

POWER SPECTRAL DENSITY

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2022-01-19	2023-01-19
Block - DC	Fairview Microwave	SD3379	AMM	2021-09-14	2022-09-14
Cable	UtiFlex Micro-Coax	UFD1150A-1-0720-200200	TXJ	2021-09-13	2022-09-13
Attenuator	Fairview Microwave	SA18E 1913	TZV	2021-09-15	2022-09-15

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



TestTx 2021.10.29.2 XMR 2020.12.30.0

EUT: Radio Thermostat		Work Order: F3EN0068	
Serial Number: DUT 1		Date: 10-Feb-22	
Customer: Quext		Temperature: 20.8 °C	
Attendees: None		Humidity: 24.4% RH	
Project: None		Barometric Pres.: 1021 mbar	
Tested by: Brandon Hobbs		Power: 110VAC/60Hz	
		Job Site: TX09	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2022		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	3	Signature 	
		Value dBm/3kHz	Limit < dBm/3kHz
BLE/GFSK 125 kbps			
	Low Channel, 2402 MHz	-0.452	8
	Mid Channel, 2440 MHz	-1.075	8
	High Channel, 2480 MHz	-0.64	8
BLE/GFSK 500 kbps			
	Low Channel, 2402 MHz	-0.523	8
	Mid Channel, 2440 MHz	-1.403	8
	High Channel, 2480 MHz	-0.85	8
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	-11.47	8
	Mid Channel, 2440 MHz	-13.158	8
	High Channel, 2480 MHz	-11.32	8
BLE/GFSK 2 Mbps			
	Low Channel, 2402 MHz	-13.22	8
	Mid Channel, 2440 MHz	-14.654	8
	High Channel, 2480 MHz	-13.13	8

POWER SPECTRAL DENSITY

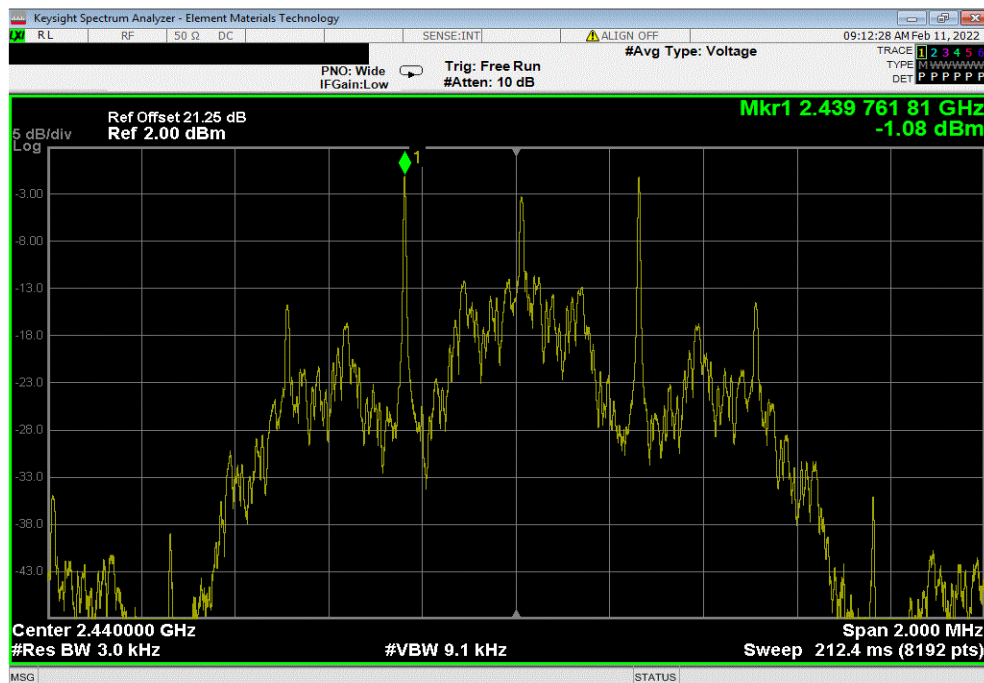


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 125 kbps, Low Channel, 2402 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-0.452	8	Pass			



BLE/GFSK 125 kbps, Mid Channel, 2440 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-1.075	8	Pass			

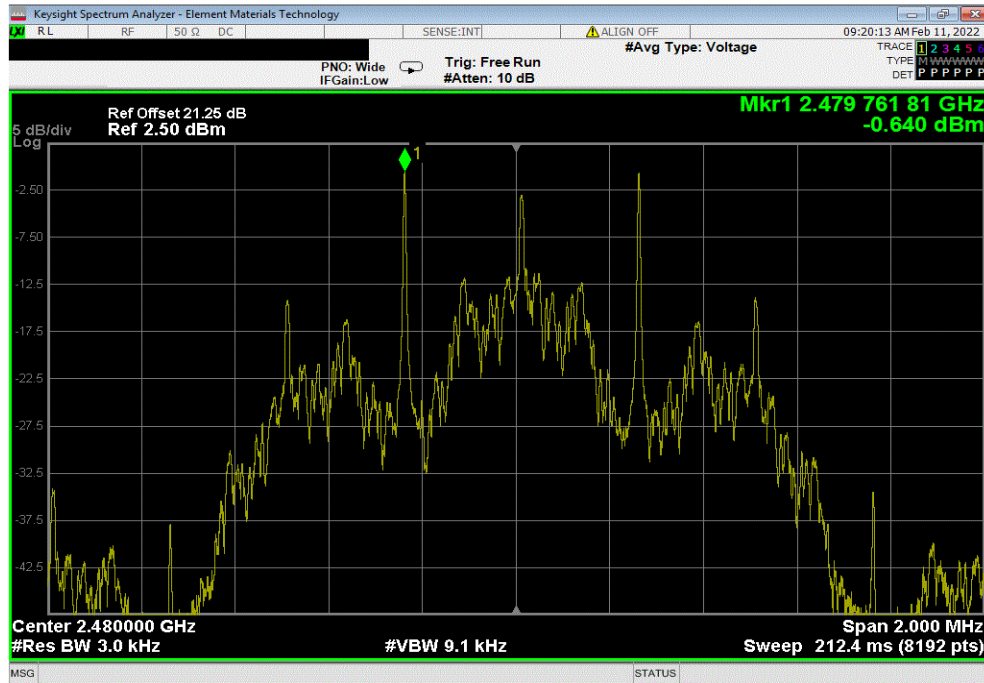


POWER SPECTRAL DENSITY

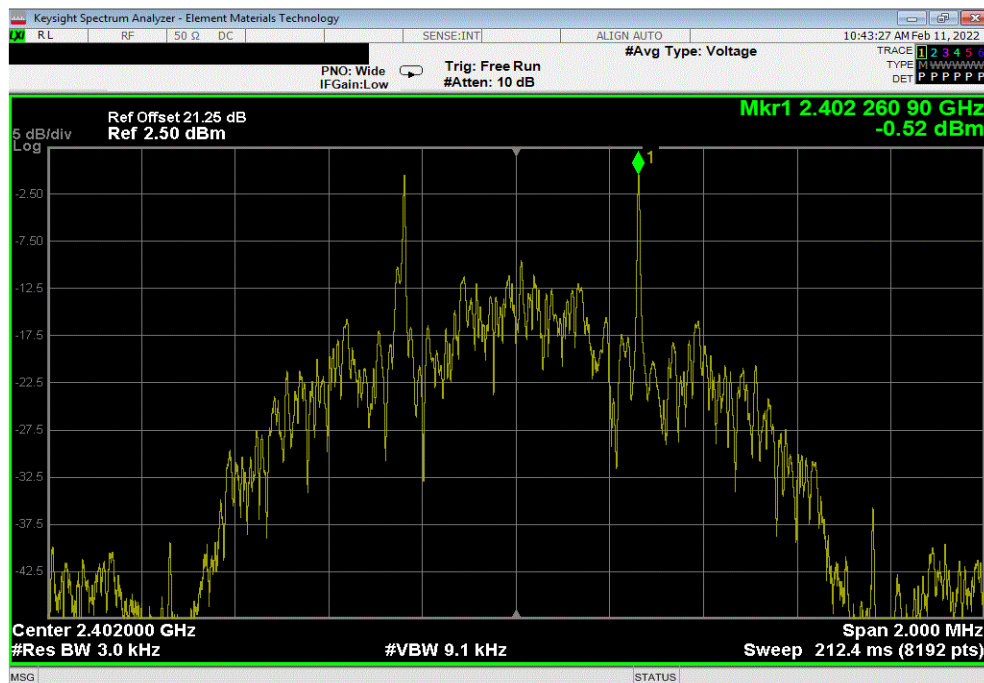


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 125 kbps, High Channel, 2480 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-0.64	8	Pass			



BLE/GFSK 500 kbps, Low Channel, 2402 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-0.523	8	Pass			

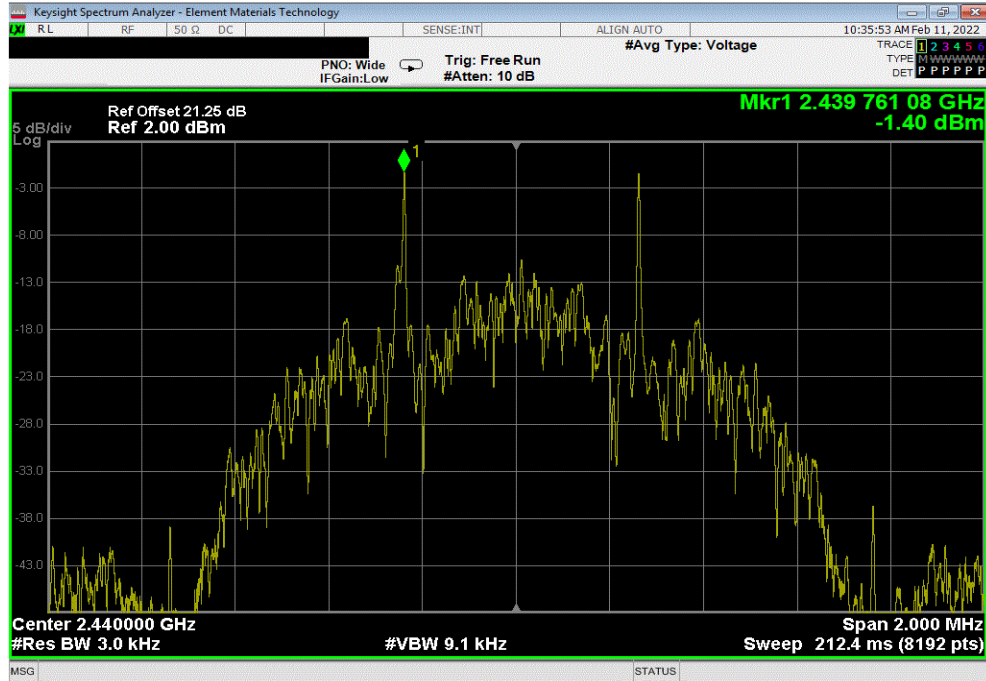


POWER SPECTRAL DENSITY

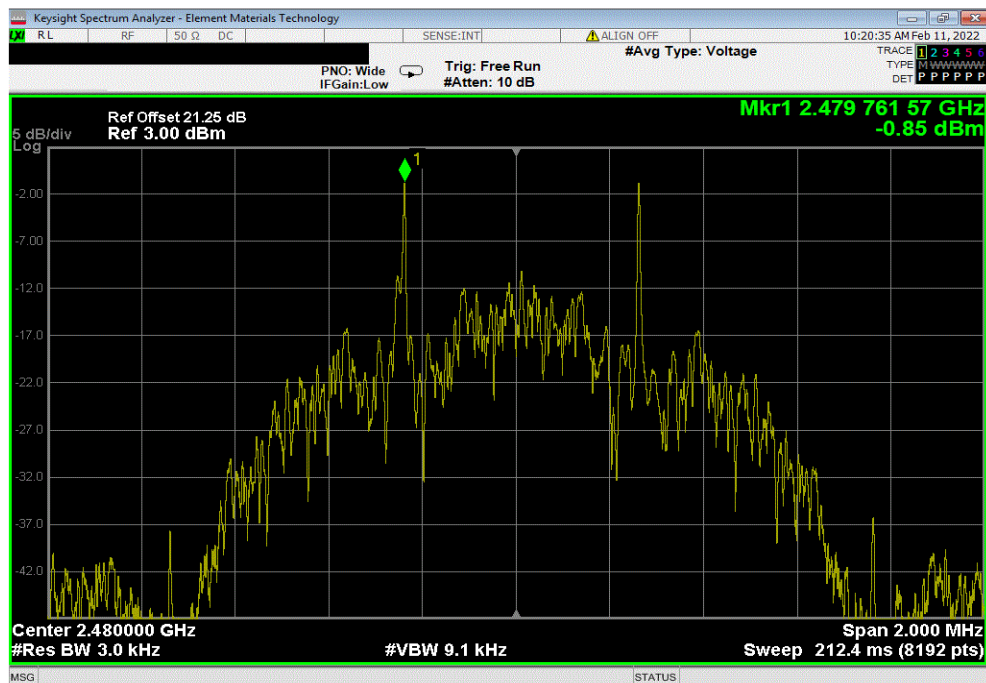


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 500 kbps, Mid Channel, 2440 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-1.403	8	Pass			



BLE/GFSK 500 kbps, High Channel, 2480 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-0.85	8	Pass			

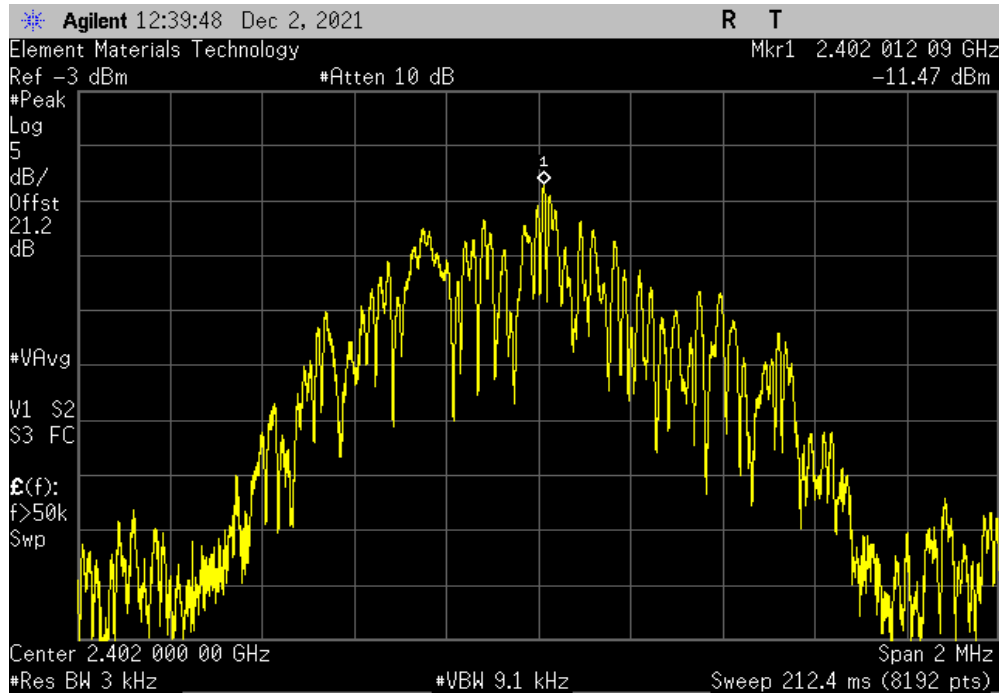


POWER SPECTRAL DENSITY

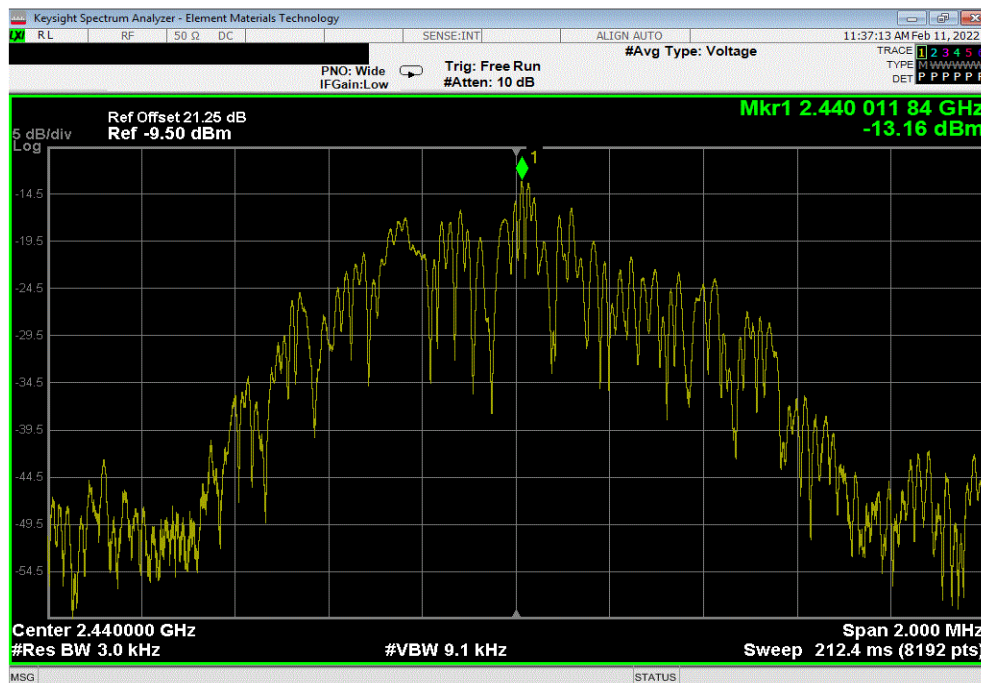


TbTb 2021.10.29.2 XMR 2020.12.30.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-11.47	8	Pass



BLE/GFSK 1 Mbps, Mid Channel, 2440 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-13.158	8	Pass

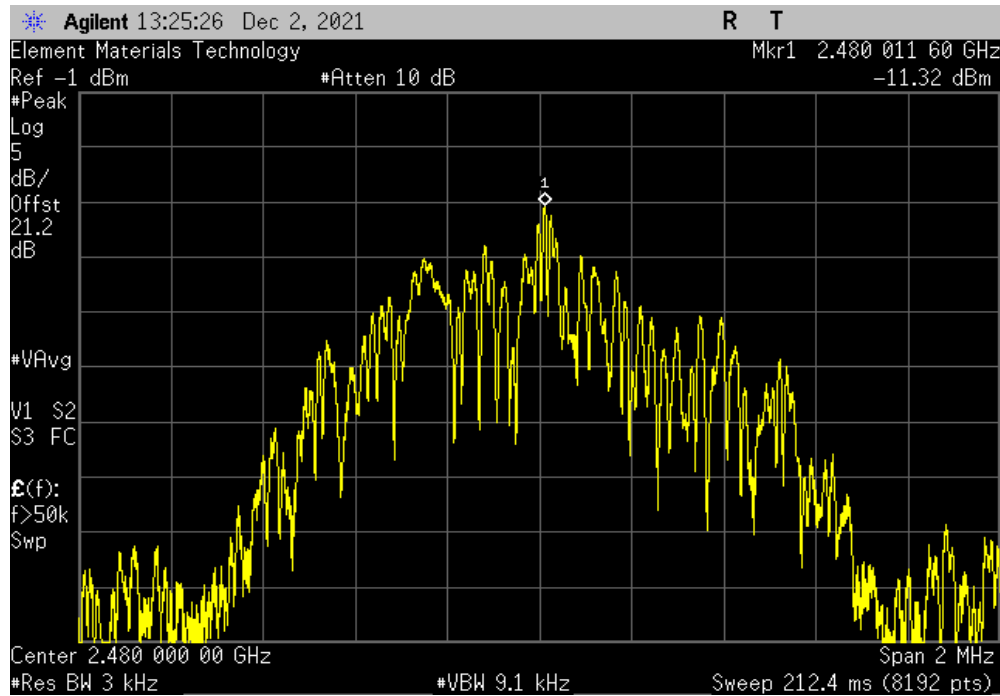


POWER SPECTRAL DENSITY

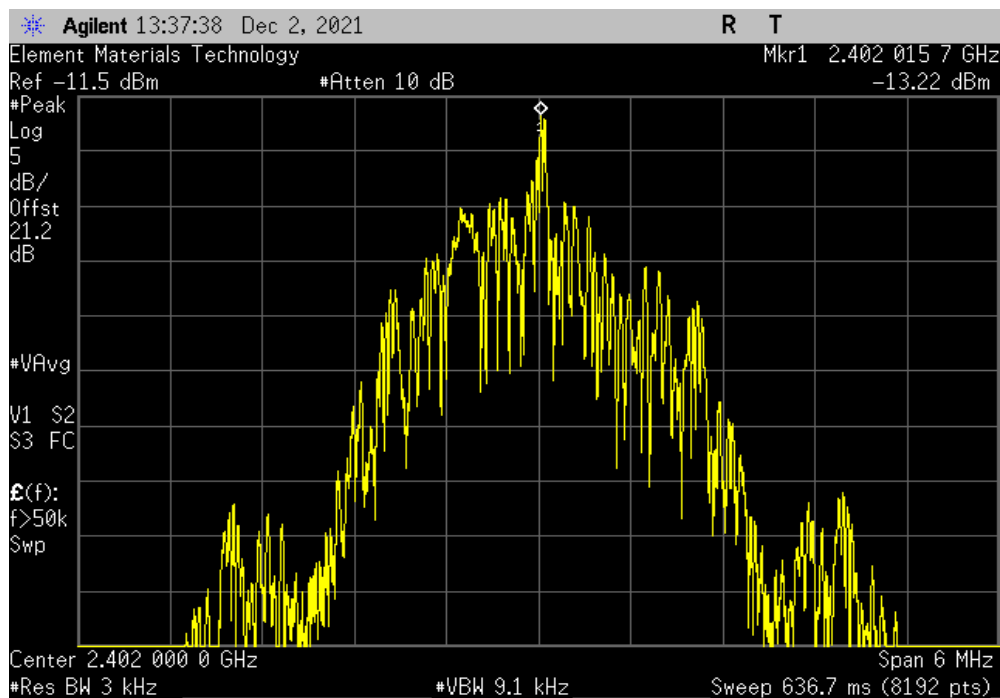


TUTx 2021.10.29.2 XM8 2020.12.30.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
	Value	Limit				
	dBm/3kHz	< dBm/3kHz	Results			
	-11.32	8	Pass			



