RF Test Report

Report Number:	**208949-4** **Revision Level: 2**
Client:	**Alarm.com Incorporated**
	8281 Greensboro Drive, Suite 100, Tysons VA 22102, USA
Equipment Under Test:	**Alarm.com 4MP Outdoor Wi-Fi Spotlight Camera**
Product Name:	**V730**
Model:	**ADC-V730**
FCC ID:	**YL6-143V730**
IC:	**9111A-143V730**
Applicable Standards:	**FCC Part 15 Subpart C, § 15.247 (BLE DTS)**
	RSS-247, Issue 3, August 2023
	RSS-GEN, Issue 5, February 2021, Amendment 2
	ANSI C63.10:2013
Report issued on:	**February 27, 2025**
Test Result:	**Compliant**

A2LA Cert. No. 1935.01

FOR THE SCOPE OF ACCREDITATION UNDER CERTIFICATE NUMBER: 1935.01
Report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the Federal Government.

Prepared by: A. Gillmeier
Andreas Gillmeier, Sr. Wireless Engineer

Reviewed by: Martin Taylor
Martin Taylor, RF/EMC Project Engineer

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1 Summary of Test Results

Test Description	Test Specification		Test Result
Bandwidth	15.247(a)(2)	RSS-247 S5.2(a) RSS-GEN S6.7	Compliant
Output Power	15.247(b)(3)	RSS-247 S5.4(d)	Compliant
Power Spectral Density	15.247(e)	RSS-247 S5.2(b)	Compliant
Conducted Spurious Emissions / Band Edge	15.247(d)	RSS-247 S5.5	Compliant
Field Strength of Spurious Radiation (Restricted Bands)	15.247(d) 15.205, 15.209	RSS-247 S5.5 RSS-GEN S8.9, S8.10	Compliant
Band Edge Emissions in Restricted Frequency Bands	15.205, 15.209	RSS-GEN S8.9, S8.10	Compliant
AC Powerline Conducted Emissions	15.207	RSS-GEN S8.8	Compliant
Antenna Requirement	15.203	RSS-GEN S6.8	Compliant

1.1 *Modifications Required for Compliance*

None.

2 General Information

2.1 *Client Information*

Name:	Alarm.com Incorporated
Address:	8281 Greensboro Drive, Suite 100,
City, State, Zip, Country:	Tysons, Virginia 22102, USA

2.2 *Test Laboratory*

Name:	SGS North America, Inc.
Address:	12310 World Trade Drive, Suite 106/107
City, State, Zip, Country:	San Diego, CA 92128, USA
Accrediting Body:	A2LA
Type of lab:	Testing Laboratory
Certificate Number:	1935.01
Designation Number:	US1346
CAB Identifier:	US0236

2.3 *General Information of EUT*

Equipment Under Test:	Alarm.com 4MP Outdoor Wi-Fi Spotlight Camera
Product Name:	V730
Model:	ADC-V730
Serial Number:	504074C00096 (radiated tests), 504074C000D4 (conducted tests)
FCC ID:	YL6-143V730
IC:	9111A-143V730
Firmware Version:	18.15 RC1.49

Frequency Range: 2402 – 2480 MHz
Data Modes: BLE 1M, BLE 2M
Antenna Gain*: 2 x PCB Omnidirectional Antenna (ALX23F-222AA4-00); peak gain 4.2dBi*

	Frequency(MHz)	2400	2450	2500	5150	5350	5550	5750	5850
Ant.1	Peak Gain(dBi)	3.0	3.1	2.9	5.2	5.3	5.0	4.0	3.9
	Efficiency(%)	64	62	58	73	76	78	73	69
Ant.2	Peak Gain(dBi)	4.2	4.0	3.5	4.7	4.5	3.9	3.9	3.8
	Efficiency(%)	67	66	61	73	71	73	77	77

Rated Voltage: 100 – 240 V_{AC} / 50 – 60 Hz

Test Voltage: 120 V_{AC} / 60 Hz

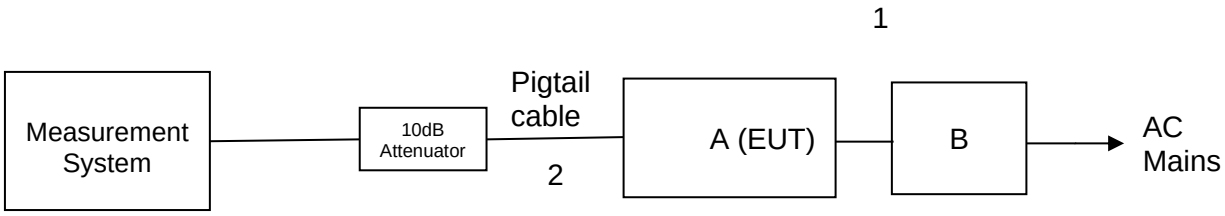
Sample Received Date: July 10, 2024
Dates of testing: August 06 – December 11, 2024

*Data was not measured by SGS laboratory and therefore SGS is not responsible for accuracy. Data obtained via customer, specification sheet, previous filing or other.

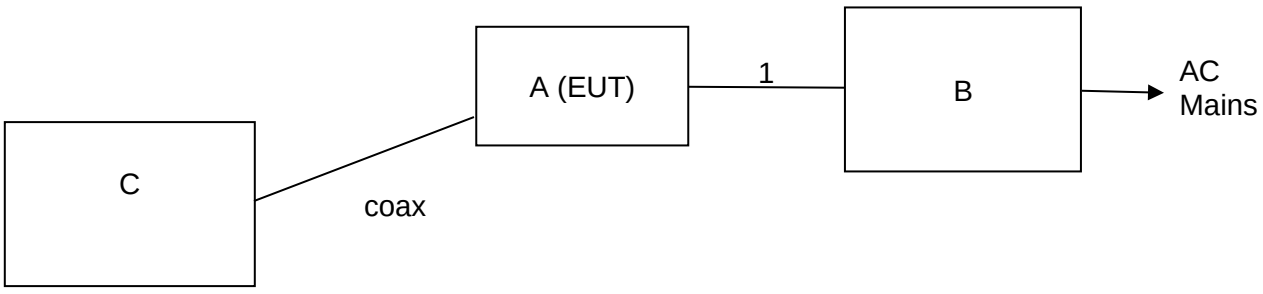
2.4 *Operating Modes and Conditions*

The EUT was running test mode firmware which allowed commands to be sent to transmit on low, middle and high channels in all necessary modulation and modes of operation.

2.5 *EUT Connection Block Diagram – Conducted Measurements*



2.6 *EUT Connection Block Diagram – Radiated Measurements*



2.7 *System Configurations*

Device Reference	Manufacturer	Description	Model Number	Serial Number
A	Alarm.Com	V730	V730	N/A
B1	Asian Power Devices Inc.	AC adapter	WB-12G12FU	D3J120374100
B2	PYS	AC adapter	PYS-18UP120150U	- - -
C	LYNwave	Dual Band WLAN antenna	ALX23F-222AA4-00	N/A

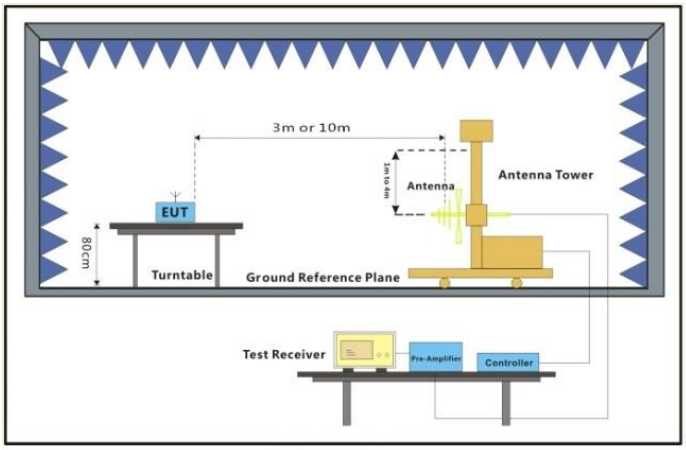
2.8 *Cable List*

Cable reference	Port Name	Start	End	Cable Length (m)	Ferrite installed?	Shielded?
1	DC out	AC/DC power adapter	DC plug	2.9	No	No

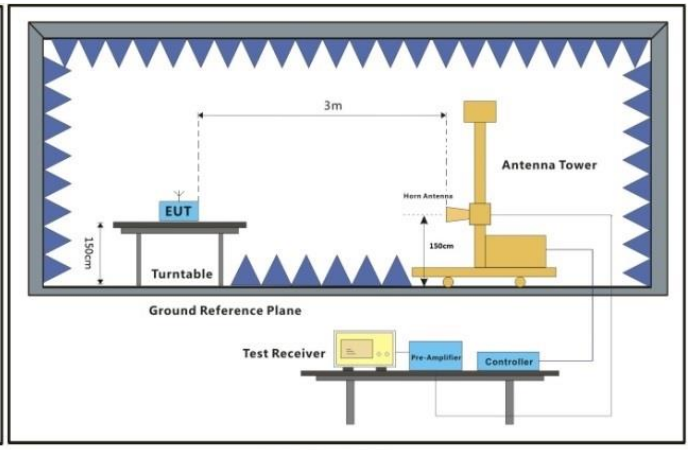
2.9 *Supporting Test Equipment*

Manufacturer	Description	Model Number
Dell	Support laptop to set parameters on the EUT	P117F

2.10 *Test Setup Diagrams (Radiated)*



30MHz-1GHz



Above 1GHz

3 Bandwidth

3.1 *Test Result*

Test Description	Test Specification		Test Result
6 dB Bandwidth 99% Occupied Bandwidth	15.247(a)(2)	RSS-247 S5.2(a) RSS-GEN S6.7	Compliant

3.2 *Test Method*

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

FCC measurement

1. The testing follows the Measurement Procedure from ANSI C63.10: 2013 clause 11.8 and KDB 558074 D01.
2. Set the spectrum analyzer as
   RBW= 100 kHz ,
   VBW = 3 X RBW,
   Span= 2 to 5 times of the OBW,
   Sweep=auto, Detector = Peak, and Max hold.
3. Mark the upper and lower frequencies of -6dB.
4. Repeat above procedures until all test default channel is completed.

ISED measurements

1. The testing follows the Measurement Procedure from ANSI C63.10: 2013 clause 6.9.2 and RSS-Gen section 6.7.
2. Set the spectrum analyzer as
   RBW= 1 % to 5% of 99% and -6dB Bandwidth ,
   VBW ≥ 3 X RBW,
   Span= large enough to capture all products of the modulation process
   Sweep=auto, Detector = Peak, and Max hold.
3. Mark the upper and lower frequencies of 99% and -6dB.
4. Repeat above procedures until all test default channel is completed.

3.3 *Test Site and Environmental Condition*

EMC Laboratory, San Diego, CA

Temperature: 20 – 25 °C
Relative Humidity: 35 – 50 %

3.4 *Test Equipment*

Test End Date: August 08, 2024 Tester: Alex Chang

Asset No.	Type of Equipment	Model	Serial No.	Manufacturer	Cal Date	Cal Due Date
Conducted Testing						
2003	Signal Analyzer	N9030B	MY61330812	Keysight	01/29/2024	01/29/2025
-	RF Cable	S141MMHF-18	616003	Rfcoax.com	N/A (verified before use)	
-	10 dB Attenuator	3M-10	47578	WEINSCHEL	N/A (verified before use)	
-	Test Software	Radio Test Software	v.23	SGS Taiwan	N/A	
2036	Temp/Humidity Data Logger	GSP-8	CMA231100002	Elitech	07/09/2024	07/09/2025

3.5 *Test Setup Photographs*

Test setup photographs are located in a separate report (208949-9).

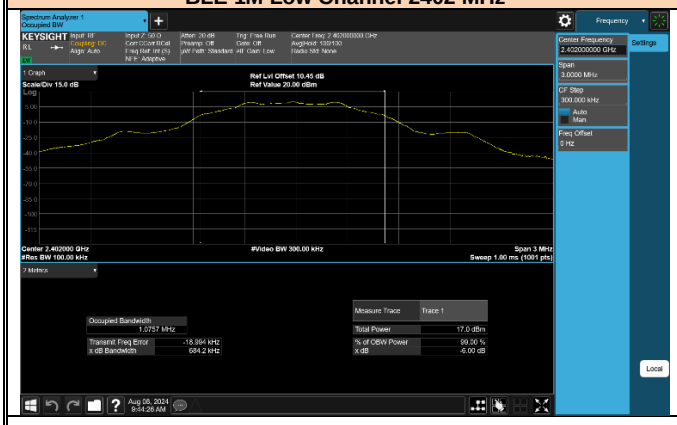
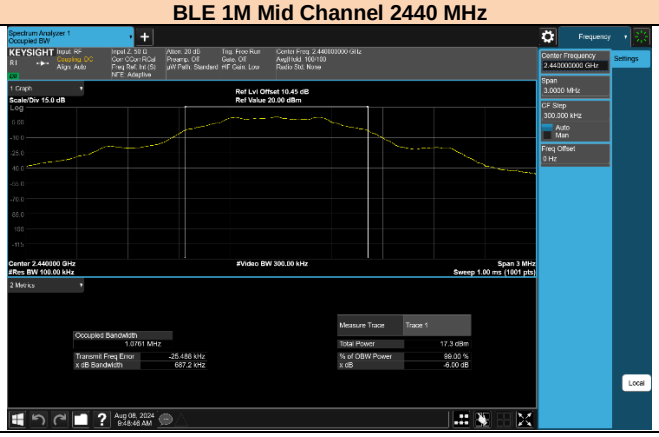
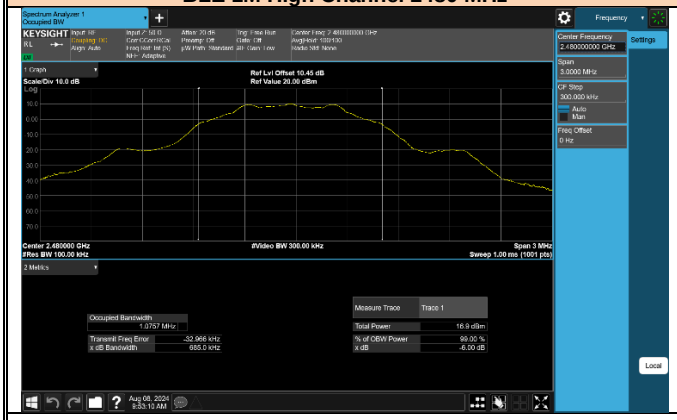
3.6 *Test Data – 6dB Bandwidth*

Mode	Frequency (MHz)	6dB Bandwidth Measured (kHz)	Limit	Verdict
BLE 1M	2402	684.2	≥ 500kHz	Pass
	2440	687.2		
	2480	685.0		
BLE 2M	2402	1251		
	2440	1253		
	2480	1252		

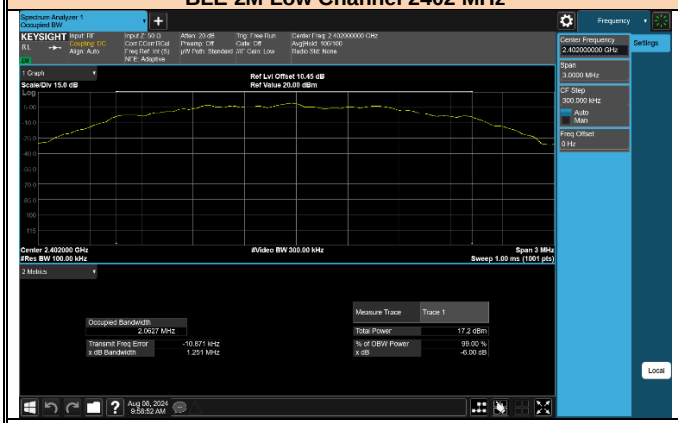
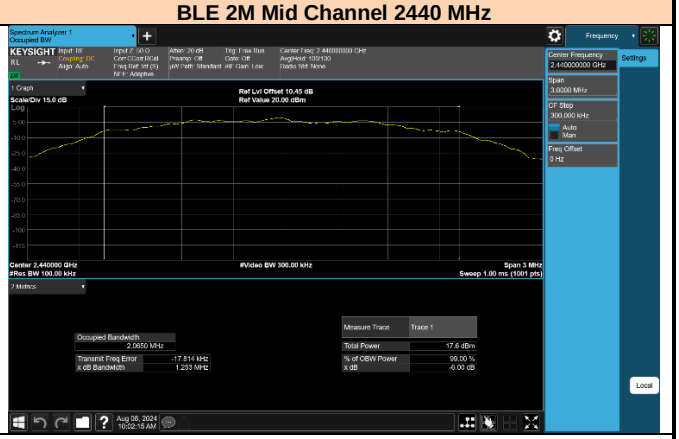
3.7 *Test Data – 99% Bandwidth*

Mode	Frequency (MHz)	99% Bandwidth Measured (MHz)	Verdict
BLE 1M	2402	1.0430	For Information Only
	2440	1.0436	
	2480	1.0431	
BLE 2M	2402	2.0590	
	2440	2.0610	
	2480	2.0595	

6dB Bandwidth measured screenshots

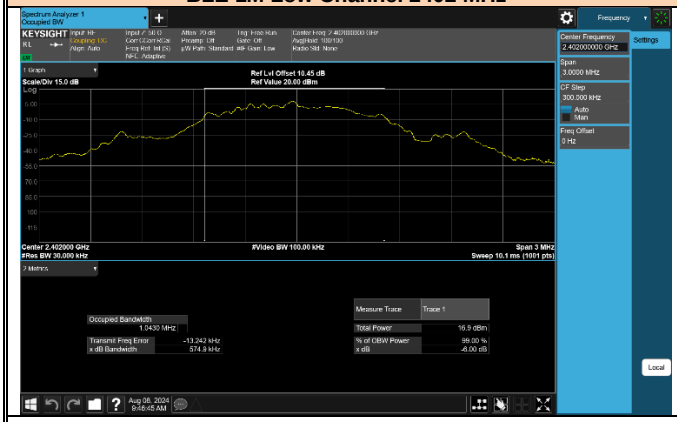
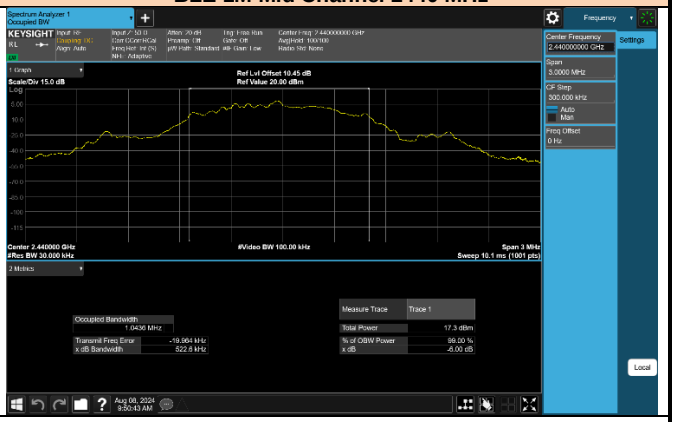
BLE 1M Low Channel 2402 MHz	BLE 1M Mid Channel 2440 MHz
	
BLE 1M High Channel 2480 MHz	
	

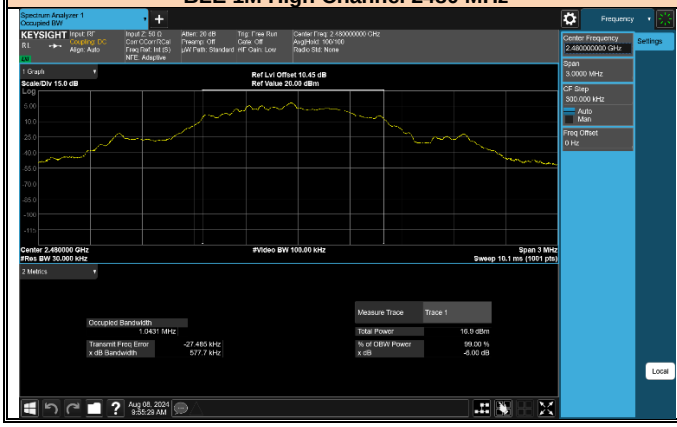
6dB Bandwidth measured screenshots

BLE 2M Low Channel 2402 MHz	BLE 2M Mid Channel 2440 MHz
	

BLE 2M High Channel 2480 MHz	
	

99% Bandwidth measured screenshots

BLE 1M Low Channel 2402 MHz	BLE 1M Mid Channel 2440 MHz
	

BLE 1M High Channel 2480 MHz	
	

BLE 2M Low Channel 2402 MHz	BLE 2M Mid Channel 2440 MHz
	
BLE 2M High Channel 2480 MHz	
	

4 Duty Cycle/Output Power

4.1 *Test Result*

Test Description	Test Specification		Test Result
Peak Output Power	15.247(b)(3)	RSS-247 S5.4(d)	Compliant

4.2 *Test Method*

Fundamental average power measurements were recorded using the procedures from ANSI C63.10: 2013 clause 11.9 and KDB 558074 D01 Measurement Guidance v05r02.

Limit

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. For using antennas with greater than 6dBi of gain, the limit is reduced in dB by the amount the gain exceeds 6dBi (e.g. for a 7.4dBi antenna, the limit is reduced from 30dBm to 28.6dBm)

4.3 *Test Site*

EMC Laboratory, San Diego, CA

Environmental Conditions

Temperature: 20 – 25 °C

Relative Humidity: 35 – 50 %

4.4 *Test Equipment*

Test End Date: August 06 - 08, 2024 Tester: Dongho Jeong, Alex Chang

Asset No.	Type of Equipment	Model	Serial No.	Manufacturer	Cal Date	Cal Due Date
Conducted Testing						
2003	Signal Analyzer	N9030B	MY61330812	Keysight	01/29/2024	01/29/2025
2013	Power Meter	N1911A	MY62310007	Keysight	01/29/2024	01/29/2025
2015	Wideband Power Sensor	N1921A	MY62220017	Keysight	01/29/2024	01/29/2025
-	RF Cable	S141MMHF-18	616003	Rfcoax.com	N/A (verified before use)	
-	10 dB Attenuator	3M-10	47578	WEINSCHEL	N/A (verified before use)	
-	Test Software	Radio Test Software	v.23	SGS Taiwan	N/A	-
2036	Temp/Humidity Data Logger	GSP-8	CMA231100002	Elitech	07/09/2024	07/09/2025

4.5 *Test Setup Photographs*

Test setup photographs are located in a separate report (208949-9).

