Test Report

Verified code: 662147

Report No.: E20240819312801-1

Customer:	Lumi United Technology Co., Ltd
Address:	B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China
Sample Name:	Dual Relay Module T2
Sample Model:	DCM-K01
Receive Sample Test Date:	Sep.20,2024
Test Date:	Sep.26,2024 ~ Oct.10,2024
Reference Document:	CFR 47 FCC Part 15 Subpart C RADIO FREQUENCY DEVICES:Subpart C—Intentional Radiators
Test Result:	Pass

Prepared by: Lu Wei — Lu Wei

Reviewed by: Jiang Tao — Jiang Tao

Approved by: Xiao Liang — Xiao Liang

GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2024-10-18

GRG METROLOGY & TEST GROUP CO., LTD.
Address: No.163,Pingyun Road, West of Huangpu Avenue, Guangzhou, Guangdong, China
Tel：（+86）400-602-0999 FAX：（+86）020-38698685 Web：http://www.grgtest.com

Statement

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2. The sample information is provided by the client and responsible for its authenticity; The content of the report is only valid for the samples sent this time.

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. This testing report is only for scientific research, teaching, internal quality control, etc.

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E20240819312801-1	Original Issue	2024-10-15

Note:

1. This report is based on the original report E20230411918001-1 to add an adapter with the model of SC06Z-240020. After evaluation, it is added to test Conducted Emissions and Radiated spurious emissions below 1GHz, other all test datas come from E20230411918001-1.
2. The difference between this report and E20230411918001-1 is:
   a) The new adapter description and test mode was added in Section 2.3 to 2.7.
   b) Update the calibration time for adapter test in section 6.
   c) Add adapter test datas in sections 7&8.

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1. TEST RESULT SUMMARY

Technical Requirements		
CFR 47 FCC Part 15 Subpart C (§15.247) ANSI C63.10-2013 KDB 558074 D01 15.247 measurement guidance v05r02		
Limit / Severity	**Item**	**Result**
§15.247(b)(3)	Maximum peak output power	Pass
§15.207 (a)	Conducted Emissions	Pass
§15.247(e)	Power spectral density	Pass
§15.247(a)(2)	6dB bandwidth	Pass
§15.247(d)& §15.205& §15.209	Restricted bands of operation	Pass
§15.247(d)	Conducted band edges and spurious emissions	Pass
§15.247(d) & §15.209 & §15.205	Radiated spurious emissions	Pass
§15.203	Antenna requirement	Pass

Note:
1) The EUT has one antenna. The max gain of antenna is 1dBi. The antenna is PIFA antenna, 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:	Lumi United Technology Co., Ltd
Address:	B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China

2.2 MANUFACTURER

Name:	Lumi United Technology Co., Ltd
Address:	B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China

2.3 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment:	Dual Relay Module T2
Model No.:	DCM-K01
Adding Model:	/
Models Difference:	/.
Trade Name:	Aqara
FCC ID:	2AKIT-DCM-K01
Power Supply:	AC 100-250V, 50/60Hz, Max. 10A,Max 2500W; DC 24-30V, Max. 10A, Max 300W; DC 30-60V, Max. 1A, Max 60W Adapter Model: SC06Z-240020 Input: 100-240V~50/60Hz 0.25A Max Output: 24.0V ⎓ 0.2A 4.8W
Battery Specification:	/
Frequency Range:	2405MHz-2475MHz
Transmit Power:	6.68dBm
Modulation type:	O-QPSK
Antenna Specification:	PIFA antenna 1dBi gain (Max.)
Temperature Range:	-10 ℃ ~ 40 ℃
Hardware Version:	x4
Software Version:	0.0.0_0023
Sample No:	E20230411918001-0001, E20230411918001-0002, E20240819312801-0001
Note:	The 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.

2.4 CHANNEL LIST

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
***11**	**2405**	12	2410	13	2415	14	2420
15	2425	16	2430	17	2435	***18**	**2440**
19	2445	20	2450	21	2455	22	2460
23	2465	24	2470	***25**	**2475**	/	/

* is the test frequency

2.5 TEST OPERATION MODE

Mode No.	Description of the modes
1	Zigbee fixed frequency transmitting

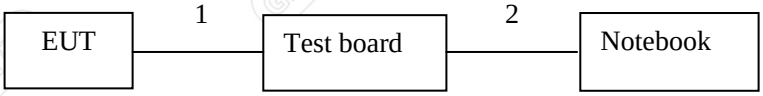
2.6 LOCAL SUPPORTIVE

Name of Equipment	Manufacturer	Model	Serial Number	Note
Notebook	LENOVO	TianYi 310-14ISK	MP18DLC6	/
Test board	/	/	/	/
Adapter	SUNUN	SC06Z-240020	/	/

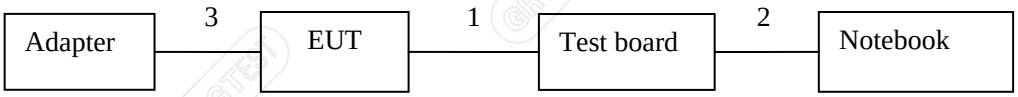
No.	Cable Type	Qty.	Shielded Type	Ferrite Core(Qty.)	Length
1	DC cable	1	No	0	0.5m
2	DC cable	1	No	0	0.2m
3	DC cable	1	No	0	1.5m

Note :The notebook is just used to produce fixed frequency transmitting.

2.7 CONFIGURATION OF SYSTEM UNDER TEST



For Adapter



Test software:

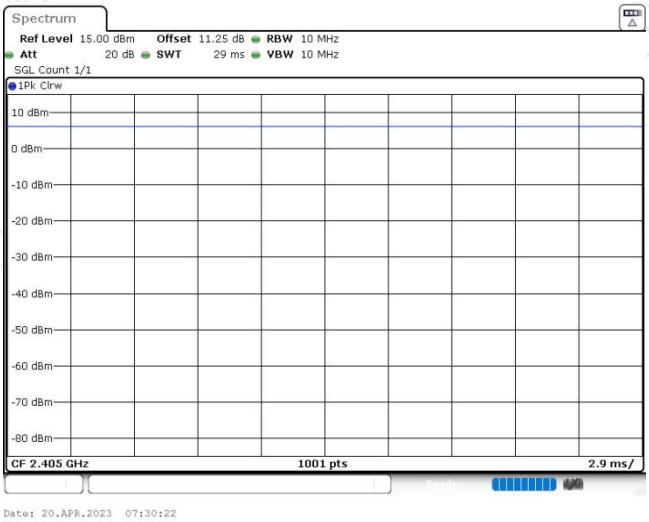
Software version	Test level
QCOM_V1.0	2405MHz: 80 2440MHz: 80 2475MHz: 80

2.8 DUTY CYCLE

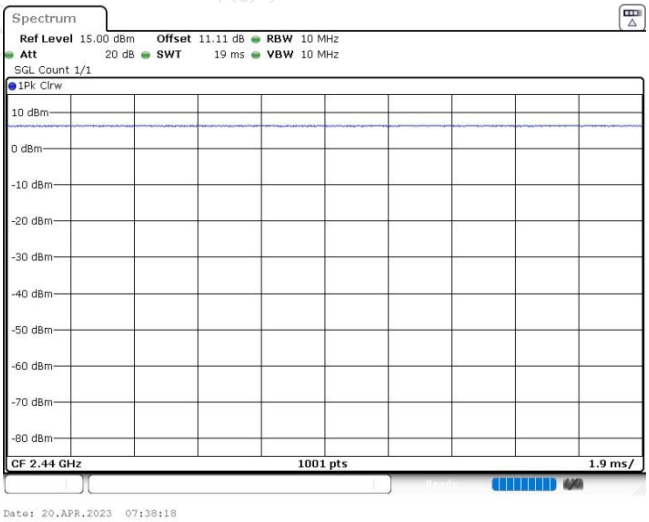
Environment: 24.6℃/65%RH/101.0kPa Voltage: AC 120V/60Hz
Tested By: Qin Tingting Date: 2023-04-20

Test Mode	Antenna	Frequency (MHz)	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
Zigbee	Ant1	2405	1.00	1.00	100
		2440	1.00	1.00	100
		2475	1.00	1.00	100

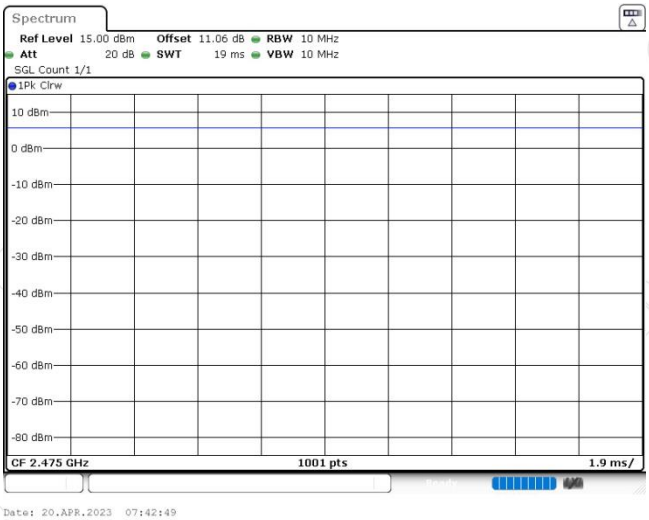
Lowest_2405MHz



Middle_2440MHz



Highest_2475MHz



3. 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

4. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025:2017.

USA	A2LA(Certificate #2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	ISED (Company Number: 24897，CAB identifier:CN0069)
USA	FCC (Registration Number: 759402，Designation Number:CN1198)

Copies of granted accreditation certificates are available for downloading from our web site, http://www.grgtest.com

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5. 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	Horizontal	9kHz～30MHz	5.1dB[1)]
		30MHz～200MHz	4.5dB[1)]
		200MHz～1000MHz	4.4dB[1)]
		1GHz～18GHz	5.6dB[1)]
		18GHz～26.5GHz	3.7dB[1)]
	Vertical	9kHz～30MHz	5.1dB[1)]
		30MHz～200MHz	4.4dB[1)]
		200MHz～1000MHz	4.5dB[1)]
		1GHz～18GHz	5.6dB[1)]
		18GHz～26.5GHz	3.7dB[1)]
Conduction Emission		150kHz～30MHz	3.4dB[1)]

Measurement	Uncertainty
RF frequency	6.0×10^{-6}
RF power conducted	0.8dB
Power spectral density conducted	0.8dB
Occupied channel bandwidth	0.4dB
Unwanted emission, conducted	0.7dB
Humidity	6%
Temperature	2℃

Note:
[1)] This uncertainty represents an expanded uncertainty expressed at approximately the 95%.
This uncertainty represents an expanded uncertainty factor of *k*=2.

6. LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Radiated Spurious Emission&Restricted bands of operation				
Test S/W	EZ	CCS-03A1		
Test Receiver	R&S	ESR7	102444	2023-09-02
Preamplifier	EMEC	EM330	I00426	2024-02-06
Bi-log Antenna	Schwarzbeck	CBL6143A	26039	2024-10-23
Loop Antenna	Schwarzbeck	FMZB 1513-60	1513-60-56	2023-08-06
Spectrum Analyzer	KEYSIGHT	N9010A	MY52221469	2023-06-29
Horn Antenna	Schwarzbeck	BBHA9120D	02143	2023-10-15
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170-497	2023-10-14
Amplifier	Tonscend	TAP01018048	AP20E8060075	2024-04-11
Amplifier	Tonscend	TAP184050	AP20E806071	2024-04-16
Amplifier	SHIRONG ELECTRONIC	DLNA-1G18G-G40	20200928005	2023-08-27
Test S/W	Tonscend	JS36-RE/2.5.1.5		
6dB Bandwidth&Conducted band edges and Spurious Emission&Power Spectral Density				
Spectrum Analyzer	R&S	FSV30	1321.3008K30-104381-rH	2023-11-17
BT/WIFI System	Tonscend	JS0806		
Maximum Peak Output Power				
Pulse power sensor	Anristu	MA2411B	1126150	2024-02-12
Power meter	Anristu	ML2495A	1204003	2024-02-12
Conduction Emission				
EMI TESTRECEIVER	R&S	ESCI	100783	2023-08-28
LISN(EUT)	R&S	ENV216	101543	2023-09-13
Test S/W	EZ	CCS-3A1-CE		

Note: The calibration cycle of the above instruments is 12 months.

For Adapter

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Conduction Emission				
Test Receiver	R&S	ESCI	100783	2025/07/19
LISN(EUT)	R&S	ENV216	101543	2025/07/10
Test S/W	EZ	CCS-3A1-CE		
Radiated Spurious Emission (Frequencies up to 1 GHz)				
Test S/W	Tonscend	JS32-RE	5.0.0	/
Test Receiver	R&S	ESR26	101758	2025/09/10
Preamplifier	Shirong Electronic	DLNA-9k1G-G40	20200928003	2024/11/26
Bi-log Antenna	Schwarzbeck	VULB 9160	VULB9160-3401	2024/12/04

Note: The calibration cycle of the above instruments is 12 months.

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7. CONDUCTED EMISSION MEASUREMENT

7.1 LIMITS

Frequency range	Limits (dBμV)	
	Quasi-peak	Average
150kHz～0.5MHz	66～56	56～46
0.5MHz～5MHz	56	46
5MHz～30MHz	60	50

NOTE: (1) The lower limit shall apply at the transition frequencies.
(2) The limit decreases in line with the logarithm of the frequency in the range of 150 kHz to 0.5MHz.

