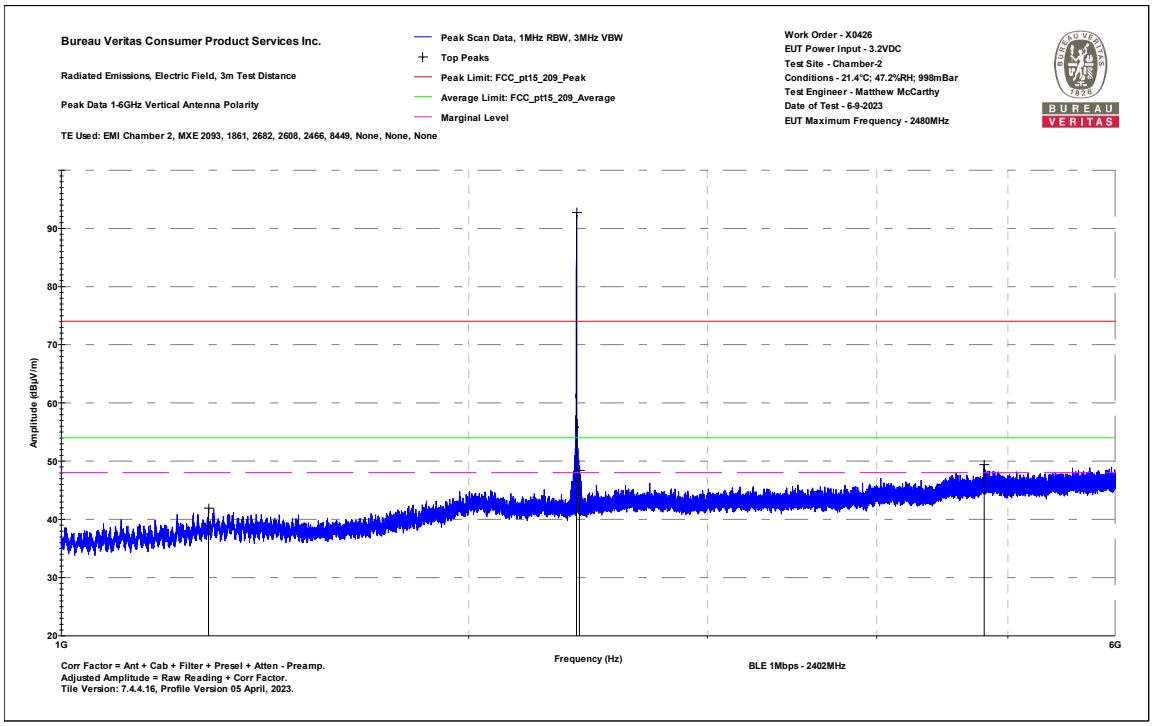
Emissions 1-18GHz

Results for BLE 1Mbps GFSK Channel 0

Bureau Veritas Consumer Product Services Inc.	Work Order - X0426
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 3.2VDC
Top Peaks Vertical 1-6GHz	Test Site - Chamber-2
Notes:	Conditions - 21.4°C; 47.2%RH; 998mBar
BLE 1Mbps - 2402MHz	Test Engineer - Matthew McCarthy
	Date of Test - 6-9-2023

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Margin to Average Limit (dB)	Average Limit Test Result (Pass/Fail)	Average Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1284.5	48.9	-7	41.9	74	-32.1	PASS		54	-12.1	PASS		100	111
2401.75	FUNDAMENTAL											100	93
2413.5	51	-2.5	48.4	74	-25.6	PASS		54	-5.6	PASS		100	111
4803.63	46.4	3	49.4	74	-24.6	PASS	-24.6	54	-4.6	PASS	-4.6	200	279

1-6GHz Vertical Data Table

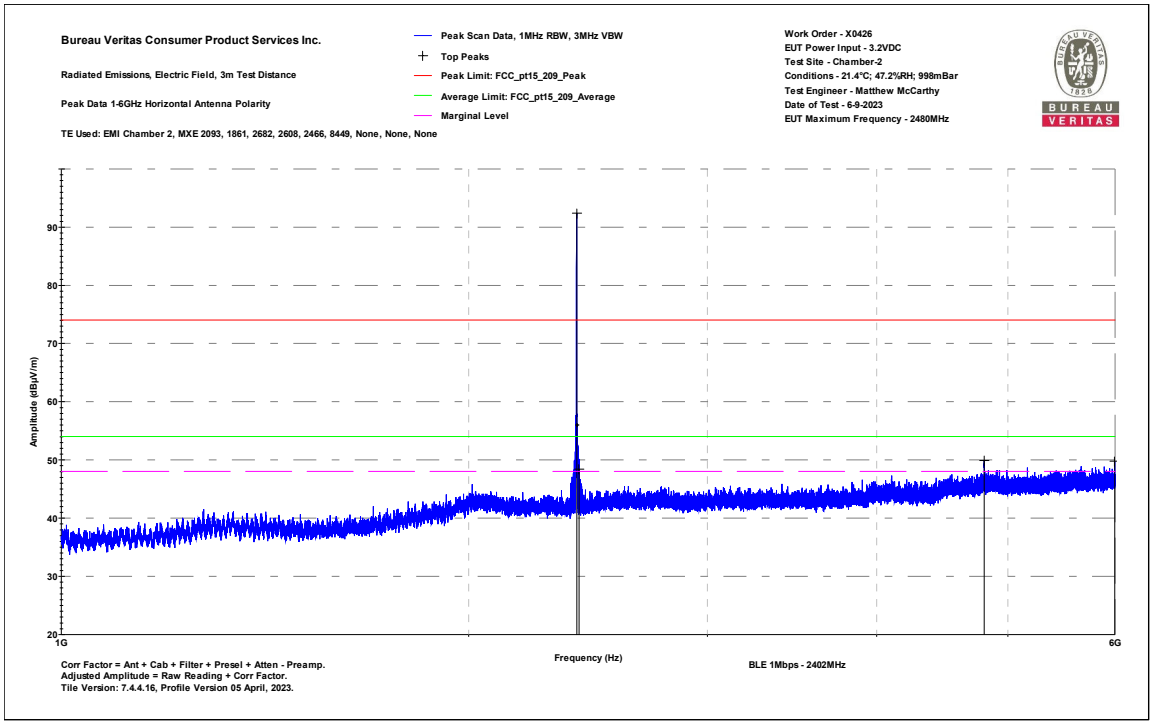


1-6GHz Vertical Plot

Bureau Veritas Consumer Product Services Inc.	Work Order - X0426
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 3.2VDC
Top Peaks Horizontal 1-6GHz	Test Site - Chamber-2
Notes:	Conditions - 21.4°C; 47.2%RH; 998mBar
BLE 1Mbps - 2402MHz	Test Engineer - Matthew McCarthy
	Date of Test - 6-9-2023

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Margin to Peak Limit (dB)	Peak Limit Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Margin to Avg Limit (dB)	Avg Limit Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
2402.25	FUNDAMENTAL											100	36
2412.63	50.9	-2.6	48.4	74	-25.6	PASS		54	-5.6	PASS		100	36
4804.38	46.9	3	49.9	74	-24.1	PASS	-24.1	54	-4.1	PASS	-4.1	100	36
5995.63	46.3	3.5	49.8	74	-24.2	PASS		54	-4.2	PASS		300	55

1-6GHz Horizontal Data Table

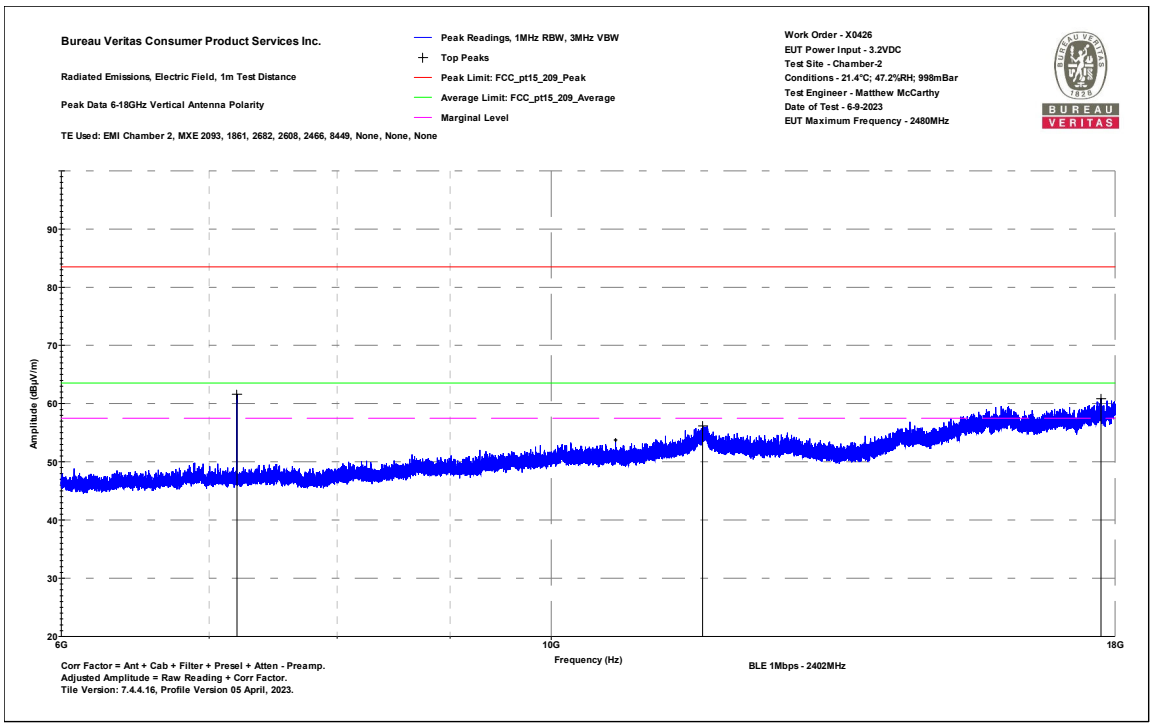


1-6GHz Horizontal Plot

Bureau Veritas Consumer Product Services Inc.	Work Order - X0426
Radiated Emissions Electric Field 1m Distance	EUT Power Input - 3.2VDC
Top Peaks Vertical 6-18GHz	Test Site - Chamber-2
Notes:	Conditions - 21.4°C; 47.2%RH; 998mBar
BLE 1Mbps - 2402MHz	Test Engineer - Matthew McCarthy
	Date of Test - 6-9-2023

