FCC Test Report

FOR:

Philips Respironics.

Model Number
1116426
With Cellular Modem Model Numbers:
200603C, 200604C

Product Description:
Continuous Positive Airway Pressure Device with Bluetooth Radio (BDR/EDR) with LTE Cat M Modem which sends and receives data on Band 4 and Band 13

FCC ID: THO-1116426

Per:
47 CFR: Part 27

REPORT #: EMC_PHIL4-066-20001_FCC_27

DATE: 2020-04-03

A2LA Accredited

IC recognized # 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

The BLUETOOTH trademarks are owned by Bluetooth SIG, Inc., U.S.A. and licensed to CETECOM Inc.
© Copyright by *CETECOM*

TABLE OF CONTENTS

1 ASSESSMENT 3

2 ADMINISTRATIVE DATA 4

2.1 IDENTIFICATION OF THE TESTING LABORATORY ISSUING THE EMC TEST REPORT 4
2.2 IDENTIFICATION OF THE CLIENT 4
2.3 IDENTIFICATION OF THE APPLICANT 4
2.4 IDENTIFICATION OF THE MANUFACTURER 4

3 EQUIPMENT UNDER TEST (EUT) 5

3.1 EUT SPECIFICATIONS 5
3.2 EUT SAMPLE DETAILS 6
3.3 ACCESSORY EQUIPMENT (AE) DETAILS 6
3.4 TEST SAMPLE CONFIGURATION 6
3.5 MODE OF OPERATION DETAILS 7
3.6 JUSTIFICATION FOR WORST CASE MODE OF OPERATION 7

4 SUBJECT OF INVESTIGATION 8

4.1 DATES OF TESTING: 8
4.2 MEASUREMENT UNCERTAINTY 8
4.3 ENVIRONMENTAL CONDITIONS DURING TESTING: 8

5 MEASUREMENT PROCEDURES 9

5.1 RADIATED MEASUREMENT 9
5.2 SAMPLE CALCULATIONS FOR FIELD STRENGTH MEASUREMENTS 11

6 MEASUREMENT RESULTS SUMMARY 12

6.1 FCC 27: 12

7 TEST RESULT DATA 13

7.1 ERP 13
7.2 RADIATED SPURIOUS EMISSIONS 14

8 TEST SETUP PHOTO 30

9 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTING 30

10 REVISION HISTORY 30

1 Assessment

The following device as further described in section 3 of this report was evaluated for radiated spurious emissions in simultaneous transmission of cellular and unlicensed radios according to criteria specified in the Code of Federal Regulations Title 47 parts 27.

Company	Description	Model #
Philips Respironics	Continuous Positive Airway Pressure Device with Bluetooth Radio (BDR/EDR)	1116426

Specifically this report shows that the product fulfills the radiated emission requirements, operating in simultaneous transmission mode, when plugged into a common host together with the Cellular Modem Models below.

Company	Description	Model #
Philips Respironics	LTE Cat M Modem sends and receives data on Band 4, 13	200603C Parent & 200604C Variant

Based on client declaration, the only differences in same accessory models is one is a diminutive version where parts are not stuffed to remove a USB port

No deficiencies were ascertained.

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2020-04-03	Compliance	Cindy Li (Lab Manager)	Cindy Li Digitally signed by cindy.li@cetecom.com DN: CN=cindy.li@cetecom.com Reason: I am approving this document Location: Date: 2020-04-22 14:52:02

Responsible for the Report:

Date	Section	Name	Signature
2020-04-03	Compliance	Yuchan Lu (Test Engineer)	Yuchan Lu Digitally signed by: Yuchan Lu DN: CN = Yuchan Lu email = Yuchan.Lu@cetecom.com C = US O = CETECOM Inc. OU = EMC Date: 2020.04.03 12:07:15 -07'00'

The test results of this test report relate exclusively to the test item specified in Section3.
CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

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
Lab Manager:	Cindy Li
Responsible Project Leader:	Cathy Palacios

2.2 Identification of the Client

Client's Name:	Philips Respironics
Street Address:	1740 Golden Mile Highway
City/Zip Code	Monroeville, PA 15146
Country	USA

2.3 Identification of the Applicant

Client's Name:	Philips Respironics
Street Address:	1001 Murry Ridge Lane
City/Zip Code	Murrysville, PA 15668
Country	USA

2.4 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:	1116426
Cellular Modem Model #:	200603C, 200604C
Firmware Version Identification Number (FVIN):	N/A
Hardware Version Identification Number (HVIN):	200603C, 200604C
HW Version:	01
SW Version :	B4.00.03.3075
Product Marketing Name (PMN):	DreamStation Cellular Modem
Antenna Information as declared:	● Max gain: LTE Band 4: -0.51 dBi LTE Band 13: 1.32 dBi
Other Radios included in the device:	❖ BT • Module name: Broadcom • Module number: 1116426 • FCC ID: THO1116426
Power Supply/ Rated Operating Voltage Range:	Low 100 VAC, Nominal 115 VAC, High 240 VAC
Operating Temperature Range:	Low 5º C, Nominal 25º C, High 35º C
Sample Revision	☐Prototype Unit; ☐Production Unit; ■Pre-Production
EUT Dimensions(mm):	15 x 65 x 48
Weight(grams):	200
EUT Diameter	■ < 60 cm ☐ Other _____

Module Information	
Module Name:	u-blox
Model Number:	SARA-R410M-02B
FCC ID:	XPY2AGQN4NNN

3.2 EUT Sample details

EUT #	IMEI number	HW Version	SW Version	Notes/Comments
1	359215108568636	01	B4.00.03.3075	Radiated Measurement

3.3 Accessory Equipment (AE) Details

AE #	Comments
1	DreamStation Hum Core Pack DOM Base, Manufacture: Philips Respironics Inc, Model: DSXHCP, Serial Number: H2692984482AB
2	AC/DC Adapter, Manufacture: Delta Electronics Inc. Model: MDS-065AAC12 A, S/N: 6CTW59G0043

3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT# 1 + AE# 1 + AE# 2	Worst Case

3.5 Mode of Operation details

Mode of Operation	Description of Operating modes	Additional Information
Op. 1	Cellular and BT Co-Transmission	Cellular was tested on Low, Mid, High Channels at the maximum power in a co-transmission mode. Special commands through command window used to configure the Bluetooth Mid channel provided by the client that will not be available to the end user For radiated measurements: The internal antenna was connected.

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 at the maximum power simultaneous transmission with Bluetooth Mid channel. Which it is the worst case of the radios supported, based on the maximum average conducted output power from the reports.

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

4 Subject of Investigation

The objective of the evaluation conducted by CETECOM Inc. is to support a request for new equipment authorization under **FCC ID:** THO-1116426

The pre-certified module to be integrated (SARA-R410M-02B) as described in Section 3, Radiated Spurious Emissions test was performed. Results have been checked to meet limits per Code of Federal Regulations Title 47 parts 27.

The conducted module test data that can be obtained under the **FCC Filing ID:** XPY2AGQN4NNN is applicable for the host described in section 3.

4.1 Dates of Testing:

02/19/2020

4.2 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 30MHz	±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)

4.3 Environmental Conditions during Testing:

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

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

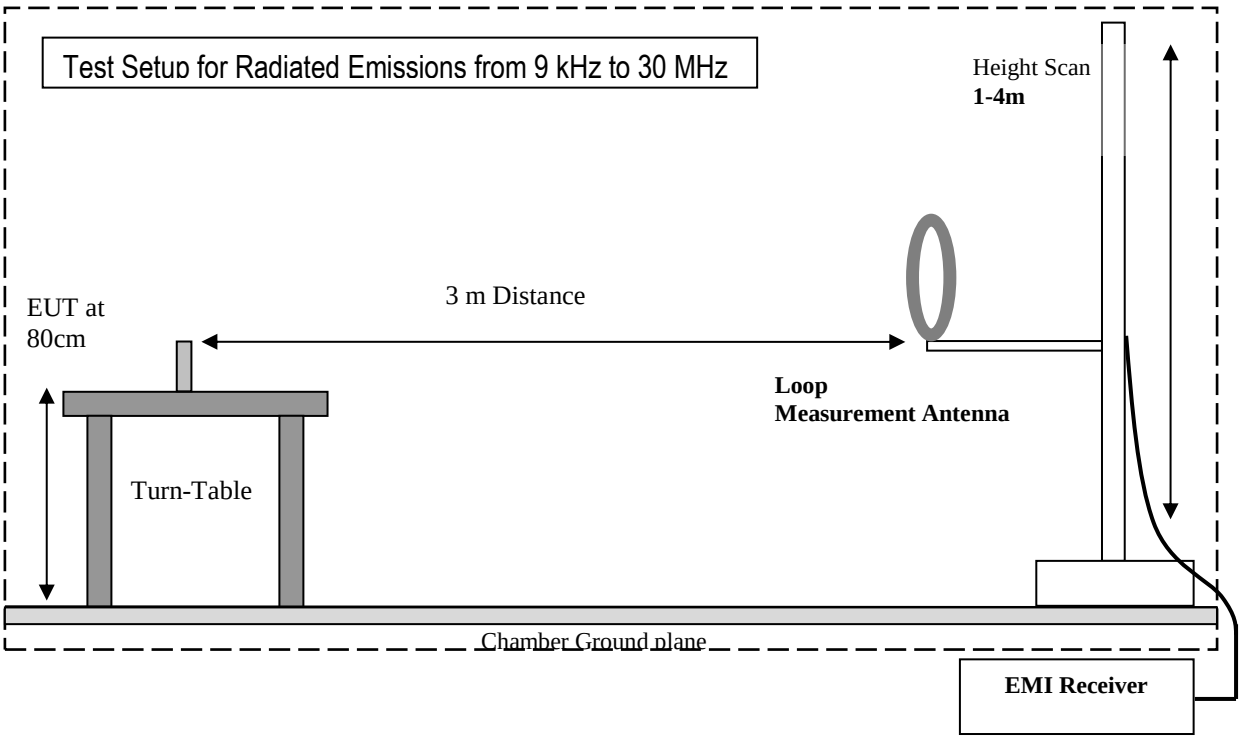
Deviating test conditions are indicated at individual test description where applicable.

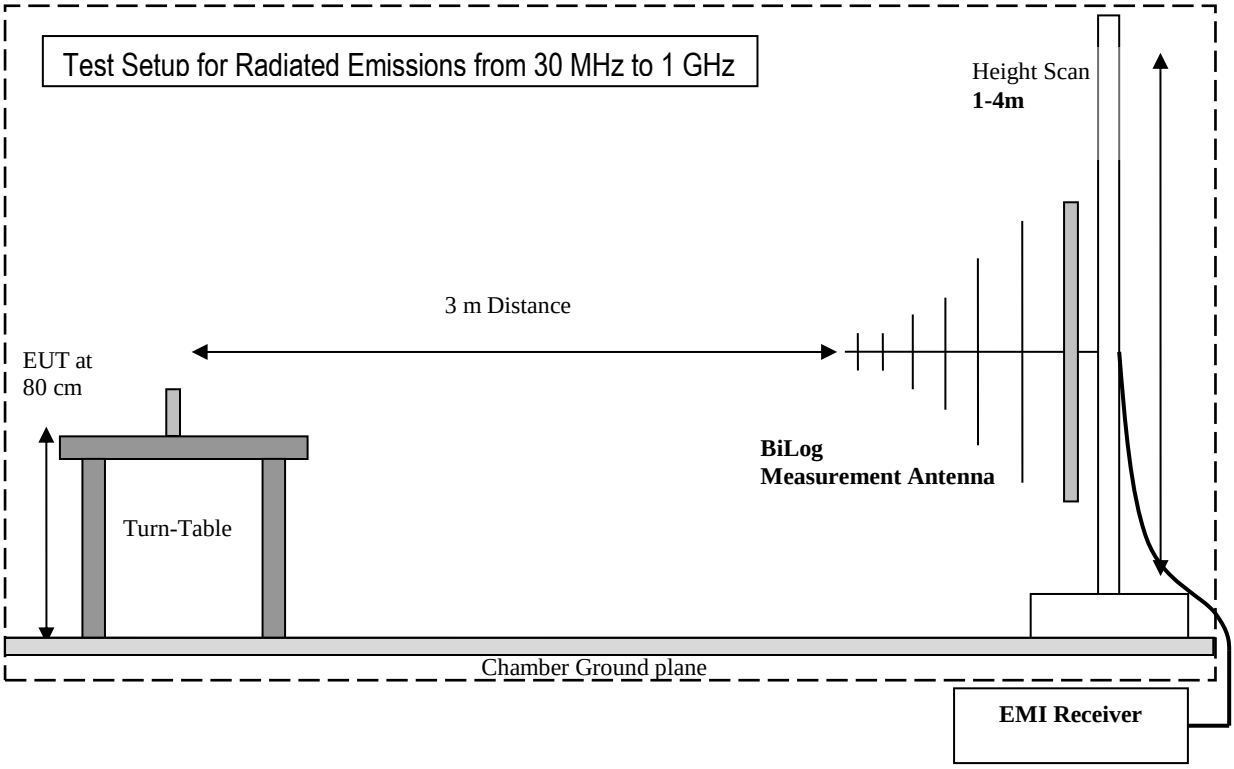
5 Measurement Procedures

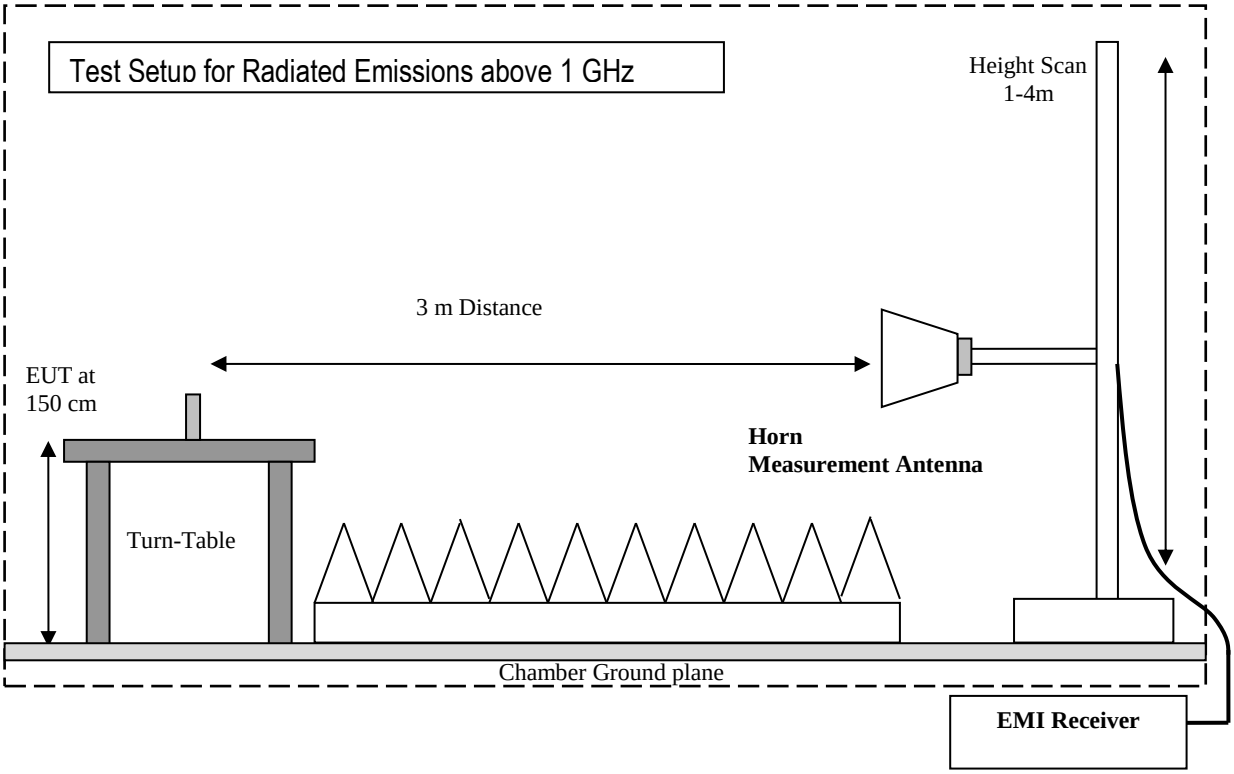
Testing is performed according to the guidelines provided in FCC publication (KDB) 971168 D01 v03 – "Measurement Guidance for Certification of Licensed Digital Transmitters" and according to ANSI C63.26 as detailed below.

5.1 Radiated Measurement

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions 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.




Test Setup for Radiated Emissions from 30 MHz to 1 GHz
Height Scan
1-4m
3 m Distance
EUT at
80 cm
BiLog
Measurement Antenna
Turn-Table
Chamber Ground plane
EMI Receiver


Test Setup for Radiated Emissions above 1 GHz
Height Scan
1-4m
3 m Distance
EUT at
150 cm
Horn
Measurement Antenna
Turn-Table
Chamber Ground plane
EMI Receiver

5.2 Sample Calculations for Field Strength Measurements

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

- Measured reading in dBµV
- Cable Loss between the receiving antenna and SA in dB and
- 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

6 Measurement Results Summary

6.1 FCC 27:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046; §27.50 (d)	RF Output Power	Nominal	-	☐	☐	☐	■	Note 1 Note 2
§2.1055; §27.54	Frequency Stability	Nominal	-	☐	☐	☐	■	Note 1 Note 2
§2.1049; §27.53	Occupied Bandwidth	Nominal	-	☐	☐	☐	■	Note 1 Note 2
§2.1051; §27.53	Band Edge Compliance	Nominal	-	☐	☐	☐	■	Note 1 Note 2
§2.1051; §27.53	Conducted Spurious Emissions	Nominal	-	☐	☐	☐	■	Note 1 Note 2
§2.1053; §27.53(g); §27.53(h)	Radiated Spurious Emissions	Nominal	Op.1	■	☐	☐	☐	Complies

Note 1: NA= Not Applicable; NP= Not Performed.
Note 2: Leveraged from module certification FCC ID: XPY2AGQN4NNN

7 Test Result Data

7.1 ERP

Band	Frequency Range (MHz)	Power conducted (W)	Emission Designator	Antenna Gain (dBi)	gain linear	EIRP[1] (W)	ERP[1] (W)	Frequency deviation (ppm)	Limit ERP (W)
LTE 4	1710 – 1755	0.245	1M24G7D	1.32	1.355	0.332	-	1.0	1
LTE 13	777 – 787	0.275	1M21W7D	-0.51	0.889	0.245	0.149	1.0	3
LTE 13	779.5 – 784.5	0.173	1M34W7D	-0.51	0.889	0.154	0.094	0.002	3

Note 1: ERP are calculated from maximum power in grant of cellular module SARA-R410M-02B adding the maximum gain of the utilized cellular antenna per operational description.

7.2 Radiated Spurious Emissions

7.2.1 Measurement according to FCC: CFR 47 Part 2.1053; Part 27.53 utilizing KDB 971168 D01 Power Meas License Digital Systems v03, and according to ANSI C63.26 2017

Spectrum Analyzer Settings for FCC 27

Frequency Range	30MHz – 1 GHz	1 – 2.7 GHz	2.7 – 18 GHz	18 – 19.1 GHz
Resolution Bandwidth	100 kHz	1 MHz	1 MHz	1 MHz
Video Bandwidth	100 kHz	1 MHz	1 MHz	1 MHz
Detector	Peak	Peak	Peak	Peak
Trace Mode	Max Hold	Max Hold	Max Hold	Max Hold
Sweep Time	Auto	Auto	Auto	Auto

7.2.2 Limits:

- **FCC Part 27.53 (g), and Part 27.53 (h)**

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB = (-13dBm)

7.2.3 Test conditions and setup:

Ambient Temperature (C)	**EUT operating mode**	**Power Input**
25.7	Op. 1	110 VAC

7.2.4 Measurement Plots:

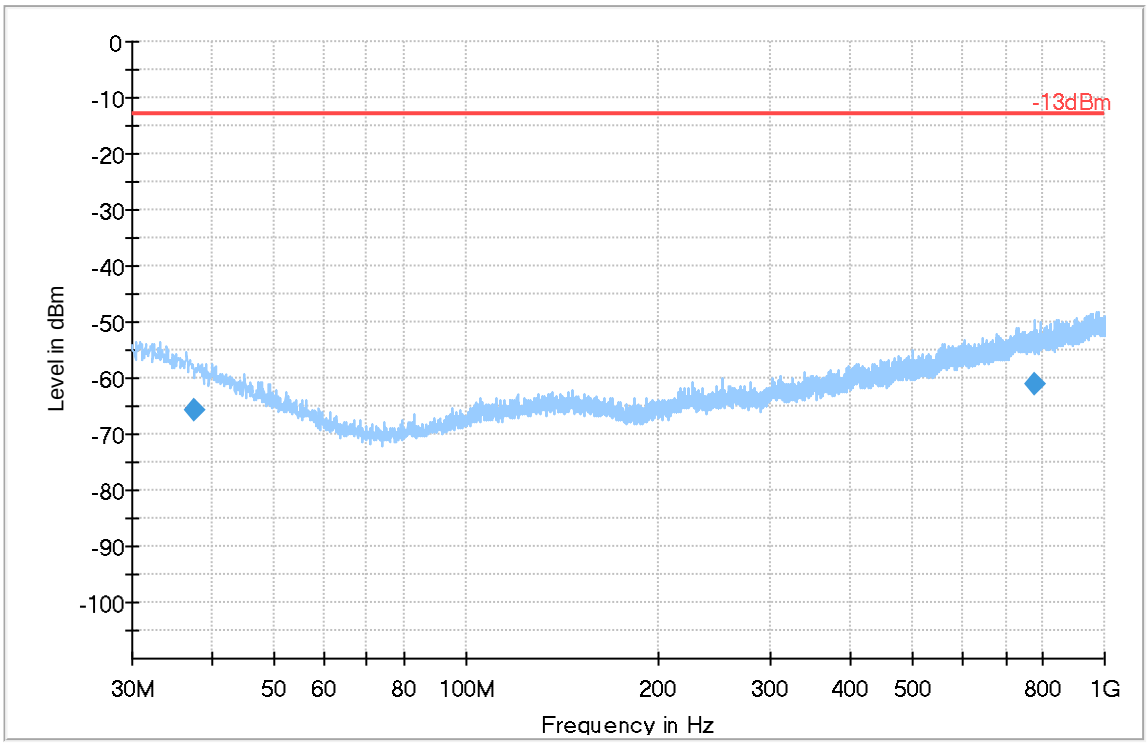
LTE Band 4

Plot # 1 Radiated Emissions: 30 MHz - 1 GHz

Channel: Low

Final_Result

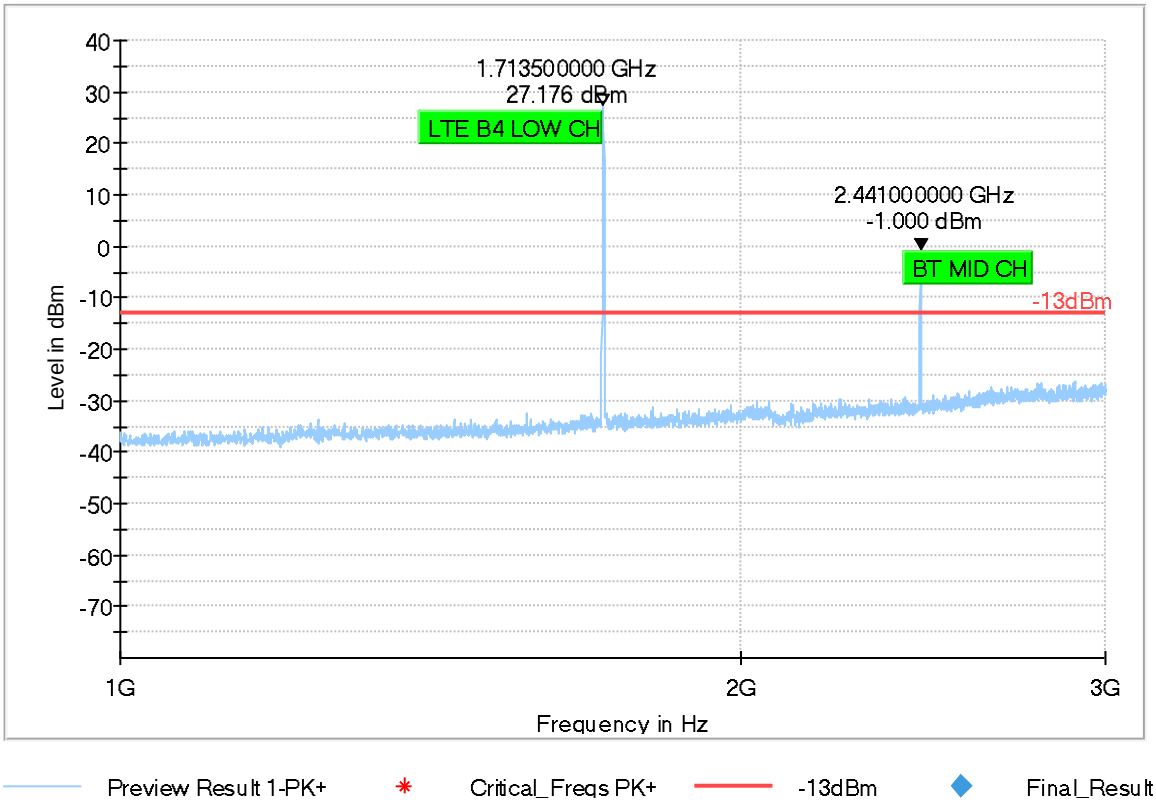
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Corr. (dB)	Comment
37.445	-65.763	-13.00	52.76	200.0	100.000	235.0	H	262.0	-87.1	5:19:40 PM - 2/19/2020
775.691	-61.111	-13.00	48.11	200.0	100.000	292.0	V	251.0	-82.8	5:22:50 PM - 2/19/2020



Preview Result 1-PK+ Critical_Freqs PK+ -13dBm Final_Result RMS

Plot # 2 Radiated Emissions: 1 GHz - 3 GHz

Channel: Low

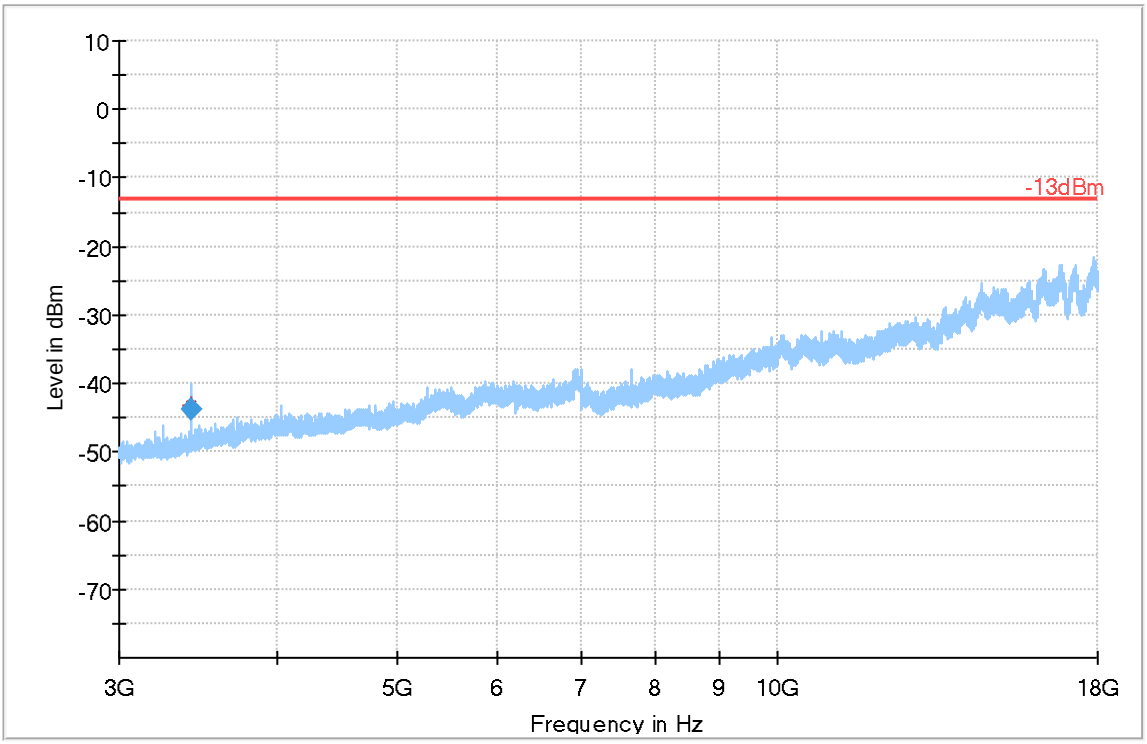


Plot # 3 Radiated Emissions: 3 GHz - 18 GHz

Channel: Low

Final_Result

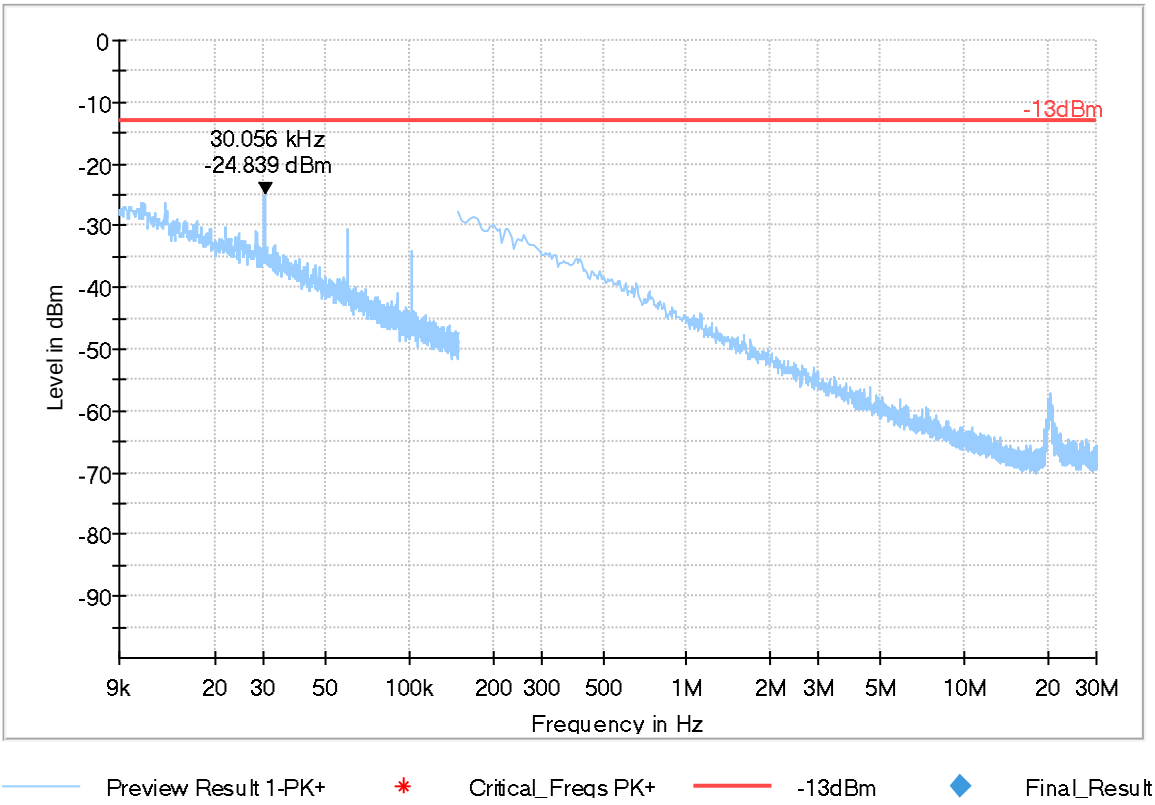
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Corr. (dB)	Comment
3425.654	-43.659	-13.00	30.66	200.0	1000.000	310.0	V	105.0	-103.9	2:55:07 PM - 2/19/2020



Preview Result 1-PK+ Critical_Freqs PK+ -13dBm Final_Result RMS

Plot # 4 Radiated Emissions: 9 kHz - 30 MHz

Channel: Mid

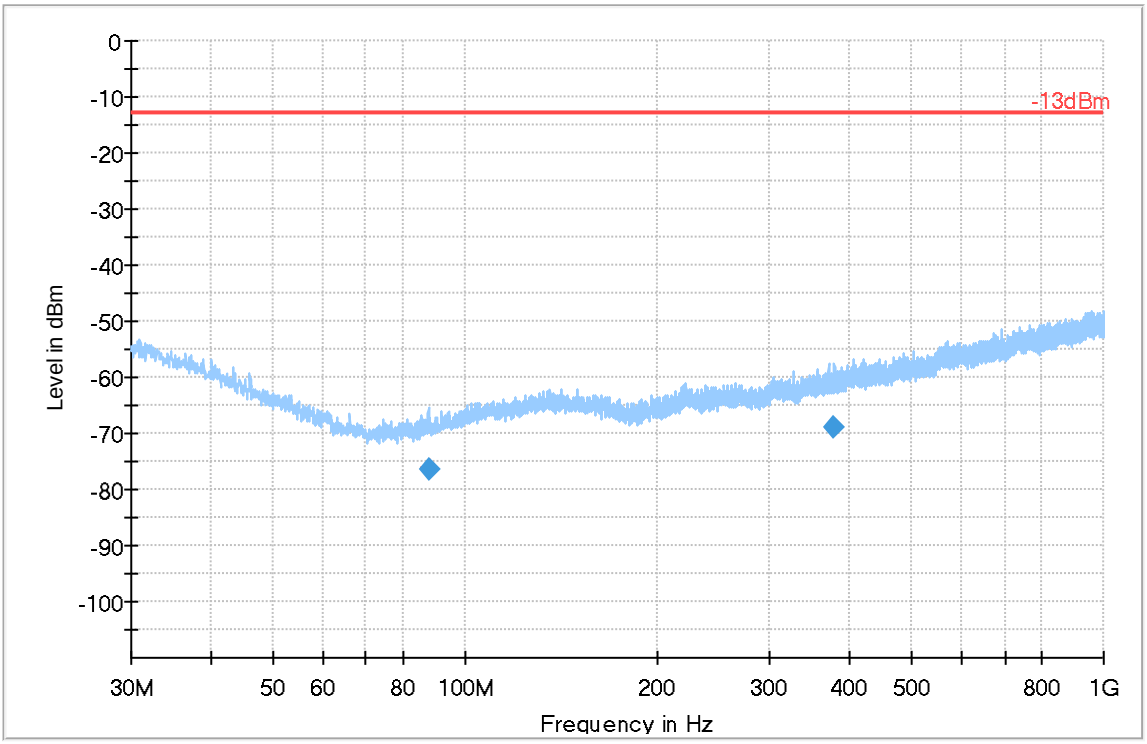


Plot # 5 Radiated Emissions: 30 MHz – 1 GHz

Channel: Mid

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Corr. (dB)	Comment
87.819	-76.318	-13.00	63.32	200.0	100.000	260.0	V	267.0	-97.8	4:53:50 PM - 2/19/2020
378.824	-68.948	-13.00	55.95	200.0	100.000	214.0	H	150.0	-90.4	4:50:38 PM - 2/19/2020



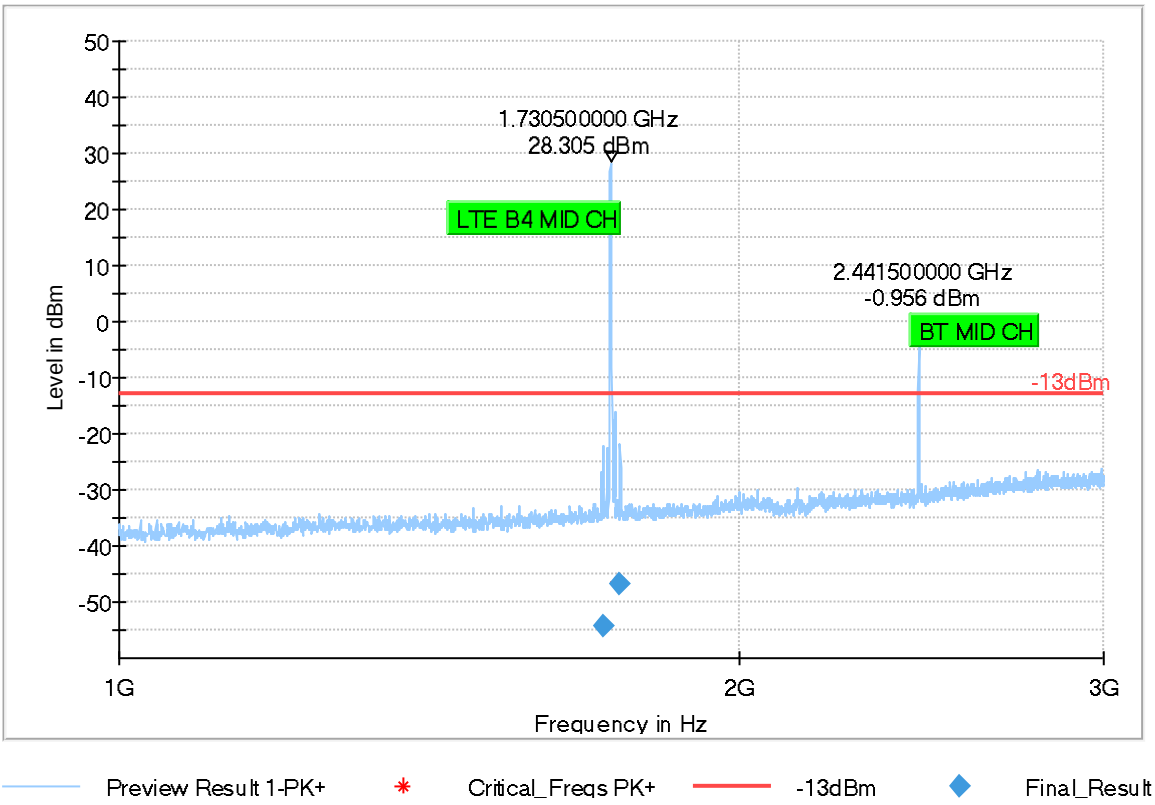
Preview Result 1-PK+ Critical_Freqs PK+ -13dBm Final_Result RMS

Plot # 6 Radiated Emissions: 1 GHz - 3 GHz

Channel: Mid

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Corr. (dB)	Comment
1716.940	-54.116	-13.00	41.12	500.0	1000.000	100.0	V	41.0	-91.8	1:46:23 PM - 2/19/2020
1749.522	-46.736	-13.00	33.74	500.0	1000.000	100.0	H	344.0	-91.6	1:49:56 PM - 2/19/2020

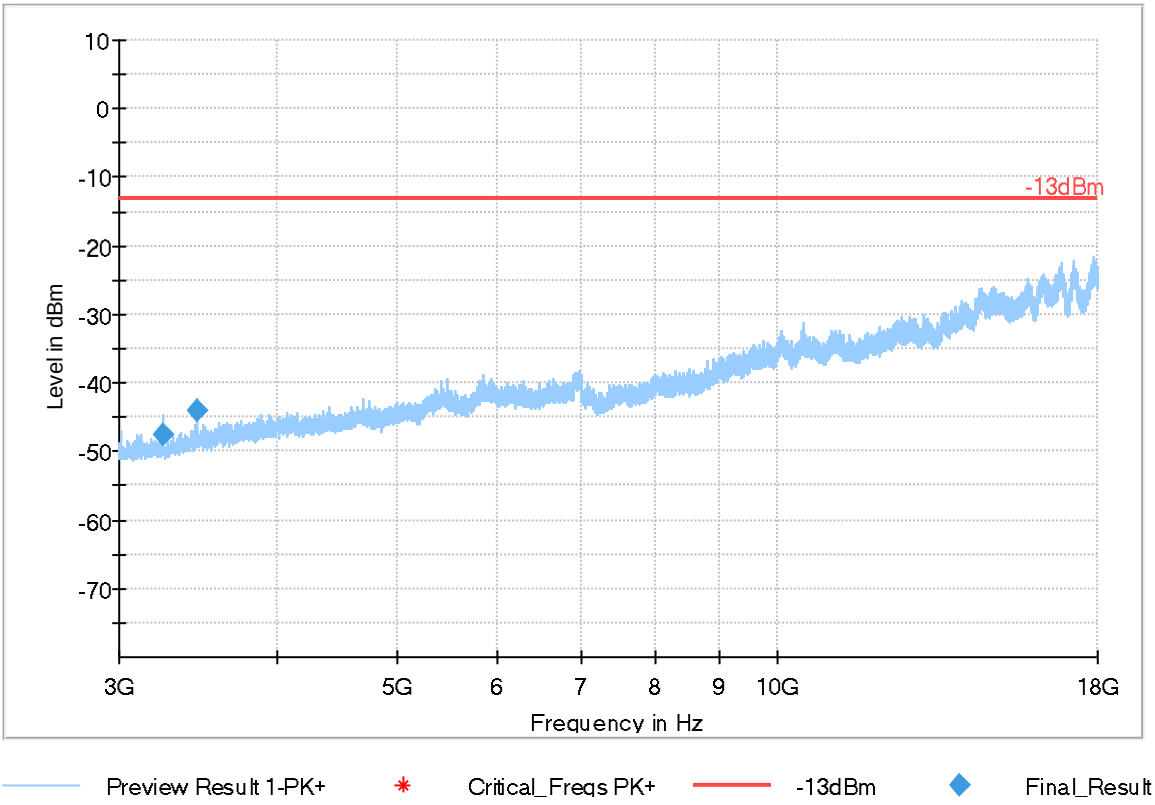


Plot # 7 Radiated Emissions: 3 GHz – 18GHz

Channel: Mid

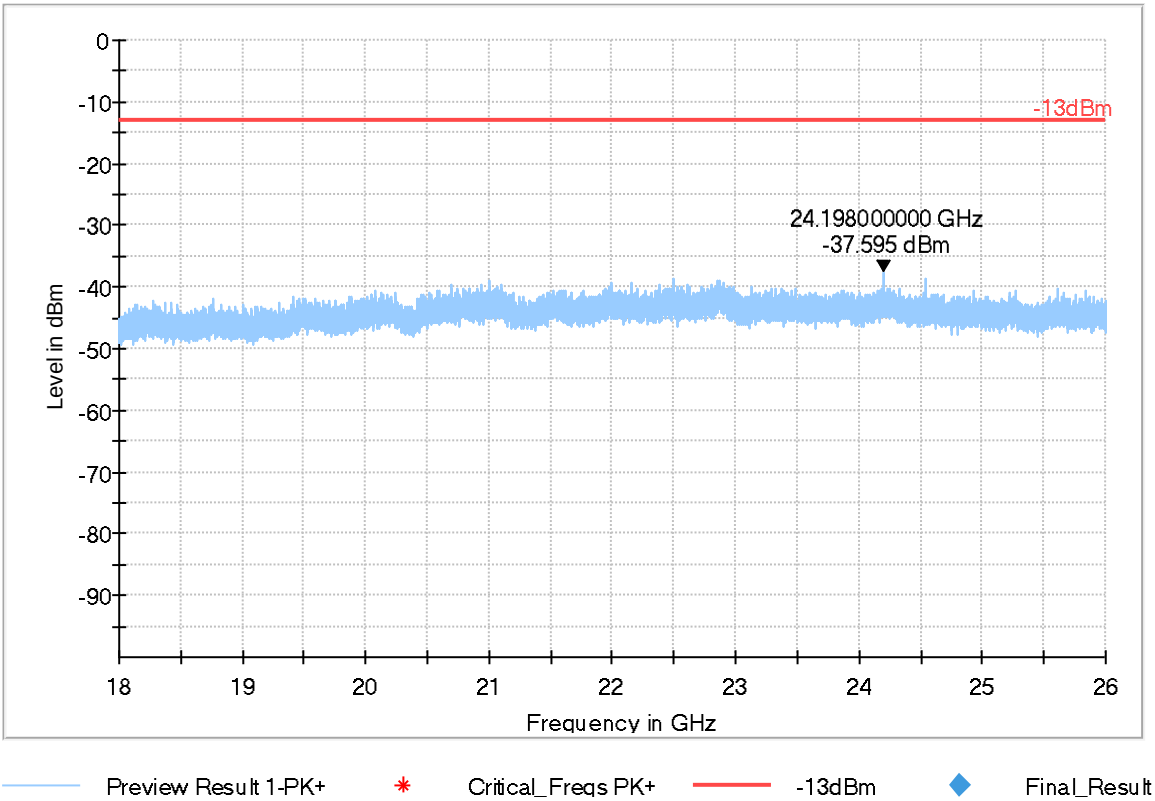
Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Corr. (dB)	Comment
3254.682	-47.694	-13.00	34.69	200.0	1000.000	184.0	V	128.0	-104.6	2:43:07 PM - 2/19/2020
3460.803	-44.052	-13.00	31.05	200.0	1000.000	259.0	V	108.0	-103.8	2:39:49 PM - 2/19/2020



Plot # 8 Radiated Emissions: 18 GHz – 26 GHz

Channel: Mid

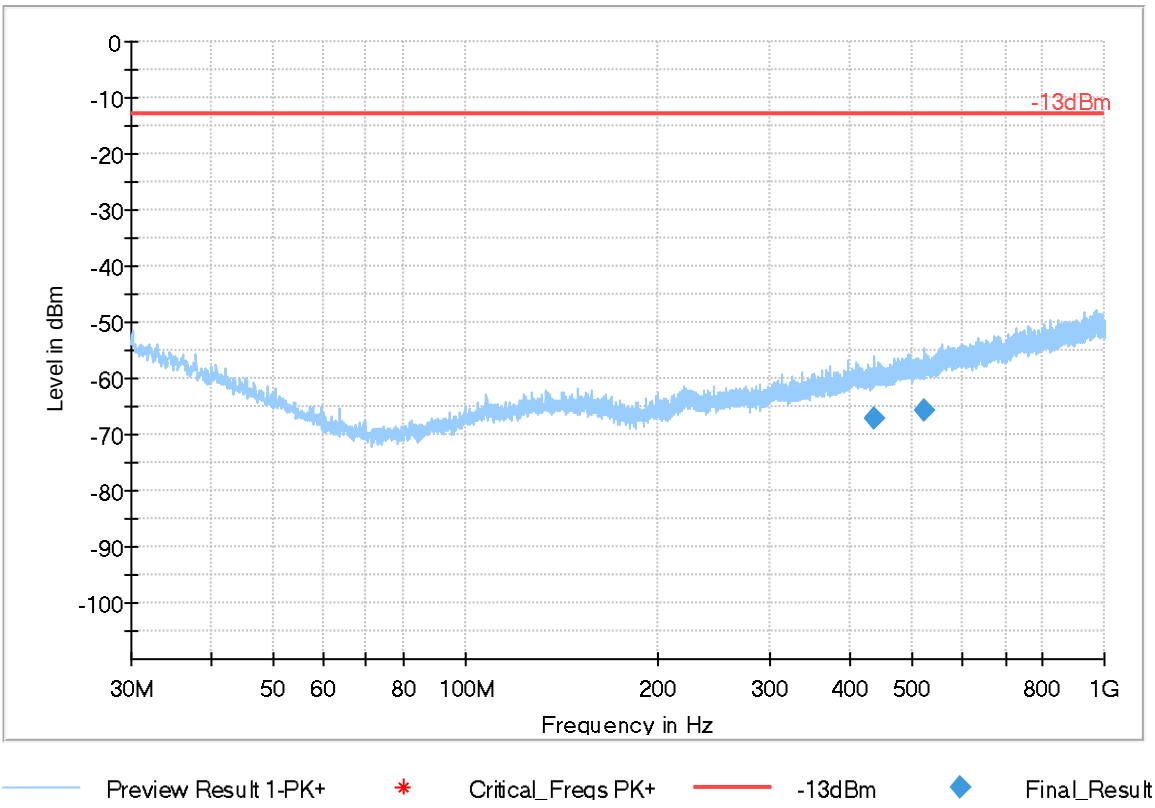


Plot # 9 Radiated Emissions: 30 MHz - 1 GHz

Channel: High

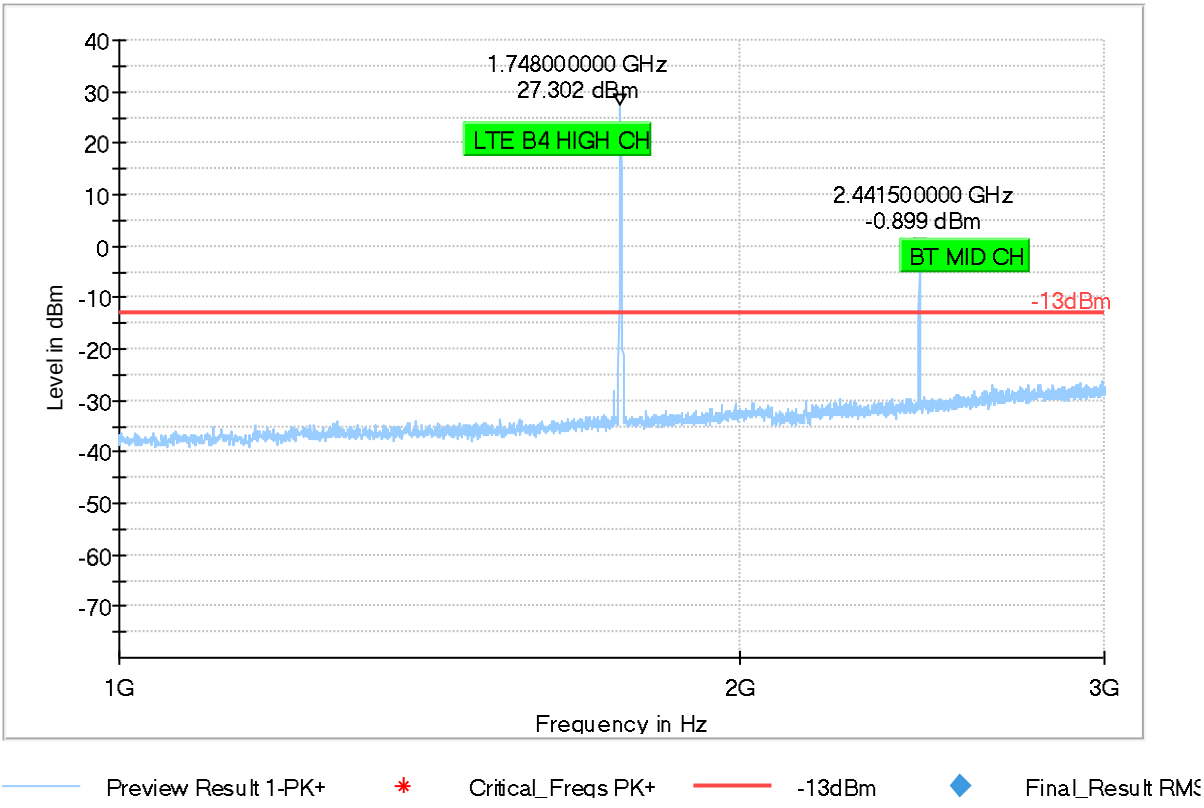
Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Corr. (dB)	Comment
436.765	-67.060	-13.00	54.06	200.0	100.000	229.0	H	248.0	-88.8	5:38:02 PM - 2/19/2020
520.735	-65.764	-13.00	52.76	200.0	100.000	227.0	H	-25.0	-87.3	5:34:54 PM - 2/19/2020