BLE/GFSK 2 Mbps, Low Channel, 2402 MHz						
	Value	Limit				
	dBm/3kHz	< dBm/3kHz	Results			
	-13.22	8	Pass			

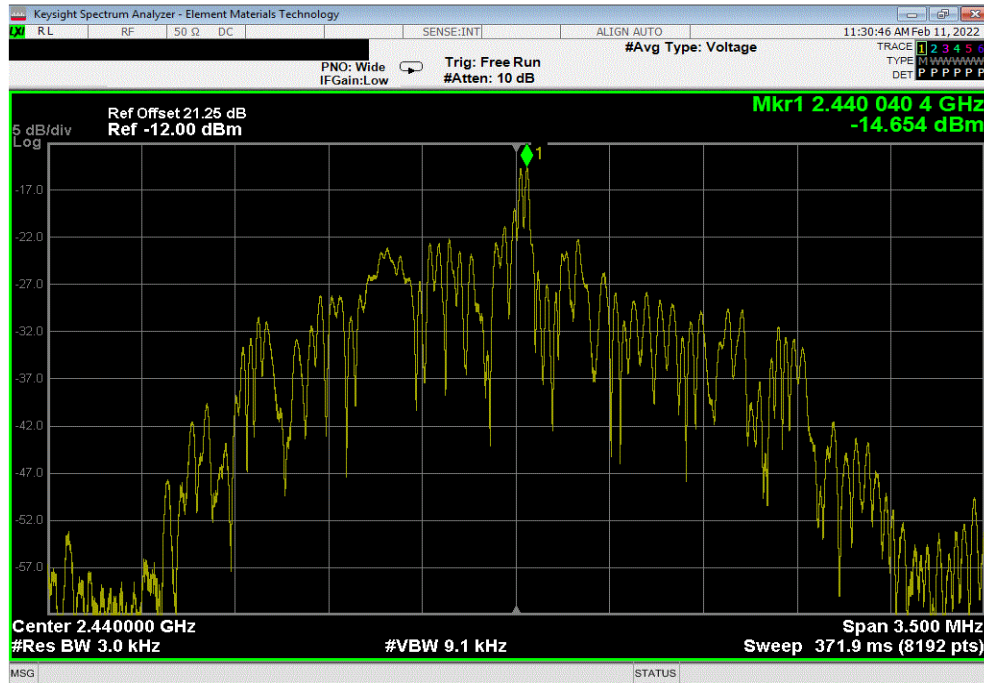


POWER SPECTRAL DENSITY

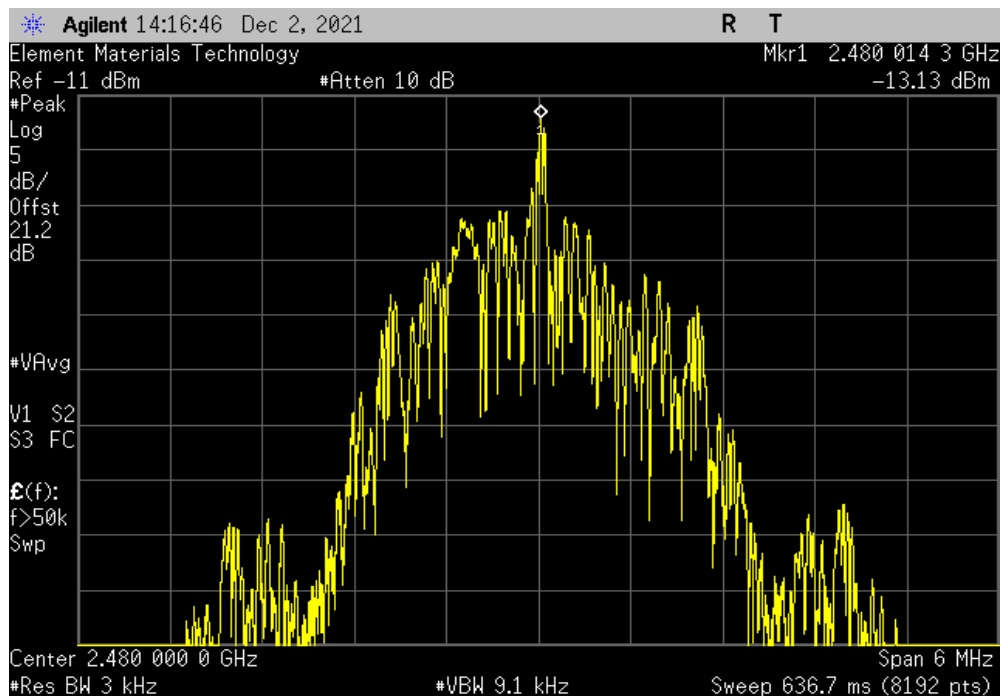


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 2 Mbps, Mid Channel, 2440 MHz						
				Value	Limit	Results
				dBm/3kHz	< dBm/3kHz	
				-14.654	8	Pass



BLE/GFSK 2 Mbps, High Channel, 2480 MHz						
				Value	Limit	Results
				dBm/3kHz	< dBm/3kHz	
				-13.13	8	Pass



BAND EDGE COMPLIANCE

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Attenuator	Fairview Microwave	SA26B-06	TZJ	2021-07-16	2022-07-16
Attenuator	Fairview Microwave	SA18E 1913	TZV	2021-09-15	2022-09-15
Block - DC	Fairview Microwave	SD3379	AMM	2021-09-14	2022-09-14
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2022-01-19	2023-01-19

TEST DESCRIPTION

The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The 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



TestTx 2021.10.29.2 XMIR 2020.12.30.0

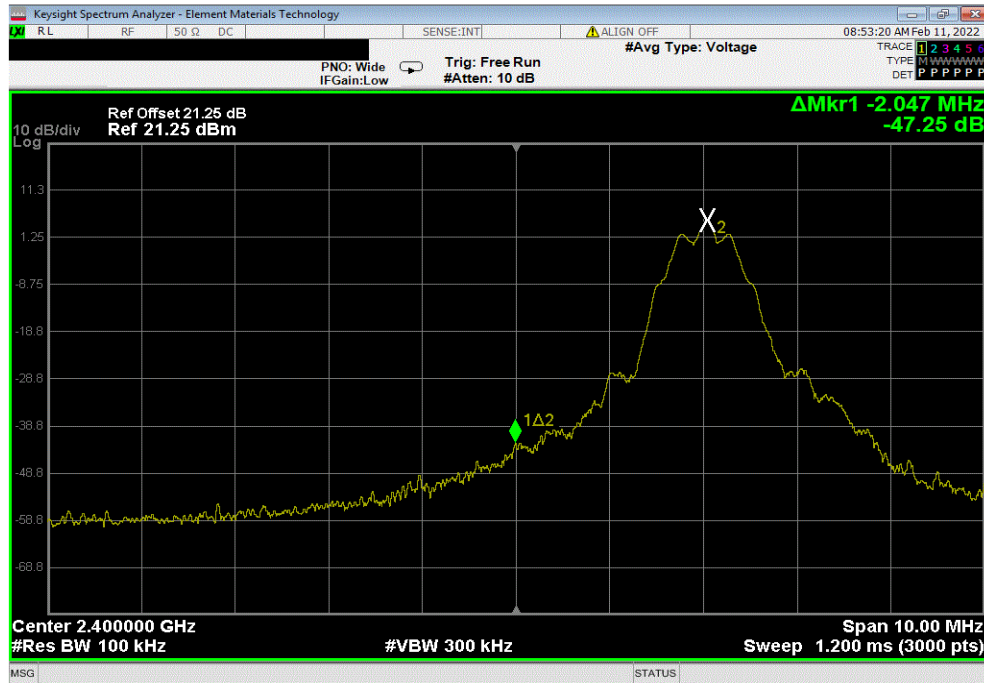
EUT: Radio Thermostat		Work Order: F3EN0068	
Serial Number: DUT 1		Date: 10-Feb-22	
Customer: Quext		Temperature: 21.3 °C	
Attendees: None		Humidity: 24% RH	
Project: None		Barometric Pres.: 1021 mbar	
Tested by: Brandon Hobbs	Power: 110VAC/60Hz	Job Site: TX09	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2022		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	3	Signature 	
		Value (dBc)	Limit ≤ (dBc) Result
BLE/GFSK 125 kbps			
Low Channel, 2402 MHz		-47.25	-20 Pass
High Channel, 2480 MHz		-58.09	-20 Pass
BLE/GFSK 500 kbps			
Low Channel, 2402 MHz		-49.92	-20 Pass
High Channel, 2480 MHz		-59.3	-20 Pass
BLE/GFSK 1 Mbps			
Low Channel, 2402 MHz		-48.63	-20 Pass
High Channel, 2480 MHz		-52.56	-20 Pass
BLE/GFSK 2 Mbps			
Low Channel, 2402 MHz		-33.1	-20 Pass
High Channel, 2480 MHz		-53.04	-20 Pass

BAND EDGE COMPLIANCE

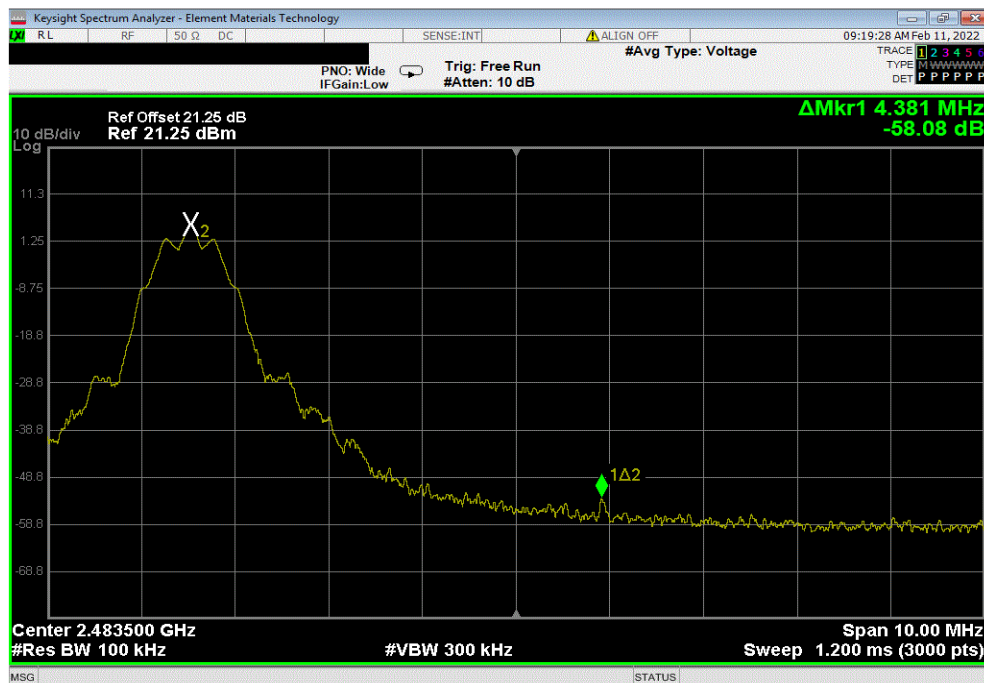


TbTtx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 125 kbps, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-47.25	-20	Pass



BLE/GFSK 125 kbps, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-58.09	-20	Pass

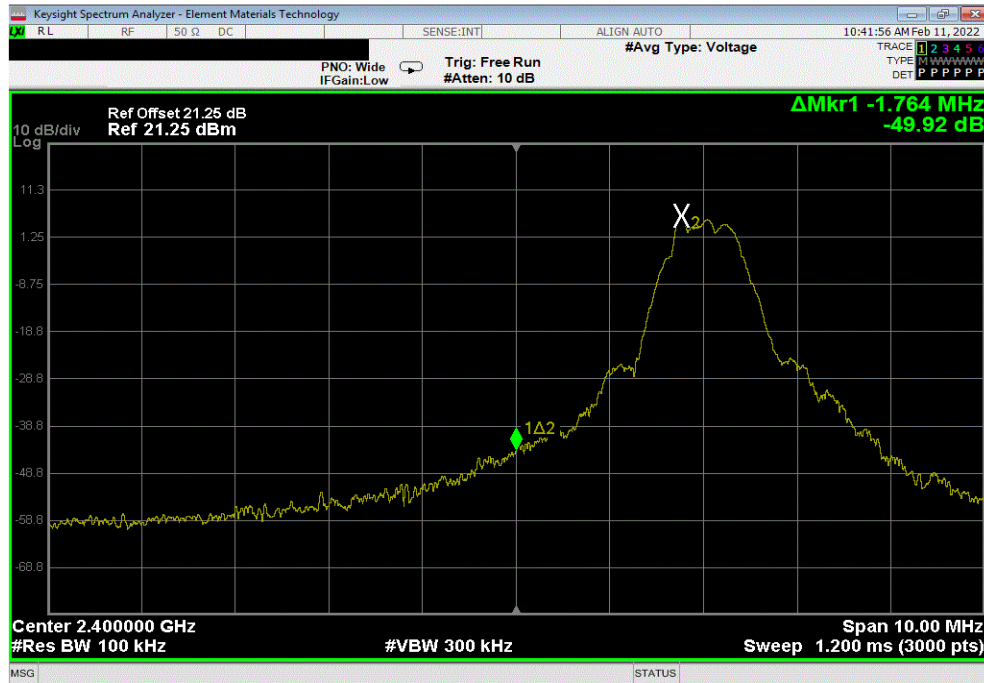


BAND EDGE COMPLIANCE

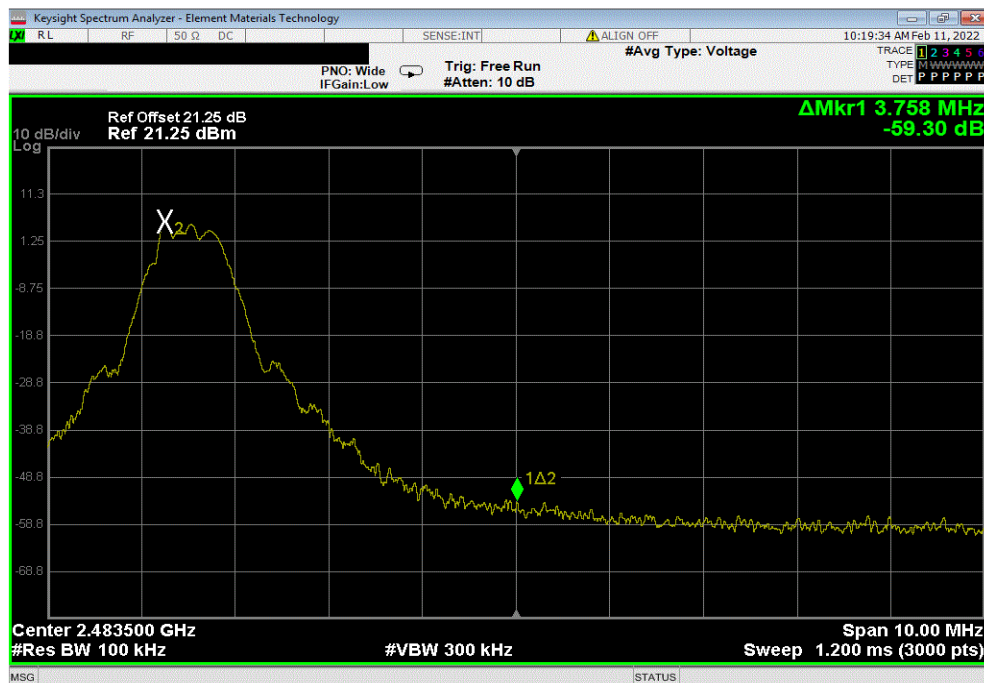


TbTtx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 500 kbps, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-49.92	-20	Pass



BLE/GFSK 500 kbps, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-59.3	-20	Pass

