

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



XMit 2023.02.14.0

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
Attenuator	S.M. Electronics	SA26B-20	TZP	2022-11-06	2023-11-06
Block - DC	Fairview Microwave	SD3379	AMZ	2022-11-06	2023-11-06
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2022-09-10	2023-09-10
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2023-02-02	2024-02-02

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.

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

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TSMTx 2022.06.03.0 XMR 2023.02.14.0

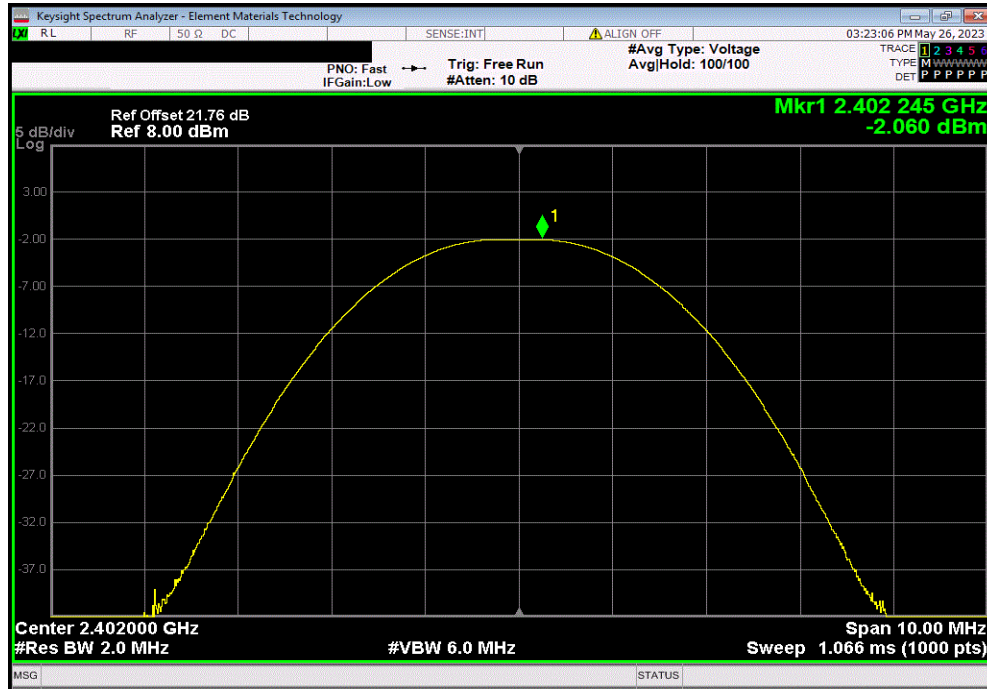
EUT: TSI Inc. OmniTrak		Work Order: TSIN0196	
Serial Number: TSI5230200045		Date: 05/25/2023	
Customer: TSI, Incorporated		Temperature: 21.8°C	
Attendees: Micah Larson		Humidity: 40.9%	
Project: None		Barometric Pres.: 1022 mbar	
Tested by: Christopher Heintzelman	Power: Internal Battery (3.7VDC)	Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2023		Test Method	
RSS-247 Issue 2:2017; RSS-Gen Issue 5:2018+A1:2019+A2:2021		ANSI C63.10:2013	
		ANSI C63.10:2013	
COMMENTS			
Reference level offset includes measurement cable, attenuator, and DC block. The customer states that the USB does not charge the EUT while in the test mode, USB is for programming only. Payload length is 65535.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	TSIN0196-20	Signature <i>Christopher Heintzelman</i>	
		Out Pwr (dBm)	Antenna Gain (dBi)
		EIRP (dBm)	EIRP Limit (dBm)
			Result
BLE/GFSK 125 kbps			
	Low Channel, 2402 MHz	-2.06	0.17
	Mid Channel, 2442 MHz	-2.081	0.17
	High Channel, 2480 MHz	-2.042	0.17
BLE/GFSK 500 kbps			
	Low Channel, 2402 MHz	-1.993	0.17
	Mid Channel, 2442 MHz	-2.029	0.17
	High Channel, 2480 MHz	-1.976	0.17
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	-2.004	0.17
	Mid Channel, 2442 MHz	-2.021	0.17
	High Channel, 2480 MHz	-1.959	0.17
BLE/GFSK 2 Mbps			
	Low Channel, 2402 MHz	-1.901	0.17
	Mid Channel, 2442 MHz	-1.899	0.17
	High Channel, 2480 MHz	-1.848	0.17

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

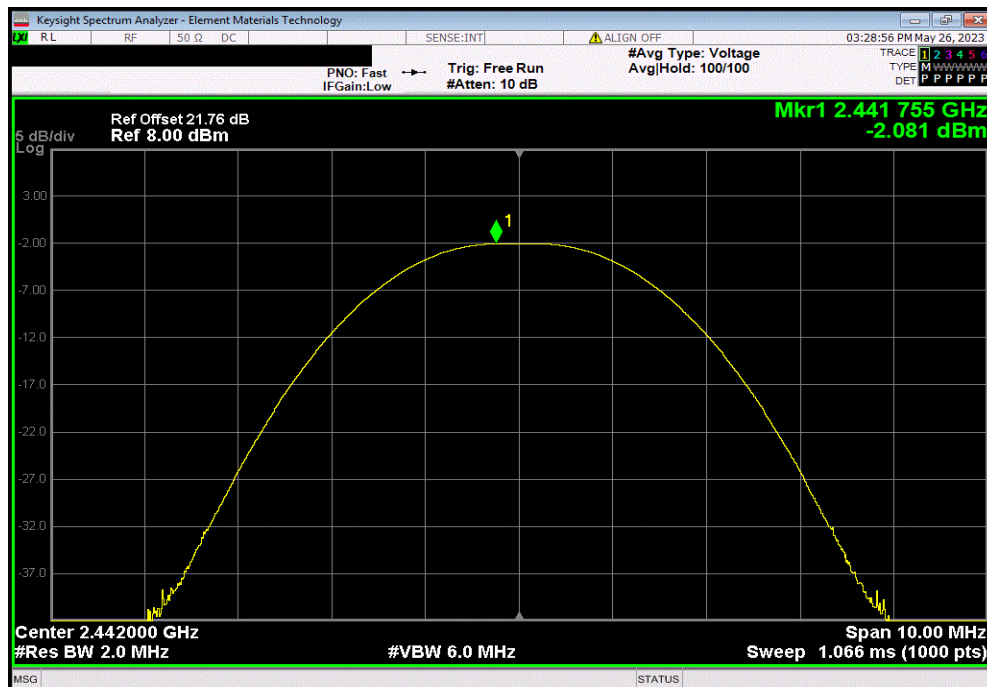


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 125 kbps, Low Channel, 2402 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	-2.06	0.17	-1.89	36	Pass	



BLE/GFSK 125 kbps, Mid Channel, 2442 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	-2.081	0.17	-1.911	36	Pass	

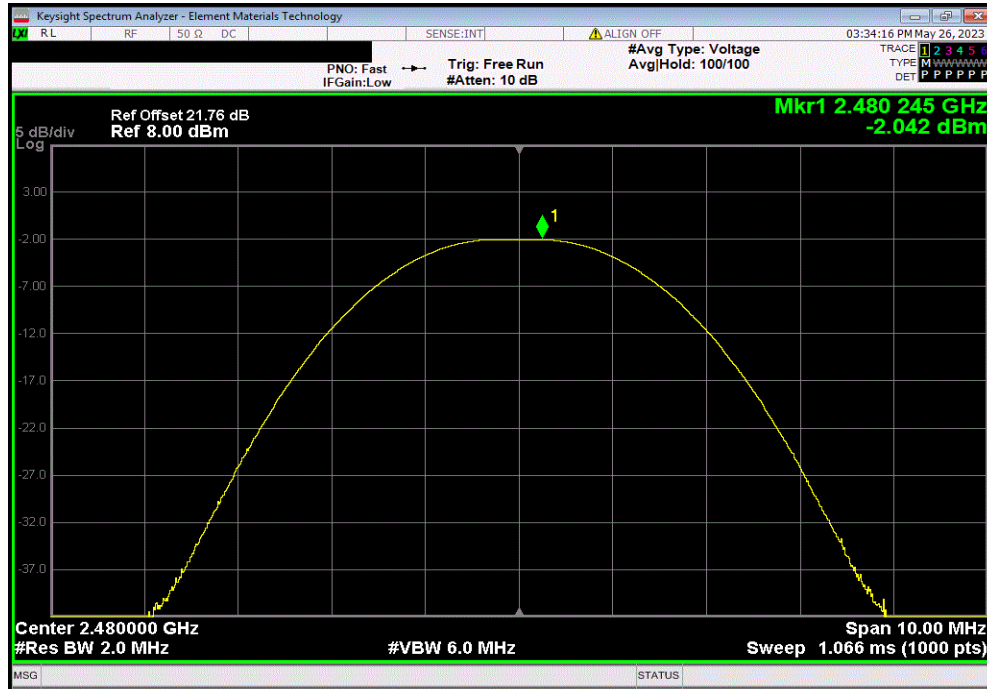


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

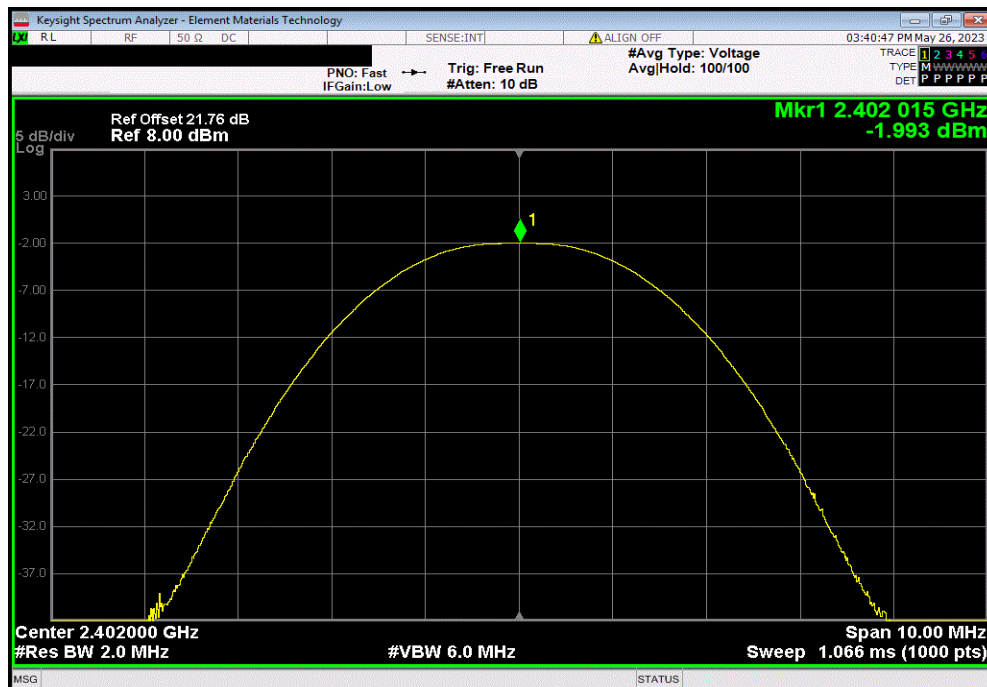


TbTx 2022.06.03.0 XbTx 2023.02.14.0

BLE/GFSK 125 kbps, High Channel, 2480 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	-2.042	0.17	-1.872	36	Pass	



BLE/GFSK 500 kbps, Low Channel, 2402 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	-1.993	0.17	-1.823	36	Pass	

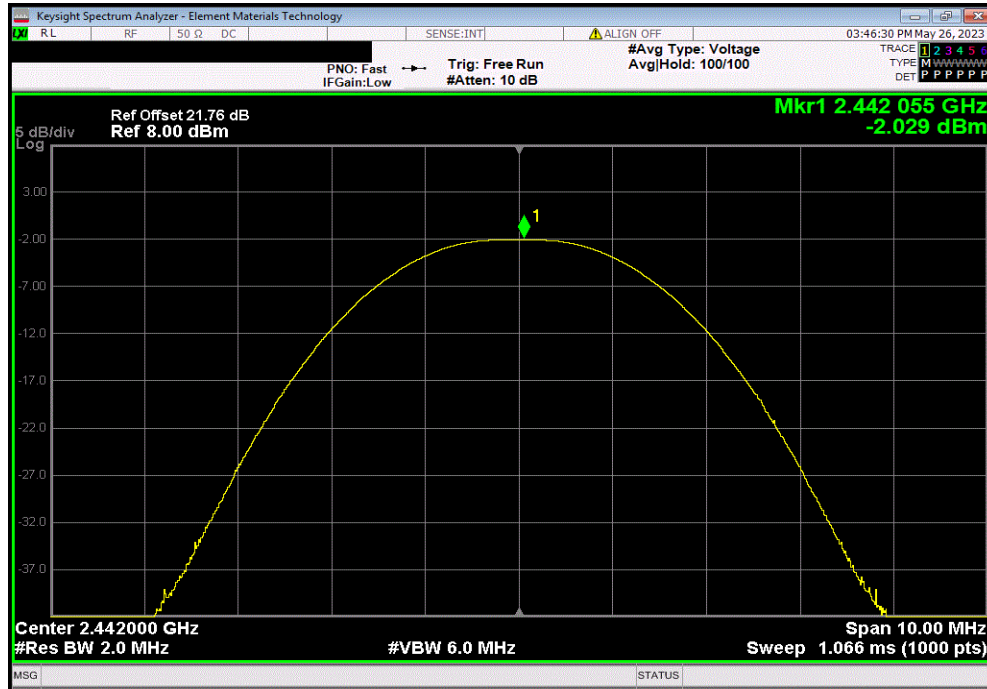


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

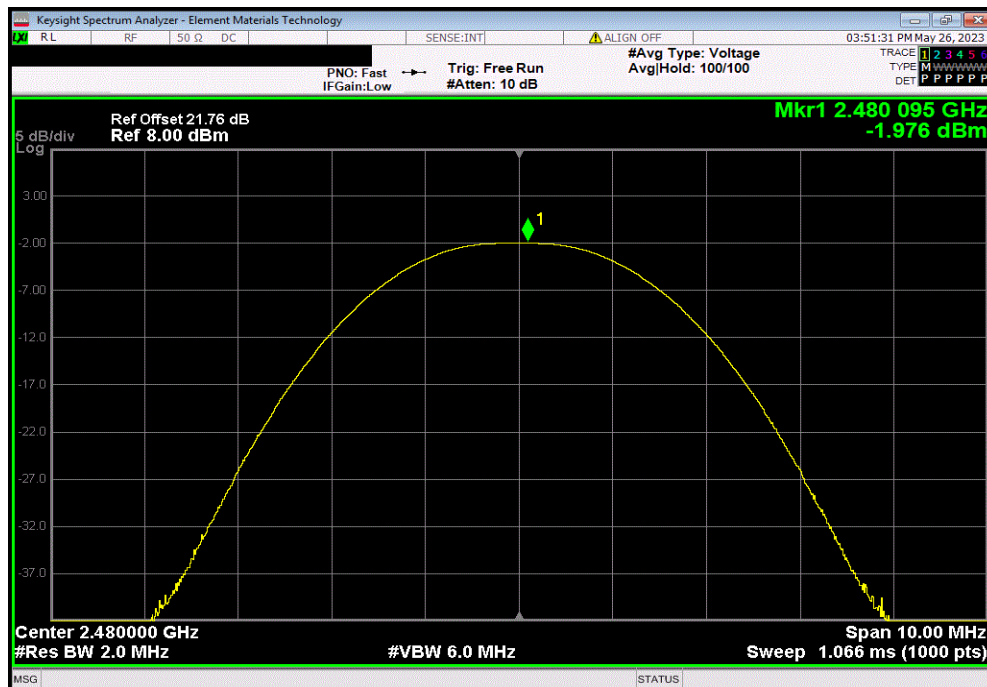


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 500 kbps, Mid Channel, 2442 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
-2.029	0.17	-1.859	36	Pass		



BLE/GFSK 500 kbps, High Channel, 2480 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
-1.976	0.17	-1.806	36	Pass		

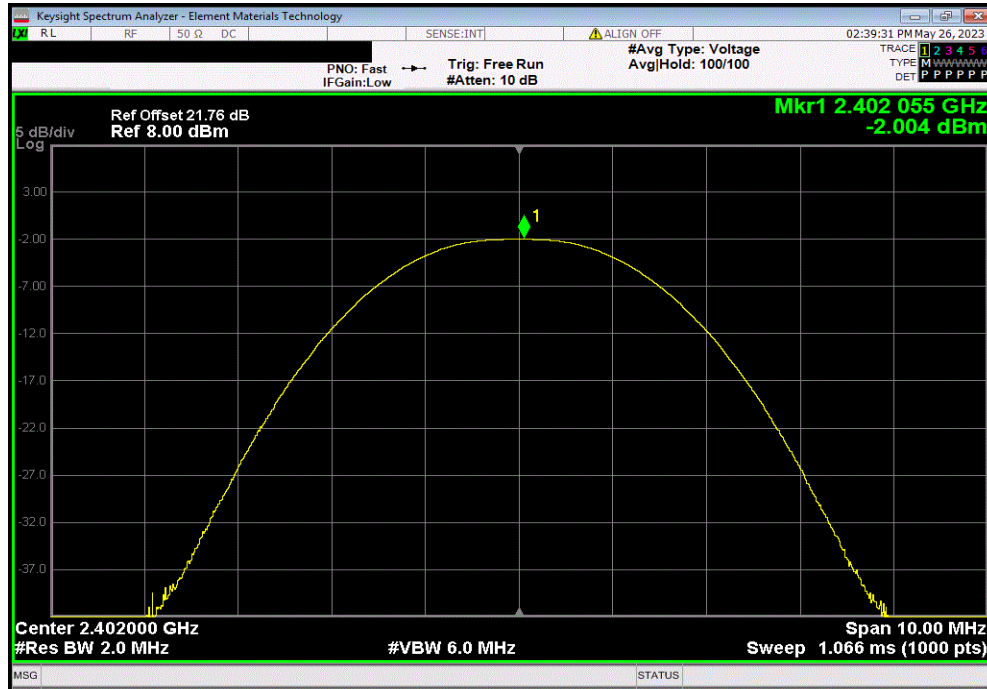


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

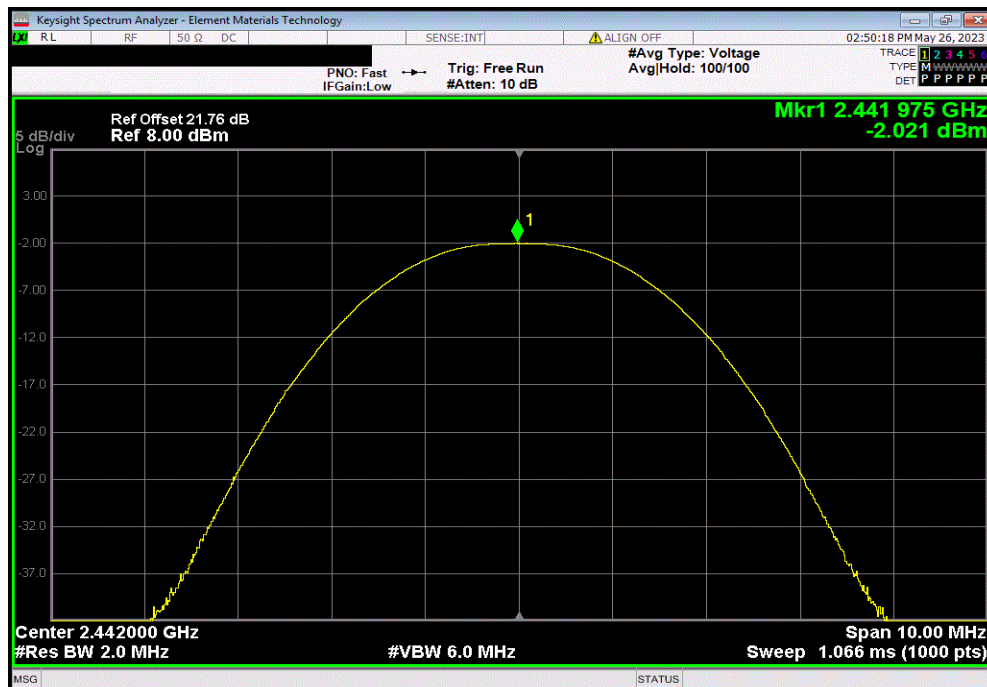


TbTx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
-2.004	0.17	-1.834	36	Pass		



BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
-2.021	0.17	-1.851	36	Pass		

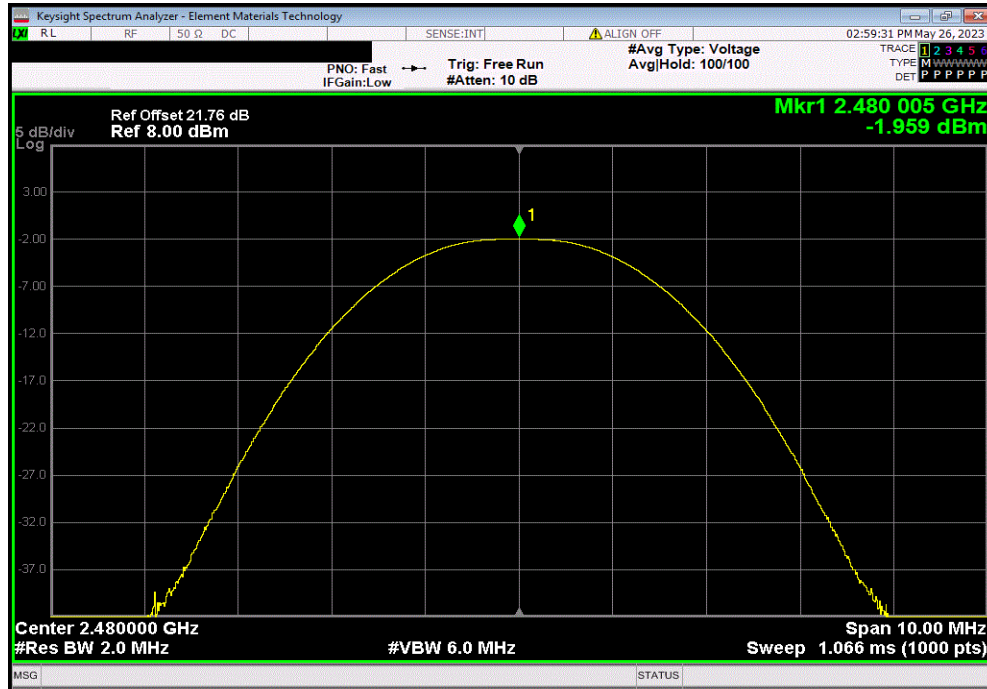


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

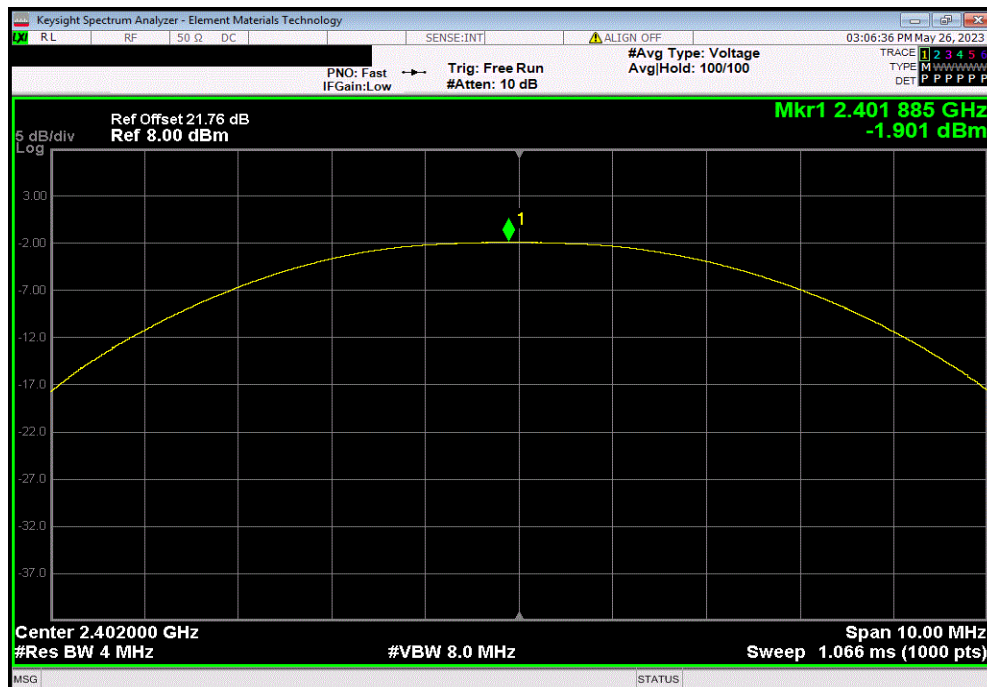


TbTx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
-1.959	0.17	-1.789	36	Pass		



