

FCC UNII RF TEST REPORT



Test Report Number.....	HME-19081321-LC-FCC-NII
Applicant.....	HM Electronics Inc
Applicant Address.....	2848 Whiptail Loop, Carlsbad, CA 92010 USA
Product Name.....	Wireless Beltpack
Model Number.....	1409
Family Product/Model.....	N/A
FCC ID.....	BYM1409
Date of EUT received.....	09/27/2019
Date of Test.....	09/27/2019 – 12/30/2019
Report Issue Date.....	05/12/2020
Test Standards.....	47CFR Part 15.407
Test Result.....	Pass

Issued By:

Vista Laboratories

1261 Puerta Del Sol, San Clemente, CA 92673 USA

www.vista-compliance.com

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Tested by:

David Zhang/Test Engineer

Approved By:

Yuna Yin/Engineering Reviewer

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Laboratory Introduction

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Our comprehensive testing services include EMC emission and susceptibility testing, RF and wireless testing (including DFS).

As your partner, Vista investigates appropriate test standards, develops test plans, performs troubleshooting & failure analysis, reviews documentation, and provides test reports for a complete compliance testing and certification package.



17025 Product Testing Accreditation Certificate



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Electromagnetic Compatibility
Radio Frequency
Product Certification
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Product:	Wireless Beltpack
Model Number:	1409



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REVISION HISTORY

Revision	Issue Date	Description	Note
Original	05/12/2020	Original release	N/A

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1 General Information

1.1 Applicant

Applicant:	HM Electronics Inc
Applicant address:	2848 Whiptail Loop, Carlsbad, CA 92010 USA
Manufacturer:	HM Electronics Inc
Manufacturer Address:	2848 Whiptail Loop, Carlsbad, CA 92010 USA

1.2 Product information

Product Name	Wireless Beltpack
Model Number	1409
Family Model Number	N/A
Serial Number	42YYF083 (Conducted), 42YYF084 (Radiated)
Frequency Band	BLE: 2402-2480MHz 5Ghz-20Mhz: 5180-5240Mhz, 5260-5320Mhz, 5500-5720Mhz, 5745-5825Mhz
Type of modulation	BLE: GFSK 5GHz: OFDM
Equipment Class/ Category	DTS, UNII
Maximum output power	See test result
Antenna Information	BLE: Internal chip antenna, 2.5 dBi gain 5GHz: 2 x External omni-directional antenna, 3 dBi gain
Clock Frequencies	N/A
Port/Connectors	USB-C
Input Power	3.6VDC (battery), 5V/3A (USB-C adapter)
Power Adapter Manu/Model	N/A
Power Adapter SN	N/A
Hardware version	N/A
Software version	N/A
Simultaneous Transmission	BLE and 5GHz can transmit simultaneously. EUT has two 5GHz antennas, but these two antennas do not transmit simultaneously.
Additional Info	N/A

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1.3 Test standard and method

Test standard	47CFR Part 15.407
Test method	ANSI C63.10: 2013 789033 D02 General UNII Test Procedures New Rules v02r01

1.4 Test Purpose and statement

The purpose of this test report is intended to demonstrate the compliance of product listed in section 1.2, received from company listed in section 1.1, to the requirements of standard and method listed in section 1.3. Based on our test results, we conclude that the product tested complies with the requirements of the standards indicated.

2 Test site information

Lab performing tests	Vista Laboratories
Lab Address	1261 Puerta Del Sol, San Clemente, CA 92673 USA
Phone Number	+1 (949) 393-1123
Website	www.Vista-compliance.com

Test condition	Test Engineer	Test Environment	Test Date
RF conducted	David Zhang	23.5°C / 58.2%/996 mbar	09/27/2019 – 04/12/2020
Radiated	David Zhang	23.5°C / 58.2%/996 mbar	09/27/2019 – 04/12/2020

3 Modification of EUT

The EUT is an engineering test sample loaded with RF testing firmware specifically designed to support the RF TX/RX measurement in different aspects.

4 Test configuration and operation

4.1 EUT test configuration

EUT can be powered by battery or external USB-C adapter. The external power source is not port of EUT but will be used during the testing as supporting equipment. EUT's RF antenna port is connected to spectrum analyzer through RF test cable for measurement. The test software is used to set EUT to different transmission mode in terms of radio mode (5GHz, BLE), test channel, modulation on/off, etc.

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4.2 EUT test channel

Radio	Channel	Radio	Channel
5GHz	5180	5GHz	5720
5GHz	5220	5GHz	5745
5GHz	5240	5GHz	5785
5GHz	5260	5GHz	5825
5GHz	5300	5GHz	
5GHz	5320		
5GHz	5500		
5GHz	5580		
5GHz	5700		

4.3 Supporting Equipment

Index	Description	Model	S/N	Brand	Remark
1	USB-C adapter	TC0003	N/A	CHOETECH	-
2	Laptop	P29G	34917771602	ASUS	Remote access

4.4 EUT setup diagram



4.5 EUT operation

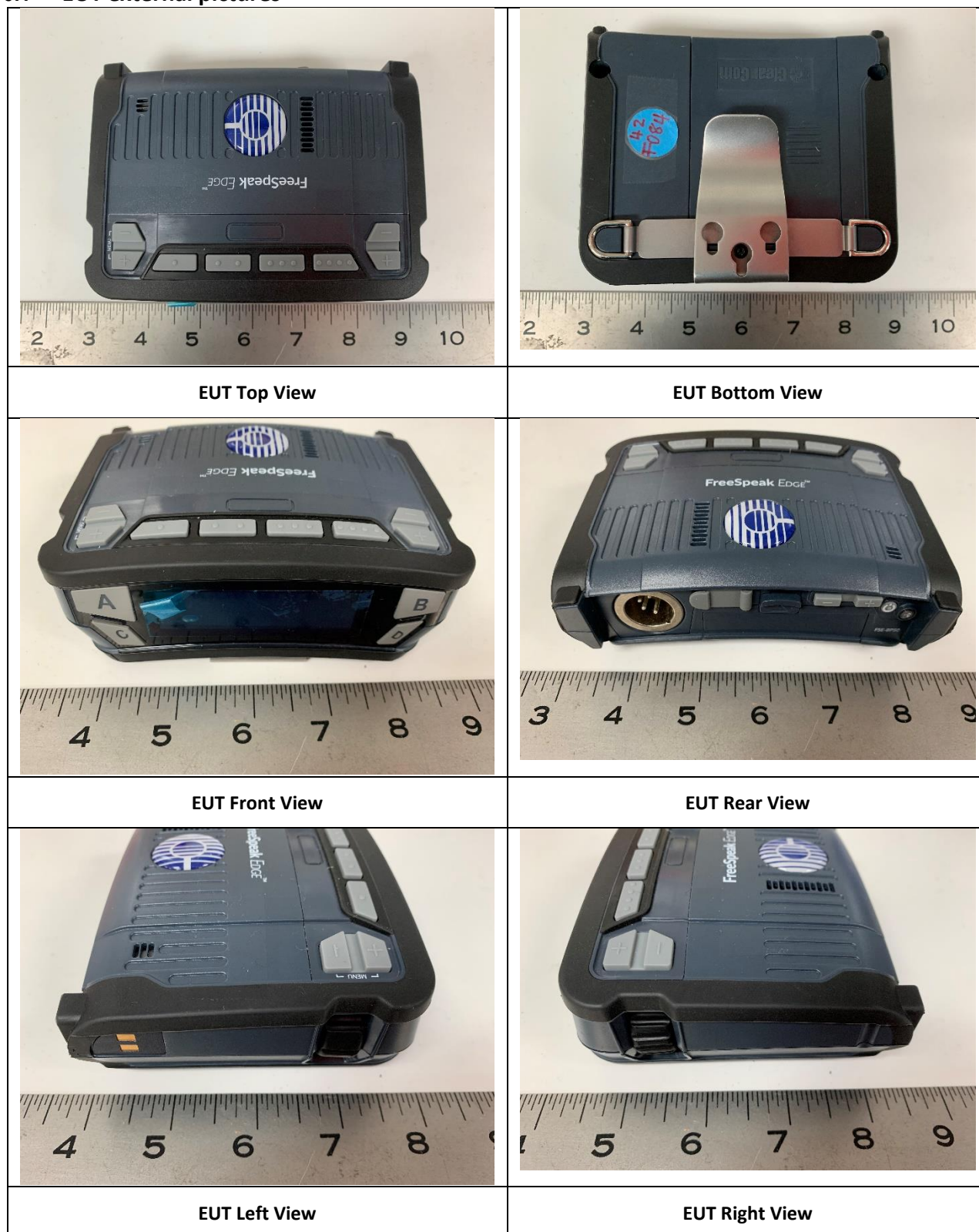
Other than normal operational mode, the EUT has test software is used to set EUT to different transmission mode in terms of radio mode (5GHz, BLE), test channel, data rate, etc.

4.6 Test software

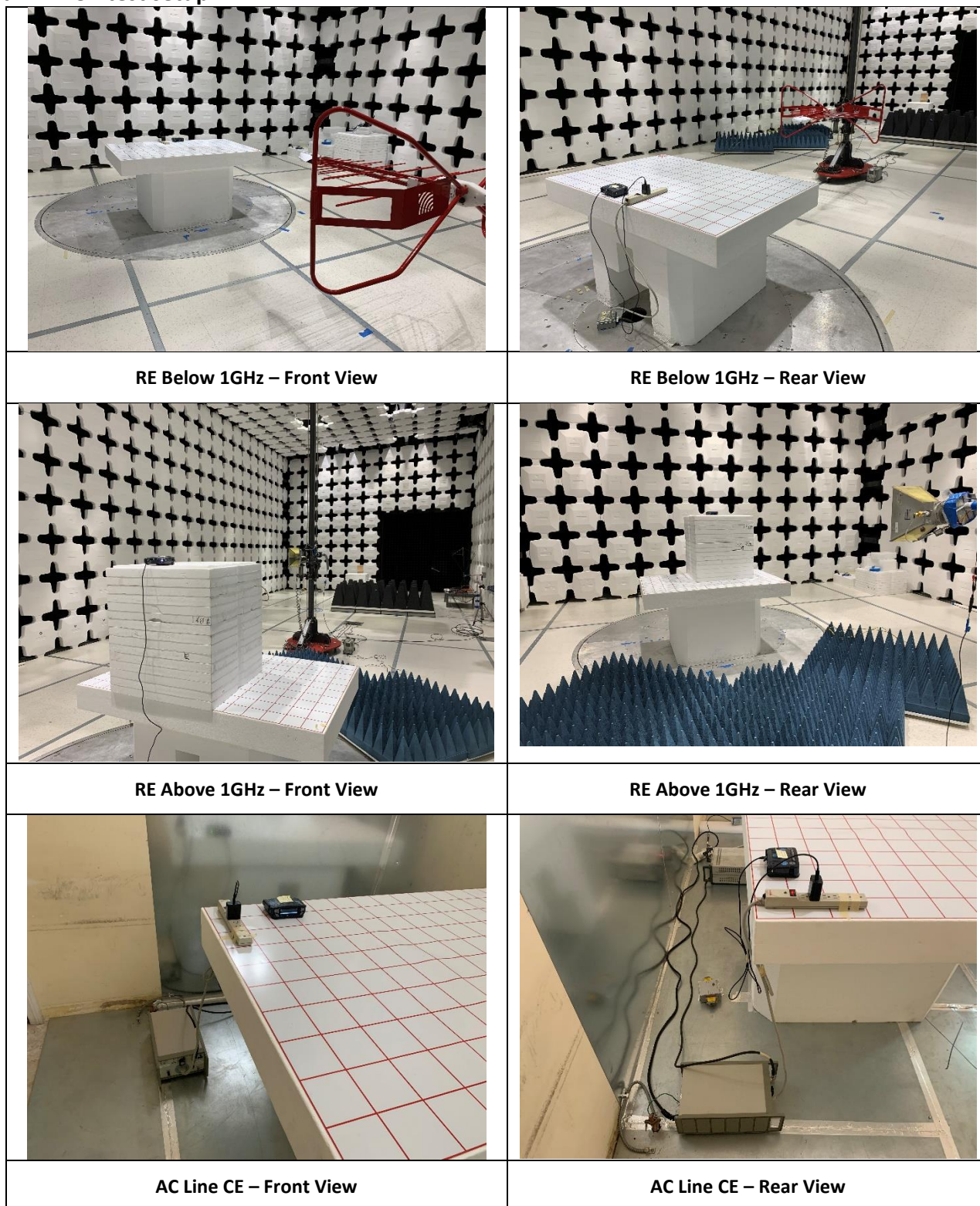
Index	Description	Remark
1	Putty.exe 0.63	Set Wi-Fi radio to different test mode
2	EMISoft Vasona 6.0049	EMC/Spurious emission test software used during testing

5 EUT and test setup pictures

5.1 EUT external pictures



5.2 EUT test setup



6 Test Summary

Report Number:	HME-19081321-LC-FCC-NII
Product:	Wireless Beltpack
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FCC Rules	Test Item	Section	Verdict
§15.203	Antenna Requirement	8.1	Pass
§15.407(e)	6 dB Bandwidth	8.2	Pass
§15.407(a)	26 dB Bandwidth	8.3	Pass
§15.407(a)	Conducted Maximum Output Power & E.I.R.P	8.4	Pass
§15.407(a)	Power Spectral Density& E.I.R.Psd	8.5	Pass
§15.407(c)	Automatically Discontinue Transmission	8.6	Pass
§15.205, §15.209, §15.407(b)	Radiated Emissions & Unwanted Emissions into Restricted Frequency Bands	8.7	Pass
§15.207 (a)	AC Power Line Conducted Emissions	8.8	Pass

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7 Uncertainty of Measurement

Test item	Measurement Uncertainty (dB)
RF Output Power (Conducted)	±1.2 dB
Power Spectral Density	±0.9 dB
Unwanted Emission (conducted)	±2.6 dB
Occupied Channel Bandwidth	±5 %
Radiated Emission (9KHz-30MHz)	±3.5 dB
Radiated Emission (30MHz-1GHz)	±4.6 dB
Radiated Emission (1-18GHz)	±4.9 dB
Radiated Emission (18-40GHz)	±3.5 dB

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8 Test summary and result

8.1 Antenna Requirement

8.1.1 Requirement

Per § 15.203, 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.

8.1.2 Result

Analysis:

EUT has two internal antennas. No standard RF connector or coupling is used.

Conclusion:

EUT complies with antenna requirement in § 15.203.

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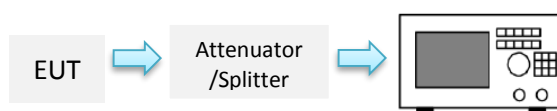
8.2 6 d Bandwidth

8.2.1 Requirement

§ 15.407 (e)

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

8.2.2 Test setup



8.2.3 Test Procedure

According to 789033 D02 General U-NII Test Procedures New Rules v02r01, Section C) Emission bandwidth.

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW $\geq 3 \times$ RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Use automatic bandwidth measurement capability on instrument to obtain BW result.

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8.2.4 Test Result

For U-NII-3 band

Mode/ Bandwidth	Channel	Frequency (MHz)	Data rate	Measured Bandwidth (KHz)	Minimum Bandwidth (KHz)	Result
5GHz	149	5745	MCS0	16870	500	Pass
5GHz	157	5785	MCS0	17570	500	Pass
5GHz	165	5825	MCS0	17220	500	Pass

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8.2.5 Test Plots



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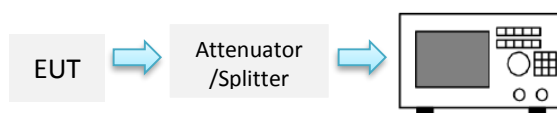
8.3 26 d Bandwidth

8.3.1 Requirement

§ 15.407 (a)

This section is for reporting purpose only. There are no restriction limits for bandwidth.

8.3.2 Test setup



8.3.3 Test Procedure

According to 789033 D02 General U-NII Test Procedures New Rules v02r01, Section C) Emission bandwidth.

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 26 dB, if the functionality described above (i.e., $RBW, VBW \geq 3 \times RBW$, peak detector with maximum hold) is implemented by the instrumentation function.

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the video bandwidth (VBW) $\geq 3 \times RBW$.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Use automatic bandwidth measurement capability on instrument to obtain BW result.

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Product:	Wireless Beltpack
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8.3.4 Test Result

For U-NII-1 band

Mode/ Bandwidth	Channel	Frequency (MHz)	Data rate	Measured 26 dB Bandwidth (KHz)	Minimum Bandwidth (KHz)	Result
5GHz	36	5180	MCS0	44950	N/A	N/A
5GHz	44	5220	MCS0	44180	N/A	N/A
5GHz	48	5240	MCS0	43570	N/A	N/A

For U-NII-2A band

Mode/ Bandwidth	Channel	Frequency (MHz)	Data rate	Measured Bandwidth (KHz)	Minimum Bandwidth (KHz)	Result
5GHz	52	5260	MCS0	43590	N/A	N/A
5GHz	60	5300	MCS0	43780	N/A	N/A
5GHz	64	5320	MCS0	43050	N/A	N/A

For U-NII-2C band

Mode/ Bandwidth	Channel	Frequency (MHz)	Data rate	Measured 26 dB Bandwidth (KHz)	Minimum Bandwidth (KHz)	Result
5GHz	100	5500	MCS0	43830	N/A	N/A
5GHz	116	5580	MCS0	43370	N/A	N/A
5GHz	140	5700	MCS0	39690	N/A	N/A

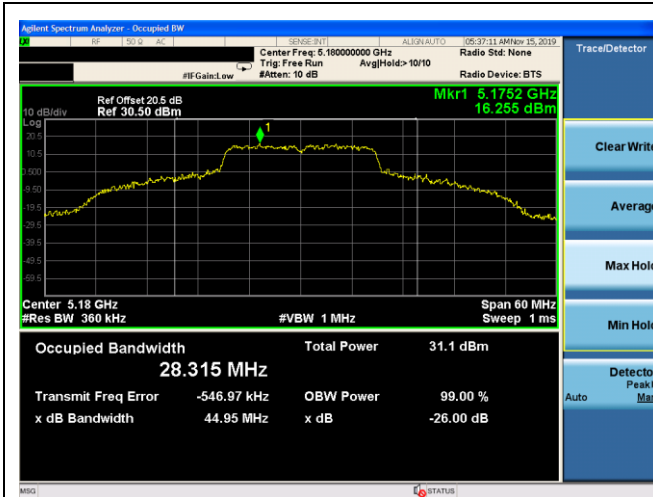
For U-NII-2C band Cross-band channel

Mode/ Bandwidth	Channel	Frequency (MHz)	Data rate	Measured 26 dB Bandwidth (KHz)	Minimum Bandwidth (KHz)	Result
5GHz	144	5720	MCS0	31720	N/A	N/A

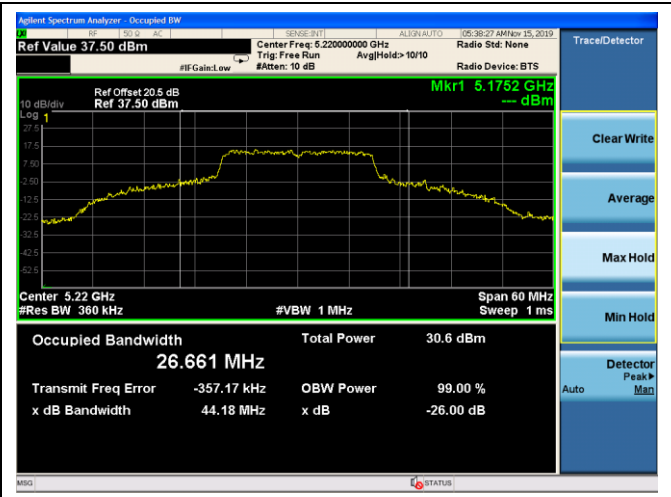
Report Number: HME-19081321-LC-FCC-NII
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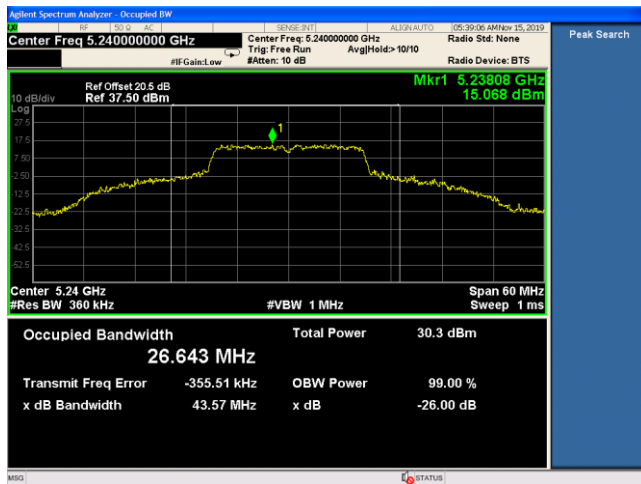
8.3.5 Test Plots



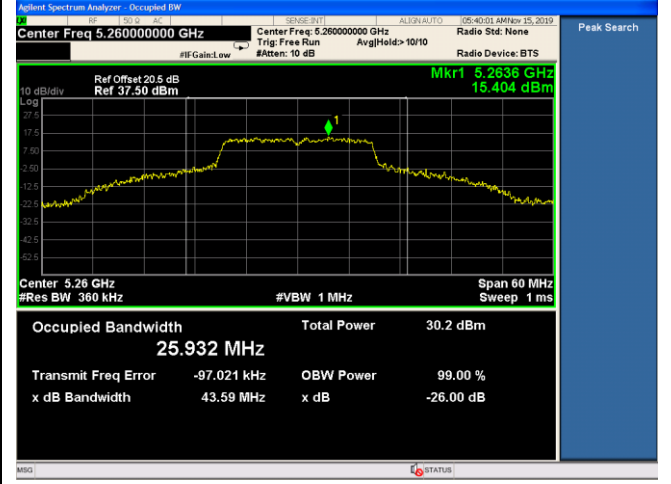
26dB BW - 5180MHz



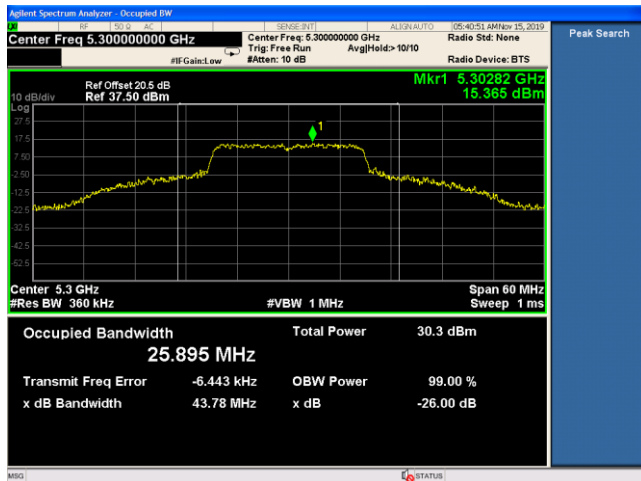
26dB BW - 5220MHz



26dB BW - 5240MHz



26dB BW - 5260MHz



26dB BW - 5300MHz



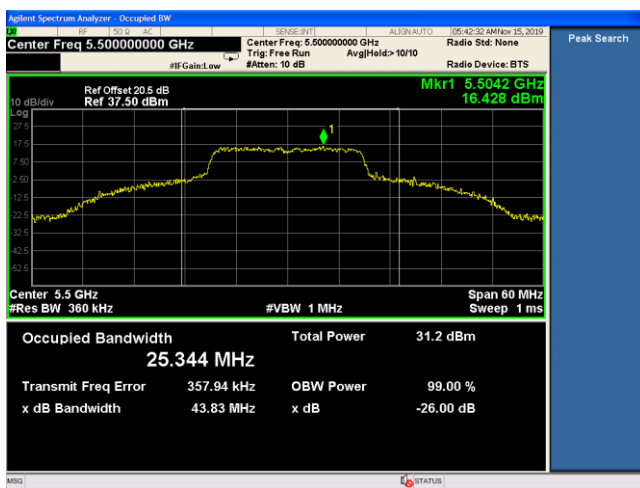
26dB BW - 5320MHz



Electromagnetic Compatibility
Radio Frequency
Product Certification
International Approval

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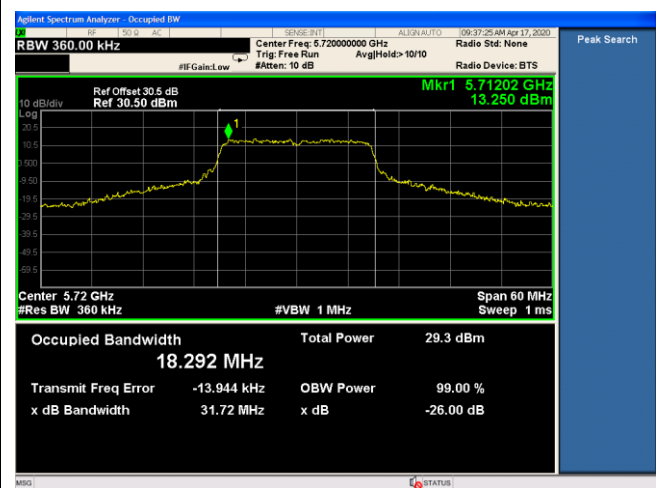
26dB BW – 5500MHz



26dB BW - 5580MHz



26dB BW - 5700MHz



26dB BW - 5720MHz

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8.4 Maximum Output Power

8.4.1 Requirement

§ 15.407 (a)

FCC for the 5.15–5.25 GHz bands:

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

ISED for the 5.15–5.25 GHz bands:

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or $1.76 + 10 \log_{10} B$, dBm, whichever is less. Devices shall implement transmitter power control (TPC) in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.

For the 5.25–5.725 GHz bands:

The maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz.

For Straddle Channel, according to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, if the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

For the band 5.725-5.85 GHz:

The maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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Per § 15.407 (a),

For the 5.15–5.25 GHz bands:

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25–5.725 GHz bands:

The maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz.

For Straddle Channel, according to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, if the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

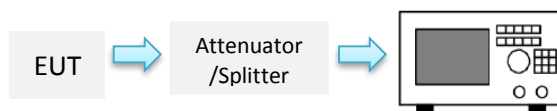
For the band 5.725-5.85 GHz:

The maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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8.4.2 Test setup



8.4.3 Test Procedure

According to 789033 D02 General U-NII Test Procedures New Rules v02r01, Section E) Maximum conducted output power, 2, b), method SA-1

1. Set span to encompass the entire emission bandwidth (EBW)(or, alternatively, the entire 99% occupied bandwidth)of the signal.
2. Set RBW=1MHz
3. Set VBW $\geq 3 \times$ RBW
4. Number of points in sweep $\geq 2 \times$ span/ RBW. (This ensures that bin-to-bin spacing is $\leq$ RBW/2, so that narrowband signals are not lost between frequency bins.)
5. Sweep time = auto couple.
6. Detector = Power averaging (RMS)
7. Trace average at least 100 traces in power averaging(rms)mode.
8. Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges.

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8.4.4 Test Result

For U-NII-1 band

Mode/ Bandwidth	Frequency (MHz)	Data rate	TX1 power (dBm)	TX2 power (dBm)	Highest or Total power (dBm)	Max Output Power Limit (dBm)	Result
5GHz	5180	MCS0	21.96	22.07	22.07	24.00	Pass
5GHz	5220	MCS0	22.17	21.61	22.17	24.00	Pass
5GHz	5240	MCS0	22.18	21.67	22.18	24.00	Pass

For U-NII-2A band

Mode/ Bandwidth	Frequency (MHz)	Data rate	TX1 power (dBm)	TX2 power (dBm)	Highest or Total power (dBm)	Max Output Power (dBm)	Result
5GHz	5260	MCS0	21.95	21.58	21.95	24.00	Pass
5GHz	5300	MCS0	22.23	21.86	22.23	24.00	Pass
5GHz	5320	MCS0	22.24	21.78	22.24	24.00	Pass

For U-NII-2C band

Mode/ Bandwidth	Frequency (MHz)	Data rate	TX1 power (dBm)	TX2 power (dBm)	Highest or Total power (dBm)	Max Output Power (dBm)	Result
5GHz	5500	MCS0	21.98	22.14	22.14	24.00	Pass
5GHz	5580	MCS0	21.79	21.61	21.79	24.00	Pass
5GHz	5700	MCS0	18.44	18.25	18.44	24.00	Pass

For U-NII-3 band

Mode/ Bandwidth	Frequency (MHz)	Data rate	TX1 power (dBm)	TX2 power (dBm)	Highest or Total power (dBm)	Max Output Power Limit (dBm)	Result
5GHz	5745	MCS0	23.42	23.21	23.42	30.00	Pass
5GHz	5785	MCS0	23.10	22.93	23.10	30.00	Pass
5GHz	5825	MCS0	22.72	22.59	22.72	30.00	Pass

For U-NII-2C band Cross-band channel

Mode/ Bandwidth	Frequency (MHz)	Data rate	TX1 power (dBm)	TX2 power (dBm)	Highest or Total power (dBm)	Max Output Power (dBm)	Result
5GHz	5720	MCS0	21.64	21.13	21.64	24.00	Pass

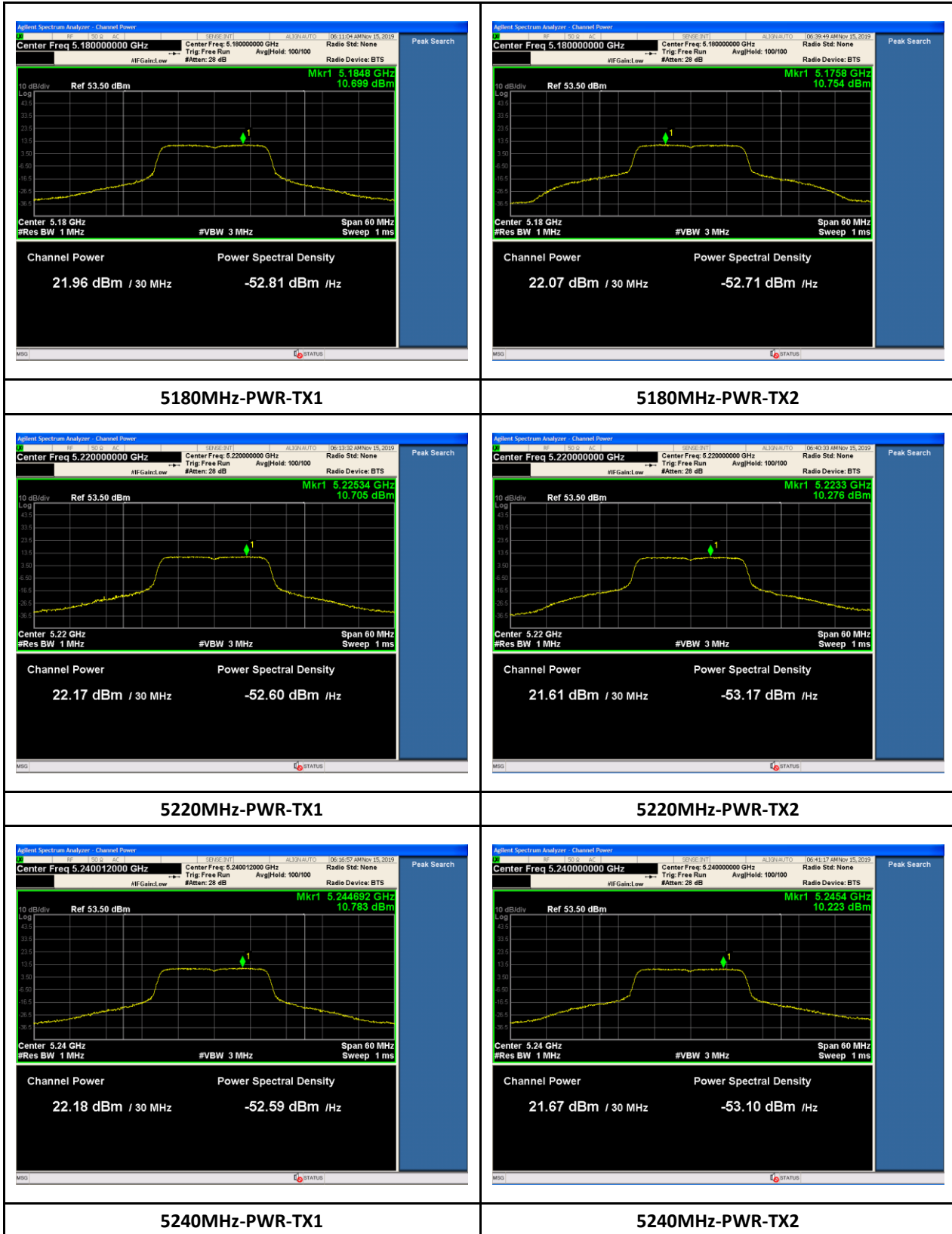
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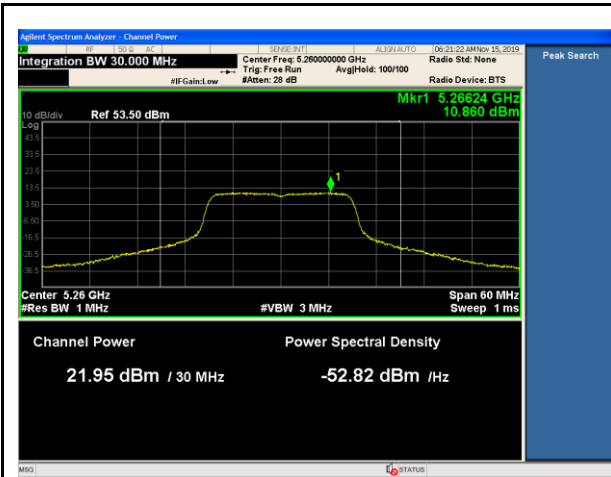


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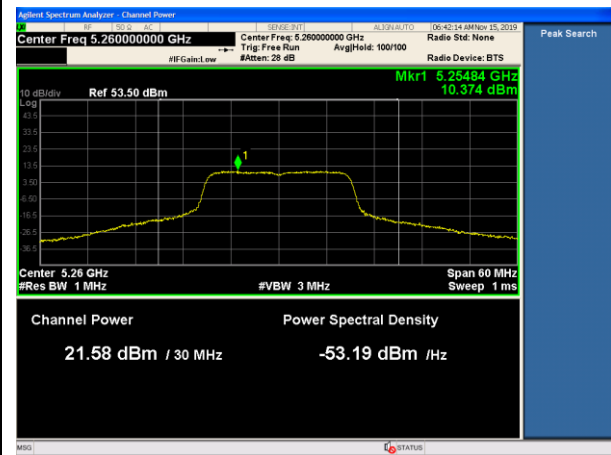
- 1) EUT has two TX chains, but they don't transmit simultaneously and are not MIMO. It's not required the combine the power of two chains in this case.

8.4.5 Test Plots

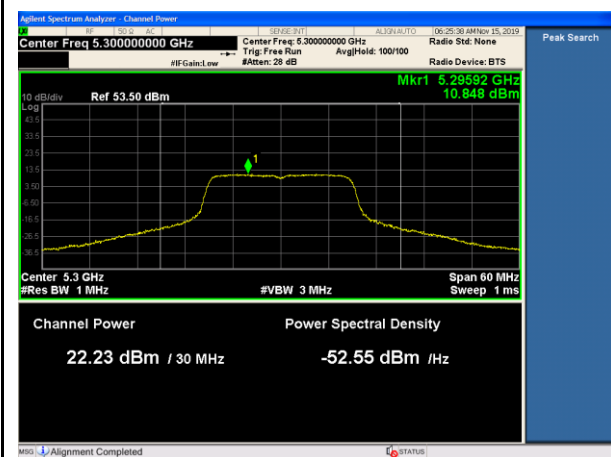




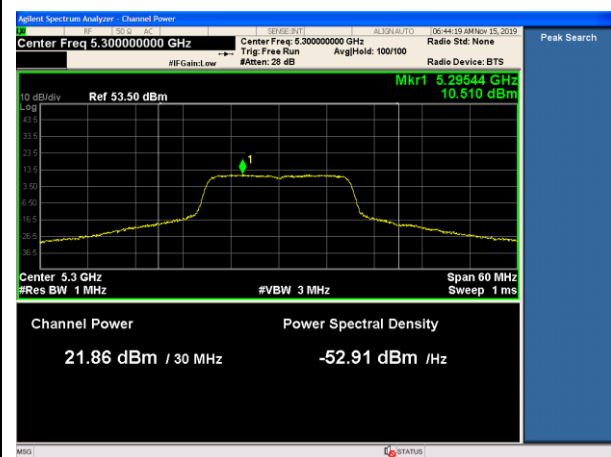
5260MHz-PWR-TX1



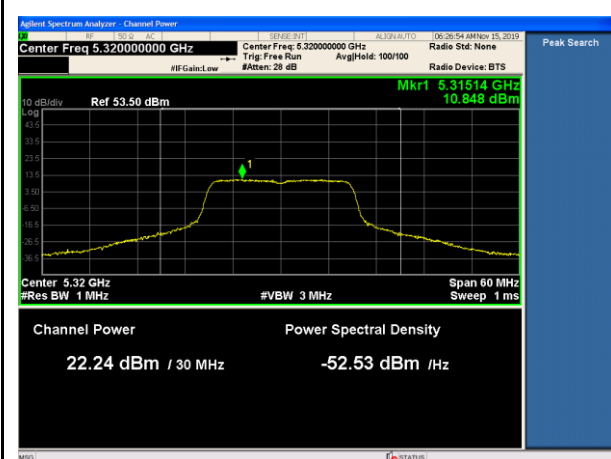
5260MHz-PWR-TX2



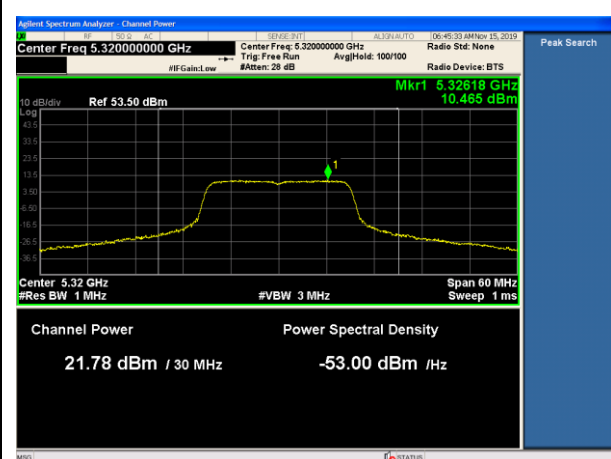
5300MHz-PWR-TX1



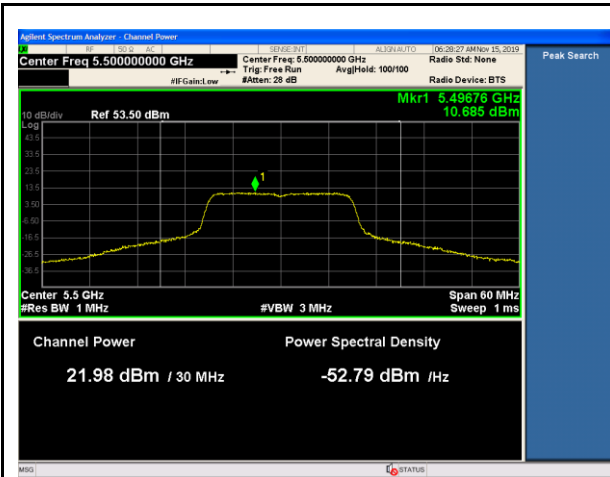
5300MHz-PWR-TX2



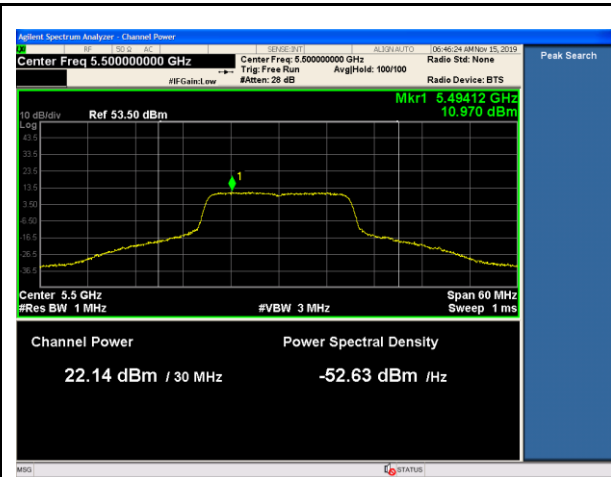
5320MHz-PWR-TX1



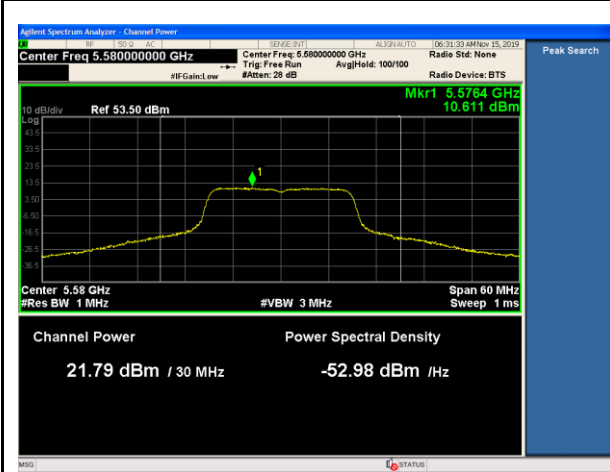
5320MHz-PWR-TX2



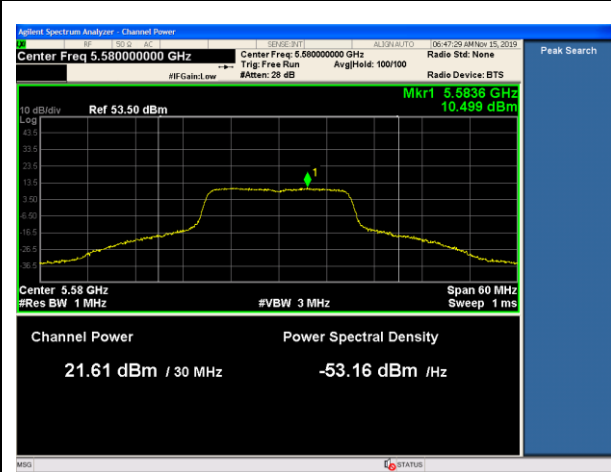
5500MHz-PWR-TX1



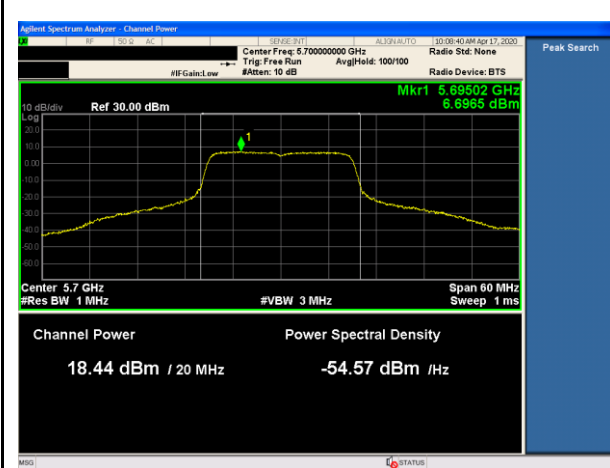
5500MHz-PWR-TX2



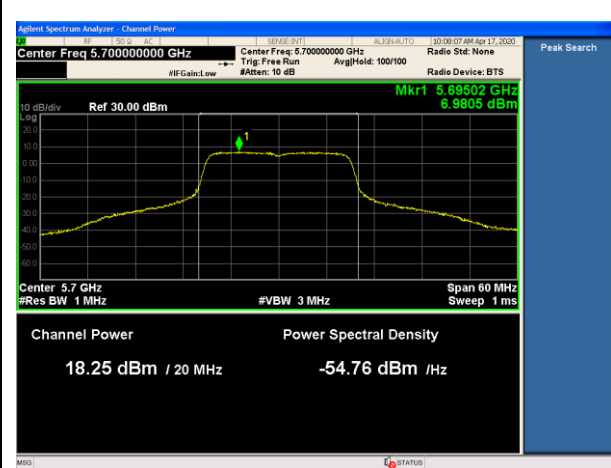
5580MHz-PWR-TX1



5580MHz-PWR-TX2



5700MHz-PWR-TX1

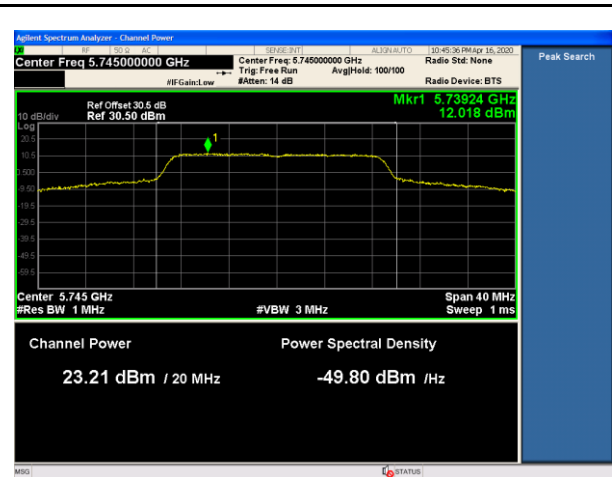


5700MHz-PWR-TX2

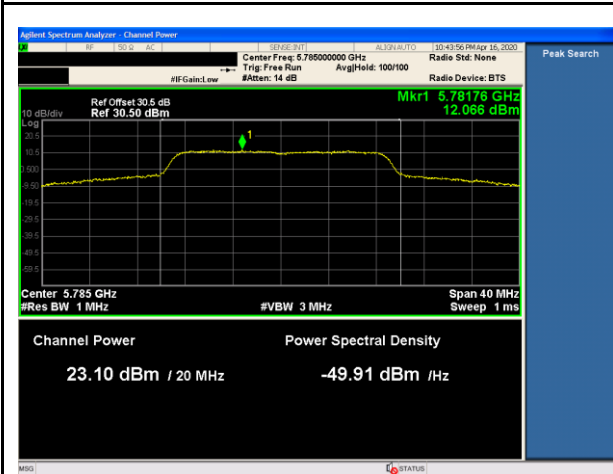
Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
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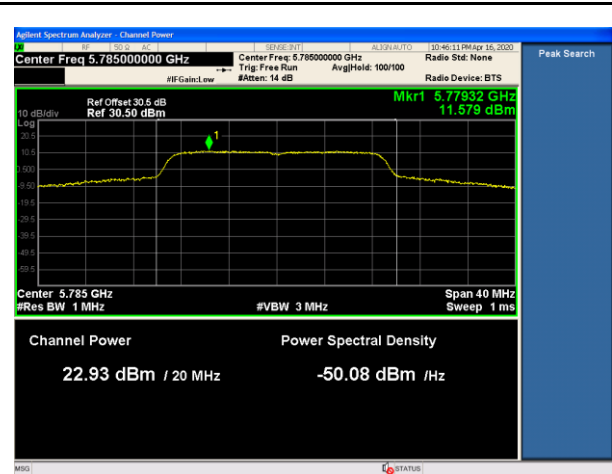
5745MHz-PWR-TX1



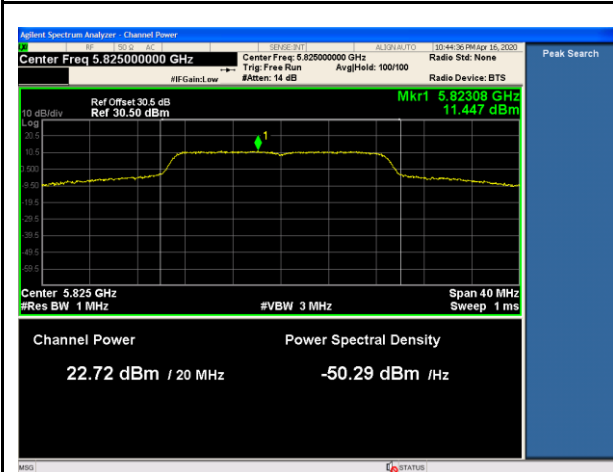
5745MHz-PWR-TX2



5785MHz-PWR-TX1



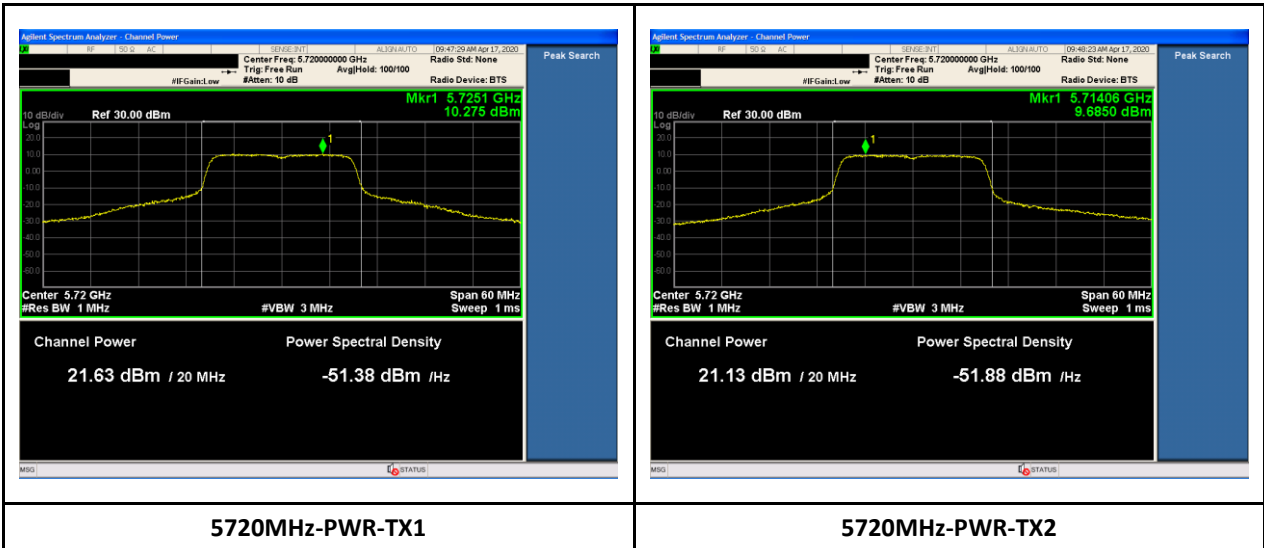
5785MHz-PWR-TX2



5825MHz-PWR-TX1



5825MHz-PWR-TX2



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Product:	Wireless Beltpack
Model Number:	1409



8.5 Power Spectral Density

8.5.1 Requirement

§ 15.407 (a)

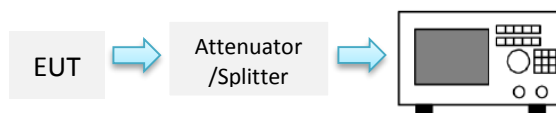
For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.

For the 5.25–5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For Straddle Channel, According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

8.5.2 Test setup



8.5.3 Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, section F) Maximum power spectral density. Method SA-1

1. Set span to encompass the entire emission bandwidth (EBW)(or, alternatively, the entire 99% occupied bandwidth)of the signal.
2. Set RBW=1MHz
3. Set VBW $\geq 3 \times$ RBW
4. Number of points in sweep $\geq 2 \times$ span/ RBW. (This ensures that bin-to-bin spacing is $\leq$ RBW/2, so that narrowband signals are not lost between frequency bins.)
5. Sweep time = auto couple.
6. Detector = Power averaging (RMS)
7. Trace average at least 100 traces in power averaging(rms)mode.
8. Use the peak marker function to determine the maximum amplitude level within the RBW.

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8.5.4 Test Result

For U-NII-1 band

Mode/ Bandwidth	Frequency (MHz)	Data rate	TX1 PSD (dBm/MHz)	TX2 PSD (dBm/MHz)	Highest or Total PSD (dBm/MHz)	Max PSD (dBm/MHz)	Result
5GHz	5180	MCS0	10.699	10.754	10.754	11	Pass
5GHz	5220	MCS0	10.705	10.276	10.705	11	Pass
5GHz	5240	MCS0	10.783	10.223	10.783	11	Pass

Mode/ Bandwidth	Frequency (MHz)	Data rate	TX1 PSD (dBm/MHz)	TX2 PSD (dBm/MHz)	Highest or Total PSD (dBm/MHz)	Max PSD (dBm/MHz)	Result
5GHz	5260	MCS0	10.860	10.374	10.860	11	Pass
5GHz	5300	MCS0	10.848	10.510	10.848	11	Pass
5GHz	5320	MCS0	10.848	10.465	10.848	11	Pass

For U-NII-2C band

Mode/ Bandwidth	Frequency (MHz)	Data rate	TX1 PSD (dBm/MHz)	TX2 PSD (dBm/MHz)	Highest or Total PSD (dBm/MHz)	Max PSD (dBm/MHz)	Result
5GHz	5500	MCS0	10.685	10.970	10.970	11	Pass
5GHz	5580	MCS0	10.611	10.499	10.611	11	Pass
5GHz	5700	MCS0	6.697	6.981	6.981	11	Pass

For U-NII-3 band

Mode/ Bandwidth	Frequency (MHz)	Data rate	TX1 PSD (dBm/MHz)	TX2 PSD (dBm/MHz)	Highest or Total PSD (dBm/MHz)	Corrected PSD (dBm/500KHz)	Max PSD (dBm/500KHz)	Result
5GHz	5745	MCS0	12.043	12.018	12.043	9.033	30	Pass
5GHz	5785	MCS0	12.066	11.579	12.066	9.056	30	Pass
5GHz	5825	MCS0	11.447	11.577	11.577	8.567	30	Pass

For U-NII-2C band Cross-band channel

Mode/ Bandwidth	Frequency (MHz)	Data rate	TX1 PSD (dBm/MHz)	TX2 PSD (dBm/MHz)	Highest or Total PSD (dBm/MHz)	Max PSD (dBm/MHz)	Result
5GHz	5720	MCS0	10.275	9.685	10.275	11	Pass

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Note:

- 1) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add $10 \log (1\text{MHz}/\text{RBW})$ to the measured result, whereas RBW ($< 1 \text{ MHz}$) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
- 2) EUT has two TX chains, but they don't transmit simultaneously and are not MIMO. It's not required the combine the PSD of two chains in this case.

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8.5.5 Test Plots

Refer to test plots in conducted peak output power

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Product:	Wireless Beltpack
Model Number:	1409



8.6 Automatically Discontinue Transmission

8.6.1 Requirement

§ 15.407 (c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signalling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

8.6.2 Test setup



8.6.3 Test Result

The transmission on this device is based on a single type, unique frame structure which only allows it to transmit a 730 uS duration within every 5000 uS period. In case of absence of information, the EUT will continue to transmit using repetitive codes to complete frame or burse intervals.

This frame structure makes the maximum TX duty cycle and channel loading to be:

$$\text{Channel loading} = 730 \text{ us} / 5000 \text{ us} * 100\% = 14.6 \%$$

8.7 Radiated Spurious Emissions into Restricted Frequency Bands

8.7.1 Requirement

§ 15.205, 15.209, 15.407(b)

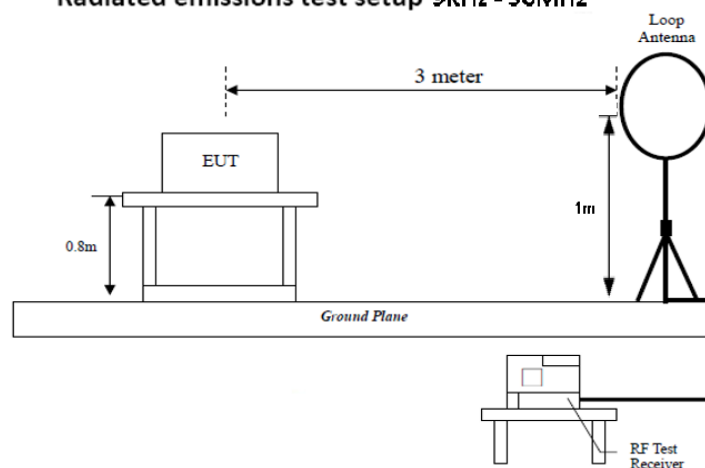
- (1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.
- (3) For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.
- (5) Restricted band, emission must also comply with the radiated emission limits specified in 15.209

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)).

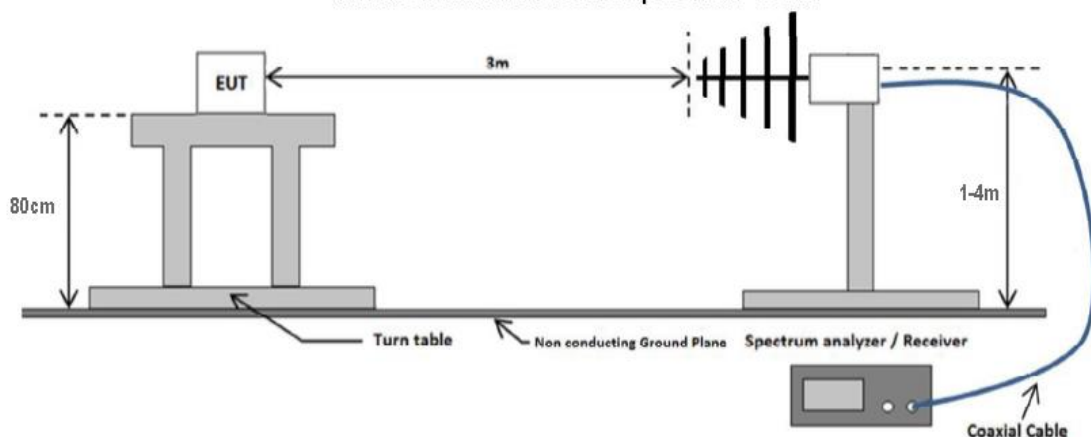
Frequency range (MHz)	Field Strength ($\mu\text{V}/\text{m}$)
0.009~0.490	2400/F(KHz)
0.490~1.705	24000/F(KHz)
1.705~30.0	30
30 – 88	100
88 – 216	150
216 960	200
Above 960	500

8.7.2 Test setup

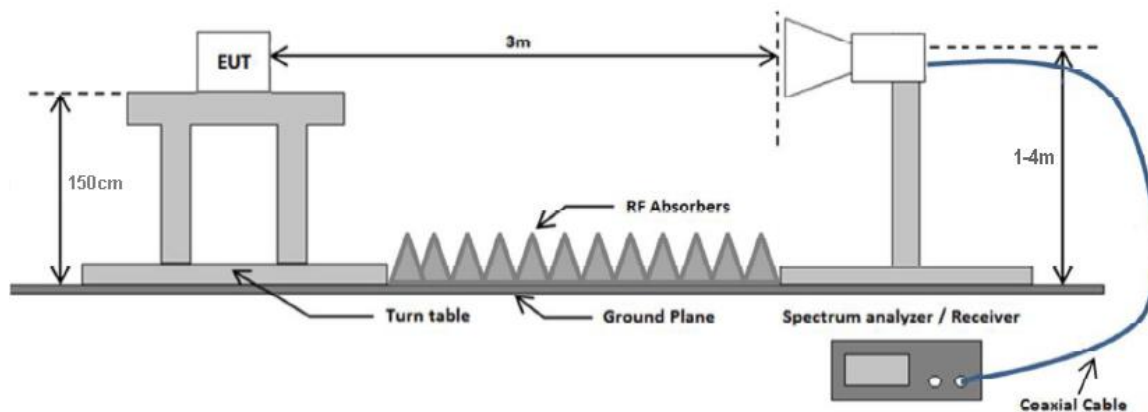
Radiated emissions test setup 9KHz - 30MHz



Radiated emissions test setup 30 MHz - 1 GHz



Radiated emissions test setup above 1 GHz



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Product:	Wireless Beltpack
Model Number:	1409



8.7.3 Test Procedure

According to FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section G) Unwanted emissions measurement. And subclause 12.7 Radiated spurious emission measurements in ANSI C62.10-2013 as well as the procedures for maximizing and measuring radiated emissions that are described in ANSI C63.10 was followed. Boresight antenna mast was used during the scanning to point to EUT to maximize the emission. The process will be repeated in 3 EUT orientations.

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
 - a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
 - b. The EUT was then rotated to the direction that gave the maximum emission.
 - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 300 Hz for frequency below 150KHz.
4. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 10 kHz for frequency between 150KHz – 30MHz.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-Peak detection at frequency between 30MHz - 1GHz.
6. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak and average measurement at frequency above 1GHz.
7. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

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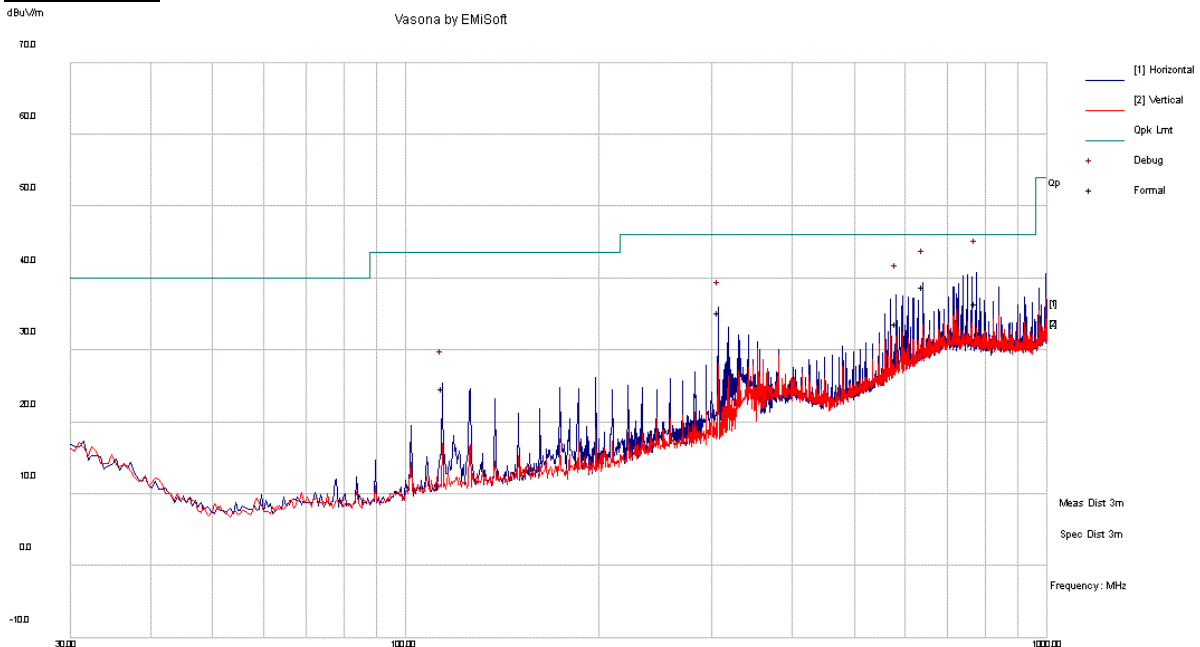


8.7.4 Test Result

RADIATED EMISSIONS < 1 GHZ

Test Standard:	15.209, 15.407	Mode:	5180 MHz
Frequency Range:	30 - 1000 MHz	Test Date:	12/09/2019 - 04/12/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	David Zhang
Remark:	N/A	Test Result:	Pass

5180 MHz



Radiated Emissions Template: FCC Class B (3m) 30MHz-1GHz
 Filename: c:\users\camara\documents\lab drive\2019\hme-19081321-lc-thunder beltpack fcc\test data\rfcc\below 1 ghz\data\02_5GHz 5200MHz_clock8MHz.emi

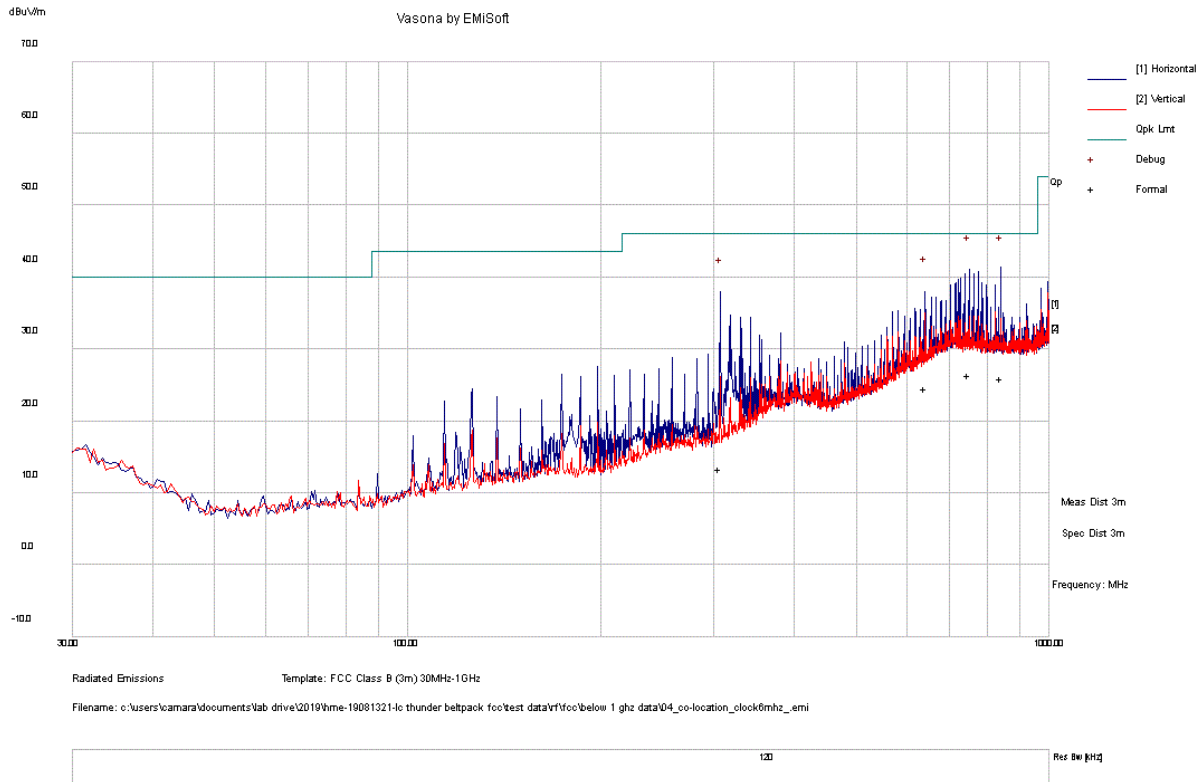
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
774.02	35.90	7.30	-6.70	36.50	Quasi Max	H	178	343	46.00	-9.50	Pass
640.00	40.10	7.20	-8.50	38.90	Quasi Max	H	177	176	46.00	-7.10	Pass
582.01	37.20	7.00	-10.40	33.80	Quasi Max	H	123	0	46.00	-12.20	Pass
307.21	47.90	5.70	-18.30	35.30	Quasi Max	H	177	18	46.00	-10.70	Pass
113.99	44.30	3.80	-23.30	24.70	Quasi Max	H	148	88	43.50	-18.80	Pass

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Product: Wireless Beltpack
Model Number: 1409



Test Standard:	15.209, 15.407	Mode:	BLE + 5GHz co-located
Frequency Range:	30 - 1000 MHz	Test Date:	12/09/2019 - 04/12/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	David Zhang
Remark:	N/A	Test Result:	Pass

BLE + 5GHz co-located



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
750.01	25.70	7.30	-6.60	26.40	Quasi Max	H	105	344	46.00	-19.60	Pass
839.89	25.60	7.40	-7.00	26.00	Quasi Max	H	169	238	46.00	-20.00	Pass
640.01	25.80	7.20	-8.50	24.60	Quasi Max	H	100	201	46.00	-21.40	Pass
306.89	25.90	5.70	-18.30	13.30	Quasi Max	H	364	326	46.00	-32.70	Pass

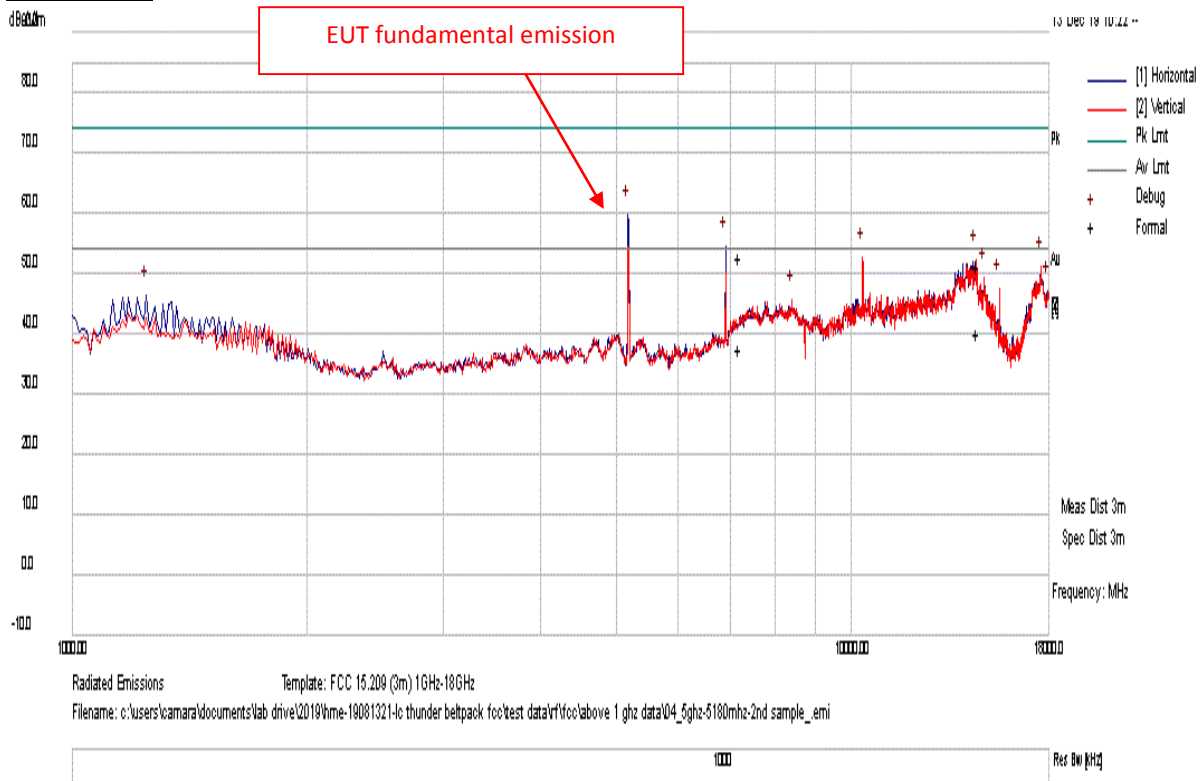
Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
Model Number: 1409



RADIATED EMISSIONS > 1 GHz

Test Standard:	15.209, 15.407	Mode:	5180MHz
Frequency Range:	1 - 18 GHz	Test Date:	12/09/2019 - 04/12/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	David Zhang
Remark:	N/A	Test Result:	Pass

5180MHz



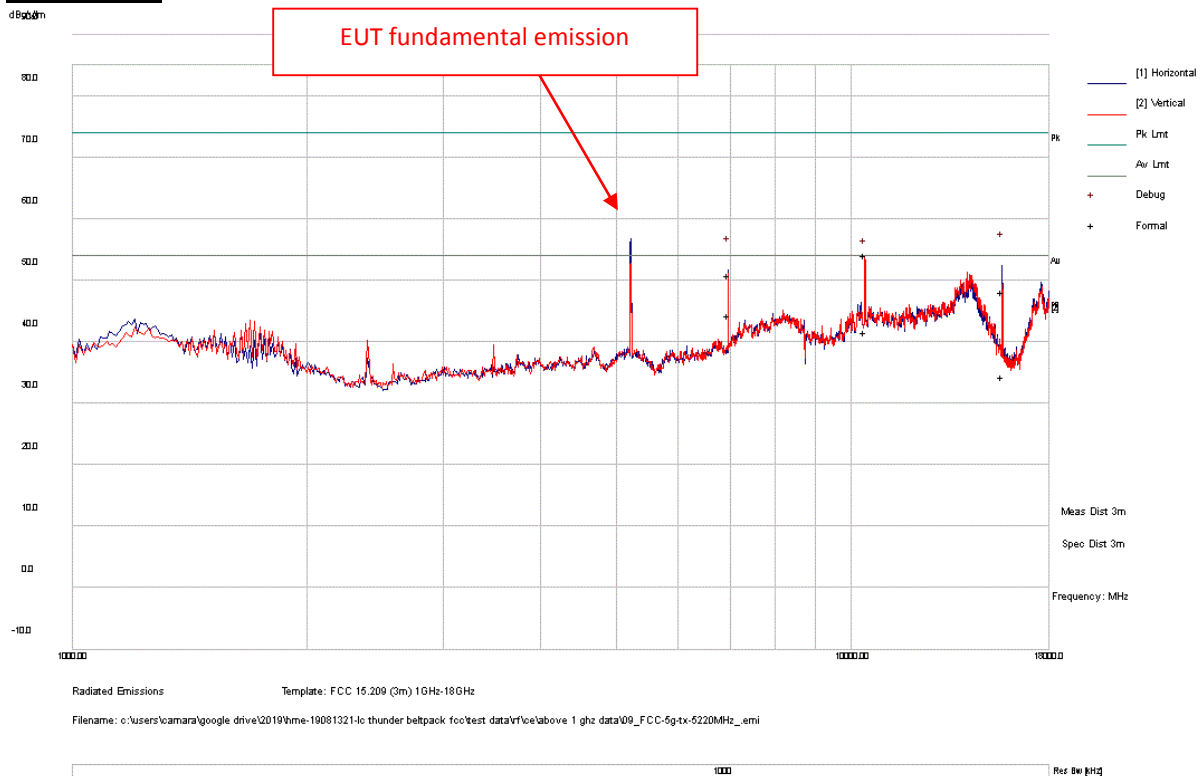
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
7205.99	40.80	20.50	-8.30	52.90	Peak Max	V	223	31	74.00	-21.10	Pass
14552.95	23.40	27.20	0.90	51.50	Peak Max	V	324	31	74.00	-22.50	Pass
7205.99	25.70	20.50	-8.30	37.80	Average Max	V	223	31	54.00	-16.20	Pass
14552.95	12.20	27.20	0.90	40.30	Average Max	V	324	31	54.00	-13.70	Pass

Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
Model Number: 1409



Test Standard:	15.209, 15.407	Mode:	5220MHz
Frequency Range:	1 - 18 GHz	Test Date:	12/09/2019 - 04/12/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	David Zhang
Remark:	N/A	Test Result:	Pass

5220 MHz



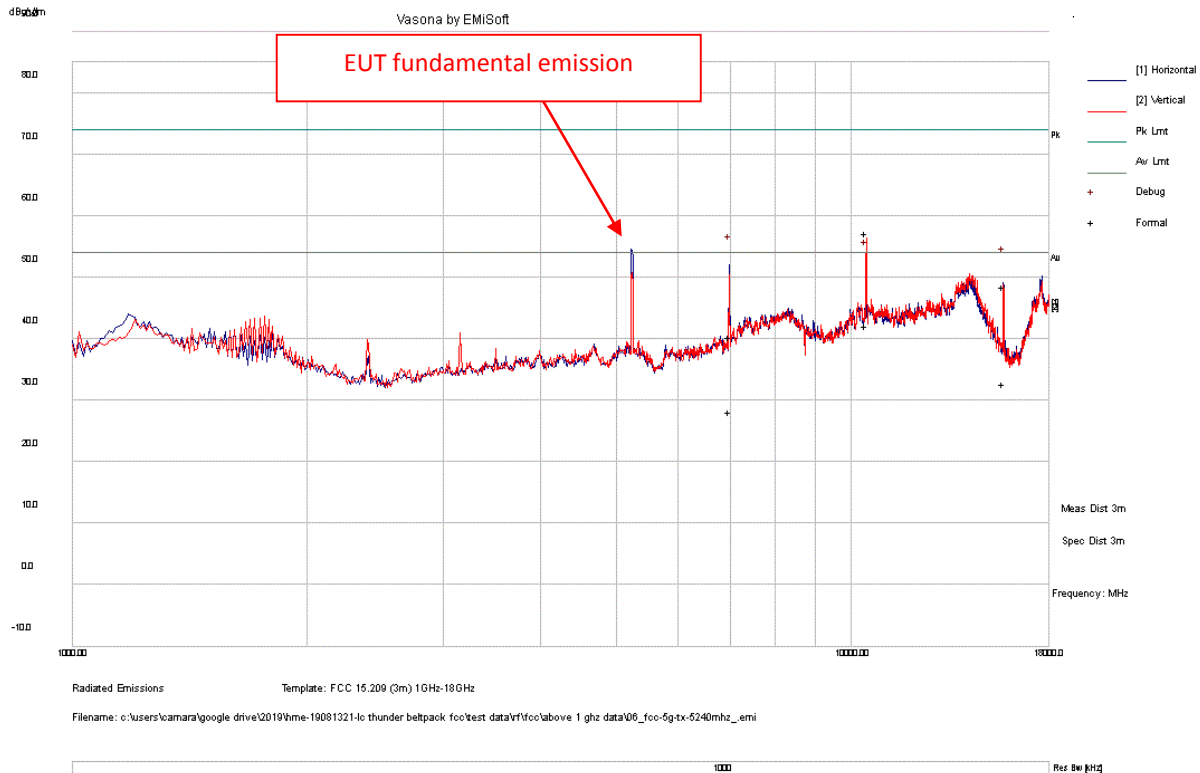
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
15652.67	24.80	28.00	-4.50	48.20	Peak Max	V	218	28	74.0	-25.80	Pass
6959.97	40.70	20.00	-9.70	51.00	Peak Max	V	103	224	74.0	-23.00	Pass
10441.38	34.60	23.00	-3.50	54.10	Peak Max	V	120	75	74.0	-19.90	Pass
15652.67	10.80	28.00	-4.50	34.30	Average Max	V	218	28	54.0	-19.70	Pass
6959.97	34.00	20.00	-9.70	44.30	Average Max	V	103	224	54.0	-9.70	Pass
10441.38	22.20	23.00	-3.50	41.70	Average Max	V	120	75	54.0	-12.30	Pass

Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
Model Number: 1409



Test Standard:	15.209, 15.407	Mode:	5240MHz
Frequency Range:	1 - 18 GHz	Test Date:	12/09/2019 - 04/12/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	David Zhang
Remark:	N/A	Test Result:	Pass

5240 MHz



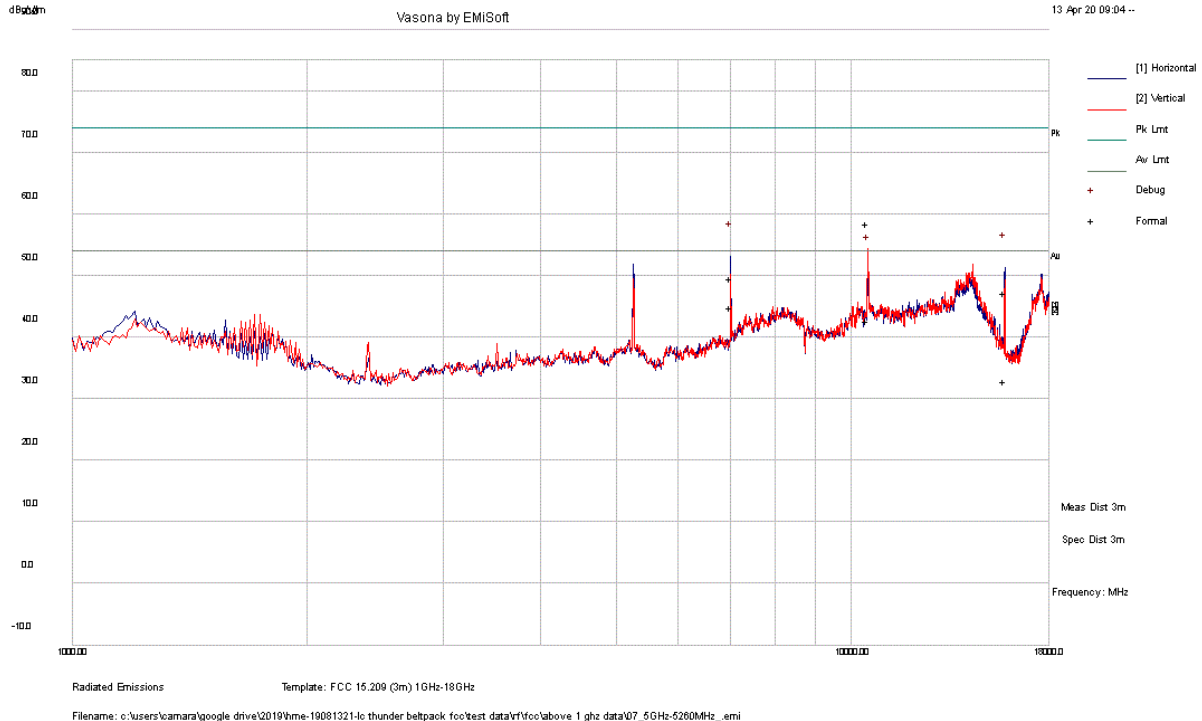
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
6982.14	30.00	20.00	-9.70	40.30	Peak Max	H	170	140	74.0	-33.70	Pass
10478.92	37.50	23.10	-3.50	57.20	Peak Max	V	114	354	74.0	-16.80	Pass
15715.92	25.20	28.00	-4.70	48.40	Peak Max	H	109	352	74.0	-25.60	Pass
6982.14	17.80	20.00	-9.70	28.20	Average Max	H	170	140	54.0	-25.80	Pass
10478.92	22.50	23.10	-3.50	42.10	Average Max	V	114	354	54.0	-11.90	Pass
15715.92	9.60	28.00	-4.70	32.80	Average Max	H	109	352	54.0	-21.20	Pass

Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
Model Number: 1409



Test Standard:	15.209, 15.407	Mode:	5260MHz
Frequency Range:	1 - 18 GHz	Test Date:	12/09/2019 - 04/12/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	David Zhang
Remark:	N/A	Test Result:	Pass

5260 MHz



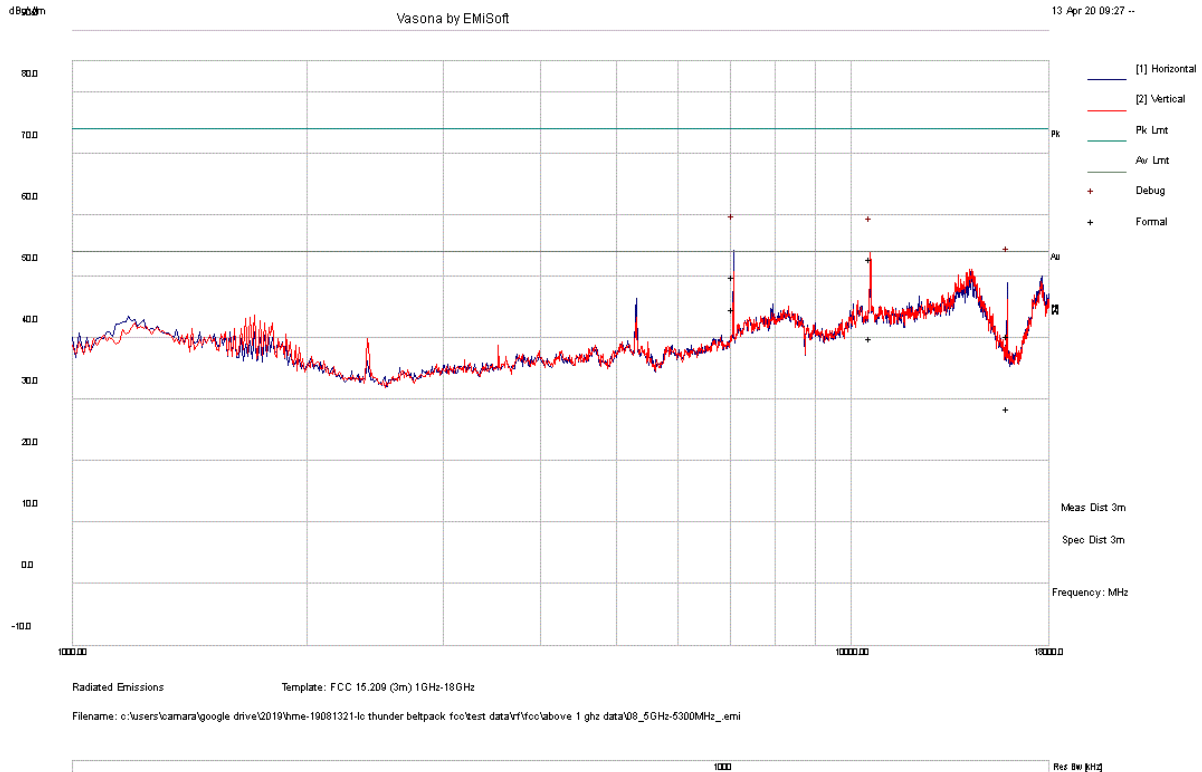
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
7013.27	39.10	20.10	-9.50	49.70	Peak Max	H	100	252	74.0	-24.30	Pass
15778.97	24.10	27.90	-4.80	47.20	Peak Max	H	120	234	74.0	-26.80	Pass
10517.87	38.90	23.20	-3.50	58.60	Peak Max	V	100	66	74.0	-15.40	Pass
7013.27	34.40	20.10	-9.50	45.00	Average Max	H	100	252	54.0	-9.00	Pass
15778.97	9.80	27.90	-4.80	33.00	Average Max	H	120	234	54.0	-21.00	Pass
10517.87	23.10	23.20	-3.50	42.80	Average Max	V	100	66	54.0	-11.20	Pass

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Model Number: 1409



Test Standard:	15.209, 15.407	Mode:	5300MHz
Frequency Range:	1 - 18 GHz	Test Date:	12/09/2019 - 04/12/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	David Zhang
Remark:	N/A	Test Result:	Pass

5300 MHz



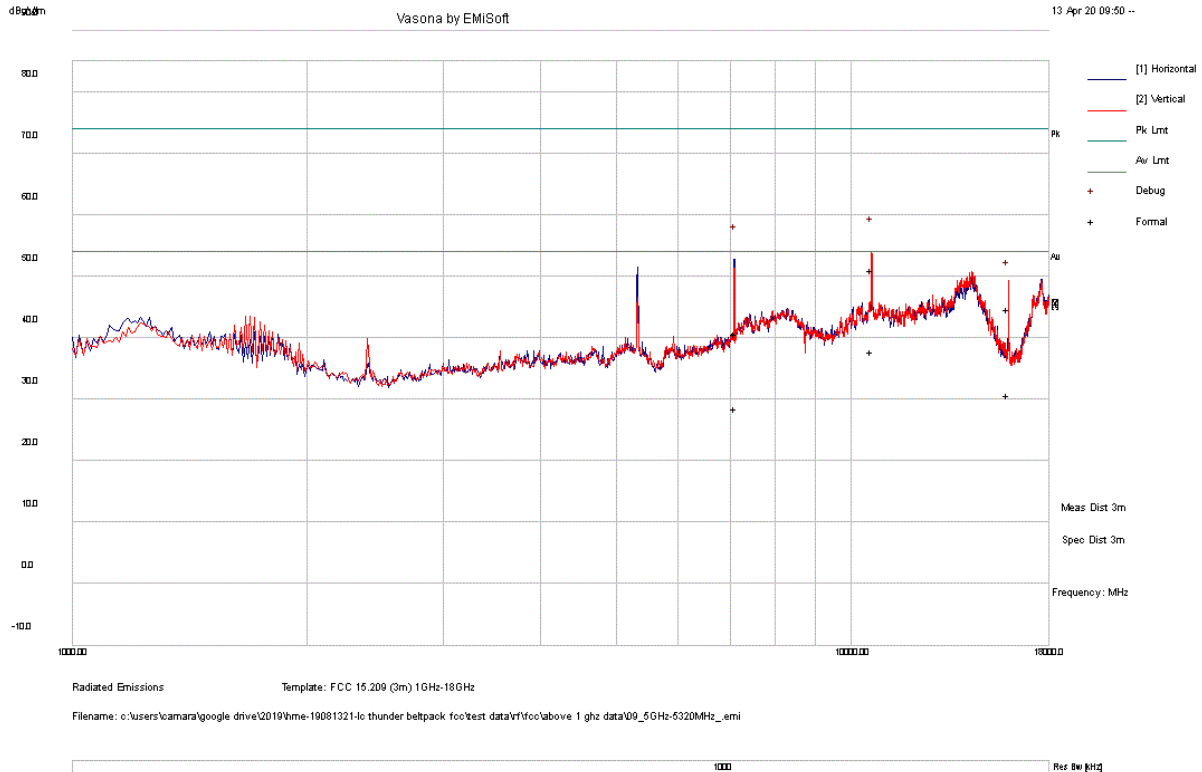
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
7066.66	38.90	20.20	-9.10	50.00	Peak Max	H	100	256	74.0	-24.00	Pass
10605.08	33.10	23.30	-3.60	52.80	Peak Max	V	138	140	74.0	-21.20	Pass
15906.29	17.30	27.90	-4.80	40.30	Peak Max	H	263	166	74.0	-33.70	Pass
7066.66	33.70	20.20	-9.10	44.70	Average Max	H	100	256	54.0	-9.30	Pass
10605.08	20.30	23.30	-3.60	40.00	Average Max	V	138	140	54.0	-14.00	Pass
15906.29	5.50	27.90	-4.80	28.60	Average Max	H	263	166	54.0	-25.40	Pass

Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
Model Number: 1409



Test Standard:	15.209, 15.407	Mode:	5320MHz
Frequency Range:	1 - 18 GHz	Test Date:	12/09/2019 - 04/12/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	David Zhang
Remark:	N/A	Test Result:	Pass

5320 MHz



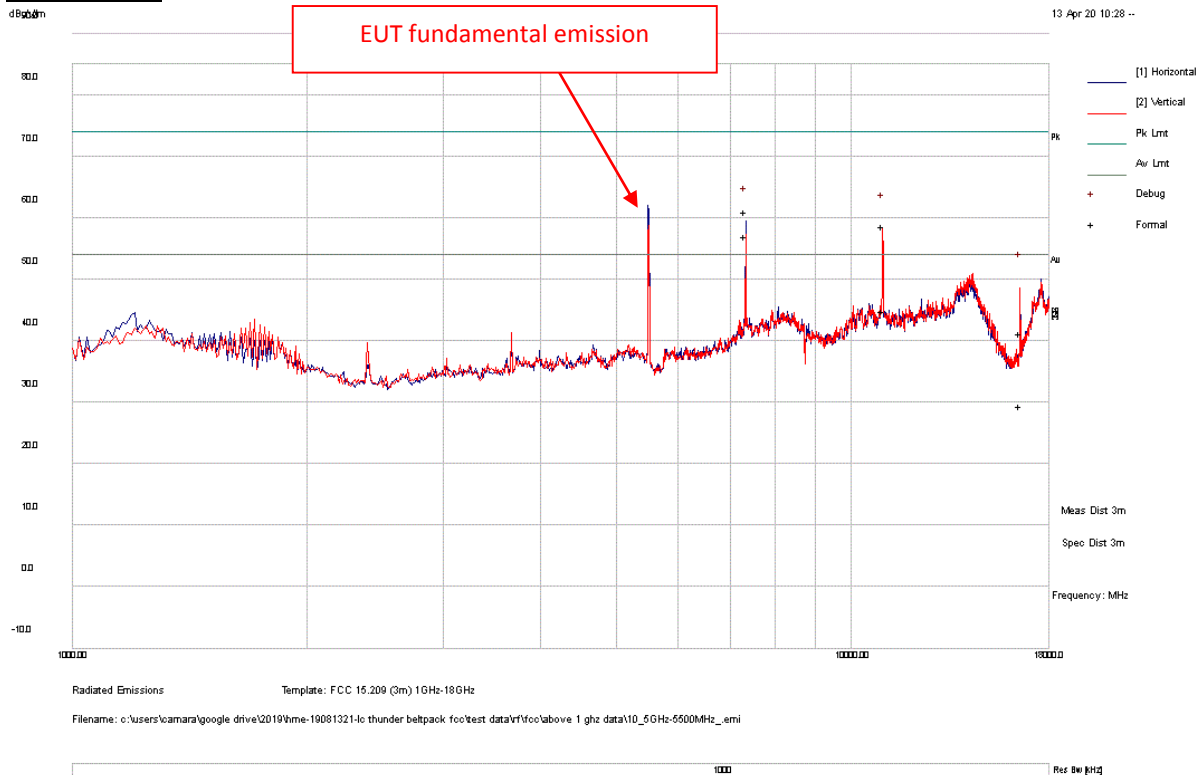
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
10636.49	31.30	23.30	-3.50	51.00	Peak Max	V	170	298	74.0	-23.00	Pass
7098.98	29.40	20.20	-9.00	40.70	Peak Max	H	162	285	74.0	-33.30	Pass
15949.55	21.70	27.80	-4.80	44.70	Peak Max	V	229	112	74.0	-29.30	Pass
10636.49	18.10	23.30	-3.50	37.90	Average Max	V	170	298	54.0	-16.10	Pass
7098.98	17.40	20.20	-9.00	28.60	Average Max	H	162	285	54.0	-25.40	Pass
15949.55	7.60	27.80	-4.80	30.70	Average Max	V	229	112	54.0	-23.30	Pass

Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
Model Number: 1409



Test Standard:	15.209, 15.407	Mode:	5500MHz
Frequency Range:	1 - 18 GHz	Test Date:	12/09/2019 - 04/12/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	David Zhang
Remark:	N/A	Test Result:	Pass

5500 MHz



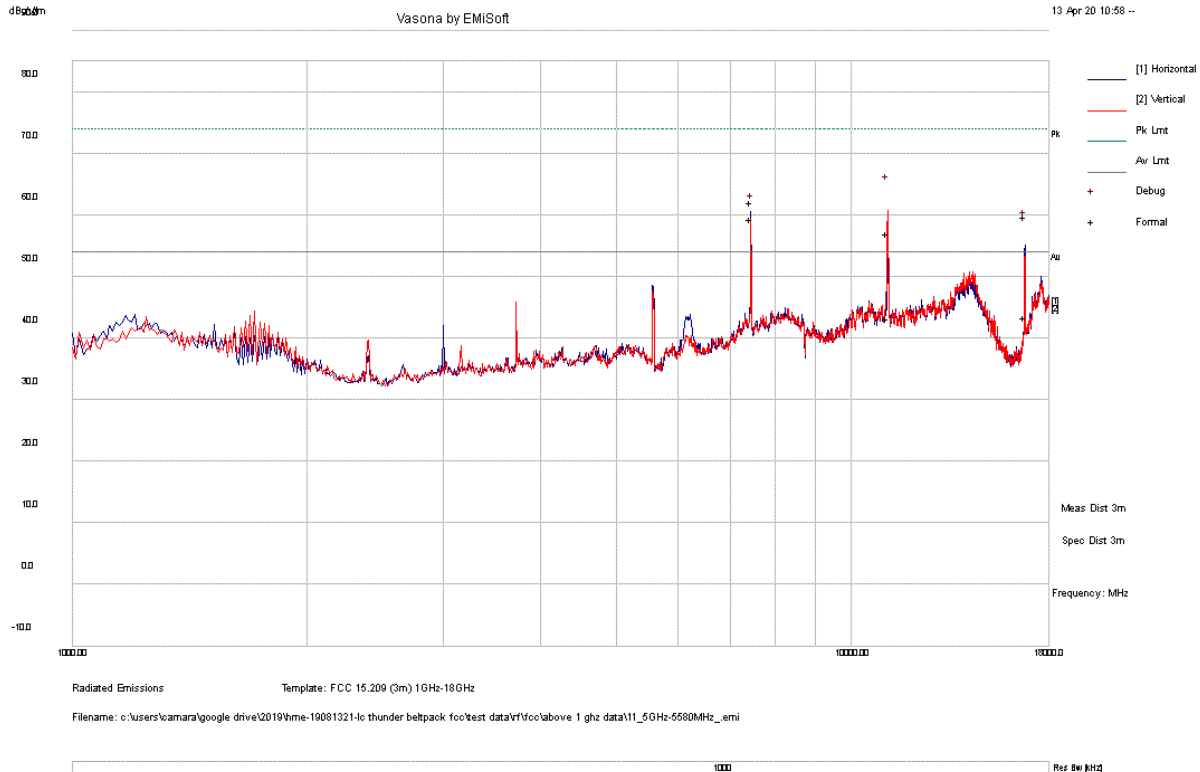
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
7333.23	48.30	20.70	-7.90	61.20	Peak Max	H	215	136	74.0	-12.80	Pass
10998.75	37.70	23.90	-2.90	58.70	Peak Max	V	100	282	74.0	-15.30	Pass
16489.47	16.10	28.10	-2.90	41.30	Peak Max	V	196	164	74.0	-32.70	Pass
7333.23	40.20	20.70	-7.90	53.10	Average Max	H	215	136	54.0	-0.90	Pass
10998.75	24.00	23.90	-2.90	44.90	Average Max	V	100	282	54.0	-9.10	Pass
16489.47	4.30	28.10	-2.90	29.50	Average Max	V	196	164	54.0	-24.50	Pass

Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
Model Number: 1409



Test Standard:	15.209, 15.407	Mode:	5580MHz
Frequency Range:	1 - 18 GHz	Test Date:	12/09/2019 - 04/12/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	David Zhang
Remark:	N/A	Test Result:	Pass

5580 MHz



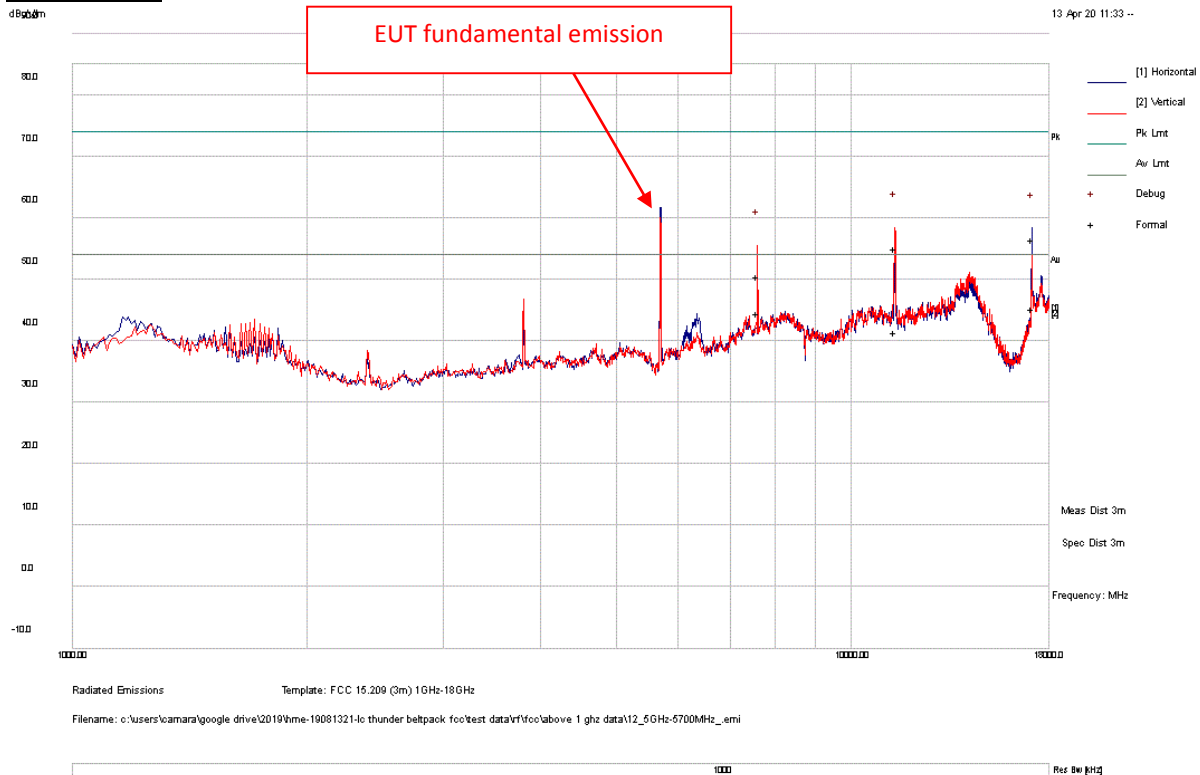
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
7440.01	52.90	20.90	-7.60	66.20	Peak Max	H	179	107	74.0	-7.80	Pass
11158.00	35.70	24.10	-2.80	57.10	Peak Max	V	214	66	74.0	-16.90	Pass
16746.64	32.30	28.30	-0.90	59.70	Peak Max	H	100	0	74.0	-14.30	Pass
7440.01	40.20	20.90	-7.60	53.40	Average Max	H	179	107	54.0	-0.6	Pass
11158.00	22.00	24.10	-2.80	43.30	Average Max	V	214	66	54.0	-10.70	Pass
16746.64	16.00	28.30	-0.90	43.40	Average Max	H	100	0	54.0	-10.60	Pass

Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
Model Number: 1409



Test Standard:	15.209, 15.407	Mode:	5580MHz
Frequency Range:	1 - 18 GHz	Test Date:	12/09/2019 - 04/12/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	David Zhang
Remark:	N/A	Test Result:	Pass

5700 MHz



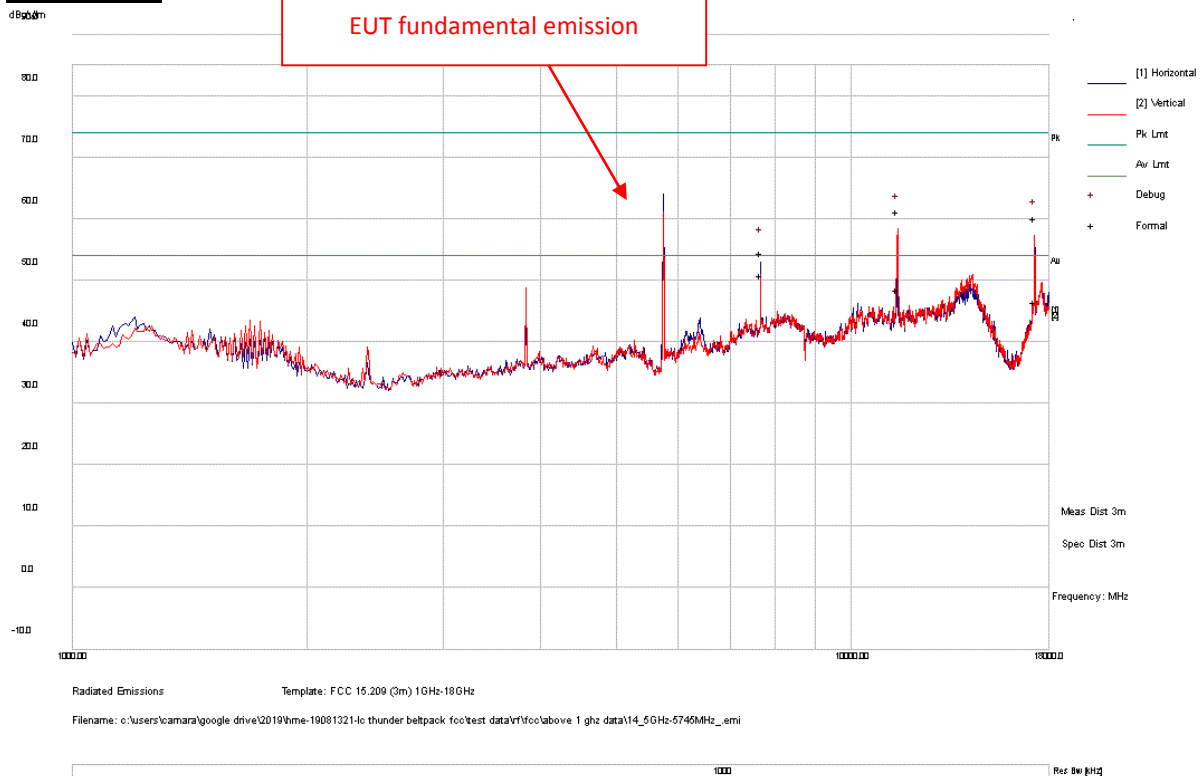
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
11401.13	33.50	24.60	-3.00	55.10	Peak Max	V	265	84	74.0	-18.90	Pass
17106.59	25.50	28.60	2.40	56.50	Peak Max	H	215	237	74.0	-17.50	Pass
7600.08	36.90	21.10	-7.50	50.50	Peak Max	V	118	226	74.0	-23.50	Pass
11401.13	20.00	24.60	-3.00	41.50	Average Max	V	265	84	54.0	-12.50	Pass
17106.59	14.20	28.60	2.40	45.20	Average Max	H	215	237	54.0	-8.80	Pass
7600.08	30.90	21.10	-7.50	44.50	Average Max	V	118	226	54.0	-9.50	Pass

Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
Model Number: 1409



Test Standard:	15.209, 15.407	Mode:	5745MHz
Frequency Range:	1 - 18 GHz	Test Date:	12/09/2019 - 04/12/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	David Zhang
Remark:	N/A	Test Result:	Pass

5745 MHz



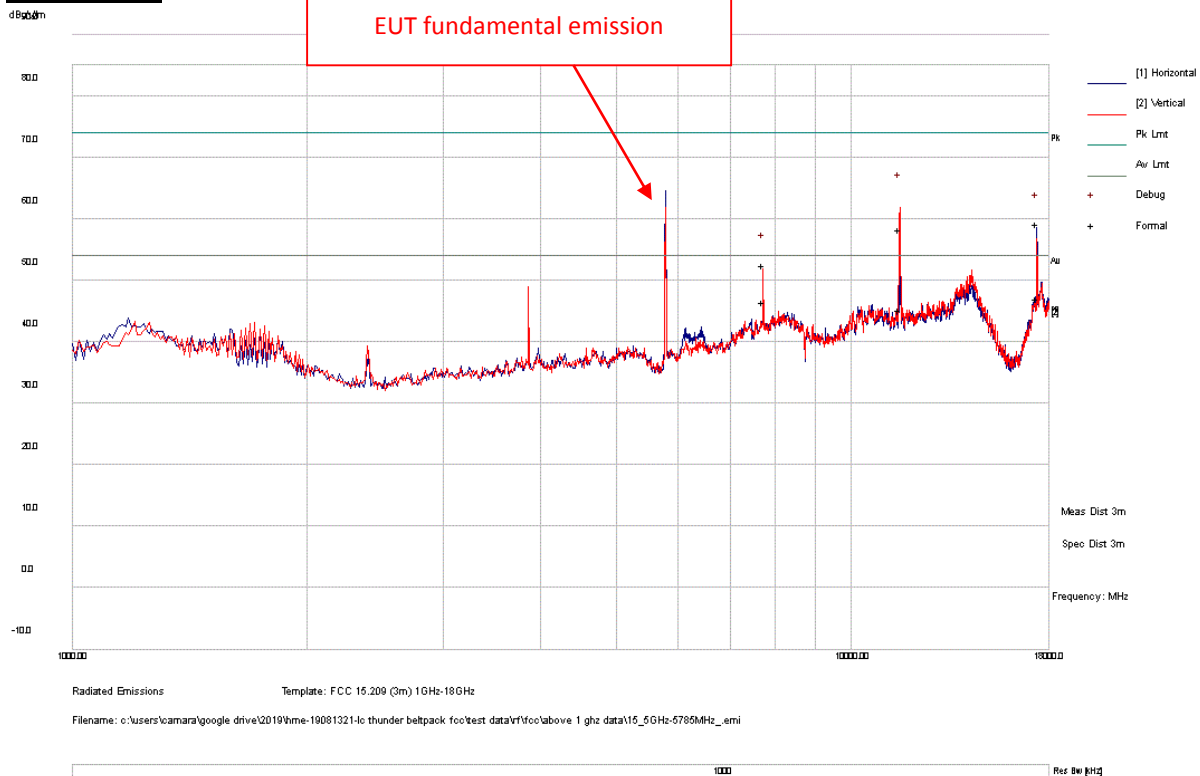
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
11488.40	39.50	24.70	-2.90	61.30	Peak Max	V	170	98	74.0	-12.70	Pass
17233.11	27.60	28.80	3.70	60.10	Peak Max	V	223	250	74.0	-13.90	Pass
7659.96	40.70	21.10	-7.30	54.50	Peak Max	H	102	111	74.0	-19.50	Pass
11488.40	26.80	24.70	-2.90	48.60	Average Max	V	170	98	54.0	-5.40	Pass
17233.11	14.10	28.80	3.70	46.60	Average Max	V	223	250	54.0	-7.40	Pass
7659.96	37.20	21.10	-7.30	51.00	Average Max	H	102	111	54.0	-3.00	Pass

Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
Model Number: 1409



Test Standard:	15.209, 15.407	Mode:	5785MHz
Frequency Range:	1 - 18 GHz	Test Date:	12/09/2019 - 04/12/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	David Zhang
Remark:	N/A	Test Result:	Pass

5785 MHz



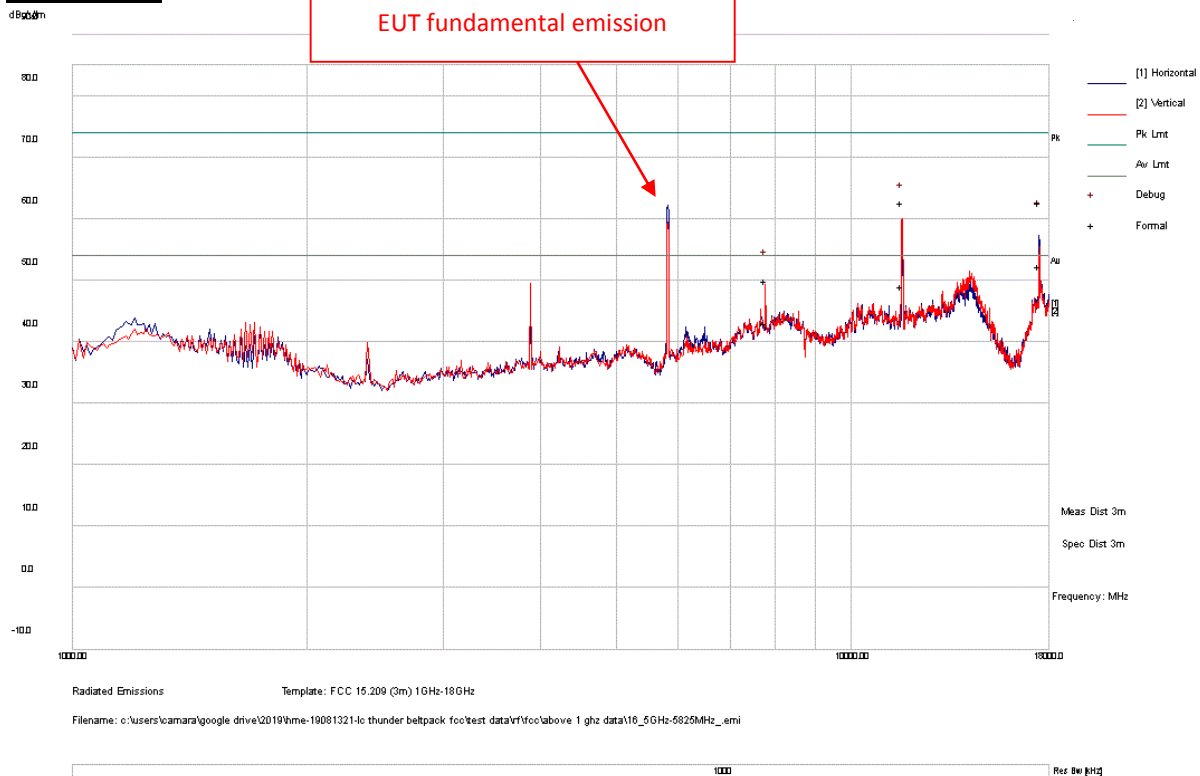
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
11571.10	36.10	24.90	-2.70	58.30	Peak Max	V	100	261	74.0	-15.70	Pass
17350.08	26.60	29.00	3.70	59.30	Peak Max	H	226	259	74.0	-14.70	Pass
7713.26	38.60	21.10	-7.20	52.60	Peak Max	V	100	264	74.0	-21.50	Pass
11571.10	23.00	24.90	-2.70	45.20	Average Max	V	100	261	54.0	-8.80	Pass
17350.08	14.50	29.00	3.70	47.10	Average Max	H	226	259	54.0	-6.90	Pass
7713.26	32.50	21.10	-7.20	46.50	Average Max	V	100	264	54.0	-7.50	Pass

Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
Model Number: 1409



Test Standard:	15.209, 15.407	Mode:	5825MHz
Frequency Range:	1 - 18 GHz	Test Date:	12/09/2019 - 04/12/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	David Zhang
Remark:	N/A	Test Result:	Pass

5825 MHz



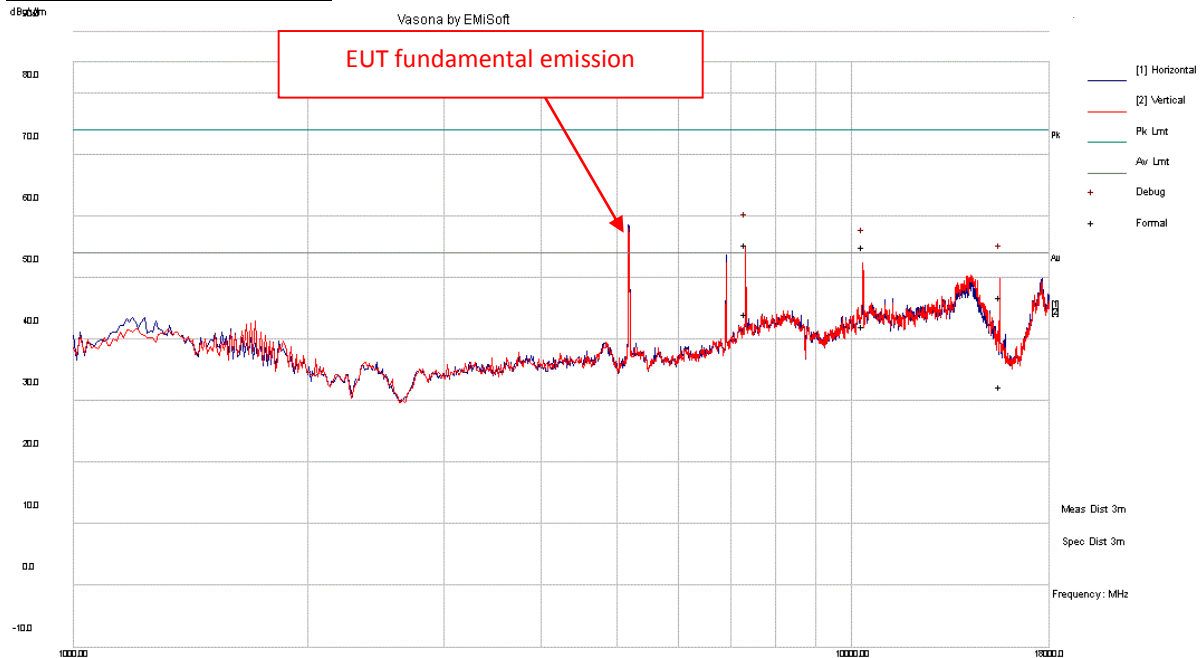
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
11648.06	40.20	25.00	-2.50	62.70	Peak Max	V	168	96	74.0	-11.30	Pass
17470.51	30.10	29.10	3.50	62.80	Peak Max	H	186	65	74.0	-11.20	Pass
7766.65	35.90	21.10	-7.00	50.00	Peak Max	V	177	204	74.0	-24.00	Pass
11648.06	26.60	25.00	-2.50	49.10	Average Max	V	168	96	54.0	-4.90	Pass
17470.51	19.80	29.10	3.50	52.40	Average Max	H	186	65	54.0	-1.60	Pass
7766.65	28.90	21.10	-7.00	43.00	Average Max	V	177	204	54.0	-11.00	Pass

Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
Model Number: 1409



Test Standard:	15.209, 15.407	Mode:	BLE+5GHz co-located
Frequency Range:	1 - 18 GHz	Test Date:	12/09/2019 - 04/12/2020
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	David Zhang
Remark:	N/A	Test Result:	Pass

BLE+5GHz co-located



Radiated Emissions Template: FCC 15.209 (3m) 1GHz-18GHz
 Filename: c:\users\camara\google drive\2019\hme-19081321-lc thunder beltpack fcc\test data\rf\fcc\above 1 ghz\data\18_Co-location_emi

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
7320.06	42.60	20.70	-7.90	55.40	Peak Max	V	121	342	74.0	-18.60	Pass
10358.70	35.80	22.90	-3.60	55.10	Peak Max	V	113	96	74.0	-18.90	Pass
15546.43	23.10	28.10	-4.40	46.80	Peak Max	V	238	58	74.0	-27.20	Pass
7320.06	31.40	20.70	-7.90	44.20	Average Max	V	121	342	54.0	-9.80	Pass
10358.70	22.90	22.90	-3.60	42.20	Average Max	V	113	96	54.0	-11.80	Pass
15546.43	8.60	28.10	-4.40	32.30	Average Max	V	238	58	54.0	-21.70	Pass

Report Number:	HME-19081321-LC-FCC-NII
Product:	Wireless Beltpack
Model Number:	1409



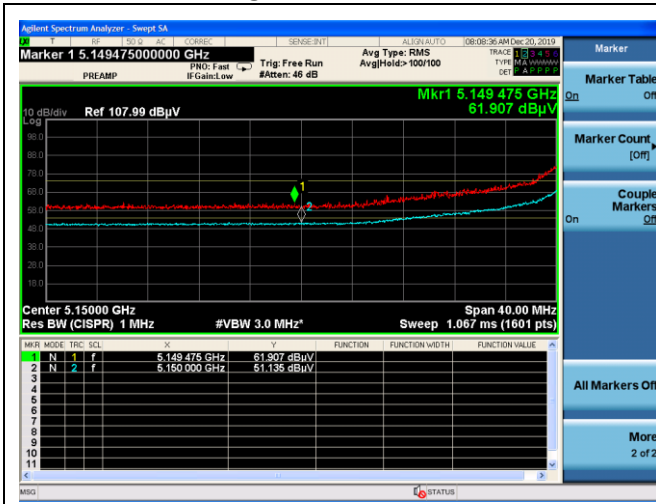
18GHz – 40GHz test result

Note: no substantial emission is found other than the noise floor.

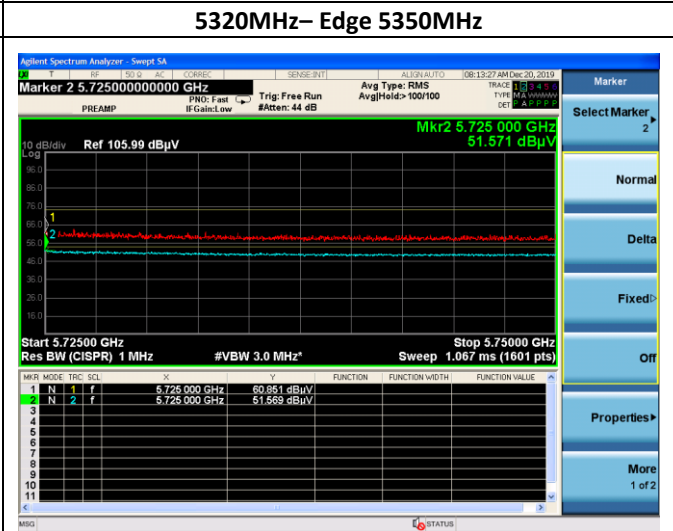
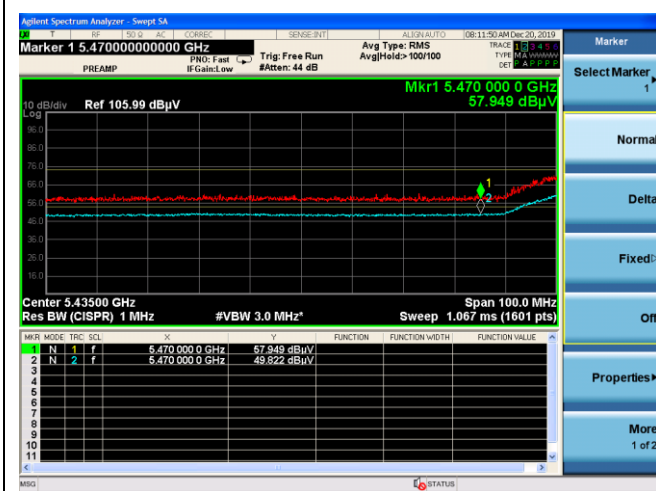
Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
Model Number: 1409



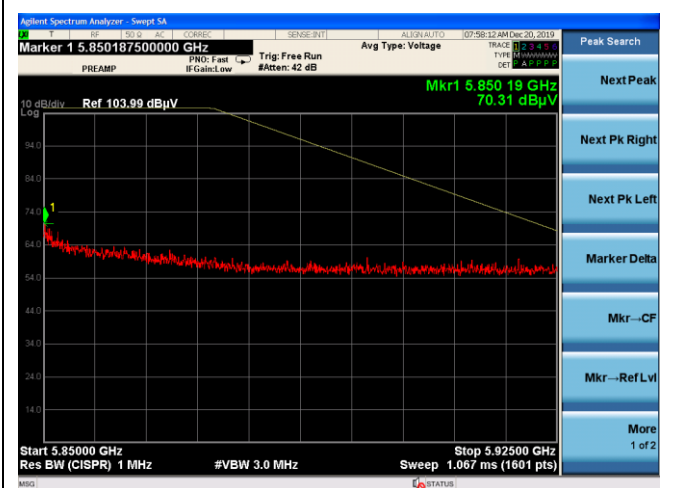
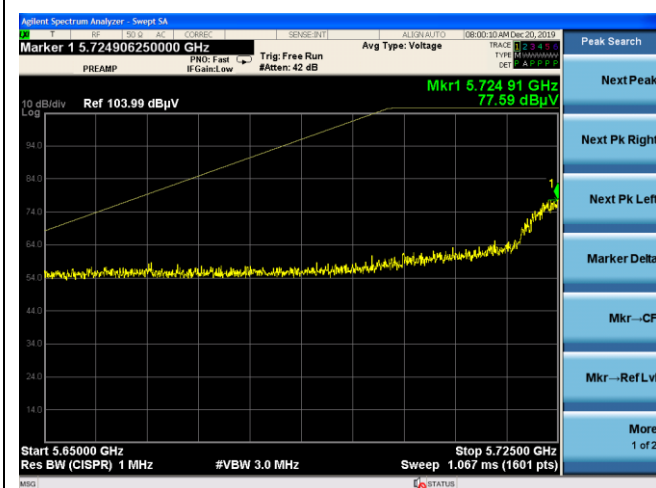
Radiated Band Edge measurement result



5180MHz- Edge 5150MHz



5500MHz- Edge 5470MHz



5745MHz- Edge 5725MHz (Peak)

5825MHz- Edge 5850MHz (Peak)

8.8 Conducted Emissions

8.8.1 Requirement

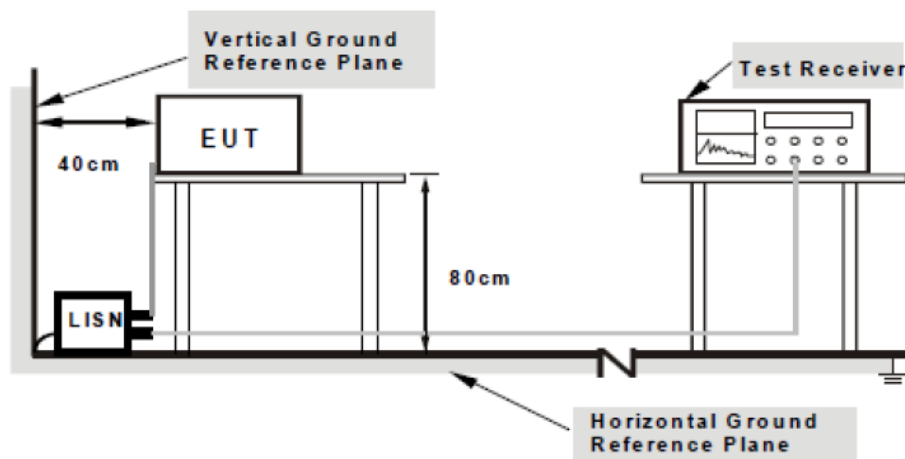
Per § 15.207 (a), an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/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 the frequency ranges.

Limits for Conducted Emissions at the Mains Ports

Section	Frequency ranges (MHz)	Limit (dBuV)	
		QP	Average
Class B devices	0.15 – 0.5	66 – 56	56 – 46
	0.5 – 5	56	46
	5 - 30	60	50

NOTE 1 The lower limit shall apply at the transition frequencies.

8.8.2 Test setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

Report Number:	HME-19081321-LC-FCC-NII
Product:	Wireless Beltpack
Model Number:	1409



8.8.3 Test Procedure

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
4. All other supporting equipment was powered separately from another main supply.
5. The EUT was switched on and allowed to warm up to its normal operating condition.
6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.
7. High peaks, relative to the limit line, were then selected.
8. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz. For FCC tests, only Quasi-peak measurements were made; while for CISPR/EN tests, both Quasi-peak and Average measurements were made
9. All possible modes of operation were investigated. Only the worst case emissions were measured and reported. All other emissions were relatively insignificant.

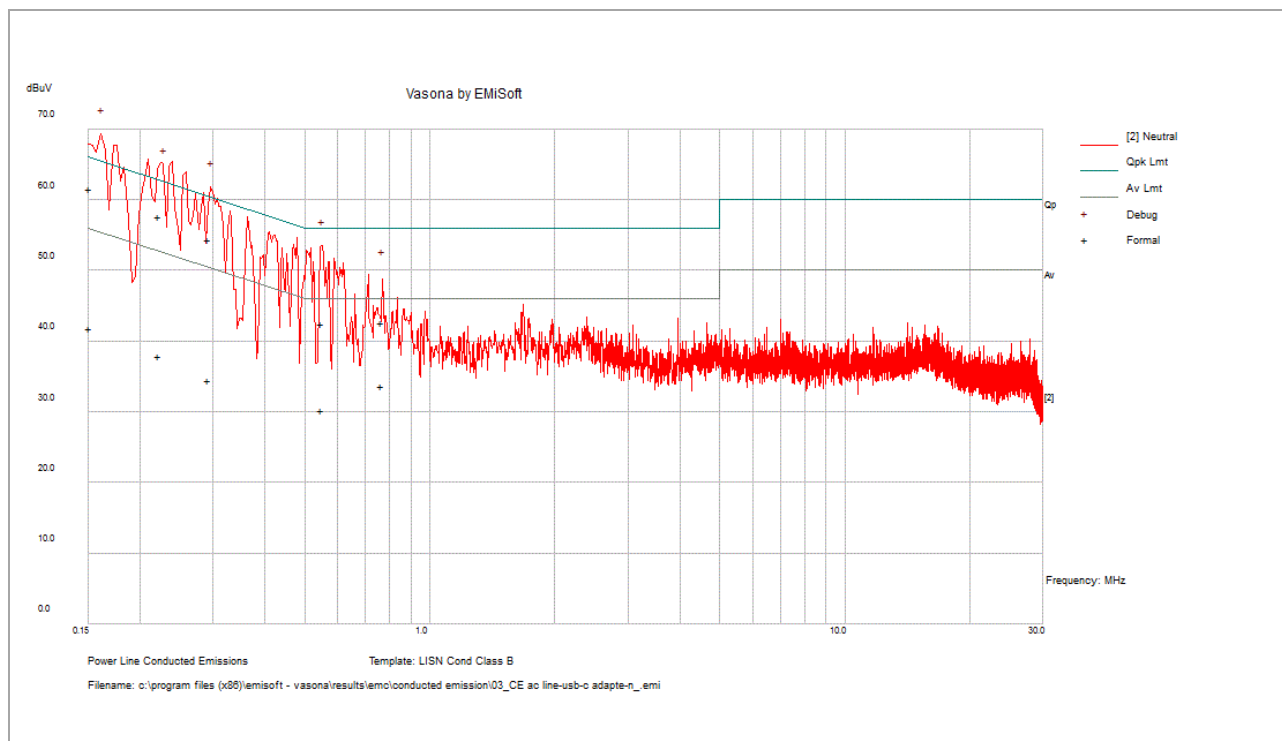
Report Number:	HME-19081321-LC-FCC-NII
Product:	Wireless Beltpack
Model Number:	1409



8.8.4 Test Result

Neutral Line

Test Standard:	15.207	Mode:	Neutral, USB-C adapter
Frequency Range:	0.15-30MHz	Test Date:	11/20/2019
Antenna Type/Polarity:	N/A	Test Personnel:	David Zhang
Remark:	Class B, 120VAC, 60Hz	Test Result:	Pass



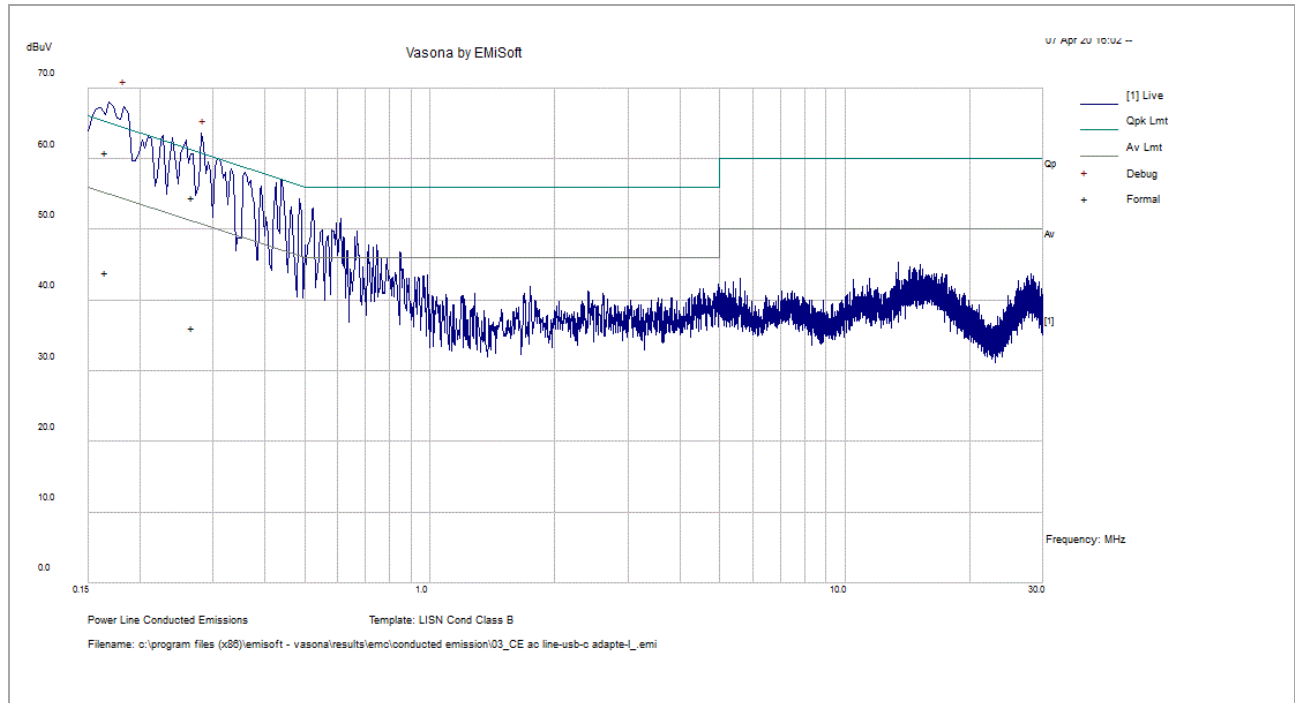
Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Meas. Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
0.15	51.30	10.10	0.20	61.60	QP	Neutral	65.90	-4.30	Pass
0.29	44.20	10.10	0.10	54.40	QP	Neutral	60.40	-6.00	Pass
0.22	47.30	10.10	0.20	57.60	QP	Neutral	62.70	-5.10	Pass
0.55	32.20	10.10	0.10	42.40	QP	Neutral	56.00	-13.60	Pass
0.76	32.50	10.10	0.10	42.70	QP	Neutral	56.00	-13.30	Pass
0.15	31.60	10.10	0.20	41.90	AV	Neutral	55.90	-14.10	Pass
0.29	24.20	10.10	0.10	34.40	AV	Neutral	50.40	-16.00	Pass
0.22	27.60	10.10	0.20	37.90	AV	Neutral	52.70	-14.80	Pass
0.55	20.10	10.10	0.10	30.30	AV	Neutral	46.00	-15.70	Pass
0.76	23.40	10.10	0.10	33.60	AV	Neutral	46.00	-12.40	Pass

Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
Model Number: 1409



Live Line

Test Standard:	15.207	Mode:	Line, USB-C adapter
Frequency Range:	0.15-30MHz	Test Date:	11/20/2019
Antenna Type/Polarity:	N/A	Test Personnel:	David Zhang
Remark:	Class B, 120VAC, 60Hz	Test Result:	Pass



Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV/m)	Meas. Type	Line	Limit (dBuV/m)	Margin (dB)	Pass /Fail
0.17	50.60	10.10	0.20	60.90	QP	Live	65.20	-4.30	Pass
0.27	44.30	10.10	0.10	54.50	QP	Live	61.20	-6.70	Pass
0.17	33.60	10.10	0.20	43.90	AV	Live	55.20	-11.30	Pass
0.27	25.90	10.10	0.10	36.10	AV	Live	51.20	-15.10	Pass

Report Number: HME-19081321-LC-FCC-NII
Product: Wireless Beltpack
Model Number: 1409



9 Test instrument list

Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Due
Semi-Anechoic Chamber	ETS-Lindgren	10M	VL001	5/11/2019	5/11/2020
Shielding Control Room	ETS-Lindgren	Series 81	VL006	N/A	N/A
Spectrum Analyzer	Keysight	N9020A	MY50110074	5/4/2019	5/4/2020
EMC Test Receiver	R&S	ESL6	100230	5/7/2019	5/7/2020
LISN (9KHz – 30MHz)	EMCO	3816/2	9705-1066	5/4/2019	5/4/2020
Bi-Log Antenna	ETS-Lindgren	3142E	217921	11/15/2019	11/15/2020
Horn Antenna (1-18GHz)	Electro-Metrics	EM-6961	6292	5/2/2019	5/2/2020
Horn Antenna (18-40GHz)	Com-Power	AH-840	101109	5/2/2019	5/2/2020
Preamplifier	RF Bay, Inc.	LPA-10-20	11180621	5/10/2019	5/10/2020
True RMS Multi-meter	UNI-T	UT181A	C173014829	5/10/2019	5/10/2020
Temp / Humidity / Pressure Meter	PCE Instruments	PCE-THB 40	R062028	5/9/2019	5/9/2020
RF Attenuator	Pasternack	PE7005-3	VL061	5/10/2019	5/10/2020
Preamplifier 100KHz - 40GHz	Aeroflex	33711-392-77150-11	064	5/10/2019	5/10/2020
EM Center Control	ETS-Lindgren	7006-001	160136	N/A	N/A
Turn Table	ETS-Lindgren	2181-3.03	VL002	N/A	N/A
Boresight Antenna Tower	ETS-Lindgren	2171B	VL003	N/A	N/A
Loop Antenna (9k-30MHz)	Com-Power	AL-130	121012	5/9/2019	5/9/2020
RE test cable(below 6GHz)	Vista	RE-6GHz-01	RE-6GHz-01	5/10/2019	5/10/2020
RE test cable (1-18GHz)	PhaseTrack	II-240	RE-18GHz-01	5/10/2019	5/10/2020
RE test cable (>18GHz)	Sucoflex	104	344903/4	5/10/2019	5/10/2020
Pulse limiter	Com-Power	LIT-930A	531727	5/15/2019	5/15/2020
CE test cable #1	FIRST RF	FRF-C-1002-001	CE-6GHz-01	5/10/2019	5/10/2020
CE test cable#2	FIRST RF	FRF-C-1002-001	CE-6GHz-02	5/9/2019	5/9/2020
Wideband Communication	R&S	CMW500	147508	5/8/2019	5/8/2020