

Test Report

Verified code: 480116

Report No.: E202306264850-5

Customer: Yanssie HK Limited

Address: 19H MAXGRAND PLAZA NO.3 TAI,YAU STREET SAN PO KONG, KOWLOON,
HONG KONG

Sample Name: Keystone Hardware Wallet

Sample Model: KV032

Receive Sample
Date: Aug.18,2023

Test Date: Aug.20,2023 ~ Sep.18,2023

Reference CFR 47, FCC Part 15 Subpart C
Document: RADIO FREQUENCY DEVICES: Subpart C—Intentional Radiators

Test Result: Pass

Prepared by: Lu Wei
Lu WeiReviewed by: Jiang Tao
Jiang TaoApproved by: Xiao Liang
Xiao Liang

GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2023-10-20

GRG METROLOGY & TEST GROUP CO., LTD.

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Statement

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3. When there are reports in both Chinese and English, the Chinese version will prevail when the language problems are inconsistent.
4. If there is any objection concerning the report, please inform us within 15 days from the date of receiving the report.
5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E202306264850-5	Original Issue	2023-09-20

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1. TEST RESULT SUMMARY

FCC 47 CFR Part 15 Subpart C 15.247, ANSI C63.10-2013 KDB 558074 D01 15.247 measurement guidance v05r02			
Standard	Item	Limit / Severity	Result
FCC 47 CFR Part 15 Subpart C (15.247)	Antenna Requirement	Section 15.203	PASS
	20dB Bandwidth	Section 15.247(a)(1)	PASS
	Carrier Frequencies Separated	Section 15.247(a)(1)	PASS
	Hopping Channel Number	Section 15.247(a)(1)(iii)	PASS
	Dwell Time	Section 15.247(a)(1)(iii)	PASS
	Maximum Peak Output Power	Section 15.247(b)(1)	PASS
	Conducted Emission	Section 15.207	N/A ¹
	Conducted band edges and Spurious Emission	Section 15.209 &15.247(d)	PASS
	Radiated Spurious Emission	Section 15.209 &15.247(d)	PASS
	Restricted bands of operation	Section 15.247 (d) &15.205	PASS

Note: 1.The EUT is power by Battery, not applicable.

2.The EUT antenna is PCB antenna. The max gain of Antenna is 1.5dBi which accordance 15.203 is considered sufficient to comply with the provisions of this section.

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2. GENERAL DESCRIPTION OF EUT

2.1 APPLICANT

Name: Yanssie HK Limited
Address: 19H MAXGRAND PLAZA NO.3 TAI,YAU STREET SAN PO KONG,
KOWLOON, HONG KONG

2.2 MANUFACTURER

Name: Yanssie HK Limited
Address: 19H MAXGRAND PLAZA NO.3 TAI,YAU STREET SAN PO KONG,
KOWLOON, HONG KONG

2.3 FACTORY

Name: Shenzhen Along Electronic co.,Ltd
Address: NO.35 Xinyuan Industrial Park Gushu Community Xixiang, Baoan, Shenzhen,
Guangdong

2.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Keystone Hardware Wallet
Model No.: KV032
Adding Model: KV031
Model different description: See Section 2.5
Trade Name: KEYSTONE
FCC ID: 2BCRX-KV032
Power supply: DC 3.7V,1A Max
Battery Specification: Model: 523450
Ratings: 3.7V, 1000mAh, 3.7Wh
Frequency Range: 2402MHz~2480MHz
Transmit Power: GFSK:-1.81dBm
Pi/4-DQPSK:-1.82dBm
Type of Modulation: GFSK for 1Mbps, Pi/4-DQPSK for 2Mbps
Antenna Specification: PCB antenna 1.5dBi
Temperature Range: 0°C~+50°C
Hardware Version: V2.0

Software Version: V 0.9.0

Sample No: E202306264850-0008, E202306264850-0012

Note:

1. EUT antenna gain is provided by the applicant. This report is made solely on the basis of such data and/or information. We accept no responsibility for the authenticity and completeness of the above data and information and the validity of the results and/or conclusions.
2. Based on the differences between the two models, the high configuration covered the low configuration, and the test was performed on the model KV032.

2.5 MODEL DIFFERENT

Function	KV032	KV031
fingerprint sensor	☒	☐
Inside battery	☒	☐
IC(MAX32520)	☒	☐
Note : The product name: Keystone Hardware Wallet, Model KV032 and KV031 are same in Circuit diagram, PCB layout, Hardware version, Software version, Bluetooth chip, RF module. KV031 removes these three Function based on KV032.		

2.6 TEST OPERATION MODE

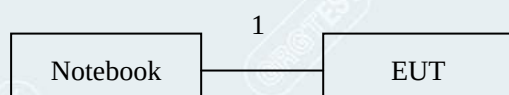
Mode No.	Description of the modes
1	Bluetooth(BT) fixed frequency transmitting

2.7 LOCAL SUPPORTIVE

Name of equipment	Manufacturer	Model	Serial number	Note
Notebook	DELL	Latitude3490	2095LR2	/

No.	Cable Type	Qty.	Shielded Type	Ferrite Core(Qty.)	Length
1	USB cable	1	No	0	1.5m

2.8 CONFIGURATION OF SYSTEM UNDER TEST



Test software:

Software version	Test level
BR BlueletSuite	DH5: 07 2DH5: 07

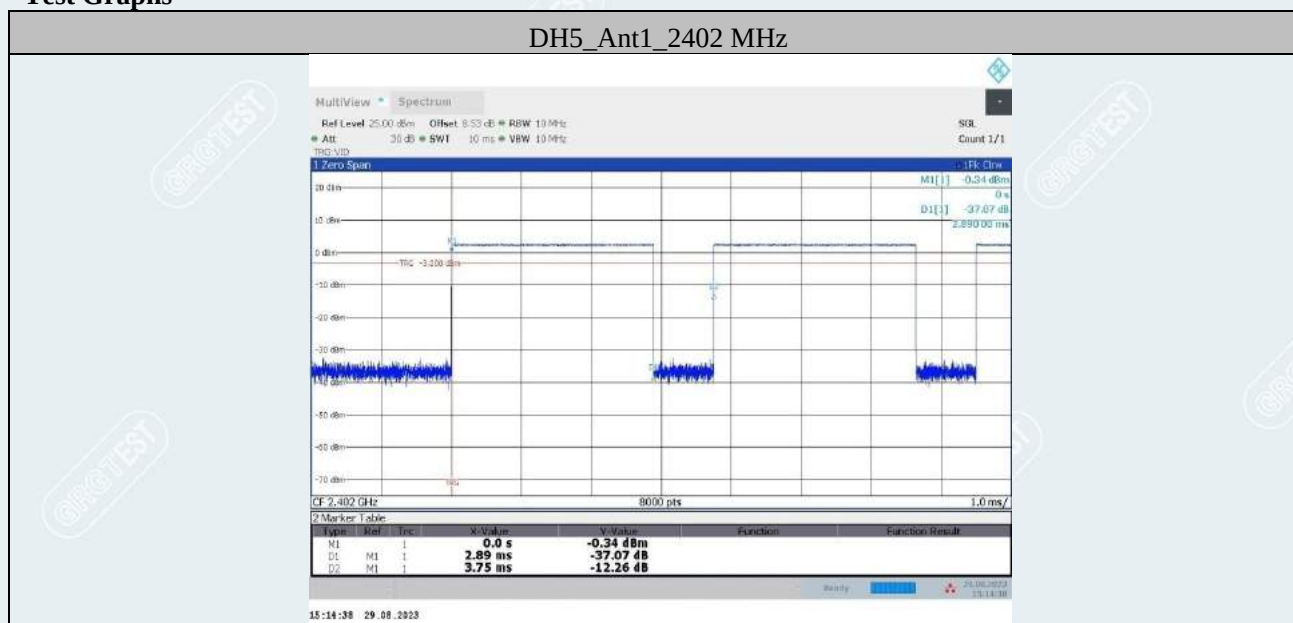
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2.9 DUTY CYCLE

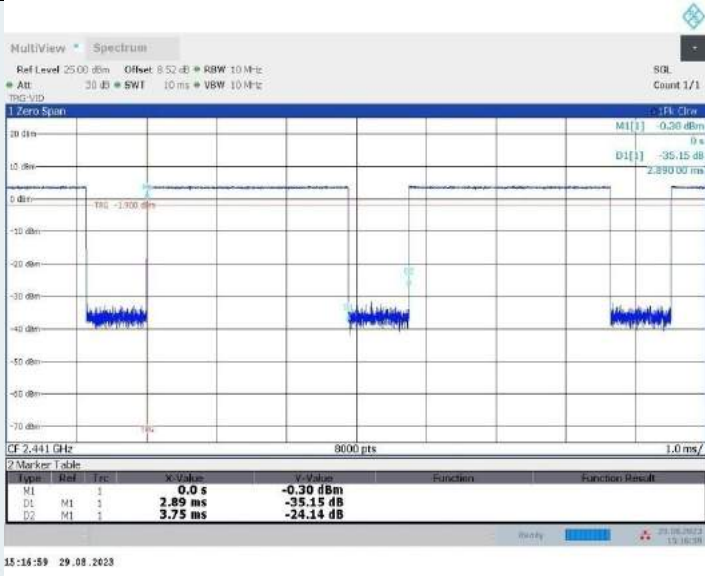
EUT Name	Keystone Hardware Wallet	Model	KV032
Environmental Conditions	26.4°C/58%RH/101.0kPa	Test Voltage	DC 3.7V
Tested By	Qin Tingting	Tested Date	2023-08-29

TestMode	Antenna	Freq(MHz)	ON Time [ms]	Period [ms]	DC [%]	T[s]
DH5	Ant1	2402	2.89	3.75	77.07	0.00289
		2441	2.89	3.75	77.07	0.00289
		2480	2.89	3.75	77.07	0.00289
2DH5	Ant1	2402	2.89	3.75	77.07	0.00289
		2441	2.89	3.75	77.07	0.00289
		2480	2.89	3.75	77.07	0.00289

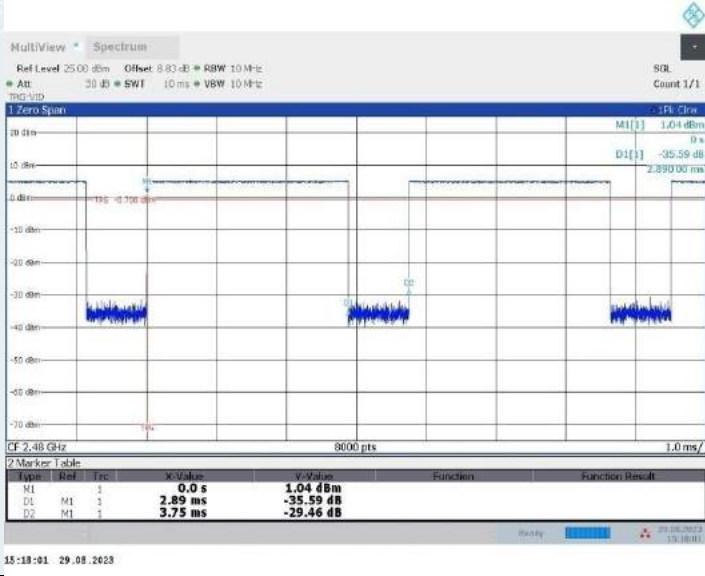
Test Graphs



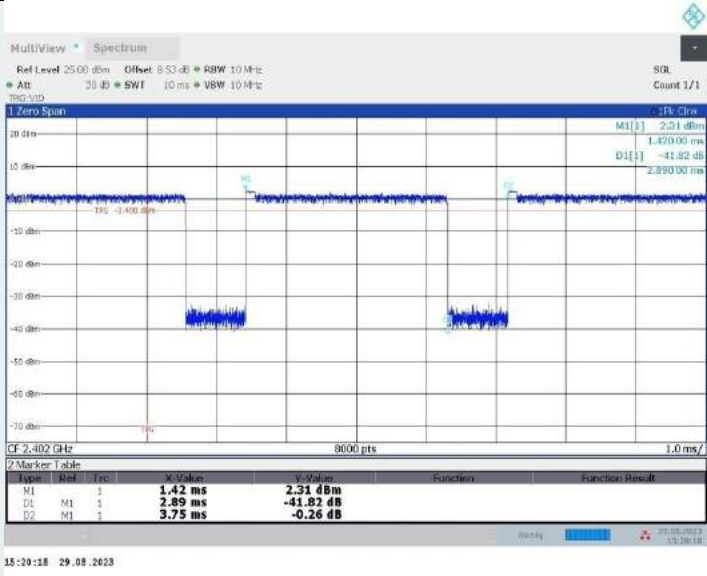
DH5_Ant1_2441 MHz



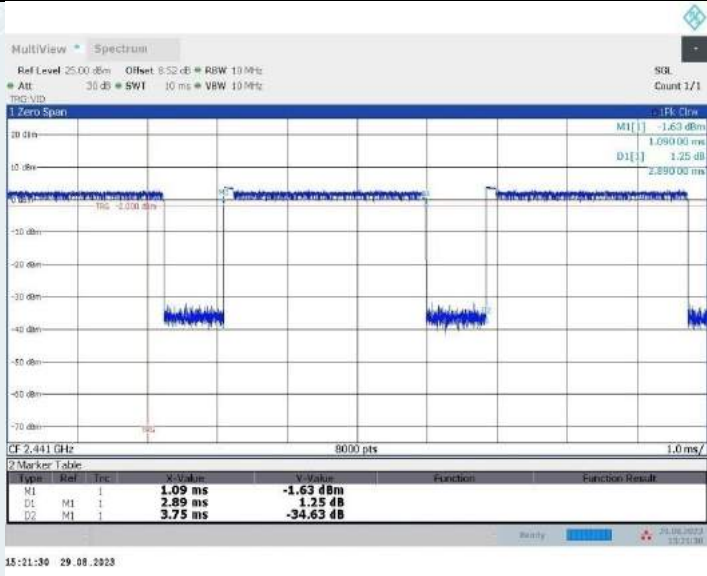
DH5_Ant1_2480 MHz

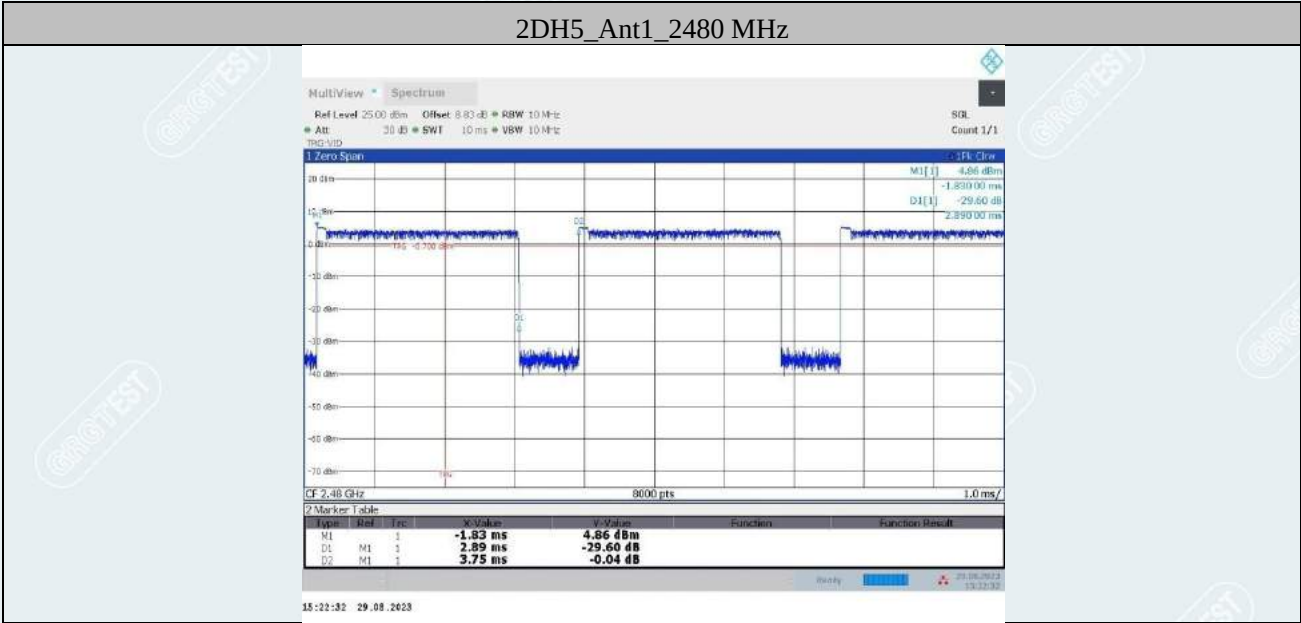


2DH5_Ant1_2402 MHz



2DH5_Ant1_2441 MHz





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3. LABORATORY AND ACCREDITATIONS

3.1 LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of GRG METROLOGY & TEST GROUP CO., LTD.

Add : No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District
Shenzhen, 518110, People's Republic of China

P.C. : 518110

Tel : 0755-61180008

Fax : 0755-61180008

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4. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement		Frequency	Uncertainty
Radiated Emission	Coplanar	9kHz~30MHz	4.4dB ¹⁾
	Coaxial	9kHz~30MHz	4.4dB ¹⁾
	Horizontal	30MHz~200MHz	4.6dB ¹⁾
		200MHz~1000MHz	4.8dB ¹⁾
		1GHz~18GHz	5.0dB ¹⁾
		18GHz~26.5GHz	5.2dB ¹⁾
	Vertical	30MHz~200MHz	4.7dB ¹⁾
		200MHz~1000MHz	4.7dB ¹⁾
		1GHz~18GHz	5.1dB ¹⁾
		18GHz~26.5GHz	5.4dB ¹⁾
Conduction Emission		150kHz~30MHz	3.30dB ¹⁾

Measurement	Uncertainty
RF frequency	6.0×10^{-6}
RF power conducted	0.78dB
Occupied channel bandwidth	0.4dB
Unwanted emission, conducted	0.68dB
Humidity	6%
Temperature	2°C

Note:

¹⁾ This uncertainty represents an expanded uncertainty expressed at approximately the 95%.

This uncertainty represents an expanded uncertainty factor of $k=2$.

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5. LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Hopping Channel Number, Dwell Time, 20 dB Bandwidth, Conducted band edges and Spurious Emission, Carrier Frequencies Separated				
Spectrum Analyzer	R&S	FSW43	102072	2024-07-09
Automatic power measuring unit	TONSCEND	JS0806-2	2018060317	2024-08-04
Radiated Spurious Emission&Restricted bands of operation				
Test Receiver	R&S	ESR26	101758	2023-10-27
Horn Antenna	Schwarzbeck	BBHA9120D	02143	2023-10-15
Bi-log Antenna	Schwarzbeck	VULB 9160	VULB9160-3401	2023-12-26
Loop Antenna	Schwarzbeck	FMZB 1513-60	1513-60-56	2024-07-15
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	BBHA 9170-497	2023-10-14
Amplifier	Tonscend	TAP184050	AP20E806071	2024-04-16
Amplifier	Tonscend	TAP01018048	AP20E8060075	2024-04-11
Amplifier	SHIRONG ELECTRONIC	DLNA-30M1G-G40	20200928001	2024-08-11
Amplifier	SHIRONG ELECTRONIC	DLNA-1G18G-G40	20200928005	2024-08-17
Test S/W	Tonscend	JS32-RE		
Maximum Peak Output Power				
Pulse power sensor	Anritsu	MA2411B	1126150	2024-02-12
Power meter	Anritsu	ML2495A	1204003	2024-02-12

Note: The calibration interval of the above test instruments is 12 months except Bi-log Antenna, The calibration interval of the Bi-log Antenna is 24 months.

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6. E.U.T. TEST CONDITIONS

Type of antenna: PCB

Test frequencies: According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top 1 near middle and 1 near bottom

EUT channels and frequencies list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	14	2416	28	2430
1	2403	15	2417	29	2431
2	2404	16	2418	30	2432
3	2405	17	2419	31	2433
4	2406	18	2420	32	2434
5	2407	19	2421	33	2435
6	2408	20	2422	34	2436
7	2409	21	2423	35	2437
8	2410	22	2424	36	2438
9	2411	23	2425	37	2439
10	2412	24	2426	38	2440
11	2413	25	2427	39	2441
12	2414	26	2428	40	2442
13	2415	27	2429	41	2443

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
42	2444	55	2457	68	2470
43	2445	56	2458	69	2471
44	2446	57	2459	70	2472
45	2447	58	2460	71	2473
46	2448	59	2461	72	2474
47	2449	60	2462	73	2475
48	2450	61	2463	74	2476
49	2451	62	2464	75	2477
50	2452	63	2465	76	2478
51	2453	64	2466	77	2479
52	2454	65	2467	78	2480
53	2455	66	2468		
54	2456	67	2469		

Test frequency is the lowest channel: 0 frequency(2402MHz), middle channel: 39 frequency (2441MHz) and highest channel: 78 frequency(2480MHz)

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7. 20dB BANDWIDTH

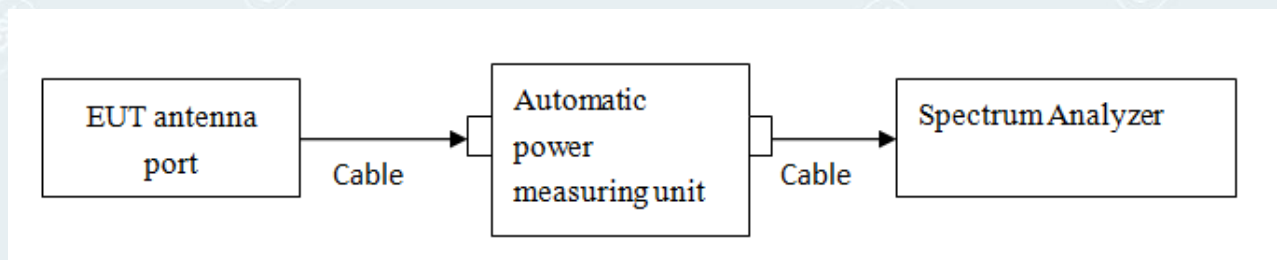
7.1 LIMITS

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

7.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT, and then connect a low loss RF cable from antenna port to the spectrum analyzer.
- 2) Set the spectrum analyzer as RBW=1%~5% OBW, VBW $\approx$ 3*RBW, Span=3MHz, Sweep = auto. Allow the trace to stabilize, record 20dB bandwidth value
- 3) Repeat until all the test channels are investigated.

7.3 TEST SETUP



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7.4 TEST RESULTS

Environment: 26.4℃/58%RH/101.0kPa
Tested By:Qin Tingting

Voltage:DC 3.7V
Date: 2023-08-29

Test Mode	Antenna	Freq[MHz]	20dB Bandwidth[kHz]
DH5	Ant1	2402	900
		2441	930
		2480	930
2DH5	Ant1	2402	1227
		2441	1224
		2480	1221

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Test Graphs





2DH5_Ant1_2441 MHz



2DH5_Ant1_2480



8. CARRIER FREQUENCIES SEPARATED

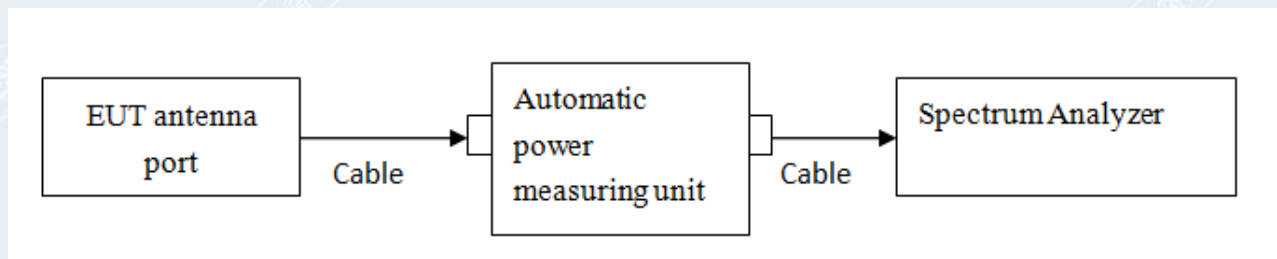
8.1 LIMITS

1) Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

8.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 2) Set center frequency of spectrum analyzer = middle of hopping channel.
- 3) Set the spectrum analyzer as RBW=100kHz, VBW=300kHz, Adjust Span to 2MHz, Sweep = auto
- 4) Use the marker-delta function to mark hopping channel carrier frequencies and record the channel separation.

8.3 TEST SETUP



----- The following blanks -----

8.4 TEST RESULTS

Environment: 26.4°C/58%RH/101.0kPa
Tested By:Qin Tingting

Voltage:DC 3.7V
Date: 2023-08-29

TestMode	Antenna	Freq(MHz)	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2441	1.036	≥0.620	PASS
2DH5	Ant1	2441	0.878	≥0.820	PASS

Test Graphs



9. HOPPING CHANNEL NUMBER

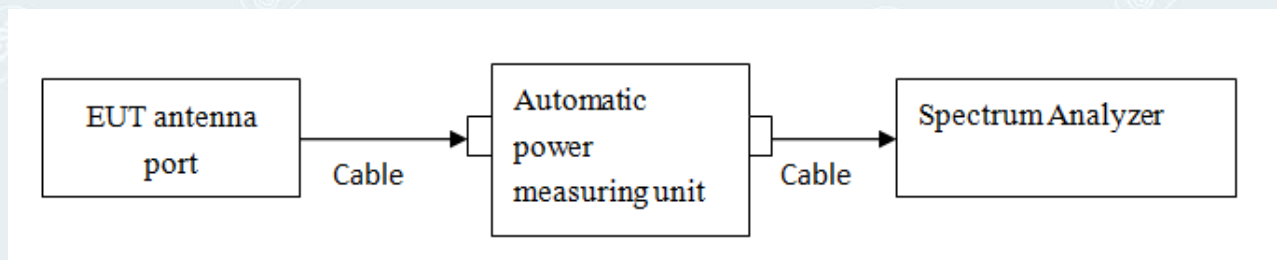
9.1 LIMITS

Regulation 15.247 (a) (1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

9.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 2) Set the spectrum analyzer as RBW=100kHz, VBW=300kHz.
- 3) Set the spectrum analyzer: start frequency = 2400MHz. stop frequency = 2483.5MHz. Submit the test result graph.

9.3 TEST SETUP



----- The following blanks -----

9.4 TEST RESULTS

Environment: 26.4°C/58%RH/101.0kPa
Tested By:Qin Tingting

Voltage:DC 3.7V
Date: 2023-08-29

TestMode	Antenna	Freq(MHz)	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS

Test Graphs



10. DWELL TIME

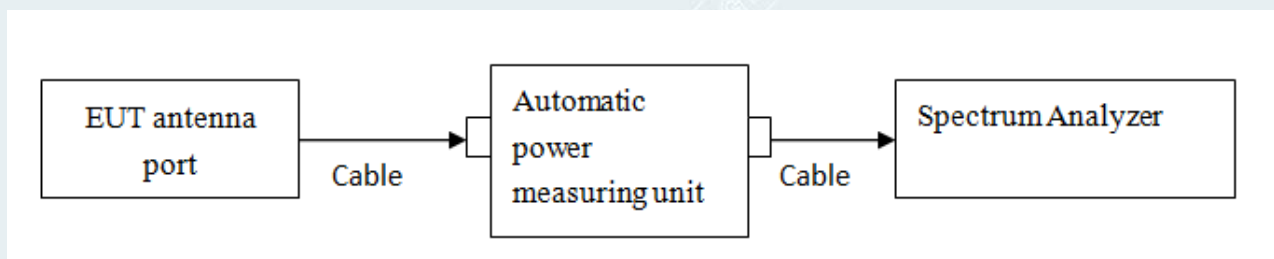
10.1 LIMITS

Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

10.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
- 2) Set spectrum analyzer span = 0. centered on a hopping channel;
- 3) Set RBW = 1MHz and VBW = 3MHz. Sweep = as necessary to capture the entire dwell time per hopping channel. Detector Function = Peak. Trace = Clear Write;
- 4) Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.). Repeat this test for each variation.
- 5) DH1 Packet permit maximum $1600 / 79 / 2 = 10.12$ hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times $10.12 \times 31.6 = 320$ within 31.6 seconds
- 6) DH3 Packet permit maximum $1600 / 79 / 4 = 5.06$ hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times $5.06 \times 31.6 = 160$ within 31.6 seconds
- 7) DH5 Packet permit maximum $1600 / 79 / 6 = 3.37$ hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times $3.37 \times 31.6 = 106.6$ within 31.6 seconds

10.3 TEST SETUP



10.4 TEST RESULTS

Environment: 26.4°C/58%RH/101.0kPa
Tested By:Qin Tingting

Voltage:DC 3.7V
Date:2023-08-29

The test period: T= 0.4 Second/Channel x 79 Channel = 31.6 s

GFSK:Mid Channel (2.441GHz)

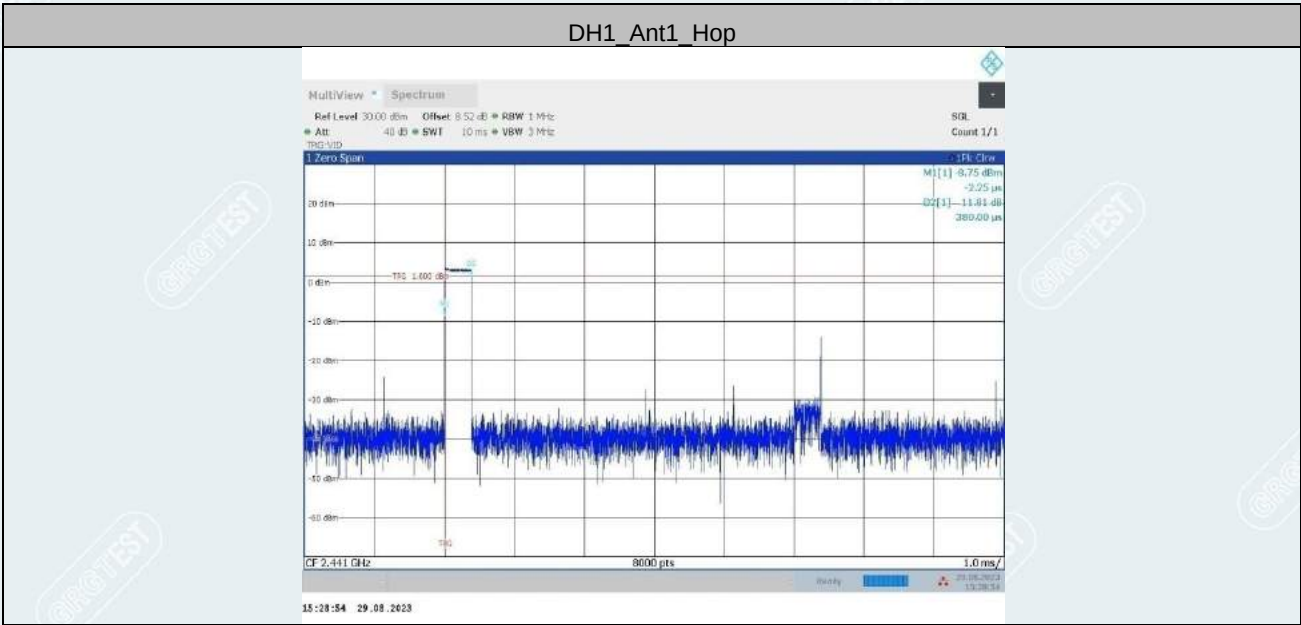
DH1	time slot=	0.380	(ms)*	(1600/(2*79))	*	31.6	=	121.600	ms
DH3	time slot=	1.635	(ms)*	(1600/(4*79))	*	31.6	=	261.600	ms
DH5	time slot=	2.884	(ms)*	(1600/(6*79))	*	31.6	=	307.627	ms

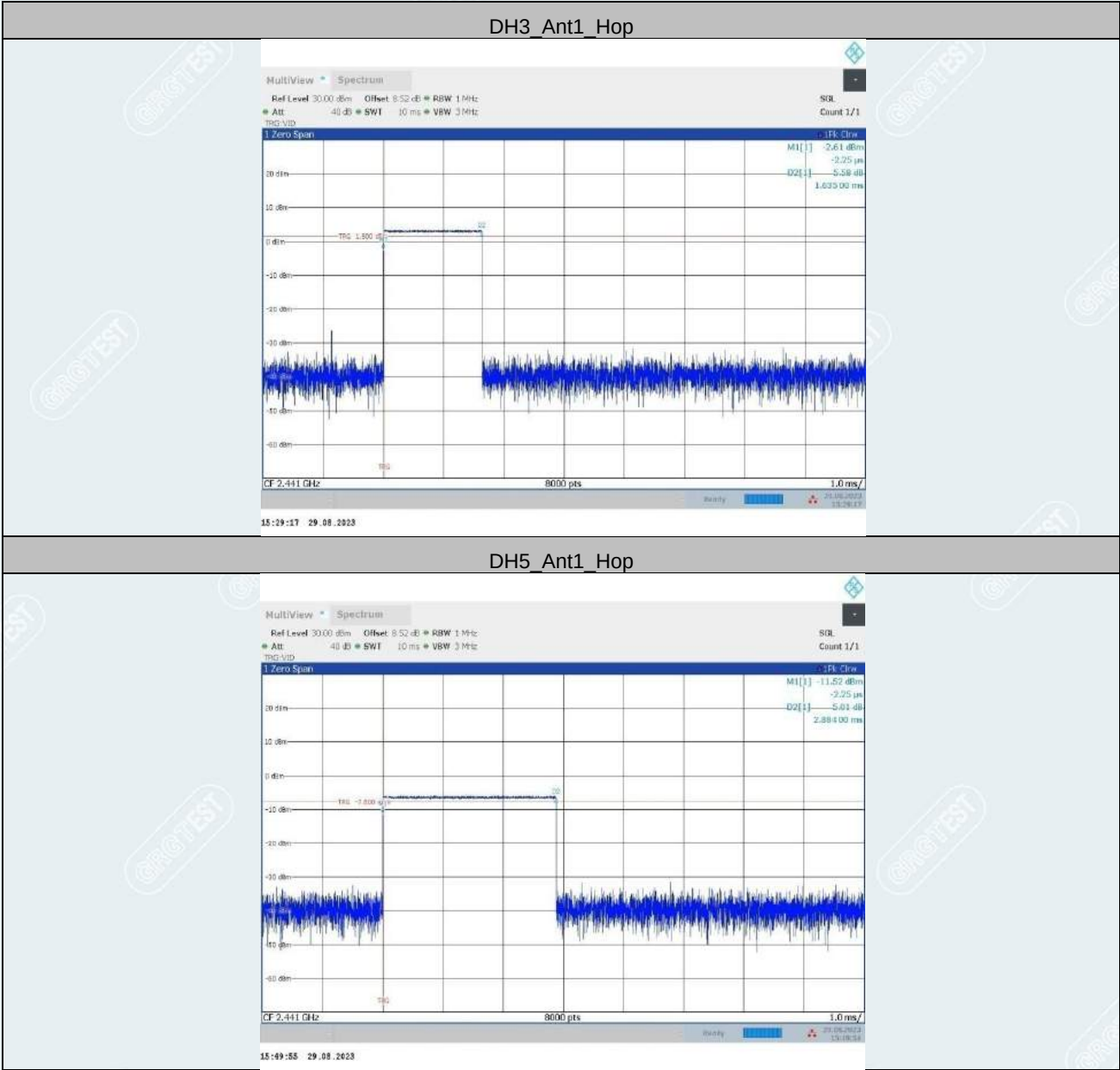
π/4-DQPSK:Mid Channel (2.441GHz)