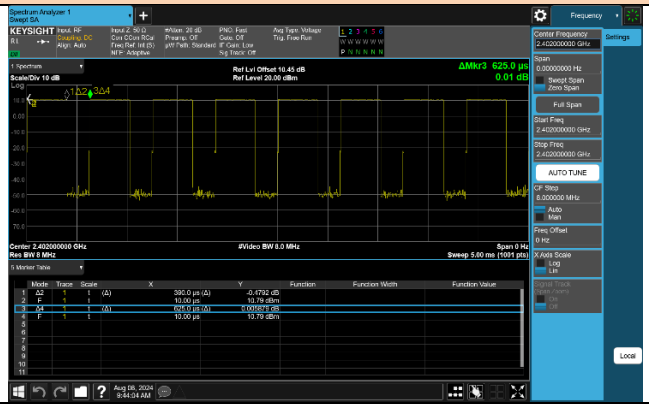
4.6 *Duty Cycle Test Data*

The test system reported the following duty-cycles used for correcting the average measurements: Only worst-case scenario reported.

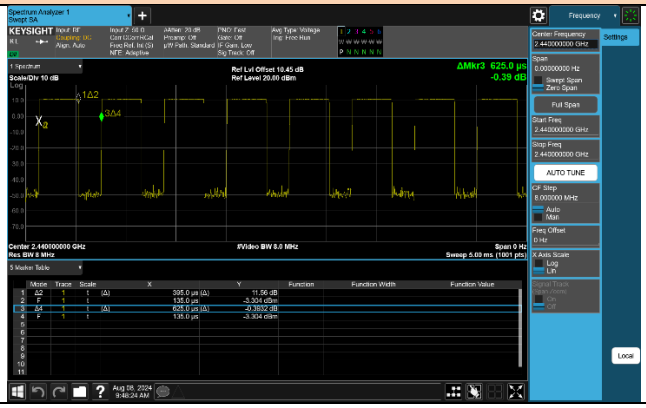
Mode	Channel	Data Rate (Mbps)/	T_on (ms)	T_on + T_off (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
BLE 1M	1 (2402 MHz)	1	0.39	0.625	62.4	2.04
	19 (2440 MHz)	1	0.395	0.625	63.2	2.00
	39 (2480 MHz)	1	0.39	0.625	62.4	2.05
BLE 2M	1 (2402 MHz)	2	0.195	0.625	31.2	5.06
	19 (2440 MHz)	2	0.195	0.625	31.2	5.06
	39 (2480 MHz)	2	0.195	0.625	31.2	5.06

Duty Cycle measured screenshots

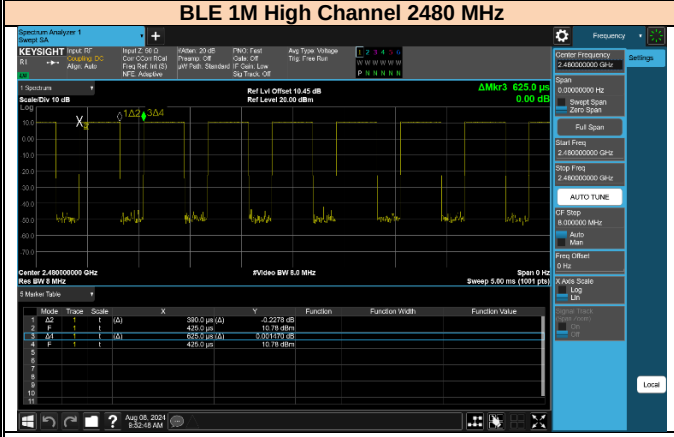
BLE 1M Low Channel 2402 MHz

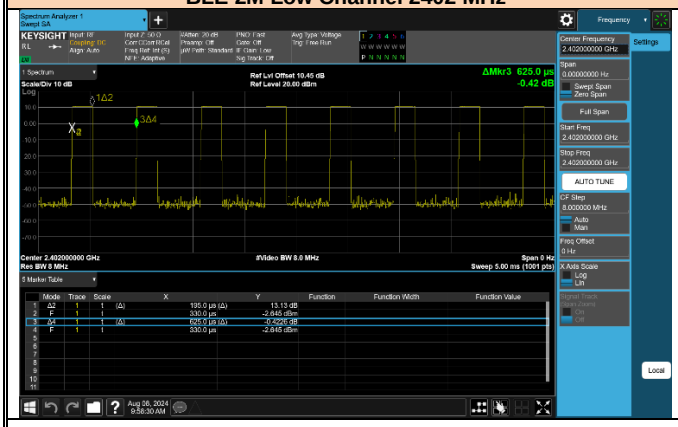
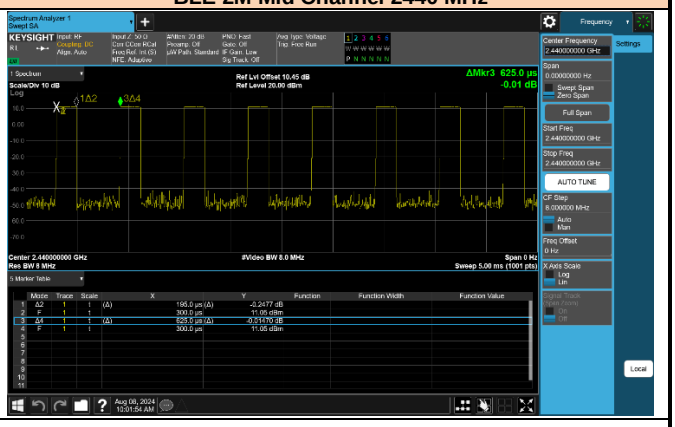
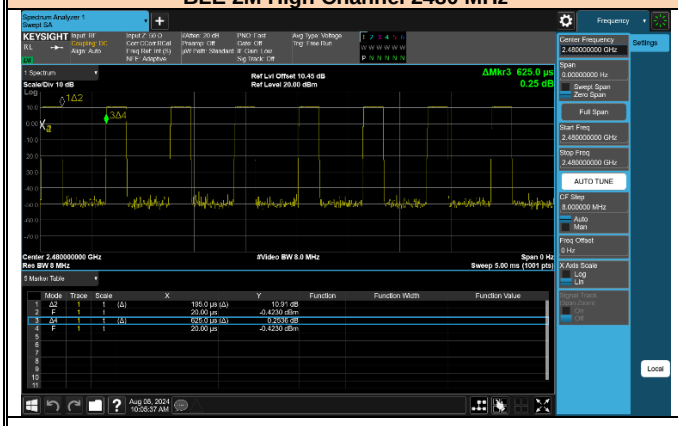


BLE 1M Mid Channel 2440 MHz



BLE 1M High Channel 2480 MHz



BLE 2M Low Channel 2402 MHz	BLE 2M Mid Channel 2440 MHz
	
BLE 2M High Channel 2480 MHz	
	

4.7 *Output Power*

Mode	Channel/ Frequency (MHz)	AVG measured (dBm)	Duty Cycle (%)	Duty Cycle Correction (dB)	AVG incl. DC correction (dBm)	Antenna Gain (max.) (dBi)	Calculated EIRP (dBm)	Limit (dBm)	Verdict
BLE 1M	1 (2422)	9.66	62.4	2.04	11.7	4.20	15.9	30	Pass
	19 (2440)	10.15	63.2	2.00	12.15	4.20	16.35	30	Pass
	39 (2480)	9.18	62.4	2.05	11.23	4.20	15.43	30	Pass
BLE 2M	1 (2422)	5.06	31.2	5.06	10.12	4.20	14.32	30	Pass
	19 (2440)	7.89	31.2	5.06	12.95	4.20	17.15	30	Pass
	39 (2480)	6.37	31.2	5.06	11.43	4.20	15.63	30	Pass

5 Power Spectral Density

5.1 *Test Result*

Test Description	Test Specification		Test Result
Power Spectral Density	15.247(e)	RSS-247 S5.2(b)	Compliant

5.2 *Test Method*

Power spectral density measurements were recorded using the procedures from ANSI C63.10: 2013 clause 11.10 and KDB 558074 D01 Measurement Guidance v05r02.

1. Set analyzer center frequency to DTS channel center frequency.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW = 3 kHz & VBW = 10 kHz.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

Limit
The limit is 8 dBm.

5.3 *Test Site*

Environmental Conditions

Temperature:	20 – 25 °C
Relative Humidity:	35 – 50 %

5.4 *Test Equipment*

Test Dates: August 08, 2024 Tester: Alex Chang

Asset No.	Type of Equipment	Model	Serial No.	Manufacturer	Cal Date	Cal Due Date
Conducted Testing						
2003	Signal Analyzer	N9030B	MY61330812	Keysight	01/29/2024	01/29/2025
-	RF Cable	S141MMHF-18	616003	Rfcoax.com	N/A (verified before use)	
-	10 dB Attenuator	3M-10	47578	WEINSCHEL	N/A (verified before use)	
-	Test Software	Radio Test Software	v.23	SGS Taiwan	N/A	
2036	Temp/Humidity Data Logger	GSP-8	CMA231100002	Elitech	07/09/2024	07/09/2025

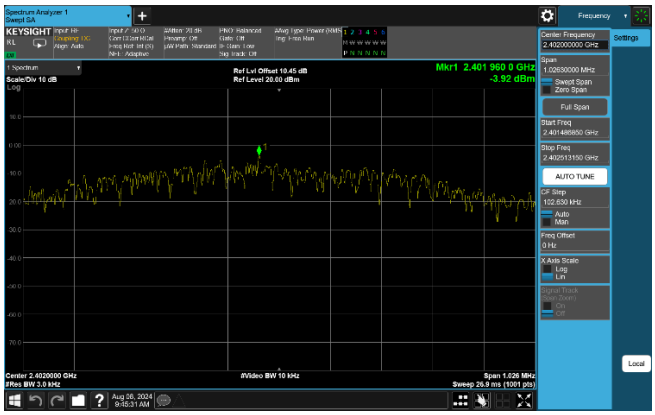
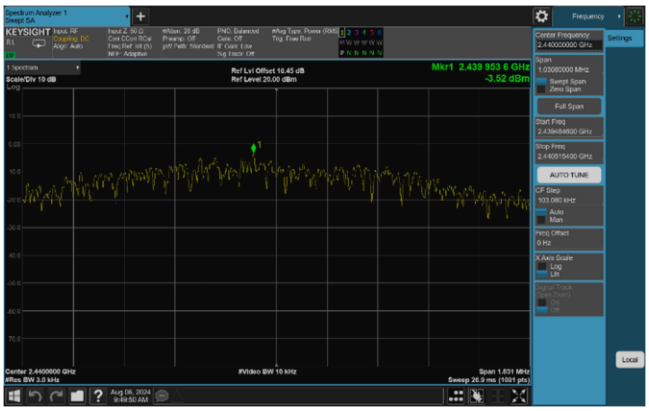
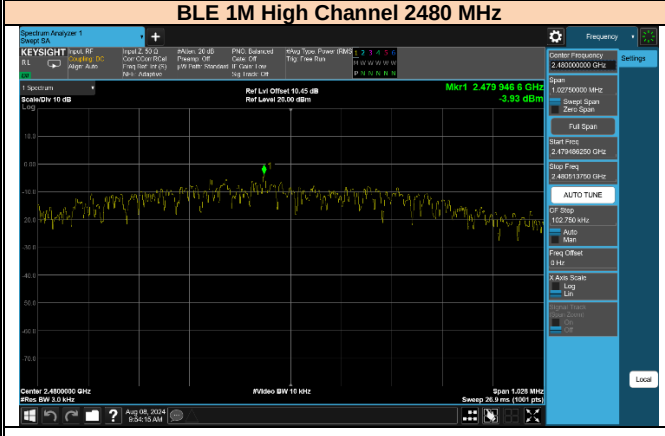
5.5 *Test Setup Photographs*

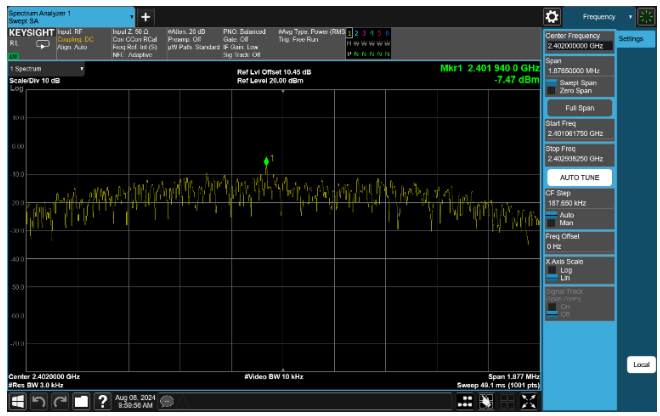
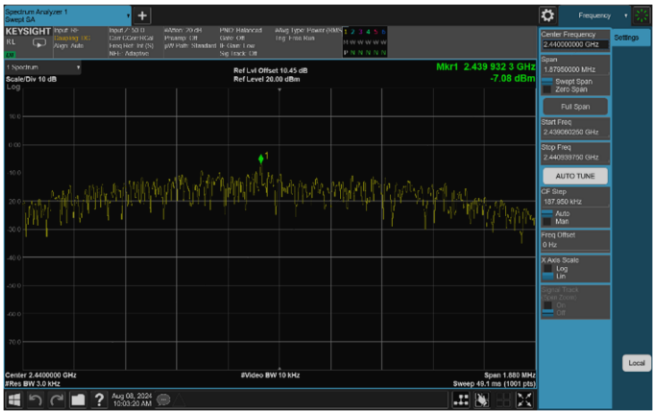
Test setup photographs are located in a separate report (208949-9).

5.6 *Test Data*

Mode	Frequency (MHz)	AVG measured (dBm)	Duty Cycle (%)	Duty Cycle Correction (dB)	Power Spectral Density (dBm/3 kHz)	Limit	Verdict
BLE 1M	2402	-3.92	62.4	2.04	-1.88	8	Pass
	2440	-3.52	63.2	2.00	-1.52	8	Pass
	2480	-3.93	62.4	2.05	-1.88	8	Pass
BLE 2M	2402	-7.47	31.2	5.06	-2.41	8	Pass
	2440	-7.08	31.2	5.06	-2.02	8	Pass
	2480	-7.51	31.2	5.06	-2.45	8	Pass

PSD measured screenshot

BLE 1M Low Channel 2402 MHz	BLE 1M Mid Channel 2440 MHz
	
BLE 1M High Channel 2480 MHz	
	

BLE 2M Low Channel 2402 MHz	BLE 2M Mid Channel 2440 MHz
	
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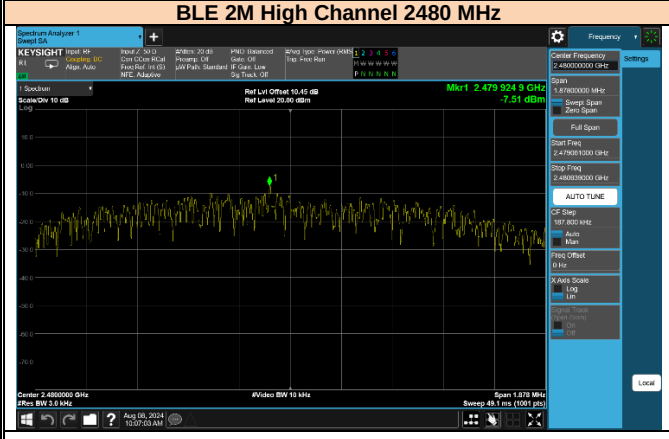
	

6 Conducted Spurious Emissions / Band Edge

6.1 *Test Result*

Test Description	Test Specification		Test Result
Conducted Spurious Emissions / Band Edge	15.247(d)	RSS-247 S5.5	Compliant

6.2 *Test Method*

Spurious emissions in non-restricted frequency bands were recorded using the methods defined in ANSI C63.10: 2013 clause 11.11 and KDB 558074 D01 Measurement Guidance v05r02.

Lowest, middle, and highest channels were investigated.

Because the maximum conducted peak output power was used to determine compliance with the output power limits, the limit in any 100 kHz band outside of the authorized band is 20 dB below the maximum in-band peak level.

Reference Level of Emission Limit:

1. Set analyzer center frequency to DTS channel center frequency.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW = 100kHz & VBW = 300 kHz.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

6.3 *Test Site*

Environmental Conditions

Temperature: 20 – 25 °C

Relative Humidity: 35 – 50 %

6.4 *Test Equipment*

Test Dates: August 08, 2024 Tester: Alex Chang

Asset No.	Type of Equipment	Model	Serial No.	Manufacturer	Cal Date	Cal Due Date
Conducted Testing						
2003	Signal Analyzer	N9030B	MY61330812	Keysight	01/29/2024	01/29/2025
-	RF Cable	S141MMHF-18	616003	Rfcoax.com	N/A (verified before use)	
-	10 dB Attenuator	3M-10	47578	WEINSCHEL	N/A (verified before use)	
-	Test Software	Radio Test Software	v.23	SGS Taiwan	N/A	
2036	Temp/Humidity Data Logger	GSP-8	CMA231100002	Elitech	07/09/2024	07/09/2025

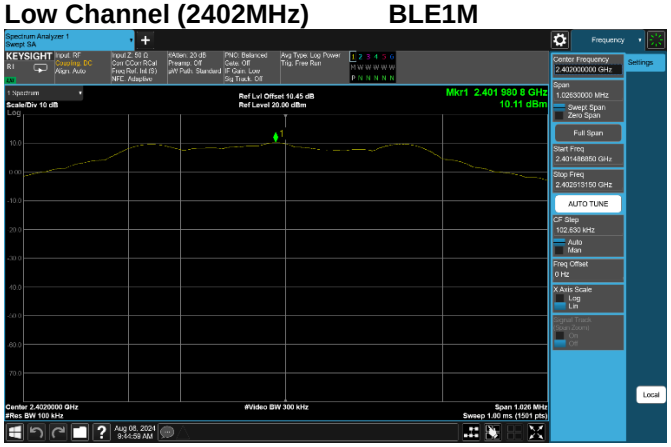
6.5 *Test Setup Photographs*

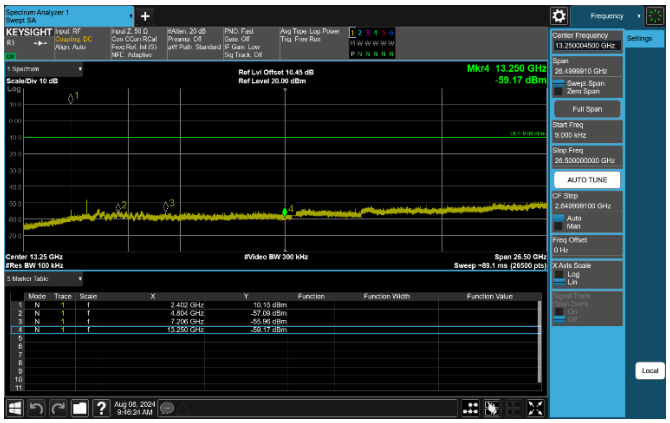
Test setup photographs are located in a separate report (208949-9).