BLE/GFSK 2 Mbps, Low Channel, 2402 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
-1.901	0.17	-1.731	36	Pass		

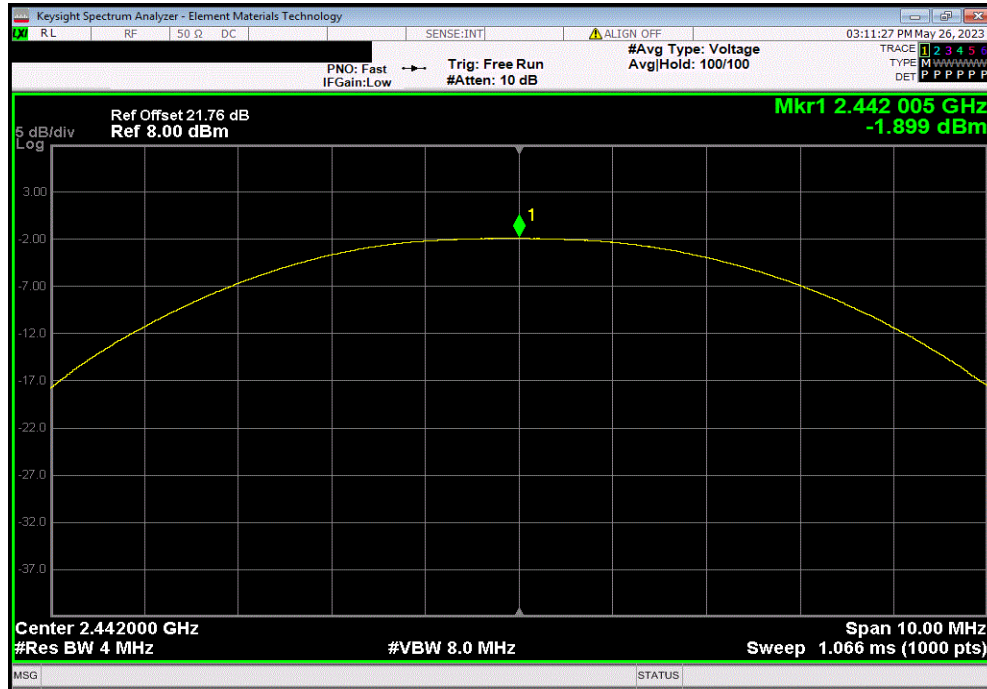


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

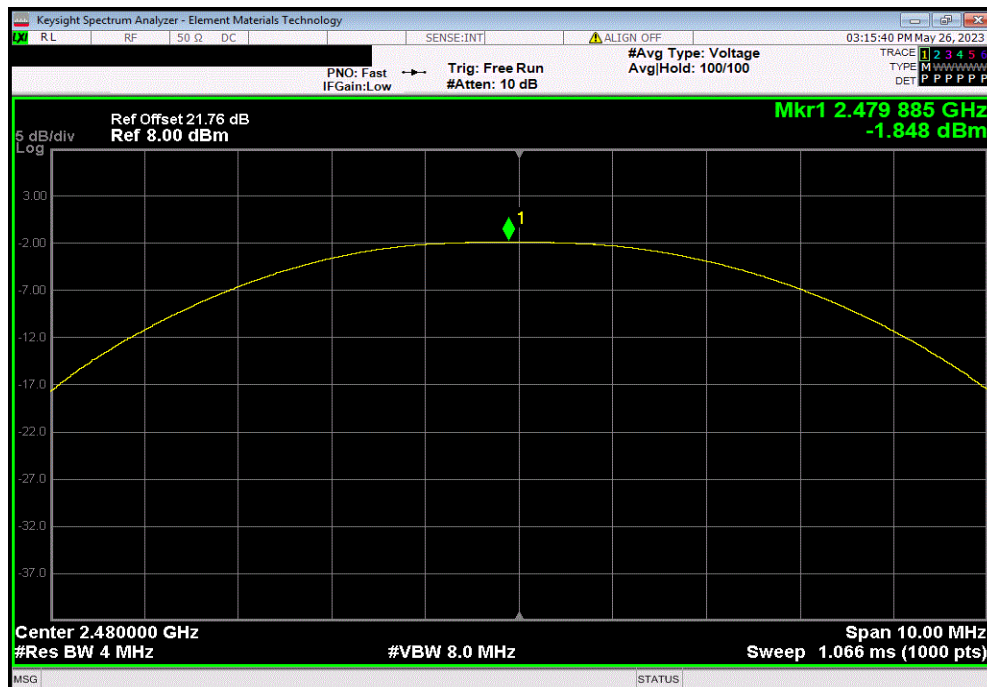


TbTtx 2022.06.03.0 XMR 2023.02.14.0

BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
-1.899	0.17	-1.729	36	Pass		



BLE/GFSK 2 Mbps, High Channel, 2480 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
-1.848	0.17	-1.678	36	Pass		



POWER SPECTRAL DENSITY



XMR 2023.02.14.0

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
Attenuator	S.M. Electronics	SA26B-20	TZP	2022-11-06	2023-11-06
Block - DC	Fairview Microwave	SD3379	AMZ	2022-11-06	2023-11-06
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2022-09-10	2023-09-10
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2023-02-02	2024-02-02
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29

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



TSMTx 2022.06.03.0 XMt 2023.02.14.0

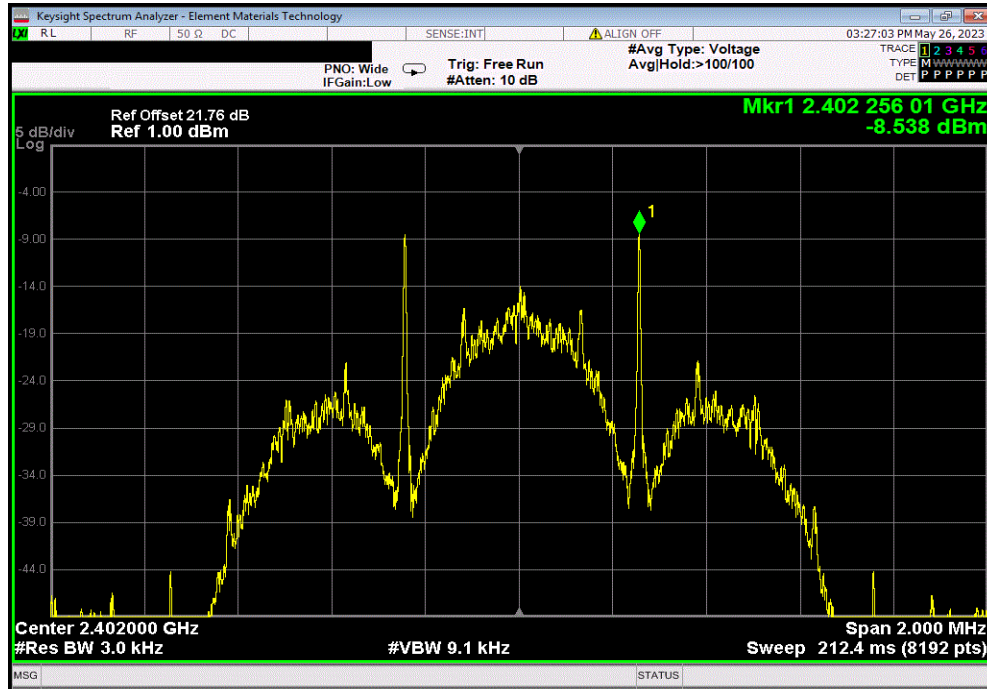
EUT: TSI Inc. OmniTrak		Work Order: TSIN0196	
Serial Number: TSI5230200045		Date: 05/25/2023	
Customer: TSI, Incorporated		Temperature: 21.7°C	
Attendees: Micah Larson		Humidity: 40.8%	
Project: None		Barometric Pres.: 1022 mbar	
Tested by: Christopher Heintzelman	Power: Internal Battery (3.7VDC)	Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2023		ANSI C63.10:2013	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
COMMENTS			
Reference level offset includes measurement cable, attenuator, and DC block. The customer states that the USB does not charge the EUT while in the test mode, USB is for programming only. Payload length is 65535.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	TSIN0196-20	Signature <i>Christopher Heintzelman</i>	
		Value dBm/3kHz	Limit < dBm/3kHz
BLE/GFSK 125 kbps			
	Low Channel, 2402 MHz	-8.538	8
	Mid Channel, 2442 MHz	-8.569	8
	High Channel, 2480 MHz	-8.533	8
BLE/GFSK 500 kbps			
	Low Channel, 2402 MHz	-8.595	8
	Mid Channel, 2442 MHz	-8.622	8
	High Channel, 2480 MHz	-8.644	8
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	-18.357	8
	Mid Channel, 2442 MHz	-18.431	8
	High Channel, 2480 MHz	-18.423	8
BLE/GFSK 2 Mbps			
	Low Channel, 2402 MHz	-20.864	8
	Mid Channel, 2442 MHz	-20.875	8
	High Channel, 2480 MHz	-20.809	8

POWER SPECTRAL DENSITY

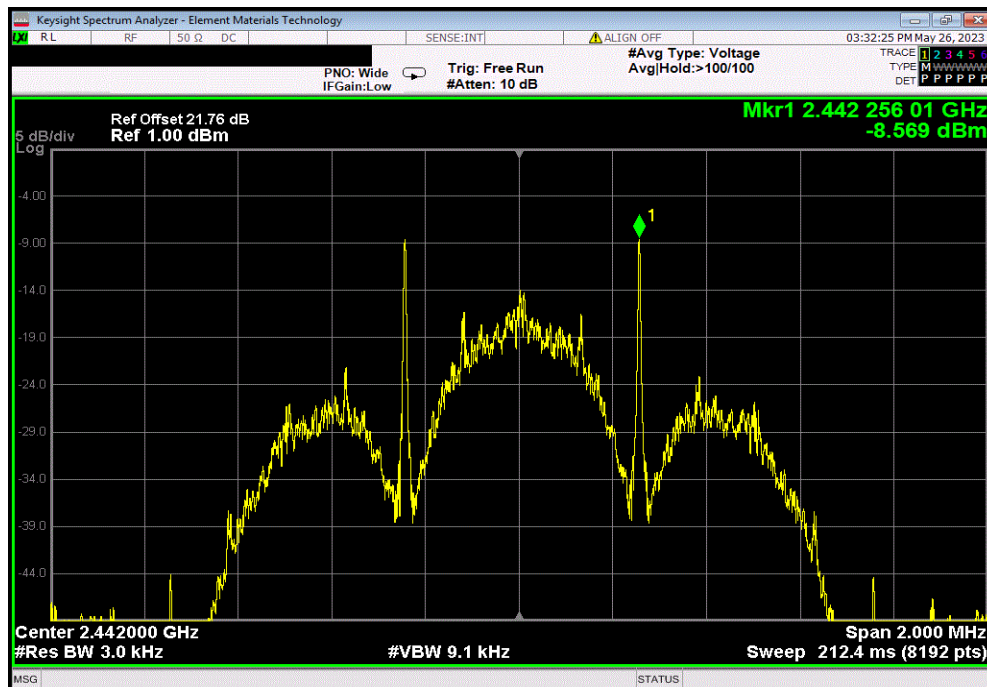


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 125 kbps, Low Channel, 2402 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-8.538	8	Pass			



BLE/GFSK 125 kbps, Mid Channel, 2442 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-8.569	8	Pass			

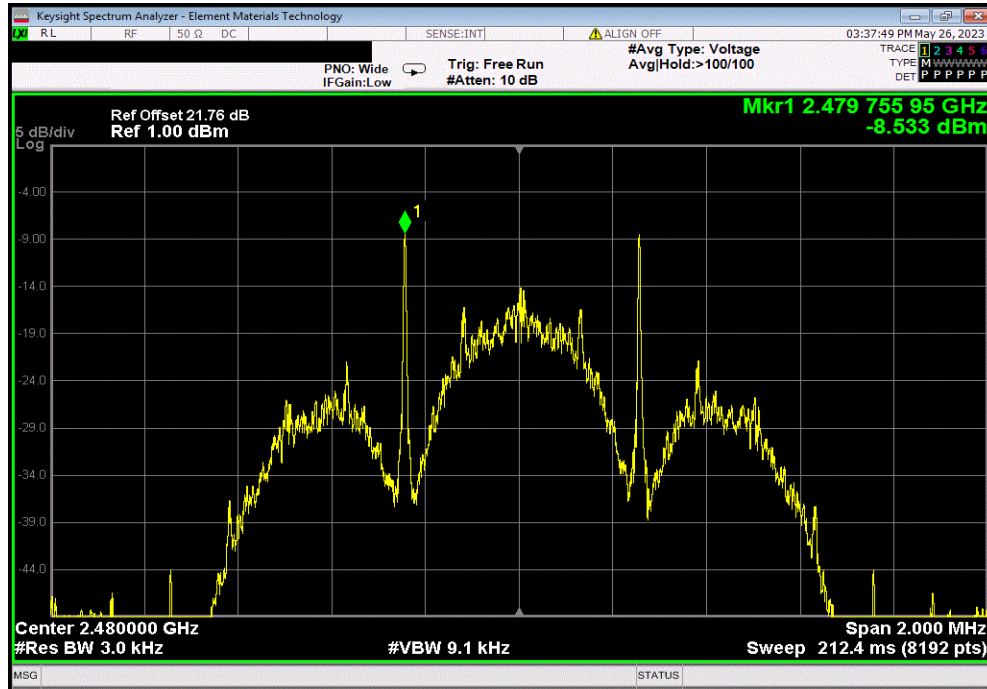


POWER SPECTRAL DENSITY

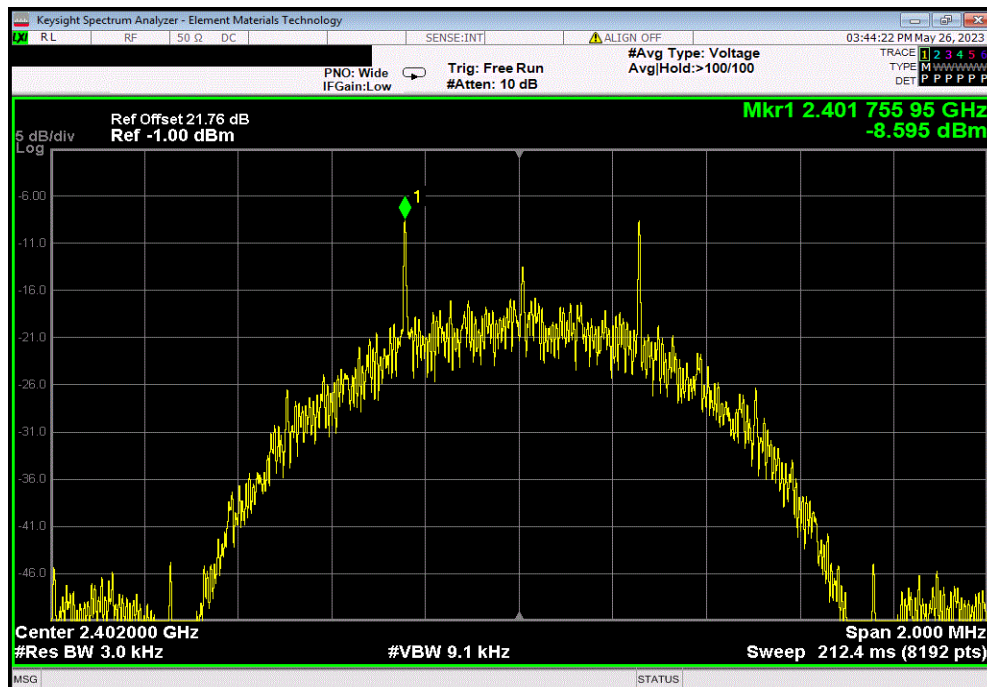


TbTx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 125 kbps, High Channel, 2480 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-8.533	8	Pass			



BLE/GFSK 500 kbps, Low Channel, 2402 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-8.595	8	Pass			

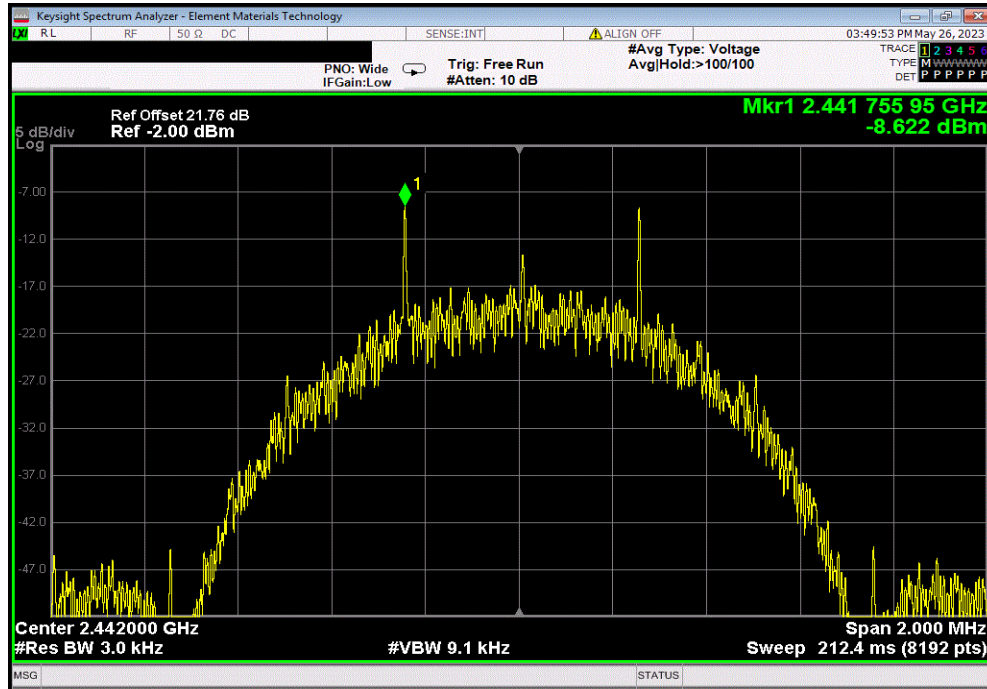


POWER SPECTRAL DENSITY

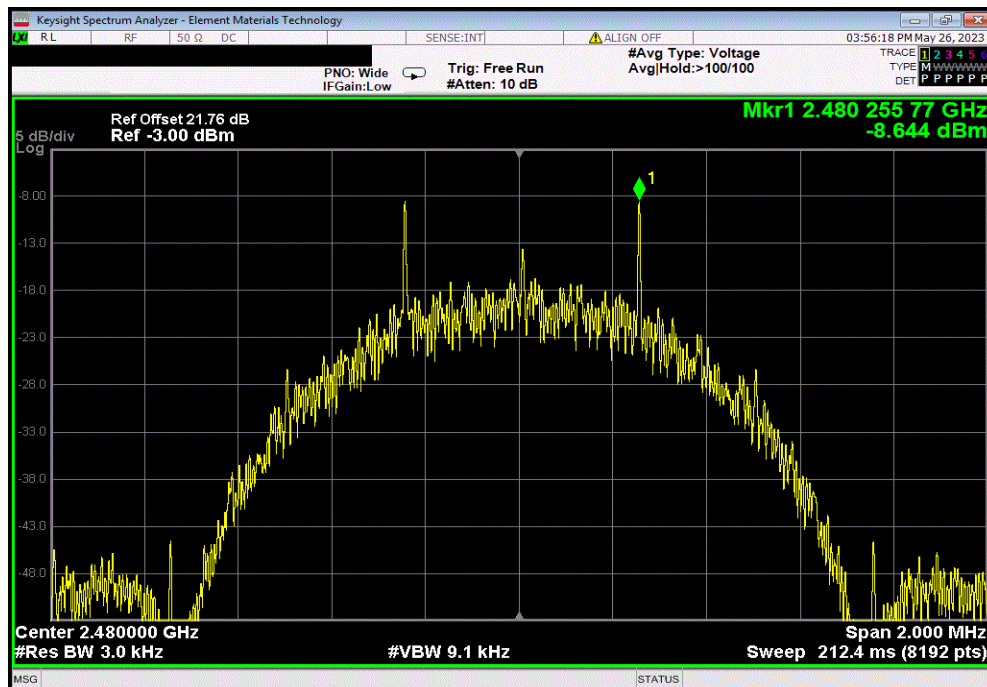


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 500 kbps, Mid Channel, 2442 MHz						
	Value	Limit				
	dBm/3kHz	< dBm/3kHz	Results			
	-8.622	8	Pass			



BLE/GFSK 500 kbps, High Channel, 2480 MHz						
	Value	Limit				
	dBm/3kHz	< dBm/3kHz	Results			
	-8.644	8	Pass			

