

ELECTROMAGNETIC EMISSIONS **COMPLIANCE REPORT**



FCC Applicant:	Quanta Computer Inc. No. 188, Wenhua 2nd Road, Guishan District, Taoyuan City
FCC Manufacturer: Product Name:	33377, Taiwan Quanta Computer Inc. No. 188, Wenhua 2nd Road, Guishan District, Taoyuan City 33377, Taiwan Flex Wireless Cradle
Brand Name:	Clover
Model No.:	K405
Model Difference:	N/A
Report Number:	TERF2206000789E2
FCC ID	HFS-K405
Date of EUT Received:	Jun. 02, 2022
Date of Test:	Jun. 22, 2022 ~ Jul. 07, 2022
Issue Date:	Jul. 21, 2022
	ALNO HSieh

Approved By

Arno Hsieh

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 §15C.

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
TERF2206000789E2	00	Original.	Jul. 15, 2022	Celery Wei	
TERF2206000789E2	01	Revise photographs of set up	Jul. 21, 2022	Celery Wei	

Note:

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

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	Flex Wireless Cradle	
Brand Name:	Clover	
Model No.:	K405	
Model Difference:	N/A	
Hardware Version:	N/A	
Firmware Version:	N/A	
EUT Series No.:	C045UT20760001	
Power Supply:	12V from Switching Power Adapter	

1.2 RF Specification

Technology:	Wireless Power Transfer	
Operating Frequency	110 kHz ~ 205 kHz	
FCC Transmit Power	< -5.03dBuV/m at 300m.	
Number of Channels	1	
Antenna Type	Coil	

Note: Antenna information is provided by the applicant.

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1.3 Test Methodology

FCC Part 15, Supbpart C ANSI C63.10:2013

1.4 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
		SAC 1		
		SAC 3		
		Conduction 1		
	No.134, Wu Kung Road, New Taipei	Conducted 1		
	Industrial Park, Wuku District, New	Conducted 2	TW0027	
	Taipei City, Taiwan.	Conducted 3		
		Conducted 4	_	TW3702
		Conducted 5		
SGS Taiwan Ltd.		Conducted 6		
Central RF Lab.	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction C	-	
(TAF code 3702)		SAC C		
$(1AI \ COUE \ 510Z)$		SAC D		
		SAC G		
		Conducted A		
		Conducted B	TW0028	
		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 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. 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.

2.3.2 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,

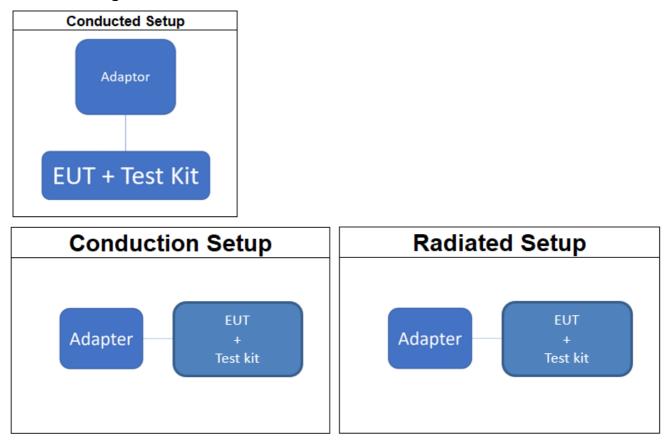
the measurements correspond to those obtained at an open-field test site. There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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2.4 Test Configuration



2.5 Control Unit(s)

AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE MFR MODEL NUMBER SERIAL NUMBER LAST CAL. CAL DUE.					
Adaptor	Clover	FSP040-RHBN3	N/A	N/A	N/A
Test kit	Clover	c405	N/A	N/A	N/A

Radiated Emission Test Site: SAC G						
EQUIPMENT TYPE	MER MODELNUMBER SERIALNUMBER LAST CAL CALDUE.					
Adaptor	Clover	FSP040-RHBN3	N/A	N/A	N/A	
Test kit	Clover	c405	N/A	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 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		Incertair	nty
AC Power Line Conducted Emission	+/- 2.34 d		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	+/-	2.57	dB	9kHz~30MHz
	+/-	4.85	dB	30MHz - 1000MHz
	+/-	4.45	dB	1GHz - 18GHz
	+/-	4.24	dB	18GHz - 40GHz
	+/-	2.57	dB	9kHz~30MHz
Polarization: Horizontal	+/-	4.37	dB	30MHz - 1000MHz
	+/-	4.45	dB	1GHz - 18GHz
	+/-	4.24	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

