



KSIGN(Guangdong) Testing Co, Ltd.

First Floor West Side, Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu Village, Shatou Community, Shajing Street, Bao'an District, Shenzhen City, Guangdong Province, P. R. China
Tel.: +(86) 755-2985 2678 Fax: +(86)755-29852397 E-mail: info@gdkesign.cn Website:www.gdkesign.com

TEST REPORT

Report No...... : **KS2009S01084E02**
FCC ID..... : **2AXPW-MD002**
Applicant..... : **Shenzhen Moldull Acoustic Technology**
Address..... : 403 Huiyi Wealth Center No.9, Zhongxin Road, Dalang, Longhua New Area, ShenZhen City,Guangdong Province,China
Manufacturer..... : Shenzhen Moldull Acoustic Technology
Address..... : 403 Huiyi Wealth Center No.9, Zhongxin Road, Dalang, Longhua New Area, ShenZhen City,Guangdong Province,China
Factory : Shenzhen Moldull Acoustic Technology
Address..... : 403 Huiyi Wealth Center No.9, Zhongxin Road, Dalang, Longhua New Area, ShenZhen City,Guangdong Province,China
Product Name..... : **TWS Bluetooth Headset**
Trade Mark..... : **MOLDULL**
魔都
Model/Type reference : MD002
Listed Model(s) : /
Standard : **FCC CFR Title 47 Part 15 Subpart C Section 15.247**
Date of Receipt : Sep. 16, 2020
Date of Test Date : Sep. 16, 2020-Sep. 28, 2020
Date of issue : Sep. 28, 2020
Test result..... : **Pass**

Compiled by:

(Printed name+signature)

Rory Huang

Supervised by:

(Printed name+signature)

Kelly Cheng

Approved by:

(Printed name+signature)

Cary Luo

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

Address..... : First Floor West Side, Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu Village, Shatou Community, Shajing Street, Bao'an District, