

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT



FCC Applicant: Cognito Health Inc.
9F-1, No. 3, Yuanqu St. Nangang Dist., Taipei, 115 TAIWAN

Product Name: Control Box

Brand Name: Cognito Health

Model No.: BA6E-31, BA6E-32

Model Difference: BA6E-31 with LTE/GNSS module, BA6E-32 without LTE/GNSS module.

Report Number: E2/2022/20134

FCC ID 2A5HF-BA6EN

Issue Date: Apr. 25, 2022

Date of Test: Mar. 03, 2022~Apr. 22, 2022

Date of EUT Received: Dec. 22, 2021

Approved By

Jazz Huang

Jazz Huang

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 §15.225.

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
E2/2022/20134	00	Original.	Mar. 30, 2022	Yami Kuo	*
E2/2022/20134	01	Add the radiated spurious emission of co-located mode.	Apr. 25, 2022	Yami Kuo	*

Note:

- 1、The remark "*" indicates modification of the report upon requests from certification body.
- 2、Variant information of model numbers is provided by the applicant, test results of this report are applicable to the sample EUT(s) received.

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	Control Box
Brand Name:	Cognito Health
Model No.:	BA6E-31, BA6E-32
Model Difference:	BA6E-31 with LTE/GNSS module, BA6E-32 without LTE/GNSS module.
Hardware Version:	N/A
Firmware Version:	N/A
EUT Series No.:	NK4003026(BA6E-31) SK4010680(BA6E-32)
Power Supply:	12Vdc from AC/DC Adapter
Test Software (Name/Version)	Default (Power on)

1.2 RF specification

Radio Technology:	NFC
Operating Frequency	13.56MHz
Transmit Power	BA6E-31 19.04 dBuV/m at 30m; 59.04 dBuV/m at 3m. BA6E-32 20.03 dBuV/m at 30m; 60.03 dBuV/m at 3m.
Number of Channels	1
Modulation Type	ASK
Antenna Type	Loop Antenna

Note: Antenna information is provided by the applicant.

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1.3 Test Methodology

FCC Part 15, Subpart C §15.225

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 C	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 other accessory attached. This is the worst case condition.

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 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 Radiated Emissions

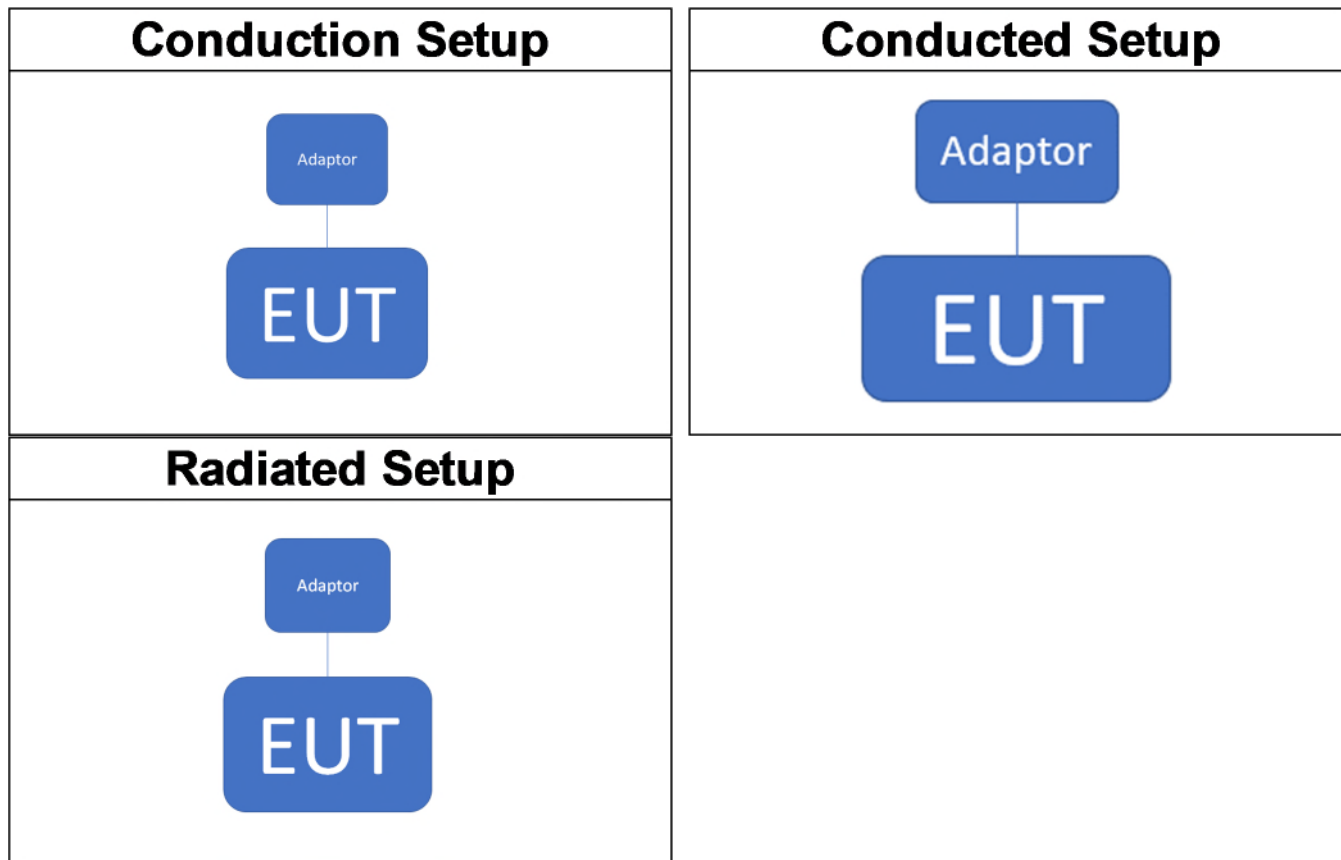
The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. 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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2.4 Test Configuration



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3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.225 (a)-(d)	Radiated Emission	Compliant
§15.209	Radiated Emission Limits, general requirement	Compliant
§15.225 (e)	Frequency Stability	Compliant
§2.1049 §15.215 (c)	Emission Bandwidth	Compliant
§15.203	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 The Worst Test Modes and Channel Details

1. The EUT stay in continuous transmission mode.
2. The frequency 13.56 MHz is the default channel to test, where it is the only manipulative channel as this application supports.
3. Only one configuration is supported/applicable as follows.

RADIATED EMISSION TEST			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION
NFC	1	1	ASK
FREQUENCY STABILITY			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION
NFC	1	1	ASK
20dB BANDWIDTH			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION
NFC	1	1	ASK

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	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	+/-	2.57 dB	9kHz~30MHz
	+/-	4.85 dB	30MHz - 1000MHz
	+/-	4.45 dB	1GHz - 18GHz
	+/-	4.24 dB	18GHz - 40GHz
Polarization: Horizontal	+/-	2.57 dB	9kHz~30MHz
	+/-	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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6 MEASUREMENT EQUIPMENT USED

6.1 Emission from 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	03/25/2021	03/24/2022
EMI Test Receiver	R&S	ESCI	101342	04/28/2021	04/27/2022
Coaxial Cable	EC Lab	RF-HY-CAB-250	RF-HY-CAB-250-01	03/27/2021	03/26/2022
Pulse Limiter	EC Lab	VTSD 9561F-N	485	03/27/2021	03/26/2022
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R

6.2 Conducted Measurement

Conducted Emission Test Site: Conducted A					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071570	06/01/2021	05/31/2022
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	2021/4/6	04/05/2022
DC Block	PASTERNAK	PE8210	RF151	11/18/2021	11/17/2022
H-Loop Near Field Antenna	LANGER EMV-Technik	LF-R 400	02-1597	N.C.R	N.C.R
DC Power Supply	Gwinstek	SPS-3610	GEV856767	09/29/2021	09/28/2022
Temperature Chamber	TERCHY	MHK-120LK	1020582	2021/7/1	06/30/2022

6.3 Radiated Measurement

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	SCHWAZBECK	VULB 9168	9168-617	11/12/2021	11/11/2022
Loop Antenna	ETS.LINDGREN	6502	143303	05/07/2021	05/06/2022
3m Site NSA	SGS	966 chamber D	N/A	07/12/2021	07/11/2022
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120200	03/22/2021	03/21/2022
Pre-Amplifier	EMC Instruments	EMC9135	980234	11/18/2021	11/17/2022
Coaxial Cable	Huber+Suhner	RG 214/U	W21.01	11/18/2021	11/17/2022

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

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6.4 Co-located

Radiated Emission Test Site: SAC G					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-617	11/12/2021	11/11/2022
Broadband Antenna	SCHWARZBECK	VULB 9168	1206	02/15/2022	02/14/2023
Horn Antenna	Schwarzbeck	BBHA9170	184	12/16/2021	12/15/2022
Horn Antenna	Schwarzbeck	BBHA9170	185	08/06/2021	08/05/2022
Horn Antenna	Schwarzbeck	BBHA9120D	1341	06/04/2021	06/03/2022
Horn Antenna	Schwarzbeck	BBHA9120D	D603	05/18/2022	05/17/2023
Loop Antenna	ETS.LINDGREN	6502	143303	05/07/2021	05/06/2022
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
Radio Communication Analyzer	Anritsu	MT8820C	6201107337	07/28/2021	07/27/2022
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R
Pre-Amplifier	EMC Instruments	EMC184045 B	980135	10/27/2021	10/26/2022
Pre-Amplifier	EMC Instruments	EMC330N	980781	03/15/2022	03/14/2023
Pre-Amplifier	EMC Instruments	EMC118A45 SE	980815	03/15/2022	03/14/2023
Band Rejection Filter	WI	WRC GV1700/20 30-1640/2090	RF193	11/18/2021	11/17/2022
Band Rejection Filter	Micro-Tronics	G015	RF198	11/18/2021	11/17/2022
Band Rejection Filter	Micro-Tronics	BRM50701-01	RF201	11/18/2021	11/17/2022
Highpass Filter	WI	WHKX10-2624-3200-1800-80SS	1	05/10/2021	05/09/2022
Highpass Filter	WI	WHKX10-6090-7000-17000-80SS	1	05/10/2021	05/09/2022
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

6.1 Standard Applicable

According to §15.207 and frequency within 150 kHz to 30MHz shall not exceed the limit table as below.

Frequency range MHz	Limits (dBuV)	
	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

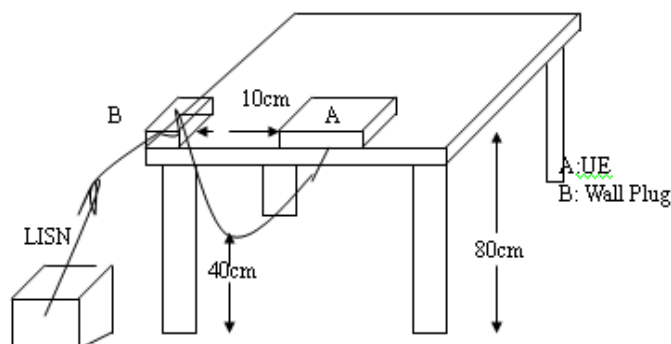
Note

- 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.