Plot # 10 Radiated Emissions: 1 GHz - 3 GHz

Channel: High

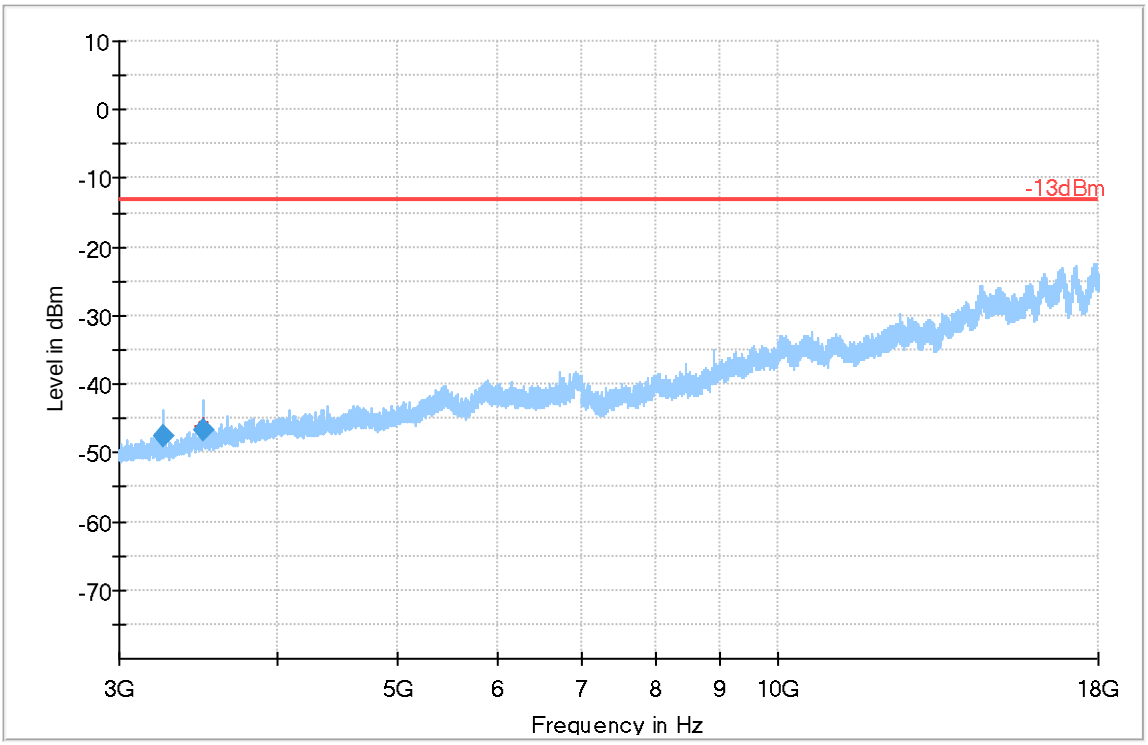


Plot # 11 Radiated Emissions: 3 GHz - 18 GHz

Channel: High

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Corr. (dB)	Comment
3254.449	-47.670	-13.00	34.67	200.0	1000.000	185.0	V	128.0	-104.6	2:28:59 PM - 2/19/2020
3495.293	-46.697	-13.00	33.70	200.0	1000.000	274.0	V	105.0	-103.6	2:25:41 PM - 2/19/2020

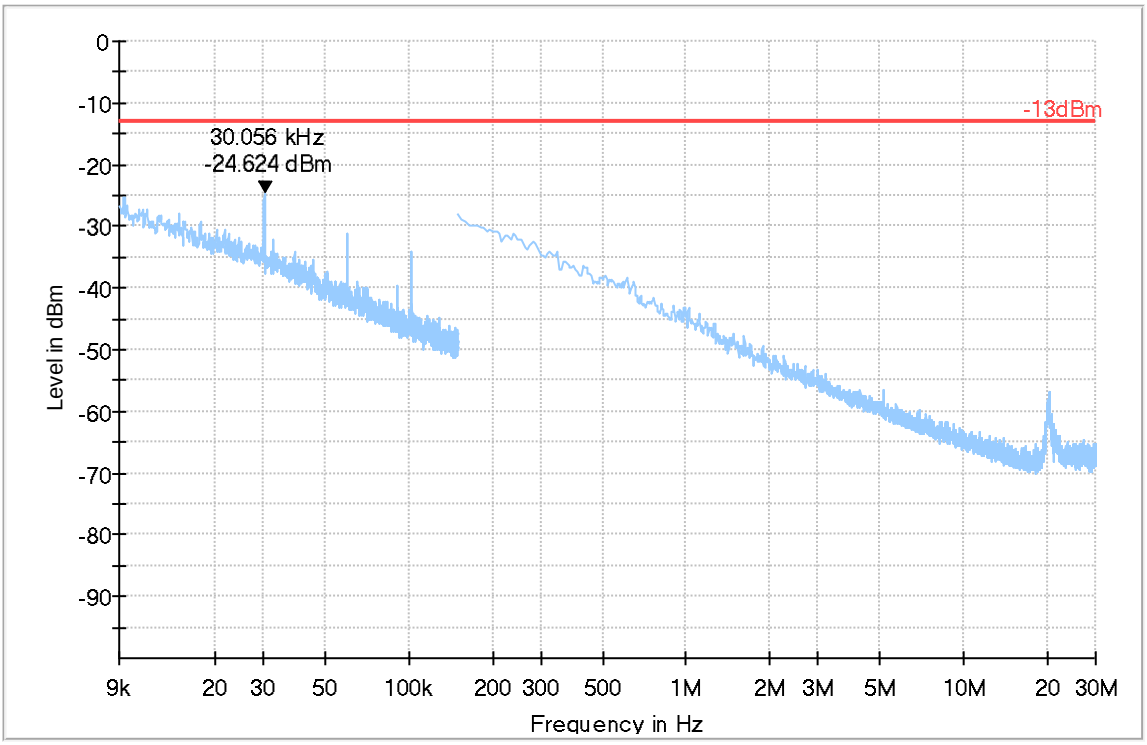


Preview Result 1-PK+ * Critical_Freqs PK+ -13dBm ◆ Final_Result RMS

LTE Band 13

Plot # 12 Radiated Emissions: 9 kHz - 30 MHz

Channel: Mid



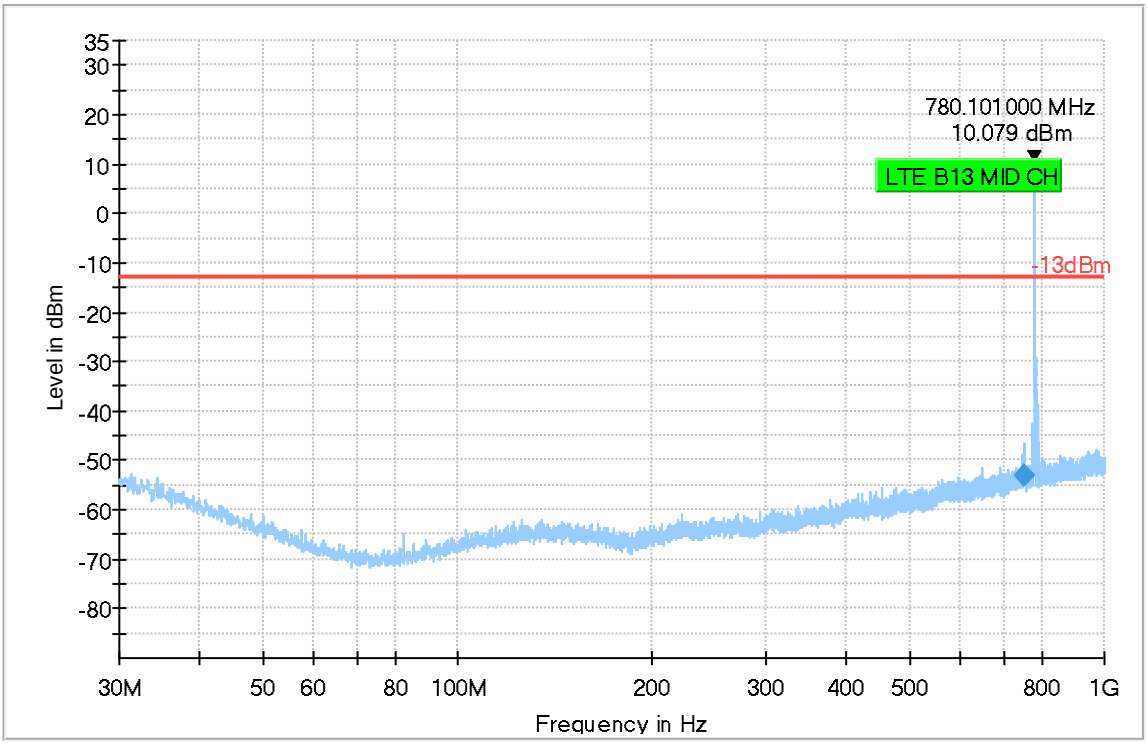
Preview Result 1-PK+ Critical_Freqs PK+ -13dBm Final_Result RMS