6.6 *Test Data*

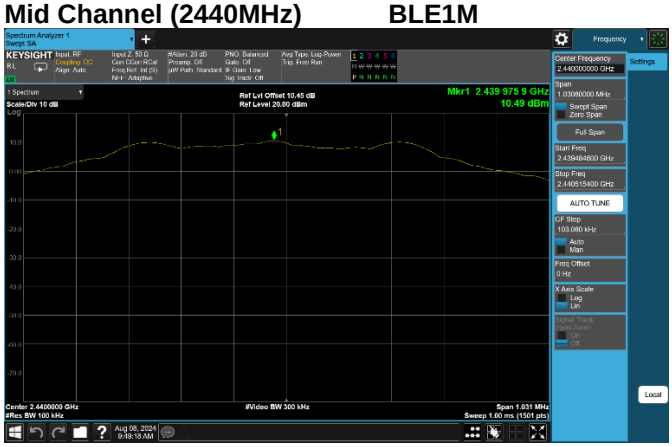
Mode	Frequency (MHz)	Level of Reference (dBm)		Verdict
		Measured (dBm)	Limit (dBm)	
BLE 1M	2402	10.11	-9.89	Pass
	2440	10.49	-9.51	Pass
	2480	10.08	-9.92	Pass
BLE 2M	2402	9.19	-10.81	Pass
	2440	9.56	-10.44	Pass
	2480	9.14	-10.86	Pass

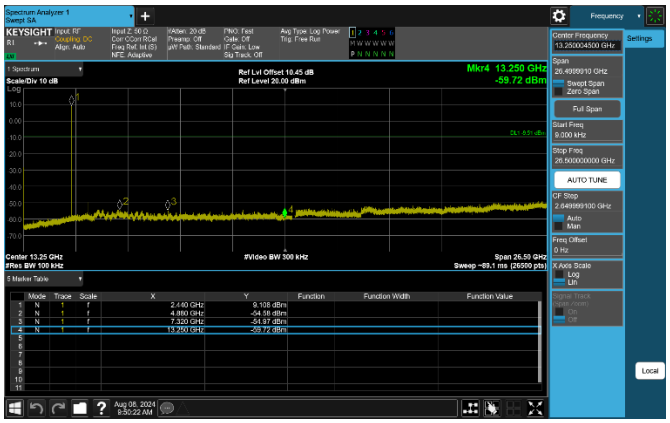
Low Channel (2402MHz) BLE1M



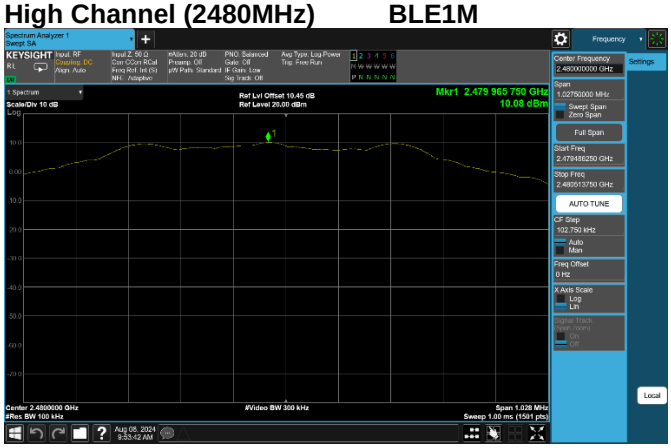


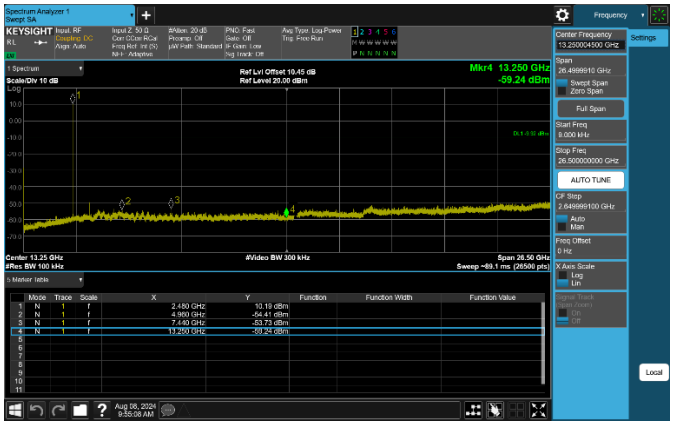
Mid Channel (2440MHz) BLE1M



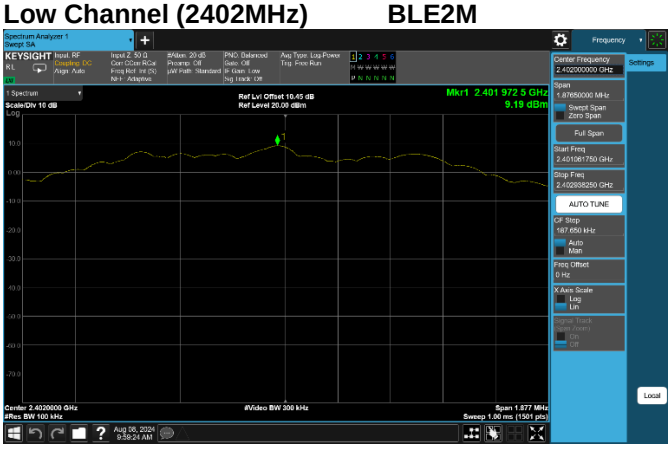


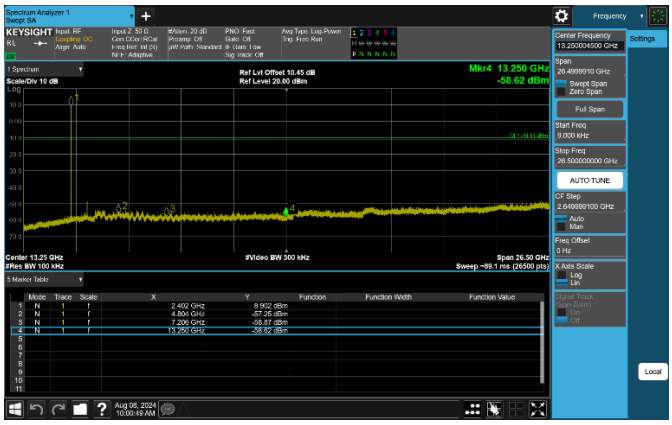
High Channel (2480MHz) BLE1M



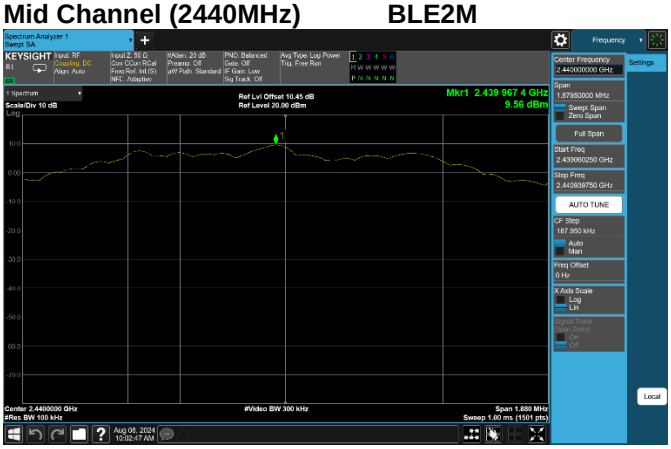


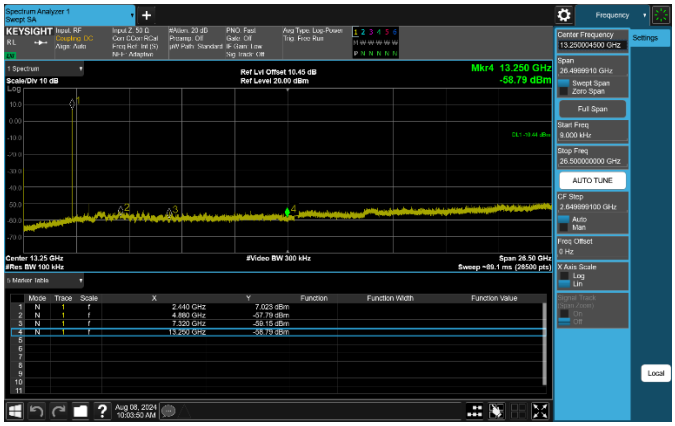
Low Channel (2402MHz) BLE2M



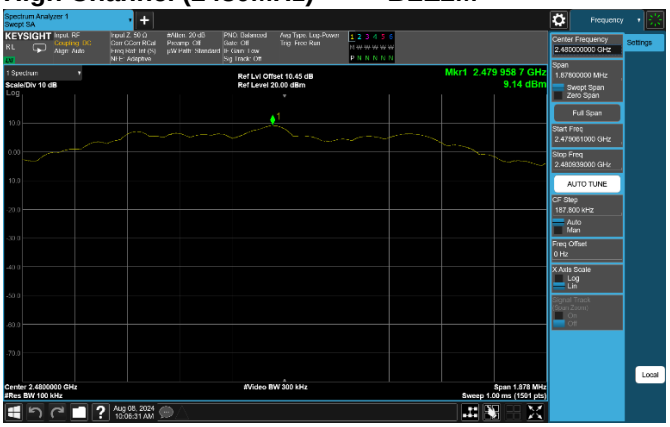


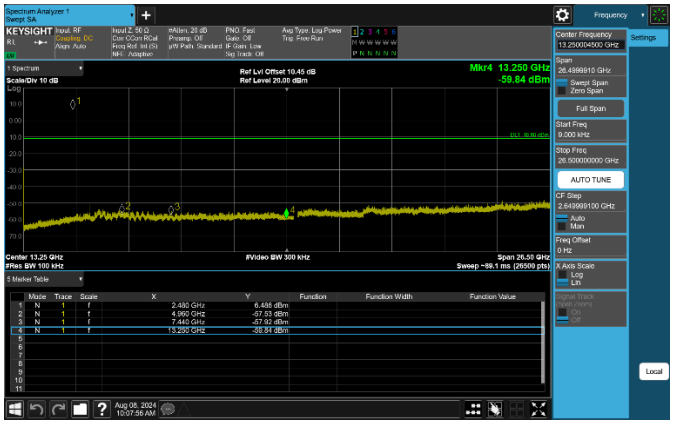
Mid Channel (2440MHz) BLE2M



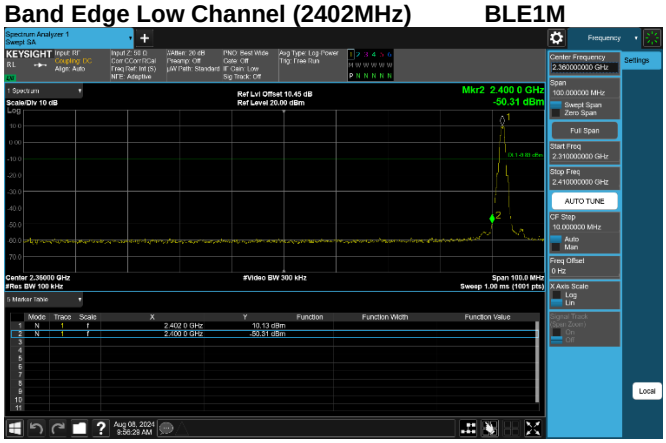


High Channel (2480MHz) BLE2M

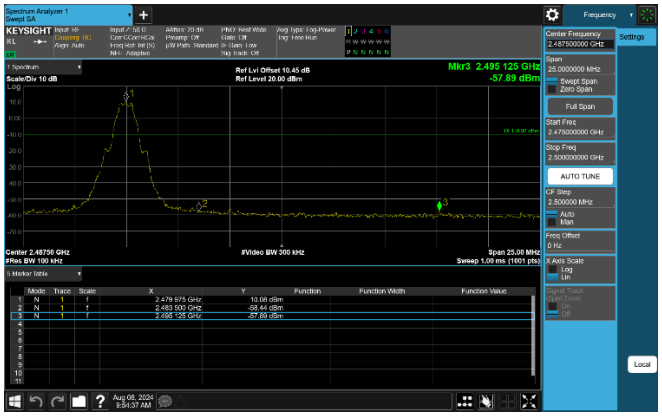




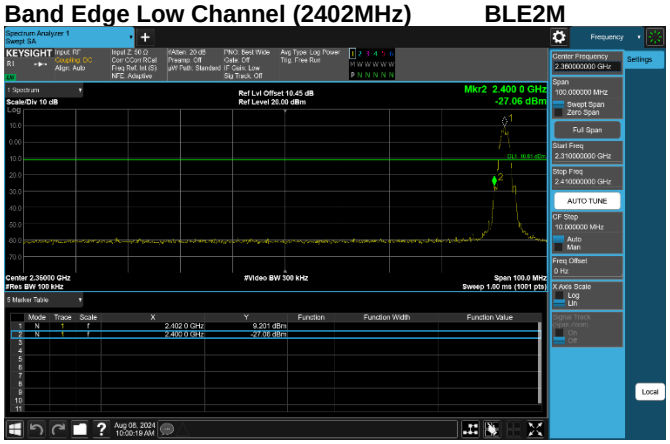
Band Edge Low Channel (2402MHz) BLE1M



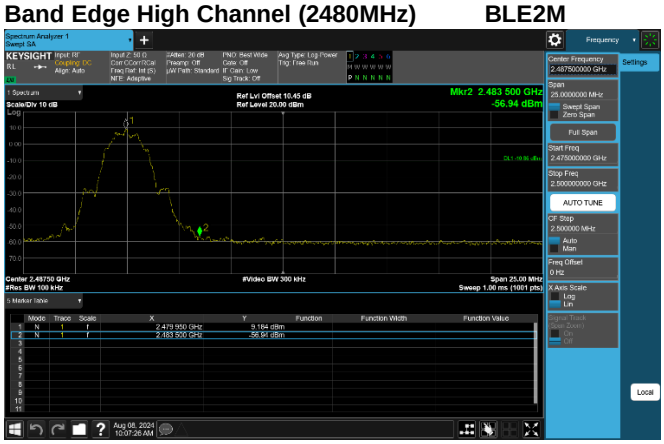
Band Edge High Channel (2480MHz) BLE1M



Band Edge Low Channel (2402MHz) BLE2M



Band Edge High Channel (2480MHz) BLE2M



7 Field Strength of Spurious Radiation (Restricted Bands)

7.1 *Test Result*

Test Description	Test Specification		Test Result
Radiated Spurious Emissions	15.247(d) and 15.209	RSS-247 S5.5	Compliant

7.2 *Test Method*

The measurement methods defined in ANSI C63.10: 2013 were used.

Lowest, middle, and highest channels were investigated – the device was commanded to continuously transmit on low, middle, and high channels.

Test distance:

9k to 30 MHz – Near field prescan to determine if there were any emissions
30 to 1000 MHz - The EUT to measurement antenna distance was 3 meters
1 to 18 GHz - The EUT to measurement antenna distance was 3 meters
18 to 26 GHz - The EUT to measurement antenna distance was 3 meters

Limits within restricted bands of operation:

Frequency	Limits(1)		Peak Limits dBuV/m
	Microvolts/m	dBuV/m	
30 - 88 MHz	100	40 (2)	--
88 - 216 MHz	150	43.5 (2)	--
216 - 960 MHz	200	46 (2)	--
960 - 1000 MHz	500	54 (2)	--
1 - 40 GHz	500	54 (3)	74

(1) These limits are applicable to emissions outside of the intentional transmit frequency band.
(2) Quasi-peak limit
(3) Average limit

7.3 *Test Site*

3m Absorber Lined Shielded Enclosure (ALSE), San Diego, CA

Environmental Conditions
Temperature: 20 – 25 °C
Relative Humidity: 35 – 50 %

7.4 *Additional Observation*

- *The low frequency band started from 9kHz to 30MHz was pre-scanned and the results was 20dB lower than the limit per 15.31(o); therefore, no data was presented in this test report.*

- *The high frequency band beyond 18GHz was pre-scanned and the results was 20dB lower than the limit; therefore, no data was presented in this test report.*

7.5 *Test Equipment*

Test Dates: August 12 to December 11, 2024 Tester: Andreas Gillmeier/Alex Chang

Asset No.	Type of Equipment	Model	Serial No.	Manufacturer	Cal Date	Cal Due Date
Radiated Emission < 1 GHz						
2017	EMI Receiver	N9038B	MY59050132	Keysight	10/24/2023	01/24/2025
2029	ETS Lindgren	Loop Antenna, H-Field	6512	00249642	10/04/2024	10/04/2026
2034	Biconilog Antenna 26M-6000MHz	3142E	00243882	ETS Lindgren	06/29/2023	06/29/2025
Radiated Emission > 1 GHz						
2017	EMI Receiver	N9038B	MY59050132	Keysight	10/24/2023	01/24/2025
2026	RF Microwave Systems Amplifier	RAMP00M45GA	00089204010	RF-Lambda	07/09/2024	07/09/2025
-	High Pass Filter	HPM16182	G015	Micro-Tronics	NCR	NCR
2042	DRG Horn Antenna 1G-18GHz	3117	00259209	ETS Lindgren	05/26/2023	05/26/2025
2032	ETS Lindgren	DRG Horn Antenna 10G-40GHz	3116C	00251668	07/23/2024	07/23/2026
Miscellaneous						
2036	Temp/Humidity Data Logger	GSP-8	CMA231100002	Elitech	07/09/2024	07/09/2025
-	Test Software	TILE!	V7.8.1.7	ETS Lindgren	N/A	

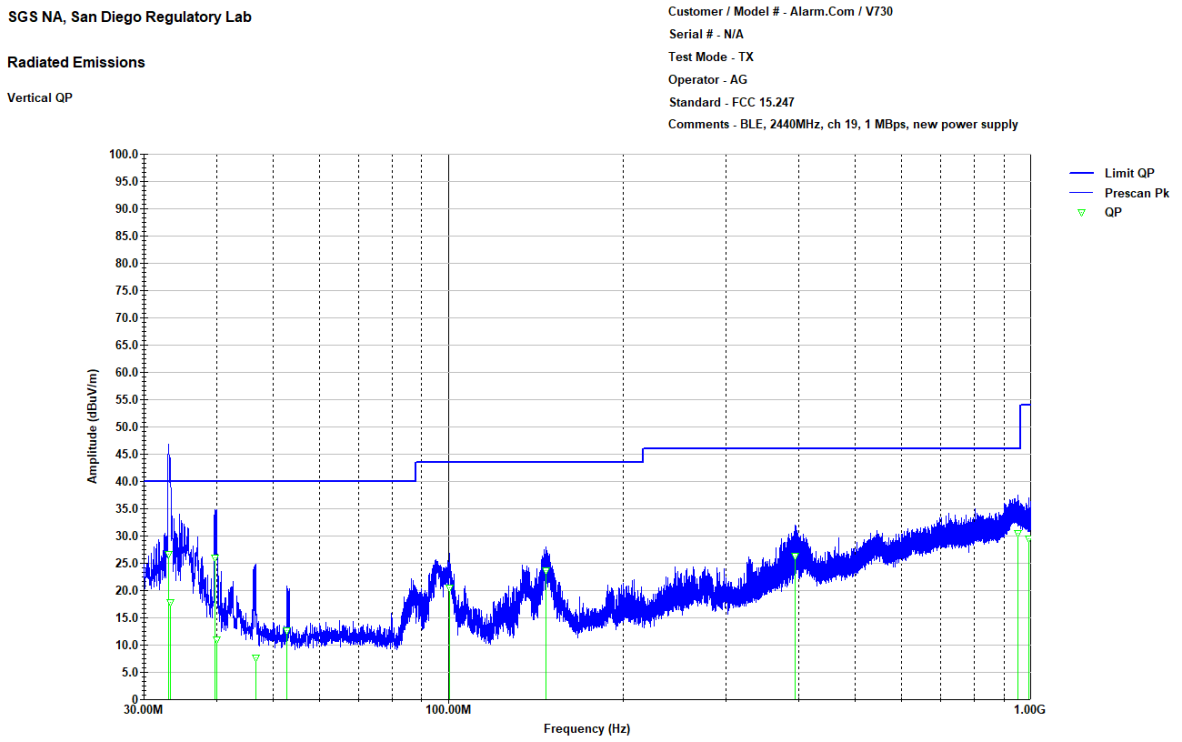
7.6 *Test Setup Photographs*

Test setup photographs are located in a separate report (208949-9).

7.7 *Test Data*

- Radiated Spurious Emissions test performed from 30MHz to 18GHz.
- No emissions beyond 12GHz. 12GHz and up only noise floor figures. No test performed beyond 18GHz.

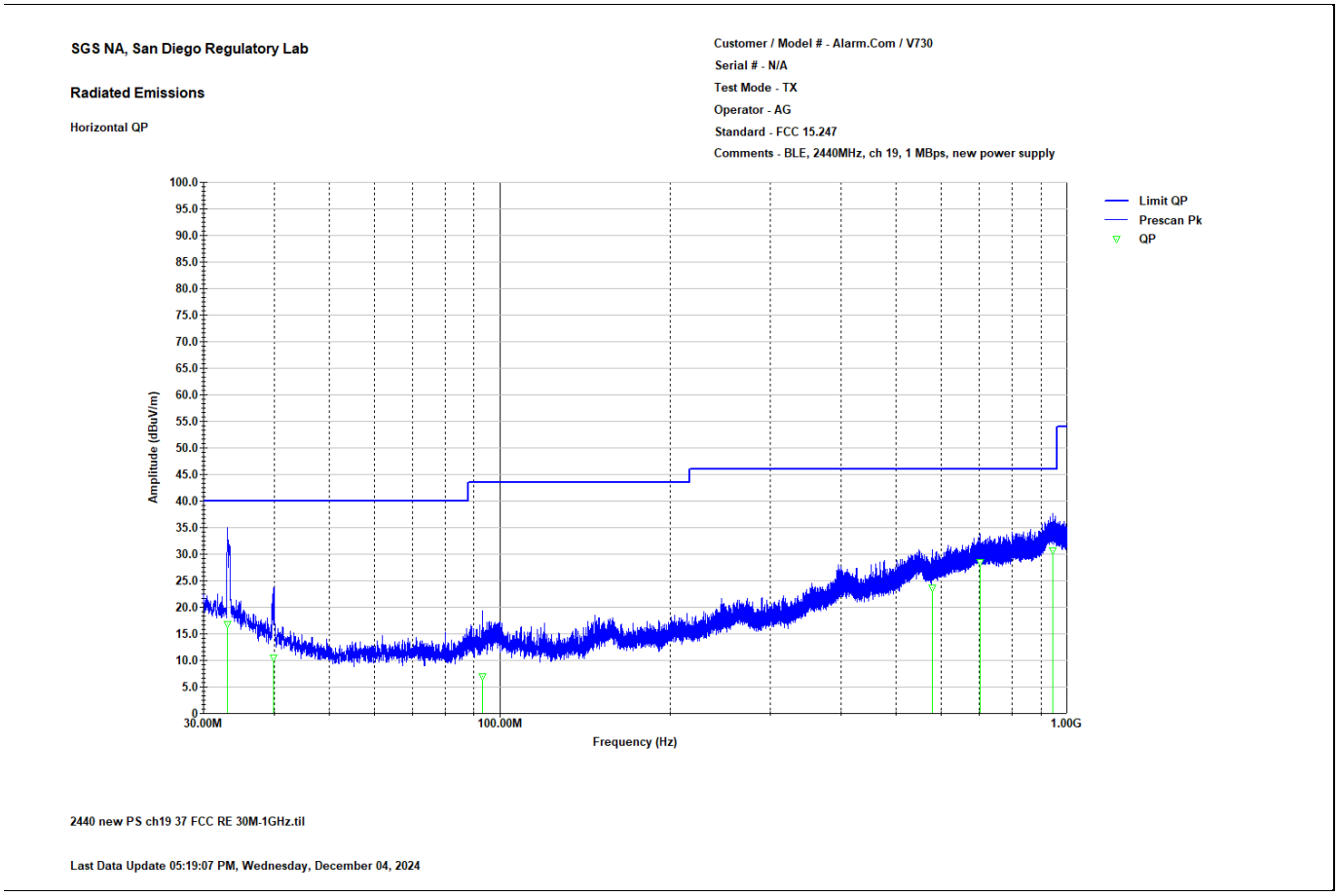
Horizontal Radiated Spurious Emissions Plot – 30 to 1000 MHz (BLE 1M, 2440MHz)
Worst-Case presented



Quasi-Peak Data

Freq. (MHz)	Final QP (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
33.056	26.69	-23	-13.31	40	100	19
33.298	17.86	-23.17	-22.14	40	154	7
39.676	25.95	-26.83	-14.05	40	100	62
39.943	10.92	-26.96	-29.08	40	150	7
46.636	7.58	-29.74	-32.42	40	281	31
52.843	12.71	-30.68	-27.29	40	209	62
100.543	20.53	-29.46	-22.99	43.52	106	25
146.958	23.73	-28.79	-19.79	43.52	100	246
394.478	26.29	-18.9	-19.73	46.02	100	267
952.106	30.43	-8.46	-15.59	46.02	393	307
993.064	29.5	-9.41	-24.48	53.98	114	279

