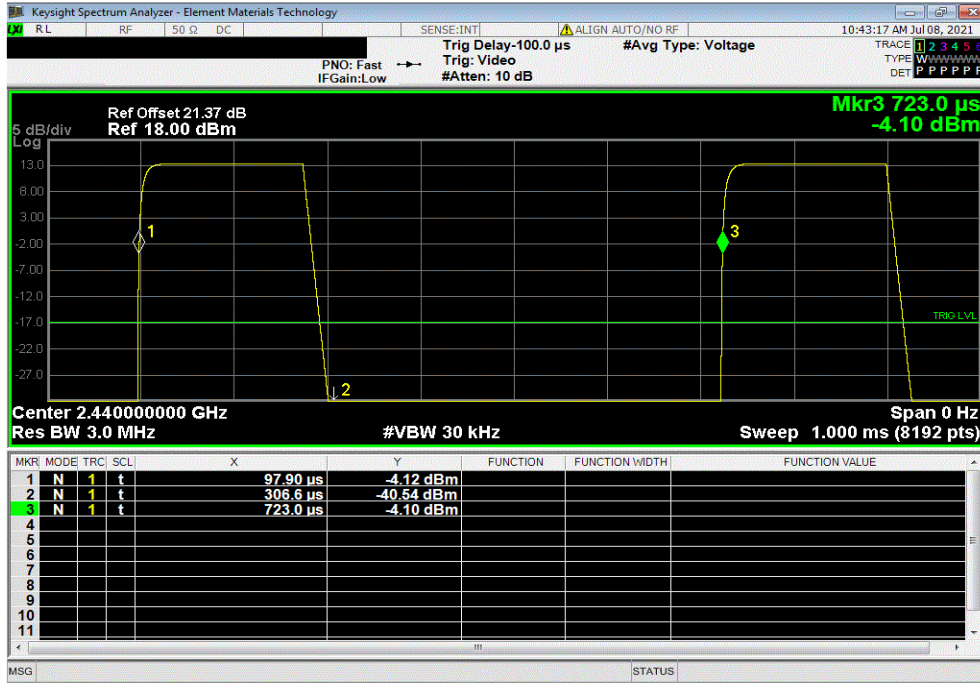


# DUTY CYCLE

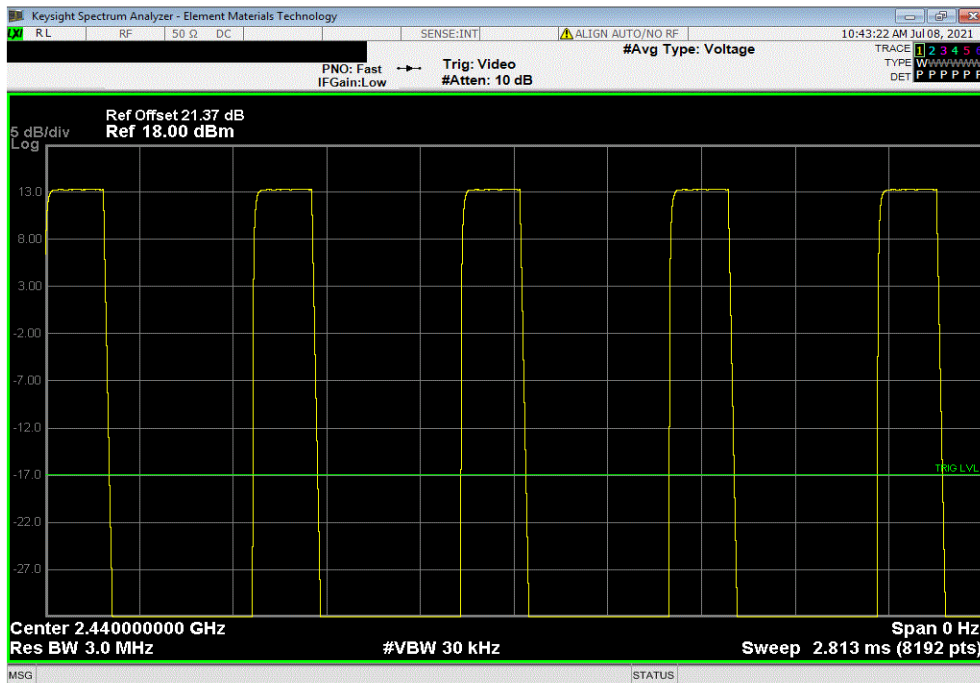


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 1Mbps Modulation, Mid Channel, 2440 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
208.7 us	625.1 us	1	33.4	N/A	N/A	



BLE/GFSK , 1Mbps Modulation, Mid Channel, 2440 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

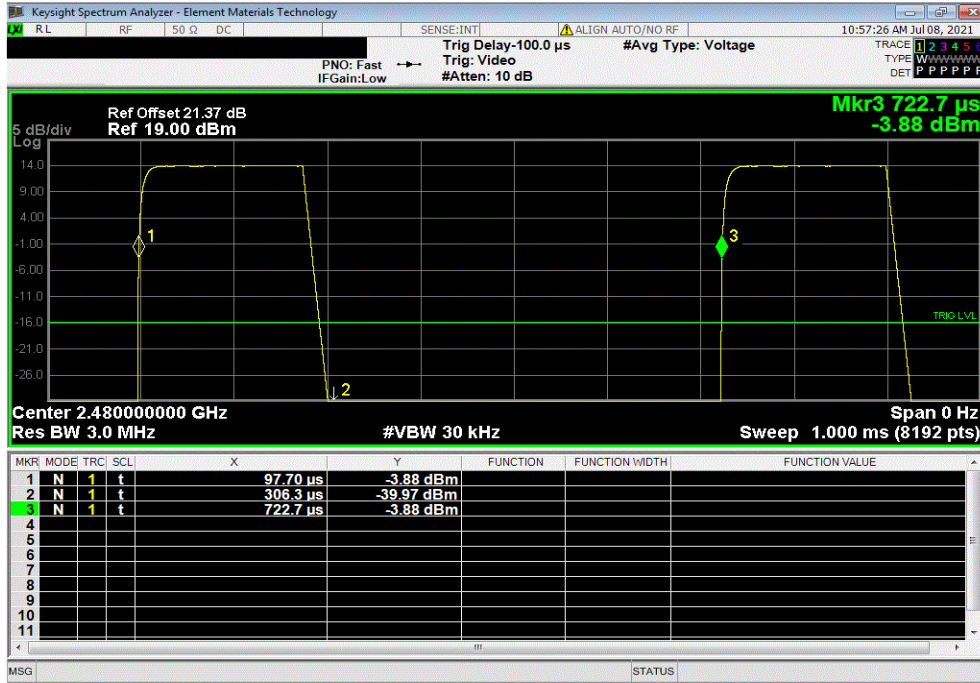


# DUTY CYCLE

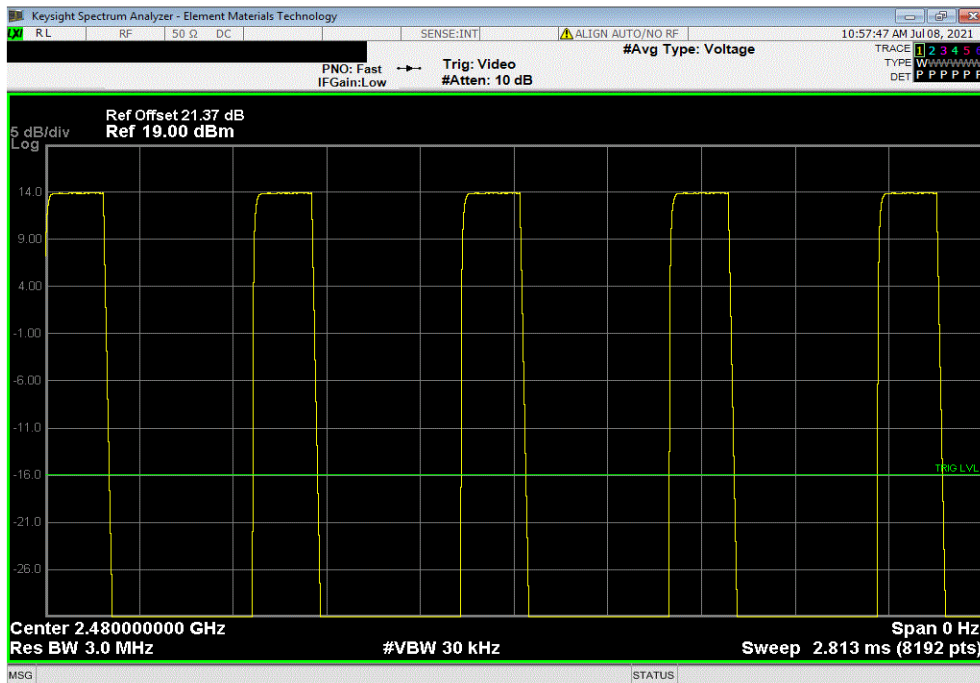


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 1Mbps Modulation, High Channel, 2480 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
208.6 us	625 us	1	33.4	N/A	N/A	



BLE/GFSK , 1Mbps Modulation, High Channel, 2480 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

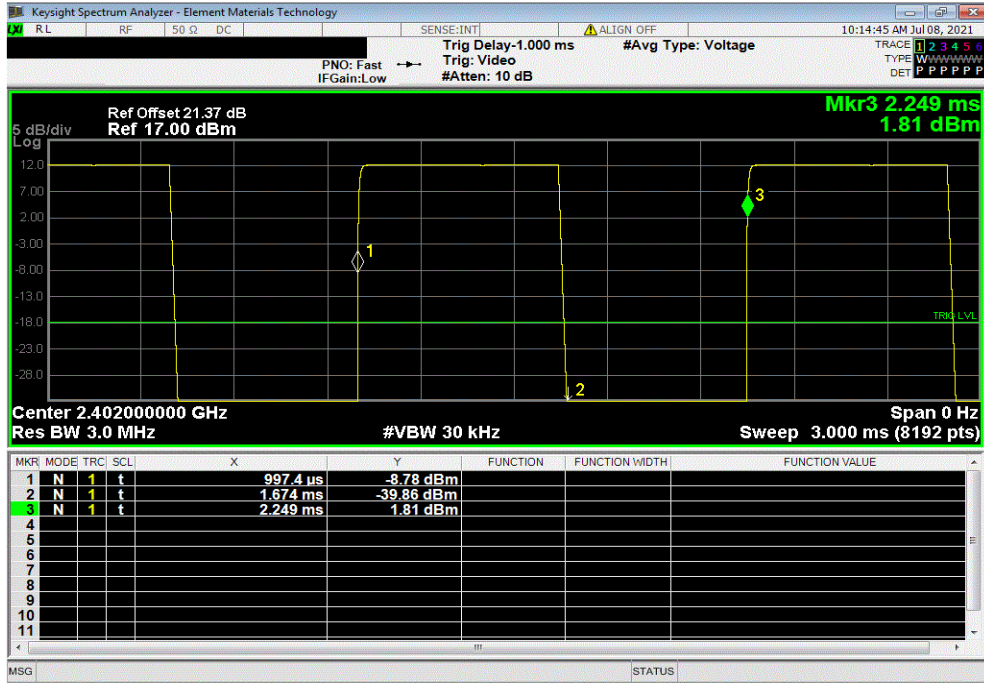


# DUTY CYCLE

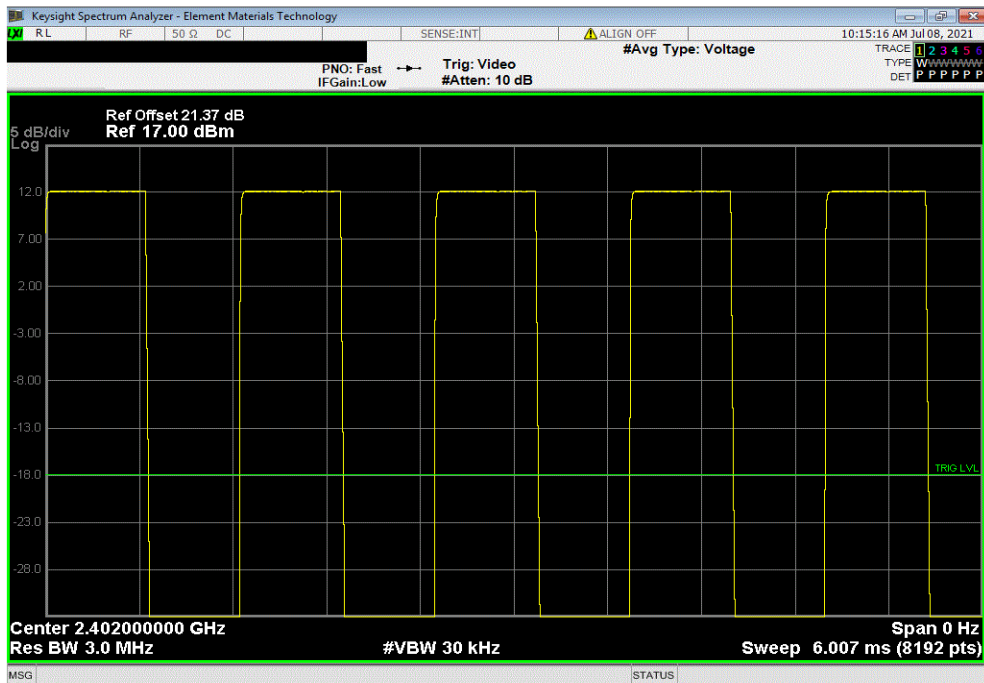


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 500kbps Modulation, Low Channel, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
676.1 us	1.252 ms	1	54	N/A	N/A	



BLE/GFSK , 500kbps Modulation, Low Channel, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