7.2 TEST PROCEDURES

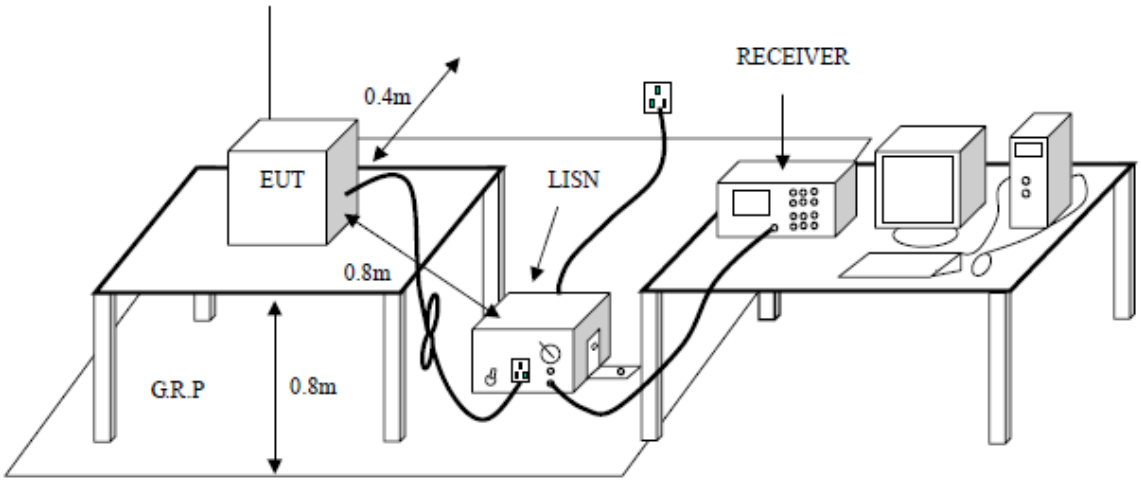
Procedure of Preliminary Test

Test procedures follow ANSI C63.10:2013.
For measurement of the disturbance voltage the equipment under test (EUT) is connected to the power supply mains and any other extended network via one or more artificial network(s). An EUT, whether intended to be grounded or not, and which is to be used on a table is configured as follows:
– Either the bottom or the rear of the EUT shall be at a controlled distance of 40 cm from a reference ground plane. This ground plane is normally the wall or floor of a shielded room. It may also be a grounded metal plane of at least 2 m by 2 m. This is physically accomplished as follows:
1) place the EUT on a table of non-conducting material which is at least 80 cm high. Place the EUT so that it is 40 cm from the wall of the shielded room, or
2) place the EUT on a table of non-conducting material which is 40 cm high so that the bottom of the EUT is 40 cm above the ground plane;
– All other conductive surfaces of the EUT shall be at least 80 cm from the reference ground plane;
– The EUT are placed on the floor that one side of the housings is 40 cm from the vertical reference ground plane and other metallic parts;
– Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 cm to 40 cm long, hanging approximately in the middle between the ground plane and the table.
– I/O cables that are connected to a peripheral shall be bundled in the centre. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1 m.
– 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 test mode(s) described in Item 2.6 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.6 producing the highest emission level.The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test. A scan was taken on both power lines, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

7.3 TEST SETUP



7.4 DATA SAMPLE

Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XXXX	32.69	25.65	11.52	44.21	37.17	65.78	55.79	-21.57	-18.62	Pass

Factor = Insertion loss of LISN + Cable Loss
Result = Quasi-peak Reading/ Average Reading + Factor
Limit = Limit stated in standard
Margin = Result (dBuV) – Limit (dBuV)

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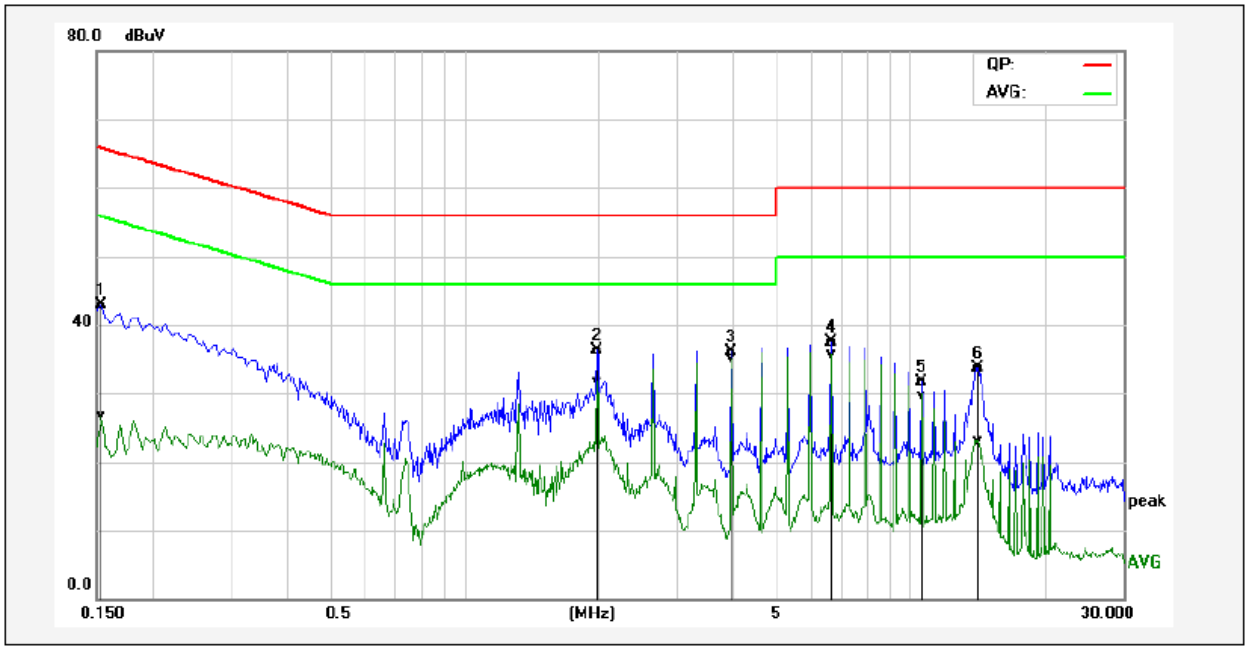
7.5 TEST RESULTS

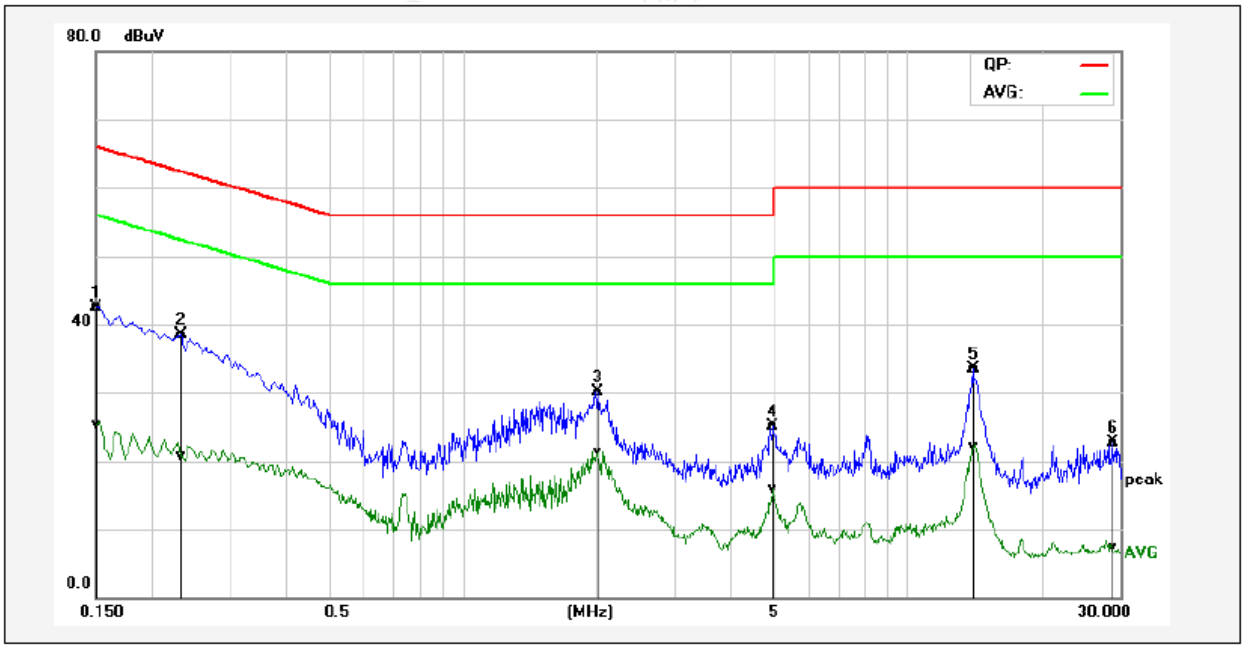
All modes were pretested and only the worst modes and channels were recorded in this report: Highest channel (2475MHz),Power supply:AC 120V/60Hz

EUT Name:	Dual Relay Module T2	Test Mode:	Mode 1
Model:	DCM-K01	Sample No:	E20230411918001-0001
Power supply:	AC 120V/60Hz	Environmental Conditions:	24.1℃/51%RH/101.0kPa
Test Engineer:	Huang Xinlong	Test Date:	2023-05-10
Channel	Highest channel (2475MHz)	Line:	L



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1539	33.34	17.00	9.61	42.95	26.61	65.78	55.79	-22.83	-29.18	Pass
2	1.9900	26.62	21.97	9.65	36.27	31.62	56.00	46.00	-19.73	-14.38	Pass
3*	3.9820	26.45	25.37	9.68	36.13	35.05	56.00	46.00	-19.87	-10.95	Pass
4	6.6340	27.77	26.02	9.73	37.50	35.75	60.00	50.00	-22.50	-14.25	Pass
5	10.6180	21.86	20.03	9.77	31.63	29.80	60.00	50.00	-28.37	-20.20	Pass
6	14.1380	23.92	13.29	9.80	33.72	23.09	60.00	50.00	-26.28	-26.91	Pass

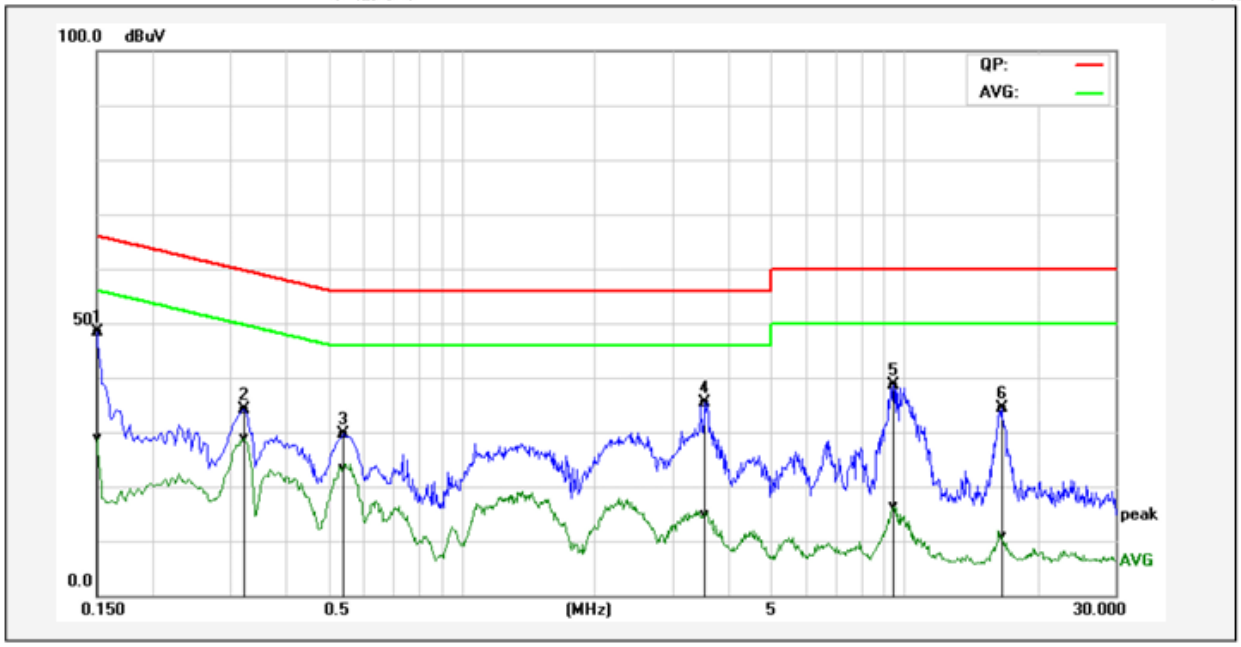
EUT Name:	Dual Relay Module T2	Test Mode:	Mode 1
Model:	DCM-K01	Sample No:	E20230411918001-0001
Power supply:	AC 120V/60Hz	Environmental Conditions:	24.1℃/51%RH/101.0kPa
Test Engineer:	Huang Xinlong	Test Date:	2023-05-10
Channel	Highest channel (2475MHz)	Line:	N



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1500	32.94	15.63	9.60	42.54	25.23	65.99	56.00	-23.45	-30.77	Pass
2	0.2340	28.91	11.16	9.60	38.51	20.76	62.30	52.31	-23.79	-31.55	Pass
3	2.0180	20.45	11.64	9.64	30.09	21.28	56.00	46.00	-25.91	-24.72	Pass
4	5.0020	15.47	6.21	9.70	25.17	15.91	60.00	50.00	-34.83	-34.09	Pass
5	14.0180	23.71	12.33	9.86	33.57	22.19	60.00	50.00	-26.43	-27.81	Pass
6	28.8300	12.67	-2.79	10.05	22.72	7.26	60.00	50.00	-37.28	-42.74	Pass

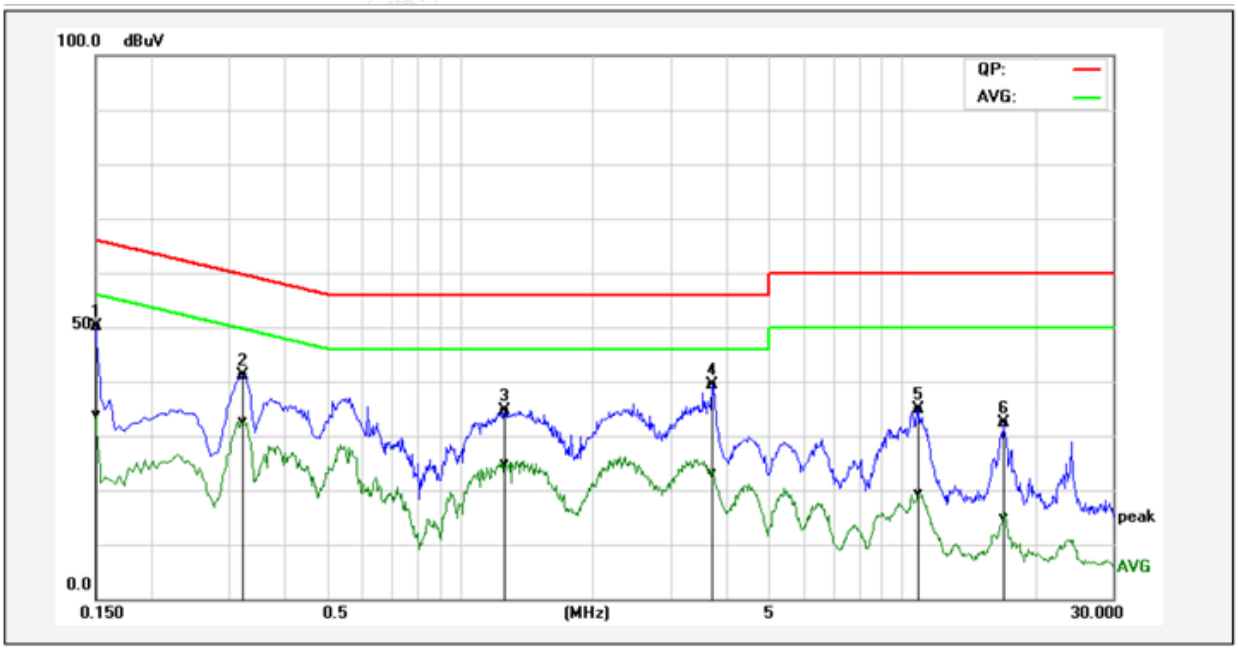
For Adapter

EUT Name:	Dual Relay Module T2	Test Mode:	Mode 1
Model:	DCM-K01	Sample No:	E20240819312801-0001
Power supply:	AC 120V/60Hz	Environmental Conditions:	22.9℃/49%RH/101.0kPa
Test Engineer:	Chen Zexin	Test Date:	2024-10-10
Channel	Highest channel (2475MHz)	Line:	L1