6.1 Conducted AC Power line

AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE MFR		MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
LISN	SCHWARZBECK Mess- Elektronik	NSLK8127	973	04/13/2022	04/12/2023
EMI Test Receiver	R&S	ESCI	101342	04/25/2022	04/24/2023
Coaxial Cable	EC Lab	RF-HY-CAB-250	RF-HY-CAB-250-01	03/27/2022	03/26/2023
Coaxial Cable	EMC Instruments Corp	EMC5D-BM-BM-3000	1401004	03/27/2022	03/26/2023
Pulse Limiter	EC Lab	VTSD 9561F-N	485	03/27/2022	03/26/2023
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R

6.2 Emission Bandwidth

	Conducted Emission Test Site: Conducted D					
EQUIPMENT TYPE	EQUIPMENT TYPE MFR MODEL NUMBER SERIAL NUMBER LAST CAL. CAL DU					
H-Loop Near Field Antenna	LANGER EMV-Technik	LF-R 400	02-1597	N.C.R	N.C.R	
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071574	06/25/2021	06/24/2022	
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071574	06/20/2022	06/19/2023	
Attenuator	Marvelous	MVE2213-10	RF14	11/18/2021	11/17/2022	
DC Block	PASTERNACK	PE8210	RF158	11/18/2021	11/17/2022	

6.3 Radiated Measurement

	Radiated Emission Test Site: SAC G					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.	
Broadband Antenna	SCHWARZBECK	VULB 9168	1206	02/15/2022	02/14/2023	
Loop Antenna	ETS.LINDGREN	6502	143303	05/06/2022	05/07/2023	
3m Site NSA	SGS	966 chamber G	N/A	03/30/2022	03/29/2023	
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	07/13/2021	07/12/2022	
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R	
Pre-Amplifier	EMC Instruments	EMC330N	980781	03/15/2022	03/14/2023	
Coaxial Cable	EMC Instruments	EMCCFD400-NM-NM- 8000-5000-2000	210216 \ 210217 \ 210218	03/15/2022	03/14/2023	
Coaxial Cable	EMC Instruments	EMC104-SM-SM-8000- 5000-5000	210219 \ 210220 \ 210221	03/15/2022	03/14/2023	
Coaxial Cable	EMC Instruments	EMC105-NM-NM-5000- 15000	210224 \ 210306	03/15/2022	03/14/2023	

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7 CONDUCTED EMISSIONS TEST

7.1 Limitation

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

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

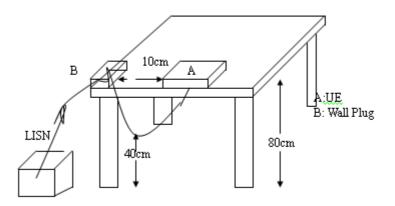
1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50

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

7.3 Test SET-UP (Block Diagram of Configuration)



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 frequency measured were complete.

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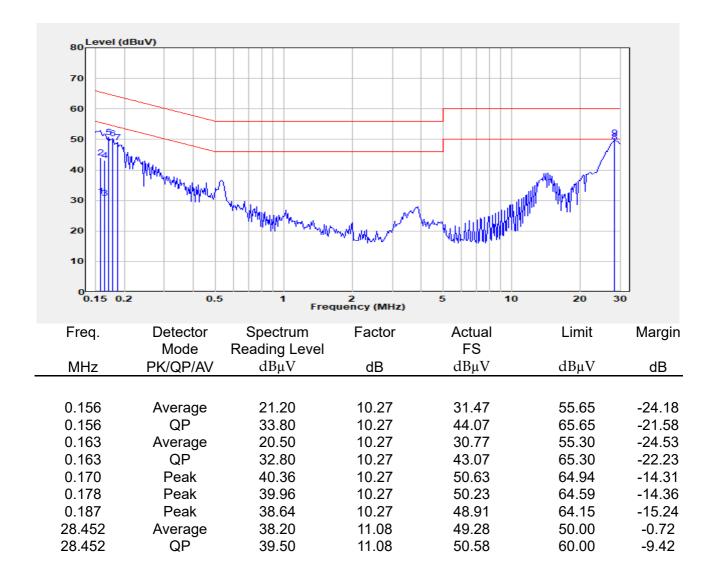