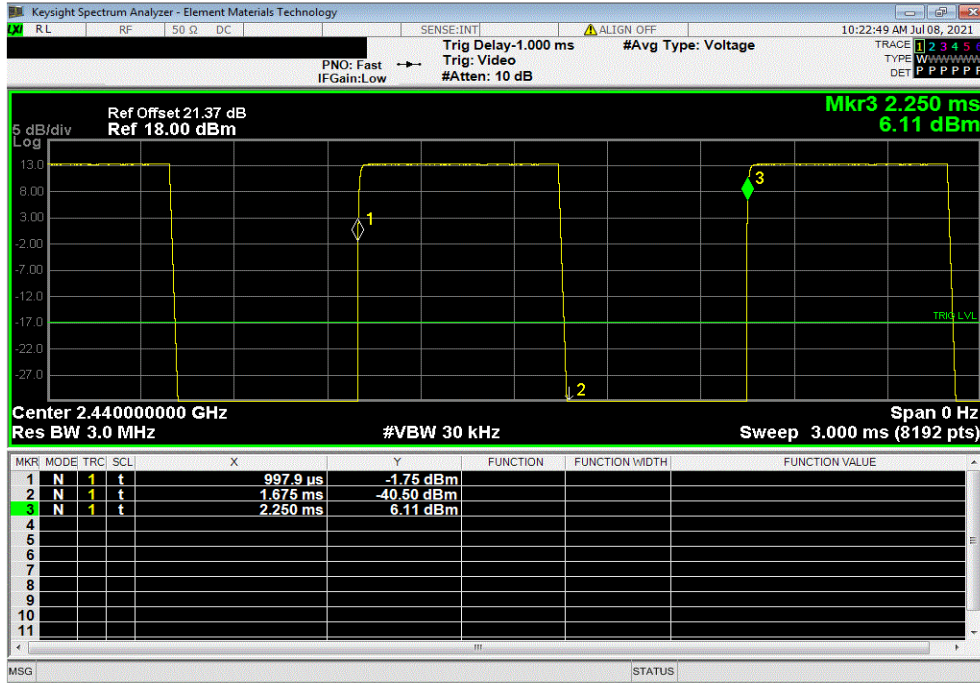


# DUTY CYCLE

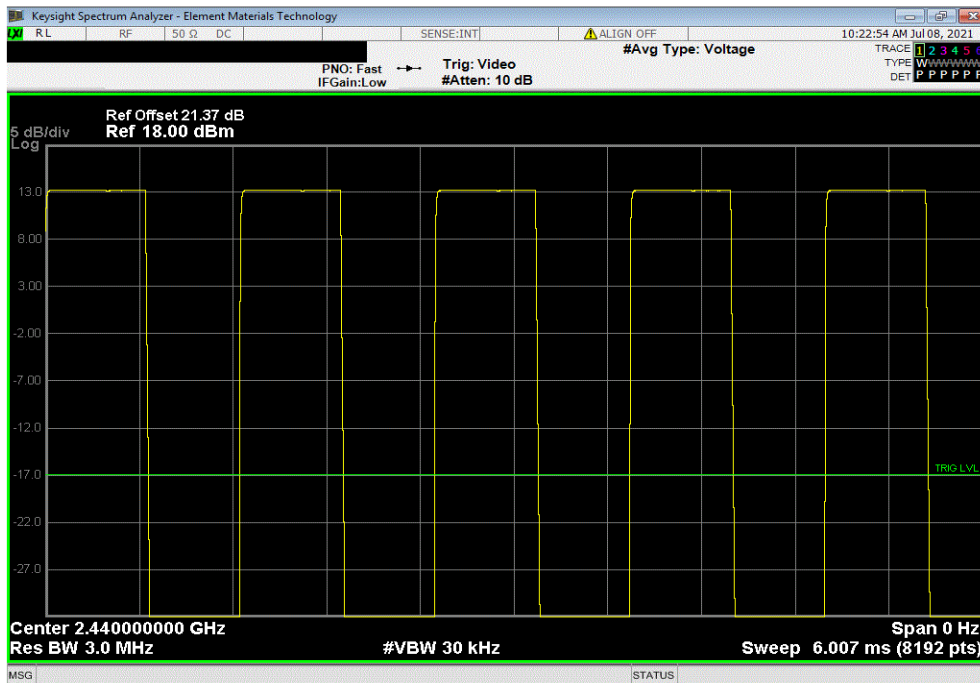


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 500kbps Modulation, Mid Channel, 2440 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
676.9 us	1.252 ms	1	54.1	N/A	N/A	



BLE/GFSK , 500kbps Modulation, Mid Channel, 2440 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

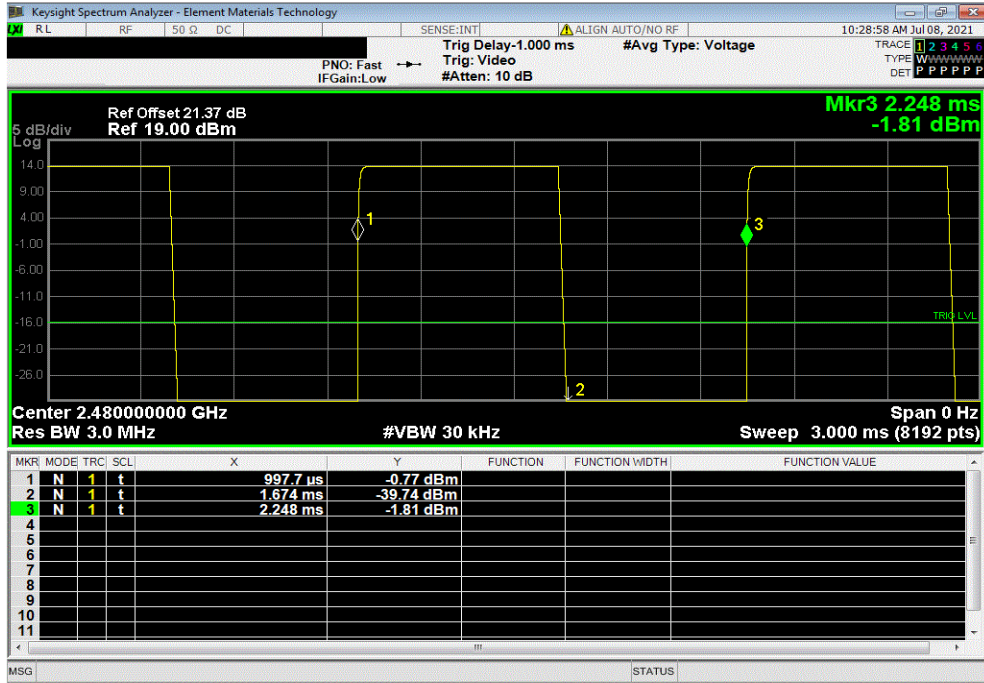


# DUTY CYCLE

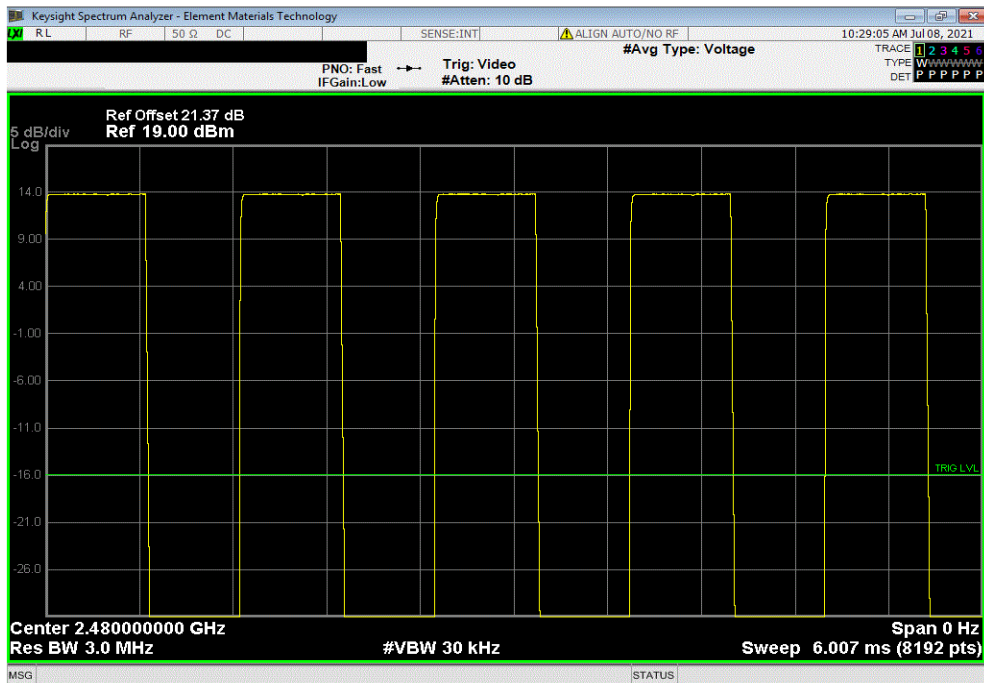


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 500kbps Modulation, High Channel, 2480 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
676.6 us	1.25 ms	1	54.1	N/A	N/A	



BLE/GFSK , 500kbps Modulation, High Channel, 2480 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

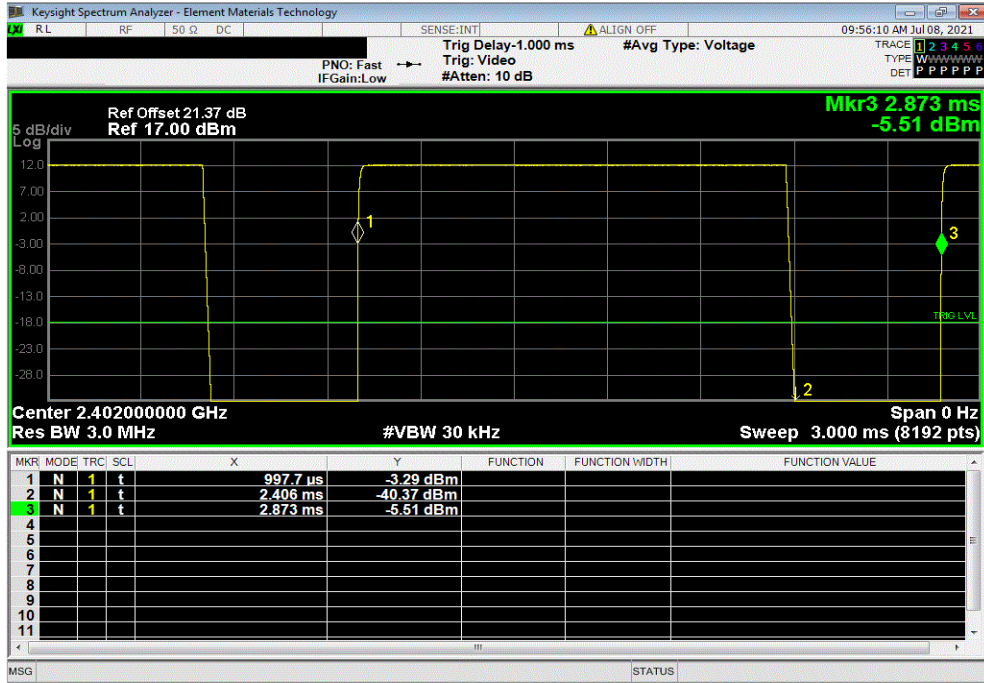


# DUTY CYCLE

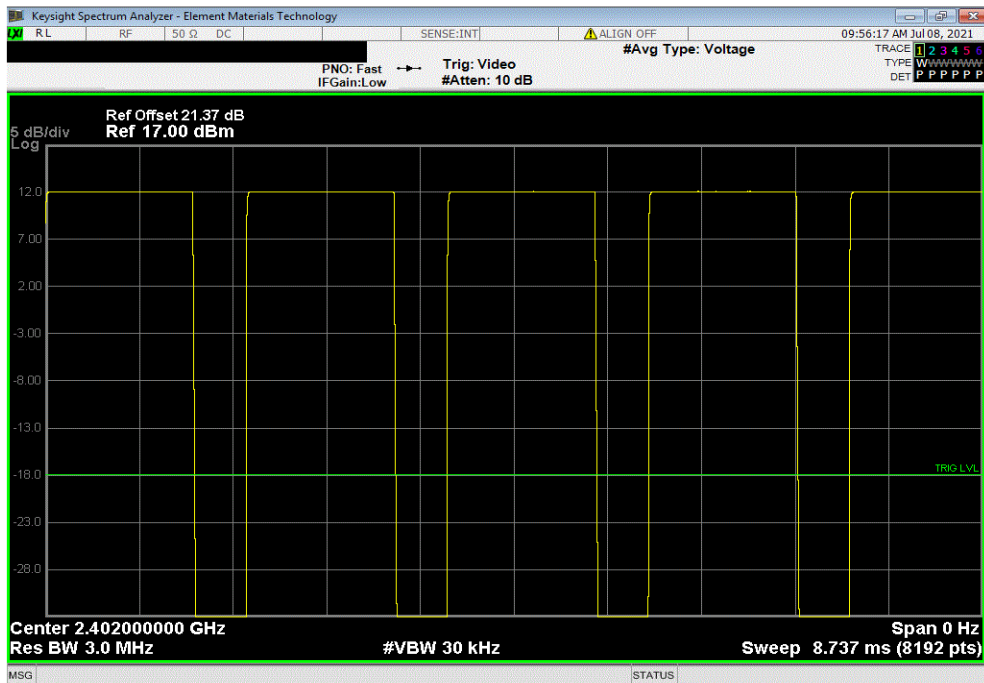


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 125kbps Modulation, Low Channel, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
1.408 ms	1.875 ms	1	75.1	N/A	N/A	



BLE/GFSK , 125kbps Modulation, Low Channel, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