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1500	38.64	19.17	9.82	48.46	28.99	65.99	56.00	-17.53	-27.01	Pass
2	0.3220	24.56	19.19	9.68	34.24	28.87	59.65	49.66	-25.41	-20.79	Pass
3	0.5420	19.94	13.63	9.69	29.63	23.32	56.00	46.00	-26.37	-22.68	Pass
4	3.5580	25.45	4.94	9.94	35.39	14.88	56.00	46.00	-20.61	-31.12	Pass
5	9.4580	28.73	6.55	9.88	38.61	16.43	60.00	50.00	-21.39	-33.57	Pass
6	16.5860	24.25	0.98	10.01	34.26	10.99	60.00	50.00	-25.74	-39.01	Pass

EUT Name:	Dual Relay Module T2	Test Mode:	Mode 1
Model:	DCM-K01	Sample No:	E20240819312801-0001
Power supply:	AC 120V/60Hz	Environmental Conditions:	22.9℃/49%RH/101.0kPa
Test Engineer:	Chen Zexin	Test Date:	2024-10-10
Channel	Highest channel (2475MHz)	Line:	N



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1500	40.35	24.01	9.82	50.17	33.83	65.99	56.00	-15.82	-22.17	Pass
2	0.3220	31.45	23.02	9.68	41.13	32.70	59.65	49.66	-18.52	-16.96	Pass
3	1.2660	24.95	15.10	9.78	34.73	24.88	56.00	46.00	-21.27	-21.12	Pass
4	3.7300	29.54	13.23	9.90	39.44	23.13	56.00	46.00	-16.56	-22.87	Pass
5	10.9500	24.89	9.44	9.90	34.79	19.34	60.00	50.00	-25.21	-30.66	Pass
6	16.9619	22.28	4.79	10.03	32.31	14.82	60.00	50.00	-27.69	-35.18	Pass

8. RADIATED SPURIOUS EMISSIONS

8.1 LIMITS

In any 100 kHz 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 20 dB below that in the 100 kHz 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 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

Frequency (MHz)	Quasi-peak(μV/m)	Measurement distance(m)	Quasi-peak(dBμV/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 lower limit shall apply at the transition frequencies.
(2) Above 18GHz test distance is 1m, so the Peak Limit=74+20*log(3/1)=83.54 (dBμV/m).
The Avg Limit=54+20*log(3/1)=63.54 (dBμV/m).

8.2 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.

--- 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 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.

--- 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 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 pre measurement 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 pre measurement 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.

--- 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 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 pre measurement 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 antenna is moved spherical over the EUT in different polarisations of the antenna.

Final measurement:

--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the pre measurements with Peak and Average detector.
--- 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 pre measurement 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, the EUT is configured to transmit with duty cycle≥98%, set VBW≤RBW/100 (i.e.,10kHz) but not less than 10 Hz.

8.3 TEST SETUP

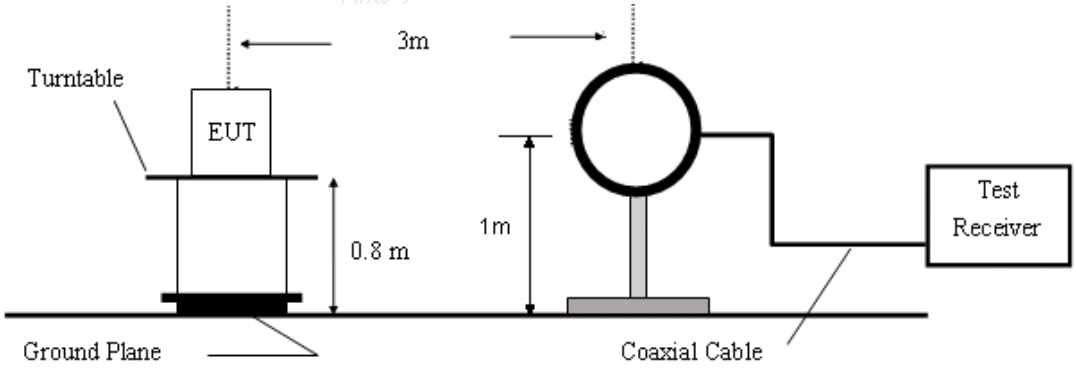


Figure 1. 9kHz to 30MHz radiated emissions test configuration

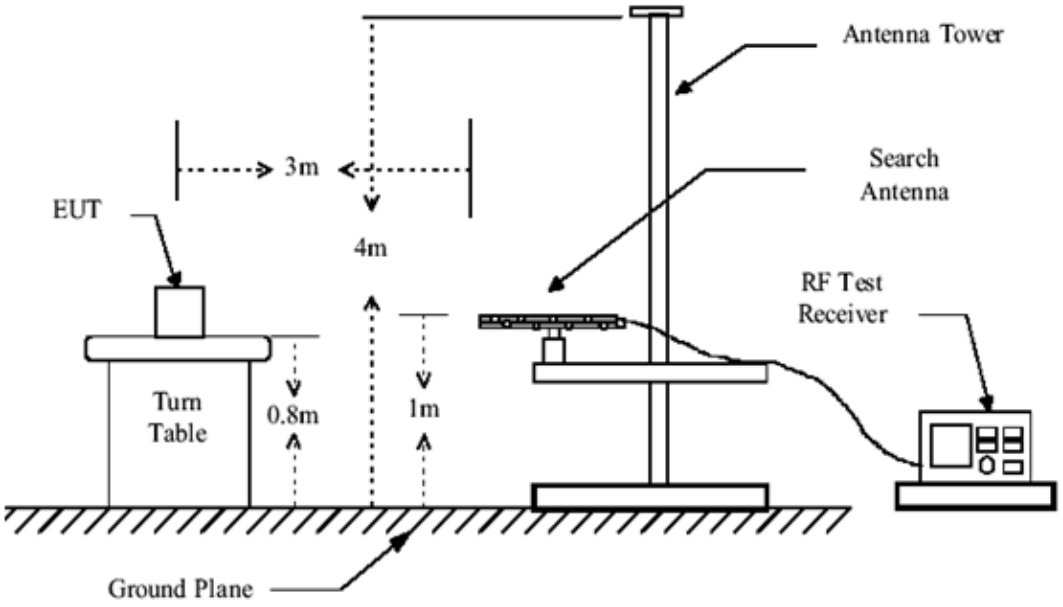


Figure 2. 30MHz to 1GHz radiated emissions test configuration

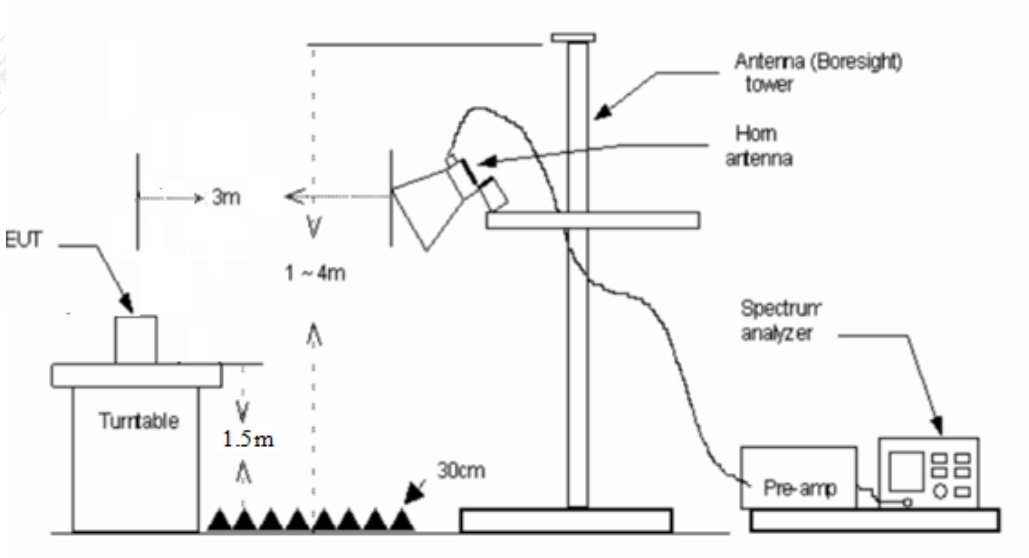


Figure 3. 1GHz-18GHz radiated emissions test configuration

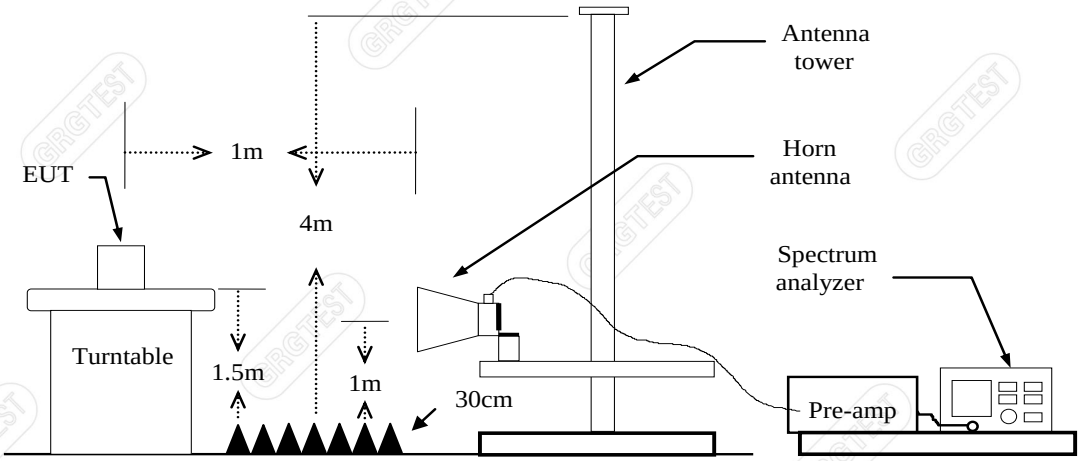


Figure 4. 18GHz-26.5GHz radiated emissions test configuration

8.4 DATA SAMPLE

30MHz to 1GHz

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Detector type
XXXX	63.53	-27.15	36.38	43.50	-7.12	0	100	QP

Frequency (MHz) = Emission frequency in MHz

Reading (dBuV) = Uncorrected Analyzer / Receiver reading

Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)

Limit (dBuV/m) = Limit stated in standard

Margin (dB) = Result (dBuV/m) – Limit(dBuV/m)

QP = Quasi-peak Reading

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

Level (dBuV/m) = Reading (dBuV/m) + Factor (dB/m)

Limit (dBuV/m) = Limit stated in standard

Margin (dB) = Limit (dBuV/m) – Level (dBuV/m)

Polarity = Antenna polarization

Peak = Peak Reading

AVG = Average Reading

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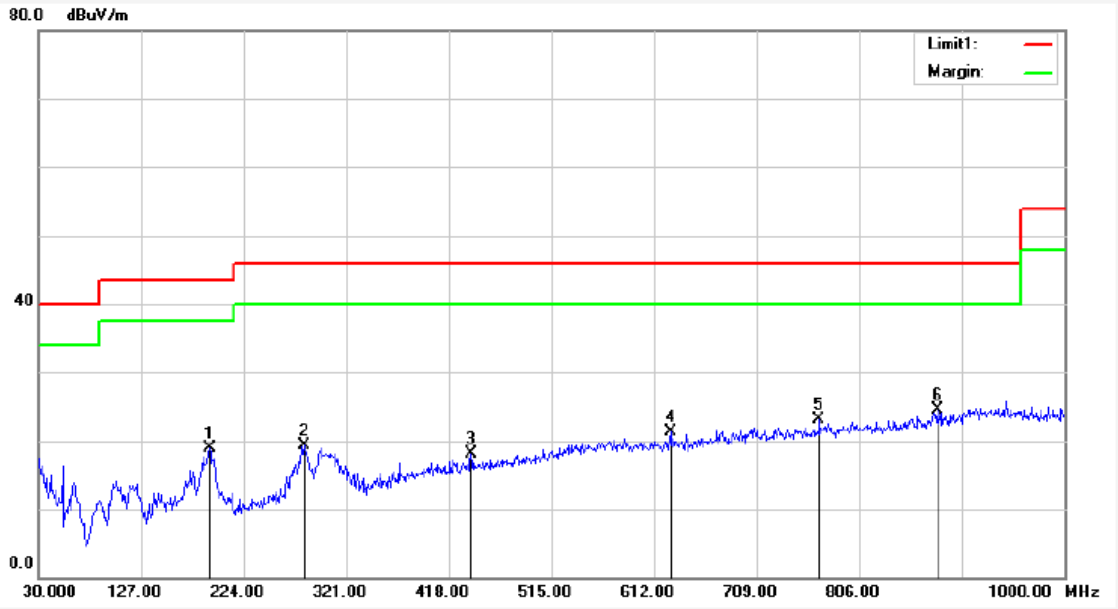
8.5 TEST RESULTS

Below 1GHz

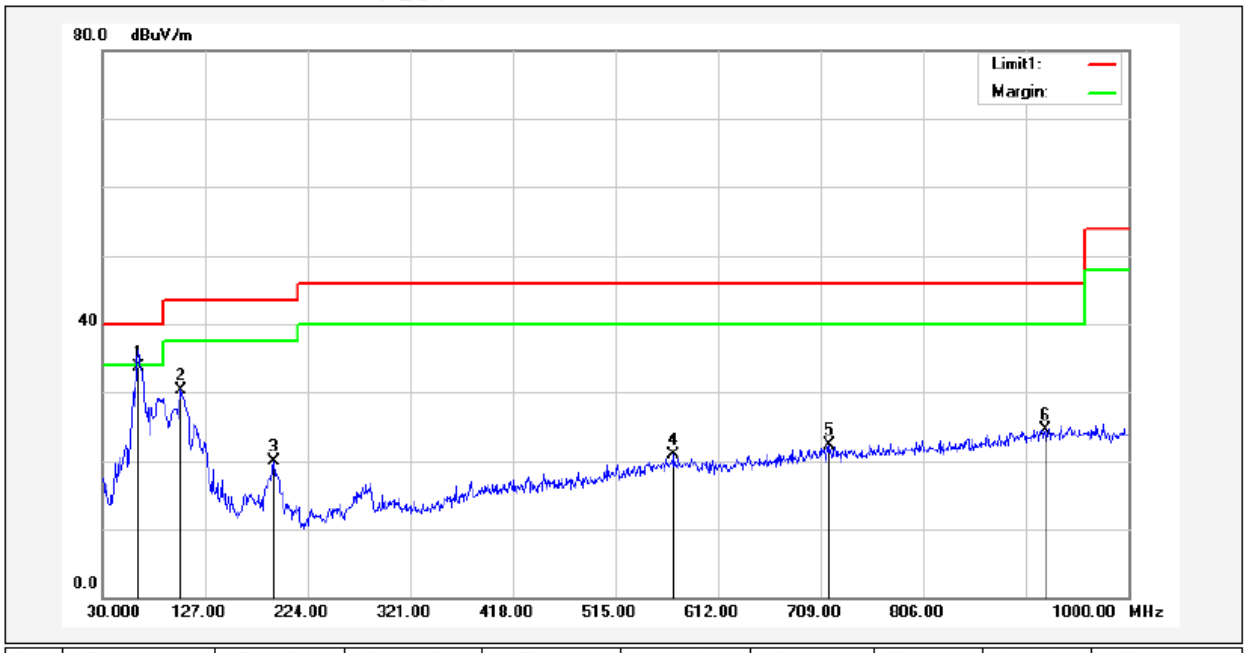
Pre-scan all mode(power supply:AC 120V/60Hz, DC 30V, DC 60V) and recorded the worst case results in this report (Highest channel (2475MHz),Power supply:AC 120V/60Hz)

EUT Name:	Dual Relay Module T2	Test Mode:	Mode 1
Model:	DCM-K01	Sample No:	E20230411918001-0001
Power supply:	AC 120V/60Hz	Environmental Conditions:	24.5℃/55%RH/101.0kPa
Test Engineer:	Huang Xinlong	Test Date:	2023-05-06
Channel	Highest channel (2475MHz)	Polarity:	Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Detector type
1	191.9900	45.79	-26.80	18.99	43.50	-24.51	34	200	QP
2	281.2300	43.11	-23.77	19.34	46.00	-26.66	185	100	QP
3	439.3400	37.15	-19.13	18.02	46.00	-27.98	221	100	QP
4	627.5200	37.07	-15.76	21.31	46.00	-24.69	96	200	QP
5	768.1700	37.03	-13.92	23.11	46.00	-22.89	238	200	QP
6*	879.7200	37.36	-12.92	24.44	46.00	-21.56	112	100	QP

EUT Name:	Dual Relay Module T2	Test Mode:	Mode 1
Model:	DCM-K01	Sample No:	E20230411918001-0001
Power supply:	AC 120V/60Hz	Environmental Conditions:	24.5℃/55%RH/101.0kPa
Test Engineer:	Huang Xinlong	Test Date:	2023-05-06
Channel	Highest channel (2475MHz)	Polarity:	Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Detector type
1*	63.9500	63.32	-29.52	33.80	40.00	-6.20	358	100	QP
2	104.6900	57.81	-27.41	30.40	43.50	-13.10	14	100	QP
3	191.9900	46.69	-26.80	19.89	43.50	-23.61	1	200	QP
4	570.2900	36.96	-16.15	20.81	46.00	-25.19	163	200	QP
5	717.7300	36.49	-14.26	22.23	46.00	-23.77	358	100	QP
6	921.4300	37.03	-12.51	24.52	46.00	-21.48	134	200	QP

Remark:

1 No emission found between lowest internal used/generated frequency to 30MHz.

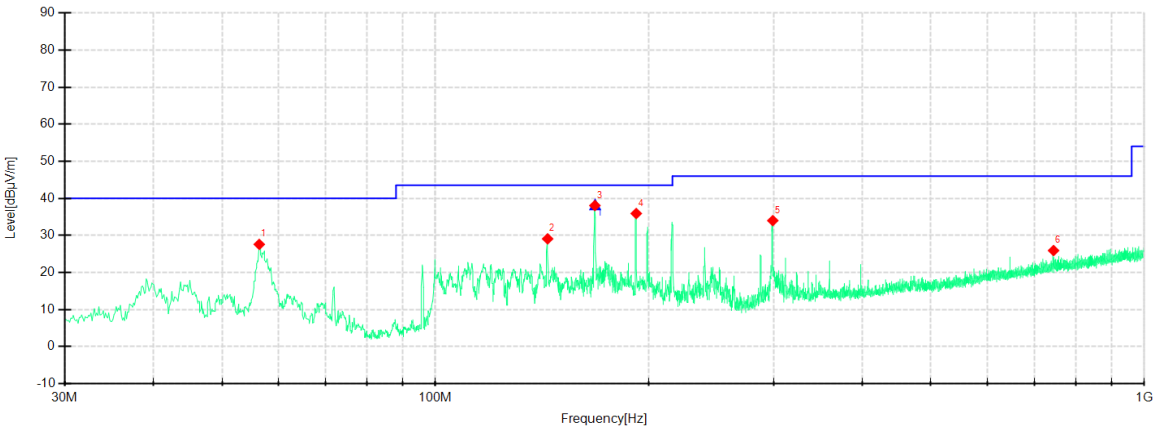
2 Radiated emissions measured in frequency range from 9kHz to 1GHz were made with an instrument using Quasi-peak detector mode.

3 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.

4 The IF bandwidth of Receiver between 30MHz to 1GHz was 120kHz.

For Adapter

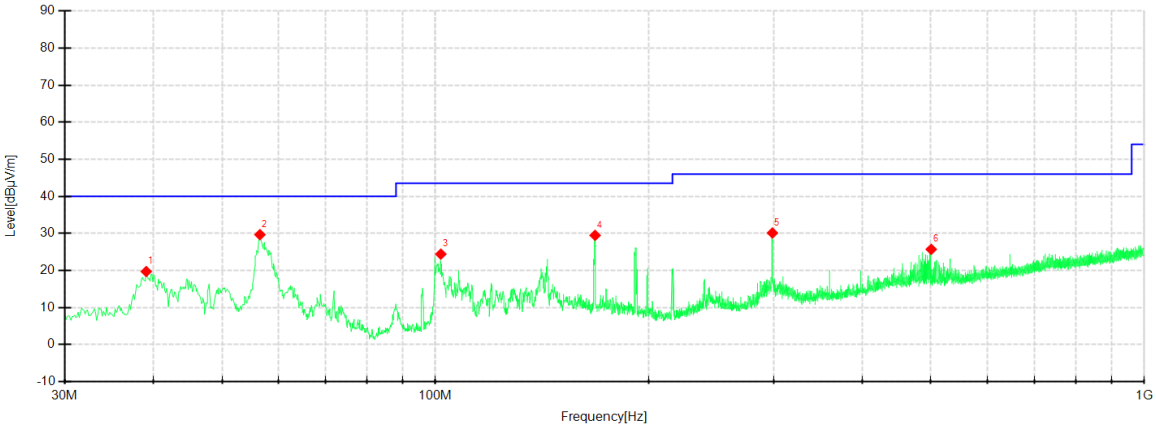
EUT Name:	Dual Relay Module T2	Test Mode:	Mode 1
Model:	DCM-K01	Sample No:	E20240819312801-0001
Power supply:	AC 120V/60Hz	Environmental Conditions:	25.8℃/64%RH/101.0kPa
Test Engineer:	Chen Zexin	Test Date:	2024-09-26
Channel	Highest channel (2475MHz)	Polarity:	Horizontal



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Trace
1	56.4358	56.84	27.57	-29.27	40.00	12.43	200	275	QP
2	143.9892	57.37	29.07	-28.30	43.50	14.43	200	326	QP
3	167.8785	66.86	38.04	-28.82	43.50	5.46	200	184	QP
4	192.0103	66.88	35.89	-30.99	43.50	7.61	200	339	QP
5	299.2087	61.51	33.99	-27.52	46.00	12.01	100	186	QP
6	744.7368	43.15	25.91	-17.24	46.00	20.09	200	312	QP

Final Data List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Trace
1	168.0048	-28.82	67.11	38.29	43.50	5.21	198	174.3	QP

EUT Name:	Dual Relay Module T2	Test Mode:	Mode 1
Model:	DCM-K01	Sample No:	E20240819312801-0001
Power supply:	AC 120V/60Hz	Environmental Conditions:	25.8℃/64%RH/101.0kPa
Test Engineer:	Chen Zexin	Test Date:	2024-09-26
Channel	Highest channel (2475MHz)	Polarity:	Vertical



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Trace
1	39.0949	49.06	19.71	-29.35	40.00	20.29	100	275	QP
2	56.5571	58.94	29.66	-29.28	40.00	10.34	200	20	QP
3	101.7890	56.10	24.40	-31.70	43.50	19.10	100	162	QP
4	167.9998	58.29	29.46	-28.83	43.50	14.04	100	162	QP
5	298.8449	57.62	30.10	-27.52	46.00	15.90	200	200	QP
6	500.5088	47.20	25.69	-21.51	46.00	20.31	100	340	QP

Remark:

1 No emission found between lowest internal used/generated frequency to 30MHz.

2 Radiated emissions measured in frequency range from 9kHz to 1GHz were made with an instrument using Quasi-peak detector mode.

3 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.

4 The IF bandwidth of Receiver between 30MHz to 1GHz was 120kHz.

1GHz-18GHz:
According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.
Pre-scan all mode(Power supply:AC 120V/60Hz, DC 30V, DC 60V) and recorded the worst case results in this report (Power supply:AC 120V/60Hz)

EUT Name:	Dual Relay Module T2	Test Mode:	Mode 1
Model:	DCM-K01	Sample No:	E20230411918001-0001
Power supply:	AC 120V/60Hz	Environmental Conditions:	18.9℃/65%RH/101.0kPa
Test Engineer:	Zhang Zishan	Test Date:	2023-04-25
Channel	Lowest channel (2405MHz)	/	/

Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1115.0115	72.90	47.54	-25.36	74.00	26.46	100	240	Horizontal
2	1307.8308	71.09	48.25	-22.84	74.00	25.75	200	173	Horizontal
3	1683.0683	64.54	41.63	-22.91	74.00	32.37	200	222	Horizontal
4	2367.1367	64.70	44.52	-20.18	74.00	29.48	100	121	Horizontal
5	4809.1809	60.73	48.13	-12.60	74.00	25.87	200	229	Horizontal
6	17894.9895	46.96	55.49	8.53	74.00	18.51	200	350	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	1307.8218	-22.84	60.36	37.52	54.00	16.48	200	173	Horizontal
2	4810.382	-12.60	49.88	37.28	54.00	16.72	152	269.8	Horizontal
3	17883.1946	8.53	32.10	40.63	54.00	13.37	200	0	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	1113.8114	72.72	50.00	-22.72	74.00	24.00	200	301	Vertical
2	1320.432	73.61	50.69	-22.92	74.00	23.31	200	241	Vertical
3	3498.0498	61.53	44.82	-16.71	74.00	29.18	200	139	Vertical
4	4810.6811	60.58	47.70	-12.88	74.00	26.30	100	238	Vertical
5	9771.6772	50.00	54.31	4.31	74.00	19.69	100	147	Vertical
6	17962.4962	46.67	57.32	10.65	74.00	16.68	200	320	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	1114.1783	-22.72	55.57	32.85	54.00	11.15	151	297.6	Vertical
2	1320.4318	-22.92	68.43	45.51	54.00	8.49	200	230.6	Vertical
3	9759.6698	4.31	36.47	40.78	54.00	13.22	107	168.1	Vertical
4	17884.345	10.65	32.29	42.94	54.00	11.06	123	17	Vertical

EUT Name:	Dual Relay Module T2	Test Mode:	Mode 1
Model:	DCM-K01	Sample No:	E20230411918001-0001
Power supply:	AC 120V/60Hz	Environmental Conditions:	18.9℃/65%RH/101.0kPa
Test Engineer:	Zhang Zishan	Test Date:	2023-04-25
Channel	Middle channel (2440MHz)	/	/

Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1117.2117	73.89	48.55	-25.34	74.00	25.45	200	237	Horizontal
2	1307.2307	72.14	49.31	-22.83	74.00	24.69	200	177	Horizontal
3	2377.1377	64.31	44.18	-20.13	74.00	29.82	100	128	Horizontal
4	4879.688	60.36	48.75	-11.61	74.00	25.25	100	315	Horizontal
5	9777.6778	50.77	54.78	4.01	74.00	19.22	100	346	Horizontal
6	17834.9835	46.95	55.94	8.99	74.00	18.06	200	183	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	1117.2102	-25.34	60.17	34.83	54.00	19.17	200	237	Horizontal
2	1307.7925	-22.83	60.32	37.49	54.00	16.51	180	166.7	Horizontal
3	4855.3136	-11.61	50.18	38.57	54.00	15.43	196	126.4	Horizontal
4	9758.9234	4.01	36.49	40.50	54.00	13.50	200	23.9	Horizontal
5	17755.8786	8.99	31.93	40.92	54.00	13.08	200	155	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	1120.6121	73.14	50.19	-22.95	74.00	23.81	100	302	Vertical
2	1320.032	73.04	50.11	-22.93	74.00	23.89	200	239	Vertical
3	1667.8668	67.31	44.99	-22.32	74.00	29.01	200	178	Vertical
4	4881.1881	59.78	48.27	-11.51	74.00	25.73	100	173	Vertical
5	9761.1761	50.96	55.21	4.25	74.00	18.79	100	203	Vertical
6	17942.9943	46.51	57.22	10.71	74.00	16.78	100	243	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	1121.261	-22.95	56.09	33.14	54.00	10.86	148	297.6	Vertical
2	1319.8998	-22.93	51.58	28.65	54.00	15.35	123	250	Vertical
3	4857.6352	-11.51	42.25	30.74	54.00	13.26	122	201.8	Vertical
4	9759.7132	4.25	36.49	40.74	54.00	13.26	109	176.2	Vertical
5	17892.0001	10.71	32.29	43.00	54.00	11.00	100	214.3	Vertical

EUT Name:	Dual Relay Module T2	Test Mode:	Mode 1
Model:	DCM-K01	Sample No:	E20230411918001-0001
Power supply:	AC 120V/60Hz	Environmental Conditions:	18.9℃/65%RH/101.0kPa
Test Engineer:	Zhang Zishan	Test Date:	2023-04-25
Channel	Highest channel (2475MHz)	/	/

Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1112.4112	74.28	48.88	-25.40	74.00	25.12	100	249	Horizontal
2	1247.8248	70.34	48.35	-21.99	74.00	25.65	200	178	Horizontal
3	1672.4672	65.09	42.06	-23.03	74.00	31.94	200	15	Horizontal
4	4950.195	62.83	51.28	-11.55	74.00	22.72	100	224	Horizontal
5	9803.1803	50.68	54.96	4.28	74.00	19.04	100	131	Horizontal
6	17837.9838	46.63	55.62	8.99	74.00	18.38	100	160	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	1116.7451	-25.40	55.82	30.42	54.00	23.58	144	252.4	Horizontal
2	1244.2847	-21.99	60.04	38.05	54.00	15.95	178	205.1	Horizontal
3	4950.393	-11.55	54.24	42.69	54.00	11.31	141	226.7	Horizontal
4	9758.4244	4.28	36.53	40.81	54.00	13.19	200	157.9	Horizontal
5	17885.0339	8.99	32.26	41.25	54.00	12.75	100	133.1	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	1119.4119	72.64	49.74	-22.90	74.00	24.26	200	289	Vertical
2	1320.032	73.77	50.84	-22.93	74.00	23.16	200	239	Vertical
3	1747.6748	68.68	46.94	-21.74	74.00	27.06	100	249	Vertical
4	3492.0492	66.20	49.53	-16.67	74.00	24.47	100	292	Vertical
5	4950.195	61.47	50.22	-11.25	74.00	23.78	100	343	Vertical
6	17854.4854	46.73	57.54	10.81	74.00	16.46	100	261	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	1119.4898	-22.90	56.06	33.16	54.00	20.84	165	283.4	Vertical
2	1320.1638	-22.93	61.90	38.97	54.00	15.03	180	244.5	Vertical
3	3506.108	-16.67	54.13	37.46	54.00	16.54	100	302.3	Vertical
4	4950.343	-11.25	50.23	38.98	54.00	15.02	121	344.2	Vertical