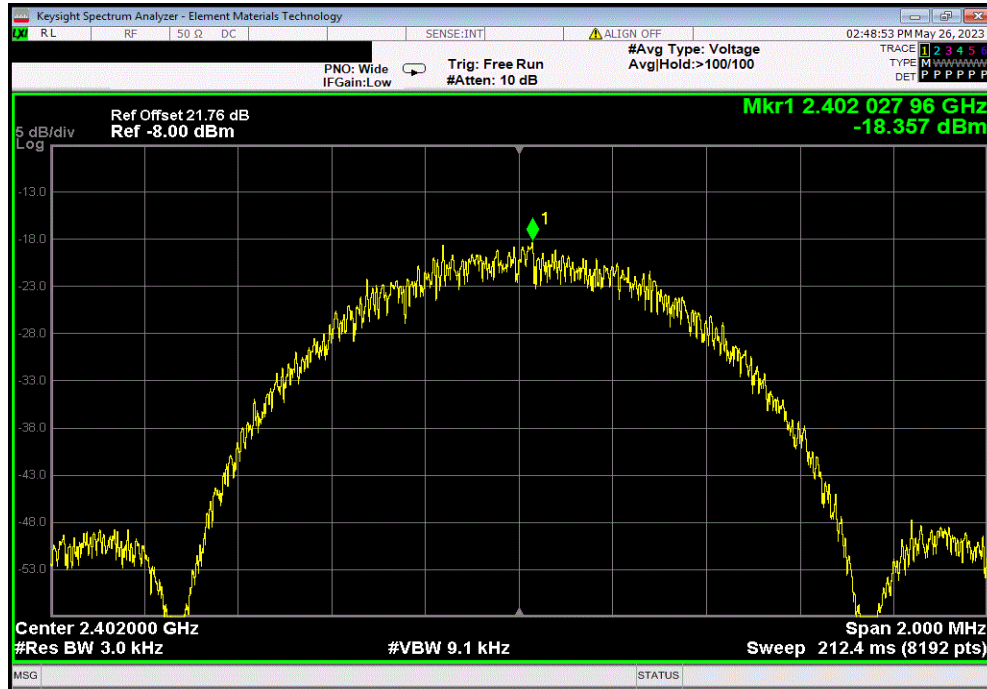


POWER SPECTRAL DENSITY

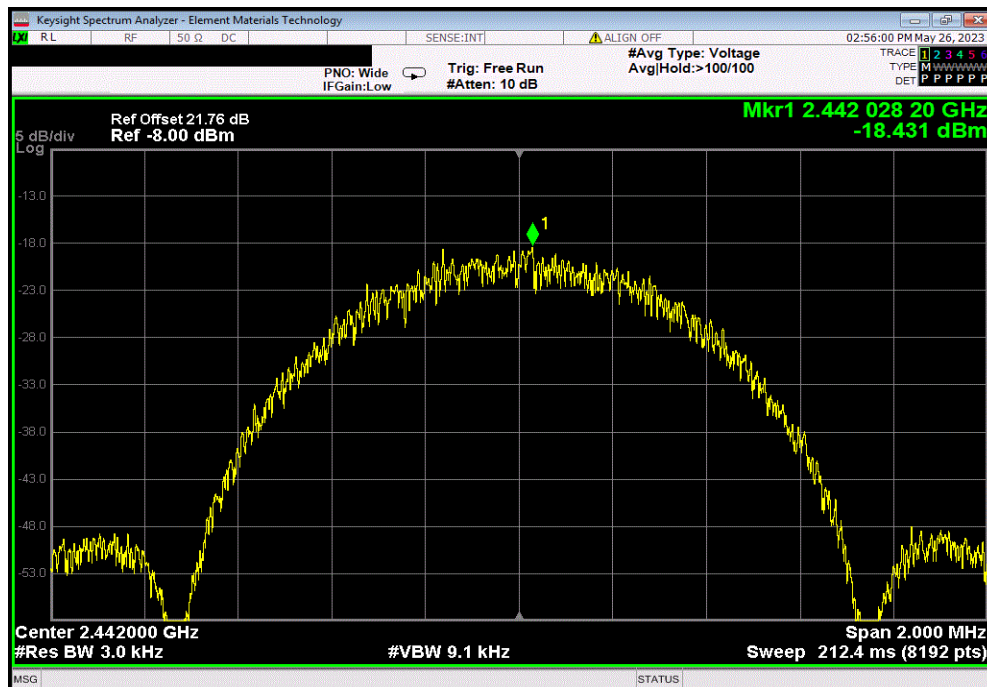


TbTx 2022.06.03.0 XMR 2023.02.14.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-18.357	8	Pass			



BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-18.431	8	Pass			

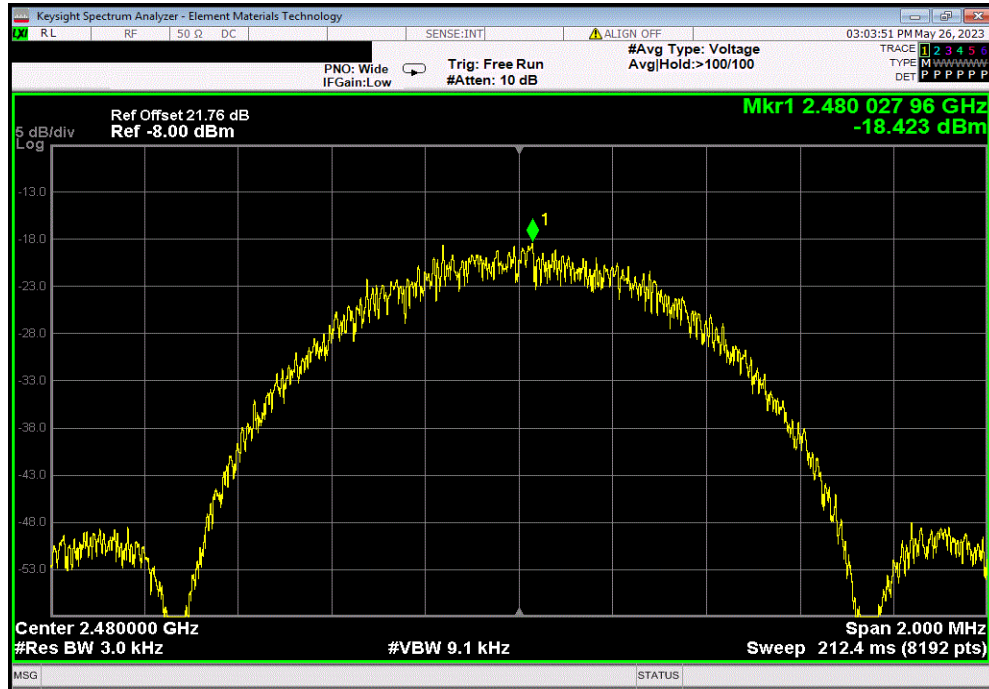


POWER SPECTRAL DENSITY

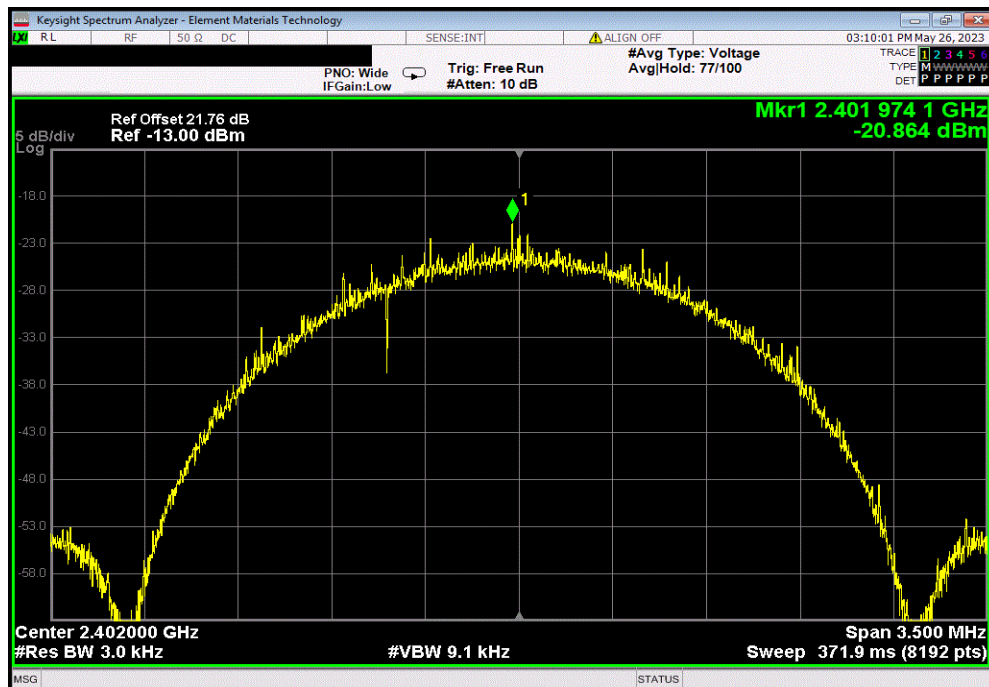


TbTx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-18.423	8	Pass			



BLE/GFSK 2 Mbps, Low Channel, 2402 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-20.864	8	Pass			

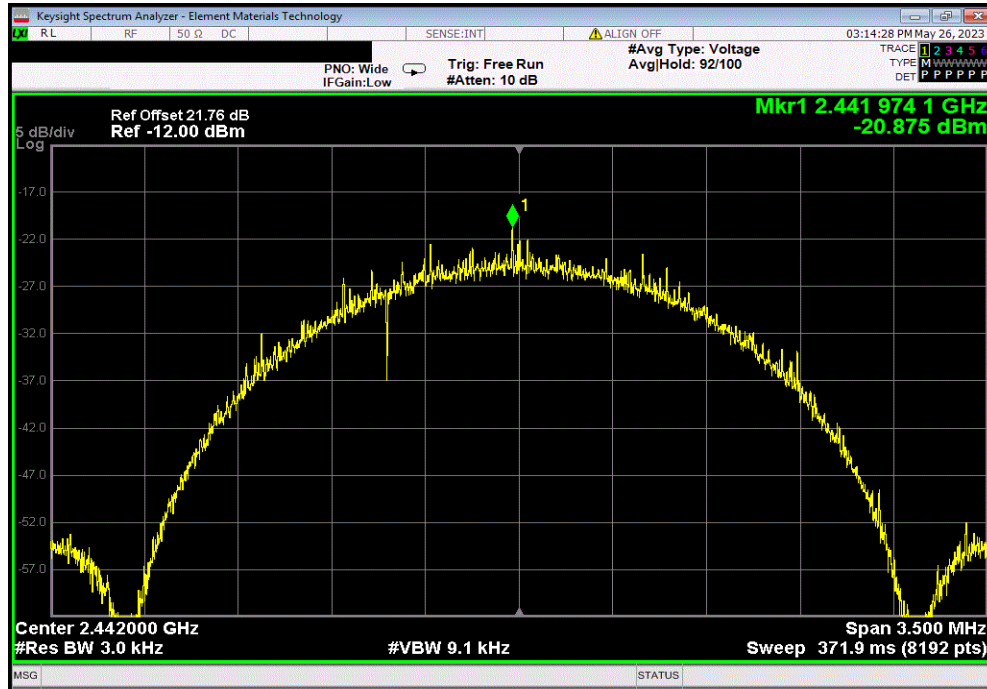


POWER SPECTRAL DENSITY

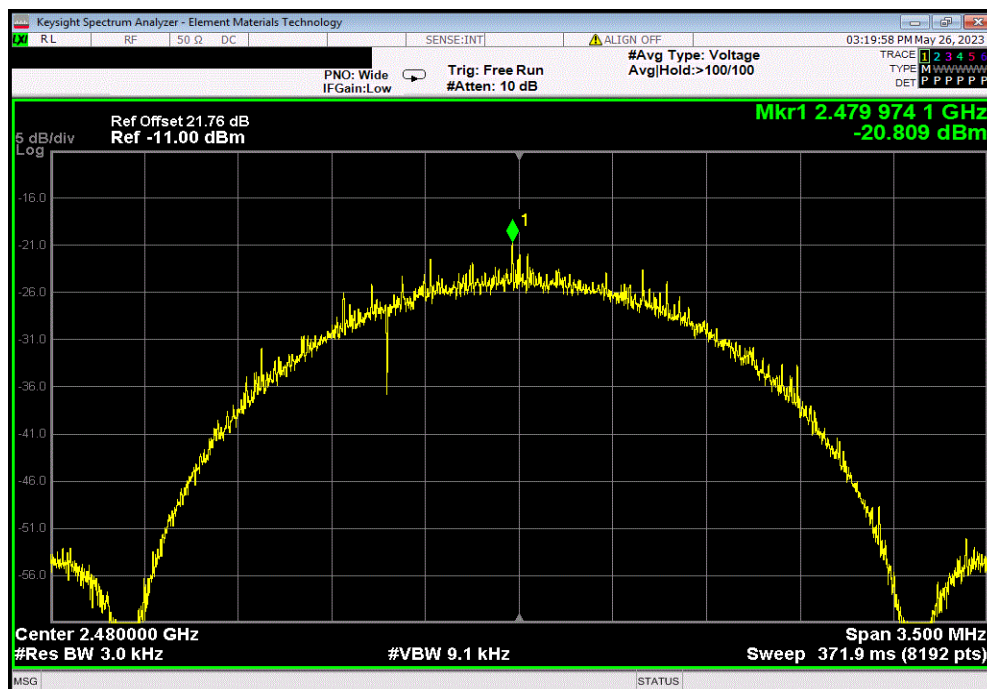


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-20.875	8	Pass			



BLE/GFSK 2 Mbps, High Channel, 2480 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-20.809	8	Pass			



BAND EDGE COMPLIANCE



XMIT 2023.02.14.0

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Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2023-02-02	2024-02-02

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



TSMTx 2022.06.03.0 XMR 2023.02.14.0

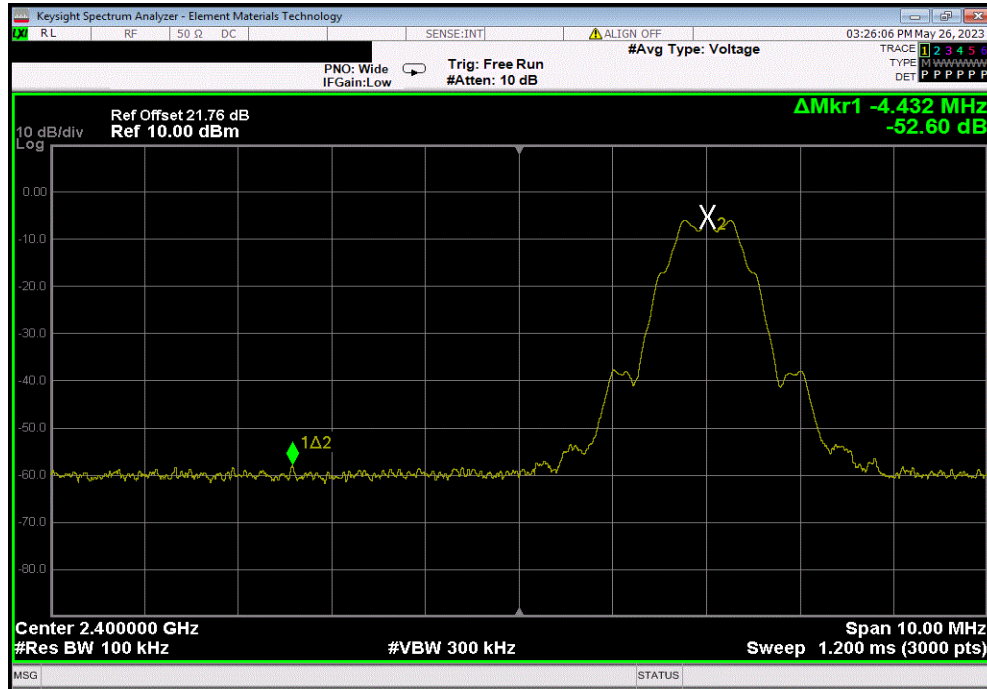
EUT: TSI Inc. OmniTrak		Work Order: TSIN0196	
Serial Number: TSI5230200045		Date: 05/25/2023	
Customer: TSI, Incorporated		Temperature: 21.7°C	
Attendees: Micah Larson		Humidity: 40.9%	
Project: None		Barometric Pres.: 1022 mbar	
Tested by: Christopher Heintzelman	Power: Internal Battery (3.7VDC)	Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2023		ANSI C63.10:2013	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
COMMENTS			
Reference level offset includes measurement cable, attenuator, and DC block. The customer states that the USB does not charge the EUT while in the test mode, USB is for programming only. Payload length is 65535.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	TSIN0196-20	Signature <i>Christopher Heintzelman</i>	
		Value (dBc)	Limit ≤ (dBc) Result
BLE/GFSK 125 kbps			
	Low Channel, 2402 MHz	-52.6	-20 Pass
	High Channel, 2480 MHz	-52.33	-20 Pass
BLE/GFSK 500 kbps			
	Low Channel, 2402 MHz	-55.7	-20 Pass
	High Channel, 2480 MHz	-54.82	-20 Pass
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	-55.09	-20 Pass
	High Channel, 2480 MHz	-55.32	-20 Pass
BLE/GFSK 2 Mbps			
	Low Channel, 2402 MHz	-31.26	-20 Pass
	High Channel, 2480 MHz	-54.38	-20 Pass

BAND EDGE COMPLIANCE

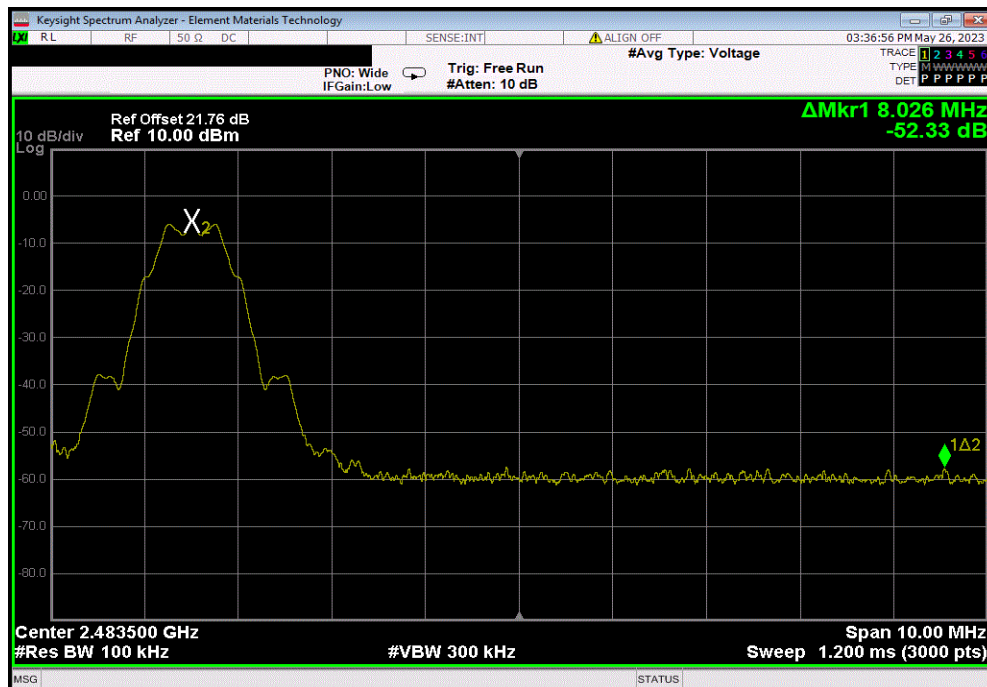


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 125 kbps, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-52.6	-20	Pass



BLE/GFSK 125 kbps, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-52.33	-20	Pass

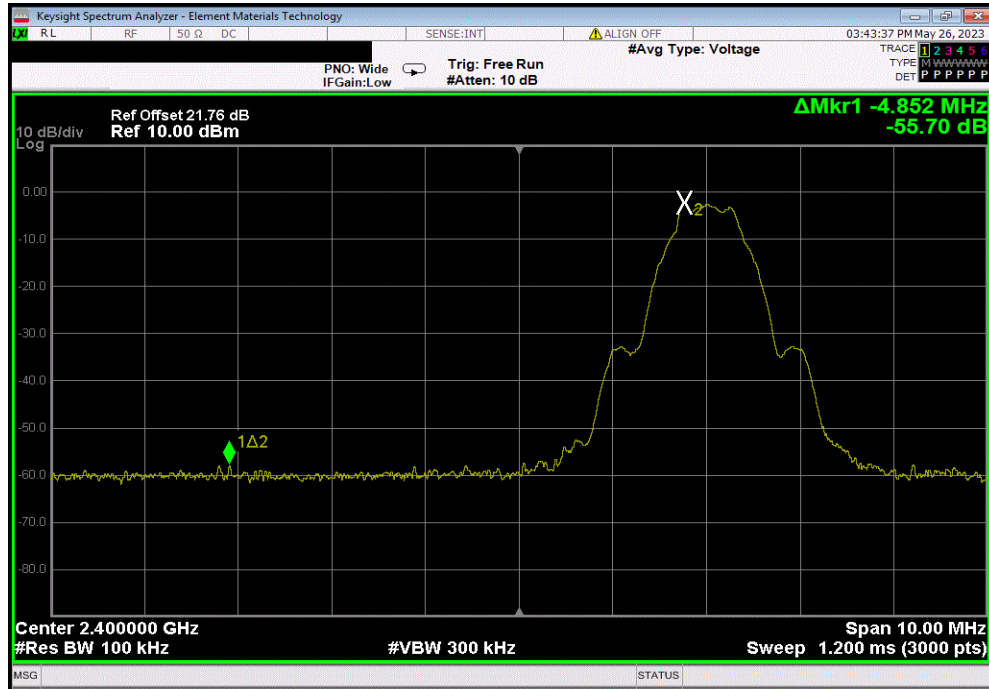


BAND EDGE COMPLIANCE



TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 500 kbps, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-55.7	-20	Pass



BLE/GFSK 500 kbps, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-54.82	-20	Pass

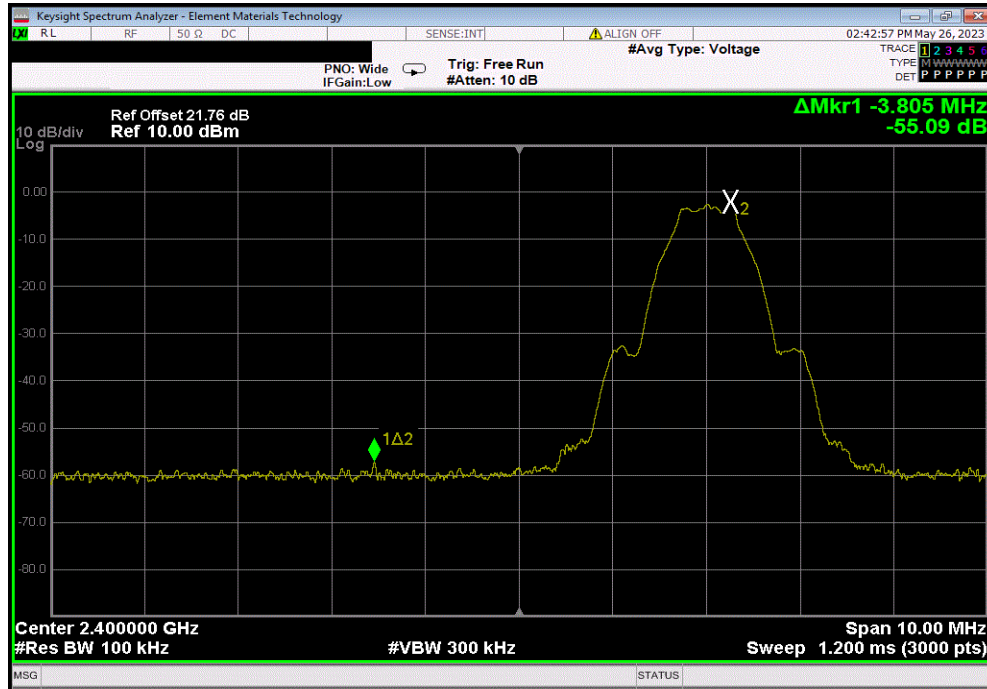


BAND EDGE COMPLIANCE

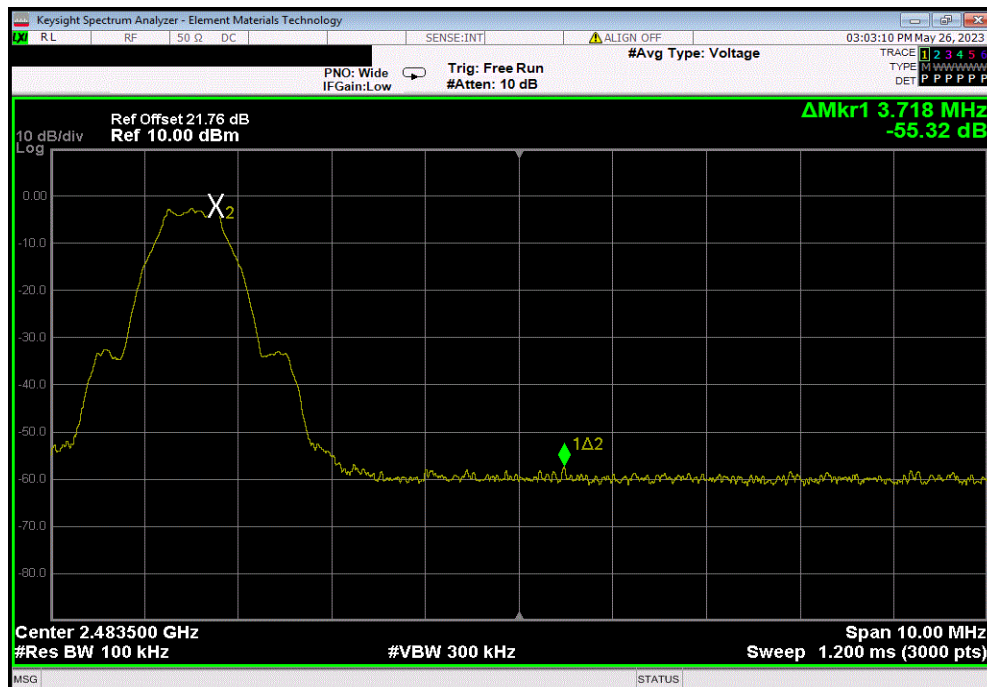


TbTtx 2022.06.03.0 XMt 2022.02.14.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-55.09	-20	Pass



BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-55.32	-20	Pass

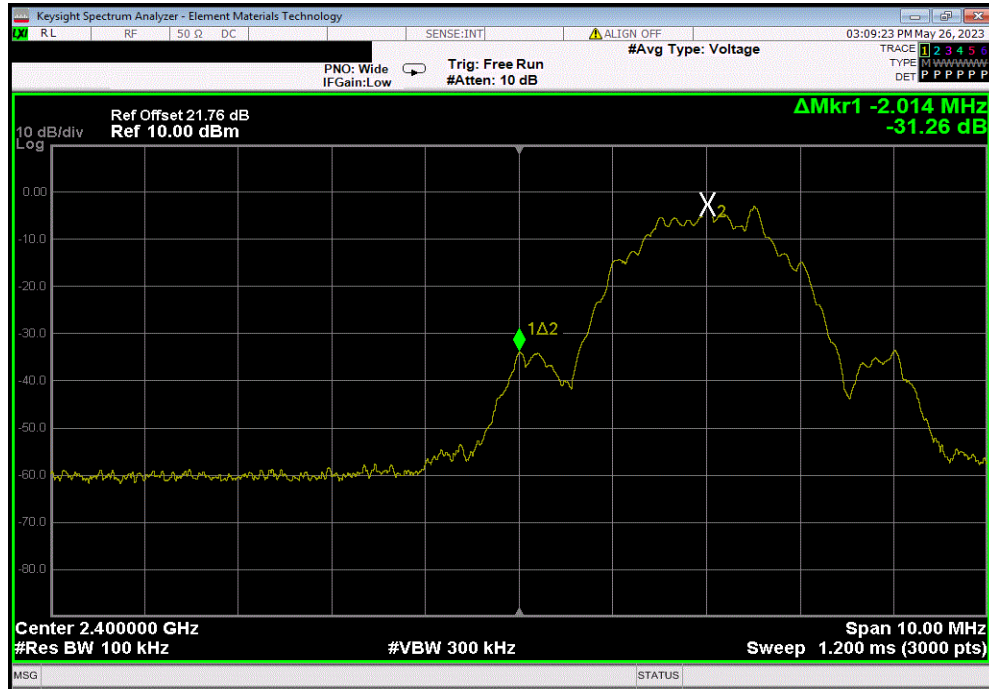


BAND EDGE COMPLIANCE



TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 2 Mbps, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-31.26	-20	Pass



BLE/GFSK 2 Mbps, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-54.38	-20	Pass



SPURIOUS CONDUCTED EMISSIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Attenuator	S.M. Electronics	SA26B-20	TZP	2022-11-06	2023-11-06
Block - DC	Fairview Microwave	SD3379	AMZ	2022-11-06	2023-11-06
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2022-09-10	2023-09-10
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2023-02-02	2024-02-02

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 fundamental was measured with a 100 kHz resolution bandwidth and the highest value was recorded. The rest of the spectrum was then measured with a 100 kHz resolution bandwidth and the highest value was found. The difference between the value found on the fundamental and the rest of the spectrum was compared against the limit to determine compliance.

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

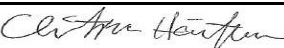
Fundamental Offset = Ref Lvl Offset showing measured composite factor of all losses

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

SPURIOUS CONDUCTED EMISSIONS



TSMTx 2022.06.03.0 XMR 2023.02.14.0

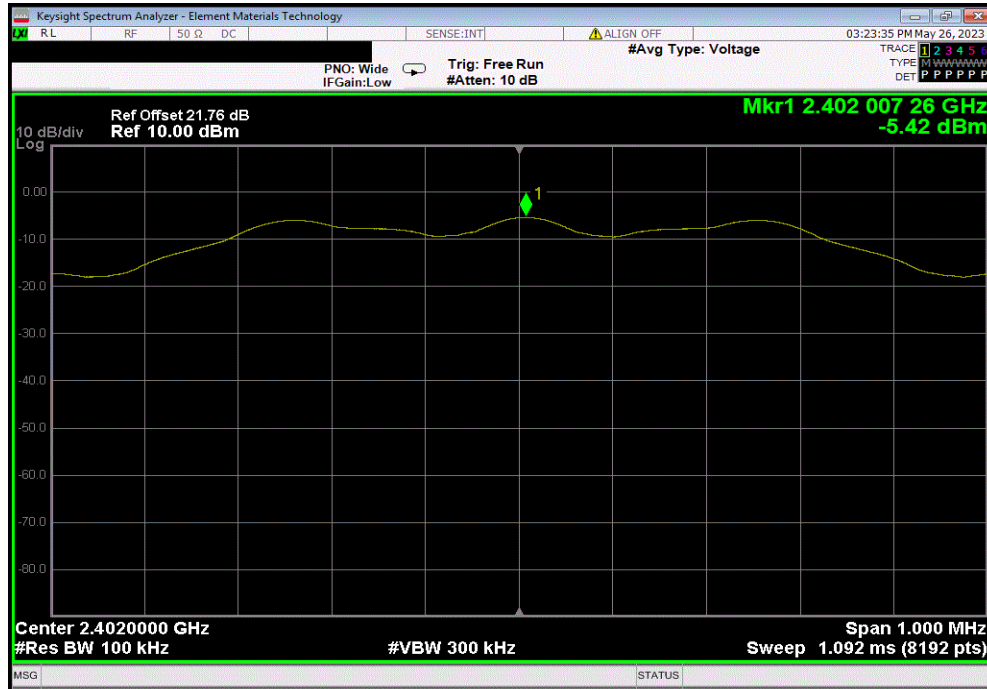
EUT: TSI Inc. OmniTrak		Work Order: TSIN0196				
Serial Number: TSI5230200045		Date: 05/25/2023				
Customer: TSI, Incorporated		Temperature: 21.6°C				
Attendees: Micah Larson		Humidity: 40.8%				
Project: None		Barometric Pres.: 1022 mbar				
Tested by: Christopher Heintzelman		Power: Internal Battery (3.7VDC)				
Job Site: MN11						
TEST SPECIFICATIONS		Test Method				
FCC 15.247:2023		ANSI C63.10:2013				
RSS-247 Issue 2:2017		ANSI C63.10:2013				
COMMENTS						
Reference level offset includes measurement cable, attenuator, and DC block. The customer states that the USB does not charge the EUT while in the test mode, USB is for programming only. Payload length is 65535.						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	TSIN0196-20	Signature 				
		Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 125 kbps						
	Low Channel, 2402 MHz	Fundamental	2402.01	N/A	N/A	N/A
	Low Channel, 2402 MHz	30 MHz - 12.5 GHz	7269.02	-48.3	-20	Pass
	Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24722.26	-43.32	-20	Pass
	Mid Channel, 2442 MHz	Fundamental	2442.01	N/A	N/A	N/A
	Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	9752.06	-48.35	-20	Pass
	Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	24194.24	-44.01	-20	Pass
	High Channel, 2480 MHz	Fundamental	2480.01	N/A	N/A	N/A
	High Channel, 2480 MHz	30 MHz - 12.5 GHz	9822.09	-48.12	-20	Pass
	High Channel, 2480 MHz	12.5 GHz - 25 GHz	23823.4	-44.44	-20	Pass
BLE/GFSK 500 kbps						
	Low Channel, 2402 MHz	Fundamental	2401.76	N/A	N/A	N/A
	Low Channel, 2402 MHz	30 MHz - 12.5 GHz	1724.43	-49.37	-20	Pass
	Low Channel, 2402 MHz	12.5 GHz - 25 GHz	23838.66	-47.5	-20	Pass
	Mid Channel, 2442 MHz	Fundamental	2441.76	N/A	N/A	N/A
	Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	10555.89	-51.02	-20	Pass
	Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	24987.79	-46.75	-20	Pass
	High Channel, 2480 MHz	Fundamental	2479.76	N/A	N/A	N/A
	High Channel, 2480 MHz	30 MHz - 12.5 GHz	8063.72	-51.28	-20	Pass
	High Channel, 2480 MHz	12.5 GHz - 25 GHz	24844.34	-46.61	-20	Pass
BLE/GFSK 1 Mbps						
	Low Channel, 2402 MHz	Fundamental	2402.26	N/A	N/A	N/A
	Low Channel, 2402 MHz	30 MHz - 12.5 GHz	9812.96	-51.77	-20	Pass
	Low Channel, 2402 MHz	12.5 GHz - 25 GHz	23814.25	-46.72	-20	Pass
	Mid Channel, 2442 MHz	Fundamental	2442.26	N/A	N/A	N/A
	Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	9388.21	-50.91	-20	Pass
	Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	23994.32	-46.87	-20	Pass
	High Channel, 2480 MHz	Fundamental	2480.26	N/A	N/A	N/A
	High Channel, 2480 MHz	30 MHz - 12.5 GHz	10607.65	-51.95	-20	Pass
	High Channel, 2480 MHz	12.5 GHz - 25 GHz	23652.48	-46.36	-20	Pass
BLE/GFSK 2 Mbps						
	Low Channel, 2402 MHz	Fundamental	2402	N/A	N/A	N/A
	Low Channel, 2402 MHz	30 MHz - 12.5 GHz	10712.7	-50.03	-20	Pass
	Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24928.27	-46.22	-20	Pass
	Mid Channel, 2442 MHz	Fundamental	2442.01	N/A	N/A	N/A
	Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	1712.25	-46.89	-20	Pass
	Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	23887.5	-46.31	-20	Pass
	High Channel, 2480 MHz	Fundamental	2480.01	N/A	N/A	N/A
	High Channel, 2480 MHz	30 MHz - 12.5 GHz	1710.73	-45.91	-20	Pass
	High Channel, 2480 MHz	12.5 GHz - 25 GHz	23542.61	-45.36	-20	Pass

SPURIOUS CONDUCTED EMISSIONS

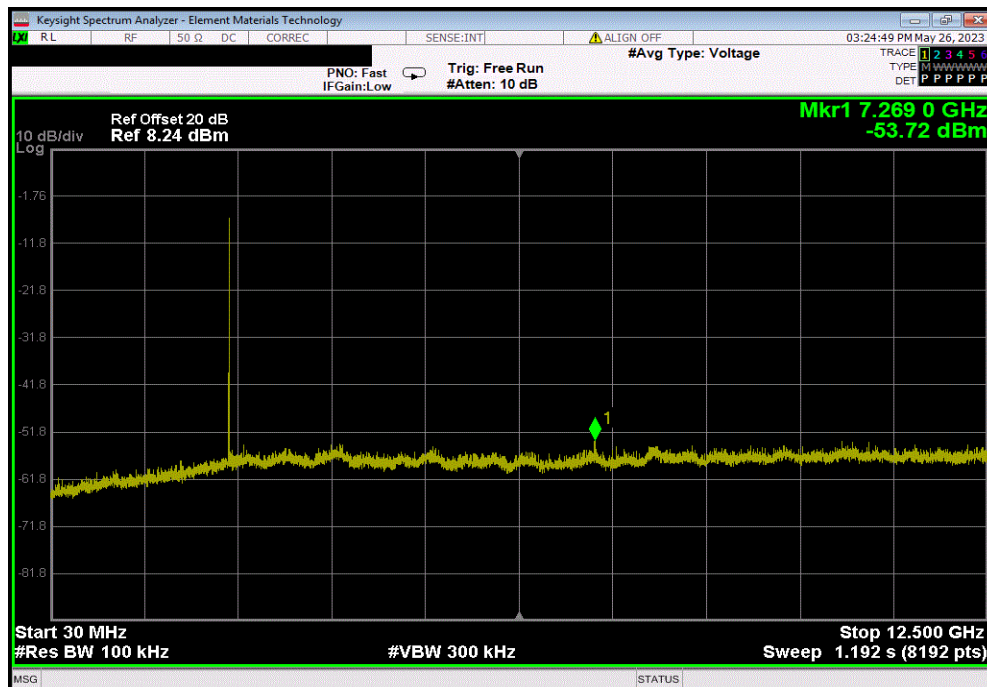


TbTx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 125 kbps, Low Channel, 2402 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2402.01	N/A	N/A	N/A		



BLE/GFSK 125 kbps, Low Channel, 2402 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz	7269.02	-48.3	-20	Pass		

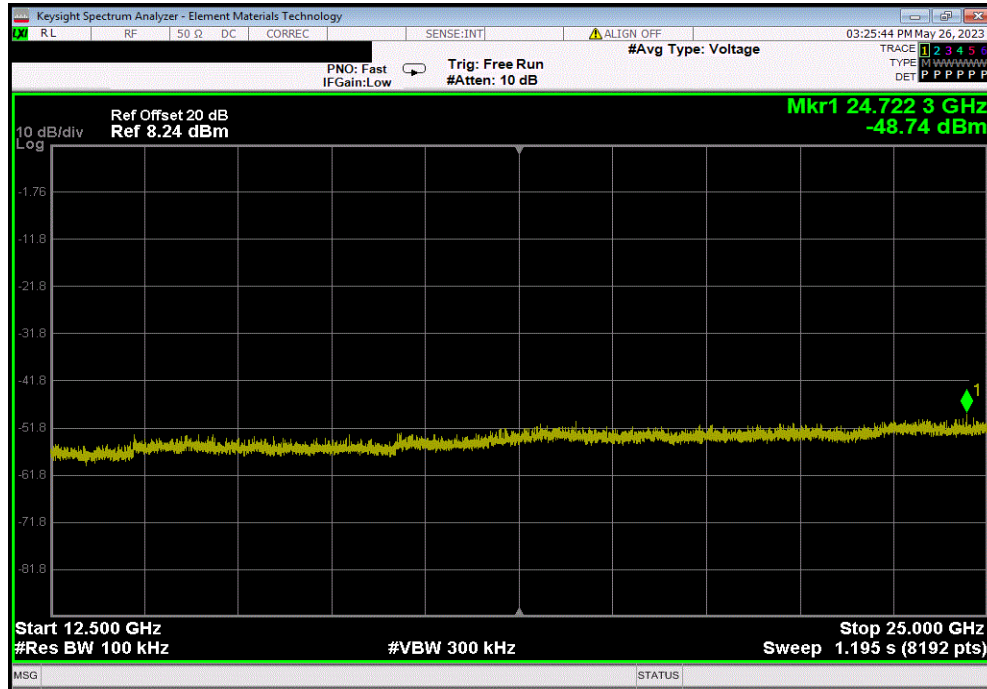


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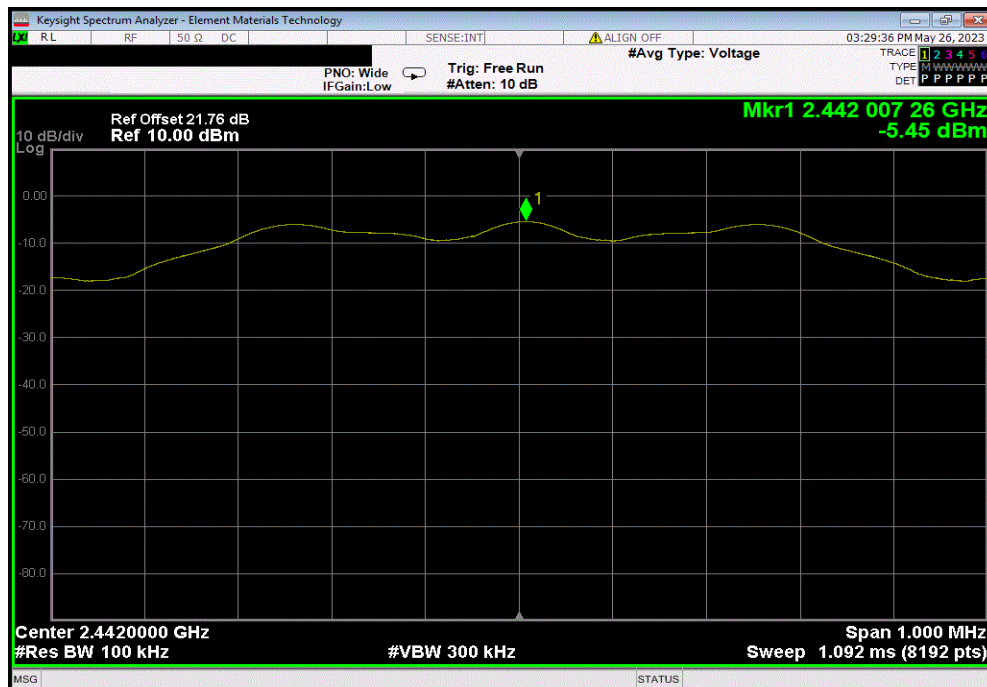


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 125 kbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24722.26	-43.32	-20	Pass	



BLE/GFSK 125 kbps, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2442.01	N/A	N/A	N/A	

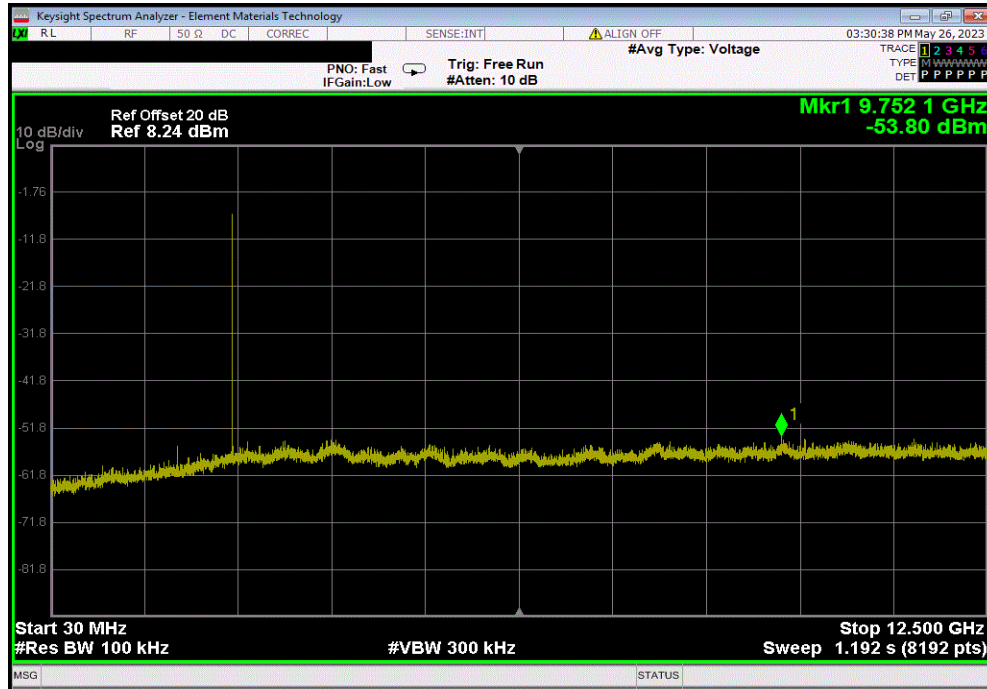


SPURIOUS CONDUCTED EMISSIONS

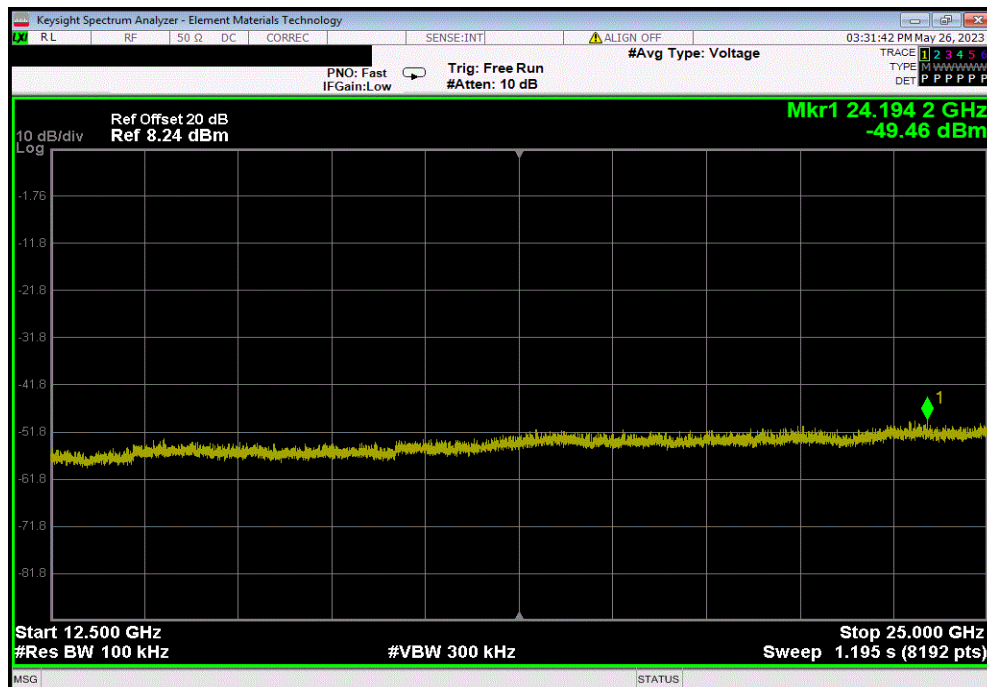


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 125 kbps, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	9752.06	-48.35	-20	Pass	



BLE/GFSK 125 kbps, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24194.24	-44.01	-20	Pass	

