



Test Report for RSAE Labs, Inc.
Report No. EY0475-1-2 Issue 2



TEST REPORT

Applicant	RSAE Labs, Inc.
Address	1002 Arthur Drive Suite 200 Lynn Haven, FL 32444
FCC ID	2ASIM-TSU1
ISED IC	33142-TSU1
Product Marketing Name (PMN)	TSU-1 and RSU-4
Hardware Version Identification Number (HVIN)	03-2003-01
Additional HVINs	See Section 3.1 of this report for details
Firmware Version Identification Number (FVIN)	3.12
Date of tests	Sep 27 – Oct 2, 2024
FCC Test Firm DN Canada CABID	US1028 US0106
The tests have been carried out according to the requirements of the following standard:	
☒ FCC Part 15, Subpart C, Section 15.247	
☒ ISED Canada RSS-247 Issue 3	
CONCLUSION: The submitted sample was found to <u>COMPLY</u> with the test requirement	
Prepared by Nisha Patel Wireless Engineer I	Approved by Ahmed Ait Ahmed EMC Manager
	
Report Issue Date: Jan 15, 2025	Issue Number: 2
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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
1	Original release	Nov 12, 2024
2	Updated applicant address	Jan 15, 2025



1 SUMMARY OF TEST RESULTS

The EUT has been tested against the following requirements:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247), RSS-247				
STANDARD SECTION		TEST TYPE AND LIMIT	APPLICABLE	RESULT
47CFR15	RSS			
15.207	Gen 8.8	AC Power Line Conducted Emissions	N/A (Note 1)	N/A
15.205 15.209	247 3.3 247 5.5 Gen 8.9 Gen 8.10	Radiated Spurious Emissions	Y	Pass
15.247(d)	247 5.5	Conducted Spurious Emissions	Y	Pass
15.247(a)(2)	247 5.2(a)	6dB Bandwidth	Y	Pass
--	Gen 6.7	99% Occupied Bandwidth	Y	Pass
15.247(b)(3)	247 5.4(d)	Conducted Output Power	Y	Pass
15.247(e)	247 5.2(b)	Power Spectral Density	Y	Pass
15.203	Gen 6.8	Antenna Requirement	Y	Pass

Note 1: EUT is battery powered.

2 MEASUREMENT UNCERTAINTY

The listed uncertainties are the worst-case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results. Values for measurement uncertainty are calculated per ETSI TR 100 028 (2001).

Measurement	Expanded Uncertainty k=2	Maximum allowable uncertainty
Radio frequency (@ 2.4GHz)	3.23×10^{-8}	1×10^{-7}
RF power, conducted	0.40dB	0.75dB
Maximum frequency deviation: Within 300Hz and 6kHz of audio frequency / Within 6kHz and 25kHz of audio frequency	3.4% 0.3dB	5% 3dB
Adjacent channel power	1.9dB	3dB
Conducted spurious emission of transmitter, valid up to 12.75GHz	2.39dB	3dB
Conducted emission of receivers	1.3dB	3dB
Radiated emission of transmitter, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of transmitter, valid up to 80GHz	3.3dB	6dB
Radiated emission of receiver, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of receiver, valid up to 80GHz	3.3dB	6dB
Humidity	2.37%	5%
Temperature	0.7°C	1.0°C
Time	4.1%	10%
RF Power Density, Conducted	0.4dB	3dB
DC and low frequency voltages	1.3%	3%
Voltage (AC, <10kHz)	1.3%	2%
Voltage (DC)	0.62%	1%
The above reflects a 95% confidence level		

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.



3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

NOMINAL VOLTAGE	3.3 VDC (battery)
MODULATION TECHNOLOGY	DTS
MODULATION TYPES	OQPSK
DATA RATES	250kbps
OPERATING FREQUENCY	2405 – 2480MHz
EUT Power Setting	4.5dBm
OUTPUT POWER	2.33mW (Average Conducted Power)
ANTENNA TYPE (Customer Supplied Information)	Planar Inverted F Antenna (PIFA) with 0.23dBi Peak Gain

Additional Versions and Differences:

Product Marketing Name	Hardware Version Identification Number	Tested
RSU-4	03-2002-01	No (See Note 1)
RSU-4	03-2002-02	No (See Note 1)
RSU-4	03-2002-03	No (See Note 1)
RSU-4	03-2002-04	No (See Note 1)
RSU-4	03-2002-05	No (See Note 1)
TSU-1	03-2003-01	Yes
TSU-1	03-2003-02	No (See Note 1)
TSU-1	03-2003-03	No (See Note 1)
TSU-1	03-2003-04	No (See Note 1)
TSU-1	03-2003-05	No (See Note 1)
TSU-1	03-2003-06	No (See Note 1)

Note 1: Version variant for marketing purposes only. Electrically identical to the tested version.

EUT has no ports for power or I/O.

Lowest clock frequency in the device (used/generated): 0.032 MHz

Highest clock frequency in the device (used/generated): 2480 MHz

For a more detailed description of the EUT, please refer to the manufacturer's specifications or the user's manual.

For photos of the EUT, please refer to External and Internal Photos exhibits.

3.2 DESCRIPTION OF TEST MODES

EUT has 16 operating channels as shown below:

Channel	FREQ. (MHz)	Channel	FREQ. (MHz)
11	2405	19	2445
12	2410	20	2450
13	2415	21	2455
14	2420	22	2460
15	2425	23	2465
16	2430	24	2470
17	2435	25	2475
18	2440	26	2480

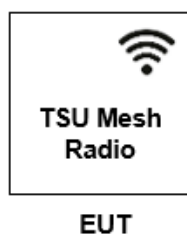
Two samples were provided for testing, one for radiated measurements and another with an u.FL connector for conducted antenna port measurements. EUT is a battery powered device. Customer supplied the laptop with software tool and PRU4 (USB dongle) for necessary test mode setup. EUT battery voltages were monitored via customer supplied laptop to ensure fresh battery levels during testing.

EUT configuration modes:

TEST MODE	DESCRIPTION
A	Transmit at 250kbps (Duty-cycle: 99.89%)

EUT SETUP BLOCK DIAGRAMS

Radiated Emissions EUT Setup



Laptop was removed from the chamber after the necessary test mode was setup.

For antenna port test setup block diagrams, please see the corresponding sections of this report.



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Following channels/modes were selected for the applicable tests below.

TEST	TEST MODE	AVAILABLE CHANNELS	TESTED CHANNEL	MODULATION TYPE	DATA RATE (kbps)	Notes
COP	A	11 to 26	11,18,26	OQPSK	250	-
PSD	A	11 to 26	11,18,26	OQPSK	250	-
CBE	A	11 to 26	11,26	OQPSK	250	-
6DB	A	11 to 26	11,18,26	OQPSK	250	-
OBW	A	11 to 26	11,18,26	OQPSK	250	-
CSE	A	11 to 26	11,18,26	OQPSK	250	-
RSE<1G	A	11 to 26	11,18,26	OQPSK	250	1
RSE≥1G	A	11 to 26	11,18,26	OQPSK	250	1
RBE	A	11 to 26	11,26	OQPSK	250	1
PLCE	-	-	-	-	-	2

Notes:

- 1) For radiated emissions, worst-case orientation was found when the EUT was positioned on Y-Axis as shown in the Test Setup Photos exhibit. Worst-case orientation was determined based on pre-scans.
- 2) Not applicable since EUT is battery powered only.

COP: Conducted Output Power

PSD: Power Spectral Density

CBE: Conducted Band-edge

6DB: 6dB Bandwidth

OBW: 99% Occupied Bandwidth

CSE: Conducted Spurious Emissions

RSE<1G: Radiated Spurious Emissions Below 1GHz

RSE≥1G: Radiated Spurious Emissions Above 1GHz

RBE: Radiated Band-edge

PLCE: Power Line Conducted Emissions

TEST CONDITIONS:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY	DATE OF TEST
RE<1G	21.2°C, 57.8%, 1011mbar	3.3VDC	NP	10/1/2024
RE≥1G	21.1°C, 58.1%, 1009mbar	3.3VDC	NP	9/30/2024
RBE	21.6°C, 64.1%, 1008mbar 21.1°C, 58.1%, 1009mbar	3.3VDC	NP	9/27/2024 9/30/2024
Antenna Port Measurements	20.7°C, 56.7%, 1009mbar	3.3VDC	YF	10/2/2024



3.3 MEASUREMENT PROCEDURES USED

All tests were performed in accordance with the following measurement procedures:

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

ANSI C63.10-2013

3.4 DESCRIPTION OF SUPPORT EQUIPMENT

Support Equipment	Model #	Serial #	Comments
Laptop	Dell Latitude 5450	-	Supplied by the customer for necessary test mode setup
PRU-4 80-1024-01 (USB dongle)	BL654	1462400199	

4 TEST TYPES AND RESULTS

4.1 RADIATED EMISSIONS MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSIONS MEASUREMENT

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emissions limits specified in Section 15.209(a).

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

- Lower limit applies at the transition frequencies.
- As specified in 15.35(b), for frequencies above 1000MHz, field strength limits are based on the use of measurement instrumentation employing an average detector function. However, there is also a limit on the peak level of the emissions that is 20 dB above the maximum permitted average emission limit.
- Measurements above 6GHz or 18GHz can be performed at distances less than 3m from the EUT due to increased noise floor of the measurement system. Since such measurements produce higher amplitudes than what they would be if they were measured at 3 meters, this would be considered worst-case and no compensation back to 3 meters is needed. Limit conversion above 30MHz is done by using inverse linear distance extrapolation factor (20dB/decade) as allowed in FCC 15.31(f)(1).

$$\text{Limit}(1\text{m}) = \text{Limit}(3\text{m}) + 20 \cdot \log(3/1) = \text{Limit}(3\text{m}) + 9.5$$

$$\text{Limit}(0.1\text{m}) = \text{Limit}(3\text{m}) + 20 \cdot \log(3/0.1) = \text{Limit}(3\text{m}) + 29.5$$
- Limit conversion below 30MHz is done by using the square of an inverse linear distance extrapolation factor (40 dB/decade) as allowed in FCC 15.31(f)(2).

$$\text{Limit}(3\text{m}) = \text{Limit}(30\text{m}) + 40 \cdot \log(30/3) = \text{Limit}(30\text{m}) + 40$$

$$\text{Limit}(3\text{m}) = \text{Limit}(300\text{m}) + 40 \cdot \log(300/3) = \text{Limit}(300\text{m}) + 80$$
- Adjusted Reading (dBuV/m) = Raw Reading (dBuV) + Transducer(Correction) Factor (dB/m)
 Transducer Factor (dB/m) = Antenna Factor (dB/m) – PreAmp Gain (dB) + Cable Loss (dB) + Filter Loss (dB)
 Note: Filter loss only applies if a notch filter is used during testing.
- RSS-GEN Table 6 H-field limits are 51.5dB lower than FCC 15.209(a) E-field limits. Measurements are performed in terms of magnetic field and converted to electric field using the free space impedance of 377Ω (E-field = H-field + 51.5). Therefore resulting pass/fail margin would be the same if an E-field reading is compared to an E-field limit or an H-field reading is compared to an H-field limit.



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4.1.2 TEST INSTRUMENTS

Rev. 9/25/2024								
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due	Calibrated on
EMI Chamber 1	719150	2762A-6	A-0015	30-1000MHz	1685	I	9/19/2025	9/19/2024
EMI Chamber 1	719150	2762A-6	A-0015	1-18GHz	1685	I	9/19/2025	9/19/2024
Spectrum Analyzers / Receivers/Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gauss TDEMI Ultra 40	9kHz-40Ghz	TDEMI Ultra 40	Gauss	2305001	2712	1	7/23/2025	7/23/2024
Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Red-Black Bilog	30-2000MHz	JB1	Sunol	A091604-2	1106	I	10/2/2025	10/2/2023
Blue Horn	1-18Ghz	3117	ETS	157647	1861	I	3/27/2025	3/27/2023
3116C Horn / PA	18-40GHz	3116C	ETS	258845	2852	I	3/21/2026	3/21/2024
2615 Active Loop Antenna	9KHz-30MHz	6502	EMCO	2049	2615	I	1/18/2025	1/18/2023
Preamps /Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
2862 PA	9KHz-1GHz	310	SONOMA INSTRUMENT	185927		II	2/17/2025	2/17/2024
2116 BRF	0.009-18000MHz	BRM50702	Micro-Tronics	G226	2116	II	12/5/2024	12/5/2023
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
Asset #2608	9KHz-18GHz		Pasternack			II	11/2/2024	11/2/2023
Asset #2595	9KHz-40GHz		Carlisle			II	2/17/2025	2/17/2024
Asset #2596	9KHz-40GHz		Carlisle			II	4/22/2025	4/22/2024
Asset #2681	9KHz-18GHz		Pasternack			II	12/7/2024	12/7/2023
Meteorological Meters/Chambers		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Asset 2848		SD700	EXTECH	A.115171	2848	I	1/13/2025	1/13/2023
Asset #2847		1235C97	Control Company	200435382	2847	I	8/18/2025	8/18/2022
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.								



4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 1.5 meters (above 1GHz) and 0.8 meters (below 1GHz) above the ground at a 3 meters semi-anechoic chamber.
- b. For below 30MHz, a loop antenna with its lowest point 1m above the ground was placed 3m away from the EUT and it was rotated 0 and 90 degrees around its vertical axis.
- c. In 30MHz-1GHz range, a biconilog antenna was mounted on a variable-height antenna tower and placed 3m away from the EUT. Antenna height was varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna were investigated. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. In 1GHz-18GHz range, a horn antenna was mounted on a variable-height antenna tower and placed 3m away from the EUT. Antenna height was varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna were investigated. The table was rotated 360 degrees to determine the position of the highest radiation.
- e. In 18-25GHz a smaller horn antenna was used to make measurements at 1m away from the EUT.
- f. Tests were performed using fresh batteries.
- g. Following bandwidths were used during emissions testing:

Freq. (MHz)	RBW	VBW	Pre-scan	Final
0.009-0.15	200Hz	1kHz	Peak	Not required based on pre-scan data
0.15-30	9kHz	30kHz	Peak	Not required based on pre-scan data
30-1000	120kHz	300kHz	Peak	Quasi Peak
>1000	1MHz	3MHz	Peak	Peak Max Hold and RMS Power Avg (Max Hold)

Per FCC §15.209(d), limits §15.209(a) are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. If peak measurements in these frequency bands were below the applicable limits, QPk and RMS measurements were not performed.

