



FCC TEST REPORT

FCC ID: 2BCY3-MK

On Behalf of

Shenzhen Maskura Technology Co., LTD

RTK

Model No.: MK NAV RTK, 330Nav Hand RTK, 330Nav Pro RTK,
350Nav Hand RTK, 350Nav Pro RT, 660Nav Hand RTK, 660Nav
Pro RTK, 770Nav Hand RTK, 770Nav Pro RTK, 880Nav Hand RTK,
880Nav Pro RTK, 990Nav Hand RTK, 990Nav Pro RTK, Cube RTK,
Mesh RTK, Alloy RTK, 660 RTK

Prepared for : Shenzhen Maskura Technology Co., LTD
Address : Shenzhen Xixiang GuShu Huafeng Century Science and Technology
Park

Prepared By : Shenzhen PSI Testing Co., Ltd.
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TEST REPORT DECLARATION

Applicant : Shenzhen Maskura Technology Co., LTD
 Address : Shenzhen Xixiang GuShu Huafeng Century Science and Technology Park
 Manufacturer : Shenzhen Maskura Technology Co., LTD
 Address : Shenzhen Xixiang GuShu Huafeng Century Science and Technology Park
 EUT Description : RTK

(A) Model No. : MK NAV RTK, 330Nav Hand RTK, 330Nav Pro RTK, 350Nav Hand RTK, 350Nav Pro RT, 660Nav Hand RTK, 660Nav Pro RTK, 770Nav Hand RTK, 770Nav Pro RTK, 880Nav Hand RTK, 880Nav Pro RTK, 990Nav Hand RTK, 990Nav Pro RTK, Cube RTK, Mesh RTK, Alloy RTK, 660 RTK
 (B) Trademark : maskura

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247

ANSI C63.10-2013

The device described above is tested by Shenzhen PSI Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen PSI Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

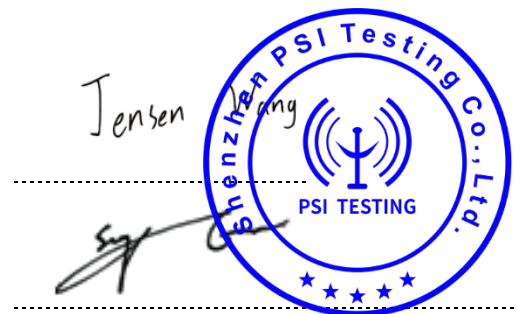
After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen PSI Testing Co., Ltd.

Tested by (name + signature).....: Jensen Wang
Project Engineer

Approved by (name + signature).....: Simple Guan
Project Manager

Date of issue.....: September 21, 2023



Revision History

Revision	Issue Date	Revisions	Revised By
V0	September 21, 2023	Initial released Issue	Jensen Wang

1. Summary Of Standards And Results

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Test Item	Standards Paragraph	Result
Conducted Emission	FCC Part 15: 15.207	P
6dB Bandwidth	FCC PART 15:15.247(a)(2)	P
Output Power	FCC Part 15: 15.247(b)(3)	P
Radiated Spurious Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d)	P
Conducted Spurious & Band Edge Emission	FCC Part 15: 15.247(d)	P
Power Spectral Density	FCC PART 15:15.247(e)	P
Radiated Band Edge Emission	FCC Part 15: 15.247(d)	P
Antenna Requirement	FCC Part 15: 15.203	P
Note: 1. P is an abbreviation for Pass. 2. F is an abbreviation for Fail. 3. N/A is an abbreviation for Not Applicable. 4. Conclusion determination rules of this report: Unless there are clear provisions on measurement uncertainty in the standard or customer requirements, decision by actual test data without considering measurement uncertainty.		

2. General Information

2.1. Description of Device (EUT)

Description/PMN	: RTK
Model Number/HVIN(s)	: MK NAV RTK, 330Nav Hand RTK, 330Nav Pro RTK, 350Nav Hand RTK, 350Nav Pro RT, 660Nav Hand RTK, 660Nav Pro RTK, 770Nav Hand RTK, 770Nav Pro RTK, 880Nav Hand RTK, 880Nav Pro RTK, 990Nav Hand RTK, 990Nav Pro RTK, Cube RTK, Mesh RTK, Alloy RTK, 660 RTK
Diff.	: There is no difference between the except for different names of sales regions. So all the test were performed on the model MK NAV RTK.
Trademark	: maskura
Test Voltage	: DC 5V for USB port
Operation frequency	: 2402MHz~2480MHz
Modulation type	: GFSK
Channel No.	: 40
Antenna Type	: PCB Antenna, max gain 1.08dBi.
Software version	: V1.0
Hardware version/FVIN	: V1.0

Note:

Antenna information is provided by applicant, Testing lab is not responsible for the accuracy of then information. Note:

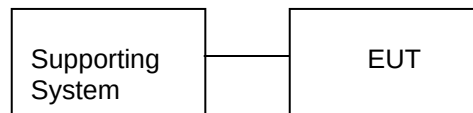
2.2. Accessories of Device (EUT)

Accessories1 : /
Manufacturer : /
Model : /
Ratings : /

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or SDOC
1.	AC ADAPTER	Shenzhen HUONIU Technology Co., Ltd.	HNFCQC3024U U	N/A	N/A
2.	/	/	/	/	/

2.4. Block Diagram of connection between EUT and simulators



2.5. Test Mode Description

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402 MHz	11	2422 MHz	21	2442 MHz	31	2462 MHz
2	2404 MHz	12	2424 MHz	22	2444 MHz	32	2464 MHz
3	2406 MHz	13	2426 MHz	23	2446 MHz	33	2466 MHz
4	2408 MHz	14	2428 MHz	24	2448 MHz	34	2468 MHz
5	2410 MHz	15	2430 MHz	25	2450 MHz	35	2470 MHz
6	2412 MHz	16	2432 MHz	26	2452 MHz	36	2472 MHz
7	2414 MHz	17	2434 MHz	27	2454 MHz	37	2474 MHz
8	2416 MHz	18	2436 MHz	28	2456 MHz	38	2476 MHz
9	2418 MHz	19	2438 MHz	29	2458 MHz	39	2478 MHz
10	2420 MHz	20	2440 MHz	30	2460 MHz	40	2480 MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	Frequency (MHz)
Lowest channel	2402MHz
Middle channel	2440MHz
Highest channel	2480MHz

2.6. Test Conditions

Items	Required	Actual
Temperature range:	15-35°C	24°C
Humidity range:	25-75%	56%
Pressure range:	86-106kPa	98kPa

2.7. Test Facility

Shenzhen PSI Testing Co., Ltd.

1-2F, Building 5, Yudafu Industrial Park, No. 10, Xingye West Road, Shajing Street, Bao'an District, Shenzhen, Guangdong, China 518104

September 13, 2023 File on Federal Communication Commission

Registration Number: 916281

2.8. Measurement Uncertainty

(95% confidence levels, k=2)

Item	Uncertainty
Uncertainty for Power point Conducted Emissions Test	2.17dB
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	3.5dB
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	2.74dB(Polarize: V)
	2.76dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.29dB(Polarize: V)
	4.82dB(Polarize: H)
Uncertainty for radio frequency	48.24KHz
Uncertainty for conducted RF Power	0.41dB

2.9. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Firmware Version	Last Cal.Due	Cal. Interval
1.	9*6*6 anechoic chamber	SKET	9*6*6	N/A	/	2022.12.20	3 Year
2.	Test Receiver	Rohde&Schwarz	ESCI 7	101032/003	4.42 SP3	2022.12.30	1 Year
3.	L.I.S.N.#1	Rohde&Schwarz	ENV216	102282	/	2022.12.30	1 Year
4.	L.I.S.N.#2	RFT	NNB111	13835240	/	2023.05.04	1 Year
5.	Loop Antenna	Schwarz beck	FMZB 1519B	00128	/	2023.04.03	2 Year
6.	Bilog Antenna	Schwarz beck	VULB 9168	01448	/	2022.12.26	2 Year
7.	Spectrum Analyzer	Rohde&Schwarz	FSV-40N	101648	3.70	2022.12.30	1 Year
8.	Horn Antenna	Schwarz beck	BBHA 9120 D	02706	/	2022.12.26	2 Year
9.	Amplifier	SKET	LAPA_01G1 8G-45dB	SK20220329 01	/	2022.12.29	1 Yea
10.	Horn Antenna	Schwarz beck	BBHA 9170	00946	/	2022.12.25	2 Year
11.	Amplifier	SKET	LNPA_0118 G-45	SK20200108 01	/	2022.12.30	1 Yea
12.	RF Power Probe	Rohde&Schwarz	NRP-Z11	1138.3004.02 -1111533-Fz	/	2023.03.30	1 Yea
For Test Software Information							
Item	Software Name	Manufacturer			Version		
RE	EMC-I	SKET			V1.5.0.3		
CE	EMC-I	SKET			V1.5.0.3		
RF	RTS	TACHOY			V1.0.0		

3. Spurious Emission

3.1. Test Limits

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

15.209 Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
0.009-0.490	300	$2400/\text{F}(\text{KHz})$	/
0.490-1.705	30	$24000/\text{F}(\text{KHz})$	/
1.705-30	30	30	29.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	
Note 1: The peak limit is 20 dB higher than the average limit			
Note 2: Peak limit applies (AVG limit + 20 dB) as well as RSS-247 Section 5.5			

Harmonic emissions limits comply with below 54 $\text{dB}\mu\text{V}/\text{m}$ at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field strength ($\mu\text{V}/\text{m}$ at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) ($\mu\text{A}/\text{m}$)	Measurement distance (m)
9 - 490 kHz ^{Note 1}	$6.37/\text{F}$ (F in kHz)	300
490 - 1705 kHz	$63.7/\text{F}$ (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

3.2. Test Procedure

The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1GHz.

The EUT was placed on a rotating 0.8 m high above ground for below 1GHz and 1.5m high for above 1GHz testing, the table was rotated 360 degrees to determine the position of the highest radiation

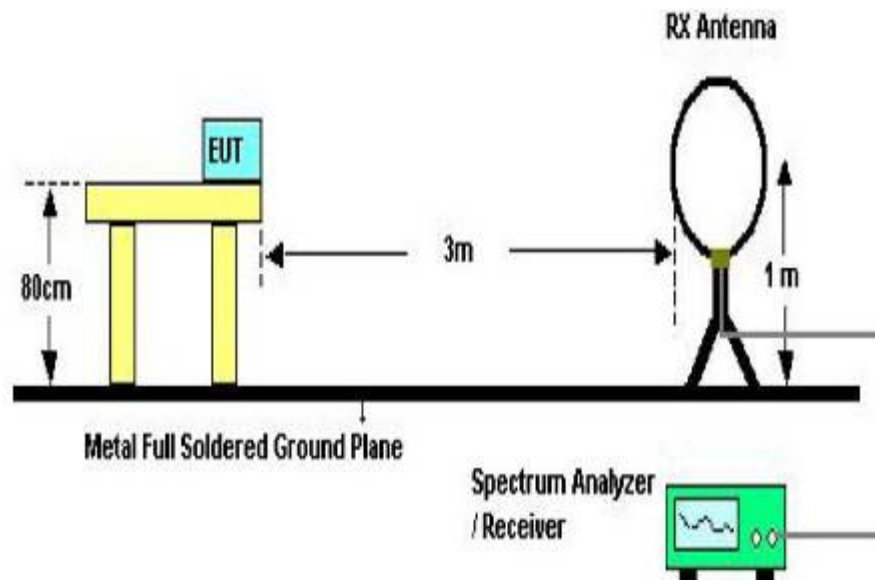
The Test antenna shall vary between 1m and 4m, both Horizontal and Vertical antenna are set of make measurement.

The initial step in collecting radiated emission data is a spectrum analyzer Peak detector mode pre-scanning the measurement frequency range. Significant Peaks are then marked. and then Quasi Peak Detector mode premeasured

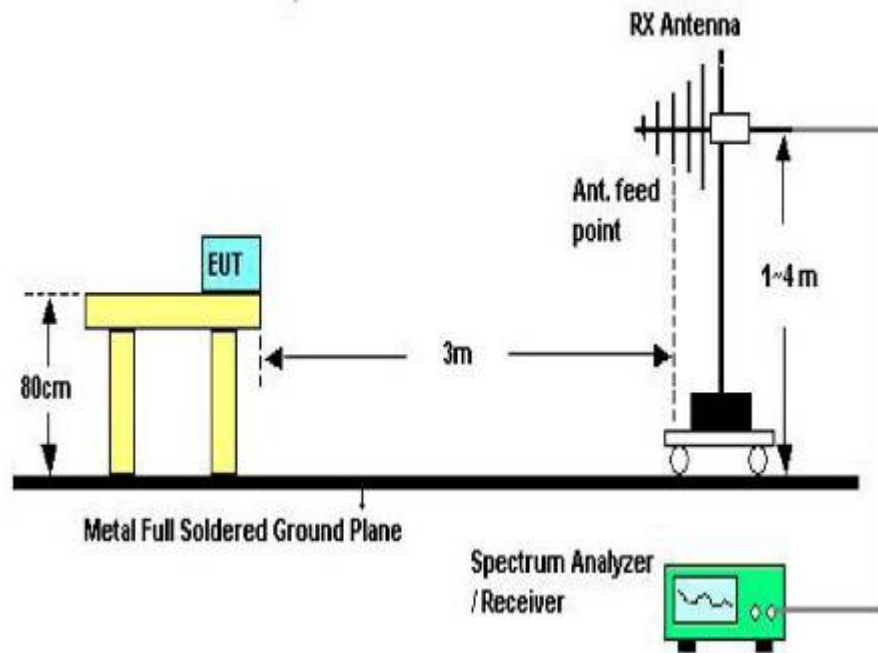
If Peak value comply with QP limit below 1GHz, the EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.

For the actual test configuration, please see the test setup photo.

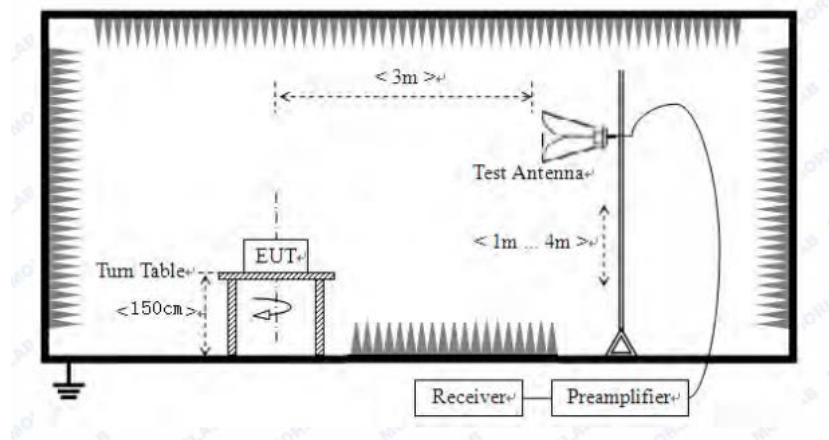
3.3. Test Setup



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

3.4. Test Results

Test Condition

Continual Transmitting in maximum power.

9KHz~150KHz	RBW200Hz	VBW1KHz
150KHz~30MHz	RBW9KHz	VBW 30KHz
30MHz~1GHz	RBW120KHz	VBW 300KHz
Above1GHz	RBW1MHz	VBW 3MHz

We have scanned the EUT from 9kHz up to the 10th harmonic of the fundamental.

Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

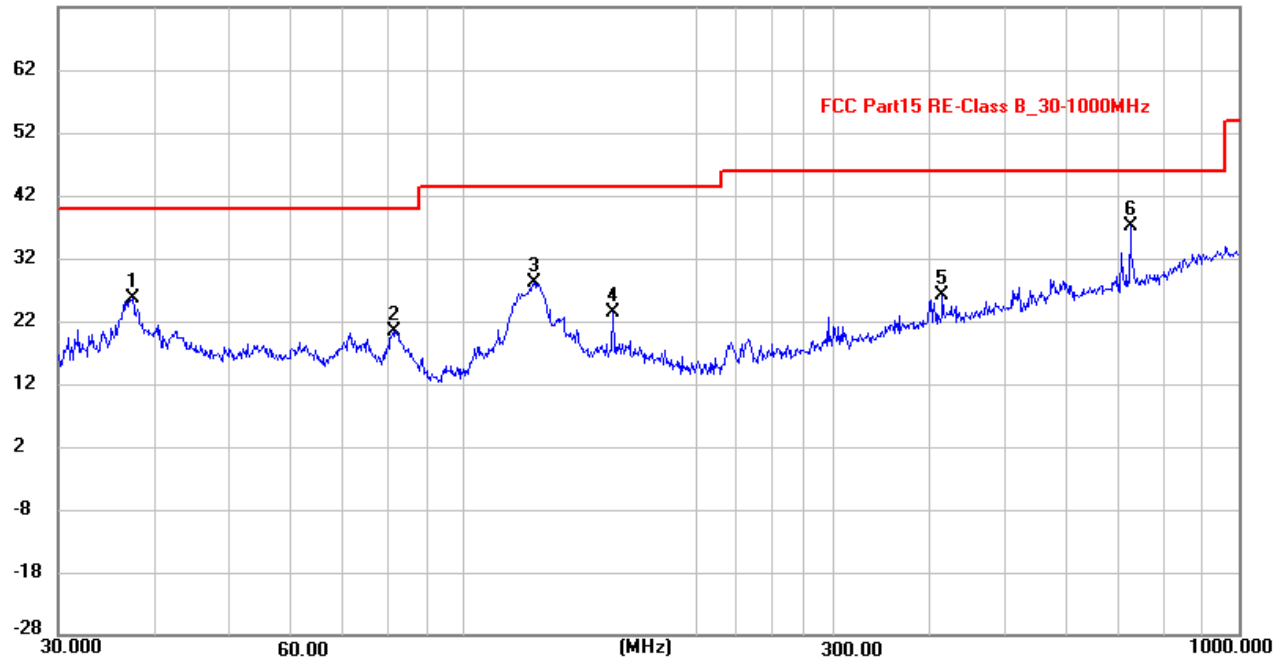
Note:1.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

2.Only show the test data of the worst Channel in this report.

Frequency Range	: 30MHz~1000MHz
Test Mode	: TX 2402MHz
Test Results	: PASS
Note: 1. The test results are listed in next pages. 2. This mode is worst case mode, and this report only reflected the worst mode. 3. If the limits for the measurement with the quasi-peak detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the quasi-peak detector need not be carried out.	

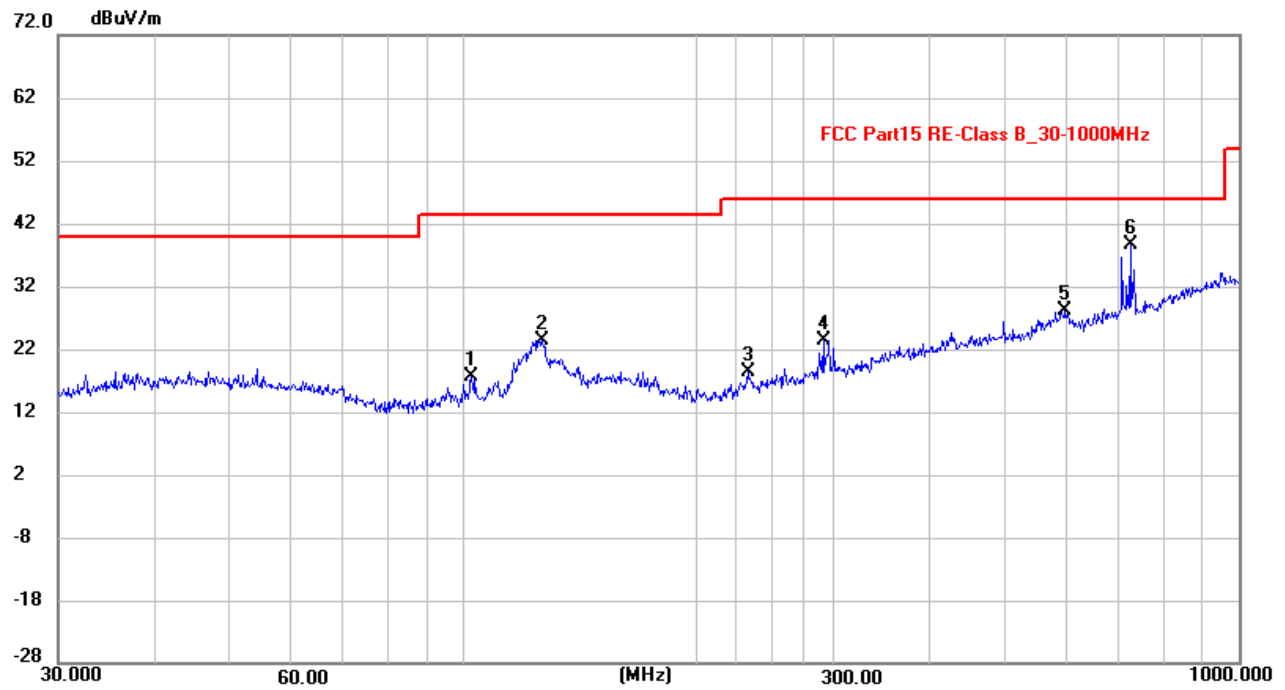
Vertical:

72.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	37.4165	12.42	13.27	25.69	40.00	-14.31	peak
2	81.2117	12.01	8.47	20.48	40.00	-19.52	peak
3	123.2655	16.50	11.70	28.20	43.50	-15.30	peak
4	155.9101	10.17	13.17	23.34	43.50	-20.16	peak
5	414.7223	9.56	16.49	26.05	46.00	-19.95	peak
6 *	724.2611	14.92	22.33	37.25	46.00	-8.75	peak

Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	102.3597	7.99	9.76	17.75	43.50	-25.75	peak
2	126.3286	11.44	11.90	23.34	43.50	-20.16	peak
3	232.5318	6.95	11.52	18.47	46.00	-27.53	peak
4	291.0360	9.84	13.52	23.36	46.00	-22.64	peak
5	597.2234	7.61	20.63	28.24	46.00	-17.76	peak
6 *	724.2611	16.24	22.33	38.57	46.00	-7.43	peak

Test channel:	Lowest
---------------	--------

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	60.53	32.10	5.96	45.70	52.89	74.00	-21.11	Vertical
7206.00	55.17	36.10	6.86	45.50	52.63	74.00	-21.37	Vertical
9608.00	52.94	38.30	8.25	46.20	53.29	74.00	-20.71	Vertical
12010.00	*	--	--	--	--	74.00	--	Vertical
14412.00	*	--	--	--	--	74.00	--	Vertical
4804.00	61.36	32.10	5.96	45.70	53.72	74.00	-20.28	Horizontal
7206.00	55.25	36.10	6.86	45.50	52.71	74.00	-21.29	Horizontal
9608.00	52.41	38.30	8.25	46.20	52.76	74.00	-21.24	Horizontal
12010.00	*	--	--	--	--	74.00	--	Horizontal
14412.00	*	--	--	--	--	74.00	--	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	40.63	32.10	5.96	45.70	32.99	54.00	-21.01	Vertical
7206.00	37.50	36.10	6.86	45.50	34.96	54.00	-19.04	Vertical
9608.00	32.55	38.30	8.25	46.20	32.90	54.00	-21.10	Vertical
12010.00	*	--	--	--	--	54.00	--	Vertical
14412.00	*	--	--	--	--	54.00	--	Vertical
4804.00	40.44	32.10	5.96	45.70	32.80	54.00	-21.20	Horizontal
7206.00	36.20	36.10	6.86	45.50	33.66	54.00	-20.34	Horizontal
9608.00	33.62	38.30	8.25	46.20	33.97	54.00	-20.03	Horizontal
12010.00	*	--	--	--	--	54.00	--	Horizontal
14412.00	*	--	--	--	--	54.00	--	Horizontal

Remarks:

1. $\text{Level} = \text{Read level} + \text{Antenna Factor} + \text{Cable Loss} - \text{Preamplifier Factor}$
2. "*", means this data is the too weak instrument of signal is unable to test.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test channel:	Middle
---------------	--------

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4880.00	60.21	32.10	5.96	45.70	52.57	74.00	-21.43	Vertical
7320.00	55.62	36.10	6.86	45.50	53.08	74.00	-20.92	Vertical
9760.00	51.06	38.30	8.25	46.20	51.41	74.00	-22.59	Vertical
12200.00	*	--	--	--	--	74.00	--	Vertical
14640.00	*	--	--	--	--	74.00	--	Vertical
4880.00	40.69	32.10	5.96	45.70	33.05	54.00	-20.95	Horizontal
7320.00	37.76	36.10	6.86	45.50	35.22	54.00	-18.78	Horizontal
9760.00	31.61	38.30	8.25	46.20	31.96	54.00	-22.04	Horizontal
12200.00	*	--	--	--	--	74.00	--	Horizontal
14640.00	*	--	--	--	--	74.00	--	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4880.00	63.19	32.10	5.96	45.70	55.55	74.00	-18.45	Vertical
7320.00	55.32	36.10	6.86	45.50	52.78	74.00	-21.22	Vertical
9760.00	51.55	38.30	8.25	46.20	51.90	74.00	-22.10	Vertical
12200.00	*	--	--	--	--	54.00	--	Vertical
14640.00	*	--	--	--	--	54.00	--	Vertical
4880.00	40.33	32.10	5.96	45.70	32.69	54.00	-21.31	Horizontal
7320.00	35.73	36.10	6.86	45.50	33.19	54.00	-20.81	Horizontal
9760.00	33.33	38.30	8.25	46.20	33.68	54.00	-20.32	Horizontal
12200.00	*	--	--	--	--	54.00	--	Horizontal
14640.00	*	--	--	--	--	54.00	--	Horizontal

Remarks:

1. $\text{Level} = \text{Read level} + \text{Antenna Factor} + \text{Cable Loss} - \text{Preamplifier Factor}$
2. "*", means this data is the too weak instrument of signal is unable to test.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test channel:	Highest
---------------	---------

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	63.99	32.10	5.96	45.70	56.35	74.00	-17.65	Vertical
7440.00	58.06	36.10	6.86	45.50	55.52	74.00	-18.48	Vertical
9920.00	52.45	38.30	8.25	46.20	52.80	74.00	-21.20	Vertical
12400.00	*	--	--	--	--	74.00	--	Vertical
14880.00	*	--	--	--	--	74.00	--	Vertical
4960.00	60.83	32.10	5.96	45.70	53.19	74.00	-20.81	Horizontal
7440.00	55.75	36.10	6.86	45.50	53.21	74.00	-20.79	Horizontal
9920.00	53.54	38.30	8.25	46.20	53.89	74.00	-20.11	Horizontal
12400.00	*	--	--	--	--	74.00	--	Horizontal
14880.00	*	--	--	--	--	74.00	--	Horizontal

Average value:

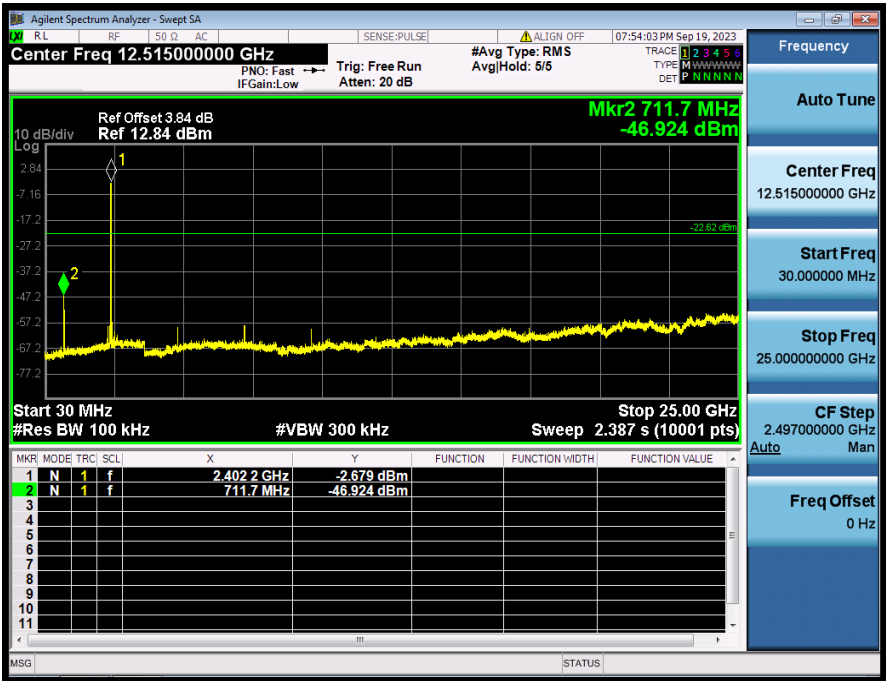
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	40.95	32.10	5.96	45.70	33.31	54.00	-20.69	Vertical
7440.00	35.27	36.10	6.86	45.50	32.73	54.00	-21.27	Vertical
9920.00	33.67	38.30	8.25	46.20	34.02	54.00	-19.98	Vertical
12400.00	*	--	--	--	--	54.00	--	Vertical
14880.00	*	--	--	--	--	54.00	--	Vertical
4960.00	40.92	32.10	5.96	45.70	33.28	54.00	-20.72	Horizontal
7440.00	38.23	36.10	6.86	45.50	35.69	54.00	-18.31	Horizontal
9920.00	31.41	38.30	8.25	46.20	31.76	54.00	-22.24	Horizontal
12400.00	*	--	--	--	--	54.00	--	Horizontal
14880.00	*	--	--	--	--	54.00	--	Horizontal

Remarks:

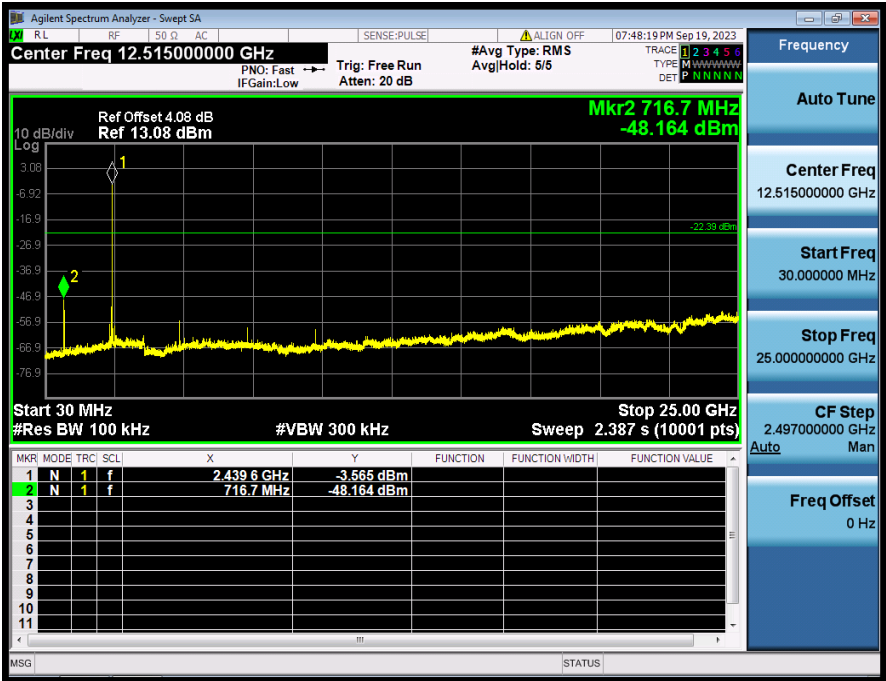
1. Level = Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. “*”, means this data is the too weak instrument of signal is unable to test.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

Conducted RF Spurious Emission

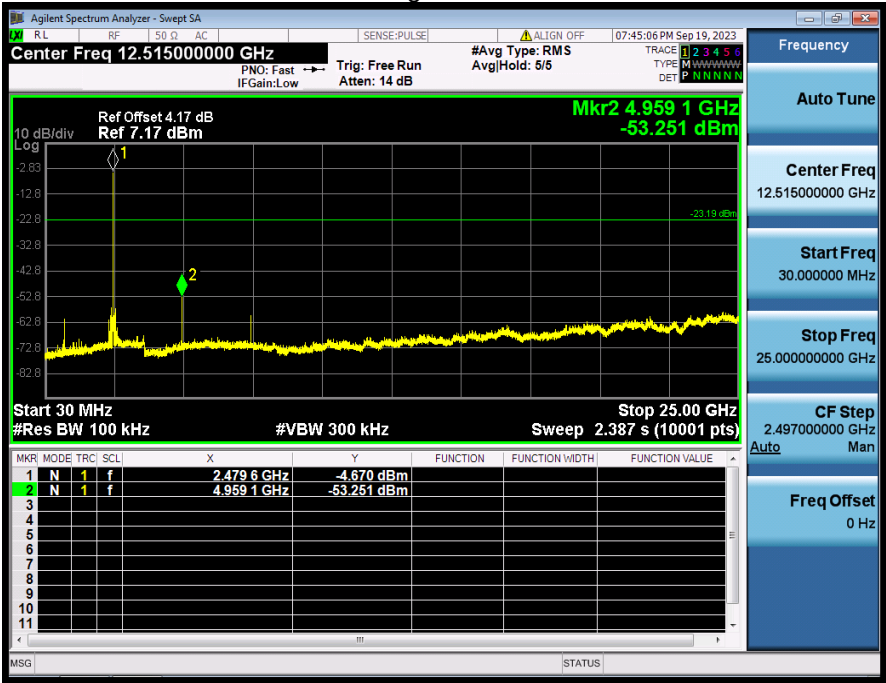
Tx. Low Emission



Tx.Mid Emission



Tx. High Emission



4. Power Line Conducted Emission

4.1. Test Limits

Frequency MHz	Limits dB(μ V)	
	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

3. The limit decreases in line with the logarithm of the frequency in the rang of 0.15 to 0.50 MHz.

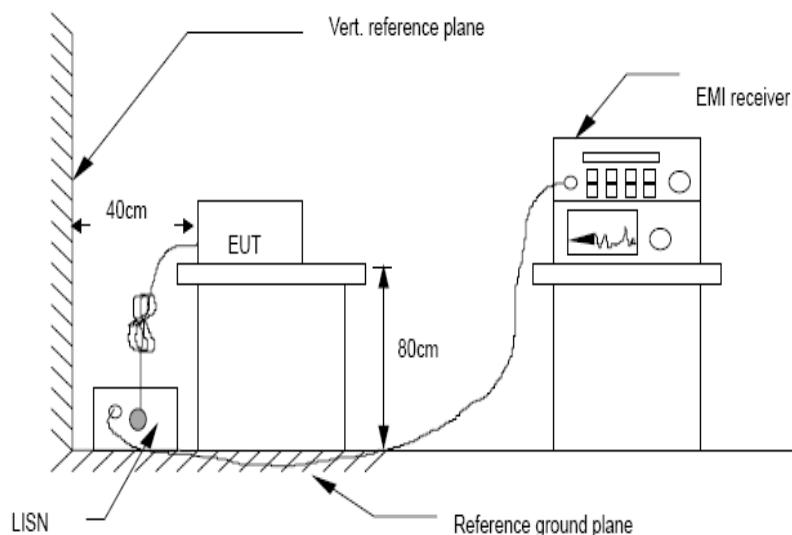
4.2. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs.

Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10:2013 on Conducted Emission Measurement.

The bandwidth of test receiver is set at 9 kHz.

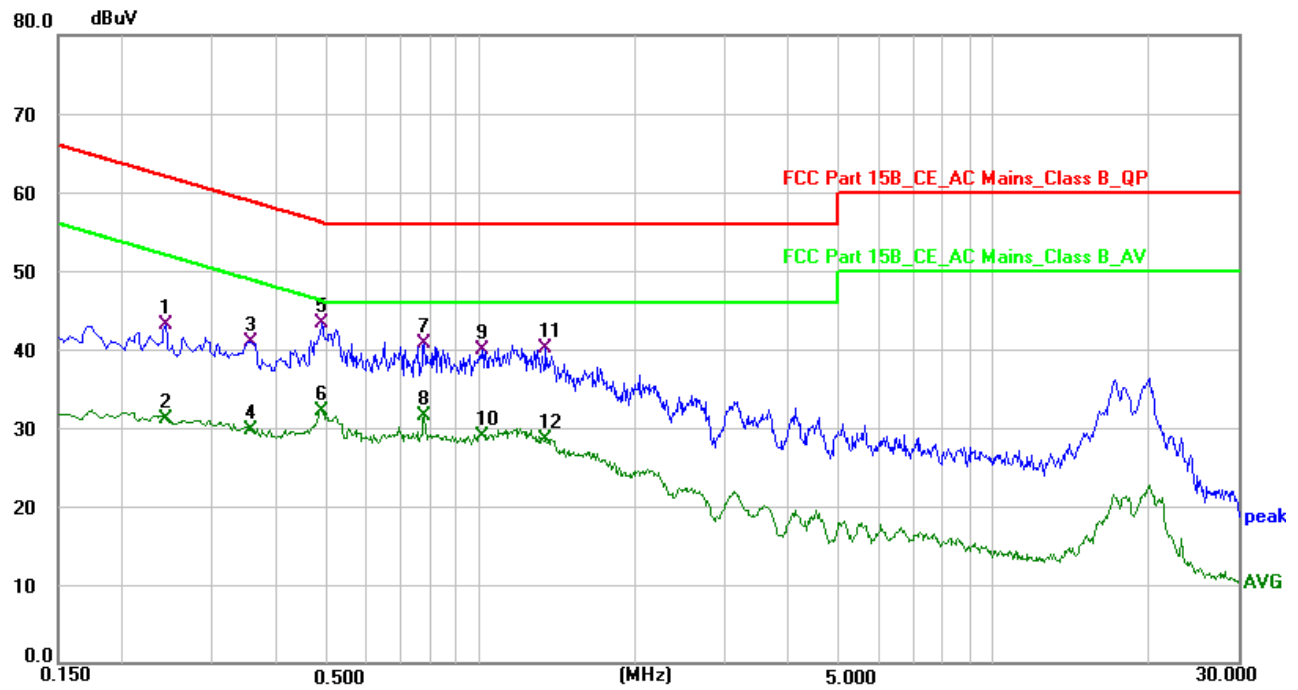
4.3. Test Setup



4.4. Test Results

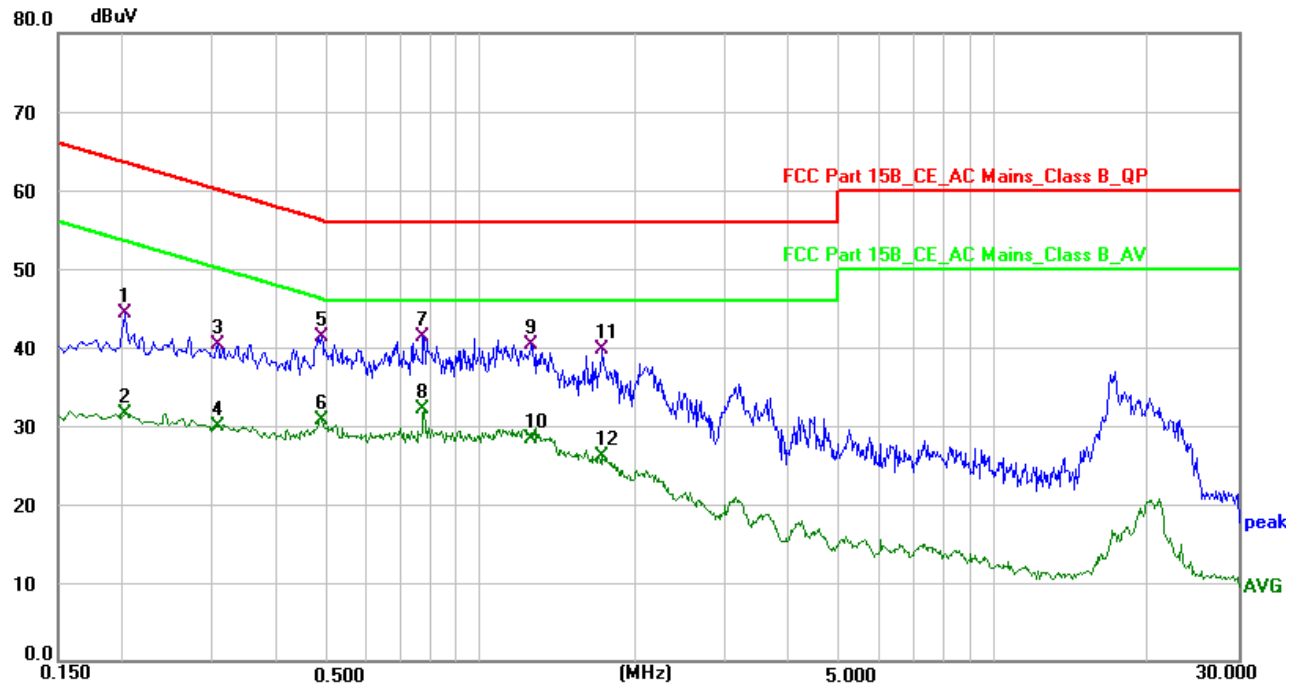
Frequency Range	: 0.15MHz~30MHz
Test Mode	: TX 2402MHz
Test Results	: PASS
Note: 1. The test results are listed in next pages. 2. This mode is worst case mode, and this report only reflected the worst mode. 3. If the limits for the measurement with the quasi-peak detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the quasi-peak detector need not be carried out.	