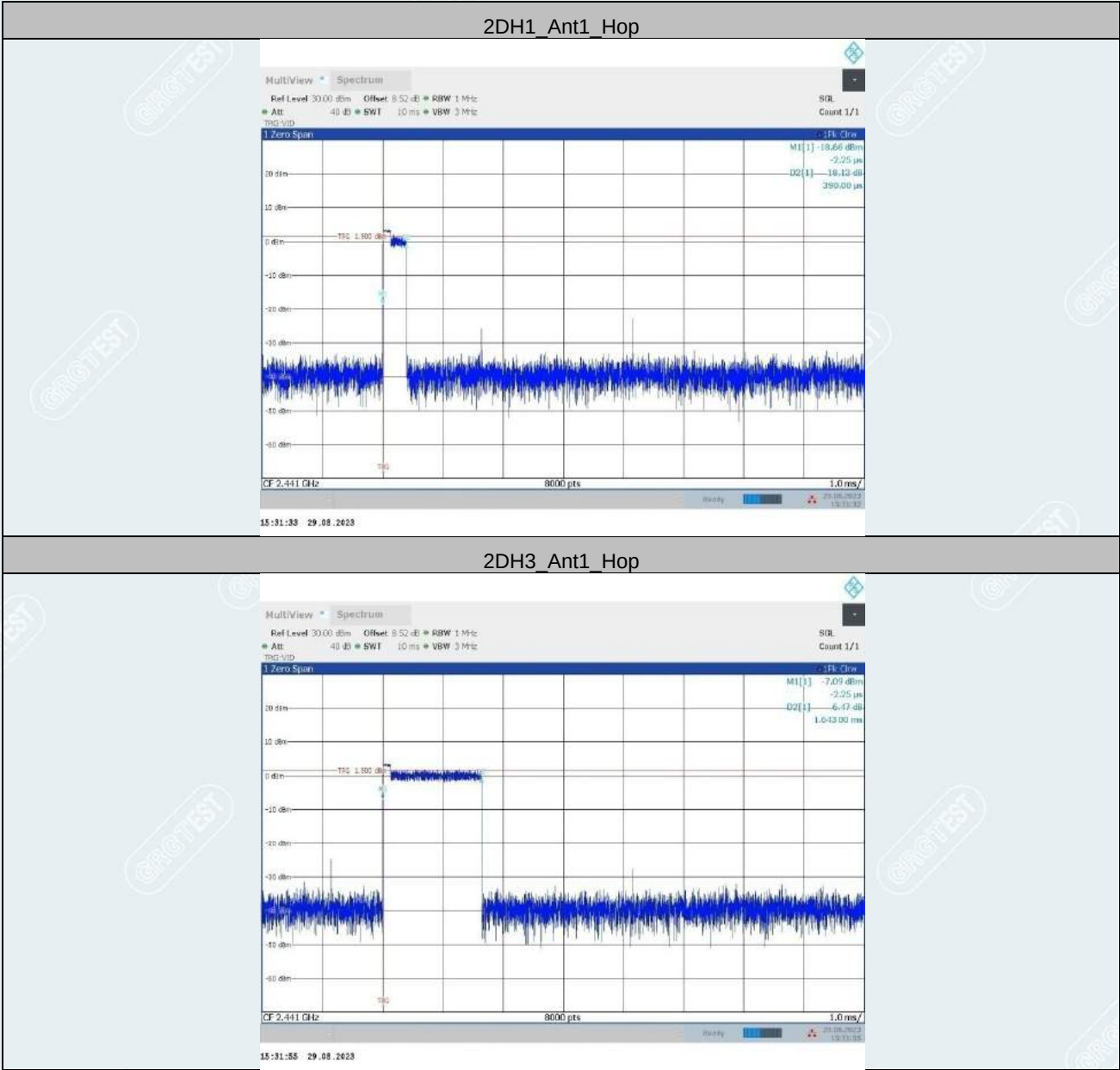
2DH1	time slot=	0.390	(ms)*	(1600/(2*79))	*	31.6	=	124.800	ms
2DH3	time slot=	1.643	(ms)*	(1600/(4*79))	*	31.6	=	262.880	ms
2DH5	time slot=	2.890	(ms)*	(1600/(6*79))	*	31.6	=	308.267	ms

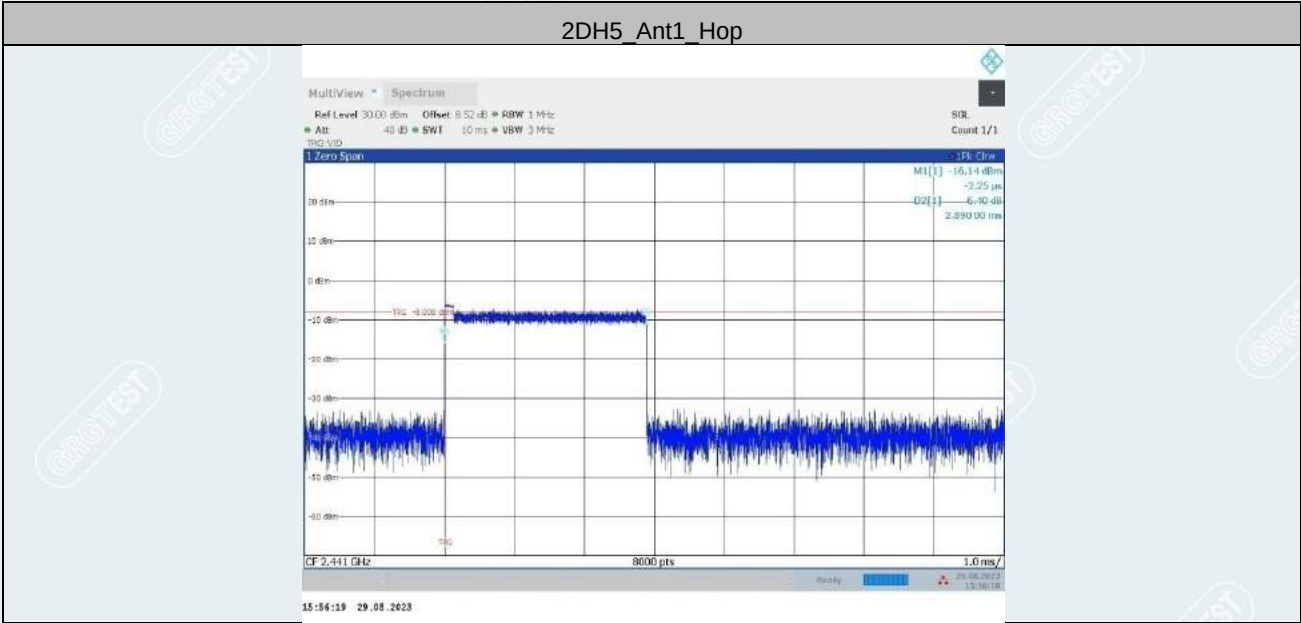
The results are not greater than 0.4 seconds.
The unit does meet the requirements.

Test Graphs









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11. MAXIMUM PEAK OUTPUT POWER

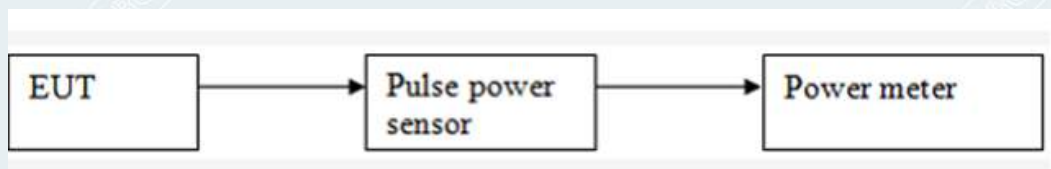
11.1 LIMITS

Regulation 15.247 (b)(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

11.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the power meter and enable the EUT transmit continuously.
- 2) Keep the EUT in transmitting at lowest, middle and highest channel individually. Record the max value.

11.3 TEST SETUP



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11.4 TEST RESULTS

Environment: 28.4°C/61%RH/101.0kPa
Tested By:Qin Tingting

Voltage:DC 3.7V
Date: 2023-09-16

DH5

Test Channel	Fundamental Frequency (GHz)	Max Output Power(dBm)	Limit (dBm)	Peak/ Average	Pass/Fail
Lowest	2.402	-4.57	20.97	Peak	Pass
Middle	2.441	-3.63			Pass
Highest	2.480	-1.81			Pass

2DH5

Test Channel	Fundamental Frequency (GHz)	Max Output Power(dBm)	Limit (dBm)	Peak/ Average	Pass/Fail
Lowest	2.402	-4.63	20.97	Peak	Pass
Middle	2.441	-3.62			Pass
Highest	2.480	-1.82			Pass

Test result: The unit does meet the FCC requirements.

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12. CONDUCTED BAND EDGES AND SPURIOUS EMISSIONS

12.1 LIMITS

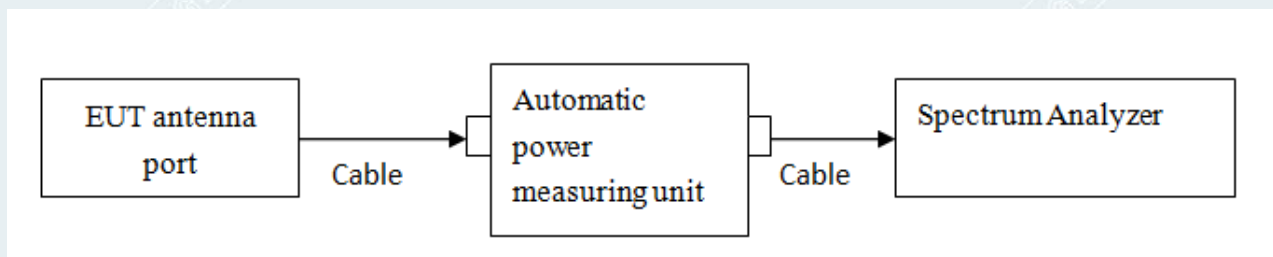
In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB.

12.2 TEST PROCEDURES

Test procedures follow KDB 558074 D01 DTS Measurement Guidance v05r02.

- 1) Remove the antenna from the EUT and then connect a low attenuation cable from the antenna port to the spectrum.
- 2) Set the spectrum analyzer: RBW =100kHz; VBW =300kHz, Frequency range = 30MHz to 26.5GHz; Sweep = auto; Detector Function = Peak. Trace = Max hold.
- 3) Measure and record the results in the test report.
- 4) The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

12.3 TEST SETUP



12.4 TEST RESULTS

Environment: 26.4°C/58%RH/101.0kPa
Tested By:Qin Tingting

Voltage:DC 3.7V
Date: 2023-08-29

Band Edge

TestMode	Antenna	ChName	Freq(MHz)	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	1.79	-41.17	≤-18.21	PASS
		High	2480	4.48	-42.59	≤-15.52	PASS
		Low	Hop_2402	0.90	-41.76	≤-19.10	PASS
		High	Hop_2480	3.68	-48.99	≤-16.32	PASS
2DH5	Ant1	Low	2402	1.25	-42.63	≤-18.75	PASS
		High	2480	3.45	-44.01	≤-16.55	PASS
		Low	Hop_2402	-5.26	-48.81	≤-25.26	PASS
		High	Hop_2480	3.64	-48.60	≤-16.36	PASS

----- The following blanks -----

Conducted Spurious Emission

TestMode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	1.15	1.15	---	PASS
			30~1000	1.15	-59.62	≤ -18.85	PASS
			1000~26500	1.15	-55.81	≤ -18.85	PASS
		2441	Reference	2.37	2.37	---	PASS
			30~1000	2.37	-58.58	≤ -17.63	PASS
			1000~26500	2.37	-54.41	≤ -17.63	PASS
		2480	Reference	3.51	3.51	---	PASS
			30~1000	3.51	-59.71	≤ -16.49	PASS
			1000~26500	3.51	-50.40	≤ -16.49	PASS
2DH5	Ant1	2402	Reference	-0.07	-0.07	---	PASS
			30~1000	-0.07	-59.77	≤ -20.07	PASS
			1000~26500	-0.07	-55.25	≤ -20.07	PASS
		2441	Reference	1.54	1.54	---	PASS
			30~1000	1.54	-59.19	≤ -18.46	PASS
			1000~26500	1.54	-54.18	≤ -18.46	PASS
		2480	Reference	2.39	2.39	---	PASS
			30~1000	2.39	-59.73	≤ -17.61	PASS
			1000~26500	2.39	-54.91	≤ -17.61	PASS

----- The following blanks -----

Test Graphs

Band Edge



DH5_Ant1_High_2480 MHz

MultView Spectrum

Ref Level 20.00 dBm Offset 8.83 dB BW 100 kHz

Att 30 dB SWI 1.07 ms VBW 300 kHz Mode Auto Sweep

Count 272/300

10 dB

0 dB

-10 dB

-20 dB

-30 dB

-40 dB

-50 dB

-60 dB

-70 dB

2.47 GHz

1001 pts

8.0 MHz

2.55 GHz

MI(1) 4.48 dBm

2.4801100 GHz

MD(1) -50.82 dBm

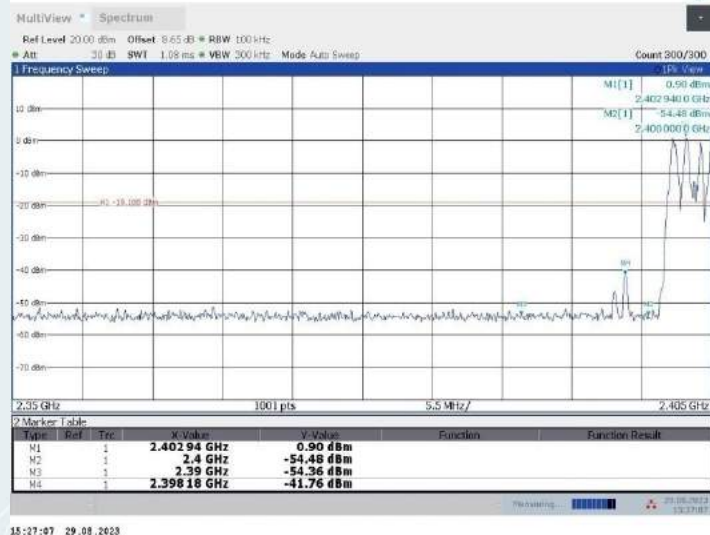
2.4835000 GHz

2 Marker Table

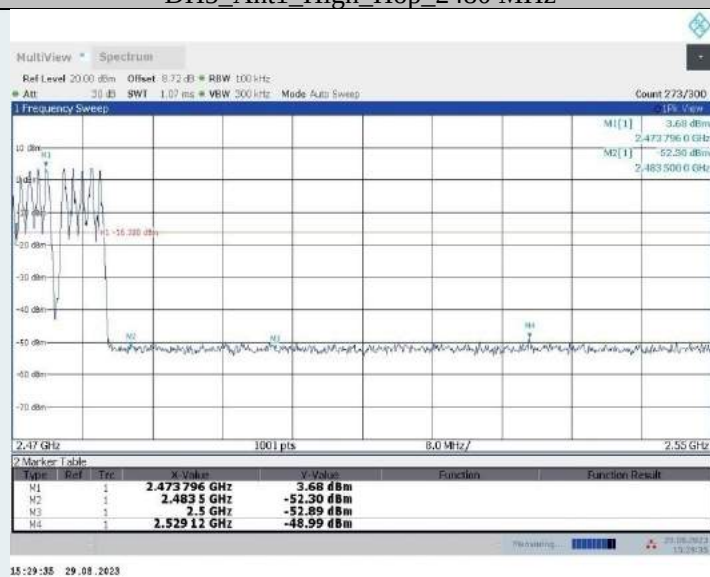
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1	1		2.48011 GHz	4.48 dBm		
M2	1		2.4835 GHz	-50.82 dBm		
M3	1		2.5 GHz	-51.43 dBm		
M4	1		2.48512 GHz	-42.59 dBm		

