

TEST REPORT

Report No..... KS2210S4407E02

FCC ID..... 2A7SL-ZORDAI Z8ULTRA

Applicant..... Shenzhen Zhongdai e-commerce Co., Ltd

Address..... 14,block C,electronic technology building,No.2070 Shennan Middle Road,Shenzhen

Manufacturer..... Shenzhen Zhongdai e-commerce Co., Ltd

Address..... 14,block C,electronic technology building,No.2070 Shennan Middle Road,Shenzhen

Product Name..... ZORDAI Smart wear

Trademark..... ZORDAI

Model/Type reference..... ZORDAI Z8Ultra,
ZORDAI Z8,ZORDAI Z8pro,ZORDAI Z8promax,ZORDAI Z8Ultrapro,ZORDAI Z8Ultramax

Standard..... 47 CFR Part 15.247

Date of Receipt..... October 12, 2022

Date of Test Date..... October 12, 2022 to October 21, 2022

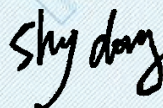
Date of issue..... October 21, 2022

Test result..... Pass

Prepared by:
(Printed name + Signature) pandy pan



Approved by:
(Printed name + Signature) Sky Dong



Testing Laboratory Name..... KSIGN(Guangdong) Testing Co., Ltd.

Address..... West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

47 CFR Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

1.2. Report Version

Revised No.	Date of issue	Description
01	October 21, 2022	Original

1.3. Test Description

Test Item	Standard	Requirement	Result
Antenna requirement	47 CFR Part 15.247	Part 15.203	Pass
Conducted Emission at AC power line	47 CFR Part 15.247	47 CFR 15.207(a)	Pass
Occupied Bandwidth	47 CFR Part 15.247	47 CFR 15.215(c)	Pass
Maximum Conducted Output Power	47 CFR Part 15.247	47 CFR 15.247(b)(1)	Pass
Channel Separation	47 CFR Part 15.247	47 CFR 15.247(a)(1)	Pass
Number of Hopping Frequencies	47 CFR Part 15.247	47 CFR 15.247(a)(1)(iii)	Pass
Dwell Time	47 CFR Part 15.247	47 CFR 15.247(a)(1)(iii)	Pass
Emissions in non-restricted frequency bands	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
Emissions around the fundamental	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
Emissions in restricted frequency bands (below 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
Emissions in restricted frequency bands (above 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d)	Pass

1.4. Test Facility

KSIGN(Guangdong) Testing Co., Ltd.

West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L13261

KSIGN(Guangdong) Testing Co., Ltd. has been assessed and proved to be in Compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: 5457.01

KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing

ISED#: 25693 CAB identifier.: CN0096

KSIGN(Guangdong) Testing Co., Ltd. has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

FCC-Registration No.: 294912 Designation Number: CN1328

KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

1.5. Measurement Uncertainty

Test Items	Measurement Uncertainty
Conducted Emission (150k-30MHz)	$\pm 3.34\text{dB}$
Output Power, Conducted	$\pm 1.4\text{dB}$
Spurious Emissions, Conducted	$\pm 3.3\text{dB}$
RSE (1-18GHz)	$\pm 4.68\text{dB}$
RSE (30-1000MHz)	$\pm 5.7\text{dB}$
RSE (18-40GHz)	$\pm 5.18\text{dB}$

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

2. GENERAL INFORMATION

2.1. General Description Of EUT

Product Name:	ZORDAI Smart wear
Trademark:	ZORDAI
Model / Type reference:	ZORDAI Z8Ultra, ZORDAI Z8,ZORDAI Z8pro,ZORDAI Z8promax,ZORDAI Z8Ultrapro,ZORDAI Z8 Ultramax
Model Difference:	The only difference between product models is the color.Different model names are available to meet market demands. Other power supply methods, internal structures, circuits and key components are the same, and do not affect safety and electromagnetic compatibility performance.
Power Supply:	DC3.7V from the Battery
Operation Frequency:	2402MHz to 2480MHz
Number of Channels:	79
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Antenna Type:	Internal Antenna
Antenna Gain:	1.4dBi

2.2. Accessory Equipment Information

The EUT was tested as an independent device.

2.3. Description of Test Modes

No.	Title	Description of Mode
TM1	TX-GFSK (Non-Hopping)	Keep the EUT in continuously transmitting mode (non-hopping) with GFSK modulation.
TM2	TX-GFSK (Hopping)	Keep the EUT in continuously transmitting mode (hopping) with GFSK modulation,.

2.4. Measurement Instruments List

Conducted Emission at AC power line				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
ISN	Schwarzbeck	CAT5 8158	227	2023-03-04
EMF Test Fixture	Schwarzbeck	VDHH 9502	176	2023-03-06
Manual RF Switch	JS TOYO	/	MSW-01/002	2023-03-04
EMI Test Receiver	R&S	ESR	102524	2023-03-04
LISN	R&S	ENV432	1326.6105.02	2023-03-04
Power Absorbing Clamp	R&S	MDS-21	100925	2023-03-06
Triple Loop Antenna	Beijin ZHINAN	ZN30401	17028	2023-03-04
Hygrothermograph	/	HTC-1	/	2023-03-07
High Voltage Probe	Tektronix	P6015A	X070429	2023-03-04
Flexible current probe	DKFLEX	DK-7000	181327	2023-03-04
LISN	Schwarzbeck	NNLK 8121	8121-442	2023-03-04
Current Sensor Probe	TESEQ	CSP9160A	71674	2023-03-04
Capacitive Voltage Probe	TESEQ	CPV2200A	27045	2023-03-04
Click Analyzer	SCHAFFNER	DIA1512D	5244	2023-03-04
Digital Multimeter	FLUKE	17B+	38830666WS	2023-03-04
854 shield room	JS TOYO Corporation	854	/	2024-11-24

Occupied Bandwidth				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Spectrum Analyzer	R&S	FSV40-N	101798	2023-03-04
Wideband Radio Communication Tester	R&S	CMW500	157282	2023-03-04
Vector Signal Generator	Agilent	N5182A	MY50142520	2023-03-04
Analog Signal Generator	HP	83752A	3344A00337	2023-03-04
RF Control Unit	Tonscend	JS0806-2	/	2023-03-04
Dual Output DC Power Supply	Agilent	E3646A	MY40009992	2023-03-04
Spectrum Analyzer	HP	8593E	3831U02087	2023-03-04
Climate Chamber	Angul	AGNH80L	1903042120	2023-03-04
Hygrothermograph	Anymetre	JB913	/	2023-03-07
Coaxial Cable	BEBES	A40-2.92M2.92 F-4.5M	1907021	2023-03-04
Splitter	COM-MW Technology Co., Ltd	ZPD-M1-8-2103	09203407	2023-03-04
Band Stop Filter	COM-MW Technology Co., Ltd	ZBSF6-C820-92 0-188	09203401	2023-03-04
High Pass Filter	COM-MW Technology Co., Ltd	ZHPF-M1.2-9G- 187	09203403	2023-03-04
Shielding box	Gxiong	GX-5915A	2201113	2023-04-23

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Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdkesign.cn Web: www.gdkesign.com

Audio Analyzer	R&S	UPL16	100001	2023-03-04
Wideband Radio Communication Tester	R&S	CMU200	115297	2023-03-04

Maximum Conducted Output Power				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Spectrum Analyzer	R&S	FSV40-N	101798	2023-03-04
Wideband Radio Communication Tester	R&S	CMW500	157282	2023-03-04
Vector Signal Generator	Agilent	N5182A	MY50142520	2023-03-04
Analog Signal Generator	HP	83752A	3344A00337	2023-03-04
RF Control Unit	Tonscend	JS0806-2	/	2023-03-04
Dual Output DC Power Supply	Agilent	E3646A	MY40009992	2023-03-04
Spectrum Analyzer	HP	8593E	3831U02087	2023-03-04
Climate Chamber	Angul	AGNH80L	1903042120	2023-03-04
Hygrothermograph	Anymetre	JB913	/	2023-03-07
Coaxial Cable	BEBES	A40-2.92M2.92 F-4.5M	1907021	2023-03-04
Splitter	COM-MW Technology Co., Ltd	ZPD-M1-8-2103	09203407	2023-03-04
Band Stop Filter	COM-MW Technology Co., Ltd	ZBSF6-C820-92 0-188	09203401	2023-03-04
High Pass Filter	COM-MW Technology Co., Ltd	ZHPF-M1.2-9G- 187	09203403	2023-03-04
Shielding box	Gxiong	GX-5915A	2201113	2023-04-23
Audio Analyzer	R&S	UPL16	100001	2023-03-04
Wideband Radio Communication Tester	R&S	CMU200	115297	2023-03-04

Channel Separation				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Spectrum Analyzer	R&S	FSV40-N	101798	2023-03-04
Wideband Radio Communication Tester	R&S	CMW500	157282	2023-03-04
Vector Signal Generator	Agilent	N5182A	MY50142520	2023-03-04
Analog Signal Generator	HP	83752A	3344A00337	2023-03-04
RF Control Unit	Tonscend	JS0806-2	/	2023-03-04
Dual Output DC Power Supply	Agilent	E3646A	MY40009992	2023-03-04
Spectrum Analyzer	HP	8593E	3831U02087	2023-03-04
Climate Chamber	Angul	AGNH80L	1903042120	2023-03-04
Hygrothermograph	Anymetre	JB913	/	2023-03-07

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Coaxial Cable	BEBES	A40-2.92M2.92 F-4.5M	1907021	2023-03-04
Splitter	COM-MW Technology Co., Ltd	ZPD-M1-8-2103	09203407	2023-03-04
Band Stop Filter	COM-MW Technology Co., Ltd	ZBSF6-C820-92 0-188	09203401	2023-03-04
High Pass Filter	COM-MW Technology Co., Ltd	ZHPF-M1.2-9G- 187	09203403	2023-03-04
Shielding box	Gxiong	GX-5915A	2201113	2023-04-23
Audio Analyzer	R&S	UPL16	100001	2023-03-04
Wideband Radio Communication Tester	R&S	CMU200	115297	2023-03-04

Number of Hopping Frequencies				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Spectrum Analyzer	R&S	FSV40-N	101798	2023-03-04
Wideband Radio Communication Tester	R&S	CMW500	157282	2023-03-04
Vector Signal Generator	Agilent	N5182A	MY50142520	2023-03-04
Analog Signal Generator	HP	83752A	3344A00337	2023-03-04
RF Control Unit	Tonscend	JS0806-2	/	2023-03-04
Dual Output DC Power Supply	Agilent	E3646A	MY40009992	2023-03-04
Spectrum Analyzer	HP	8593E	3831U02087	2023-03-04
Climate Chamber	Angul	AGNH80L	1903042120	2023-03-04
Hygrothermograph	Anymetre	JB913	/	2023-03-07
Coaxial Cable	BEBES	A40-2.92M2.92 F-4.5M	1907021	2023-03-04
Splitter	COM-MW Technology Co., Ltd	ZPD-M1-8-2103	09203407	2023-03-04
Band Stop Filter	COM-MW Technology Co., Ltd	ZBSF6-C820-92 0-188	09203401	2023-03-04
High Pass Filter	COM-MW Technology Co., Ltd	ZHPF-M1.2-9G- 187	09203403	2023-03-04
Shielding box	Gxiong	GX-5915A	2201113	2023-04-23
Audio Analyzer	R&S	UPL16	100001	2023-03-04
Wideband Radio Communication Tester	R&S	CMU200	115297	2023-03-04

Dwell Time				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Spectrum Analyzer	R&S	FSV40-N	101798	2023-03-04
Wideband Radio	R&S	CMW500	157282	2023-03-04

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Communication Tester				
Vector Signal Generator	Agilent	N5182A	MY50142520	2023-03-04
Analog Signal Generator	HP	83752A	3344A00337	2023-03-04
RF Control Unit	Tonscend	JS0806-2	/	2023-03-04
Dual Output DC Power Supply	Agilent	E3646A	MY40009992	2023-03-04
Spectrum Analyzer	HP	8593E	3831U02087	2023-03-04
Climate Chamber	Angul	AGNH80L	1903042120	2023-03-04
Hygrothermograph	Anymetre	JB913	/	2023-03-07
Coaxial Cable	BEBES	A40-2.92M2.92 F-4.5M	1907021	2023-03-04
Splitter	COM-MW Technology Co., Ltd	ZPD-M1-8-2103	09203407	2023-03-04
Band Stop Filter	COM-MW Technology Co., Ltd	ZBSF6-C820-92 0-188	09203401	2023-03-04
High Pass Filter	COM-MW Technology Co., Ltd	ZHPF-M1.2-9G- 187	09203403	2023-03-04
Shielding box	Gxiong	GX-5915A	2201113	2023-04-23
Audio Analyzer	R&S	UPL16	100001	2023-03-04
Wideband Radio Communication Tester	R&S	CMU200	115297	2023-03-04

Emissions in non-restricted frequency bands				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Spectrum Analyzer	R&S	FSV40-N	101798	2023-03-04
Wideband Radio Communication Tester	R&S	CMW500	157282	2023-03-04
Vector Signal Generator	Agilent	N5182A	MY50142520	2023-03-04
Analog Signal Generator	HP	83752A	3344A00337	2023-03-04
RF Control Unit	Tonscend	JS0806-2	/	2023-03-04
Dual Output DC Power Supply	Agilent	E3646A	MY40009992	2023-03-04
Spectrum Analyzer	HP	8593E	3831U02087	2023-03-04
Climate Chamber	Angul	AGNH80L	1903042120	2023-03-04
Hygrothermograph	Anymetre	JB913	/	2023-03-07
Coaxial Cable	BEBES	A40-2.92M2.92 F-4.5M	1907021	2023-03-04
Splitter	COM-MW Technology Co., Ltd	ZPD-M1-8-2103	09203407	2023-03-04
Band Stop Filter	COM-MW Technology Co., Ltd	ZBSF6-C820-92 0-188	09203401	2023-03-04
High Pass Filter	COM-MW	ZHPF-M1.2-9G-	09203403	2023-03-04

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	Technology Co., Ltd	187		
Shielding box	Gxiong	GX-5915A	2201113	2023-04-23
Audio Analyzer	R&S	UPL16	100001	2023-03-04
Wideband Radio Communication Tester	R&S	CMU200	115297	2023-03-04

Emissions around the fundamental				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	01230	2023-12-04
Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	2023-03-04
Horn Antenna	Schwarzbeck	BBHA 9120 D	2023	2023-03-29
Pre-Amplifier	EMCI	EMC051835SE	980662	2023-03-04
Spectrum Analyzer	Keysight	N9020A	MY46471971	2023-03-04
Loop Antenna	Beijin ZHINAN	ZN30900C	18050	2023-03-05
High Pass Filter	Chengdu E-Microwave	OHF-3-18-S	0E01901038	2023-03-04
High Pass Filter	Chengdu E-Microwave	OHF-6.5-18-S	0E01901039	2023-03-04
Band Stop Filter	Chengdu E-Microwave	OBSF-2400-248 3.5-50N	0E01901040	2023-03-04
Band Stop Filter	Chengdu E-Microwave	OBSF-5100-590 0-50N	/	2023-03-04
EMI Test Receiver	R&S	ESR	102525	2023-03-04
Hygrothermograph	/	HTC-1	/	2023-03-07
RF Switch	JS TOYO Corporation	NS 4903	1901-214	2023-03-04
996 chamber	JS TOYO Corporation	966	/	2024-11-24
Horn Antenna	Schwarzbeck	BBHA9170	00943	2022-11-28
Pre-Amplifier	EMCI	BBV 9721	BBV 9721-57	2023-03-04

Emissions in restricted frequency bands (below 1GHz)				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	01230	2023-12-04
Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	2023-03-04
Horn Antenna	Schwarzbeck	BBHA 9120 D	2023	2023-03-29
Pre-Amplifier	EMCI	EMC051835SE	980662	2023-03-04
Spectrum Analyzer	Keysight	N9020A	MY46471971	2023-03-04
Loop Antenna	Beijin ZHINAN	ZN30900C	18050	2023-03-05
High Pass Filter	Chengdu E-Microwave	OHF-3-18-S	0E01901038	2023-03-04
High Pass Filter	Chengdu E-Microwave	OHF-6.5-18-S	0E01901039	2023-03-04
Band Stop Filter	Chengdu E-Microwave	OBSF-2400-248 3.5-50N	0E01901040	2023-03-04

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Band Stop Filter	Chengdu E-Microwave	OBSF-5100-590 0-50N	/	2023-03-04
EMI Test Receiver	R&S	ESR	102525	2023-03-04
Hygrothermograph	/	HTC-1	/	2023-03-07
RF Switch	JS TOYO Corporation	NS 4903	1901-214	2023-03-04
996 chamber	JS TOYO Corporation	966	/	2024-11-24
Horn Antenna	Schwarzbeck	BBHA9170	00943	2022-11-28
Pre-Amplifier	EMCI	BBV 9721	BBV 9721-57	2023-03-04

Emissions in restricted frequency bands (above 1GHz)				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	01230	2023-12-04
Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	2023-03-04
Horn Antenna	Schwarzbeck	BBHA 9120 D	2023	2023-03-29
Pre-Amplifier	EMCI	EMC051835SE	980662	2023-03-04
Spectrum Analyzer	Keysight	N9020A	MY46471971	2023-03-04
Loop Antenna	Beijin ZHINAN	ZN30900C	18050	2023-03-05
High Pass Filter	Chengdu E-Microwave	OHF-3-18-S	0E01901038	2023-03-04
High Pass Filter	Chengdu E-Microwave	OHF-6.5-18-S	0E01901039	2023-03-04
Band Stop Filter	Chengdu E-Microwave	OBSF-2400-248 3.5-50N	0E01901040	2023-03-04
Band Stop Filter	Chengdu E-Microwave	OBSF-5100-590 0-50N	/	2023-03-04
EMI Test Receiver	R&S	ESR	102525	2023-03-04
Hygrothermograph	/	HTC-1	/	2023-03-07
RF Switch	JS TOYO Corporation	NS 4903	1901-214	2023-03-04
996 chamber	JS TOYO Corporation	966	/	2024-11-24
Horn Antenna	Schwarzbeck	BBHA9170	00943	2022-11-28
Pre-Amplifier	EMCI	BBV 9721	BBV 9721-57	2023-03-04