7.5 Measurement Result:

Report Number	:TERF2206000789E2
Test Mode	:WPC
Power	:120V/60Hz
Probe	:L1

Test Site	:Conduction C
Test Date	:2022-06-27
Temp./Humi	:24.5/60
Engineer	:Quentin Liu



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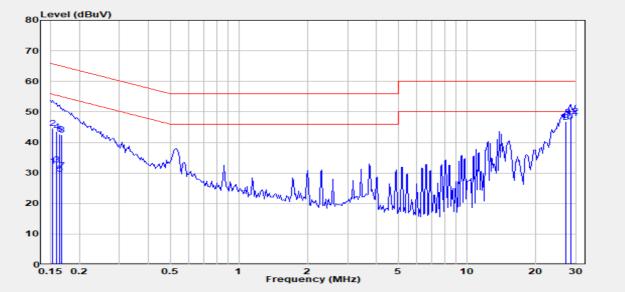
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Report Number	:TERF2206000789E2
Test Mode	:WPC
Power	:120V/60Hz
Probe	:N

Test Site	:Conduction C
Test Date	:2022-06-27
Temp./Humi	:24.5/60
Engineer	:Quentin Liu



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV	dBµV	dB
0.153	Average	22.00	10.28	32.28	55.82	-23.54
0.153	QP	34.30	10.28	44.58	65.82	-21.24
0.158	Average	22.40	10.28	32.68	55.56	-22.88
0.158	QP	33.30	10.28	43.58	65.56	-21.98
0.163	Average	19.50	10.28	29.78	55.30	-25.52
0.163	QP	32.40	10.28	42.68	65.30	-22.62
0.167	Average	20.50	10.28	30.78	55.12	-24.34
0.167	QP	32.30	10.28	42.58	65.12	-22.54
27.271	Average	35.60	11.05	46.65	50.00	-3.35
27.271	QP	35.80	11.05	46.85	60.00	-13.15
28.755	Average	36.90	11.09	47.99	50.00	-2.01
28.755	QP	37.40	11.09	48.49	60.00	-11.51

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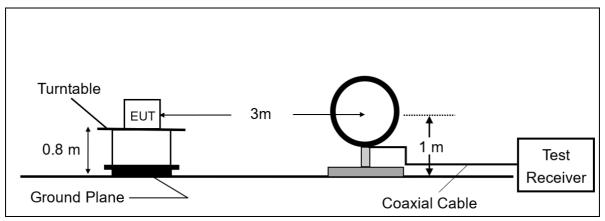
8 RADIATED EMISSION TEST

8.1 Measurement Procedure

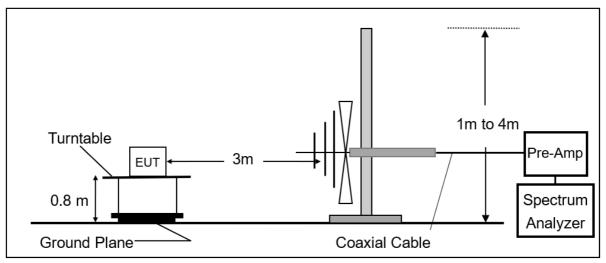
- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

8.2 Test Setup

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



(B) Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



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8.3 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 $dB\mu V/m=20 \log (\mu V/m)$
- 2. Distance extrapolation factor = 40 log (required distance/ test distance) (dB)
- 3. 20*log(30uV/m) + 40dB = 69.54 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(dB μ V/m) = Spectrum. Reading level(dB μ V) + Factor(dB) Factor(dB) = Antenna Factor(dB) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note:

- The more stringent limit applies at the transition frequency. 1.
- 2. Measurements are demonstrated in SAC with distance at 3m.
- Actual FS(dB μ V/m) = Spectrum. Reading level(dB μ V) + Factor(dB) 1. Factor(dB) = Antenna Factor(dB) + Cable Loss(dB) – Pre Amplifier Gain(dB)