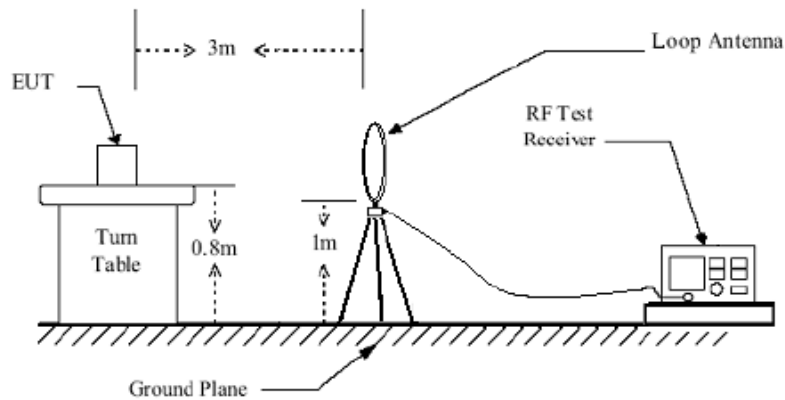
RMS power averaging default mode in measurement software is trace max-hold.

4.1.4 DEVIATION FROM TEST STANDARD

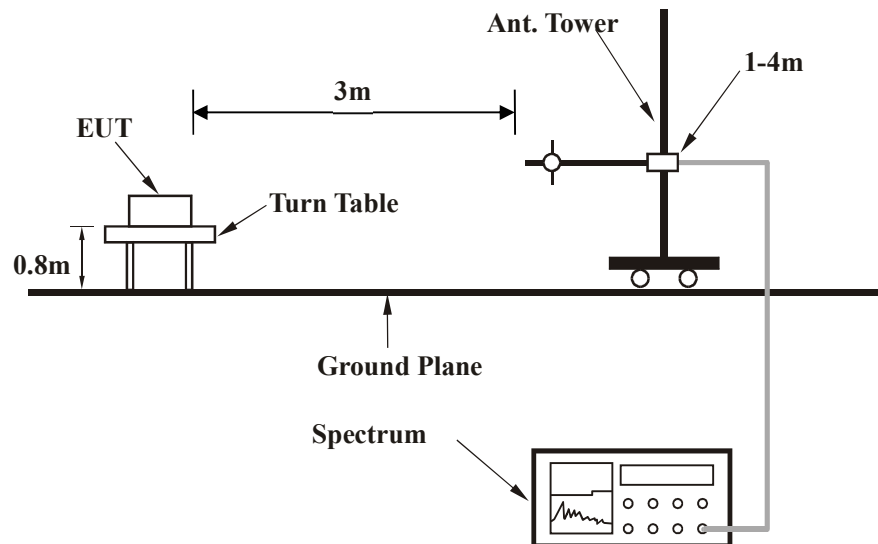
No deviation.

4.1.5 TEST SETUP

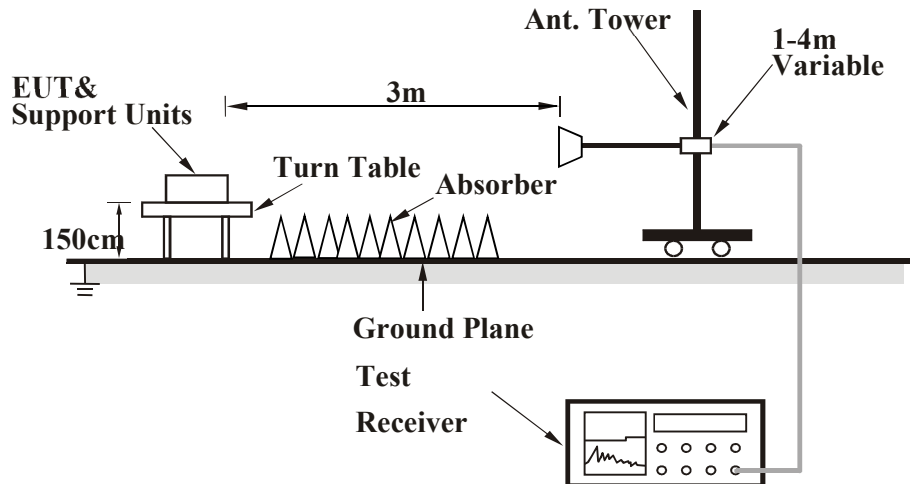
Below 30MHz test setup



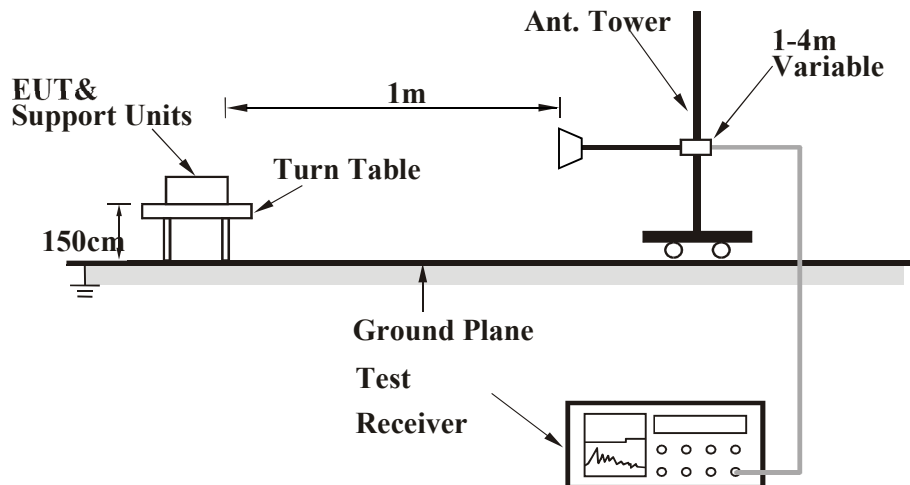
Below 1GHz test setup



1GHz – 18GHz Test Setup



18GHz – 25GHz Test Setup



Note: For the actual test configuration, please refer to the Test Setup Photos exhibit.

4.1.6 EUT OPERATING CONDITIONS

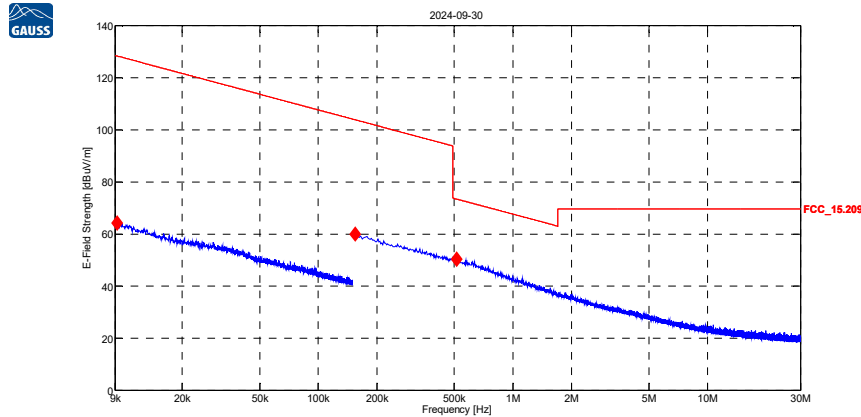
EUT was operated according to the manufacturer's specifications.

4.1.7 TEST RESULTS

Emissions below 30MHz

No emissions within 20dB of the limit were identified in 9kHz-30MHz range.

250kbps 802.15.4 Channel 11



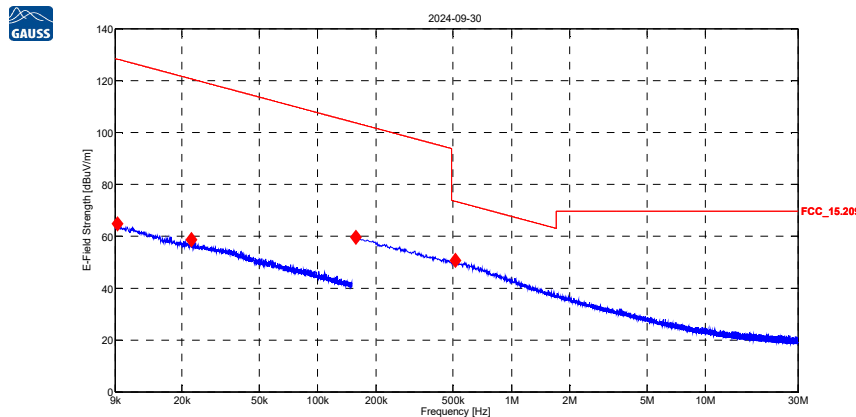
Scan1: 9.0 kHz, 100.0 Hz, 150.0 kHz; IF:200Hz, 100.0 ms MaxPeak, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
9.25 kHz	64.25	128.27	64.03	Parallel	100	237.881	19.05	FCC_15.209

Scan2: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 100.0 ms MaxPeak, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
155 kHz	59.89	103.79	43.91	Parallel	100	176.487	10.01	FCC_15.209
515 kHz	50.37	73.37	23.00	Parallel	100	219.052	10.12	FCC_15.209

9k-30MHz Parallel, Plot and Data Table



Scan1: 9.0 kHz, 100.0 Hz, 150.0 kHz; IF:200Hz, 100.0 ms MaxPeak, Att 10dB

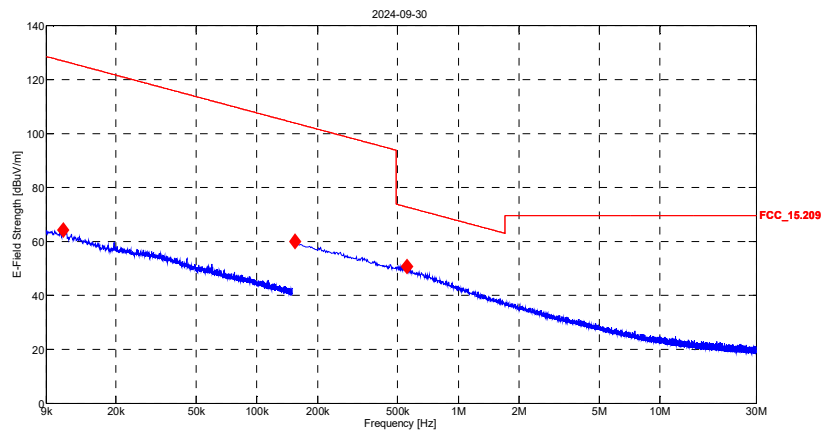
f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
9.3 kHz	64.75	128.23	63.48	Perpendicular	100	139.636	19.02	FCC_15.209
22.35 kHz	58.57	120.61	62.04	Perpendicular	100	272.043	13.54	FCC_15.209

Scan2: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 100.0 ms MaxPeak, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
157.5 kHz	59.59	103.66	44.07	Perpendicular	100	347.238	10.01	FCC_15.209
515 kHz	50.72	73.37	22.65	Perpendicular	100	49.483	10.12	FCC_15.209

9k-30MHz Perpendicular, Plot and Data Table

250kbps 802.15.4 Channel 18



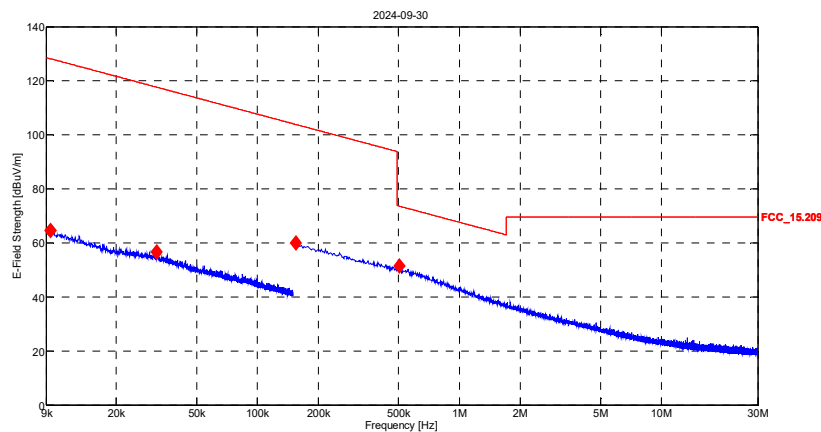
Scan1: 9.0 kHz, 100.0 Hz, 150.0 kHz; IF:200Hz, 100.0 ms MaxPeak, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
10.95 kHz	64.18	126.81	62.63	Parallel	100	43.3	18.08	FCC_15.209

Scan2: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 100.0 ms MaxPeak, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
155 kHz	59.87	103.79	43.92	Parallel	100	251.696	10.01	FCC_15.209
557.5 kHz	50.56	72.68	22.12	Parallel	100	313.373	10.21	FCC_15.209

9k-30MHz Parallel, Plot and Data Table



Scan1: 9.0 kHz, 100.0 Hz, 150.0 kHz; IF:200Hz, 100.0 ms MaxPeak, Att 10dB

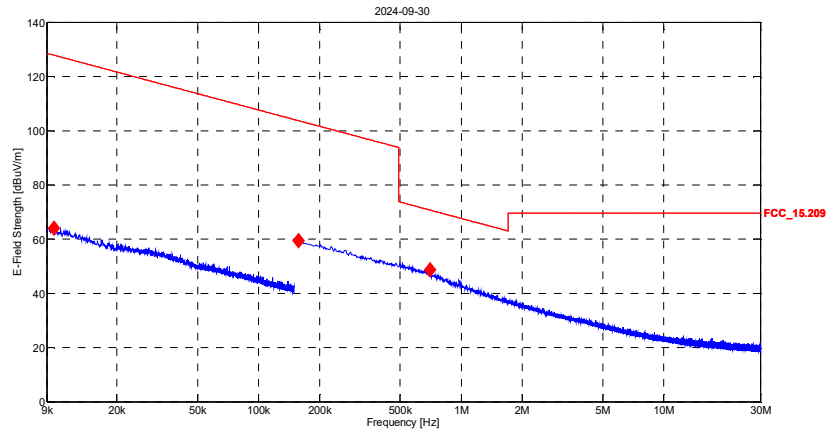
f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
9.45 kHz	64.54	128.09	63.55	Perpendicular	100	164.458	18.95	FCC_15.209
31.75 kHz	56.50	117.56	61.06	Perpendicular	100	316.333	12.94	FCC_15.209