Line:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.2420	33.04	10.04	43.08	62.03	-18.95	QP	P
2	0.2420	21.15	10.04	31.19	52.03	-20.84	AVG	P
3	0.3540	31.10	9.87	40.97	58.87	-17.90	QP	P
4	0.3540	19.77	9.87	29.64	48.87	-19.23	AVG	P
5 *	0.4900	33.25	9.96	43.21	56.17	-12.96	QP	P
6	0.4900	22.10	9.96	32.06	46.17	-14.11	AVG	P
7	0.7780	31.23	9.50	40.73	56.00	-15.27	QP	P
8	0.7780	22.03	9.50	31.53	46.00	-14.47	AVG	P
9	1.0060	30.39	9.50	39.89	56.00	-16.11	QP	P
10	1.0060	19.34	9.50	28.84	46.00	-17.16	AVG	P
11	1.3420	30.66	9.50	40.16	56.00	-15.84	QP	P
12	1.3420	19.06	9.50	28.56	46.00	-17.44	AVG	P

Neutral:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.2020	34.16	10.11	44.27	63.53	-19.26	QP	P
2	0.2020	21.38	10.11	31.49	53.53	-22.04	AVG	P
3	0.3060	30.37	9.84	40.21	60.08	-19.87	QP	P
4	0.3060	20.11	9.84	29.95	50.08	-20.13	AVG	P
5	0.4900	31.50	9.84	41.34	56.17	-14.83	QP	P
6	0.4900	20.96	9.84	30.80	46.17	-15.37	AVG	P
7	0.7740	31.46	9.79	41.25	56.00	-14.75	QP	P
8 *	0.7740	22.35	9.79	32.14	46.00	-13.86	AVG	P
9	1.2620	30.78	9.53	40.31	56.00	-15.69	QP	P
10	1.2620	18.73	9.53	28.26	46.00	-17.74	AVG	P
11	1.7260	30.29	9.43	39.72	56.00	-16.28	QP	P
12	1.7260	16.63	9.43	26.06	46.00	-19.94	AVG	P

5. Conducted Maximum Output Power

5.1. Test limits

Please refer RSS-247 & FCC PART 15: 15.247.

Regulation 15.247(b) The limit of Maximum Peak Output Power Measurement is 1 W(30dBm)

5.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

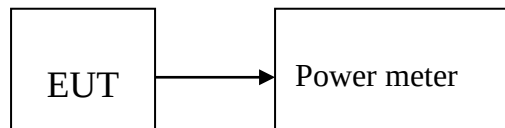
5.2.1 Place the EUT on the table and set it in transmitting mode.

5.2.2 Connected the EUT's antenna port to peak power meter by 20dB attenuator.

5.2.3 Measure out each mode and each bands AVG output power of EUT.

Note: The cable loss and attenuator loss were offset into measure device as amplitude offset.

5.3. Test Setup



5.4. Test Results

PASS

Detailed information please sees the following page.

Mode	Frequency (MHz)	PK Output power(dBm)	Limit (dBm)	Result
BLE	2402	-2.51	30	PASS
	2440	-2.28	30	PASS
	2480	-3.07	30	PASS

6. Peak Power Spectral Density

6.1. Test limits

6.1.1 Please refer RSS-247 & FCC PART 15: 15.247.

6.1.2 For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

6.1.3 The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

6.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

6.2.1 Place the EUT on the table and set it in transmitting mode.

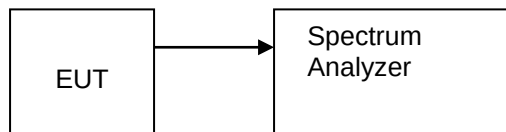
6.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3 Set the spectrum analyzer as $RBW = 100\text{kHz}$ (Set the RBW to: $3\text{ kHz} \leq RBW \leq 100\text{ kHz}$), $VBW = 300\text{kHz}$ (Set the $VBW \geq 3 \times RBW$), $\text{span} \geq 1.5 \times \text{DTS bandwidth}$., detail see the test plot.

6.2.4 Record the max reading.

6.2.5 Repeat the above procedure until the measurements for all frequencies are completed.

6.3. Test Setup



6.4. Test Results

Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm/3K)	Limit (dBm/3K)	Verdict
NVNT	BLE	2402	Ant1	-22.42	8	Pass
NVNT	BLE	2440	Ant1	-22.54	8	Pass
NVNT	BLE	2480	Ant1	-23.64	8	Pass

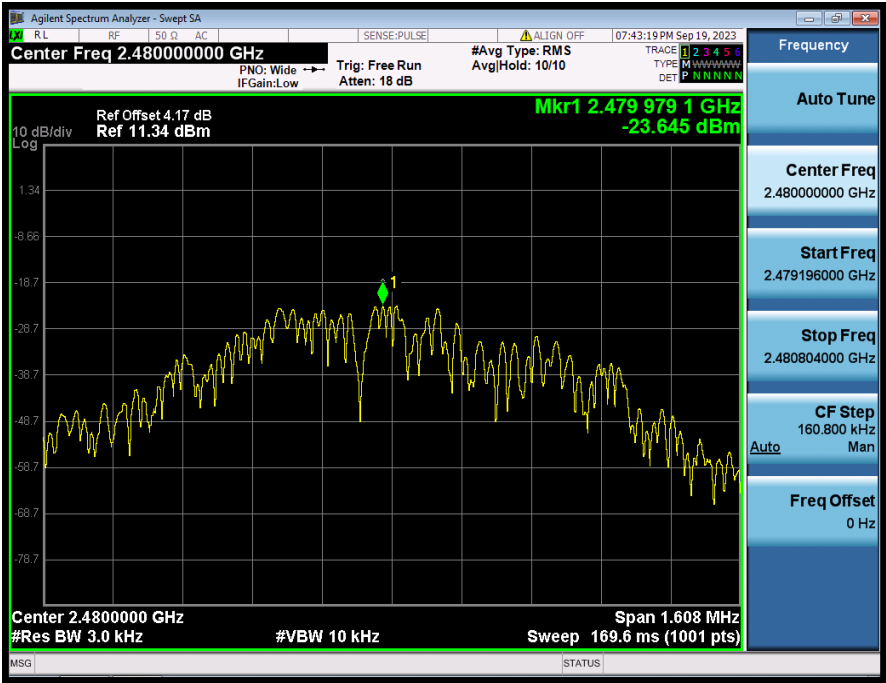
PSD NVNT 2402MHz



PSD NVNT 2440MHz Ant1



PSD NVNT 2480MHz Ant1



7. Bandwidth

7.1. Test limits

Please refer RSS-247 & FCC PART 15: 15.247

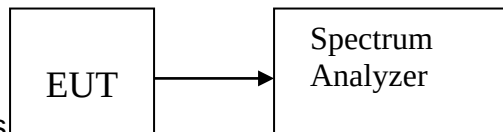
For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz.

7.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

- a) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.
- b) The test receiver set RBW = 100kHz, VBW $\geq$ 3*RBW =300kHz,, Peak Detector, Sweep time set auto, detail see the test plot.