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3. Evaluation Results (Evaluation)

3.1. Antenna requirement

Test Requirement:	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.
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3.1.1. E.U.T. Operation:

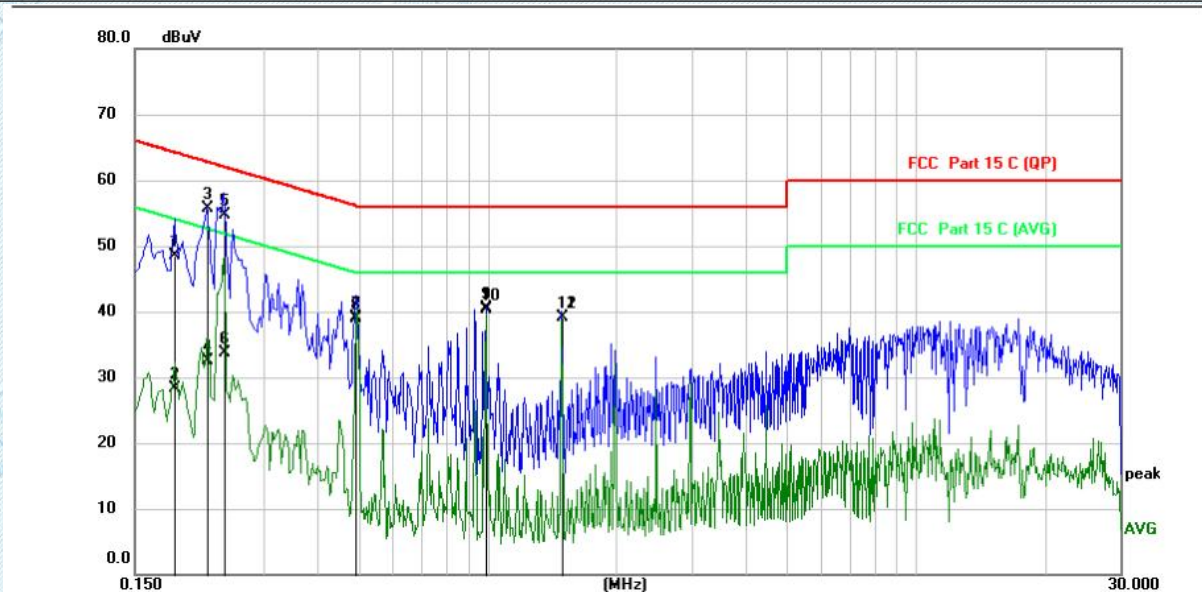
Operating Environment:	
Temperature:	23.3 °C
Humidity:	49.3 %
Atmospheric Pressure:	102 mbar
Final test mode:	TM1

3.1.2. Test Data:

The antenna gain is 1.4dB, the directional gain of the antenna less than 6dBi. It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used.
Antenna structure please refer to the EUT internal photographs antenna photo.

4.1.3. Test Data:

TM1 / Line: Line / Band: 2.4G / BW: 1 / CH: L



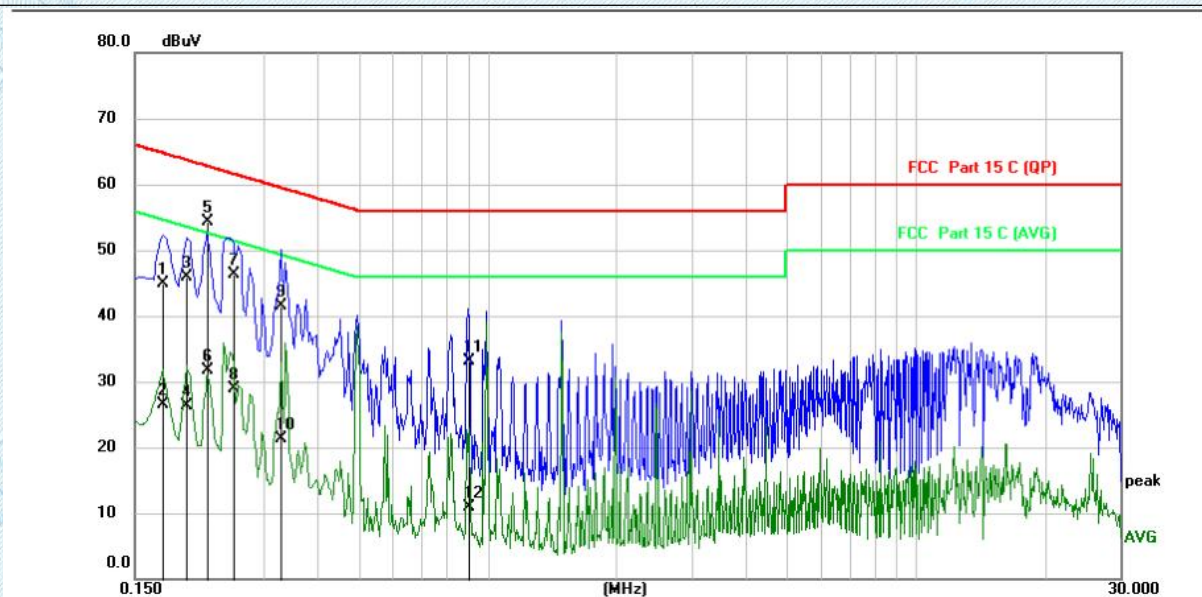
No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.1860	37.81	10.75	48.56	64.21	-15.65	QP	
2	0.1860	17.48	10.75	28.23	54.21	-25.98	AVG	
3	0.2220	45.02	10.73	55.75	62.74	-6.99	QP	
4	0.2220	21.80	10.73	32.53	52.74	-20.21	AVG	
5	0.2420	43.90	10.72	54.62	62.03	-7.41	QP	
6	0.2420	22.95	10.72	33.67	52.03	-18.36	AVG	
7	0.4940	28.55	10.52	39.07	56.10	-17.03	QP	
8	0.4940	28.31	10.52	38.83	46.10	-7.27	AVG	
9	0.9940	29.98	10.50	40.48	56.00	-15.52	QP	
10 *	0.9940	29.84	10.50	40.34	46.00	-5.66	AVG	
11	1.4900	28.61	10.50	39.11	56.00	-16.89	QP	
12	1.4900	28.62	10.50	39.12	46.00	-6.88	AVG	

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TM1 / Line: Neutral / Band: 2.4G / BW: 1 / CH: L



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.1740	34.09	10.73	44.82	64.77	-19.95	QP	
2	0.1740	15.85	10.73	26.58	54.77	-28.19	AVG	
3	0.1980	35.05	10.76	45.81	63.69	-17.88	QP	
4	0.1980	15.52	10.76	26.28	53.69	-27.41	AVG	
5 *	0.2220	43.63	10.75	54.38	62.74	-8.36	QP	
6	0.2220	20.88	10.75	31.63	52.74	-21.11	AVG	
7	0.2540	35.53	10.71	46.24	61.63	-15.39	QP	
8	0.2540	18.17	10.71	28.88	51.63	-22.75	AVG	
9	0.3300	30.93	10.54	41.47	59.45	-17.98	QP	
10	0.3300	10.71	10.54	21.25	49.45	-28.20	AVG	
11	0.9020	22.58	10.48	33.06	56.00	-22.94	QP	
12	0.9020	0.47	10.48	10.95	46.00	-35.05	AVG	

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4.2. Occupied Bandwidth

Test Requirement:	Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.
Test Limit:	Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.
Test Method:	Occupied bandwidth—relative measurement procedure
Procedure:	a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.5.2. d) Steps a) through c) might require iteration to adjust within the specified tolerances. e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “-xx dB down” requirement; that is, if the requirement calls for measuring the -20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value. f) Set detection mode to peak and trace mode to max hold. g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value). h) Determine the “-xx dB down amplitude” using $[(\text{reference value}) - xx]$. Alternatively, this calculation may be made by using the marker-delta function of the instrument. i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j). j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “-xx dB down amplitude” determined in step h). If a marker is below this “-xx dB down amplitude” value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “-xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission

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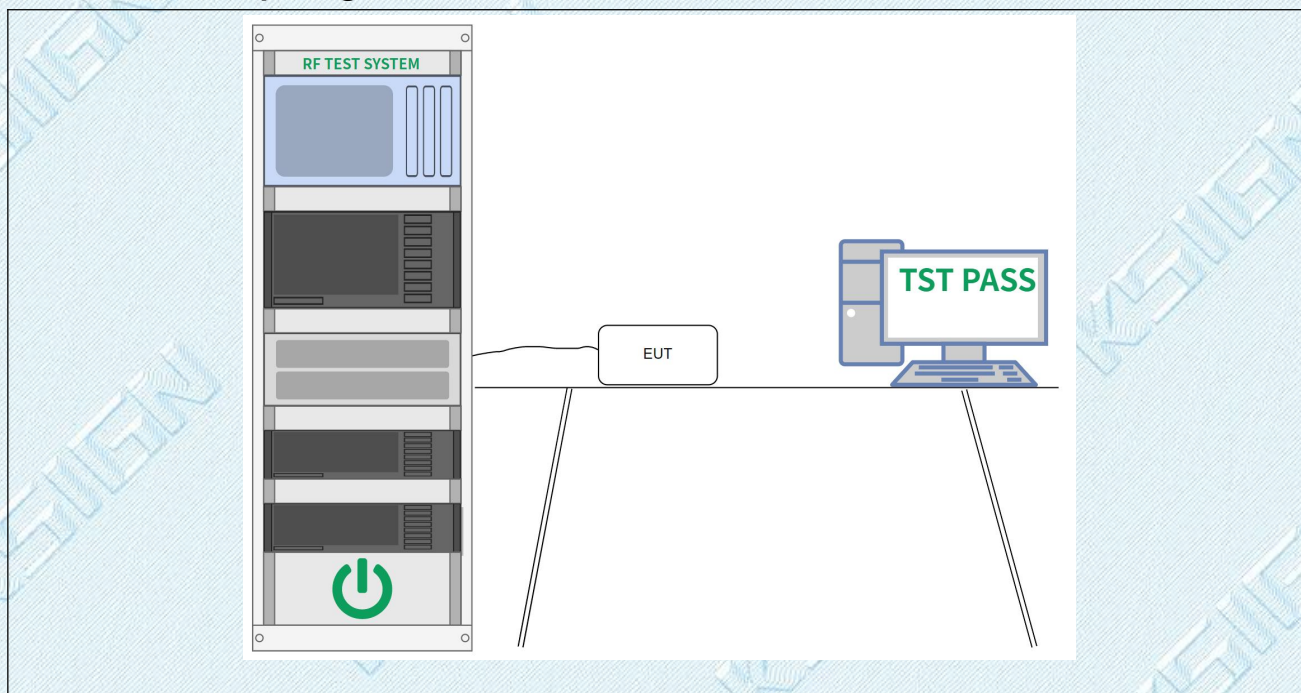
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	bandwidth. k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).
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4.2.1. E.U.T. Operation:

Operating Environment:	
Temperature:	23.8 °C
Humidity:	46.5 %
Atmospheric Pressure:	102 mbar
Final test mode:	TM1

4.2.2. Test Setup Diagram:



4.2.3. Test Data:

Please Refer to Appendix for Details.

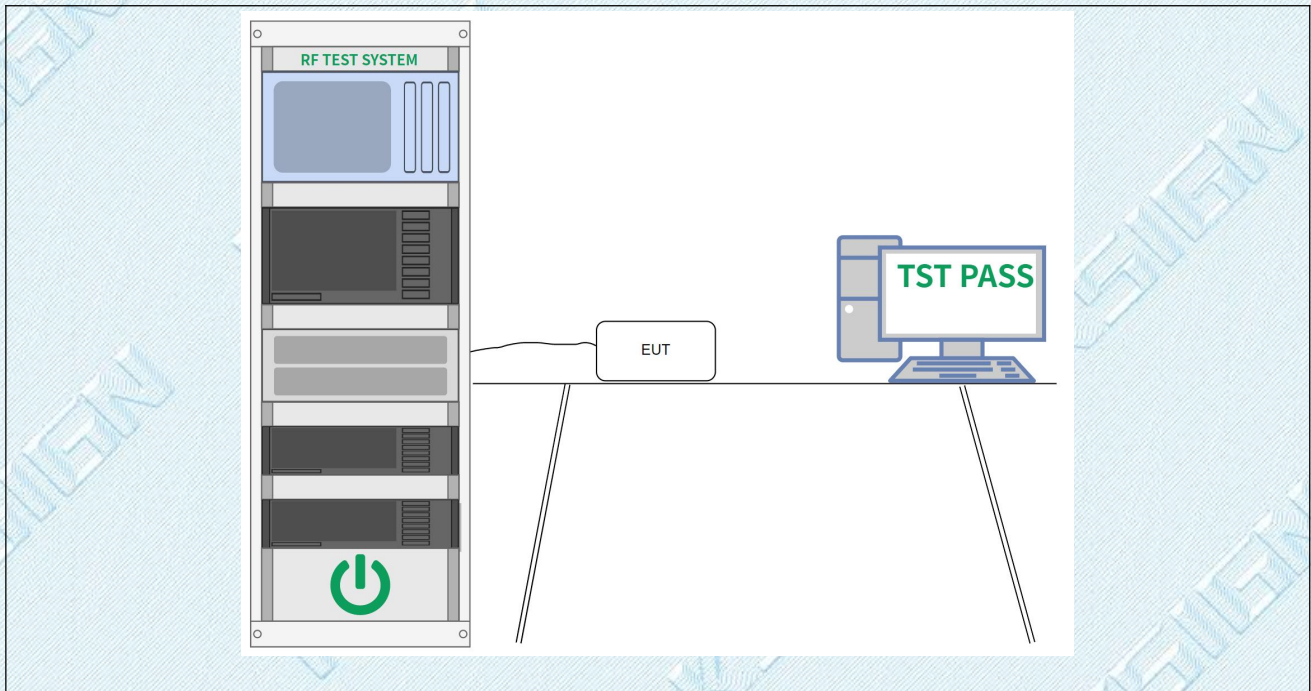
4.3. Maximum Conducted Output Power

Test Requirement:	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.
Test Limit:	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.
Test Method:	Output power test procedure for frequency-hopping spread-spectrum (FHSS) devices
Procedure:	This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test: a) Use the following spectrum analyzer settings: 1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel. 2) RBW > 20 dB bandwidth of the emission being measured. 3) VBW >= RBW. 4) Sweep: Auto. 5) Detector function: Peak. 6) Trace: Max hold. b) Allow trace to stabilize. c) Use the marker-to-peak function to set the marker to the peak of the emission. d) The indicated level is the peak output power, after any corrections for external attenuators and cables. e) A plot of the test results and setup description shall be included in the test report. NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

4.3.1. E.U.T. Operation:

Operating Environment:	
Temperature:	23.9 °C
Humidity:	45.5 %
Atmospheric Pressure:	102 mbar
Final test mode:	TM1

4.3.2. Test Setup Diagram:



4.3.3. Test Data:

Please Refer to Appendix for Details.

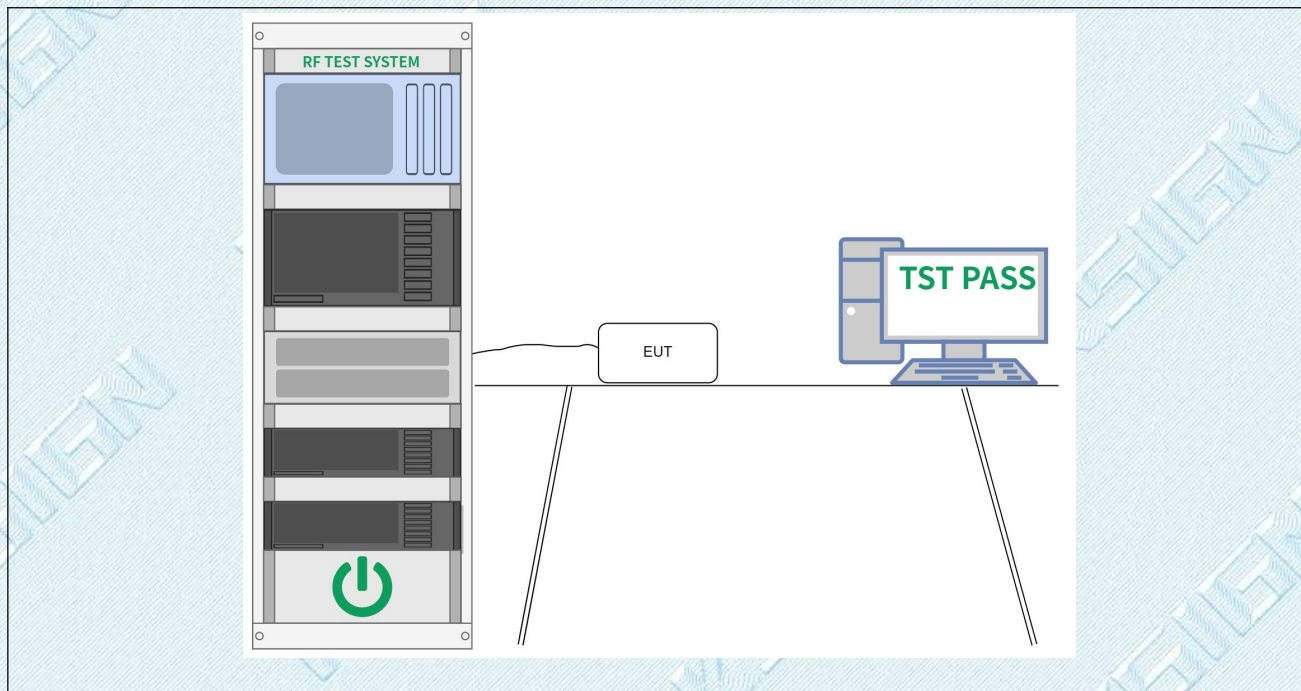
4.4. Channel Separation

Test Requirement:	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, 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.
Test Limit:	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, 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.
Test Method:	Carrier frequency separation
Procedure:	The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings: a) Span: Wide enough to capture the peaks of two adjacent channels. b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel. c) Video (or average) bandwidth (VBW) $\geq$ RBW. d) Sweep: Auto. e) Detector function: Peak. f) Trace: Max hold. g) Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined. A plot of the data shall be included in the test report.