Plot # 13 Radiated Emissions: 30 MHz – 1GHz

Channel: Mid

Final_Result

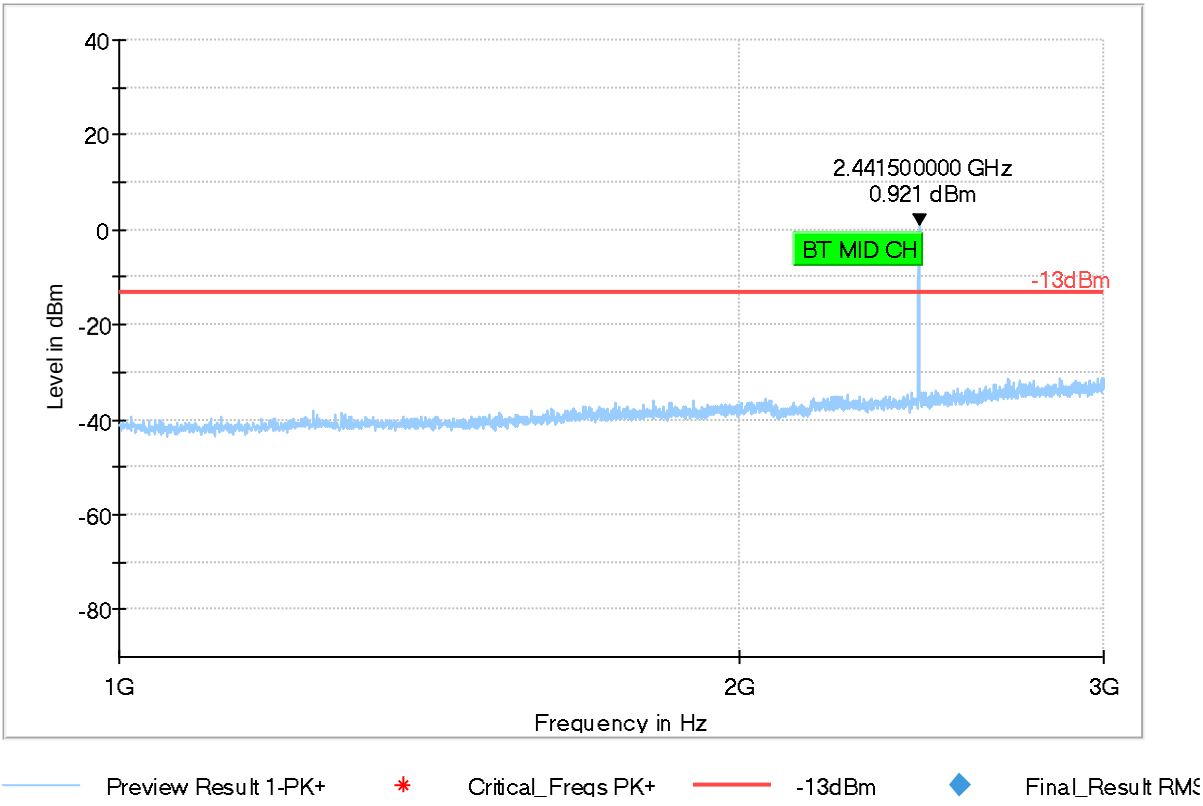
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Corr. (dB)	Comment
750.233	-53.197	-13.00	40.20	500.0	100.000	240.0	V	304.0	-82.9	4:33:29 PM - 2/19/2020



Preview Result 1-PK+ Critical_Freqs PK+ -13dBm Final_Result RMS

Plot # 14 Radiated Emissions: 1 GHz - 3 GHz

Channel: Mid

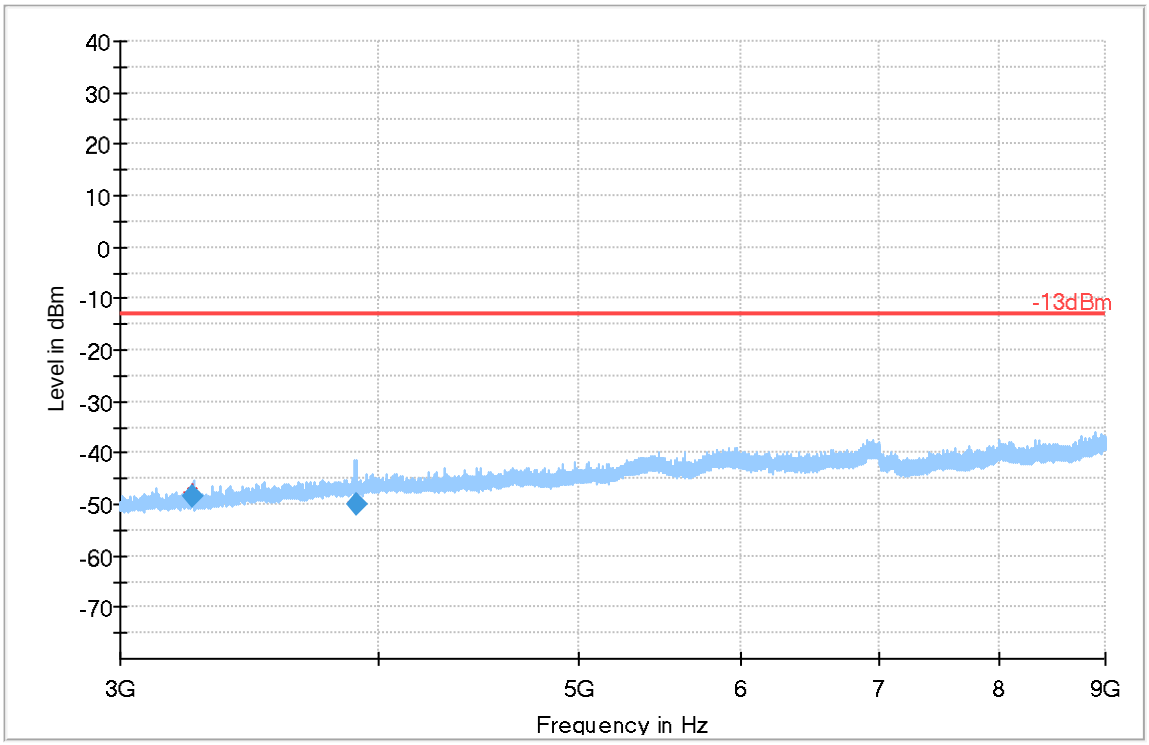


Plot # 15 Radiated Emissions: 3 GHz – 9 GHz

Channel: Mid

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Corr. (dB)	Comment
3254.719	-48.258	-13.00	35.26	500.0	1000.000	184.0	V	126.0	-104.6	3:13:57 PM - 2/19/2020
3901.595	-49.974	-13.00	36.97	500.0	1000.000	107.0	H	49.0	-102.3	3:10:30 PM - 2/19/2020



Preview Result 1-PK+ Critical_Freqs PK+ -13dBm Final_Result RMS

8 Test setup photo

Setup photos are included in supporting file name: “EMC_PHIL4-066-20001_Setup_Photos.pdf”

9 Test Equipment And Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
PASSIVE LOOP ANTENNA	ETS LINDGREN	6507	00161344	3 YEARS	10/26/2017
BILOG ANTENNA	TESEO	CBL 6141B	41106	3 YEARS	11/01/2017
HORN ANTENNA	EMCO	3115	00035114	3 YEARS	07/31/2017
HORN ANTENNA	ETS LINDGREN	3117	00169547	3 YEARS	08/08/2017
HORN ANTENNA	ETS LINDGREN	3116C	00169535	3 YEARS	09/24/2017
UNIVERSAL RADIO COMMUNICATION TESTER	R&S	CMU 200	101821	3 YEARS	07/06/2017
WIDEBAND RADIO COMMUNICATION	R&S	CMW500	127068	3 YEARS	07/01/2017
SIGNAL ANALYZER	R&S	FSV 40	101022	2 YEARS	07/15/2019
COMPACT DIGITAL BAROMETER	CONTROL COMPANY	35519-055	91119547	3 YEARS	06/20/2017
DIGITAL THRMOMETER	CONTROL COMPANY	36934-164	191871994	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.

10 Revision History

Date	Report Name	Changes to report	Report prepared by
2020-04-03	EMC_ PHIL4-066-20001_FCC_27	Initial version	Yuchan Lu

<<The End>>