15:18:25 29.08.2023

DH5_Ant1_Low_Hop_2402 MHz



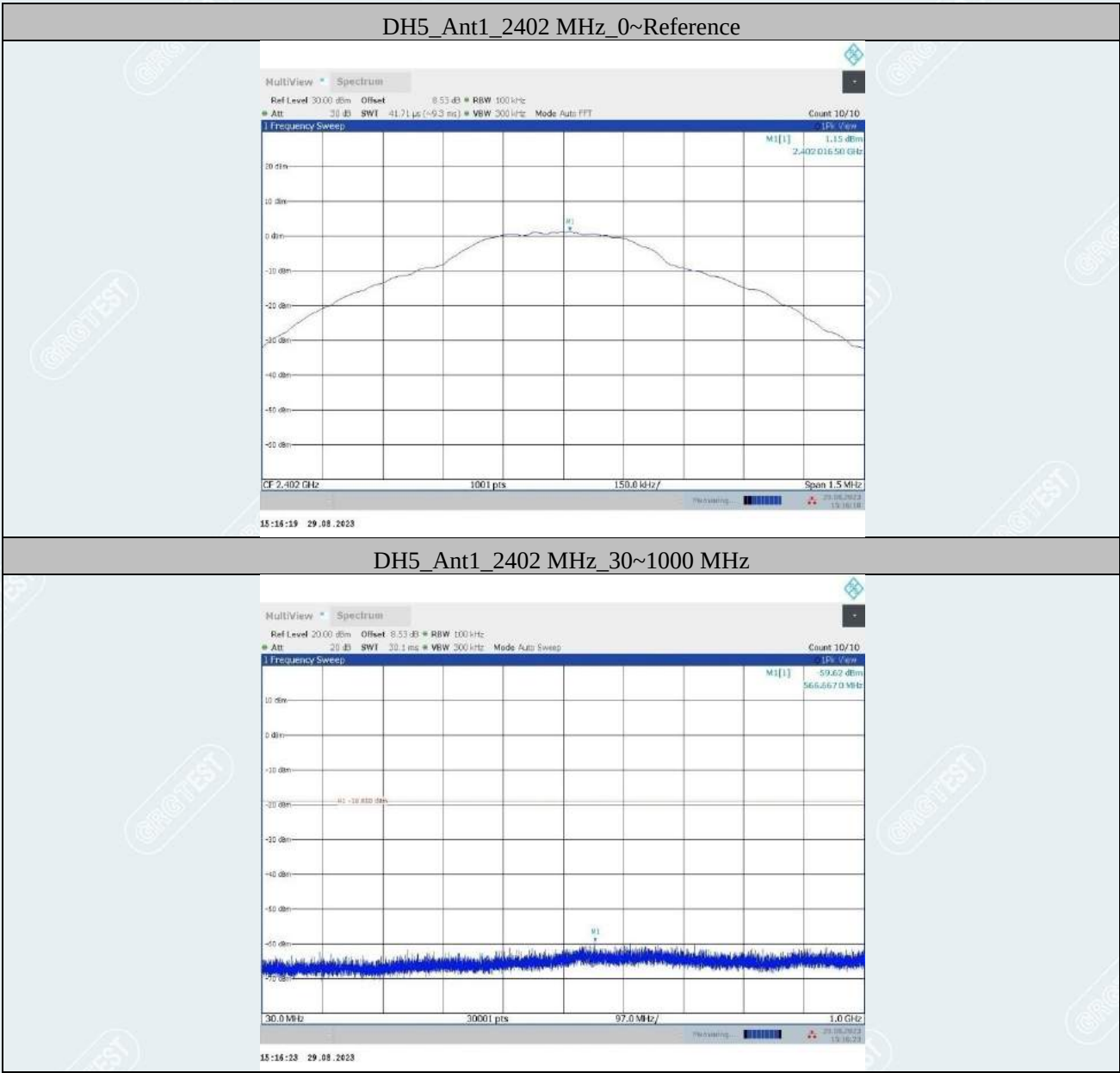
DH5_Ant1_High_Hop_2480 MHz



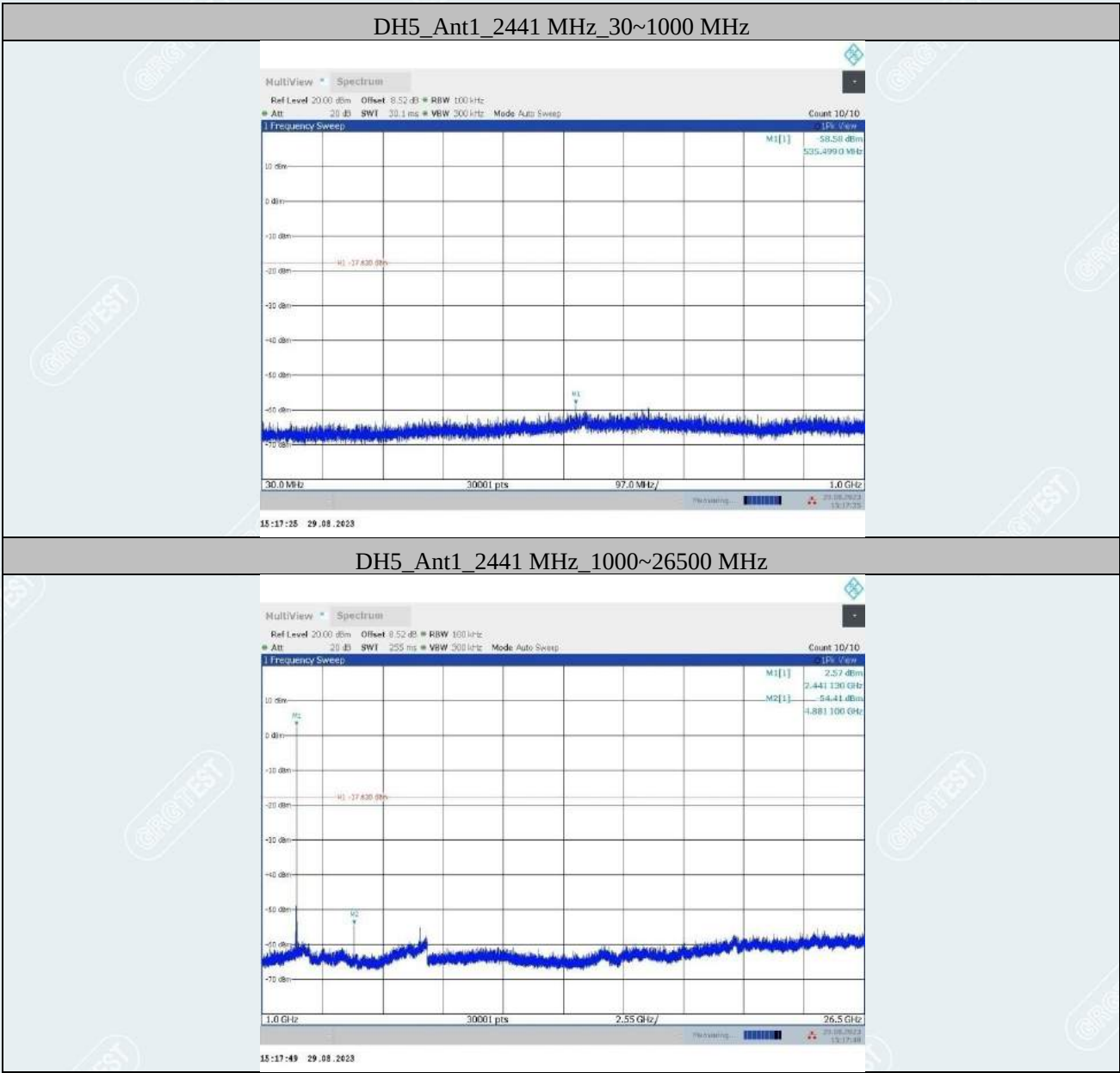


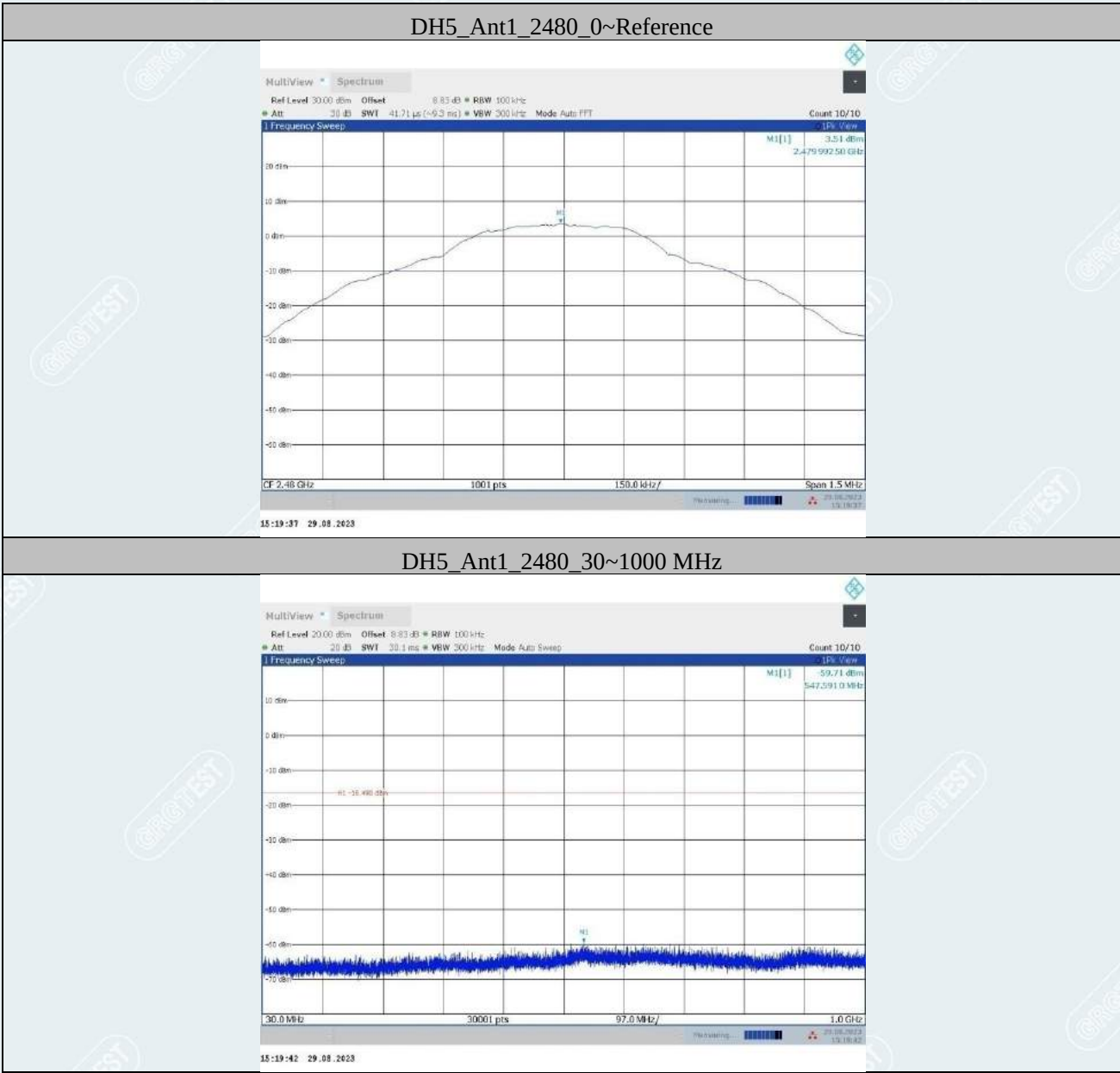


Conducted Spurious Emission



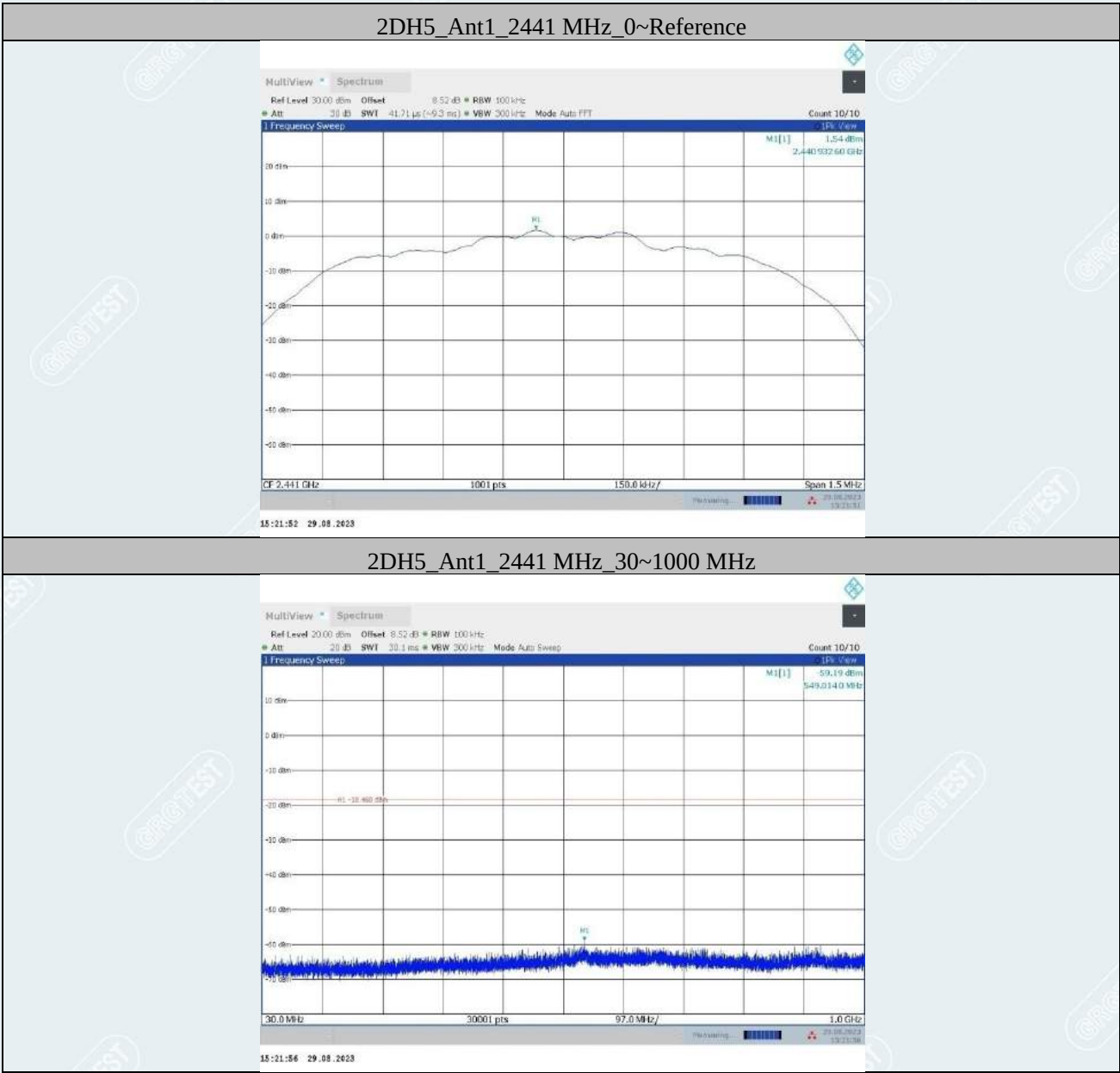




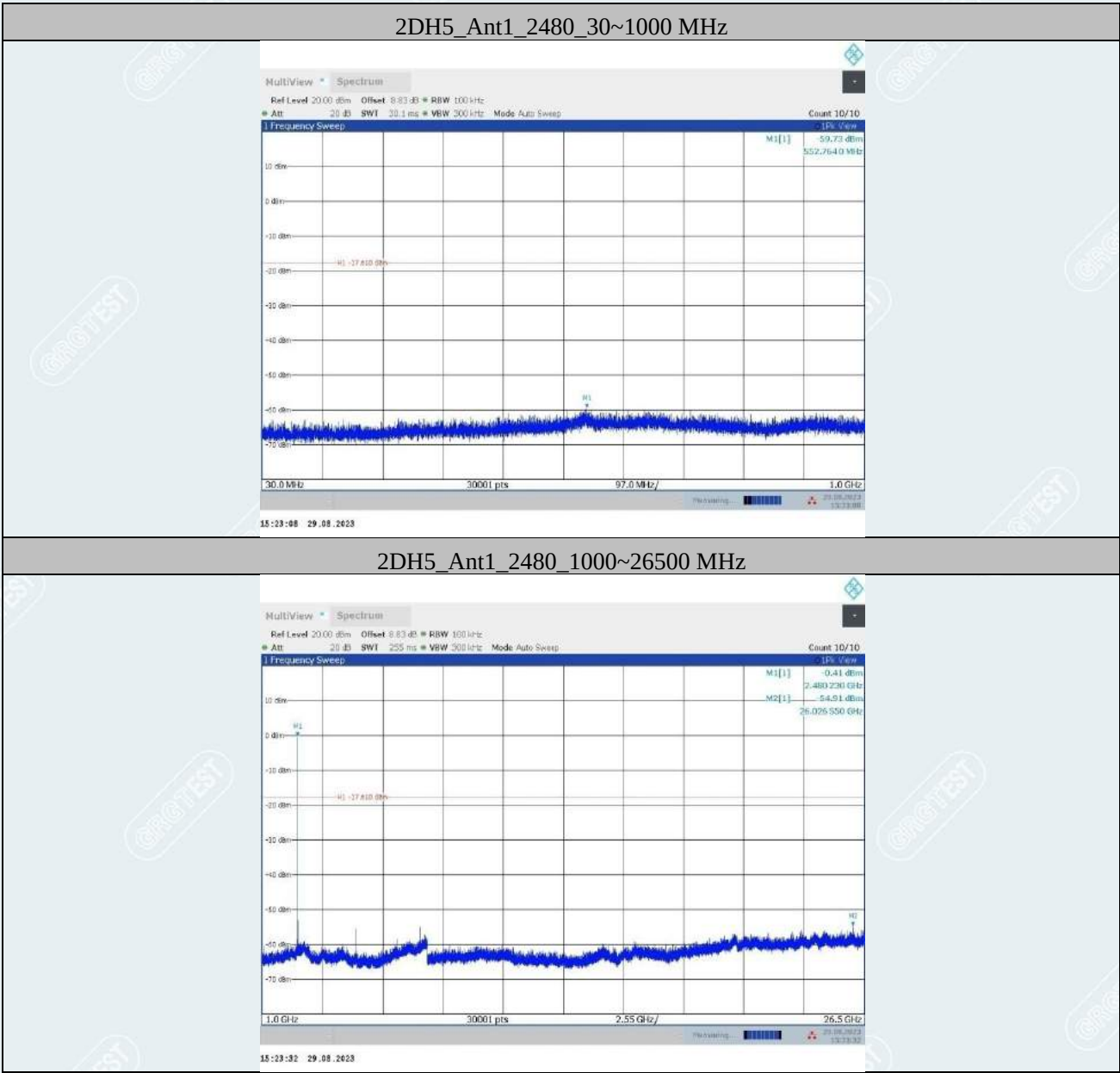












13. RADIATED SPURIOUS EMISSIONS

13.1 LIMITS

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required.

Frequency (MHz)	Quasi-peak($\mu\text{V/m}$)	Measurement distance(m)	Quasi-peak(dB $\mu\text{V/m}$)@distance 3m
0.009-0.490	2400/F(kHz)	300	128.5~93.8
0.490-1.705	24000/F(kHz)	30	73.8~63
1.705-30.0	30	30	69.5
30 ~ 88	100	3	40
88~216	150	3	43.5
216 ~ 960	200	3	46
Above 960	500	3	54

NOTE:

- (1) The emission limits for the ranges 9-90kHz and 110-490kHz are based on measurements employing a linear average detector.
- (2) The lower limit shall apply at the transition frequencies.
- (3) Above 18GHz test distance is 1m, so the Peak Limit=74+20*log(3/1)=83.54 (dB $\mu\text{V/m}$).
The Avg Limit=54+20*log(3/1)=63.54 (dB $\mu\text{V/m}$).

13.2 TEST PROCEDURES

1) Sequence of testing 9kHz to 30MHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.
- If the EUT is a floor standing device, it is placed on the ground.
- Set the EUT transmit continuously with maximum output power.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Pre measurement:

- The turntable rotates from 0 ° to 360 °.
- The antenna height is 1.0 meter.
- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

--- Identified emissions during the pre measurement the software maximizes by rotating the turntable position (0 °to 360 °) and by rotating the elevation axes (0 °to 360 °).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QP detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement and the limit will be stored.

2) Sequence of testing 30MHz to 1GHz**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Set the EUT transmit continuously with maximum output power.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

--- The turntable rotates from 0 °to 360 °.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 4 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable rotates from 0 °to 360 °and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1GHz to 18GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Set the EUT transmit continuously with maximum output power.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Pre measurement:

- The turntable rotates from 0 °to 360 °.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 4 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable rotates from 0 °to 360 °and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.
- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement with marked maximum final measurements and the limit will be stored.

4) Sequence of testing above 18GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Use serial board or connecting line to make EUT and notebook to communicate, according to the actual need to make EUT send constant frequency signal continuously.
- The EUT is placed on a desktop position in the center of the turntable.
- The measurement distance is 1 meter.
- The EUT was set into operation.

Pre measurement:

- The pre measurement distance is 1 meter.
- The turntable rotates from 0 °to 360 °.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 4 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak detector.
- The final measurement distance is 3 meter.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable rotates from 0 °to 360 °and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.
- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

NOTE:

- (a).The frequency from 9kHz to 150kHz, Set RBW=300Hz(for Peak&AVG), RBW=300Hz(for Peak&AVG). the frequency from 150kHz to 30MHz, Set RBW=9kHz, RBW=9kHz,(for QP Detector).
- (b).The frequency from 30MHz to 1GHz, Set RBW=120kHz, RBW=300kHz,(for QP Detector).
- (c).The frequency above 1GHz, for Peak detector: Set RBW=1MHz, RBW=3MHz.
- (d).The frequency above 1GHz, for Avg detector: Set RBW=1MHz, if the EUT is configured to transmit with duty cycle $\geq 98\%$, set $VBW \leq RBW/100$ (i.e.,10kHz) but not less than 10Hz. if the EUT duty cycle is $< 98\%$, set $VBW \geq 1/T$, Where T is defined in section 2.9.

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13.3 TEST SETUP

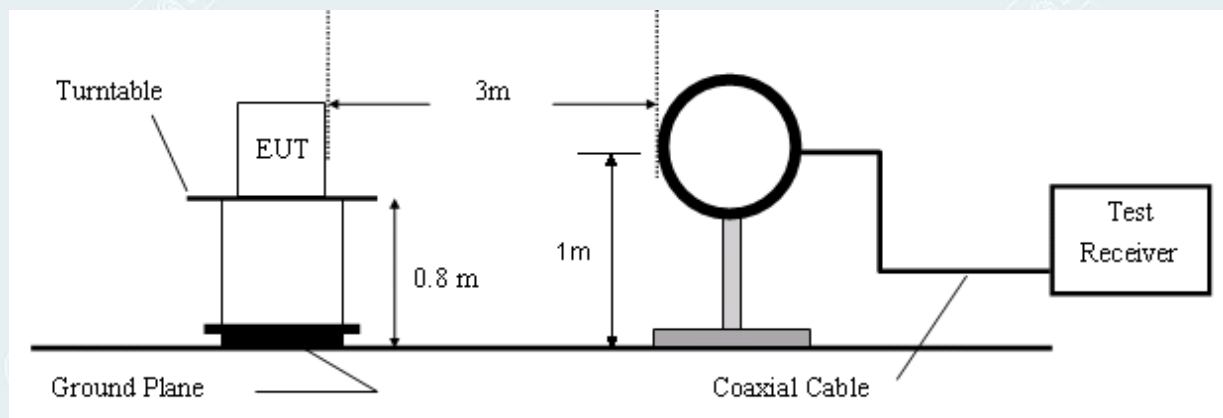


Figure 1. 9kHz to 30MHz radiated emissions test configuration

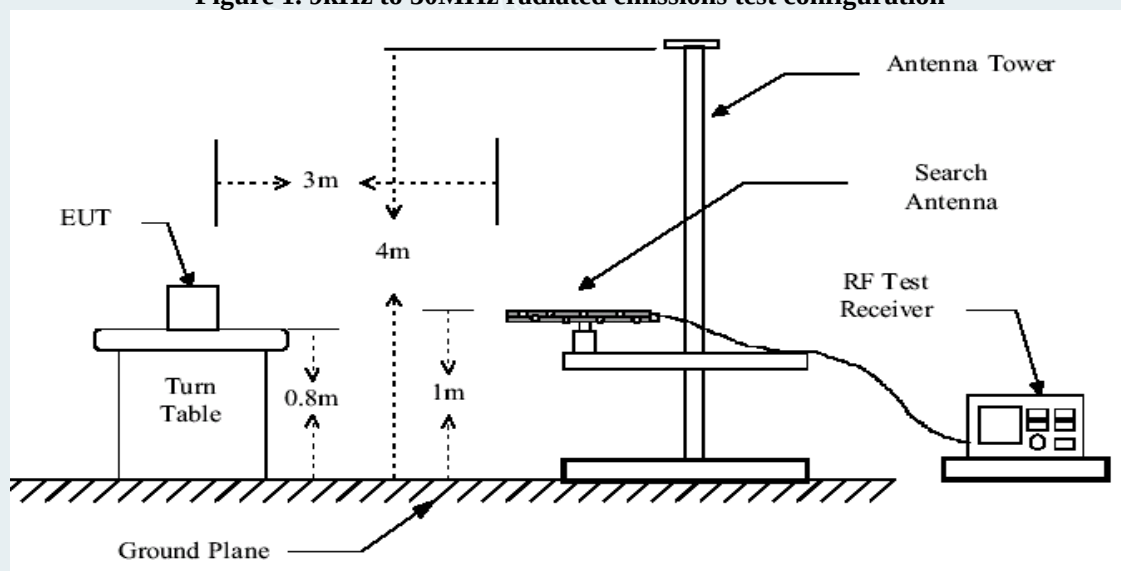


Figure 2. 30MHz to 1GHz radiated emissions test configuration

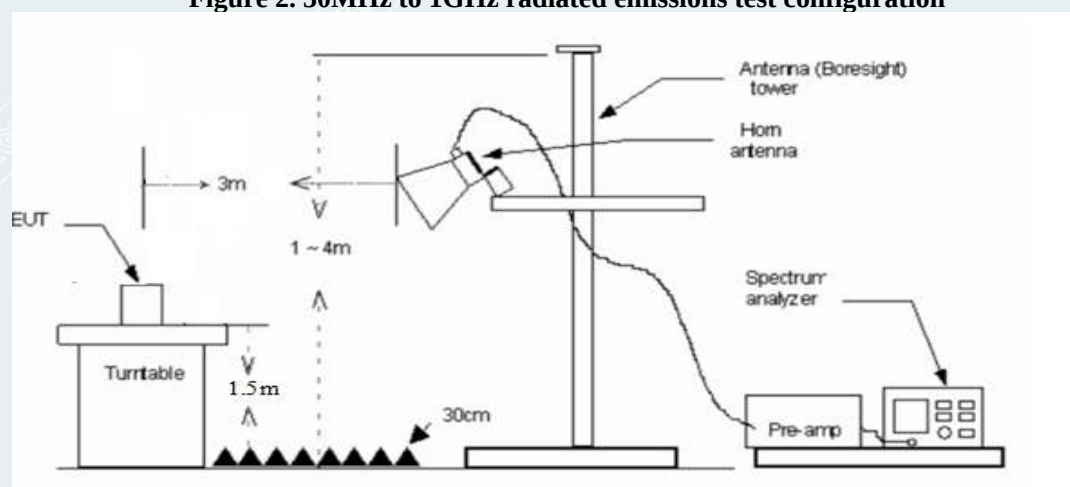


Figure 3. 1GHz to 18GHz radiated emissions test configuration

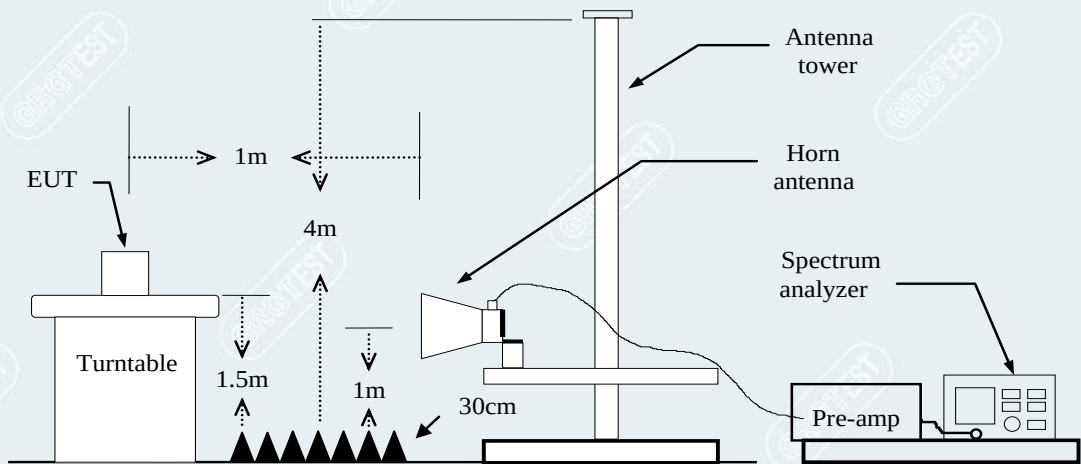


Figure 4. 18GHz to 26.5GHz radiated emissions test configuration

13.4 DATA SAMPLE

30MHz to 1GHz

No.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
xxx	XXXX	63.53	36.38	-27.15	43.50	7.12	0	100	Horizontal

- Frequency (MHz)

Reading (dBuV/m)

Level (dBuV/m)

Limit (dBuV/m)

Margin (dB)

Polarity
- = Emission frequency in MHz

= Uncorrected Analyzer / Receiver reading

= Reading (dBuV) + Factor (dB)

= Limit stated in standard

= Limit(dBuV/m) – Level (dBuV/m)

= Antenna polarization

----- The following blanks -----

1GHz-18GHz

No.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Remark
xxx	xxxx	78.01	55.30	-22.71	74.00	18.70	100	50	Horizontal	Peak
xxx	xxxx	66.37	43.66	-22.71	54.00	10.34	100	50	Horizontal	AVG

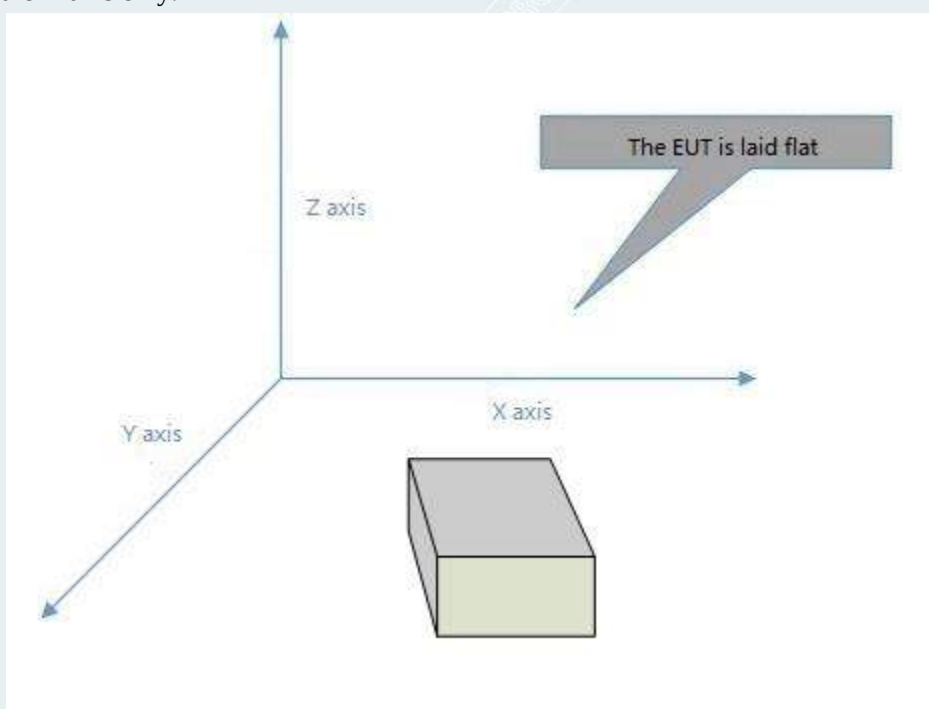
Above 18GHz

No.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Remark
xxx	xxxx	54.49	42.38	-12.11	83.54	41.16	100	211	Vertical	Peak
xxx	xxxx	43.99	31.88	-12.11	63.54	31.66	100	211	Vertical	AVG

Frequency (MHz)	= Emission frequency in MHz
Reading (dBuV/m)	= Uncorrected Analyzer / Receiver reading
Factor (dB)	= Antenna factor + Cable loss – Amplifier gain
Level (dBuV/m)	= Reading (dBuV/m) + Factor (dB)
Limit (dBuV/m)	= Limit stated in standard
Margin (dB)	= Limit (dBuV/m) – Level (dBuV/m)
Polarity	= Antenna polarization
Peak	= Peak Reading
AVG	= Average Reading

13.5 TEST RESULTS

The test are under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X axis. So the data shown the X axis only.

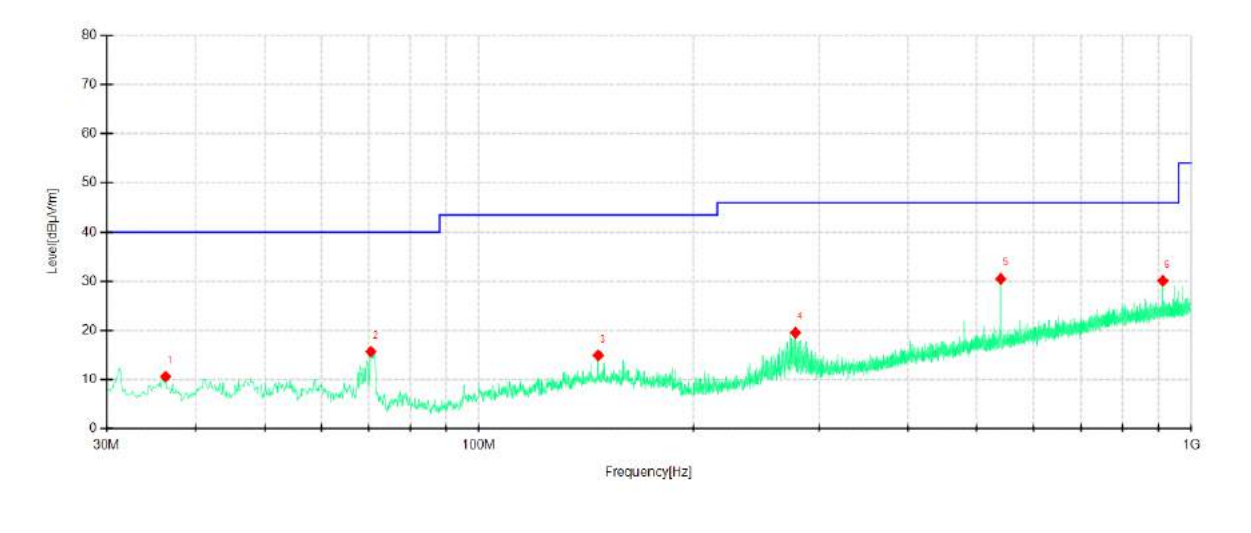


Below 1GHz

Mode: DH5
Middle Frequency (2441MHz)
Environment: 25.8°C/53%RH/101.0kPa
Test Engineer: Zhang Zishan

Date: 2023-09-09
Test Voltage: DC 3.7V
Probe : Horizontal

Test Graph

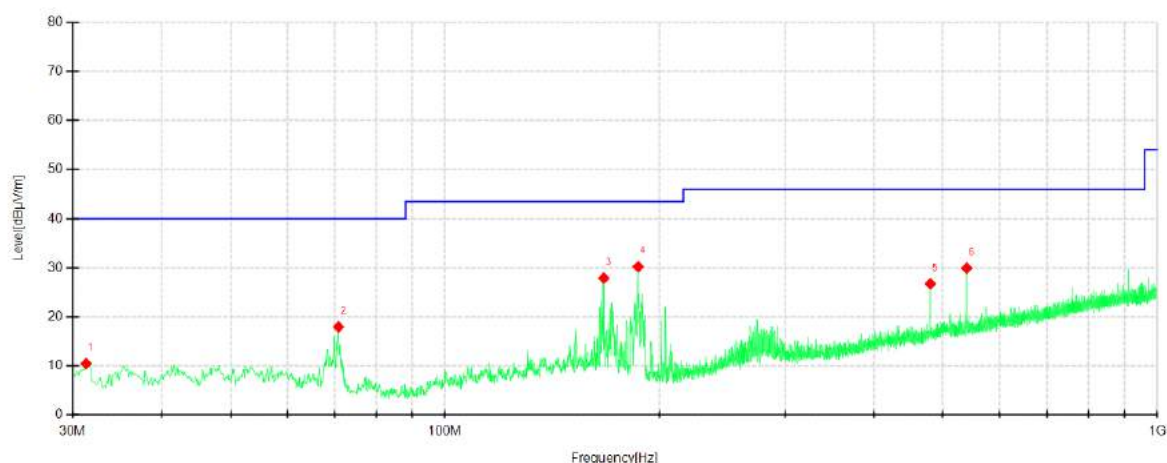


Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	36.3058	39.49	10.62	-28.87	40.00	29.38	200	193	Horizontal
2	70.5026	46.74	15.71	-31.03	40.00	24.29	200	213	Horizontal
3	147.0209	42.86	14.94	-27.92	43.50	28.56	200	73	Horizontal
4	278.1085	47.83	19.54	-28.29	46.00	26.46	200	262	Horizontal
5	540.0413	51.11	30.50	-20.61	46.00	15.50	100	204	Horizontal
6	912.2040	45.36	30.12	-15.24	46.00	15.88	200	113	Horizontal

Mode: DH5
 Middle Frequency (2441MHz)
 Environment: 25.8°C/53%RH/101.0kPa
 Test Engineer: Zhang Zishan

Date: 2023-09-09
 Test Voltage: DC 3.7V
 Probe : Vertical

Test Graph



Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	31.3339	39.64	10.48	-29.16	40.00	28.42	100	295	Vertical
2	70.8664	49.09	17.98	-31.11	40.00	22.02	200	254	Vertical
3	167.0296	56.48	27.90	-28.58	43.50	15.28	100	235	Vertical
4	186.6746	60.42	30.23	-30.19	43.50	13.27	100	117	Vertical
5	480.1363	48.68	26.75	-21.93	46.00	19.25	200	26	Vertical
6	540.0413	50.55	29.94	-20.61	46.00	16.06	200	345	Vertical

Remark:

- 1 No emission found between lowest internal used/generated frequency to 30MHz.
- 2 Pre-scan all mode and recorded the worst case results in this report (TX- Middle Channel(DH5))
- 3 Measuring frequencies from 9kHz to the 1GHz.
- 4 Radiated emissions measured in frequency range from 30MHz to 1GHz were made with an instrument using Peak/Quasi-peak detector mode.
- 5 Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 6 The IF bandwidth of SPA between 30MHz to 1GHz was 120kHz.