6.5 Measurement Result

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

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

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AC POWER LINE CONDUCTED EMISSION TEST DATA

BA6E-31

Report Number :E2/2022/20134

Test Site :Conduction C

Test Mode :NFC

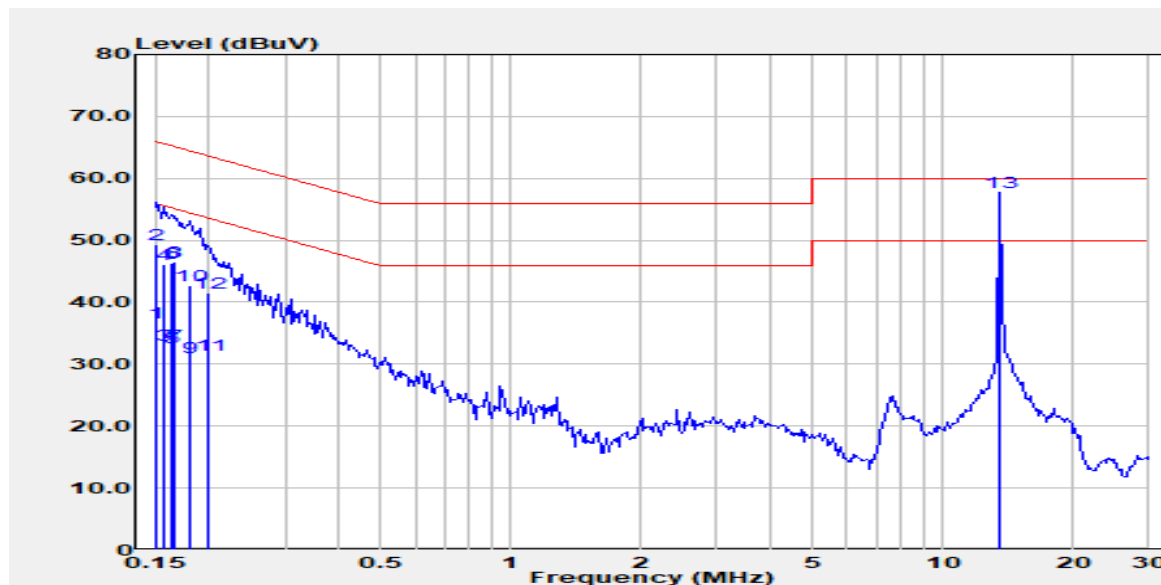
Test Date :2022-03-04

Power :120V/60Hz

Temp./Humi. :21.6/66

Probe :L1

Engineer :Jack Tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.152	Average	26.40	10.30	36.70	55.91	-19.21
0.152	QP	39.10	10.30	49.40	65.91	-16.51
0.158	Average	22.80	10.30	33.10	55.56	-22.46
0.158	QP	35.90	10.30	46.20	65.56	-19.36
0.163	Average	22.40	10.30	32.70	55.30	-22.60
0.163	QP	36.00	10.30	46.30	65.30	-19.00
0.167	Average	22.70	10.30	33.00	55.12	-22.12
0.167	QP	36.20	10.30	46.50	65.12	-18.62
0.182	Average	20.70	10.30	31.00	54.42	-23.42
0.182	QP	32.50	10.30	42.80	64.42	-21.62
0.200	Average	21.22	10.30	31.52	53.62	-22.10
0.200	QP	31.16	10.30	41.46	63.62	-22.16
13.551	Peak	---	10.75	57.76	---	---

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Report Number :E2/2022/20134

Test Site :Conduction C

Test Mode :NFC

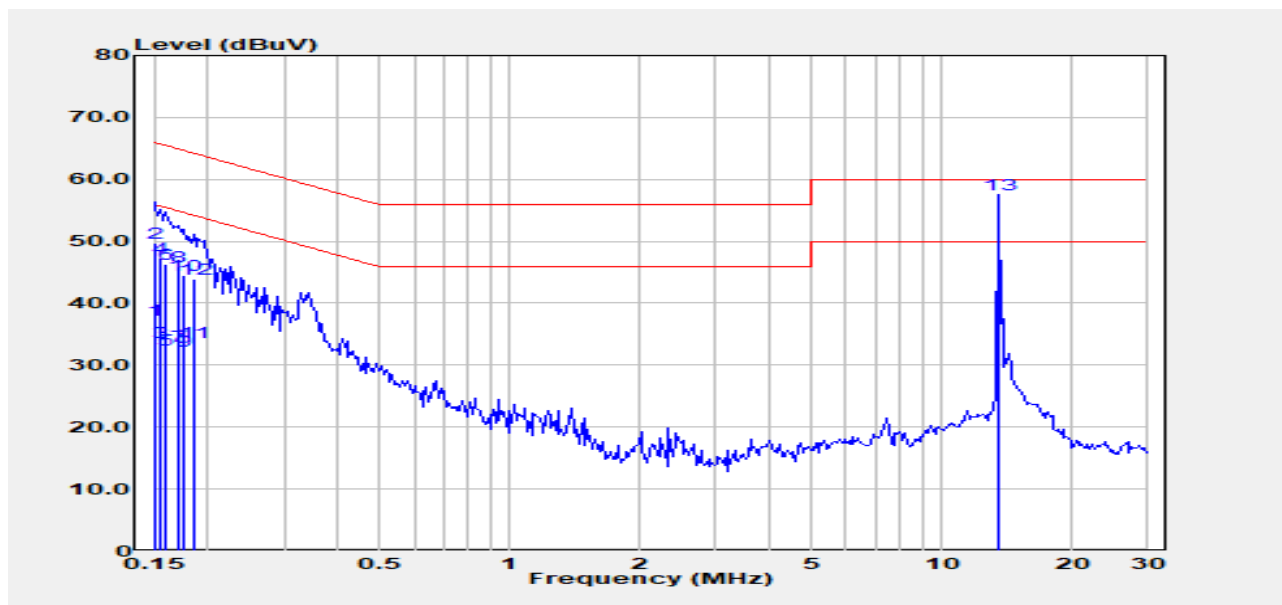
Test Date :2022-03-04

Power :120V/60Hz

Temp./Humi. :21.6/66

Probe :N

Engineer :Jack Tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V	Limit dB μ V	Margin dB
0.150	Average	26.90	10.31	37.21	56.00	-18.79
0.150	QP	39.40	10.31	49.71	66.00	-16.29
0.155	Average	23.30	10.31	33.61	55.74	-22.13
0.155	QP	37.00	10.31	47.31	65.74	-18.43
0.160	Average	22.20	10.31	32.51	55.47	-22.96
0.160	QP	36.10	10.31	46.41	65.47	-19.06
0.170	Average	22.80	10.31	33.11	54.94	-21.84
0.170	QP	35.70	10.31	46.01	64.94	-18.94
0.176	Average	21.89	10.30	32.19	54.68	-22.49
0.176	QP	34.22	10.30	44.52	64.68	-20.16
0.185	Average	23.44	10.30	33.74	54.24	-20.50
0.185	QP	33.56	10.30	43.86	64.24	-20.38
13.551	Peak	---	10.83	57.51	---	---

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BA6E-32

Report Number :E2/2022/20134

Test Site :Conduction C

Test Mode :NFC

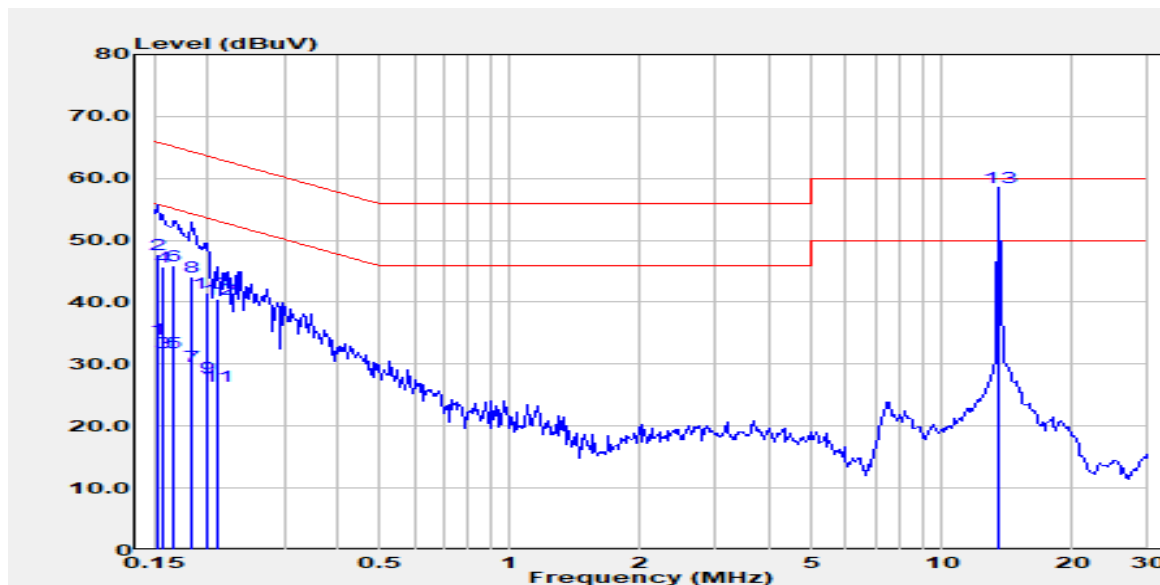
Test Date :2022-03-04

Power :120V/60Hz

Temp./Humi. :21.6/66

Probe :L1

Engineer :Jack Tseng



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS		
	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.153	Average	23.70	10.30	34.00	55.82	-21.82
0.153	QP	37.50	10.30	47.80	65.82	-18.02
0.156	Average	21.60	10.30	31.90	55.65	-23.75
0.156	QP	35.40	10.30	45.70	65.65	-19.95
0.167	Average	21.58	10.30	31.88	55.12	-23.24
0.167	QP	35.70	10.30	46.00	65.12	-19.12
0.183	Average	19.30	10.30	29.60	54.33	-24.73
0.183	QP	33.80	10.30	44.10	64.33	-20.23
0.200	Average	17.50	10.30	27.80	53.62	-25.82
0.200	QP	31.20	10.30	41.50	63.62	-22.12
0.211	Average	16.11	10.30	26.41	53.18	-26.77
0.211	QP	30.22	10.30	40.52	63.18	-22.66
13.551	Peak	---	10.75	58.50	---	---

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Report Number :E2/2022/20134

Test Site :Conduction C

Test Mode :NFC

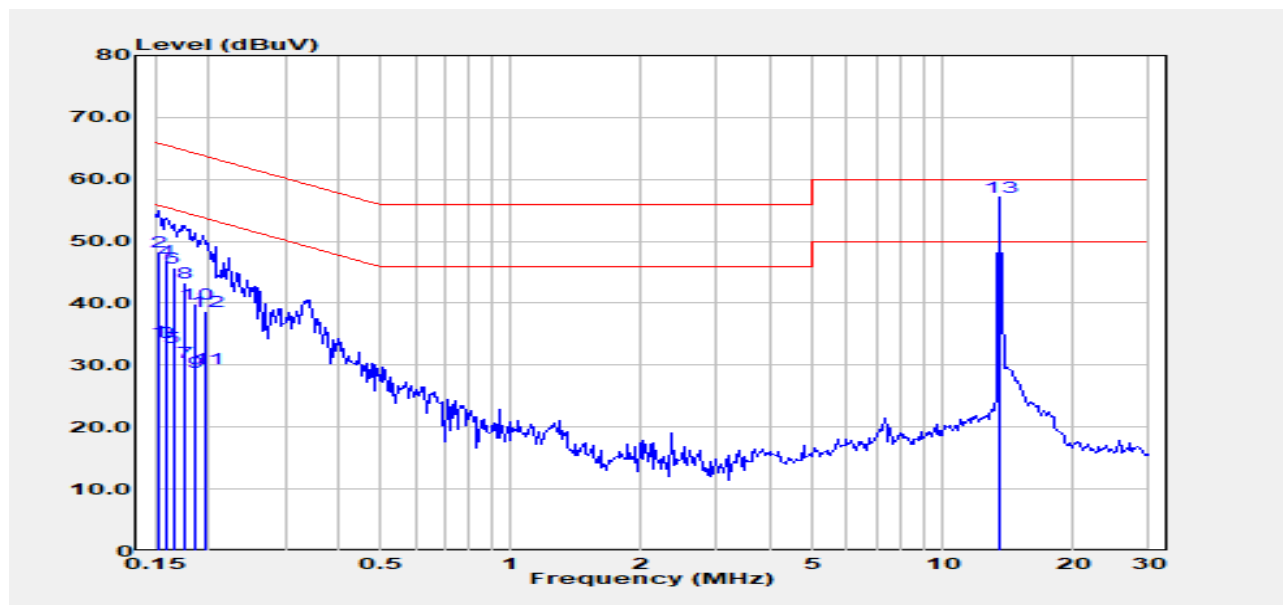
Test Date :2022-03-04

Power :120V/60Hz

Temp./Humi. :21.6/66

Probe :N

Engineer :Jack Tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V	Limit dB μ V	Margin dB
0.153	Average	23.60	10.31	33.91	55.82	-21.91
0.153	QP	38.00	10.31	48.31	65.82	-17.51
0.160	Average	23.30	10.31	33.61	55.47	-21.86
0.160	QP	36.60	10.31	46.91	65.47	-18.56
0.165	Average	22.60	10.31	32.91	55.21	-22.30
0.165	QP	35.50	10.31	45.81	65.21	-19.40
0.176	Average	20.10	10.30	30.40	54.68	-24.28
0.176	QP	33.10	10.30	43.40	64.68	-21.28
0.185	Average	18.60	10.30	28.90	54.24	-25.34
0.185	QP	29.50	10.30	39.80	64.24	-24.44
0.198	Average	19.12	10.30	29.42	53.71	-24.29
0.198	QP	28.44	10.30	38.74	63.71	-24.97
13.551	Peak	---	10.83	57.12	---	---

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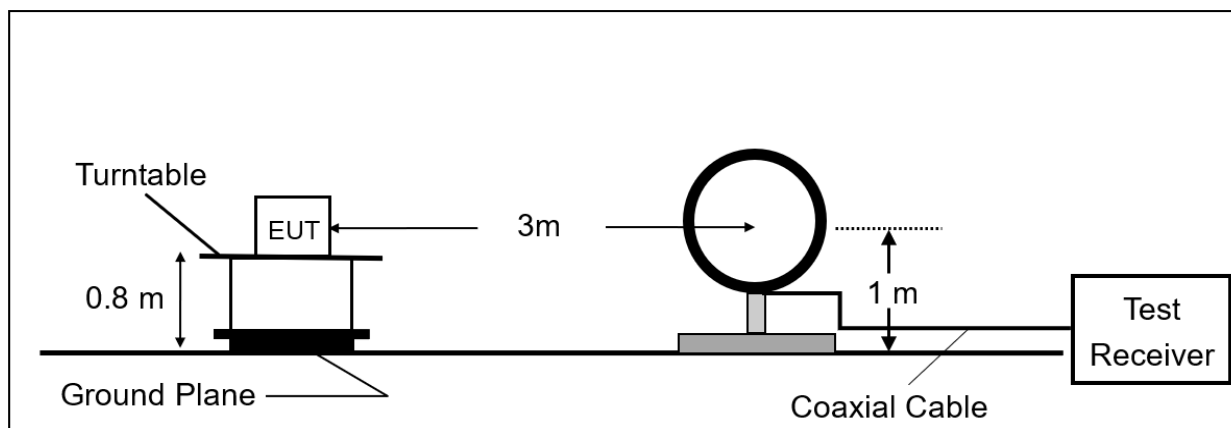
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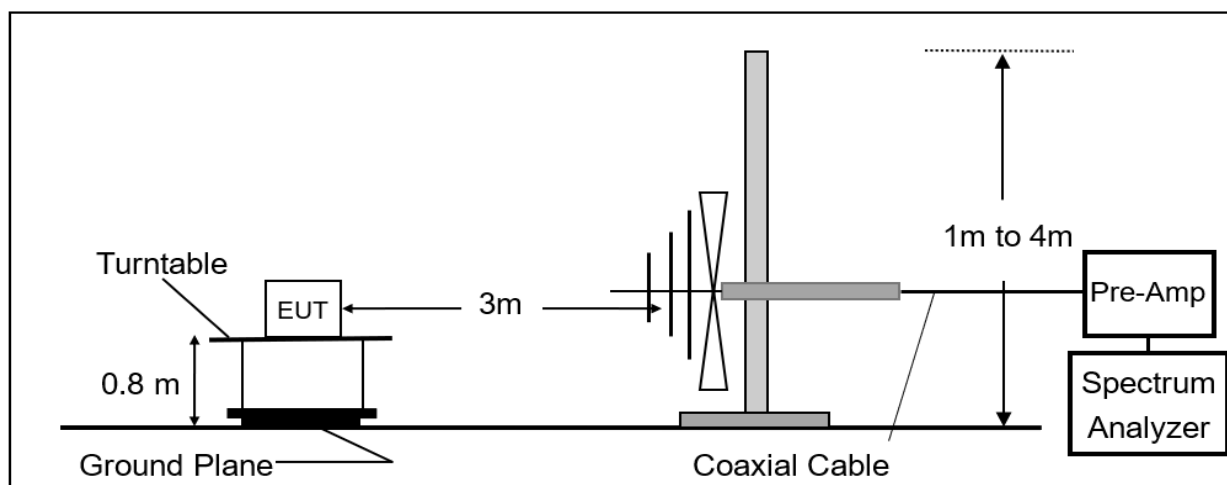
8 RADIATED EMISSION TEST

8.1 Test SET-UP (Block Diagram of Configuration)

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



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



8.2 Measurement Procedure

1. Configure the EUT according to ANSI C63.10.
2. The EUT was placed on a turn table which is 0.8m above ground plane and been measured in the frequency range between 0.009MHz to 30MHz and 30MHz to 1GHz.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all default test channel measured were complete.

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8.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

8.4 Field Strength of Fundamental Emission

8.4.1 Applicable standard

Rules and specifications	CFR 47 Part 15 section 15.225(a)-(d)	
Frequency of Emission (MHz)	Field Strength (μV/m) at 30m	Field Strength (dBμV/m) at 30m
1.705~13.110	30	29.5
13.110~13.410	106	40.5
13.410~13.553	334	50.5
13.553~13.567	15848	84
13.567~13.710	334	50.5
13.710~14.010	106	40.5
14.010~30.00	30	29.5

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8.4.2 Distance Extrapolation Factor

30m to 3m

Distance extrapolation = $40 \cdot \log(30/3) = 40 \text{ dB}$

30m to 10m

Distance extrapolation = $40 \cdot \log(30/10) = 19.08 \text{ dB}$

10m to 3m

Distance extrapolation = $40 \cdot \log(10/3) = 20.92 \text{ dB}$

Note:

1. Distance extrapolation factor = $40 \log(\text{required distance}/\text{test distance}) \text{ (dB)}$
2. The lower limit shall apply at the transition frequencies.
3. KDB 414788 D01 OATS and 3m semi-anechoic chamber Justification:
Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. OATS and 3m SAC chamber testing had been performed and 3m SAC measured test result is the worst case test result.

Actual FS(dBμV/m) = Spectrum. Reading level(dBμV) + Factor(dB)

Below 30 MHz of Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Distance Factor (dB)

Above 30 MHz of Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amp Gain (dB)

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

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8.4.3 Field Strength of Fundamental Emission Measurement Result

8.5 Radiated Spurious Emission Measurement

8.5.1 Standard Applicable

The field strength of any emissions appearing outside of the 13.110-14.010 MHz 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 (μV/m)
2. Distance extrapolation factor = 40 log (required distance/ test distance) (dB)
3. $20 \cdot \log(30 \mu\text{V/m}) = 29.54 \text{ dBuV/m}$
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.

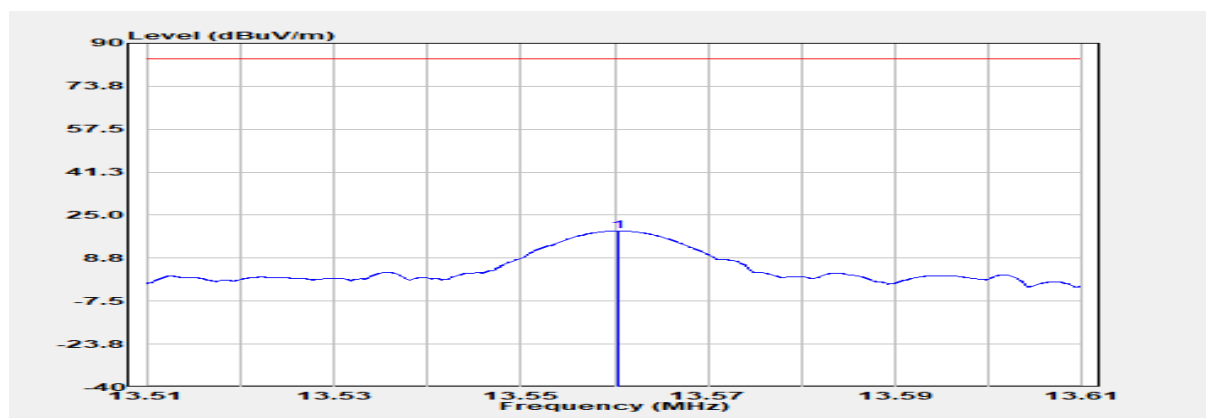
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8.5.2 Radiated Spurious Emission Measurement Result

BA6E-31

Report Number	:E2/2022/20134	Test Site	:SAC D
Operation Mode	:NFC	Test Date	:2022-03-03
Test Frequency	:13.56 MHz	Temp./Humi.	:23.5/67
Test Mode	:Main	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Jack Tseng



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level				
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
13.560	Peak	47.28	-28.24	19.04	84.00	-64.96

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.

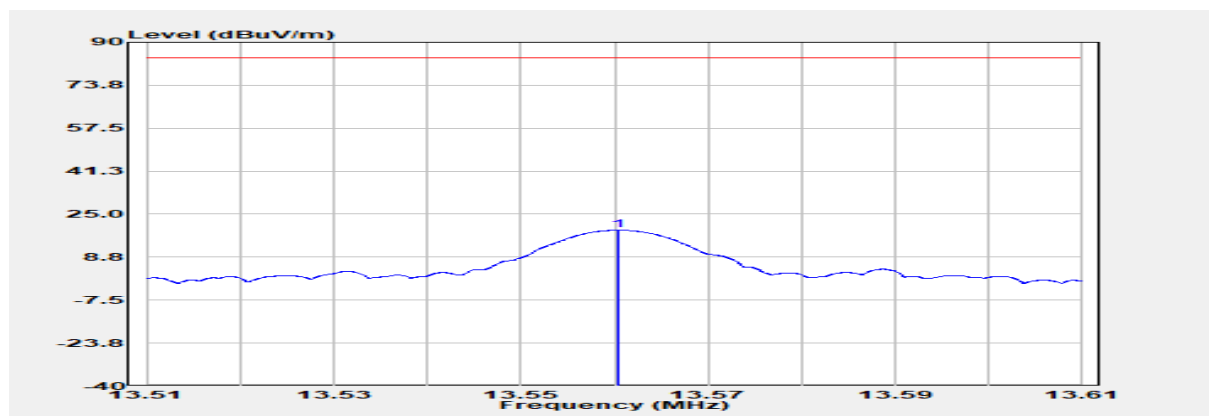
Field strength (dBUV/m) at 30m, within the band 490 kHz - 30 MHz.

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Report Number	:E2/2022/20134	Test Site	:SAC D
Operation Mode	:NFC	Test Date	:2022-03-03
Test Frequency	:13.56 MHz	Temp./Humi.	:23.5/67
Test Mode	:Main	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Jack Tseng



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level				
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
13.561	Peak	47.16	-28.24	18.92	84.00	-65.08

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.

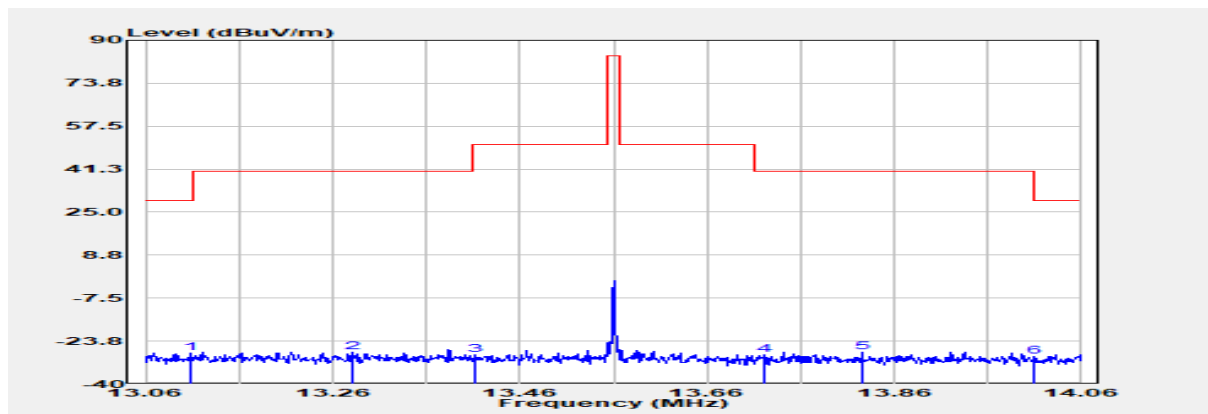
Field strength (dBUV/m) at 30m, within the band 490 kHz - 30 MHz.

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Report Number	:E2/2022/20134	Test Site	:SAC D
Operation Mode	:NFC	Test Date	:2022-03-03
Test Frequency	:13.56 MHz	Temp./Humi.	:23.5/67
Test Mode	:Mask	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Jack Tseng



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level				
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
13.107	Peak	-0.04	-28.20	-28.24	29.54	-57.78
13.280	Peak	0.12	-28.22	-28.10	40.50	-68.60
13.412	Peak	-0.59	-28.23	-28.82	50.47	-79.29
13.722	Peak	-0.56	-28.26	-28.81	40.50	-69.31
13.826	Peak	0.20	-28.26	-28.06	40.50	-68.56
14.010	Peak	-1.30	-28.28	-29.58	29.54	-59.12

Actual level = Reading level + Factor

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

Test distance= 3m

For Actual level and limit:

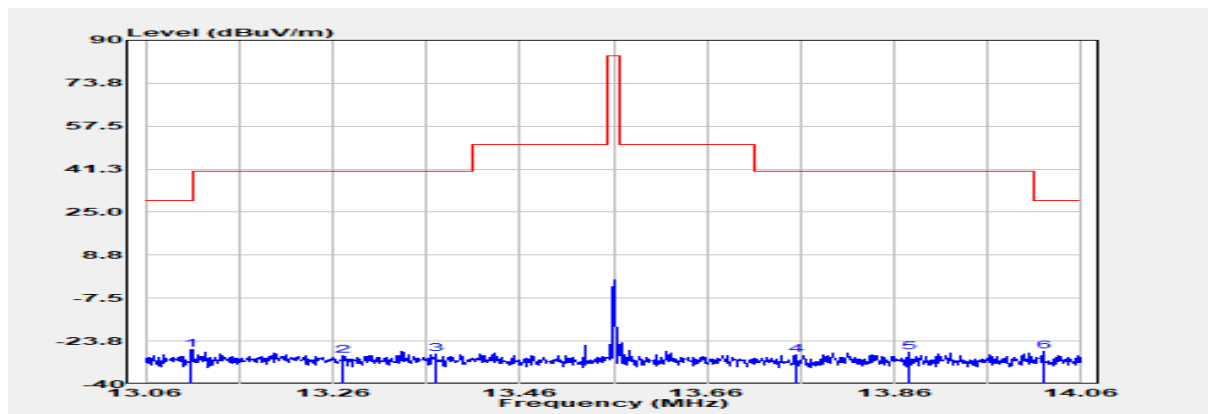
Field strength (dBUV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBUV/m) at 30m, within the band 490 kHz - 30 MHz.

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Report Number	:E2/2022/20134	Test Site	:SAC D
Operation Mode	:NFC	Test Date	:2022-03-03
Test Frequency	:13.56 MHz	Temp./Humi.	:23.5/67
Test Mode	:Mask	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Jack Tseng



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level				
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
13.109	Peak	1.22	-28.20	-26.99	29.54	-56.53
13.271	Peak	-0.90	-28.22	-29.12	40.50	-69.62
13.370	Peak	-0.27	-28.23	-28.50	40.50	-69.00
13.754	Peak	-0.80	-28.26	-29.06	40.50	-69.56
13.876	Peak	0.30	-28.27	-27.97	40.50	-68.47
14.019	Peak	0.69	-28.28	-27.59	29.54	-57.13

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.

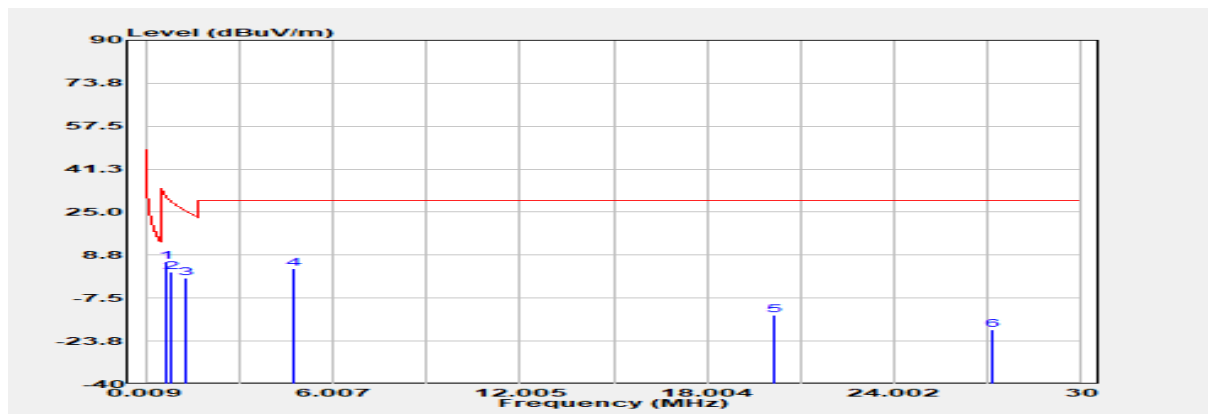
Field strength (dBUV/m) at 30m, within the band 490 kHz - 30 MHz.

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Report Number	:E2/2022/20134	Test Site	:SAC D
Operation Mode	:NFC	Test Date	:2022-03-03
Test Frequency	:13.56 MHz	Temp./Humi.	:23.5/67
Test Mode	:TX	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Jack Tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBUV	Factor dB	Actual dBUV/m	Limit dBUV/m	Margin dB
0.639	Peak	35.03	-28.63	6.40	31.50	-25.10
0.849	Peak	30.78	-28.54	2.24	29.03	-26.79
1.329	Peak	28.60	-28.60	-0.01	25.14	-25.15
4.778	Peak	32.52	-28.93	3.60	29.54	-25.94
20.163	Peak	14.88	-28.71	-13.83	29.54	-43.37
27.120	Peak	10.43	-30.00	-19.56	29.54	-49.10

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.

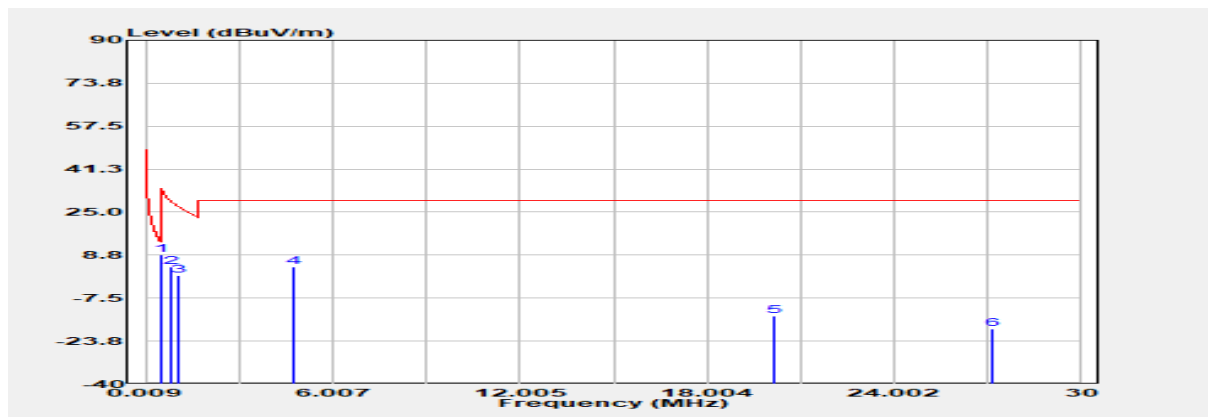
Field strength (dBUV/m) at 30m, within the band 490 kHz - 30 MHz.

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Report Number	:E2/2022/20134	Test Site	:SAC D
Operation Mode	:NFC	Test Date	:2022-03-03
Test Frequency	:13.56 MHz	Temp./Humi.	:23.5/67
Test Mode	:TX	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Jack Tseng



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level				
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
0.519	Peak	37.56	-28.70	8.86	33.31	-24.45
0.789	Peak	32.84	-28.56	4.28	29.67	-25.38
1.059	Peak	29.55	-28.51	1.04	27.11	-26.07
4.748	Peak	33.13	-28.93	4.21	29.54	-25.33
20.163	Peak	14.44	-28.71	-14.27	29.54	-43.81
27.120	Peak	10.86	-30.00	-19.14	29.54	-48.68

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 :E2/2022/20134

Test Site :SAC D

Operation Mode :NFC

Test Date :2022-03-03

Test Frequency :13.56 MHz

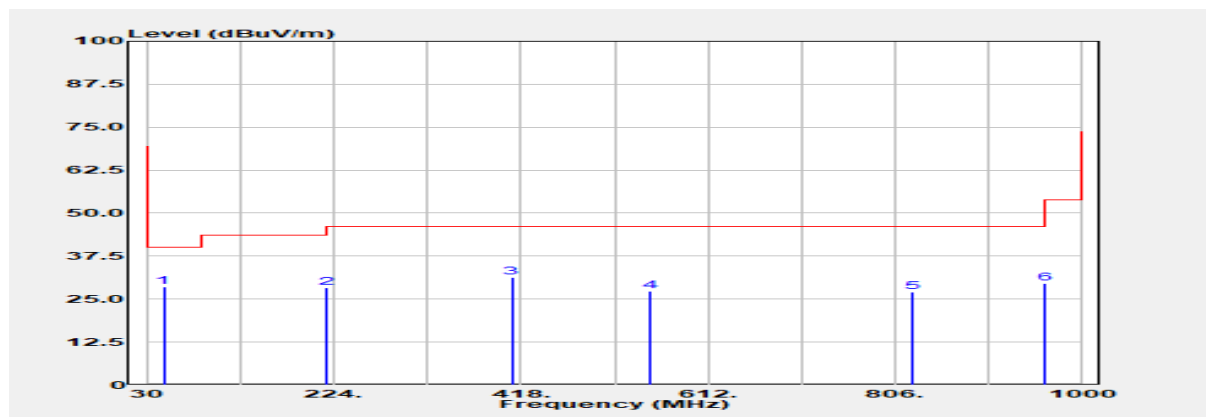
Temp./Humi. :23.5/67

Test Mode :TX

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Jack Tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
47.460	Peak	46.17	-17.62	28.55	40.00	-11.45
216.240	Peak	48.29	-19.99	28.30	46.00	-17.70
408.300	Peak	44.72	-13.42	31.30	46.00	-14.70
551.860	Peak	37.85	-10.47	27.38	46.00	-18.62
824.430	Peak	33.45	-6.34	27.11	46.00	-18.89
961.200	Peak	33.83	-4.25	29.58	54.00	-24.42

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Report Number :E2/2022/20134

Test Site :SAC D

Operation Mode :NFC

Test Date :2022-03-03

Test Frequency :13.56 MHz

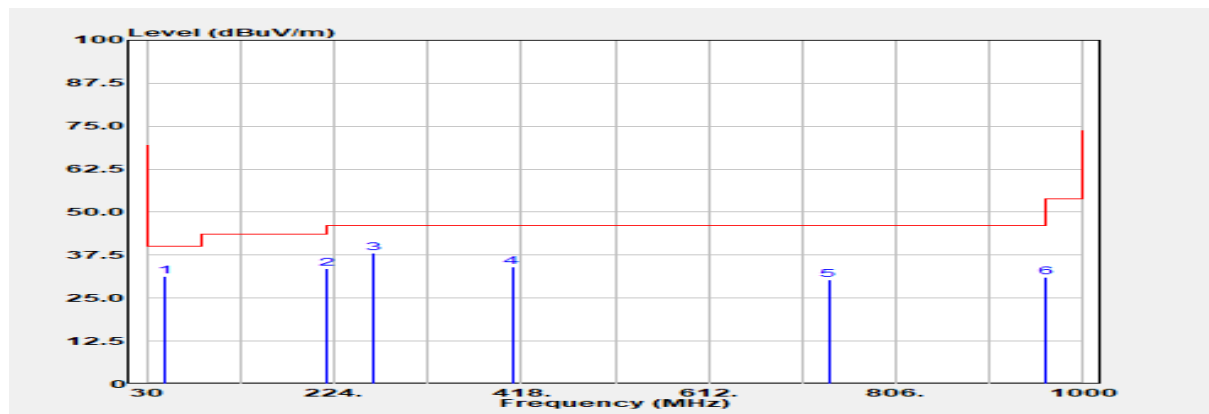
Temp./Humi. :23.5/67

Test Mode :TX

Antenna Pol. :Horizontal

EUT Pol :E2 Plane

Engineer :Jack Tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
48.430	Peak	48.68	-17.44	31.25	40.00	-8.75
216.240	Peak	53.58	-19.99	33.59	46.00	-12.41
263.770	Peak	55.09	-17.05	38.05	46.00	-7.95
408.300	Peak	47.62	-13.42	34.20	46.00	-11.80
736.160	Peak	37.89	-7.58	30.30	46.00	-15.70
960.230	Peak	35.35	-4.23	31.12	54.00	-22.88

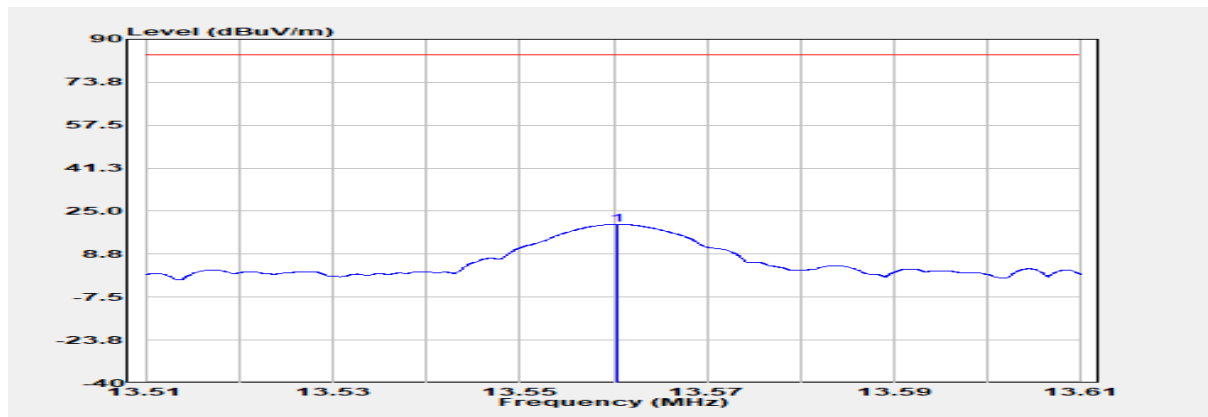
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BA6E-32

Report Number	:E2/2022/20134	Test Site	:SAC D
Operation Mode	:NFC	Test Date	:2022-03-03
Test Frequency	:13.56 MHz	Temp./Humi.	:23.5/67
Test Mode	:Main	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Jack Tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual dB μ V/m	Limit dB μ V/m	Margin dB
13.560	Peak	48.27	-28.24	20.03	84.00	-63.97

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.

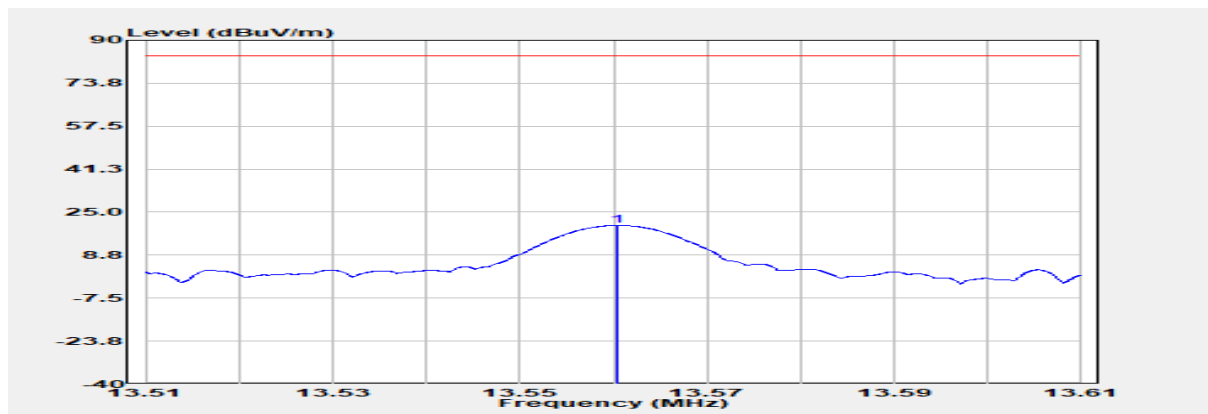
Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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Report Number	:E2/2022/20134	Test Site	:SAC D
Operation Mode	:NFC	Test Date	:2022-03-03
Test Frequency	:13.56 MHz	Temp./Humi.	:23.5/67
Test Mode	:Main	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Jack Tseng



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual	Limit	Margin
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
13.560	Peak	48.24	-28.24	20.00	84.00	-64.00

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.

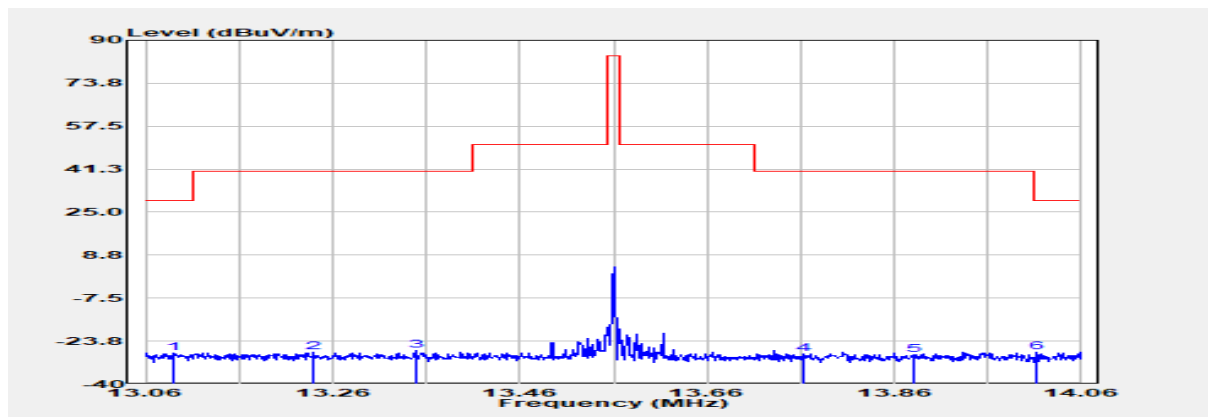
Field strength (dBUV/m) at 30m, within the band 490 kHz - 30 MHz.

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Report Number	:E2/2022/20134	Test Site	:SAC D
Operation Mode	:NFC	Test Date	:2022-03-03
Test Frequency	:13.56 MHz	Temp./Humi.	:23.5/67
Test Mode	:Mask	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Jack Tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual dBμV/m	Limit dBμV/m	Margin dB
13.091	Peak	-0.08	-28.20	-28.28	29.54	-57.82
13.240	Peak	0.17	-28.22	-28.04	40.50	-68.54
13.348	Peak	0.97	-28.22	-27.26	40.50	-67.76
13.764	Peak	-0.40	-28.26	-28.66	40.50	-69.16
13.880	Peak	-0.78	-28.27	-29.05	40.50	-69.55
14.012	Peak	0.47	-28.28	-27.81	29.54	-57.35

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.

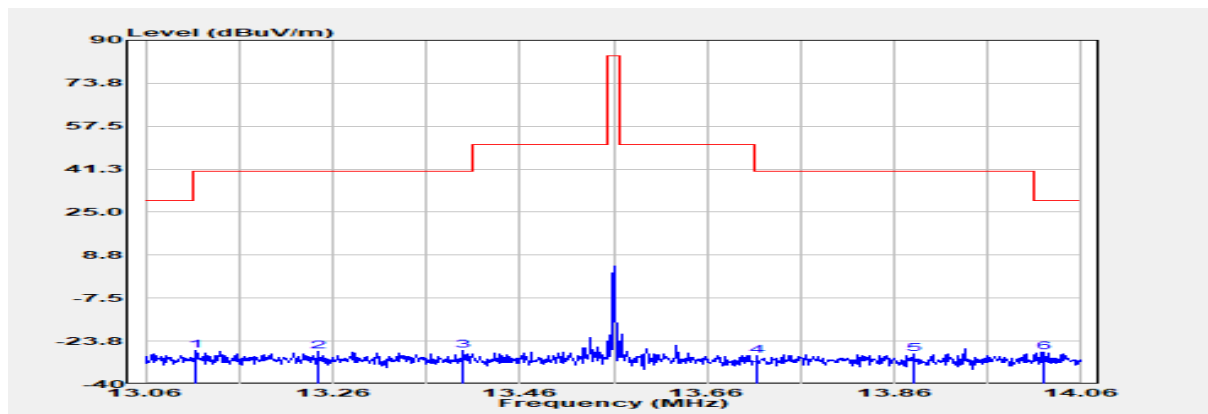
Field strength (dBUV/m) at 30m, within the band 490 kHz - 30 MHz.

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Report Number	:E2/2022/20134	Test Site	:SAC D
Operation Mode	:NFC	Test Date	:2022-03-03
Test Frequency	:13.56 MHz	Temp./Humi.	:23.5/67
Test Mode	:Mask	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Jack Tseng



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level				
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
13.114	Peak	1.05	-28.20	-27.15	40.50	-67.65
13.244	Peak	0.48	-28.22	-27.73	40.50	-68.23
13.399	Peak	1.04	-28.23	-27.19	40.50	-67.69
13.713	Peak	-0.87	-28.25	-29.12	40.50	-69.62
13.880	Peak	-0.45	-28.27	-28.72	40.50	-69.22
14.019	Peak	0.27	-28.28	-28.00	29.54	-57.54

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.

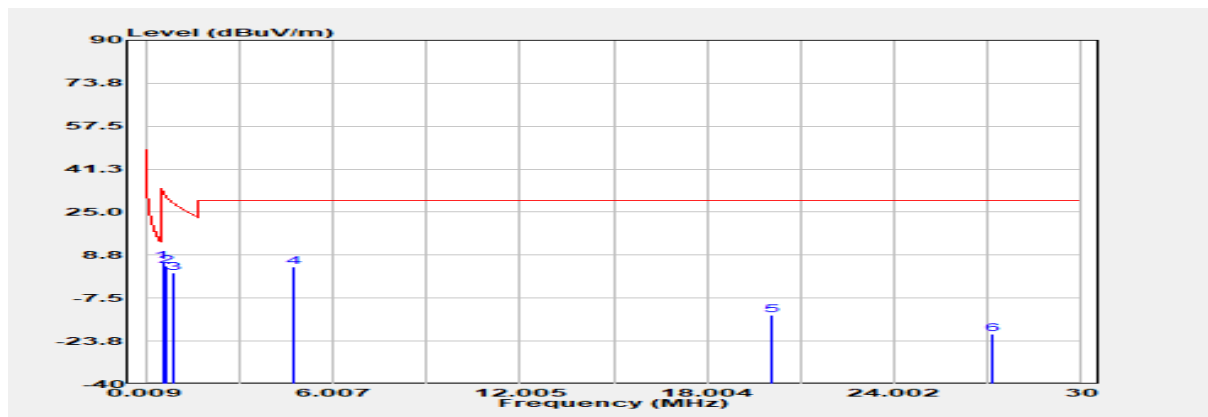
Field strength (dBUV/m) at 30m, within the band 490 kHz - 30 MHz.

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Report Number	:E2/2022/20134	Test Site	:SAC D
Operation Mode	:NFC	Test Date	:2022-03-03
Test Frequency	:13.56 MHz	Temp./Humi.	:23.5/67
Test Mode	:TX	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Jack Tseng



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level				
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
0.549	Peak	34.85	-28.68	6.17	32.82	-26.65
0.699	Peak	33.16	-28.60	4.56	30.72	-26.16
0.879	Peak	30.57	-28.53	2.04	28.73	-26.69
4.778	Peak	33.13	-28.93	4.20	29.54	-25.34
20.103	Peak	14.78	-28.70	-13.92	29.54	-43.46
27.120	Peak	8.78	-30.00	-21.22	29.54	-50.76

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.

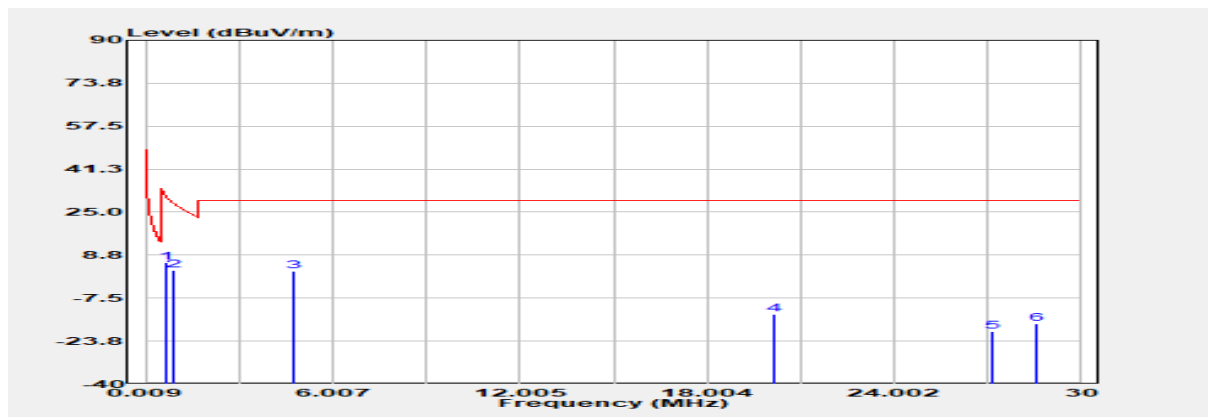
Field strength (dBUV/m) at 30m, within the band 490 kHz - 30 MHz.