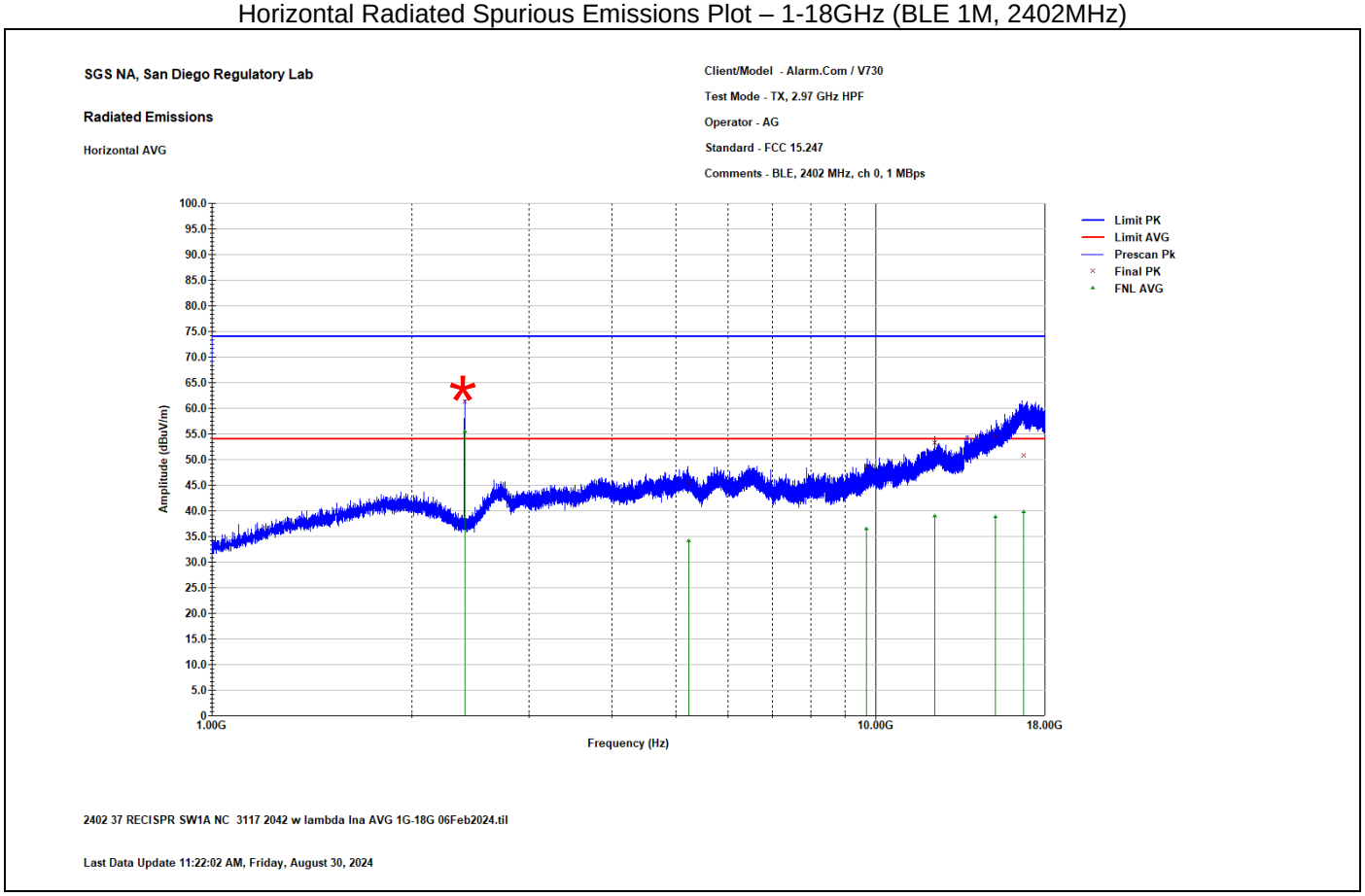
Vertical Radiated Spurious Emissions Plot – 30 to 1000 MHz (BLE 1M, 2440MHz)



Quasi-Peak Data

Freq. (MHz)	Final QP (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
30	22.28	-21.46	-17.72	40	122	144
39.724	21.49	-26.85	-18.51	40	100	52
43.65	21.5	-28.73	-18.5	40	138	-2
53.912	23.42	-30.64	-16.58	40	100	-20
936.308	31.17	-8.34	-14.85	46.02	312	294
978.767	30.5	-9.27	-23.48	53.98	130	380

Horizontal Radiated Spurious Emissions Plot – 1-18GHz (BLE 1M, 2402MHz)



(*) marks TX signal from the EUT which are excluded from measurement

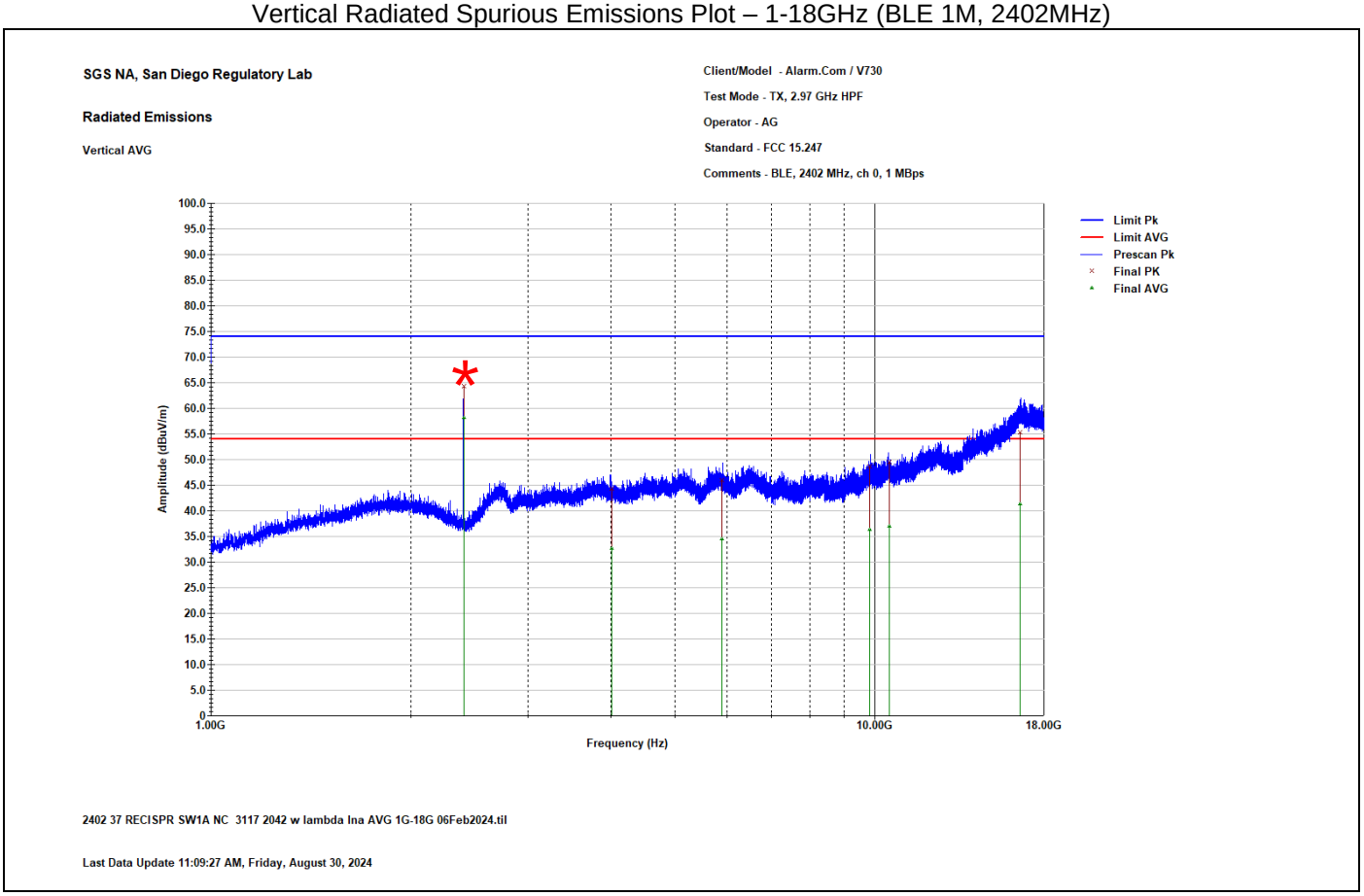
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2402.065	61.28	-0.5	(*)	(*)	348	235
5230.367	45.53	7.4	-28.47	74	280	-20
9699.617	48.64	18.8	-25.36	74	150	239
12273.52	53.25	25.84	-20.75	74	225	86
15162.43	54.42	28.74	-19.58	74	255	-17
16711.51	50.82	33.6	-23.18	74	209	231

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2402.065	57.49	2.04	-0.5	(*)	(*)	348	235
5230.367	36.25	2.04	7.4	-17.75	54	280	-20
9699.617	38.5	2.04	18.8	-15.5	54	150	239
12273.52	41.09	2.04	25.84	-12.91	54	225	86
15162.43	40.91	2.04	28.74	-13.09	54	255	-17
16711.51	41.85	2.04	33.6	-12.15	54	209	231

Vertical Radiated Spurious Emissions Plot – 1-18GHz (BLE 1M, 2402MHz)



(*) marks TX signal from the EUT which are excluded from measurement

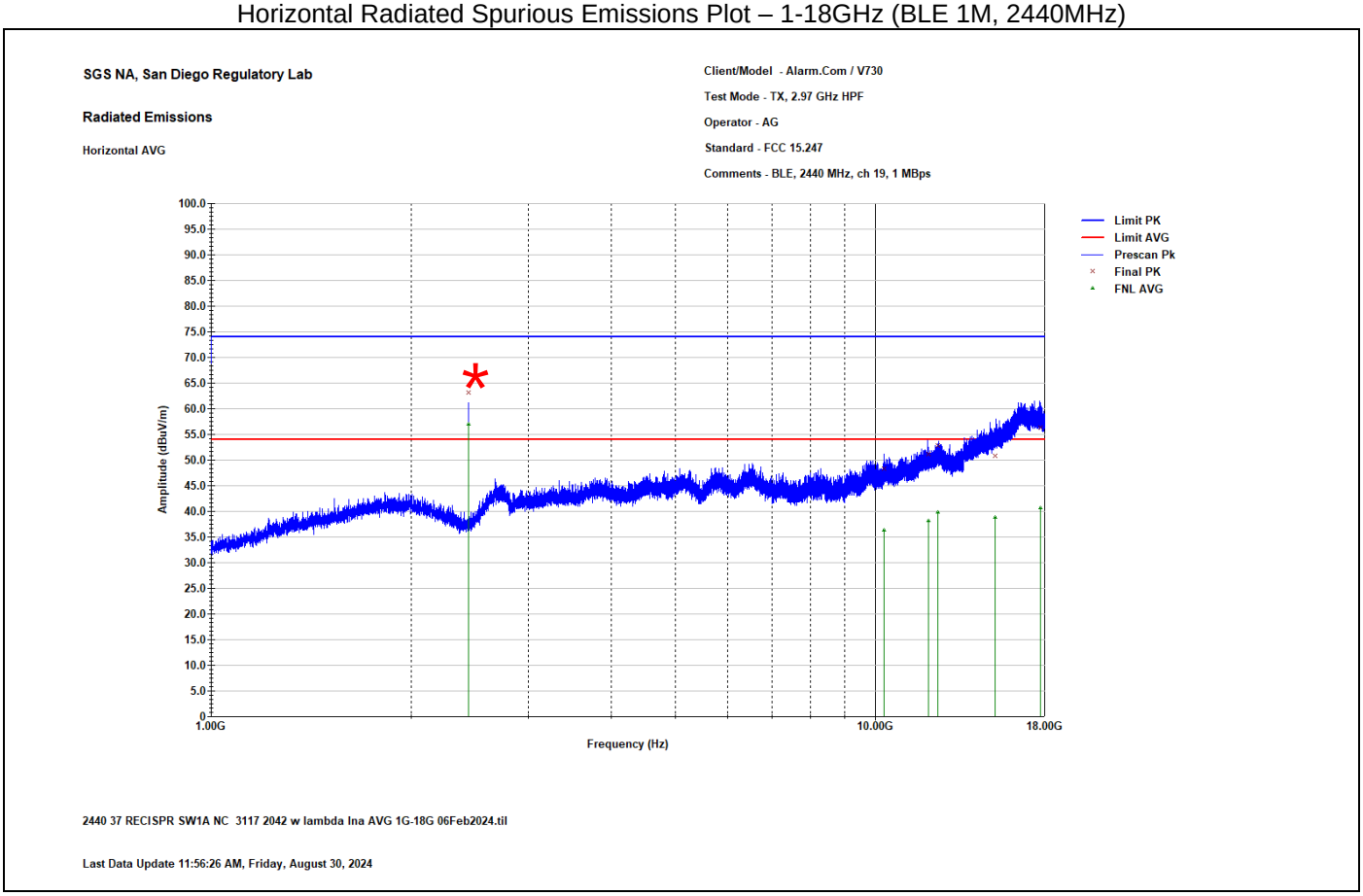
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2402.142	64.26	-0.5	(*)	(*)	261	272
4014.553	44.32	4.4	-29.68	74	171	337
5888.746	45.95	9.81	-28.05	74	248	372
9828.556	48.6	19.11	-25.4	74	150	236
10511.66	49.45	20.57	-24.55	74	309	59
16586.16	55.35	33.47	-18.65	74	210	-6

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2402.142	60.12	2.04	-0.5	(*)	(*)	261	272
4014.553	34.62	2.04	4.4	-19.38	54	171	337
5888.746	36.5	2.04	9.81	-17.5	54	248	372
9828.556	38.37	2.04	19.11	-15.63	54	150	236
10511.66	39.07	2.04	20.57	-14.93	54	309	59
16586.16	43.3	2.04	33.47	-10.7	54	210	-6

Horizontal Radiated Spurious Emissions Plot – 1-18GHz (BLE 1M, 2440MHz)



(*) marks TX signal from the EUT which are excluded from measurement

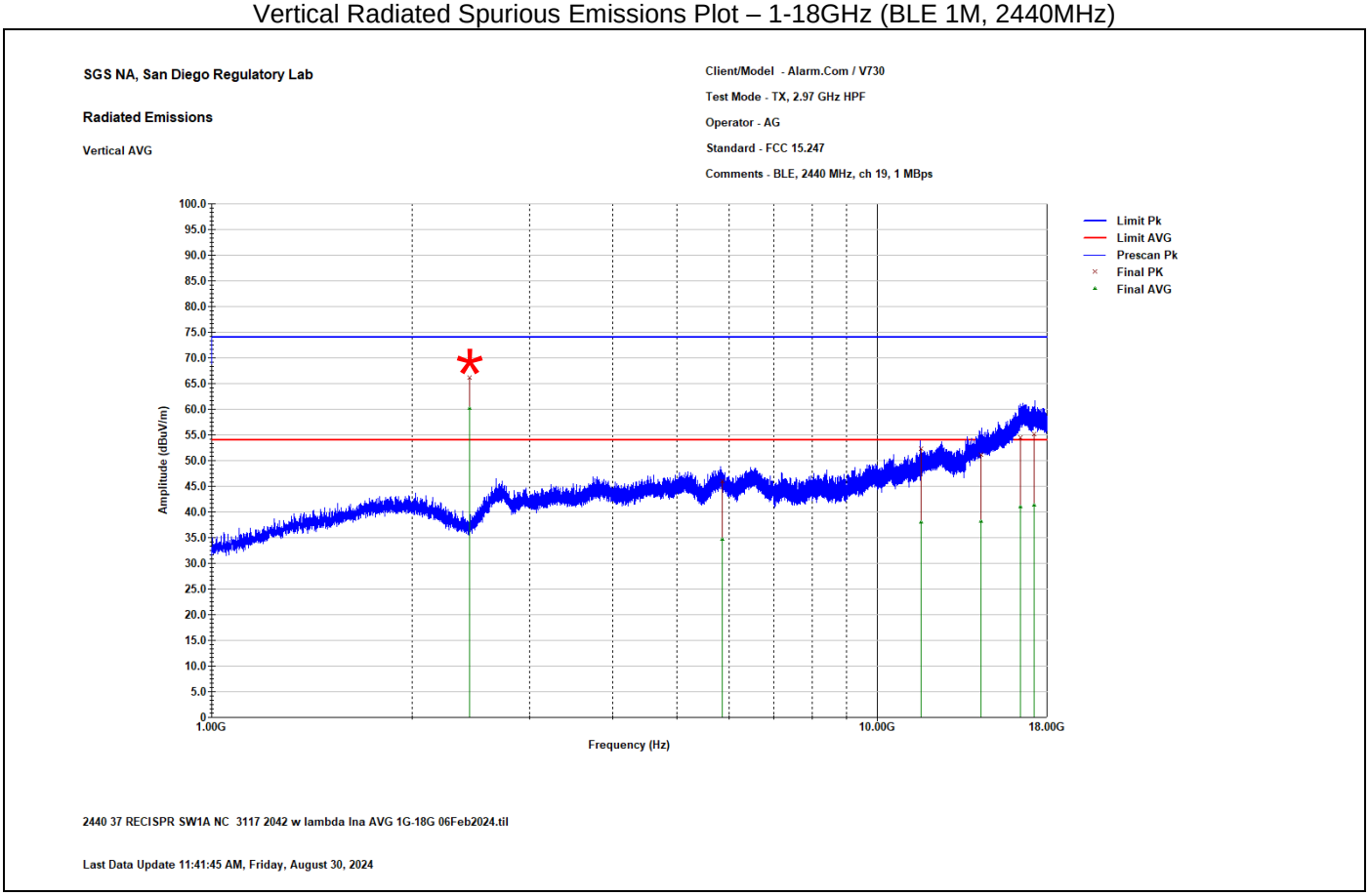
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2440.123	63.08	-0.27	(*)	(*)	387	208
10308.29	48.3	20.16	-25.7	74	378	295
12035.65	51.13	25.3	-22.87	74	387	226
12436.07	52.9	25.96	-21.1	74	293	161
15148.84	50.81	28.7	-23.19	74	163	193
17747	56.35	31.89	-17.65	74	333	185

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2440.123	58.95	2	-0.27	(*)	(*)	387	208
10308.29	38.27	2	20.16	-15.73	54	378	295
12035.65	40.16	2	25.3	-13.84	54	387	226
12436.07	41.78	2	25.96	-12.22	54	293	161
15148.84	40.76	2	28.7	-13.24	54	163	193
17747	42.59	2	31.89	-11.41	54	333	185

Vertical Radiated Spurious Emissions Plot – 1-18GHz (BLE 1M, 2440MHz)



(*) marks TX signal from the EUT which are excluded from measurement

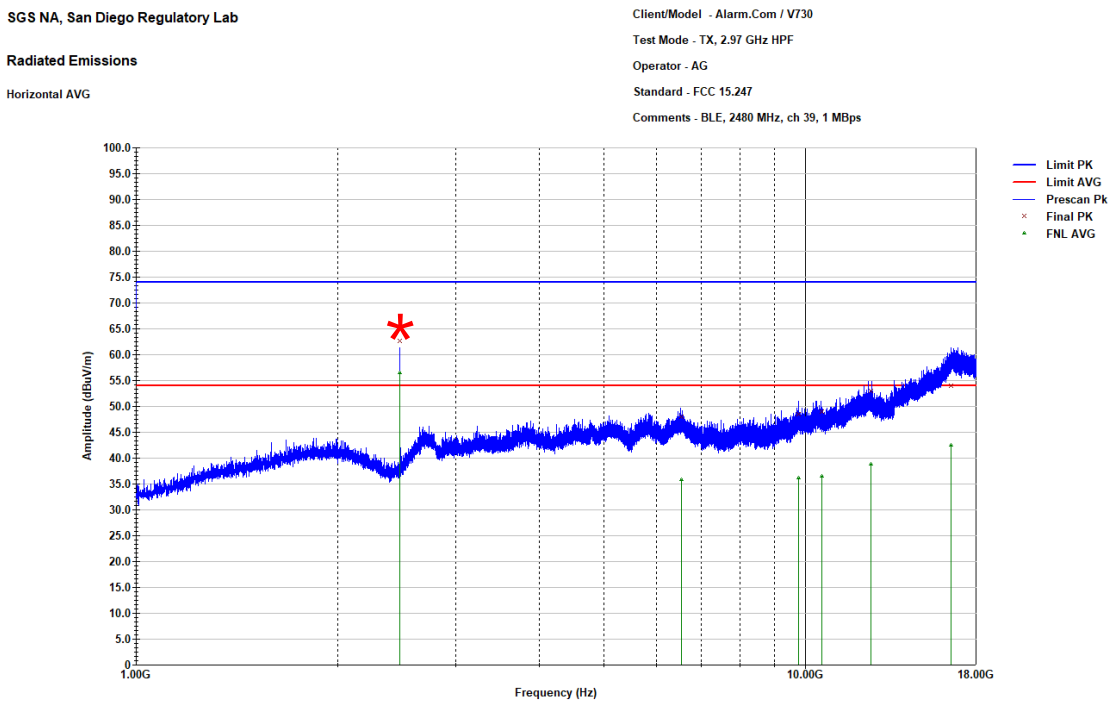
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2440.123	66.16	-0.27	(*)	(*)	172	242
5852.131	45.99	9.57	-28.01	74	318	5
11659.98	52.24	24.44	-21.76	74	372	254
14323.85	51.09	27.14	-22.91	74	335	97
16419.63	54.45	32.74	-19.55	74	381	77
17199.73	55.21	32.81	-18.79	74	150	154

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2440.123	62.15	2	-0.27	(*)	(*)	172	242
5852.131	36.71	2	9.57	-17.29	54	318	5
11659.98	39.94	2	24.44	-14.06	54	372	254
14323.85	40.12	2	27.14	-13.88	54	335	97
16419.63	43.06	2	32.74	-10.94	54	381	77
17199.73	43.32	2	32.81	-10.68	54	150	154

Horizontal Radiated Spurious Emissions Plot – 1-18GHz (BLE 1M, 2480MHz)