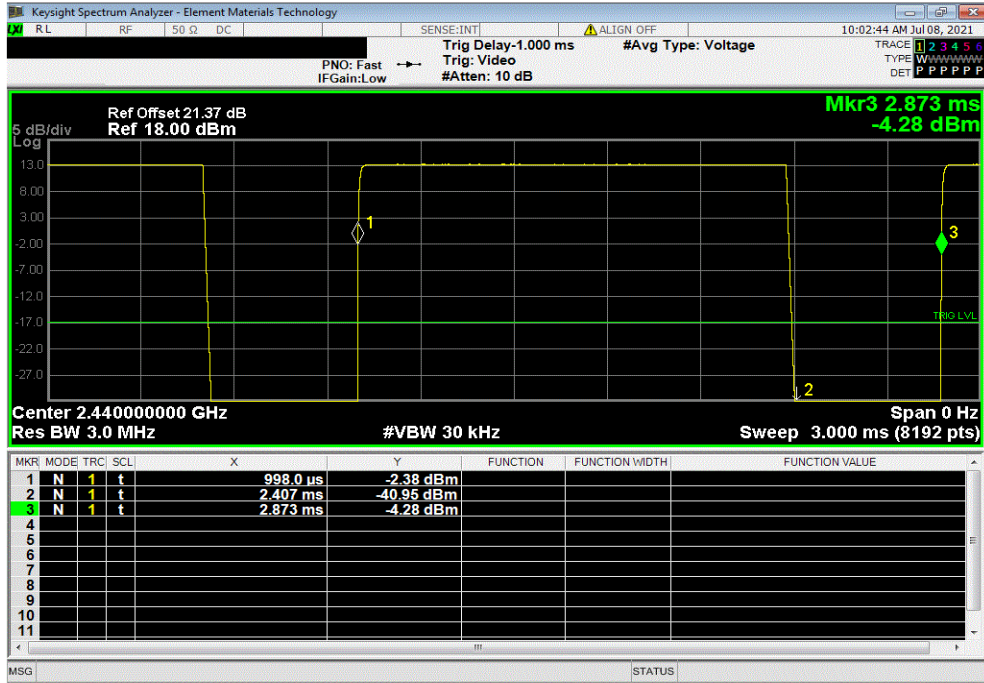


# DUTY CYCLE

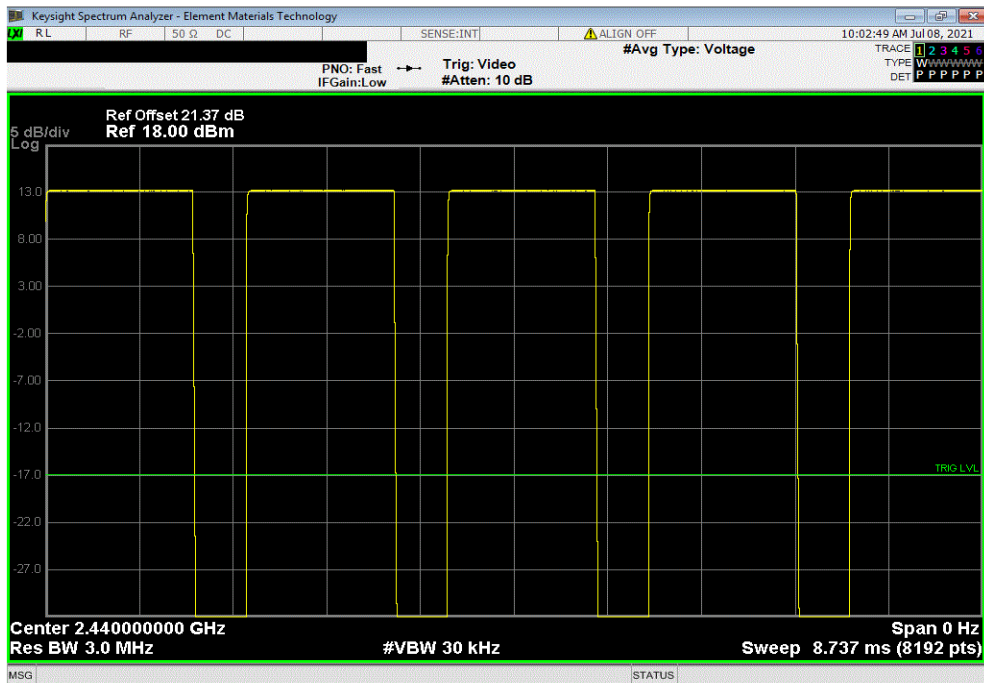


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 125kbps Modulation, Mid Channel, 2440 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
1.409 ms	1.875 ms	1	75.2	N/A	N/A	



BLE/GFSK , 125kbps Modulation, Mid Channel, 2440 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

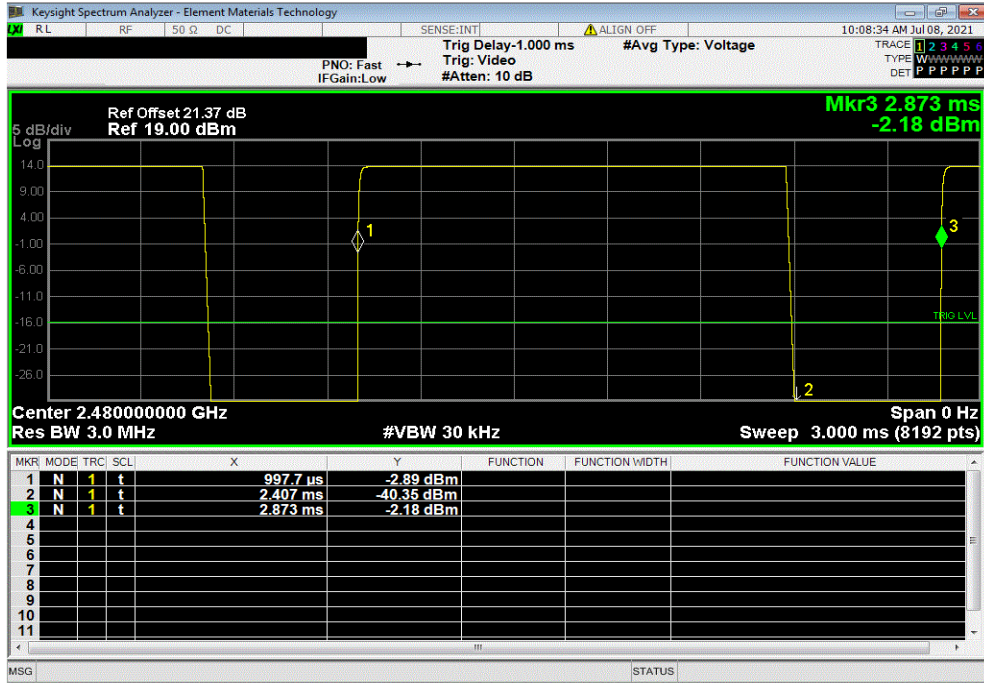


# DUTY CYCLE

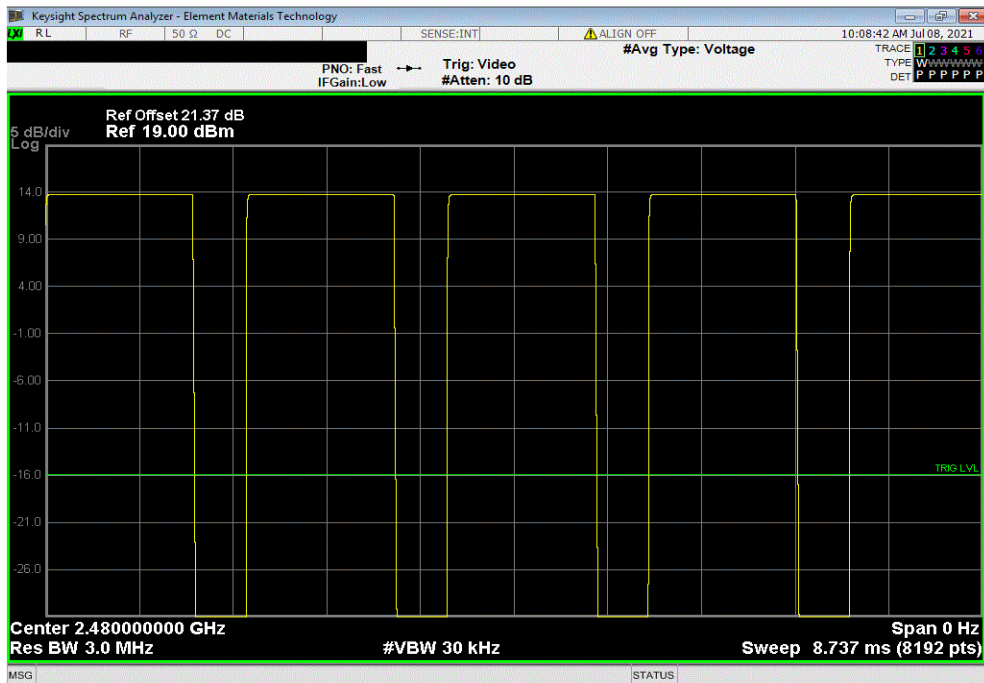


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 125kbps Modulation, High Channel, 2480 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
1.409 ms	1.875 ms	1	75.1	N/A	N/A	



BLE/GFSK , 125kbps Modulation, High Channel, 2480 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	





# OCCUPIED BANDWIDTH



element

XMit 2020.12.30.0

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
Block - DC	Fairview Microwave	SD3379	AMM	2020-09-21	2021-09-21
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2021-03-11	2022-03-11
Cable	UtiFlex Micro-Coax	UFD1150A-1-0720-200200	TXK	2020-09-22	2021-09-22
Attenuator	Fairview Microwave	SA4018-20	TYE	2020-09-18	2021-09-18

## TEST DESCRIPTION


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



TelTx 2021.03.19.1 XMI 2020.12.30.0

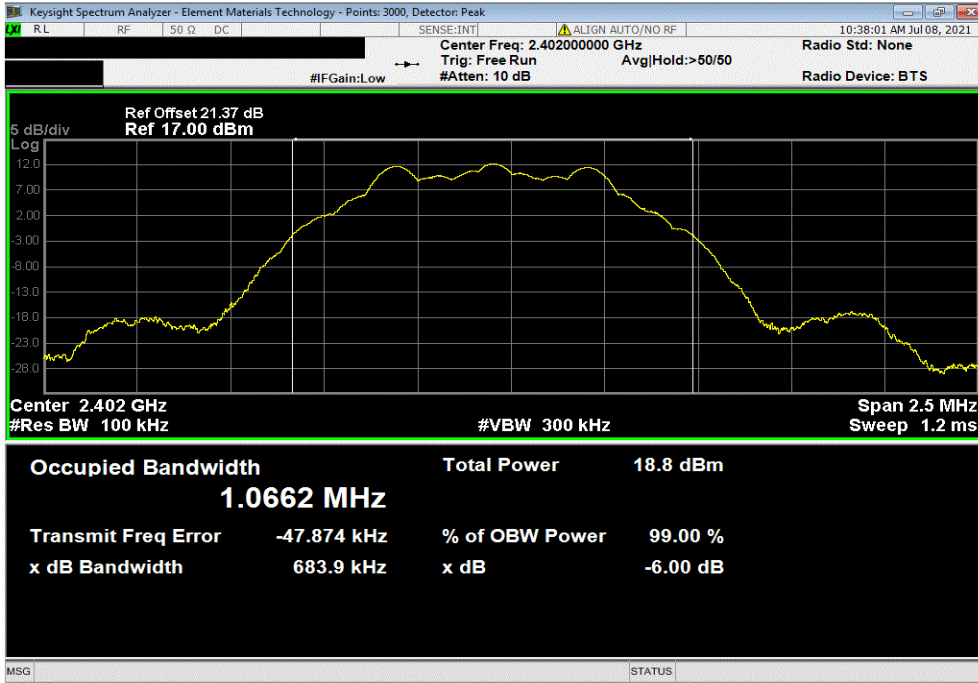
EUT: HiFi Mic 3.0		Work Order: WTVD0040	
Serial Number: 2		Date: 16-Jul-21	
Customer: Motorola Solutions Inc		Temperature: 21.4 °C	
Attendees: Navaid Karimi		Humidity: 56.1% RH	
Project: None		Barometric Pres.: 1017 mbar	
Tested by: Brandon Hobbs		Power: Battery	
		Job Site: TX09	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2021		ANSI C63.10:2013	
COMMENTS			
All measurement path losses were accounted for: DC block, attenuater and cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value	Limit (±) Result
BLE/GFSK			
1Mbps Modulation			
	Low Channel, 2402 MHz	683.949 kHz	500 kHz Pass
	Mid Channel, 2440 MHz	690.176 kHz	500 kHz Pass
	High Channel, 2480 MHz	691.322 kHz	500 kHz Pass
500kbps Modulation			
	Low Channel, 2402 MHz	686.735 kHz	500 kHz Pass
	Mid Channel, 2440 MHz	681.19 kHz	500 kHz Pass
	High Channel, 2480 MHz	689.338 kHz	500 kHz Pass
125kbps Modulation			
	Low Channel, 2402 MHz	610.688 kHz	500 kHz Pass
	Mid Channel, 2440 MHz	610.954 kHz	500 kHz Pass
	High Channel, 2480 MHz	610.093 kHz	500 kHz Pass

# OCCUPIED BANDWIDTH

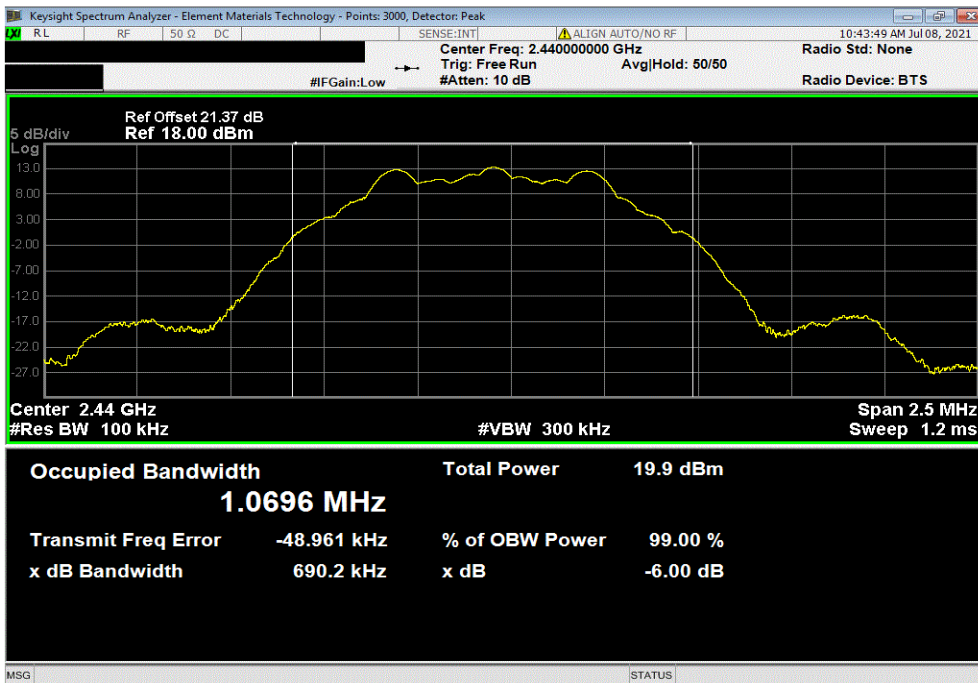


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 1Mbps Modulation, Low Channel, 2402 MHz						
				Value	Limit	Result
					(≥)	
				683.949 kHz	500 kHz	Pass



BLE/GFSK , 1Mbps Modulation, Mid Channel, 2440 MHz						
				Value	Limit	Result
					(≥)	
				690.176 kHz	500 kHz	Pass

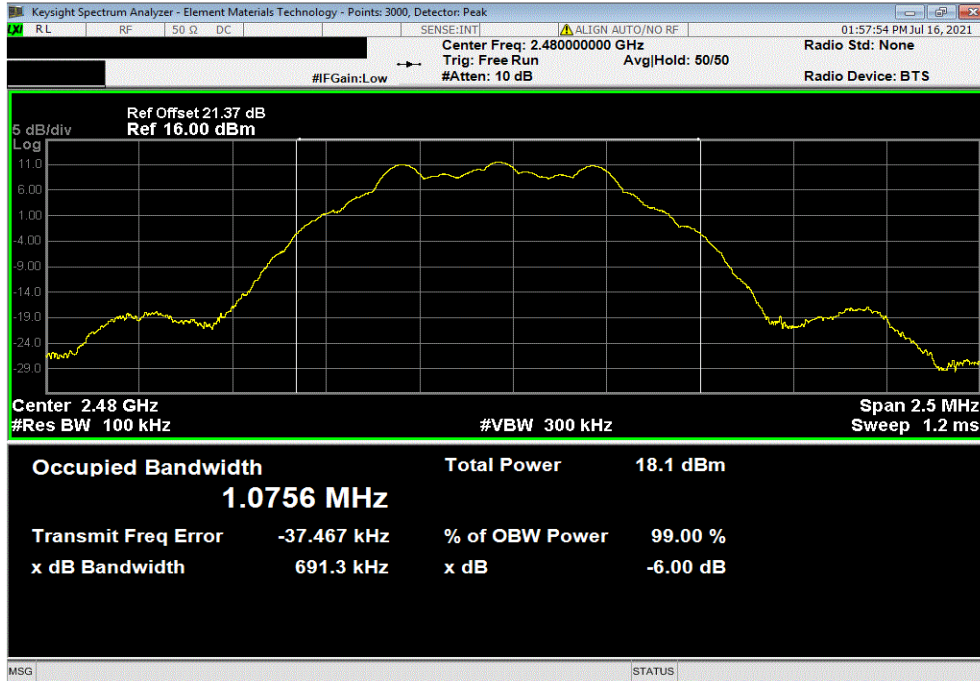


# OCCUPIED BANDWIDTH

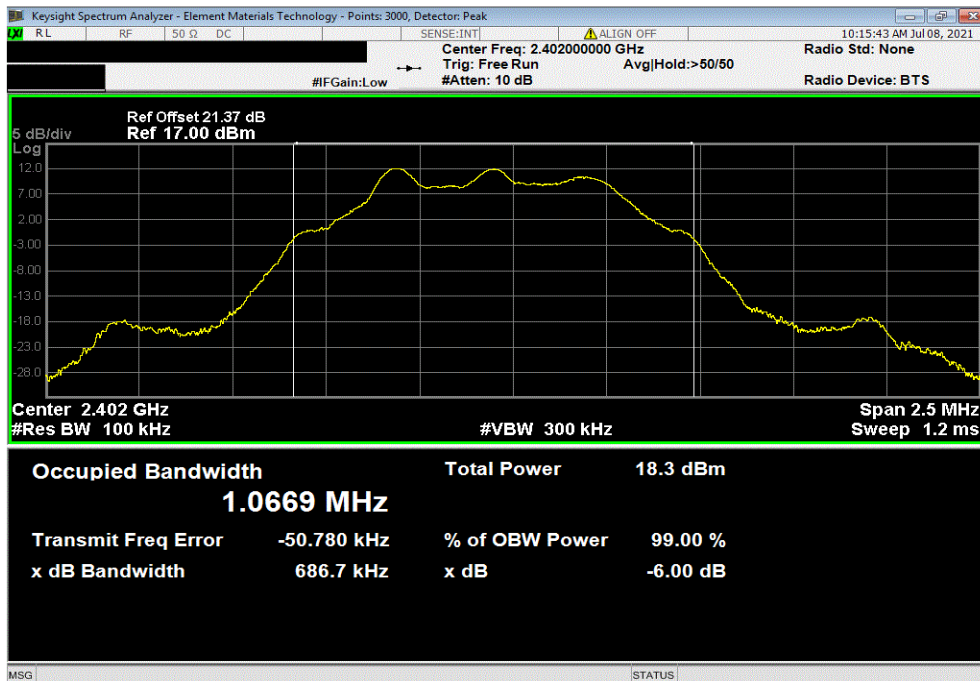


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 1Mbps Modulation, High Channel, 2480 MHz						
				Value	Limit	Result
					(≥)	
				691.322 kHz	500 kHz	Pass



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

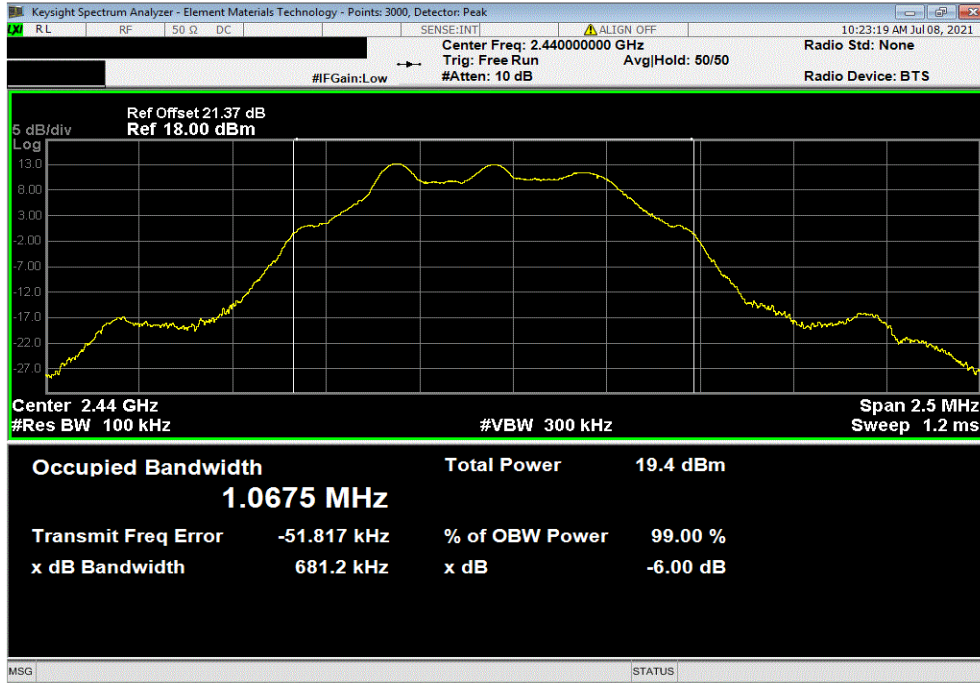


# OCCUPIED BANDWIDTH

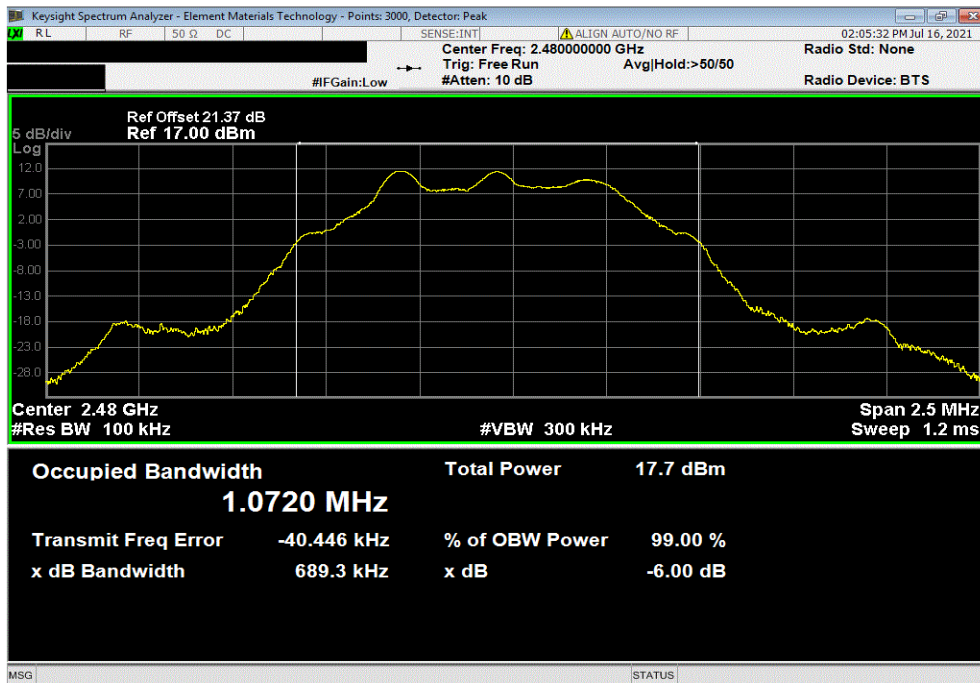


TbTx 2021.03.19.1 XMI 2020.12.30.0

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



BLE/GFSK , 500kbps Modulation, High Channel, 2480 MHz						
				Value	Limit	Result
					(≥)	
				689.338 kHz	500 kHz	Pass

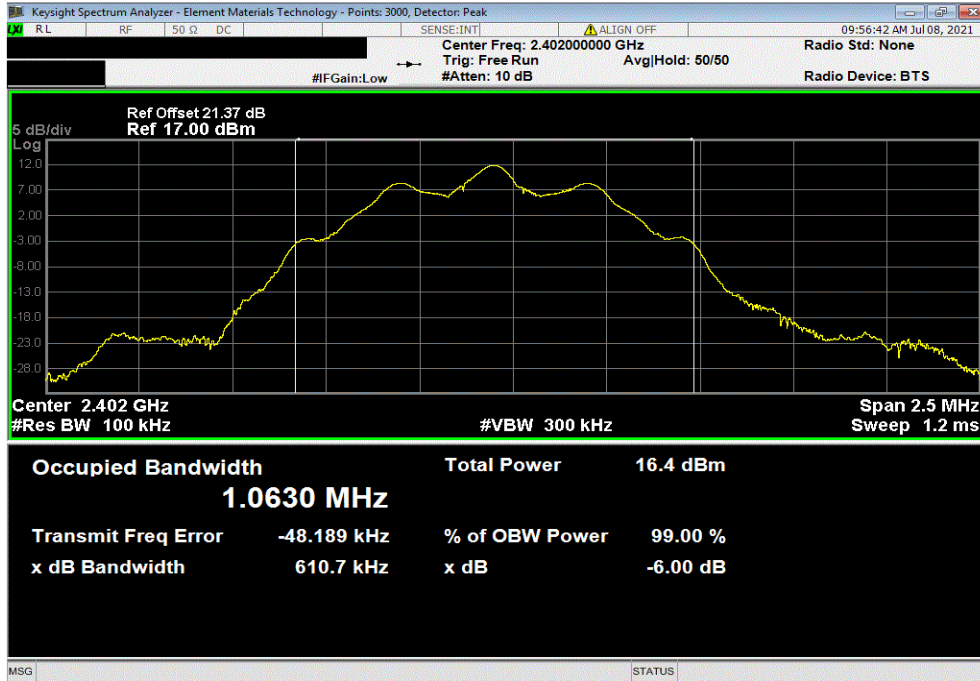


# OCCUPIED BANDWIDTH

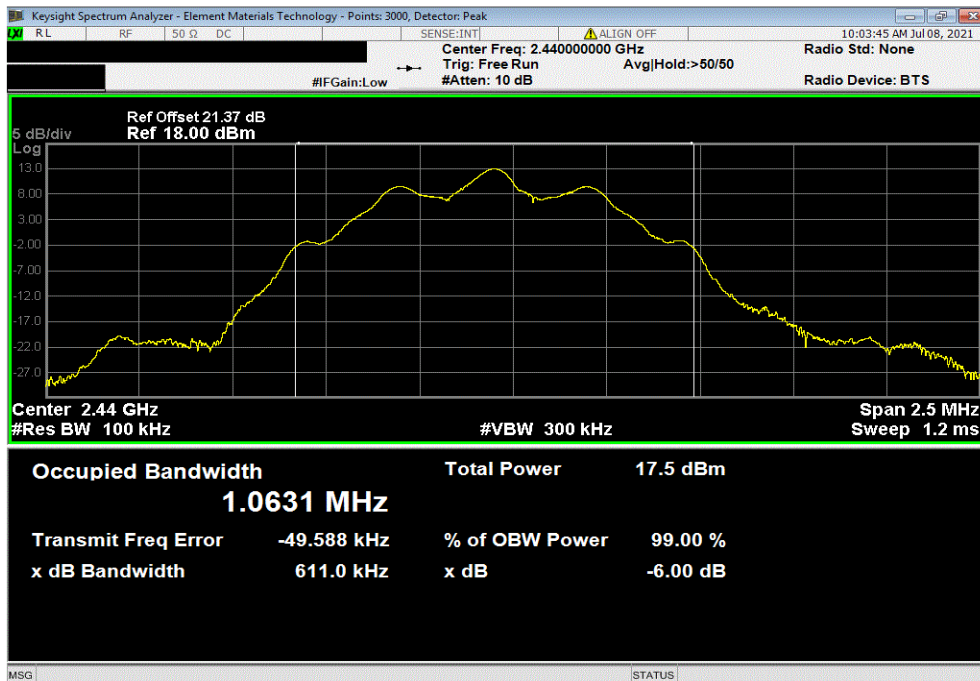


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 125kbps Modulation, Low Channel, 2402 MHz						
				Value	Limit	Result
					(≥)	
				610.688 kHz	500 kHz	Pass



BLE/GFSK , 125kbps Modulation, Mid Channel, 2440 MHz						
				Value	Limit	Result
					(≥)	
				610.954 kHz	500 kHz	Pass

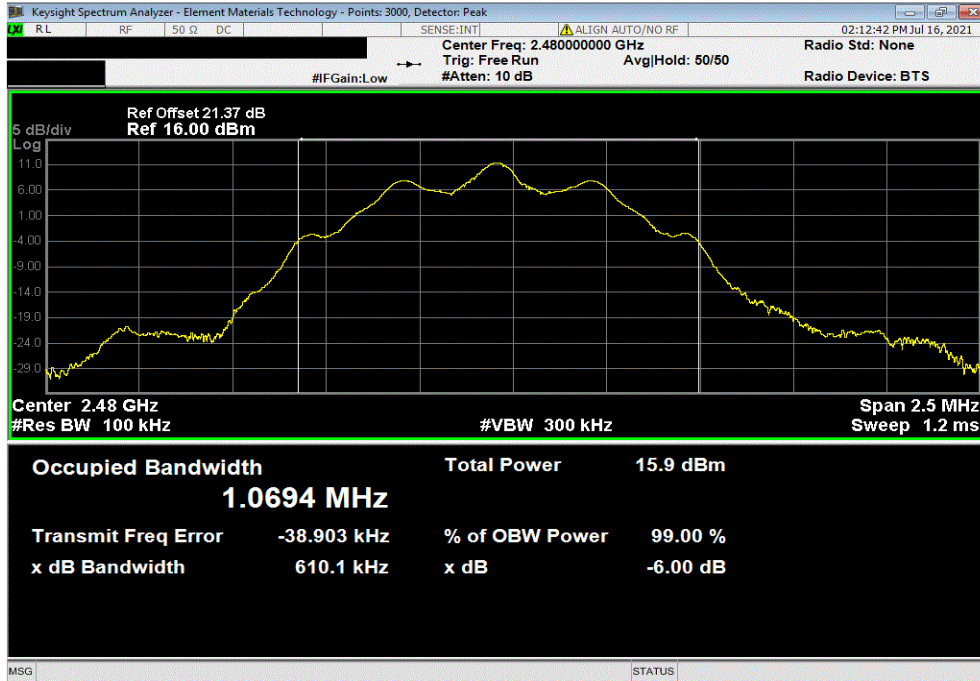


# OCCUPIED BANDWIDTH



TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 125kbps Modulation, High Channel, 2480 MHz		
Value	Limit	Result
610.093 kHz	500 kHz	Pass



# OUTPUT POWER



element

XMIT 2020.12.30.0

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## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3379	AMM	2020-09-21	2021-09-21
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2021-03-11	2022-03-11
Cable	UtiFlex Micro-Coax	UFD1150A-1-0720-200200	TXK	2020-09-22	2021-09-22
Attenuator	Fairview Microwave	SA4018-20	TYE	2020-09-18	2021-09-18

## TEST DESCRIPTION

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



TelTx 2021.03.19.1 XMI 2020.12.30.0

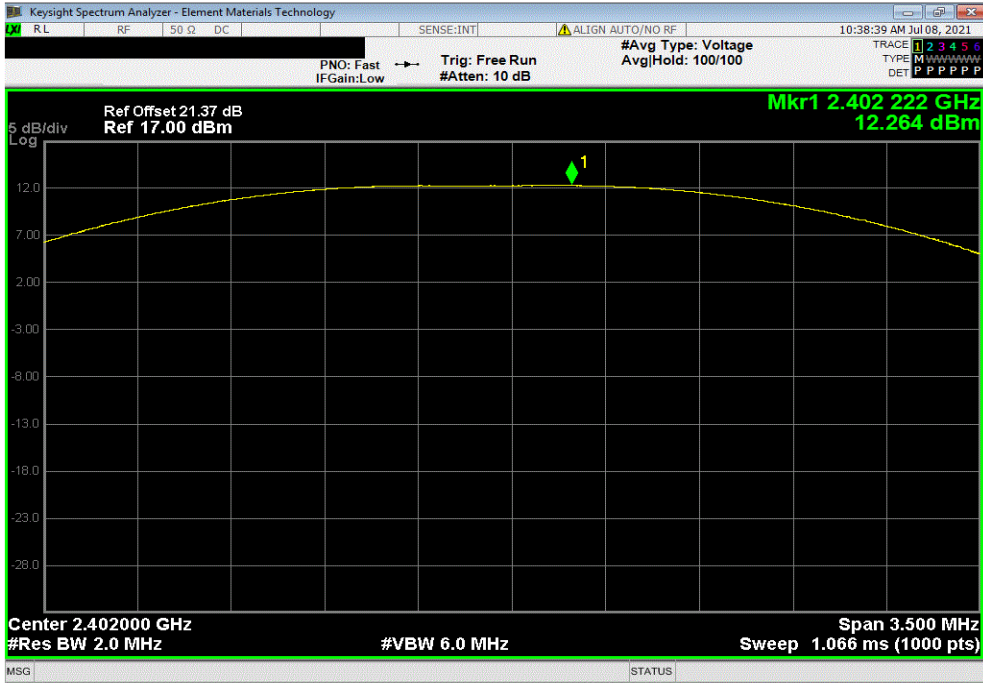
EUT: HiFi Mic 3.0		Work Order: WTVD0040	
Serial Number: 2		Date: 16-Jul-21	
Customer: Motorola Solutions Inc		Temperature: 21.1 °C	
Attendees: Navaid Karimi		Humidity: 57.7% RH	
Project: None		Barometric Pres.: 1017 mbar	
Tested by: Brandon Hobbs		Power: Battery	
		Job Site: TX09	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2021		ANSI C63.10:2013	
COMMENTS			
All measurement path losses were accounted for: DC block, attenuater and cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature	
		Out Pwr (dBm)	Limit (dBm) Result
BLE/GFSK			
1Mbps Modulation			
	Low Channel, 2402 MHz	12.264	30 Pass
	Mid Channel, 2440 MHz	13.373	30 Pass
	High Channel, 2480 MHz	11.594	30 Pass
500kbps Modulation			
	Low Channel, 2402 MHz	12.196	30 Pass
	Mid Channel, 2440 MHz	13.31	30 Pass
	High Channel, 2480 MHz	11.556	30 Pass
125kbps Modulation			
	Low Channel, 2402 MHz	12.154	30 Pass
	Mid Channel, 2440 MHz	13.246	30 Pass
	High Channel, 2480 MHz	11.503	30 Pass

# OUTPUT POWER

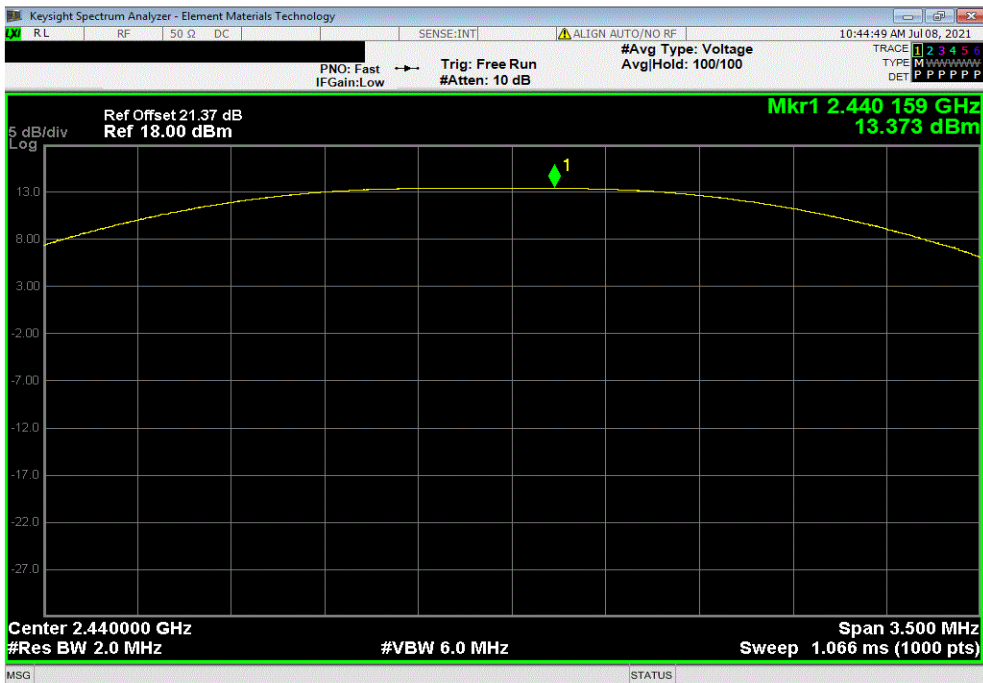


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 1Mbps Modulation, Low Channel, 2402 MHz						
	Out Pwr (dBm)	Limit (dBm)	Result			
	12.264	30	Pass			



BLE/GFSK , 1Mbps Modulation, Mid Channel, 2440 MHz						
	Out Pwr (dBm)	Limit (dBm)	Result			
	13.373	30	Pass			

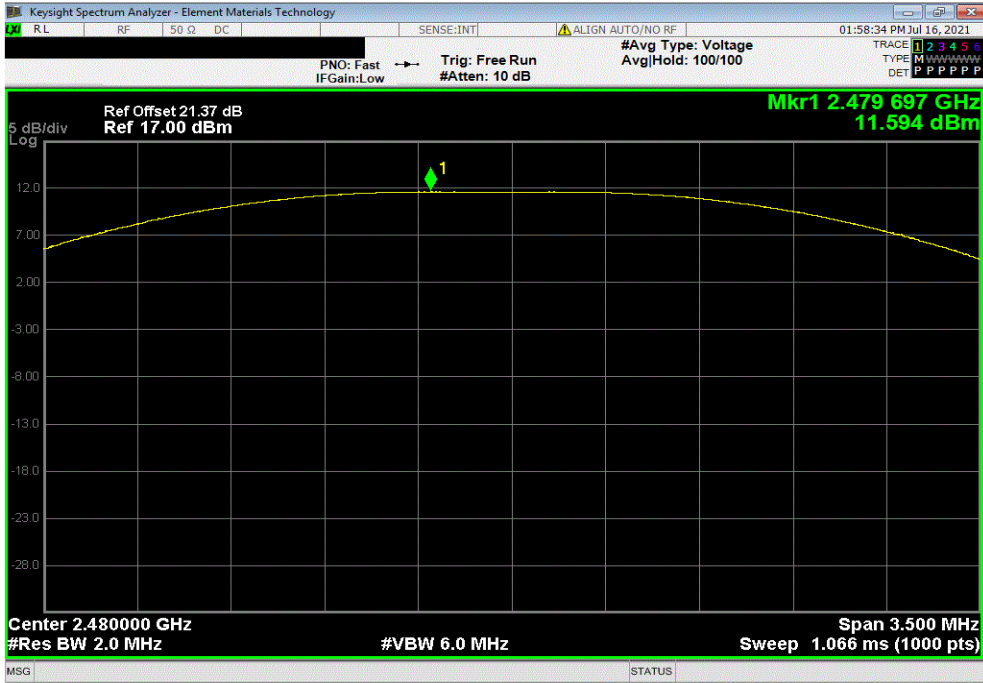


# OUTPUT POWER

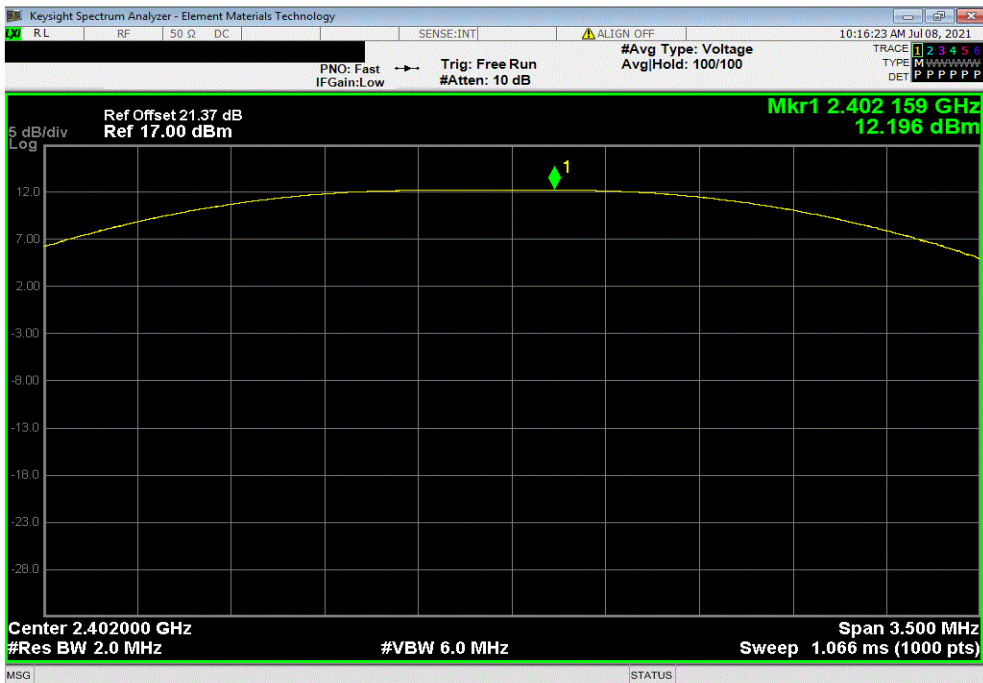


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 1Mbps Modulation, High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				11.594	30	Pass



BLE/GFSK , 500kbps Modulation, Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				12.196	30	Pass

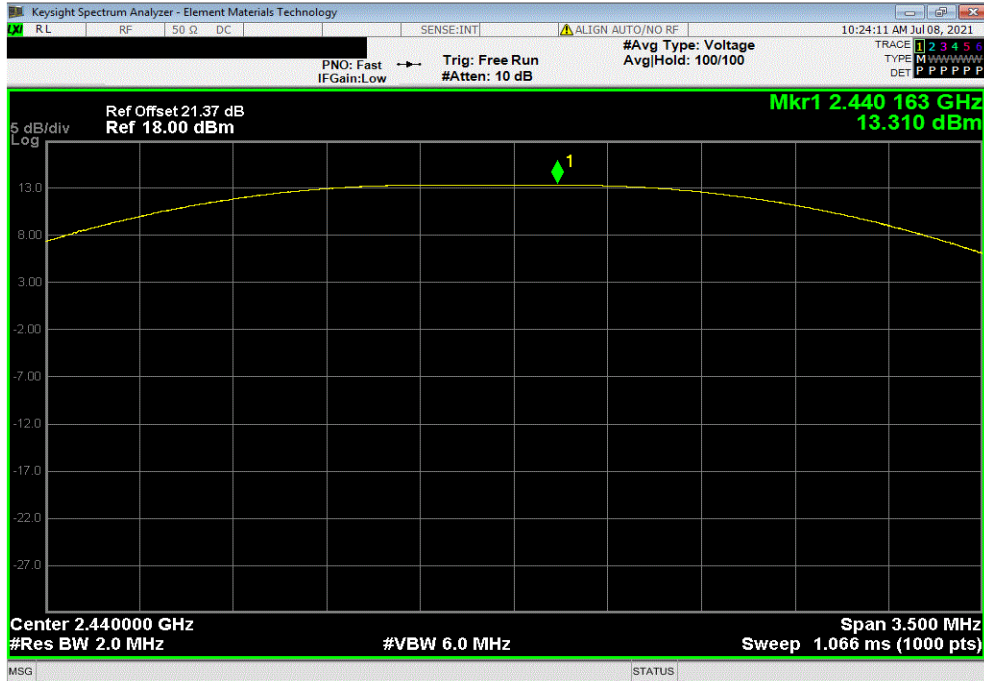


# OUTPUT POWER

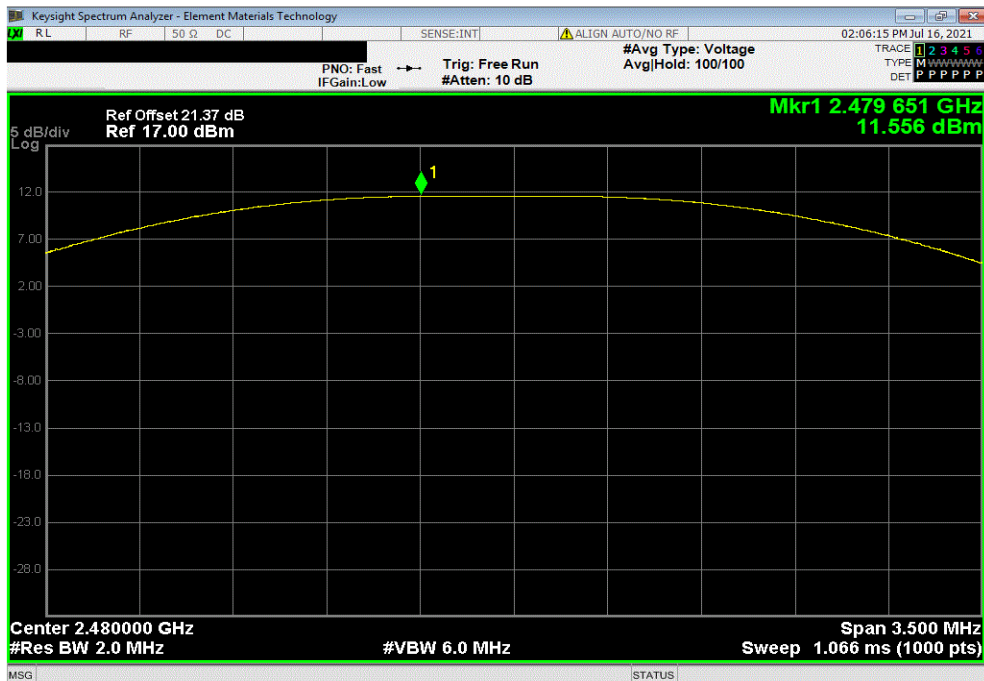


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 500kbps Modulation, Mid Channel, 2440 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				13.31	30	Pass