Scan2: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 100.0 ms MaxPeak, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
155 kHz	59.90	103.79	43.89	Perpendicular	100	80.847	10.01	FCC_15.209
505 kHz	51.30	73.54	22.23	Perpendicular	100	47.515	10.10	FCC_15.209

9k-30MHz Perpendicular, Plot and Data Table

250kbps 802.15.4 Channel 26



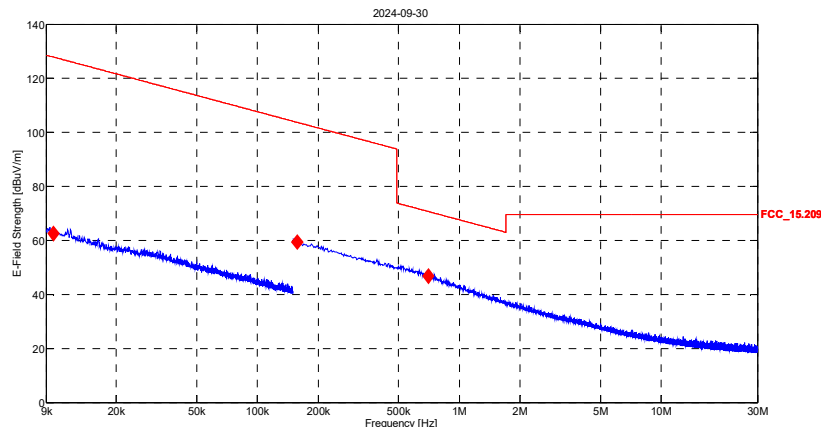
Scan1: 9.0 kHz, 100.0 Hz, 150.0 kHz; IF:200Hz, 100.0 ms MaxPeak, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
9.8 kHz	64.05	127.77	63.72	Parallel	100	254.156	18.77	FCC_15.209

Scan2: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 100.0 ms MaxPeak, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
157.5 kHz	59.32	103.66	44.34	Parallel	100	79.967	10.01	FCC_15.209
702.5 kHz	48.60	70.67	22.07	Parallel	100	80.5	10.34	FCC_15.209

9k-30MHz Parallel, Plot and Data Table



Scan1: 9.0 kHz, 100.0 Hz, 150.0 kHz; IF:200Hz, 100.0 ms MaxPeak, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
9.8 kHz	62.55	127.77	65.22	Perpendicular	100	220.396	18.77	FCC_15.209

Scan2: 150.0 kHz, 5.0 kHz, 30.0 MHz; IF:9kHz, 100.0 ms MaxPeak, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Height [cm]	Angle [°]	Trans	Name
157.5 kHz	59.35	103.66	44.31	Perpendicular	100	36.251	10.01	FCC_15.209
702.5 kHz	46.83	70.67	23.84	Perpendicular	100	274.84	10.34	FCC_15.209

9k-30MHz Perpendicular, Plot and Data Table

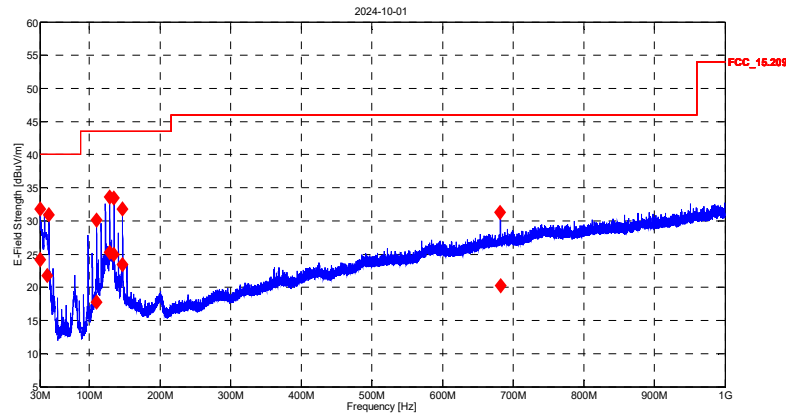


Test Report for RSAE Labs, Inc.
Report No. EY0475-1-2 Issue 2



30MHz-1000MHz

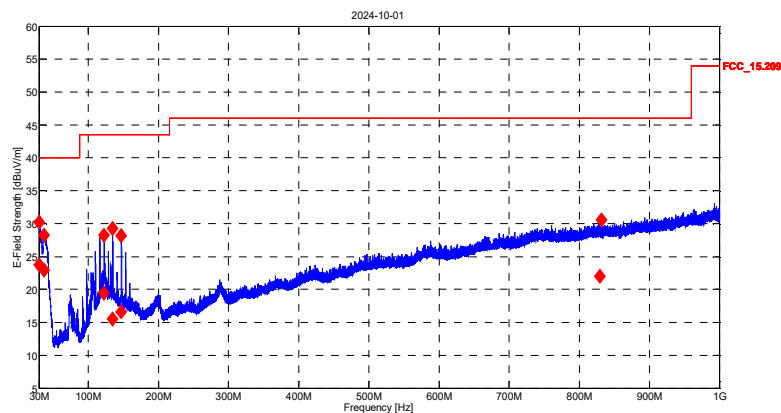
250kbps 802.15.4 Channel 11



Final 1: 30.0 MHz, 50.0 kHz, 683.8 MHz; IF:120kHz, 200.0 ms QP, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
30.675 MHz	24.14	40.00	15.86	V	359.351	100	-2.66	FCC 15.209
40.85 MHz	21.76	40.00	18.24	V	217.59	126.56	-10.48	FCC 15.209
110.125 MHz	17.79	43.50	25.71	V	344.627	100.02	-11.49	FCC 15.209
128.625 MHz	25.28	43.50	18.22	V	59.927	100	-9.79	FCC 15.209
134.725 MHz	24.98	43.50	18.52	V	19.08	100	-9.83	FCC 15.209
146.975 MHz	23.44	43.50	20.06	V	313.2	130.867	-10.60	FCC 15.209
681.925 MHz	20.24	46.00	25.76	V	188.15	125.325	-1.91	FCC 15.209

30-1000MHz Vertical, Plot and Data Table



Final 1: 30.0 MHz, 50.0 kHz, 833.7 MHz; IF:120kHz, 200.0 ms QP, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
30.25 MHz	23.71	40.00	16.29	H	295.98	359.967	-2.66	FCC 15.209
37.475 MHz	22.97	40.00	17.03	H	216.727	100	-6.24	FCC 15.209
122.525 MHz	19.47	43.50	24.03	H	262.693	400	-9.84	FCC 15.209
134.725 MHz	15.55	43.50	27.95	H	15.514	250	-9.83	FCC 15.209
147 MHz	16.58	43.50	26.92	H	224.753	235.722	-10.62	FCC 15.209
830 MHz	21.97	46.00	24.03	H	115.233	399.8	-0.03	FCC 15.209

30-1000MHz Horizontal, Plot and Data Table

Bureau Veritas Consumer Product
Services Inc.

One Distribution Center Circle, #1
Littleton, MA

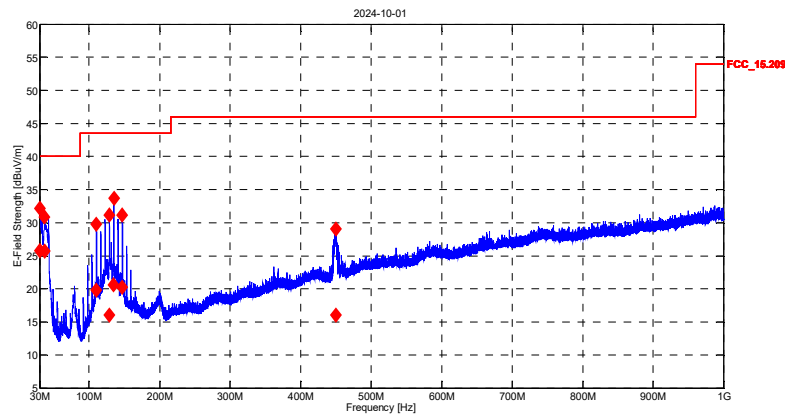
Tel.: (978) 486-8880
Fax: (978) 486-8828



Test Report for RSAE Labs, Inc.
Report No. EY0475-1-2 Issue 2



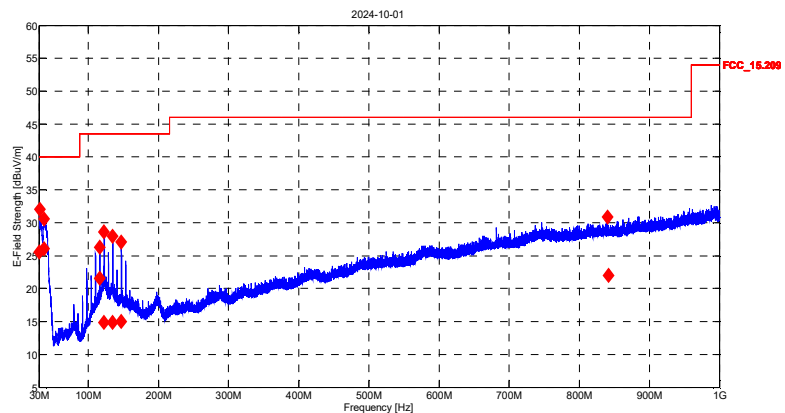
250kbps 802.15.4 Channel 18



Final 1: 30.0 MHz, 50.0 kHz, 452.0 MHz; IF:120kHz, 200.0 ms QP, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
30.6 MHz	25.78	40.00	14.22	V	360	169.644	-2.66	FCC 15.209
37.025 MHz	25.72	40.00	14.28	V	219.761	200	-6.04	FCC 15.209
110.275 MHz	19.80	43.50	23.70	V	342.366	100	-11.48	FCC 15.209
128.625 MHz	15.99	43.50	27.51	V	79.1	112.958	-9.79	FCC 15.209
134.8 MHz	20.61	43.50	22.89	V	60.512	100	-9.83	FCC 15.209
147.05 MHz	20.25	43.50	23.25	V	313.426	113.3	-10.62	FCC 15.209
450.325 MHz	16.04	46.00	29.96	V	360	100.1	-6.17	FCC 15.209

30-1000MHz Vertical, Plot and Data Table



Final 1: 30.0 MHz, 50.0 kHz, 842.9 MHz; IF:120kHz, 200.0 ms QP, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
30.5 MHz	25.52	40.00	14.48	H	71.246	101.844	-2.66	FCC 15.209
36.85 MHz	26.04	40.00	13.96	H	305.755	124.175	-6.35	FCC 15.209
116.425 MHz	21.56	43.50	21.94	H	265.988	289.86	-10.38	FCC 15.209
122.55 MHz	14.87	43.50	28.63	H	262.666	382.2	-9.84	FCC 15.209
134.75 MHz	14.84	43.50	28.66	H	18.53	312.3	-9.83	FCC 15.209
147.025 MHz	15.04	43.50	28.46	H	227.305	150	-10.61	FCC 15.209
841.925 MHz	21.96	46.00	24.04	H	86.28	150	-0.03	FCC 15.209

30-1000MHz Horizontal, Plot and Data Table

Bureau Veritas Consumer Product
Services Inc.

One Distribution Center Circle, #1
Littleton, MA

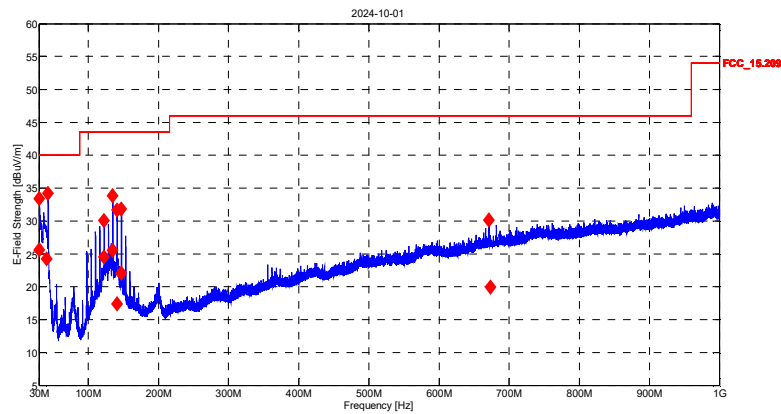
Tel.: (978) 486-8880
Fax: (978) 486-8828



Test Report for RSAE Labs, Inc.
Report No. EY0475-1-2 Issue 2



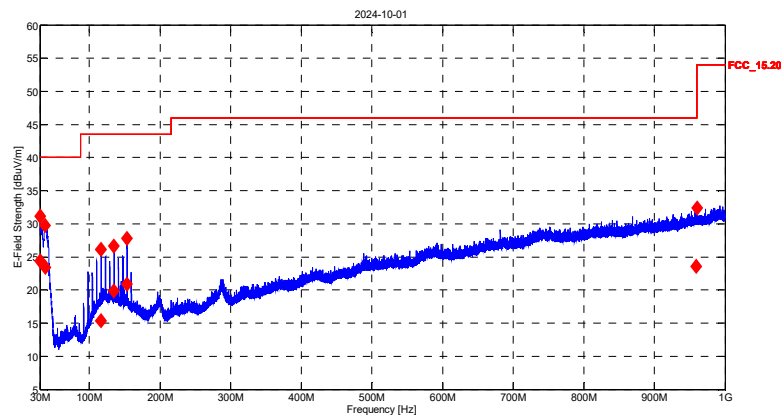
250kbps 802.15.4 Channel 26



Final 1: 30.0 MHz, 50.0 kHz, 673.0 MHz; IF:120kHz, 200.0 ms QP, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
30.575 MHz	25.64	40.00	14.36	V	347.752	100.29	-2.66	FCC 15.209
40.85 MHz	24.23	40.00	15.77	V	209.934	145.858	-10.48	FCC 15.209
122.525 MHz	24.54	43.50	18.96	V	142.708	249.7	-9.84	FCC 15.209
134.8 MHz	25.58	43.50	17.92	V	49.113	100	-9.83	FCC 15.209
140.9 MHz	17.40	43.50	26.10	V	74.876	130.7	-10.25	FCC 15.209
147.025 MHz	22.09	43.50	21.41	V	360	100.1	-10.62	FCC 15.209
673.05 MHz	19.94	46.00	26.06	V	199.06	303.713	-2.01	FCC 15.209