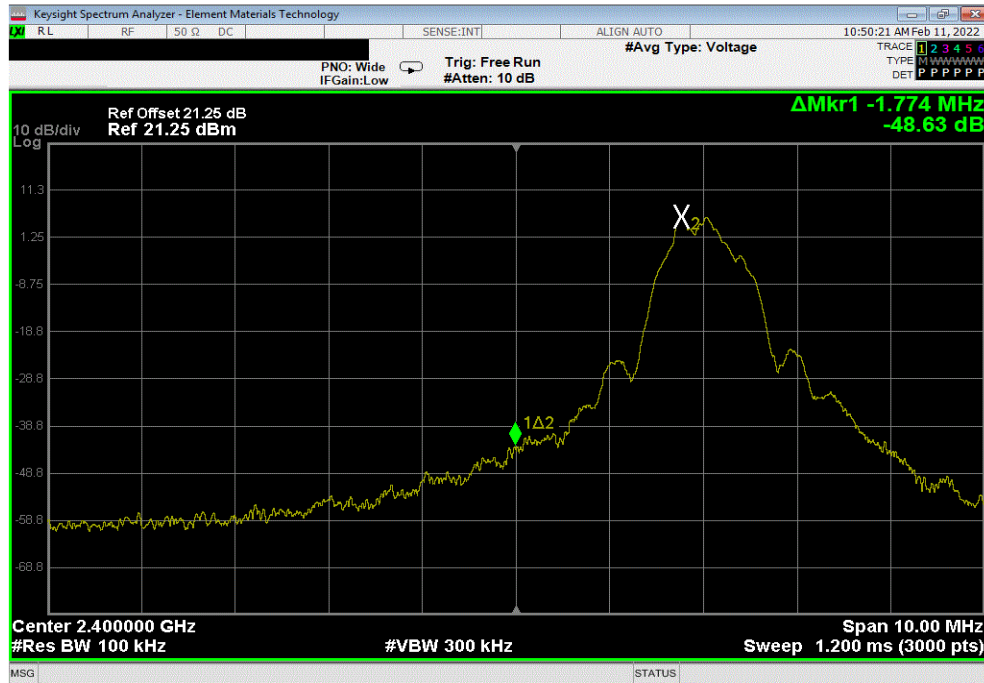


BAND EDGE COMPLIANCE

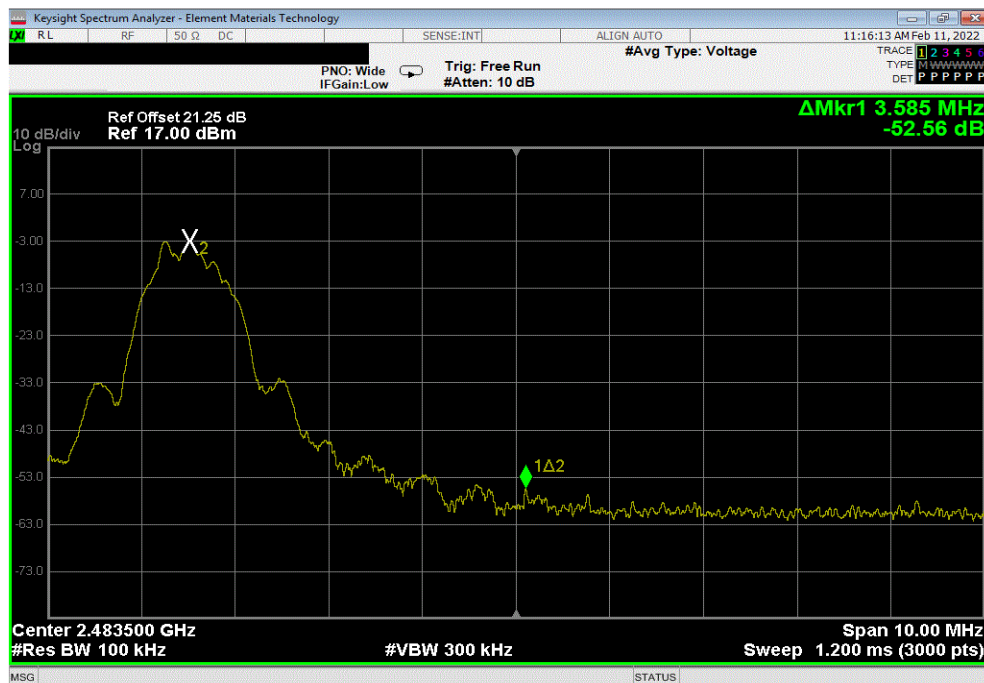


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-48.63	-20	Pass



BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-52.56	-20	Pass

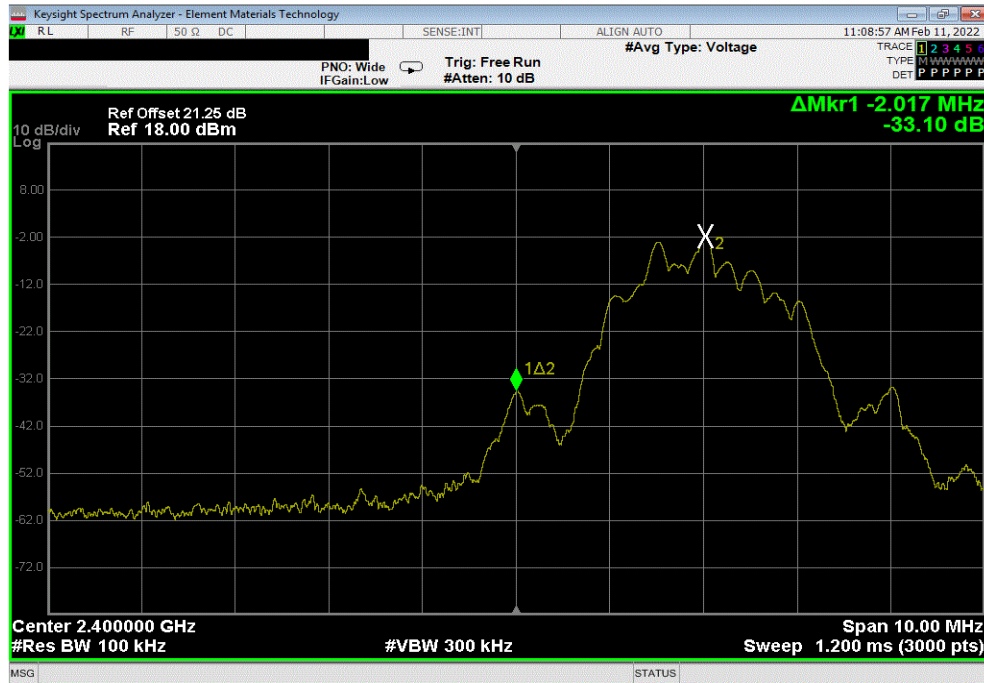


BAND EDGE COMPLIANCE

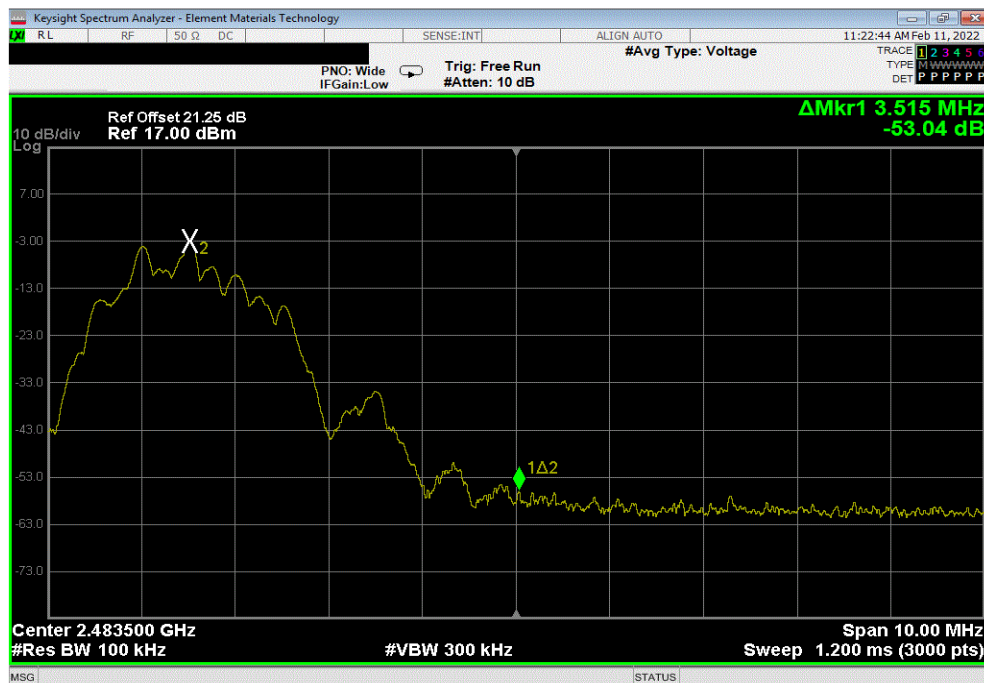


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 2 Mbps, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-33.1	-20	Pass



BLE/GFSK 2 Mbps, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-53.04	-20	Pass



SPURIOUS CONDUCTED EMISSIONS

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TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3379	AMM	2021-09-14	2022-09-14
Cable	UtiFlex Micro-Coax	UFD1150A-1-0720-200200	TXJ	2021-09-13	2022-09-13
Attenuator	Fairview Microwave	SA18E 1913	TZV	2021-09-15	2022-09-15
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2022-01-19	2023-01-19

TEST DESCRIPTION

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.

SPURIOUS CONDUCTED EMISSIONS



TSTx 2021.10.29.2 XMR 2020.12.30.0

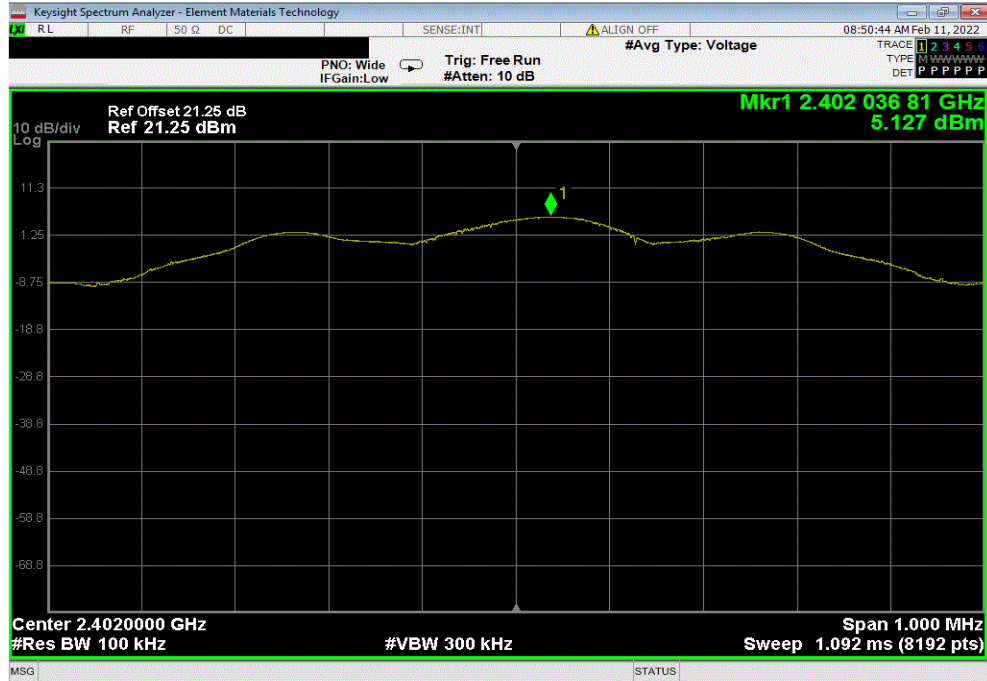
EUT: Radio Thermostat		Work Order: F3EN0068			
Serial Number: DUT 1		Date: 10-Feb-22			
Customer: Quext		Temperature: 20.9 °C			
Attendees: None		Humidity: 24.5% RH			
Project: None		Barometric Pres.: 1021 mbar			
Tested by: Brandon Hobbs		Power: 110VAC/60Hz			
		Job Site: TX09			
TEST SPECIFICATIONS		Test Method			
FCC 15.247:2022		ANSI C63.10:2013			
COMMENTS					
None					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	3	Signature			
	Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 125 kbps					
Low Channel, 2402 MHz	Fundamental	2402.04	N/A	N/A	N/A
Low Channel, 2402 MHz	30 MHz - 12.5 GHz	12008.26	-57.17	-20	Pass
Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24206.45	-56.65	-20	Pass
Mid Channel, 2440 MHz	Fundamental	2440.03	N/A	N/A	N/A
Mid Channel, 2440 MHz	30 MHz - 12.5 GHz	12200.09	-56.2	-20	Pass
Mid Channel, 2440 MHz	12.5 GHz - 25 GHz	24287.33	-56.26	-20	Pass
High Channel, 2480 MHz	Fundamental	2480.03	N/A	N/A	N/A
High Channel, 2480 MHz	30 MHz - 12.5 GHz	12399.52	-57.42	-20	Pass
High Channel, 2480 MHz	12.5 GHz - 25 GHz	24487.24	-56.36	-20	Pass
BLE/GFSK 500 kbps					
Low Channel, 2402 MHz	Fundamental	2401.75	N/A	N/A	N/A
Low Channel, 2402 MHz	30 MHz - 12.5 GHz	12008.26	-55.63	-20	Pass
Low Channel, 2402 MHz	12.5 GHz - 25 GHz	23902.76	-56.91	-20	Pass
Mid Channel, 2440 MHz	Fundamental	2439.75	N/A	N/A	N/A
Mid Channel, 2440 MHz	30 MHz - 12.5 GHz	12198.56	-52.77	-20	Pass
Mid Channel, 2440 MHz	12.5 GHz - 25 GHz	23701.32	-56.08	-20	Pass
High Channel, 2480 MHz	Fundamental	2479.75	N/A	N/A	N/A
High Channel, 2480 MHz	30 MHz - 12.5 GHz	12399.52	-55.32	-20	Pass
High Channel, 2480 MHz	12.5 GHz - 25 GHz	23940.91	-57.01	-20	Pass
BLE/GFSK 1 Mbps					
Low Channel, 2402 MHz	Fundamental	2401.75	N/A	N/A	N/A
Low Channel, 2402 MHz	30 MHz - 12.5 GHz	12008.26	-54.93	-20	Pass
Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24055.37	-56.57	-20	Pass
Mid Channel, 2440 MHz	Fundamental	2439.75	N/A	N/A	N/A
Mid Channel, 2440 MHz	30 MHz - 12.5 GHz	12198.56	-56.04	-20	Pass
Mid Channel, 2440 MHz	12.5 GHz - 25 GHz	24066.05	-56.35	-20	Pass
High Channel, 2480 MHz	Fundamental	2479.75	N/A	N/A	N/A
High Channel, 2480 MHz	30 MHz - 12.5 GHz	3816.22	-49.72	-20	Pass
High Channel, 2480 MHz	12.5 GHz - 25 GHz	24000.43	-48.02	-20	Pass
BLE/GFSK 2 Mbps					
Low Channel, 2402 MHz	Fundamental	2402.01	N/A	N/A	N/A
Low Channel, 2402 MHz	30 MHz - 12.5 GHz	3848.19	-51.65	-20	Pass
Low Channel, 2402 MHz	12.5 GHz - 25 GHz	19178.06	-49.4	-20	Pass
Mid Channel, 2440 MHz	Fundamental	2440.03	N/A	N/A	N/A
Mid Channel, 2440 MHz	30 MHz - 12.5 GHz	12197.04	-55.26	-20	Pass
Mid Channel, 2440 MHz	12.5 GHz - 25 GHz	24044.68	-56.06	-20	Pass
High Channel, 2480 MHz	Fundamental	2480.01	N/A	N/A	N/A
High Channel, 2480 MHz	30 MHz - 12.5 GHz	3702.04	-50.95	-20	Pass
High Channel, 2480 MHz	12.5 GHz - 25 GHz	23734.89	-48.61	-20	Pass

SPURIOUS CONDUCTED EMISSIONS

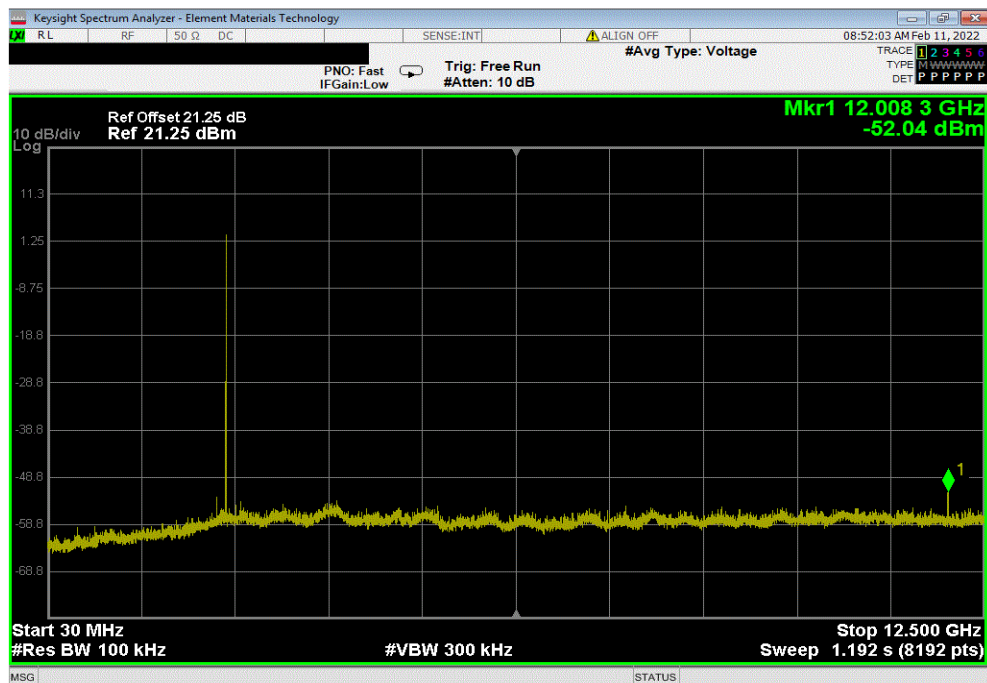


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 125 kbps, Low Channel, 2402 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2402.04	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	12008.26	-57.17	-20	Pass		

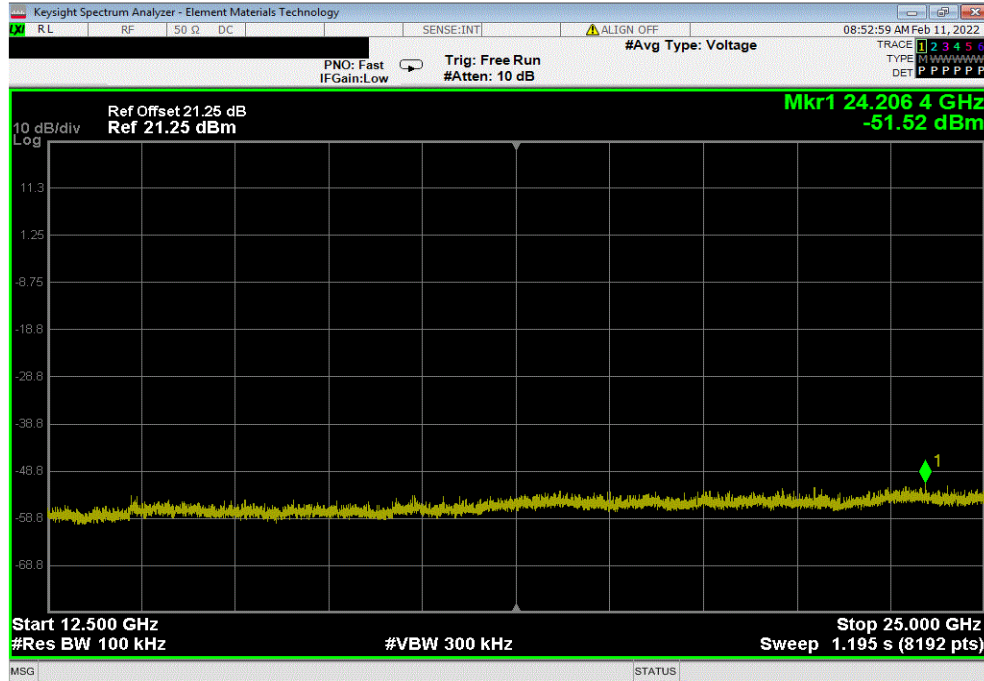


SPURIOUS CONDUCTED EMISSIONS

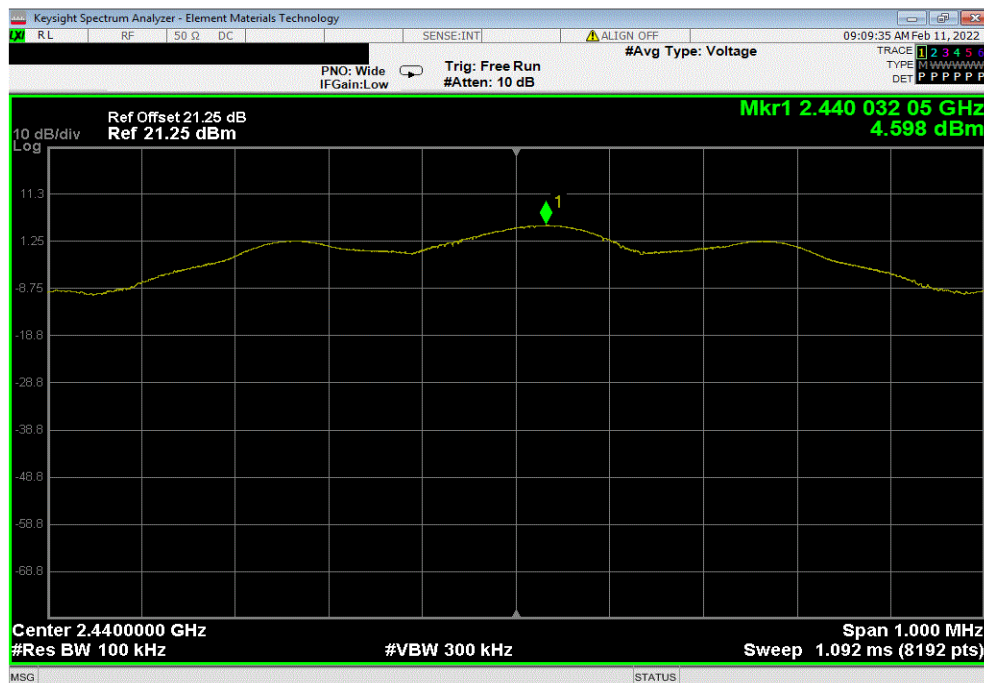


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 125 kbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24206.45	-56.65	-20	Pass	



BLE/GFSK 125 kbps, Mid Channel, 2440 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2440.03	N/A	N/A	N/A	

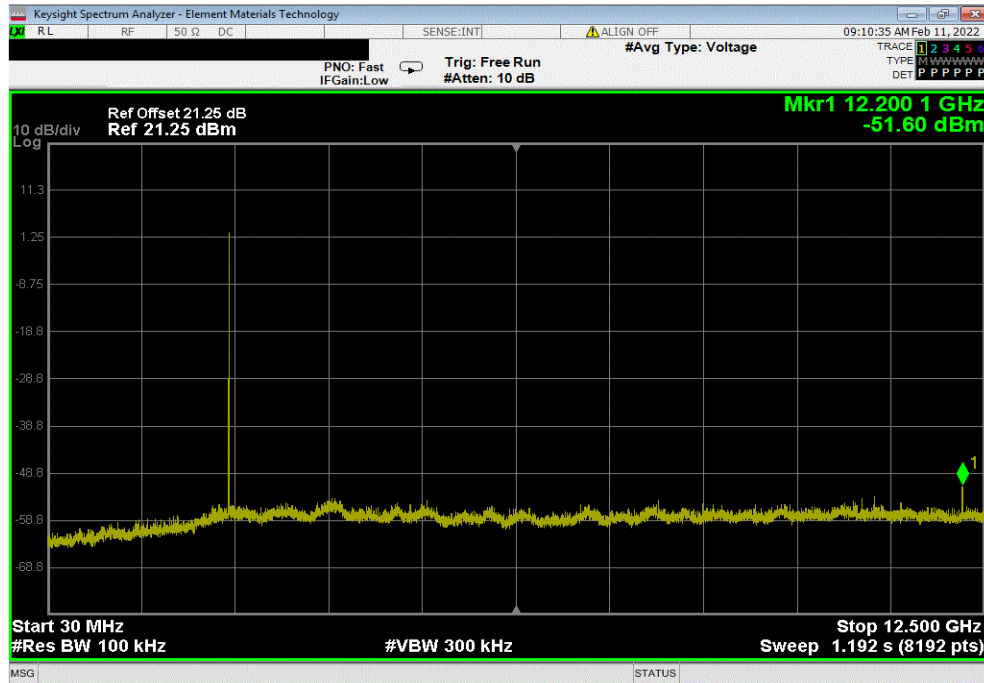


SPURIOUS CONDUCTED EMISSIONS

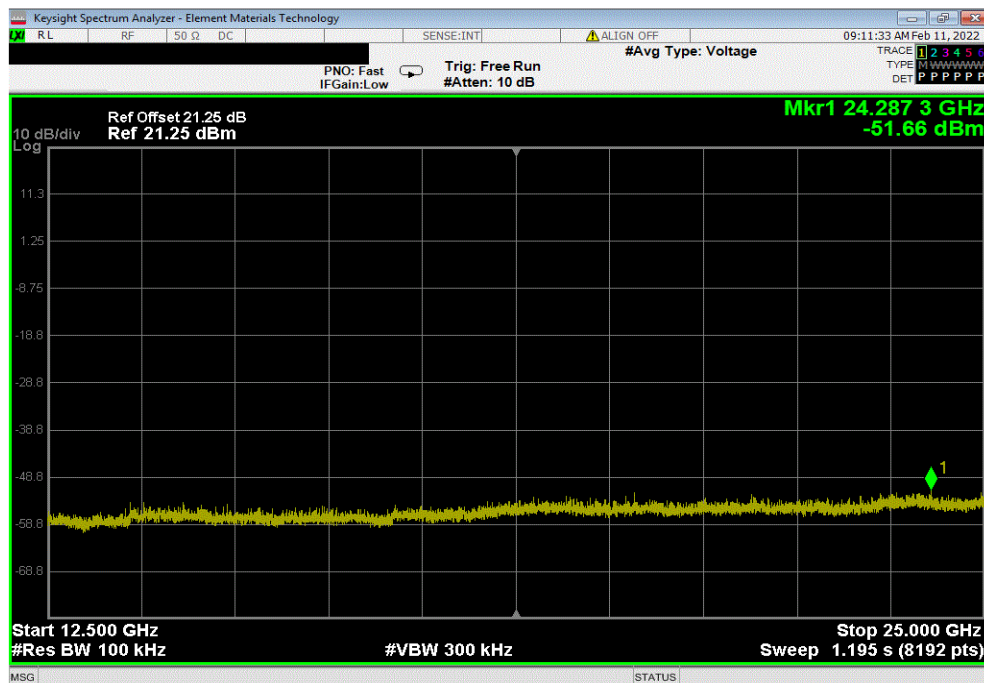


TbTtx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 125 kbps, Mid Channel, 2440 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	12200.09	-56.2	-20	Pass	