1GHz to 18GHz

Mode: DH5

Lowest Frequency (2402MHz)

Environment: 24.2℃;Humi:54%RH 101.0kPa

Test Engineer: Zhang Zishan

Date: 2023-09-17

Test Voltage: DC 3.7V

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1109.0000	55.67	46.13	-9.54	74.00	27.87	100	140	Horizontal
2	2980.4000	47.20	46.66	-0.54	74.00	27.34	100	46	Horizontal
3	3196.5000	54.21	42.42	-11.79	74.00	31.58	100	30	Horizontal
4	5029.5000	46.29	46.71	0.42	74.00	27.29	200	326	Horizontal
5	8605.5000	42.03	48.46	6.43	74.00	25.54	100	152	Horizontal
6	15663.0000	38.43	50.72	12.29	74.00	23.28	100	71	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	8605.5000	6.43	35.21	41.64	54.00	12.36	100	152	Horizontal
2	15663.0000	12.29	30.11	42.40	54.00	11.60	100	71	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1113.0000	55.00	44.00	-11.00	74.00	30.00	100	33	Vertical
2	1225.2000	52.37	44.25	-8.12	74.00	29.75	100	181	Vertical
3	1995.4000	51.23	44.51	-6.72	74.00	29.49	100	249	Vertical
4	3000.0000	47.13	46.15	-0.98	74.00	27.85	100	207	Vertical
5	5023.5000	46.26	46.50	0.24	74.00	27.50	100	313	Vertical
6	11814.0000	38.39	49.80	11.41	74.00	24.20	100	26	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	11814.0000	11.41	30.21	41.62	54.00	12.38	100	26	Vertical

Mode: DH5

Middle Frequency (2441MHz)

Environment: 24.2℃;Humi:54%RH 101.0kPa

Test Engineer: Zhang Zishan

Date: 2023-09-17

Test Voltage: DC 3.7V

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1120.8000	56.08	46.64	-9.44	74.00	27.36	100	142	Horizontal
2	1996.8000	51.78	46.31	-5.47	74.00	27.69	100	264	Horizontal
3	2618.6000	51.76	49.06	-2.70	74.00	24.94	200	207	Horizontal
4	3190.5000	54.91	43.11	-11.80	74.00	30.89	100	179	Horizontal
5	5101.5000	46.37	46.47	0.10	74.00	27.53	200	285	Horizontal
6	15651.0000	37.50	50.40	12.90	74.00	23.60	200	313	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2618.6000	-2.70	44.24	41.54	54.00	12.46	200	207	Horizontal
2	15651.0000	12.90	30.24	43.14	54.00	10.86	200	313	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1123.6000	54.85	44.03	-10.82	74.00	29.97	100	317	Vertical
2	1281.8000	53.26	45.50	-7.76	74.00	28.50	100	182	Vertical
3	2588.8000	51.61	48.59	-3.02	74.00	25.41	100	45	Vertical
4	3675.0000	52.65	42.89	-9.76	74.00	31.11	100	218	Vertical
5	5062.5000	46.80	47.56	0.76	74.00	26.44	200	232	Vertical
6	17922.0000	36.76	50.29	13.53	74.00	23.71	200	245	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2588.8000	-3.02	43.27	40.25	54.00	13.75	100	45	Vertical
2	17922.0000	13.53	30.75	44.28	54.00	9.72	200	245	Vertical

Mode: DH5

Highest Frequency (2480MHz)

Environment: 24.2℃;Humi:54%RH 101.0kPa

Test Engineer: Zhang Zishan

Date: 2023-09-17

Test Voltage: DC 3.7V

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1117.8000	55.80	46.34	-9.46	74.00	27.66	100	117	Horizontal
2	1819.4000	52.36	44.86	-7.50	74.00	29.14	100	133	Horizontal
3	1996.0000	51.19	45.70	-5.49	74.00	28.30	100	256	Horizontal
4	2589.0000	50.77	48.22	-2.55	74.00	25.78	100	338	Horizontal
5	5170.5000	46.35	46.67	0.32	74.00	27.33	100	358	Horizontal
6	13330.5000	36.88	50.89	14.01	74.00	23.11	200	74	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2590.1610	-2.55	36.43	33.88	54.00	20.12	196	174.9	Horizontal
2	13330.5000	14.01	30.22	44.23	54.00	9.77	200	74	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1117.8000	55.49	44.57	-10.92	74.00	29.43	100	311	Vertical
2	1819.0000	54.10	46.81	-7.29	74.00	27.19	100	298	Vertical
3	2616.2000	51.11	48.11	-3.00	74.00	25.89	200	192	Vertical
4	4258.5000	51.25	44.31	-6.94	74.00	29.69	100	302	Vertical
5	5037.0000	46.66	47.27	0.61	74.00	26.73	100	101	Vertical
6	17926.5000	37.10	50.63	13.53	74.00	23.37	200	302	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2616.7680	-3.00	39.84	36.84	54.00	17.16	107	212.4	Vertical
2	17926.5000	13.53	30.24	43.77	54.00	10.23	200	302	Vertical

Mode: 2DH5

Lowest Frequency (2402MHz)

Environment: 24.2°C;Humi:54%RH 101.0kPa

Test Engineer: Zhang Zishan

Date: 2023-09-17

Test Voltage: DC 3.7V

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1120.2000	54.87	45.43	-9.44	74.00	28.57	100	221	Horizontal
2	1993.8000	51.32	45.78	-5.54	74.00	28.22	100	262	Horizontal
3	2926.0000	48.21	47.48	-0.73	74.00	26.52	200	139	Horizontal
4	3384.0000	59.12	47.75	-11.37	74.00	26.25	100	220	Horizontal
5	4999.5000	46.95	46.75	-0.20	74.00	27.25	100	301	Horizontal
6	13558.5000	37.45	51.16	13.71	74.00	22.84	200	3	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	13558.5000	13.71	29.94	43.65	54.00	10.35	200	3	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1124.2000	56.25	45.44	-10.81	74.00	28.56	100	141	Vertical
2	1820.0000	52.34	45.06	-7.28	74.00	28.94	100	315	Vertical
3	2847.2000	47.60	46.12	-1.48	74.00	27.88	100	128	Vertical
4	4530.0000	48.53	43.21	-5.32	74.00	30.79	200	136	Vertical
5	5049.0000	45.89	46.81	0.92	74.00	27.19	200	16	Vertical
6	17992.5000	37.35	50.82	13.47	74.00	23.18	100	326	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	17992.5000	13.47	30.11	43.58	54.00	10.42	100	326	Vertical

Mode: 2DH5

Middle Frequency (2441MHz)

Environment: 24.2°C;Humi:54%RH 101.0kPa

Test Engineer: Zhang Zishan

Date: 2023-09-17

Test Voltage: DC 3.7V

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1110.4000	55.12	45.59	-9.53	74.00	28.41	100	140	Horizontal
2	2549.0000	48.77	46.53	-2.24	74.00	27.47	100	234	Horizontal
3	2989.4000	47.26	46.75	-0.51	74.00	27.25	100	221	Horizontal
4	3198.0000	53.65	41.86	-11.79	74.00	32.14	200	96	Horizontal
5	5038.5000	45.86	46.47	0.61	74.00	27.53	100	315	Horizontal
6	17929.5000	38.11	49.76	11.65	74.00	24.24	200	43	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	17929.5000	11.65	30.30	41.95	54.00	12.05	200	43	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1118.4000	54.80	43.89	-10.91	74.00	30.11	100	32	Vertical
2	1215.2000	54.29	45.82	-8.47	74.00	28.18	100	177	Vertical
3	1999.6000	52.53	45.82	-6.71	74.00	28.18	100	177	Vertical
4	3409.5000	53.92	42.59	-11.33	74.00	31.41	100	267	Vertical
5	5050.5000	47.34	48.28	0.94	74.00	25.72	100	34	Vertical
6	17887.5000	38.00	51.22	13.22	74.00	22.78	100	241	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5050.5000	0.94	40.21	41.15	54.00	12.85	100	34	Vertical
2	17887.5000	13.22	30.11	43.33	54.00	10.67	100	241	Vertical

Mode: 2DH5

Highest Frequency (2480MHz)

Environment: 24.2°C;Humi:54%RH 101.0kPa

Test Engineer: Zhang Zishan

Date: 2023-09-17

Test Voltage: DC 3.7V

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1111.2000	56.33	46.80	-9.53	74.00	27.20	100	143	Horizontal
2	1994.6000	49.69	44.17	-5.52	74.00	29.83	100	227	Horizontal
3	2594.0000	48.62	46.03	-2.59	74.00	27.97	100	198	Horizontal
4	2991.6000	47.37	46.87	-0.50	74.00	27.13	100	102	Horizontal
5	5106.0000	46.02	46.13	0.11	74.00	27.87	200	207	Horizontal
6	15768.0000	39.76	50.42	10.66	74.00	23.58	200	124	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	15768.0000	10.66	30.23	40.89	54.00	13.11	200	124	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1113.0000	55.25	44.25	-11.00	74.00	29.75	100	315	Vertical
2	1239.0000	51.64	43.98	-7.66	74.00	30.02	100	168	Vertical
3	2128.0000	50.25	45.78	-4.47	74.00	28.22	100	197	Vertical
4	2916.2000	48.16	46.94	-1.22	74.00	27.06	100	197	Vertical
5	5103.0000	46.37	46.56	0.19	74.00	27.44	200	340	Vertical
6	17665.5000	40.38	51.18	10.80	74.00	22.82	100	146	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	17665.5000	10.80	31.20	42.00	54.00	12.00	100	146	Vertical

Remark:

- 1 Measuring frequencies from 1 GHz to 18GHz harmonic of highest fundamental frequency.
- 2 Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum setting:
 - a. Peak Setting 1GHz–26.5GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = auto.
 - b. AV Setting 1GHz–26.5GHz, Set RBW=1MHz, if the EUT is configured to transmit with duty cycle $\geq 98\%$, set $VBW \leq RBW/100$ (i.e., 10kHz) but not less than 10 Hz. if the EUT duty cycle is $< 98\%$, set $VBW \geq 1/T$, Where T is defined in section 2.9.

Test result: The unit does meet the requirements.

----- The following blanks -----

18GHz to 26.5GHz

Pre-scan all modes and recorded the worst case results in this report (2DH5). The peak test results is less than the average limits, so the average test results had not reported.

Mode: 2DH5

Lowest Frequency (2402MHz)

Environment: 21.6°C;Humi:64%RH /101.0kPa

Test Engineer: Zhang Zishan

Date: 2023-09-18

Test Voltage: DC 3.7V

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	18785.4000	54.54	37.37	-17.17	83.54	46.17	100	98	Horizontal
2	19164.9250	54.61	37.39	-17.22	83.54	46.15	100	286	Horizontal
3	20826.6750	52.32	36.09	-16.23	83.54	47.45	100	160	Horizontal
4	22267.4250	52.22	36.48	-15.74	83.54	47.06	100	98	Horizontal
5	24511.8500	49.19	34.97	-14.22	83.54	48.57	100	47	Horizontal
6	25416.6750	48.85	34.76	-14.09	83.54	48.78	100	224	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	18787.1000	54.19	37.02	-17.17	83.54	46.52	100	282	Vertical
2	20042.9750	54.13	37.37	-16.76	83.54	46.17	100	143	Vertical
3	21090.6000	52.38	36.26	-16.12	83.54	47.28	100	250	Vertical
4	22286.9750	51.99	36.31	-15.68	83.54	47.23	100	173	Vertical
5	23499.9250	50.31	35.28	-15.03	83.54	48.26	100	111	Vertical
6	25494.4500	49.46	35.42	-14.04	83.54	48.12	100	18	Vertical

Note: The pre measurement result margin is greater than 20dB, and final measurement is not required

----- The following blanks -----

Mode: 2DH5
Middle Frequency (2441MHz)
Environment: 21.6℃;Humi:64%RH /101.0kPa
Test Engineer: Zhang Zishan

Date: 2023-09-18
Test Voltage: DC 3.7V

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	18804.1000	54.28	37.06	-17.22	83.54	46.48	100	360	Horizontal
2	19900.6000	53.42	36.84	-16.58	83.54	46.70	100	78	Horizontal
3	20581.8750	54.39	37.86	-16.53	83.54	45.68	100	142	Horizontal
4	22297.1750	51.35	35.86	-15.49	83.54	47.68	100	303	Horizontal
5	24097.9000	49.37	35.12	-14.25	83.54	48.42	100	360	Horizontal
6	25510.6000	48.47	34.23	-14.24	83.54	49.31	100	78	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	18675.3250	54.94	37.57	-17.37	83.54	45.97	100	48	Vertical
2	19232.0750	53.85	36.94	-16.91	83.54	46.60	100	95	Vertical
3	19904.8500	53.78	37.21	-16.57	83.54	46.33	100	328	Vertical
4	21008.1500	52.62	36.57	-16.05	83.54	46.97	100	204	Vertical
5	22174.7750	51.69	36.06	-15.63	83.54	47.48	100	328	Vertical
6	24303.1750	49.41	35.14	-14.27	83.54	48.40	100	251	Vertical

Note: The pre measurement result margin is greater than 20dB, and final measurement is not required

----- The following blanks -----

Mode: 2DH5

Highest Frequency (2480MHz)

Environment: 21.6°C;Humi:64%RH /101.0kPa

Test Engineer: Zhang Zishan

Date: 2023-09-18

Test Voltage: DC 3.7V

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	19337.4750	54.69	37.46	-17.23	83.54	46.08	100	299	Horizontal
2	19928.6500	53.74	36.92	-16.82	83.54	46.62	100	237	Horizontal
3	21452.2750	52.22	36.34	-15.88	83.54	47.20	100	143	Horizontal
4	22678.4000	51.13	35.97	-15.16	83.54	47.57	100	128	Horizontal
5	24668.6750	49.17	35.10	-14.07	83.54	48.44	100	315	Horizontal
6	26128.5500	49.52	35.13	-14.39	83.54	48.41	100	221	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	18427.9750	54.38	36.68	-17.70	83.54	46.86	100	345	Vertical
2	20059.5500	54.01	37.26	-16.75	83.54	46.28	100	49	Vertical
3	21034.0750	53.34	37.20	-16.14	83.54	46.34	100	95	Vertical
4	22533.0500	52.02	36.89	-15.13	83.54	46.65	100	235	Vertical
5	24416.2750	49.31	35.05	-14.26	83.54	48.49	100	126	Vertical
6	25364.4000	49.01	34.89	-14.12	83.54	48.65	100	95	Vertical

Note: The pre measurement result margin is greater than 20dB, and final measurement is not required

----- The following blanks -----

14. RESTRICTED BANDS OF OPERATION

14.1 LIMITS

Section 15.247(d) In addition, Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

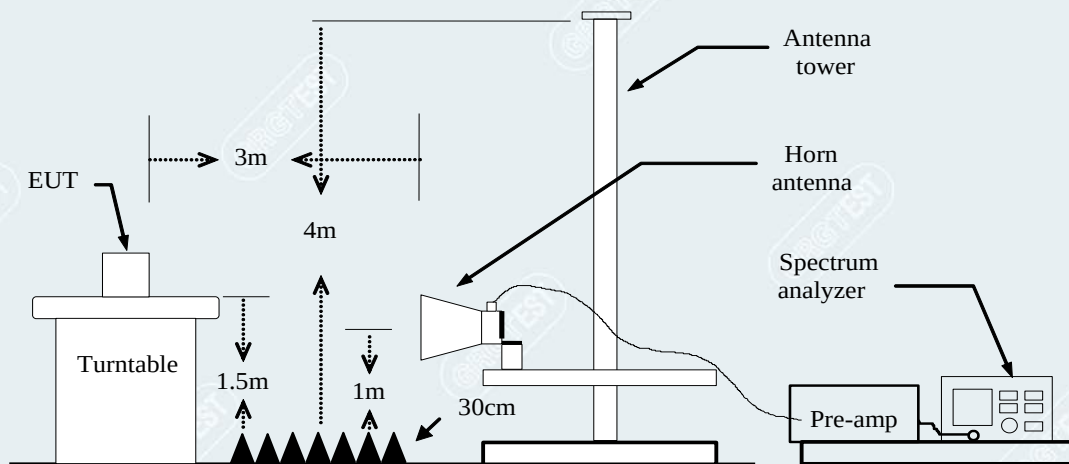
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 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	2655 - 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	
13.36 - 13.41			

Frequency (MHz)	Quasi-peak(μ V/m)	Measurement distance(m)	Quasi-peak(dB μ V/m)@distance 3m
0.009-0.490	2400/F(kHz)	300	128.5~93.8
0.490-1.705	24000/F(kHz)	30	73.8~63
1.705-30.0	30	30	69.5
30 ~ 88	100	3	40
88~216	150	3	43.5
216 ~ 960	200	3	46
Above 960	500	3	54

14.2 TEST PROCEDURES

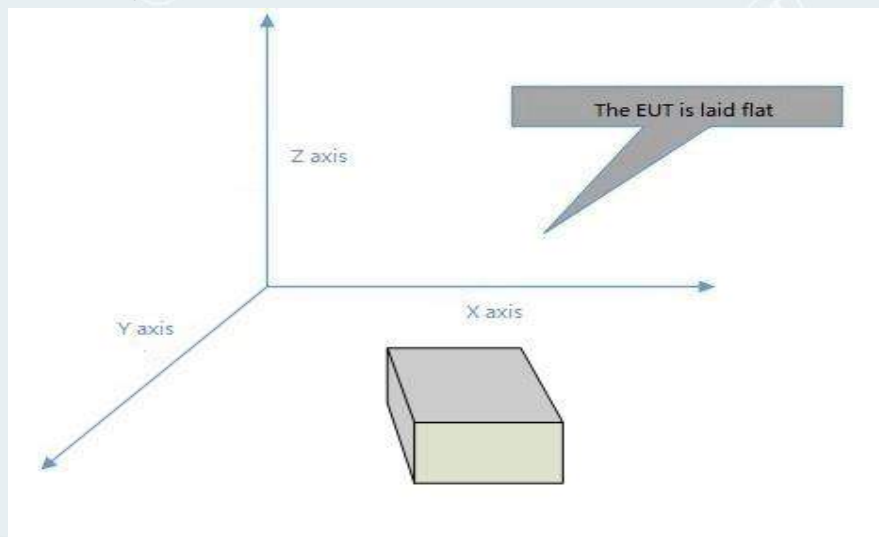
- 1) The EUT is placed on a turntable, which is 1.5m above the ground plane.
- 2) The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3) EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
- 4) Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - a) PEAK: RBW=1MHz / VBW=1MHz / Sweep=AUTO.
 - b) AVERAGE: RBW=1MHz / VBW=1/T / Sweep=AUTO. Where T is defined in section 2.9.
- 5) Repeat the procedures until all the PEAK and AVERAGE versus polarization are measured.

14.3 TEST SETUP



14.4 TEST RESULTS

The test are under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X axis. So the data shown the X axis only.



