

ISED CABid: ES1909

Test Report No:
 NIE: 70437RRF.003A2

Partial Test Report

USA FCC 15.31(h), 27, 15.209, 15.247

CANADA RSS-130, RSS-139, RSS-Gen, RSS-247

(*) Identification of item tested	AirCurve 11
(*) Trademark	ResMed
(*) Model and /or type reference	39428
Other identification of the product	HW version: 1.0 SW version: SW04600 FCC ID: 2ACHL-AIR11M1B IC: 9103A-AIR11M1B
(*) Features	LTE Cat-M1, BLE
Applicant	ResMed Pty Ltd. 1 Elizabeth Macarthur Drive, Bella Vista, NSW 2153 Australia
Test method requested, standard	USA FCC Part 15.31(h) (10-1-20 Edition): Measurement standard. USA FCC Part 27 (10-1-20 Edition): Miscellaneous Wireless Communications Services. USA FCC Part 15.209 (10-1-20 Edition): Radiated emission limits; general requirements. USA FCC Part 15.247 (10-1-20 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. CANADA RSS-130 Issue 2, Feb. 2019. CANADA RSS-139 Issue 3, Jul. 2015. CANADA RSS-Gen Issue 5, Feb 2021. CANADA RSS-247 Issue 2, Feb. 2017. -Transmitter out of band radiated emissions with simultaneous transmissions. Guidance for Performing Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid Systems Devices Operating Under Section 15.247 of the FCC Rules. 558074 D01 Meas Guidance v05r02 dated April 2, 2019. KDB 971168 D01 Power Meas License Digital Systems v03r01, April. 2018. ANSI C63.26-2015.
Approved by (name / position & signature)	Rafael López Martín EMC Consumer & RF Lab. Manager
Date of issue	2022-05-31
Report template No	FDT08_24 (*) "Data provided by the client"

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Competences and guarantees

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DEKRA Testing and Certification S.A.U is a FCC-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

DEKRA Testing and Certification S.A.U is an ISED-recognized accredited testing laboratory, CABid: ES1909, with the appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample of the model 39428 is a bilevel device with integrated cellular and Bluetooth connectivity.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Reception
70437B/003	AirCurve 11	39428	22211762279	2021/11/19
70437B/006	AC Adapter	390001	210002829XB	2021/11/19
63467B/015	ClimateLine Tube	AIR11	22201142041	2020/10/14

Sample S/01 has undergone the following test(s): The radiated tests indicated in Appendix A.

Test sample description

Ports.....:	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾		
	Power		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Supplementary information to the ports.....:	-						
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	<input checked="" type="checkbox"/>	AC: 100-240V~50-60 Hz 1.0-1.5A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/>	AC: 115V~400Hz 1.5A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	DC:						
Rated Power.....:	24 VDC, 3.75A						
Clock frequencies.....:	N/A						
Other parameters	390001 (PSU Model Number)						
Software version.....:	SW04600 (DUT)						
Hardware version	1.0 (DUT)						
Dimensions in cm (W x H x D) ...:	138.5 mm x 259.4 mm x 94.5 mm						
Mounting position	<input checked="" type="checkbox"/>	Table top equipment					
	<input type="checkbox"/>	Wall/Ceiling mounted equipment					
	<input type="checkbox"/>	Floor standing equipment					
	<input type="checkbox"/>	Hand-held equipment					
	<input type="checkbox"/>	Other:					
Modules/parts.....:	Module/parts of test item		Type	Manufacturer			
	Wireless Module		EXS62-W	Thales			
	Bluetooth LE		EFR32BG1	SiLabs			
Accessories (not part of the test item)	Description		Type	Manufacturer			
	Power Supply Unit 390001		N/A	ResMed			
Documents as provided by the applicant	Description		File name	Issue date			
	-						

⁽³⁾ Only for Medical Equipment

Identification of the client

ResMed Pty Ltd.
1 Elizabeth Macarthur Drive,
Bella Vista, NSW 2153
Australia

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2021-12-10
Date (finish)	2021-12-13

Document history

Report number	Date	Description
70437RRF.003	2022-03-16	First release.
70437RRF.003A1	2022-05-06	First modification: added clarification for supported power supply. This modification test report cancels and replaces the test report 70437RRF.003.
70437RRF.003A2	2022-05-31	Second modification: correction on antenna value typo for Band 66. This modification test report cancels and replaces the test report 70437RRF.003A1.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Javier Miguel Nadales, Nicolás Salguero.

Used instrumentation:

Radiated Measurements:

	Last Calibration	Due Calibration
1. Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP	N/A	N/A
2. Shielded Room ETS LINDGREN S101	N/A	N/A
3. Biconical/Log Antenna 30 MHz - 6 GHz ETS LINDGREN 3142E	2020/04	2023/04
4. EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7	2020/12	2022/12
5. Horn Antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D	2019/11	2022/11
6. Horn Antenna 18-40 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9170	2020/05	2023/05
7. RF Preamplifier, 40 dB ,1-18 GHz BONN ELEKTRONIK BLMA 0118-1M	2021/06	2022/06
8. Pre-Amplifier G>30dB 17-40GHz BONN ELEKTRONIK BLMA 1840-4A	2021/09	2022/09
9. Spectrum Analyzer ROHDE AND SCHWARZ FSW50	2020/07	2022/07
10. Wideband Radio Communication Tester ROHDE AND SCHWARZ CMW500	N/A	N/A
11. AC Power Supply 135/270 V, 5/10/20/40 A ELGAR CS-AC35(351SL)	2019/09	2022/09
12. Digital Multimeter FLUKE 175	2021/11	2022/11

Testing verdicts

Not applicable:	N/A
Pass:	P
Fail:	F
Not measured :	N/M

Summary

FCC 15, FCC 27 / RSS-130, RSS-139, RSS-Gen, RSS-247 PARAGRAPH		
Requirement – Test case	Verdict	Remark
FCC 15.31 (h), FCC 27.53, FCC 15.209 (a), FCC 15.247 (d) /RSS-130 4.6, RSS-139 6.6, RSS-Gen 8.9, RSS-247 5.5. Emission limitations radiated (Transmitter)	P	(1)
<u>Supplementary information and remarks:</u>		
(1) Only Co-location radiated spurious emission test was requested.		

Appendix A: Test results FCC 27 / RSS-130, RSS-139

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TEST CONDITIONS

(*) Declared by the Applicant

POWER SUPPLY (*):

Vnominal: 115 Vac / 60Hz (*)
 Type of Power Supply: AC Voltage mains.

(*): Preliminary RSE scan determined 115Vac / 60Hz as worst case of power supply.

ANTENNA (*):

Type of Bluetooth LE Antenna: Internal.
 Maximum Declared Gain for Bluetooth LE: +1.98 dBi
 Maximum Declared Gain for CELLULAR:

HIGH Bands	GAIN	TYPE OF ANTENNA
LTE Cat-M1 Band 13	+2.0 dBi	Internal.
LTE Cat-M1 Band 66	+4.5 dBi	Internal.

TEST FREQUENCIES (*):

CELLULAR LTE Cat-M1 (Bands 13, 66)		
Band:	LTE Cat-M1 Band 13	
Frequency Range:	777 – 787 MHz	
Transmit Channel:	Channel	Channel Frequency (MHz)
	Low: 23205	779.5 MHz (BW 5 MHz, RB Size 1, RB Offset 0, Narrowband=0, 16QAM)
Band:	LTE Cat-M1 Band 66	
Frequency Range:	1710 – 1780 MHz	
Transmit Channel:	Channel	Channel Frequency (MHz)
	High: 132572	1770 MHz (BW 20 MHz, RB Size 1, RB Offset 0, Narrowband=0, 16QAM)

Bluetooth LE		
Mode:	GFSK	
Channel Spacing:	1 MHz	
Frequency Range:	2400 MHz to 2483.5 MHz	
Transmit Channel:	Channel	Channel Frequency (MHz)
	Middle: 20	2440

The test set-up was made in accordance to the general provisions of FCC DTS Measurement 558074 D01 DTS Meas Guidance v05r02 dated April 2, 2019.

The EUT was tested in the following operating mode:

During transmitter test the EUT was being controlled by the SW tool to operate in a continuous transmit mode on the test channel as required and in each of the different modulation modes.

The following configurations were selected based on preliminary testing that identified those corresponding to the worst-cases:

Selected Transmission Modes for each Radio:

The following configurations were selected based on preliminary testing that identified those corresponding to the worst-cases:

* Cellular LTE Cat-M1: Transmitter radiated spurious emissions tests were performed with the EUT transmitting in Cellular LTE Cat-M1 Band 13 / Low Channel configuration and in Cellular LTE Cat-M1 Band 66 / High Channel configuration as these channels were found to transmit higher EIRP than all the other LTE Cat-M1 channels.

* Bluetooth Low Energy: Transmitter radiated spurious emissions tests were performed with the EUT transmitting in Bluetooth Low Energy / GFSK mode configuration.

TESTED SIMULTANEOUS TRANSMISSION MODES:

* **Co-location mode Cellular LTE Cat-M1 Band 13, Bluetooth Low Energy**, with the EUT configured to simultaneously transmit two signals at maximum output power, Cellular LTE Cat-M1 Band 13 / Low Channel and Bluetooth Low Energy / GFSK.

* **Co-location mode Cellular LTE Cat-M1 Band 66, Bluetooth Low Energy**, with the EUT configured to simultaneously transmit two signals at maximum output power, Cellular LTE Cat-M1 Band 66 / High Channel and Bluetooth Low Energy / GFSK.

Radiated emissions

SPECIFICATION:

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) / RSS-Gen):

Frequency Range (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247. Attenuation below the general field strength limits specified in RSS-Gen is not required.

LTE Cat-M1 Band 13. FCC §2.1053 & §27.53 (c) (2) (4) & (f) / RSS-130 Issue 2 4.7.

FCC §27.53 (c) (2) (4) & (f):

(c) (2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB.

(c) (4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations.

(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW (-40 dBm)/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW (-50 dBm) EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

RSS-130 Issue 2 4.7:

4.7.1 General unwanted emissions limits:

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$ (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

4.7.2 Additional unwanted emissions limits:

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:

$76 + 10 \log_{10} p$ (watts), dB, for base and fixed equipment and
 $65 + 10 \log_{10} p$ (watts), dB, for mobile and portable equipment

the e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz.

LTE Cat-M1 Band 13 MEASUREMENT LIMIT:

At P_o transmitting power, the specified minimum attenuation becomes $43+10 \log (P_o)$, and the level in dBm relative P_o becomes:

$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = -13 \text{ dBm}$$

LTE Band 66. FCC §2.1053 & §27.53 (h) / RSS-139 Issue 3 Clause 6.6.

FCC §27.53 (h):

(h) Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB.

RSS-139 Issue 3 Clause 6.6:

i. In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} p$ (watts) dB.

ii. After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} P$ (watts) dB.

METHOD:

The measurement was performed with the EUT inside an anechoic chamber.

The spectrum was scanned from 9 kHz to at least the 10th harmonic of the highest frequency of the co-located radios till 26 GHz.

The EUT was placed on a non-conductive stand at a 3 meter distance from the measuring antenna.

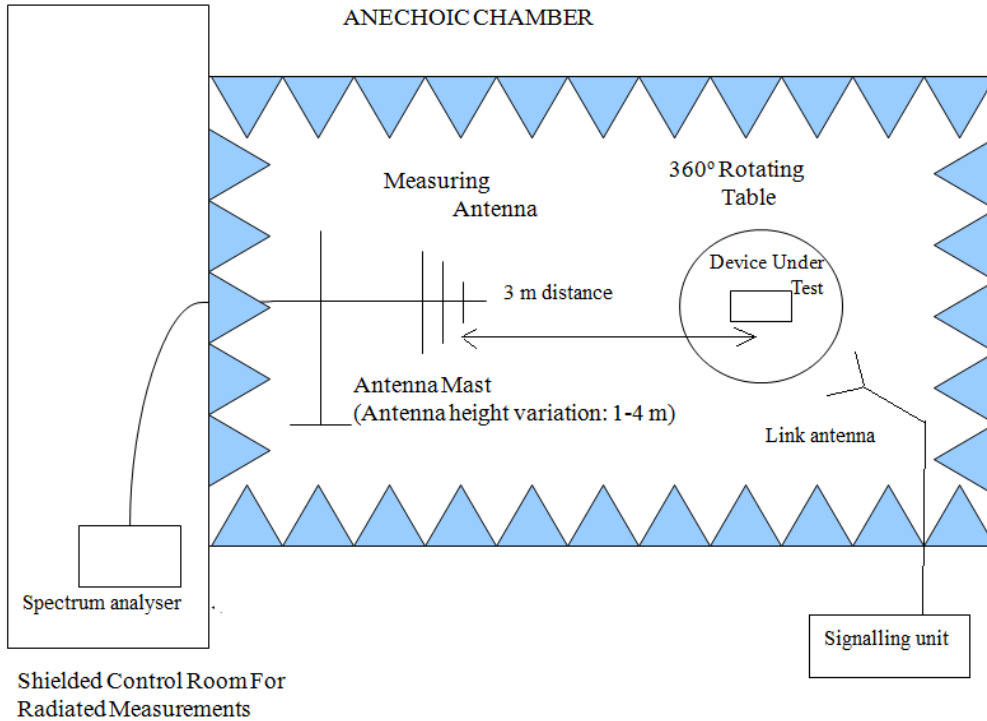
Detected emissions were maximized at each frequency by rotating the EUT and adjusting the measuring antenna height and polarization. The maximum meter reading was recorded.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

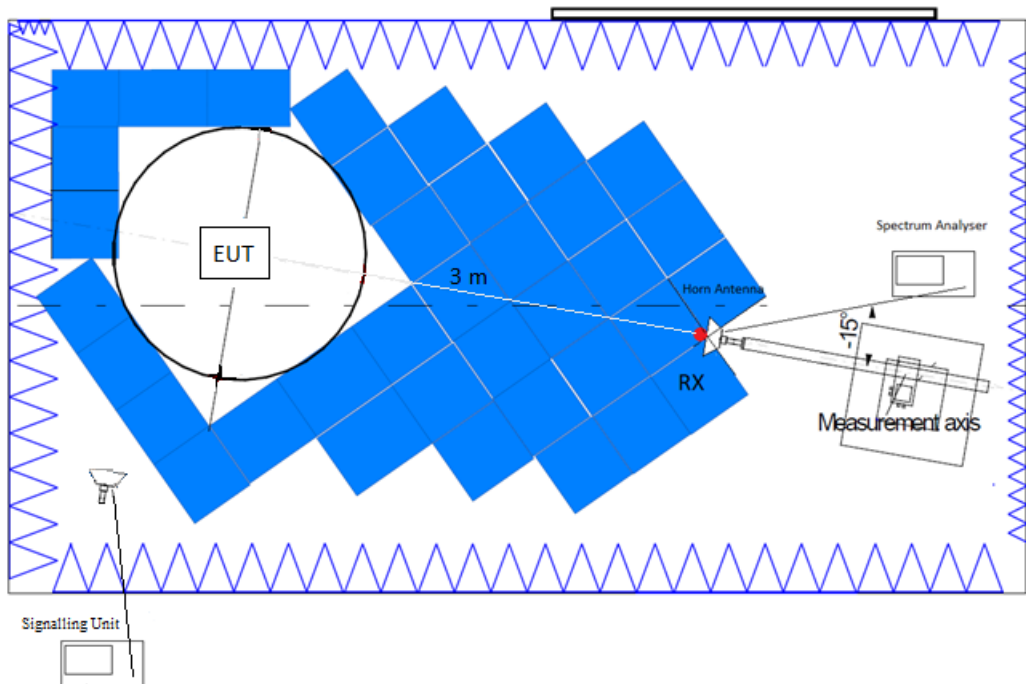
These measurements have been performed in order to check the impact of the Co-Location of all radio interfaces (that can be transmitting simultaneously).

TEST SETUP:

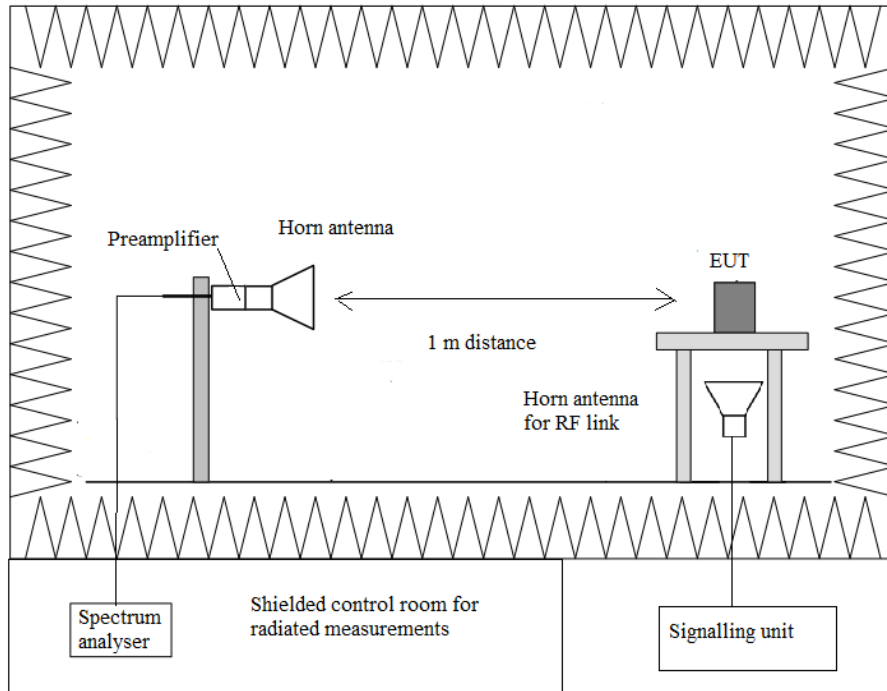
Radiated measurements below 1 GHz.



Radiated measurements between 1 GHz and 17 GHz.



Radiated measurements above 17 GHz.



RESULTS:

- **Co-location mode Cellular LTE Cat-M1 Band 13, Bluetooth Low Energy.**

QPSK & 16QAM:

A preliminary scan determined the 16QAM modulation in the Low Channel as the worst-case.

LTE Cat-M1 Band 13: Low Channel (779.5 MHz). 16QAM
 Bluetooth Low Energy: Middle Channel (2440 MHz). GFSK.

LIMIT: The spurious frequencies were measured at 3 meter. The limit of the test is determined by:

Frequency Range	Detector	Limit at 3m (dBµV/m)
30 MHz to 8 GHz	Peak	43 + 10 log (P) dB = -13 dBm -> 82.23 dBµV/m
8 GHz to 26 GHz	Peak	74 dBµV/m
8 GHz to 26 GHz	Average	54 dBµV/m (*)

(*) Radiated emissions which fall in the restricted bands, as defined in §15.205(a).

Frequency range 30 MHz - 1 GHz:

No spurious frequencies at less than 20 dB below the limit.

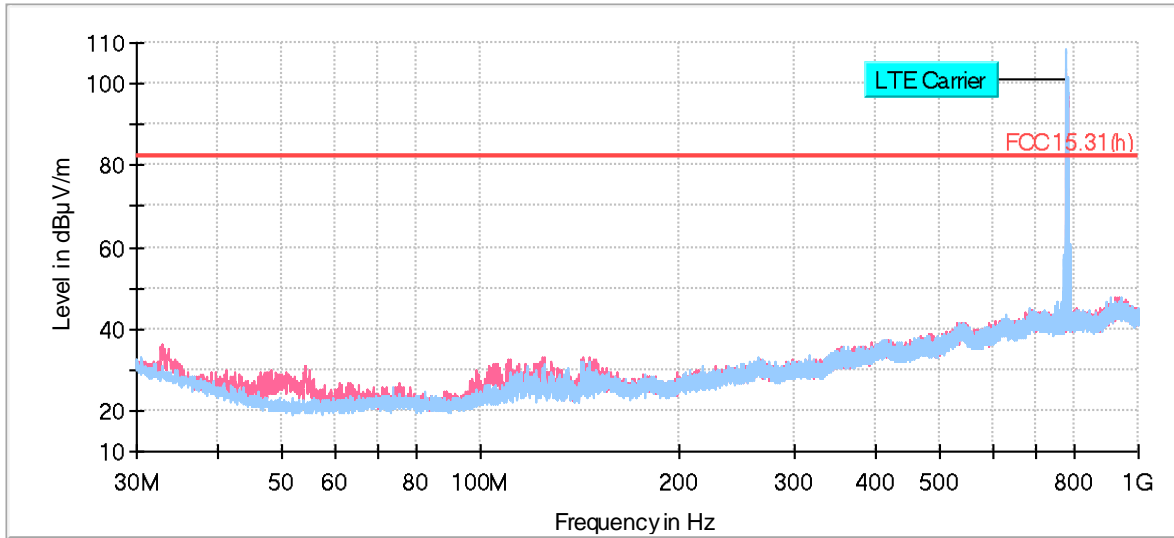
Frequency range 1 - 26 GHz:

No spurious frequencies at less than 20 dB below the limit.

Measurement uncertainty (dB)	f < 1 GHz, <± 5.01 f ≥ 1 GHz up to 3 GHz, <± 4.00 f ≥ 3 GHz up to 17 GHz, <± 4.22 f ≥ 17 GHz up to 26 GHz, <± 4.71
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Verdict: PASS

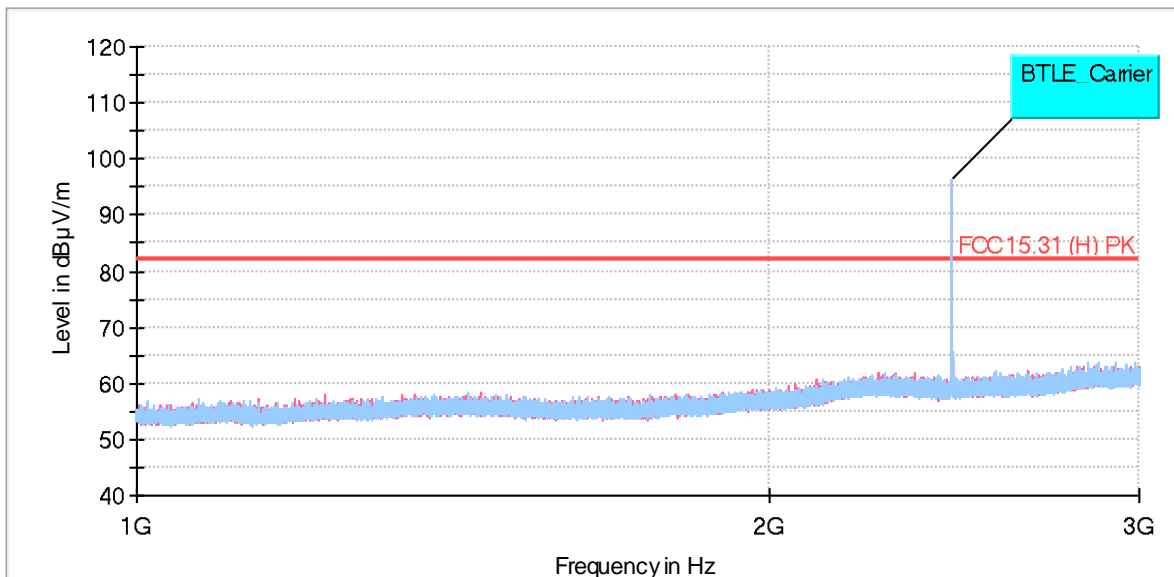
FREQUENCY RANGE 30 MHz - 1 GHz:



- Preview Result 1V-PK+ — Preview Result 1H-PK+ — FCC15.31(h)
- FCC15.31(h) ◆ Final_Result QPK ◆ Final_Result PK+

The peak above the limit is the carrier frequency LTE Cat-M1 Band 13 (779.5 MHz)

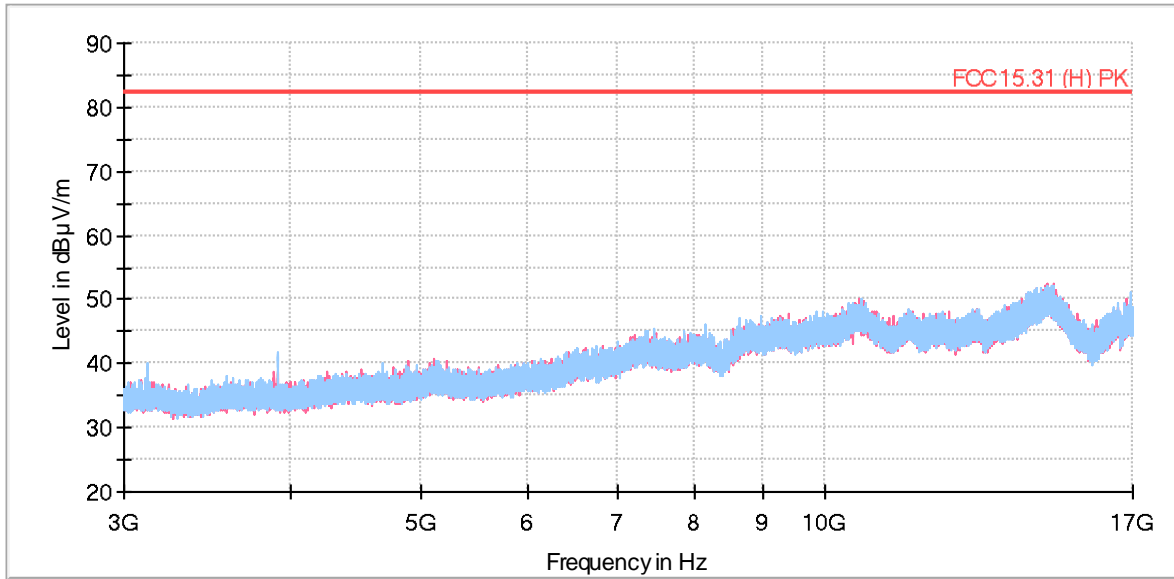
FREQUENCY RANGE 1 - 3 GHz:



- FCC15.31 (H) PK — Preview Result 1V-PK+ — Preview Result 1H-PK+

The peak above the limit is the carrier frequency Bluetooth Low Energy (2440 MHz).

FREQUENCY RANGE 3 - 17 GHz:



— FCC15.31 (H) PK — Preview Result 1V-PK+ — Preview Result 1H-PK+

FREQUENCY RANGE 17 - 26 GHz:



— Preview Result 2V-AVG — Preview Result 1V-PK+ — Preview Result 2H-AVG — Preview Result 1H-PK+
 — FCC 15.247 Restricted Bands PK - - - - - FCC 15.247 Restricted Bands AVG ◆ Final Result PK+ ◆ Final Result AVG

• **Co-location mode Cellular LTE Cat-M1 Band 66, Bluetooth Low Energy.**

QPSK & 16QAM:

A preliminary scan determined the 16QAM modulation in the High Channel as the worst-case.

LTE Cat-M1 Band 66: High Channel (1770 MHz). 16QAM.
 Bluetooth Low Energy: Middle Channel (2440 MHz). GFSK.

LIMIT: The spurious frequencies were measured at 3 meter. The limit of the test is determined by:

Frequency Range	Detector	Limit at 3m (dBµV/m)
30 MHz to 17 GHz	Peak	43 + 10 log (P) dB = -13 dBm -> 82.23 dBµV/m
17 GHz to 26 GHz	Peak	74 dBµV/m
17 GHz to 26 GHz	Average	54 dBµV/m (*)

(*) Radiated emissions which fall in the restricted bands, as defined in §15.205(a).

Frequency range 30 MHz - 1 GHz:

No spurious frequencies at less than 20 dB below the limit.

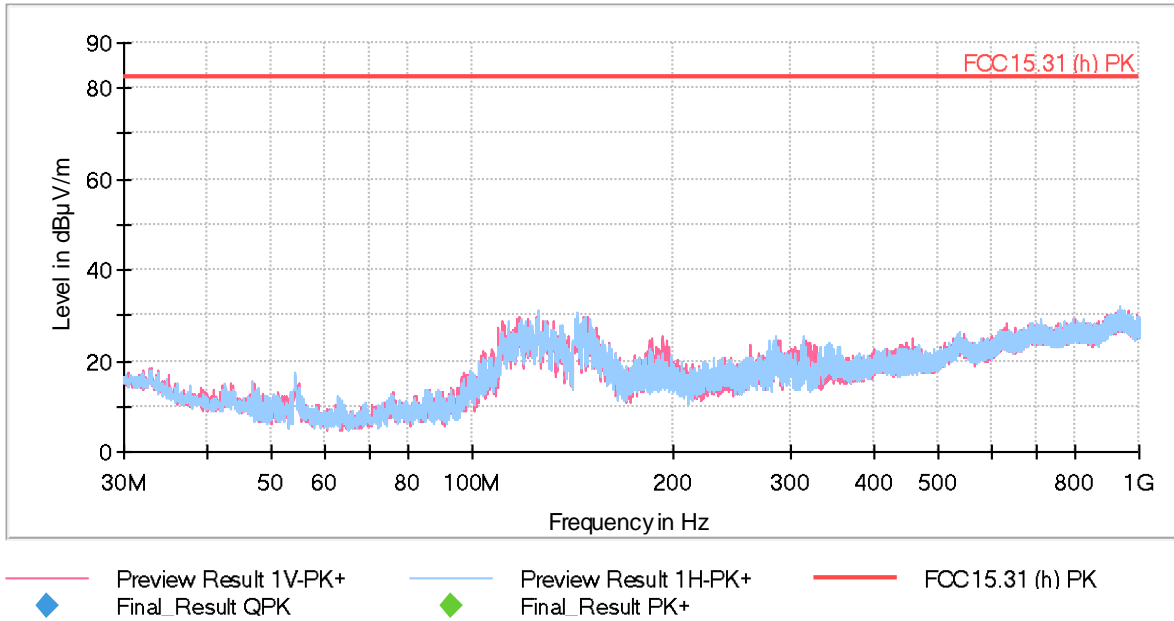
Frequency range 1 - 26 GHz:

No spurious frequencies at less than 20 dB below the limit.

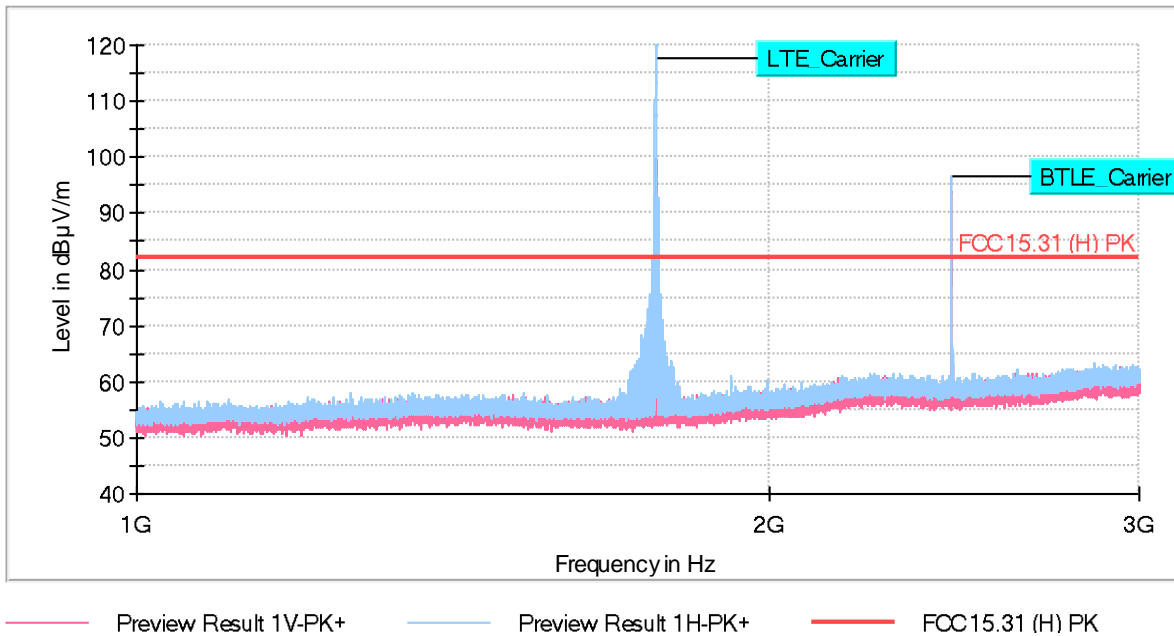
Measurement uncertainty (dB)	f < 1 GHz, <± 5.01 f ≥ 1 GHz up to 3 GHz, <± 4.00 f ≥ 3 GHz up to 17 GHz, <± 4.22 f ≥ 17 GHz up to 26 GHz, <± 4.71
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Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz:

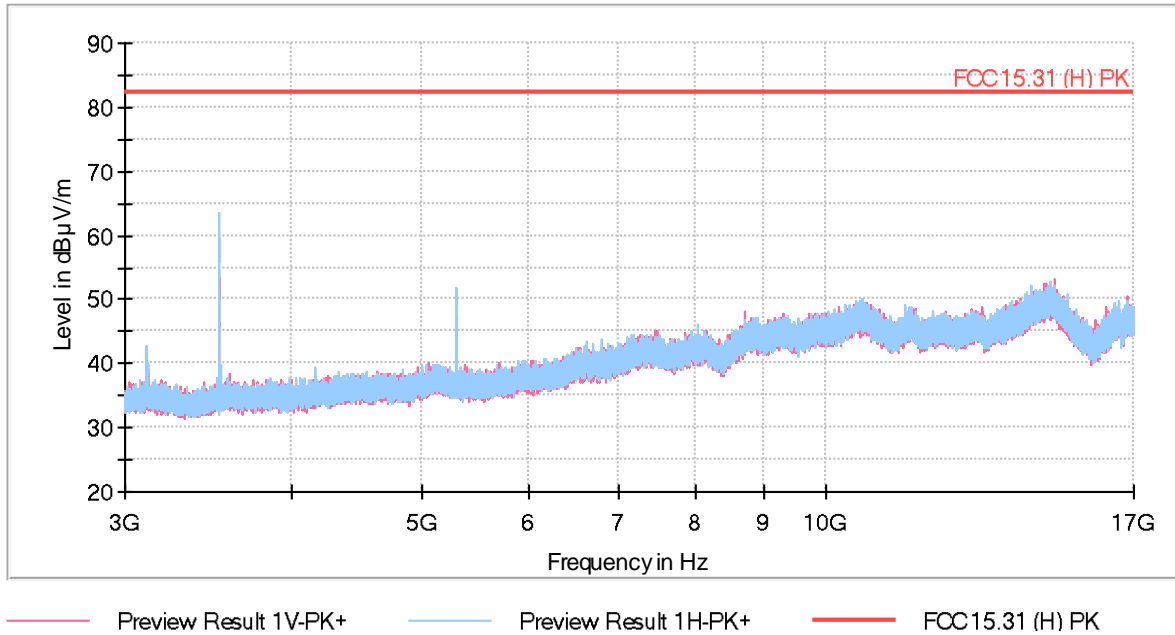


FREQUENCY RANGE 1 - 3 GHz:



The peak above the limit is the carrier frequency LTE Cat-M1 Band 66 (1770 MHz).
 The peak above the limit is the carrier frequency Bluetooth Low Energy (2440 MHz).

FREQUENCY RANGE 3 - 17 GHz:



FREQUENCY RANGE 17 - 26 GHz:

