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ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT





Applicant: Honeywell International Inc.

9680 Old Bailes Rd, Fort Mill, SC 29707, USA

Manufacturer: Honeywell International Inc.

9680 Old Bailes Rd, Fort Mill, SC 29707, USA

Vehicle Mount Computer **Product Name:**

Brand Name: Honeywell Model No.: VM1A-L0N

Model Difference: N/A

Report Number: TERF2212002706ER

FCC ID HD5-VM1AL0N

1693B-VM1AL0N IC:

Date of EUT Received: December 14, 2022

December 26, 2022 ~ March 03, 2023 Date of Test:

Issue Date: March 15, 2023

Approved By_

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT comply with FCC rule part §15.407, ISED RSS-247.

The results of this report relate only to the sample identified in this report.

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Revision History					
Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2212002706ER	00	Original.	March 15, 2023	Tiffany Kao	

Note:

1 . The remark "*" indicates modification of the report upon requests from certification body.

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GENERAL INFORMATION

1.1 **Product Description**

Product Name:	Vehicle Mount Computer	
Brand Name:	Honeywell	
Model No.:	VM1A-L0N	
Model Difference:	N/A	
Hardware Version:	VM1A-REF MAIN BOARD Rev:2.2	
Firmware Version:	85.00.00-1171	
EUT Series No.:	2231461110	
Power Supply:	15V	
Test Software (Name/Version)	FTM Tool /1.8	

1.2 **Modulation & Data Rate**

Modulation type:	64QAM, 16QAM, QPSK, BPSK for OFDM
	256QAM for OFDM in 802.11ac
	802.11 a: 6 - 54 Mbps
	802.11 n_20MHz: up to 144.4 Mbps
Transition Rate:	802.11 n_40MHz: up to 300 Mbps
Transition Rate.	802.11 ac_20MHz: up to 173.4 Mbps
	802.11 ac_40MHz: up to 400 Mbps
	802.11 ac_80MHz: up to 866.6 Mbps

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Antenna Designation

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Transmitter Chain	Peak Antenna Gain (dBi)	MIMO An- tenna Gain (dBi)	Worst An- tenna Gain
			5150~5250	Ch 0 & Ch 1	5	8.01	V
	LARSEN	R380500314	5250~5350	Ch 0 & Ch 1	5	8.01	V
Futowal	LARSEN	K300300314	5470~5725	Ch 0 & Ch 1	5	8.01	V
External di-pole			5725~5850	Ch 0 & Ch 1	5	8.01	V
antenna	LAIRD	WTS 2450	5150~5250	Ch 0 & Ch 1	2.6	5.61	
			5250~5350	Ch 0 & Ch 1	2.6	5.61	
			5470~5725	Ch 0 & Ch 1	2.6	5.61	
			5725~5850	Ch 0 & Ch 1	3.4	6.41	
			5150~5250	Ch 0	4.7	7.56	
			5250~5350	Ch 0	4.6	7.66	
			5470~5725	Ch 0	4.8	7.86	
Internal Printed	Honeywell	VM1A Int Ant	5725~5850	Ch 0	4.7	7.08	
Antenna	Honeyweii	VIVITA_IIIL_AIIL	5150~5250	Ch 1	4.4	7.56	
			5250~5350	Ch 1	4.7	7.66	
			5470~5725	Ch 1	4.9	7.86	
			5725~5850	Ch 1	3.4	7.08	

Note:

- 1. Pre-scanned was done on the above antennas, measurements were demonstrated by using the antenna with the highest gain as the worst case scenarios.
- 2. Antenna information is provided by the applicant.

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Wi-Fi	Frequency Range	Channels	Rated Power(Avg) (dBm) (Worst Case)	Modulation Technology
a/	5180~5240	4	13.87 dBm	OFDM
n_HT/	5260~5320	4	20.87 dBm	OFDM
ac_VHT 20M	5500~5700	11	20.76 dBm	OFDM
ZOIVI	5745-5825	5	20.92 dBm	OFDM
	5190~5230	2	13.58 dBm	OFDM
n_HT/ ac_VHT	5270~5310	2	20.71 dBm	OFDM
40M	5510~5670	5	20.72 dBm	OFDM
	5755-5795	2	20.89 dBm	OFDM
	5210	1	11.31 dBm	OFDM
ac_VHT	5290	1	8.66 dBm	OFDM
80M	5530~5610	2	20.55 dBm	OFDM
	5775	1	19.50 dBm	OFDM

1.5 **ISED**

Wi-Fi	Frequency Range	Channels	EIRP/Avg	Rated Power(EIRP/Avg) (dBm) (Worst Case)		Modulation Technology
a/	5180~5240	4	EIRP	21.88	dBm	OFDM
n_HT/	5260~5320	4	Avg	20.87	dBm	OFDM
ac_VHT 20M	5500~5700	11	Avg	20.76	dBm	OFDM
20101	5745-5825	5	Avg	20.92	dBm	OFDM
	5190~5230	2	EIRP	21.59	dBm	OFDM
n_HT/ ac_VHT	5270~5310	2	Avg	20.71	dBm	OFDM
40M	5510~5670	5	Avg	20.72	dBm	OFDM
	5755-5795	2	Avg	20.89	dBm	OFDM
	5210	1	EIRP	19.32	dBm	OFDM
ac_VHT	5290	1	Avg	8.66	dBm	OFDM
80M	5530~5610	2	Avg	20.55	dBm	OFDM
	5775	1	Avg	19.50	dBm	OFDM

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1.6 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

FCC KDB 291074 D02 EMC Measurement v01

RSS-247 issue 2 Feb. 2017

RSS-Gen, issue 5 April, 2018

ANSI C63.10:2013

1.7 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designa- tion number	IC CAB identifier
		SAC 1		
		SAC 2		
		SAC 3		
	No 124 Wu Kung Dood New Toingi	Conduction 1		
	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New	Conducted 1	TW0027	TW3702
	Taipei City, Taiwan.	Conducted 2	1 000027	
	Taiper City, Taiwaii.	Conducted 3		
		Conducted 4		
		Conducted 5		
SGS Taiwan Ltd.		Conducted 6		
Central RF Lab.	N. O. K. " A. I. D. I. Q. i. I District	Conduction C	- -	
(TAF code 3702)		SAC C		
		SAC D		
1		SAC G		
		Conducted A		
	No.2, Keji 1st Rd., Guishan District,	Conducted B	TW0028	
	Taoyuan City, Taiwan 333	Conducted C		
		Conducted D		
		Conducted E		
		Conducted F		
		Conducted G	1	

Note: Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

1.8 Special Accessories

There are no special accessories used while test was conducted.

1.9 Equipment Modifications

There was no modification incorporated into the EUT.

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SYSTEM TEST CONFIGURATION

2.1 **EUT Configuration**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 **EUT Exercise**

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 **Test Procedure**

2.3.1 **Conducted Emissions**

The EUT is a placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

2.3.3 **Radiated Emissions**

The EUT is a placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

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Measurement Results Explanation Example

2.4.1 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

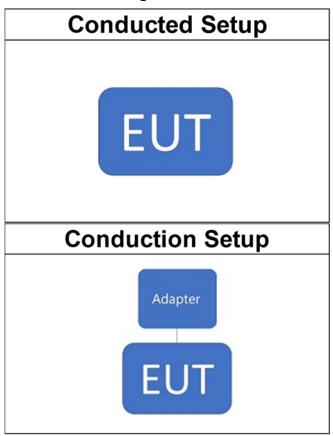
Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

2.4.2 For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

2.5 **Test Configuration**



Radiated Setup



2.6 Control Unit(s)

AC Power-Line Conducted Emission Test Site: Conduction 1					
EQUIPMENT TYPE MFR MODEL NUMBER SERIAL NUMBER LAST CAL. CAL DUE.					
Adapter	GlobTek, Inc	GT-46600-6015-T3	N/A	N/A	N/A

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SUMMARY OF TEST RESULT

FCC Rules	ISED Rules	Description Of Test	Result
§15.207	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.407(e)	RSS-Gen §6.7 RSS-247 §6.2.4.1	Emission Bandwidth	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Maximum Conducted Output Power	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Power Spectral Density	Compliant
§15.205 §15.209 §15.407(b)	RSS-247 §6.2.1~ 4 (2)	Undesirable Radiated Emissions	Compliant
§15.407(c)	RSS-247 §6.4	Transmission in case of Absence of Information	Compliant
§15.203	N/A	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operating Frequencies

Operated band in 5150 MHz ~5250 MHz:

20 M		
СН	Freq	
CII	(MHz)	
36	5180	
40	5200	
44	5220	
48	5240	

d	d <u>in 5150 MHz</u> ~5250 MHz:				
	4	0 M	8	0 M	
	СН	Freq (MHz)	СН	Freq (MHz)	
	38	5190	42	5210	
	46	5230			

Operated barra in 3230 Minz							
20	М	40 M					
СН	Freq (MHz)	СН	Freq (MHz)				
52	5260	54	5270				
56	5280	62	5310				
60	5300						
64	5320						

•	วรวบ เทเนร.							
	80 M							
	СН	Freq (MHz)						
	58	5290						

Operated band in 5470 MHz ~5725 MHz:

20 M							
СН	Freq (MHz)						
100	5500						
104	5520						
108	5540						
112	5560						
116	5580						
120	5600						
124	5620						
128	5640						
132	5660						
136	5680						
140	5700						

ľ	1 54/U IVIHZ ~5/25 IVIHZ:								
	4	0 M	80 M						
	СН	Freq (MHz)	СН	Freq (MHz)					
	102	5510	106	5530					
	110	5550	122	5610					
	118	5590							
	126	5630							

5670

Operated band in 5725 MHz ~5850 MHz:

20 M							
+	Freq (MHz)						
9	5745						
3	5765						
7	5785						
1	5805						
5	5825						
	7 7 5						

	4	0 M	80 M			
)	СН	Freq (MHz)	СН	Freq (MHz)		
1	151	5755	155	5775		
	159	5795				

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The Worst Test Modes and Channel Details

- 1. The EUT has been tested under operating condition.
- 2. Test program used to control the EUT for staying in continuous transmitting mode is programmed.
- 3. Investigation has been done on all the possible configurations for searching the worst case. The given UE is pre-scanned among below modes.

ı	Modulation	Transmission Chain						Tr	Single ansmission Spatial	Tr	Multiple ansmission Spatial	
V	802.11 a	٧	Ch0	٧	Ch1		Ch2	Ch3		1TX	٧	2TX
V	802.11 n	٧	Ch0	٧	Ch1		Ch2	Ch3		1TX	٧	2TX
V	802.11 ac	٧	Ch0	٧	Ch1		Ch2	Ch3		1TX	٧	2TX
	802.11 ax		Ch0		Ch1		Ch2	Ch3		1TX		2TX

4. Therefore, below summary is the modes of test configuration that yield the highest reading and generate the highest emission chosen to carry out the relevantly mandatory test items.

CONDUCTED TEST									
MODE	FREQUENC	AVAILABLE	TESTED	MODULATIO	DATARATE	ANTENNA			
WODE	YBAND	CHANNEL	CHANNEL	N	(Mbps)	PORT			
	5180~5240	36 to 48	36,44,48						
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6	2TX			
002.114	5500~5700	100 to 140	100,116,140	OI DIVI	O	217			
	5745~5825	149 to 165	149,157,165						
	5180~5240	36 to 48	36,44,48						
802.11n_HT20	5260~5320	52 to 64	52,60,64	OFDM	MCS0	2TX			
	5500~5700	100 to 140	100,116,140	OI DIVI		ZIX			
	5745~5825	149 to 165	149,157,165						
	5190~5230	38 to 46	38,46			2TX			
802.11n_HT40	5270~5310	54 to 62	54,62	OFDM	MCS0				
002.1111_11140	5510~5670	102 to 134	102,110,134	OI DIVI	WOOO	217			
	5755~5795	151 to 159	151,159						
	5210	42	42						
802.11ac_VHT80	5290	58	58	OFDM	MCS0	2TX			
002.11ac_v11100	5530~5610	106 to 122	106,122	1 OI DIVI	WICOU	217			
	5775	155	155						

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	RADIATED EMISSION TEST (BELOW 1 GHz)										
MODE	FREQUENC	AVAILABLE	TESTED	MODULATIO	DATARATE	ANTENNA					
MODE	YBAND	CHANNEL	CHANNEL	N	(Mbps)	PORT					
	5180~5240	36 to 48	44								
802.11a	5260~5320	52 to 64	60	OFDM	6	2TX					
	5500~5700	100 to 140	116	- OFDIVI	U	217					
	5745~5825	149 to 165	157								
	R	ADIATED EN	MISSION TE	ST (ABOVE	1 GHz)						
MODE	FREQUENC	AVAILABLE	TESTED	MODULATIO	DATARATE	ANTENNA					
WODE	YBAND	CHANNEL	CHANNEL	N	(Mbps)	PORT					
	5180~5240	36 to 48	36,44,48								
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6	2TX					
	5500~5700	100 to 140	100,116,140	OFDIN		217					
	5745~5825	149 to 165	149,157,165								
	5180~5240	36 to 48	36,44,48		MCS0						
802.11n_HT20	5260~5320	52 to 64	52,60,64	OFDM		2TX					
002.1111_111.20	5500~5700	100 to 140	100,116,140	OI DIVI		217					
	5745~5825	149 to 165	149,157,165								
	5190~5230	38 to 46	38,46								
802.11n HT40	5270~5310	54 to 62	54,62	OFDM	MCS0	2TX					
002.1111_111 10	5510~5670	102 to 134	102,110,134		WOOO	217					
	5755~5795	151 to 159	151,159								
	5210	42	42								
802.11ac_HT80	5290	58	58	OFDM	MCS0	2TX					
802.11ac_H180	5530~5610	106 to 122	106,122		IVIOOU						
	5775	155	155								

Note:

The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

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5 MEASUREMENT UNCERTAINTY

Test Items	Un	certain	ty
AC Power Line Conducted Emission	+/-	2.32	dB
Output Power measurement	+/-	1	dB
Emission Bandwidth	+/-	1.53	Hz
Undesignable radiated emission measure- ment	+/-	1.68	dB
Peak Power Density	+/-	2.16	dB
Temperature	+/-	0.7	°C
Humidity	+/-	3	%
DC / AC Power Source	+/-	1	%

Radiated Spurious Emission Measurement Uncertainty						
	+/- 2.8 dB			9kHz~30MHz		
Polarization: Vertical	+/-	4.82	dB	30MHz - 1000MHz		
Polarization: Vertical	+/-	4.37	dB	1GHz - 18GHz		
	+/-	4.21	dB	18GHz - 40GHz		
	+/-	2.8	dB	9kHz~30MHz		
Polarization: Horizontal	+/-	4.54	dB	30MHz - 1000MHz		
Polarization: Horizontal	+/-	4.37	dB	1GHz - 18GHz		
	+/-	4.21	dB	18GHz - 40GHz		

Note:

- 1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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MEASUREMENT EQUIPMENT USED

6.1 **Emission from AC power line**

AC Power-Line Conducted Emission Test Site: Conduction 1								
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.			
EMI Test Receiver	R&S	ESCI 7	100759	08/22/2022	08/21/2023			
LISN	SCHWARZBECK	NSLK 8127	01040	08/23/2022	08/22/2023			
Coaxial Cables	EMC Instruments Corp.	EMCCFD300-BM-BM- 3000	161207	06/22/2022	06/21/2023			
Test Software	audix	e3	Ver. 9 210322	N.C.R	N.C.R			

6.2 **Condcuted Measurement**

Conducted Emission Test Site: Conducted 1								
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.			
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY59071571	05/19/2022	05/18/2023			
Test Software	SGS	Radio Test Software	Ver. 21	N.C.R	N.C.R			
Power Meter	Anritsu	ML2496A	1242004	10/26/2022	10/25/2023			
Power Sensor	Anritsu	MA2411B	1207365	10/26/2022	10/25/2023			
Power Sensor	Anritsu	MA2411B	1207368	10/26/2022	10/25/2023			
Attenuator	Mini-Circuit	BW-S10W2+	2	12/13/2022	12/12/2023			
DC Block	Mini-Circuits	BLK-18-S+	1	12/13/2022	12/12/2023			

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6.3 **Radiated Measurement**

Radiated Emission Test Site: SAC 1								
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.			
Horn Antenna	SCHWARZBECK	BBHA9120D	D803	09/27/2022	09/26/2023			
Bi-log Antenna	TESEO	CBL 6112D	35242 & AT-N0555	12/27/2022	12/26/2023			
Horn Antenna	SCHWARZBECK	BBHA9170	184	12/30/2022	12/29/2023			
Site Cal	SGS	SAC 1	N/A	01/01/2023	12/31/2023			
Loop Antenna	ETS.LINDGREN	6502	148045	10/05/2022	10/04/2023			
Spectrum Analyzer	Agilent	E4446A	MY51100003	10/28/2022	10/27/2023			
EMI Test Receiver	R&S	ESCI 7	100759	08/22/2022	08/21/2023			
Pre-Amplifier	EMC Instruments	EMC184045B	980135	10/27/2022	10/26/2023			
Pre-Amplifier	HP	8449B	3008A01973	12/13/2022	12/12/2023			
Pre-Amplifier	HP	8447D	2944A09469	12/13/2022	12/12/2023			
Bandreject Filter 5150-5350	Micro-Tronics	BRM50703	1	12/13/2022	12/12/2023			
Bandreject Filter 5470-5725	Micro-Tronics	BRM50704	1	12/13/2022	12/12/2023			
Bandreject Filter 5725-5875	Micro-Tronics	BRM50705	1	12/13/2022	12/12/2023			
8.6GHz High Pass Filter	Titan	T04H86002600060S01	210619-2-7	12/13/2022	12/12/2023			
Coaxial Cable	Huber Suhner	succoflex 102	MY2622/2	12/13/2022	12/12/2023			
Coaxial Cable	Huber Suhner	succoflex 104A	800086/4a	12/13/2022	12/12/2023			
Coaxial Cable	Huber Suhner	EMC 104-SM-SM-2000	160123	12/13/2022	12/12/2023			
Coaxial Cable	Huber Suhner	SUCOFLEX 102	MY2630/2	12/13/2022	12/12/2023			
Coaxial Cable	Huber Suhner	SUCOFLEX 102	MY22962/2	12/13/2022	12/12/2023			
Test Software	Audix	e3	Ver. 9.210322	N.C.R	N.C.R			

NOTE: N.C.R refers to Not Calibrated Required.

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CONDUCTED EMISSION TEST

7.1 Standard Applicable

Frequency range within 150 kHz to 30 MHz shall not exceed the Limit table as below.

Frequency range	Limits (dBuV)			
MHz	Quasi-peak	Average		
0.15 to 0.50	66 to 56	56 to 46		
0.50 to 5	56	46		
5 to 30	60	50		

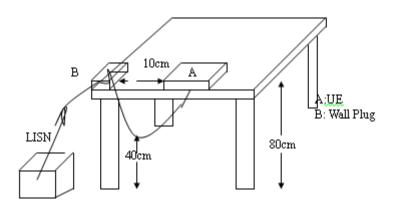
Note

- 1. The lower limit shall apply at the transition frequencies
- 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

7.2 **EUT Setup**

- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
- 3. The LISN was connected with 120Vac/60Hz power source.

7.3 **Test SET-UP**



7.4 **Measurement Procedure**

- 1. The EUT was placed on a table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all phases of power being supplied by given UE are completed.

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7.5 **Measurement Result**

Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that closest to the limit.

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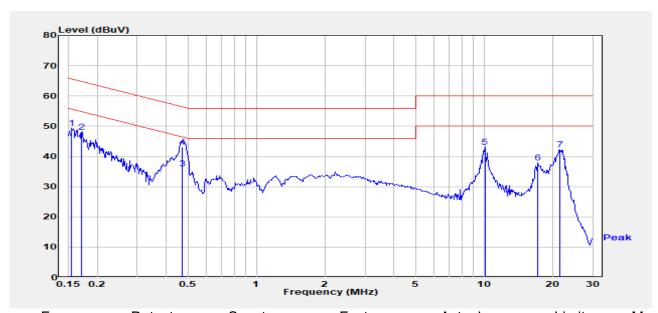
AC POWER LINE CONDUCTED EMISSION TEST DATA Cradle (S/N: VM1DG223800172)

Report Number Test Site :TERF2212002706ER :Conduction 1

Test Mode :5G **Test Date** :2023-03-03

:120V/60Hz :23.8/52 Power Temp./Humi.

Probe :L Engineer :GN Lin



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dΒμV	dB	dΒμV	dΒμV	dB
0.155	Peak	49.47	0.05	49.52	65.74	-16.22
0.171	Peak	48.06	0.05	48.11	64.92	-16.80
0.475	Average	35.95	0.05	36.00	46.43	-10.43
0.475	QP	43.02	0.05	43.07	56.43	-13.36
10.083	Peak	42.71	0.34	43.05	60.00	-16.95
17.259	Peak	37.29	0.57	37.86	60.00	-22.14
21.564	Peak	41.54	0.66	42.20	60.00	-17.80

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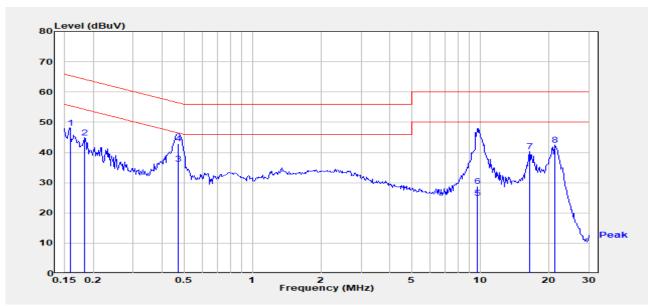
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Report Number :TERF2212002706ER Test Site :Conduction 1

Test Mode :5G Test Date :2023-03-03

Power :120V/60Hz Temp./Humi. :23.8/52

Probe :N Engineer :GN Lin



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dΒμV	dB	dΒμV	dΒμV	dB
0.158	Peak	48.05	0.05	48.10	65.55	-17.46
0.183	Peak	44.81	0.05	44.86	64.34	-19.48
0.471	Average	36.12	0.05	36.17	46.50	-10.33
0.471	QP	42.84	0.05	42.89	56.50	-13.61
9.703	Average	24.53	0.33	24.86	50.00	-25.14
9.703	QP	28.46	0.33	28.79	60.00	-31.21
16.482	Peak	39.81	0.47	40.28	60.00	-19.72
21.235	Peak	41.95	0.54	42.49	60.00	-17.51

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:2023-03-03

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Test Date

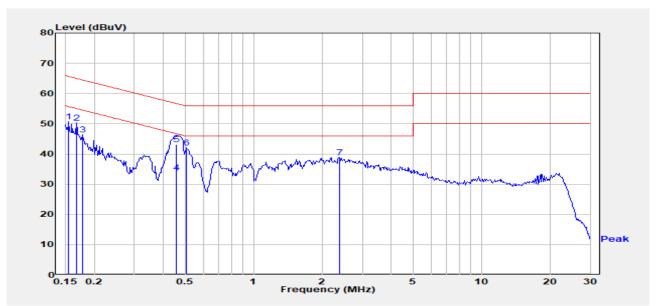
Cradle (S/N: VM3AC2235G00006)

Report Number :TERF2212002706ER Test Site :Conduction 1

Test Mode :5G

Power :120V/60Hz Temp./Humi. :23.8/52

Probe :L Engineer :GN Lin



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dΒμV	dB	dΒμV	dΒμV	dB
0.155	Peak	50.76	0.05	50.81	65.74	-14.94
0.167	Peak	50.21	0.05	50.26	65.11	-14.84
0.178	Peak	46.45	0.05	46.50	64.60	-18.10
0.457	Average	33.75	0.05	33.80	46.75	-12.95
0.457	QP	43.16	0.05	43.21	56.75	-13.54
0.509	Peak	41.92	0.05	41.97	56.00	-14.03
2.380	Peak	38.79	0.11	38.89	56.00	-17.11

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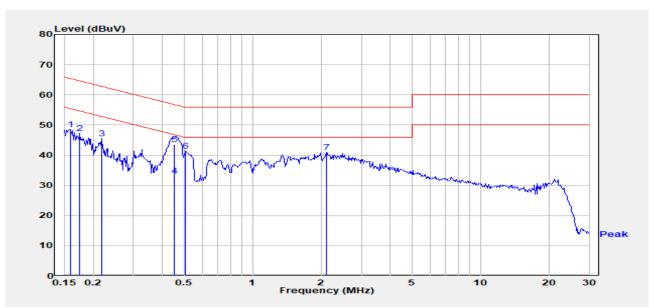
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Report Number Test Site :TERF2212002706ER :Conduction 1

Test Mode :5G **Test Date** :2023-03-03

Power :120V/60Hz Temp./Humi. :23.8/52

Probe :N Engineer :GN Lin



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dΒμV	dB	dΒμV	dΒμV	dB
0.158	Peak	48.53	0.05	48.58	65.55	-16.98
0.175	Peak	47.31	0.05	47.36	64.72	-17.36
0.217	Peak	45.44	0.05	45.49	62.94	-17.45
0.453	Average	33.09	0.05	33.14	46.82	-13.67
0.453	QP	43.45	0.05	43.50	56.82	-13.31
0.509	Peak	41.32	0.05	41.37	56.00	-14.63
2.105	Peak	40.80	0.09	40.89	56.00	-15.11

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:2023-03-03

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Test Date

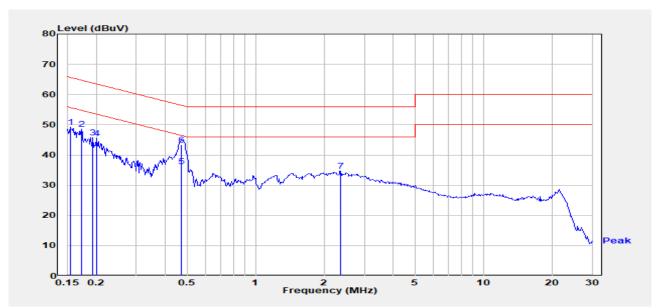
Cradle (S/N: VW3AC2304G00015)

Report Number :TERF2212002706ER **Test Site** :Conduction 1

Test Mode :5G

Power :120V/60Hz Temp./Humi. :23.8/52

Probe :L Engineer :GN Lin



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dΒμV	dB	dΒμV	dΒμV	dB
0.153	Peak	49.09	0.05	49.14	65.81	-16.67
0.172	Peak	48.56	0.05	48.61	64.85	-16.24
0.193	Peak	45.66	0.05	45.71	63.90	-18.18
0.201	Peak	45.41	0.05	45.46	63.58	-18.11
0.475	Average	36.20	0.05	36.25	46.43	-10.18
0.475	QP	43.41	0.05	43.46	56.43	-12.97
2 362	Peak	34 61	0 11	34 72	56 00	-21 28

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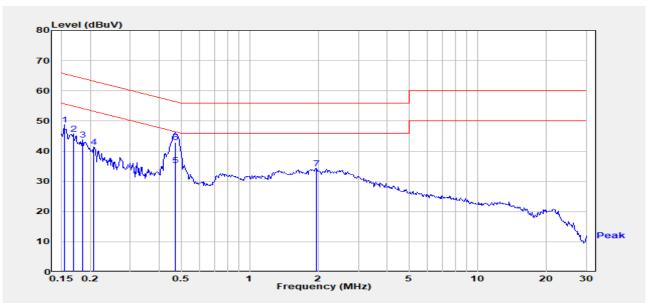
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Report Number :TERF2212002706ER Test Site :Conduction 1

Test Mode :5G Test Date :2023-03-03

Power :120V/60Hz Temp./Humi. :23.8/52

Probe :N Engineer :GN Lin



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dΒμV	dB	dΒμV	dΒμV	dB
0.153	Peak	48.67	0.05	48.72	65.81	-17.09
0.168	Peak	45.68	0.05	45.73	65.04	-19.32
0.185	Peak	43.81	0.05	43.86	64.28	-20.42
0.207	Peak	41.29	0.05	41.34	63.32	-21.98
0.471	Average	35.33	0.05	35.38	46.50	-11.12
0.471	QP	42.93	0.05	42.98	56.50	-13.52
1.965	Peak	34.20	0.08	34.28	56.00	-21.72

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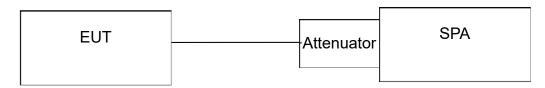
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EMISSION BANDWIDTH MEASUREMENT

8.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C. The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3.

8.2 **Test Setup**



8.3 **Measurement Procedure**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
 - 3.a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto,

Detector = Peak.

Trace Mode = Max Hold.

Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.

- 3.b. Mark the peak frequency and -26dB (upper and lower) frequency.
- 4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
- 5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
 - a. Set the spectrum analyzer as

RBW = 100 kHz,

VBW = 3*RBW,

Span = large enough to capture all products of the modulation process,

Detector=Peak,

Sweep=auto

- b. Mark the peak frequency and -6dB (upper and lower) frequency.
- 6. For 99% Bandwidth: Set the spectrum analyzer as

RBW = 1%,

VBW = 3*RBW.

Span = large enough to capture all products of the modulation process,

Detector=Sample,

Sweep=auto.

- 7. Turn on the 99% bandwidth function, max reading.
- 8. Repeat above procedures until all frequency of interest measured was complete.

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8.4 **Measurement Result**

8.4.1 **FCC Occupied Bandwidth**

802.11a_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.62	13.540
5220	23.28	13.670
5240	22.70	13.560
5260	24.25	13.850
5300	24.67	13.920
5320	22.33	13.490
5500	21.89	13.400
5580	24.76	13.940

802.11a_Ch0

5700

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	15.15	11.800
5785	16.38	12.140
5825	16.27	12.110

21.58

13.340

802.11a_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.31	< 5250
5745	5736.74	> 5725

802 11a Ch1

602.11a_CIII		
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	21.36	13.300
5220	22.17	13.460
5240	21.65	13.350
5260	22.86	13.590
5300	21.70	13.360
5320	21.62	13.350
5500	21.92	13.410
5580	22.67	13.550
5700	21.49	13.320

802.11a_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.32	12.130
5785	14.80	11.700
5825	16.39	12.150

802.11a_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.32	< 5250
5745	5736.80	> 5725

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802 11n HT20 Ch0

802.1111_H120_C110		
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	23.48	13.710
5220	23.15	13.650
5240	22.41	13.500
5260	26.13	14.170
5300	24.43	13.880
5320	22.55	13.530
5500	23.03	13.620
5580	25.70	14.100
5700	21.94	13.410

802.11n_HT20_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.24	12.370
5785	16.90	12.280
5825	11.76	10.700

802.11n_HT20_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.89	< 5250
5745	5736.14	> 5725

802 11n HT20 Ch1

002.1111_11120_0111		
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.55	13.530
5220	21.55	13.330
5240	22.86	13.590
5260	23.42	13.700
5300	21.50	13.320
5320	23.46	13.700
5500	22.38	13.500
5580	23.04	13.620
5700	21.95	13.410

802.11n_HT20_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	11.10	10.450
5785	16.93	12.290
5825	13.83	11.410

802.11n_HT20_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.90	< 5250
5745	5736.18	> 5725

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802.11n_HT40_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	40.70	16.100
5230	40.40	16.060
5270	42.67	16.300
5310	41.03	16.130
5510	40.64	16.090
5550	43.70	16.400
5670	41.11	16.140

802.11n_HT40_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.21	15.470
5795	34.14	15.330

802.11n_HT40_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.13	< 5250
5755	5736.90	> 5725

802 11n HT40 Ch1

002.1111_11140_CI11			
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	
5190	40.68	16.090	
5230	40.39	16.060	
5270	40.40	16.060	
5310	40.61	16.090	
5510	40.79	16.110	
5550	41.38	16.170	
5670	40.70	16.100	

802.11n_HT40_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.48	15.500
5795	35.69	15.530

802.11n_HT40_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.17	< 5250
5755	5736.93	> 5725

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802.11ac VHT80 Ch0

002000			
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	
5210	82.15	19.150	
5290	82.81	19.180	
5530	83.17	19.200	
5610	96.58	19.850	

802.11ac_VHT80_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.13	18.760

802.11ac_VHT80_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.93	< 5250
5775	5737.26	> 5725

802.11ac VHT80 Ch1

002.1100_111100_0111			
26dB BW (MHz)	10 Log (B) (dB)		
81.40	19.110		
81.41	19.110		
81.48	19.110		
84.77	19.280		
	BW (MHz) 81.40 81.41 81.48		

802.11ac_VHT80_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.10	18.760

802.11ac VHT80 Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5210	5247.90	< 5250
5775	5737.35	> 5725

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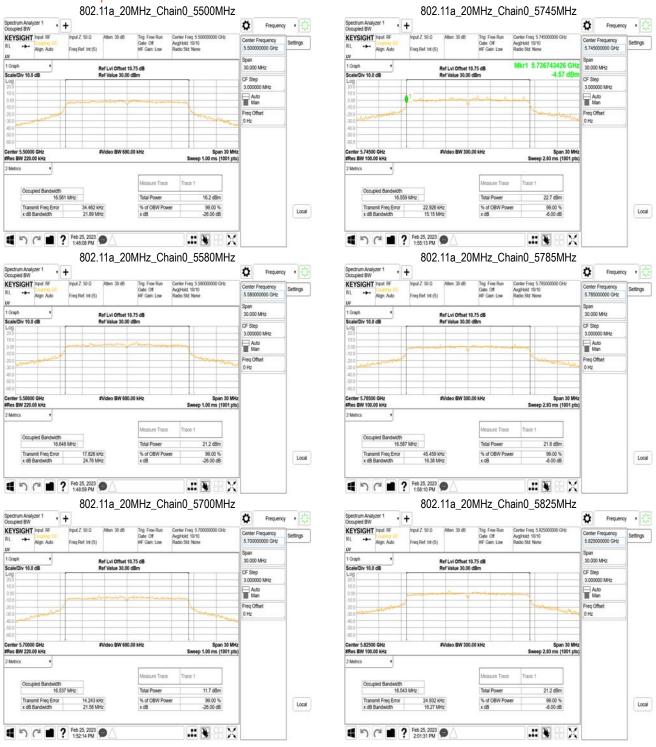
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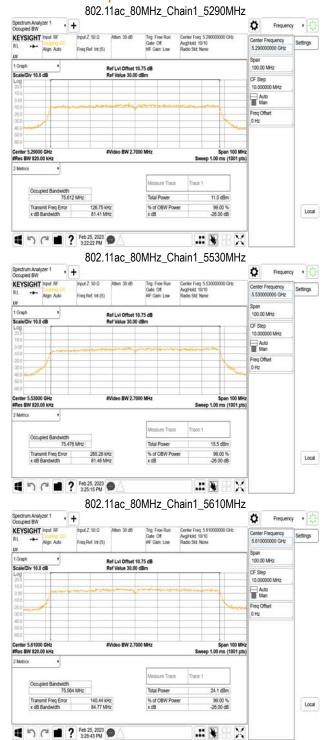
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8.4.2 ISED Occupied Bandwidth

802.11a Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	16.531	12.180
5220	16.535	12.180
5240	16.555	12.190
5260	16.622	12.210
5300	16.591	12.200
5320	16.538	12.180
5500	16.527	12.180
5580	16.640	12.210
5700	16.528	12.180

802.11a Ch1

92		
Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	16.545	12.190
5220	16.507	12.180
5240	16.547	12.190
5260	16.560	12.190
5300	16.549	12.190
5320	16.510	12.180
5500	16.528	12.180
5580	16.584	12.200
5700	16.501	12.180

802.11a_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5745	16.710	16.250
5785	16.691	16.100
5825	16.672	16.330

802.11a_Ch1

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5745	16.548	15.830
5785	16.613	16.370
5825	16.599	16.290

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802.11n_HT20_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.751	12.490
5220	17.717	12.480
5240	17.752	12.490
5260	17.788	12.500
5300	17.823	12.510
5320	17.722	12.490
5500	17.743	12.490
5580	17.790	12.500
5700	17.769	12.500

802.11n HT20 Ch1

••=		
Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.735	12.490
5220	17.754	12.490
5240	17.714	12.480
5260	17.747	12.490
5300	17.732	12.490
5320	17.719	12.480
5500	17.737	12.490
5580	17.786	12.500
5700	17.692	12.480

802.11n_HT20_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5745	17.910	17.390
5785	17.819	17.190
5825	17.852	17.200

802.11n_HT20_Ch1

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5745	17.732	17.230
5785	17.796	17.480
5825	17.747	17.270

802.11n_HT40_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5190	36.196	15.590
5230	36.200	15.590
5270	36.219	15.590
5310	36.201	15.590
5510	36.161	15.580
5550	36.203	15.590
5670	36.176	15.580

802.11n_HT40_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5190	36.146	15.580
5230	36.166	15.580
5270	36.124	15.580
5310	36.148	15.580
5510	36.083	15.570
5550	36.148	15.580
5670	36.089	15.570

802.11n_HT40_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5755	36.357	36.110
5795	36.174	36.060

802.11n_HT40_Ch1

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5755	36.153	36.020
5795	36.190	36.020

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802.11ac_VHT80_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5210	75.533	18.780
5290	75.654	18.790
5530	75.522	18.780
5610	75.836	18.800

802.11ac_VHT80_Ch1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5210	75.495	18.780
5290	75.579	18.780
5530	75.619	18.790
5610	75.619	18.790

802.11ac_VHT80_Ch0

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
		76.170

802.11ac_VHT80_Ch1

Frequency (MHz)	99% BW	6dB BW
(111112)	(MHz)	(MHz)
	` '	` '

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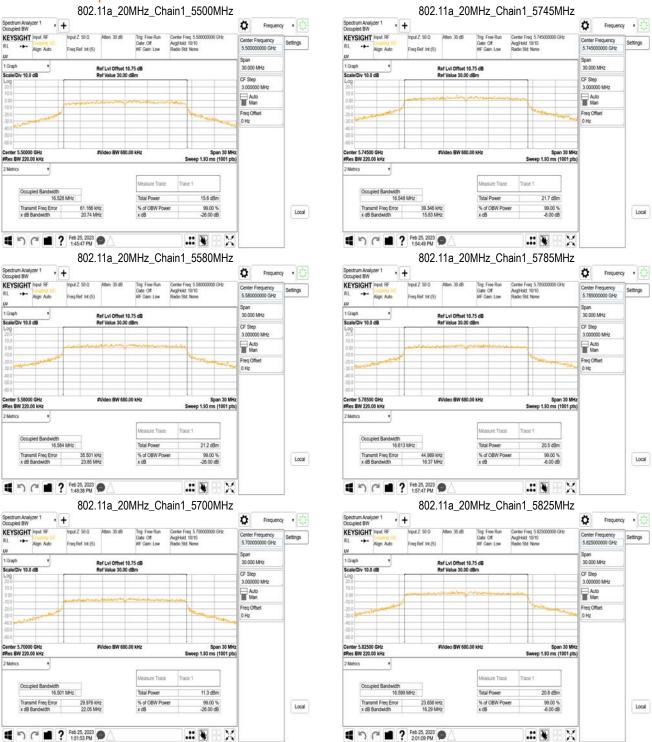
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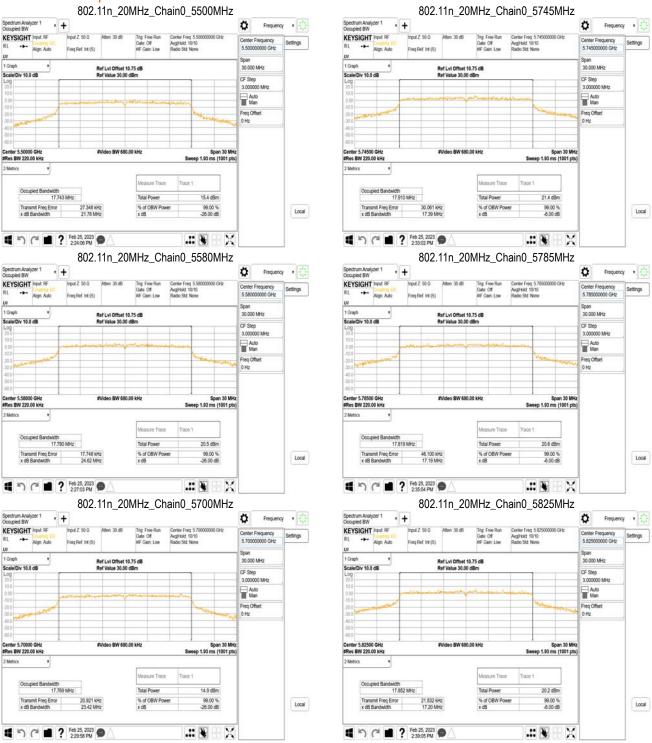
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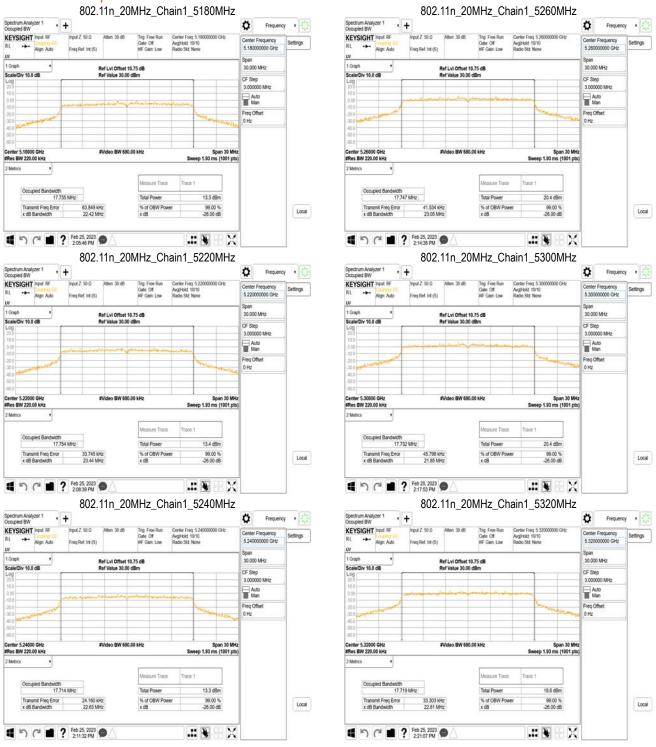
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