4.4.1. E.U.T. Operation:

Operating Environment:	
Temperature:	23.5 °C
Humidity:	48.7 %
Atmospheric Pressure:	102 mbar
Final test mode:	TM2

4.4.2. Test Setup Diagram:



4.4.3. Test Data:

Please Refer to Appendix for Details.

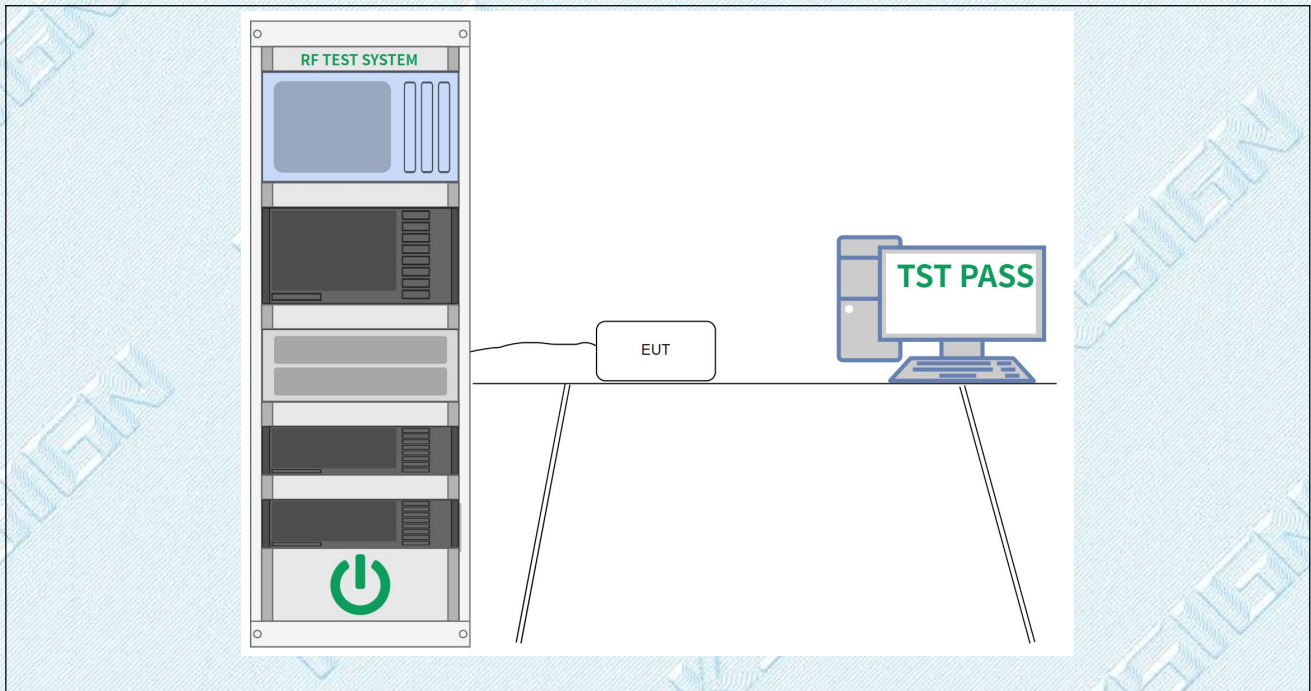
4.5. Number of Hopping Frequencies

Test Requirement:	Frequency hopping systems in the 2400-2483.5 MHz 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.
Test Limit:	Frequency hopping systems in the 2400-2483.5 MHz 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.
Test Method:	Number of hopping frequencies
Procedure:	The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings: a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen. b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller. c) VBW $\geq$ RBW. d) Sweep: Auto. e) Detector function: Peak. f) Trace: Max hold. g) Allow the trace to stabilize. It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A plot of the data shall be included in the test report.

4.5.1. E.U.T. Operation:

Operating Environment:	
Temperature:	24.3 °C
Humidity:	49 %
Atmospheric Pressure:	102 mbar
Final test mode:	TM2

4.5.2. Test Setup Diagram:



4.5.3. Test Data:

Please Refer to Appendix for Details.

4.6. Dwell Time

Test Requirement:	Frequency hopping systems in the 2400-2483.5 MHz 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.
Test Limit:	Frequency hopping systems in the 2400-2483.5 MHz 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.
Test Method:	Time of occupancy (dwell time)
Procedure:	The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings: a) Span: Zero span, centered on a hopping channel. b) RBW shall be $\leq$ channel spacing and where possible RBW should be set $\gg 1/T$, where T is the expected dwell time per channel. c) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel. d) Detector function: Peak. e) Trace: Max hold. Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time. Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation: $(\text{Number of hops in the period specified in the requirements}) = (\text{number of hops on spectrum analyzer}) \times (\text{period specified in the requirements} / \text{analyzer sweep time})$ The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation. The measured transmit time and time between hops shall be consistent with the values described in the operational description for the EUT.

4.6.1. E.U.T. Operation:

Operating Environment:	
Temperature:	24.4 °C
Humidity:	53.5 %
Atmospheric Pressure:	102 mbar

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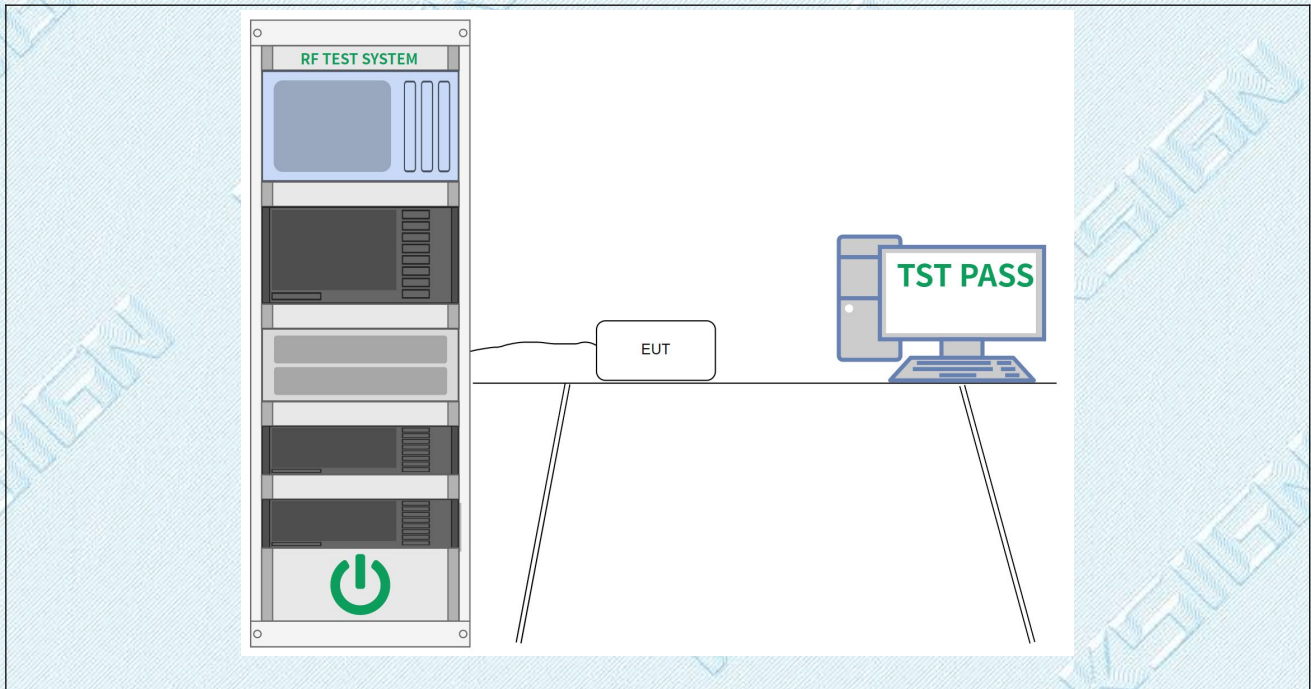
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Final test mode:

TM2

4.6.2. Test Setup Diagram:



4.6.3. Test Data:

Please Refer to Appendix for Details.

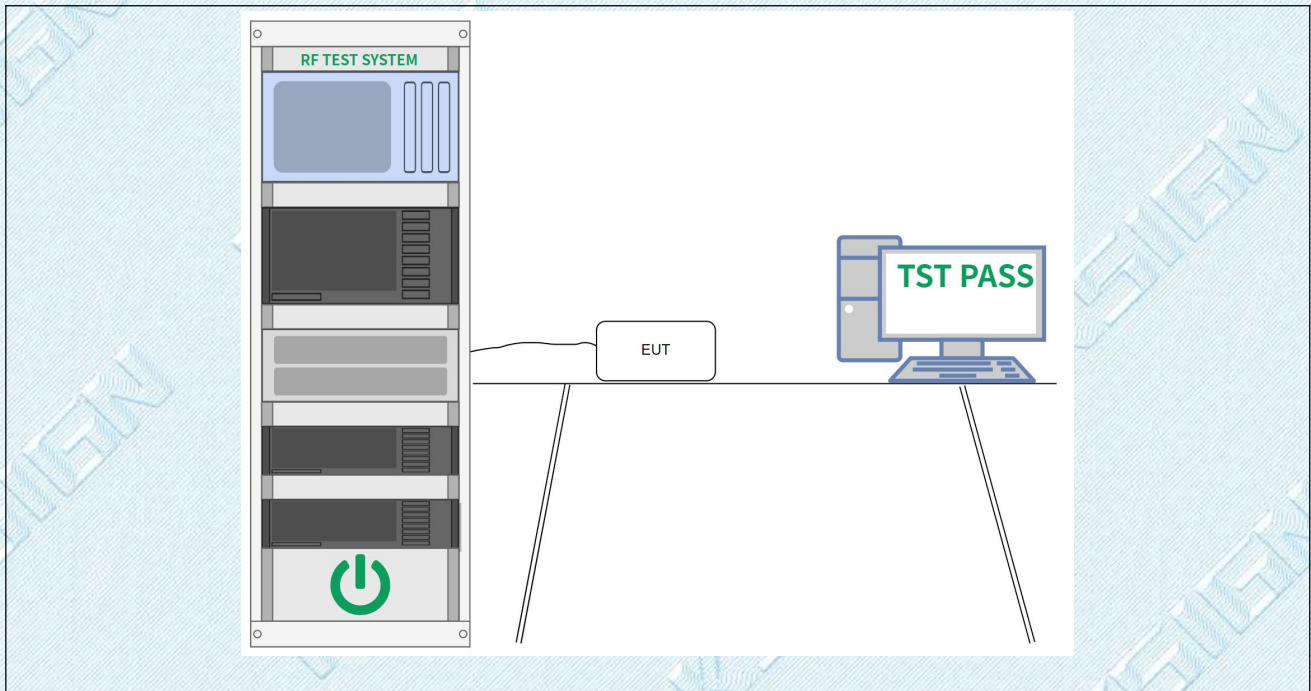
4.7. Emissions in non-restricted frequency bands

Test Requirement:	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.
Test Limit:	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.
Test Method:	Conducted spurious emissions test methodology
Procedure:	Conducted spurious emissions shall be measured for the transmit frequency, per 5.5 and 5.6, and at the maximum transmit powers. Connect the primary antenna port through an attenuator to the spectrum analyzer input; in the results, account for all losses between the unlicensed wireless device output and the spectrum analyzer. The instrument shall span 30 MHz to 10 times the operating frequency in GHz, with a resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector. The band 30 MHz to the highest frequency may be split into smaller spans, as long as the entire spectrum is covered.

4.7.1. E.U.T. Operation:

Operating Environment:	
Temperature:	23.9 °C
Humidity:	47.6 %
Atmospheric Pressure:	102 mbar
Final test mode:	TM1, TM2

4.7.2. Test Setup Diagram:



4.7.3. Test Data:

Please Refer to Appendix for Details.

4.8. Emissions around the fundamental

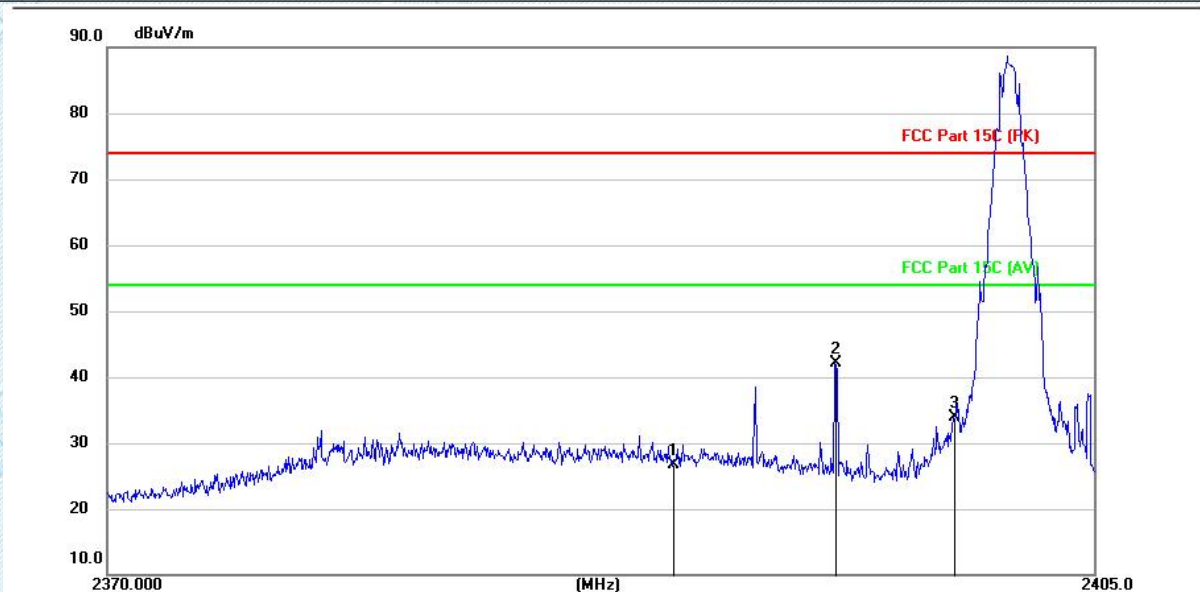
Test Requirement:	In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`		
Test Limit:	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
	30-88	100 **	3
	88-216	150 **	3
	216-960	200 **	3
	Above 960	500	3
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.			
Test Method:	Radiated emissions tests		
Procedure:	ANSI C63.10-2013 section 6.6.4		

4.8.1. E.U.T. Operation:

Operating Environment:	
Temperature:	25.7 °C
Humidity:	44 %
Atmospheric Pressure:	102 mbar
Final test mode:	TM1, TM2

4.8.2. Test Data:

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: L

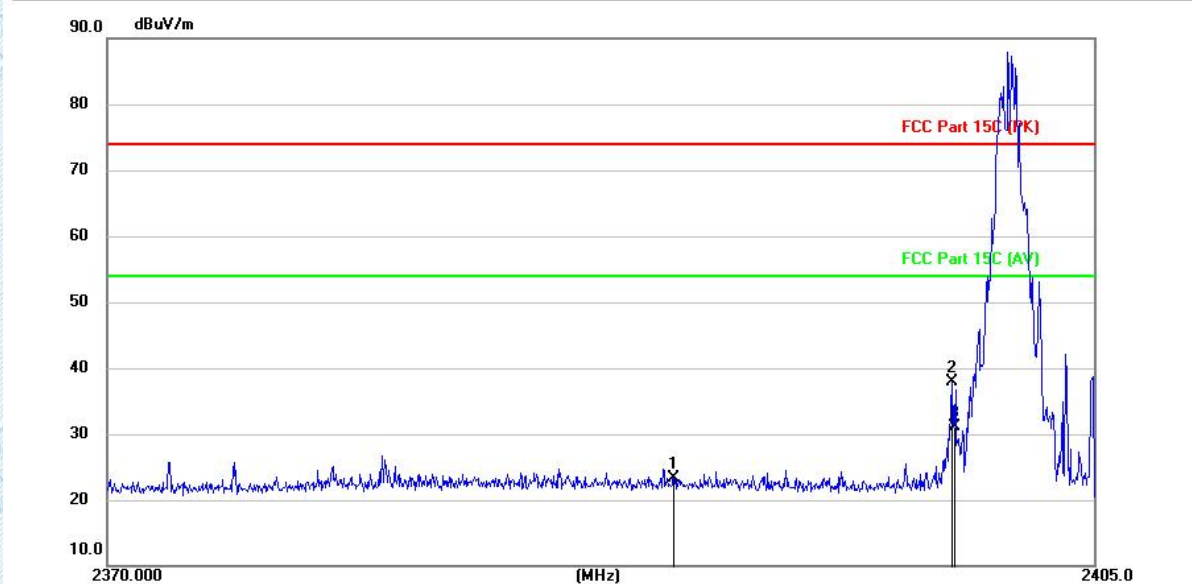


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2390.000	37.65	-10.92	26.73	74.00	-47.27	peak
2	*	2395.774	53.01	-10.91	42.10	74.00	-31.90	peak
3		2400.000	44.74	-10.92	33.82	74.00	-40.18	peak