BLE/GFSK 125 kbps, Mid Channel, 2440 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24287.33	-56.26	-20	Pass	

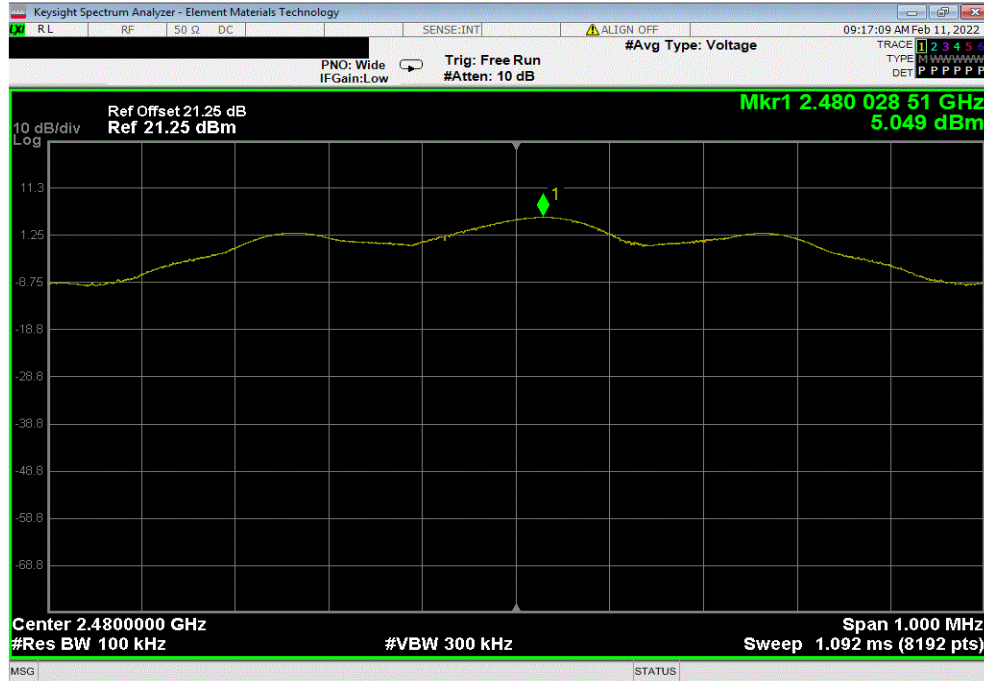


SPURIOUS CONDUCTED EMISSIONS

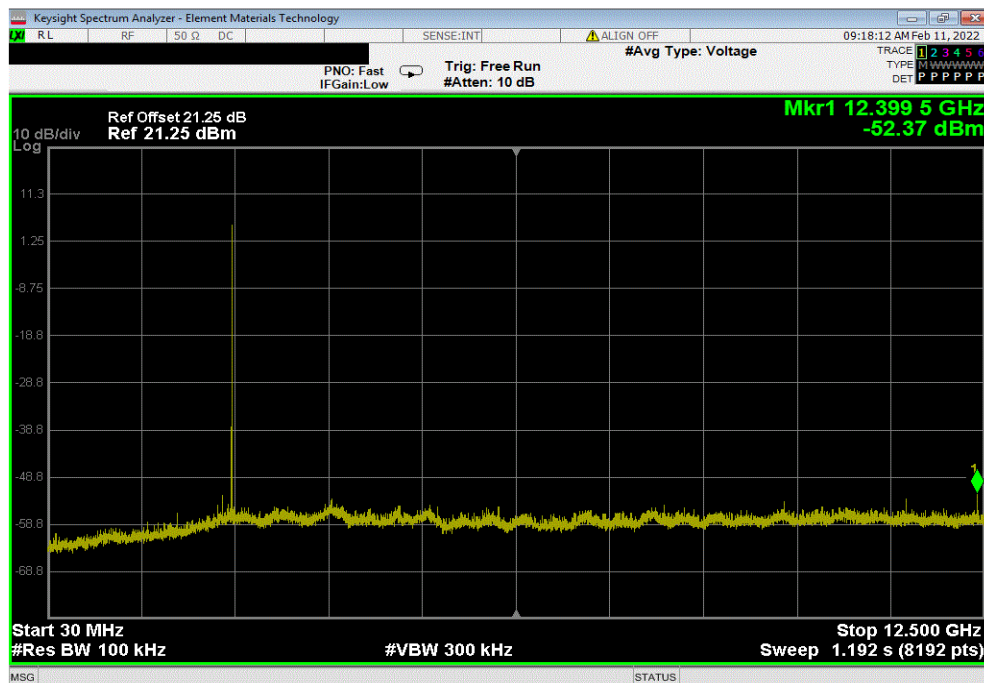


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 125 kbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2480.03	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	12399.52	-57.42	-20	Pass	

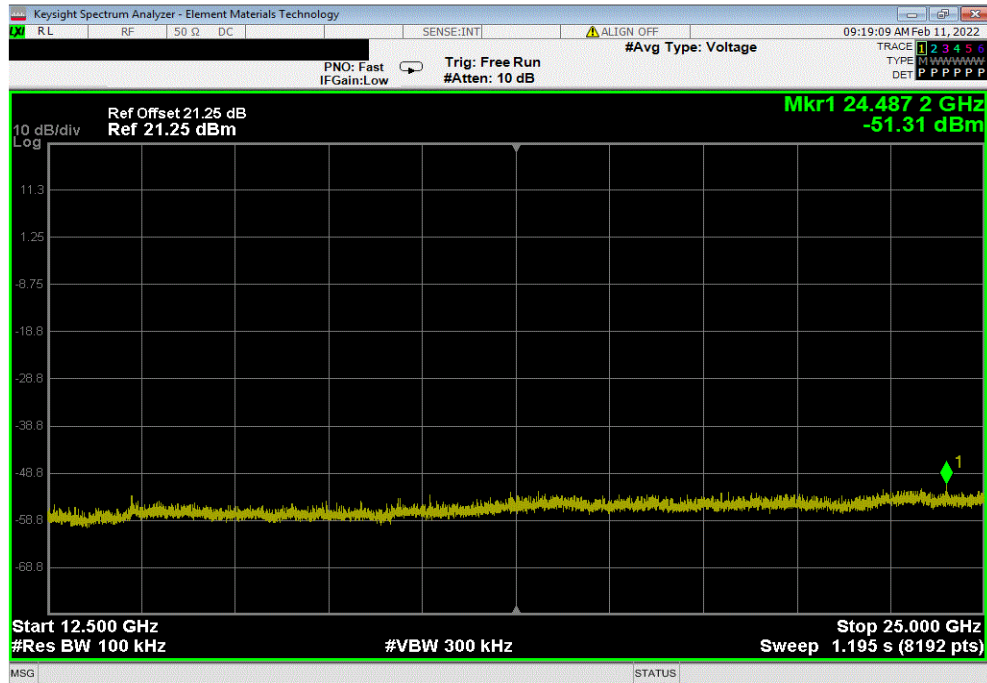


SPURIOUS CONDUCTED EMISSIONS

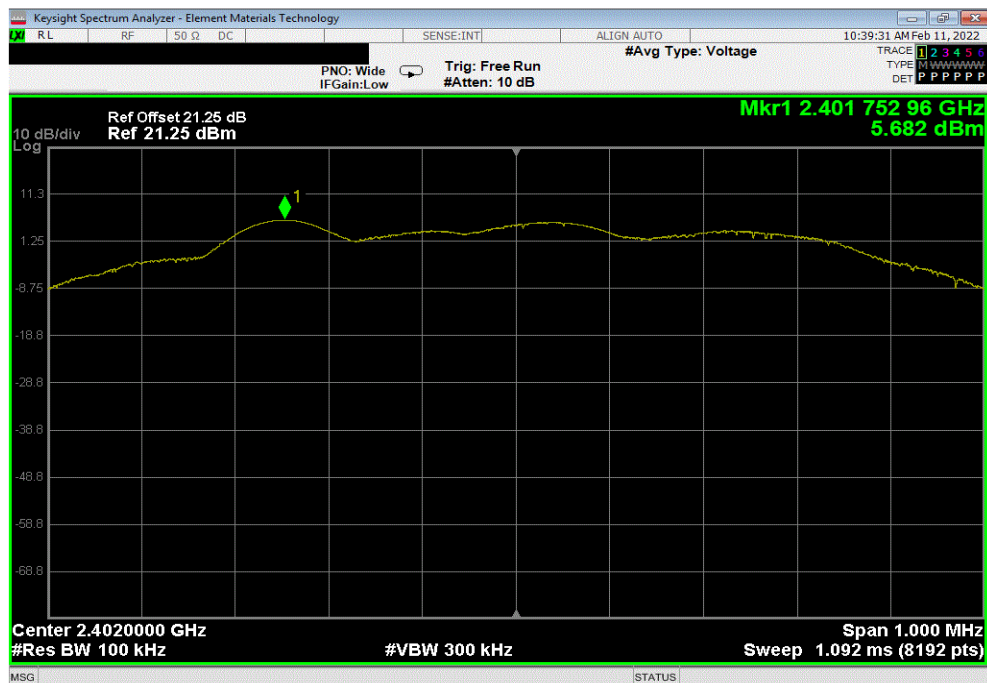


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 125 kbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24487.24	-56.36	-20	Pass	



BLE/GFSK 500 kbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2401.75	N/A	N/A	N/A	

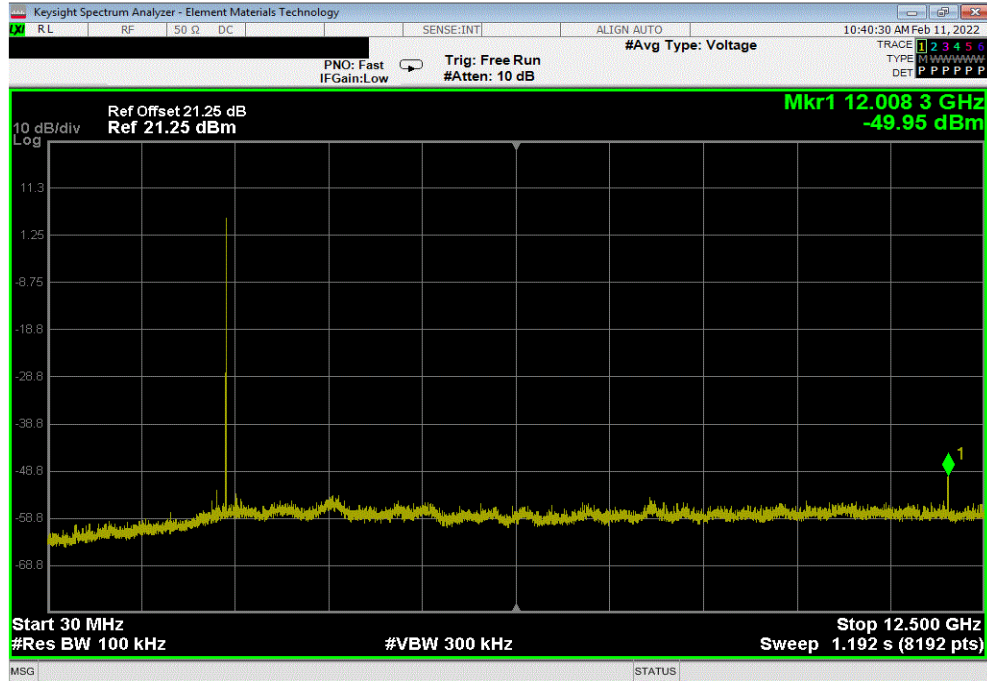


SPURIOUS CONDUCTED EMISSIONS

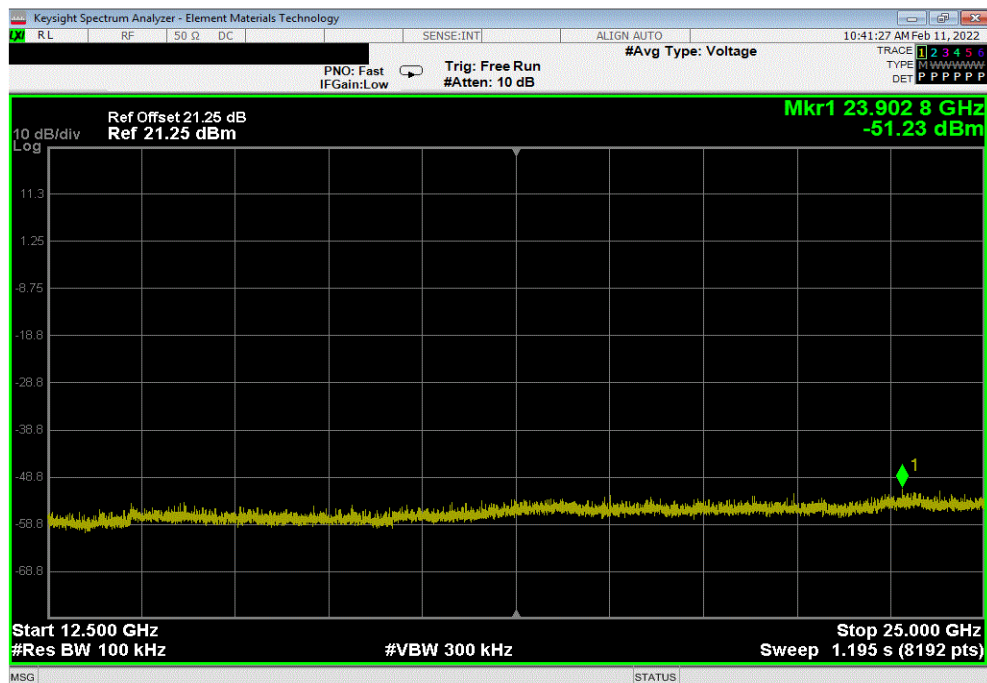


TbTtx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 500 kbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	12008.26	-55.63	-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	23902.76	-56.91	-20	Pass	

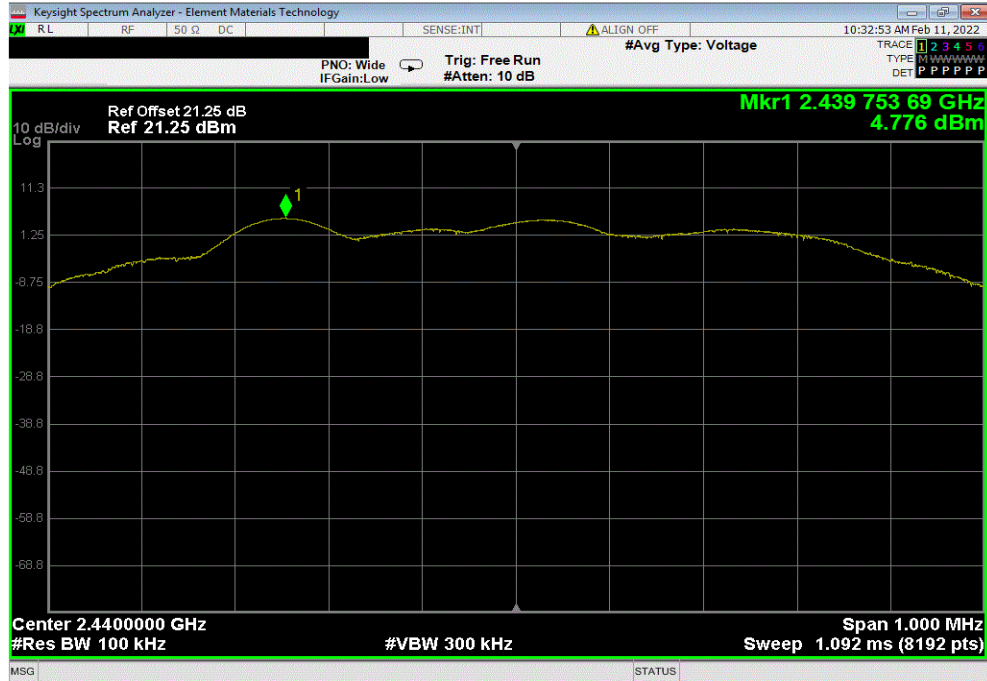


SPURIOUS CONDUCTED EMISSIONS

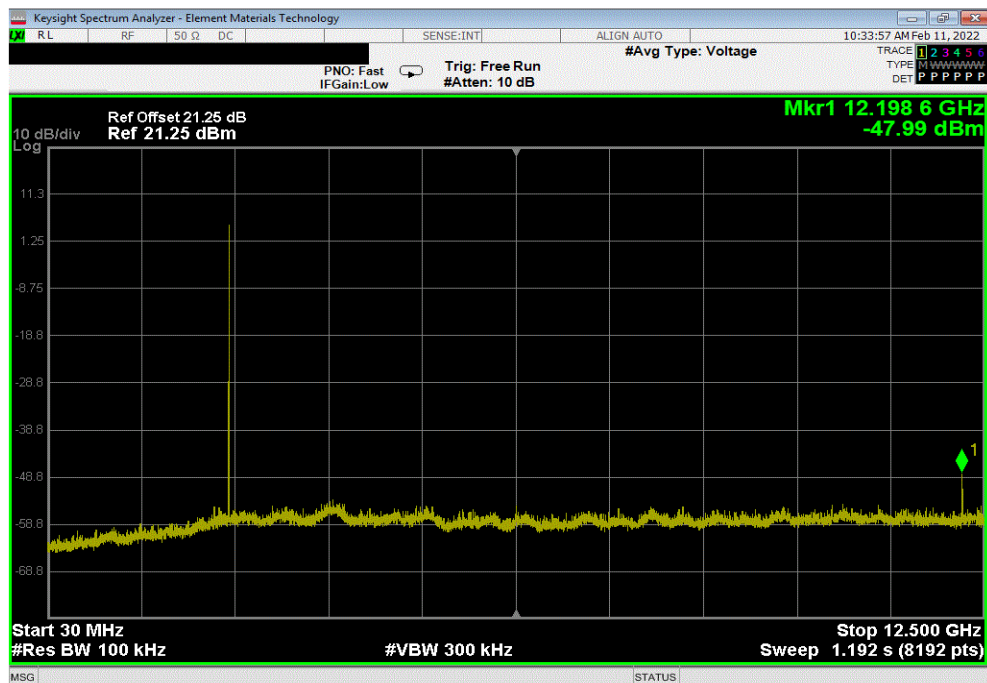


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 500 kbps, Mid Channel, 2440 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2439.75	N/A	N/A	N/A		



BLE/GFSK 500 kbps, Mid Channel, 2440 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz	12198.56	-52.77	-20	Pass		

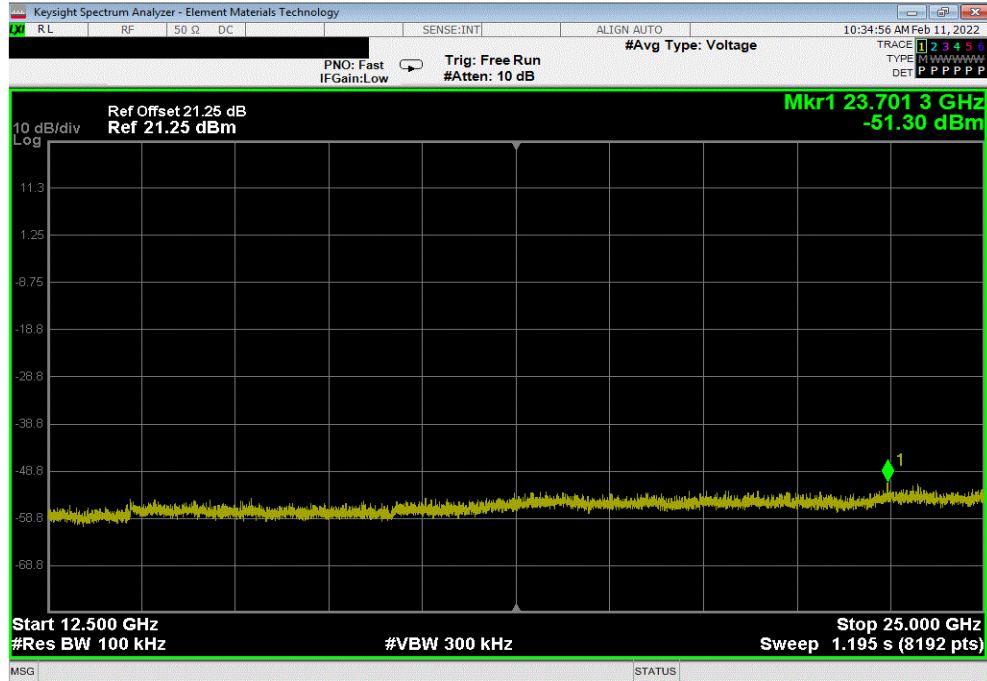


SPURIOUS CONDUCTED EMISSIONS

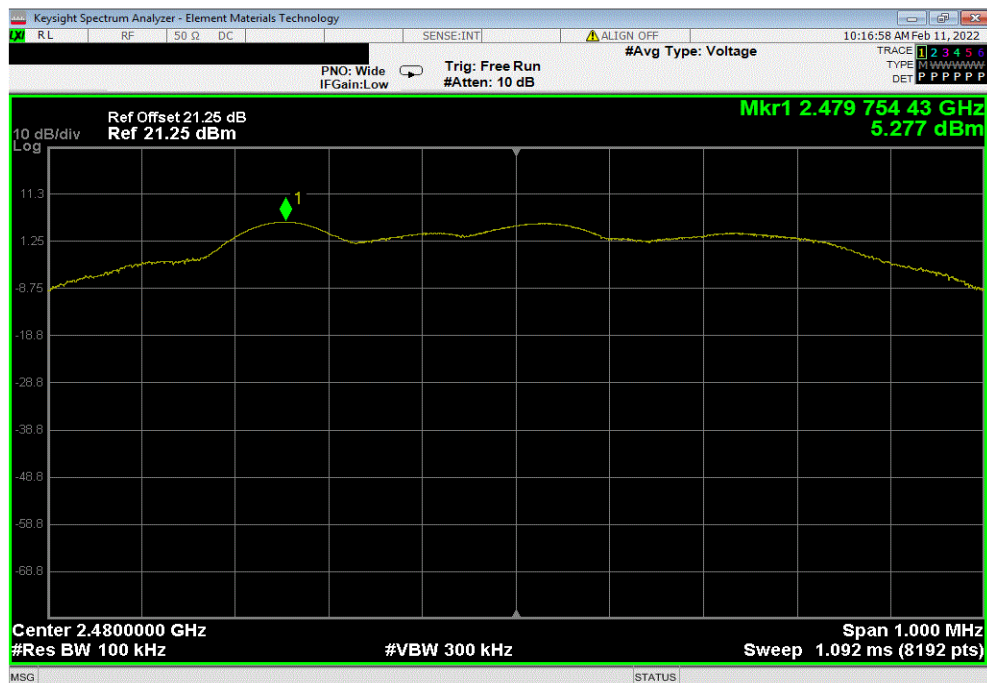


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 500 kbps, Mid Channel, 2440 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	23701.32	-56.08	-20	Pass	



BLE/GFSK 500 kbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2479.75	N/A	N/A	N/A	

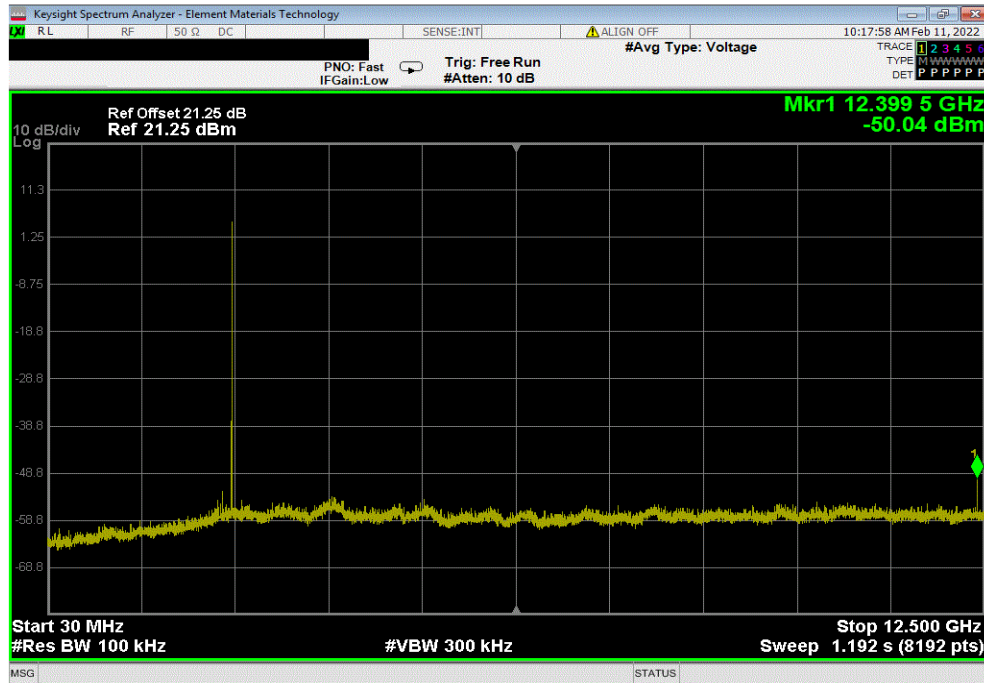


SPURIOUS CONDUCTED EMISSIONS

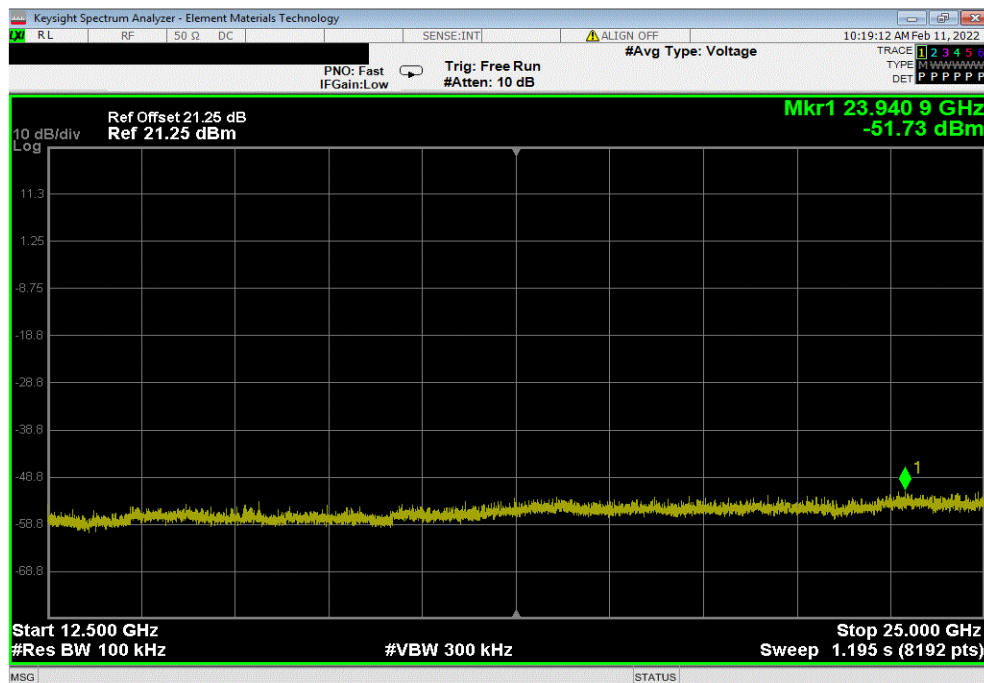


TbTtX 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 500 kbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	12399.52	-55.32	-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	23940.91	-57.01	-20	Pass	

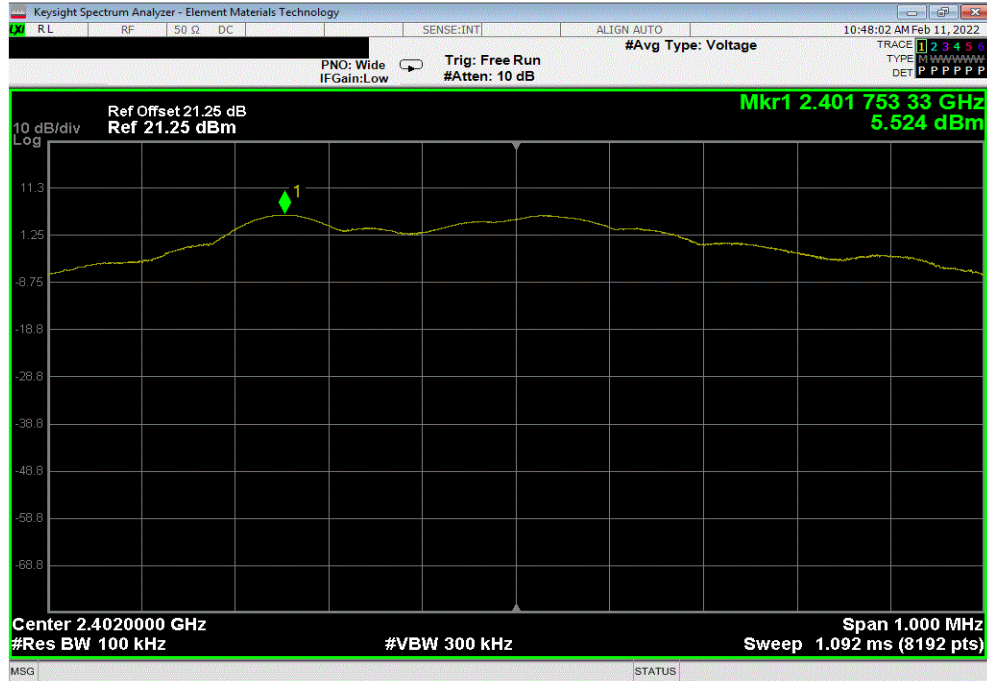


SPURIOUS CONDUCTED EMISSIONS

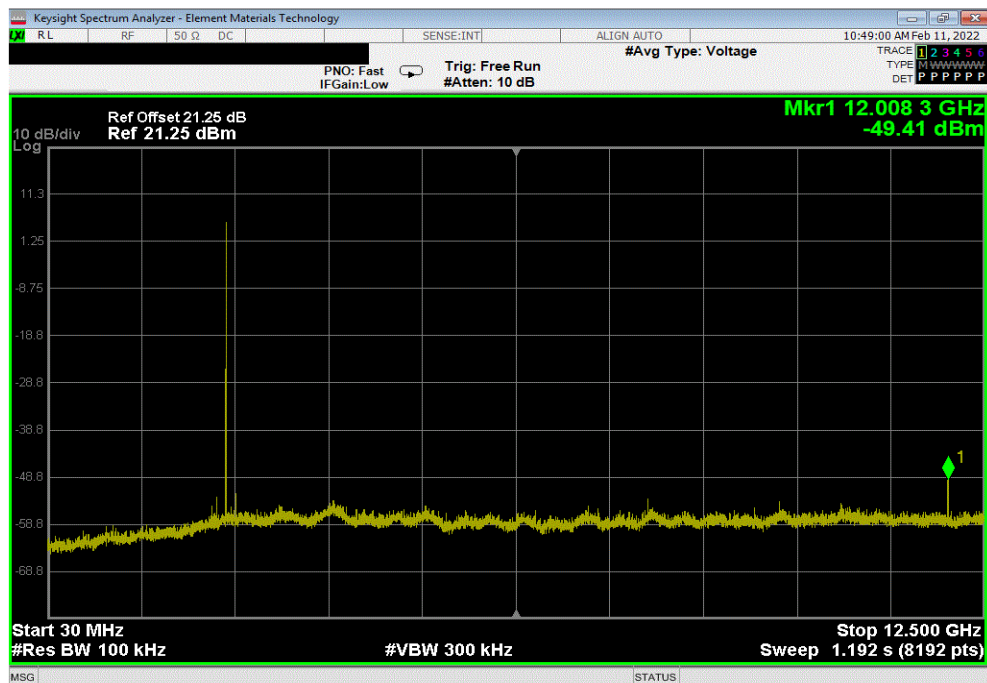


TbTtX 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2401.75	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	12008.26	-54.93	-20	Pass		

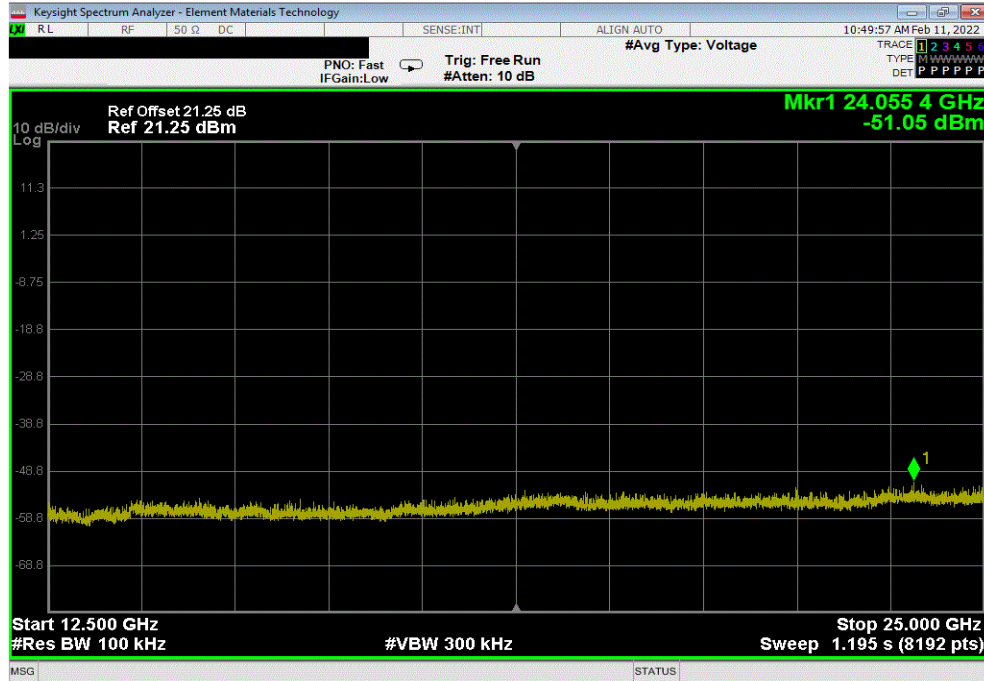


SPURIOUS CONDUCTED EMISSIONS

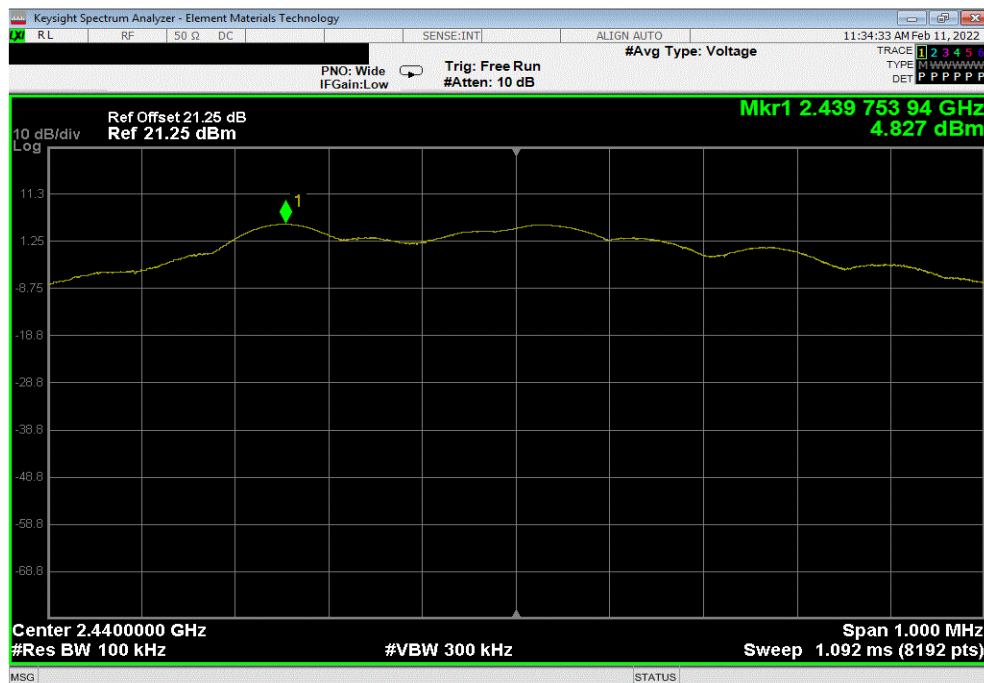


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24055.37	-56.57	-20	Pass	



BLE/GFSK 1 Mbps, Mid Channel, 2440 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2439.75	N/A	N/A	N/A	

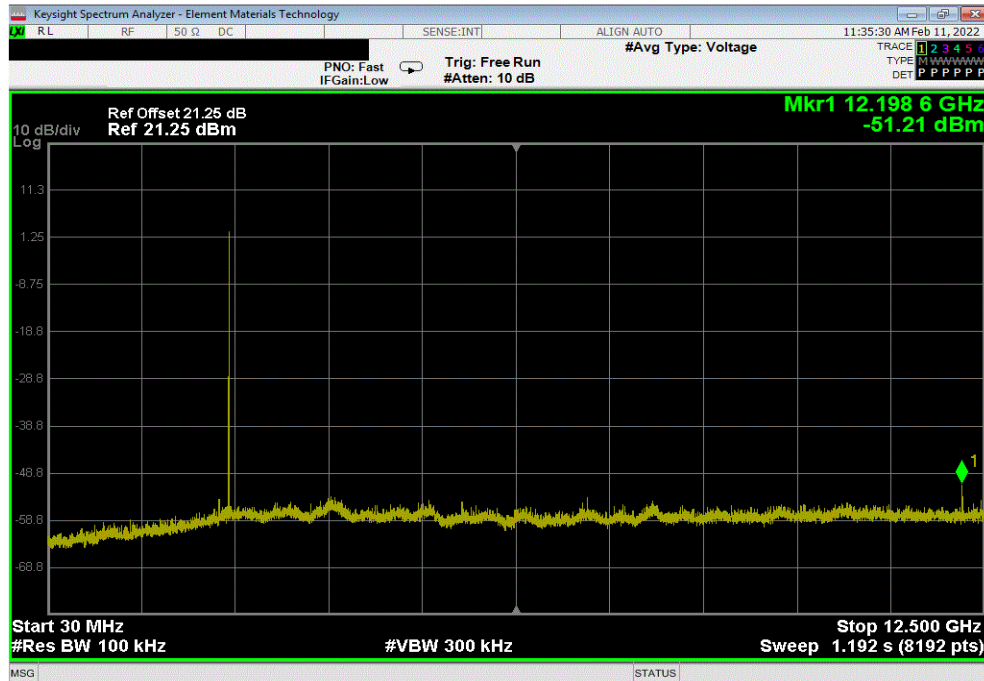


SPURIOUS CONDUCTED EMISSIONS

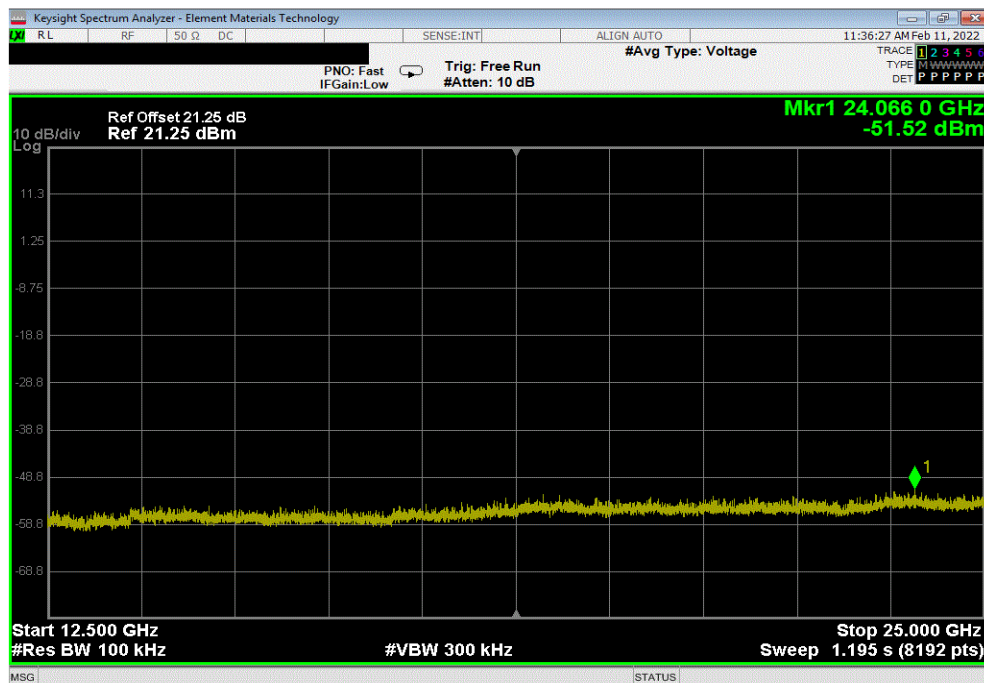


TbTtx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 1 Mbps, Mid Channel, 2440 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	12198.56	-56.04	-20	Pass	



BLE/GFSK 1 Mbps, Mid Channel, 2440 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24066.05	-56.35	-20	Pass	

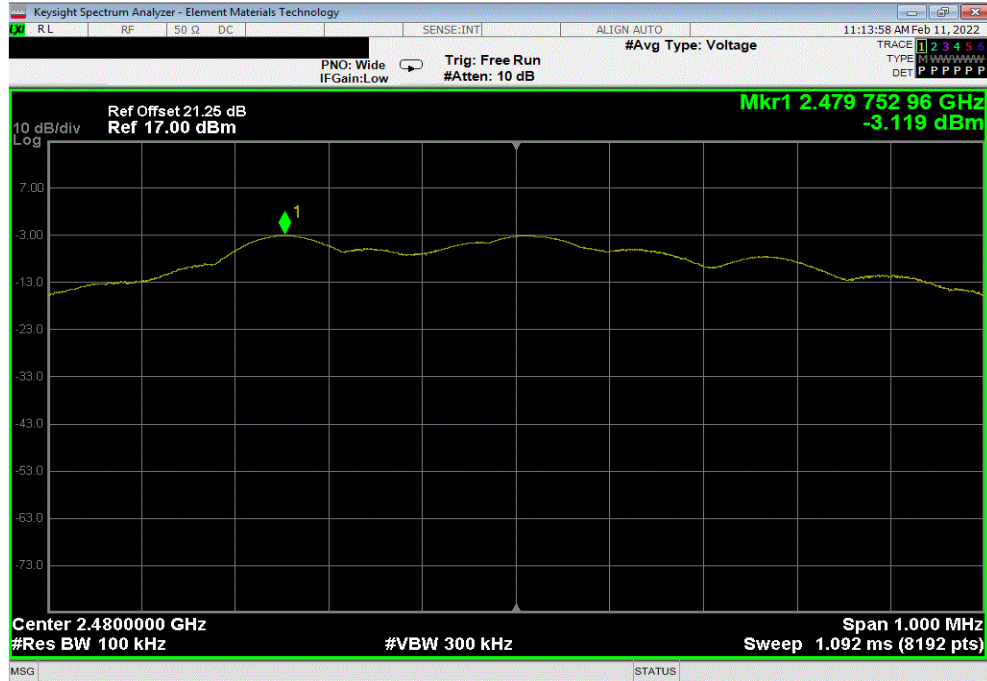


SPURIOUS CONDUCTED EMISSIONS

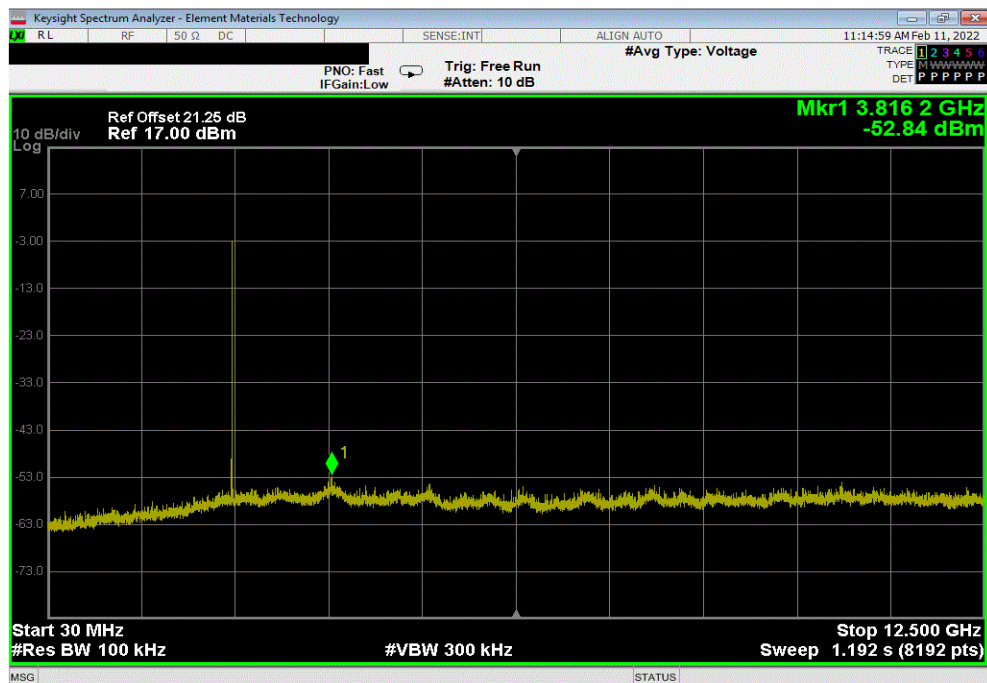


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2479.75	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	3816.22	-49.72	-20	Pass		

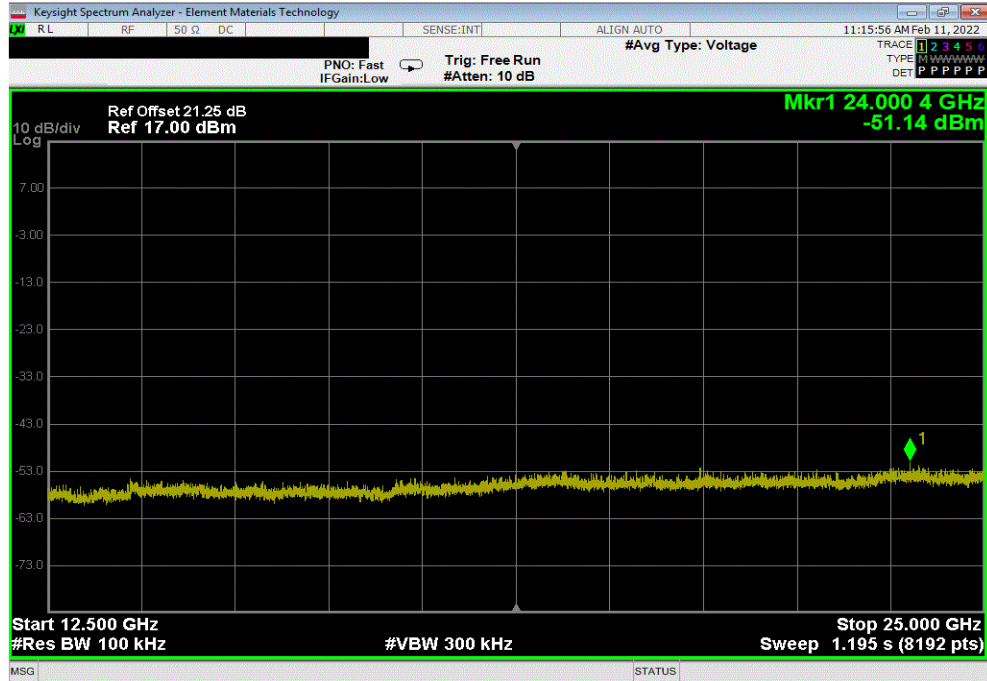


SPURIOUS CONDUCTED EMISSIONS

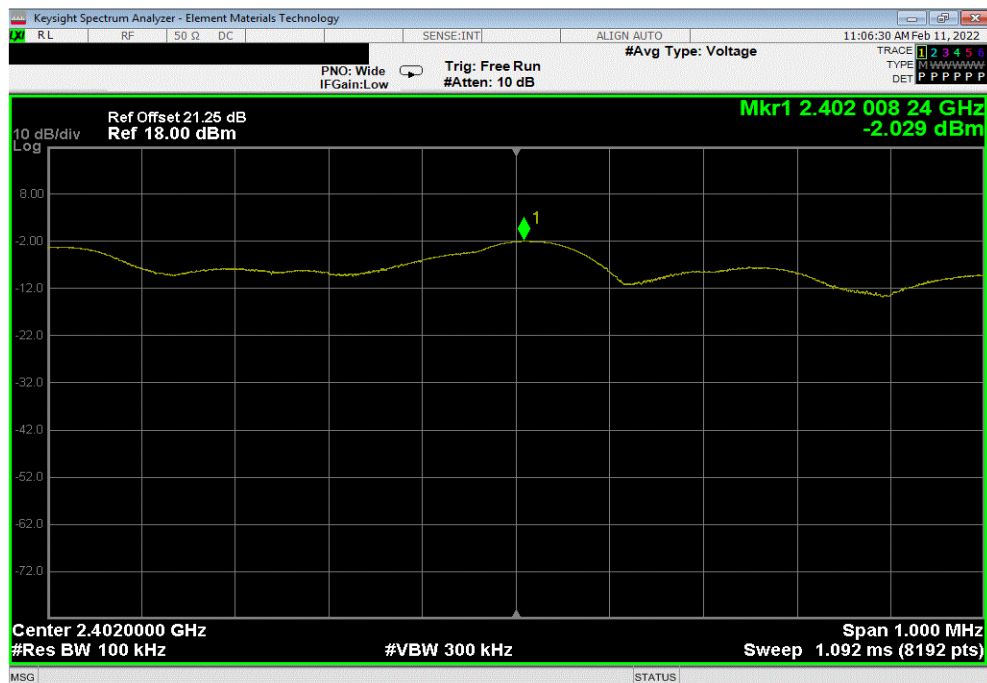


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24000.43	-48.02	-20	Pass	



BLE/GFSK 2 Mbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2402.01	N/A	N/A	N/A	

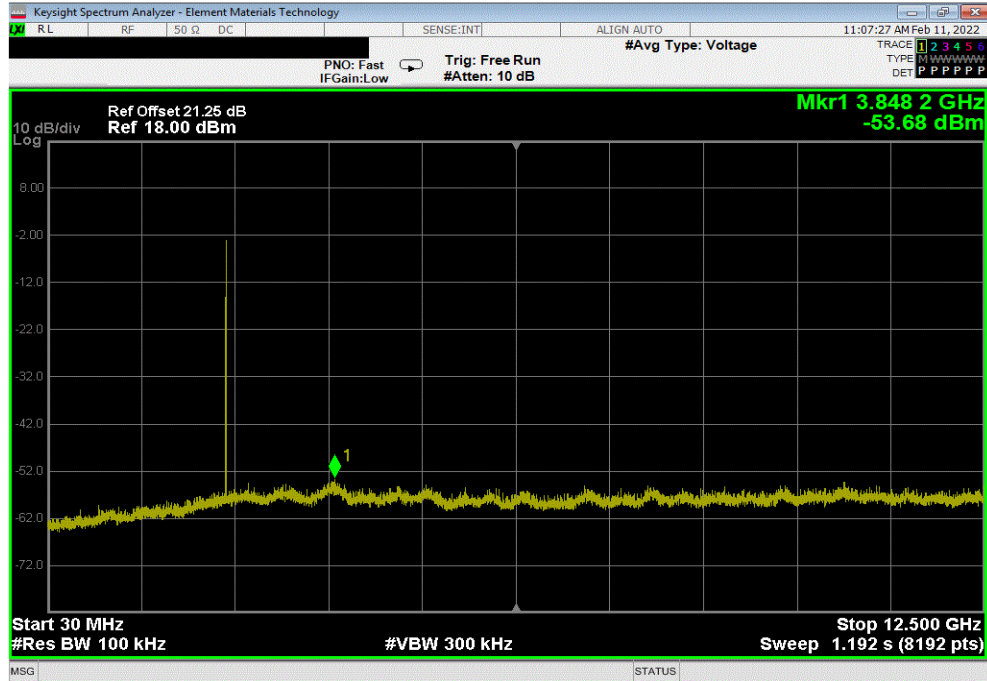


SPURIOUS CONDUCTED EMISSIONS

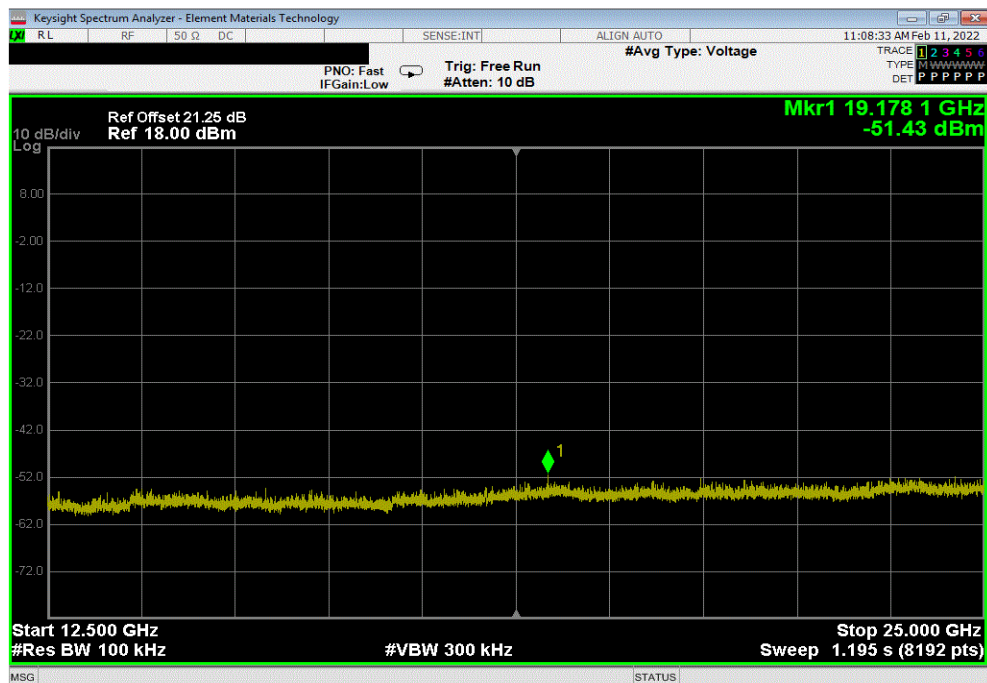


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 2 Mbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	3848.19	-51.65	-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	19178.06	-49.4	-20	Pass	

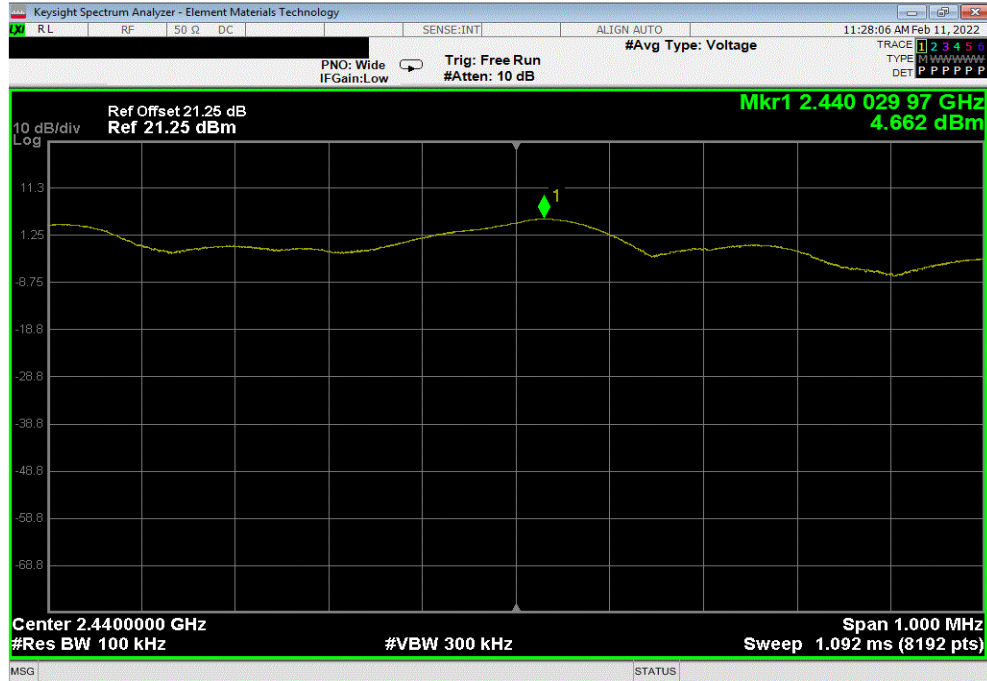


SPURIOUS CONDUCTED EMISSIONS

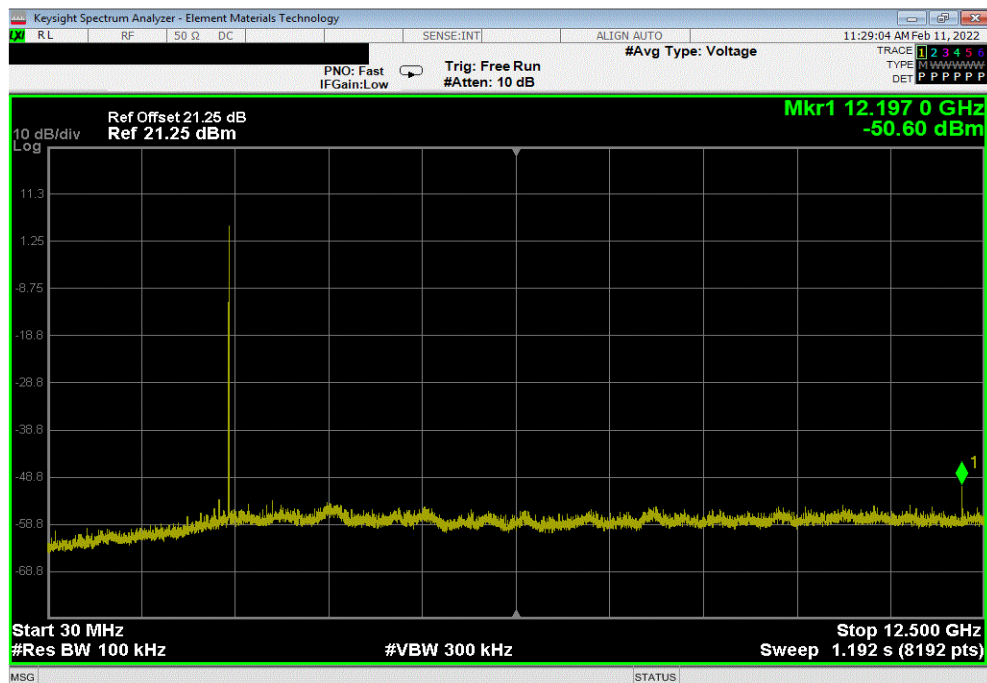


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 2 Mbps, Mid Channel, 2440 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2440.03	N/A	N/A	N/A		



BLE/GFSK 2 Mbps, Mid Channel, 2440 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz	12197.04	-55.26	-20	Pass		

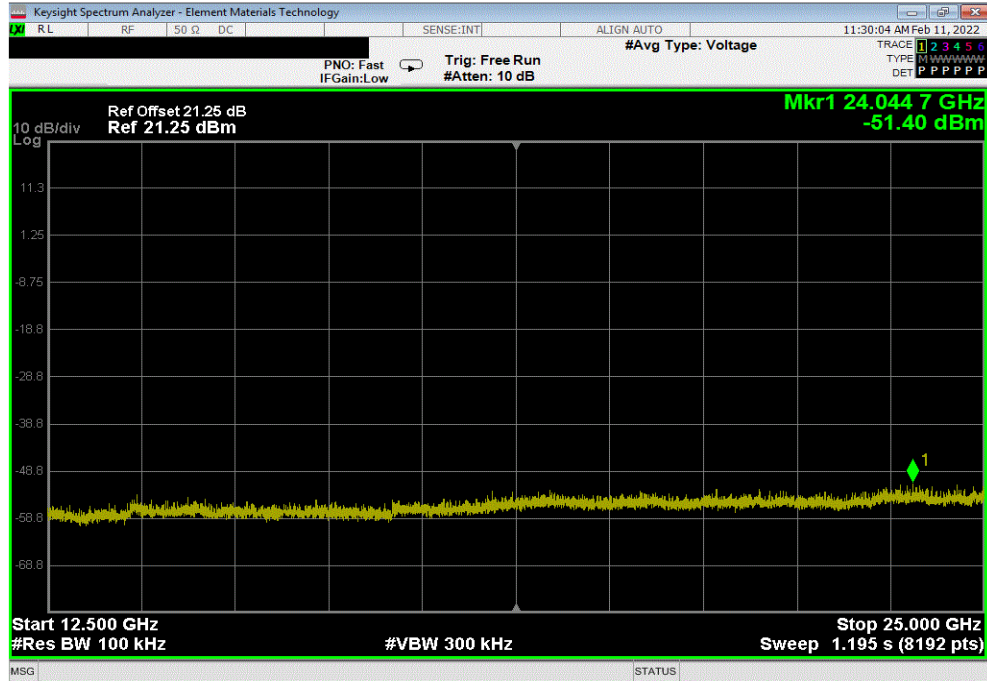


SPURIOUS CONDUCTED EMISSIONS

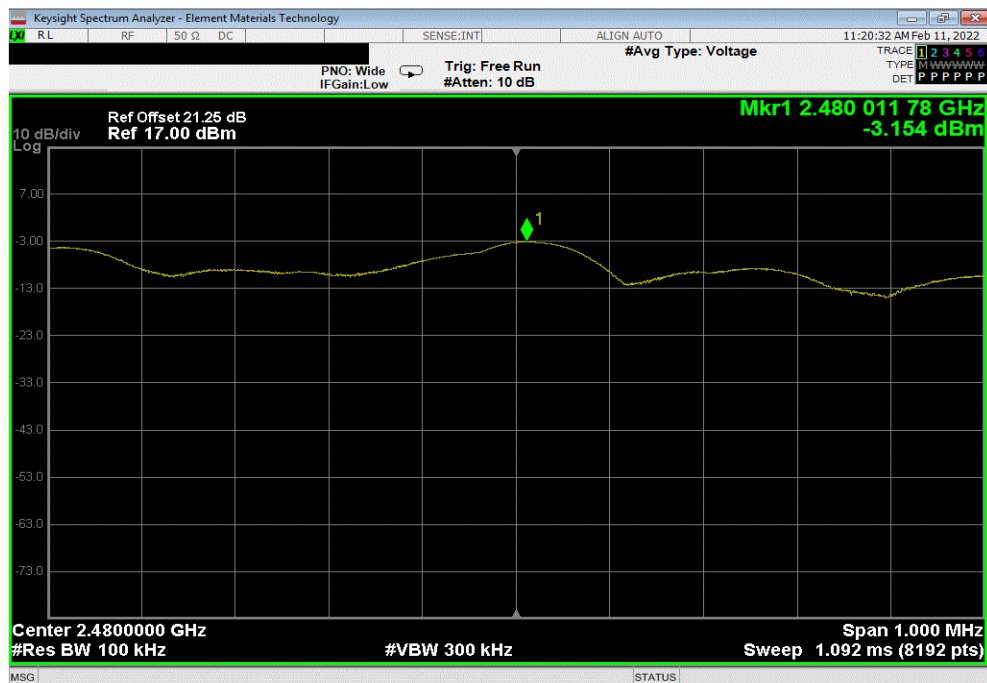


TbTx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 2 Mbps, Mid Channel, 2440 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24044.68	-56.06	-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	

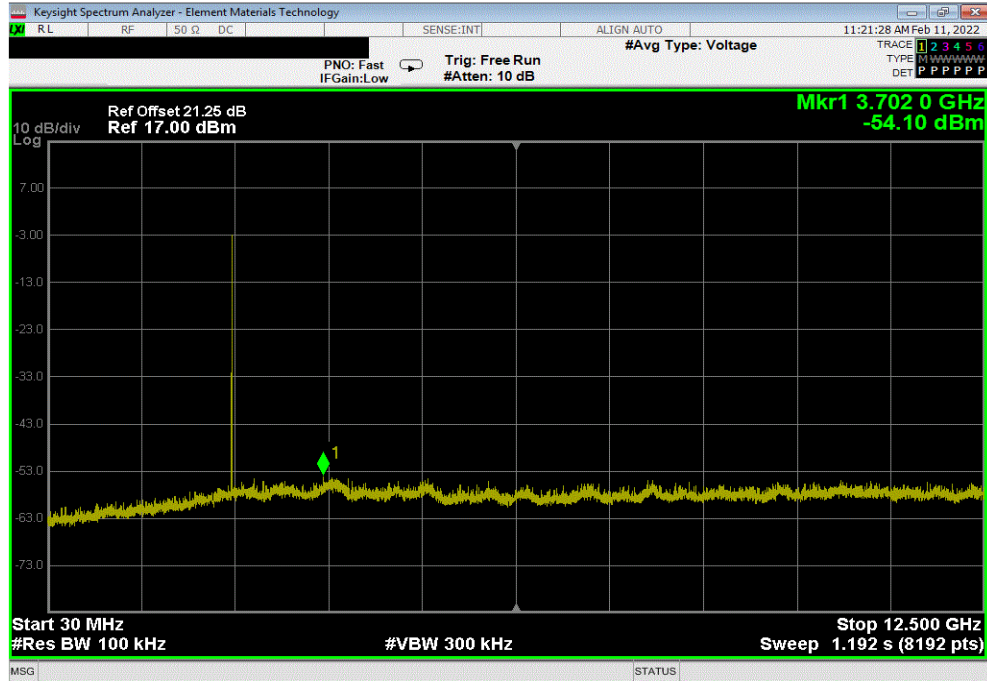


SPURIOUS CONDUCTED EMISSIONS

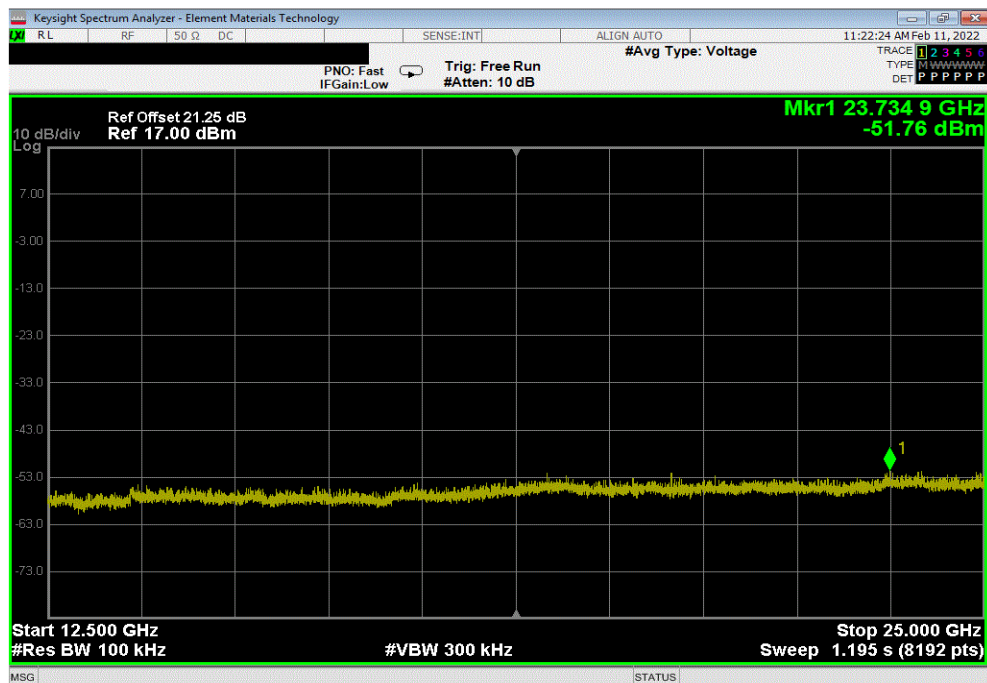


TbTtx 2021.10.29.2 XMt 2020.12.30.0

BLE/GFSK 2 Mbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	3702.04	-50.95	-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	23734.89	-48.61	-20	Pass	



SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2021.03.17.0

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. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

CHANNEL OF OPERATION

BLE, Tx Low Channel 2402 MHz, Power Level 8 dBm

BLE, Tx Mid Channel 2440 MHz, Power Level 7 dBm

BLE, Tx High Channel 2480 MHz, Power Level 8 dBm

MODE OF OPERATION

125 kbps Data Rate

500 kbps Data Rate

1 Mbps Data Rate

2 Mbps Data Rate

POWER SETTINGS INVESTIGATED

3.0VDC via Battery

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

F3EN0068 - 4

F3EN0068 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 MHz
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SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Amplifier - Pre-Amplifier	Fairview Microwave	FMAM63001	PAS	2021-05-24	2022-05-24
Cable	Northwest EMC	RE 9kHz - 1GHz	TXB	2021-05-24	2022-05-24
Antenna - Biconilog	ETS Lindgren	3143B	AYF	2020-06-25	2022-06-25
Amplifier - Pre-Amplifier	Miteq	JSDWK42-18004000-60-5P	PAM	2021-09-15	2022-09-15
Cable	Northwest EMC	18-40GHz	TXE	2021-09-13	2022-09-13
Antenna - Double Ridge	A.H. Systems, Inc.	SAS-574	AXW	2020-09-02	2022-09-02
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	PAL	2021-09-13	2022-09-13
Antenna - Standard Gain	ETS Lindgren	3160-08	AJG	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	PAK	2021-09-13	2022-09-13
Cable	Northwest EMC	8-18GHz	TXD	2021-04-30	2022-04-30
Antenna - Standard Gain	ETS Lindgren	3160-07	AJF	NCR	NCR
Filter - Low Pass	Micro-Tronics	LPM50004	HHV	2021-07-27	2022-07-27
Filter - High Pass	Micro-Tronics	HPM50111	HGC	2021-03-09	2022-03-09
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAJ	2021-05-24	2022-05-24
Cable	Northwest EMC	1-8.2 GHz	TXC	2021-05-24	2022-05-24
Antenna - Double Ridge	ETS Lindgren	3115	AJL	2020-10-20	2022-10-20
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2021-03-11	2022-03-11

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 $10 \cdot \log(1/dc)$.

SPURIOUS RADIATED EMISSIONS

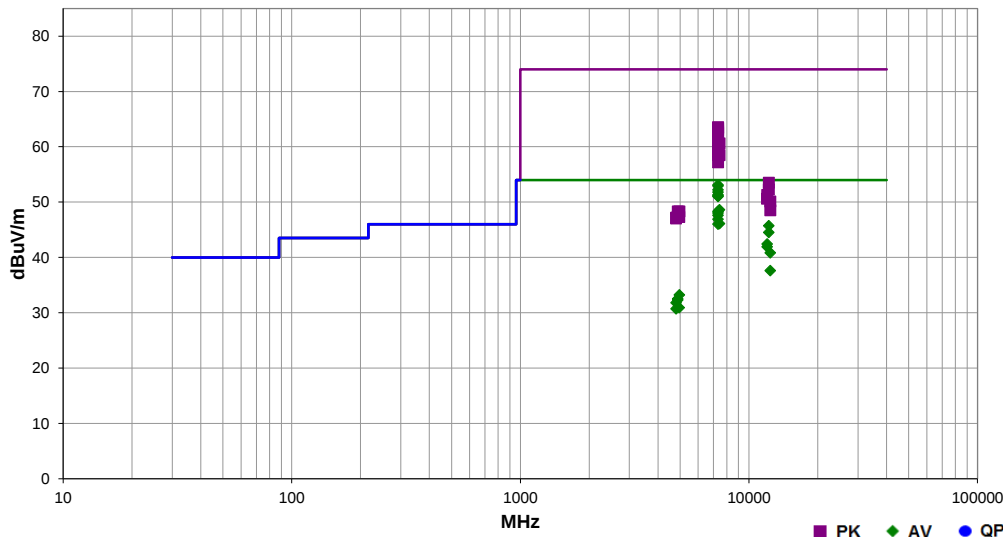


EmRS 2021.09.09.0 PSA-ESCI 2021.03.17.0

Work Order:	F3EN0068	Date:	2021-12-08	
Project:	None	Temperature:	23.1 °C	
Job Site:	TX02	Humidity:	34% RH	
Serial Number:	DUT2	Barometric Pres.:	1021 mbar	
EUT:	Radio Thermostat			Tested by: Brandon Hobbs
Configuration:	2			
Customer:	Quext			
Attendees:	None			
EUT Power:	Please reference data comments			
Operating Mode:	BLE, Please reference the data comments for EUT orientation, Channel, Bandwidth and EUT Power.			
Deviations:	None			
Comments:	Mid ch, 125 kbps, pwr lvl 8 dBm, power eval. DCCF of 10*LOG10(1/0.6) = 2.2 dB, The client provided real world protocol limited duty cycle in any 100 mSec period evaluates to be 10*LOG10(100/21.5) = 6.7 dB. Then 2.2 - 6.7 = -4.5 dB total DCCF applied for 125 kbps. The same math was used for 500 kbps (Total DCCF = -2.7), 1 Mbps (Total DCCF = 1.3) and 2 Mbps (Total DCCF = 3.5).			

Test Specifications	Test Method
FCC 15.247:2022	ANSI C63.10:2013

Run #	26	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dBm)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7325.527	39.9	11.9	1.4	327.0	1.3	0.0	Vert	AV	0.0	53.1	54.0	-0.9	EUT horz, mid ch, 1 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
7325.535	39.7	11.9	1.3	322.9	1.3	0.0	Horz	AV	0.0	52.9	54.0	-1.1	EUT side, mid ch, 1 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
7325.360	43.0	11.9	1.4	327.0	-2.7	0.0	Vert	AV	0.0	52.2	54.0	-1.8	EUT horz, mid ch, 500 kbps, pwr lvl 7 dBm, 110VAC/60Hz
7325.543	38.6	11.9	1.5	303.0	1.3	0.0	Vert	AV	0.0	51.8	54.0	-2.2	EUT vert, mid ch, 1 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
7325.410	43.9	11.9	1.4	326.0	-4.5	0.0	Vert	AV	0.0	51.3	54.0	-2.7	EUT horz, mid ch, 125 kbps, pwr lvl 7 dBm, 110VAC/60Hz
7325.460	37.9	11.9	2.8	242.0	1.3	0.0	Horz	AV	0.0	51.1	54.0	-2.9	EUT vert, mid ch, 1 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
7326.168	35.6	11.9	1.4	326.0	3.5	0.0	Vert	AV	0.0	51.0	54.0	-3.0	EUT horz, mid ch, 2 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
7439.433	41.0	12.1	1.4	326.0	-4.5	0.0	Vert	AV	0.0	48.6	54.0	-5.4	EUT horz, high ch, 125 kbps, pwr lvl 7 dBm, 110VAC/60Hz
7325.443	35.1	11.9	1.5	237.0	1.3	0.0	Horz	AV	0.0	48.3	54.0	-5.7	EUT horz, mid ch, 1 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
7325.443	40.6	11.9	1.5	237.9	-4.5	0.0	Horz	AV	0.0	48.0	54.0	-6.0	EUT horz, mid ch, 125 kbps, pwr lvl 7 dBm, 110VAC/60Hz
7325.368	38.4	11.9	1.5	237.9	-2.7	0.0	Horz	AV	0.0	47.6	54.0	-6.4	EUT horz, mid ch, 500 kbps, pwr lvl 7 dBm, 110VAC/60Hz
7326.043	31.5	11.9	1.5	240.0	3.5	0.0	Horz	AV	0.0	46.9	54.0	-7.1	EUT horz, mid ch, 2 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
7440.633	38.5	12.1	1.5	127.0	-4.5	0.0	Horz	AV	0.0	46.1	54.0	-7.9	EUT horz, high ch, 125 kbps, pwr lvl 7 dBm, 110VAC/60Hz
7325.493	32.8	11.9	1.5	181.0	1.3	0.0	Vert	AV	0.0	46.0	54.0	-8.0	EUT side, mid ch, 1 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
12211.220	44.6	-1.9	3.4	52.9	3.0	0.0	Horz	AV	0.0	45.7	54.0	-8.3	EUT horz, mid ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
12211.200	43.4	-1.9	2.6	54.0	3.0	0.0	Vert	AV	0.0	44.5	54.0	-9.5	EUT horz, mid ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
7326.943	51.6	11.9	1.3	322.9	0.0	0.0	Horz	PK	0.0	63.5	74.0	-10.5	EUT side, mid ch, 1 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
7325.410	51.6	11.9	1.4	327.0	0.0	0.0	Vert	PK	0.0	63.5	74.0	-10.5	EUT horz, mid ch, 1 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
7325.218	51.4	11.9	1.4	327.0	0.0	0.0	Vert	PK	0.0	63.3	74.0	-10.7	EUT horz, mid ch, 500 kbps, pwr lvl 7 dBm, 110VAC/60Hz
7324.568	51.1	11.9	1.4	326.0	0.0	0.0	Vert	PK	0.0	63.0	74.0	-11.0	EUT horz, mid ch, 2 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
7325.385	50.8	11.9	1.4	326.0	0.0	0.0	Vert	PK	0.0	62.7	74.0	-11.3	EUT horz, mid ch, 125 kbps, pwr lvl 7 dBm, 110VAC/60Hz
7326.035	50.6	11.9	1.5	303.0	0.0	0.0	Vert	PK	0.0	62.5	74.0	-11.5	EUT vert, mid ch, 1 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
12011.240	42.3	-2.9	1.4	38.0	3.0	0.0	Vert	AV	0.0	42.4	54.0	-11.6	EUT horz, low ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
12011.160	41.8	-2.9	3.7	110.0	3.0	0.0	Horz	AV	0.0	41.9	54.0	-12.1	EUT horz, low ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
7325.118	49.7	11.9	2.8	242.0	0.0	0.0	Horz	PK	0.0	61.6	74.0	-12.4	EUT horz, mid ch, 1 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
12398.920	39.4	-1.6	2.3	40.9	3.0	0.0	Vert	AV	0.0	40.8	54.0	-13.2	EUT horz, high ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
7440.808	48.5	12.1	1.4	326.0	0.0	0.0	Vert	PK	0.0	60.6	74.0	-13.4	EUT horz, high ch, 125 kbps, pwr lvl 7 dBm, 110VAC/60Hz
7326.768	48.6	11.9	1.5	237.9	0.0	0.0	Horz	PK	0.0	60.5	74.0	-13.5	EUT horz, mid ch, 125 kbps, pwr lvl 7 dBm, 110VAC/60Hz
7325.327	47.7	11.9	1.5	237.9	0.0	0.0	Horz	PK	0.0	59.6	74.0	-14.4	EUT horz, mid ch, 500 kbps, pwr lvl 7 dBm, 110VAC/60Hz
7325.118	47.3	11.9	1.5	237.0	0.0	0.0	Horz	PK	0.0	59.2	74.0	-14.8	EUT horz, mid ch, 1 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
7324.660	46.6	11.9	1.5	240.0	0.0	0.0	Horz	PK	0.0	58.5	74.0	-15.5	EUT horz, mid ch, 2 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
7439.258	46.4	12.1	1.5	127.0	0.0	0.0	Horz	PK	0.0	58.5	74.0	-15.5	EUT horz, high ch, 125 kbps, pwr lvl 7 dBm, 110VAC/60Hz
12398.880	36.2	-1.6	2.3	76.9	3.0	0.0	Horz	AV	0.0	37.6	54.0	-16.4	EUT horz, high ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7325.277	45.3	11.9	1.5	181.0	0.0	0.0	Vert	PK	0.0	57.2	74.0	-16.8	EUT side, mid ch, 1 Mbps, pwr lvl 7 dBm, 110VAC/60Hz
12210.070	52.4	-1.9	3.4	52.9	3.0	0.0	Horz	PK	0.0	53.5	74.0	-20.5	EUT horz, mid ch, 1 Mbps, pwr lvl 8 dBm, 110VAC/60Hz
4959.900	31.7	6.0	2.7	46.9	-4.5	0.0	Horz	AV	0.0	33.2	54.0	-20.8	EUT horz, high ch, 125 kbps, pwr lvl 8 dBm, 110VAC/60Hz
4884.033	31.2	5.8	1.5	331.0	-4.5	0.0	Horz	AV	0.0	32.5	54.0	-21.5	EUT horz, mid ch, 125 kbps, pwr lvl 8 dBm, 110VAC/60Hz
12211.480	51.2	-1.9	2.6	54.0	3.0	0.0	Vert	PK	0.0	52.3	74.0	-21.7	EUT horz, mid ch, 1 Mbps, pwr lvl 8 dBm, 110VAC/60Hz
4883.775	31.0	5.8	1.5	98.0	-4.5	0.0	Vert	AV	0.0	32.3	54.0	-21.7	EUT horz, mid ch, 125 kbps, pwr lvl 8 dBm, 110VAC/60Hz
4803.992	30.7	5.6	4.0	182.0	-4.5	0.0	Horz	AV	0.0	31.8	54.0	-22.2	EUT horz, low ch, 125 kbps, pwr lvl 8 dBm, 110VAC/60Hz
12011.130	51.2	-2.9	1.4	38.0	3.0	0.0	Vert	PK	0.0	51.3	74.0	-22.7	EUT horz, low ch, 1 Mbps, pwr lvl 8 dBm, 110VAC/60Hz
4957.642	29.4	6.0	1.5	15.9	-4.5	0.0	Vert	AV	0.0	30.9	54.0	-23.1	EUT horz, high ch, 125 kbps, pwr lvl 8 dBm, 110VAC/60Hz
4804.317	29.6	5.6	1.5	57.0	-4.5	0.0	Vert	AV	0.0	30.7	54.0	-23.3	EUT horz, low ch, 125 kbps, pwr lvl 8 dBm, 110VAC/60Hz
12008.750	50.5	-2.9	3.7	110.0	3.0	0.0	Horz	PK	0.0	50.6	74.0	-23.4	EUT horz, low ch, 1 Mbps, pwr lvl 8 dBm, 110VAC/60Hz
12398.790	48.7	-1.6	2.3	40.9	3.0	0.0	Vert	PK	0.0	50.1	74.0	-23.9	EUT horz, high ch, 1 Mbps, pwr lvl 8 dBm, 110VAC/60Hz
12398.870	47.1	-1.6	2.3	76.9	3.0	0.0	Horz	PK	0.0	48.5	74.0	-25.5	EUT horz, high ch, 1 Mbps, pwr lvl 8 dBm, 110VAC/60Hz
4883.283	42.5	5.8	1.5	331.0	0.0	0.0	Horz	PK	0.0	48.3	74.0	-25.7	EUT horz, mid ch, 125 kbps, pwr lvl 8 dBm, 110VAC/60Hz
4960.067	42.3	6.0	2.7	46.9	0.0	0.0	Horz	PK	0.0	48.3	74.0	-25.7	EUT horz, high ch, 125 kbps, pwr lvl 8 dBm, 110VAC/60Hz
4884.875	41.6	5.8	1.5	98.0	0.0	0.0	Vert	PK	0.0	47.4	74.0	-26.6	EUT horz, mid ch, 125 kbps, pwr lvl 8 dBm, 110VAC/60Hz
4957.733	41.3	6.0	1.5	15.9	0.0	0.0	Vert	PK	0.0	47.3	74.0	-26.7	EUT horz, high ch, 125 kbps, pwr lvl 8 dBm, 110VAC/60Hz
4803.842	41.6	5.6	4.0	182.0	0.0	0.0	Horz	PK	0.0	47.2	74.0	-26.8	EUT horz, low ch, 125 kbps, pwr lvl 8 dBm, 110VAC/60Hz
4806.158	41.4	5.6	1.5	57.0	0.0	0.0	Vert	PK	0.0	47.0	74.0	-27.0	EUT horz, low ch, 125 kbps, pwr lvl 8 dBm, 110VAC/60Hz

