FCC / ISED Test Report

For:
Ibeat, Inc.

Brand:
100Plus

Model #:
G1

Product Description:
Relays data from certain Bluetooth devices to our physician portal over LTE.

FCC ID: 2AP3M-G1

Applied Rules and Standards:
47 CFR Part 15.247 (DTS)

REPORT #: EMC_IBEAT_006_20001_FCC_15.247_BLE_DTS

DATE: 9/14/2020

A2LA Accredited

IC recognized #
3462B-1
3462B-2

***CETECOM* Inc.**
411 Dixon Landing Road ◆ Milpitas, CA 95035 ◆ U.S.A.
Phone: + 1 (408) 586 6200 ◆ Fax: + 1 (408) 586 6299 ◆ E-mail: info@cetecom.com ◆ http://www.cetecom.com
CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

TABLE OF CONTENTS

1 Assessment

The following device was evaluated against the applicable criteria specified in FCC rules Parts 15.247 of Title 47 of the Code of Federal Regulations.

No deviations were ascertained.

According to section 5 of this report, the overall result is Pass.

Company	Description	Model #
Ibeat, Inc.	Relays data from certain Bluetooth devices to our physician portal over LTE.	G1

Responsible for Testing Laboratory:

Date	Section	Name	Signature
9/14/2020	Compliance	Li, Cindy (EMC Lab Manager)	Cindy Li Digitally signed by cindy.li@cetecom.com DN: CN=cindy.li@cetecom.com Reason: I have reviewed this document Location: your signing location here Date: 2020-09-14 12:06:32 Foxit Reader Version: 10.0.1

Responsible for the Report:

Date	Section	Name	Signature
9/14/2020	Compliance	Ghanma, Issa (EMC Engineer)	Digitally signed by: Issa W Ghanma DN: CN = Issa W Ghanma email = Issaghanma@cetecom.com C = US O = CETECOM Inc. OU = EMC Date: 2020.09.14 11:05:01 -07'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
EMC Lab Manager:	Li, Cindy
Responsible Project Leader:	Palacios, Cathy

2.2 Identification of the Client

Applicant's Name:	Ibeat, Inc.
Street Address:	430 Main St
City/Zip Code	San Francisco, CA 94105
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client /----------
Manufacturers Address:	----------
City/Zip Code	----------
Country	----------

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Model No:	G1
Marketing name:	100Plus Home Health Gateway.
FCC-ID :	2AP3M-G1
HW Version :	1.8.0
SW Version :	0.7.25
Product Description:	Relays data from certain Bluetooth devices to our physician portal over LTE.
Frequency Range / number of channels:	Nominal band: 2400 MHz – 2483.5 MHz;
Type(s) of Modulation:	Center to center: 2402 MHz (ch 0) – 2480 MHz (ch 39), 40 channels
Modes of Operation:	Bluetooth 5.0 Low Energy, using Dynamic Sequence Spread Spectrum with GFSK modulation.
Power Supply/ Rated Operating Voltage Range:	Low 4 V DC, Nominal 5 V DC, High 6 V DC
Operating Temperature Range:	Low 0º C, Nominal 25º C, High +60º C
Other Radios included in the device:	❖ Cellular: LTE Cat-M1 bands 2, 4, 12, 13 • Module name : BG96 • FCC ID : XMR201707BG96
Product dimensions [mm]:	140 x 140 x 40
Sample Revision	☐ Prototype Unit; ☐ Production Unit; ■ Pre-Production

Module information	
Name:	BGM13P Wireless Gecko
Number:	BGM13P32F512GA-V2
FCC ID:	QOQBGM13P
Antenna:	• High performance integrated chip antenna (BGM13PxxFxxxxA) • Peak Gain: 1 dBi
Maximum power:	• Module datasheet : Up to +19 dBm TX power. • Module report (290042-2-3) : 19.69 dBm (Peak) • Device operational description : The BLE maximum transmit power is + 10 dBm ± 1.9 dB

3.2 EUT Sample details

EUT #	IMEI	HW Version	SW Version	Notes/Comments
1	865284049594108	1.8.0	0.7.25	-

3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Notes/Comments
1	Class 2 Power Supply	WP0502000U	Dongguan Will Electronics Technology Co., Ltd	• Input: 100-240V – 50/60Hz 0.5A Max • Output: 5.0V ---2.0A

3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#1 + AE#1	-

3.5 Mode of Operation details

Mode of Operation	Description of Operating modes	Additional Information
OP. 1	BLE	❖ A driver provided by client, to get the ability to send commands through serial terminal, used to configure BLE radio to: • Transmit mode: Continuous **TX** • Hopping: **No** • Channel(s): Low (0), Mid (19) and High (39)

3.6 Justification for Worst Case Mode of Operation

During the testing process, the EUT was tested with transmitter sets on low, mid and high channels, and highest possible duty cycle and output power.

For radiated measurements, all data in this report show the worst case between horizontal and vertical antenna polarizations and for all orientations of the EUT.

4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to assess the performance of the EUT according to the relevant requirements specified in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations.

This test report is to support a request for new equipment authorization under the FCC ID: 2AP3M-G1

Testing procedures are based on 558074 D01 15.247 Meas Guidance v05r02 – "GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES" - April 2, 2019, by the Federal Communications Commission, Office of Engineering and Technology, Laboratory Division.

5 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA	NP	Result
§15.247(a)(1)	Emission Bandwidth	Nominal	-	☐	☐	■	See note1 See note 2
§15.247(e)	Power Spectral Density	Nominal	-	☐	☐	■	See note1 See note 2
§15.247(b)(1)	Maximum Conducted Output Power and EIRP	Nominal	-	☐	☐	■	See note1 See note 2
§15.247(d)	Band edge compliance Unrestricted Band Edges	Nominal	-	☐	☐	■	See note1 See note 2
§15.247; 15.209; 15.205	Band edge compliance Restricted Band Edges	Nominal	-	☐	☐	■	See note1 See note 2
§15.247(d); §15.209	TX Spurious emissions-Radiated	Nominal	BLE	■	☐	☐	Complies
§15.207(a)	AC Conducted Emissions	Nominal	BLE	■	☐	☐	Complies

Note1: NA= Not Applicable; NP= Not Performed.
Note2: Leveraged from module certification report 290042-2-3, FCC / IC ID: QOQBGM13P

6 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=1.

Radiated measurement

9 kHz to 30 MHz	±2.5 dB (Magnetic Loop Antenna)
30 MHz to 1000 MHz	±2.0 dB (Biconilog Antenna)
1 GHz to 40 GHz	±2.3 dB (Horn Antenna)

Conducted measurement

150 kHz to 30 MHz	±0.7 dB (LISN)
RF conducted measurement	±0.5 dB

According to TR 102 273 a multiplicative propagation of error is assumed for RF measurement systems. For this reason the RMS method is applied to dB values and not to linear values as appropriate for additive propagation of error. Also used: http://physics.nist.gov/cuu/Uncertainty/typeb.html. The above calculated uncertainties apply to direct application of the Substitution method. The Substitution method is always used when the EUT comes closer than 3 dB to the limit.

6.1 Environmental Conditions During Testing:

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25° C
- Relative humidity: 40-60%

6.2 Dates of Testing:

7/16/2020 – 7/20/2020

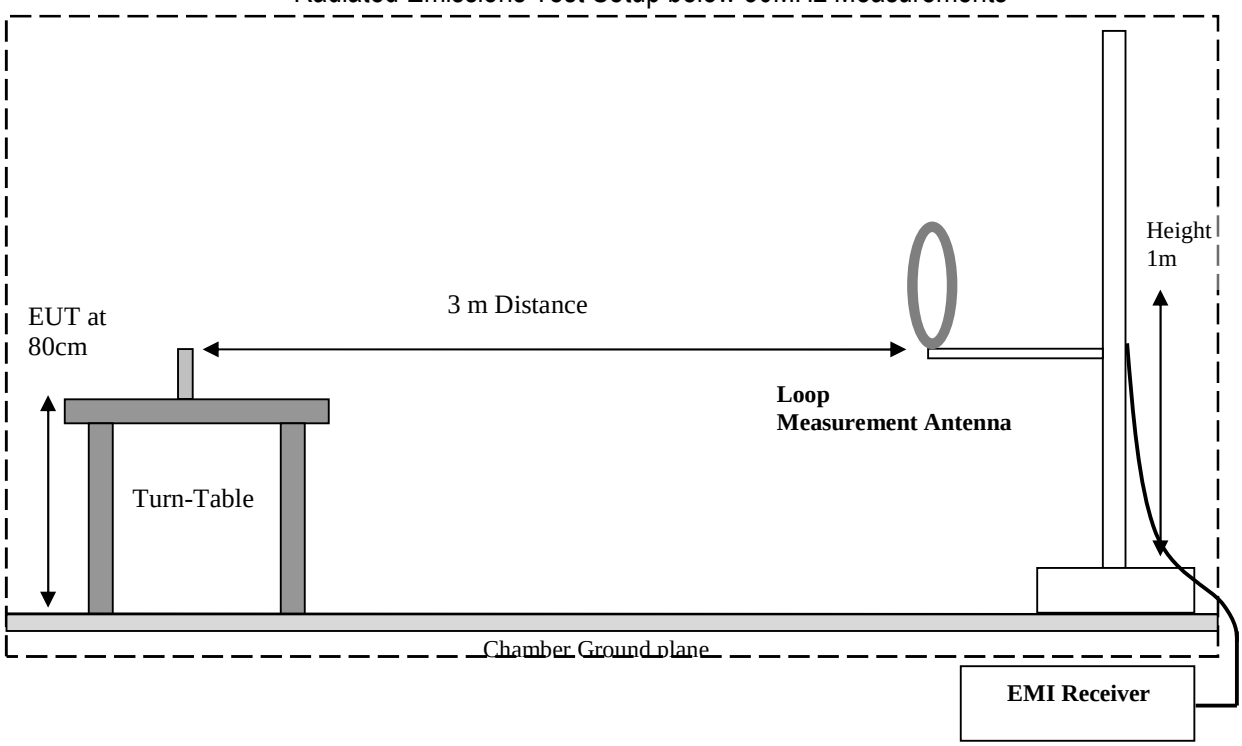
7 Measurement Procedures

7.1 Radiated Measurement

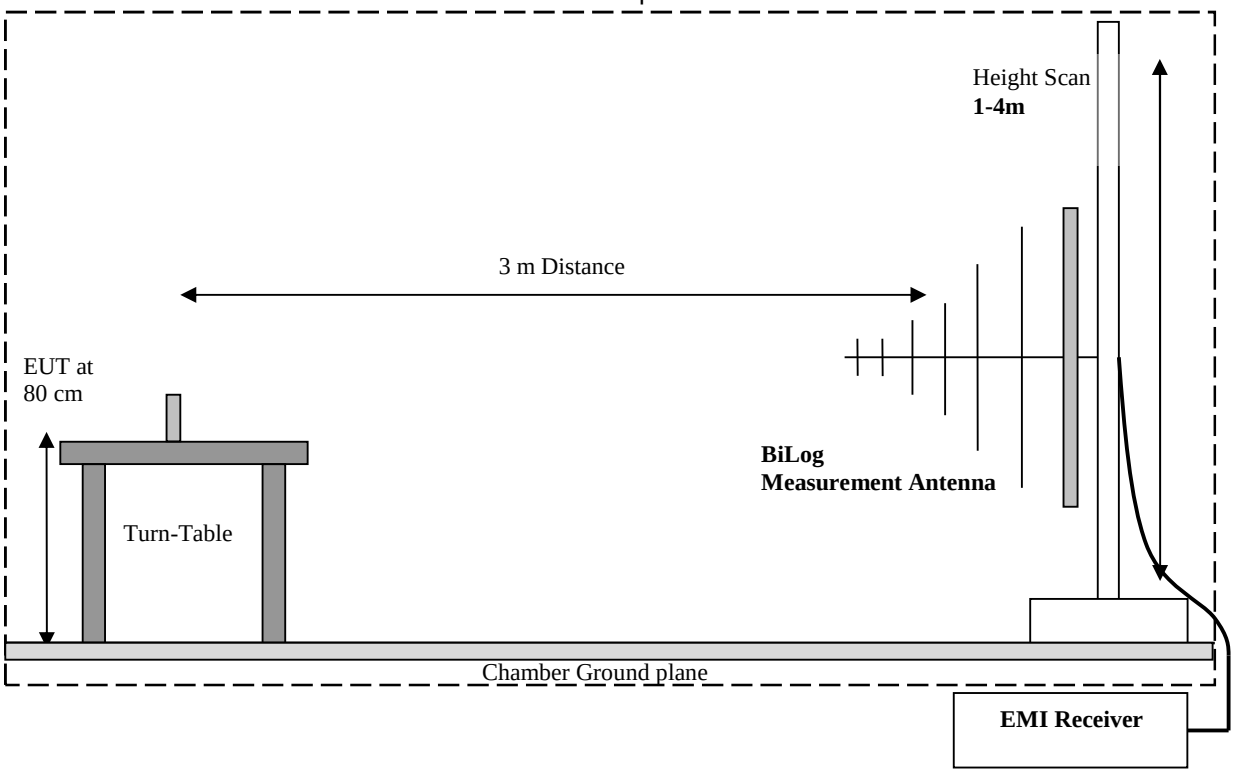
The radiated measurement is performed according to ANSI C63.10 (2013)

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 360º continuous measurement of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

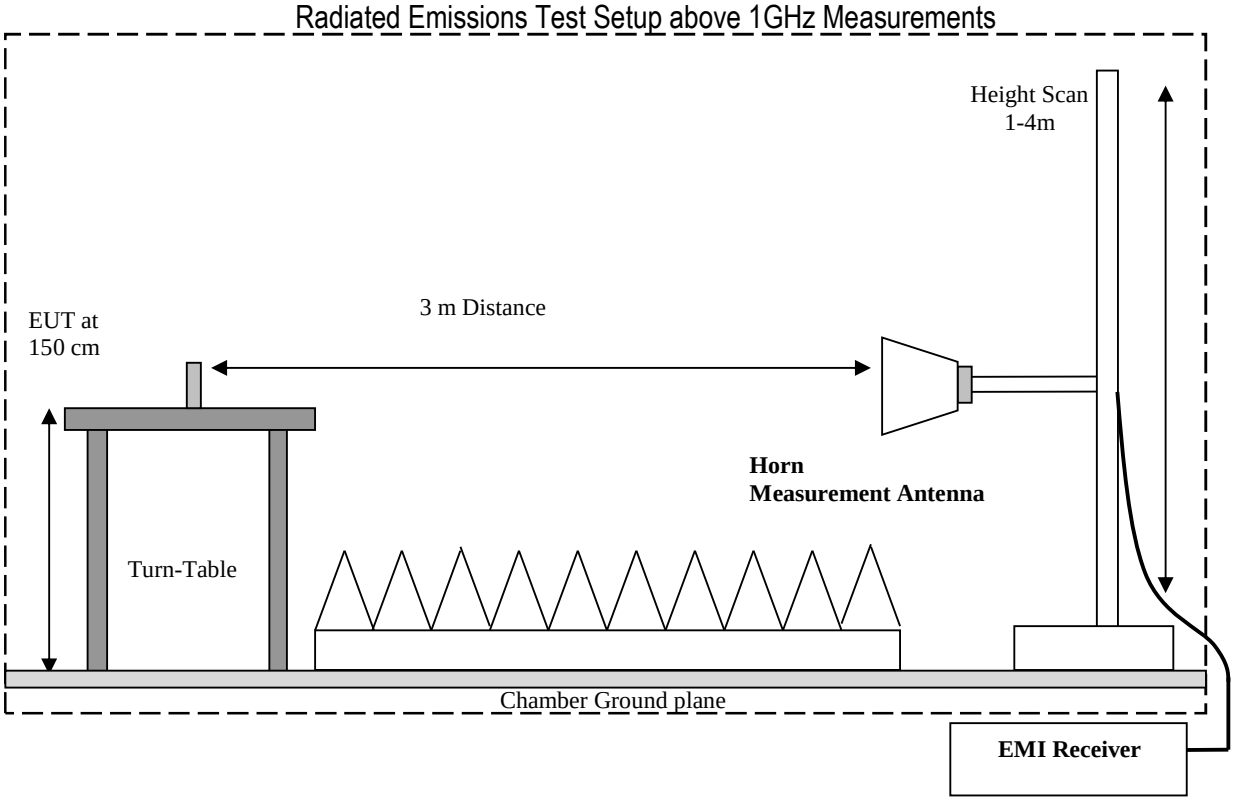
Radiated Emissions Test Setup below 30MHz Measurements



Radiated Emissions Test Setup 30MHz-1GHz Measurements



Radiated Emissions Test Setup above 1GHz Measurements



7.1.1 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

1. Measured reading in dBµV
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

FS (dBµV/m) = Measured Value on SA (dBµV) + Cable Loss (dB) + Antenna Factor (dB/m)

Example:

Frequency (MHz)	Measured SA (dBµV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBµV/m)
1000	80.5	3.5	14	98.0

7.2 Power Line Conducted Measurement Procedure

AC Power Line conducted emissions measurements performed according to: ANSI C63.4 (2014)

8 Test Result Data

8.1 EIRP

Radio	Frequency [MHz]	Maximum power [W]	EIRP [W]	Maximum power [dBm]	EIRP [dBm]	Limit [dBm]
BTLE	2402	0.015	0.025	11.9	13.9	36

8.2 Radiated Transmitter Spurious Emissions and Restricted Bands

8.2.1 Measurement according to ANSI C63.10 (2013)

Spectrum Analyzer Settings:

- Frequency = 9 KHz – 30 MHz
- RBW = 9 KHz
- Detector: Peak

- Frequency = 30 MHz – 1 GHz
- Detector = Peak / Quasi-Peak
- RBW= 120 KHz (<1GHz)

- Frequency > 1 GHz
- Detector = Peak / Average
- RBW = 1 MHz

- Radiated spurious emissions shall be measured for the transmit frequencies, transmit power, and data rate for the lowest, middle and highest channel in each frequency band of operation and for the highest gain antenna for each antenna type, and using the appropriate parameters and test requirements.
- The highest (or worst-case) data rate shall be recorded for each measurement.
- For testing at distance other than the specified in the standard, the limit conversion is calculated by using 40 dB/decade extrapolation factor as follow: Conversion factor (CF) = 40 log (D/d) = 40 log (300m / 3m) = 80dB

8.2.2 Limits:

FCC §15.247

- In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

FCC §15.209 & RSS-Gen 8.9

- Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency of emission (MHz)	Field strength (µV/m)	Measurement Distance (m)	Field strength @ 3m (dBµV/m)
0.009–0.490	2400/F(kHz) / ---------	300	-
0.490–1.705	24000/F(kHz) / --------	30	-
1.705–30.0	30 / (29.5)	30	-
30–88	100	3	40 dBµV/m
88–216	150	3	43.5 dBµV/m
216–960	200	3	46 dBµV/m
Above 960	500	3	54 dBµV/m

FCC §15.205 & RSS-Gen 8.10

- Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

- Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
  *PEAK LIMIT= 74 dBµV/m
  *AVG. LIMIT= 54 dBµV/m

8.2.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	Mode of Operation	Power Input
23.8°C	1	Op.1	5.0V

8.2.4 Measurement result:

Plot #	Channel #	Scan Frequency	Limit	Result
1 – 3	Low	30 MHz – 18 GHz	See section 8.1.2	Pass
4 – 8	Mid	9 kHz – 26 GHz	See section 8.1.2	Pass
9 – 11	High	30 MHz – 18 GHz	See section 8.1.2	Pass

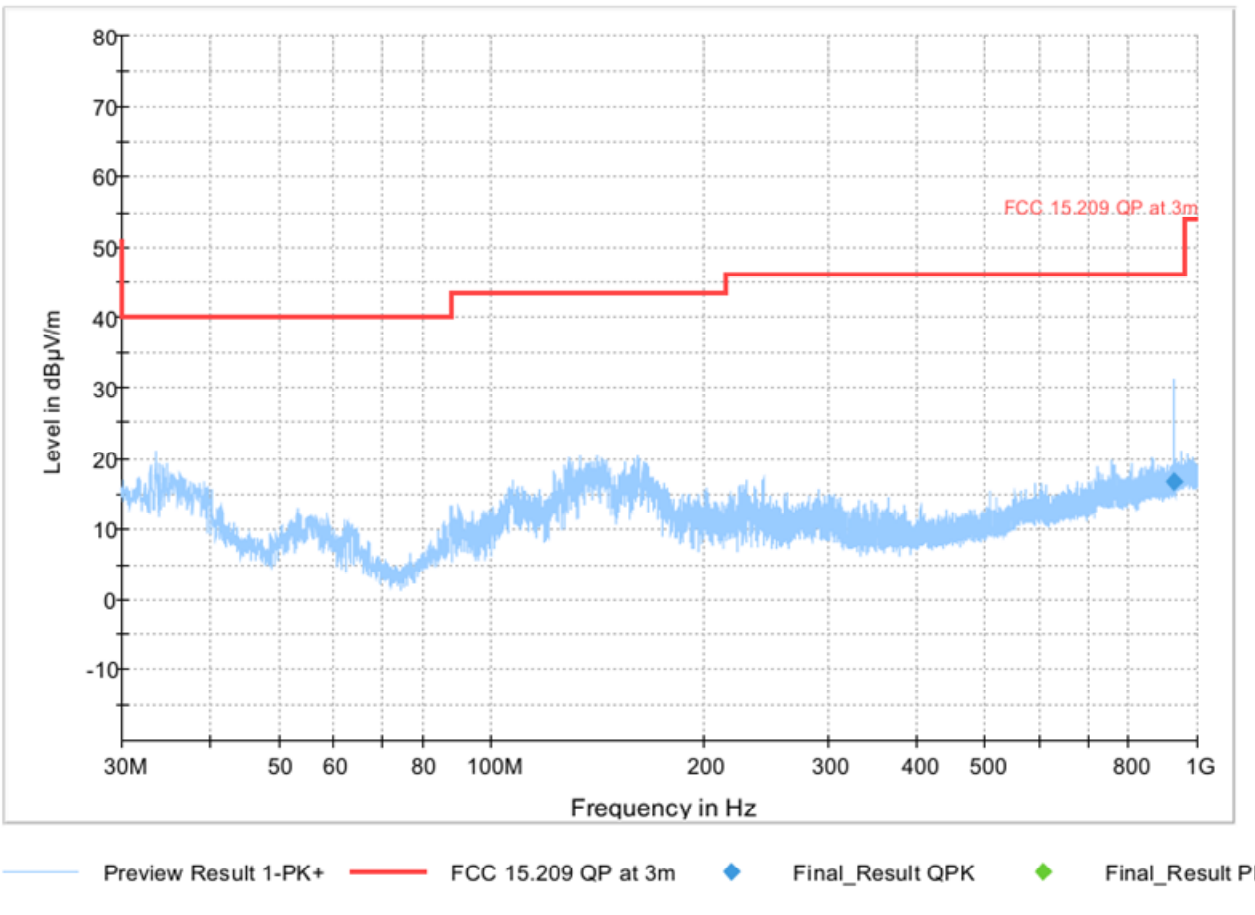
8.2.5 Measurement Plots:

Plot # 1 Radiated Emissions: 30 MHz – 1 GHz

Tx Frequency: 2402 MHz

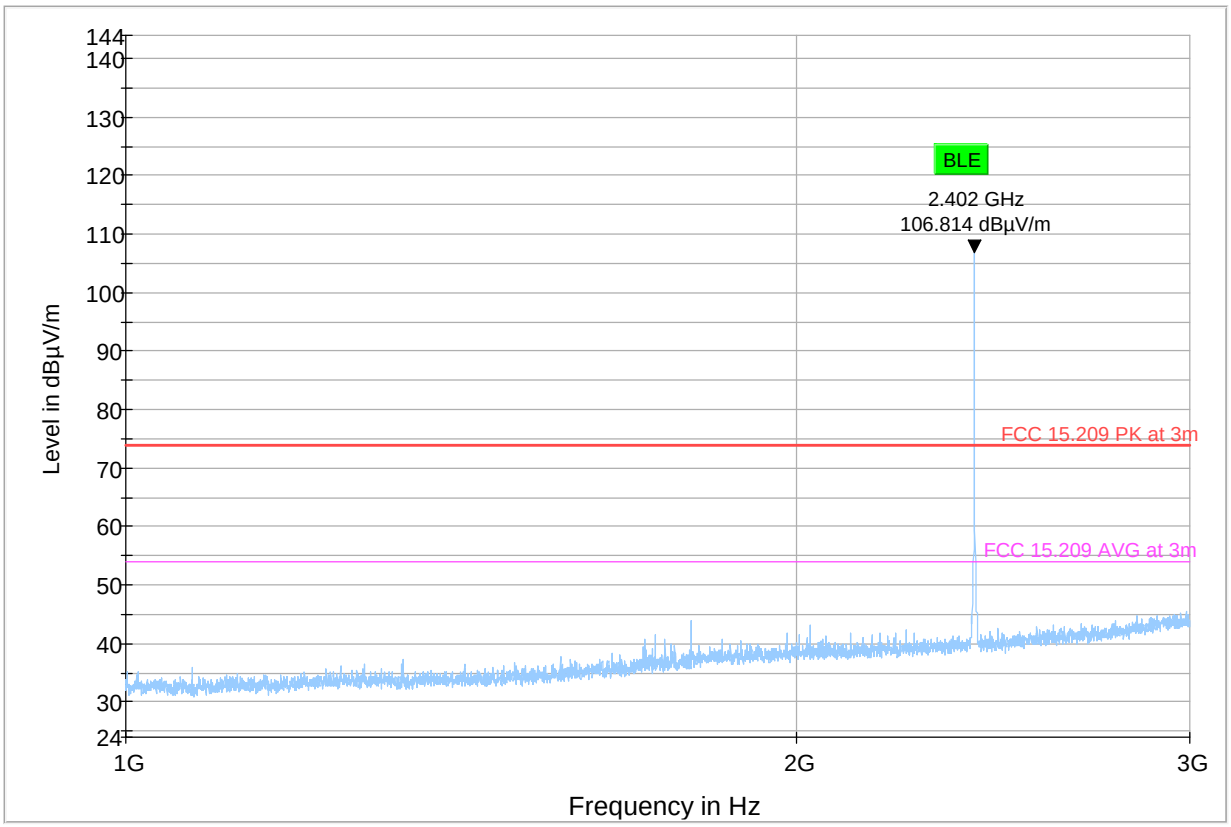
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
925.374667	16.70	---	46.02	29.32	500.0	120.000	226.0	V	66.0	-8.4



Plot # 2 Radiated Emissions: 1 – 3 GHz

Tx Frequency: 2402 MHz

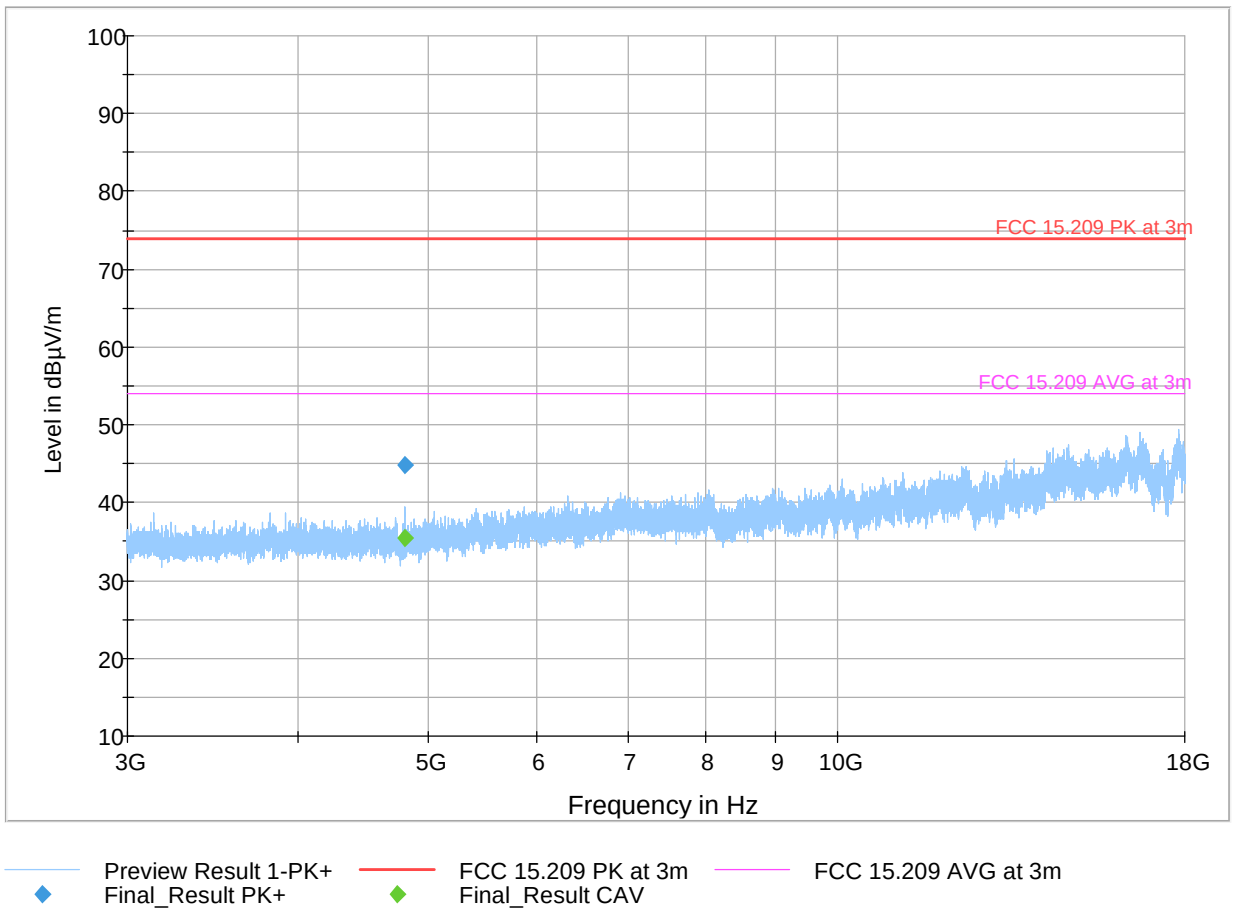


Plot # 3 Radiated Emissions: 3 – 18 GHz

Tx Frequency: 2402 MHz

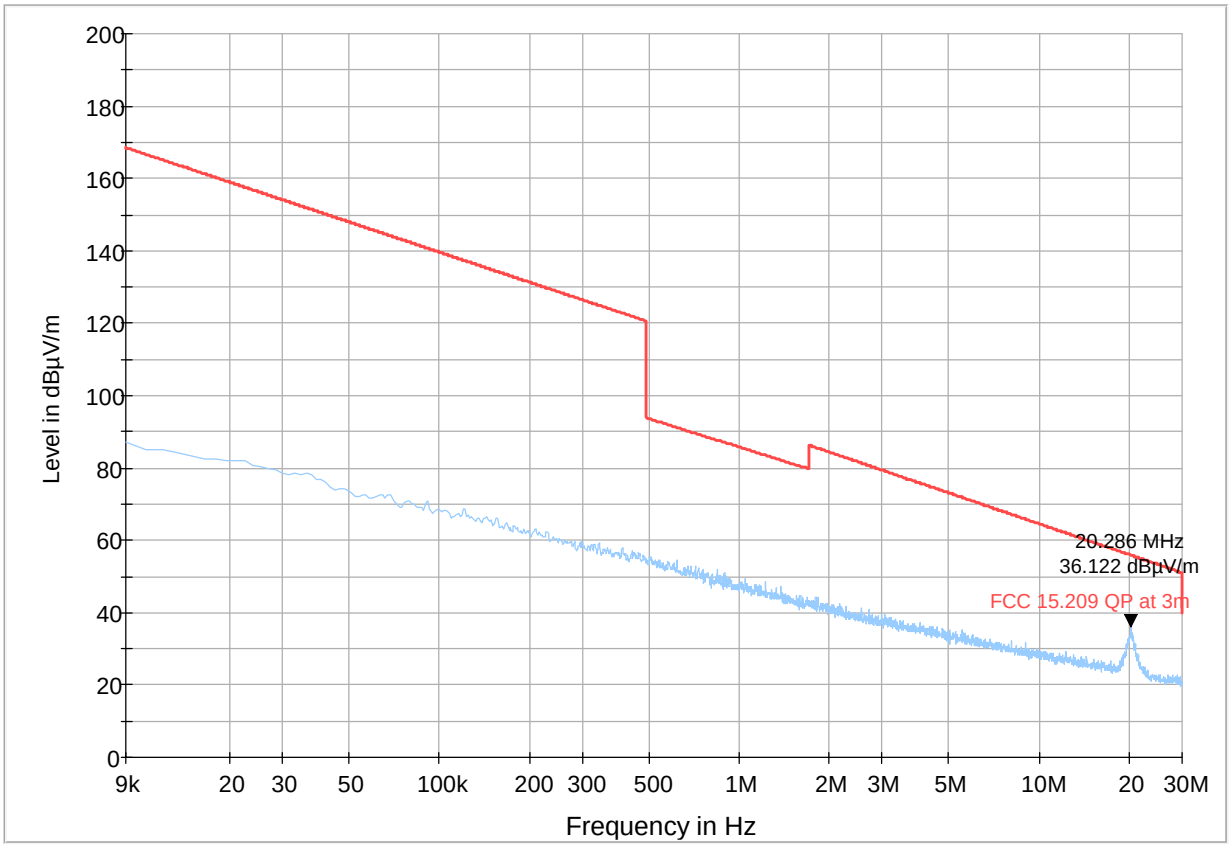
Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4804.250	---	35.49	53.98	18.49	500.0	1000.000	285.0	V	139.0	-7.1
4804.250	44.77	---	73.98	29.21	500.0	1000.000	285.0	V	139.0	-7.1



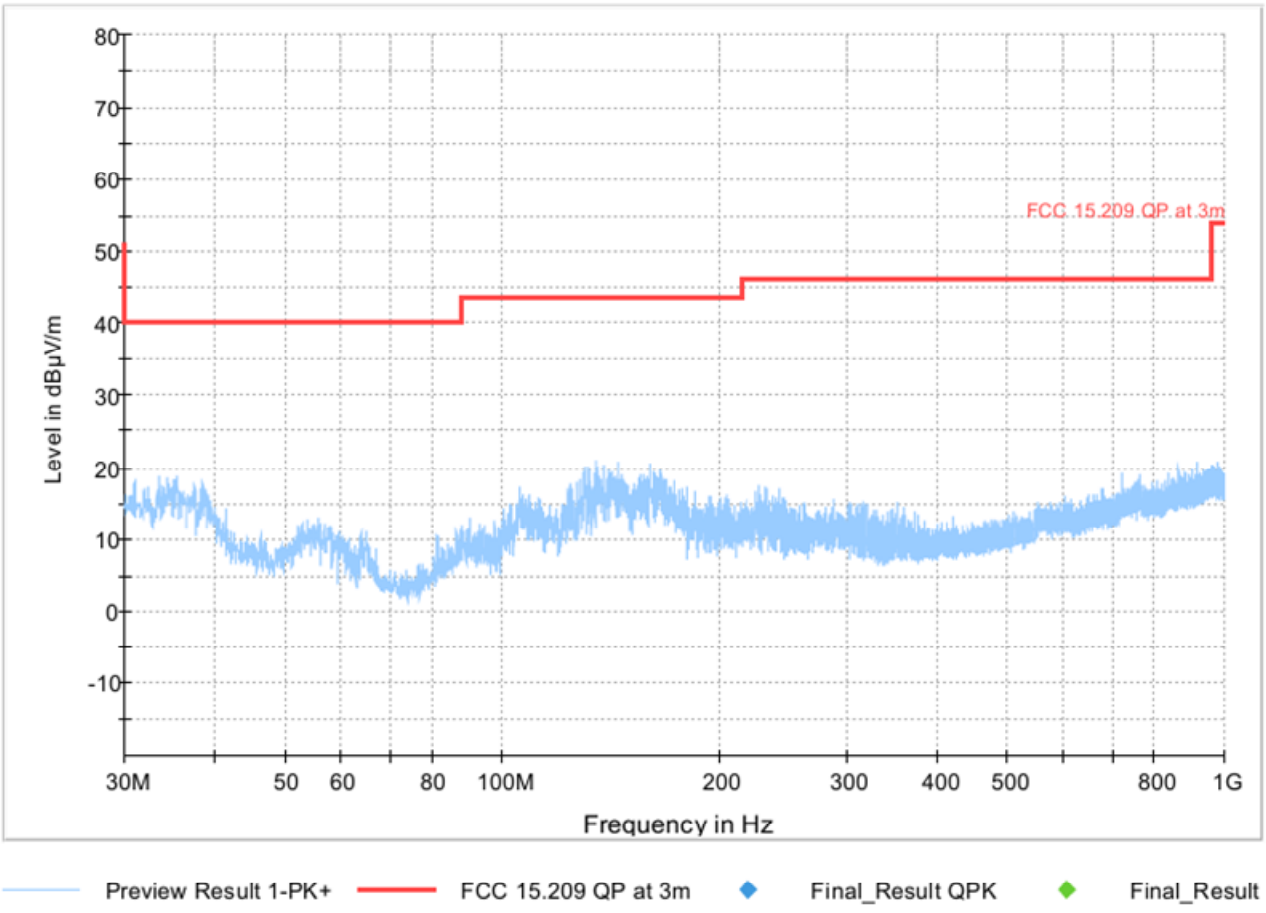
Plot # 4 Radiated Emissions: 9 KHz – 30 MHz

Tx Frequency: 2440 MHz



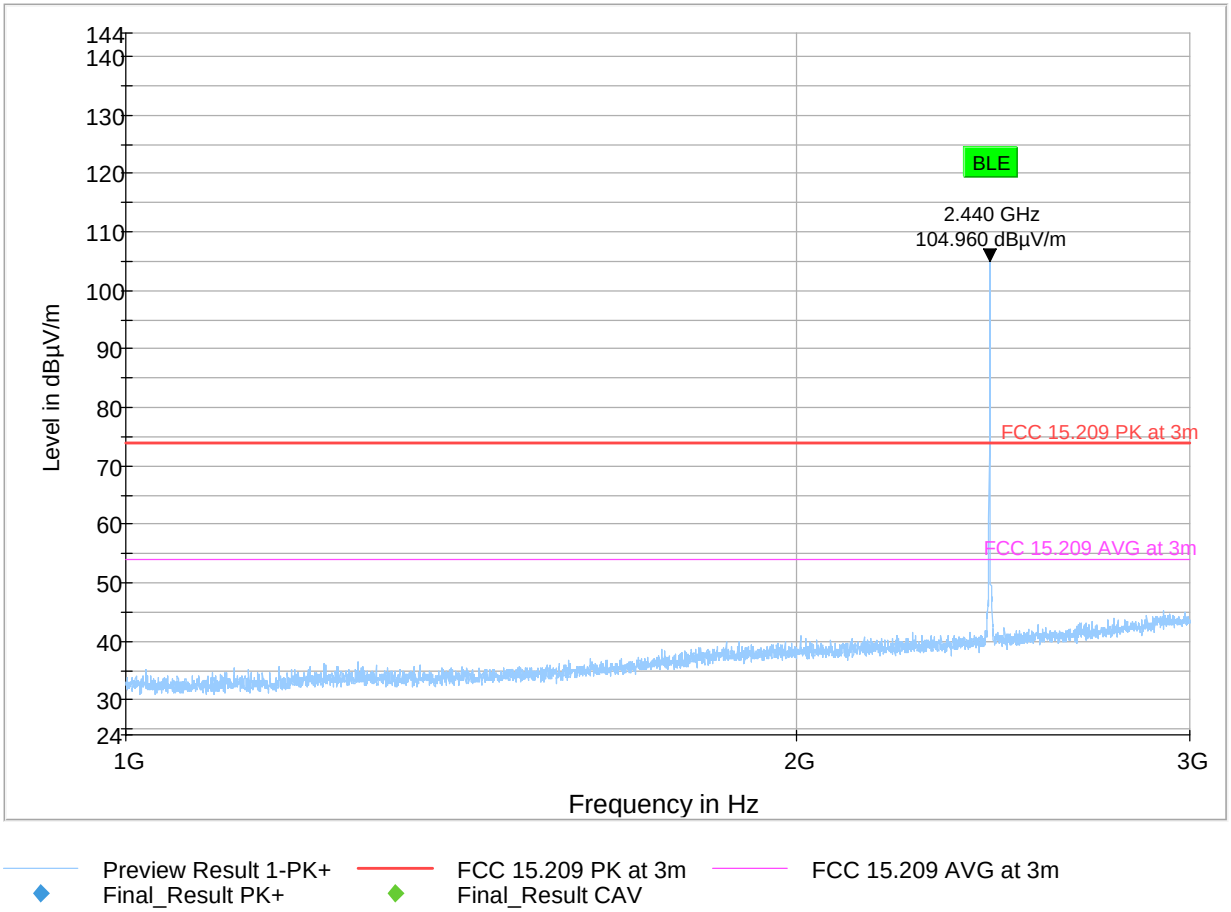
Plot # 5 Radiated Emissions: 30 MHz – 1 GHz

Tx Frequency: 2440 MHz



Plot # 6 Radiated Emissions: 1 – 3 GHz

Tx Frequency: 2440 MHz

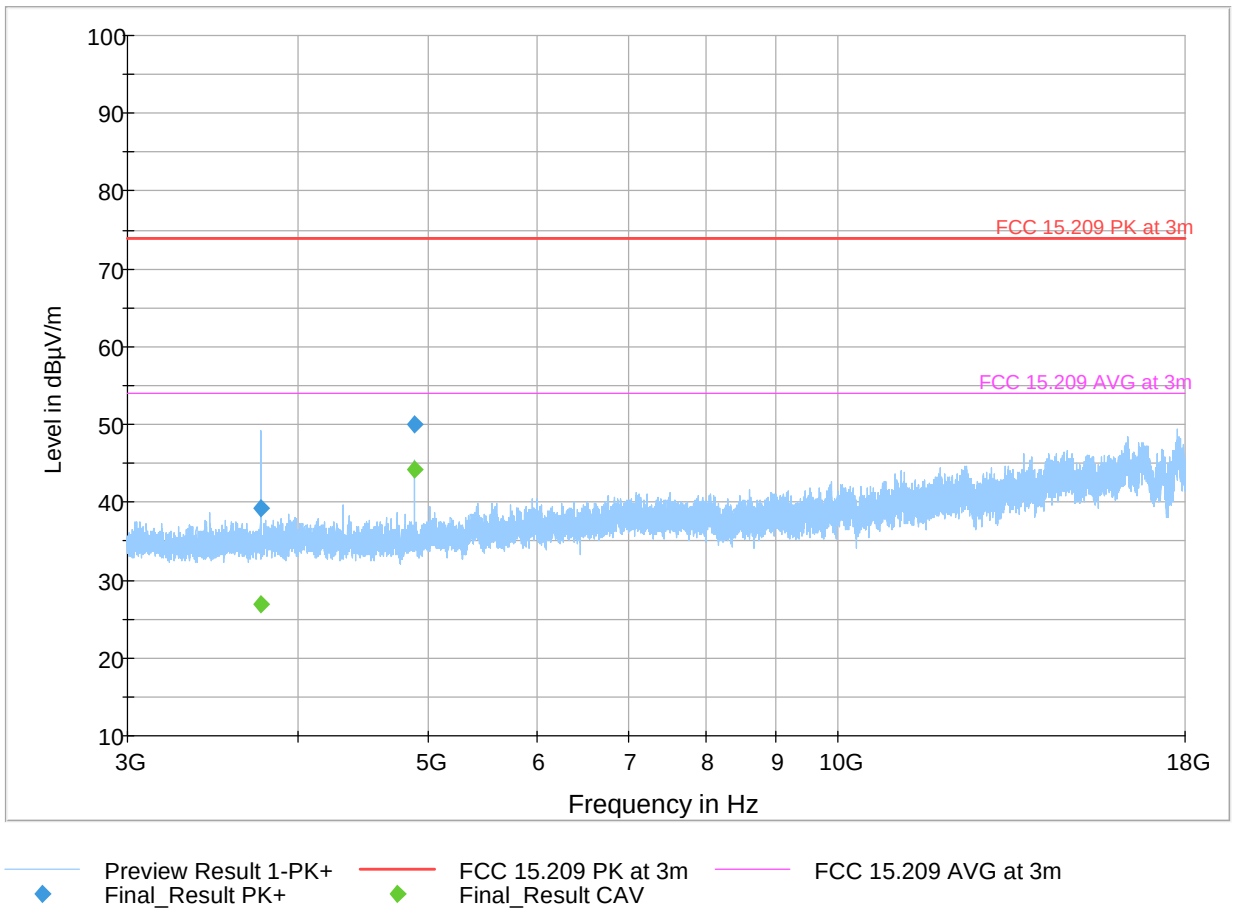


Plot # 7 Radiated Emissions: 3 – 18 GHz

Tx Frequency: 2440 MHz

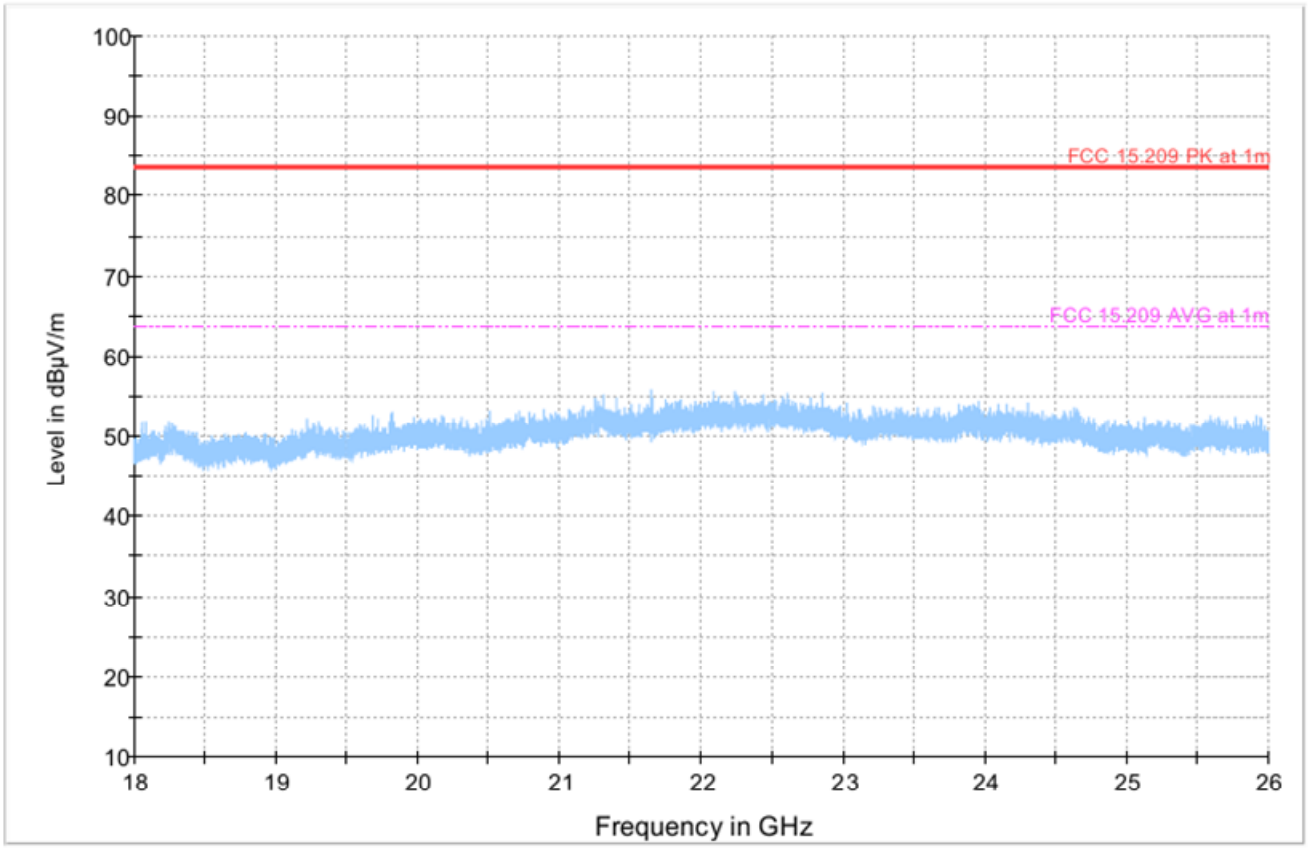
Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	C Corr. (dB/m)
3764.250	39.35	---	73.98	34.63	500.0	1000.0	134.0	V	74.0	-8.7
3764.250	---	27.01	53.98	26.97	500.0	1000.0	134.0	V	74.0	-8.7
4880.250	49.99	---	73.98	23.99	500.0	1000.0	251.0	H	270.0	-6.8
4880.250	---	44.23	53.98	9.75	500.0	1000.0	251.0	H	270.0	-6.8



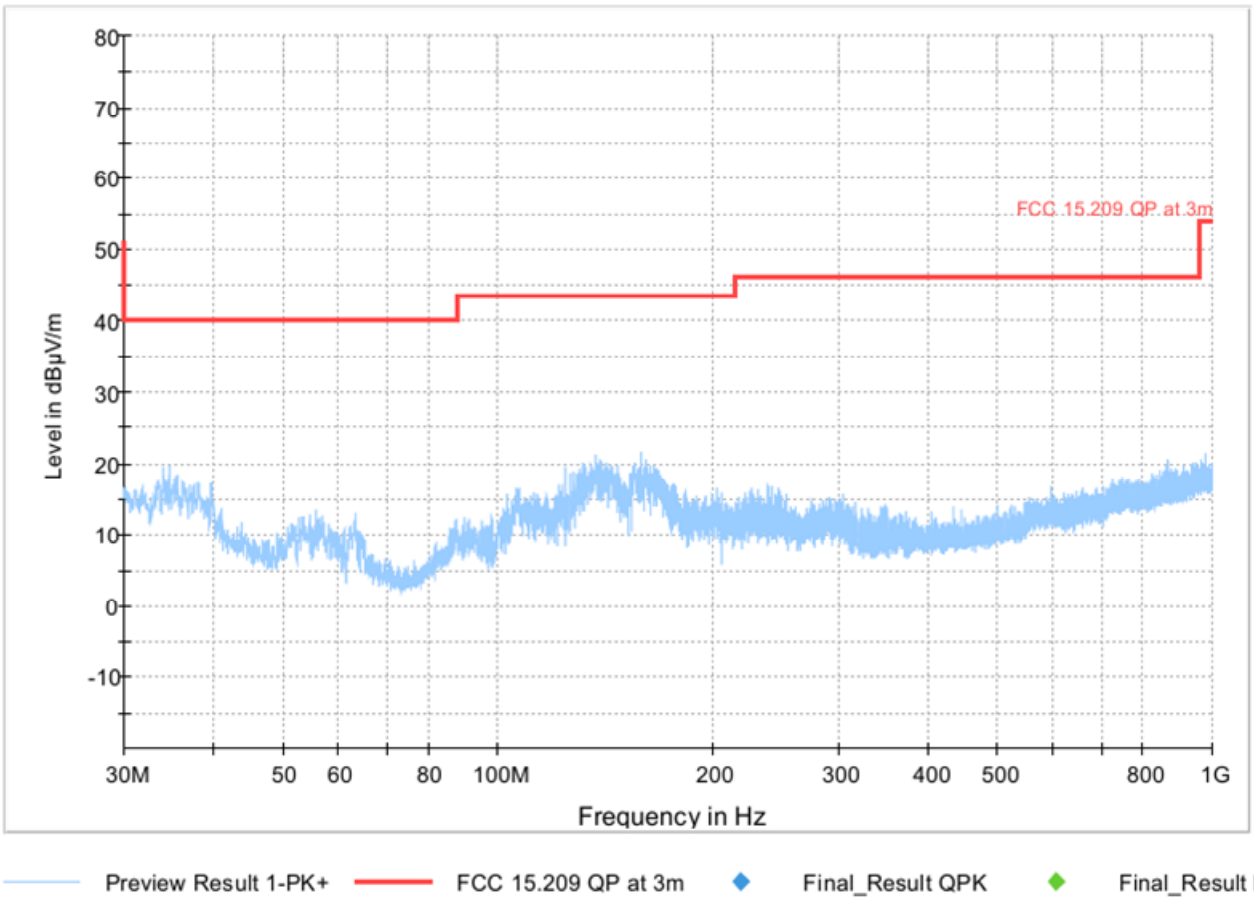
Plot # 8 Radiated Emissions: 18 – 26 GHz

Tx Frequency: 2440 MHz



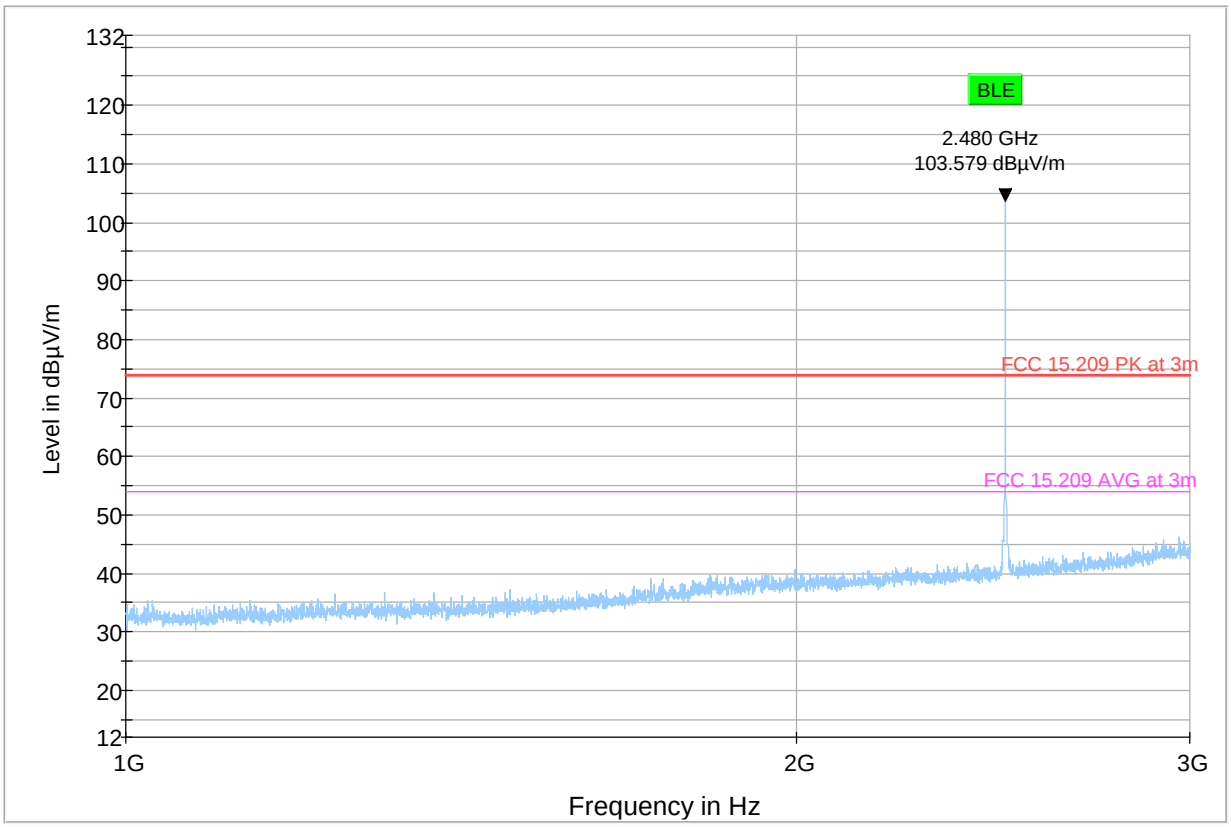
Plot # 9 Radiated Emissions: 30 MHz – 1 GHz

Tx Frequency: 2480 MHz



Plot # 10 Radiated Emissions: 1 – 3 GHz

Tx Frequency: 2480 MHz

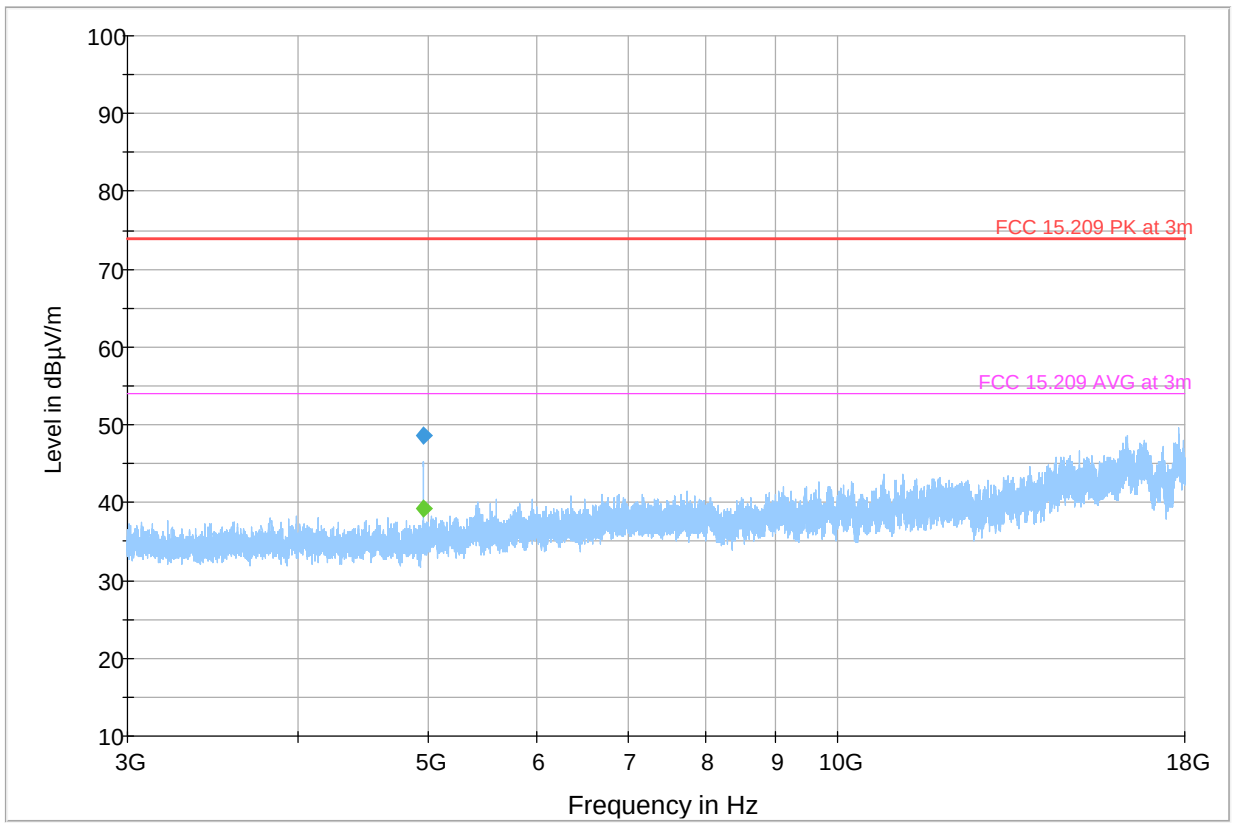


Plot # 11 Radiated Emissions: 3 – 18 GHz

Tx Frequency: 2480 MHz

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4959.250	---	39.19	53.98	14.79	500.0	1000.0	276.0	H	251.0	-6.5
4959.250	48.53	---	73.98	25.44	500.0	1000.0	276.0	H	251.0	-6.5



8.3 AC Power Line Conducted Emissions

8.3.1 Measurement according to ANSI C63.4

Analyzer Settings:

- RBW = 9 KHz (CISPR Bandwidth)
- Detector: Peak / Average for Pre-scan
- Quasi-Peak/Average for Final Measurements

8.3.2 Limits: §15.207 & RSS-Gen 8.8

FCC §15.207(a) & RSS-Gen 8.8

- Except as shown in paragraphs (b) and (c) of this section of the CFR, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table (1), as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

8.3.3 Test conditions and setup:

Ambient Temperature ©	EUT Set-Up #	EUT operating mode	Power line (L1, L2, L3, N)	Power Input
22° C	1		Line & Neutral	110V / 60Hz

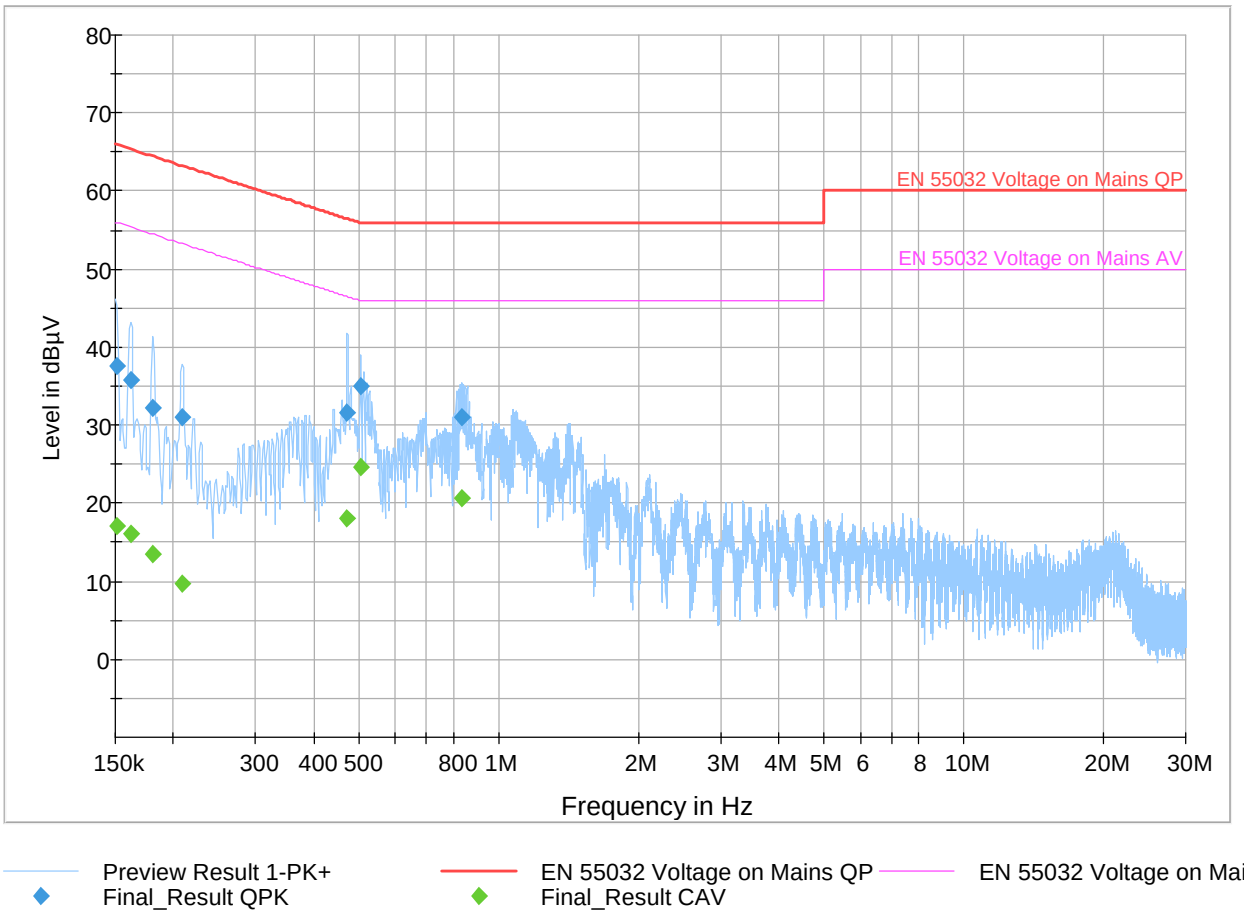
8.3.4 Measurement Result:

Plot #	Port	EUT Set-Up #:	EUT operating mode	Scan Frequency	Limit	Result
1	AC Mains	1	Op.1	150 kHz – 30 MHz	See section 8.2.2	Pass

8.3.5 Measurement Plots:

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.151	---	17.06	55.94	38.88	500.0	9.000	N	GND	0.6
0.151	37.67	---	65.94	28.27	500.0	9.000	N	GND	0.6
0.162	---	15.99	55.38	39.38	500.0	9.000	N	GND	0.6
0.162	35.74	---	65.38	29.63	500.0	9.000	N	GND	0.6
0.181	32.12	---	64.44	32.32	500.0	9.000	N	GND	0.5
0.181	---	13.44	54.44	41.01	500.0	9.000	N	GND	0.5
0.209	31.08	---	63.26	32.18	500.0	9.000	N	GND	0.4
0.209	---	9.64	53.26	43.62	500.0	9.000	N	GND	0.4
0.473	31.70	---	56.46	24.76	500.0	9.000	N	GND	0.2
0.473	---	18.04	46.46	28.42	500.0	9.000	N	GND	0.2
0.506	---	24.72	46.00	21.28	500.0	9.000	L1	GND	0.2
0.506	34.91	---	56.00	21.09	500.0	9.000	L1	GND	0.2
0.834	31.03	---	56.00	24.97	500.0	9.000	L1	GND	0.2
0.834	---	20.62	46.00	25.38	500.0	9.000	L1	GND	0.2



9 Test setup photos

Setup photos are included in supporting file name: "EMC_IBEAT_006_20001_Setup_Photos.pdf"

10 Test Equipment And Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
ACTIVE LOOP ANTENNA	ETS LINDGREN	6507	00161344	3 YEARS	10/26/2017
BILOG ANTENNA	TESEO	CBL 6141B	41106	3 YEARS	11/1/2017
HORN ANTENNA	EMCO	3115	00035111	3 YEARS	4/17/2019
HORN ANTENNA	ETS LINDGREN	3117	00215984	3 YEARS	1/26/2018
HORN ANTENNA	ETS LINDGREN	3116C	00169535	3 YEARS	09/24/2017
ESW. EMI TEST RECEIVER	R&S	ESW44	101715	3 YEARS	1/6/2020
THERMOMETER HUMIDITY MONITOR	CONTROL COMPANY	36934-164	181230565	2 YEARS	01/10/2019

Note: Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels. Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

11 History

Date	Report Name	Changes to report	Report prepared by
9/14/2020	EMC_IBEAT_006_20001_FCC_15.247_BLE_DTS	Initial Version	Issa Ghanma

<<< The End >>>