7.3. Test Setup



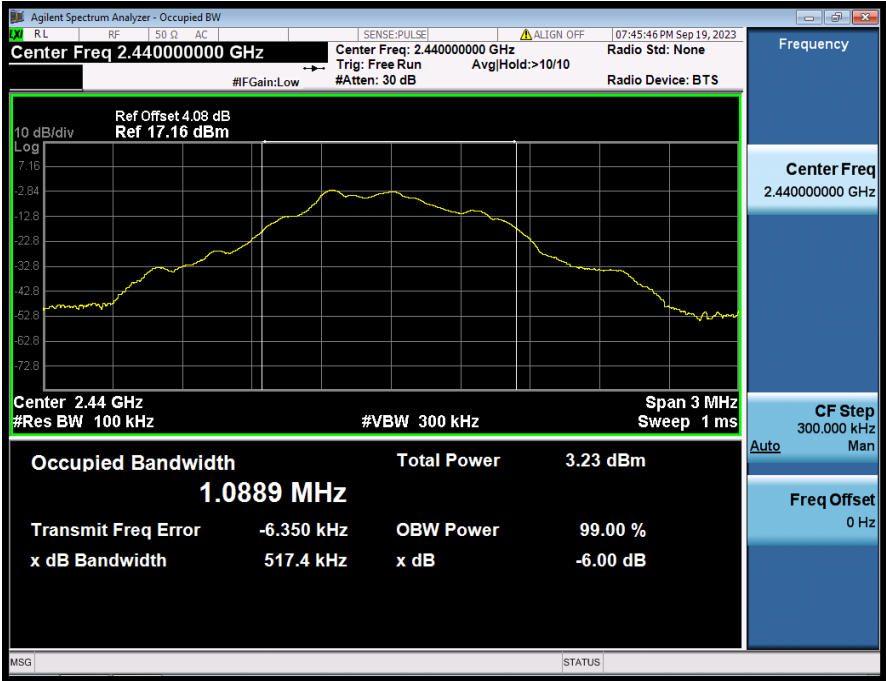
7.4. Test Results

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (KHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE	2402	Ant 1	503.09	0.5	Pass
NVNT	BLE	2440	Ant 1	517.42	0.5	Pass
NVNT	BLE	2480	Ant 1	522.62	0.5	Pass

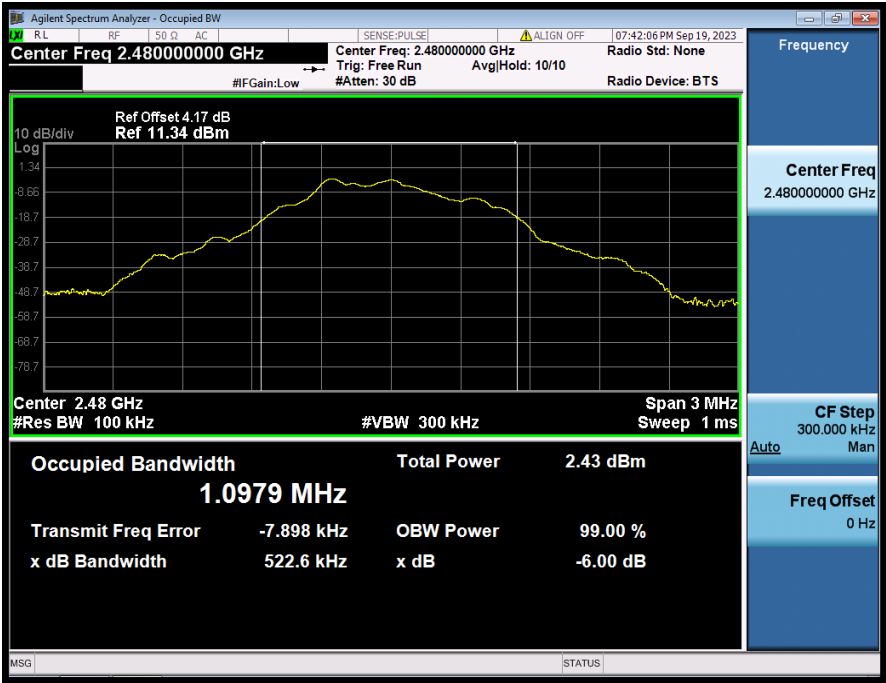
OBW NVNT 2402MHz Ant1



-6 dB BW NVNT 2442MHz Ant1



OBW NVNT 2480MHz Ant1



8. Band Edge Check

8.1. Test limits

Please refer RSS-GEN & FCC PART 15: 15.247

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits and RSS-GEN limits.

8.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

8.2.1 Put the EUT on a 1.5m high table, power on the EUT. Emissions were scanned and measured rotating the EUT to 360 degrees, Find the maximum Emission

8.2.2 Check the spurious emissions out of band.

8.2.3 RBW 1MHz, VBW 3MHz, peak detector for peak value , RBW 1MHz ,VBW 10Hz , RMS detector for AV value.

8.3. Test Setup

Same as 5.2.2.

8.4. Test Results

PASS.

Detailed information please see the following page.

Test channel:	Lowest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	62.17	27.4	3.41	45.4	47.58	74	-26.42	Horizontal
2390.00	59.03	27.1	3.43	45.4	44.16	74	-29.84	Horizontal
2400.00	59.60	27.1	3.43	45.4	44.73	74	-29.27	Horizontal
2310.00	60.84	27.4	3.41	45.4	46.25	74	-27.75	Vertical
2390.00	60.52	27.1	3.43	45.4	45.65	74	-28.35	Vertical
2400.00	62.95	27.1	3.43	45.4	48.08	74	-25.92	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	45.62	27.4	3.41	45.4	31.03	54	-22.97	Horizontal
2390.00	46.01	27.1	3.43	45.4	31.14	54	-22.86	Horizontal
2400.00	47.15	27.1	3.43	45.4	32.28	54	-21.72	Horizontal
2310.00	48.04	27.4	3.41	45.4	33.45	54	-20.55	Vertical
2390.00	47.50	27.1	3.43	45.4	32.63	54	-21.37	Vertical
2400.00	48.69	27.1	3.43	45.4	33.82	54	-20.18	Vertical

Test channel:	Highest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	54.97	27.8	3.56	45.4	40.93	74	-33.07	Horizontal
2500.00	55.28	27.8	3.56	45.4	41.24	74	-32.76	Horizontal
2483.50	56.92	27.8	3.56	45.4	42.88	74	-31.12	Vertical
2500.00	55.85	27.8	3.56	45.4	41.81	74	-32.19	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	44.28	27.8	3.56	45.4	30.24	54	-23.76	Horizontal
2500.00	48.38	27.8	3.56	45.4	34.34	54	-19.66	Horizontal
2483.50	48.25	27.8	3.56	45.4	34.21	54	-19.79	Vertical
2500.00	44.95	27.8	3.56	45.4	30.91	54	-23.09	Vertical

Remarks:

1. Level = Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

9. Antenna Requirement

9.1. Standard Requirement

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.

9.2. Antenna Connected Construction

The antenna connector is unique antenna and no consideration of replacement. Please see EUT photo for details.

9.3. Results

The EUT antenna is PCB Antenna. It complies with the standard requirement.

10. Photos of test setup

Reference to the **appendix I Test Setup Photo** for details.

11. Photos of EUT

Reference to the **appendix II external photos** and **appendix III internal photos** for details.

----- END OF REPORT-----