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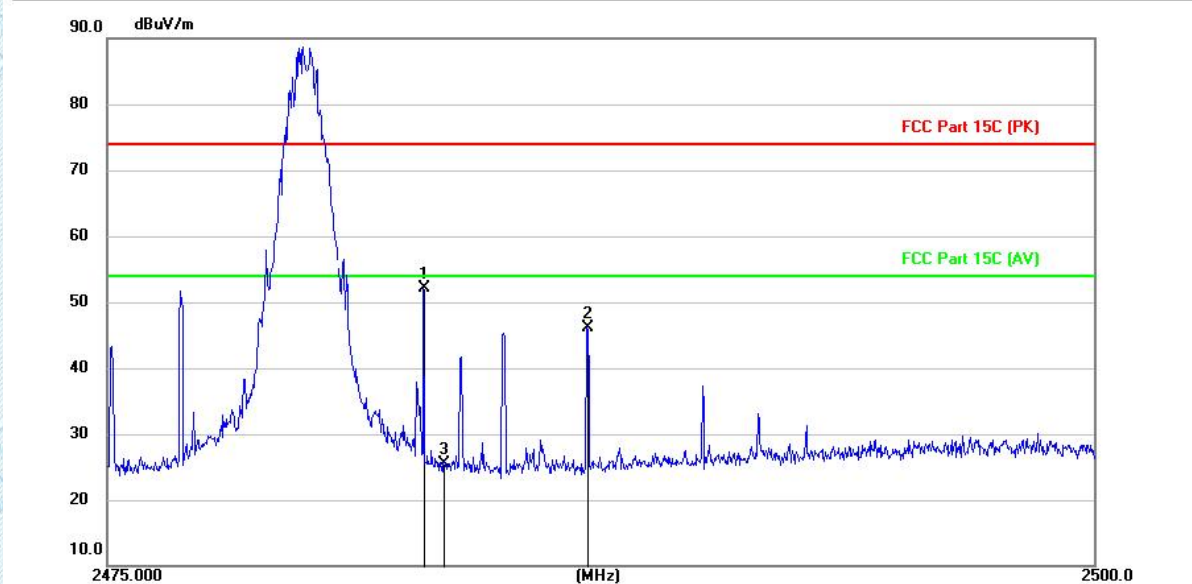
TM1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: L


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2390.000	34.24	-10.92	23.32	74.00	-50.68	peak
2	*	2399.932	48.75	-10.92	37.83	74.00	-36.17	peak
3		2400.000	41.97	-10.92	31.05	74.00	-42.95	peak

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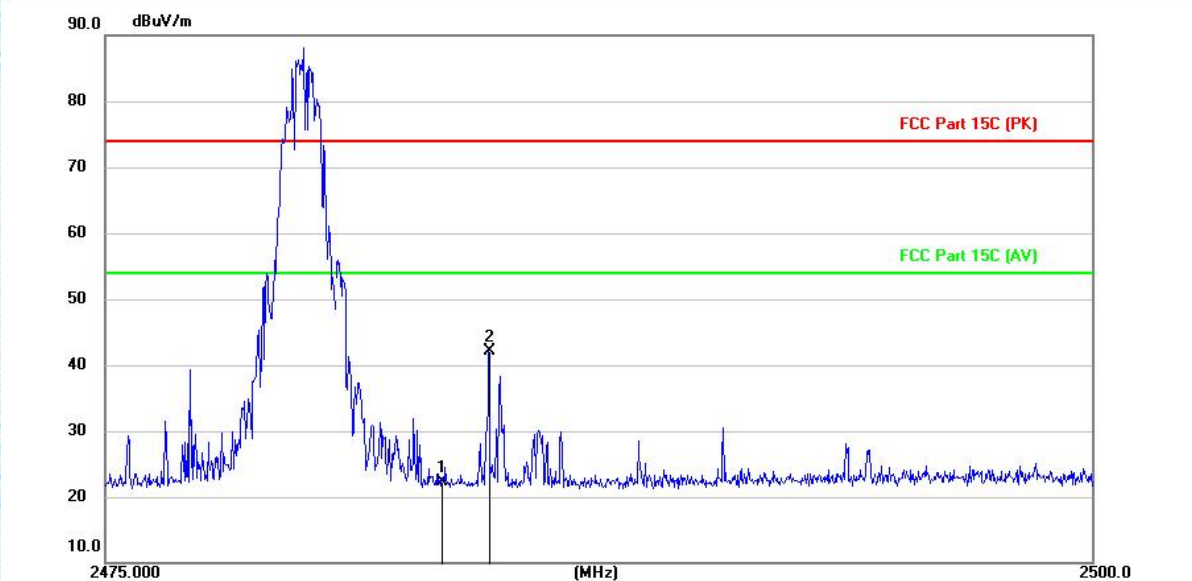
TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: H


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2483.000	62.97	-10.88	52.09	74.00	-21.91	peak
2		2487.142	56.99	-10.88	46.11	74.00	-27.89	peak
3		2483.500	36.37	-10.88	25.49	74.00	-48.51	peak

TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com

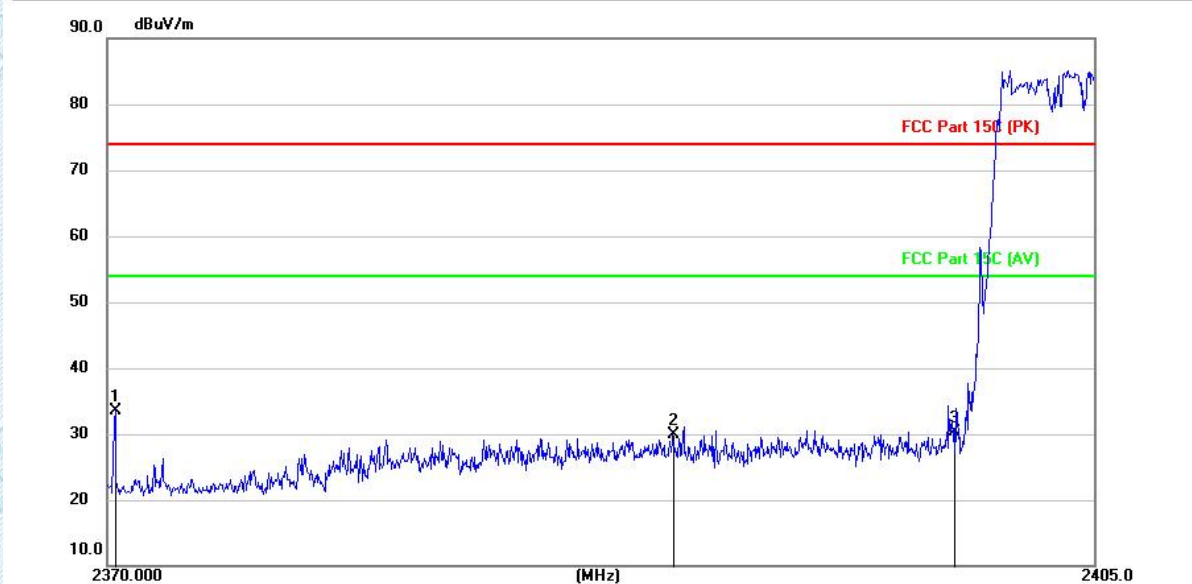
TM1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: H


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2483.500	33.14	-10.88	22.26	74.00	-51.74	peak
2	*	2484.702	53.01	-10.88	42.13	74.00	-31.87	peak

TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com

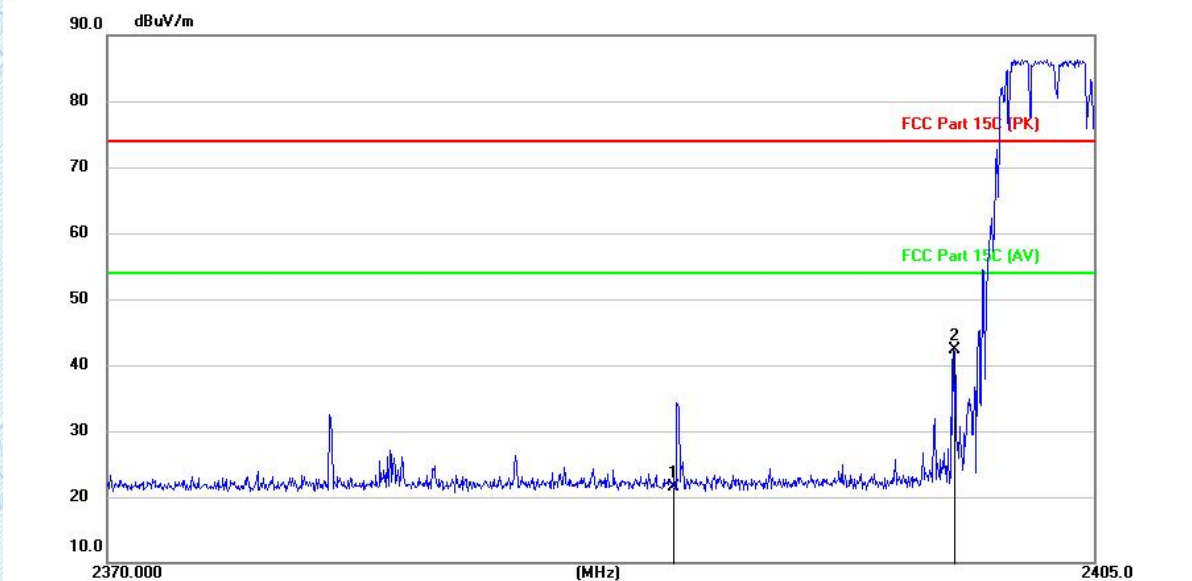
TM2 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: L


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2370.284	44.42	-10.92	33.50	74.00	-40.50	peak
2		2390.000	40.83	-10.92	29.91	74.00	-44.09	peak
3		2400.000	41.26	-10.92	30.34	74.00	-43.66	peak

TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdkesign.cn Web: www.gdkesign.com

TM2 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: L


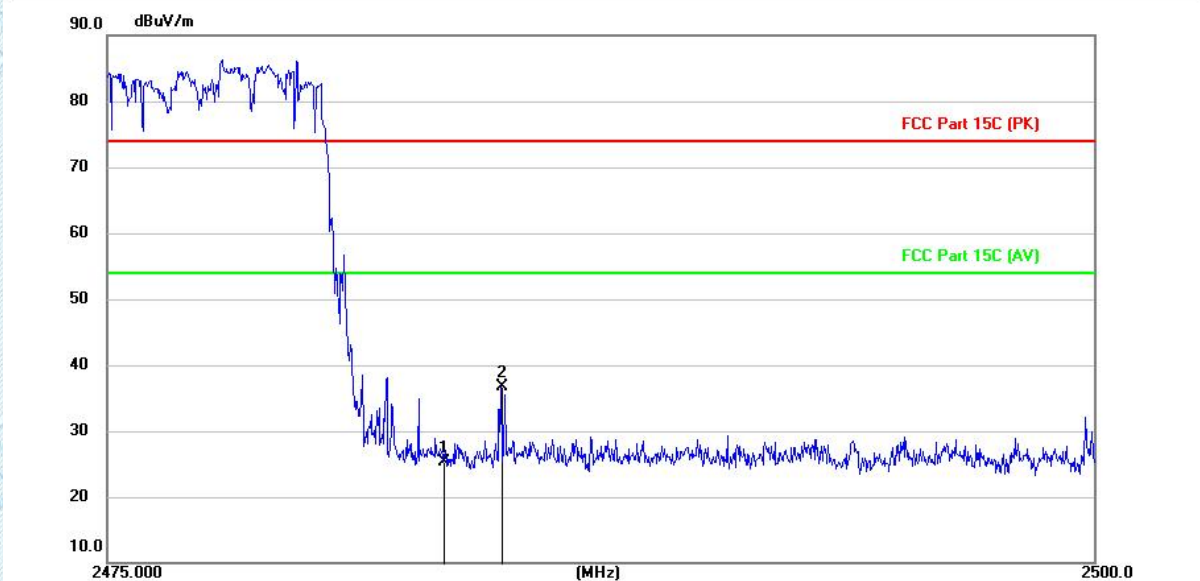
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2390.000	32.51	-10.92	21.59	74.00	-52.41	peak
2	*	2400.000	53.17	-10.92	42.25	74.00	-31.75	peak

TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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TM2 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: H

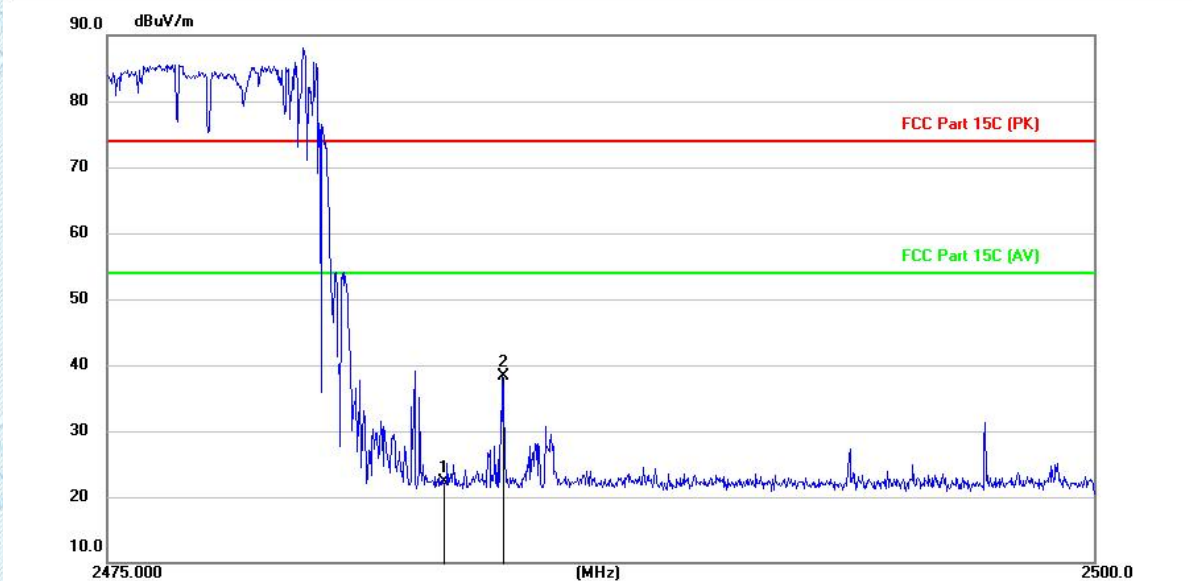


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2483.500	36.21	-10.88	25.33	74.00	-48.67	peak
2	*	2484.960	47.58	-10.88	36.70	74.00	-37.30	peak

TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com

TM2 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: H


No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		2483.500	33.26	-10.88	22.38	74.00	-51.62	peak
2	*	2484.997	49.24	-10.88	38.36	74.00	-35.64	peak

TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com

4.9. Emissions in restricted frequency bands (below 1GHz)

Test Requirement:	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)).`		
Test Limit:	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
	30-88	100 **	3
	88-216	150 **	3
	216-960	200 **	3
	Above 960	500	3
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.			
Test Method:	Radiated emissions tests		
Procedure:	ANSI C63.10-2013 section 6.6.4		

4.9.1. E.U.T. Operation:

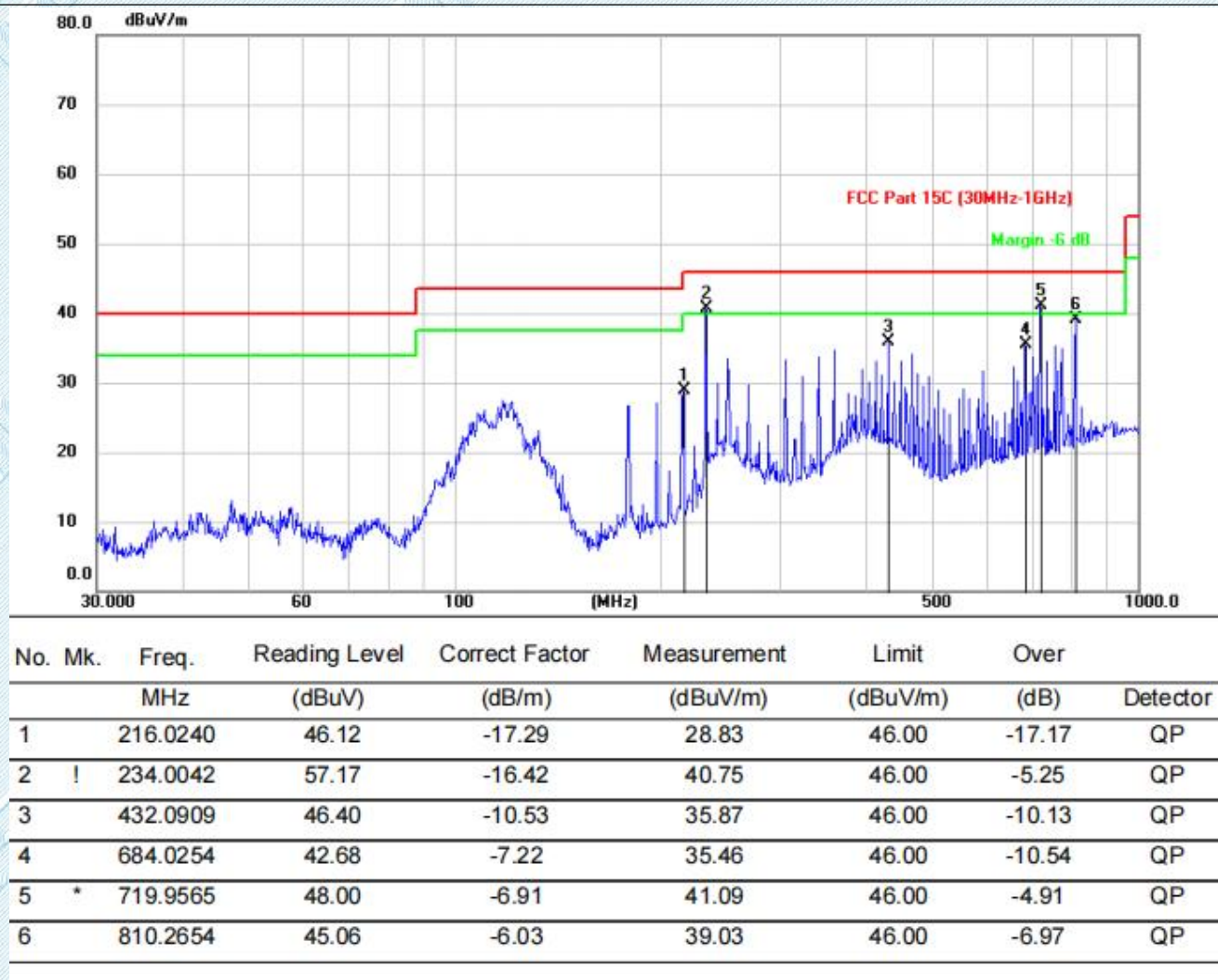
Operating Environment:	
Temperature:	25.6 °C
Humidity:	49.2 %
Atmospheric Pressure:	102 mbar
Final test mode:	TM1

Note:

Pre-scan all modulation, and found the GFSK CH00 which it is worse case for 30MHz-1GHz , so only show the test data for worse case.

4.9.2. Test Data:

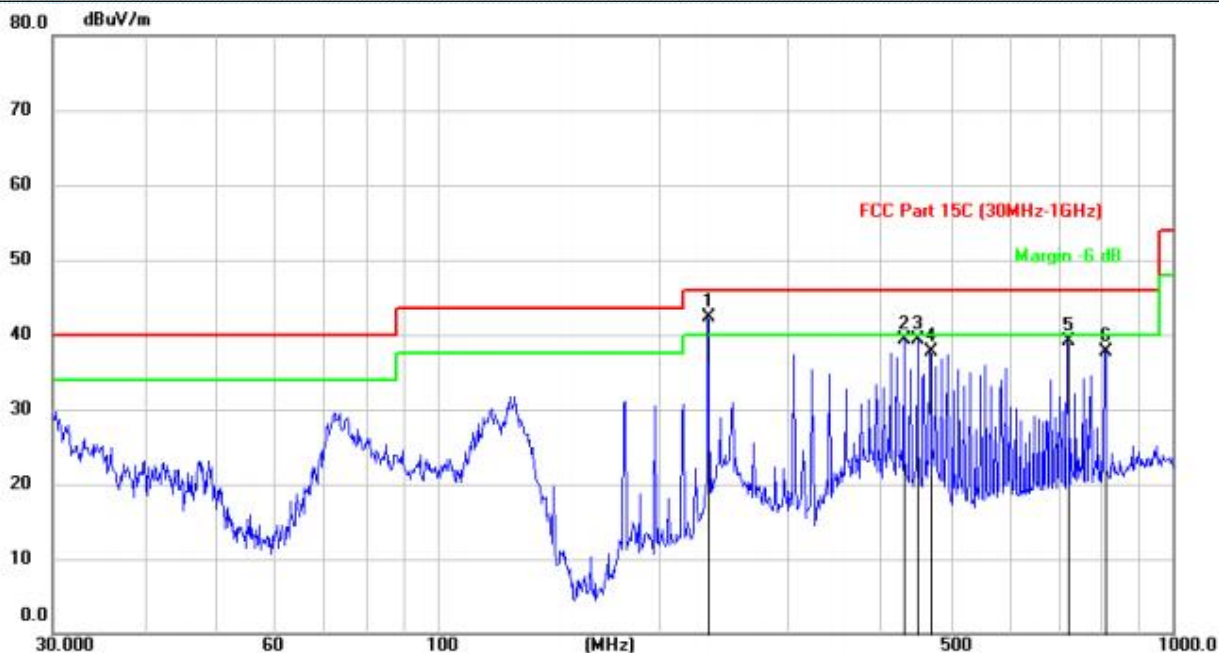
TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: L



TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com

TM1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: L


No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1	*	234.0042	58.75	-16.42	42.33	46.00	-3.67	QP
2		432.0909	49.75	-10.53	39.22	46.00	-6.78	QP
3		450.0290	49.55	-10.32	39.23	46.00	-6.77	QP
4		468.0549	47.88	-10.18	37.70	46.00	-8.30	QP
5		719.9565	45.98	-6.91	39.07	46.00	-6.93	QP
6		810.2654	43.82	-6.03	37.79	46.00	-8.21	QP

TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com

4.10. Emissions in restricted frequency bands (above 1GHz)

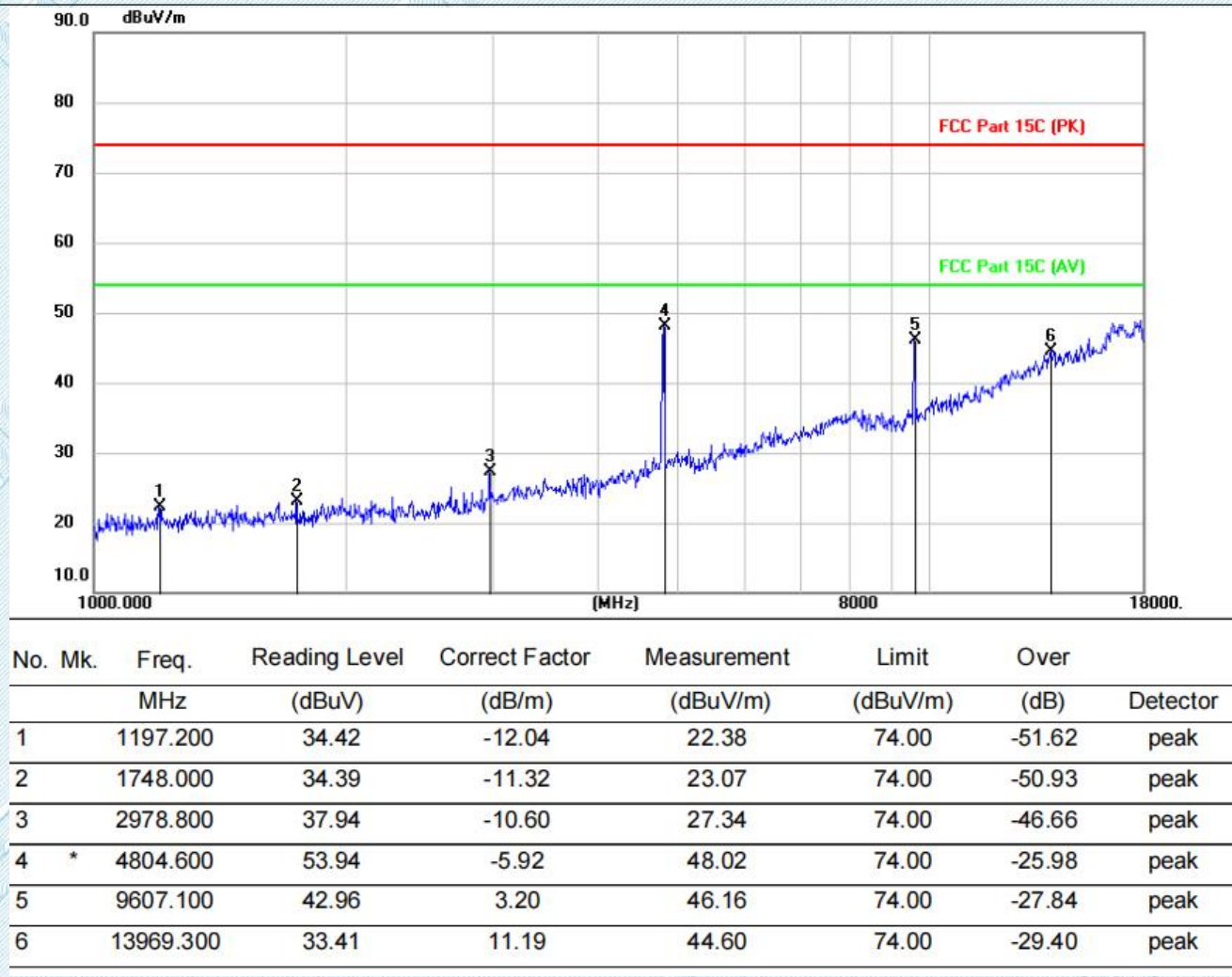
Test Requirement:	In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`		
Test Limit:	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
	30-88	100 **	3
	88-216	150 **	3
	216-960	200 **	3
	Above 960	500	3
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.			
Test Method:	Radiated emissions tests		
Procedure:	ANSI C63.10-2013 section 6.6.4		

4.10.1. E.U.T. Operation:

Operating Environment:	
Temperature:	23.6 °C
Humidity:	44 %
Atmospheric Pressure:	102 mbar
Final test mode:	TM1

4.10.2. Test Data:

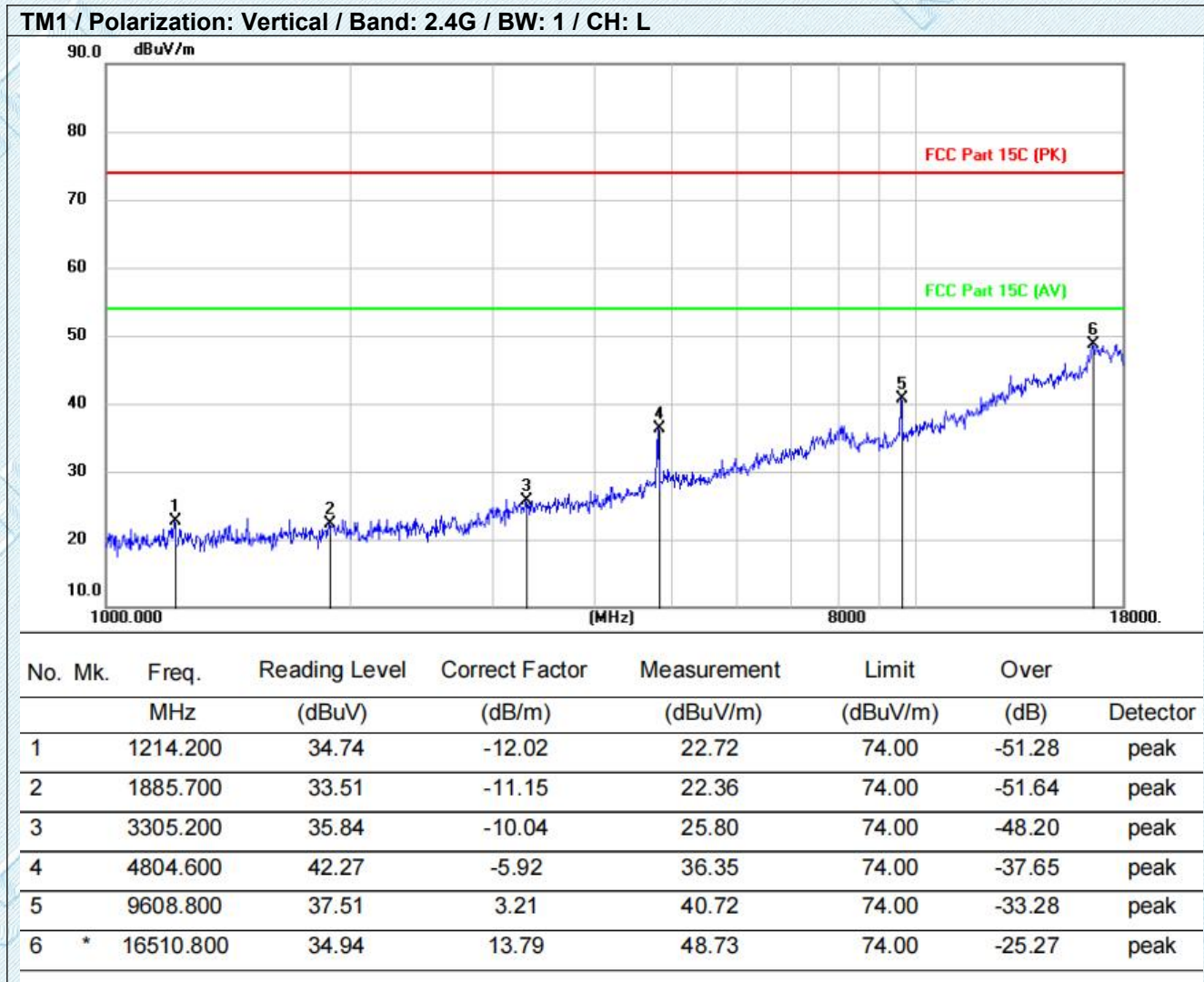
TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: L



TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

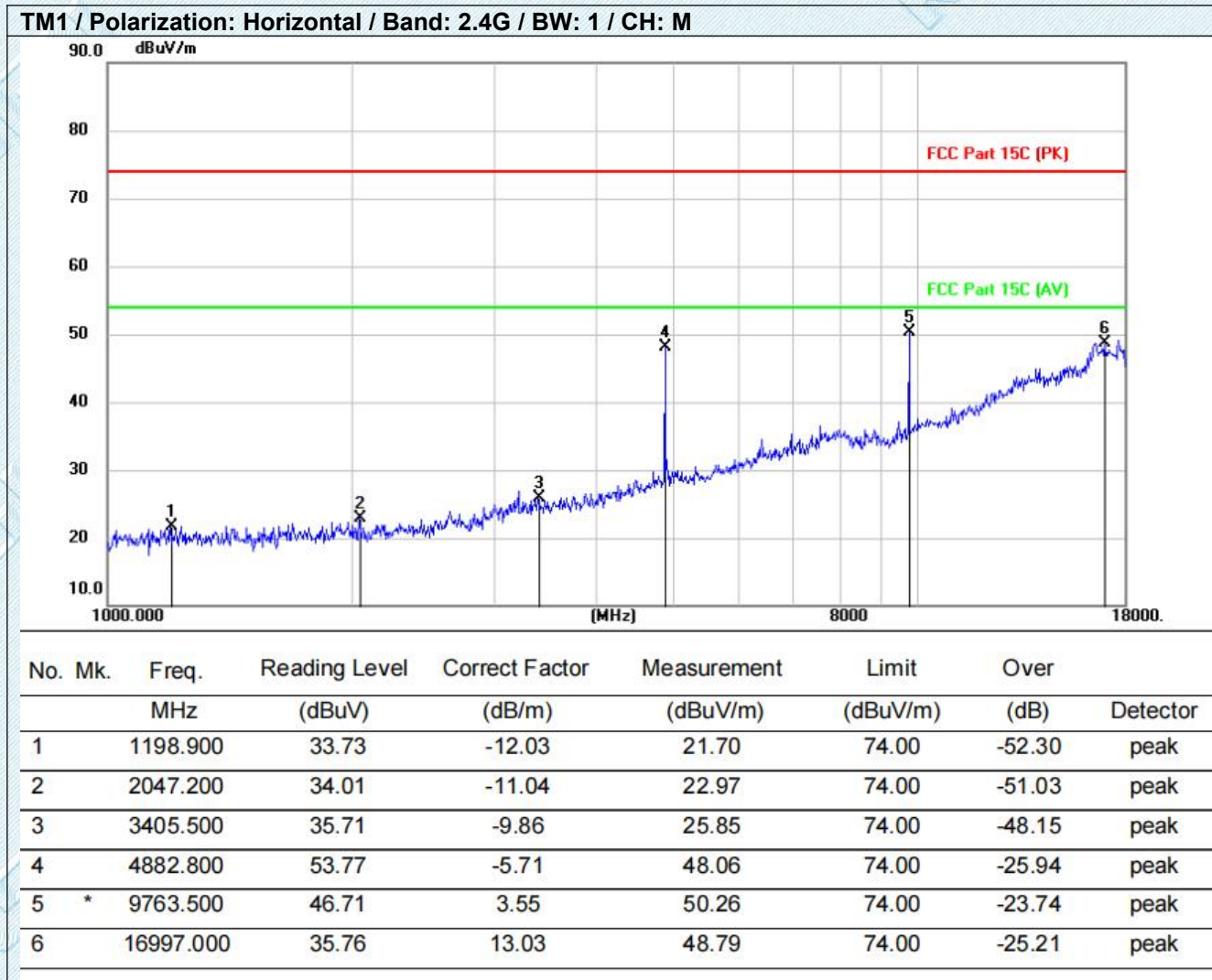
Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com



TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

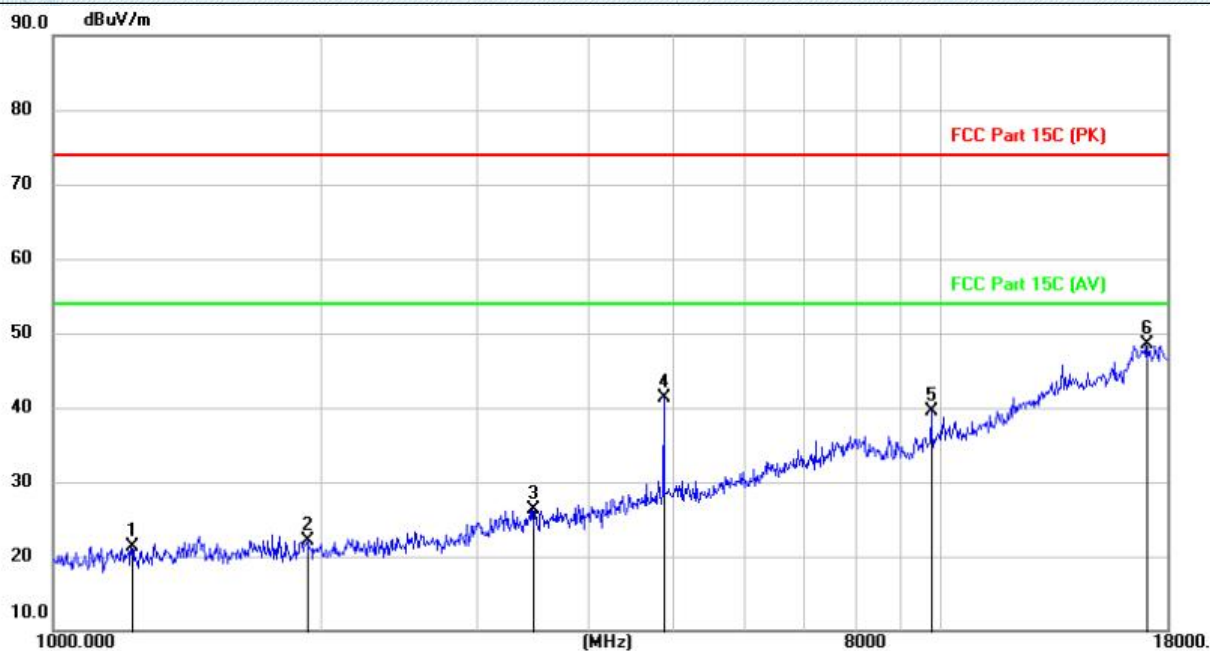
Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com



TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com

TM1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: M


No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		1224.400	33.31	-12.02	21.29	74.00	-52.71	peak
2		1938.400	33.12	-11.11	22.01	74.00	-51.99	peak
3		3466.700	36.03	-9.74	26.29	74.00	-47.71	peak
4		4882.800	47.03	-5.71	41.32	74.00	-32.68	peak
5		9763.500	36.00	3.55	39.55	74.00	-34.45	peak
6	*	17068.400	35.42	13.08	48.50	74.00	-25.50	peak

TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com

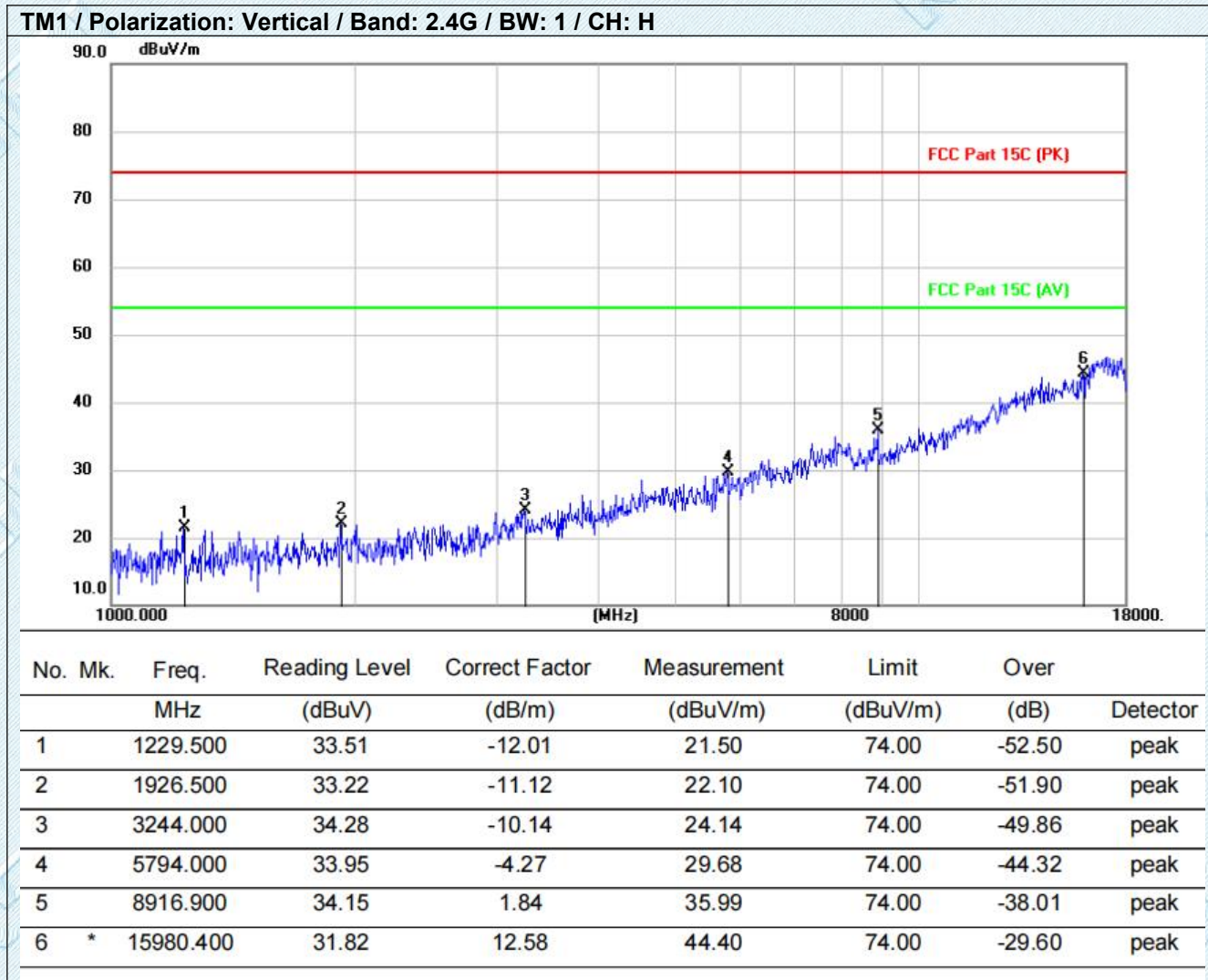
TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: H


No. Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1	1221.000	34.37	-12.01	22.36	74.00	-51.64	peak
2	1957.100	34.14	-11.09	23.05	74.00	-50.95	peak
3	2960.100	38.67	-10.62	28.05	74.00	-45.95	peak
4	4959.300	48.14	-5.51	42.63	74.00	-31.37	peak
5	9919.900	44.43	3.89	48.32	74.00	-25.68	peak
6 *	16645.100	35.30	13.58	48.88	74.00	-25.12	peak

TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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Note:

- 1.From 18GHz to 26.5GHz,the amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
- 2.Since the peak value is less than the limit of the AVG value, there is no AVG data.

5. EUT TEST PHOTOS

Conducted Emission at AC power line



Emissions in restricted frequency bands (below 1GHz)



Emissions in restricted frequency bands (above 1GHz)

TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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6. PHOTOGRAPHS OF EUT CONSTRUCTIONAL

Please refer to the report Report No.:KS2210S4407E01

Appendix

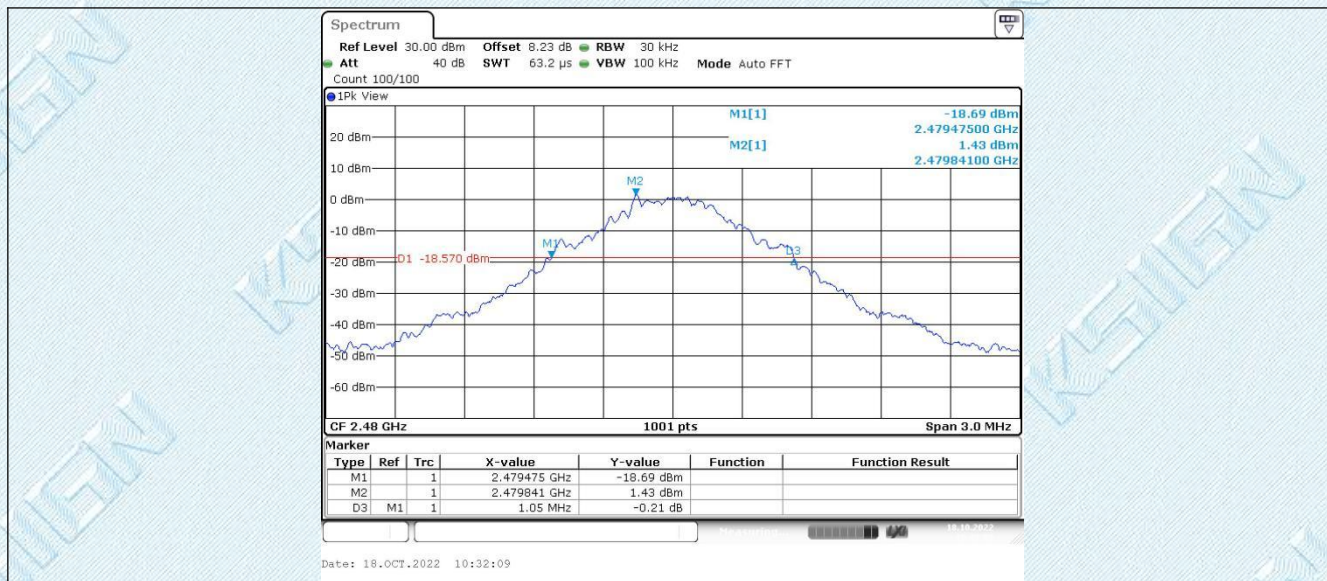
6.1. Appendix A: 20dB Emission Bandwidth

6.1.1. Test Result

TestMode	Antenna	Frequency[MHz]	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	1.05	2401.48	2402.53	---	---
		2441	1.05	2440.48	2441.53	---	---
		2480	1.05	2479.48	2480.53	---	---

6.1.2. Test Graphs





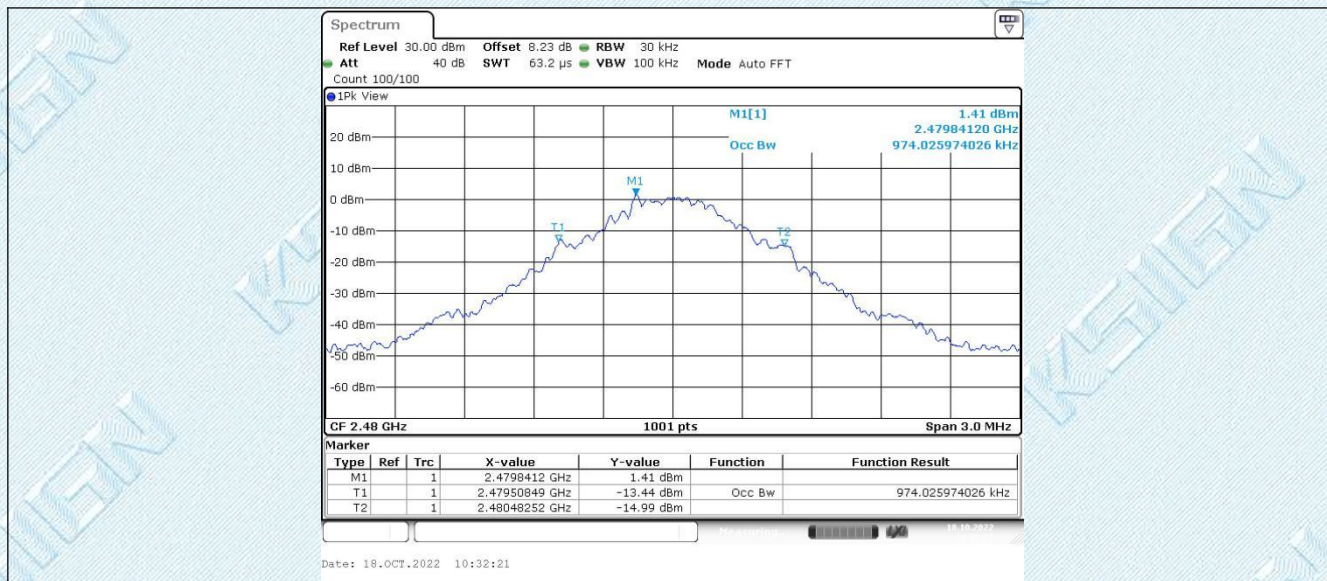
6.2. Appendix B: Occupied Channel Bandwidth

6.2.1. Test Result

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.98	2401.508	2402.489	---	---
		2441	0.968	2440.514	2441.483	---	---
		2480	0.974	2479.508	2480.483	---	---

6.2.2. Test Graphs





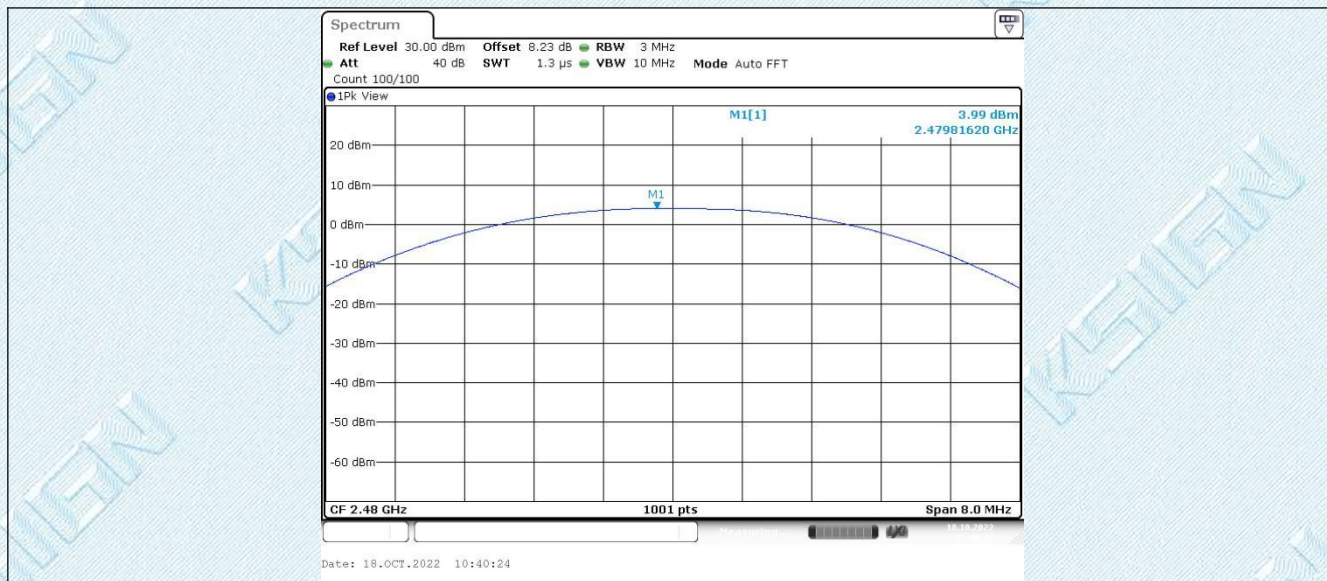
6.3. Appendix C: Maximum conducted output power

6.3.1. Test Result Peak

Test Mode	Antenna	Frequency[MHz]	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant1	2402	4.58	≤20.97	PASS
		2441	4.51	≤20.97	PASS
		2480	3.99	≤20.97	PASS

6.3.2. Test Graphs





TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

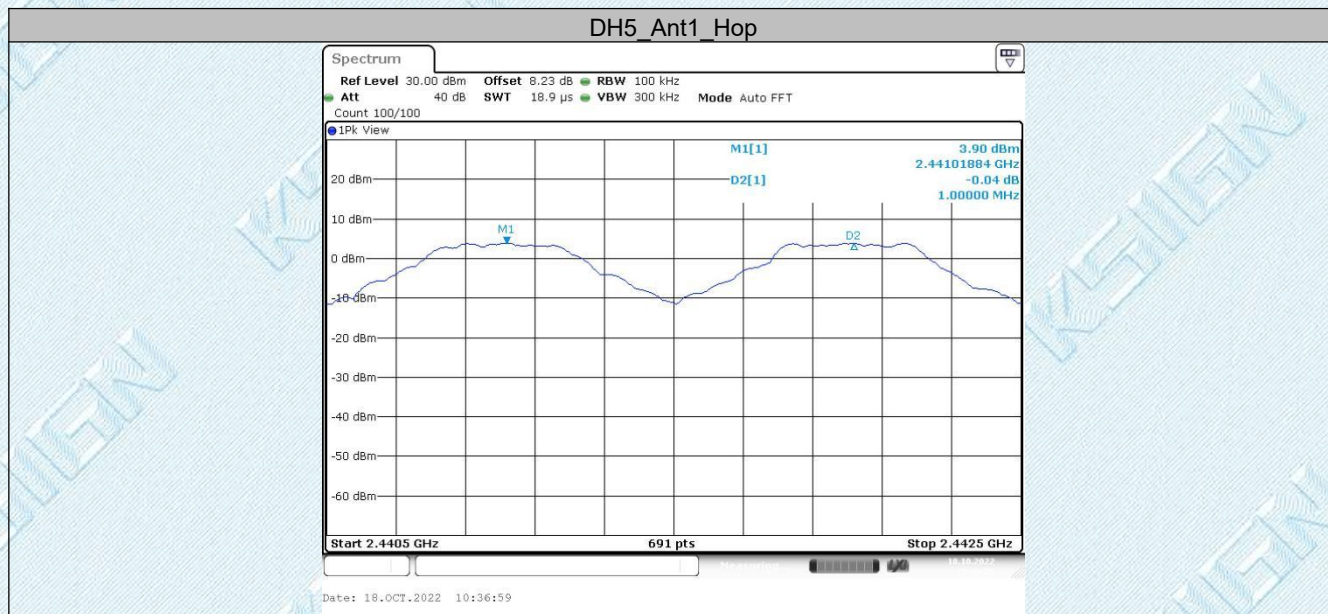
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6.4. Appendix D: Carrier frequency separation

6.4.1. Test Result

TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1	≥0.700	PASS

6.4.2. Test Graphs

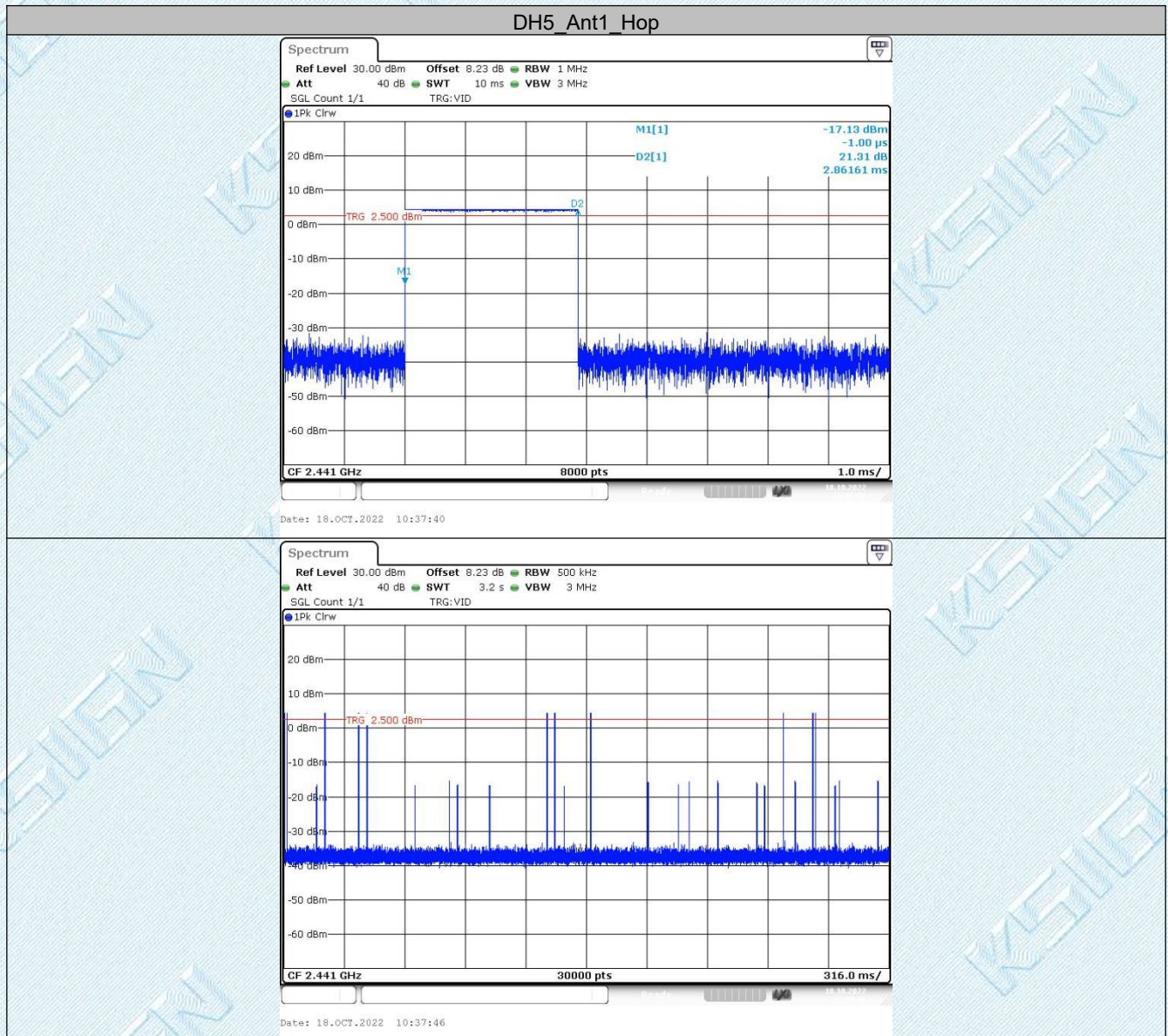


6.5. Appendix E: Time of occupancy

6.5.1. Test Result

TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.86	110	0.315	≤0.4	PASS

6.5.2. Test Graphs



TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

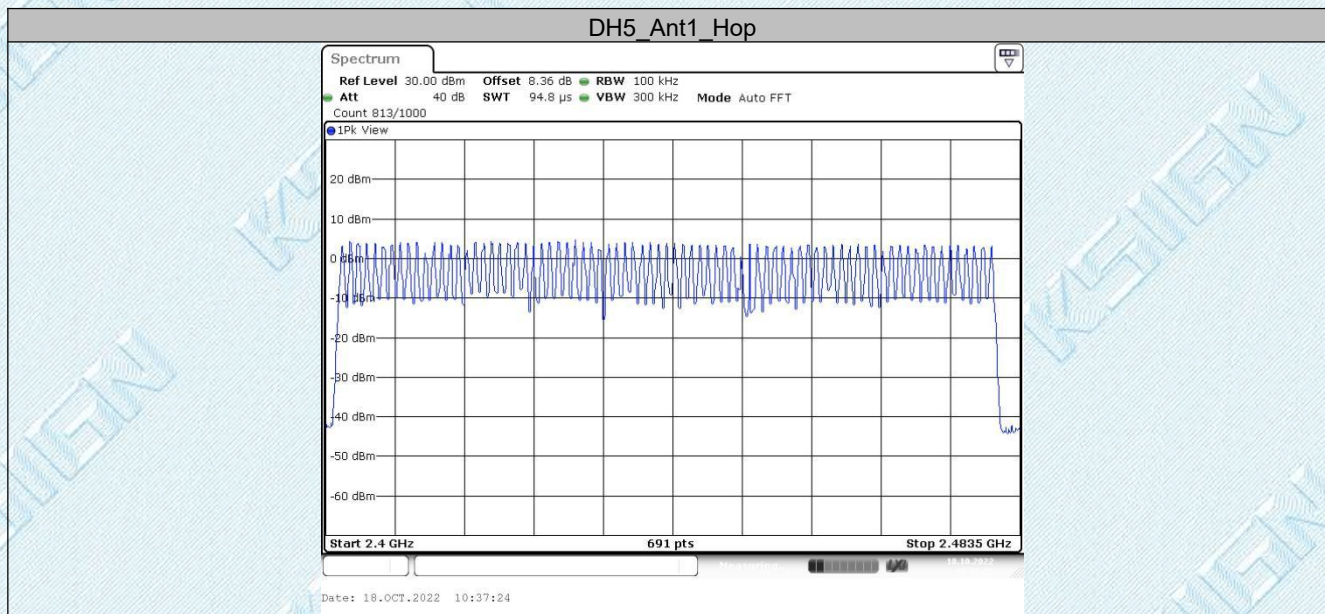
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6.6. Appendix F: Number of hopping channels

6.6.1. Test Result

TestMode	Antenna	Frequency[MHz]	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS

6.6.2. Test Graphs



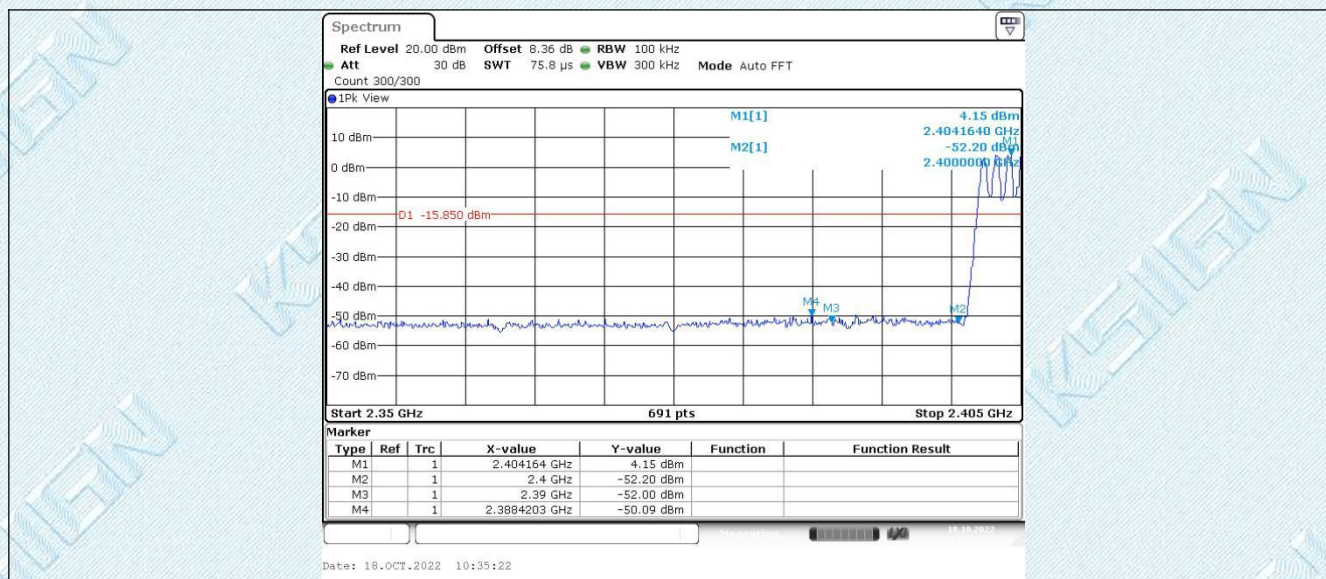
6.7. Appendix G: Band edge measurements

6.7.1. Test Result

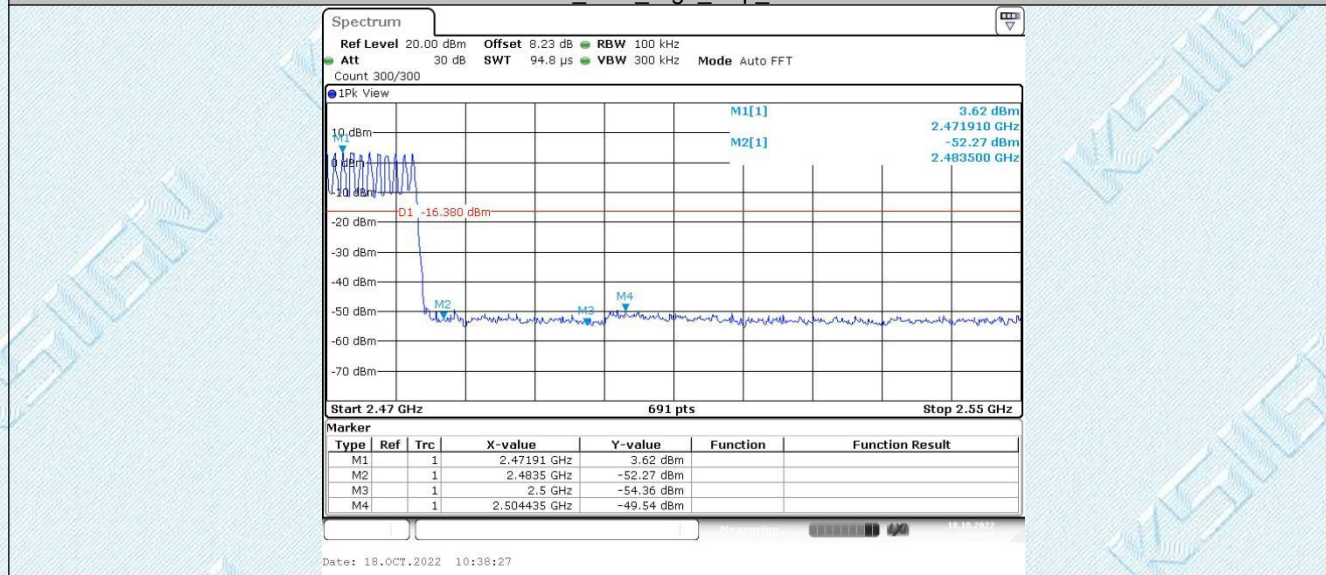
TestMode	Antenna	ChName	Frequency[MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	4.05	-49.74	≤-15.95	PASS
		High	2480	3.36	-49.81	≤-16.64	PASS
		Low	Hop_2402	4.15	-50.09	≤-15.85	PASS
		High	Hop_2480	3.62	-49.54	≤-16.38	PASS

6.7.2. Test Graphs





DH5_Ant1_High_Hop_2480

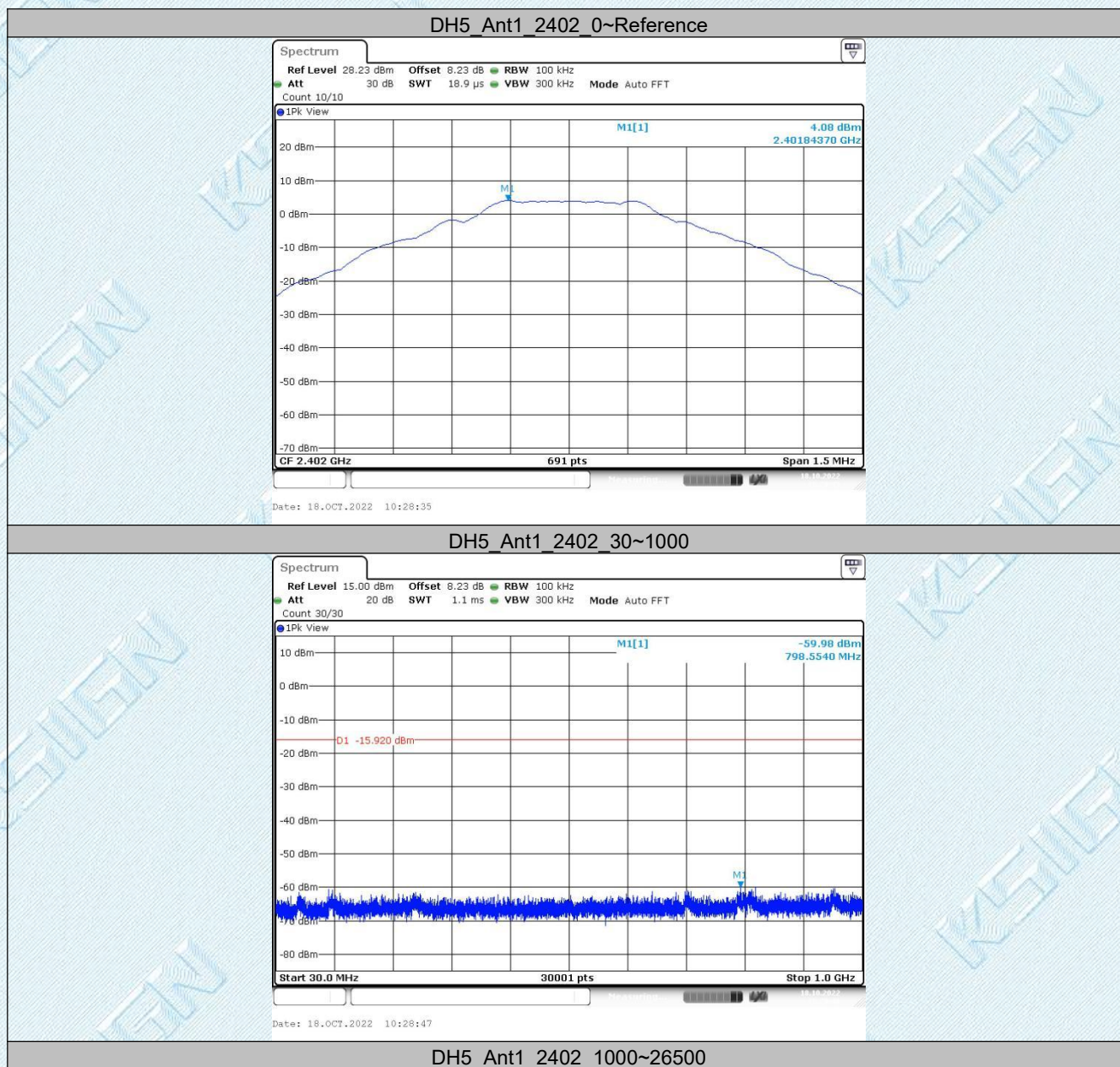


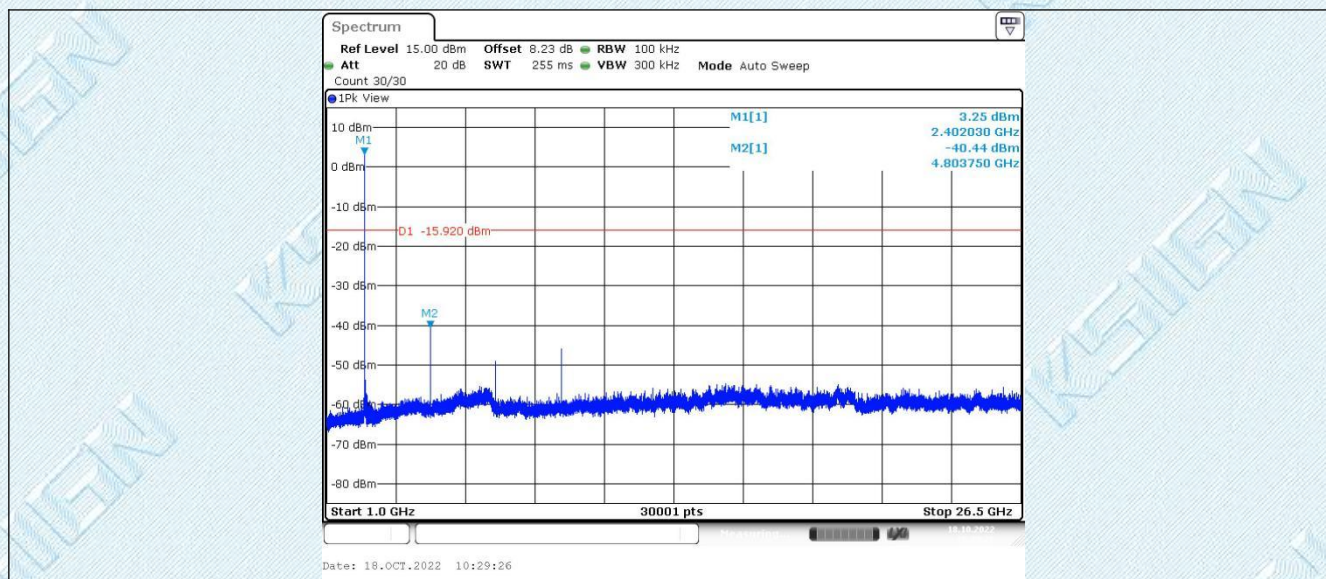
6.8. Appendix H: Conducted Spurious Emission

6.8.1. Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	4.08	4.08	---	PASS
			30~1000	4.08	-59.98	≤-15.92	PASS
			1000~26500	4.08	-40.44	≤-15.92	PASS
		2441	Reference	4.07	4.07	---	PASS
			30~1000	4.07	-59.34	≤-15.93	PASS
			1000~26500	4.07	-40.3	≤-15.93	PASS
		2480	Reference	3.49	3.49	---	PASS
			30~1000	3.49	-59.92	≤-16.51	PASS
			1000~26500	3.49	-38.3	≤-16.51	PASS