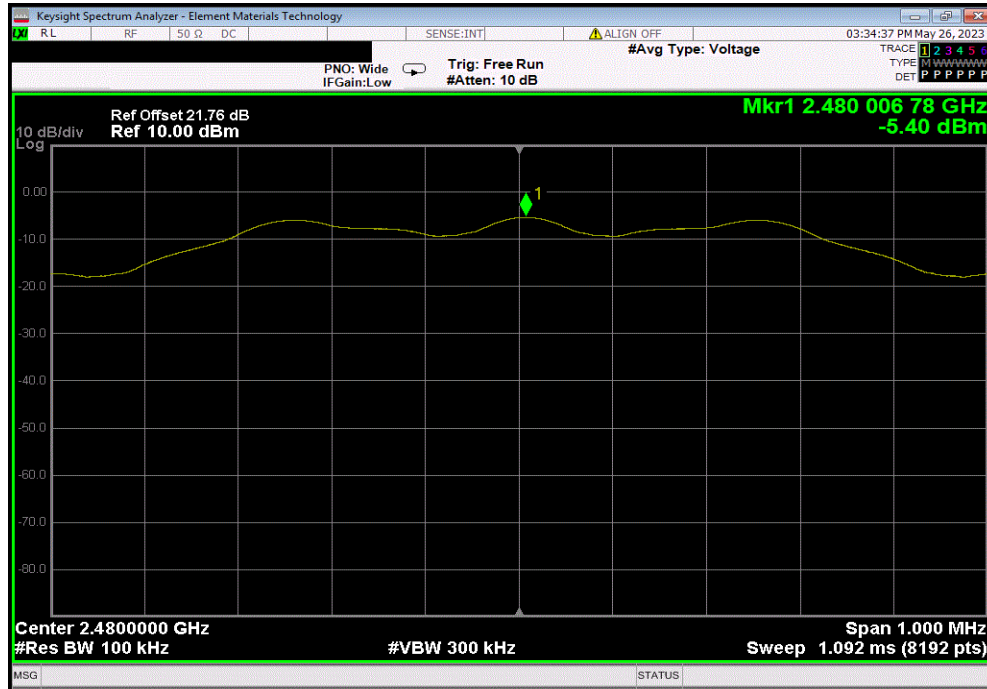


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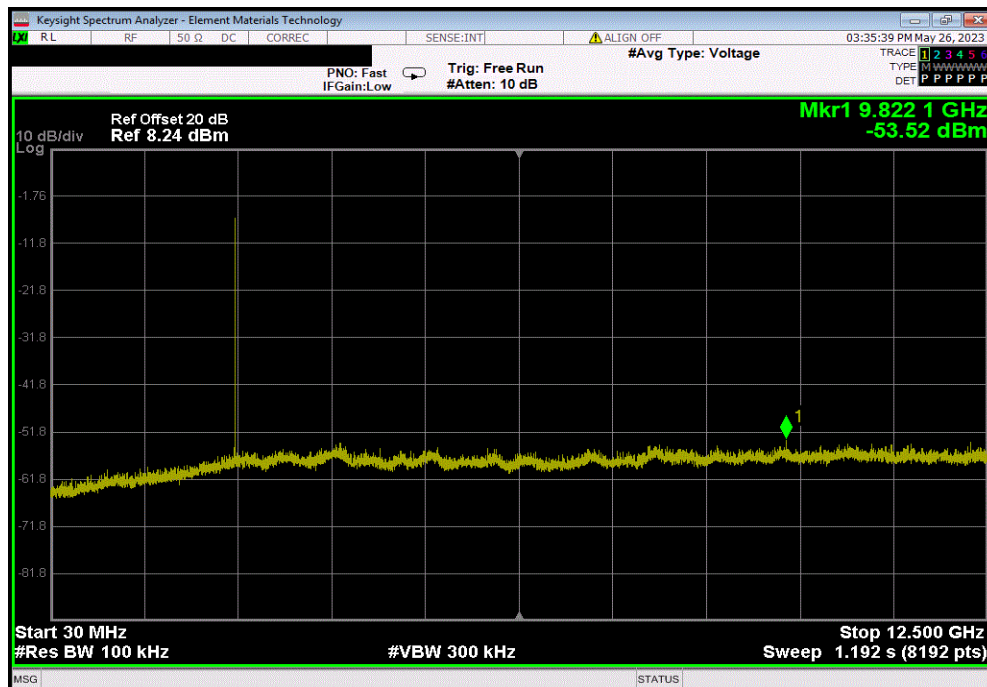


TbTx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 125 kbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2480.01	N/A	N/A	N/A	



BLE/GFSK 125 kbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	9822.09	-48.12	-20	Pass	

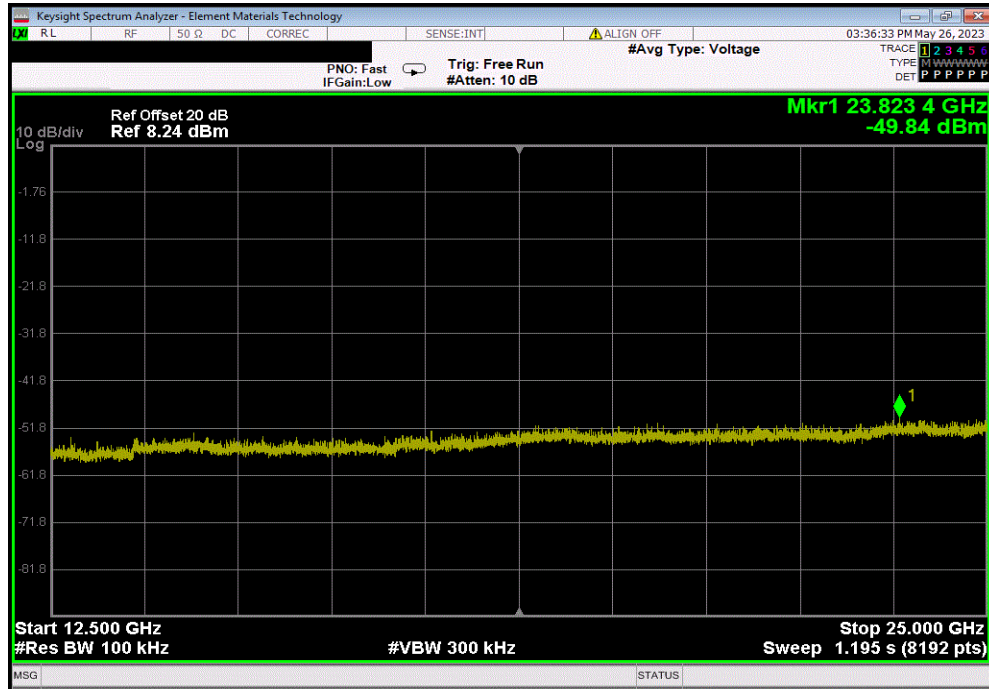


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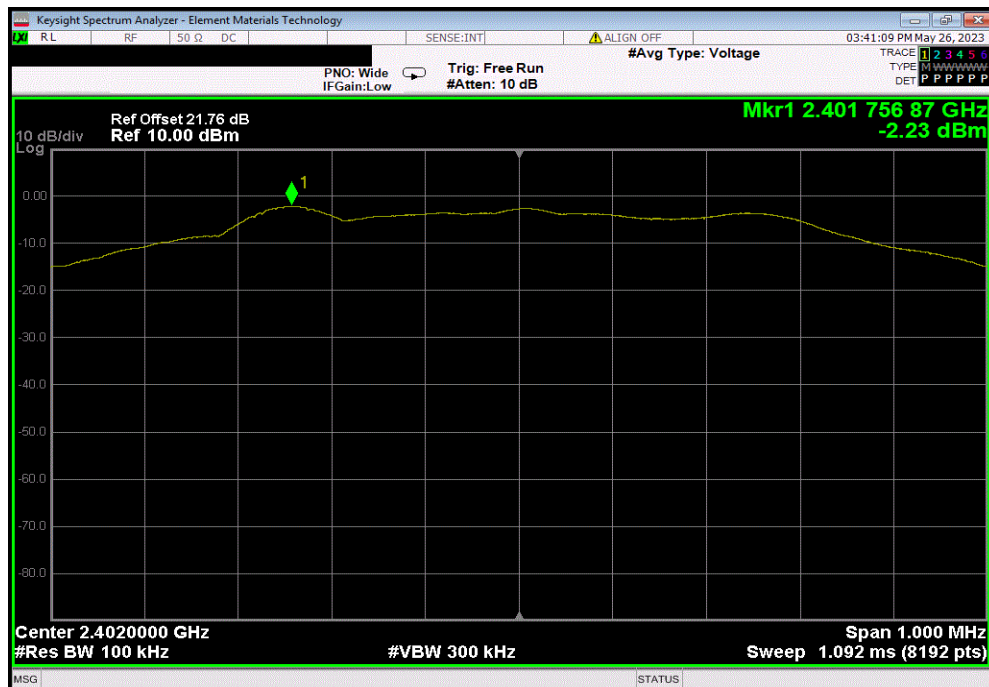


TbTtX 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 125 kbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	23823.4	-44.44	-20	Pass	



BLE/GFSK 500 kbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2401.76	N/A	N/A	N/A	

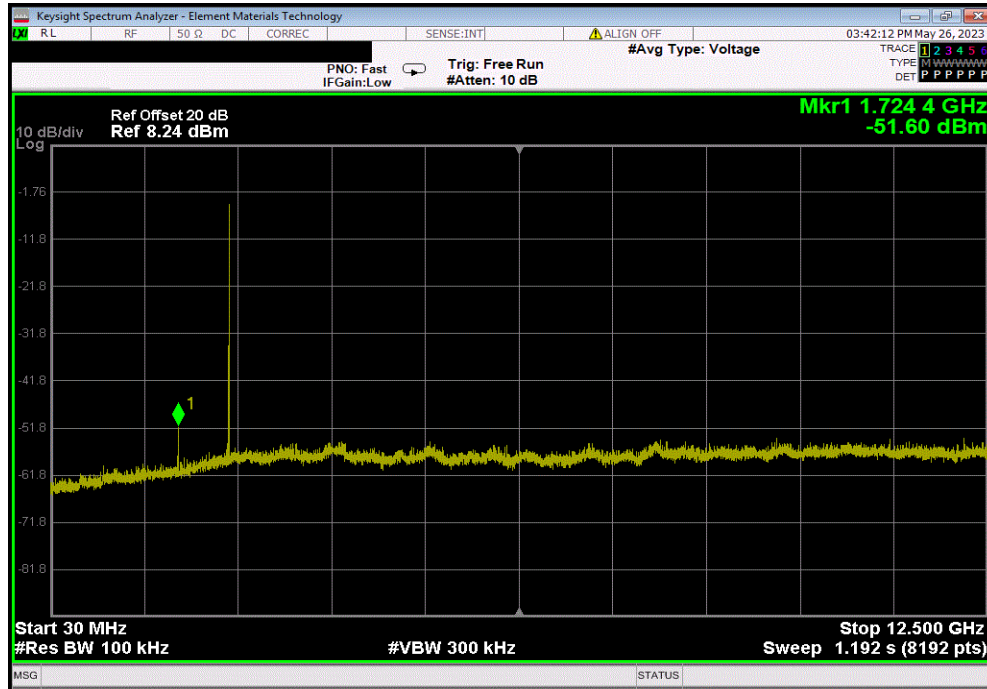


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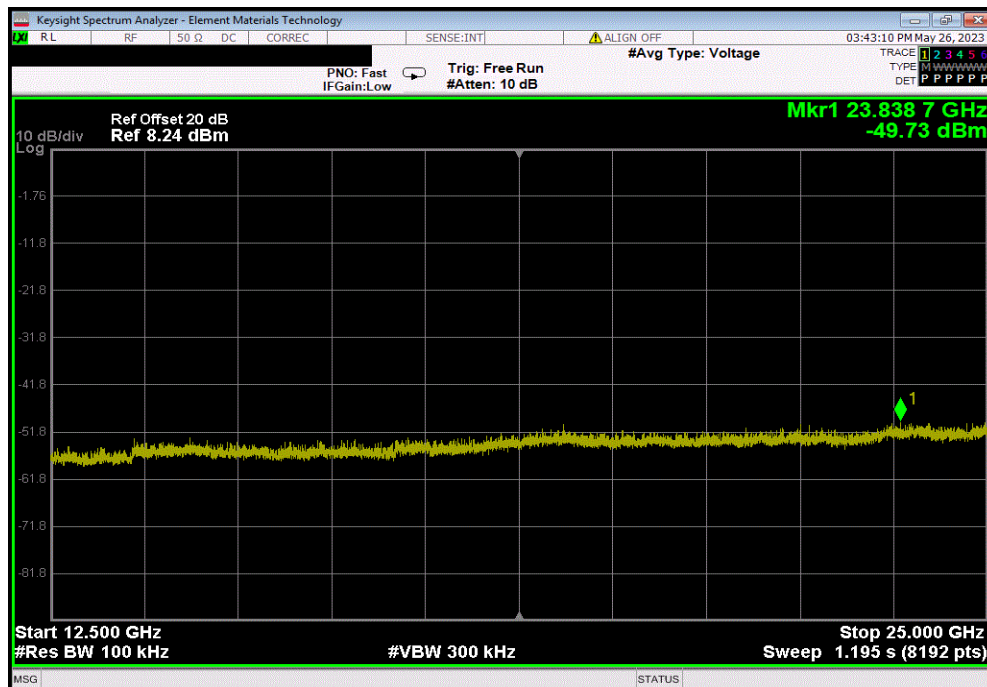


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 500 kbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	1724.43	-49.37	-20	Pass	



BLE/GFSK 500 kbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	23838.66	-47.5	-20	Pass	

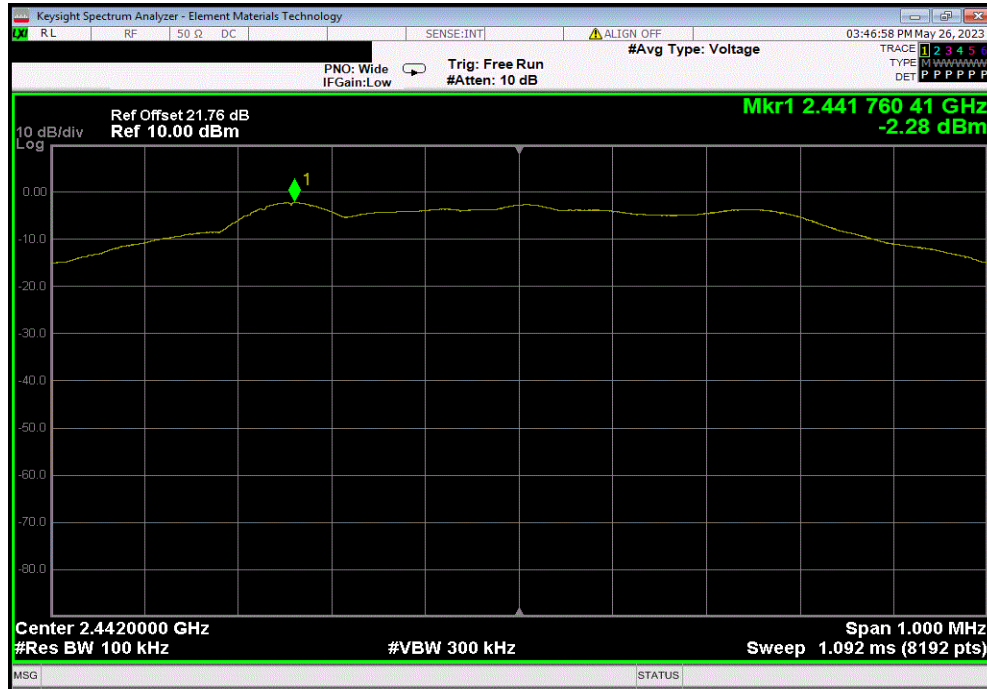


SPURIOUS CONDUCTED EMISSIONS

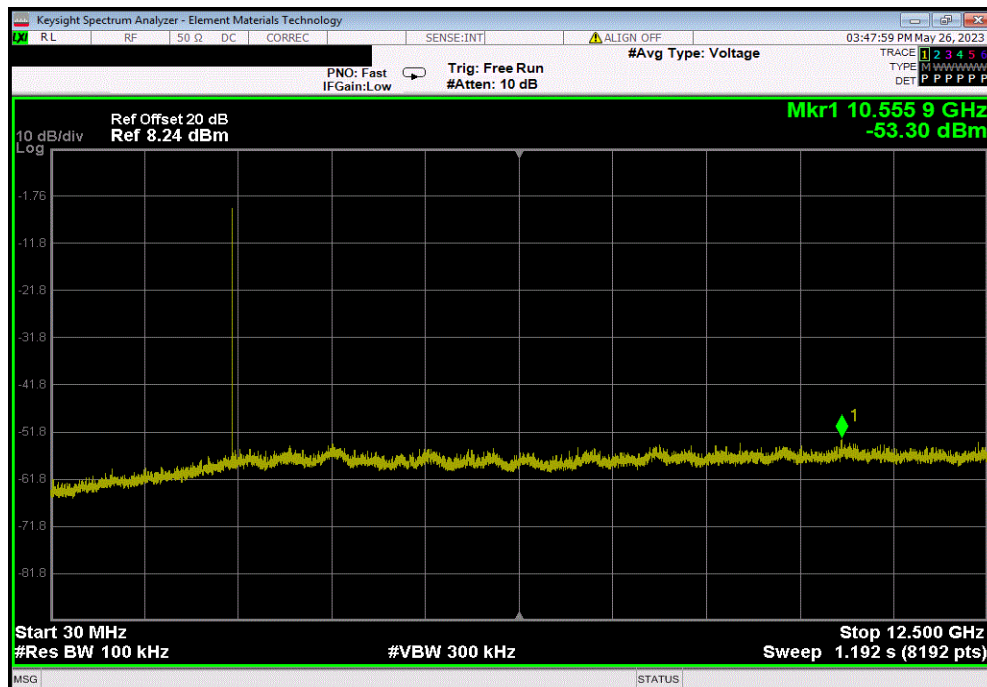


TbTx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 500 kbps, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2441.76	N/A	N/A	N/A	



BLE/GFSK 500 kbps, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	10555.89	-51.02	-20	Pass	

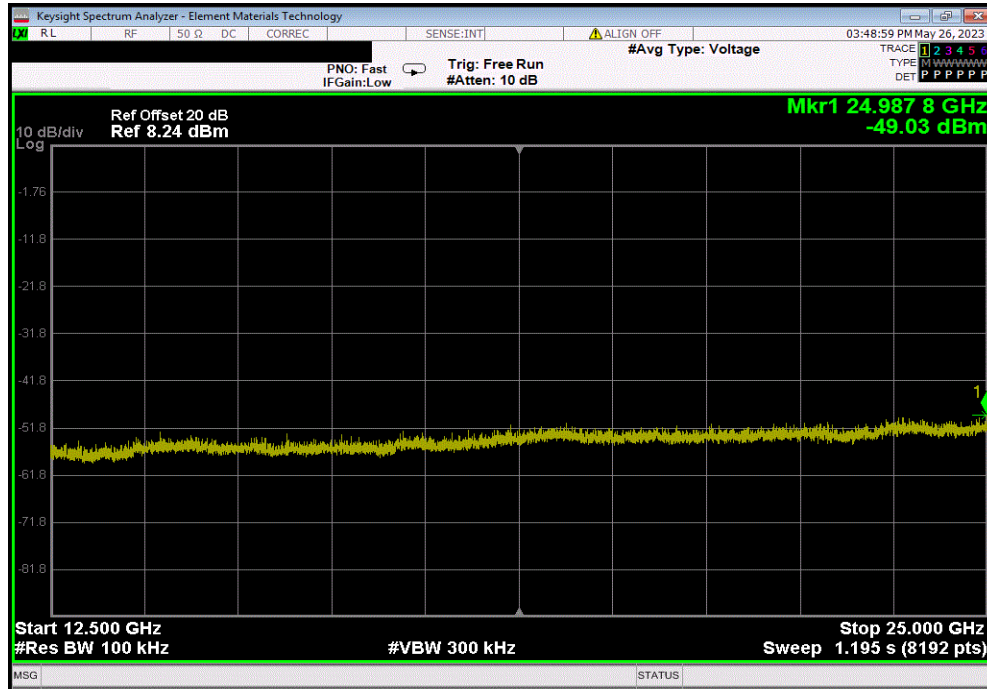


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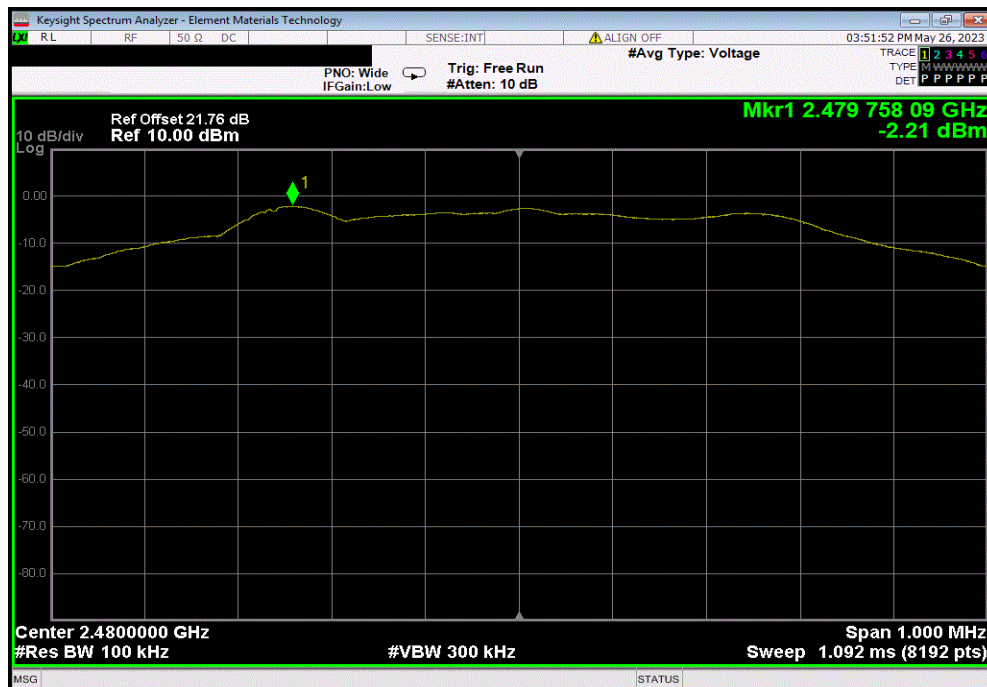


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 500 kbps, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24987.79	-46.75	-20	Pass	



BLE/GFSK 500 kbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2479.76	N/A	N/A	N/A	