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Report Number	:E2/2022/20134	Test Site	:SAC D
Operation Mode	:NFC	Test Date	:2022-03-03
Test Frequency	:13.56 MHz	Temp./Humi.	:23.5/67
Test Mode	:TX	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Jack Tseng



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level				
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
0.639	Peak	34.53	-28.63	5.89	31.50	-25.61
0.909	Peak	31.37	-28.52	2.85	28.44	-25.58
4.778	Peak	31.74	-28.93	2.81	29.54	-26.73
20.163	Peak	15.08	-28.71	-13.64	29.54	-43.18
27.120	Peak	9.95	-30.00	-20.05	29.54	-49.59
28.560	Peak	12.86	-30.18	-17.32	29.54	-46.86

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 :E2/2022/20134

Test Site :SAC D

Operation Mode :NFC

Test Date :2022-03-03

Test Frequency :13.56 MHz

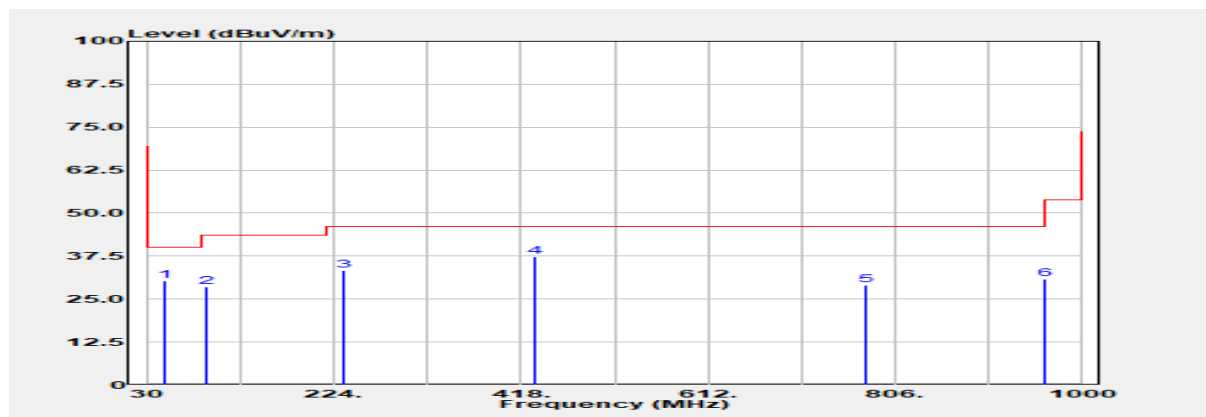
Temp./Humi. :23.5/67

Test Mode :TX

Antenna Pol. :Vertical

EUT Pol :E2 Plane

Engineer :Jack Tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
49.400	Peak	47.62	-17.35	30.26	40.00	-9.74
93.050	Peak	51.13	-22.48	28.65	43.50	-14.85
234.670	Peak	52.07	-18.71	33.36	46.00	-12.64
433.520	Peak	50.19	-12.75	37.44	46.00	-8.56
774.960	Peak	35.67	-6.65	29.02	46.00	-16.98
961.200	Peak	35.12	-4.25	30.88	54.00	-23.12

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Report Number :E2/2022/20134

Test Site :SAC D

Operation Mode :NFC

Test Date :2022-03-03

Test Frequency :13.56 MHz

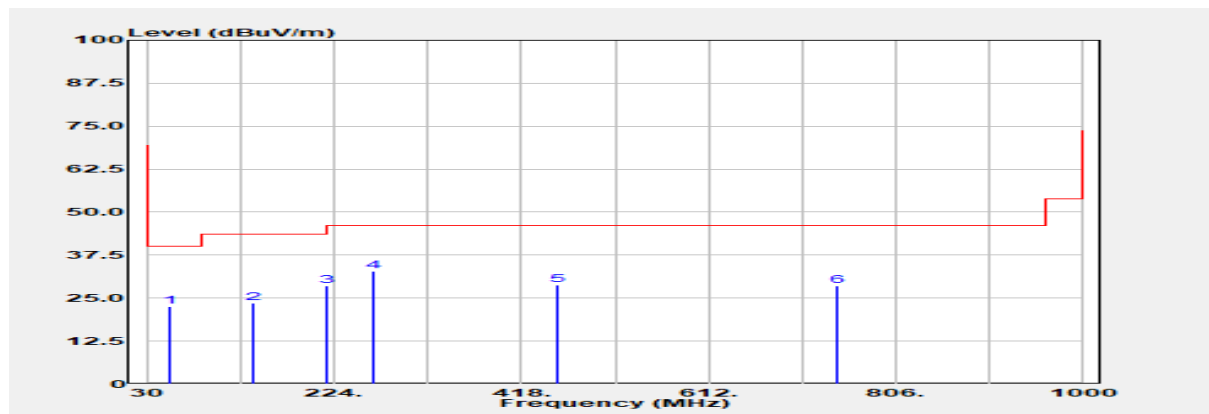
Temp./Humi. :23.5/67

Test Mode :TX

Antenna Pol. :Horizontal

EUT Pol :E2 Plane

Engineer :Jack Tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
54.250	Peak	39.92	-17.48	22.44	40.00	-17.56
140.580	Peak	40.82	-17.26	23.55	43.50	-19.95
216.240	Peak	48.53	-19.99	28.54	46.00	-17.46
263.770	Peak	49.98	-17.05	32.94	46.00	-13.06
455.830	Peak	40.37	-11.63	28.75	46.00	-17.25
743.920	Peak	35.42	-6.97	28.46	46.00	-17.54

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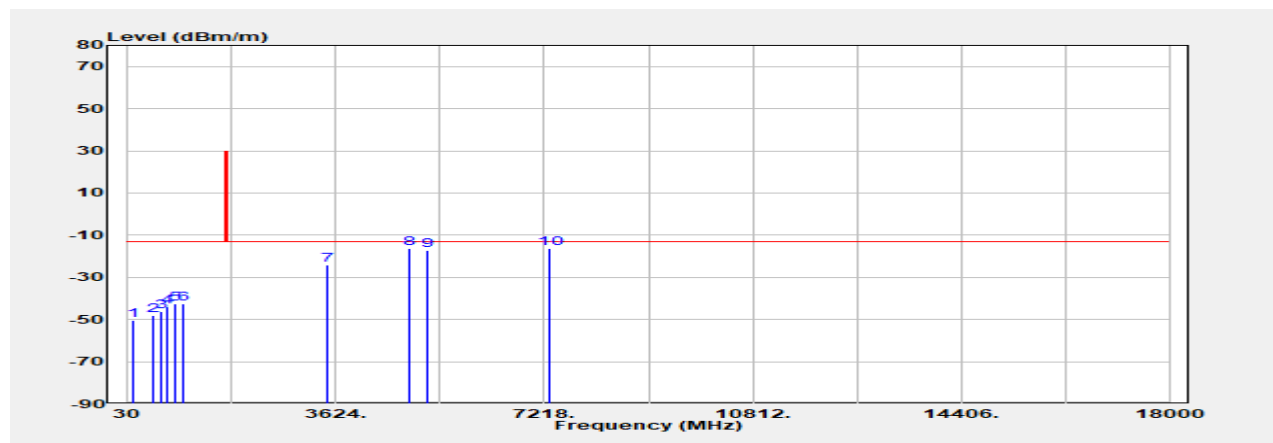
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Co-Located

Report Number :E2/2022/20134
Operation Mode :LTE B4+WLAN 2.4G
Test Mode :TX CH MID
EUT Pol :E2 Plane
Test Frequency :1732.5 MHz+2437 MHz

Test Site :SAC G
Test Date :2022-04-22
Temp./Humi. :22.5/65
Antenna Pol. :Vertical
Engineer :Howard Huang



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
110.510	-50.49	-46.22	-1.52	-2.75	-13.00	-37.49
450.010	-47.96	-49.46	4.12	-2.62	-13.00	-34.96
590.660	-46.42	-47.09	3.78	-3.11	-13.00	-33.42
723.550	-44.14	-43.62	3.27	-3.79	-13.00	-31.14
857.410	-42.52	-43.18	4.58	-3.92	-13.00	-29.52
989.330	-42.41	-41.81	3.96	-4.56	-13.00	-29.41
3465.000	-24.23	-27.4	12.34	-9.17	-13.00	-11.23
4874.000	-16.47	-18.38	12.70	-10.79	-13.00	-3.47
5197.500	-17.16	-18.87	12.88	-11.17	-13.00	-4.16
7311.000	-16.11	-13.63	10.94	-13.42	-13.00	-3.11

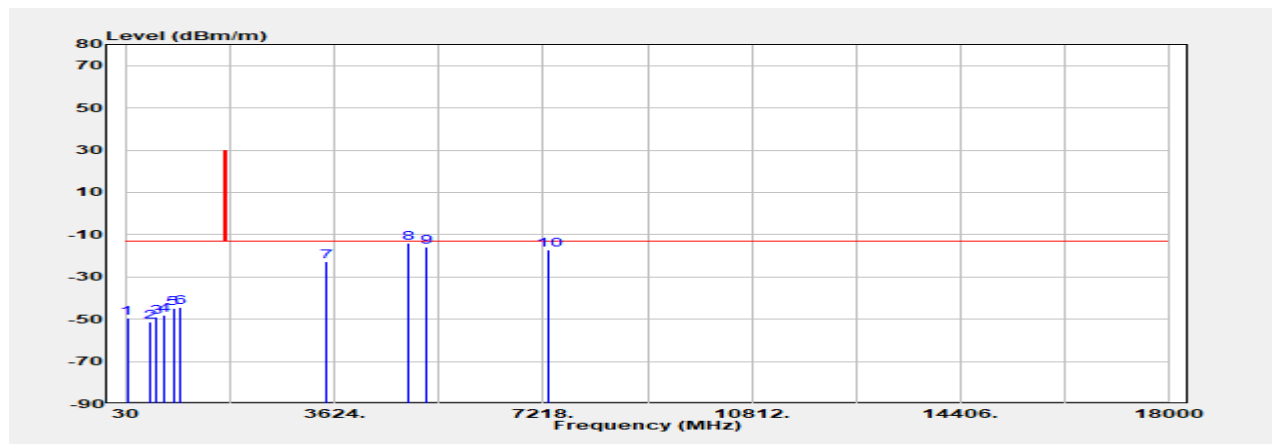
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Report Number :E2/2022/20134
Operation Mode :LTE B4+WLAN 2.4G
Test Mode :TX CH MID
EUT Pol :E2 Plane
Test Frequency :1732.5 MHz+2437 MHz

Test Site :SAC G
Test Date :2022-04-22
Temp./Humi. :22.5/65
Antenna Pol. :Horizontal
Engineer :Howard Huang



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
33.880	-49.59	-33.16	-14.03	-2.40	-13.00	-36.59
441.280	-51.16	-52.49	4.06	-2.73	-13.00	-38.16
524.700	-48.96	-50.41	4.16	-2.71	-13.00	-35.96
686.690	-48.14	-48.67	3.76	-3.23	-13.00	-35.14
828.310	-44.89	-45.4	4.49	-3.98	-13.00	-31.89
959.260	-44.25	-43.48	3.72	-4.49	-13.00	-31.25
3465.000	-22.82	-25.99	12.34	-9.17	-13.00	-9.82
4874.000	-14.06	-15.97	12.70	-10.79	-13.00	-1.06
5197.500	-15.80	-17.51	12.88	-11.17	-13.00	-2.80
7311.000	-17.02	-14.54	10.94	-13.42	-13.00	-4.02

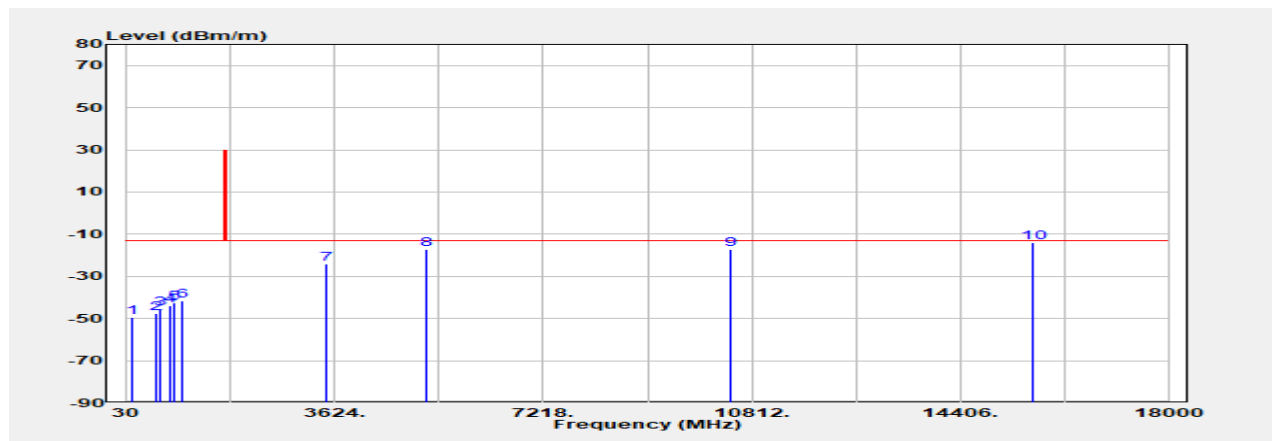
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Report Number :E2/2022/20134
Operation Mode :LTE B4+WLAN 5G
Test Mode :TX CH MID
EUT Pol :E2 Plane
Test Frequency :1732.5 MHz+5220 MHz

Test Site :SAC G
Test Date :2022-04-22
Temp./Humi. :22.5/65
Antenna Pol. :Vertical
Engineer :Howard Huang



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
110.510	-49.57	-45.30	-1.52	-2.75	-13.00	-36.57
536.340	-47.48	-49.06	4.28	-2.70	-13.00	-34.48
590.660	-45.50	-46.17	3.78	-3.11	-13.00	-32.50
785.630	-43.71	-43.89	3.58	-3.40	-13.00	-30.71
839.950	-42.50	-43.36	4.65	-3.79	-13.00	-29.50
989.330	-41.49	-40.89	3.96	-4.56	-13.00	-28.49
3465.000	-23.98	-27.15	12.34	-9.17	-13.00	-10.98
5197.500	-17.28	-18.99	12.88	-11.17	-13.00	-4.28
10440.000	-17.41	-11.67	10.56	-16.30	-13.00	-4.41
15660.000	-14.17	-10.71	16.38	-19.84	-13.00	-1.17