(*) marks TX signal from the EUT which are excluded from measurement

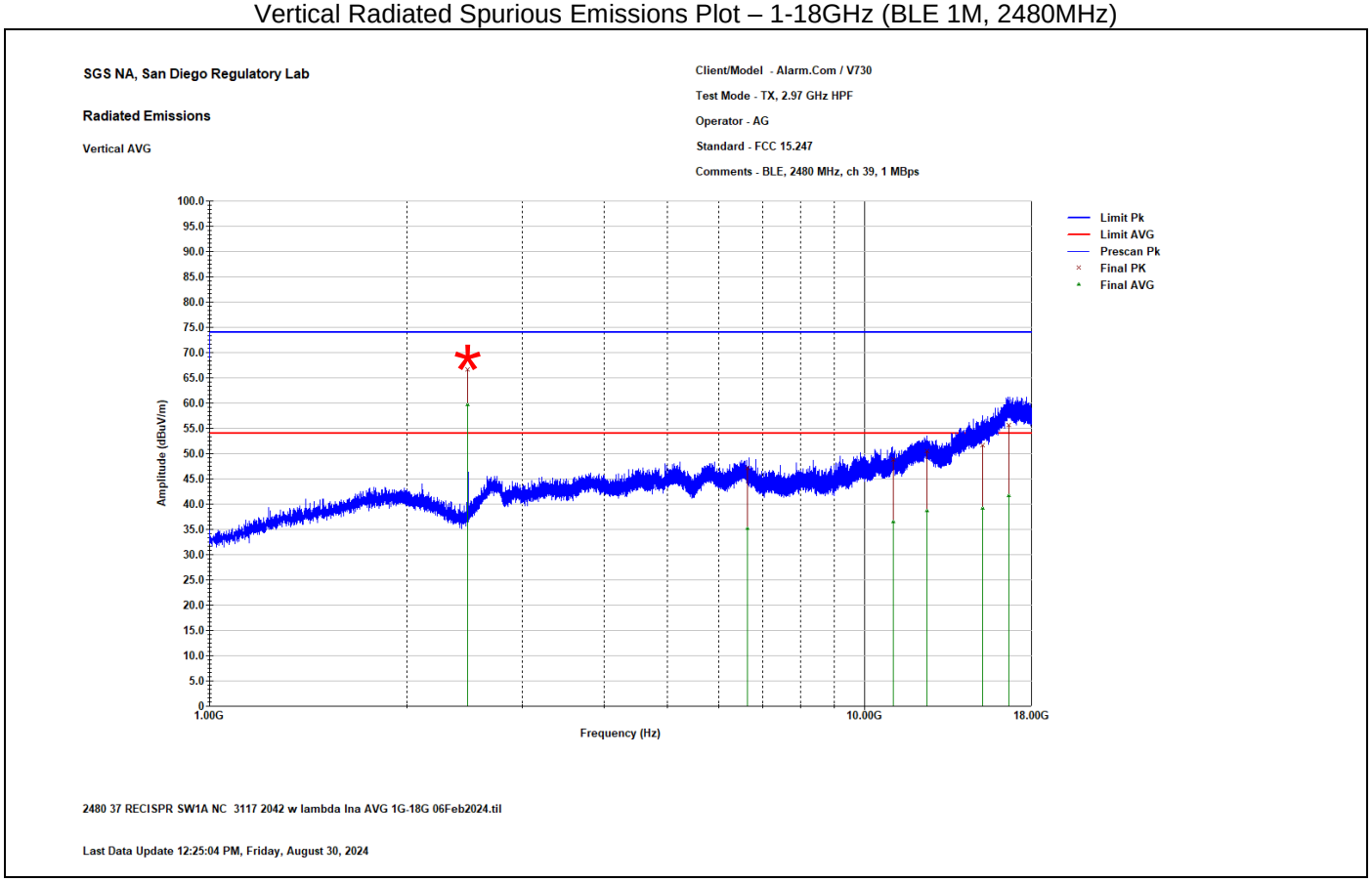
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2480.124	62.59	-0.12	(*)	(*)	171	243
6525.308	47.98	11.01	-26.02	74	364	196
9771.249	48.57	19.2	-25.43	74	150	296
10592.91	48.98	20.6	-25.02	74	333	197
12535.21	52.95	26.04	-21.05	74	150	141
16498.25	53.97	33.09	-20.03	74	386	-20

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2480.124	58.59	2.05	-0.12	(*)	(*)	171	243
6525.308	37.81	2.05	11.01	-16.19	54	364	196
9771.249	38.26	2.05	19.2	-15.74	54	150	296
10592.91	38.53	2.05	20.6	-15.47	54	333	197
12535.21	40.95	2.05	26.04	-13.05	54	150	141
16498.25	44.62	2.05	33.09	-9.38	54	386	-20

Vertical Radiated Spurious Emissions Plot – 1-18GHz (BLE 1M, 2480MHz)



(*) marks TX signal from the EUT which are excluded from measurement

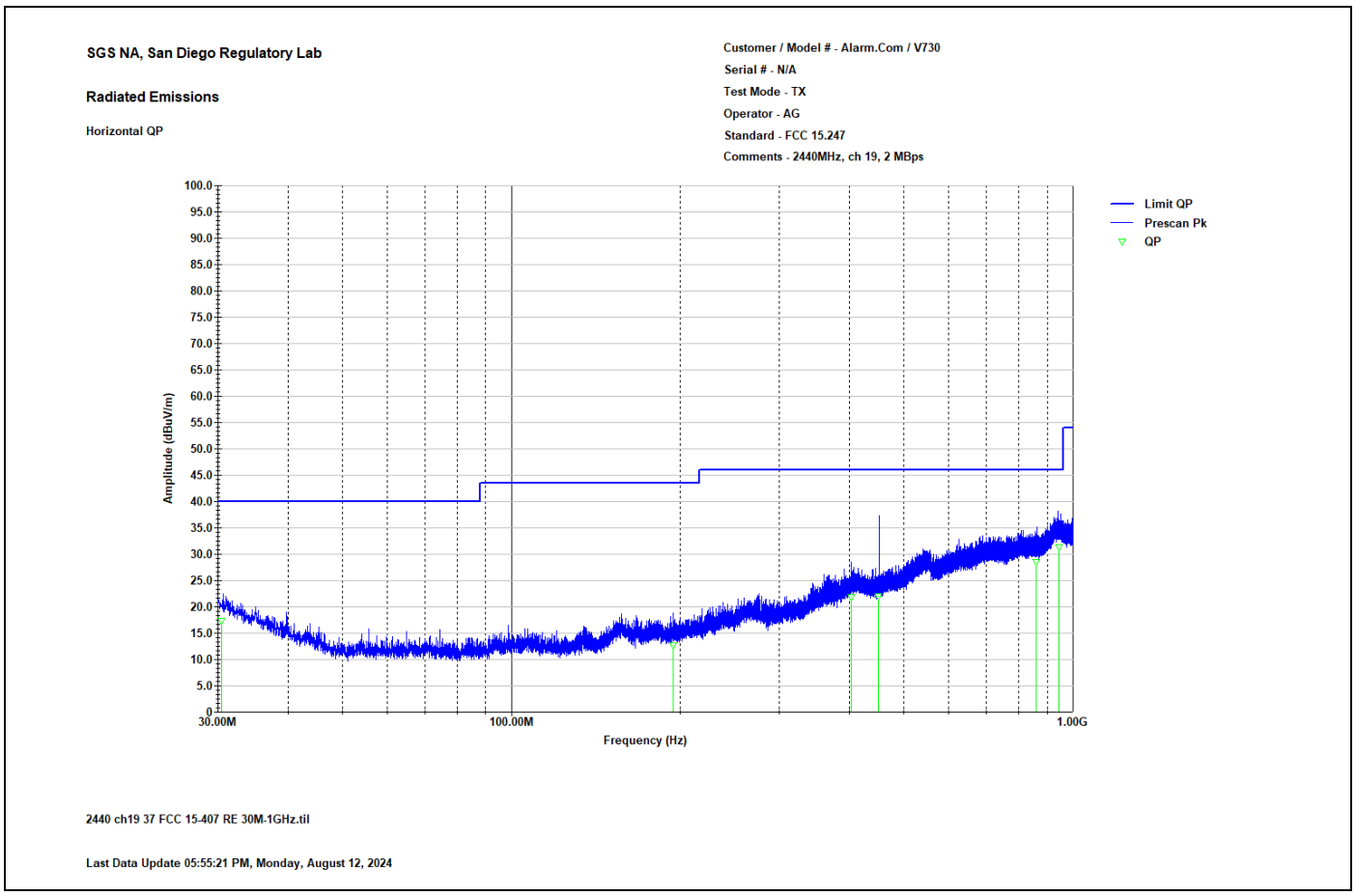
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2479.701	66.63	-0.12	(*)	(*)	172	267
6636.482	47.15	11.32	-26.85	74	365	380
11068.7	48.77	22.32	-25.23	74	150	134
12481.45	50.54	26	-23.46	74	163	53
15161.16	51.66	28.74	-22.34	74	350	256
16597.18	55.58	33.52	-18.42	74	171	318

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2479.701	61.68	2.05	-0.12	(*)	(*)	172	267
6636.482	37.25	2.05	11.32	-16.75	54	365	380
11068.7	38.49	2.05	22.32	-15.51	54	150	134
12481.45	40.78	2.05	26	-13.22	54	163	53
15161.16	41.28	2.05	28.74	-12.72	54	350	256
16597.18	43.66	2.05	33.52	-10.34	54	171	318

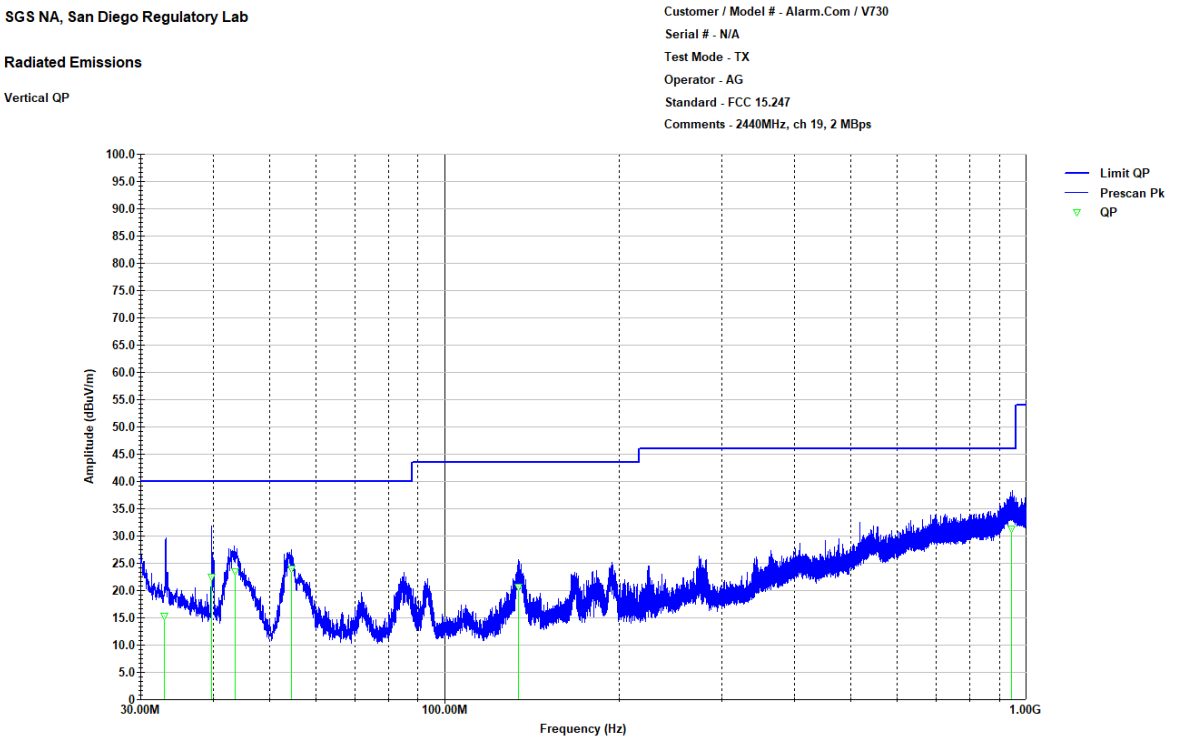
Horizontal Radiated Spurious Emissions Plot – 30 to 1000 MHz (BLE 2M, 2440MHz)
Worst-Case presented



Quasi-Peak Data

Freq. (MHz)	Final QP (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
30.453	17.27	-21.6	-22.73	40	381	372
193.821	12.59	-27.64	-30.93	43.52	209	152
402.134	21.75	-18.45	-24.27	46.02	287	307
449.405	21.93	-18.48	-24.09	46.02	200	266
861.39	28.54	-11.06	-17.48	46.02	263	64
945.892	31.31	-8.31	-14.71	46.02	121	131

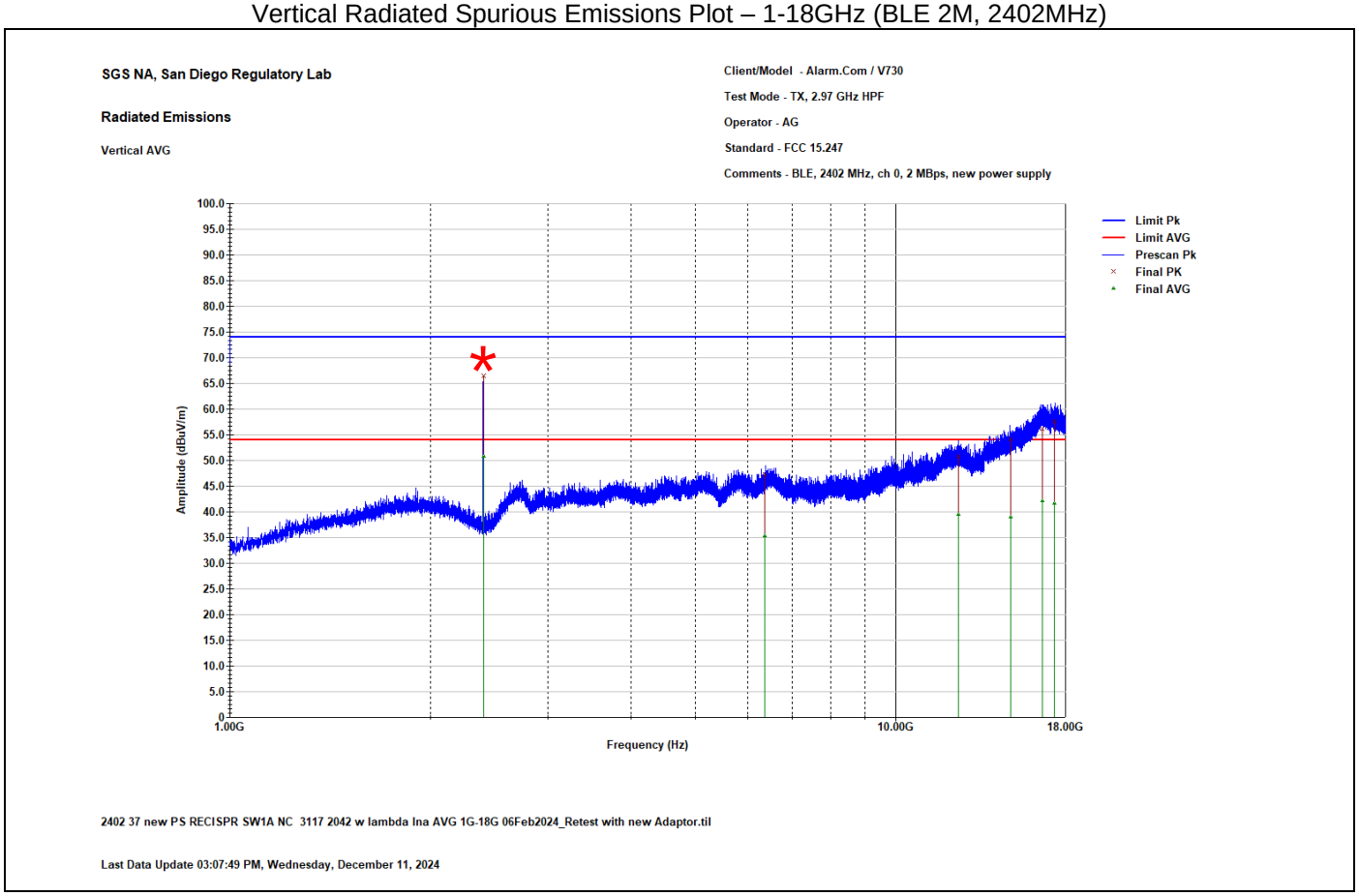
Vertical Radiated Spurious Emissions Plot – 30 to 1000 MHz (BLE 2M, 2440MHz)
Worst-Case presented



Quasi-Peak Data

Freq. (MHz)	Final QP (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
32.963	15.28	-22.94	-24.72	40	297	197
39.706	22.43	-26.84	-17.57	40	114	373
43.637	23.41	-28.72	-16.59	40	100	122
54.496	24.07	-30.64	-15.93	40	101	79
134.1	20.63	-29.66	-22.89	43.52	101	-20
942.765	31.28	-8.3	-14.74	46.02	214	75

Vertical Radiated Spurious Emissions Plot – 1-18GHz (BLE 2M, 2402MHz)



(*) marks TX signal from the EUT which are excluded from measurement

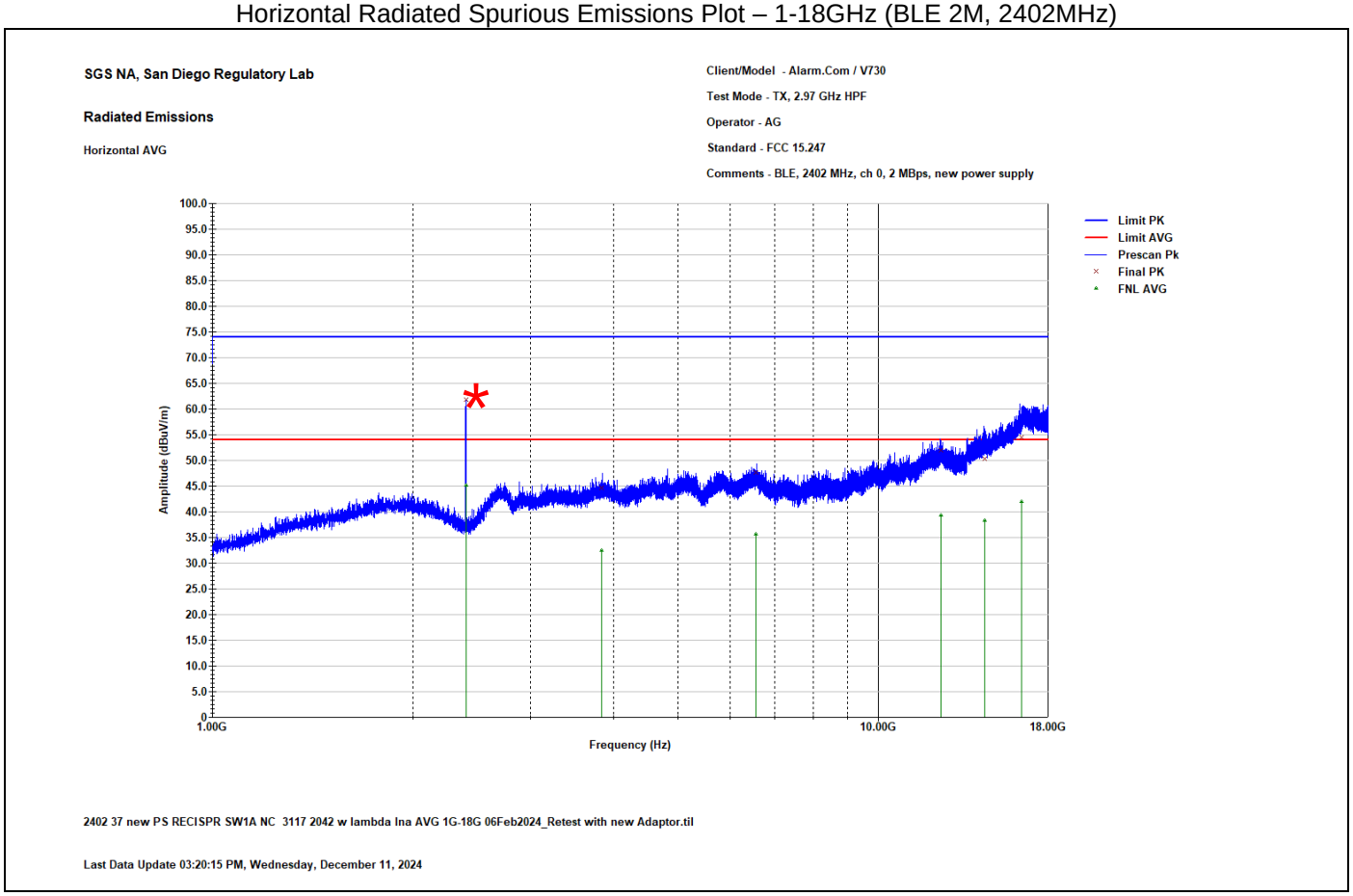
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2402.392	66.43	-0.5	(*)	(*)	236	276
6352.523	47.36	10.57	-26.64	74	171	178
12436.43	50.83	25.96	-23.17	74	341	60
14898.07	54.14	28.22	-19.86	74	335	197
16598.01	56.11	33.52	-17.89	74	186	276
17333.81	57.69	32.43	-16.31	74	179	211

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2402.392	55.89	5.06	-0.5	(*)	(*)	236	276
6352.523	40.45	5.06	10.57	-13.55	54	171	178
12436.43	44.63	5.06	25.96	-9.37	54	341	60
14898.07	44.08	5.06	28.22	-9.92	54	335	197
16598.01	47.14	5.06	33.52	-6.86	54	186	276
17333.81	46.75	5.06	32.43	-7.25	54	179	211

Horizontal Radiated Spurious Emissions Plot – 1-18GHz (BLE 2M, 2402MHz)