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7206.6	57.4	4.2	61.6	83.5	-21.9	PASS	-21.9	63.5	-1.9	PASS	-1.9	125	89
11709	47.3	8.8	56.1	83.5	-27.4	PASS		63.5	-7.4	PASS		175	315
17738.1	46.5	14.4	60.9	83.5	-22.6	PASS		63.5	-2.6	PASS		125	241

6-18GHz Vertical Data Table

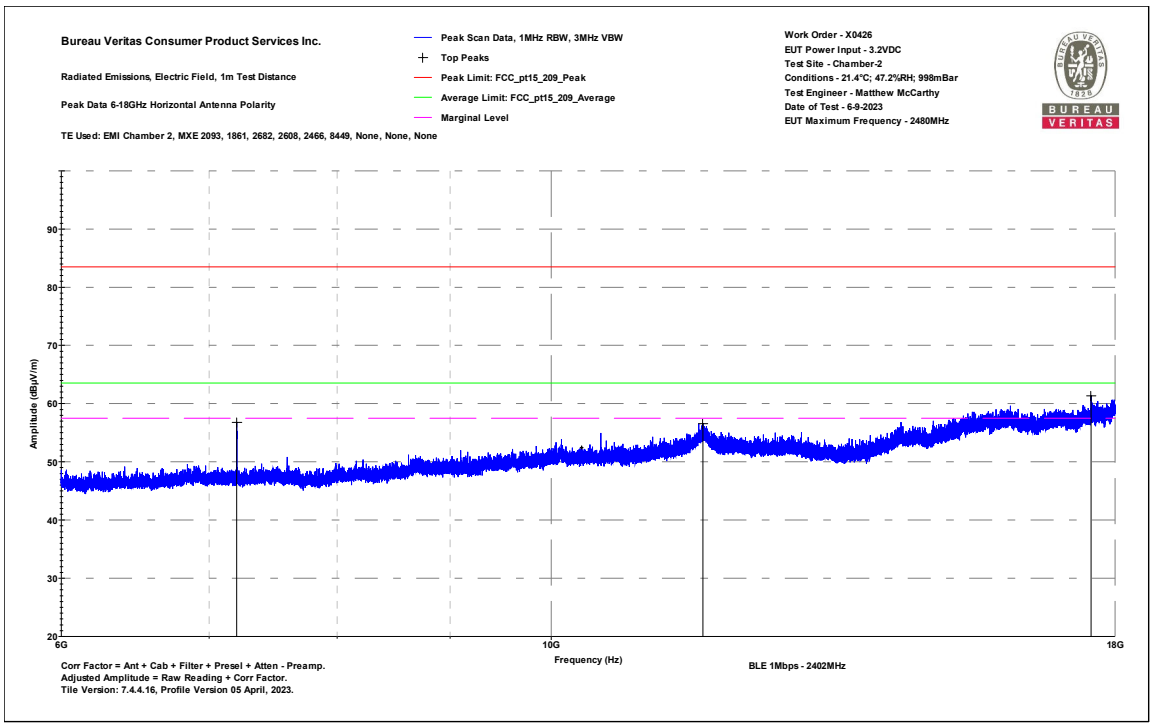


6-18GHz Vertical Plot

Bureau Veritas Consumer Product Services Inc.	Work Order - X0426
Radiated Emissions Electric Field 1m Distance	EUT Power Input - 3.2VDC
Top Peaks Horizontal 6-18GHz	Test Site - Chamber-2
Notes:	Conditions - 21.4°C; 47.2%RH; 998mBar
BLE 1Mbps - 2402MHz	Test Engineer - Matthew McCarthy
	Date of Test - 6-9-2023

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7205.4	52.6	4.2	56.8	83.5	-26.7	PASS		63.5	-6.7	PASS		125	315
11714.4	47.7	8.8	56.6	83.5	-26.9	PASS		63.5	-6.9	PASS		175	241
17554.2	47	14.4	61.4	83.5	-22.1	PASS	-22.1	63.5	-2.1	PASS	-2.1	150	37

6-18GHz Horizontal Data Table



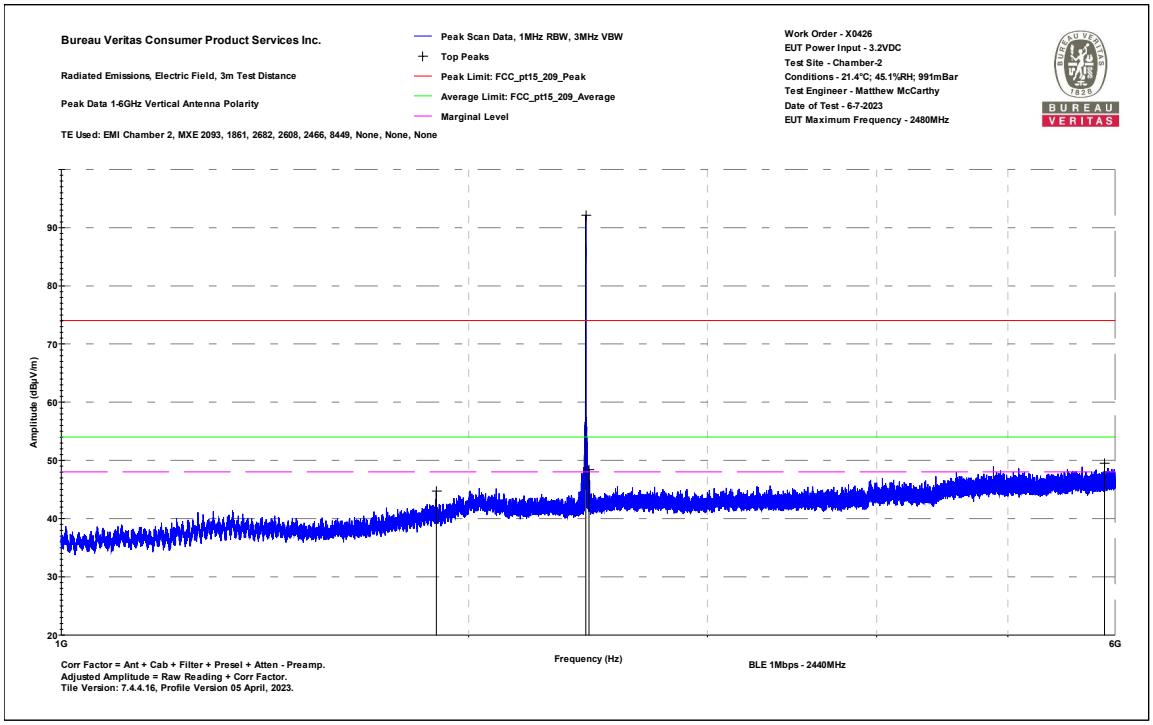
6-18GHz Horizontal Plot

Results for BLE 1Mbps GFSK Channel 19

Bureau Veritas Consumer Product Services Inc.	Work Order - X0426
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 3.2VDC
Top Peaks Vertical 1-6GHz	Test Site - Chamber-2
Notes:	Conditions - 21.4°C; 45.1%RH; 991mBar
BLE 1Mbps - 2440MHz	Test Engineer - Matthew McCarthy
	Date of Test - 6-7-2023

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Margin to Average Limit (dB)	Average Limit Test Result (Pass/Fail)	Average Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1892	48.8	-4	44.7	74	-29.3	PASS		54	-9.3	PASS		100	281
2439.88	FUNDAMENTAL											100	55
2452.63	50.7	-2.2	48.5	74	-25.5	PASS		54	-5.5	PASS		100	55
5891.88	46	3.5	49.5	74	-24.5	PASS	-24.5	54	-4.5	PASS	-4.5	100	149

1-6GHz Vertical Data Table

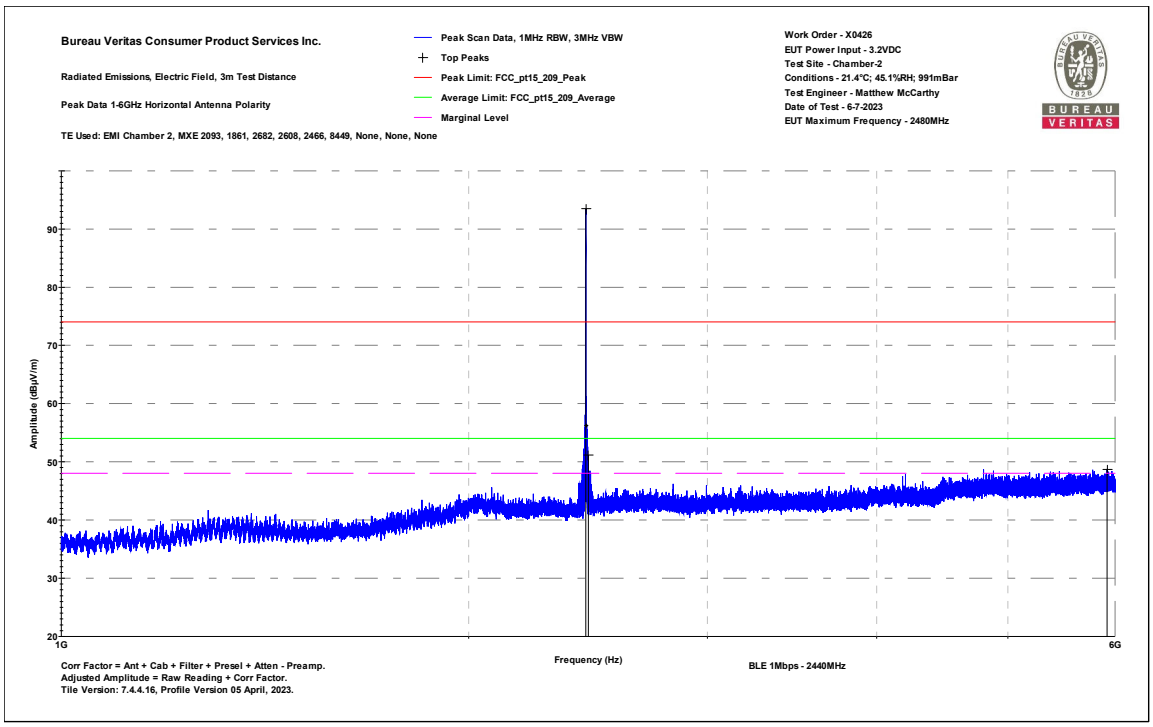


1-6GHz Vertical Plot

Bureau Veritas Consumer Product Services Inc.	Work Order - X0426
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 3.2VDC
Top Peaks Horizontal 1-6GHz	Test Site - Chamber-2
Notes:	Conditions - 21.4°C; 45.1%RH; 991mBar
BLE 1Mbps - 2440MHz	Test Engineer - Matthew McCarthy
	Date of Test - 6-7-2023

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Margin to Peak Limit (dB)	Peak Limit Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Margin to Avg Limit (dB)	Avg Limit Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
2440.25	FUNDAMENTAL											100	37
2450.88	53.3	-2.2	51.1	74	-22.9	PASS	-22.9	54	-2.9	PASS	-2.9	100	18
5917.75	45.2	3.5	48.7	74	-25.3	PASS		54	-5.3	PASS		100	283

1-6GHz Horizontal Data Table

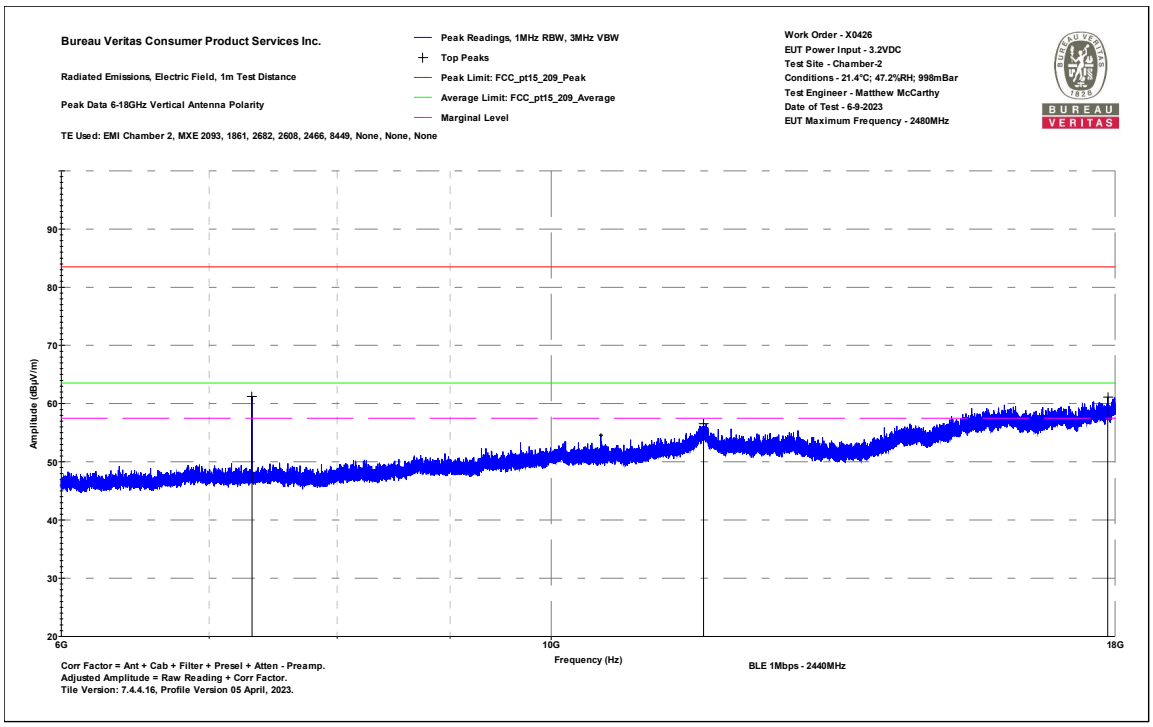


1-6GHz Horizontal Plot

Bureau Veritas Consumer Product Services Inc.	Work Order - X0426
Radiated Emissions Electric Field 1m Distance	EUT Power Input - 3.2VDC
Top Peaks Vertical 6-18GHz	Test Site - Chamber-2
Notes:	Conditions - 21.4°C; 47.2%RH; 998mBar
BLE 1Mbps - 2440MHz	Test Engineer - Matthew McCarthy
	Date of Test - 6-9-2023

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7320.6	57.2	4.1	61.2	83.5	-22.3	PASS	-22.3	63.5	-2.3	PASS	-2.3	150	55
11721.9	47.7	8.8	56.6	83.5	-26.9	PASS		63.5	-6.9	PASS		100	223
17861.1	46.5	14.6	61.1	83.5	-22.4	PASS		63.5	-2.4	PASS		150	129

6-18GHz Vertical Data Table

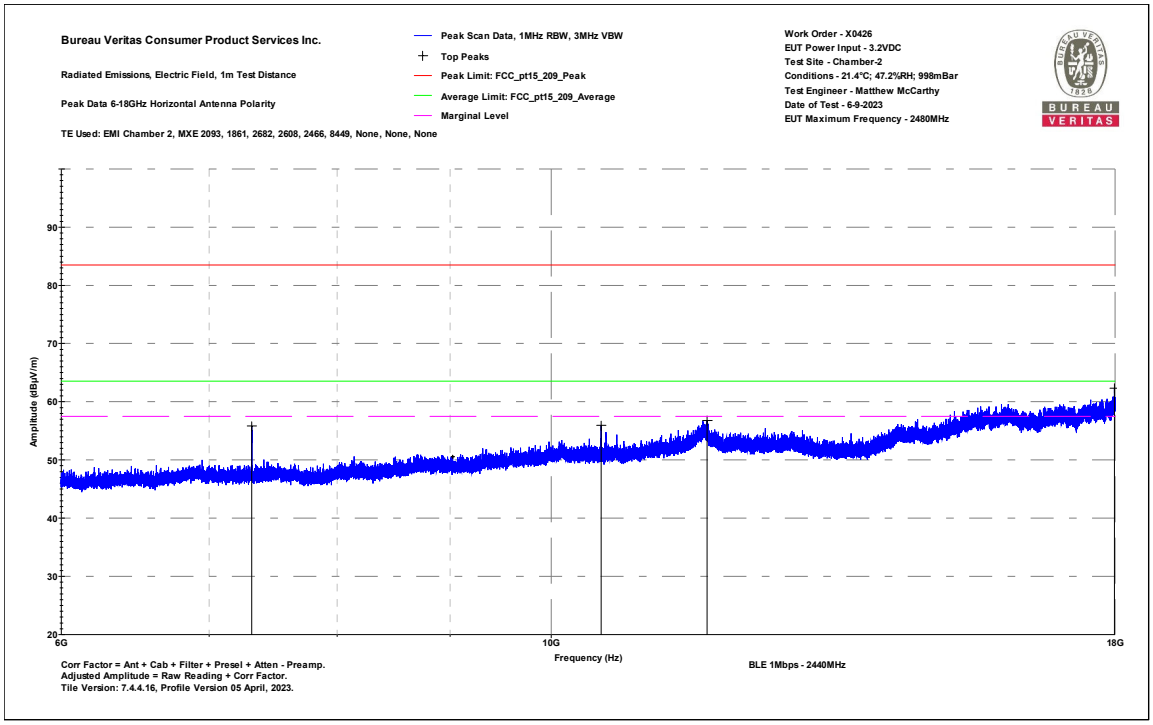


6-18GHz Vertical Plot

Bureau Veritas Consumer Product Services Inc.	Work Order - X0426
Radiated Emissions Electric Field 1m Distance	EUT Power Input - 3.2VDC
Top Peaks Horizontal 6-18GHz	Test Site - Chamber-2
Notes:	Conditions - 21.4°C; 47.2%RH; 998mBar
BLE 1Mbps - 2440MHz	Test Engineer - Matthew McCarthy
	Date of Test - 6-9-2023

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7319.1	51.7	4.1	55.8	83.5	-27.7	PASS		63.5	-7.7	PASS		125	260
10533.3	48.7	7.2	55.9	83.5	-27.6	PASS		63.5	-7.6	PASS		125	91
11763.3	47.9	8.8	56.8	83.5	-26.7	PASS		63.5	-6.7	PASS		175	148
17988	47	15.3	62.3	83.5	-21.2	PASS	-21.2	63.5	-1.2	PASS	-1.2	150	17

6-18GHz Horizontal Data Table



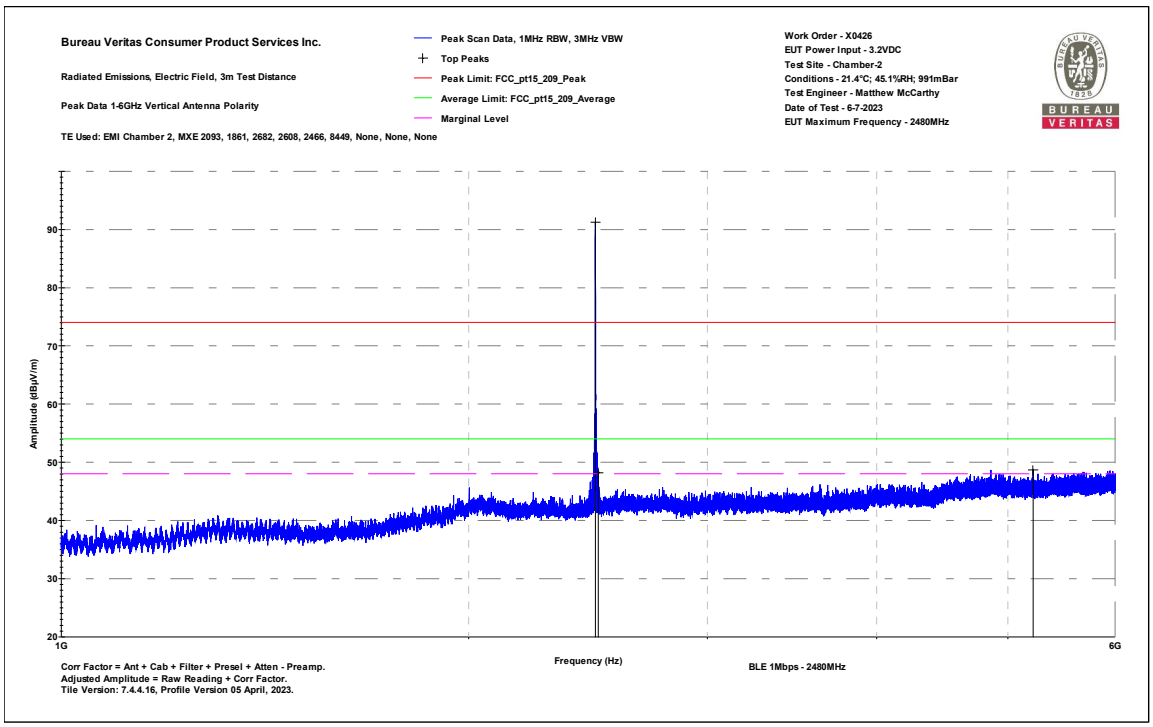
6-18GHz Horizontal Plot

Results for BLE 1Mbps GFSK Channel 39

Bureau Veritas Consumer Product Services Inc.	Work Order - X0426
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 3.2VDC
Top Peaks Vertical 1-6GHz	Test Site - Chamber-2
Notes:	Conditions - 21.4°C; 45.1%RH; 991mBar
BLE 1Mbps - 2480MHz	Test Engineer - Matthew McCarthy
	Date of Test - 6-7-2023

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Margin to Average Limit (dB)	Average Limit Test Result (Pass/Fail)	Average Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
2479.75	FUNDAMENTAL											100	17
2492.13	50.2	-2	48.2	74	-25.8	PASS		54	-5.8	PASS		200	32
5219.13	45.9	2.9	48.7	74	-25.3	PASS		54	-5.3	PASS		200	70

1-6GHz Vertical Data Table

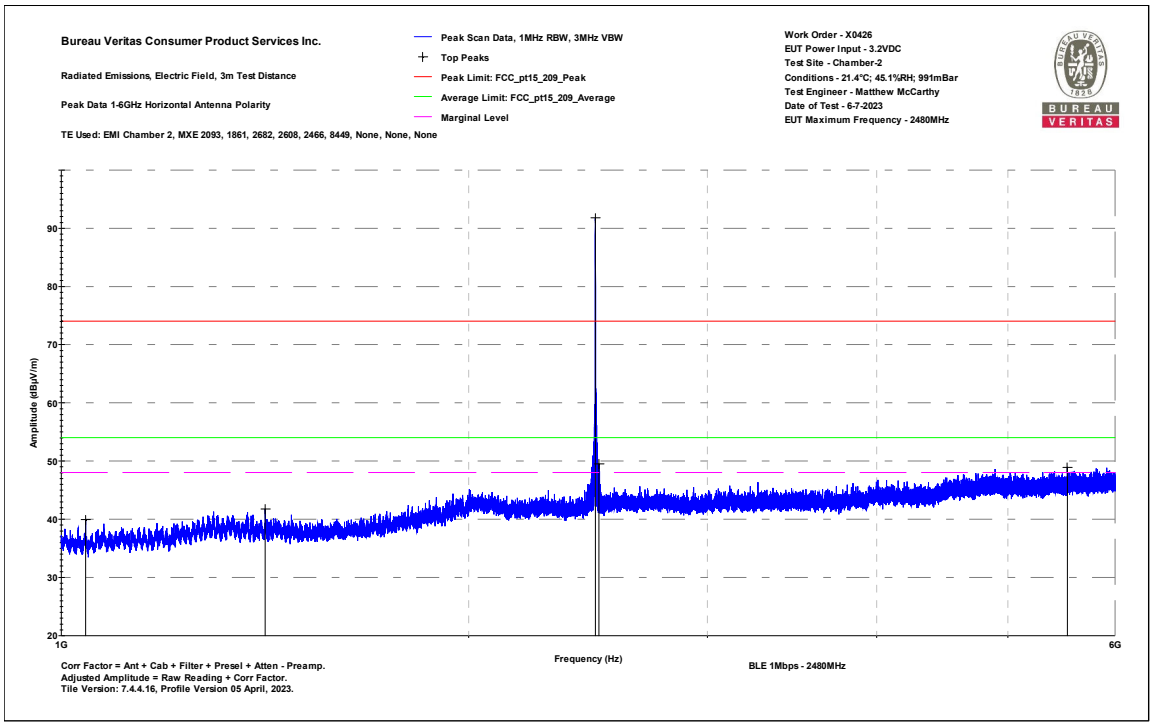


1-6GHz Vertical Plot

Bureau Veritas Consumer Product Services Inc.	Work Order - X0426
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 3.2VDC
Top Peaks Horizontal 1-6GHz	Test Site - Chamber-2
Notes:	Conditions - 21.4°C; 45.1%RH; 991mBar
BLE 1Mbps - 2480MHz	Test Engineer - Matthew McCarthy
	Date of Test - 6-7-2023

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Margin to Peak Limit (dB)	Peak Limit Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Margin to Avg Limit (dB)	Avg Limit Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1042.63	49.8	-10	39.9	74	-34.1	PASS		54	-14.1	PASS		200	315
1414.88	48.9	-7.1	41.8	74	-32.2	PASS		54	-12.2	PASS		200	126
2480.25	FUNDAMENTAL											100	0
2494.88	51.5	-2	49.5	74	-24.5	PASS		54	-4.5	PASS		100	18
5531.63	45.8	3.2	49	74	-25	PASS		54	-5	PASS		300	211

1-6GHz Horizontal Data Table

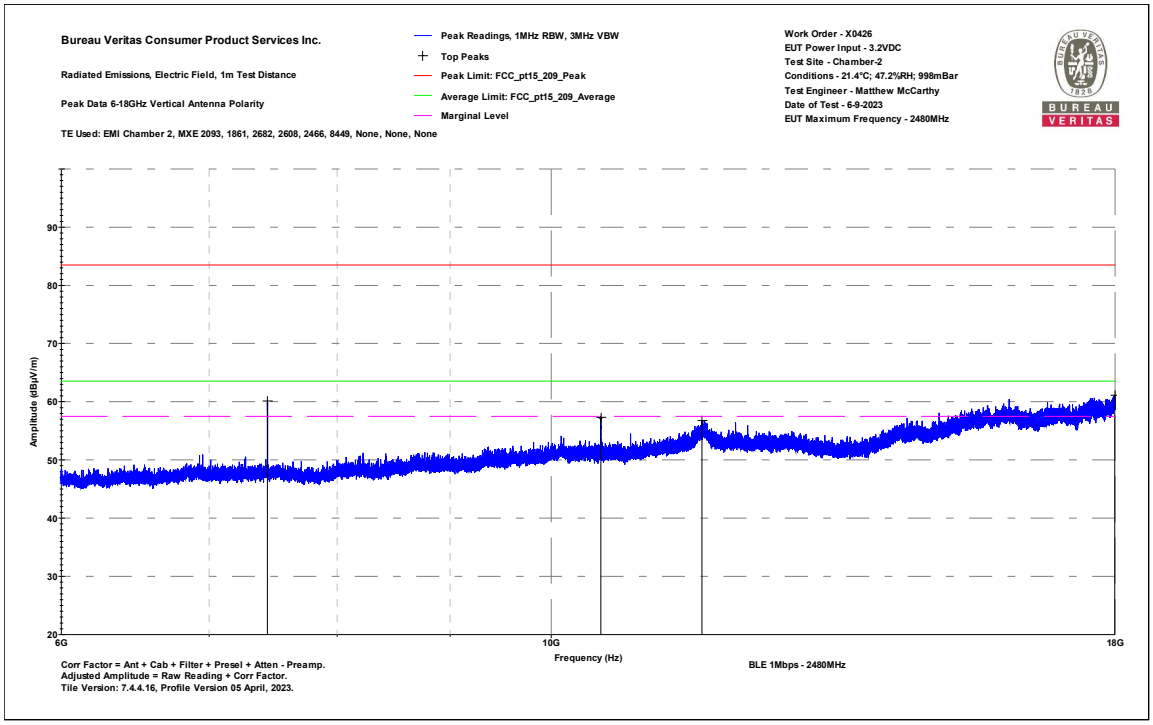


1-6GHz Horizontal Plot

Bureau Veritas Consumer Product Services Inc.	Work Order - X0426
Radiated Emissions Electric Field 1m Distance	EUT Power Input - 3.2VDC
Top Peaks Vertical 6-18GHz	Test Site - Chamber-2
Notes:	Conditions - 21.4°C; 47.2%RH; 998mBar
BLE 1Mbps - 2480MHz	Test Engineer - Matthew McCarthy
	Date of Test - 6-9-2023

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7439.1	56	4	60.1	83.5	-23.4	PASS		63.5	-3.4	PASS		150	17
10530.6	50.1	7.2	57.2	83.5	-26.3	PASS		63.5	-6.3	PASS		150	186
11700.9	48	8.8	56.8	83.5	-26.7	PASS		63.5	-6.7	PASS		175	298
17995.5	45.7	15.3	61.1	83.5	-22.4	PASS	-22.4	63.5	-2.4	PASS	-2.4	125	298

6-18GHz Vertical Data Table

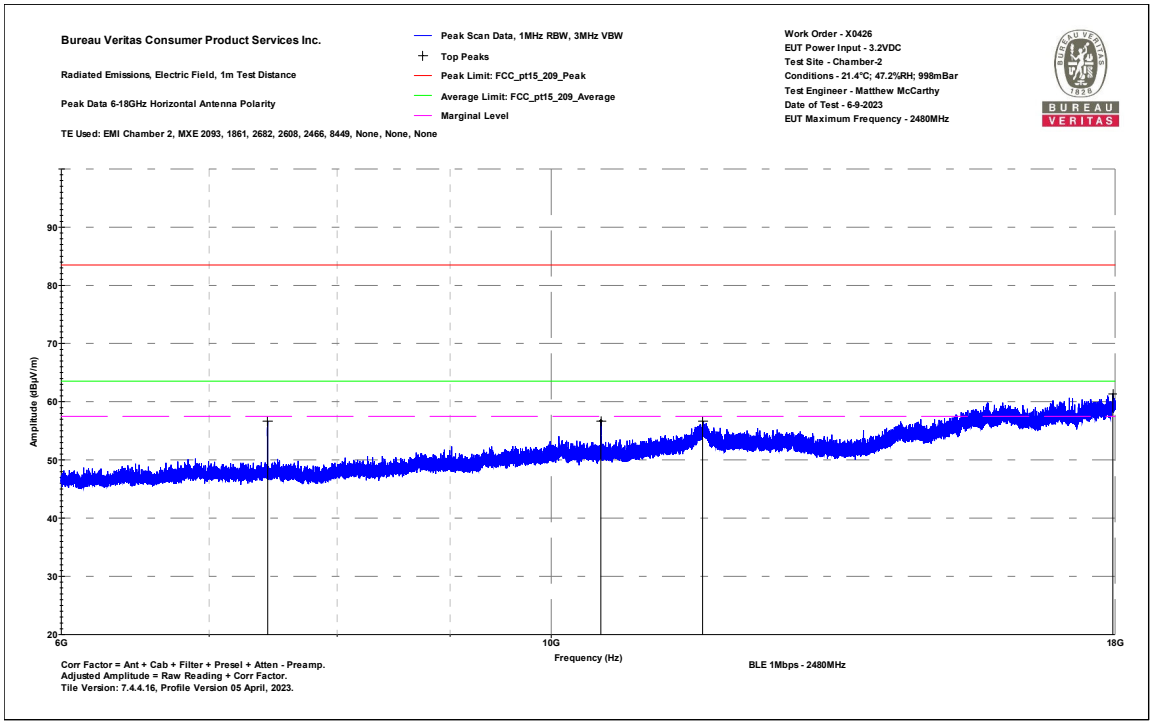


6-18GHz Vertical Plot

Bureau Veritas Consumer Product Services Inc.	Work Order - X0426
Radiated Emissions Electric Field 1m Distance	EUT Power Input - 3.2VDC
Top Peaks Horizontal 6-18GHz	Test Site - Chamber-2
Notes:	Conditions - 21.4°C; 47.2%RH; 998mBar
BLE 1Mbps - 2480MHz	Test Engineer - Matthew McCarthy
	Date of Test - 6-9-2023

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7440.9	52.7	4	56.7	83.5	-26.8	PASS		63.5	-6.8	PASS		175	261
10531.2	49.5	7.2	56.7	83.5	-26.8	PASS		63.5	-6.8	PASS		100	36
11709.9	47.8	8.8	56.6	83.5	-26.9	PASS		63.5	-6.9	PASS		175	223
17956.8	46.3	15.1	61.4	83.5	-22.1	PASS	-22.1	63.5	-2.1	PASS	-2.1	150	223

6-18GHz Horizontal Data Table



6-18GHz Horizontal Plot

Emissions 18-25GHz

Radiated Emissions Table

Date: Jun-12-2023 **Company:** Onset **Work Order:** x0426
Engineer: MCM **EUT Desc:** MX2205 **EUT Operating Voltage/Frequency:** Battery
Temp: 22.8C **Humidity:** 54% **Pressure:** 1000mbar
Frequency Range: 18-25GHz **Measurement Distance:** 0.1 m

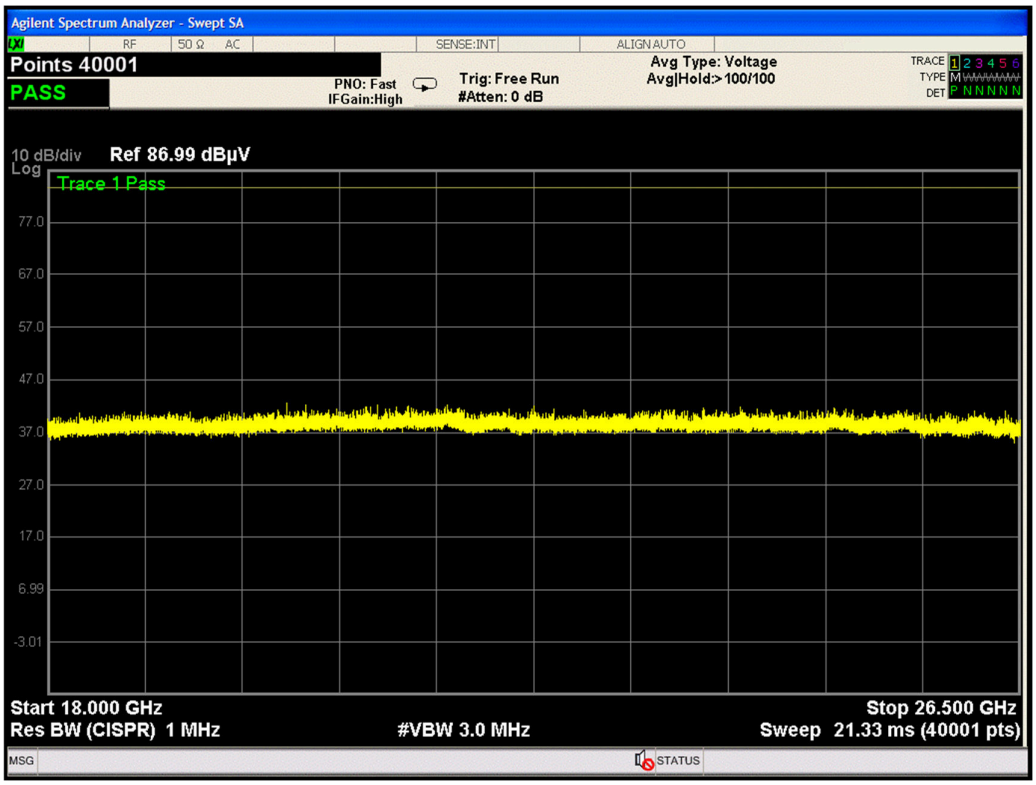
Notes: Low, mid and high channels tested.
No emissions found on either H or V polarity. Peak noise floor was more than 20dB below the Average limit.

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC 15.209 - Peak			FCC 15.209 - Average		
									Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
				---	---	---	---	---	---	---	---	---	---	---
H/V - Noise Floor	22000.0	47.0	47.0	40.8	40.5	9.2	55.9	55.9	103.5	-47.6	Pass	83.5	-27.6	Pass
				---	---	---	---	---	---	---	---	---	---	---

Table Result: Pass by -27.6 dB ***Worst Freq:*** 22000.0 MHz

Test Site: EMI Chamber 2 **Cable 1:** Asset #2324 **Cable 2:** --- **Cable 3:** ---
Analyzer: MXE 2093 **Preamp:** 18-26.5GHz **Antenna:** 18-26.5GHz Horn **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.225
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

Note: “Trace 1 Pass” remark on the spectrum analyzer screenshot below should be disregarded. Peak search was not activated. The trace on the spectrum analyzer shows that the noise floor was below the 47dBuV line across the whole span. Therefore a worst case raw reading of 47dBuV was used in the data table above for the adjusted field strength calculation.



BLE 1Mbps GFSK Radiated Band-edge:

Bureau Veritas Consumer Product Services Inc.	Work Order - X0426
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 3.2VDC
Radiated Bandedge (Low and High)	Test Site - Chamber-2
	Conditions - 21.4°C; 45.1%RH; 991mBar
	Test Engineer - Matthew McCarthy
	Date of Test - 6-7-2023

Antenna Polarity (H/V)	Frequency (MHz)	Raw Peak (dBµV)	Raw RMS Average (dBµV)	Correction Factor (dB/m)	Adjusted Peak (dBµV/m)	Adjusted RMS Average (dBµV/m)	Peak Limit FCC 15.209 (dBµV/m)	Peak Margin (dB)	Peak Result (Pass/Fail)	Peak Worst Margin (dB)	Average Limit FCC 15.209 (dBµV/m)	Average Margin (dB)	Average Result (Pass/Fail)	Average Worst Margin (dB)	Notes
H	2390	57.3	53.1	-2.8	54.5	50.3	74	-19.5	PASS	--	54	-3.7	PASS	-3.7	RMS Max Hold
V	2390	51.8	47.5	-2.8	49	44.7	74	-25	PASS	--	54	-9.3	PASS	--	RMS Max Hold
H	2483.5	66.6	47.3	-2.2	64.4	45.1	74	-9.6	PASS	-9.6	54	-8.9	PASS	--	RMS Trace Average
V	2483.5	65.7	46.3	-2.2	63.5	44.1	74	-10.5	PASS	--	54	-9.9	PASS	--	RMS Trace Average

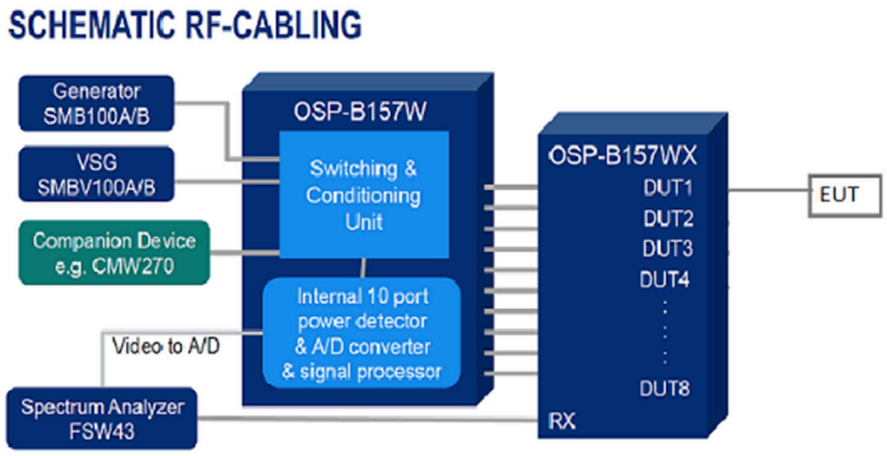
RMS trace average over 200 traces.
DCCF : 10*log(100/63.4) = 1.98dB
Raw RMS average readings at 2483.5MHz includes the added DCCF

4.2 6dB CHANNEL BANDWIDTH & 99% OBW

4.2.1 LIMITS

The minimum 6 dB bandwidth shall be 500 kHz.

4.2.2 TEST SETUP



4.2.3 TEST EQUIPMENT USED

Equipment	Manufacturer	Asset No.	Model No.	Serial No.	Last Cal.	Next Cal.
Cable	Carlisle	2595	UTiFLEX		4/20/2023	4/20/2024
Signal Analyzer	Rohde-Schwarz	2200	FSV 40	101551	10/11/2022	10/11/2023
OSP-B157W8	Rohde-Schwarz	2558	OSP_B157W8	100955	8/26/2021	8/26/2023

4.2.4 TEST PROCEDURES

6dB CHANNEL BANDWIDTH

a. Set RBW = 100 kHz.
b. Set the video bandwidth (VBW) ≥ 3 RBW.
c. Detector = Peak.
d. Trace mode = max hold.
e. Sweep = auto couple.
f. Allow the trace to stabilize.
g. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

99% OBW

a. The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.

b. The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.

c. Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

d. Step a) through step c) might require iteration to adjust within the specified range.

e. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

f. Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

4.2.5 DEVIATIONS

No deviations from the standard.

4.2.6 EUT OPERATING CONDITIONS

EUT was operated according to manufacturer's specifications.

4.2.7 TEST RESULTS

BLE (GFSK)

1Mbps:

Test date: Jun-08-2023

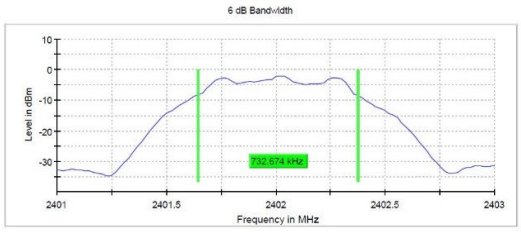
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	99% OBW (MHz)	PASS / FAIL
0	2402	0.733	1.050	PASS
19	2440	0.733	1.050	PASS
39	2480	0.733	1.050	PASS

CH0

6dB Bandwidth

Measurement

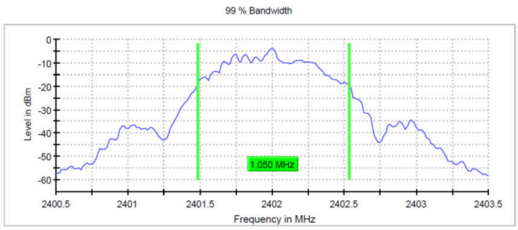
Setting	Instrument Value	Target Value
Start Frequency	2.40100 GHz	2.40100 GHz
Stop Frequency	2.40300 GHz	2.40300 GHz
Span	2.000 MHz	2.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	101	~ 40
Sweeptime	18.938 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	11 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.09 dB	0.50 dB



99% OBW

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40050 GHz	2.40050 GHz
Stop Frequency	2.40350 GHz	2.40350 GHz
Span	3.000 MHz	3.000 MHz
RBW	30.000 kHz	>= 30.000 kHz
VBW	100.000 kHz	>= 100.000 kHz
SweepPoints	200	~ 200
Sweeptime	63.151 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	8 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.12 dB	0.30 dB

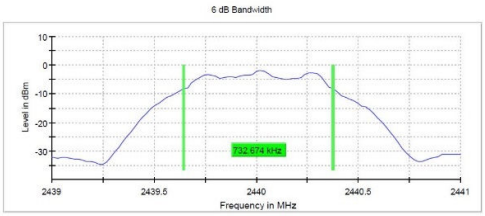


CH19

6dB Bandwidth

Measurement

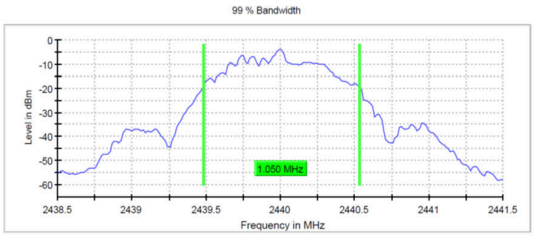
Setting	Instrument Value	Target Value
Start Frequency	2.43900 GHz	2.43900 GHz
Stop Frequency	2.44100 GHz	2.44100 GHz
Span	2.000 MHz	2.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	101	~ 40
Sweeptime	18.938 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	8 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.09 dB	0.50 dB



99% OBW

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43850 GHz	2.43850 GHz
Stop Frequency	2.44150 GHz	2.44150 GHz
Span	3.000 MHz	3.000 MHz
RBW	30.000 kHz	>= 30.000 kHz
VBW	100.000 kHz	>= 100.000 kHz
SweepPoints	200	~ 200
Sweeptime	63.151 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	7 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.08 dB	0.30 dB

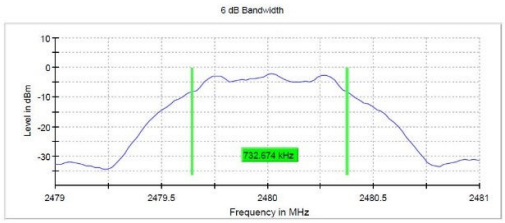


CH39

6dB Bandwidth

Measurement

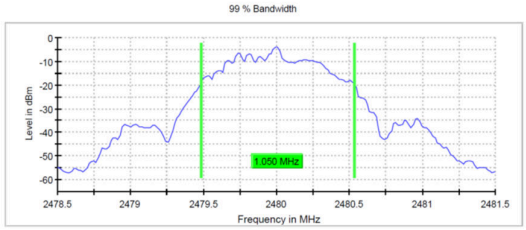
Setting	Instrument Value	Target Value
Start Frequency	2.47900 GHz	2.47900 GHz
Stop Frequency	2.48100 GHz	2.48100 GHz
Span	2.000 MHz	2.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	101	~ 40
Sweeptime	18.938 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	11 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.12 dB	0.50 dB



99% OBW

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47850 GHz	2.47850 GHz
Stop Frequency	2.48150 GHz	2.48150 GHz
Span	3.000 MHz	3.000 MHz
RBW	30.000 kHz	>= 30.000 kHz
VBW	100.000 kHz	>= 100.000 kHz
SweepPoints	200	~ 200
Sweeptime	63.151 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	8 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.14 dB	0.30 dB



4.3 CONDUCTED OUTPUT POWER

4.3.1 LIMITS

For systems using digital modulation in the 2400–2483.5 MHz band: 1 Watt (30dBm)

4.3.2 TEST SETUP

Refer to section 4.2.2.