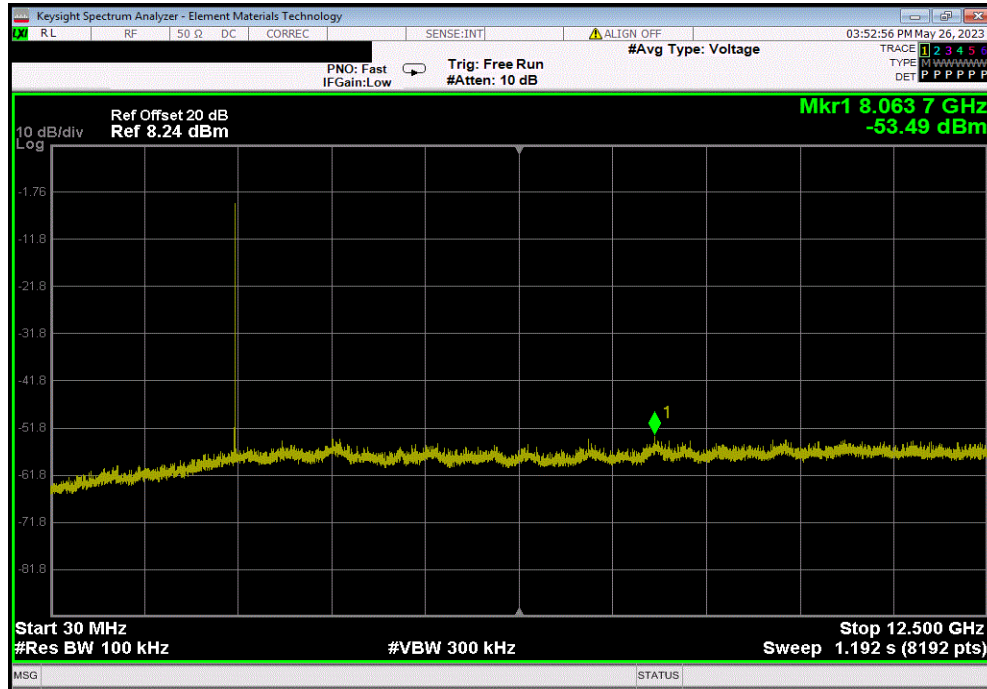


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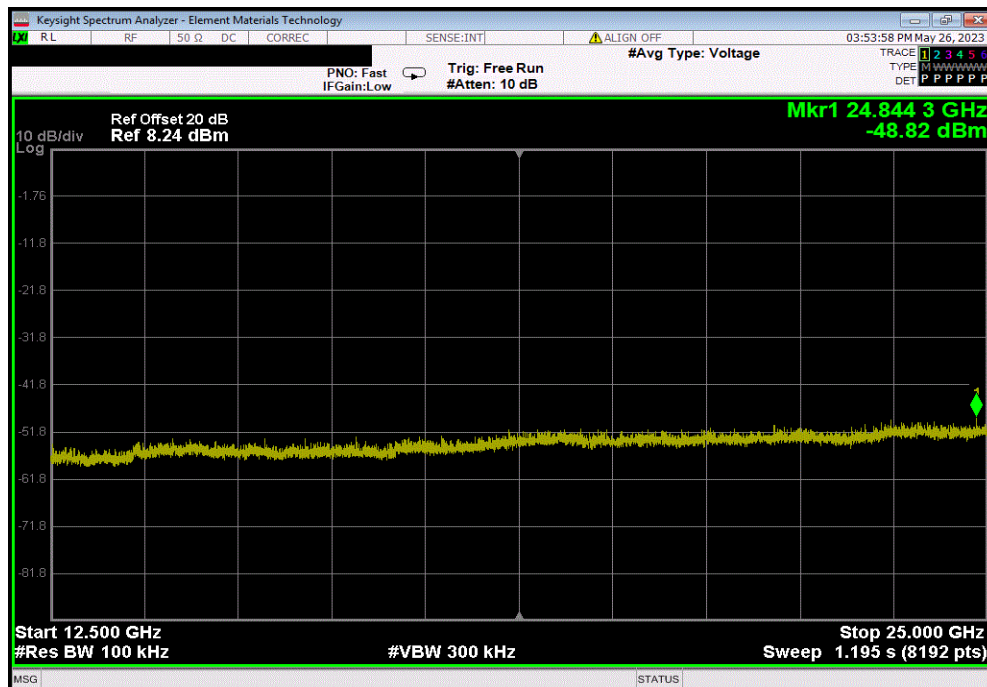


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 500 kbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	8063.72	-51.28	-20	Pass	



BLE/GFSK 500 kbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24844.34	-46.61	-20	Pass	

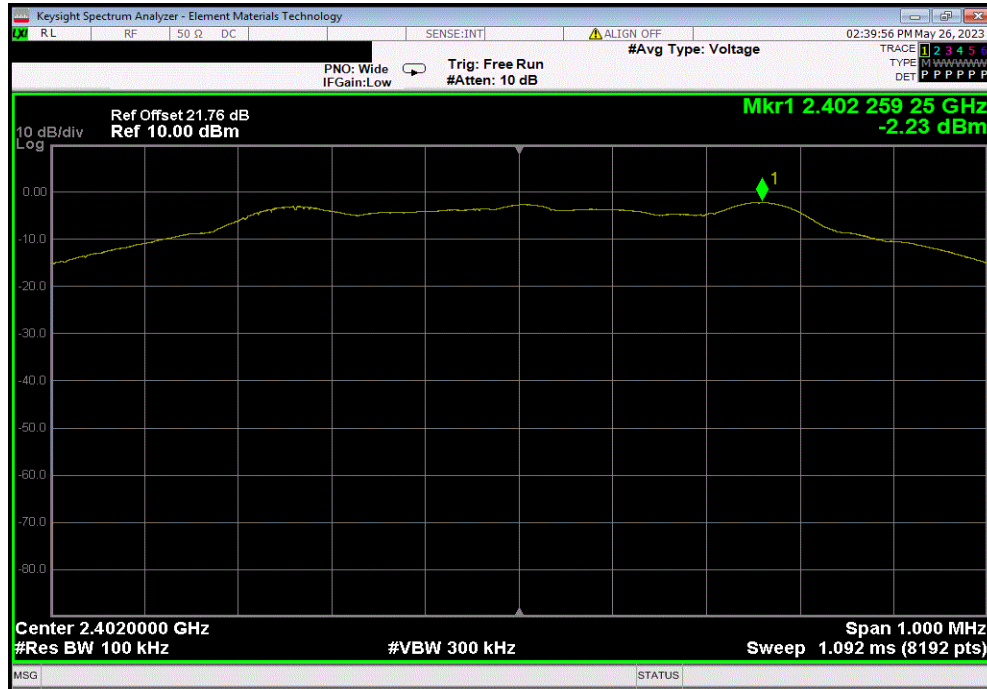


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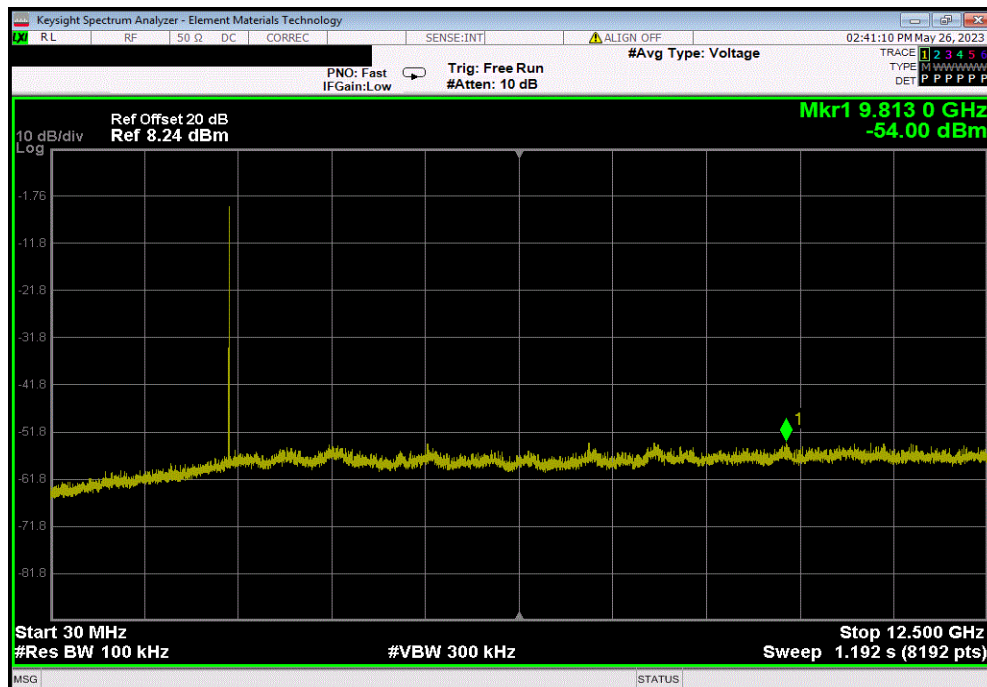


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2402.26	N/A	N/A	N/A		



BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz	9812.96	-51.77	-20	Pass		

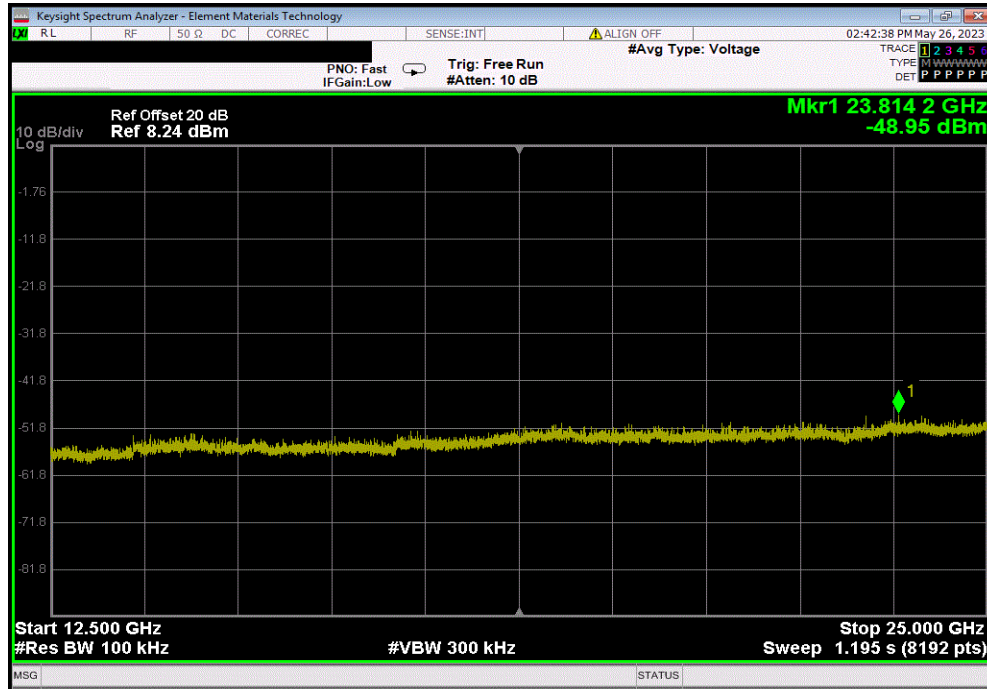


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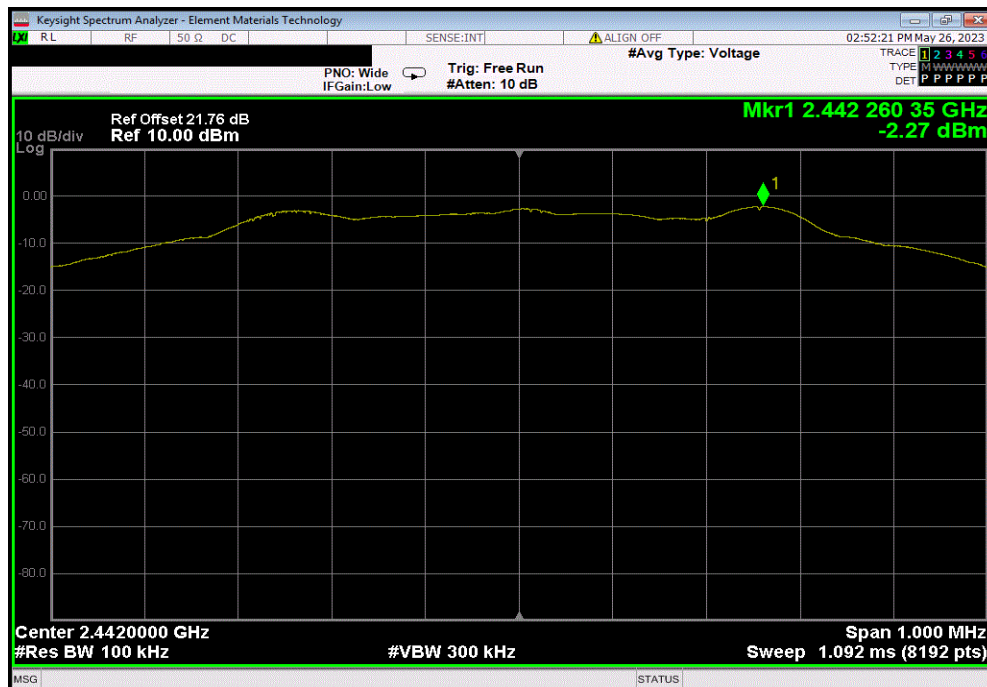


TbTtX 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	23814.25	-46.72	-20	Pass	



BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2442.26	N/A	N/A	N/A	

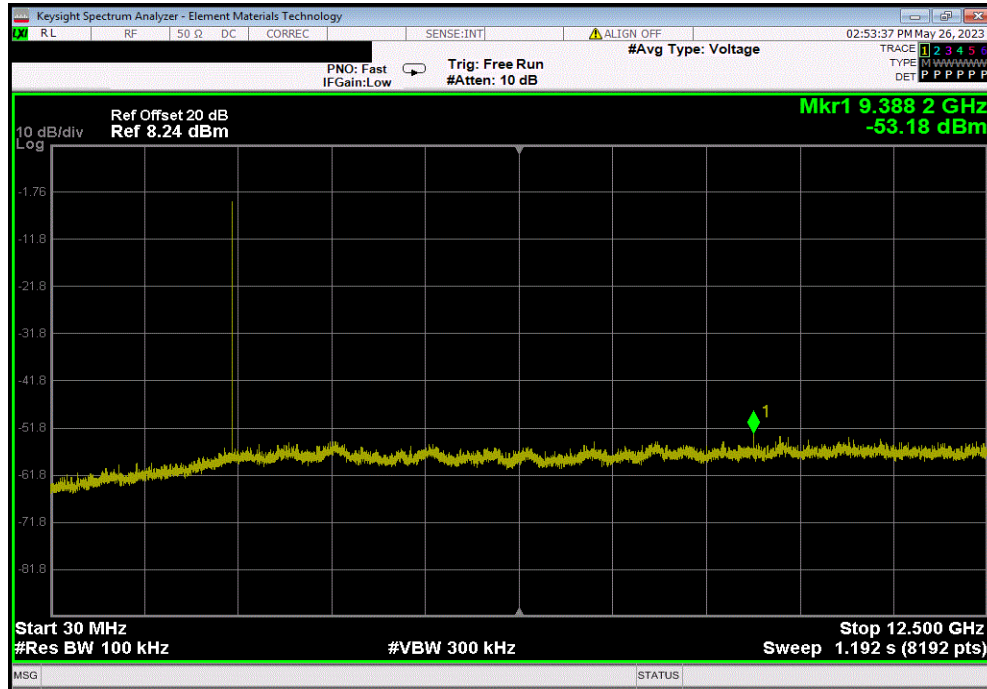


SPURIOUS CONDUCTED EMISSIONS

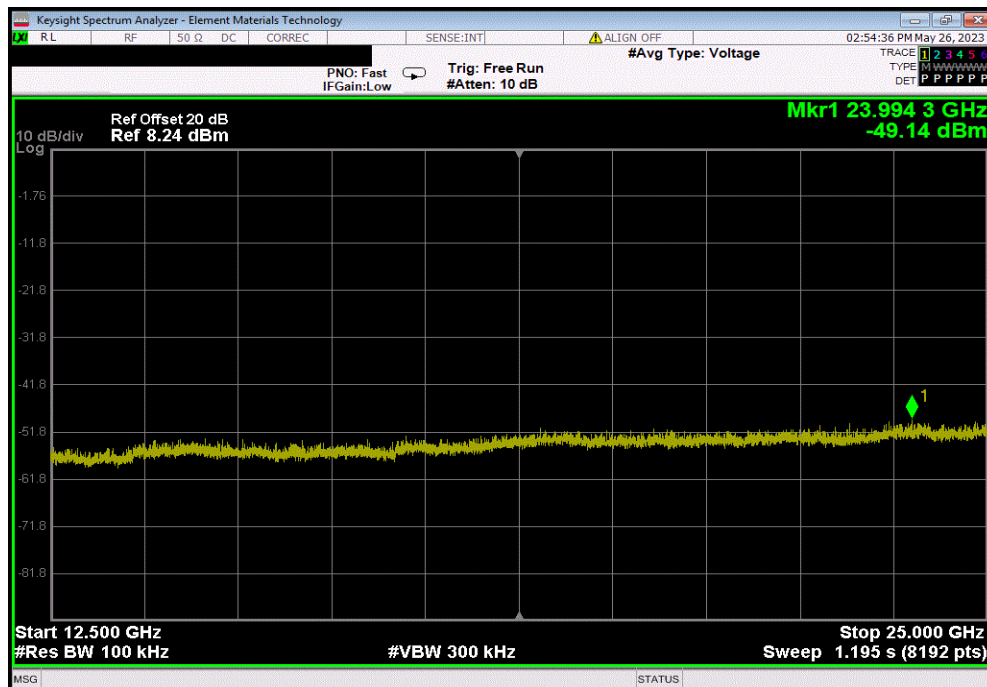


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	9388.21	-50.91	-20	Pass	



BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	23994.32	-46.87	-20	Pass	

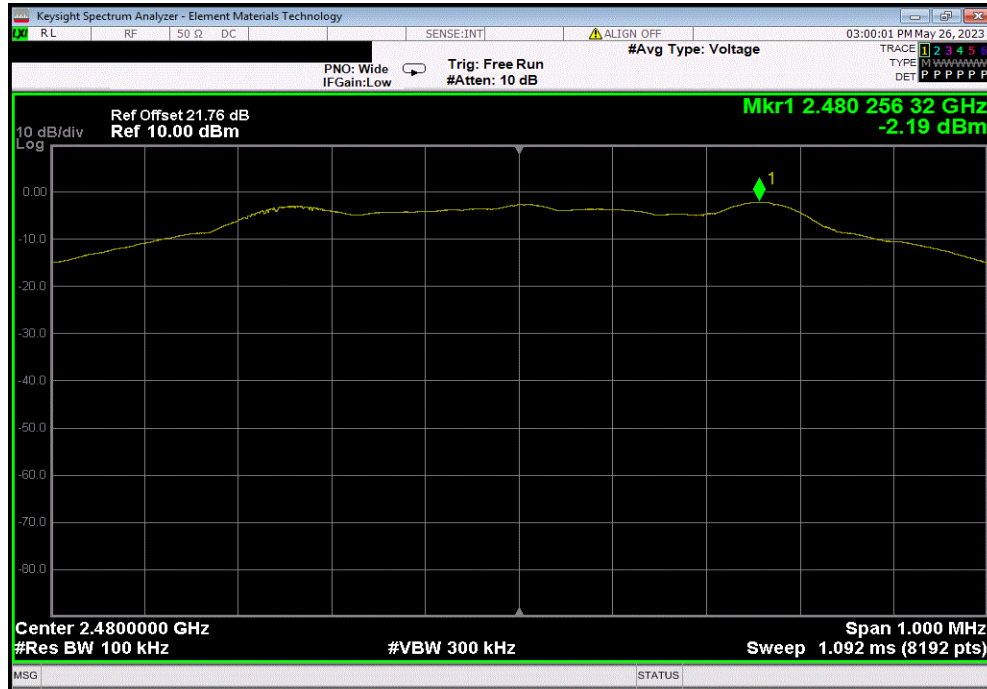


SPURIOUS CONDUCTED EMISSIONS

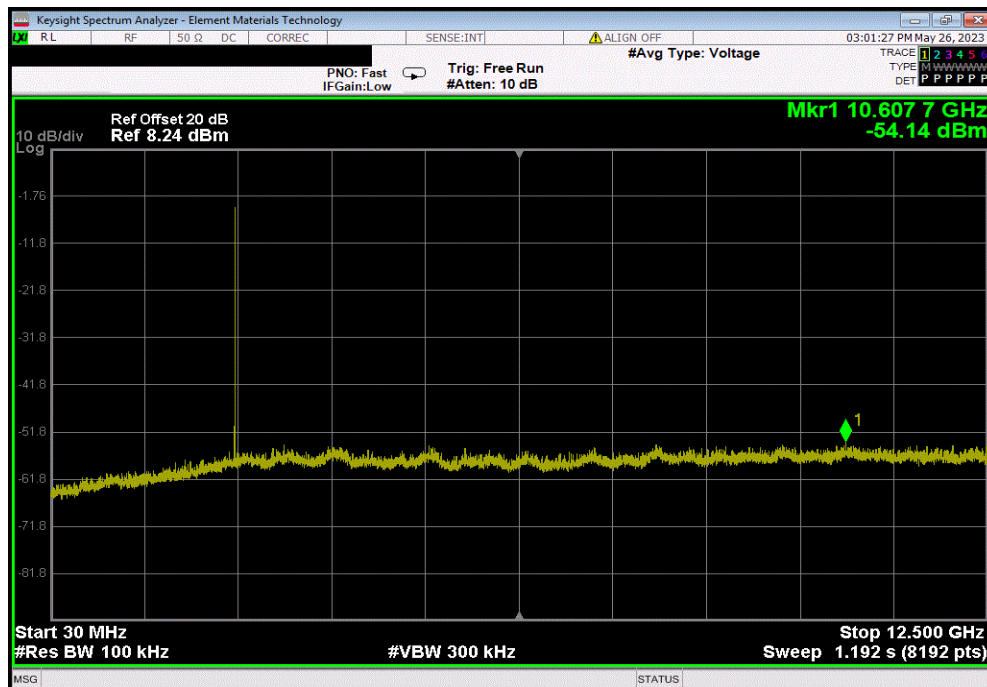


TbTx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2480.26	N/A	N/A	N/A		



BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz	10607.65	-51.95	-20	Pass		

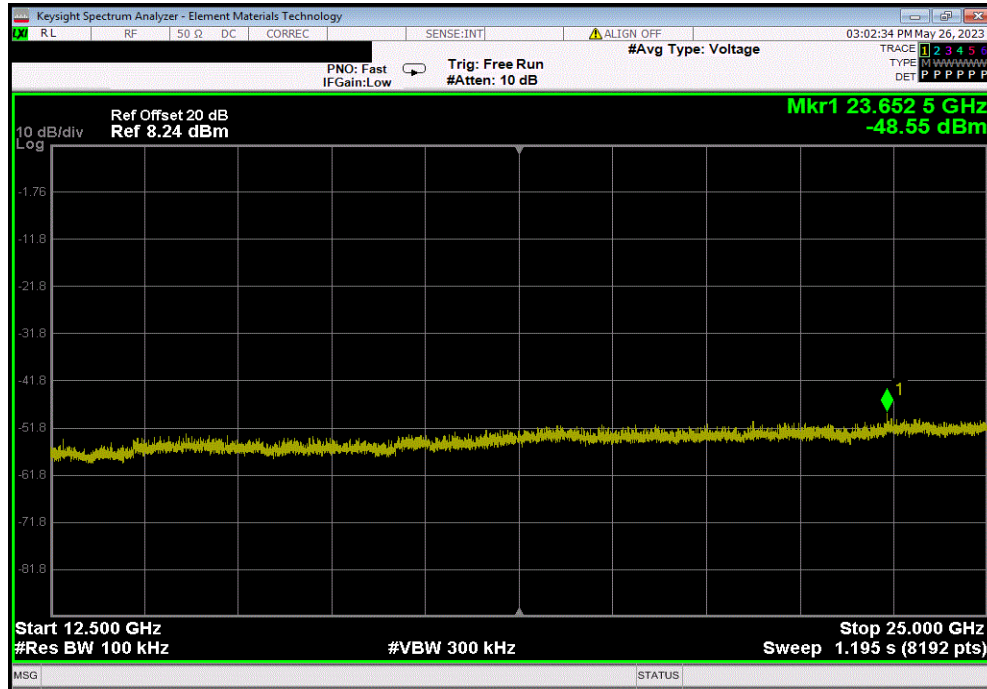


SPURIOUS CONDUCTED EMISSIONS

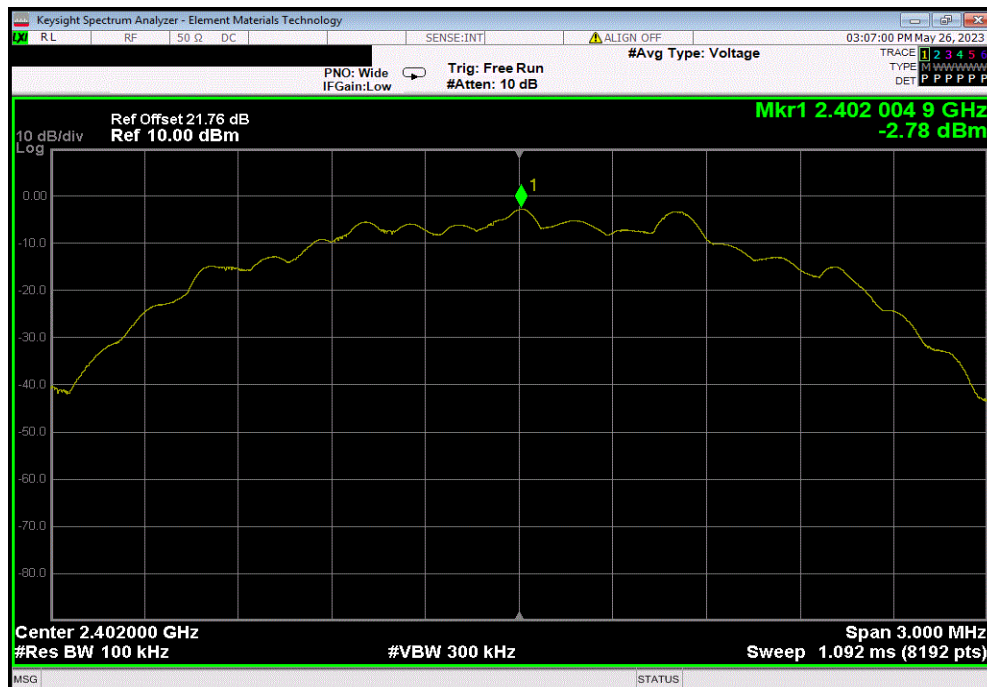


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	23652.48	-46.36	-20	Pass	



BLE/GFSK 2 Mbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2402	N/A	N/A	N/A	