DH5**Lowest Channel**

Frequency 2402MHz

Environment: 24.2°C/54%RH/101.0kPa

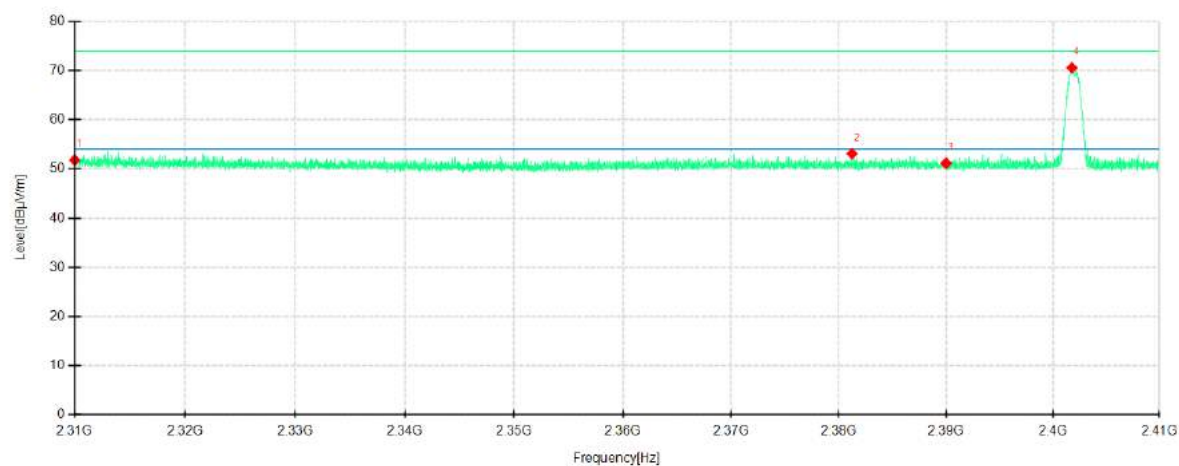
Tested By: Zhang Zishan

Detector mode: Peak

Test Voltage: DC 3.7V

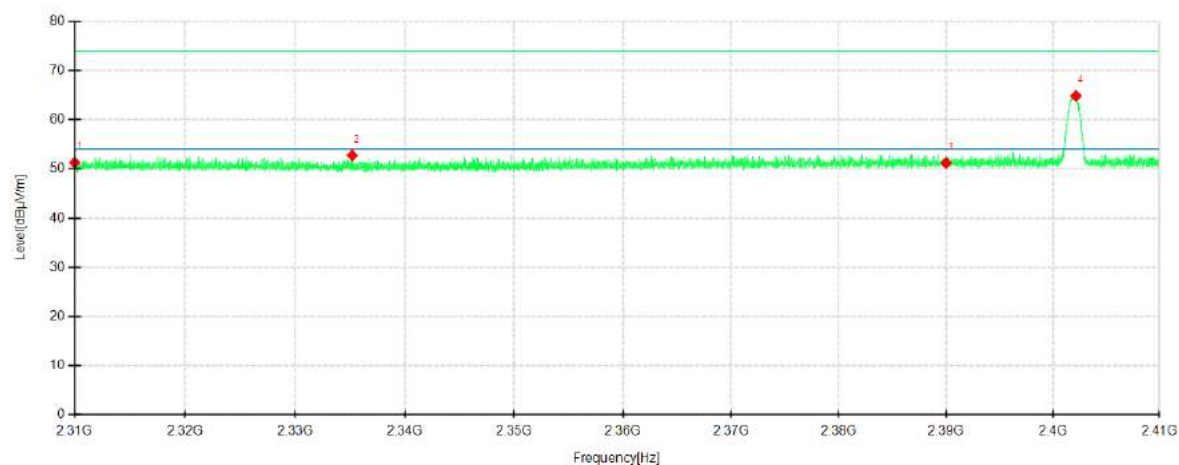
Date: 2023-09-17

Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBμV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2310.0000	46.21	51.80	5.59	74.00	22.20	100	202	Horizontal	/
2	2381.2375	48.37	53.10	4.73	74.00	20.90	100	58	Horizontal	/
3	2390.0000	46.37	51.17	4.80	74.00	22.83	200	146	Horizontal	/
4	2401.7875	65.68	70.57	4.89	-	-	100	242	Horizontal	No limit
1	2310.0000	46.42	51.31	4.89	74.00	22.69	200	136	Vertical	/
2	2335.1875	48.09	52.77	4.68	74.00	21.23	100	198	Vertical	/
3	2390.0000	46.02	51.24	5.22	74.00	22.76	100	314	Vertical	/
4	2402.1625	59.47	64.86	5.39	-	-	100	328	Vertical	No limit

Lowest Channel

Frequency 2402MHz

Environment: 24.2°C/54%RH/101.0kPa

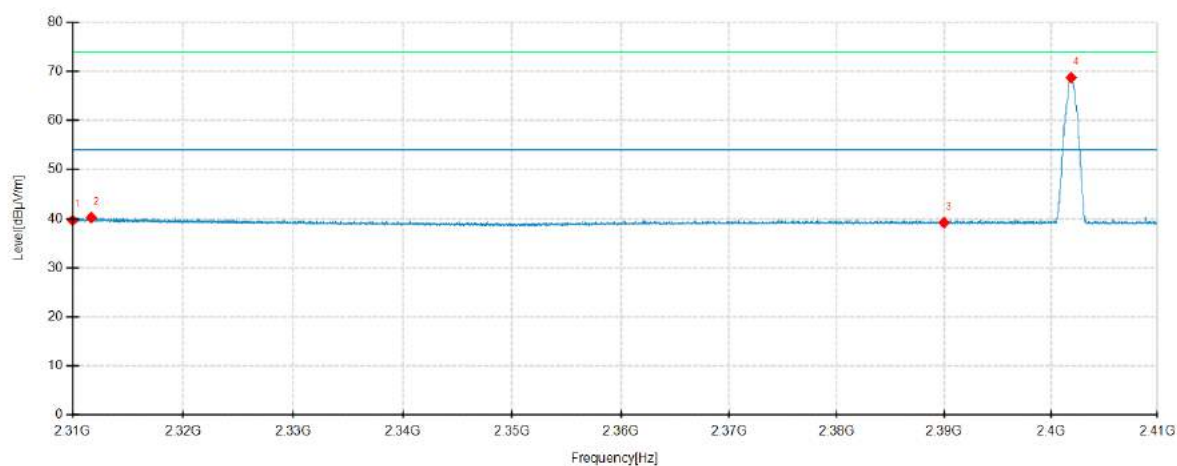
Tested By: Zhang Zishan

Detector mode: Average

Test Voltage: DC 3.7V

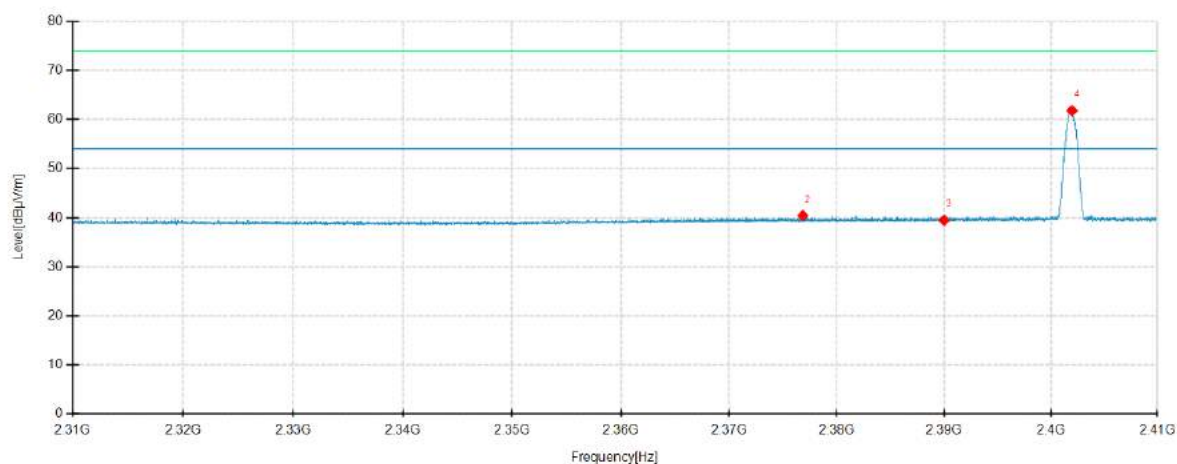
Date: 2023-09-17

Polarity: Horizontal



Detector mode: Average

Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBμV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2310.0000	34.08	39.67	5.59	54.00	14.33	200	314	Horizontal	/
2	2311.6875	34.71	40.25	5.54	54.00	13.75	200	212	Horizontal	/
3	2390.0000	34.39	39.19	4.80	54.00	14.81	100	344	Horizontal	/
4	2401.9000	63.85	68.74	4.89	-	-	100	239	Horizontal	No limit
1	2301.0000	34.15	39.04	4.89	54.00	14.96	100	95	Vertical	/
2	2376.8500	35.45	40.45	5.00	54.00	13.55	200	189	Vertical	/
3	2390.0000	34.27	39.49	5.22	54.00	14.51	100	29	Vertical	/
4	2401.9750	56.43	61.82	5.39	-	-	100	276	Vertical	No limit

Highest Channel

Frequency 2480MHz

Environment: 24.2°C/54%RH/101.0kPa

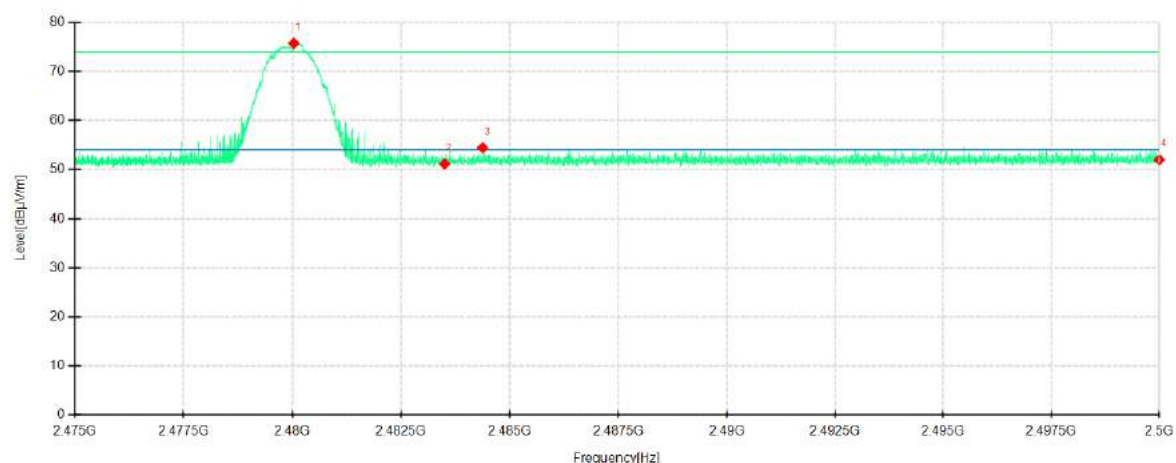
Tested By: Zhang Zishan

Detector mode: Peak

Test Voltage: DC 3.7V

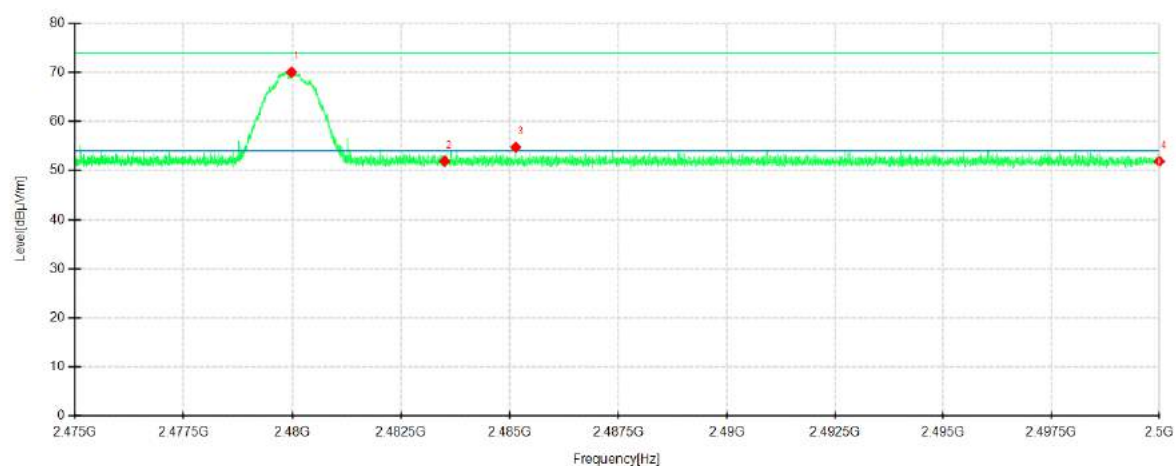
Date: 2023-09-17

Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBμV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2480.0313	70.16	75.73	5.57	-	-	100	46	Horizontal	No limit
2	2483.5000	45.54	51.17	5.63	74.00	22.83	100	360	Horizontal	/
3	2484.3750	48.83	54.47	5.64	74.00	19.53	200	186	Horizontal	/
4	2500.0000	46.11	52.01	5.90	74.00	21.99	100	201	Horizontal	/
1	2479.9781	64.37	70.06	5.69	-	-	100	327	Vertical	No limit
2	2483.5000	46.22	51.92	5.70	74.00	22.08	100	276	Vertical	/
3	2485.1375	49.08	54.77	5.69	74.00	19.23	200	237	Vertical	/
4	2500.0000	46.19	51.89	5.70	74.00	22.11	100	94	Vertical	/

Highest Channel

Frequency 2480MHz

Environment: 24.2°C/54%RH/101.0kPa

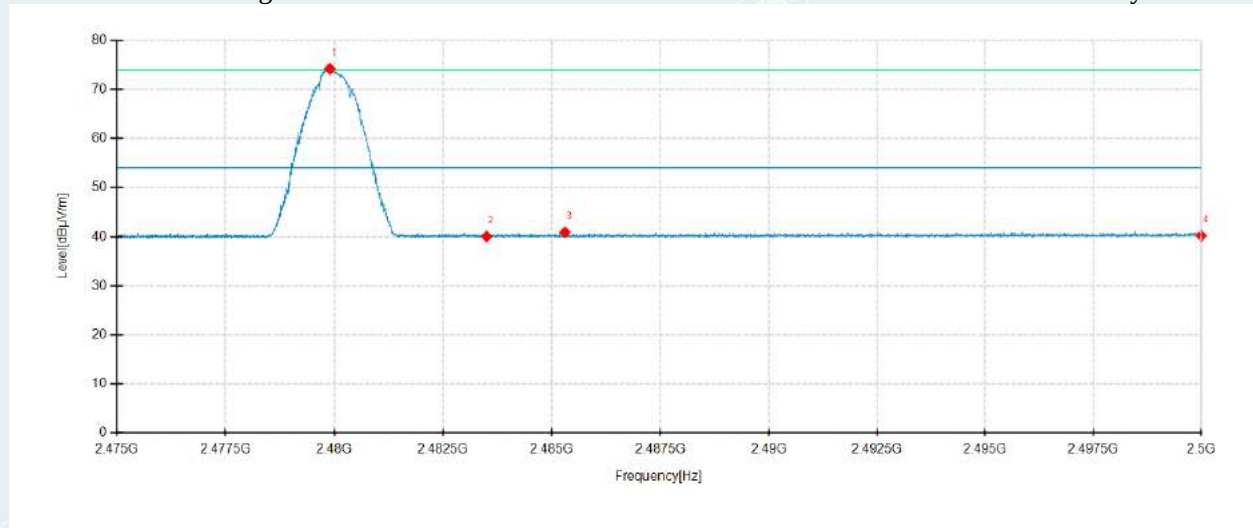
Tested By: Zhang Zishan

Detector mode: Average

Test Voltage: DC 3.7V

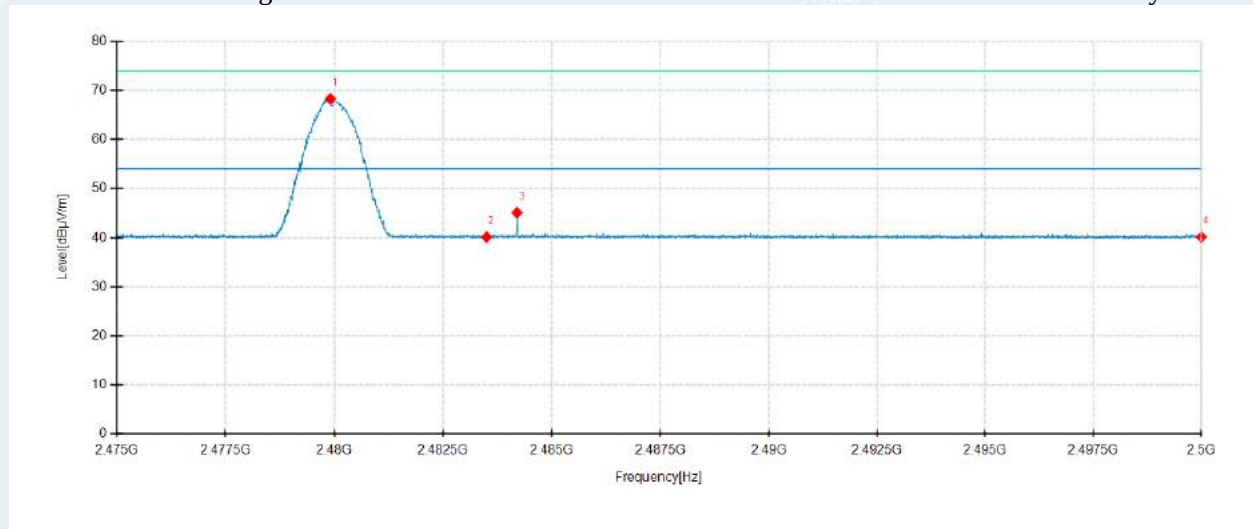
Date: 2023-09-17

Polarity: Horizontal



Detector mode: Average

Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBμV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2479.8938	68.66	74.23	5.57	-	-	100	46	Horizontal	No limit
2	2483.5000	34.43	40.06	5.63	54.00	13.94	100	330	Horizontal	/
3	2485.3031	35.25	40.91	5.66	54.00	13.09	100	85	Horizontal	/
4	2500.0000	34.32	40.22	5.90	54.00	13.78	200	340	Horizontal	/
1	2479.9063	62.60	68.29	5.69	-	-	100	314	Vertical	No limit
2	2483.5000	34.45	40.15	5.70	54.00	13.85	200	46	Vertical	/
3	2484.2000	39.41	45.11	5.70	54.00	8.89	100	55	Vertical	/
4	2500.0000	34.47	40.17	5.70	54.00	13.83	100	0	Vertical	/