4.3.3 TEST EQUIPMENT USED

Refer to section 4.2.3.

4.3.4 TEST PROCEDURES

Average conducted output power was measured in accordance with ANSI C63.10 - 2013 Section 11.9.2.3.2 (Method AVGPM-G).

4.3.5 DEVIATIONS

No deviations from the standard.

4.3.6 EUT OPERATING CONDITIONS

EUT was operated according to manufacturer’s specifications

4.3.7 TEST RESULTS

BLE (GFSK)

1Mbps:

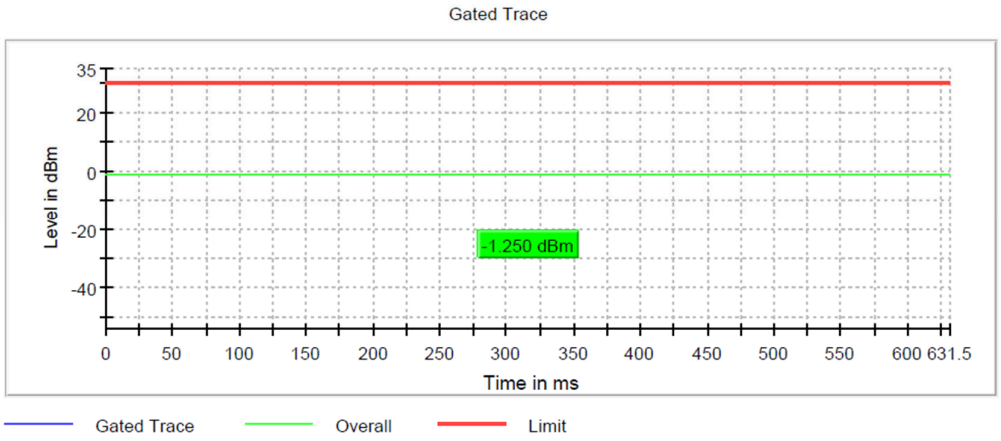
Test date: Jun-08-2023

CHANNEL	CHANNEL FREQUENCY (MHz)	AVG POWER (dBm)	AVG POWER (mW)	LIMIT (W)	PASS/FAIL
0	2402	-1.250	0.75	1	PASS
19	2440	-1.232	0.75	1	PASS
39	2480	-1.439	0.72	1	PASS

CH0

OSP PowerMeter settings

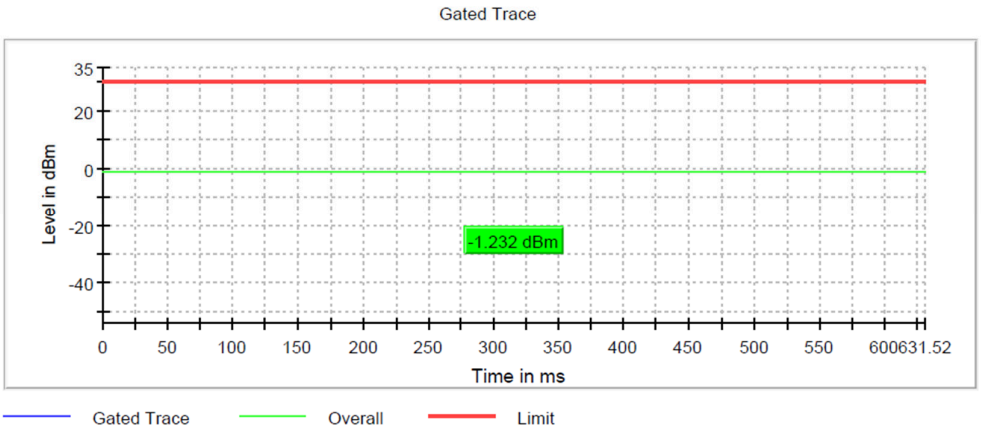
Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs



CH19

OSP PowerMeter settings

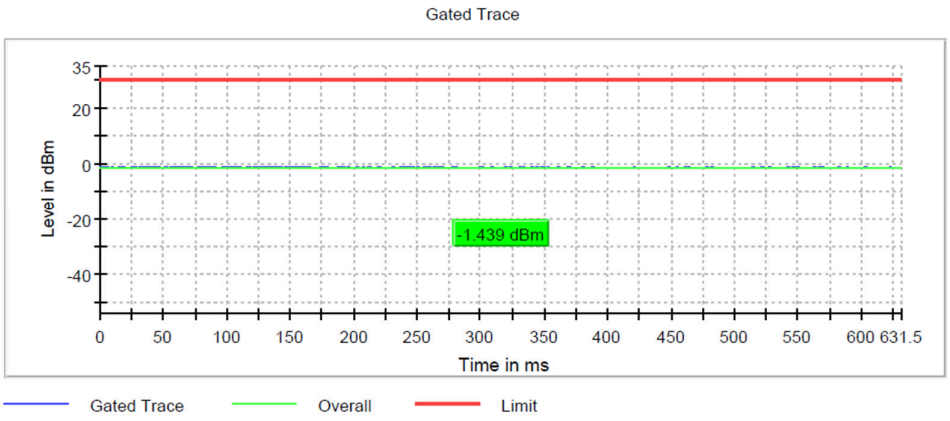
Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs



CH39

OSP PowerMeter settings

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs



4.4 POWER SPECTRAL DENSITY

4.4.1 LIMITS

The limit for Power Spectral Density is 8dBm/3kHz.

4.4.2 TEST SETUP

Refer to section 4.3.2.

4.4.3 TEST EQUIPMENT USED

Refer to section 4.3.3.

4.4.4 TEST PROCEDURES

Peak power spectral density was measured in accordance with ANSI C63.10 - 2013 Section 11.10.2 (Method PKPSD).

1. Set the span to 1.5 times the DTS bandwidth
2. Set the RBW = 10 kHz, VBW ≥ 3 x RBW, Detector = peak.
3. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

4.4.5 DEVIATIONS

No deviations from the standard.

4.4.6 EUT OPERATING CONDITIONS

EUT was operated according to manufacturer's specifications.

4.4.7 TEST RESULTS

BLE (GFSK)

1Mbps:

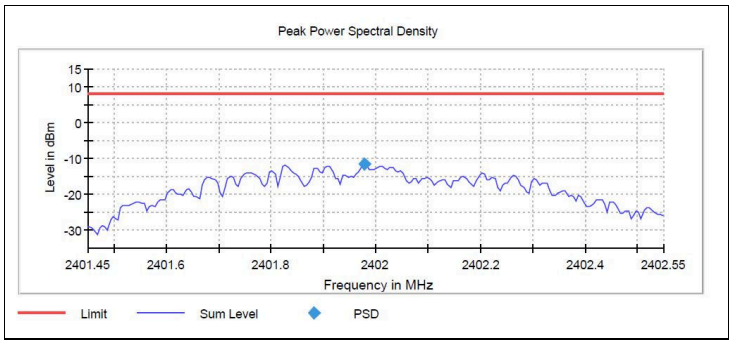
Test date: Jun-08-2023

Channel	FREQ. (MHz)	PSD (dBm)	Limit (dBm)	PASS /FAIL
0	2402	-11.705	8	PASS
19	2440	-11.890	8	PASS
39	2480	-11.950	8	PASS

CH0

Measurement

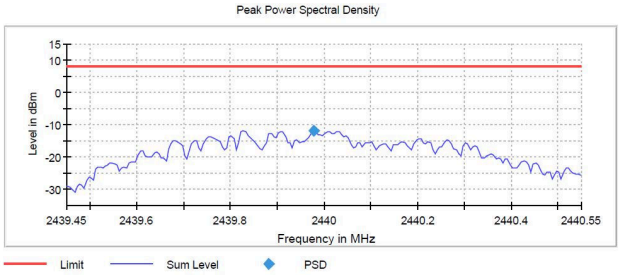
Setting	Instrument Value	Target Value
Start Frequency	2.40145 GHz	2.40145 GHz
Stop Frequency	2.40255 GHz	2.40255 GHz
Span	1.099 MHz	1.099 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	220	~ 220
Sweeptime	1.100 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.15 dB	0.50 dB



CH19

Measurement

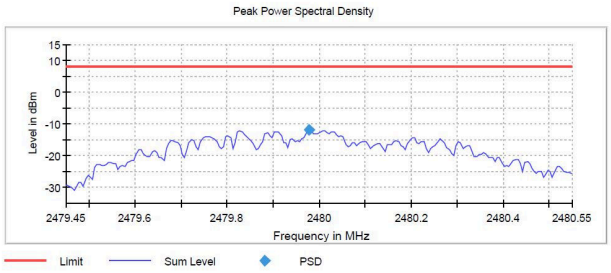
Setting	Instrument Value	Target Value
Start Frequency	2.43945 GHz	2.43945 GHz
Stop Frequency	2.44055 GHz	2.44055 GHz
Span	1.099 MHz	1.099 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	220	~ 220
Sweeptime	1.100 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.15 dB	0.50 dB



CH39

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47945 GHz	2.47945 GHz
Stop Frequency	2.48055 GHz	2.48055 GHz
Span	1.099 MHz	1.099 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	220	~ 220
Sweeptime	1.100 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	5 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.13 dB	0.50 dB



4.5 CONDUCTED SPURIOUS EMISSIONS AND BAND-EDGES

4.5.1 LIMITS

30dB below the highest emission level in the operating band (in 100kHz RBW).