BLE/GFSK , 500kbps Modulation, High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				11.556	30	Pass

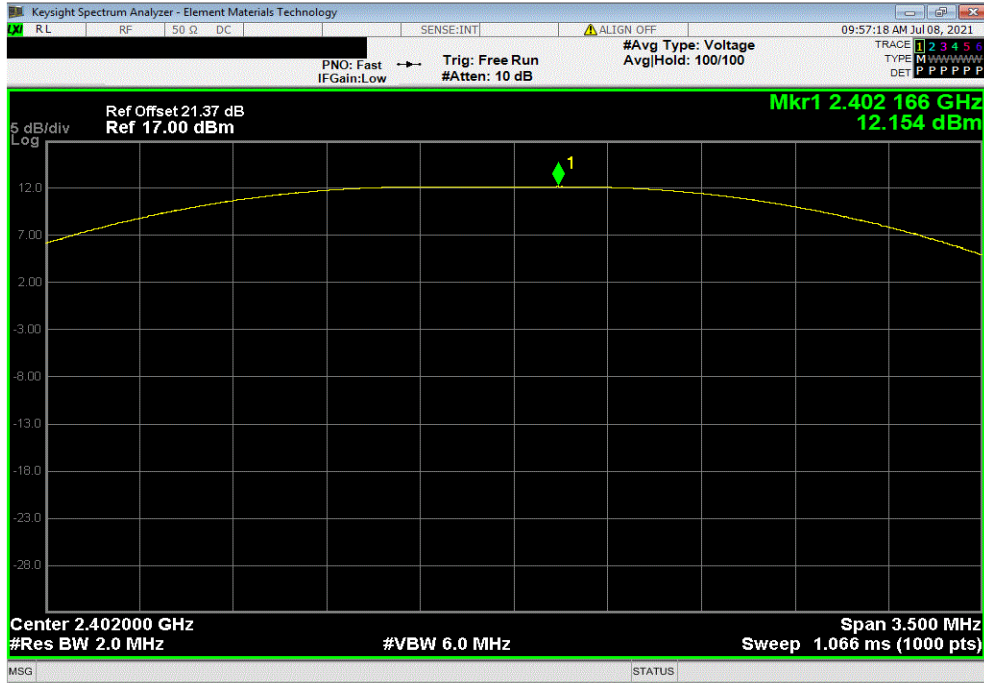


# OUTPUT POWER

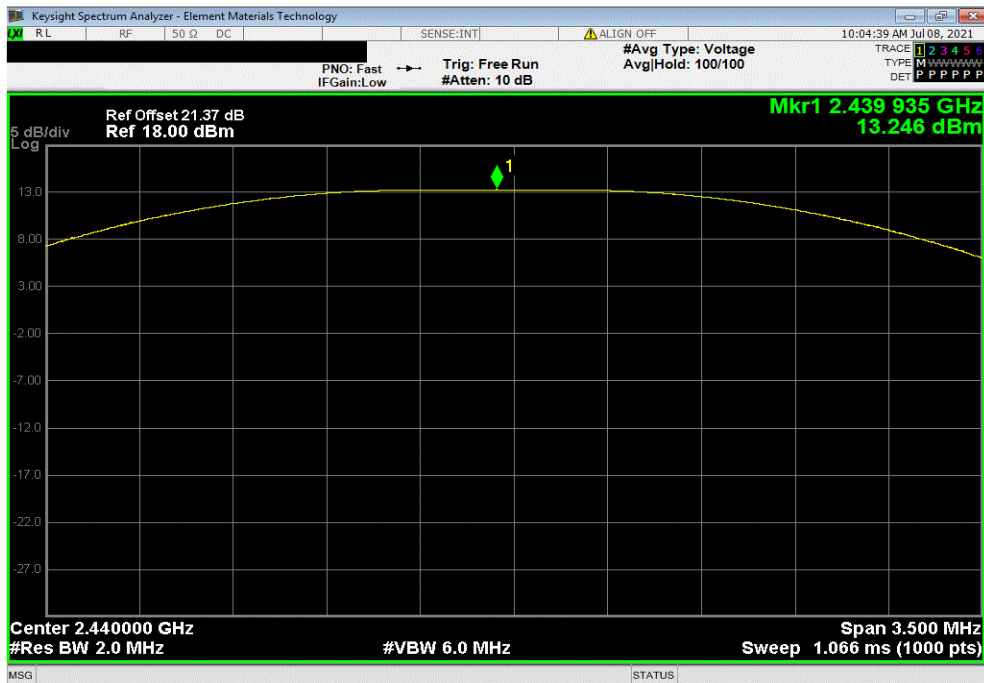


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 125kbps Modulation, Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				12.154	30	Pass



BLE/GFSK , 125kbps Modulation, Mid Channel, 2440 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				13.246	30	Pass

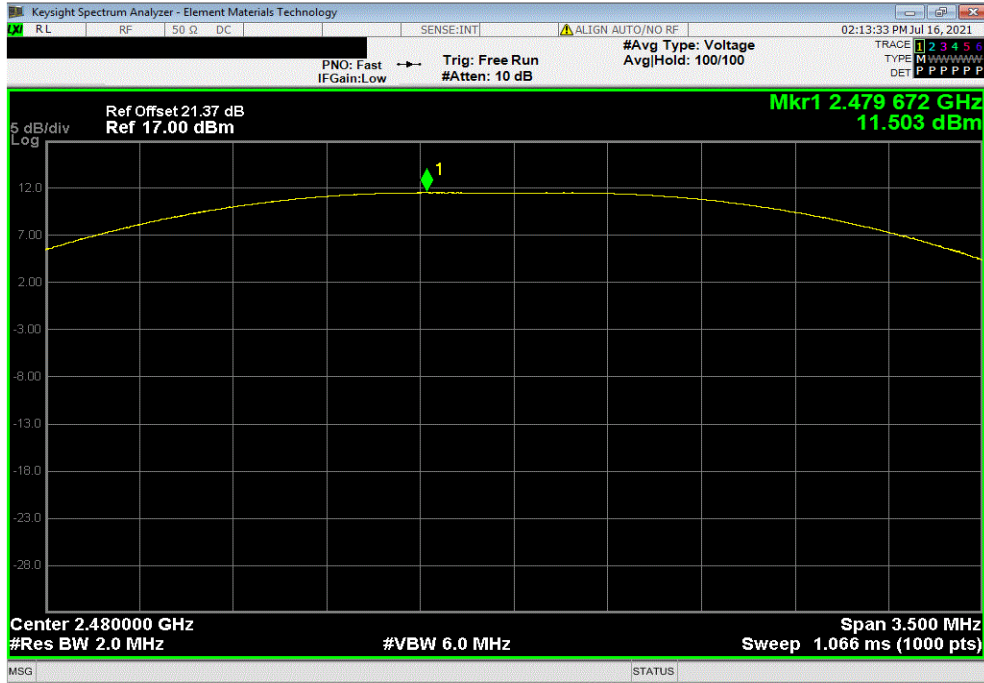


# OUTPUT POWER



TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 125kbps Modulation, High Channel, 2480 MHz						
	Out Pwr (dBm)	Limit (dBm)	Result			
	11.503	30	Pass			



# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



element

XMIT 2020.12.30.0

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
Block - DC	Fairview Microwave	SD3379	AMM	2020-09-21	2021-09-21
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2021-03-11	2022-03-11
Cable	UtiFlex Micro-Coax	UFD1150A-1-0720-200200	TXK	2020-09-22	2021-09-22
Attenuator	Fairview Microwave	SA4018-20	TYE	2020-09-18	2021-09-18

## TEST DESCRIPTION

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

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


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

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

# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TelTx 2021.03.19.1 XMt 2020.12.30.0

EUT: HiFi Mic 3.0		Work Order: WTV0040				
Serial Number: 2		Date: 16-Jul-21				
Customer: Motorola Solutions Inc		Temperature: 21.7 °C				
Attendees: Navaid Karimi		Humidity: 55.6% RH				
Project: None		Barometric Pres.: 1017 mbar				
Tested by: Brandon Hobbs		Power: Battery				
		Job Site: TX09				
TEST SPECIFICATIONS		Test Method				
FCC 15.247:2021		ANSI C63.10:2013				
COMMENTS						
All measurement path losses were accounted for: DC block, attenuater and cable.						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	1	Signature 				
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
BLE/GFSK						
1Mbps Modulation						
	Low Channel, 2402 MHz	12.264	1.39	13.654	36	Pass
	Mid Channel, 2440 MHz	13.373	1.39	14.763	36	Pass
	High Channel, 2480 MHz	11.594	1.39	12.984	36	Pass
500kbps Modulation						
	Low Channel, 2402 MHz	12.196	1.39	13.586	36	Pass
	Mid Channel, 2440 MHz	13.310	1.39	14.700	36	Pass
	High Channel, 2480 MHz	11.556	1.39	12.946	36	Pass
125kbps Modulation						
	Low Channel, 2402 MHz	12.154	1.39	13.544	36	Pass
	Mid Channel, 2440 MHz	13.246	1.39	14.636	36	Pass
	High Channel, 2480 MHz	11.503	1.39	12.893	36	Pass

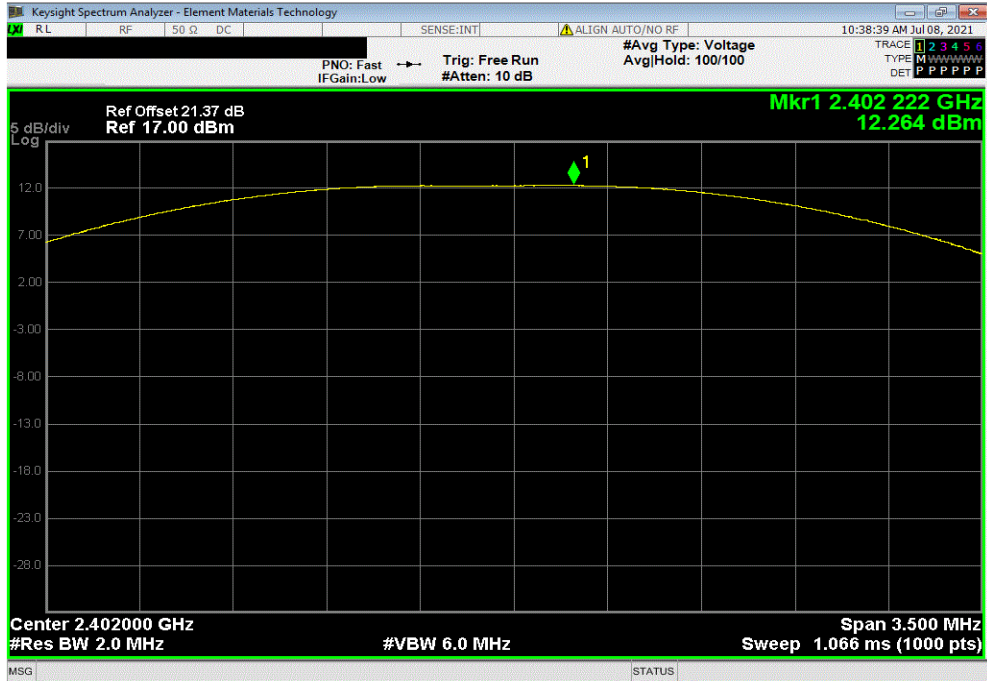


# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

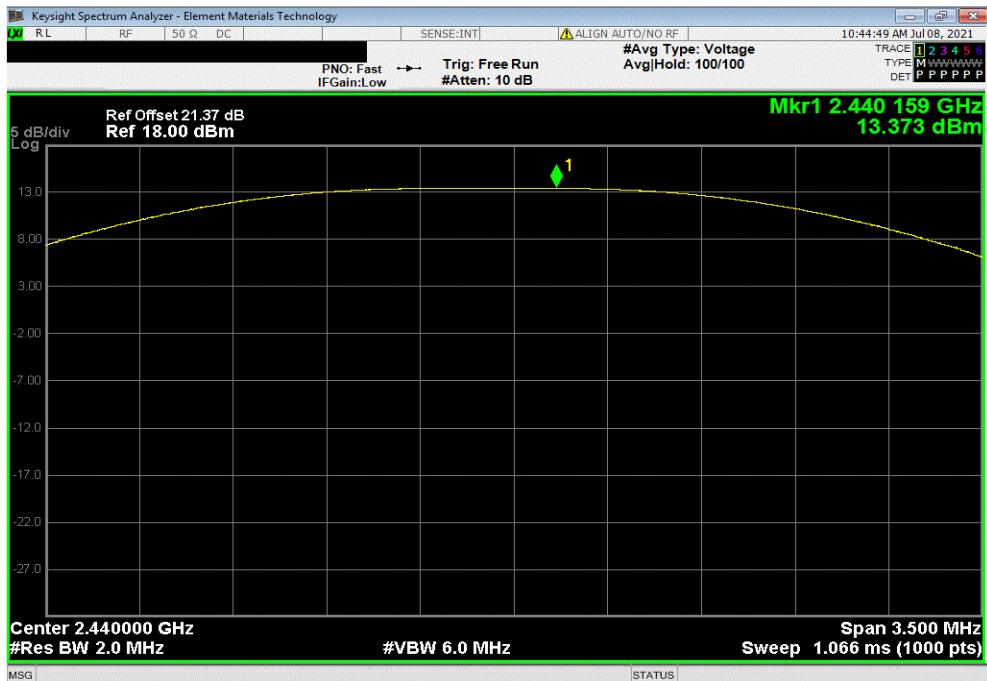


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 1Mbps Modulation, Low Channel, 2402 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	12.264	1.39	13.654	36	Pass	