18GHz-26.5GHz:
According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Pre-scan all mode and recorded the worst case results in this report (Power supply:AC 120V/60Hz)

EUT Name:	Dual Relay Module T2	Test Mode:	Mode 1
Model:	DCM-K01	Sample No:	E20230411918001-0001
Power supply:	AC 120V/60Hz	Environmental Conditions:	18.9℃/65%RH/101.0kPa
Test Engineer:	Zhang Zishan	Test Date:	2023-04-25
Channel	Lowest channel (2405MHz)	/	/

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	18586.925	54.09	41.97	-12.12	83.54	41.57	100	85	Horizontal
2	21179.85	53.77	43.71	-10.06	83.54	39.83	100	111	Horizontal
3	22661.825	51.72	42.80	-8.92	83.54	40.74	100	181	Horizontal
4	23510.55	51.14	42.43	-8.71	83.54	41.11	100	249	Horizontal
5	25124.7	49.97	42.80	-7.17	83.54	40.74	100	134	Horizontal
6	26431.575	49.79	42.61	-7.18	83.54	40.93	100	38	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	18571.625	53.54	41.47	-12.07	83.54	42.07	100	131	Vertical
2	19511.3	54.34	42.93	-11.41	83.54	40.61	100	109	Vertical
3	21118.65	52.97	42.99	-9.98	83.54	40.55	100	299	Vertical
4	23455.725	51.20	42.59	-8.61	83.54	40.95	100	18	Vertical
5	24560.3	51.10	43.40	-7.70	83.54	40.14	100	299	Vertical
6	25641.925	49.64	42.11	-7.53	83.54	41.43	100	177	Vertical

EUT Name:	Dual Relay Module T2	Test Mode:	Mode 1
Model:	DCM-K01	Sample No:	E20230411918001-0001
Power supply:	AC 120V/60Hz	Environmental Conditions:	18.9℃/65%RH/101.0kPa
Test Engineer:	Zhang Zishan	Test Date:	2023-04-25
Channel	Middle channel (2440MHz)	/	/

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	18997.9	54.22	42.42	-11.80	83.54	41.12	100	337	Horizontal
2	19851.725	53.98	42.83	-11.15	83.54	40.71	100	15	Horizontal
3	21501.15	53.07	43.21	-9.86	83.54	40.33	100	15	Horizontal
4	22637.175	51.86	42.90	-8.96	83.54	40.64	100	176	Horizontal
5	24815.3	50.76	43.28	-7.48	83.54	40.26	100	15	Horizontal
6	26177.425	50.07	42.43	-7.64	83.54	41.11	100	84	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	18895.05	54.06	42.19	-11.87	83.54	41.35	100	23	Vertical
2	19569.525	53.38	42.07	-11.31	83.54	41.47	100	276	Vertical
3	21578.925	54.04	44.36	-9.68	83.54	39.18	100	206	Vertical
4	23488.025	51.54	42.93	-8.61	83.54	40.61	100	206	Vertical
5	25179.525	50.31	43.30	-7.01	83.54	40.24	100	185	Vertical
6	26208.875	49.88	42.42	-7.46	83.54	41.12	100	116	Vertical

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EUT Name:	Dual Relay Module T2	Test Mode:	Mode 1
Model:	DCM-K01	Sample No:	E20230411918001-0001
Power supply:	AC 120V/60Hz	Environmental Conditions:	18.9℃/65%RH/101.0kPa
Test Engineer:	Huang Lifang	Test Date:	2023-04-25
Channel	Highest channel (2475MHz)	/	/

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	19017.875	54.31	42.53	-11.78	83.54	41.01	100	257	Horizontal
2	20815.625	52.85	42.63	-10.22	83.54	40.91	100	39	Horizontal
3	21251.675	52.96	42.95	-10.01	83.54	40.59	100	278	Horizontal
4	22965.7	51.02	42.37	-8.65	83.54	41.17	100	16	Horizontal
5	24448.1	51.53	43.66	-7.87	83.54	39.88	100	278	Horizontal
6	25417.525	49.97	42.67	-7.30	83.54	40.87	100	16	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	18989.825	54.06	42.26	-11.80	83.54	41.28	100	206	Vertical
2	20374.475	52.95	42.41	-10.54	83.54	41.13	100	116	Vertical
3	21477.35	52.68	42.91	-9.77	83.54	40.63	100	231	Vertical
4	22997.15	51.15	42.51	-8.64	83.54	41.03	100	254	Vertical
5	23825.05	51.96	43.49	-8.47	83.54	40.05	100	69	Vertical
6	25125.55	50.05	42.98	-7.07	83.54	40.56	100	345	Vertical

Remark:

1 Measuring frequencies from 1 GHz to the 10th 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 Above 18G test distance is 1m, so the Peak Limit=74+20*log(3/1)=83.54 (dBμV/m), The limits are relaxed.

9. 6dB BANDWIDTH

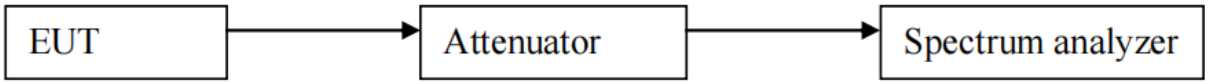
9.1 LIMITS

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

9.2 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 resolution bandwidth (RBW) = 100kHz.Set the video bandwidth (VBW) ≥ 3 x RBW. Detector = Peak. Trace mode = max hold. Sweep = auto couple. Allow the trace to stabilize, record 6dB bandwidth value.
3) Repeat above procedures until all frequencies measured were complete.

9.3 TEST SETUP



9.4 TEST RESULTS

Environment: 24.6℃/65%RH/101.0kPa Voltage: AC 120V/60Hz
Tested By: Qin Tingting Date: 2023-04-20

Ch Name	Frequency (MHz)	Bandwidth [kHz]	Limit[kHz]	Verdict
Lowest	2405	1600	≥500	PASS
Middle	2440	1600		PASS
Highest	2475	1600		PASS

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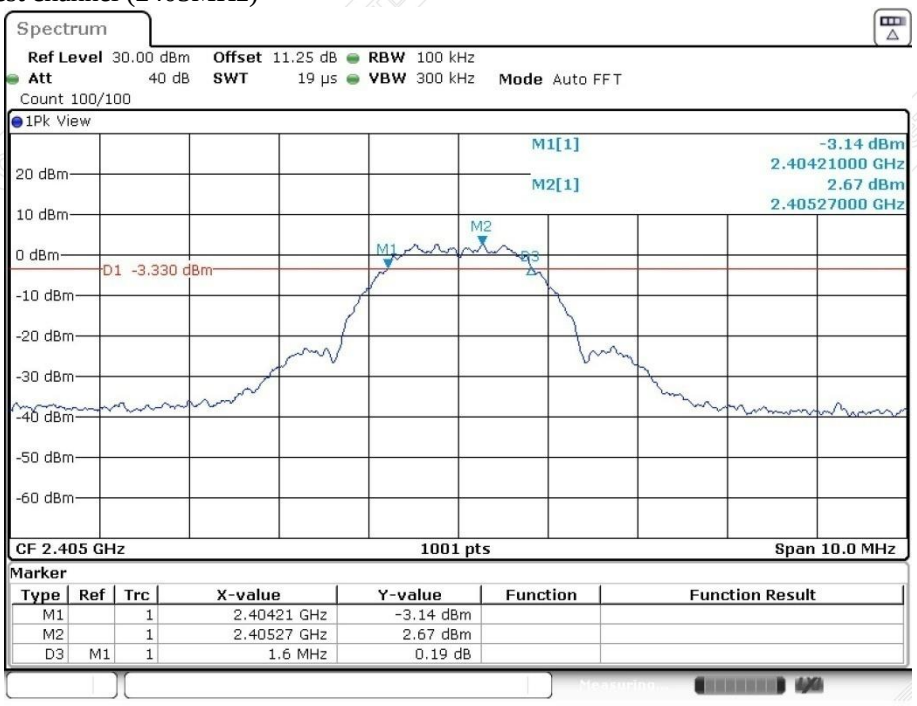
Lowest channel (2405MHz)



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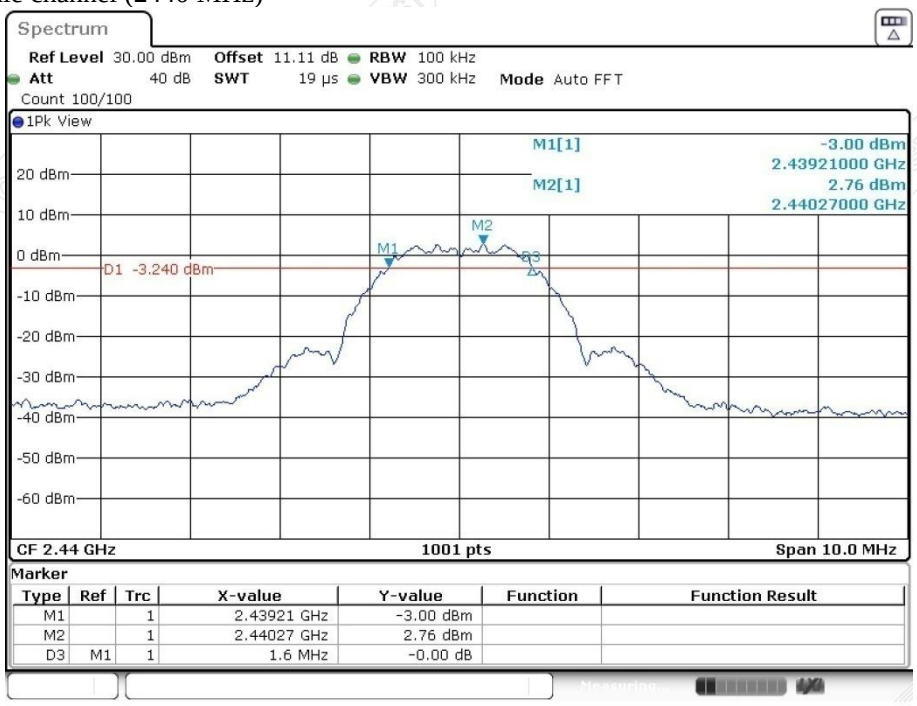
Middle channel (2440 MHz)



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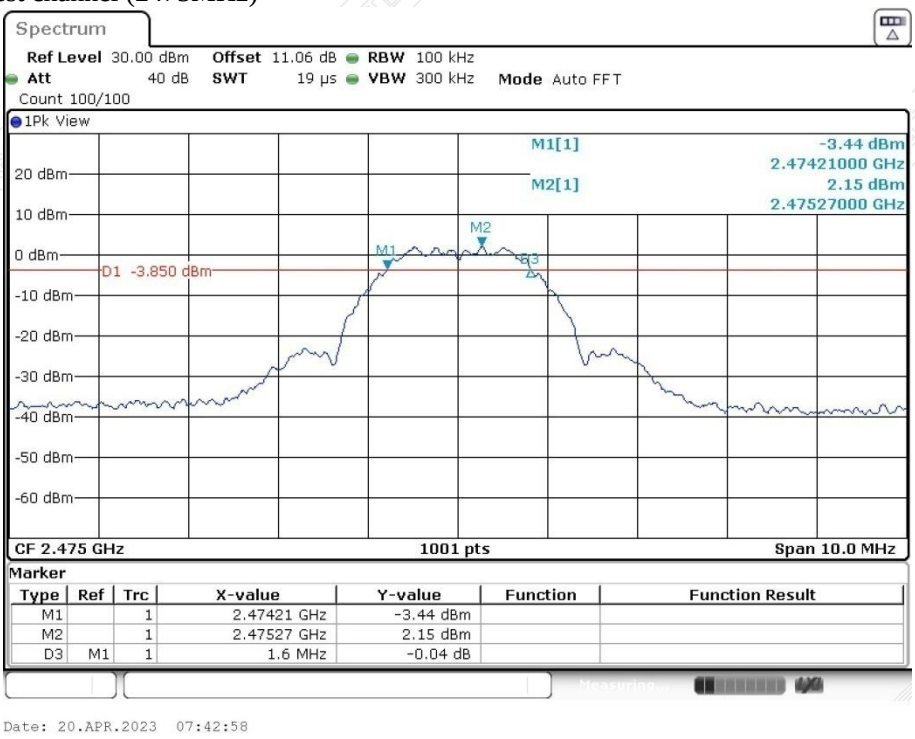
Highest channel (2475MHz)



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10. MAXIMUM PEAK OUTPUT POWER

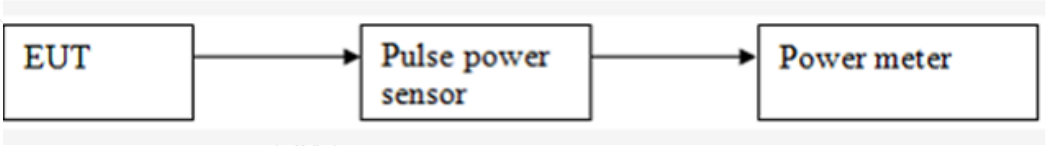
10.1 LIMITS

The maximum Peak output power measurement is 1W

10.2 TEST PROCEDURES

1) According to the test mode, the channel requirements set EUT to continuous transmission mode.
2) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.

10.3 TEST SETUP



10.4 TEST RESULTS

Environment: 24.6℃/65%RH/101.0kPa Voltage: AC 120V/60Hz
Tested By: Qin Tingting Date: 2023-04-20

ChName	Frequency (MHz)	Measured Channel Power (dBm)	Limit	Peak/ Average	Result
Lowest	2405	6.68	1W (30dBm)	Peak	Pass
Middle	2440	6.34			Pass
Highest	2475	6.01			Pass

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11. POWER SPECTRAL DENSITY

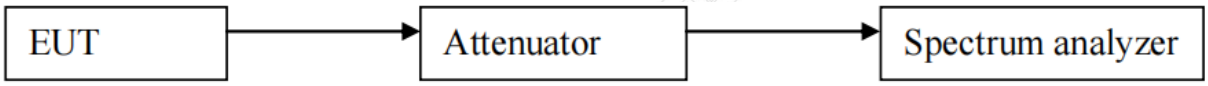
11.1 LIMITS

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

11.2 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) Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3) The following procedure shall be used if maximum peak conducted output power was used to determine compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:
   a) Set analyzer center frequency to DTS channel center frequency.
   b) Set the span to 1.5 times the DTS bandwidth.
   c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
   d) Set the VBW ≥ [3 × RBW].
   e) Detector = peak
   f) Sweep time = auto couple.
   g) Trace mode = max hold.
   h) Allow trace to fully stabilize.
   i) Use the peak marker function to determine the maximum amplitude level within the RBW.
   j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.
4) Repeat above procedures until all frequencies measured were complete.