(*) marks TX signal from the EUT which are excluded from measurement

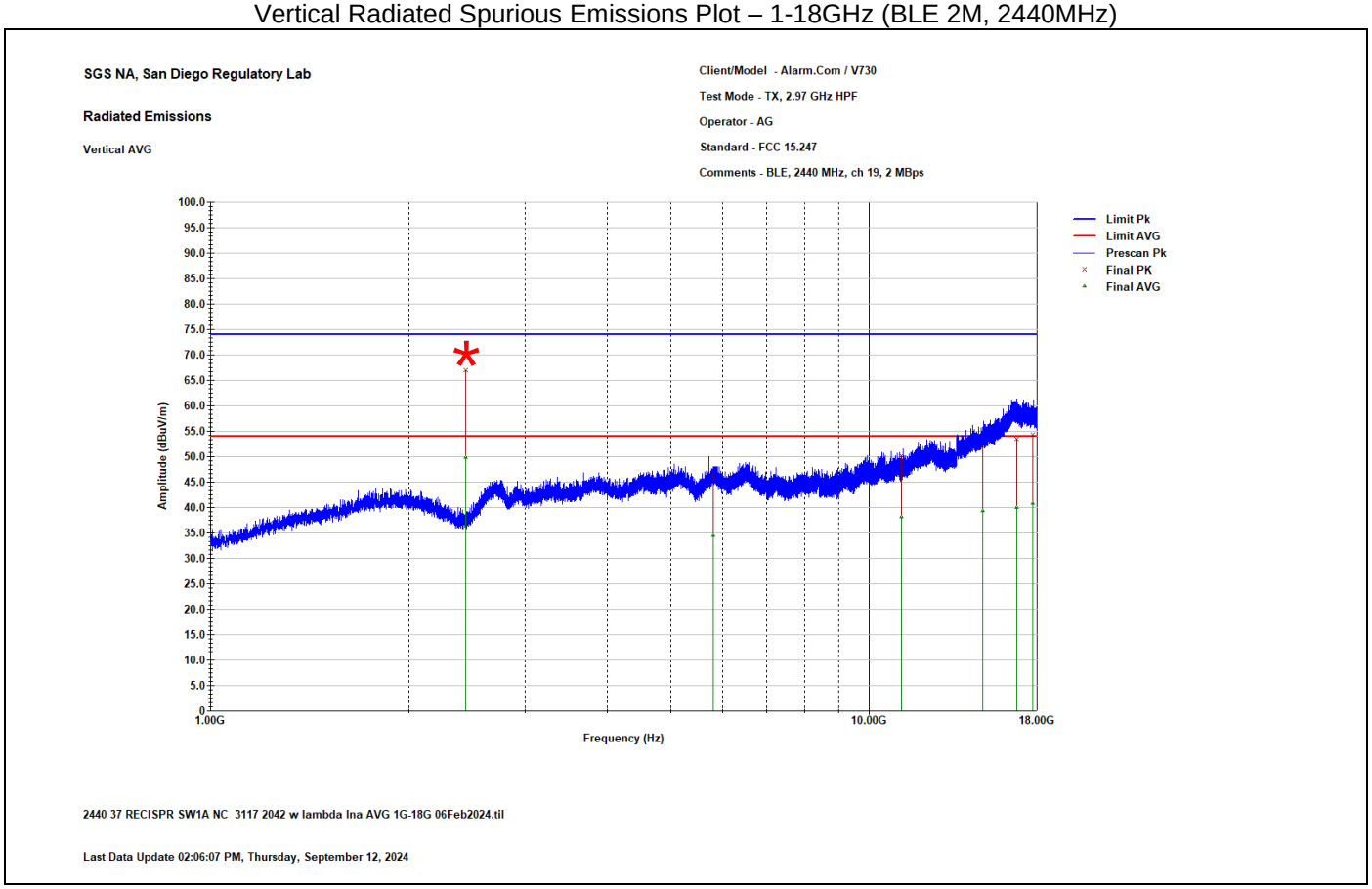
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2402.488	61.82	-0.5	(*)	(*)	331	243
3836.76	44.7	3.59	-29.3	74	310	307
6550.064	47.73	11.1	-26.27	74	325	160
12431.4	52.01	25.96	-21.99	74	247	112
14465.6	50.4	27.31	-23.6	74	294	147
16402.16	54.44	32.66	-19.56	74	271	158

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2402.488	50.27	5.06	-0.5	(*)	(*)	331	243
3836.76	37.49	5.06	3.59	-16.51	54	310	307
6550.064	40.72	5.06	11.1	-13.28	54	325	160
12431.4	44.4	5.06	25.96	-9.6	54	247	112
14465.6	43.46	5.06	27.31	-10.54	54	294	147
16402.16	47.07	5.06	32.66	-6.93	54	271	158

Vertical Radiated Spurious Emissions Plot – 1-18GHz (BLE 2M, 2440MHz)



(*) marks TX signal from the EUT which are excluded from measurement

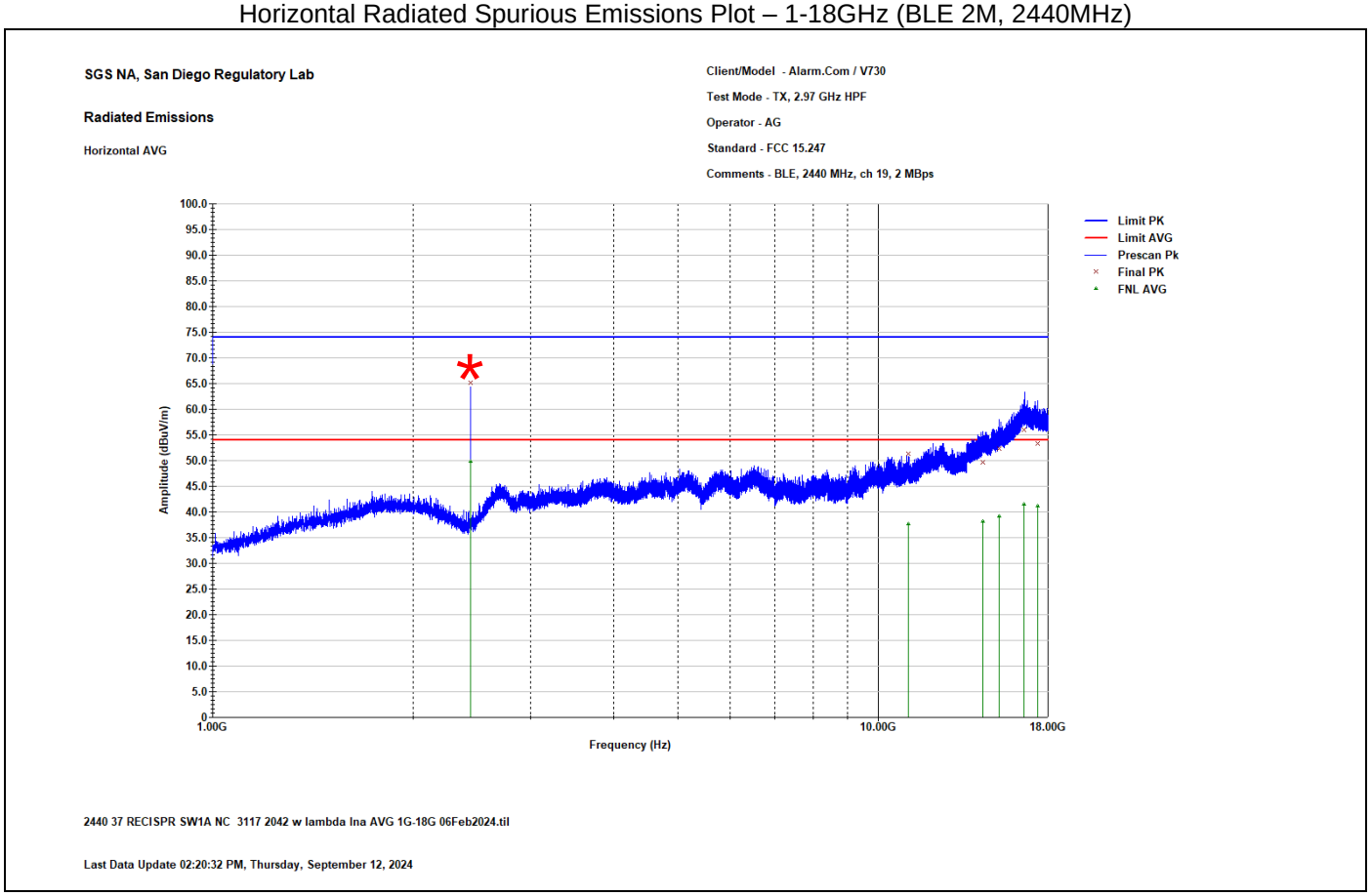
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2440.546	67.05	-0.28	(*)	(*)	150	199
5800.352	46.32	9.27	-27.68	74	400	-7
11211.38	50.2	22.94	-23.8	74	226	359
14886.71	51.97	28.2	-22.03	74	202	5
16761.84	53.47	33.57	-20.53	74	150	166
17730.78	54.4	31.9	-19.6	74	288	237

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2440.546	54.86	5.06	(*)	(*)	54	150	199
5800.352	39.51	5.06	9.27	-14.49	54	400	-7
11211.38	43.3	5.06	22.94	-10.7	54	226	359
14886.71	44.4	5.06	28.2	-9.6	54	202	5
16761.84	45.03	5.06	33.57	-8.97	54	150	166
17730.78	45.91	5.06	31.9	-8.09	54	288	237

Horizontal Radiated Spurious Emissions Plot – 1-18GHz (BLE 2M, 2440MHz)



(*) marks TX signal from the EUT which are excluded from measurement

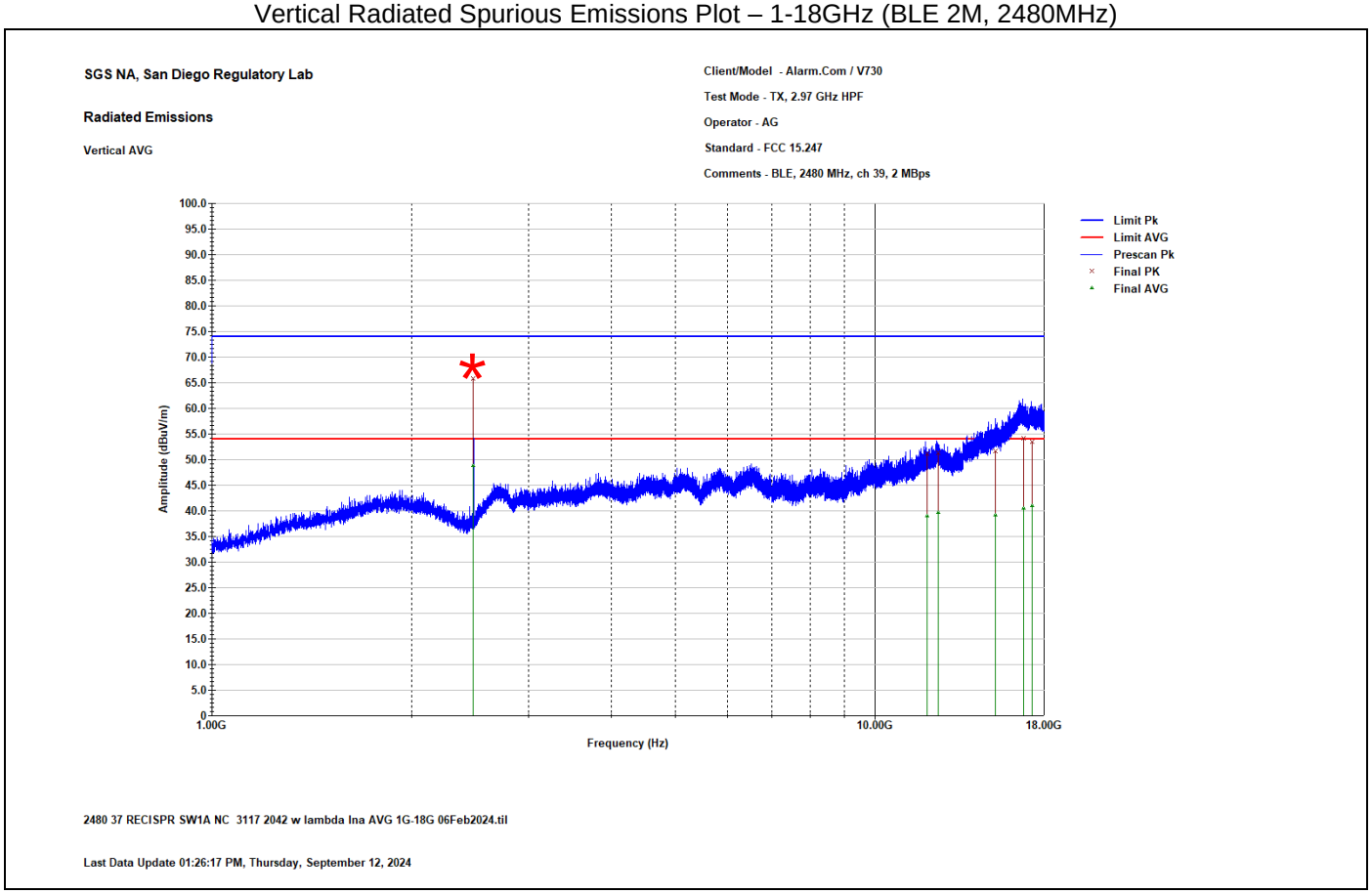
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2439.528	65.11	-0.27	(*)	(*)	156	243
11111.07	51.32	22.56	-22.68	74	363	207
14349.19	49.75	27.13	-24.25	74	194	249
15222.39	52.3	28.92	-21.7	74	316	172
16585.85	56.06	33.47	-17.94	74	194	134
17349.06	53.28	32.39	-20.72	74	201	205

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2439.528	54.95	5.06	-0.27	(*)	(*)	156	243
11111.07	42.78	5.06	22.56	-11.22	54	363	207
14349.19	43.25	5.06	27.13	-10.75	54	194	249
15222.39	44.22	5.06	28.92	-9.78	54	316	172
16585.85	46.48	5.06	33.47	-7.52	54	194	134
17349.06	46.21	5.06	32.39	-7.79	54	201	205

Vertical Radiated Spurious Emissions Plot – 1-18GHz (BLE 2M, 2480MHz)



(*) marks TX signal from the EUT which are excluded from measurement

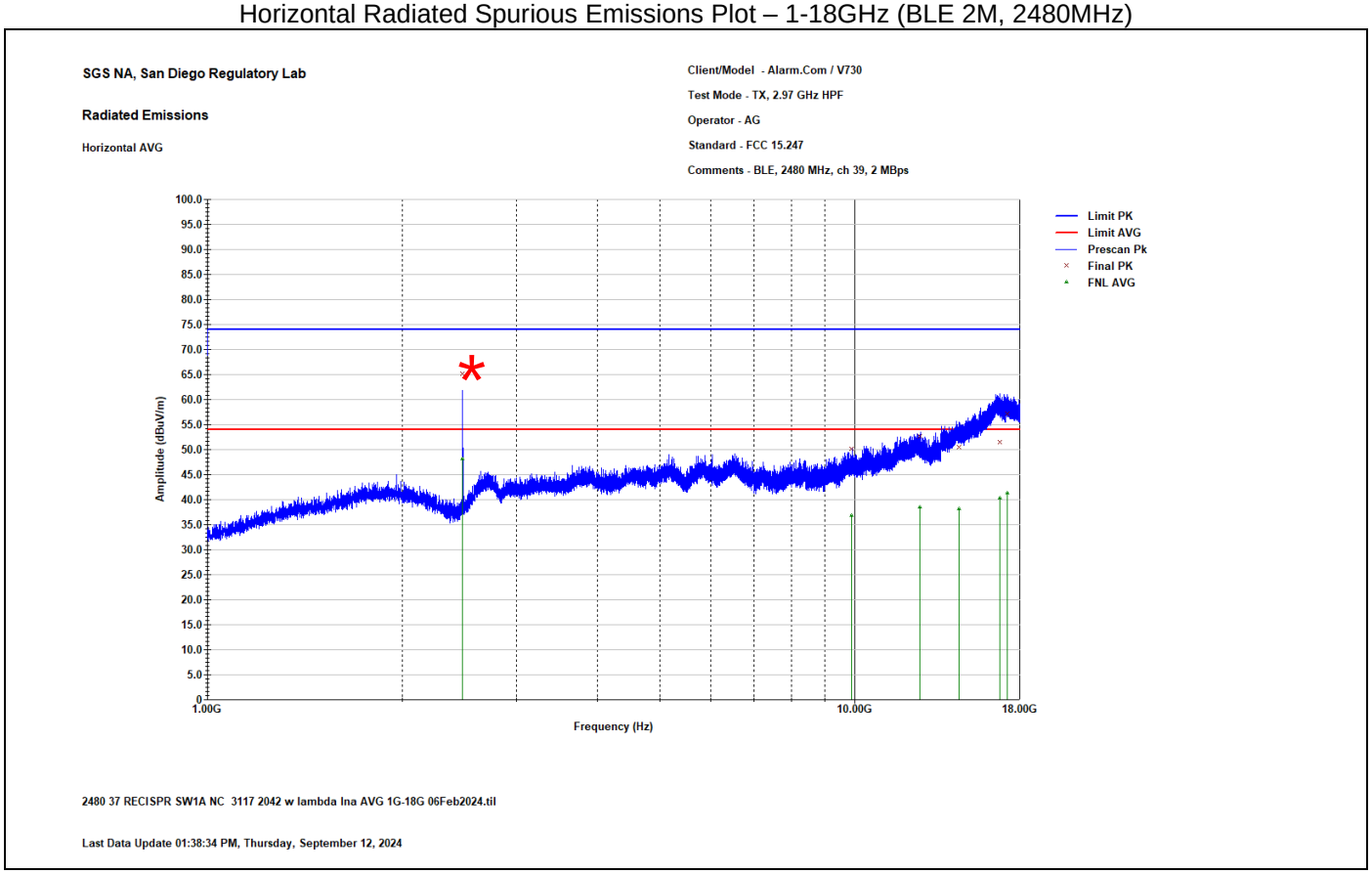
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2480.528	65.87	-0.12	(*)	(*)	150	259
11985.63	51.18	25.19	-22.82	74	400	319
12444.77	51.36	25.97	-22.64	74	217	343
15224.69	51.7	28.93	-22.3	74	156	272
16748.68	54.08	33.58	-19.92	74	280	324
17273.82	53.45	32.59	-20.55	74	156	277

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2480.528	53.92	5.06	-0.12	(*)	(*)	150	259
11985.63	44	5.06	25.19	-10	54	400	319
12444.77	44.8	5.06	25.97	-9.2	54	217	343
15224.69	44.18	5.06	28.93	-9.82	54	156	272
16748.68	45.51	5.06	33.58	-8.49	54	280	324
17273.82	46.1	5.06	32.59	-7.9	54	156	277

Horizontal Radiated Spurious Emissions Plot – 1-18GHz (BLE 2M, 2480MHz)



(*) marks TX signal from the EUT which are excluded from measurement

Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2480.528	65.11	-0.12	(*)	(*)	339	224
9883.295	50.1	19.13	-23.9	74	371	20
12609.57	52.63	26.09	-21.37	74	240	240
14497.57	50.47	27.39	-23.53	74	317	214
16762.46	51.53	33.57	-22.47	74	387	237
17199.46	57.19	32.81	-16.81	74	294	55

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2480.528	53.18	5.06	-0.12	(*)	(*)	339	224
9883.295	41.84	5.06	19.13	-12.16	54	371	20
12609.57	43.58	5.06	26.09	-10.42	54	240	240
14497.57	43.3	5.06	27.39	-10.7	54	317	214
16762.46	45.41	5.06	33.57	-8.59	54	387	237
17199.46	46.31	5.06	32.81	-7.69	54	294	55

8 Radiated Band Edge Emissions in Restricted Frequency Bands

8.1 *Test Result*

Test Description	Test Specification		Test Result
Radiated Band Edge Emissions in Restricted Frequency Bands	15.205 / 15.209	RSS-GEN S8.9 / S8.10	Compliant

8.2 *Test Method*

Measurements were made using the radiated methods defined in ANSI C63.10, Section 11.12.2.

