

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT



FCC Applicant: Quanta Computer Inc
No.188, Wenhua 2nd Rd., Guishan Dist., Taoyuan City 33377,
Taiwan (R.O.C)
Product Name: All-in-One PC
Brand Name: HP
Model No.: TPC-Q087-27
Model Difference: N/A
Report Number: ER/2021/50070
FCC ID HFSQTA-N1D
Issue Date: June 17, 2021
Date of Test: May 17, 2021 ~ June 4, 2021
Date of EUT Received: May 17, 2021

Approved By

Jim Chang

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 §15Cs.

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
ER/2021/50070	00	Original.	June 17, 2021	Yami Kuo

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	All-in-One PC
Brand Name:	HP
Model No.:	TPC-Q087-27
Model Difference:	N/A
Hardware Version:	N/A
Firmware Version:	N/A
Power Supply:	19.5 Vdc from AC/DC Adapter

1.2 RF Specification

Technology:	Wireless Power Transfer
Operating Frequency	110 kHz ~ 205 kHz
FCC Transmit Power	< 83.68 dBuV/m at 3m.
Number of Channels	1
Antenna Type	Loop

Note: Antenna information is provided by the applicant.

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1.3 Test Methodology

FCC Part 15, Subpart C

ANSI C63.10:2013

1.4 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	TW3702
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
		Conducted 5		
		Conducted 6		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction A	TW0028	
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
		Conducted B		
		Conducted C		
		Conducted D		
		Conducted E		
		Conducted F		
		Conducted G		

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.

1.5 Special Accessories

There is no special accessory used while test was conducted.

1.6 Equipment Modifications

There was no modification incorporated into the EUT.

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2 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

The Transmitter was operated in the normal operating mode. The Tx frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 9kHz 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 Radiated Emissions

The EUT is 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. 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 radiated emissions, 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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2.4 Configuration of Tested System

Fig. 2-1 Conduction Emission test set up configuration

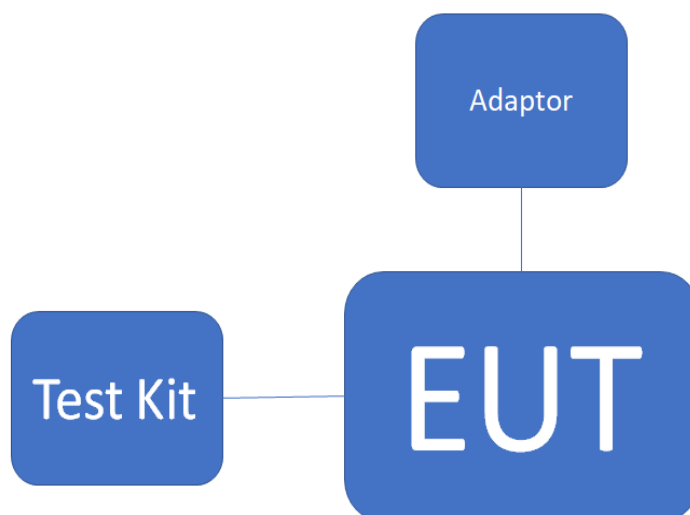


Fig. 2-2 Radiated Emission test set up configuration

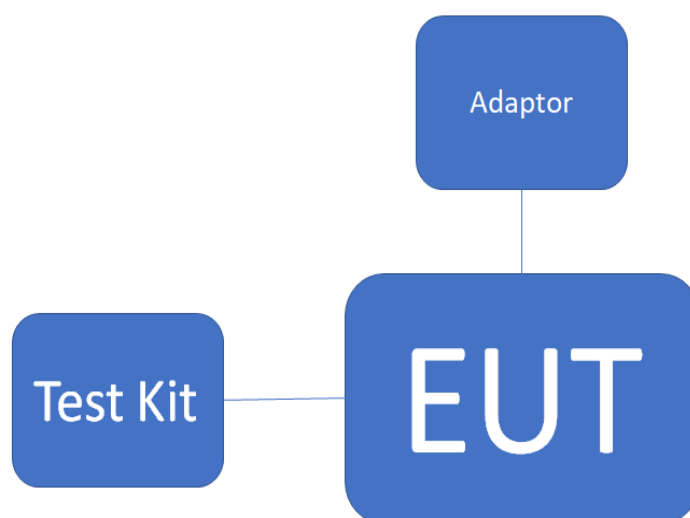


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Adapter	Apple	TPC-AA62	NA	N/A	N/A
2.	Test Kit	NA	NA	NA	N/A	N/A

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3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.209	Radiated Emission Limits, general requirement	Compliant
§15.215 (c)	20 dB OCCUPIED BANDWIDTH	Compliant
§15.203	Antenna Requirement	Compliant

4 DESCRIPTION OF TEST MODES

The EUT stay in continuous transmitting mode. The frequency is the default channel to test, where it is the only manipulative channel as this application supports.

The field strength of radiation emission was measured as EUT three orthogonal plans, E1 / E2 / H, are positioned to pre-scan the emission generating the highest one. The worst position is tested, and recorded.

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty		
AC Power Line Conducted Emission	+/-	2.34	dB
Frequency Stability	+/-	1.53	Hz
Emission Bandwidth	+/-	1.53	Hz
Temperature	+/-	0.4	°C
Humidity	+/-	3.5	%
DC / AC Power Source	+/-	1	%

Radiated Spurious Emission Measurement Uncertainty			
Polarization: Vertical	+/-	2.64 dB	9kHz~30MHz
	+/-	4.93 dB	30MHz - 1000MHz
	+/-	4.81 dB	1GHz - 18GHz
	+/-	4.52 dB	18GHz - 40GHz
Polarization: Horizontal	+/-	2.64 dB	9kHz~30MHz
	+/-	4.45 dB	30MHz - 1000MHz
	+/-	4.81 dB	1GHz - 18GHz
	+/-	4.52 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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6 CONDUCTED EMISSIONS TEST

6.1 Limitation

According to section 15.207(a) Conducted Emission Limits as following.

Frequency range MHz	Limits dB (uV)	
	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

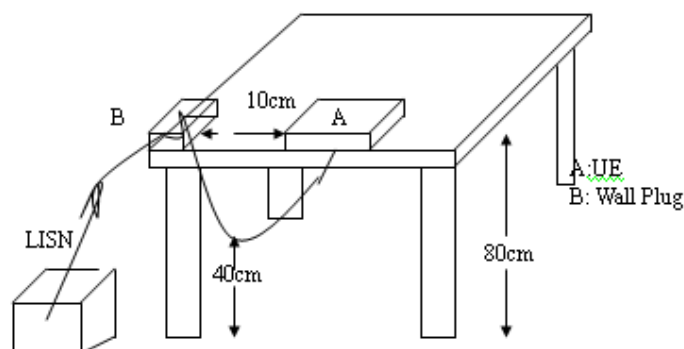
Note

- 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.

6.2 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 EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

6.3 Test SET-UP (Block Diagram of Configuration)



6.4 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 frequency measured were complete.

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6.5 Measurement Equipment Used:

Radiated Emission Test Site: Conduction 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
LISN	SCHWARZBECK	NSLK 8127	8127-465	04/09/2021	04/08/2022
Coaxial Cables	N/A	Coaxial Cable	161207	12/07/2020	12/06/2021
Test Software	audix	e3	Ver. 6.11- 20180413	01/01/2021	12/31/2021
EMI Test Receiver	R&S	ESCI 7	100759	07/13/2020	07/12/2021

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6.6 Measurement Result:

Report Number :ER-2021-50070

Test Mode :WPC

Power :AC 120V/60Hz

Probe :L

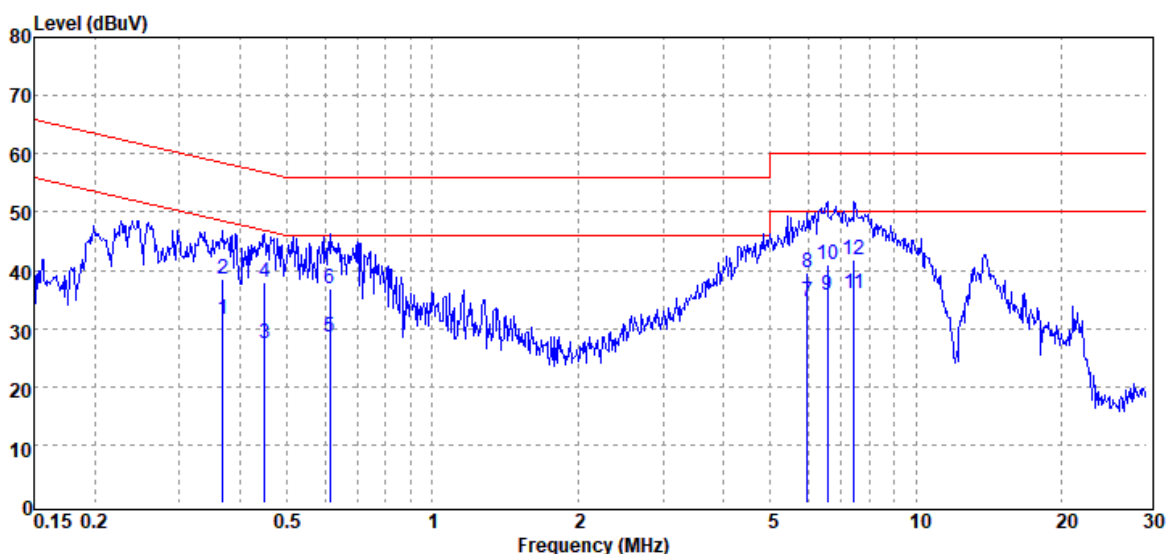
Note: :

Test Site :Conduction 6F

Test Date :2021-06-07

Temp./Humi. :25.2/66

Engineer :Neo Tsai



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.37	Average	31.40	0.09	31.49	48.52	-17.03
0.37	QP	38.40	0.09	38.49	58.52	-20.03
0.45	Average	27.30	0.13	27.43	46.89	-19.46
0.45	QP	37.90	0.13	38.03	56.89	-18.86
0.61	Average	28.40	0.13	28.53	46.00	-17.47
0.61	QP	36.70	0.13	36.83	56.00	-19.17
5.96	Average	33.90	0.62	34.52	50.00	-15.48
5.96	QP	39.10	0.62	39.72	60.00	-20.28
6.56	Average	35.10	0.65	35.75	50.00	-14.25
6.56	QP	40.30	0.65	40.95	60.00	-19.05
7.45	Average	35.20	0.71	35.91	50.00	-14.09
7.45	QP	41.10	0.71	41.81	60.00	-18.19

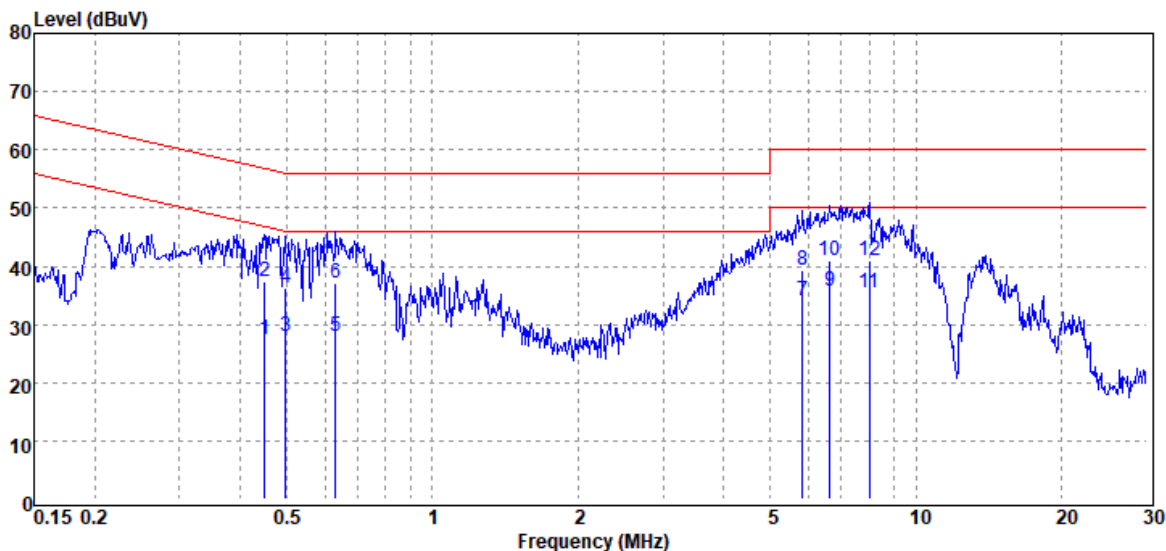
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Report Number :ER-2021-50070
 Test Mode :WPC
 Power :AC 120V/60Hz
 Probe :N
 Note: :

Test Site :Conduction 6F
 Test Date :2021-06-07
 Temp./Humi. :25.2/66
 Engineer :Neo Tsai



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.45	Average	27.19	0.20	27.39	46.89	-19.50
0.45	QP	37.19	0.20	37.39	56.89	-19.50
0.50	Average	27.80	0.22	28.02	46.05	-18.03
0.50	QP	36.10	0.22	36.32	56.05	-19.73
0.63	Average	27.90	0.20	28.10	46.00	-17.90
0.63	QP	36.80	0.20	37.00	56.00	-19.00
5.84	Average	33.60	0.52	34.12	50.00	-15.88
5.84	QP	38.80	0.52	39.32	60.00	-20.68
6.63	Average	35.10	0.57	35.67	50.00	-14.33
6.63	QP	40.40	0.57	40.97	60.00	-19.03
8.02	Average	34.70	0.63	35.33	50.00	-14.67
8.02	QP	40.40	0.63	41.03	60.00	-18.97

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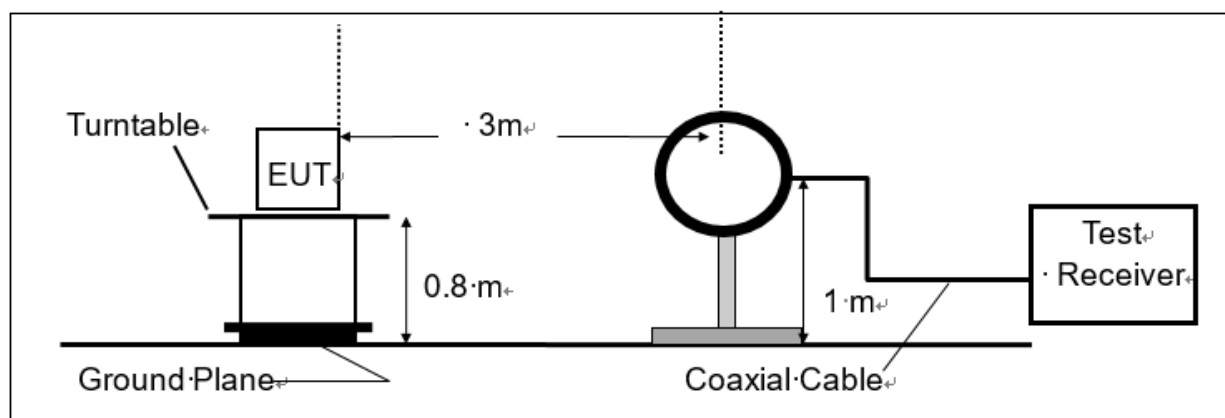
7 RADIATED EMISSION TEST

7.1 Measurement Procedure

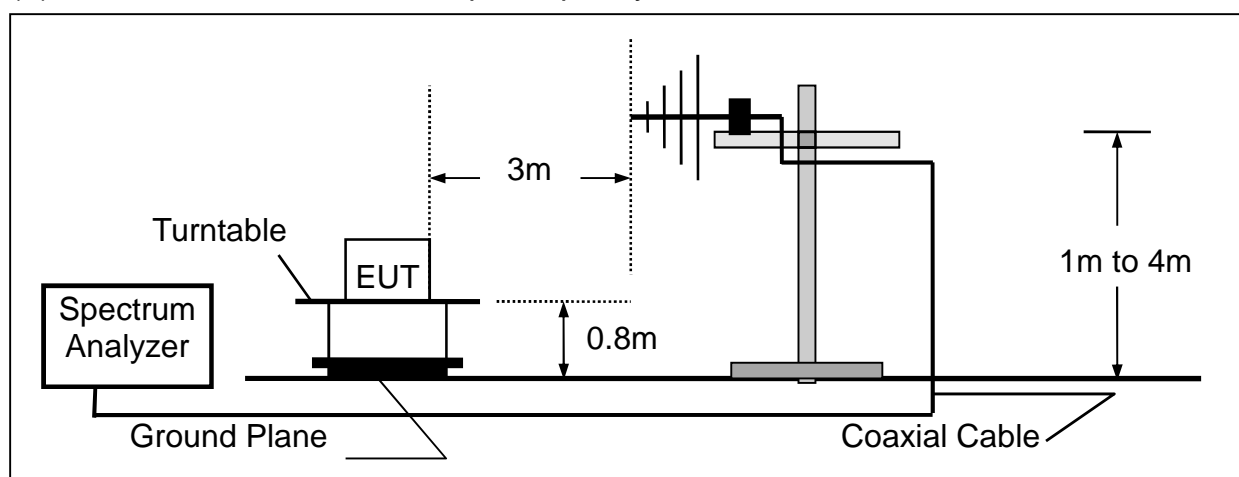
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

7.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(B) Radiated Emission Test Set-UP, Frequency form 30MHz to 1000MHz



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7.3 Measurement Equipment Used:

Radiated Emission Test Site: SAC 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Site Cal	SGS	SAC I chamber	N/A	01/01/2021	12/31/2021
Bi-log Antenna	TESEO	CBL 6112D	35242 & AT-N0555	01/13/2021	01/12/2022
Loop Antenna	ETS.LINDGREN	6502	148045	10/19/2020	10/18/2021
Spectrum Analyzer	Agilent	E4446A	MY51100003	10/29/2020	10/28/2021
Test Software	audix	e3	Ver. 6.11-20180413	01/01/2021	12/31/2021
EMI Test Receiver	R&S	ESCI 7	100759	07/13/2020	07/12/2021
Pre-Amplifier	HP	8447D	2944A09469	12/16/2020	12/15/2021
Coaxial Cable	Huber Suhner	succoflex 102	MY2622/2	12/16/2020	12/15/2021
Coaxial Cable	Huber Suhner	succoflex 104A	800086/4a	12/16/2020	12/15/2021
Coaxial Cable	Huber Suhner	EMC 104-SM-SM-2000	160123	12/16/2020	12/15/2021

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7.4 FCC Applicable Standard

The field strength of any emissions appearing outside of operation frequency shall not exceed the general radiated emission limits in section 15.209 as below.

Frequency (MHz)	Field strength (μV/m)	Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

1. Emission level in dBμV/m = $20 \log (\mu\text{V/m})$
2. Distance extrapolation factor = $40 \log (\text{required distance} / \text{test distance})$ (dB)
3. $20 * \log(30 \mu\text{V/m}) + 40 \text{dB} = 69.54 \text{ dBuV/m}$
4. The lower limit shall apply at the transition frequencies.
5. The measurement was undertaken in closer distance at 3m, where extrapolation factor is offset to convert the limit of the measurement.
6. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of §15.205.
7. The general radiated emission limits in §15.209 apply for the spurious emission generate from UE, except for the fundamental emission where the respective section specifies otherwise.
8. Actual FS(dBμV/m) = Spectrum. Reading level(dBμV) + Factor(dB)
Factor(dB) = Antenna Factor(dB) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

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7.5 FCC Test Result

7.5.1 Field Strength of Fundamental Emission

Report Number :ER/2021/50070

Operation Mode :WPC

Test Frequency :127 KHz

Test Mode :Main

EUT Pol :H Plane

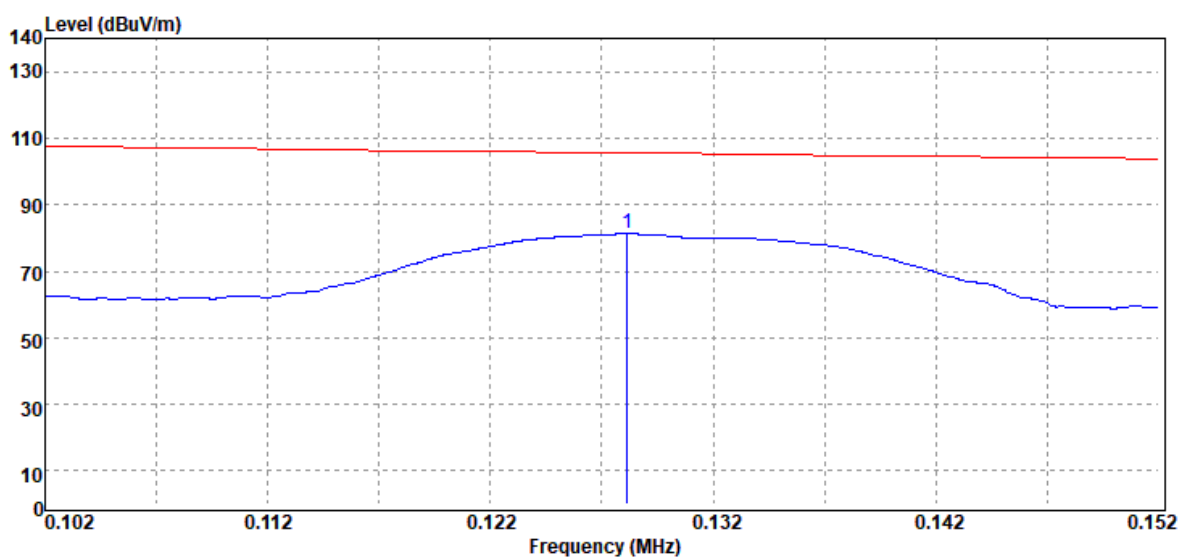
Test Site :SAC I Chamber

Test Date :2021-06-07

Temp./Humi. :26.8/62

Antenna Pol. :VERTICAL

Engineer :Neo Tsai



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
0.13	Peak	70.34	10.84	81.18	105.45	-24.27

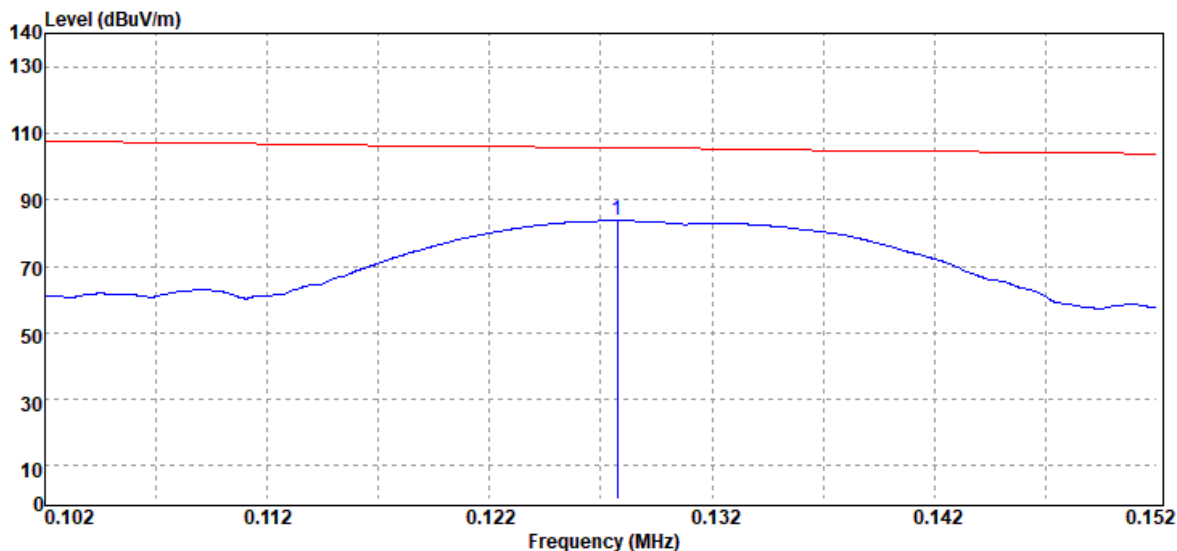
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Report Number :ER/2021/50070
 Operation Mode :WPC
 Test Frequency :127 KHz
 Test Mode :Main
 EUT Pol :H Plane

Test Site :SAC I Chamber
 Test Date :2021-06-07
 Temp./Humi. :26.8/62
 Antenna Pol. :HORIZONTAL
 Engineer :Neo Tsai



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
0.13	Peak	72.85	10.83	83.68	105.48	-21.80

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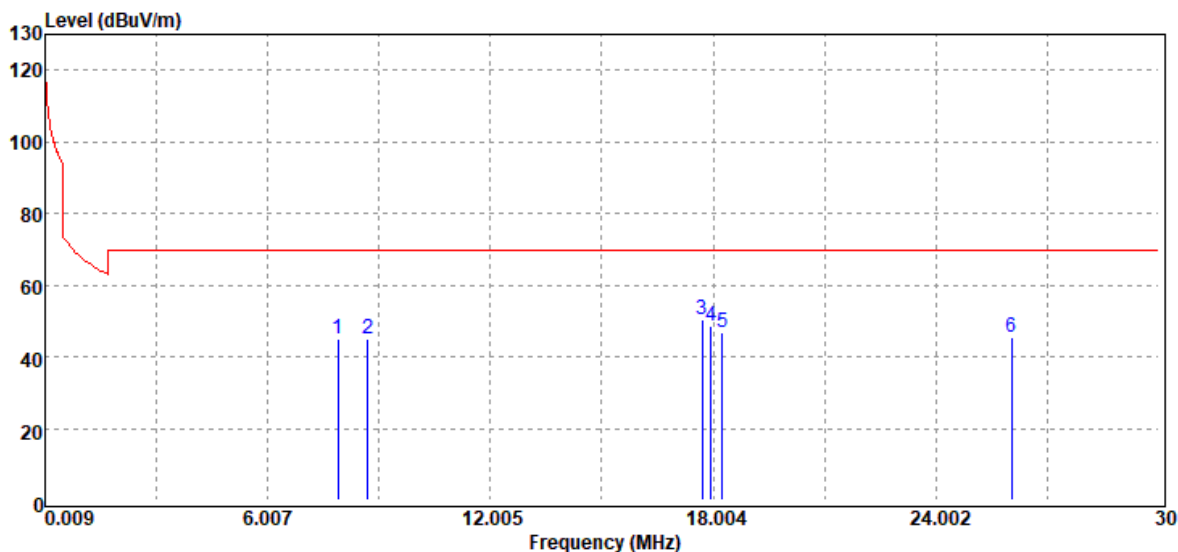
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7.5.2 Below 30 MHz test result

Report Number :ER/2021/50070
Operation Mode :WPC
Test Frequency :127 KHz
Test Mode :Tx
EUT Pol :H Plane

Test Site :SAC I Chamber
Test Date :2021-06-07
Temp./Humi. :26.8/62
Antenna Pol. :VERTICAL
Engineer :Neo Tsai



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
7.90	Peak	33.06	11.82	44.88	69.54	-24.66
8.71	Peak	33.20	11.97	45.17	69.54	-24.37
17.70	Peak	38.85	11.63	50.48	69.54	-19.06
17.94	Peak	37.16	11.62	48.78	69.54	-20.76
18.24	Peak	35.19	11.60	46.79	69.54	-22.75
26.04	Peak	35.51	10.04	45.55	69.54	-23.99

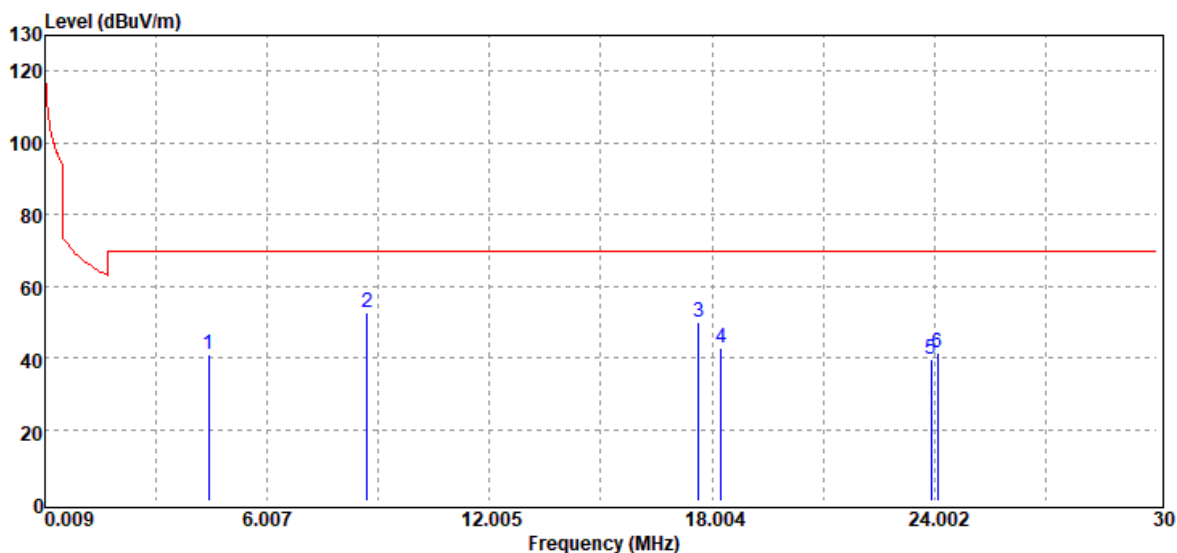
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Report Number :ER/2021/50070
 Operation Mode :WPC
 Test Frequency :127 KHz
 Test Mode :Tx
 EUT Pol :H Plane

Test Site :SAC I Chamber
 Test Date :2021-06-07
 Temp./Humi. :26.8/62
 Antenna Pol. :HORIZONTAL
 Engineer :Neo Tsai



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4.42	Peak	29.66	11.12	40.78	69.54	-28.76
8.71	Peak	40.86	11.97	52.83	69.54	-16.71
17.64	Peak	38.38	11.64	50.02	69.54	-19.52
18.24	Peak	31.14	11.60	42.74	69.54	-26.80
23.91	Peak	28.87	10.52	39.39	69.54	-30.15
24.09	Peak	31.13	10.47	41.60	69.54	-27.94

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7.5.3 FCC Above 30MHz test result

Report Number :ER/2021/50070

Operation Mode :WPC

Test Frequency :127 KHz

Test Mode :Tx

EUT Pol :H Plane

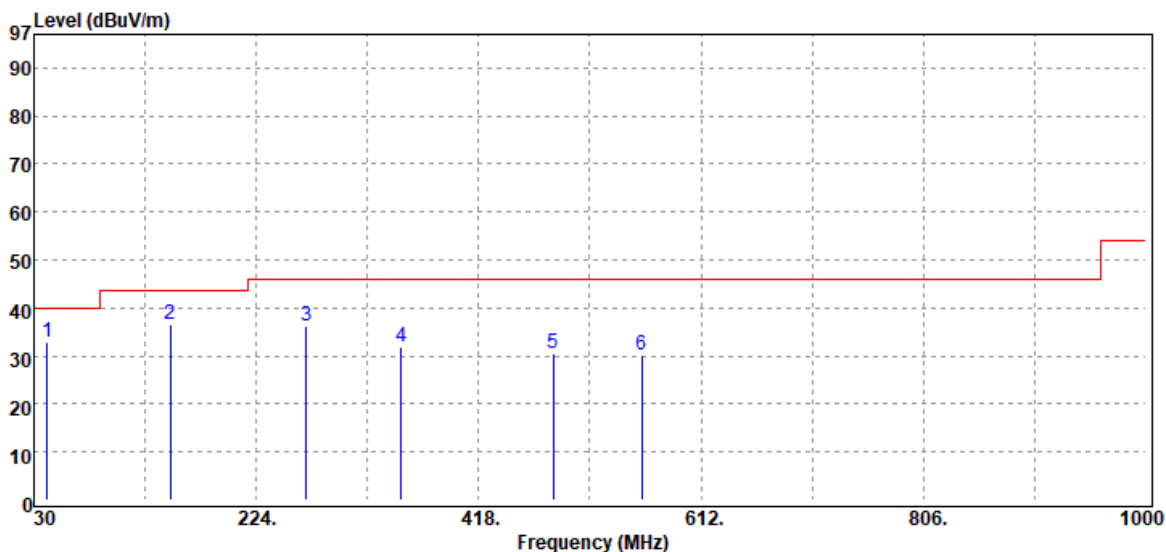
Test Site :SAC I Chamber

Test Date :2021-06-07

Temp./Humi. :26.8/62

Antenna Pol. :VERTICAL

Engineer :Neo Tsai



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
41.64	QP	44.10	-11.14	32.96	40.00	-7.04
149.31	Peak	49.19	-12.74	36.45	43.50	-7.05
267.65	Peak	45.72	-9.50	36.22	46.00	-9.78
350.10	Peak	39.98	-8.12	31.86	46.00	-14.14
482.99	Peak	36.61	-5.92	30.69	46.00	-15.31
560.59	Peak	34.59	-4.29	30.30	46.00	-15.70

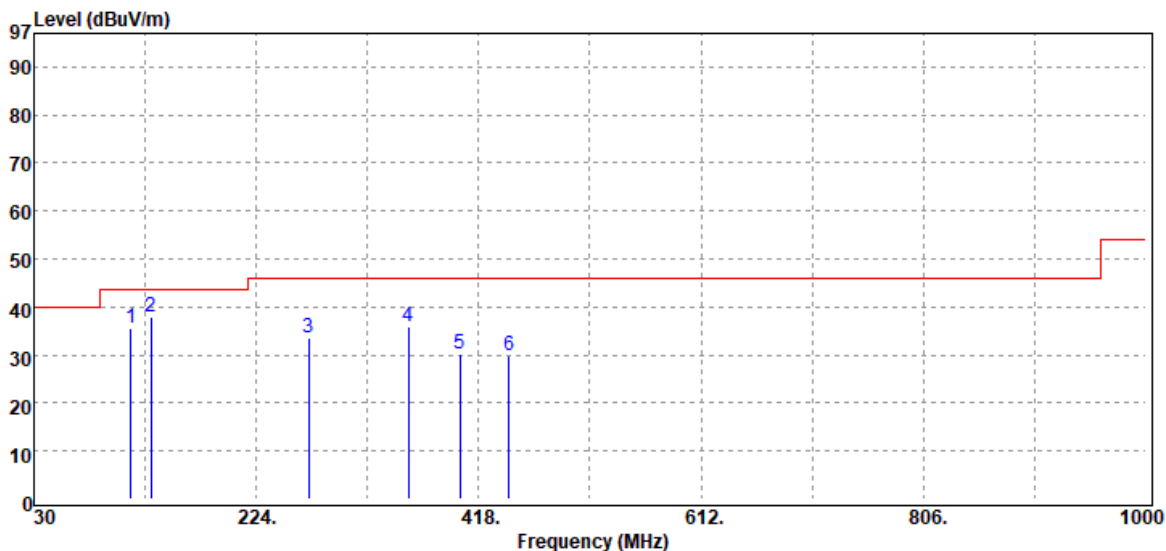
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Report Number :ER/2021/50070
 Operation Mode :WPC
 Test Frequency :127 KHz
 Test Mode :Tx
 EUT Pol :H Plane

Test Site :SAC I Chamber
 Test Date :2021-06-07
 Temp./Humi. :26.8/62
 Antenna Pol. :HORIZONTAL
 Engineer :Neo Tsai



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
114.39	Peak	47.32	-11.89	35.43	43.50	-8.07
131.85	Peak	49.66	-11.86	37.80	43.50	-5.70
269.59	Peak	43.30	-9.70	33.60	46.00	-12.40
356.89	Peak	43.82	-7.99	35.83	46.00	-10.17
401.51	Peak	37.16	-6.83	30.33	46.00	-15.67
444.19	Peak	36.17	-6.27	29.90	46.00	-16.10

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8 20 dB OCCUPIED BANDWIDTH MEASUREMENT

8.1 Standard Applicable:

§2.1049 & §15.215 (c)

8.2 Limit:

None

8.3 Test Set-up

Refer to section 6.2 in this report

8.4 Measurement Procedure

20dB bandwidth

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak mode.
2. 20dB Bandwidth the resolution bandwidth of 200 Hz and the video bandwidth of 1 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.

8.5 Measurement Equipment Used:

Conducted Emission Test Site: Conducted 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Loop Antenna	ETS.LINDGREN	6502	148045	10/19/2020	10/18/2021
EXA Spectrum Analyzer	Agilent	N9010A	MY54200716	10/20/2020	10/19/2021
DC Block	Mini-Circuits	BLK-18-S+	1	12/16/2020	12/15/2021

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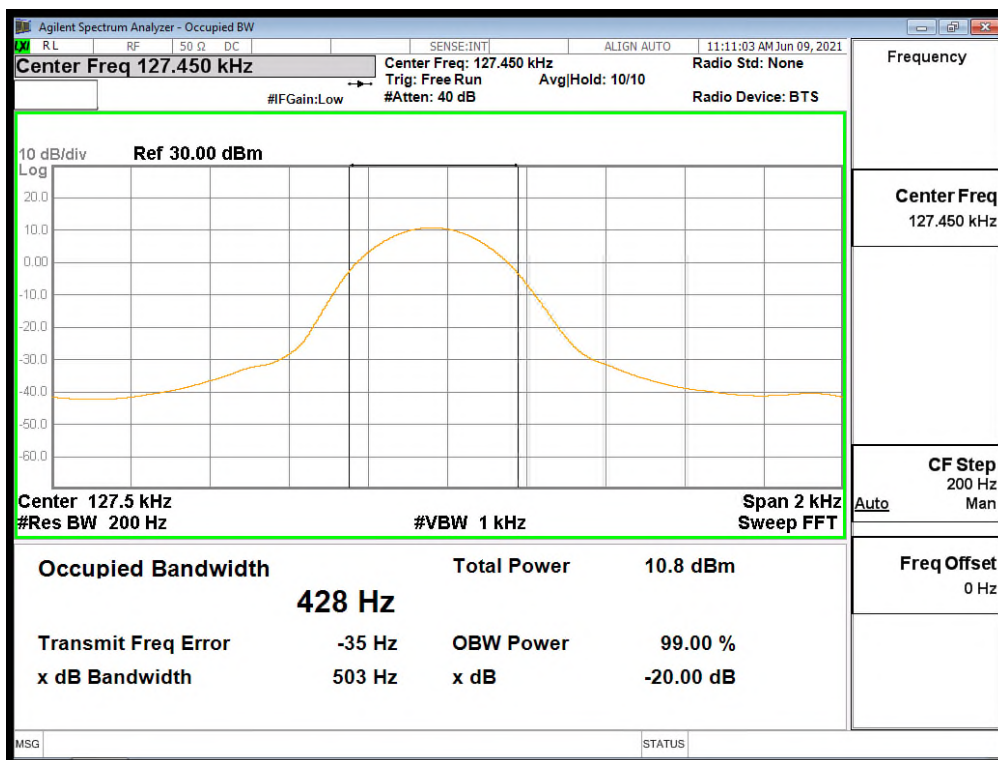
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8.6 Measurement Result

-20dB Bandwidth

20dB Bandwidth
503 Hz



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9 ANTENNA REQUIREMENT

9.1 Standard Applicable:

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

9.2 Antenna Connected Construction:

The antenna is designed as permanently attached and no consideration of replacement. Please see EUT photo and antenna spec. for details.

~ End of Report ~

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