30-1000MHz Vertical, Plot and Data Table



Final 1: 30.0 MHz, 50.0 kHz, 962.7 MHz; IF:120kHz, 200.0 ms QP, Att 10dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
30.25 MHz	24.37	40.00	15.63	H	304.06	135.9	-2.66	FCC 15.209
37.95 MHz	23.45	40.00	16.55	H	45.121	163.4	-6.11	FCC 15.209
116.45 MHz	15.36	43.50	28.14	H	256.484	136	-10.40	FCC 15.209
134.825 MHz	19.85	43.50	23.65	H	61.093	237.7	-9.83	FCC 15.209
153.175 MHz	20.88	43.50	22.62	H	231.53	250	-10.98	FCC 15.209
959.1 MHz	23.56	46.00	22.44	H	308.294	150	2.33	FCC 15.209

30-1000MHz Horizontal, Plot and Data Table

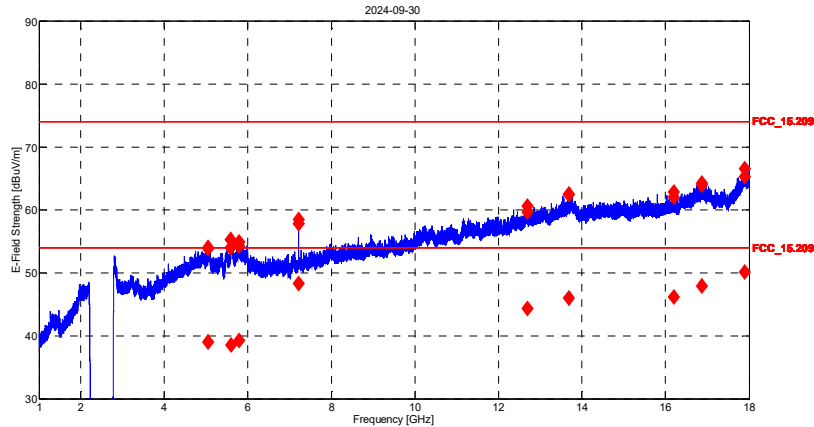


Test Report for RSAE Labs, Inc.
Report No. EY0475-1-2 Issue 2



1-18GHz

250kbps 802.15.4 Channel 11



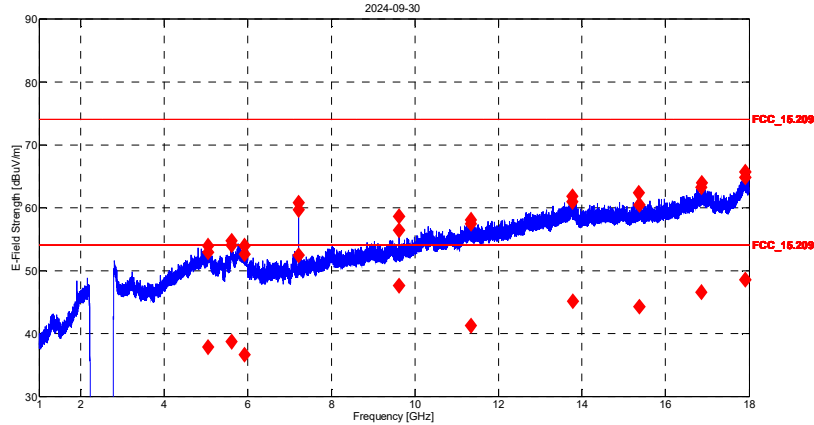
Final 1: 5.0 GHz, 50.0 kHz, 17.9 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
5.04375 GHz	53.84	74.00	20.16	V	197.359	100.013	39.46	FCC_15.209
5.59375 GHz	54.01	74.00	19.99	V	102.169	200	41.42	FCC_15.209
5.78725 GHz	54.24	74.00	19.76	V	18.112	156.268	40.97	FCC_15.209
7.2135 GHz	57.79	74.00	16.21	V	11.767	190.813	42.40	FCC_15.209
12.6965 GHz	59.64	74.00	14.36	V	138.044	100	48.13	FCC_15.209
13.683 GHz	62.44	74.00	11.56	V	301.022	200	49.37	FCC_15.209
16.20025 GHz	62.03	74.00	11.97	V	199.145	125.619	50.67	FCC_15.209
16.875 GHz	63.94	74.00	10.06	V	80.322	200	52.30	FCC_15.209
17.89625 GHz	65.30	74.00	8.70	V	360	299.703	54.51	FCC_15.209

Final 2: 5.0 GHz, 50.0 kHz, 17.9 GHz; IF:1MHz, 100.0 ms RMS, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
5.04775 GHz	39.00	54.00	15.00	V	197.359	105.473	39.46	FCC_15.209
5.595 GHz	38.50	54.00	15.50	V	102.169	115.915	41.42	FCC_15.209
5.786 GHz	39.28	54.00	14.72	V	18.112	100	40.97	FCC_15.209
7.2135 GHz	48.31	54.00	5.69	V	11.767	205.948	42.40	FCC_15.209
12.697 GHz	44.36	54.00	9.64	V	138.044	182.714	48.13	FCC_15.209
13.68575 GHz	46.01	54.00	7.99	V	301.022	100	49.37	FCC_15.209
16.20075 GHz	46.13	54.00	7.87	V	199.145	177.013	50.67	FCC_15.209
16.87425 GHz	47.93	54.00	6.07	V	80.322	100	52.30	FCC_15.209
17.895 GHz	50.13	54.00	3.87	V	360	108.212	54.51	FCC_15.209

1-18GHz Vertical, Plot and Data Table



Final 1: 5.0 GHz, 50.0 kHz, 17.9 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 0dB

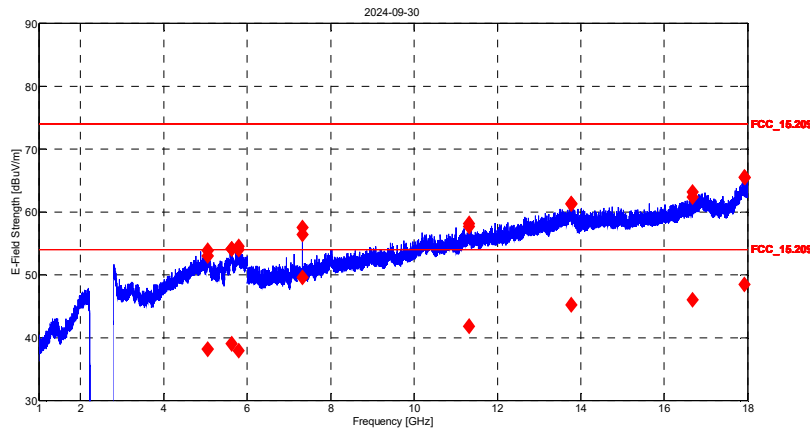
f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
5.04975 GHz	52.86	74.00	21.14	H	134.108	123.438	39.47	FCC_15.209
5.61375 GHz	54.02	74.00	19.98	H	39.562	367.739	41.40	FCC_15.209
5.9195 GHz	52.55	74.00	21.45	H	238.992	135.351	40.97	FCC_15.209
7.2135 GHz	60.77	74.00	13.23	H	52.644	197.144	42.40	FCC_15.209
9.618 GHz	58.59	74.00	15.41	H	18.456	150.971	43.95	FCC_15.209
11.348 GHz	57.43	74.00	16.57	H	283.396	108.031	46.39	FCC_15.209
13.77375 GHz	60.94	74.00	13.06	H	250.833	207.078	49.36	FCC_15.209
15.3685 GHz	60.44	74.00	13.56	H	162.089	124.43	50.01	FCC_15.209
16.863 GHz	63.22	74.00	10.78	H	11.241	246.507	52.28	FCC_15.209
17.9115 GHz	64.83	74.00	9.17	H	45.767	143.27	54.55	FCC_15.209

Final 2: 5.0 GHz, 50.0 kHz, 17.9 GHz; IF:1MHz, 100.0 ms RMS, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
5.04975 GHz	37.84	54.00	16.16	H	134.108	100	39.47	FCC_15.209
5.61525 GHz	38.66	54.00	15.34	H	39.562	200	41.40	FCC_15.209
5.9195 GHz	36.61	54.00	17.39	H	238.992	164.597	40.97	FCC_15.209
7.2135 GHz	52.38	54.00	1.62	H	52.644	197.144	42.40	FCC_15.209
9.618 GHz	47.62	54.00	6.38	H	18.456	193.427	43.95	FCC_15.209
11.3465 GHz	41.26	54.00	12.74	H	283.396	100	46.39	FCC_15.209
13.777 GHz	45.10	54.00	8.90	H	250.833	100	49.36	FCC_15.209
15.36975 GHz	44.23	54.00	9.77	H	162.089	183.581	50.01	FCC_15.209
16.863 GHz	46.55	54.00	7.45	H	11.241	200	52.28	FCC_15.209
17.913 GHz	48.49	54.00	5.51	H	45.767	178.519	54.55	FCC_15.209

1-18GHz Horizontal, Plot and Data Table

250kbps 802.15.4 Channel 18



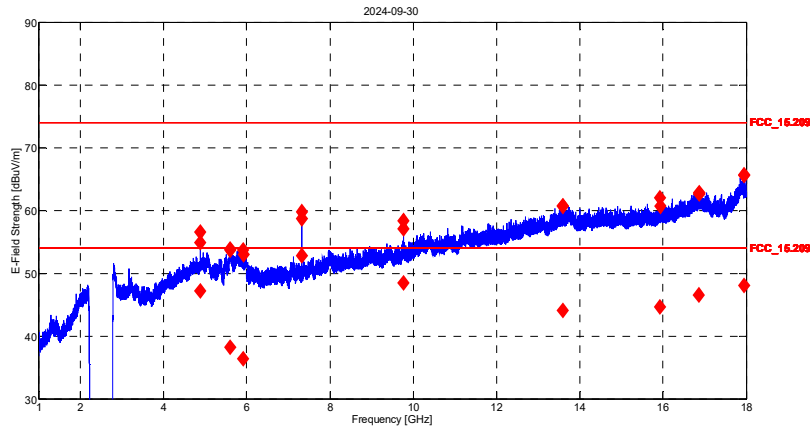
Final 1: 5.0 GHz, 50.0 kHz, 17.9 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
5.04975 GHz	53.00	74.00	21.00	V	324.425	305.613	39.48	FCC_15.209
5.6265 GHz	54.11	74.00	19.89	V	7.789	180.651	41.32	FCC_15.209
5.7915 GHz	54.50	74.00	19.50	V	139.689	200	41.00	FCC_15.209
7.321 GHz	57.54	74.00	16.46	V	18.393	174.831	42.61	FCC_15.209
11.31525 GHz	57.64	74.00	16.36	V	18.393	370.287	46.46	FCC_15.209
13.775 GHz	61.32	74.00	12.68	V	232.678	144.741	49.35	FCC_15.209
16.682 GHz	62.36	74.00	11.64	V	186.5	180.484	51.89	FCC_15.209
17.927 GHz	65.48	74.00	8.52	V	186.5	120.814	54.59	FCC_15.209

Final 2: 5.0 GHz, 50.0 kHz, 17.9 GHz; IF:1MHz, 100.0 ms RMS, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
5.0525 GHz	38.11	54.00	15.89	V	324.425	282.494	39.48	FCC_15.209
5.62625 GHz	39.02	54.00	14.98	V	7.789	100.862	41.32	FCC_15.209
5.79475 GHz	37.88	54.00	16.12	V	139.689	151.515	41.00	FCC_15.209
7.321 GHz	49.59	54.00	4.41	V	18.393	201.445	42.61	FCC_15.209
11.31375 GHz	41.79	54.00	12.21	V	18.393	213.816	46.46	FCC_15.209
13.775 GHz	45.21	54.00	8.79	V	232.678	200	49.35	FCC_15.209
16.68075 GHz	45.95	54.00	8.05	V	186.5	100	51.89	FCC_15.209
17.927 GHz	48.48	54.00	5.52	V	186.5	200	54.59	FCC_15.209

1-18GHz Vertical, Plot and Data Table



Final 1: 4.9 GHz, 50.0 kHz, 18.0 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 0dB

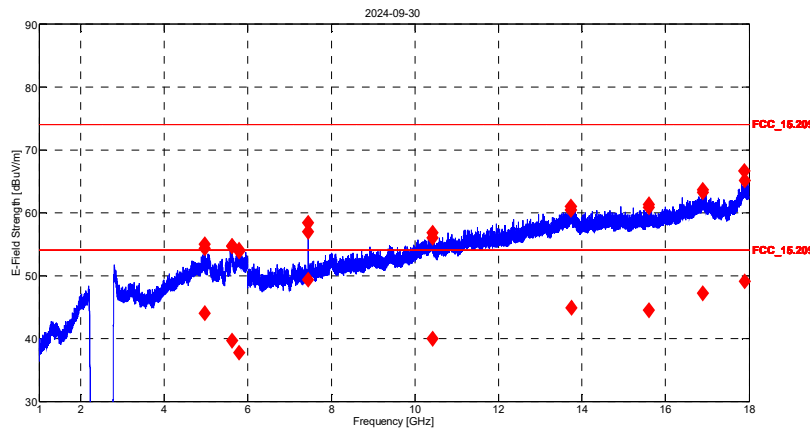
f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
4.881 GHz	56.58	74.00	17.42	H	232.038	200.461	40.06	FCC_15.209
5.598 GHz	53.88	74.00	20.12	H	232.038	155.618	41.42	FCC_15.209
5.9175 GHz	52.97	74.00	21.03	H	194.151	248.954	40.94	FCC_15.209
7.3215 GHz	59.80	74.00	14.20	H	53.278	176.356	42.60	FCC_15.209
9.762 GHz	58.36	74.00	15.64	H	18.393	219.59	44.22	FCC_15.209
13.588 GHz	60.68	74.00	13.32	H	25.389	183.781	49.36	FCC_15.209
15.9305 GHz	60.69	74.00	13.31	H	360	199.895	50.19	FCC_15.209
16.86625 GHz	62.69	74.00	11.31	H	102.148	100	52.28	FCC_15.209
17.949 GHz	65.66	74.00	8.34	H	232.267	237.097	54.61	FCC_15.209