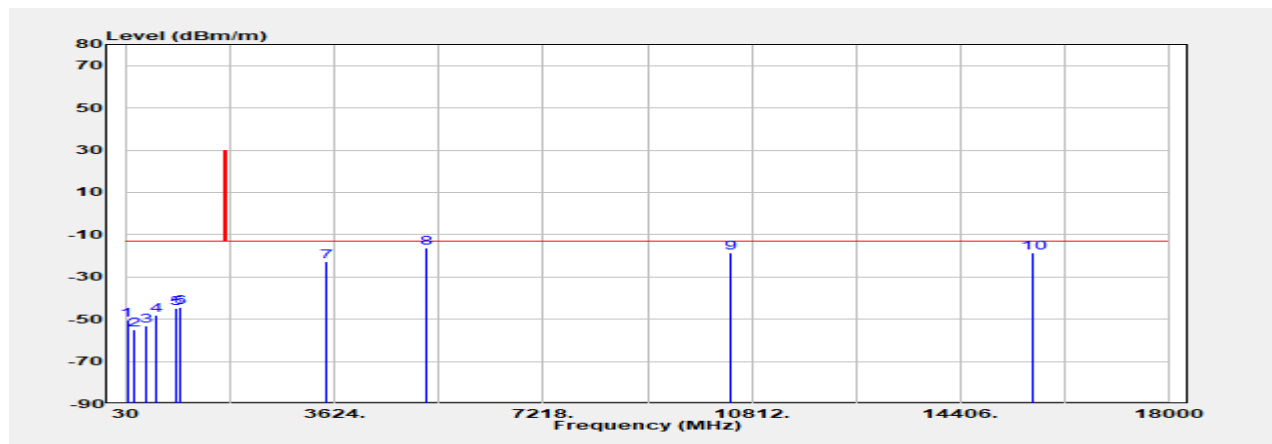
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Report Number :E2/2022/20134
Operation Mode :LTE B4+WLAN 5G
Test Mode :TX CH MID
EUT Pol :E2 Plane
Test Frequency :1732.5 MHz+5220 MHz

Test Site :SAC G
Test Date :2022-04-22
Temp./Humi. :22.5/65
Antenna Pol. :Horizontal
Engineer :Howard Huang



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
33.880	-50.59	34.16	-14.03	-2.40	-13.00	-37.59
149.310	-55.00	-50.51	-1.66	-2.83	-13.00	-42.00
358.830	-53.02	-54.35	4.48	-3.15	-13.00	-40.02
524.700	-47.96	-49.41	4.16	-2.71	-13.00	-34.96
871.960	-44.73	-45.1	4.49	-4.12	-13.00	-31.73
959.260	-44.25	-43.48	3.72	-4.49	-13.00	-31.25
3465.000	-22.57	-25.74	12.34	-9.17	-13.00	-9.57
5197.500	-16.08	-17.79	12.88	-11.17	-13.00	-3.08
10440.000	-18.46	-12.72	10.56	-16.30	-13.00	-5.46
15660.000	-18.56	-15.1	16.38	-19.84	-13.00	-5.56

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9 FREQUENCY STABILITY

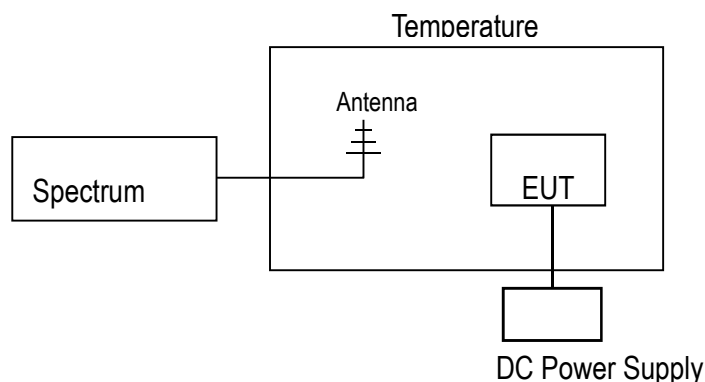
9.1 Applicable Standard

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

9.2 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation
3. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 10kHz, Span =100kHz.
4. Set SPA Max hold. Mark peak.

9.3 Test SET-UP (Block Diagram of Configuration)



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9.4 Measurement Results

BA6E-31

Startup

A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
12	-20	13.560195	0.19500	+/- 1.356
12	-10	13.560185	0.18500	+/- 1.356
12	0	13.560205	0.20500	+/- 1.356
12	10	13.560205	0.20500	+/- 1.356
12	20	13.560225	0.22500	+/- 1.356
12	30	13.560225	0.22500	+/- 1.356
12	40	13.560235	0.23500	+/- 1.356
12	50	13.560235	0.23500	+/- 1.356

B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
13.8	20	13.560215	0.21500	+/- 1.356
12	20	13.560225	0.22500	+/- 1.356
10.2	20	13.560215	0.21500	+/- 1.356

2 minutes

A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
12	-20	13.560205	0.20500	+/- 1.356
12	-10	13.560185	0.18500	+/- 1.356
12	0	13.560215	0.21500	+/- 1.356
12	10	13.560225	0.22500	+/- 1.356
12	20	13.560225	0.22500	+/- 1.356
12	30	13.560205	0.20500	+/- 1.356
12	40	13.560245	0.24500	+/- 1.356
12	50	13.560255	0.25500	+/- 1.356

B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
13.8	20	13.560205	0.20500	+/- 1.356
12	20	13.560225	0.22500	+/- 1.356
10.2	20	13.560255	0.25500	+/- 1.356

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5 minutes

A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
12	-20	13.560185	0.18500	+/- 1.356
12	-10	13.560205	0.20500	+/- 1.356
12	0	13.560205	0.20500	+/- 1.356
12	10	13.560215	0.21500	+/- 1.356
12	20	13.560225	0.22500	+/- 1.356
12	30	13.560195	0.19500	+/- 1.356
12	40	13.560205	0.20500	+/- 1.356
12	50	13.560215	0.21500	+/- 1.356

B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
13.8	20	13.560225	0.22500	+/- 1.356
12	20	13.560225	0.22500	+/- 1.356
10.2	20	13.560255	0.25500	+/- 1.356

10 minutes

A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
12	-20	13.560195	0.19500	+/- 1.356
12	-10	13.560195	0.19500	+/- 1.356
12	0	13.560195	0.19500	+/- 1.356
12	10	13.560195	0.19500	+/- 1.356
12	20	13.560225	0.22500	+/- 1.356
12	30	13.560235	0.23500	+/- 1.356
12	40	13.560215	0.21500	+/- 1.356
12	50	13.560225	0.22500	+/- 1.356

B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
13.8	20	13.560215	0.21500	+/- 1.356
12	20	13.560225	0.22500	+/- 1.356
10.2	20	13.560205	0.20500	+/- 1.356

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Startup

A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
12	-20	13.56016	0.16000	+/- 1.356
12	-10	13.56016	0.16000	+/- 1.356
12	0	13.56018	0.18000	+/- 1.356
12	10	13.56018	0.18000	+/- 1.356
12	20	13.5602	0.20000	+/- 1.356
12	30	13.56017	0.17000	+/- 1.356
12	40	13.56019	0.19000	+/- 1.356
12	50	13.5602	0.20000	+/- 1.356

B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
13.8	20	13.56021	0.21000	+/- 1.356
12	20	13.5602	0.20000	+/- 1.356
10.2	20	13.56019	0.19000	+/- 1.356

2 minutes

A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
12	-20	13.56018	0.18000	+/- 1.356
12	-10	13.56016	0.16000	+/- 1.356
12	0	13.56018	0.18000	+/- 1.356
12	10	13.56018	0.18000	+/- 1.356
12	20	13.5602	0.20000	+/- 1.356
12	30	13.56018	0.18000	+/- 1.356
12	40	13.56022	0.22000	+/- 1.356
12	50	13.56021	0.21000	+/- 1.356

B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
13.8	20	13.56023	0.23000	+/- 1.356
12	20	13.5602	0.20000	+/- 1.356
10.2	20	13.5602	0.20000	+/- 1.356

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5 minutes**A. Temperature Variation**

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
12	-20	13.56018	0.18000	+/- 1.356
12	-10	13.56016	0.16000	+/- 1.356
12	0	13.56019	0.19000	+/- 1.356
12	10	13.56017	0.17000	+/- 1.356
12	20	13.5602	0.20000	+/- 1.356
12	30	13.5602	0.20000	+/- 1.356
12	40	13.5602	0.20000	+/- 1.356
12	50	13.56017	0.17000	+/- 1.356

B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
13.8	20	13.5602	0.20000	+/- 1.356
12	20	13.5602	0.20000	+/- 1.356
10.2	20	13.56017	0.17000	+/- 1.356

10 minutes**A. Temperature Variation**

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
12	-20	13.56018	0.18000	+/- 1.356
12	-10	13.56017	0.17000	+/- 1.356
12	0	13.56017	0.17000	+/- 1.356
12	10	13.56018	0.18000	+/- 1.356
12	20	13.5602	0.20000	+/- 1.356
12	30	13.56021	0.21000	+/- 1.356
12	40	13.5602	0.20000	+/- 1.356
12	50	13.56021	0.21000	+/- 1.356

B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
13.8	20	13.56018	0.18000	+/- 1.356
12	20	13.5602	0.20000	+/- 1.356
10.2	20	13.56023	0.23000	+/- 1.356

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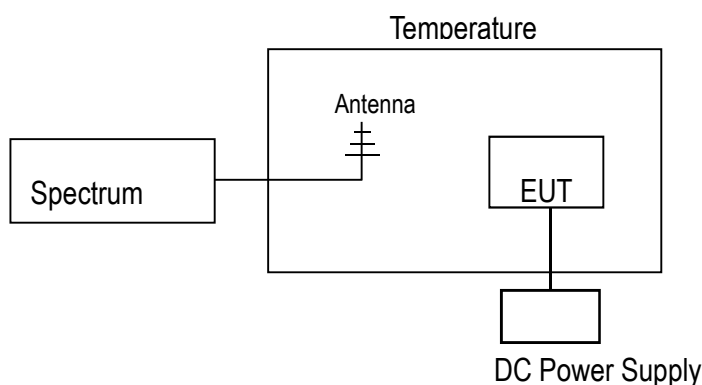
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10 EMISSION BANDWIDTH MEASUREMENT

10.1 Applicable Standard:

The 20 dB bandwidth shall be specified in operating frequency band.

10.2 Test Set-up



10.3 Measurement Procedure

1. Placed the EUT on the testing table.
2. Set the EUT under transmission condition continuously at specific channel frequency.
3. The resolution bandwidth of 1 kHz and the video bandwidth of 3 kHz were used.
4. Measured the spectrum width with power higher than 20dB below carrier.

10.4 Measurement Result

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FCC

20dB BW (kHz)
2.696

Operation range	Frequency (MHz)	Limit (MHz)
Low	13.55908	>13.11
High	13.56138	<14.01

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FCC

20dB BW (kHz)
2.695

Operation range	Frequency (MHz)	Limit (MHz)
Low	13.55905	>13.11
High	13.56138	<14.01