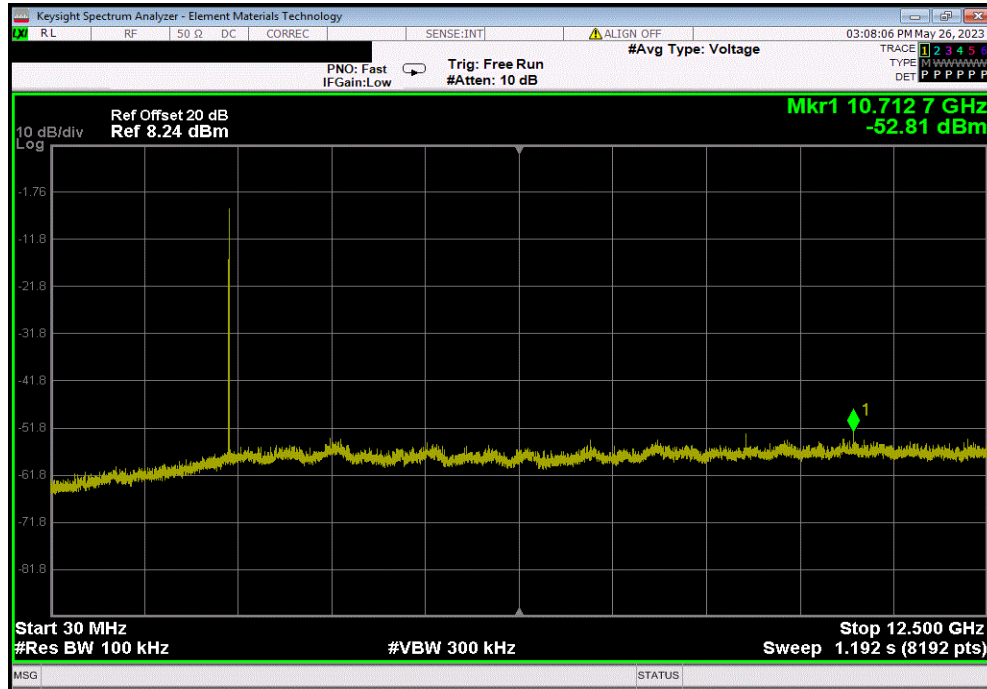


SPURIOUS CONDUCTED EMISSIONS

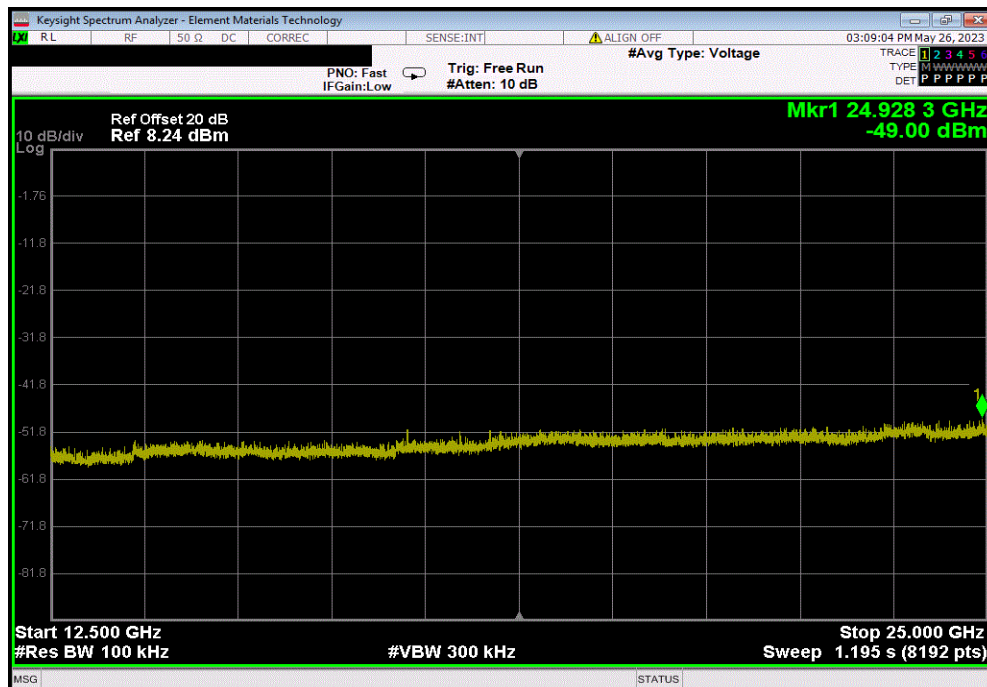


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 2 Mbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	10712.7	-50.03	-20	Pass	



BLE/GFSK 2 Mbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24928.27	-46.22	-20	Pass	

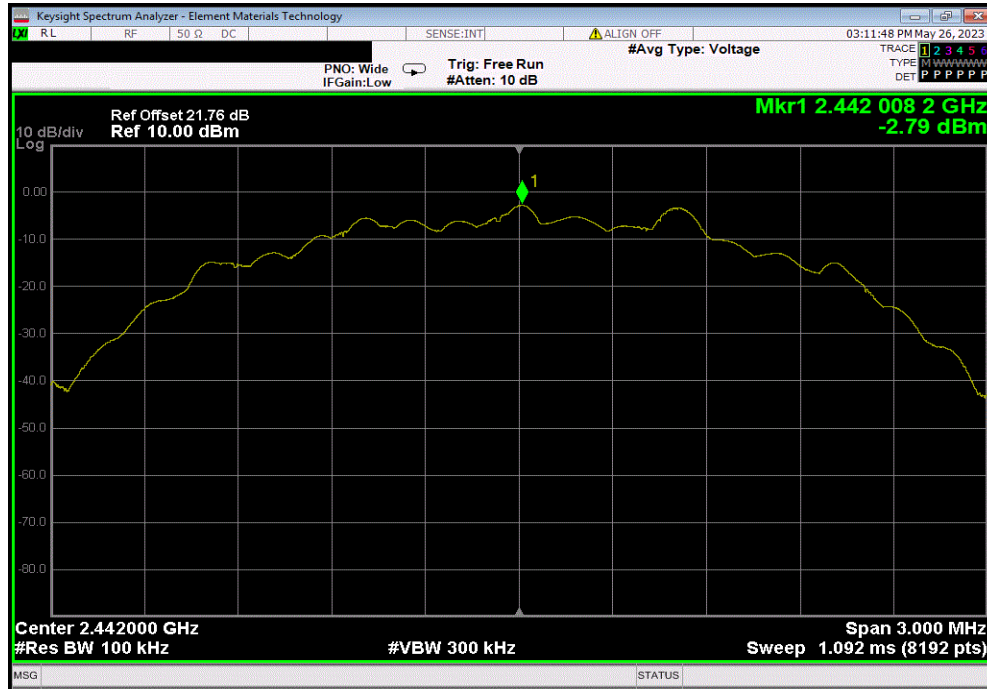


SPURIOUS CONDUCTED EMISSIONS

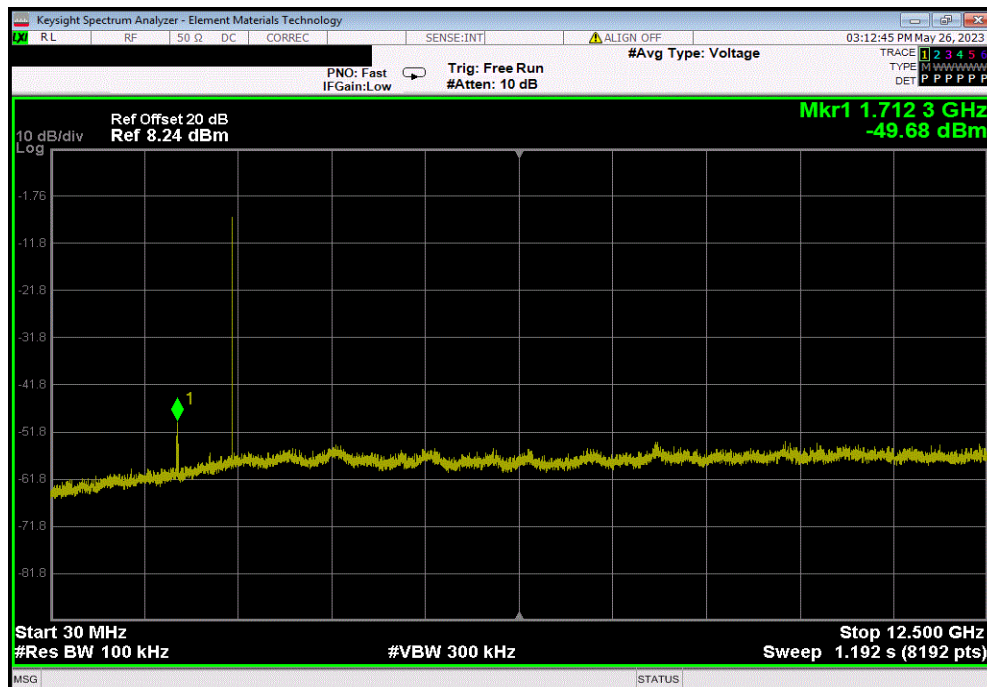


TbTx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2442.01	N/A	N/A	N/A		



BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz	1712.25	-46.89	-20	Pass		

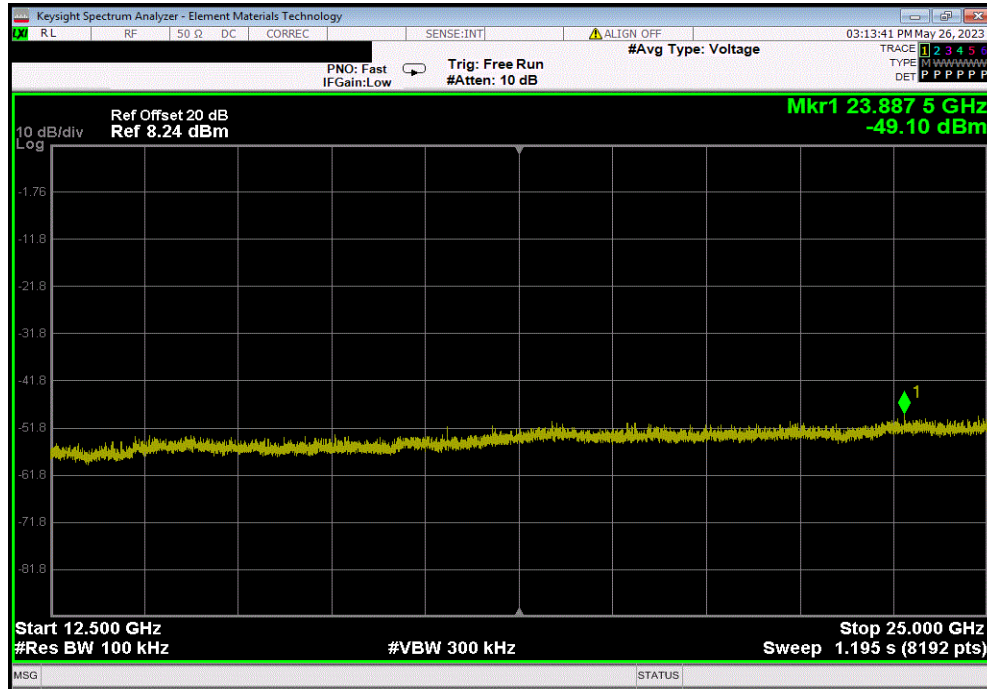


SPURIOUS CONDUCTED EMISSIONS

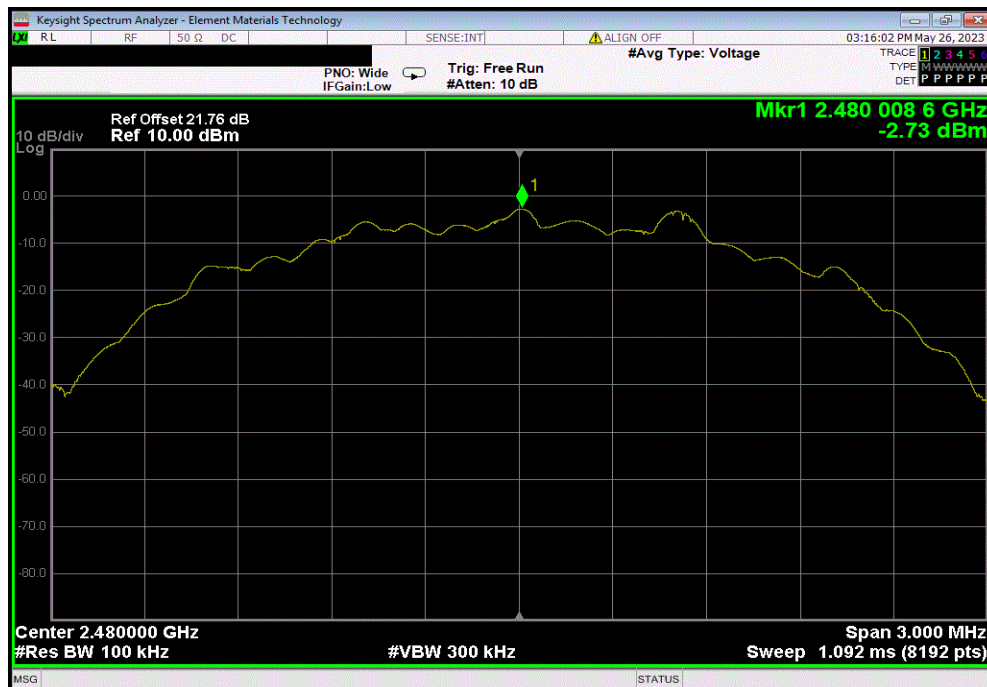


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	23887.5	-46.31	-20	Pass	



BLE/GFSK 2 Mbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2480.01	N/A	N/A	N/A	

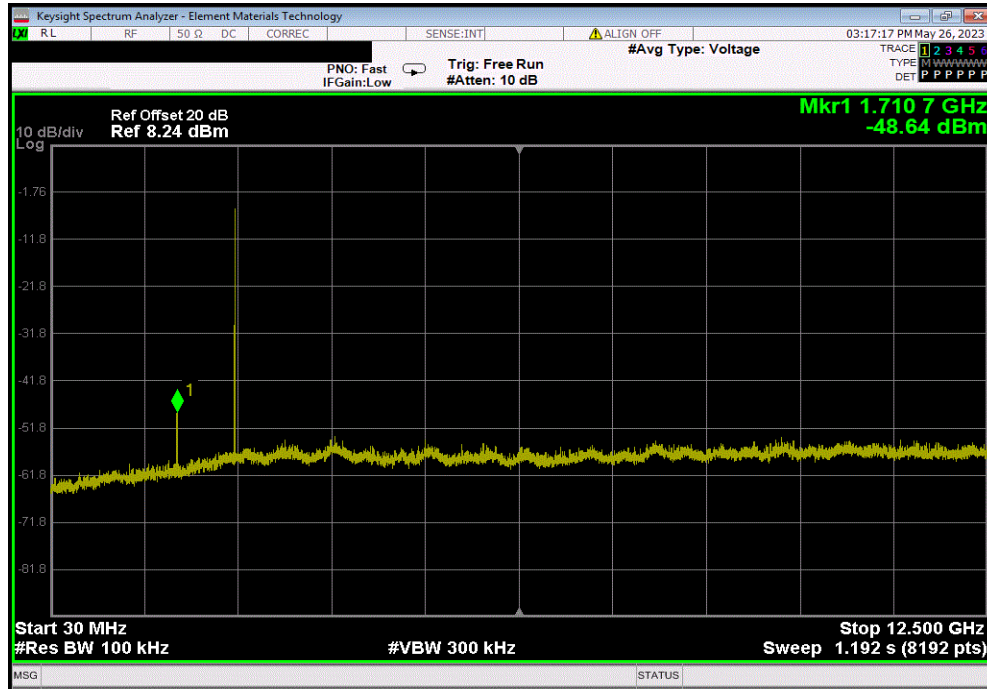


SPURIOUS CONDUCTED EMISSIONS

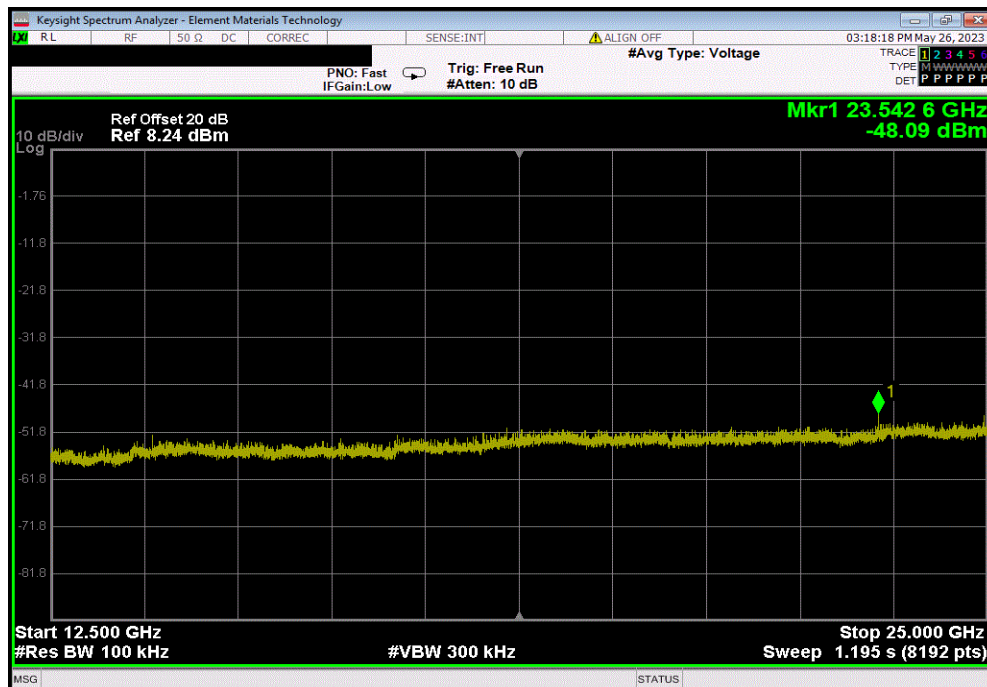


TbTtx 2022.06.03.0 XMt 2023.02.14.0

BLE/GFSK 2 Mbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	1710.73	-45.91	-20	Pass	



BLE/GFSK 2 Mbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	23542.61	-45.36	-20	Pass	



SPURIOUS RADIATED EMISSIONS

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These "pre-scans" are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

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

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

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Double Ridge	ETS Lindgren	3115	AIP	2022-07-20	2024-07-20
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	2023-01-14	2024-01-14
Attenuator	Fairview Microwave	SA18E-20	TWZ	2022-08-27	2023-08-27
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2023-02-06	2024-02-06
Filter - High Pass	Micro-Tronics	HPM50111	LFN	2022-08-27	2023-08-27
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	NCR
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	2023-01-14	2024-01-14
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	2023-01-14	2024-01-14
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	2023-01-14	2024-01-14
Antenna - Biconilog	ETS Lindgren	3142D	AXO	2021-09-14	2023-09-14
Cable	ESM Cable Corp.	Bilog Cables	MNH	2022-10-08	2023-10-08
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	2022-10-08	2023-10-08
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	2022-08-27	2023-08-27
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	NCR
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNP	2022-09-10	2023-09-10
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	2022-09-10	2023-09-10
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2022-05-18	2023-05-18

SPURIOUS RADIATED EMISSIONS

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.2 dB	-5.2 dB

FREQUENCY RANGE INVESTIGATED

30 MHz TO 26500 MHz

POWER INVESTIGATED

Internal Battery (3.7VDC)

CONFIGURATIONS INVESTIGATED

TSIN0196-7

MODES INVESTIGATED

Transmitting BLE Low and High Channels (2402 and 2480 MHz) 1 Mbps, 2 Mbps, 500 kbps and 125 kbps, Modulated. PRBS9
Transmitting BLE Low, Mid and High Channels (2402, 2442, 2480 MHz) 1 Mbps, 2 Mbps, 500 kbps and 125 kbps, Modulated. PRBS9

SPURIOUS RADIATED EMISSIONS

EUT:	TSI Inc. OmniTrak	Work Order:	TSIN0196
Serial Number:	TSI55221200061	Date:	2023-03-15
Customer:	TSI, Incorporated	Temperature:	22.7°C
Attendees:	Andrew Bentley	Relative Humidity:	21.1%
Customer Project:	None	Bar. Pressure (PMSL):	1026 mb
Tested By:	Marcelo Aguayo	Job Site:	MN05
Power:	Internal Battery (3.7VDC)	Configuration:	TSIN0196-7