BLE/GFSK , 1Mbps Modulation, Mid Channel, 2440 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	13.373	1.39	14.763	36	Pass	



# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

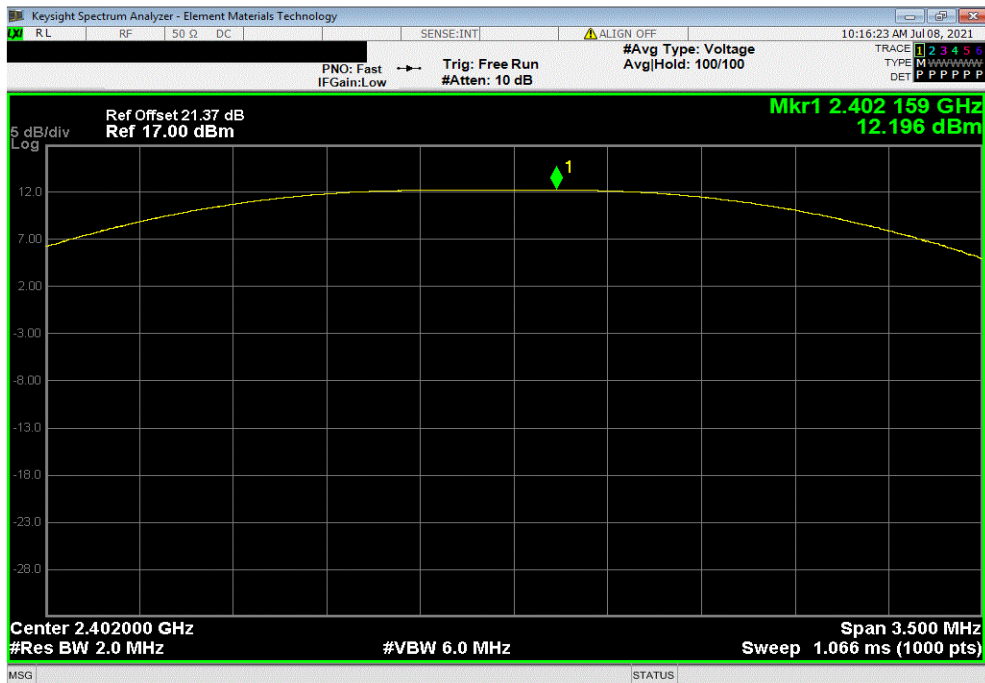


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 1Mbps Modulation, High Channel, 2480 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	11.594	1.39	12.984	36	Pass	



BLE/GFSK , 500kbps Modulation, Low Channel, 2402 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	12.196	1.39	13.586	36	Pass	

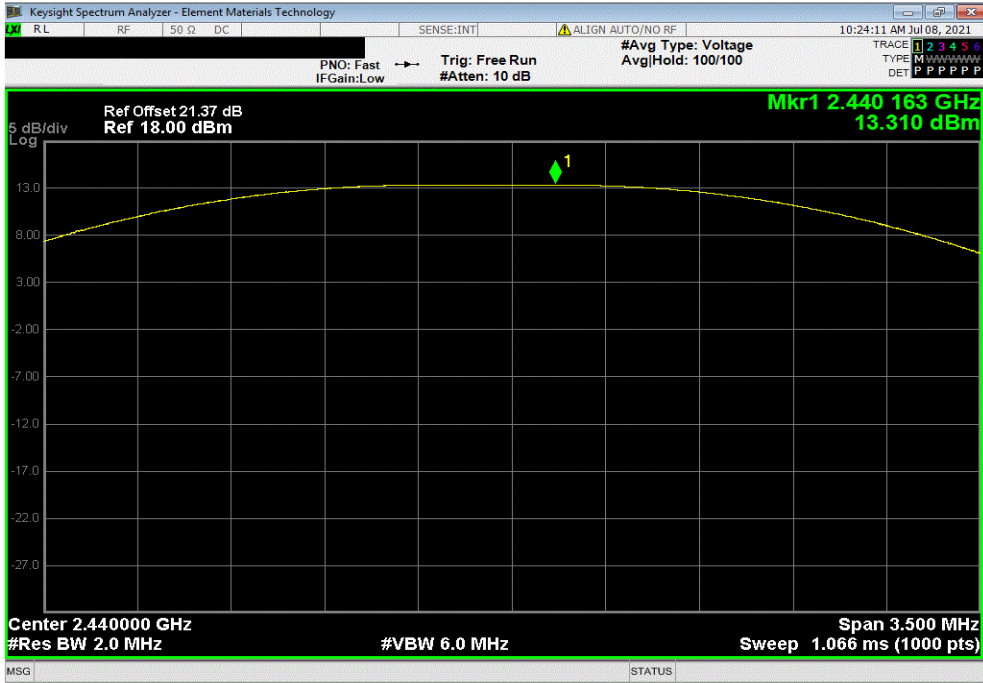


# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

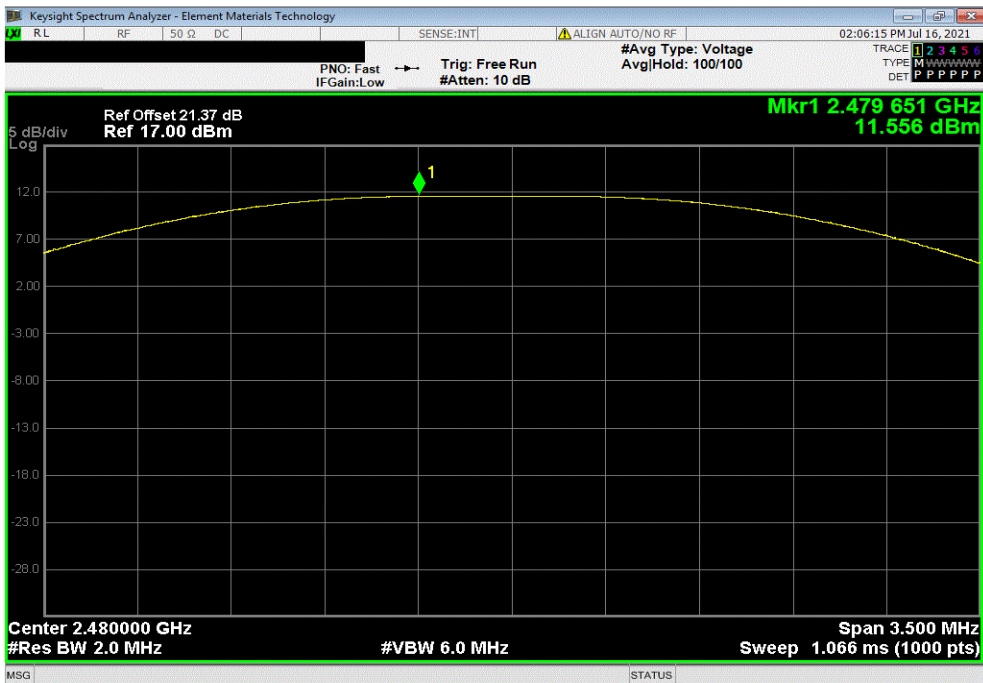


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 500kbps Modulation, Mid Channel, 2440 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
13.31	1.39	14.7	36	Pass		



BLE/GFSK , 500kbps Modulation, High Channel, 2480 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
11.556	1.39	12.946	36	Pass		

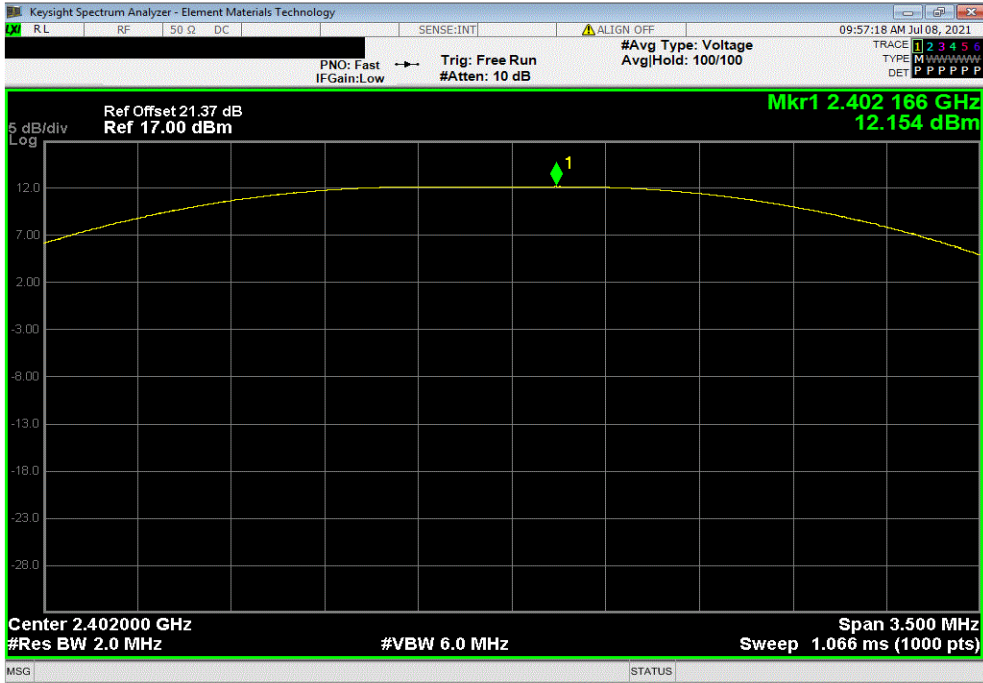


# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

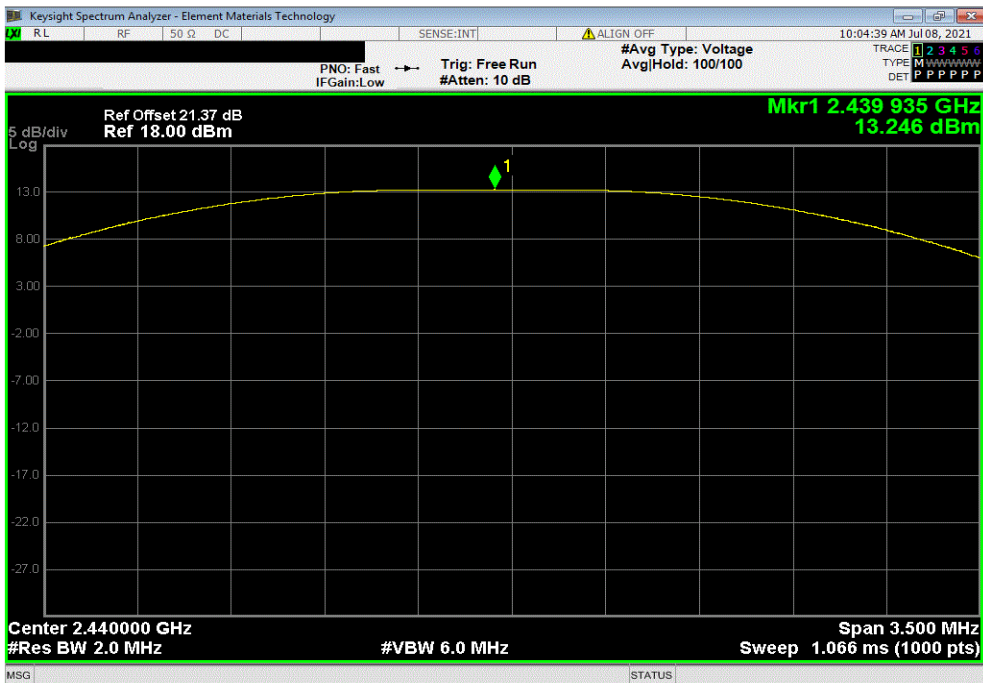


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 125kbps Modulation, Low Channel, 2402 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
12.154	1.39	13.544	36	Pass		



BLE/GFSK , 125kbps Modulation, Mid Channel, 2440 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
13.246	1.39	14.636	36	Pass		



# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 125kbps Modulation, High Channel, 2480 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	11.503	1.39	12.893	36	Pass	



1.39 1.39

# POWER SPECTRAL DENSITY



element

XMit 2020.12.30.0

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## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3379	AMM	2020-09-21	2021-09-21
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2021-03-11	2022-03-11
Cable	UtiFlex Micro-Coax	UFD1150A-1-0720-200200	TXK	2020-09-22	2021-09-22
Attenuator	Fairview Microwave	SA4018-20	TYE	2020-09-18	2021-09-18