6.8.2. Test Graphs

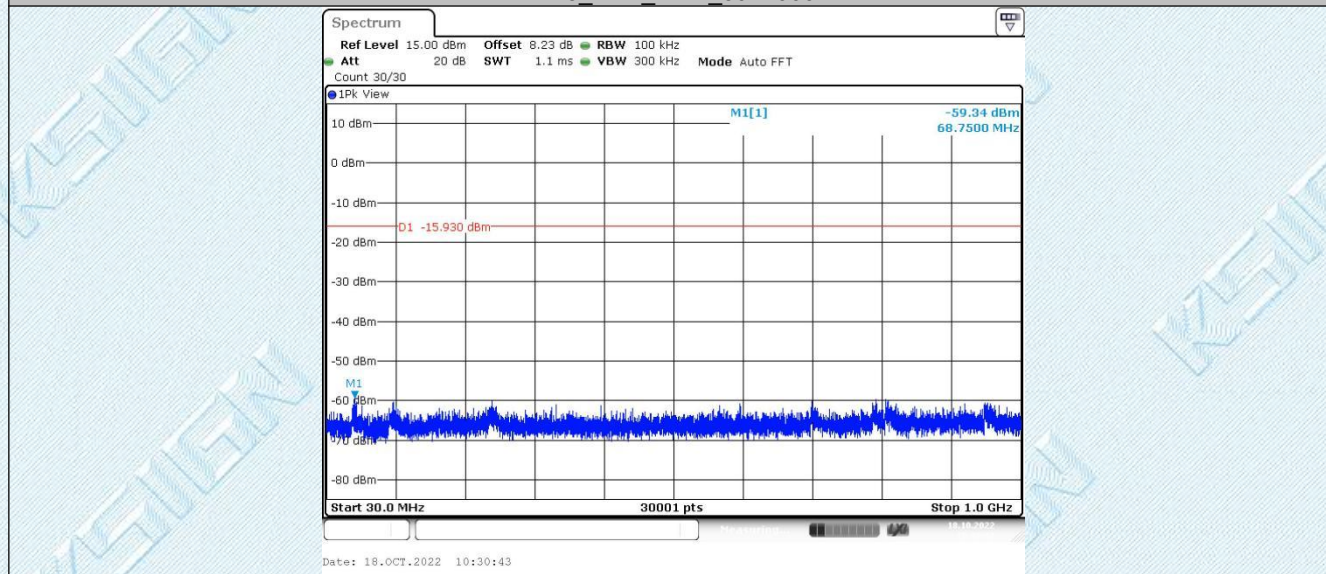




DH5_Ant1_2441_0~Reference



DH5_Ant1_2441_30~1000

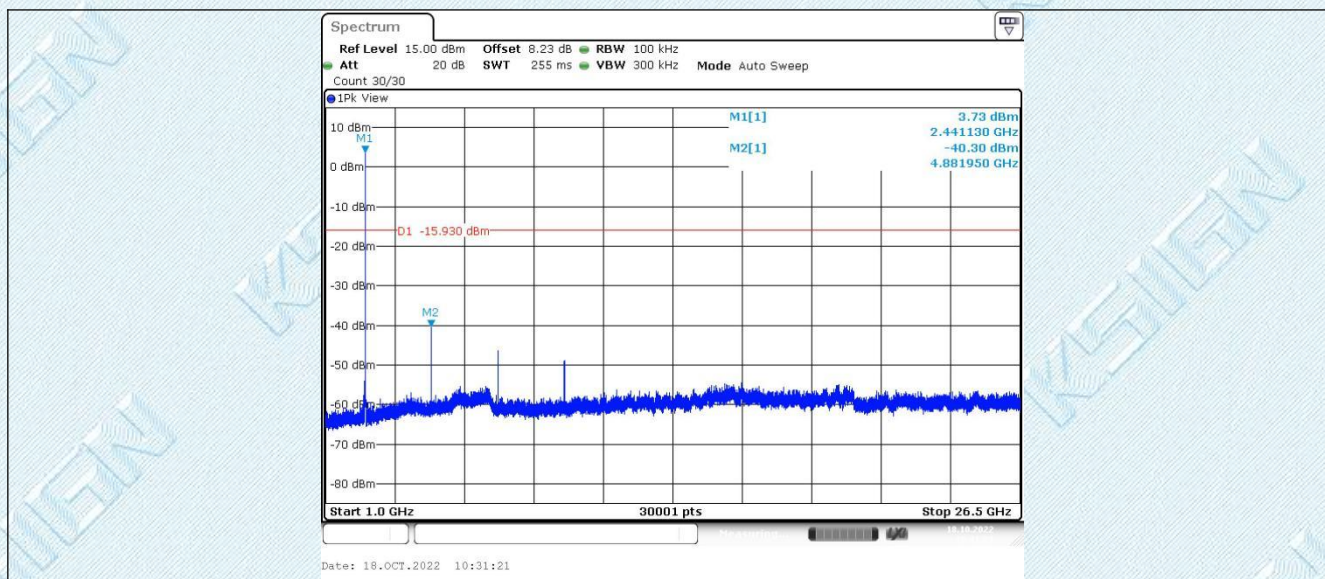


DH5_Ant1_2441_1000~26500

TRF EMC_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

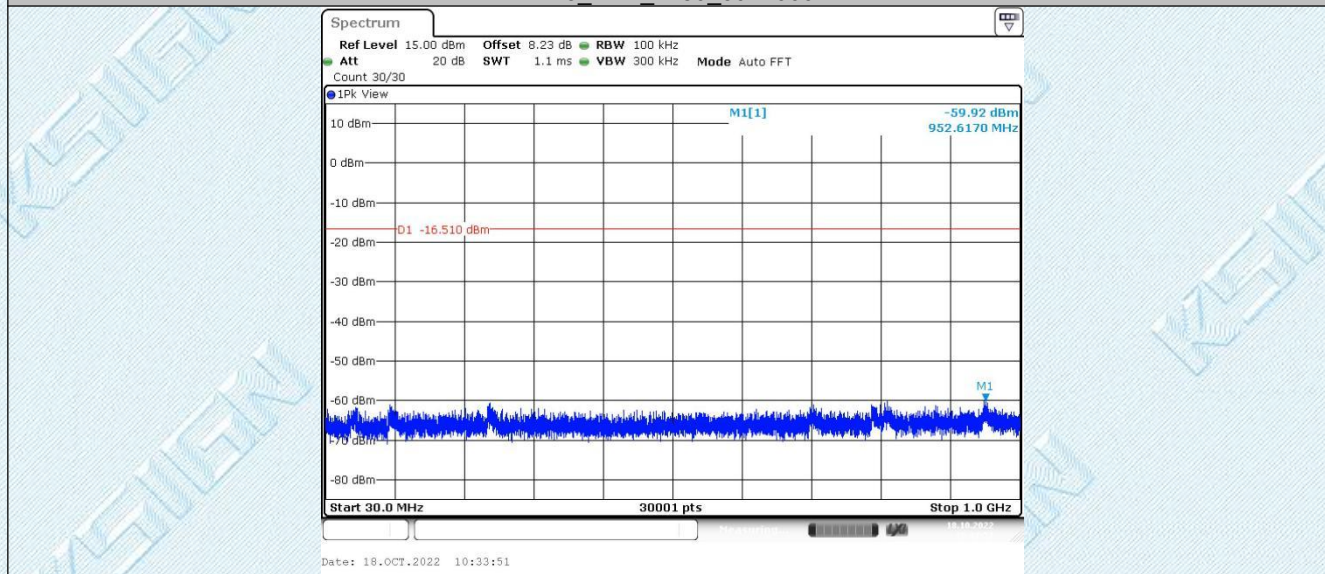
Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdkesign.cn Web: www.gdkesign.com



DH5_Ant1_2480_0~Reference



DH5_Ant1_2480_30~1000

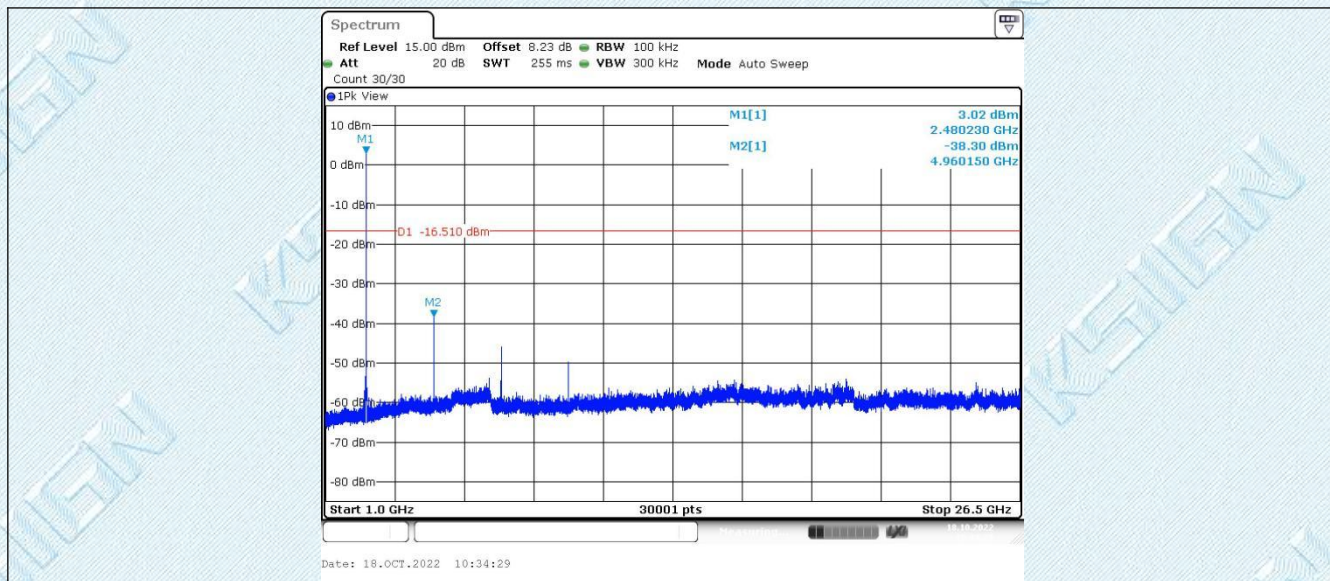


DH5_Ant1_2480_1000~26500

TRF EMC_R1

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6.9. Appendix J: Emissions in Restricted Bands

6.9.1. Test Result

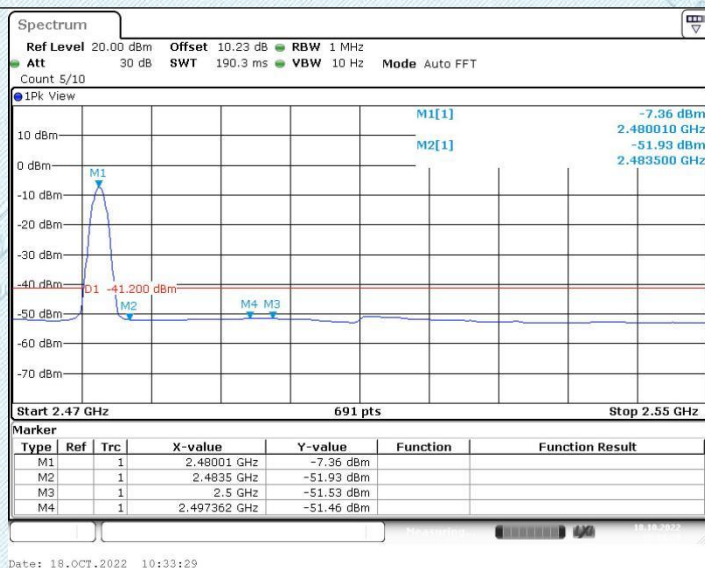
TestMode	Antenna	ChName	Frequency [MHz]	Detector	Freq [MHz]	Result [dBm]	Limit [dBm]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
DH5	Ant1	Low	2402	AV	2310.000	-53.02	≤-41.20	42.18	≤54	PASS
				AV	2340.935	-51.06	≤-41.20	44.14	≤54	PASS
				AV	2390.000	-51.68	≤-41.20	43.52	≤54	PASS
				Peak	2310.000	-41.52	≤-21.20	53.68	≤74	PASS
				Peak	2382.174	-38.23	≤-21.20	56.97	≤74	PASS
				Peak	2390.000	-40.98	≤-21.20	54.22	≤74	PASS
		High	2480	AV	2483.500	-51.93	≤-41.20	43.27	≤54	PASS
				AV	2497.362	-51.46	≤-41.20	43.74	≤54	PASS
				AV	2500.000	-51.53	≤-41.20	43.67	≤54	PASS
				Peak	2483.500	-42.73	≤-21.20	52.47	≤74	PASS
				Peak	2498.406	-36.88	≤-21.20	58.32	≤74	PASS
				Peak	2500.000	-38.38	≤-21.20	56.82	≤74	PASS
		Low	Hop_2402	Peak	2310.000	-41.39	≤-21.20	53.81	≤74	PASS
				Peak	2385.978	-38.37	≤-21.20	56.83	≤74	PASS
				Peak	2390.000	-39.56	≤-21.20	55.64	≤74	PASS
		High	Hop_2480	Peak	2483.500	-42.9	≤-21.20	52.30	≤74	PASS
				Peak	2486.464	-38.57	≤-21.20	56.63	≤74	PASS
				Peak	2500.000	-41.18	≤-21.20	54.02	≤74	PASS

Note:

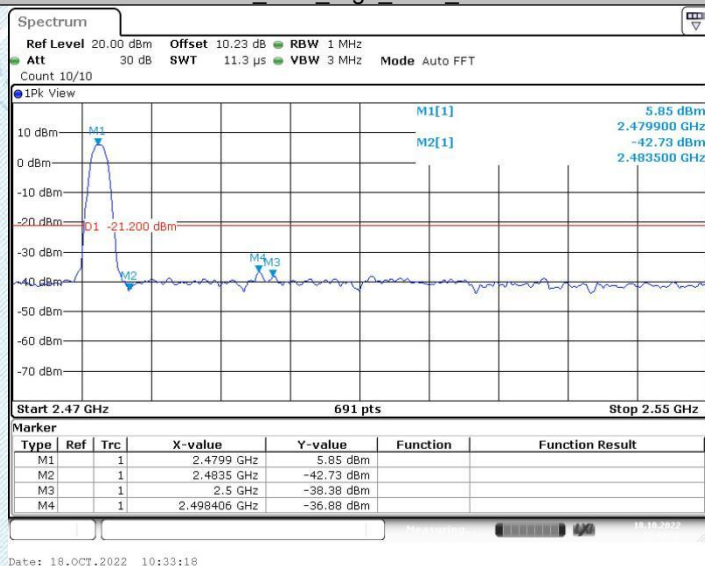
1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

6.9.2. Test Graphs

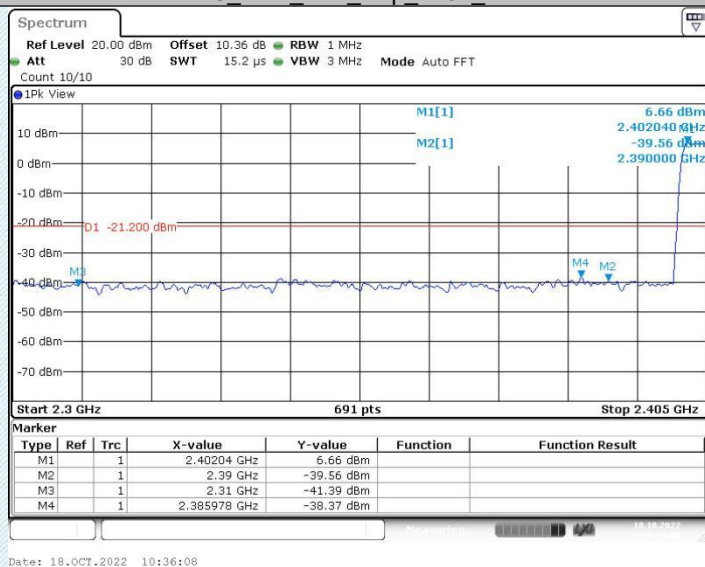




DH5_Ant1_High_2480_Peak



DH5_Ant1_Low_Hop_2402_Peak

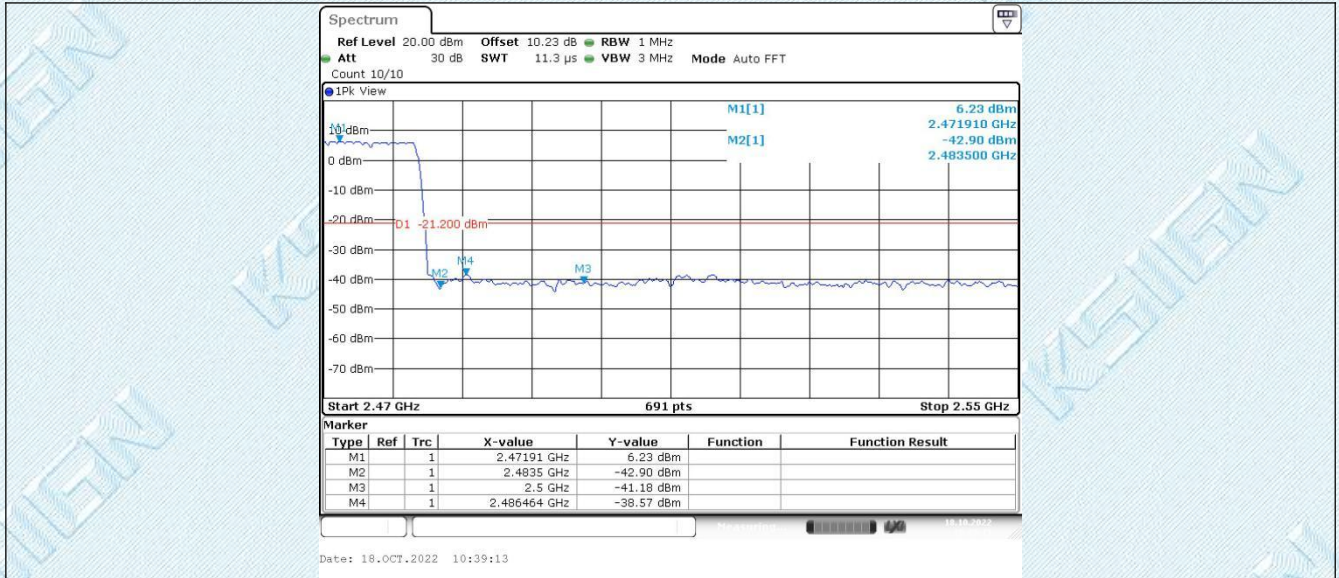


DH5_Ant1_High_Hop_2480_Peak

TRF EMC_R1

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--THE END--