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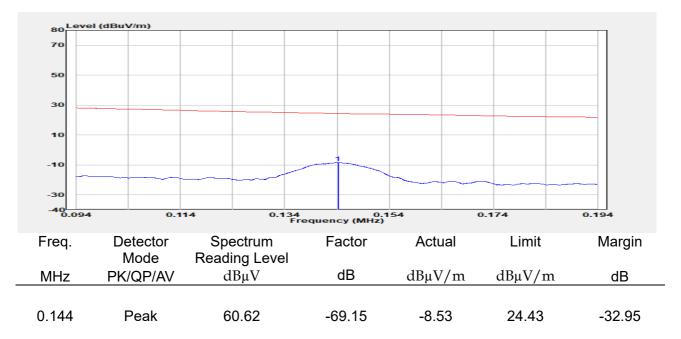
Report No.: TERF2206000789E2 Page: 16 of 24



8.4 Test Result

8.4.1 Field Strength of Fundamental Emission

Report Number	:TERF2206000789E2	Test Site	:SAC G
Operation Mode	:WPC	Test Date	:2022-06-27
Test Frequency	:140 kHz	Temp./Humi.	:22/69
Test Mode	:Main	Antenna Pol.	:Vertical
EUT Pol	:E1 Plane	Engineer	:Quentin Liu



Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre_Amplifier Gain - distance factor

Test distance= 3m

For Actual level and limit: Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz. Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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Report Number Operation Mode Test Frequency Test Mode EUT Pol	:TERF2206000789E2 :WPC :140 kHz :Main :E1 Plane	2 Test Site Test Date Temp./Humi. Antenna Pol. Engineer	:SAC G :2022-06-27 :22/69 :Horizontal :Quentin Liu
Lovol (dDv///m			
80 Level (dBuV/n			
70			
50			
50			
30			
10			
		1	
-10			
-30			
-40 0.094	0.114 0.134 Fre	0.154 equency (MHz)	0.174 0.194
Freq. Dete		Factor Actual	Limit Margin
Mo	•		Linit Margin
	<u> </u>	dB dBµV/r	n dBµV/m dB
MHz PK/Q			
0.144 Pe	ak 64.12	-69.15 -5.03	24.43 -29.46

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre_Amplifier Gain - distance factor

Test distance= 3m

For Actual level and limit: Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz. Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

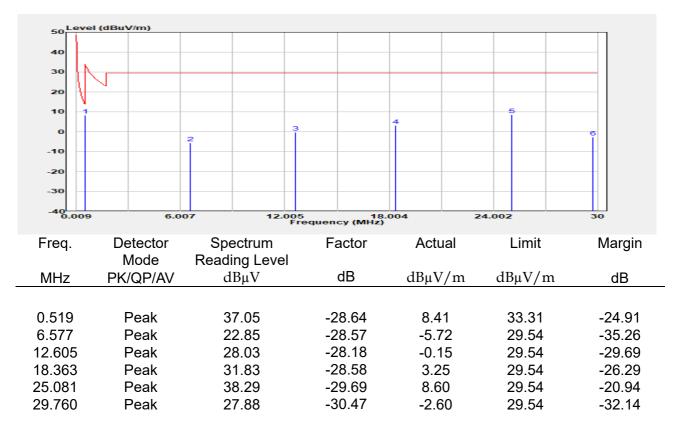
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8.4.2 Below 30 MHz test result

I	:TERF2206000789E2	Test Site Test Date	:SAC G
Operation Mode Test Frequency	:WPC :140 kHz	Temp./Humi.	:2022-06-27 :22/69
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Quentin Liu



Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre_Amplifier Gain - distance factor

Test distance= 3m

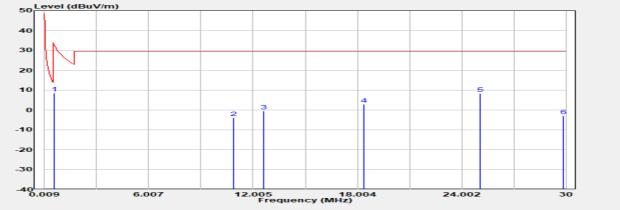
For Actual level and limit: Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz. Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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Report Number	:TERF2206000789E2	Test Site	:SAC G
Operation Mode	:WPC	Test Date	:2022-06-27
Test Frequency	:140 kHz	Temp./Humi.	:22/69
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Quentin Liu