SPURIOUS RADIATED EMISSIONS

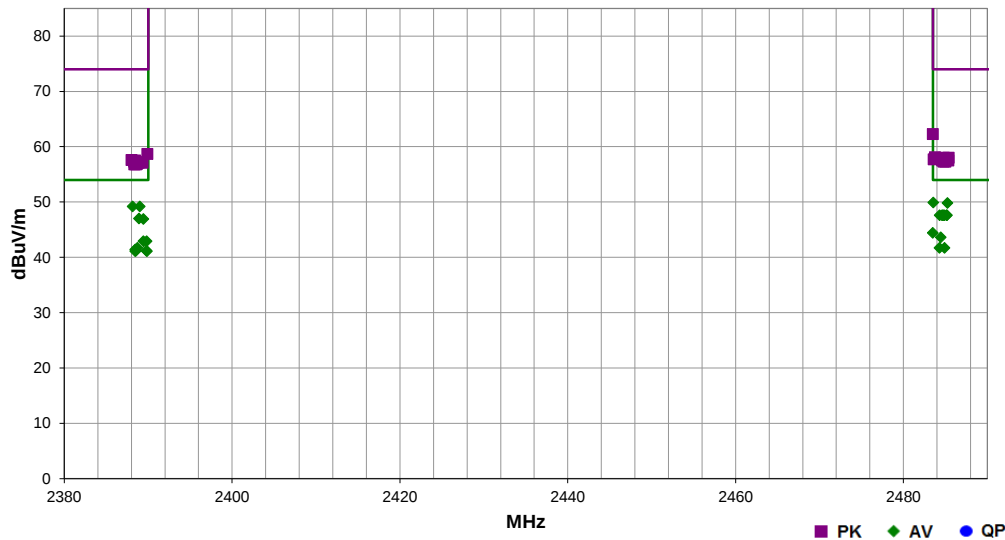


EmiRS 2021.09.09.0 PSA-ESC 2021.03.17.0

Work Order:	F3EN0068	Date:	2021-12-08	
Project:	None	Temperature:	23.1 °C	
Job Site:	TX02	Humidity:	34% RH	
Serial Number:	DUT2	Barometric Pres.:	1021 mbar	
	Tested by: Brandon Hobbs			
EUT:	Radio Thermostat			
Configuration:	2			
Customer:	Quext			
Attendees:	None			
EUT Power:	Please reference data comments			
Operating Mode:	BLE, Please reference the data comments for EUT orientation, Channel, Bandwidth and EUT Power.			
Deviations:	None			
Comments:	Mid ch, 125 kbps, pwr lvl 8 dbm, , power eval. DCCF of 10*LOG10(1/0.6) = 2.2 dB, The client provided real world protocol limited duty cycle in any 100 mSec period evaluates to be 10*LOG10(100/21.5) = 6.7 dB. Then 2.2 - 6.7 = -4.5 dB total DCCF applied for 125 kbps, pwr lvl 8 dbm, . The same math was used for 500 kbps, pwr lvl 8 dbm, (Total DCCF = -2.7), 1 Mbps, pwr lvl 8 dbm, (Total DCCF = 1.3) and 2 Mbps, pwr lvl 8 dbm, (Total DCCF = 3.5).			

Test Specifications	Test Method
FCC 15.247:2021	ANSI C63.10:2013

Run #	28	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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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
2483.567	31.8	-5.4	3.3	81.9	3.5	20.0	Vert	AV	0.0	49.9	54.0	-4.1	EUT horz, high ch, 2 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2485.257	31.7	-5.4	1.5	279.0	3.5	20.0	Horz	AV	0.0	49.8	54.0	-4.2	EUT horz, high ch, 2 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2389.000	31.5	-5.8	1.5	297.0	3.5	20.0	Horz	AV	0.0	49.2	54.0	-4.8	EUT horz, low ch, 2 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2388.153	31.5	-5.8	1.5	186.0	3.5	20.0	Vert	AV	0.0	49.2	54.0	-4.8	EUT horz, low ch, 2 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2484.610	31.7	-5.4	1.5	195.9	1.3	20.0	Horz	AV	0.0	47.6	54.0	-6.4	EUT horz, high ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2485.143	31.7	-5.4	1.5	237.0	1.3	20.0	Vert	AV	0.0	47.6	54.0	-6.4	EUT horz, high ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2484.860	31.7	-5.4	1.5	249.9	1.3	20.0	Horz	AV	0.0	47.6	54.0	-6.4	EUT Side, high ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2485.187	31.7	-5.4	1.5	96.0	1.3	20.0	Vert	AV	0.0	47.6	54.0	-6.4	EUT Side, high ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2484.723	31.7	-5.4	1.5	236.0	1.3	20.0	Horz	AV	0.0	47.6	54.0	-6.4	EUT vert, high ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2484.327	31.7	-5.4	1.5	32.0	1.3	20.0	Vert	AV	0.0	47.6	54.0	-6.4	EUT vert, high ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2389.910	31.5	-5.8	1.5	208.9	1.3	20.0	Vert	AV	0.0	47.0	54.0	-7.0	EUT horz, low ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2389.433	31.4	-5.8	1.5	3.0	1.3	20.0	Horz	AV	0.0	46.9	54.0	-7.1	EUT horz, low ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2483.503	32.5	-5.4	2.9	337.0	-2.7	20.0	Horz	AV	0.0	44.4	54.0	-9.6	EUT horz, high ch, 500 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2484.453	31.7	-5.4	1.5	316.9	-2.7	20.0	Vert	AV	0.0	43.6	54.0	-10.4	EUT horz, high ch, 500 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2389.820	31.4	-5.8	1.5	196.9	-2.7	20.0	Horz	AV	0.0	42.9	54.0	-11.1	EUT horz, low ch, 500 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2389.430	31.4	-5.8	1.5	152.0	-2.7	20.0	Vert	AV	0.0	42.9	54.0	-11.1	EUT horz, low ch, 500 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2483.503	47.7	-5.4	2.9	337.0	0.0	20.0	Horz	PK	0.0	62.3	74.0	-11.7	EUT horz, high ch, 500 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2388.713	32.0	-5.8	1.5	58.9	-4.5	20.0	Horz	AV	0.0	41.7	54.0	-12.3	EUT horz, low ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2484.303	31.6	-5.4	1.5	98.0	-4.5	20.0	Horz	AV	0.0	41.7	54.0	-12.3	EUT horz, high ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2484.903	31.6	-5.4	1.5	295.0	-4.5	20.0	Vert	AV	0.0	41.7	54.0	-12.3	EUT horz, high ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2388.470	31.7	-5.8	1.5	55.0	-4.5	20.0	Vert	AV	0.0	41.4	54.0	-12.6	EUT horz, low ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2388.553	31.5	-5.8	1.5	201.0	-4.5	20.0	Horz	AV	0.0	41.2	54.0	-12.8	EUT vert, low ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2389.790	31.5	-5.8	2.2	58.9	-4.5	20.0	Horz	AV	0.0	41.2	54.0	-12.8	EUT side, low ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2388.453	31.4	-5.8	2.0	262.9	-4.5	20.0	Vert	AV	0.0	41.1	54.0	-12.9	EUT vert, low ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2389.867	31.4	-5.8	1.5	220.9	-4.5	20.0	Vert	AV	0.0	41.1	54.0	-12.9	EUT horz, low ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2389.907	44.5	-5.8	1.5	58.9	0.0	20.0	Horz	PK	0.0	58.7	74.0	-15.3	EUT horz, low ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2483.760	43.5	-5.4	1.5	195.9	0.0	20.0	Horz	PK	0.0	58.1	74.0	-15.9	EUT horz, high ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2484.803	43.4	-5.4	3.3	81.9	0.0	20.0	Vert	PK	0.0	58.0	74.0	-16.0	EUT horz, high ch, 2 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2485.393	43.4	-5.4	1.5	98.0	0.0	20.0	Horz	PK	0.0	58.0	74.0	-16.0	EUT horz, high ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2484.357	43.2	-5.4	1.5	279.0	0.0	20.0	Horz	PK	0.0	57.8	74.0	-16.2	EUT horz, high ch, 2 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2483.600	43.1	-5.4	1.5	316.9	0.0	20.0	Vert	PK	0.0	57.7	74.0	-16.3	EUT horz, high ch, 500 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2388.017	43.4	-5.8	1.5	55.0	0.0	20.0	Vert	PK	0.0	57.6	74.0	-16.4	EUT horz, low ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2484.747	43.0	-5.4	1.5	236.0	0.0	20.0	Horz	PK	0.0	57.6	74.0	-16.4	EUT vert, high ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz

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
2388.447	43.3	-5.8	2.0	262.9	0.0	20.0	Vert	PK	0.0	57.5	74.0	-16.5	EUT vert, low ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2484.607	42.9	-5.4	1.5	237.0	0.0	20.0	Vert	PK	0.0	57.5	74.0	-16.5	EUT horz, high ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2484.720	42.9	-5.4	1.5	249.9	0.0	20.0	Horz	PK	0.0	57.5	74.0	-16.5	EUT Side, high ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2485.343	42.9	-5.4	1.5	295.0	0.0	20.0	Vert	PK	0.0	57.5	74.0	-16.5	EUT horz, high ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2388.320	43.2	-5.8	1.5	297.0	0.0	20.0	Horz	PK	0.0	57.4	74.0	-16.6	EUT horz, low ch, 2 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2484.787	42.7	-5.4	1.5	96.0	0.0	20.0	Vert	PK	0.0	57.3	74.0	-16.7	EUT Side, high ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2485.003	42.7	-5.4	1.5	32.0	0.0	20.0	Vert	PK	0.0	57.3	74.0	-16.7	EUT vert, high ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2388.367	43.0	-5.8	1.5	196.9	0.0	20.0	Horz	PK	0.0	57.2	74.0	-16.8	EUT horz, low ch, 500 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2388.990	43.0	-5.8	1.5	3.0	0.0	20.0	Horz	PK	0.0	57.2	74.0	-16.8	EUT horz, low ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2388.843	42.9	-5.8	1.5	220.9	0.0	20.0	Vert	PK	0.0	57.1	74.0	-16.9	EUT side, low ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2389.343	42.9	-5.8	1.5	152.0	0.0	20.0	Vert	PK	0.0	57.1	74.0	-16.9	EUT horz, low ch, 500 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2388.470	42.7	-5.8	1.5	201.0	0.0	20.0	Horz	PK	0.0	56.9	74.0	-17.1	EUT vert, low ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2388.660	42.7	-5.8	1.5	208.9	0.0	20.0	Vert	PK	0.0	56.9	74.0	-17.1	EUT horz, low ch, 1 Mbps, pwr lvl 8 dbm, 110VAC/60Hz
2388.563	42.6	-5.8	2.2	58.9	0.0	20.0	Horz	PK	0.0	56.8	74.0	-17.2	EUT side, low ch, 125 kbps, pwr lvl 8 dbm, 110VAC/60Hz
2388.353	42.6	-5.8	1.5	186.0	0.0	20.0	Vert	PK	0.0	56.8	74.0	-17.2	EUT horz, low ch, 2 Mbps, pwr lvl 8 dbm, 110VAC/60Hz

SPURIOUS RADIATED EMISSIONS

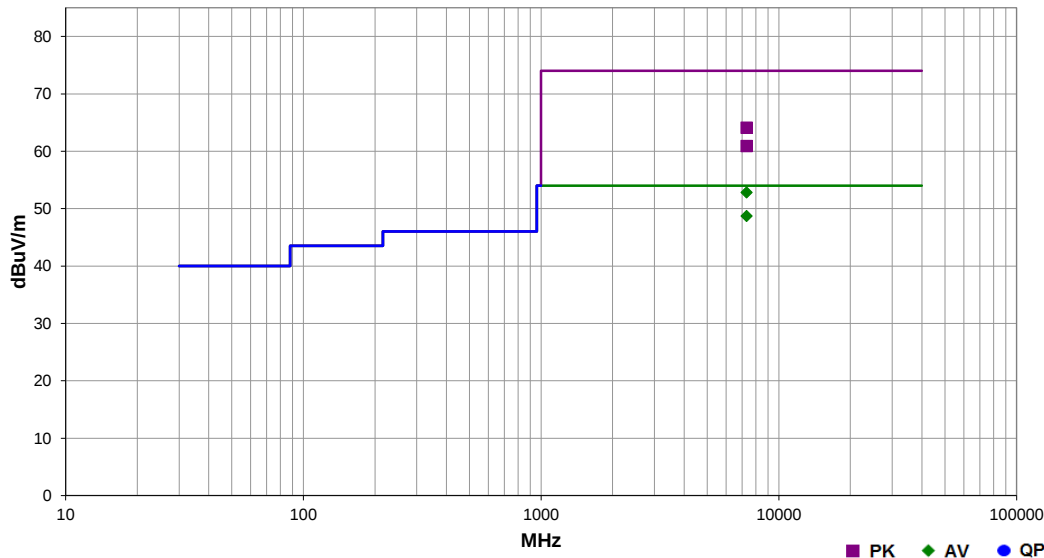
EnrRS 2021.09.09.0

PSA-ESCI 2021.03.17.0

Work Order:	F3EN0068	Date:	2022-02-08	
Project:	None	Temperature:	22.2 °C	
Job Site:	TX02	Humidity:	23.2% RH	
Serial Number:	DUT11	Barometric Pres.:	1025 mbar	
EUT:	Radio Thermostat			
Configuration:	4			
Customer:	Quest			
Attendees:	None			
EUT Power:	Please reference data comments			
Operating Mode:	BLE, Please reference the data comments for EUT orientation, Channel, Bandwidth and EUT Power.			
Deviations:	None			
Comments:	Mid ch, 125 kbps, power eval. DCCF of 10*LOG10(1/0.6) = 2.2 dB, The client provided real world protocol limited duty cycle in any 100 mSec period evaluates to be 10*LOG10(100/21.5) = 6.7 dB. Then 2.2 - 6.7 = -4.5 dB total DCCF applied for 125 kbps. The same math was used for 500 kbps (Total DCCF = -2.7), 1 Mbps (Total DCCF = 1.3) and 2 Mbps (Total DCCF = 3.5). The EUT was disconnected from the AC mains causing the DC powered condition noted in the data.			

Test Specifications	Test Method
FCC 15.247:2022	ANSI C63.10:2013

Run #	173	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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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
7320.683	45.4	11.9	1.7	25.0	-4.5	0.0	Vert	AV	0.0	52.8	54.0	-1.2	EUT horz, mid ch, 1 Mbps, pwr lvl 7 dBm, 3.0 VDC
7319.392	41.3	11.9	1.7	121.0	-4.5	0.0	Horz	AV	0.0	48.7	54.0	-5.3	EUT horz, mid ch, 1 Mbps, pwr lvl 7 dBm, 3.0 VDC
7320.858	52.2	11.9	1.7	25.0	0.0	0.0	Vert	PK	0.0	64.1	74.0	-9.9	EUT horz, mid ch, 1 Mbps, pwr lvl 7 dBm, 3.0 VDC
7319.200	49.0	11.9	1.7	121.0	0.0	0.0	Horz	PK	0.0	60.9	74.0	-13.1	EUT horz, mid ch, 1 Mbps, pwr lvl 7 dBm, 3.0 VDC

SPURIOUS RADIATED EMISSIONS

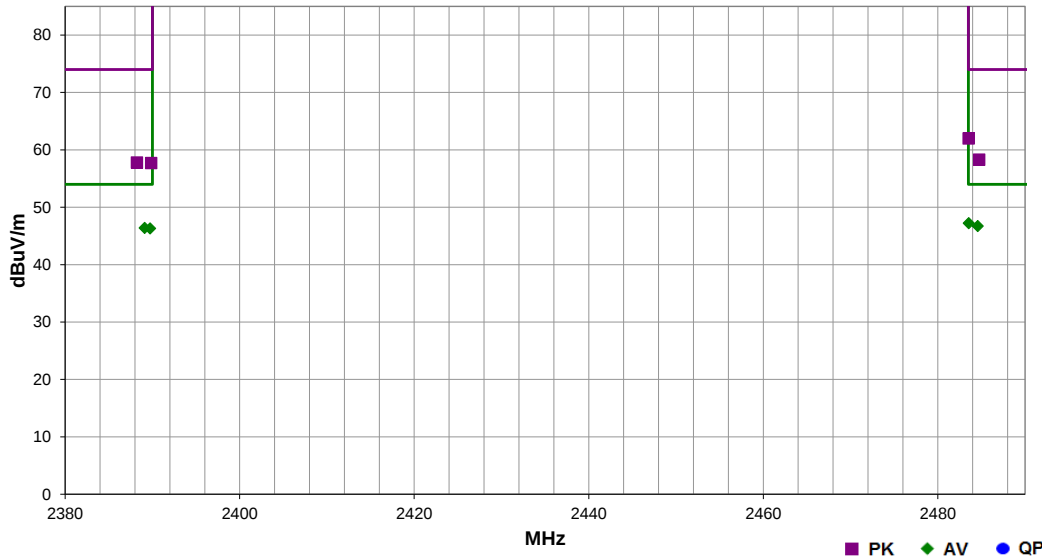


EmRS 2021.09.09.0 PSA-ESCI 2021.03.17.0

Work Order:	F3EN0068	Date:	2022-02-08	
Project:	None	Temperature:	22.2 °C	
Job Site:	TX02	Humidity:	23.2% RH	
Serial Number:	DUT11	Barometric Pres.:	1025 mbar	
EUT:	Radio Thermostat			
Configuration:	4			
Customer:	Quest			
Attendees:	None			
EUT Power:	Please reference data comments			
Operating Mode:	BLE, Please reference the data comments for EUT orientation, Channel, Bandwidth and EUT Power.			
Deviations:	None			
Comments:	Mid ch, 125 kbps, power eval. DCCF of 10*LOG10(1/0.6) = 2.2 dB, The client provided real world protocol limited duty cycle in any 100 mSec period evaluates to be 10*LOG10(100/21.5) = 6.7 dB. Then 2.2 - 6.7 = -4.5 dB total DCCF applied for 125 kbps. The same math was used for 500 kbps (Total DCCF = -2.7), 1 Mbps (Total DCCF = 1.3) and 2 Mbps (Total DCCF = 3.5). The EUT was disconnected from the AC mains causing the DC powered condition noted in the data.			

Test Specifications	Test Method
FCC 15.247:2022	ANSI C63.10:2013

Run #	176	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.547	32.6	-5.4	2.68	123.9	3.0	20.0	Horz	AV	0.0	47.2	54.0	-6.8	EUT horz, high ch, 2 Mbps, Pwr lvl 8 dBm, 3.0 VDC
2484.590	32.1	-5.4	1.5	273.0	3.0	20.0	Vert	AV	0.0	46.7	54.0	-7.3	EUT horz, high ch, 2 Mbps, Pwr lvl 8 dBm, 3.0 VDC
2389.117	32.2	-5.8	1.5	194.0	3.0	20.0	Vert	AV	0.0	46.4	54.0	-7.6	EUT horz, Low ch, 1 Mbps, Pwr lvl 8 dBm, 3.0 VDC
2389.740	32.1	-5.8	1.5	206.0	3.0	20.0	Horz	AV	0.0	46.3	54.0	-7.7	EUT horz, Low ch, 1 Mbps, Pwr lvl 8 dBm, 3.0 VDC
2483.537	47.4	-5.4	2.68	123.9	3.0	20.0	Horz	PK	0.0	62.0	74.0	-12.0	EUT horz, high ch, 2 Mbps, Pwr lvl 8 dBm, 3.0 VDC
2484.740	43.7	-5.4	1.5	273.0	3.0	20.0	Vert	PK	0.0	58.3	74.0	-15.7	EUT horz, high ch, 2 Mbps, Pwr lvl 8 dBm, 3.0 VDC
2388.220	43.6	-5.8	1.5	194.0	3.0	20.0	Vert	PK	0.0	57.8	74.0	-16.2	EUT horz, Low ch, 1 Mbps, Pwr lvl 8 dBm, 3.0 VDC
2389.860	43.5	-5.8	1.5	206.0	3.0	20.0	Horz	PK	0.0	57.7	74.0	-16.3	EUT horz, Low ch, 1 Mbps, Pwr lvl 8 dBm, 3.0 VDC

End of Test Report