## TEST DESCRIPTION

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



Tel: 2021.03.19.1 XMI: 2020.12.30.0

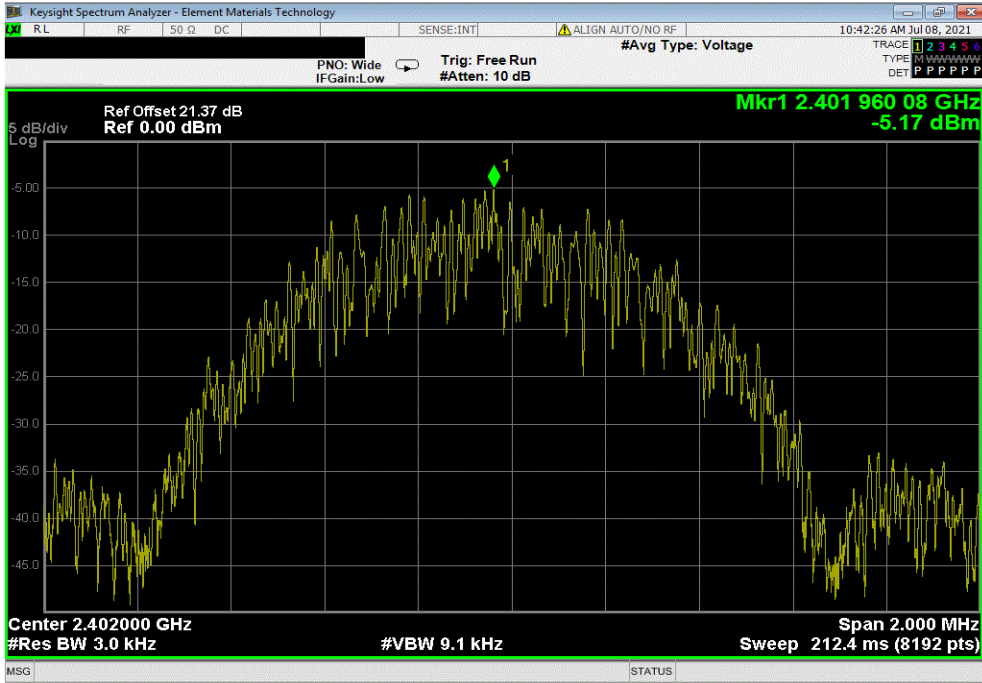
EUT: HiFi Mic 3.0		Work Order: WTVD0040		
Serial Number: 2		Date: 16-Jul-21		
Customer: Motorola Solutions Inc		Temperature: 21.4 °C		
Attendees: Navaid Karimi		Humidity: 57.7% RH		
Project: None		Barometric Pres.: 1017 mbar		
Tested by: Brandon Hobbs	Power: Battery	Job Site: TX09		
TEST SPECIFICATIONS				
FCC 15.247:2021		Test Method: ANSI C63.10:2013		
COMMENTS				
All measurement path losses were accounted for: DC block, attenuater and cable.				
DEVIATIONS FROM TEST STANDARD				
None				
Configuration #	1	Signature		
		Value	Limit	Results
		dBm/3kHz	< dBm/3kHz	
BLE/GFSK				
1Mbps Modulation				
	Low Channel, 2402 MHz	-5.168	8	Pass
	Mid Channel, 2440 MHz	-3.959	8	Pass
	High Channel, 2480 MHz	-5.851	8	Pass
500kbps Modulation				
	Low Channel, 2402 MHz	6.059	8	Pass
	Mid Channel, 2440 MHz	7.09	8	Pass
	High Channel, 2480 MHz	5.403	8	Pass
125kbps Modulation				
	Low Channel, 2402 MHz	6.129	8	Pass
	Mid Channel, 2440 MHz	7.232	8	Pass
	High Channel, 2480 MHz	5.451	8	Pass

# POWER SPECTRAL DENSITY

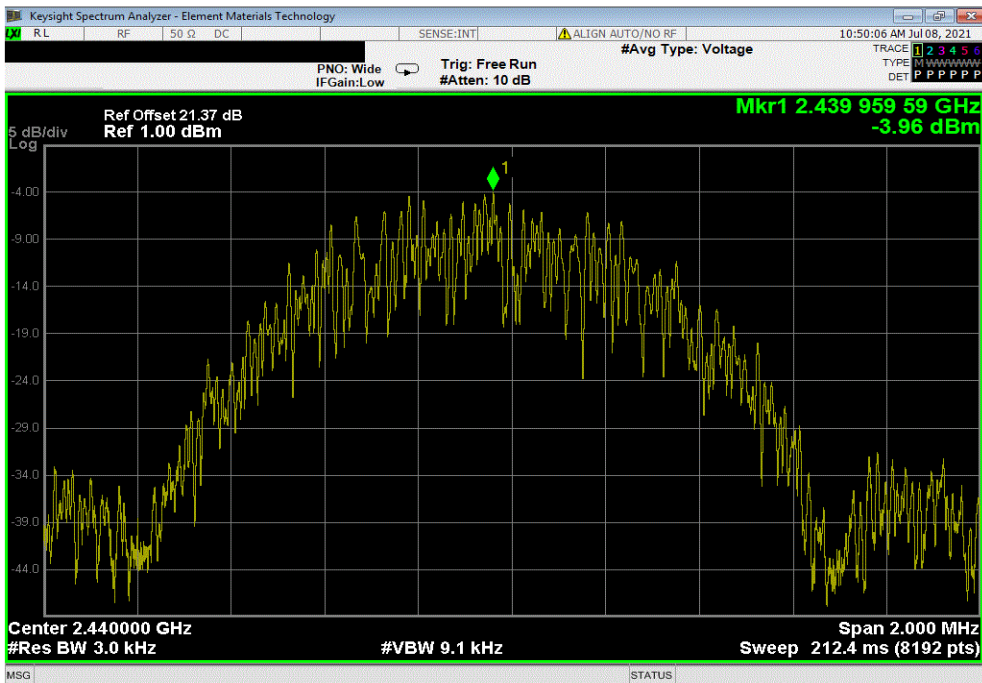


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 1Mbps Modulation, Low Channel, 2402 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-5.168	8	Pass			



BLE/GFSK , 1Mbps Modulation, Mid Channel, 2440 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-3.959	8	Pass			



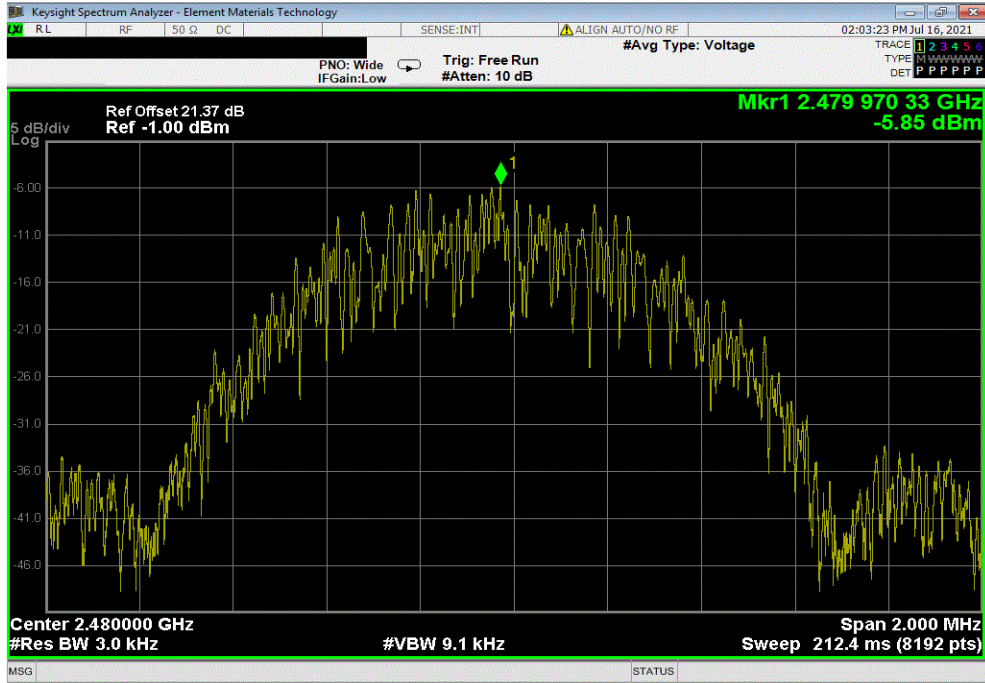


# POWER SPECTRAL DENSITY

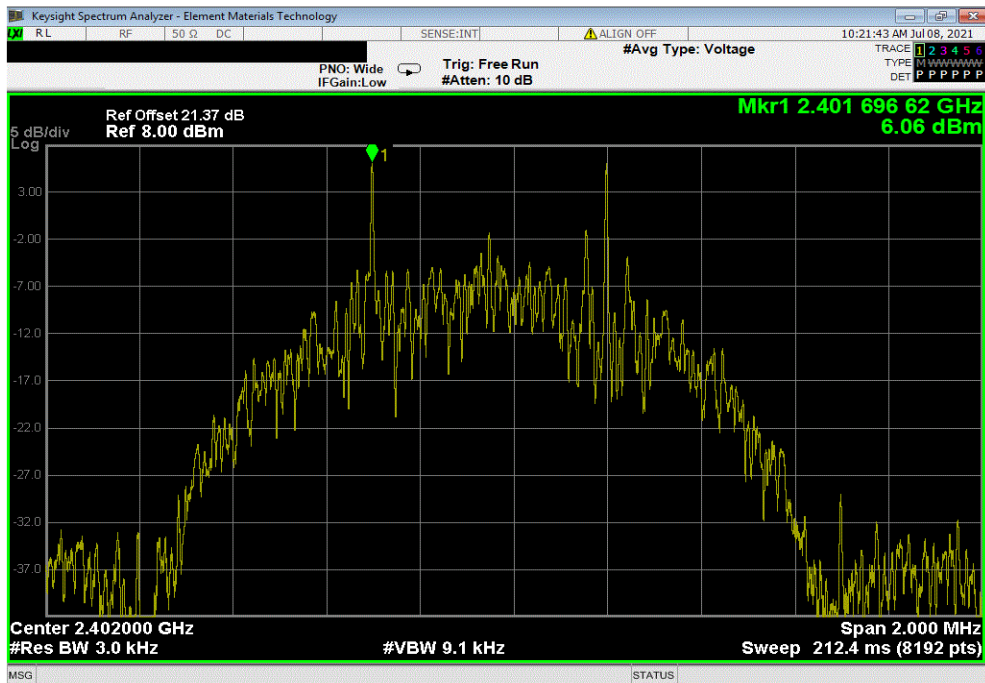


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 1Mbps Modulation, High Channel, 2480 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-5.851	8	Pass			



BLE/GFSK , 500kbps Modulation, Low Channel, 2402 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	6.059	8	Pass			

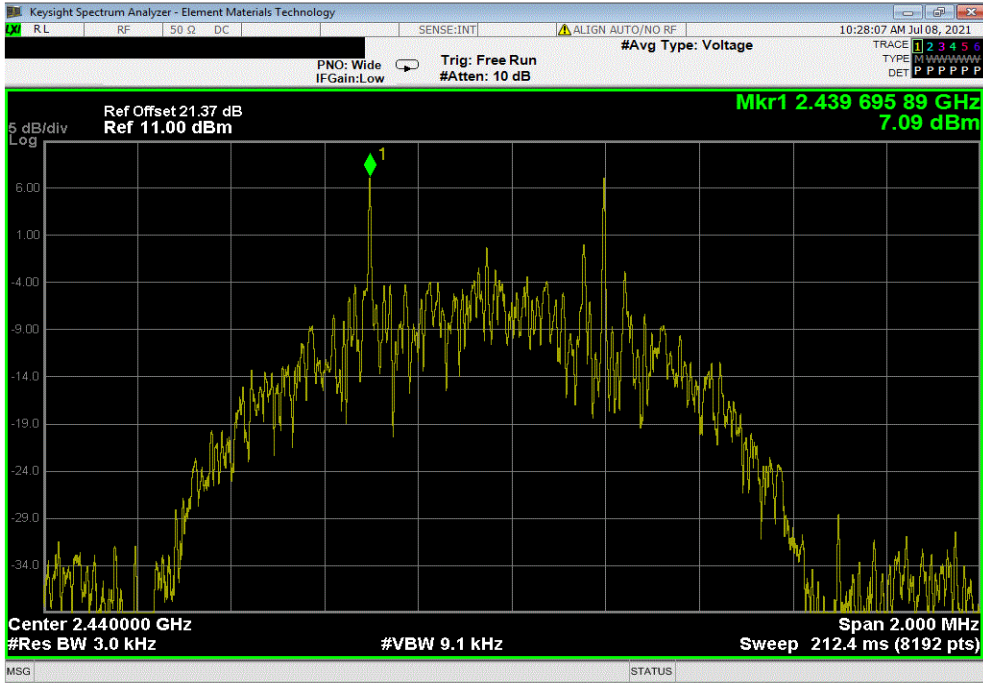


# POWER SPECTRAL DENSITY

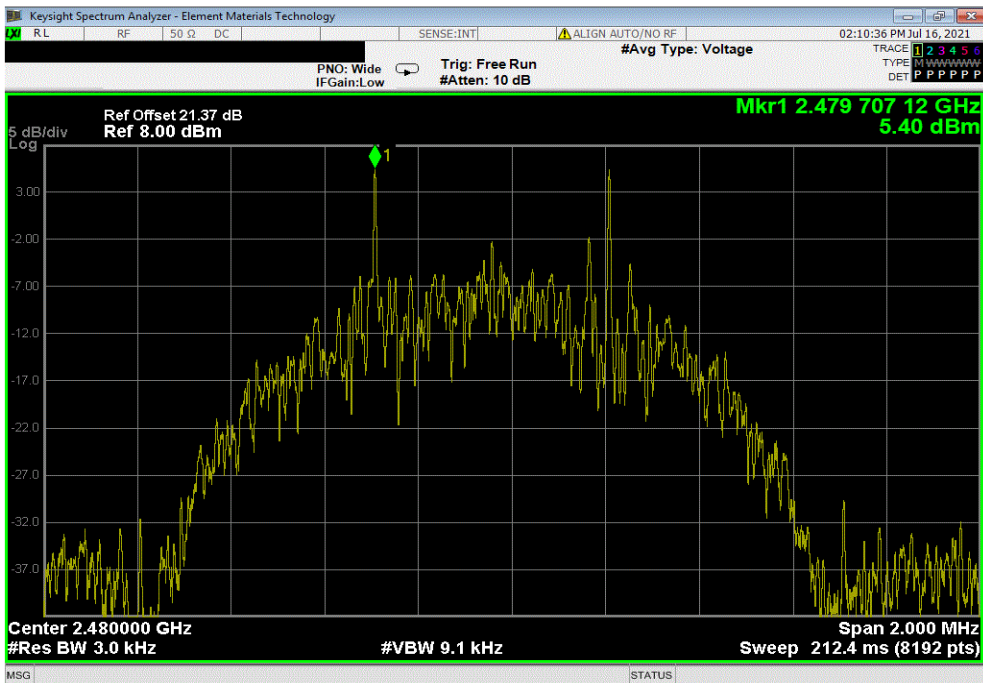


TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 500kbps Modulation, Mid Channel, 2440 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	7.09	8	Pass			



BLE/GFSK , 500kbps Modulation, High Channel, 2480 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	5.403	8	Pass			



# POWER SPECTRAL DENSITY



TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 125kbps Modulation, Low Channel, 2402 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	6.129	8	Pass			



BLE/GFSK , 125kbps Modulation, Mid Channel, 2440 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	7.232	8	Pass			



# POWER SPECTRAL DENSITY



TbTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK , 125kbps Modulation, High Channel, 2480 MHz						
	Value	Limit				
	dBm/3kHz	< dBm/3kHz	Results			
	5.451	8	Pass			