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual	Limit	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
0.579	Peak	37.27	-28.64	8.63	32.36	-23.73
10.896	Peak	24.19	-28.04	-3.84	29.54	-33.38
12.605	Peak	27.79	-28.18	-0.39	29.54	-29.93
18.363	Peak	31.58	-28.58	3.00	29.54	-26.54
25.051	Peak	38.01	-29.69	8.32	29.54	-21.22
29.850	Peak	27.45	-30.49	-3.04	29.54	-32.58

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre_Amplifier Gain - distance factor

Test distance= 3m

For Actual level and limit: Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz. Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

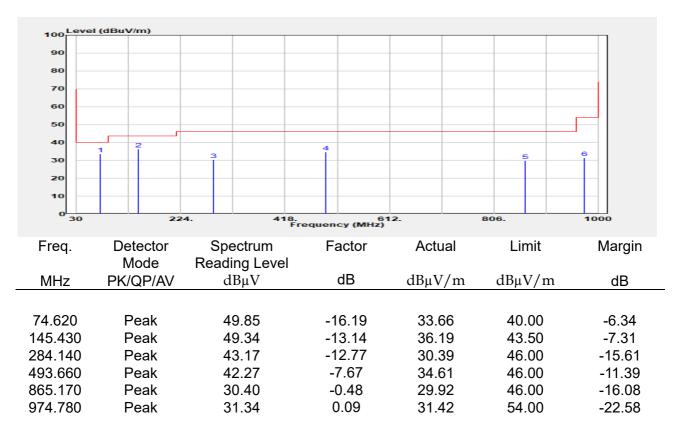
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8.4.3 FCC Above 30MHz test result

Report Number	:TERF2206000789E2	Test Site	:SAC G
Operation Mode	:WPC	Test Date	:2022-06-27
Test Frequency	:140 kHz	Temp./Humi.	:22/69
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Quentin Liu



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727.430

964.110

Peak

Peak

Report Number Operation Mode Test Frequency Test Mode EUT Pol	:TERF2206000789E2 :WPC :140 kHz :Tx :E2 Plane	Test Site Test Date Temp./Hur Antenna P Engineer		:SAC G :2022-06-27 :22/69 :Horizontal :Quentin Liu
100 Level (dBuV/n 90 80 70 60 50 40 30 1 20 10 30 30		equency (MHz)	5	6
Freq. Dete Mo	ector Spectrum		ctual Lin	nit Margin
MHz PK/Q	P/AV dBµV	dB dB	uV/m dBµV	//m dB
56.190 Pe 141.550 Pe 281.230 Pe 405.390 Pe	ak 44.65 ak 49.44	-13.34 3 -12.81 3	9.91 40.1 1.31 43.1 6.63 46.1 6.24 46.1	50 -12.19 00 -9.37

-2.66

0.53

30.81

31.50

46.00

54.00

-15.19

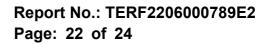
-22.50

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33.46

30.97



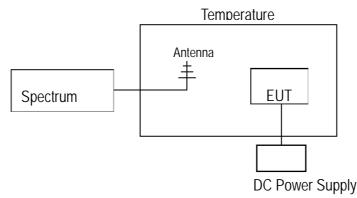


9.1 Standard Applicable:

§2.1049 & §15.215 (c)

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

9.2 Test SET-UP (Block Diagram of Configuration)



9.3 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.

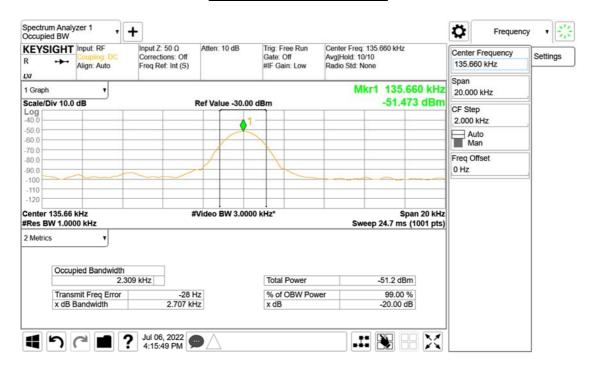
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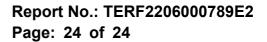
9.4 Measurement Result -20dB Bandwidth

20dB Bandwidth	
2.707kHz	



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10 ANTENNA REQUIREMENT

10.1 Standard Applicable:

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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

10.2 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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