11.3 TEST SETUP

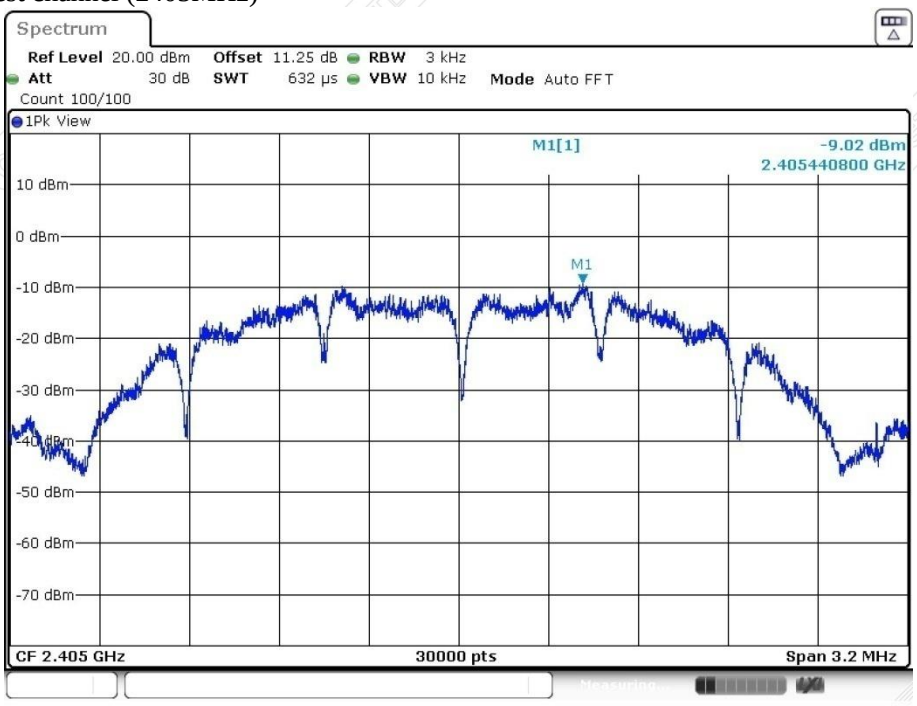


11.4 TEST RESULTS

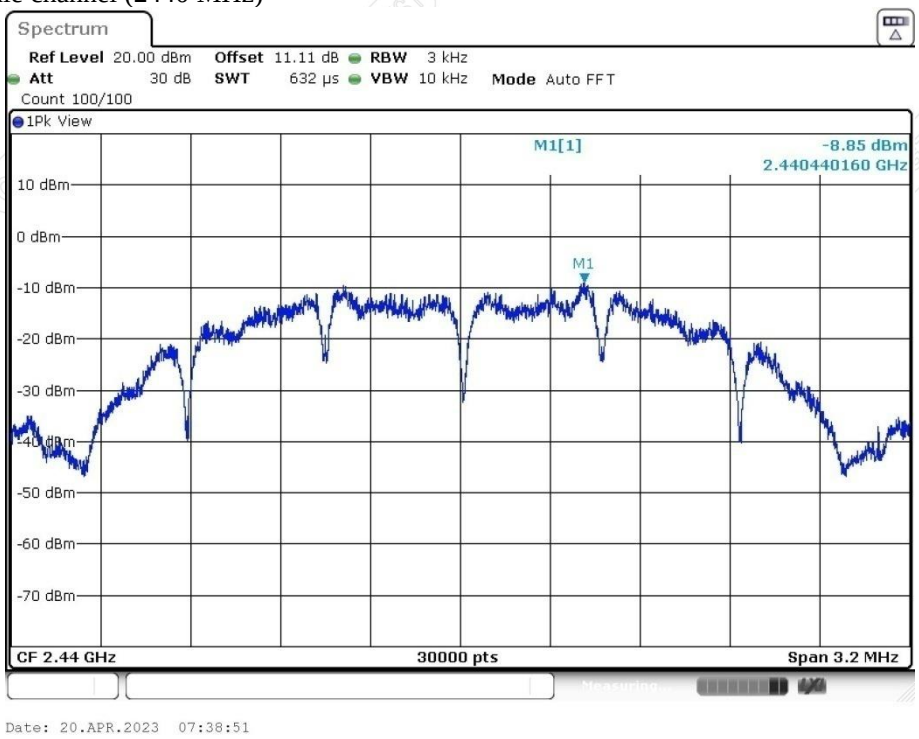
Environment: 24.6℃/65%RH/101.0kPa Voltage: AC 120V/60Hz
Tested By: Qin Tingting Date: 2023-04-20

Ch Name	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	2405	-9.02	8.00	Pass
Middle	2440	-8.85	8.00	Pass
Highest	2475	-9.54	8.00	Pass

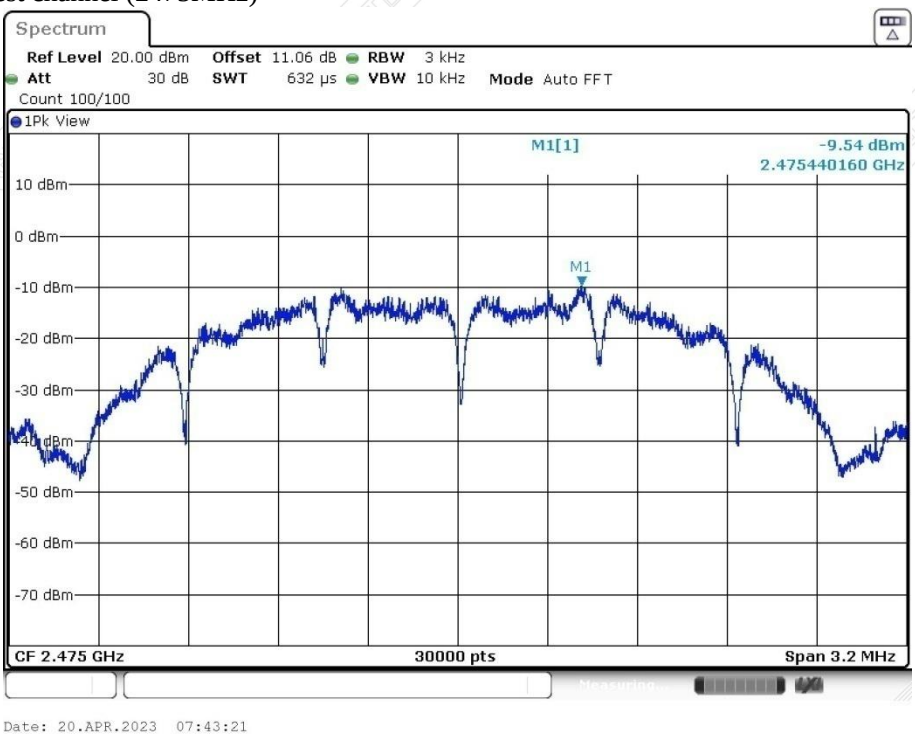
Lowest channel (2405MHz)



Middle channel (2440 MHz)



Highest channel (2475MHz)



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12. CONDUCTED BAND EDGES AND SPURIOUS EMISSIONS

12.1 LIMITS

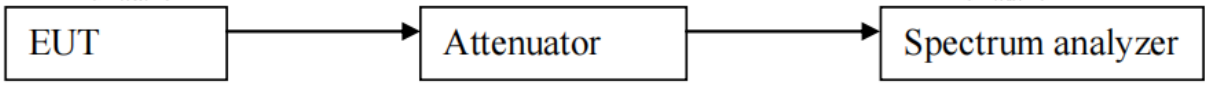
(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains 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 30 dB instead of 20 dB.

12.2 TEST PROCEDURES

Remove the antenna from the EUT and then connect a low attenuation cable from the antenna port to the spectrum.

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, Span=10MHz 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.
5) Measurements are made from 30MHz to 26.5GHz with the transmitter set to the lowest, middle, and highest channels.

12.3 TEST SETUP



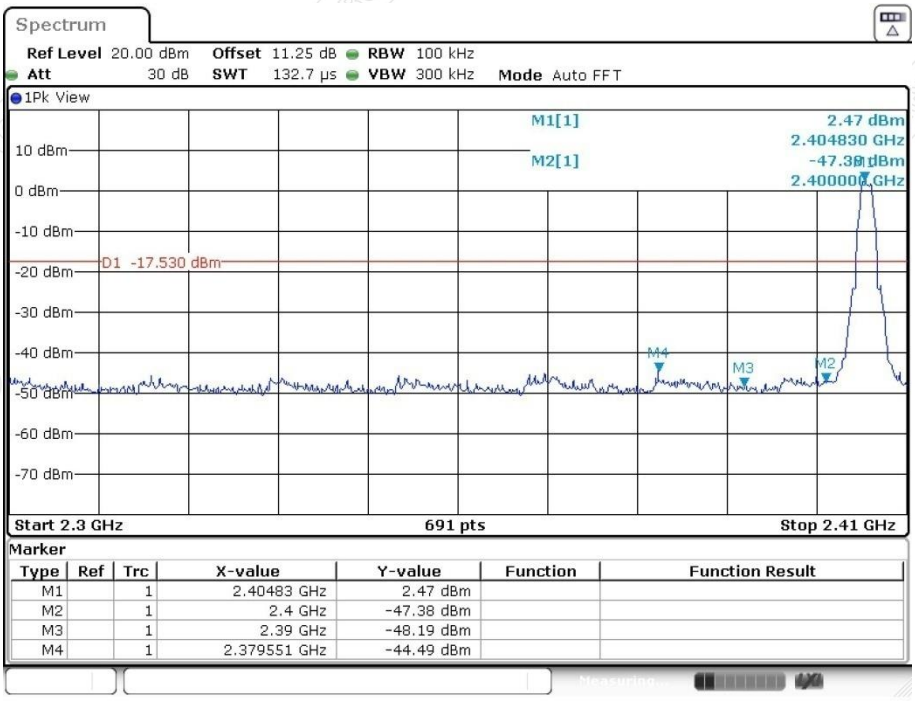
12.4 TEST RESULTS

Environment: 24.6℃/65%RH/101.0kPa Voltage: AC 120V/60Hz
Tested By: Qin Tingting Date: 2023-04-20

Band edge

Test Mode	Antenna	Ch Name	Frequency [MHz]	Ref Level[dBm]	Result[dBm]	Limit[dBm]	Verdict
Zigbee	Ant1	Lowest	2405	2.47	-44.49	≤-17.38	PASS
		Highest	2475	2.07	-45.17	≤-17.85	PASS

Lowest channel (2405MHz)
2.30GHz-2.41GHz



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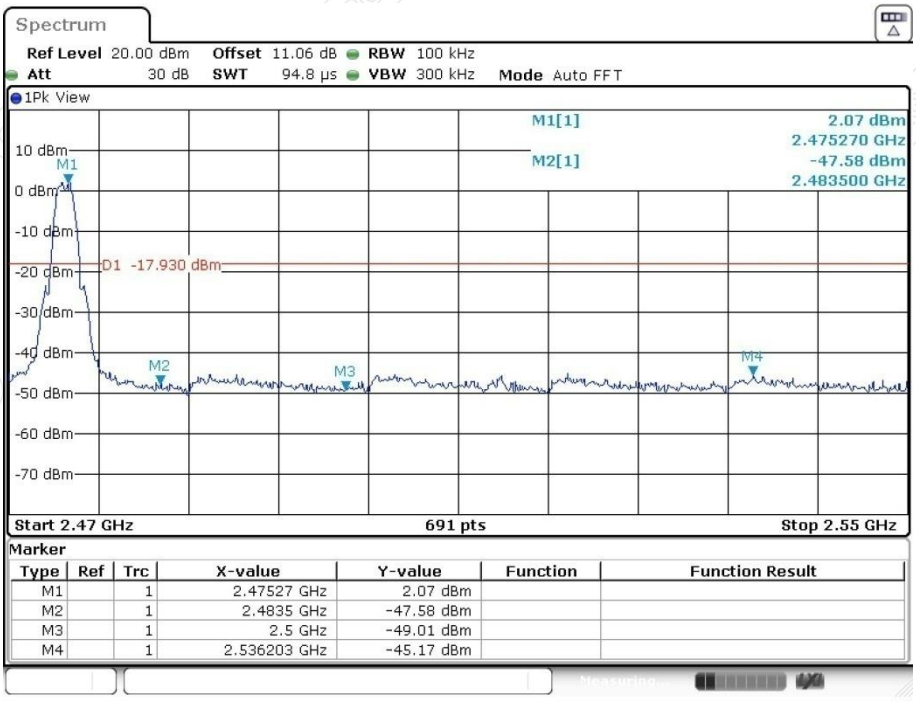
Highest channel (2475MHz)
2.47GHz-2.55GHz



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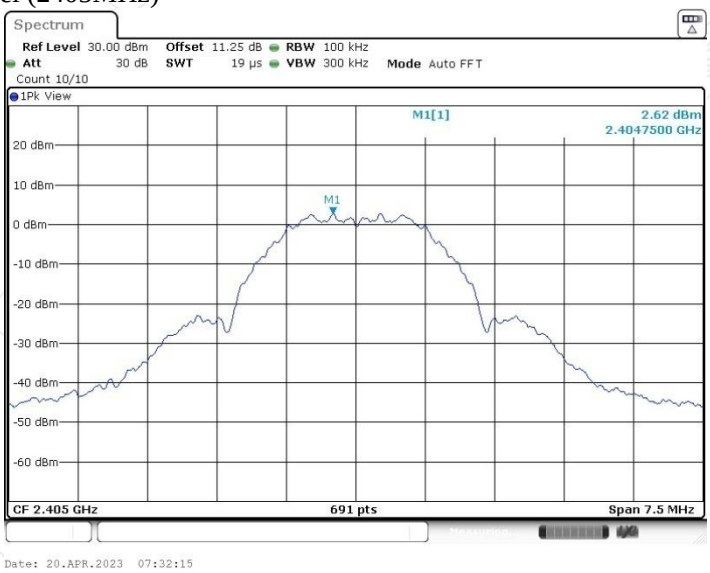
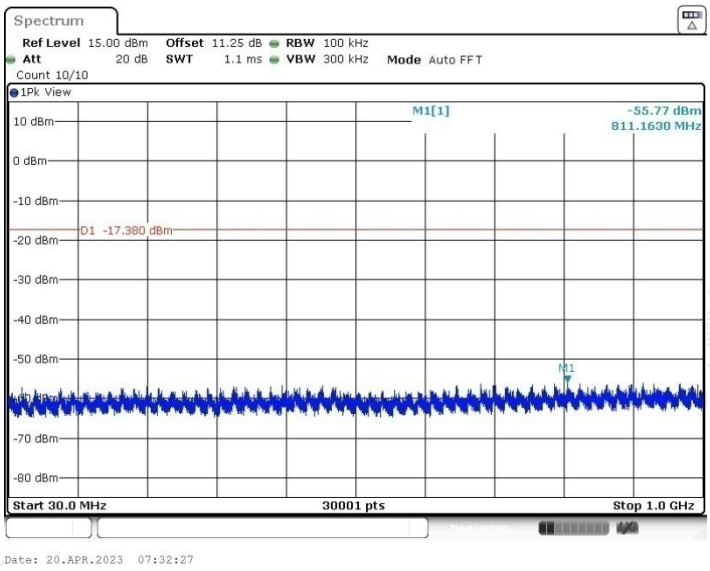
Conducted Spurious Emission