8.3 *Test Site and Environmental Condition*

3m Absorber Lined Shielded Enclosure (ALSE), San Diego, CA

Environmental Conditions
Temperature: 20 – 25 °C
Relative Humidity: 35 – 50 %

8.4 *Test Equipment*

Test Dates: August 20 to November 12, 2024 Tester: Alex Chang

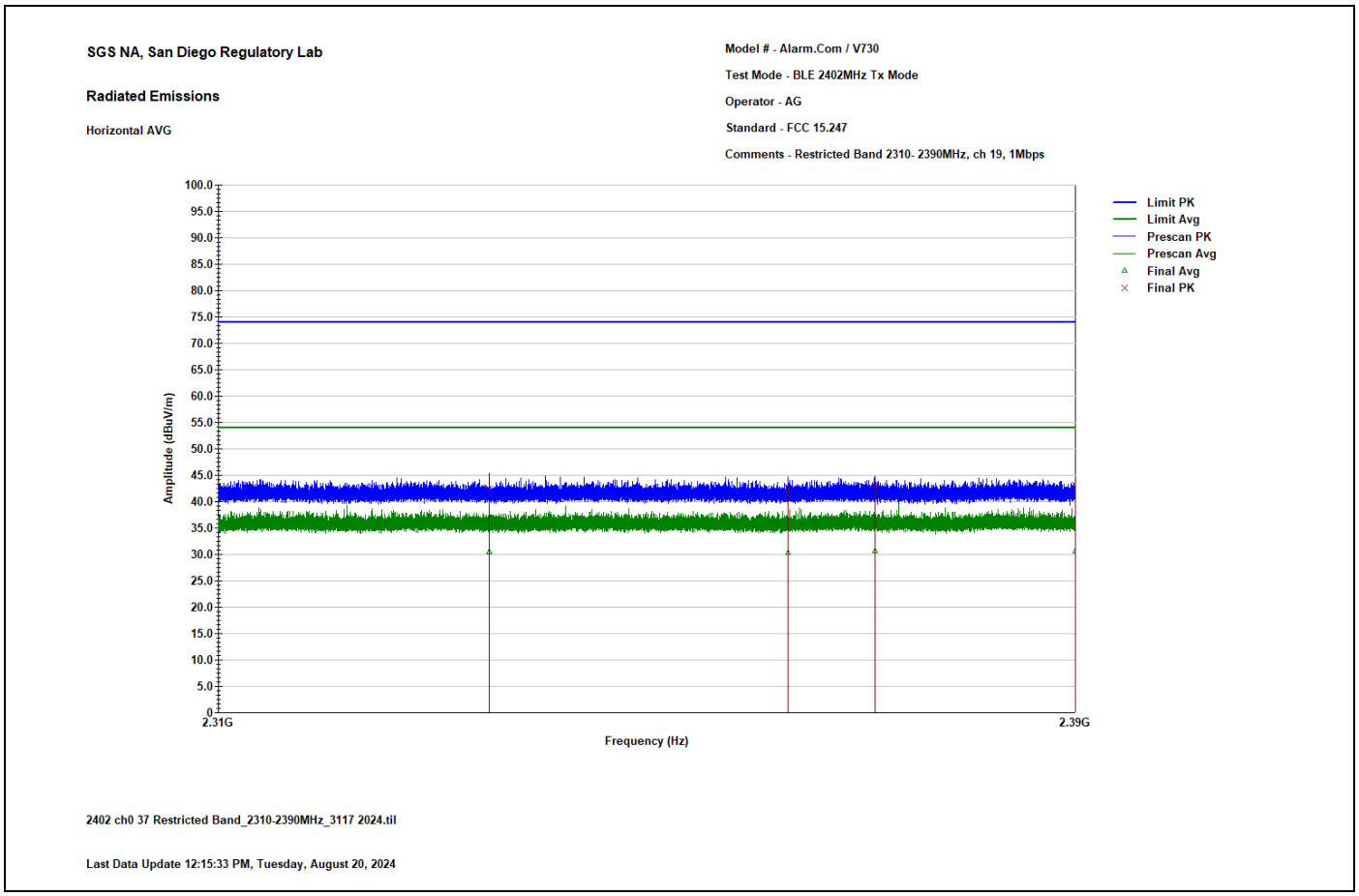
Asset No.	Type of Equipment	Model	Serial No.	Manufacturer	Cal Date	Cal Due Date
Radiated Emission < 1 GHz						
2017	EMI Receiver	N9038B	MY59050132	Keysight	10/24/2023	01/24/2025
2029	ETS Lindgren	Loop Antenna, H-Field	6512	00249642	10/04/2024	10/04/2026
2034	Biconilog Antenna 26M-6000MHz	3142E	00243882	ETS Lindgren	06/29/2023	06/29/2025
Radiated Emission > 1 GHz						
2017	EMI Receiver	N9038B	MY59050132	Keysight	10/24/2023	01/24/2025
2026	RF Microwave Systems Amplifier	RAMP00M45GA	00089204010	RF-Lambda	07/09/2024	07/09/2025
-	High Pass Filter	HPM16182	G015	Micro-Tronics	NCR	NCR
2042	DRG Horn Antenna 1G-18GHz	3117	00259209	ETS Lindgren	05/26/2023	05/26/2025
2032	ETS Lindgren	DRG Horn Antenna 10G-40GHz	3116C	00251668	07/23/2024	07/23/2026
Miscellaneous						
2036	Temp/Humidity Data Logger	GSP-8	CMA231100002	Elitech	07/09/2024	07/09/2025
-	Test Software	TILE!	V7.8.1.7	ETS Lindgren	N/A	

8.5 *Test Setup Photographs*

Test setup photographs are located in a separate report (208949-9).

8.6 *Test Data – Restricted Band Edges*

Horizontal BLE 1M, Low Channel (2402MHz)



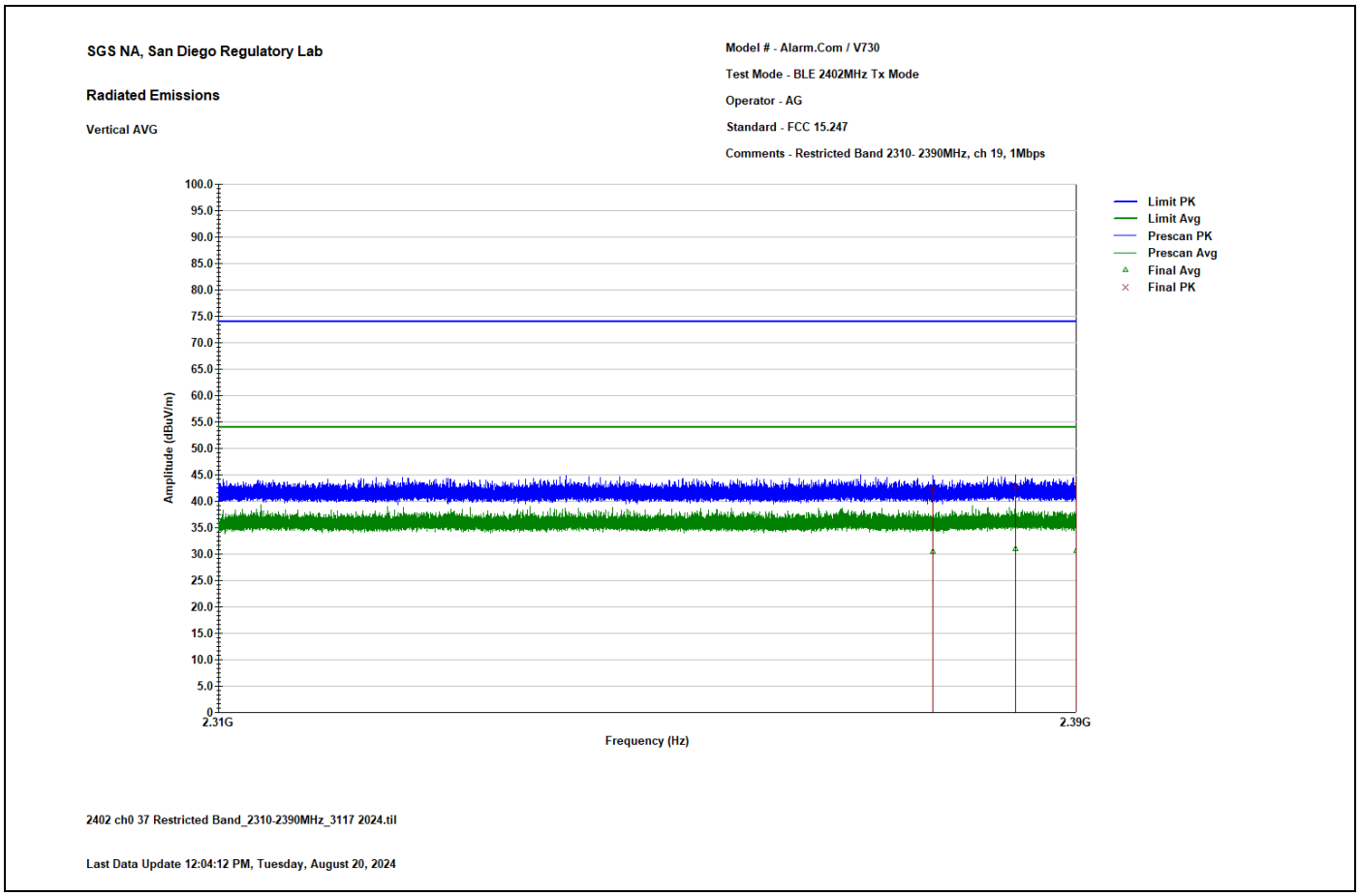
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2335.002	42.41	-0.88	-31.59	74	339	40
2362.858	42.7	-0.69	-31.3	74	300	380
2371.026	43.05	-0.67	-30.95	74	150	55
2390	43.19	-0.59	-30.81	74	150	287

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2335.002	32.55	2.04	-0.88	-21.45	54	339	40
2362.858	32.42	2.04	-0.69	-21.58	54	300	380
2371.026	32.74	2.04	-0.67	-21.26	54	150	55
2390	32.63	2.04	-0.59	-21.37	54	150	287

Vertical BLE 1M, Low Channel (2402MHz)



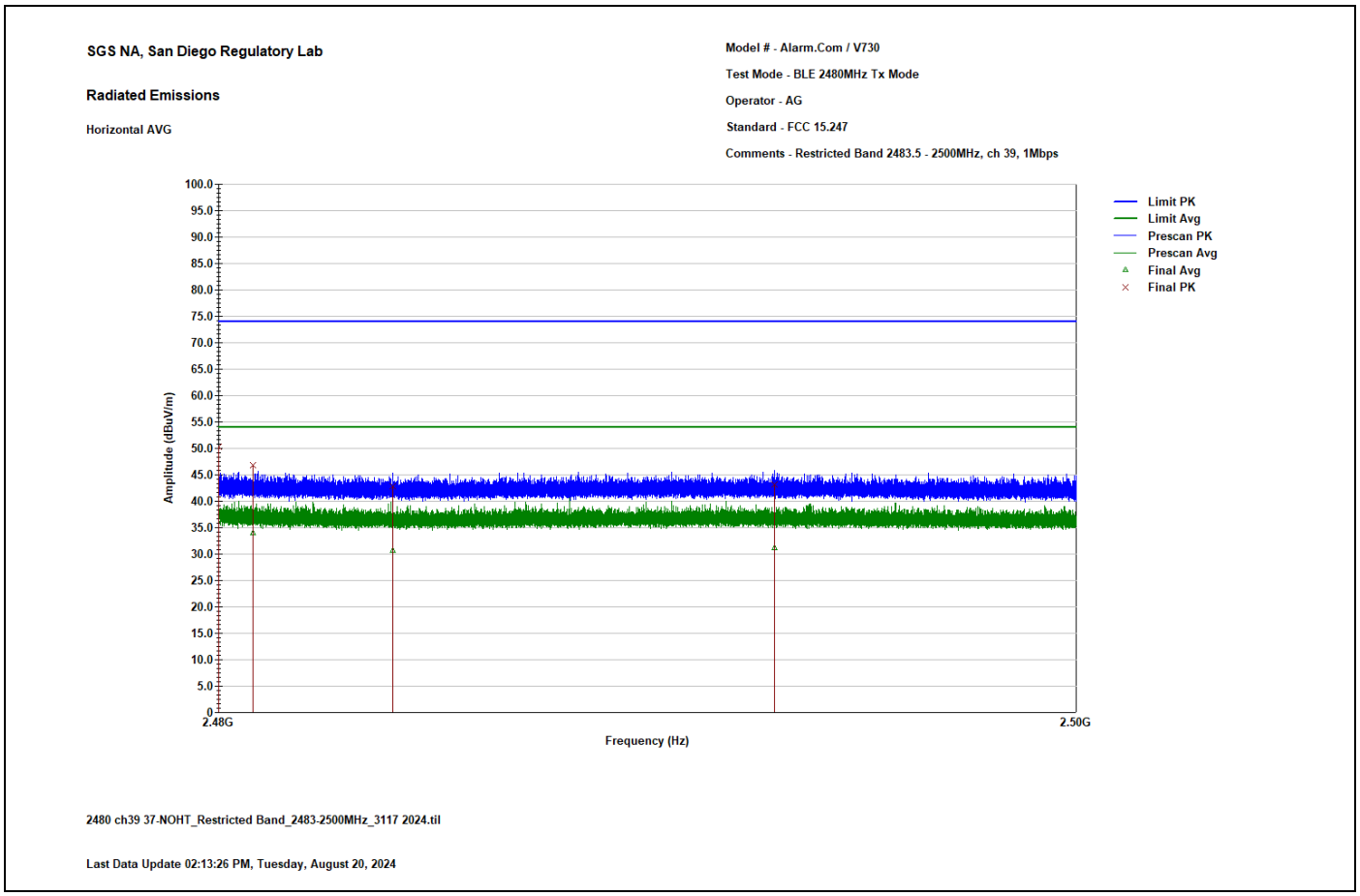
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2376.462	42.45	-0.66	-31.55	74	204	341
2384.296	42.8	-0.63	-31.2	74	237	-10
2390	43.11	-0.59	-30.89	74	269	166

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2376.462	32.59	2.04	-0.66	-21.41	54	204	341
2384.296	32.94	2.04	-0.63	-21.06	54	237	-10
2390	32.68	2.04	-0.59	-21.32	54	269	166

Horizontal BLE 1M, High Channel (2480MHz)



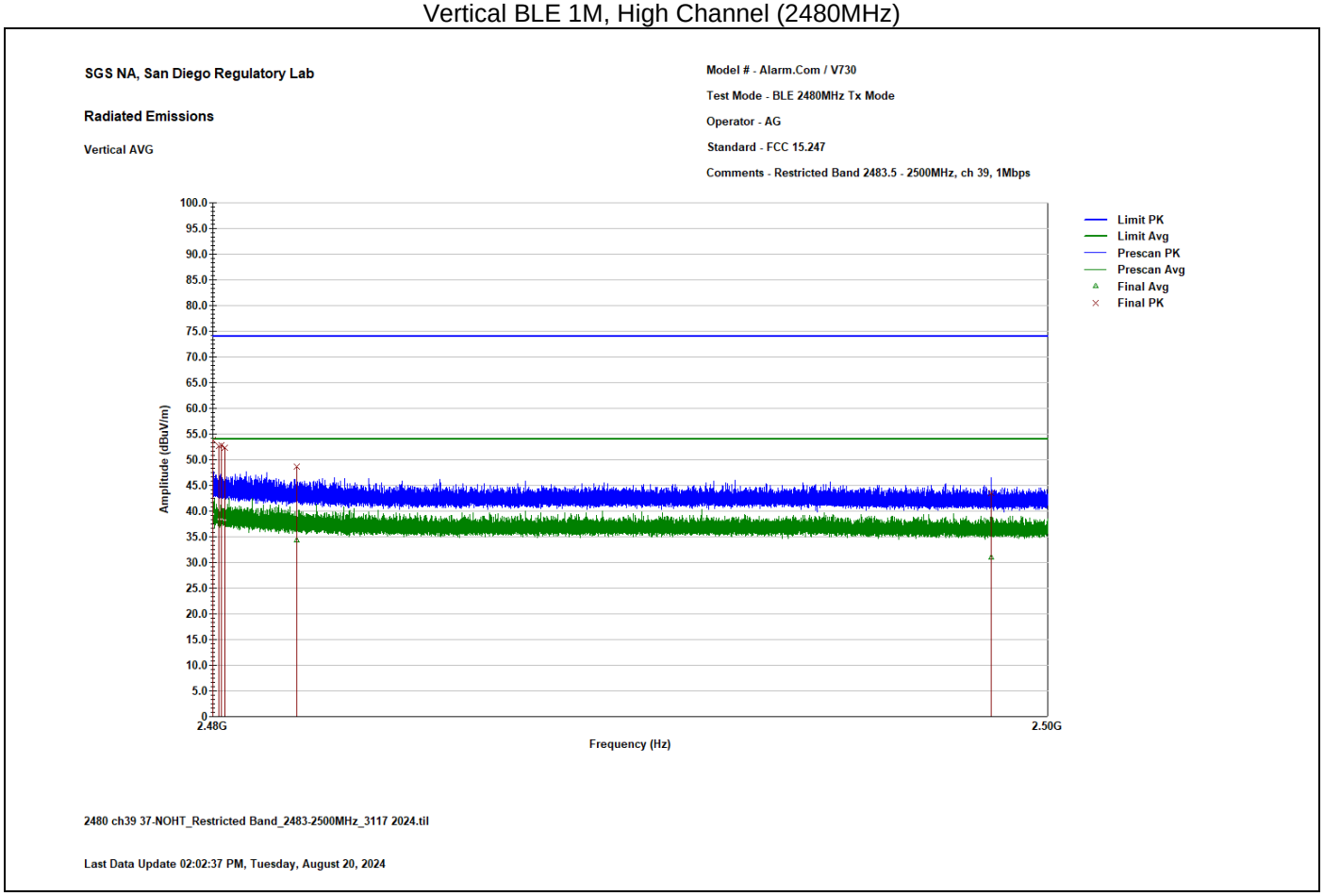
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2483.5	50.24	-0.11	-23.76	74	349	226
2484.166	46.78	-0.11	-27.22	74	164	242
2486.842	42.87	-0.1	-31.13	74	150	21
2494.19	43.23	-0.08	-30.77	74	212	176

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2483.5	38.47	2.05	-0.11	-15.53	54	349	226
2484.166	36.12	2.05	-0.11	-17.88	54	164	242
2486.842	32.75	2.05	-0.1	-21.25	54	150	21
2494.19	33.15	2.05	-0.08	-20.85	54	212	176

Vertical BLE 1M, High Channel (2480MHz)



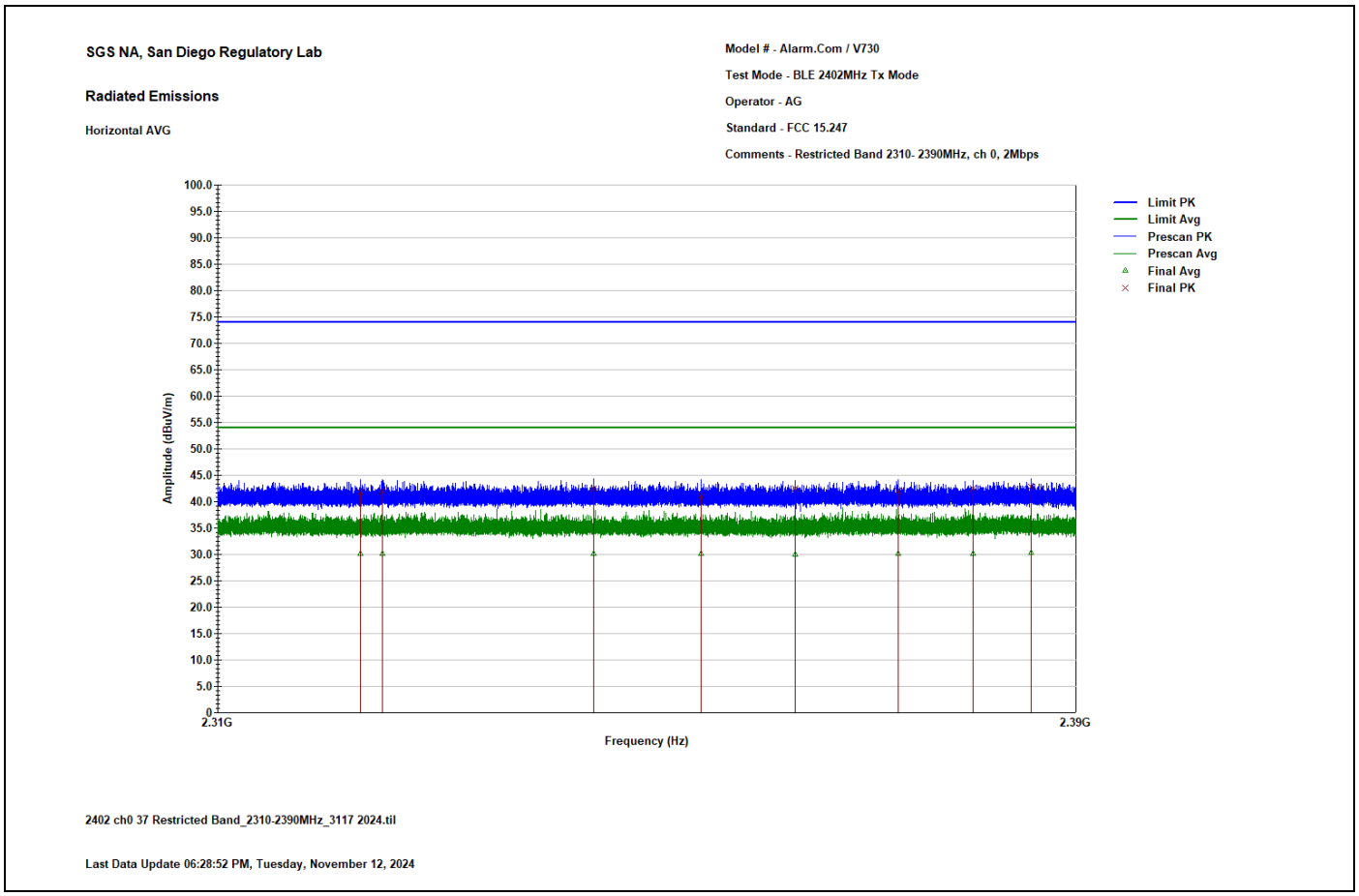
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2483.5	53.8	-0.11	-20.2	74	156	268
2483.622	52.67	-0.11	-21.33	74	150	263
2483.676	52.86	-0.11	-21.14	74	164	270
2483.745	52.26	-0.11	-21.74	74	150	267
2485.15	48.64	-0.1	-25.36	74	156	275
2498.88	43.55	-0.06	-30.45	74	341	205

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2483.5	41.48	2.05	-0.11	-12.52	54	156	268
2483.622	40.57	2.05	-0.11	-13.43	54	150	263
2483.676	40.61	2.05	-0.11	-13.39	54	164	270
2483.745	40.34	2.05	-0.11	-13.66	54	150	267
2485.15	36.41	2.05	-0.1	-17.59	54	156	275
2498.88	33.09	2.05	-0.06	-20.91	54	341	205

Horizontal BLE 2M, Low Channel (2402MHz)