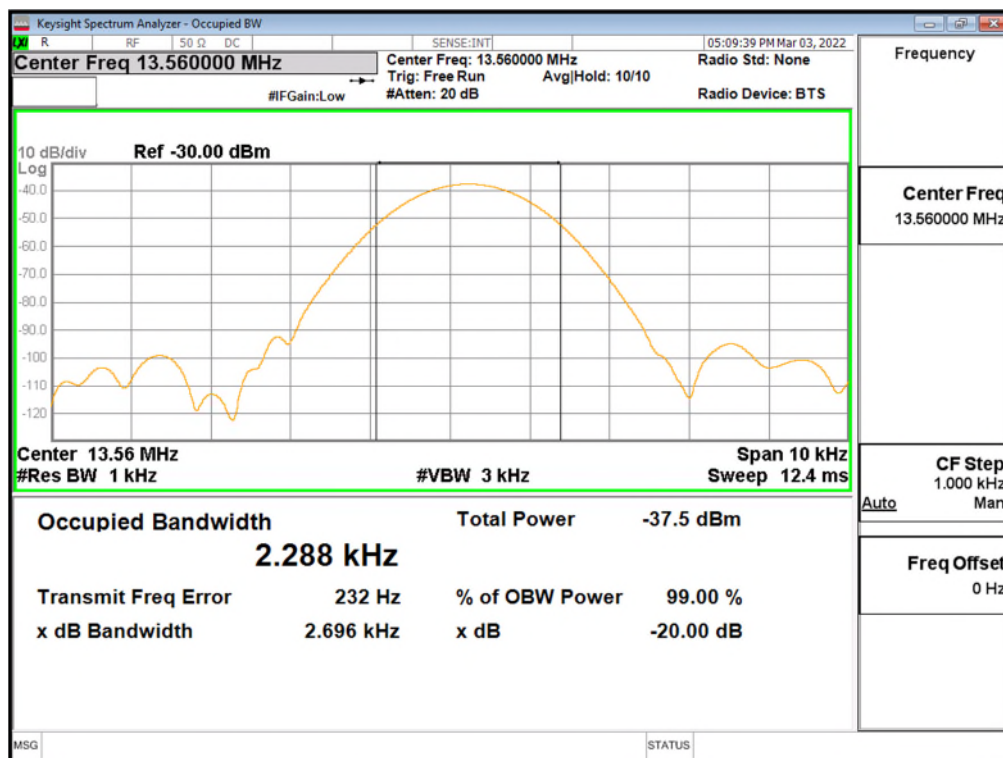
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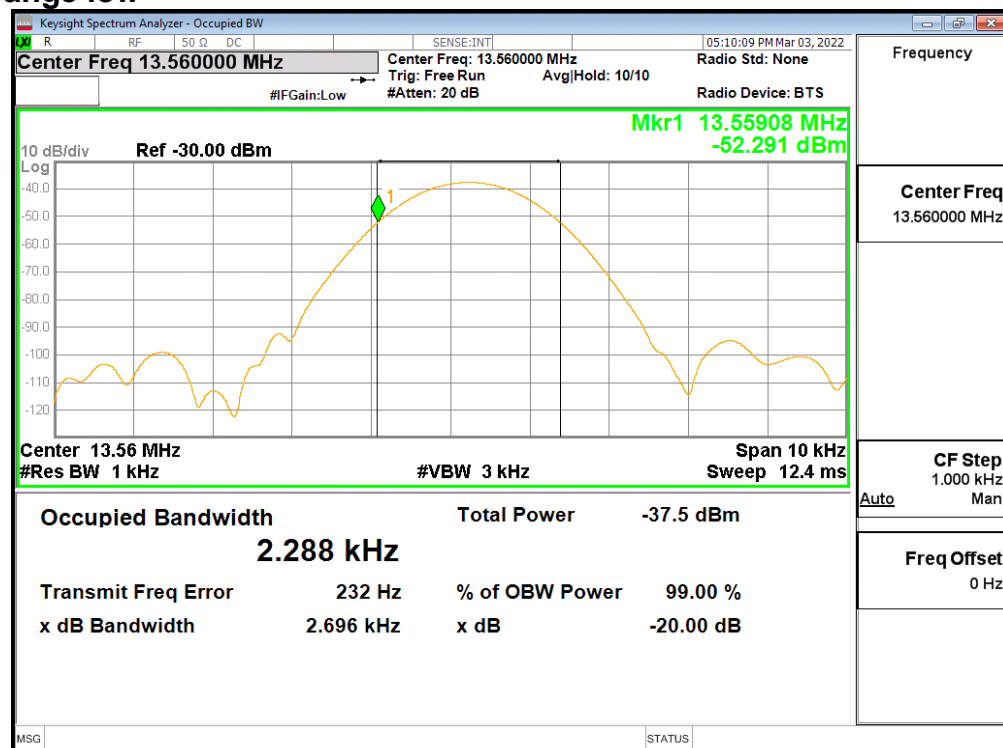
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Bandwidth



Operation range low

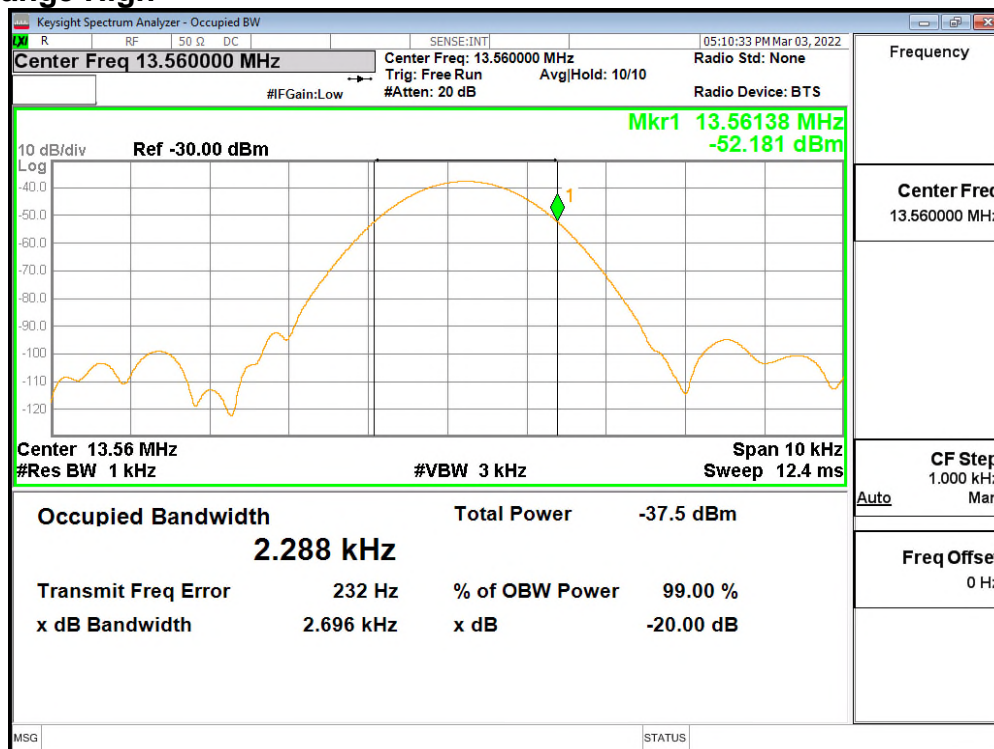


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Operation range High



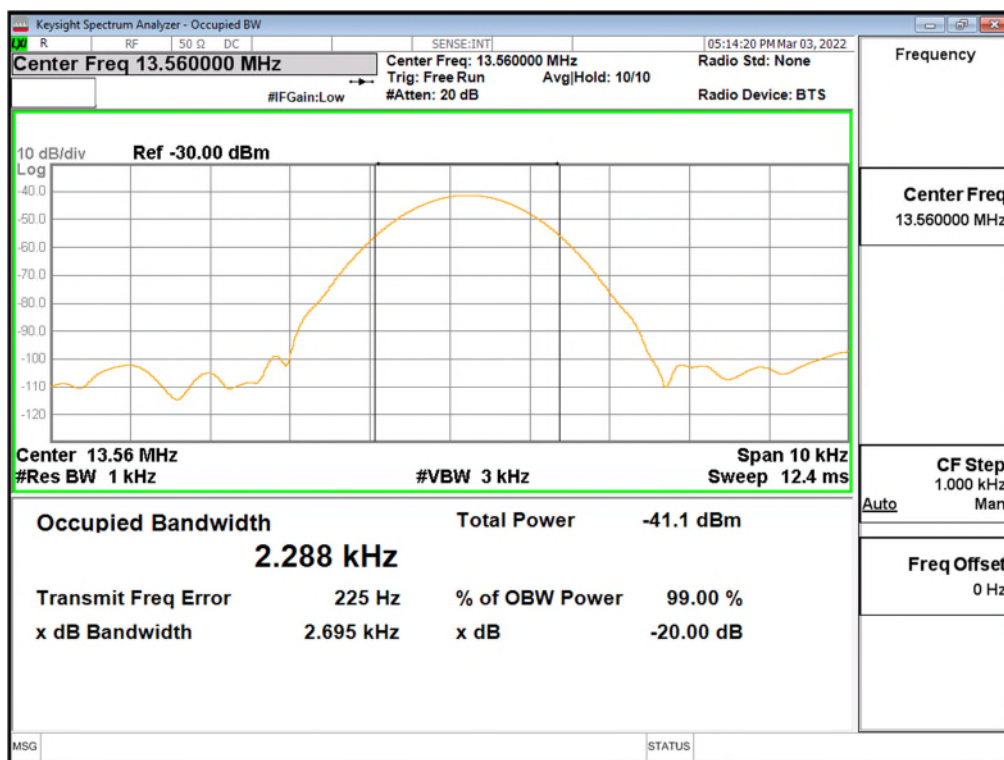
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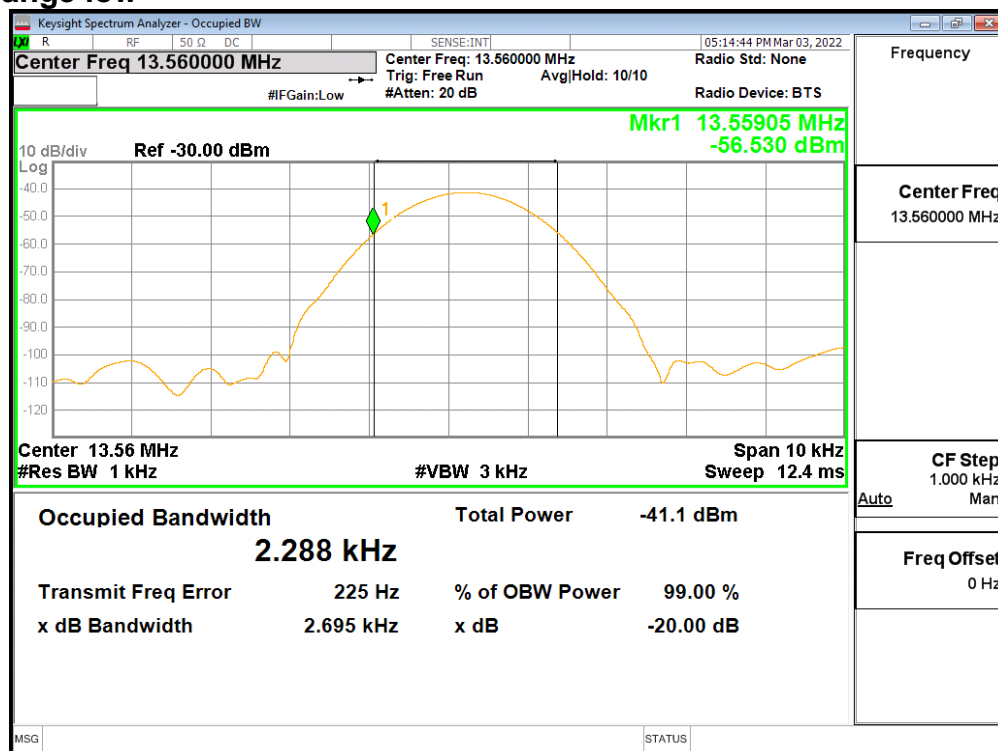
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Bandwidth



Operation range low

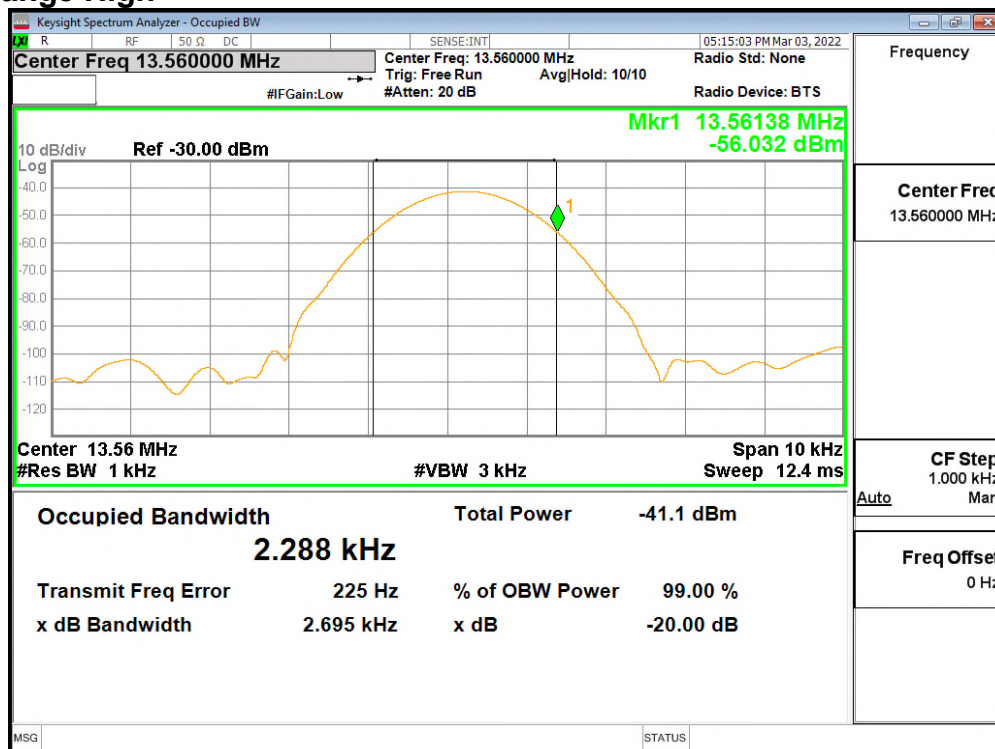


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Operation range High



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11 ANTENNA REQUIREMENT

11.1 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.

11.2 Antenna Connected Construction:

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

~ End of Report ~

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