Test Mode	Antenna	Frequency [MHz]	Freq Range [MHz]	Ref Level [dBm]	Result[dBm]	Limit[dBm]	Verdict
Zigbee	Ant1	2405	Reference	2.62	2.62	---	PASS
			30~1000	2.62	-55.77	≤-17.38	PASS
			1000~26500	2.62	-41.92	≤-17.38	PASS
		2440	Reference	2.75	2.75	---	PASS
			30~1000	2.75	-55.61	≤-17.25	PASS
			1000~26500	2.75	-41.93	≤-17.25	PASS
		2475	Reference	2.15	2.15	---	PASS
			30~1000	2.15	-55.75	≤-17.85	PASS
			1000~26500	2.15	-41.93	≤-17.85	PASS

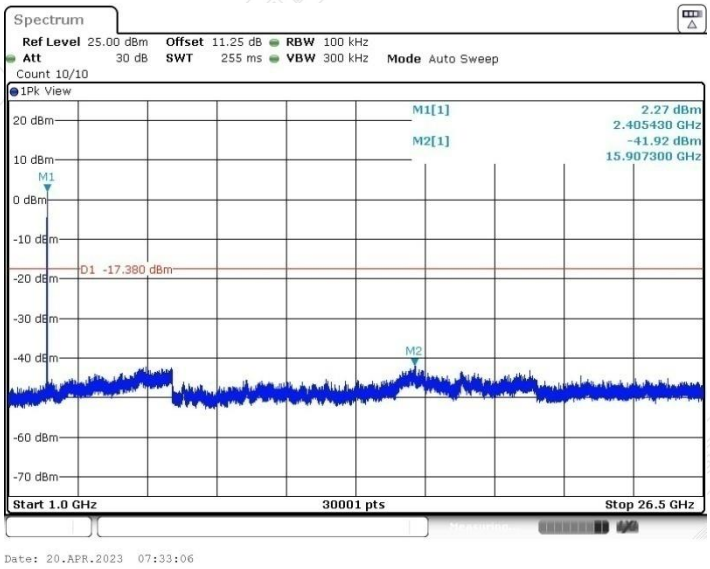
Lowest channel (2405MHz)



0.03GHz-1GHz

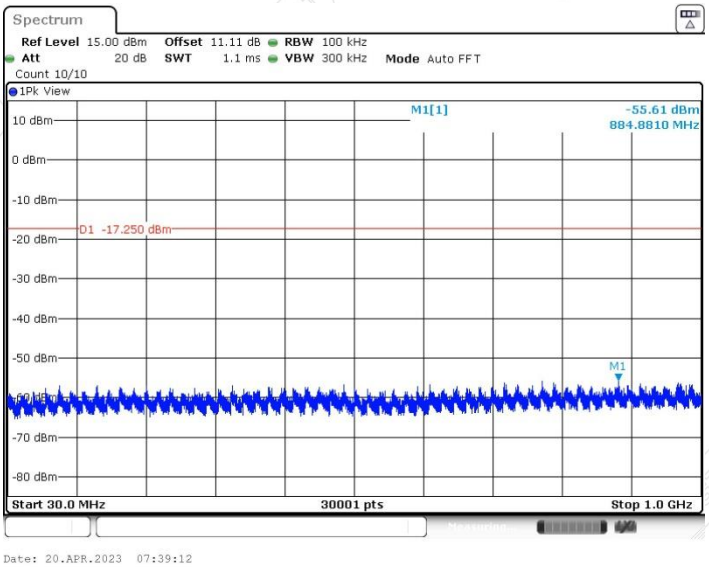


1GHz-26.5GHz

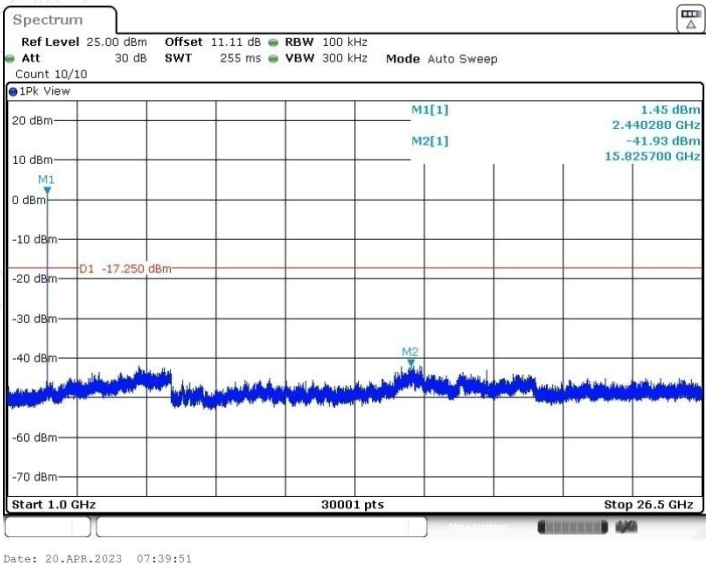


Middle channel (2440MHz)

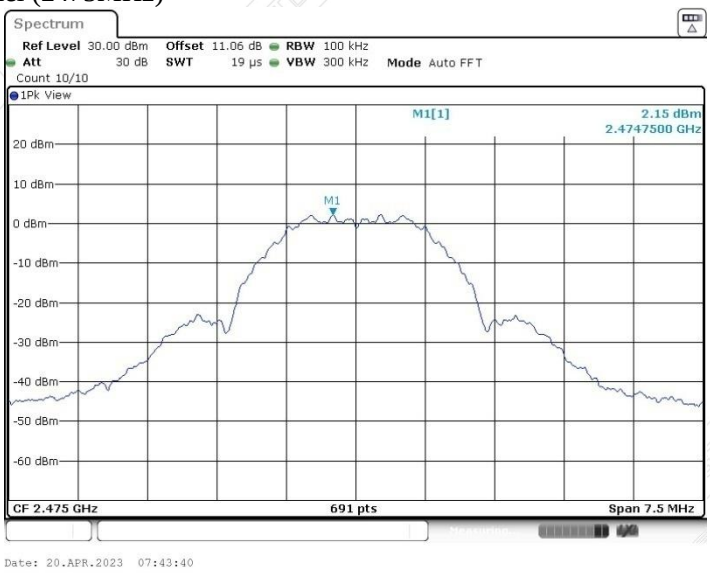
0.03GHz-1GHz



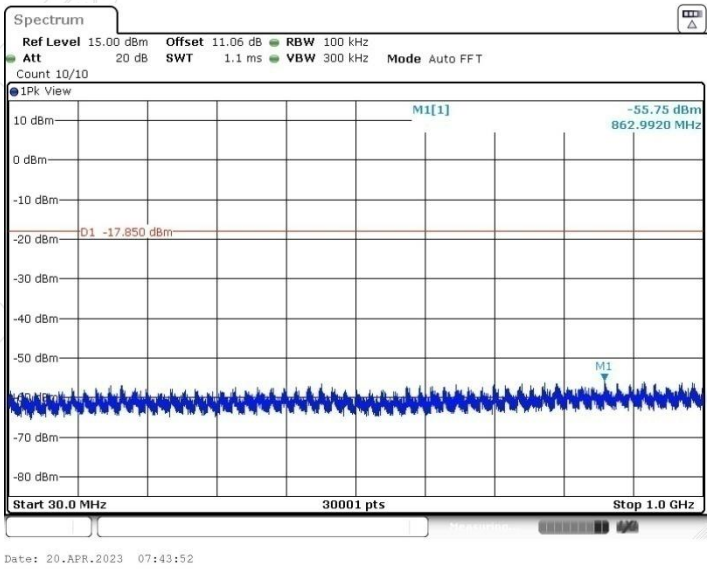
1GHz-26.5GHz



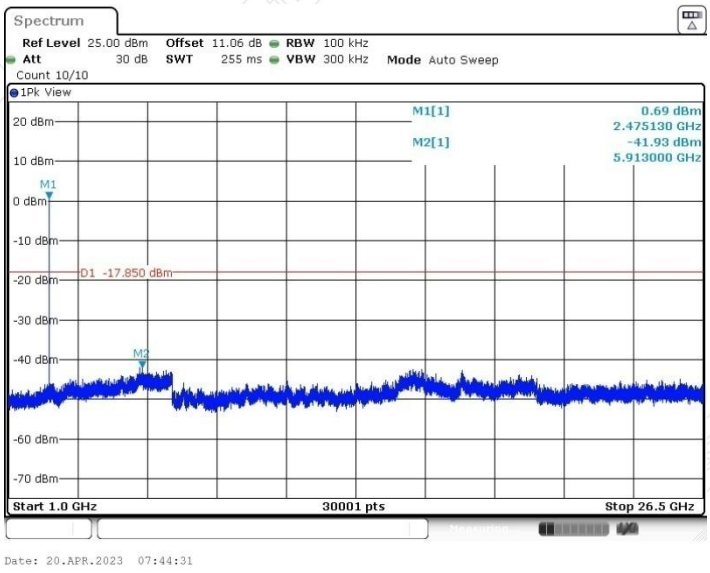
Highest channel (2475MHz)



0.03GHz-1GHz



1GHz-26.5GHz



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13. RESTRICTED BANDS OF OPERATION

13.1 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)).

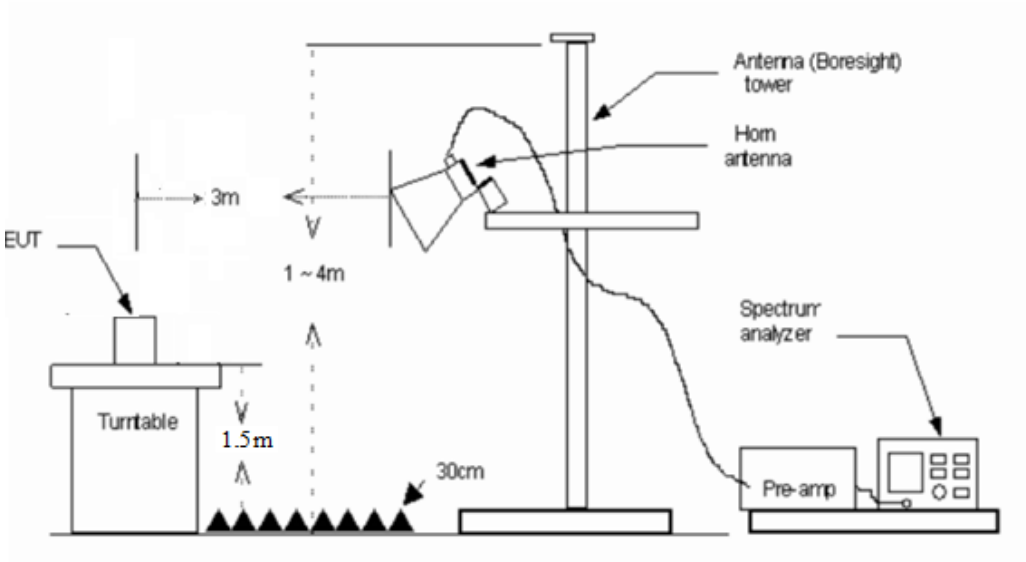
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 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(μV/m)	Measurement distance(m)	Quasi-peak(dBμV/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

13.2 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) For Peak detector: Set RBW=1MHz, RBW=3MHz, Sweep=AUTO.
   b) For Avg detector: Set RBW=1MHz, Sweep=AUTO,the EUT is configured to transmit with duty cycle≥98%,set VBW≤RBW/100 (i.e.,10kHz) but not less than 10 Hz.
5) Repeat the procedures until all the PEAK and AVERAGE versus polarization are measured.

13.3 TEST SETUP



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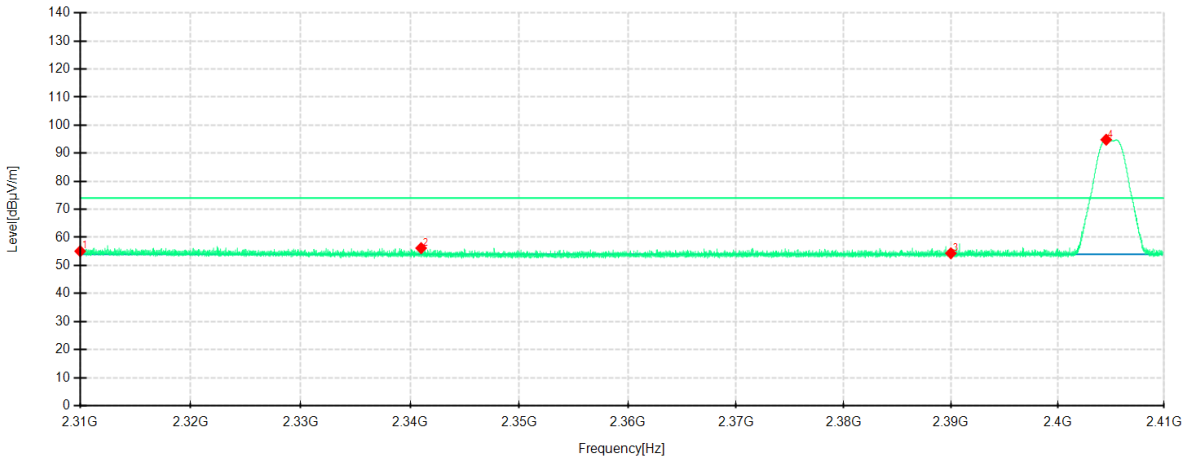
13.4 TEST RESULTS

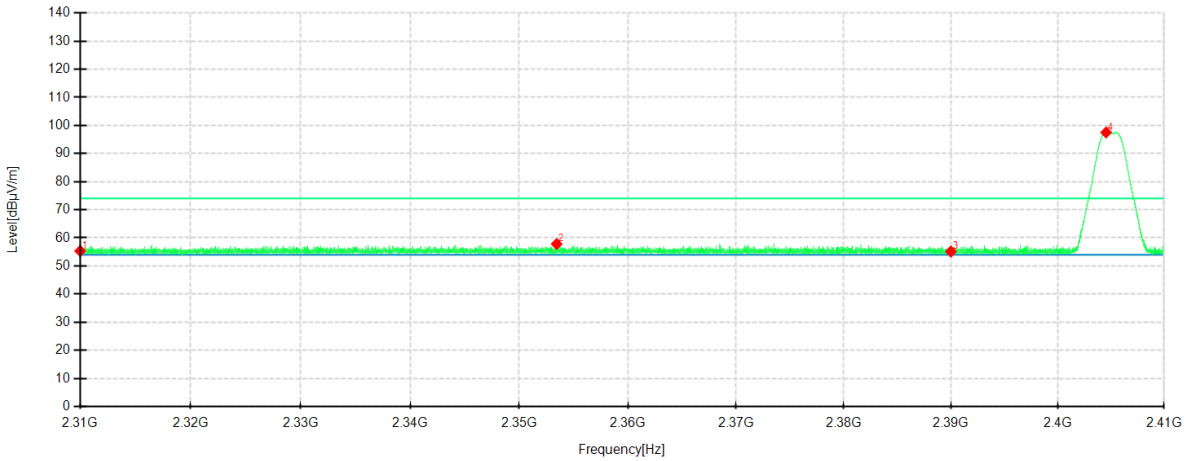
Pre-scan all mode(Power supply:AC 120V/60Hz, DC 30V, DC 60V) and recorded the worst case results in this report (Power supply:AC 120V/60Hz)