Final 2: 4.9 GHz, 50.0 kHz, 18.0 GHz; IF:1MHz, 100.0 ms RMS, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
4.881 GHz	47.21	54.00	6.79	H	232.038	193.561	40.06	FCC_15.209
5.5945 GHz	38.22	54.00	15.78	H	232.038	100	41.42	FCC_15.209
5.91475 GHz	36.42	54.00	17.58	H	194.151	373.056	40.94	FCC_15.209
7.3215 GHz	52.80	54.00	1.20	H	53.278	183.439	42.60	FCC_15.209
9.762 GHz	48.42	54.00	5.58	H	18.393	222.29	44.22	FCC_15.209
13.59075 GHz	44.06	54.00	9.94	H	25.389	190.935	49.36	FCC_15.209
15.92775 GHz	44.63	54.00	9.37	H	360	100	50.19	FCC_15.209
16.863 GHz	46.55	54.00	7.45	H	102.148	171.097	52.28	FCC_15.209
17.951 GHz	48.02	54.00	5.98	H	232.267	107.91	54.61	FCC_15.209

1-18GHz Horizontal, Plot and Data Table

250kbps 802.15.4 Channel 26



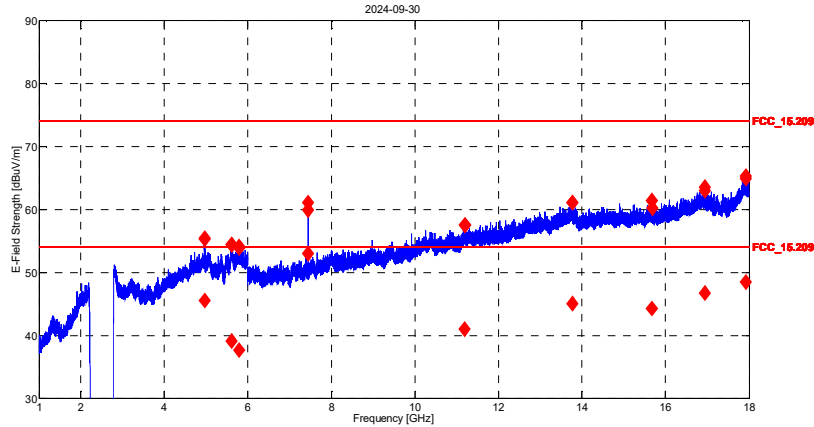
Final 1: 5.0 GHz, 50.0 kHz, 17.9 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
4.961 GHz	54.96	74.00	19.04	V	190.934	105.551	39.46	FCC_15.209
5.618 GHz	54.72	74.00	19.28	V	0	334.883	41.38	FCC_15.209
5.792 GHz	53.88	74.00	20.12	V	276.349	100	40.99	FCC_15.209
7.4385 GHz	58.34	74.00	15.66	V	102.026	196.125	42.45	FCC_15.209
10.427 GHz	56.00	74.00	18.00	V	46.789	116.746	45.82	FCC_15.209
13.739 GHz	61.02	74.00	12.98	V	188.2	338.544	49.17	FCC_15.209
15.60675 GHz	60.85	74.00	13.15	V	109.367	113.3	49.82	FCC_15.209
16.893 GHz	63.64	74.00	10.36	V	274.874	200	52.32	FCC_15.209
17.89225 GHz	66.60	74.00	7.40	V	0	300.072	54.50	FCC_15.209

Final 2: 5.0 GHz, 50.0 kHz, 17.9 GHz; IF:1MHz, 100.0 ms RMS, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
4.961 GHz	43.98	54.00	10.02	V	190.934	105.551	39.46	FCC_15.209
5.618 GHz	39.68	54.00	14.32	V	0	353.363	41.38	FCC_15.209
5.79125 GHz	37.77	54.00	16.23	V	276.349	149.416	40.99	FCC_15.209
7.4385 GHz	49.33	54.00	4.67	V	102.026	196.125	42.45	FCC_15.209
10.425 GHz	39.97	54.00	14.03	V	46.789	146.368	45.82	FCC_15.209
13.74225 GHz	44.91	54.00	9.09	V	188.2	300	49.17	FCC_15.209
15.60275 GHz	44.45	54.00	9.55	V	109.367	176.71	49.82	FCC_15.209
16.895 GHz	47.17	54.00	6.83	V	274.874	100	52.32	FCC_15.209
17.89425 GHz	49.12	54.00	4.88	V	0	100	54.50	FCC_15.209

1-18GHz Vertical, Plot and Data Table



Final 1: 5.0 GHz, 50.0 kHz, 17.9 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
4.961 GHz	55.44	74.00	18.56	H	213.673	216.933	39.46	FCC_15.209
5.613 GHz	54.40	74.00	19.60	H	140.946	390.58	41.40	FCC_15.209
5.79325 GHz	54.12	74.00	19.88	H	228.631	148.062	41.00	FCC_15.209
7.4385 GHz	61.06	74.00	12.94	H	51.489	169.789	42.45	FCC_15.209
11.1945 GHz	57.49	74.00	16.51	H	325.252	117.549	46.03	FCC_15.209
13.76575 GHz	61.07	74.00	12.93	H	176.615	177.965	49.30	FCC_15.209
15.6795 GHz	60.18	74.00	13.82	H	269.867	112.722	49.97	FCC_15.209
16.943 GHz	63.56	74.00	10.44	H	360	195.679	52.02	FCC_15.209
17.9215 GHz	65.31	74.00	8.69	H	72.319	163.573	54.58	FCC_15.209

Final 2: 5.0 GHz, 50.0 kHz, 17.9 GHz; IF:1MHz, 100.0 ms RMS, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
4.961 GHz	45.50	54.00	8.50	H	213.673	254.665	39.46	FCC_15.209
5.615 GHz	39.05	54.00	14.95	H	140.946	372.328	41.40	FCC_15.209
5.794 GHz	37.62	54.00	16.38	H	228.631	104.114	41.00	FCC_15.209
7.4385 GHz	52.99	54.00	1.01	H	51.489	163.463	42.45	FCC_15.209
11.1925 GHz	40.97	54.00	13.03	H	325.252	133.014	46.03	FCC_15.209
13.76575 GHz	45.04	54.00	8.96	H	176.615	109.051	49.30	FCC_15.209
15.67675 GHz	44.26	54.00	9.74	H	269.867	185.095	49.97	FCC_15.209
16.943 GHz	46.74	54.00	7.26	H	360	100	52.02	FCC_15.209
17.924 GHz	48.44	54.00	5.56	H	72.319	200	54.58	FCC_15.209

1-18GHz Horizontal, Plot and Data Table

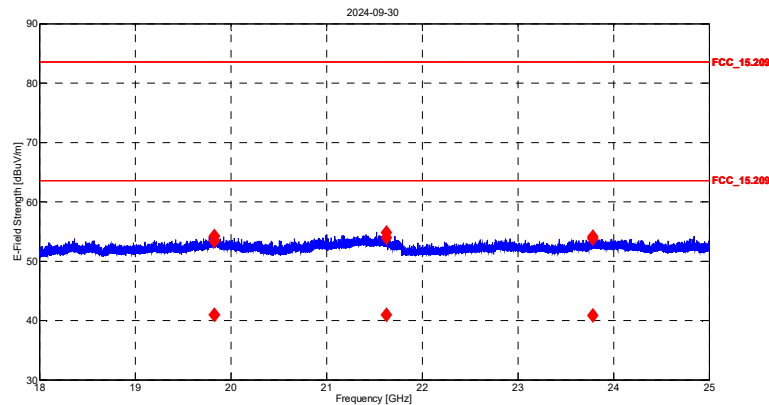


Test Report for RSAE Labs, Inc.
Report No. EY0475-1-2 Issue 2



18-25GHz

250kpbs 802.15.4 Channel 11



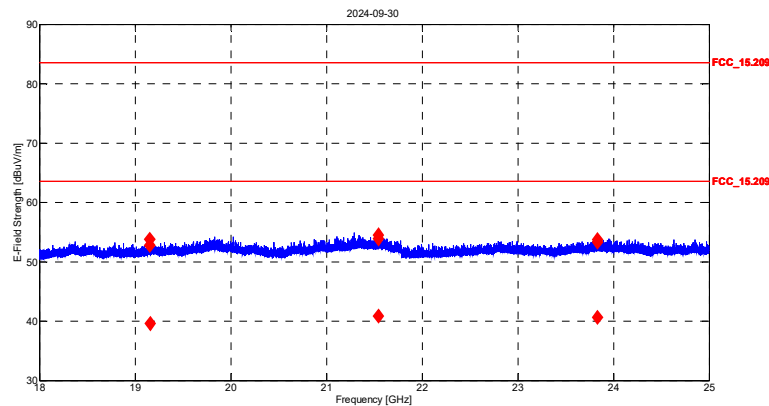
Final 1: 19.8 GHz, 50.0 kHz, 23.8 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 20dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
19.829 GHz	53.39	83.50	30.11	V	359	147.5	12.87	FCC_15.209
21.6285 GHz	53.91	83.50	29.59	V	33.069	100.938	12.47	FCC_15.209
23.78525 GHz	53.77	83.50	29.73	V	113.142	117.835	12.57	FCC_15.209

Final 2: 19.8 GHz, 50.0 kHz, 23.8 GHz; IF:1MHz, 100.0 ms RMS, Att 20dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
19.82975 GHz	40.93	63.50	22.57	V	359	175	12.87	FCC_15.209
21.63 GHz	40.93	63.50	22.57	V	33.069	125	12.47	FCC_15.209
23.78725 GHz	40.85	63.50	22.65	V	113.142	100	12.57	FCC_15.209

18-25GHz Vertical, Plot and Data Table



Final 1: 19.2 GHz, 50.0 kHz, 23.8 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 20dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
19.1575 GHz	52.72	83.50	30.78	H	258.169	100.085	11.81	FCC_15.209
21.54325 GHz	53.87	83.50	29.63	H	0	118.533	12.66	FCC_15.209
23.83525 GHz	53.32	83.50	30.18	H	360	175	12.60	FCC_15.209

Final 2: 19.2 GHz, 50.0 kHz, 23.8 GHz; IF:1MHz, 100.0 ms RMS, Att 20dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
19.159 GHz	39.59	63.50	23.91	H	258.169	125	11.81	FCC_15.209
21.54525 GHz	40.84	63.50	22.66	H	0	100	12.66	FCC_15.209
23.8345 GHz	40.58	63.50	22.92	H	360	125	12.60	FCC_15.209

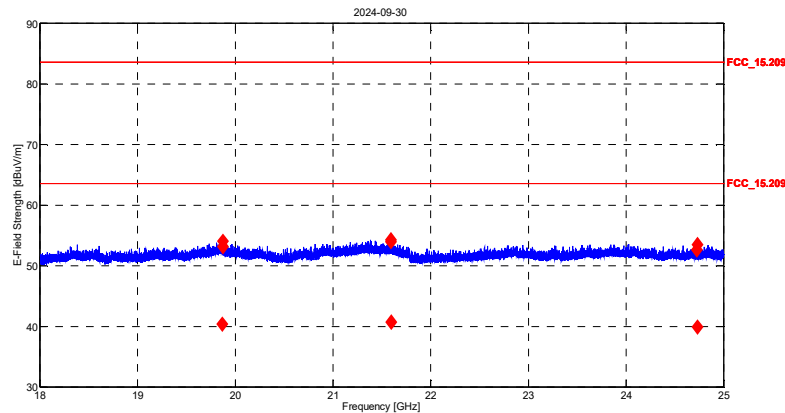
18-25GHz Horizontal, Plot and Data Table

Bureau Veritas Consumer Product
Services Inc.

One Distribution Center Circle, #1
Littleton, MA

Tel.: (978) 486-8880
Fax: (978) 486-8828

250kpbs 802.15.4 Channel 18



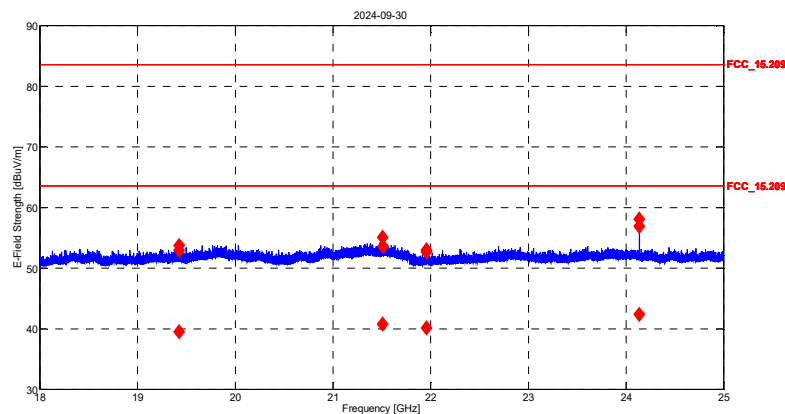
Final 1: 19.9 GHz, 50.0 kHz, 24.7 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 20dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
19.87225 GHz	53.10	83.50	30.40	V	302.954	100	12.89	FCC_15.209
21.5945 GHz	53.95	83.50	29.55	V	14.228	190.774	12.55	FCC_15.209
24.7285 GHz	52.56	83.50	30.94	V	37.973	109.1	12.15	FCC_15.209

Final 2: 19.9 GHz, 50.0 kHz, 24.7 GHz; IF:1MHz, 100.0 ms RMS, Att 20dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
19.871 GHz	40.35	63.50	23.15	V	302.954	117.666	12.89	FCC_15.209
21.5965 GHz	40.67	63.50	22.83	V	14.228	175	12.55	FCC_15.209
24.72925 GHz	39.88	63.50	23.62	V	37.973	125	12.15	FCC_15.209

18-25GHz Vertical, Plot and Data Table



Final 1: 19.4 GHz, 50.0 kHz, 24.1 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 20dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
19.4245 GHz	52.88	83.50	30.62	H	17.907	101.638	12.12	FCC_15.209
21.51375 GHz	53.53	83.50	29.97	H	360	115.968	12.71	FCC_15.209
21.959 GHz	52.64	83.50	30.86	H	123.438	125	11.94	FCC_15.209
24.13775 GHz	58.08	83.50	25.42	H	179.6	119.7	12.68	FCC_15.209

Final 2: 19.4 GHz, 50.0 kHz, 24.1 GHz; IF:1MHz, 100.0 ms RMS, Att 20dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
19.42375 GHz	39.50	63.50	24.00	H	17.907	116.069	12.12	FCC_15.209
21.51025 GHz	40.73	63.50	22.77	H	360	107.904	12.71	FCC_15.209
21.959 GHz	40.10	63.50	23.40	H	123.438	106.867	11.94	FCC_15.209
24.13775 GHz	42.37	63.50	21.13	H	179.6	119.7	12.68	FCC_15.209

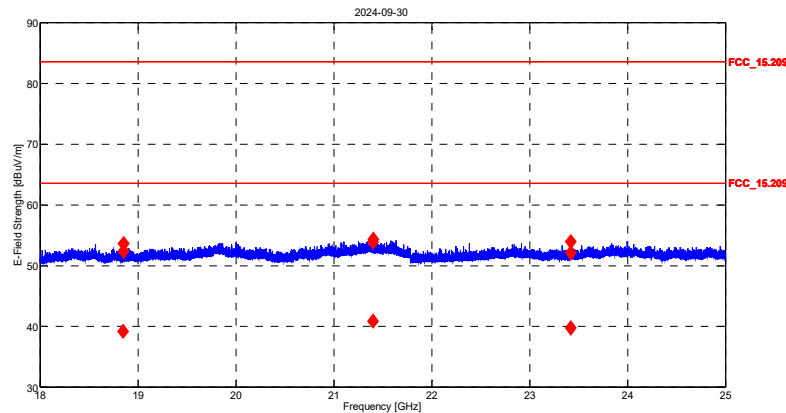
18-25GHz Horizontal, Plot and Data Table



Test Report for RSAE Labs, Inc.
Report No. EY0475-1-2 Issue 2



250kbps 802.15.4 Channel 26



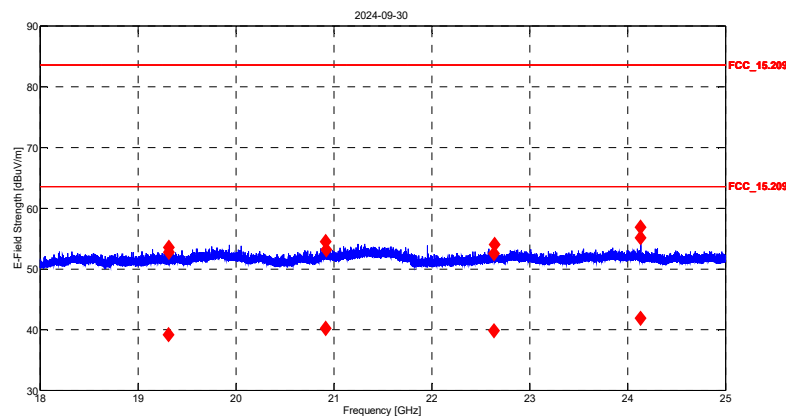
Final 1: 18.9 GHz, 50.0 kHz, 23.4 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 20dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
18.85575 GHz	52.34	83.50	31.16	V	299.331	102.669	12.03	FCC_15.209
21.40225 GHz	53.86	83.50	29.64	V	88.623	106.6	12.82	FCC_15.209
23.4235 GHz	52.14	83.50	31.36	V	294.769	100	12.03	FCC_15.209

Final 2: 18.9 GHz, 50.0 kHz, 23.4 GHz; IF:1MHz, 100.0 ms RMS, Att 20dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
18.85175 GHz	39.16	63.50	24.34	V	299.331	125	12.03	FCC_15.209
21.40225 GHz	40.84	63.50	22.66	V	88.623	111.193	12.82	FCC_15.209
23.4215 GHz	39.76	63.50	23.74	V	294.769	116.484	12.03	FCC_15.209

18-25GHz Vertical, Plot and Data Table



Final 1: 19.3 GHz, 50.0 kHz, 24.1 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 20dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
19.317 GHz	52.76	83.50	30.74	H	14.47	100	12.08	FCC_15.209
20.92175 GHz	53.16	83.50	30.34	H	37.761	100	12.54	FCC_15.209
22.6385 GHz	52.47	83.50	31.03	H	289.354	110.977	12.58	FCC_15.209
24.1375 GHz	56.85	83.50	26.65	H	284.958	118.333	12.68	FCC_15.209

Final 2: 19.3 GHz, 50.0 kHz, 24.1 GHz; IF:1MHz, 100.0 ms RMS, Att 20dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
19.315 GHz	39.18	63.50	24.32	H	14.47	125	12.08	FCC_15.209
20.9205 GHz	40.18	63.50	23.32	H	37.761	100	12.54	FCC_15.209
22.63925 GHz	39.83	63.50	23.67	H	289.354	125	12.58	FCC_15.209
24.13775 GHz	41.83	63.50	21.67	H	284.958	118.333	12.68	FCC_15.209

18-25GHz Horizontal, Plot and Data Table

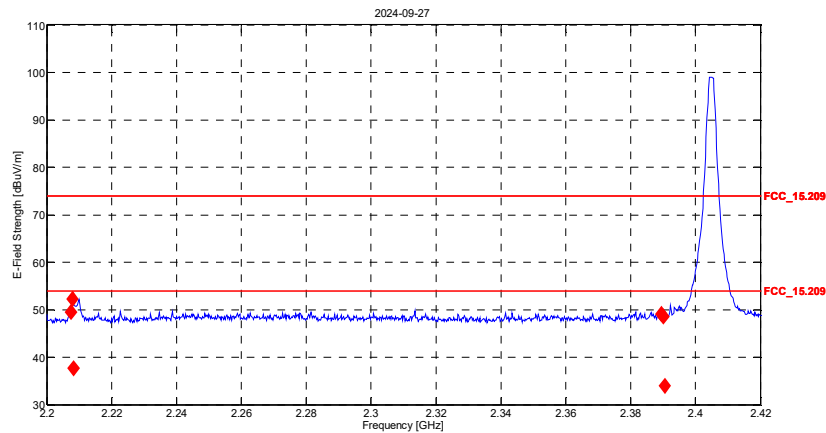
Bureau Veritas Consumer Product
Services Inc.

One Distribution Center Circle, #1
Littleton, MA

Tel.: (978) 486-8880
Fax: (978) 486-8828

Radiated Band-edge:

250kbps 802.15.4 Channel 11



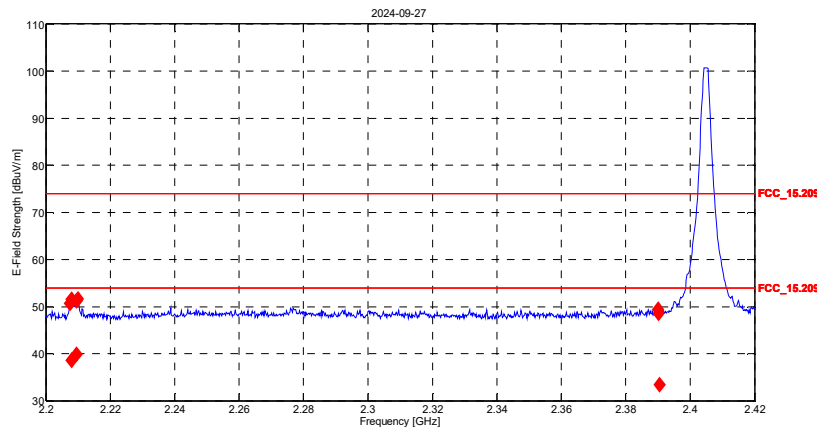
Final 1: 2.2 GHz, 50.0 kHz, 2.4 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
2.2075 GHz	49.51	74.00	24.49	V	7.742	283.665	34.40	FCC 15.209
2.3895 GHz	49.12	74.00	24.88	V	231.2	159.122	34.42	FCC 15.209

Final 2: 2.2 GHz, 50.0 kHz, 2.4 GHz; IF:1MHz, 100.0 ms RMS, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
2.20825 GHz	37.67	54.00	16.33	V	7.742	277.687	34.40	FCC 15.209
2.3905 GHz	34.01	54.00	19.99	V	231.2	100	34.42	FCC 15.209

Low-Ch Vertical, Plot and Data Table



Final 1: 2.2 GHz, 50.0 kHz, 2.4 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 0dB

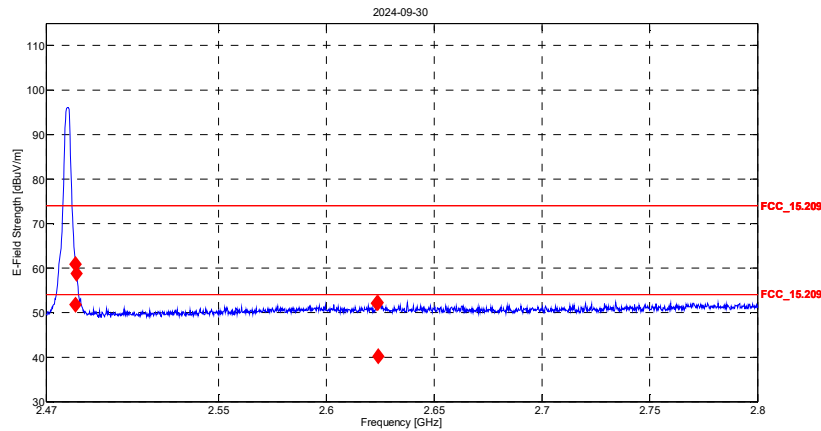
f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
2.2075 GHz	50.65	74.00	23.35	H	29.707	247.342	34.40	FCC 15.209
2.2095 GHz	51.23	74.00	22.77	H	35.481	120.774	34.40	FCC 15.209
2.39025 GHz	48.57	74.00	25.43	H	347.413	122.34	34.42	FCC 15.209

Final 2: 2.2 GHz, 50.0 kHz, 2.4 GHz; IF:1MHz, 100.0 ms RMS, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
2.208 GHz	38.66	54.00	15.34	H	29.707	255.252	34.40	FCC 15.209
2.2095 GHz	39.94	54.00	14.06	H	35.481	265.22	34.40	FCC 15.209
2.3905 GHz	33.39	54.00	20.61	H	347.413	113.66	34.42	FCC 15.209

Low-Ch Horizontal, Plot and Data Table

250kbps 802.15.4 Channel 26



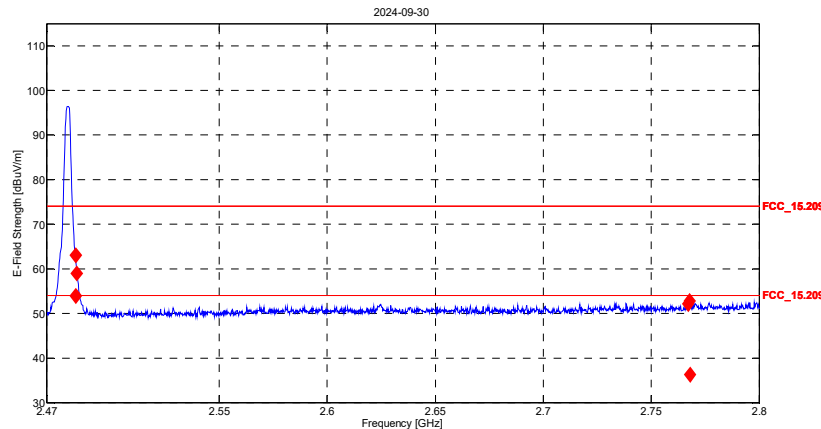
Final 1: 2.5 GHz, 50.0 kHz, 2.6 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
2.4835 GHz	60.85	74.00	13.15	V	264.508	121.718	35.49	FCC_15.209
2.62375 GHz	52.19	74.00	21.81	V	226.219	108.089	36.36	FCC_15.209

Final 2: 2.5 GHz, 50.0 kHz, 2.6 GHz; IF:1MHz, 100.0 ms RMS, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
2.4835 GHz	51.70	54.00	2.30	V	264.508	115.4	35.49	FCC_15.209
2.624 GHz	40.14	54.00	13.86	V	226.219	180.1	36.36	FCC_15.209

High-Ch Vertical, Plot and Data Table



Final 1: 2.5 GHz, 50.0 kHz, 2.8 GHz; IF:1MHz, 100.0 ms MaxPeak, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
2.4835 GHz	62.98	74.00	11.02	H	290.364	246.423	35.49	FCC_15.209
2.76725 GHz	52.05	74.00	21.95	H	293.704	276.139	36.40	FCC_15.209

Final 2: 2.5 GHz, 50.0 kHz, 2.8 GHz; IF:1MHz, 100.0 ms RMS, Att 0dB

f	Mag [dBuV/m]	Limit	Diff	Polarization	Angle [°]	Height [cm]	Trans	Name
2.4835 GHz	53.87	54.00	0.13	H	290.364	246.423	35.49	FCC_15.209
2.768 GHz	36.26	54.00	17.74	H	293.704	150.735	36.40	FCC_15.209

High-Ch Horizontal, Plot and Data Table



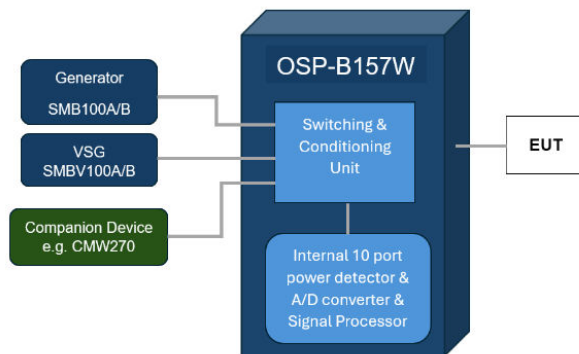
4.2 6dB CHANNEL BANDWIDTH & 99% OBW

4.2.1 LIMIT OF 6dB CHANNEL BANDWIDTH

The minimum 6 dB bandwidth shall be 500 kHz.

4.2.2 TEST SETUP

SCHEMATIC RF CABLING



4.2.3 TEST INSTRUMENTS

Rev. 10/14/2024									
Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
FSV40 Spectrum Analyzer	10Hz-40GHz	FSV40	ROHDE & SCHWARZ	101551	2200	I	10/9/2025	10/9/2024	
Signal Generators/Comparison Noise Emitter	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
OSP-B157W8		OSP-B157W8	ROHDE & SCHWARZ	100955	2558	I	2/14/2026	2/14/2024	
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on	
Asset#2905	9Kh-26.5GHz		Mini-Circuits			II	4/22/2025	4/22/2024	
Attenuators	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
10dB Attenuator-01 Brown	9KHz-18GHz		Mini Curcuits			II	2/17/2025	2/17/2024	
Preamps /Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
API - 30dB 20W Attenuator	9KHz-40GHz	89-30-11	API Weinschel	703	2121	II	4/22/2025	4/22/2024	
Meteorological Meters/Chambers		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	12/15/2025	12/15/2022	
Asset #2657		1235C97	Control Company	200435369	2657	I	8/18/2025	8/18/2022	

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



4.2.4 TEST PROCEDURE

6dB CHANNEL BANDWIDTH (In accordance with ANSI C63.10-2013 Section 11.8.1)

- 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 (In accordance with ANSI C63.10-2013 Section 6.9.3)

- 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 DEVIATION FROM TEST STANDARD

No deviation.

4.2.6 EUT OPERATING CONDITIONS

EUT was operated according to manufacturer's specifications.

4.2.7 TEST RESULTS

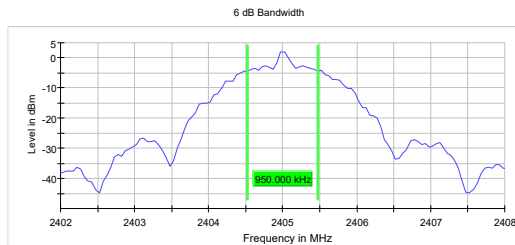
250kbps 802.15.4:

Test date: 10/02/2024

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	99% OBW (MHz)	PASS / FAIL
11	2405	0.950000	2.190000	Pass
18	2440	0.950000	2.190000	Pass
26	2480	0.950000	2.190000	Pass

CH11

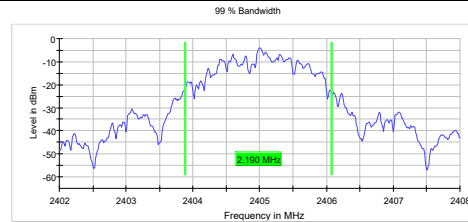
6dB Bandwidth



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40200 GHz	2.40200 GHz
Stop Frequency	2.40800 GHz	2.40800 GHz
Span	6.000 MHz	6.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	120	~ 120
SweepTime	18.984 μ s	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	0.20 dB	0.20 dB
Run	66 / max. 150	max. 150
Stable	20 / 20	20
Max Stable Difference	0.00 dB	0.20 dB

99% OBW

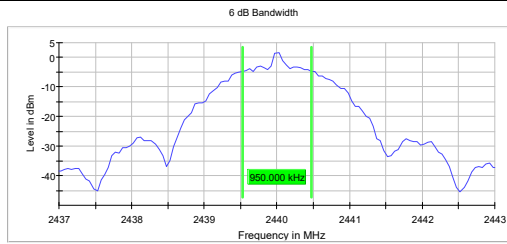


Measurement

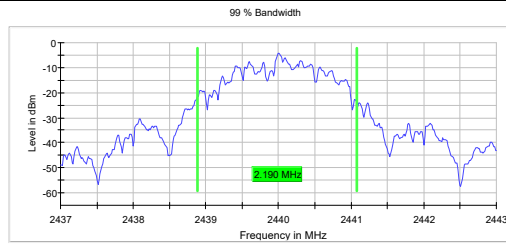
Setting	Instrument Value	Target Value
Start Frequency	2.40200 GHz	2.40200 GHz
Stop Frequency	2.40800 GHz	2.40800 GHz
Span	6.000 MHz	6.000 MHz
RBW	30.000 kHz	>= 30.000 kHz
VBW	100.000 kHz	>= 90.000 kHz
SweepPoints	400	~ 400
SweepTime	63.216 μ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	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	37 / max. 150	max. 150
Stable	10 / 10	10
Max Stable Difference	0.09 dB	0.30 dB

CH18

6dB Bandwidth



99% OBW



Measurement

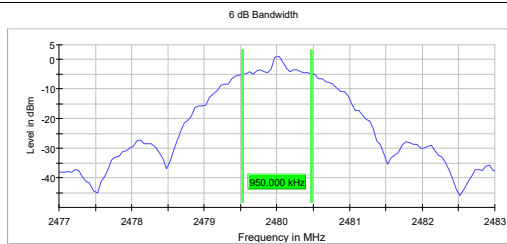
Setting	Instrument Value	Target Value
Start Frequency	2.43700 GHz	2.43700 GHz
Stop Frequency	2.44300 GHz	2.44300 GHz
Span	6.000 MHz	6.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	120	~ 120
SweepTime	18.984 μ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	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	0.20 dB	0.20 dB
Run	40 / max. 150	max. 150
Stable	20 / 20	20
Max Stable Difference	0.06 dB	0.20 dB

Measurement

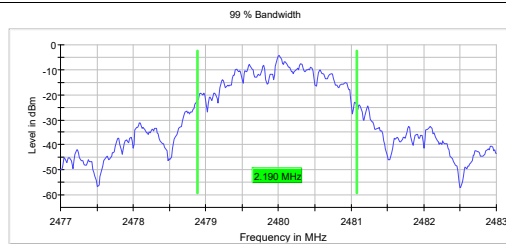
Setting	Instrument Value	Target Value
Start Frequency	2.43700 GHz	2.43700 GHz
Stop Frequency	2.44300 GHz	2.44300 GHz
Span	6.000 MHz	6.000 MHz
RBW	30.000 kHz	>= 30.000 kHz
VBW	100.000 kHz	>= 90.000 kHz
SweepPoints	400	~ 400
SweepTime	63.216 μ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	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	23 / max. 150	max. 150
Stable	10 / 10	10
Max Stable Difference	0.28 dB	0.30 dB

CH26

6dB Bandwidth



99% OBW



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47700 GHz	2.47700 GHz
Stop Frequency	2.48300 GHz	2.48300 GHz
Span	6.000 MHz	6.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	120	~ 120
SweepTime	18.984 μ s	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	0.20 dB	0.20 dB
Run	77 / max. 150	max. 150
Stable	20 / 20	20
Max Stable Difference	0.03 dB	0.20 dB

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47700 GHz	2.47700 GHz
Stop Frequency	2.48300 GHz	2.48300 GHz
Span	6.000 MHz	6.000 MHz
RBW	30.000 kHz	>= 30.000 kHz
VBW	100.000 kHz	>= 90.000 kHz
SweepPoints	400	~ 400
SweepTime	63.216 μ s	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	21 / max. 150	max. 150
Stable	10 / 10	10
Max Stable Difference	0.09 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 INSTRUMENTS

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 DEVIATION FROM TEST STANDARD

No deviations from the standard.

4.3.6 EUT OPERATING CONDITIONS

EUT was operated according to manufacturer's specifications.

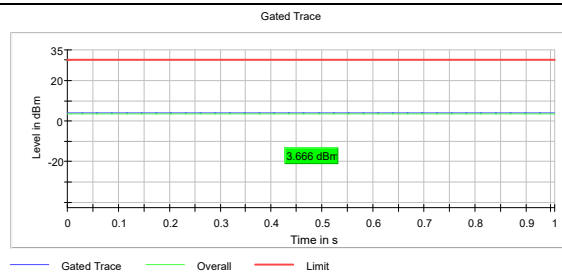
4.3.7 TEST RESULTS

250kbps 802.15.4:

Test date: 10/02/2024

CHANNEL	CHANNEL FREQUENCY (MHz)	RMS POWER (dBm)	RMS POWER (mW)	RMS POWER LIMIT (W)	PASS/FAIL
11	2405	3.666	2.33	1	PASS
18	2440	3.340	2.16	1	PASS
26	2480	3.055	2.02	1	PASS

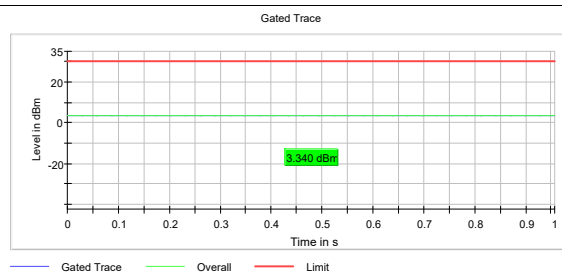
CH11



OSP PowerMeter settings

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

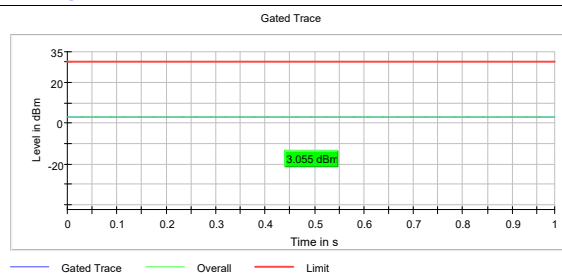
CH18



OSP PowerMeter settings

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

CH26



OSP PowerMeter settings

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



4.4 POWER SPECTRAL DENSITY MEASUREMENT

4.4.1 LIMITS

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

4.4.2 TEST SETUP

Refer to section 4.2.2.

4.4.3 TEST INSTRUMENTS

Refer to section 4.2.3.

4.4.4 TEST PROCEDURE

In accordance with ANSI C63.10-2013 Section 11.10.2 (Method PKPSD (Peak PSD)).

1. Set the span to 1.5 times the DTS bandwidth
2. Set the RBW = 3 kHz, VBW $\geq 3 \times$ 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 DEVIATION FROM TEST STANDARD

No deviations from the standard.

4.4.6 EUT OPERATING CONDITION

EUT was operated according to manufacturer's specifications.

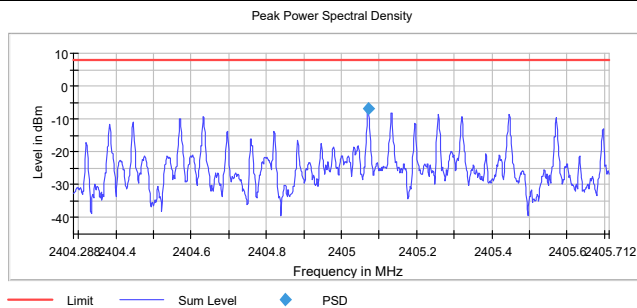
4.4.7 TEST RESULTS

250kbps 802.15.4:

Test date: 10/02/2024

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
11	2405	-7.002	8	PASS
18	2440	-7.434	8	PASS
26	2480	-7.929	8	PASS

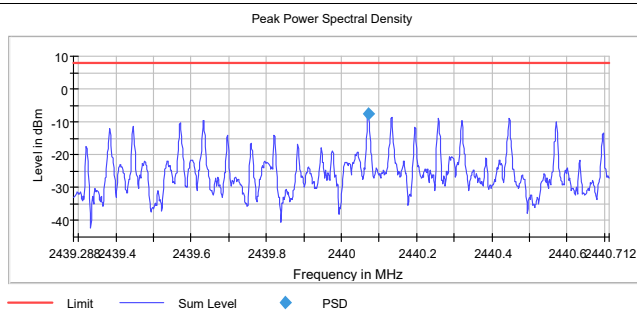
CH11



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40429 GHz	2.40429 GHz
Stop Frequency	2.40571 GHz	2.40571 GHz
Span	1.425 MHz	1.425 MHz
RBW	3.000 kHz	<= 3.000 kHz
VBW	10.000 kHz	>= 9.000 kHz
SweepPoints	950	~ 950
SweepTime	15.900 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	3 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.09 dB	0.50 dB

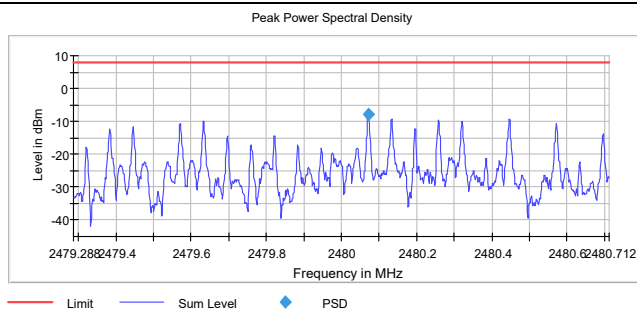
CH18



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43929 GHz	2.43929 GHz
Stop Frequency	2.44071 GHz	2.44071 GHz
Span	1.425 MHz	1.425 MHz
RBW	3.000 kHz	<= 3.000 kHz
VBW	10.000 kHz	>= 9.000 kHz
SweepPoints	950	~ 950
SweepTime	15.900 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	3 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.07 dB	0.50 dB

CH26



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47929 GHz	2.47929 GHz
Stop Frequency	2.48071 GHz	2.48071 GHz
Span	1.425 MHz	1.425 MHz
RBW	3.000 kHz	<= 3.000 kHz
VBW	10.000 kHz	>= 9.000 kHz
SweepPoints	950	~ 950
SweepTime	15.900 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	3 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.18 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 4.2.2.

4.5.3 TEST INSTRUMENTS

Refer to section 4.2.3.

4.5.4 TEST PROCEDURE

In accordance with ANSI C63.10-2013 Section 11.11.

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 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 $\geq$ 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 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

EUT was operated according to manufacturer's specifications.



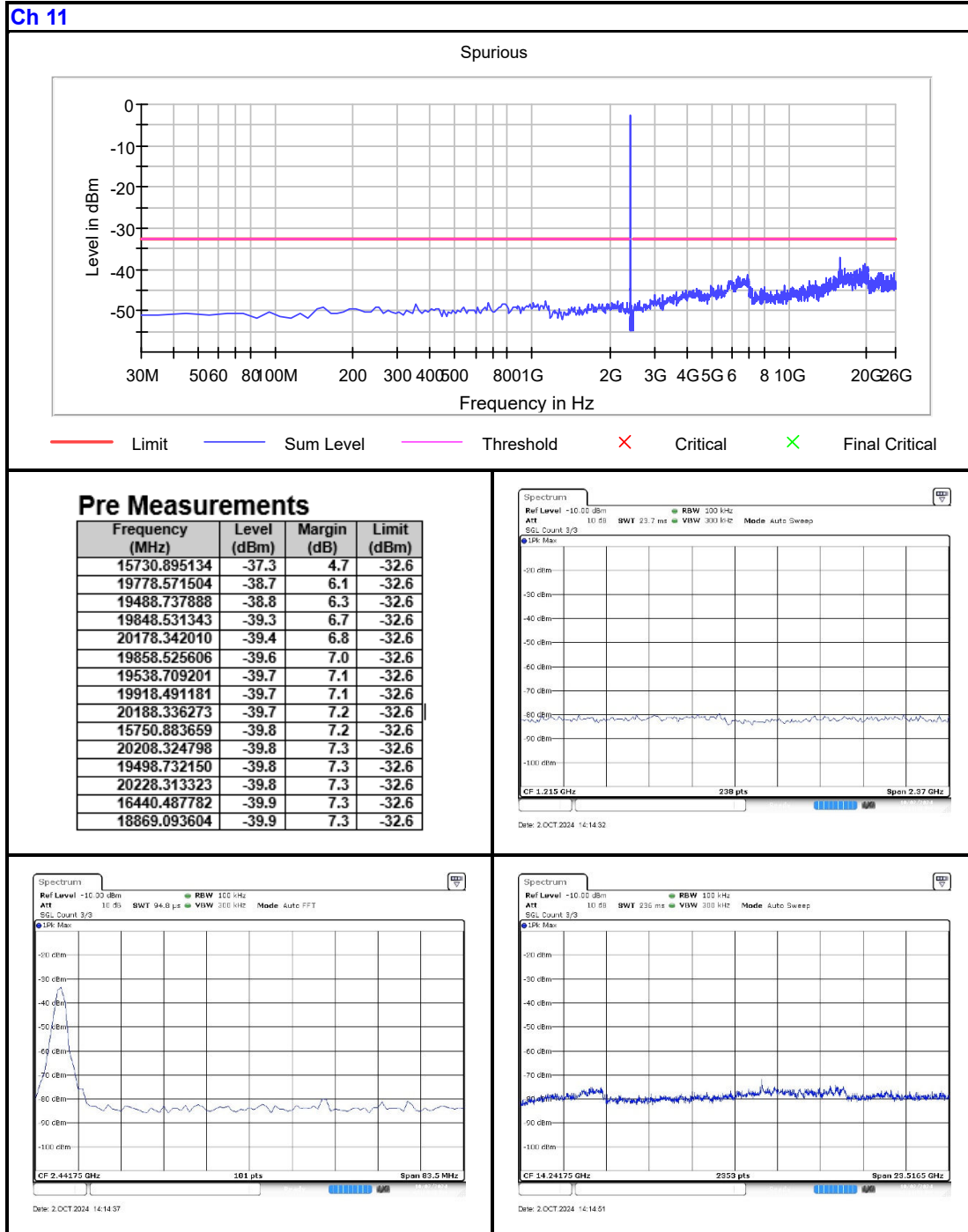
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4.5.7 TEST RESULTS

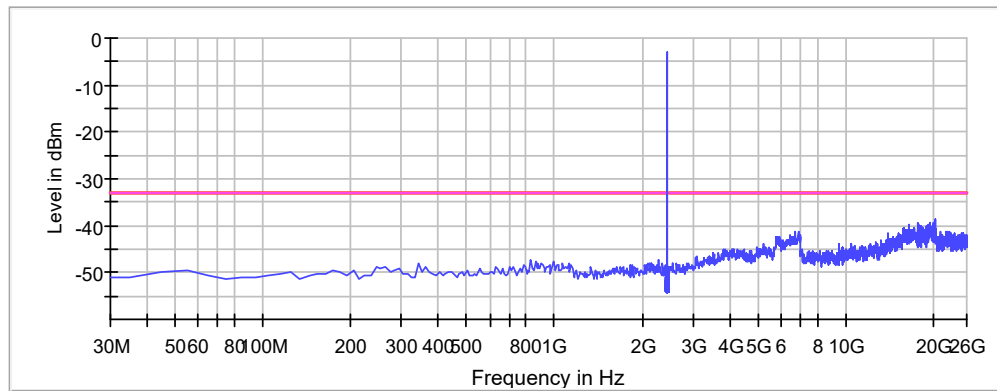
250kbps 802.15.4:

Test date: 10/02/2024



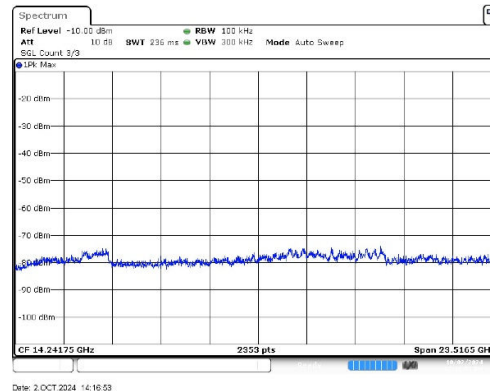
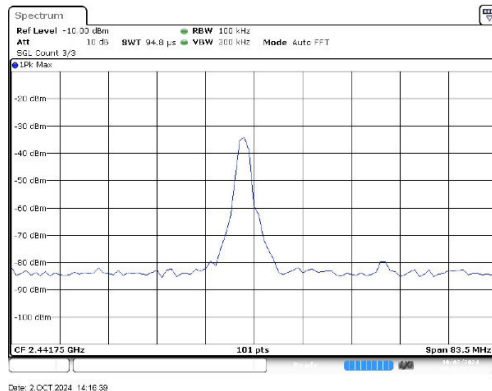
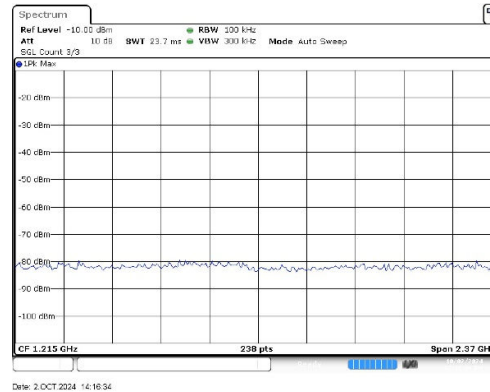
Ch 18

Spurious



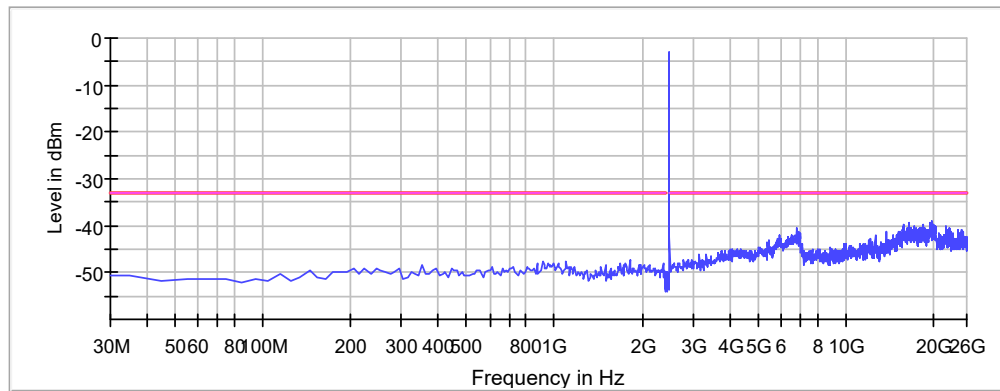
Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
20168.347748	-38.6	5.6	-33.0
19478.743625	-39.3	6.3	-33.0
19868.519868	-39.3	6.3	-33.0
19488.737888	-39.4	6.4	-33.0
17769.724713	-39.5	6.4	-33.0
19528.714938	-39.5	6.5	-33.0
19468.749363	-39.5	6.5	-33.0
20178.342010	-39.6	6.5	-33.0
19938.479707	-39.6	6.6	-33.0
20158.353485	-39.6	6.6	-33.0
19458.755100	-39.6	6.6	-33.0
19448.760837	-39.7	6.7	-33.0
19878.514131	-39.7	6.7	-33.0
16400.510731	-39.8	6.8	-33.0
19498.732150	-39.8	6.8	-33.0



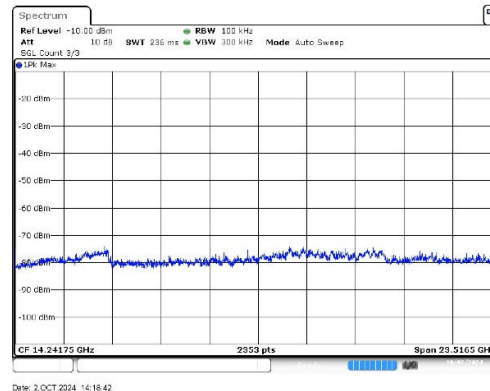
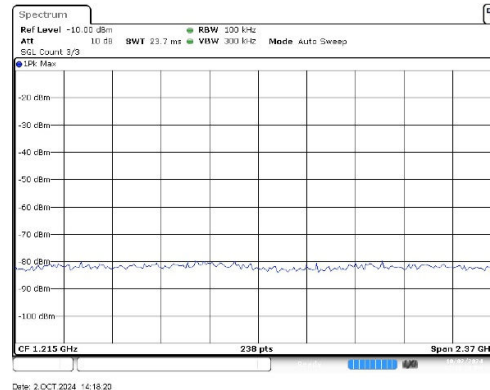
Ch 26

Spurious



Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
19798.560030	-39.1	5.9	-33.2
19508.726413	-39.3	6.1	-33.2
19808.554292	-39.4	6.2	-33.2
16440.487782	-39.5	6.3	-33.2
18479.317361	-39.6	6.5	-33.2
15760.877922	-39.8	6.7	-33.2
19878.514131	-39.8	6.7	-33.2
19858.525606	-39.9	6.7	-33.2
19818.548555	-39.9	6.7	-33.2
16430.493519	-39.9	6.7	-33.2
19548.703464	-40.0	6.8	-33.2
20248.301849	-40.0	6.8	-33.2
22067.257650	-40.0	6.9	-33.2
20228.313323	-40.0	6.9	-33.2
15780.866447	-40.1	6.9	-33.2





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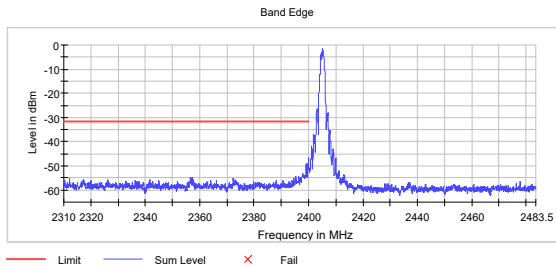


Conducted Band Edges

250kbps 802.15.4:

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Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.925000	-46.7	15.1	-31.6	PASS
2399.875000	-46.8	15.2	-31.6	PASS
2399.975000	-47.9	16.3	-31.6	PASS
2399.825000	-48.6	17.0	-31.6	PASS
2399.775000	-49.2	17.7	-31.6	PASS
2399.125000	-49.3	17.7	-31.6	PASS
2399.075000	-49.6	18.0	-31.6	PASS
2399.725000	-50.0	18.4	-31.6	PASS
2399.175000	-50.1	18.5	-31.6	PASS
2399.225000	-50.6	19.0	-31.6	PASS
2399.275000	-51.0	19.4	-31.6	PASS
2399.675000	-51.4	19.8	-31.6	PASS
2399.325000	-51.5	19.9	-31.6	PASS
2399.025000	-51.7	20.2	-31.6	PASS
2397.925000	-53.1	21.5	-31.6	PASS

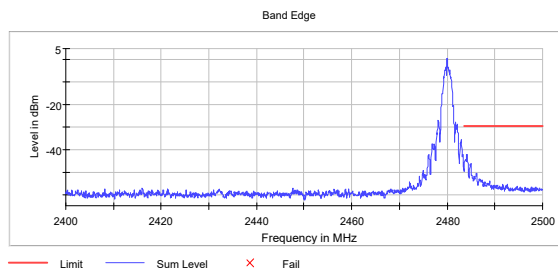
Measurement 1

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 μ s	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	0.00 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
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
SweepTime	94.727 μ s	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	10 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

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Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2484.125000	-42.2	12.7	-29.5	PASS
2484.075000	-42.5	13.0	-29.5	PASS
2484.175000	-43.2	13.7	-29.5	PASS
2484.025000	-44.0	14.5	-29.5	PASS
2483.775000	-44.3	14.8	-29.5	PASS
2483.725000	-44.4	14.9	-29.5	PASS
2484.225000	-44.8	15.3	-29.5	PASS
2483.875000	-44.9	15.4	-29.5	PASS
2483.825000	-45.0	15.5	-29.5	PASS
2483.925000	-45.1	15.6	-29.5	PASS
2484.275000	-45.3	15.8	-29.5	PASS
2483.975000	-45.4	15.9	-29.5	PASS
2483.675000	-45.7	16.3	-29.5	PASS
2483.625000	-46.0	16.5	-29.5	PASS
2484.925000	-46.4	16.9	-29.5	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 μ s	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	0.31 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
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	330	~ 330
SweepTime	18.945 μ s	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	3 / 3	3
Max Stable Difference	0.33 dB	0.50 dB



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5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the Test Setup Photos exhibit.



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6 APPENDIX A – MODIFICATIONS

No modifications were made to the EUT during testing.

---END OF REPORT---