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2023	ANSI C63.10:2013
RSS-247 Issue 2:2017	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	

TEST PARAMETERS

Run #:	77	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

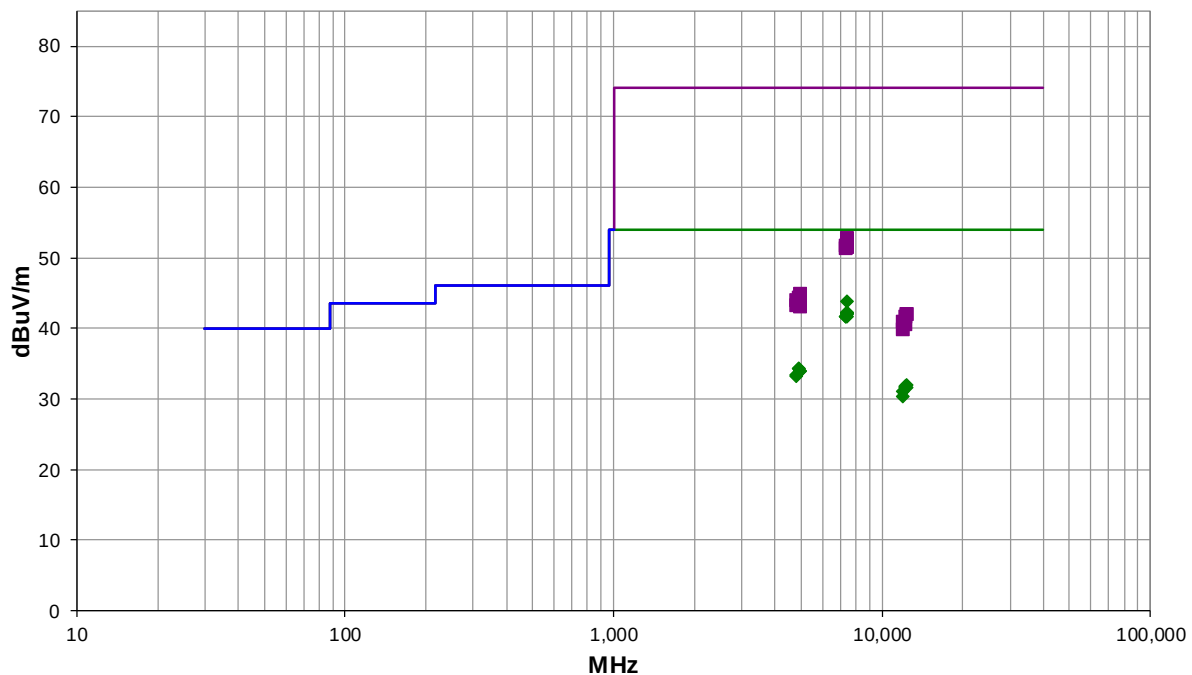
Test mode duty cycle is 85.4% (1 Mbps), 57.6% (2 Mbps), 97.4% (125 kbps), 91.2% (500 kbps).
Duty cycle correction factor (DCCF) applied using $DCCF = [10 \cdot \log(1/\text{test mode DC})]$.
Total correction applied: 1Mbps= +0.7 dB, 2Mbps= +2.4 dB, 125kbps= +0.1 dB, 500kbps= +0.4 dB

EUT OPERATING MODES

Transmitting BLE Low, Mid and High Channels (2402, 2442, 2480 MHz) 1 Mbps, 2 Mbps, 500 kbps and 125 kbps, Modulated. PRBS9

DEVIATIONS FROM TEST STANDARD

None



Run #: 77

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

RESULTS - Run #77

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
7439.392	29.8	11.9	1.5	247.9	0.4	0.0	Horz	AV	0.0	42.1	54.0	-11.9	EUT Horz, Low Ch 500 kbps
7441.850	29.6	11.9	3.5	303.0	0.7	0.0	Horz	AV	0.0	42.2	54.0	-11.8	EUT Horz, High Ch 1 Mbps
7439.467	29.6	11.9	2.9	210.9	0.7	0.0	Vert	AV	0.0	42.2	54.0	-11.8	EUT Horz, High Ch 1 Mbps
7438.933	29.6	11.9	1.5	95.0	0.7	0.0	Horz	AV	0.0	42.2	54.0	-11.8	EUT Vert, High Ch 1 Mbps
7438.450	29.6	11.9	1.5	206.0	0.7	0.0	Horz	AV	0.0	42.2	54.0	-11.8	EUT On Side, High Ch 1 Mbps
7438.692	29.6	11.9	3.5	329.0	0.7	0.0	Vert	AV	0.0	42.2	54.0	-11.8	EUT Vert, High Ch 1 Mbps
7441.333	29.6	11.9	1.2	193.9	2.4	0.0	Horz	AV	0.0	43.9	54.0	-10.1	EUT Horz, High Ch 2 Mbps
7440.183	29.6	11.9	1.5	232.0	0.1	0.0	Horz	AV	0.0	41.6	54.0	-12.4	EUT Horz, Low Ch 125 kbps
7439.833	29.5	11.9	1.5	203.0	0.7	0.0	Vert	AV	0.0	42.1	54.0	-11.9	EUT On Side, High Ch 1 Mbps
7324.192	29.2	11.7	2.0	189.9	0.7	0.0	Horz	AV	0.0	41.6	54.0	-12.4	EUT Horz, Mid Ch 1 Mbps
7323.692	29.2	11.7	1.5	113.9	0.7	0.0	Vert	AV	0.0	41.6	54.0	-12.4	EUT Horz, Mid Ch 1 Mbps
7438.858	40.9	11.9	3.5	329.0	0.0	0.0	Vert	PK	0.0	52.8	74.0	-21.2	EUT Horz, High Ch 1 Mbps
4883.800	30.2	3.4	1.5	315.0	0.7	0.0	Horz	AV	0.0	34.3	54.0	-19.7	EUT Horz, Mid Ch 1 Mbps
4884.725	30.2	3.4	1.2	141.0	0.7	0.0	Vert	AV	0.0	34.3	54.0	-19.7	EUT Horz, Mid Ch 1 Mbps
7440.050	40.5	11.9	1.5	203.0	0.0	0.0	Vert	PK	0.0	52.4	74.0	-21.6	EUT On Side, High Ch 1 Mbps
4961.883	29.6	3.6	1.5	77.9	0.7	0.0	Horz	AV	0.0	33.9	54.0	-20.1	EUT Horz, High Ch 1 Mbps
4959.750	29.6	3.6	1.3	85.9	0.7	0.0	Vert	AV	0.0	33.9	54.0	-20.1	EUT Horz, High Ch 1 Mbps
7440.175	40.0	11.9	1.5	206.0	0.0	0.0	Horz	PK	0.0	51.9	74.0	-22.1	EUT Horz, High Ch 1 Mbps
7442.500	40.0	11.9	1.5	247.9	0.0	0.0	Horz	PK	0.0	51.9	74.0	-22.1	EUT Horz, Low Ch 500 kbps
7440.058	39.9	11.9	3.5	303.0	0.0	0.0	Horz	PK	0.0	51.8	74.0	-22.2	EUT Vert, High Ch 1 Mbps
7440.867	39.9	11.9	2.9	210.9	0.0	0.0	Vert	PK	0.0	51.8	74.0	-22.2	EUT Vert, High Ch 1 Mbps
7438.917	39.9	11.9	1.2	193.9	0.0	0.0	Horz	PK	0.0	51.8	74.0	-22.2	EUT Horz, High Ch 2 Mbps
7327.342	40.0	11.7	2.0	189.9	0.0	0.0	Horz	PK	0.0	51.7	74.0	-22.3	EUT Horz, Mid Ch 1 Mbps
4805.033	29.4	3.3	1.5	339.0	0.7	0.0	Vert	AV	0.0	33.4	54.0	-20.6	EUT Horz, Low Ch 1 Mbps
7442.092	39.7	11.9	1.5	95.0	0.0	0.0	Horz	PK	0.0	51.6	74.0	-22.4	EUT On Side, High Ch 1 Mbps
7438.067	39.7	11.9	1.5	232.0	0.0	0.0	Horz	PK	0.0	51.6	74.0	-22.4	EUT Horz, Low Ch 125 kbps
4805.350	29.3	3.3	1.5	23.9	0.7	0.0	Horz	AV	0.0	33.3	54.0	-20.7	EUT Horz, Low Ch 1 Mbps
7325.075	39.7	11.7	1.5	113.9	0.0	0.0	Vert	PK	0.0	51.4	74.0	-22.6	EUT Horz, Mid Ch 1 Mbps
12398.860	29.4	1.9	1.2	120.9	0.7	0.0	Vert	AV	0.0	32.0	54.0	-22.0	EUT Horz, High Ch 1 Mbps
12210.620	29.2	1.8	1.5	105.0	0.7	0.0	Vert	AV	0.0	31.7	54.0	-22.3	EUT Horz, Mid Ch 1 Mbps
12397.500	29.0	1.9	1.5	293.0	0.7	0.0	Horz	AV	0.0	31.6	54.0	-22.4	EUT Horz, High Ch 1 Mbps
12209.870	29.1	1.8	2.7	217.0	0.7	0.0	Horz	AV	0.0	31.6	54.0	-22.4	EUT Horz, Mid Ch 1 Mbps
12011.690	29.8	0.5	1.5	278.0	0.7	0.0	Vert	AV	0.0	31.0	54.0	-23.0	EUT Horz, Low Ch 1 Mbps
12012.120	29.1	0.5	1.5	314.0	0.7	0.0	Horz	AV	0.0	30.3	54.0	-23.7	EUT Horz, Low Ch 1 Mbps
4959.217	41.3	3.6	1.3	85.9	0.0	0.0	Vert	PK	0.0	44.9	74.0	-29.1	EUT Horz, High Ch 1 Mbps
4885.833	40.9	3.4	1.2	141.0	0.0	0.0	Vert	PK	0.0	44.3	74.0	-29.7	EUT Horz, Mid Ch 1 Mbps
4803.025	40.7	3.3	1.5	339.0	0.0	0.0	Vert	PK	0.0	44.0	74.0	-30.0	EUT Horz, Low Ch 1 Mbps
4885.508	40.5	3.4	1.5	315.0	0.0	0.0	Horz	PK	0.0	43.9	74.0	-30.1	EUT Horz, Mid Ch 1 Mbps
4803.692	40.0	3.3	1.5	23.9	0.0	0.0	Horz	PK	0.0	43.3	74.0	-30.7	EUT Horz, Low Ch 1 Mbps
4959.483	39.5	3.6	1.5	77.9	0.0	0.0	Horz	PK	0.0	43.1	74.0	-30.9	EUT Horz, High Ch 1 Mbps

SPURIOUS RADIATED EMISSIONS

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
12398.530	40.1	1.9	1.5	293.0	0.0	0.0	Horz	PK	0.0	42.0	74.0	-32.0	EUT Horz, High Ch 1 Mbps
12398.340	40.1	1.9	1.2	120.9	0.0	0.0	Vert	PK	0.0	42.0	74.0	-32.0	EUT Horz, High Ch 1 Mbps
12211.480	39.8	1.8	1.5	105.0	0.0	0.0	Vert	PK	0.0	41.6	74.0	-32.4	EUT Horz, Mid Ch 1 Mbps
12009.640	40.5	0.4	1.5	278.0	0.0	0.0	Vert	PK	0.0	40.9	74.0	-33.1	EUT Horz, Low Ch 1 Mbps
12211.330	38.8	1.8	2.7	217.0	0.0	0.0	Horz	PK	0.0	40.6	74.0	-33.4	EUT Horz, Mid Ch 1 Mbps
12010.150	39.3	0.5	1.5	314.0	0.0	0.0	Horz	PK	0.0	39.8	74.0	-34.2	EUT Horz, Low Ch 1 Mbps

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS

EUT:	TSI Inc. OmniTrak	Work Order:	TSIN0196
Serial Number:	TSI55221200061	Date:	2023-03-15
Customer:	TSI, Incorporated	Temperature:	22.7°C
Attendees:	Andrew Bentley	Relative Humidity:	21.1%
Customer Project:	None	Bar. Pressure (PMSL):	1026 mb
Tested By:	Marcelo Aguayo	Job Site:	MN05
Power:	Internal Battery (3.7VDC)	Configuration:	TSIN0196-7

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2023	ANSI C63.10:2013
RSS-247 Issue 2:2017	
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	85	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

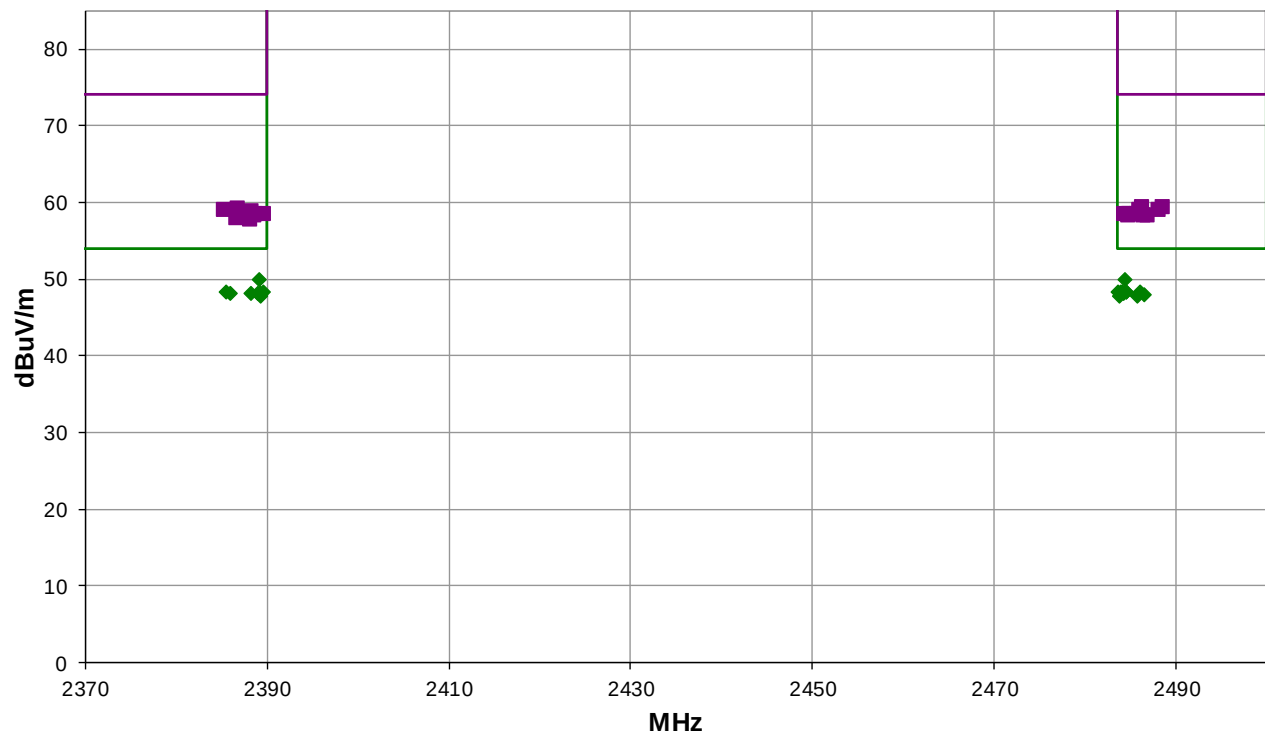
Test mode duty cycle is 85.4% (1 Mbps), 57.6% (2 Mbps), 97.4% (125 kbps), 91.2% (500 kbps).
Duty cycle correction factor (DCCF) applied using $DCCF = [10 \cdot \log(1/\text{test mode DC})]$.
Total correction applied: 1Mbps= +0.7 dB, 2Mbps= +2.4 dB, 125kbps= +0.1 dB, 500kbps= +0.4 dB

EUT OPERATING MODES

Transmitting BLE Low and High Channels (2402 and 2480 MHz) 1 Mbps, 2 Mbps, 500 kbps and 125 kbps, Modulated.
PRBS9

DEVIATIONS FROM TEST STANDARD

None



Run #: 85

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

RESULTS - Run #8

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
2483.608	31.9	-4.2	1.5	41.0	0.7	20.0	Vert	AV	0.0	48.4	54.0	-5.6	EUT Horz, High Ch 1 Mbps
2486.008	31.9	-4.2	1.2	94.0	0.7	20.0	Vert	AV	0.0	48.4	54.0	-5.6	EUT Vert, High Ch 1 Mbps
2484.208	31.9	-4.2	1.5	336.0	0.4	20.0	Horz	AV	0.0	48.1	54.0	-5.9	EUT Horz, High Ch 500 kbps
2389.517	32.0	-4.3	1.5	84.9	0.7	20.0	Horz	AV	0.0	48.4	54.0	-5.6	EUT Horz, Low Ch 1 Mbps
2484.100	31.8	-4.2	1.5	347.9	0.7	20.0	Horz	AV	0.0	48.3	54.0	-5.7	EUT Horz, High Ch 1 Mbps
2484.583	31.8	-4.2	1.5	30.9	0.7	20.0	Horz	AV	0.0	48.3	54.0	-5.7	EUT Vert, High Ch 1 Mbps
2483.917	31.8	-4.2	1.6	263.0	0.7	20.0	Horz	AV	0.0	48.3	54.0	-5.7	EUT On Side, High Ch 1 Mbps
2484.558	31.8	-4.2	2.3	168.9	0.7	20.0	Vert	AV	0.0	48.3	54.0	-5.7	EUT On Side, High Ch 1 Mbps
2484.400	31.8	-4.2	1.5	132.9	2.4	20.0	Horz	AV	0.0	50.0	54.0	-4.0	EUT Horz, High Ch 2 Mbps
2486.492	31.8	-4.2	1.4	144.0	0.4	20.0	Vert	AV	0.0	48.0	54.0	-6.0	EUT Horz, High Ch 500 kbps
2483.758	31.8	-4.2	1.5	37.9	0.1	20.0	Horz	AV	0.0	47.7	54.0	-6.3	EUT Horz, High Ch 125 kbps
2485.825	31.8	-4.2	1.5	214.0	0.1	20.0	Vert	AV	0.0	47.7	54.0	-6.3	EUT Horz, High Ch 125 kbps
2385.425	31.9	-4.3	1.5	156.9	0.7	20.0	Vert	AV	0.0	48.3	54.0	-5.7	EUT Vert, Low Ch 1 Mbps
2389.175	31.9	-4.3	1.5	175.9	2.4	20.0	Horz	AV	0.0	50.0	54.0	-4.0	EUT Horz, Low Ch 2 Mbps
2389.342	31.9	-4.3	1.5	30.0	0.4	20.0	Horz	AV	0.0	48.0	54.0	-6.0	EUT Horz, Low Ch 500 kbps
2389.242	31.9	-4.3	1.5	66.9	0.1	20.0	Horz	AV	0.0	47.7	54.0	-6.3	EUT Horz, Low Ch 125 kbps
2388.158	31.8	-4.3	1.5	84.0	0.7	20.0	Vert	AV	0.0	48.2	54.0	-5.8	EUT On Side, Low Ch 1 Mbps
2388.975	31.8	-4.3	1.5	199.9	0.7	20.0	Horz	AV	0.0	48.2	54.0	-5.8	EUT Vert, Low Ch 1 Mbps
2389.308	31.8	-4.3	2.1	160.0	0.7	20.0	Vert	AV	0.0	48.2	54.0	-5.8	EUT Vert, Low Ch 1 Mbps
2385.983	31.7	-4.3	1.5	289.0	0.7	20.0	Horz	AV	0.0	48.1	54.0	-5.9	EUT On Side, Low Ch 1 Mbps
2486.292	43.6	-4.2	1.5	41.0	0.0	20.0	Vert	PK	0.0	59.4	74.0	-14.6	EUT Horz, High Ch 1 Mbps
2488.475	43.4	-4.0	1.5	37.9	0.0	20.0	Horz	PK	0.0	59.4	74.0	-14.6	EUT Horz, High Ch 125 kbps
2386.775	43.5	-4.3	1.5	84.9	0.0	20.0	Horz	PK	0.0	59.2	74.0	-14.8	EUT Horz, Low Ch 1 Mbps
2485.908	43.3	-4.2	1.5	347.9	0.0	20.0	Horz	PK	0.0	59.1	74.0	-14.9	EUT Horz, High Ch 1 Mbps
2487.992	43.1	-4.1	1.5	336.0	0.0	20.0	Horz	PK	0.0	59.0	74.0	-15.0	EUT Horz, High Ch 500 kbps
2385.167	43.3	-4.3	1.5	84.0	0.0	20.0	Vert	PK	0.0	59.0	74.0	-15.0	EUT On Side, Low Ch 1 Mbps
2388.175	43.2	-4.3	1.5	30.0	0.0	20.0	Horz	PK	0.0	58.9	74.0	-15.1	EUT Horz, Low Ch 500 kbps
2484.792	42.8	-4.2	1.6	263.0	0.0	20.0	Horz	PK	0.0	58.6	74.0	-15.4	EUT On Side, High Ch 1 Mbps
2484.300	42.8	-4.2	1.4	144.0	0.0	20.0	Vert	PK	0.0	58.6	74.0	-15.4	EUT Horz, High Ch 500 kbps
2485.575	42.8	-4.2	1.5	214.0	0.0	20.0	Vert	PK	0.0	58.6	74.0	-15.4	EUT Horz, High Ch 125 kbps
2388.733	42.9	-4.3	1.5	175.9	0.0	20.0	Horz	PK	0.0	58.6	74.0	-15.4	EUT Vert, Low Ch 2 Mbps
2484.742	42.7	-4.2	1.2	94.0	0.0	20.0	Vert	PK	0.0	58.5	74.0	-15.5	EUT Vert, High Ch 1 Mbps
2389.650	42.8	-4.3	1.5	199.9	0.0	20.0	Horz	PK	0.0	58.5	74.0	-15.5	EUT Vert, Low Ch 1 Mbps
2388.275	42.8	-4.3	2.1	160.0	0.0	20.0	Vert	PK	0.0	58.5	74.0	-15.5	EUT Vert, Low Ch 1 Mbps
2486.325	42.6	-4.2	2.3	168.9	0.0	20.0	Vert	PK	0.0	58.4	74.0	-15.6	EUT On Side, High Ch 1 Mbps
2486.858	42.6	-4.2	1.5	132.9	0.0	20.0	Horz	PK	0.0	58.4	74.0	-15.6	EUT Horz, High Ch 2 Mbps
2484.717	42.5	-4.2	1.5	30.9	0.0	20.0	Horz	PK	0.0	58.3	74.0	-15.7	EUT Vert, High Ch 1 Mbps
2388.525	42.6	-4.3	1.5	66.9	0.0	20.0	Horz	PK	0.0	58.3	74.0	-15.7	EUT Horz, Low Ch 125 kbps
2386.600	42.3	-4.3	1.5	156.9	0.0	20.0	Vert	PK	0.0	58.0	74.0	-16.0	EUT Horz, Low Ch 1 Mbps
2388.108	42.1	-4.3	1.5	289.0	0.0	20.0	Horz	PK	0.0	57.8	74.0	-16.2	EUT On Side, Low Ch 1 Mbps

SPURIOUS RADIATED EMISSIONS

CONCLUSION

Pass



Tested By

End of Test Report