EUT Name:	Dual Relay Module T2	Test Mode:	Mode 1
Model:	DCM-K01	Sample No:	E20230411918001-0001
Test Engineer:	Huang Lifang	Test Voltage:	AC 120V/60Hz
Environmental Conditions:	18.9℃/65%RH/101.0kPa	Test Date:	2023-04-25

Lowest Channel
Frequency: 2405MHz
Detector mode: Peak Polarity: Horizontal



Detector mode: Peak Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	2310	45.72	55.07	9.35	74.00	18.93	100	182	Horizontal	/
2	2341.0021	47.46	56.17	8.71	74.00	17.83	100	195	Horizontal	/
3	2390	45.41	54.34	8.93	74.00	19.66	200	167	Horizontal	
4	2404.5596	85.77	94.82	9.05	74.00	-20.82	100	150	Horizontal	No limit
1	2310	45.39	55.32	9.93	74.00	18.68	100	238	Vertical	/
2	2353.4429	47.61	57.82	10.21	74.00	16.18	200	289	Vertical	/
3	2390	45.05	55.12	10.07	74.00	18.88	200	74	Vertical	/
4	2404.5463	87.57	97.52	9.95	74.00	-23.52	100	138	Vertical	No limit

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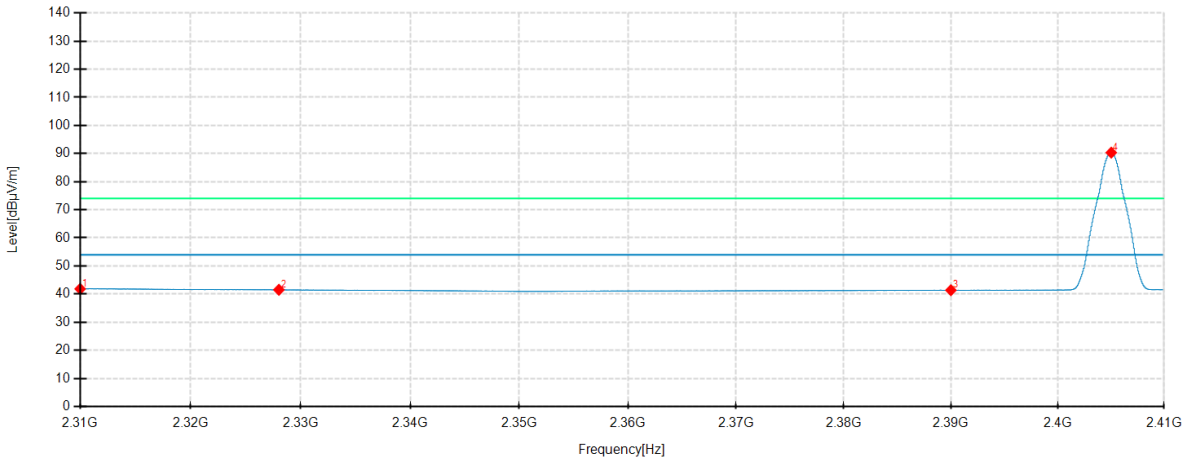
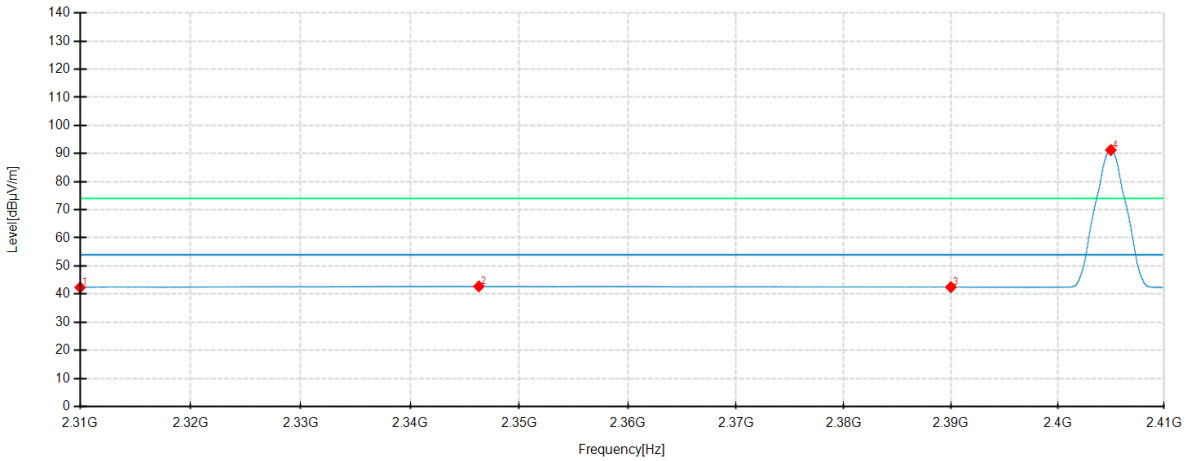
Lowest Channel
Frequency: 2405MHz
Detector mode: Average Polarity: Horizontal

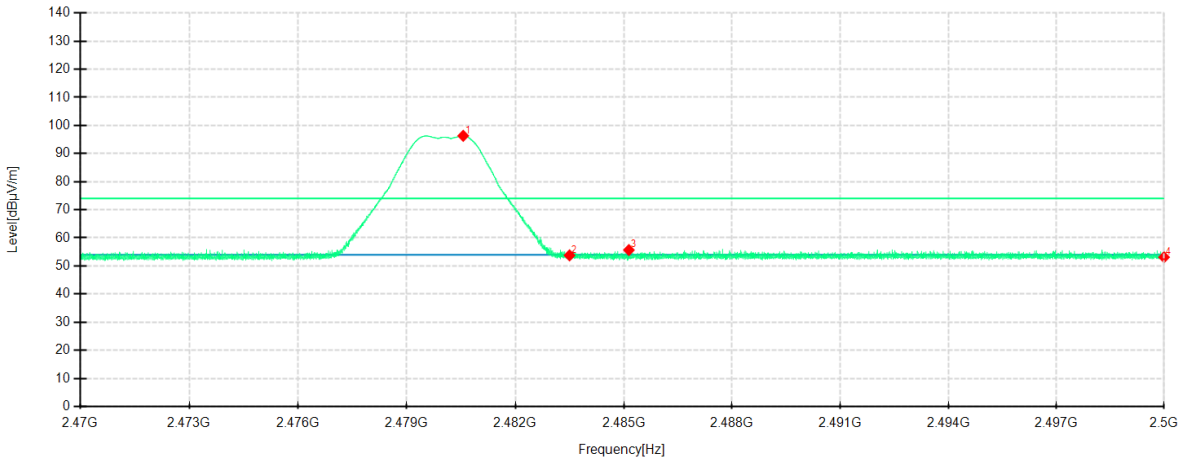


Detector mode: Average Polarity: Vertical

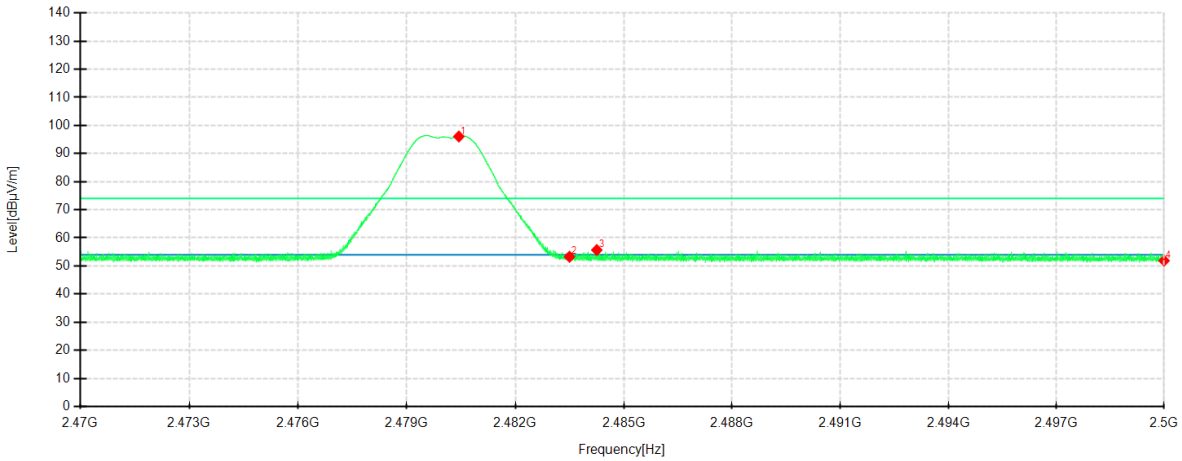


No.	Frequency MHz	Reading dBµV/m	Level dBµV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	2310	32.48	41.83	9.35	54.00	12.17	200	169	Horizontal	/
2	2328.0212	32.56	41.53	8.97	54.00	12.47	100	225	Horizontal	/
3	2390	32.45	41.38	8.93	54.00	12.62	100	148	Horizontal	/
4	2405.033	81.29	90.34	9.05	54.00	-36.34	100	181	Horizontal	No limit
1	2310	32.43	42.36	9.93	54.00	11.64	100	192	Vertical	/
2	2346.2958	32.54	42.74	10.20	54.00	11.26	200	343	Vertical	/
3	2390	32.40	42.47	10.07	54.00	11.53	100	148	Vertical	/
4	2404.993	81.31	91.25	9.94	54.00	-37.25	100	181	Vertical	No limit

Highest Channel
Frequency: 2475MHz
Detector mode: Peak Polarity: Horizontal

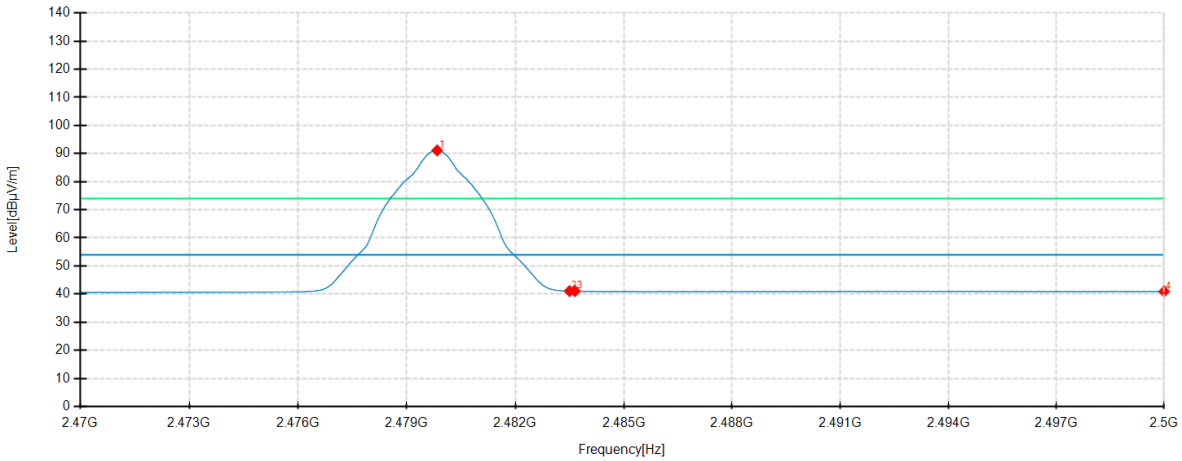


Detector mode: Peak Polarity: Vertical

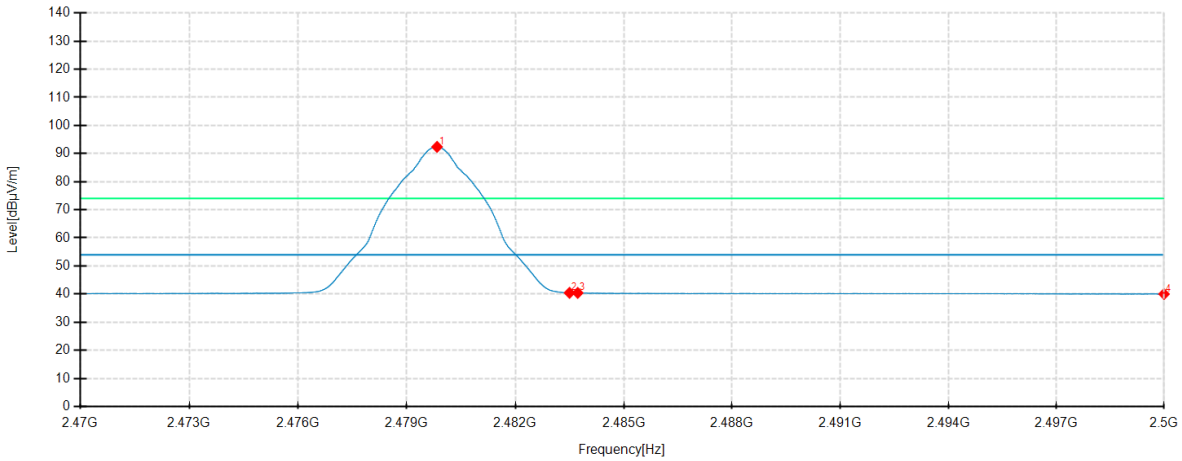


No.	Frequency MHz	Reading dBµV/m	Level dBµV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	2480.5607	86.46	96.32	9.86	74.00	-22.32	100	246	Horizontal	No limit
2	2483.5	43.85	53.77	9.92	74.00	20.23	200	344	Horizontal	/
3	2485.143	45.73	55.68	9.95	74.00	18.32	200	91	Horizontal	/
4	2500	42.87	53.12	10.25	74.00	20.88	200	158	Horizontal	/
1	2480.4407	86.80	96.07	9.27	74.00	-22.07	200	220	Vertical	No limit
2	2483.5	44.00	53.28	9.28	74.00	20.72	200	87	Vertical	/
3	2484.255	46.40	55.68	9.28	74.00	18.32	200	55	Vertical	/
4	2500	42.53	51.88	9.35	74.00	22.12	200	1	Vertical	/

Highest Channel
Frequency: 2475MHz
Detector mode: Average Polarity: Horizontal



Detector mode: Average Polarity: Vertical



No.	Frequency MHz	Reading dBµV/m	Level dBµV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	2479.8407	81.26	91.11	9.85	54.00	-37.11	100	193	Horizontal	No limit
2	2483.5	31.16	41.08	9.92	54.00	12.92	100	205	Horizontal	/
3	2483.6509	31.14	41.06	9.92	54.00	12.94	100	205	Horizontal	/
4	2500	30.66	40.91	10.25	54.00	13.09	200	344	Horizontal	/
1	2479.8387	83.11	92.38	9.27	54.00	-38.38	100	196	Vertical	No limit
2	2483.5	31.15	40.43	9.28	54.00	13.57	100	208	Vertical	/
3	2483.7269	31.13	40.41	9.28	54.00	13.59	100	208	Vertical	/
4	2500	30.66	40.01	9.35	54.00	13.99	100	342	Vertical	/

Remark: 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 E20240819312801-Test photo.

APPENDIX B. PHOTOGRAPH OF THE EUT

Please refer to the attached document E20240819312801-EUT photo.

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