2DH5**Lowest Channel**

Frequency 2402MHz

Environment: 24.2°C/54%RH/101.0kPa

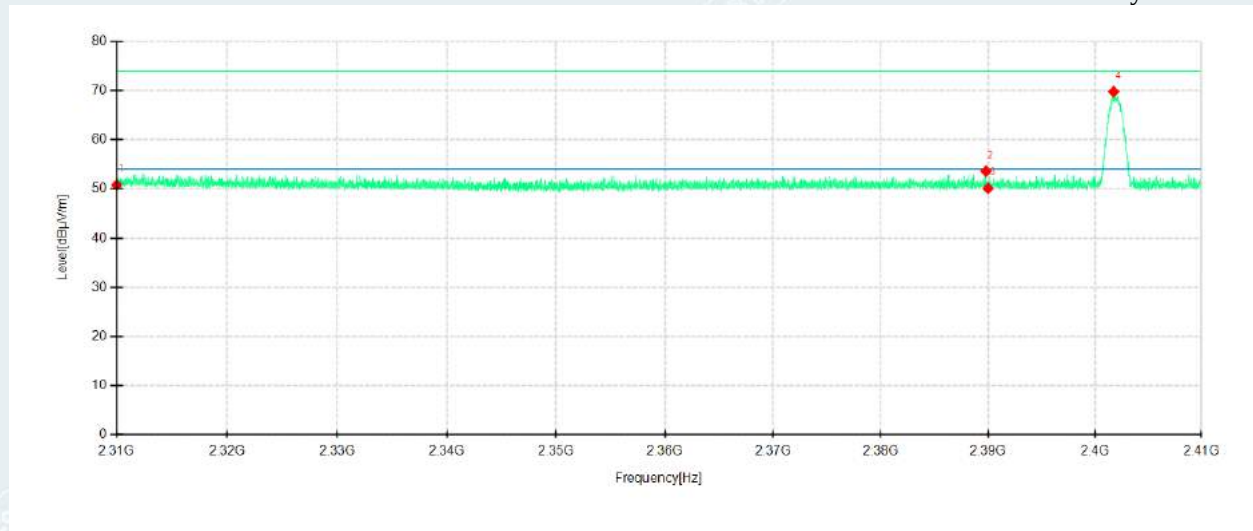
Tested By: Zhang Zishan

Detector mode: Peak

Test Voltage: DC 3.7V

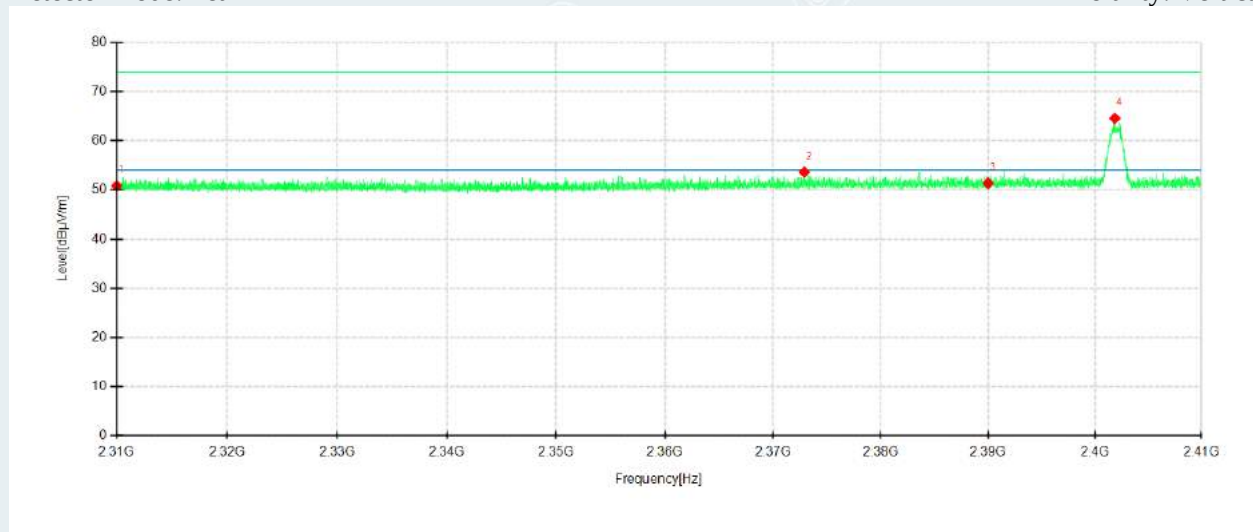
Date: 2023-09-17

Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBμV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2310.0000	45.23	50.82	5.59	74.00	23.18	200	275	Horizontal	/
2	2389.8125	48.83	53.62	4.79	74.00	20.38	200	209	Horizontal	/
3	2390.0000	45.33	50.13	4.80	74.00	23.87	100	188	Horizontal	/
4	2401.7625	64.89	69.78	4.89	-	-	100	46	Horizontal	No limit
1	2310.0000	45.96	50.85	4.89	74.00	23.15	100	287	Vertical	/
2	2372.9000	48.70	53.63	4.93	74.00	20.37	100	0	Vertical	/
3	2390.0000	46.17	51.39	5.22	74.00	22.61	100	300	Vertical	/
4	2401.8750	59.16	64.55	5.39	-	-	100	327	Vertical	No limit

Lowest Channel

Frequency 2402MHz

Environment: 24.2°C/54%RH/101.0kPa

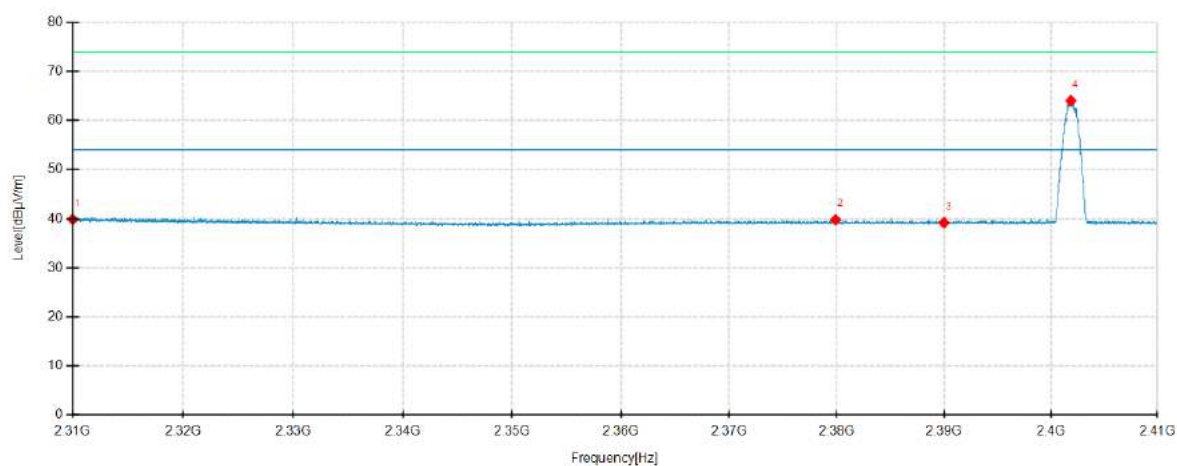
Tested By: Zhang Zishan

Detector mode: Average

Test Voltage: DC 3.7V

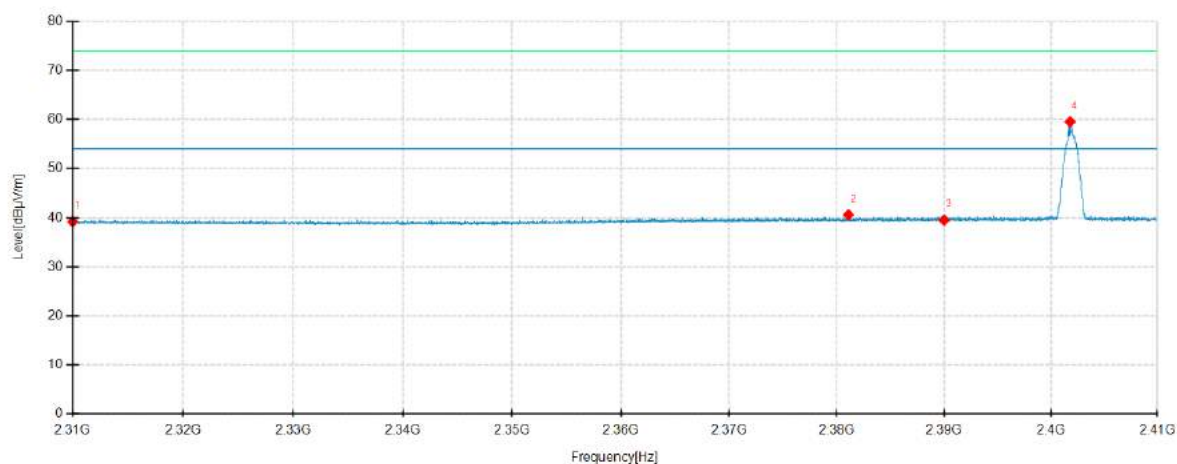
Date: 2023-09-17

Polarity: Horizontal



Detector mode: Average

Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBμV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2310.0000	34.30	39.89	5.59	54.00	14.11	100	163	Horizontal	/
2	2379.9000	35.08	39.79	4.71	54.00	14.21	200	289	Horizontal	/
3	2390.0000	34.38	39.18	4.80	54.00	14.82	200	342	Horizontal	/
4	2401.8750	59.14	64.03	4.89	-	-	100	241	Horizontal	No limit
1	2310.0000	34.29	39.18	4.89	54.00	14.82	100	339	Vertical	/
2	2381.0875	35.52	40.59	5.07	54.00	13.41	200	227	Vertical	/
3	2390.0000	34.30	39.52	5.22	54.00	14.48	100	339	Vertical	/
4	2401.8000	54.13	59.52	5.39	-	-	100	302	Vertical	No limit

Highest Channel

Frequency 2480MHz

Environment: 24.2°C/54%RH/101.0kPa

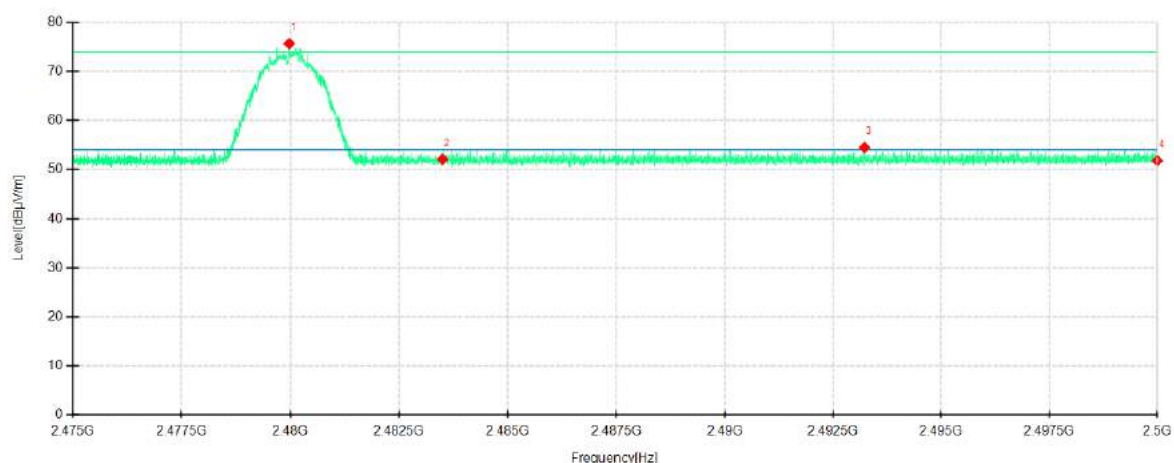
Tested By: Zhang Zishan

Detector mode: Peak

Test Voltage: DC 3.7V

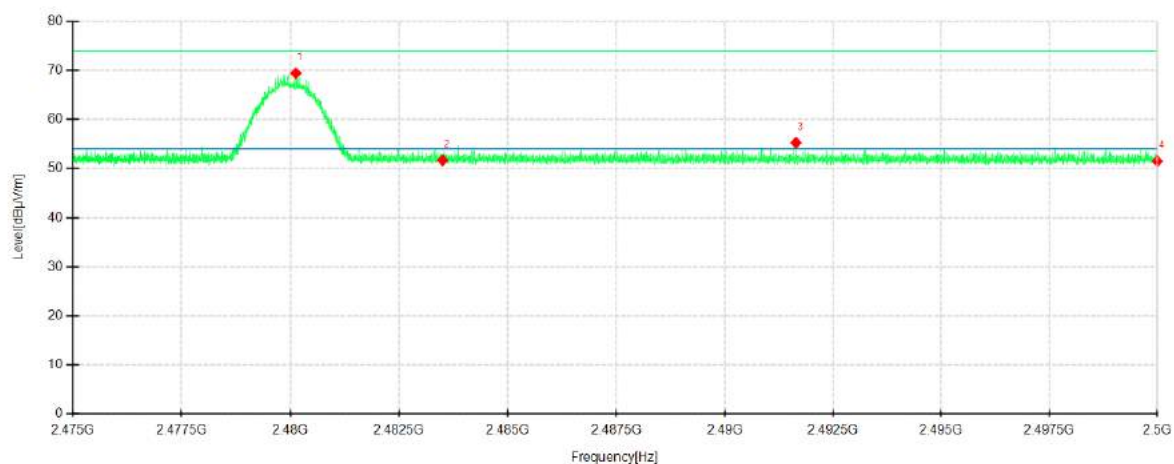
Date: 2023-09-17

Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBμV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2479.9719	70.08	75.65	5.57	-	-	100	45	Horizontal	No limit
2	2483.5000	46.47	52.10	5.63	74.00	21.90	100	253	Horizontal	/
3	2493.2281	48.72	54.51	5.79	74.00	19.49	200	5	Horizontal	/
4	2500.0000	45.92	51.82	5.90	74.00	22.18	200	136	Horizontal	/
1	2480.1250	63.73	69.42	5.69	-	-	100	324	Vertical	No limit
2	2483.5000	45.99	51.69	5.70	74.00	22.31	200	93	Vertical	/
3	2491.6438	49.60	55.29	5.69	74.00	18.71	100	0	Vertical	/
4	2500.0000	45.80	51.50	5.70	74.00	22.50	200	79	Vertical	/

Highest Channel

Frequency 2480MHz

Environment: 24.2°C/54%RH/101.0kPa

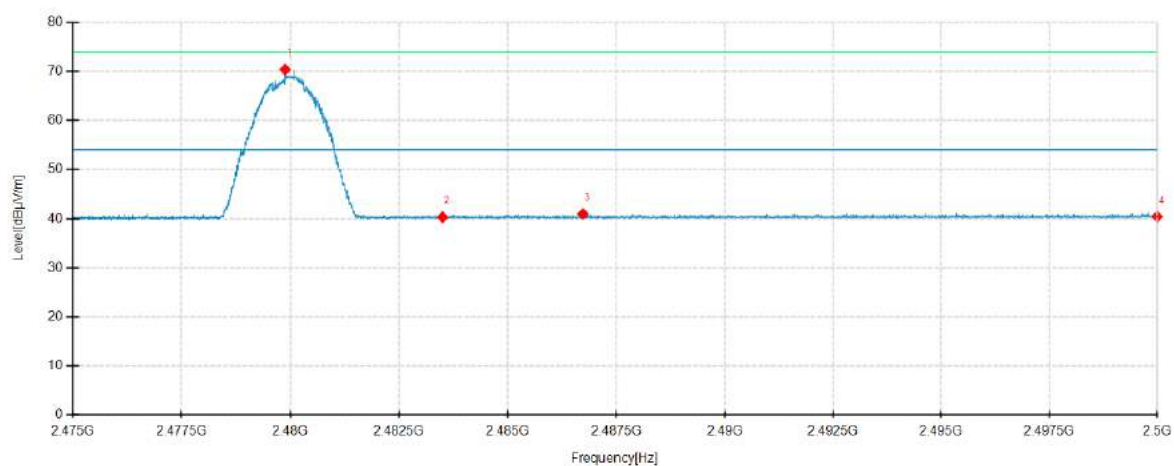
Tested By: Zhang Zishan

Detector mode: Average

Test Voltage: DC 3.7V

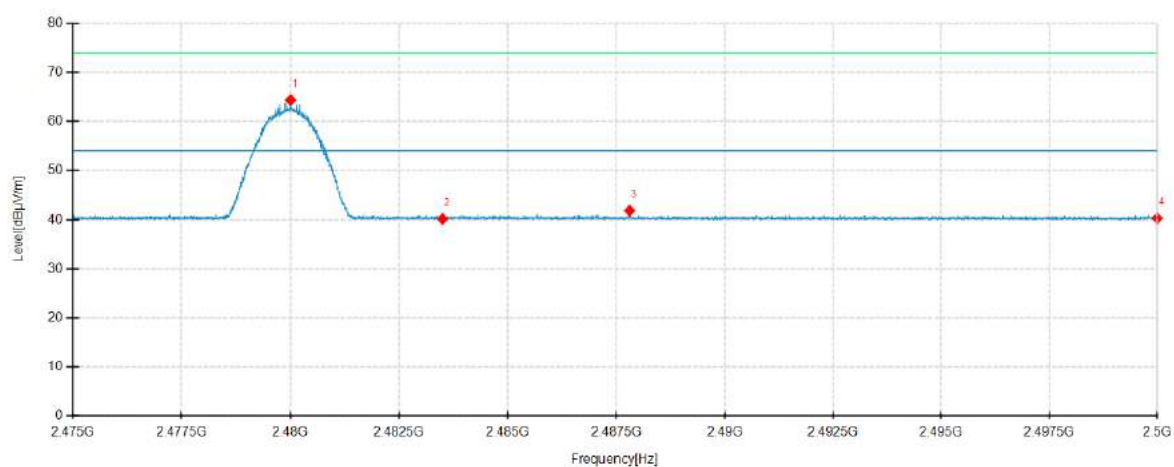
Date: 2023-09-17

Polarity: Horizontal



Detector mode: Average

Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBμV/m	Margin dB	Height cm	Angle °	Pole	Remark
1	2479.8781	64.82	70.39	5.57	-	-	100	51	Horizontal	No limit
2	2483.5000	34.69	40.32	5.63	54.00	13.68	100	304	Horizontal	/
3	2486.7313	35.31	40.99	5.68	54.00	13.01	200	208	Horizontal	/
4	2500.0000	34.53	40.43	5.90	54.00	13.57	100	317	Horizontal	
1	2480.0031	58.68	64.37	5.69	-	-	100	327	Vertical	No limit
2	2483.5000	34.47	40.17	5.70	54.00	13.83	100	300	Vertical	/
3	2487.8063	36.14	41.84	5.70	54.00	12.16	200	175	Vertical	/
4	2500.0000	34.60	40.30	5.70	54.00	13.70	100	327	Vertical	

Remark:

- 1) Max field strength in 3m distance. No any other emission which falls in restricted bands can be detected and be reported.

APPENDIX A. PHOTOGRAPH OF THE TEST CONNECTION DIAGRAM

Please refer to the attached document E202306264850-9-2 FCC Test photo.

APPENDIX B. PHOTOGRAPH OF THE EUT

Please refer to the attached document E202306264850-10-EUT photo.

----- End of Report -----