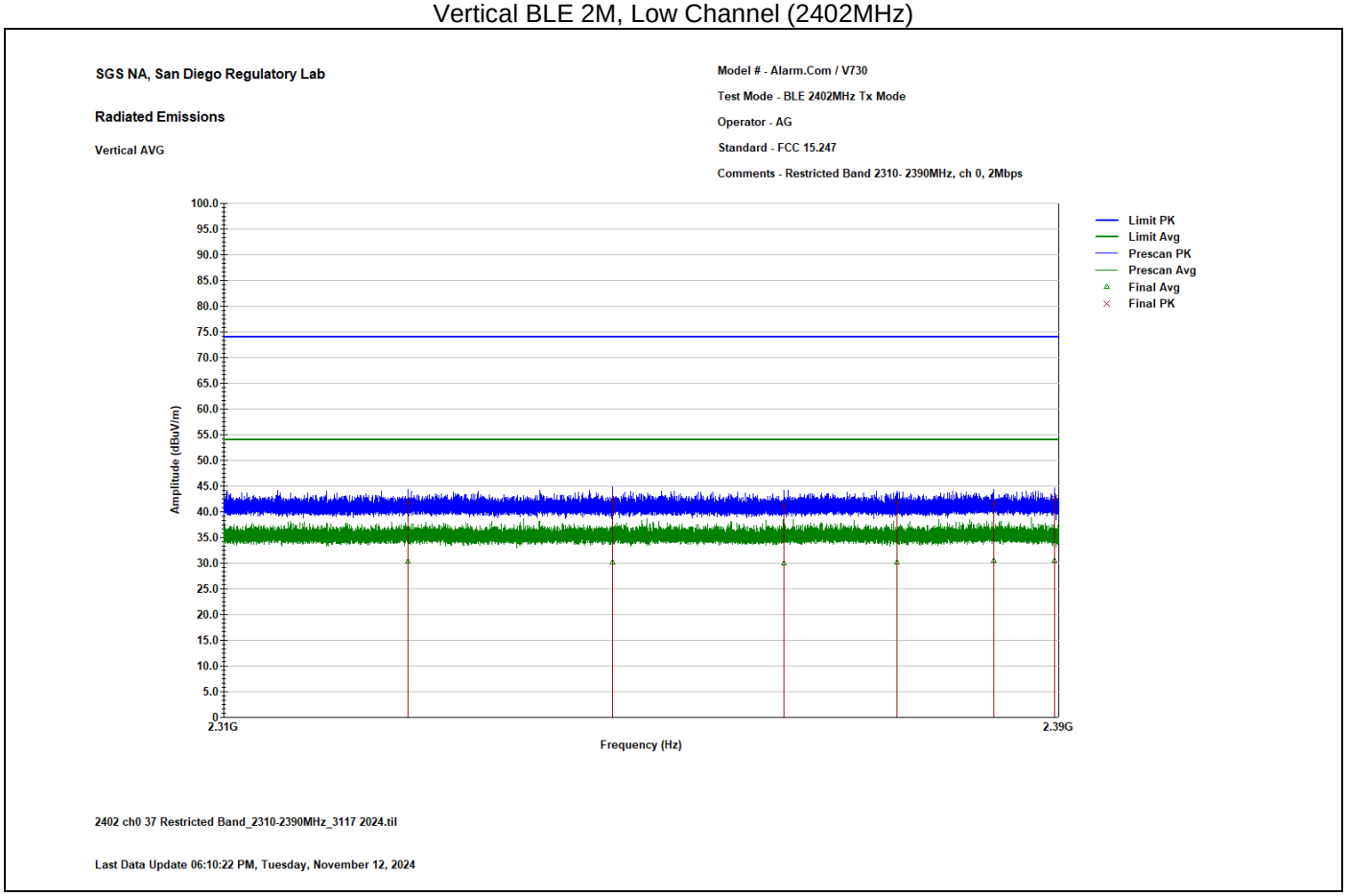
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2323.08	41.77	-0.92	-32.23	74	308	58
2325.164	42.07	-0.92	-31.93	74	212	253
2344.704	42.5	-0.8	-31.5	74	268	249
2354.728	41.1	-0.73	-32.9	74	373	298
2363.506	42.41	-0.68	-31.59	74	387	304
2373.164	41.95	-0.67	-32.05	74	348	200
2380.278	42.5	-0.65	-31.5	74	349	366
2385.776	42.85	-0.62	-31.15	74	365	194

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2323.08	35.17	5.06	-0.92	-18.83	54	308	58
2325.164	35.25	5.06	-0.92	-18.75	54	212	253
2344.704	35.19	5.06	-0.8	-18.81	54	268	249
2354.728	35.16	5.06	-0.73	-18.84	54	373	298
2363.506	35.06	5.06	-0.68	-18.94	54	387	304
2373.164	35.17	5.06	-0.67	-18.83	54	348	200
2380.278	35.25	5.06	-0.65	-18.75	54	349	366
2385.776	35.39	5.06	-0.62	-18.61	54	365	194

Vertical BLE 2M, Low Channel (2402MHz)



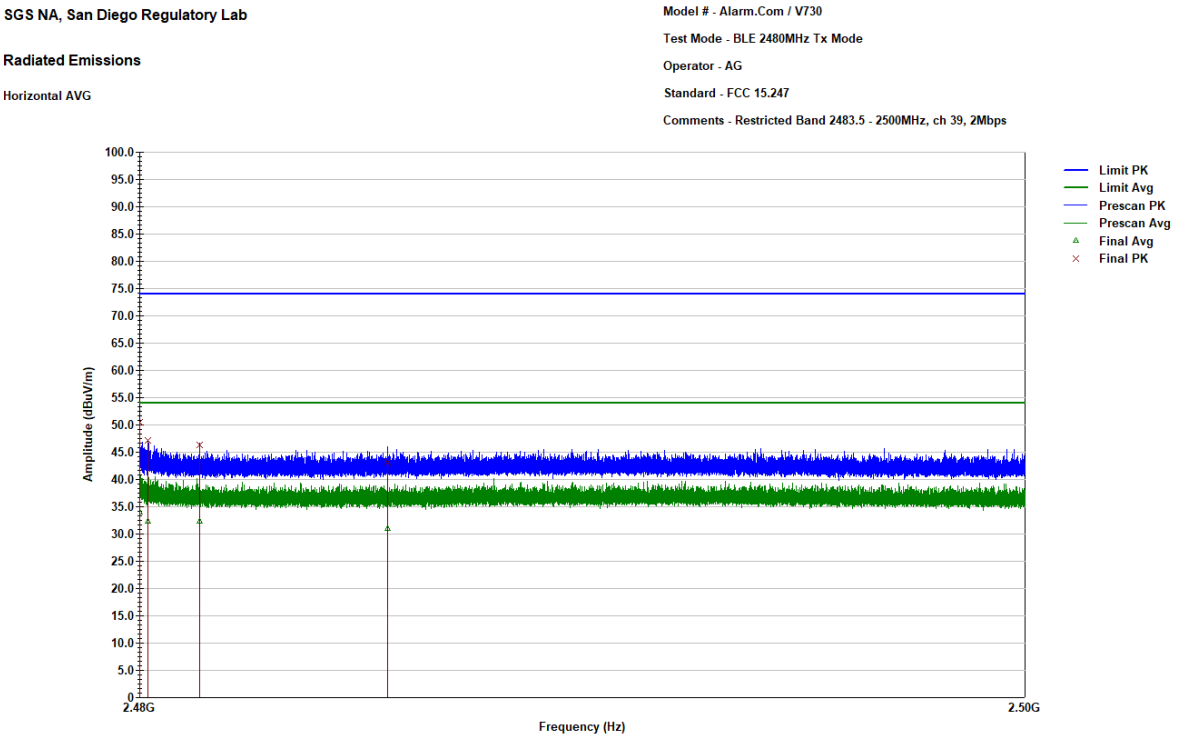
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2327.418	41.91	-0.92	-32.09	74	376	138
2346.946	42.29	-0.79	-31.71	74	150	286
2363.344	41.33	-0.68	-32.67	74	221	216
2374.248	42.01	-0.67	-31.99	74	334	247
2383.66	41.81	-0.63	-32.19	74	310	316
2389.592	42.64	-0.59	-31.36	74	302	272

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2327.418	35.33	5.06	-0.92	-18.67	54	376	138
2346.946	35.17	5.06	-0.79	-18.83	54	150	286
2363.344	35.05	5.06	-0.68	-18.95	54	221	216
2374.248	35.18	5.06	-0.67	-18.82	54	334	247
2383.66	35.52	5.06	-0.63	-18.48	54	310	316
2389.592	35.59	5.06	-0.59	-18.41	54	302	272
2327.418	35.33	5.06	-0.92	-18.67	54	376	138

Horizontal BLE 2M, High Channel (2480MHz)



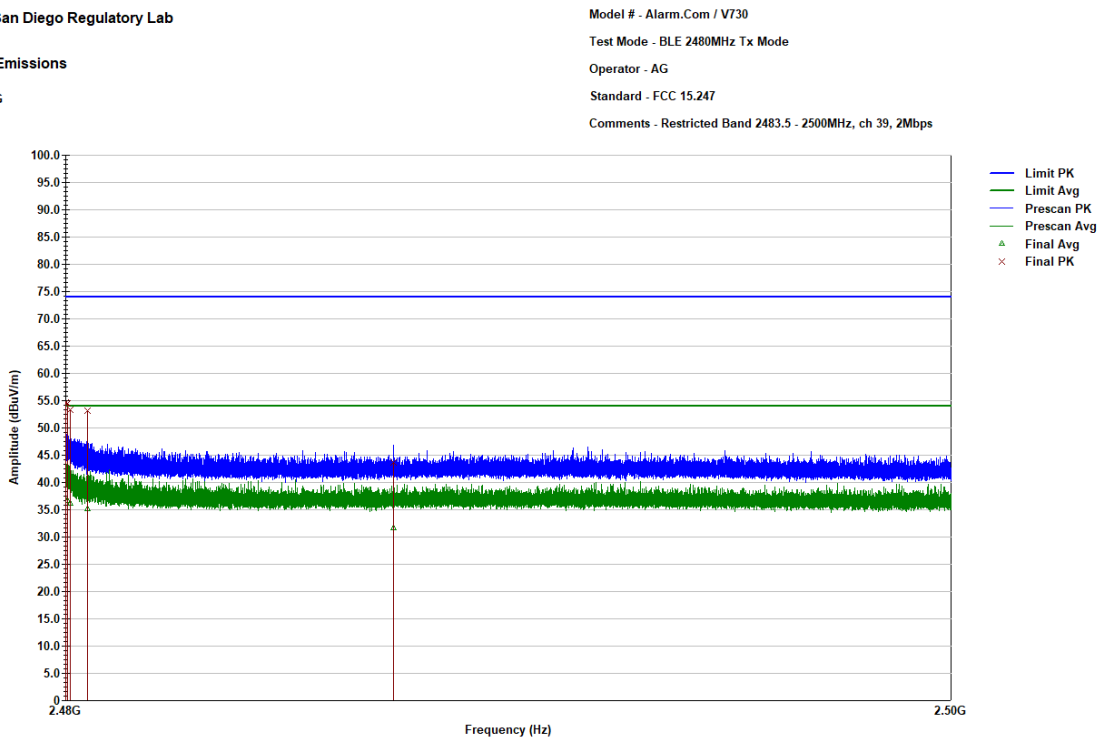
Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2483.5	50.51	-0.11	-23.49	74	400	238
2483.645	47.14	-0.11	-26.86	74	365	380
2484.607	46.29	-0.11	-27.71	74	340	238
2488.108	43.24	-0.09	-30.76	74	349	-8

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2483.5	39.04	5.06	-0.11	-14.96	54	400	238
2483.645	37.44	5.06	-0.11	-16.56	54	365	380
2484.607	37.33	5.06	-0.11	-16.67	54	340	238
2488.108	36.09	5.06	-0.09	-17.91	54	349	-8

Vertical BLE 2M, High Channel (2480MHz)



Peak Data

Freq. (MHz)	Final PK (dBµV/m)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2483.5	54.59	-0.11	-19.41	74	156	263
2483.533	54.44	-0.11	-19.56	74	334	229
2483.58	53.31	-0.11	-20.69	74	229	210
2483.905	53.09	-0.11	-20.91	74	188	274
2489.593	43.74	-0.09	-30.26	74	334	245

Average

Freq. (MHz)	Final AVG (dBµV/m)	Duty Cycle Corr. (dB)	Total Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Ant. Height (cm)	Azimuth (deg.)
2483.5	41.89	5.06	-0.11	-12.11	54	156	263
2483.533	41.77	5.06	-0.11	-12.23	54	334	229
2483.58	41.17	5.06	-0.11	-12.83	54	229	210
2483.905	40.3	5.06	-0.11	-13.7	54	188	274
2489.593	36.65	5.06	-0.09	-17.35	54	334	245

9 AC Powerline Conducted Emissions

9.1 *Test Result*

Test Description	Test Specification		Test Result
AC Powerline Conducted Emissions	15.207	RSS-GEN S8.8	Complies

9.2 *Test Method*

With the receiver's resolution bandwidth was set to 9 kHz, exploratory scans were performed over the measuring frequency range (0.15 MHz to 30 MHz) using a max hold mode incorporating a Peak detector and Average detector and using the TILE! software. The final test data was measured using a Quasi-Peak detector and Average detector and compared against the limits indicated in the table below.

Frequency Range	Limits (dBuV)
0.15 to 0.5 MHz	Avg 56 to 46 QP 66 to 56
0.5 to 5 MHz	Avg 46 Pk 56
5 to 30 MHz	Avg 50 Pk 60

9.3 *Additional information*

None.

9.4 *Test Site and Environmental Condition*

Conducted Emissions Testing Site, San Diego, CA

Environmental Conditions
Temperature: 20 – 25 °C
Relative Humidity: 35 – 50 %

9.5 *Test Setup Photographs*

Test setup photographs are located in a separate report (208949-9).

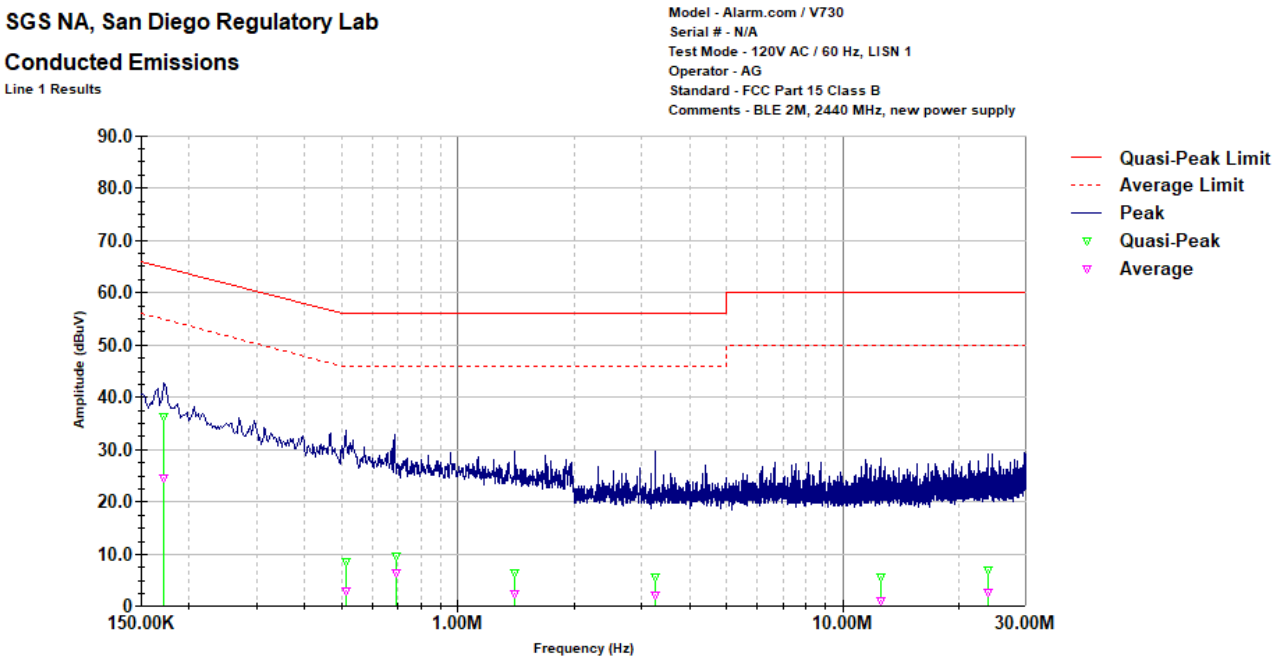
9.6 *Test Equipment*

Test Dates: December 06, 2024 Tester: Andreas Gillmeier/Alex Chang

Asset No.	Type of Equipment	Model	Serial No.	Manufacturer	Cal Date	Cal Due Date
Radiated Emission < 1 GHz						
2017	EMI Receiver	N9038B	MY59050132	Keysight	10/24/2023	01/24/2025
2027	LISN	EMV216	101535	Rohde&Schwarz	01/29/2024	01/29/2025
Miscellaneous						
2036	Temp/Humidity Data Logger	GSP-8	CMA231100002	Elitech	07/09/2024	07/09/2025
-	Test Software	TILE!	V7.8.1.7	ETS Lindgren	N/A	

9.7 *Test Data*

Conducted Emissions Line 1



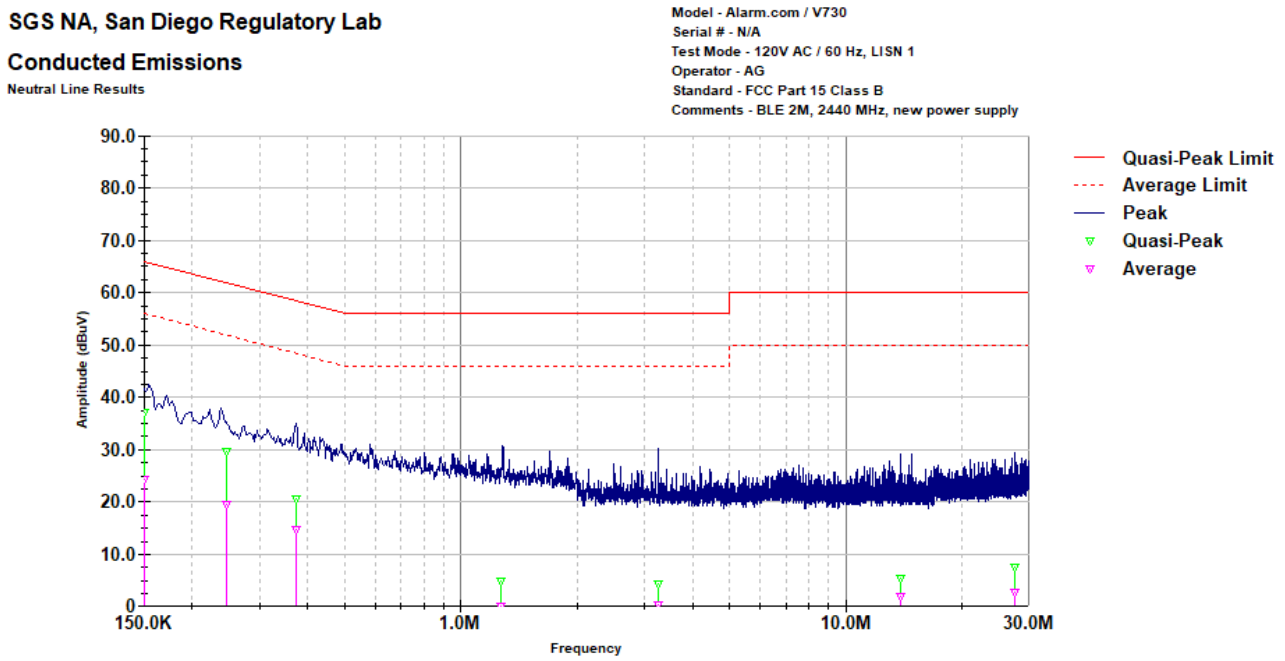
Quasi-Peak Data

Freq. (MHz)	Final QP (dBµV)	Total Corr. (dB)	Margin (dB)	Limit (dBµV)
0.172	36.22	9.49	-29.13	65.36
0.512	8.6	9.53	-47.4	56
0.69	9.67	9.54	-46.33	56
1.403	6.37	9.56	-49.63	56
3.255	5.76	9.63	-50.24	56
12.53	5.67	10.05	-54.33	60
23.967	7.06	10.28	-52.94	60

Average Data

Freq. (MHz)	Final AVG (dBµV)	Total Corr. (dB)	Margin (dB)	Limit (dBµV)
0.172	24.49	9.49	-30.87	55.36
0.512	3.12	9.53	-42.88	46
0.69	6.57	9.54	-39.43	46
1.403	2.59	9.56	-43.41	46
3.255	2.19	9.63	-43.81	46
12.53	1.07	10.05	-48.93	50
23.967	2.88	10.28	-47.12	50

Conducted Emissions Neutral



Quasi-Peak Data

Freq. (MHz)	Final QP (dBµV)	Total Corr. (dB)	Margin (dB)	Limit (dBµV)
0.15	37.12	9.49	-28.88	66
0.247	29.6	9.51	-33.64	63.24
0.373	20.5	9.54	-39.14	59.64
1.275	4.97	9.61	-51.03	56
3.262	4.34	9.71	-51.66	56
13.839	5.41	10.17	-54.59	60
27.457	7.55	10.46	-52.45	60

Average Data

Freq. (MHz)	Final AVG (dBµV)	Total Corr. (dB)	Margin (dB)	Limit (dBµV)
0.15	24.41	9.49	-31.59	56
0.247	19.44	9.51	-33.8	53.24
0.373	14.7	9.54	-34.94	49.64
1.275	0.13	9.61	-45.87	46
3.262	0.33	9.71	-45.67	46
13.839	1.89	10.17	-48.11	50
27.457	2.8	10.46	-47.2	50

10 Antenna Requirement

10.1 *Test Result*

Test Description	Test Specification		Test Result
Antenna Requirement	15.203	RSS-GEN S6.8	Compliant

10.2 *Applicable Requirement*

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

10.3 *Antenna Connection/Construction*

The antennas are integral and not upgradable. The EUT has a tight construction and to access the antennas the device has to be opened which is affecting the warranty.

Additionally the user guide states “Changes or modifications not expressly approved by the party responsible for compliance could void the user‘s authority to operate the equipment.”.

11 Measurement Uncertainty

The measurement uncertainty figures are be calculated in accordance with TR 100 028-1 [2] and correspond to an expansion factor (coverage factor) k = 2 (which provide confidence levels of 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Measurement uncertainty is not used to adjust the measurements to determine compliance.

	Expanded Uncertainty for Normal k factor equal to 2	
Parameter	Required	Laboratory Actual
Radio Frequency	±1 x 10-5	±9.8 x 10-8
total RF power, conducted	±1.5 dB	±1.2 dB
RF power density, conducted	±3 dB	±0.7 dB
spurious emissions, conducted	±3 dB	±2.1 dB
all emissions, radiated	±6 dB	±4.8 dB
temperature	±1°C	±0.5°C
humidity	±5 %	±3.5%
DC and low frequency voltages	±3 %	±0.4%

12 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	February 10, 2025
1	Corrected orientation of plots on page 16 and 17	February 24, 2025
2	Corrected cal dates in chapters 7.5, 8.4, 9.6	February 27, 2025