4.5.2 TEST SETUP

Refer to section 4.3.2.

4.5.3 TEST EQUIPMENT USED

Refer to section 4.3.3.

4.5.4 TEST PROCEDURES

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

4.5.5 DEVIATIONS

No deviations from the standard.

4.5.6 EUT OPERATING CONDITIONS

EUT was operated according to manufacturer's specifications.

4.5.7 TEST RESULTS

BLE (GFSK)

1Mbps Conducted Spurious Emissions:

Test date: Jun-08-2023

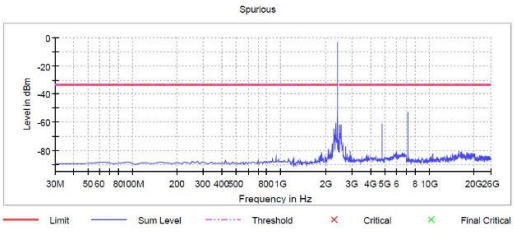
CH 0

Inband Peak

Frequency (MHz)	Level (dBm)
2402.066832	-3.0

Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2395.021008	-49.6	16.6	-33.0
7205.789099	-53.0	20.0	-33.0
2335.273109	-60.3	27.3	-33.0
4807.166065	-60.9	27.9	-33.0
2528.474182	-62.0	29.0	-33.0
2275.525210	-64.5	31.6	-33.0
2498.491394	-67.6	34.7	-33.0
2305.399160	-69.1	36.1	-33.0
2285.483193	-69.2	36.2	-33.0
2538.468445	-70.1	37.1	-33.0
2508.485657	-70.8	37.8	-33.0
2558.456970	-70.9	37.9	-33.0
2365.147059	-71.3	38.3	-33.0
2345.231092	-71.3	38.3	-33.0
2488.497131	-71.4	38.4	-33.0



Pre Measurement 1

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	238	~ 238
Sweeptime	23.700 ms	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	3	3
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	2.00 dB	2.00 dB
Run	4 / max. 40	max. 40
Stable	3 / 3	3
Max Stable Difference	0.00 dB	2.00 dB

CH 19

Inband Peak

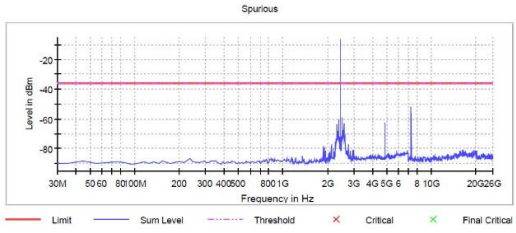
Frequency (MHz)	Level (dBm)
2440.096535	-6.0

Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
7315.725988	-51.6	15.6	-36.0
7325.720251	-52.3	16.3	-36.0
2508.485657	-59.1	23.0	-36.0
2375.105042	-60.1	24.1	-36.0
4877.125903	-62.3	26.2	-36.0
2568.451232	-63.1	27.1	-36.0
2315.357143	-63.3	27.3	-36.0
2538.468445	-67.7	31.6	-36.0
2345.231092	-68.0	32.0	-36.0
2548.462707	-69.5	33.5	-36.0
2325.315126	-69.9	33.9	-36.0
2578.445495	-70.2	34.2	-36.0
2498.491394	-70.6	34.6	-36.0
2385.063025	-71.6	35.6	-36.0
2598.434020	-71.7	35.6	-36.0

Pre Measurement 1

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	238	~ 238
Sweeptime	23.700 ms	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	3	3
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	2.00 dB	2.00 dB
Run	4 / max. 40	max. 40
Stable	3 / 3	3
Max Stable Difference	0.00 dB	2.00 dB



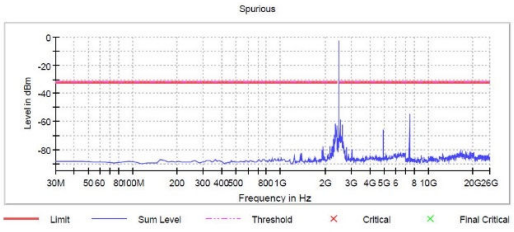
CH 39

Inband Peak

Frequency (MHz)	Level (dBm)
2479.779703	-2.2

Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
7445.651402	-54.8	22.5	-32.2
7435.657140	-58.3	26.1	-32.2
2548.462707	-58.8	26.5	-32.2
2355.189076	-61.6	29.4	-32.2
2608.428283	-62.6	30.4	-32.2
2488.497131	-63.4	31.2	-32.2
4957.080004	-66.0	33.8	-32.2
2365.147059	-67.5	35.3	-32.2
2385.063025	-67.8	35.6	-32.2
2395.021008	-68.7	36.5	-32.2
2315.357143	-69.7	37.5	-32.2
2538.468445	-69.9	37.6	-32.2
2508.485657	-70.7	38.4	-32.2
2568.451232	-70.9	38.6	-32.2
2375.105042	-71.2	38.9	-32.2



Pre Measurement 1

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	238	~ 238
Sweeptime	23.700 ms	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	3	3
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	2.00 dB	2.00 dB
Run	8 / max. 40	max. 40
Stable	3 / 3	3
Max Stable Difference	0.00 dB	2.00 dB

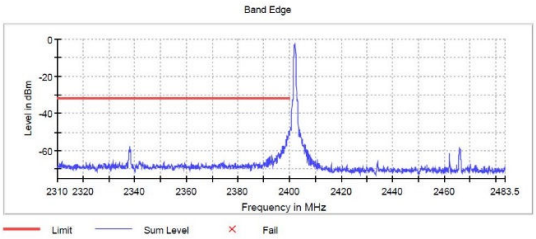
1Mbps Conducted Band-edge:

Test date: Jun-08-2023

CH0

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.825000	-49.6	17.6	-32.0	PASS
2399.875000	-49.8	17.8	-32.0	PASS
2399.775000	-49.8	17.8	-32.0	PASS
2399.725000	-50.1	18.1	-32.0	PASS
2399.625000	-50.2	18.2	-32.0	PASS
2399.675000	-50.2	18.2	-32.0	PASS
2399.575000	-50.2	18.2	-32.0	PASS
2399.925000	-50.5	18.5	-32.0	PASS
2399.525000	-50.8	18.8	-32.0	PASS
2399.975000	-51.0	19.0	-32.0	PASS
2399.475000	-52.0	20.0	-32.0	PASS
2399.075000	-52.2	20.2	-32.0	PASS
2399.025000	-52.2	20.3	-32.0	PASS
2399.125000	-52.6	20.6	-32.0	PASS
2399.175000	-52.7	20.7	-32.0	PASS



Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
Sweeptime	113.672 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	8 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Measurement 2

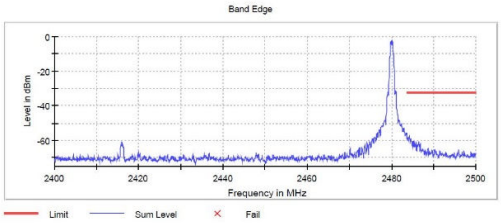
Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
Sweeptime	94.727 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	7 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.08 dB	0.50 dB

CH39

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.525000	-56.2	24.1	-32.1	PASS
2483.575000	-56.7	24.6	-32.1	PASS
2484.175000	-57.5	25.4	-32.1	PASS
2484.125000	-57.6	25.5	-32.1	PASS
2484.225000	-57.6	25.5	-32.1	PASS
2483.625000	-57.9	25.8	-32.1	PASS
2483.825000	-58.3	26.1	-32.1	PASS
2484.275000	-58.3	26.2	-32.1	PASS
2483.775000	-58.5	26.4	-32.1	PASS
2484.075000	-58.7	26.6	-32.1	PASS
2483.875000	-58.7	26.6	-32.1	PASS
2484.525000	-59.0	26.9	-32.1	PASS
2484.575000	-59.1	27.0	-32.1	PASS
2483.675000	-59.1	27.0	-32.1	PASS
2484.475000	-59.5	27.4	-32.1	PASS



Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
Sweeptime	94.727 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	5 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.06 dB	0.50 dB

Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.48350 GHz	2.48350 GHz
Stop Frequency	2.50000 GHz	2.50000 GHz
Span	16.500 MHz	16.500 MHz

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	330	~ 330
Sweeptime	18.945 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the Test Setup Photos exhibit.

6 APPENDIX A – MODIFICATIONS

No modifications were made to the EUT during testing.

---END OF REPORT---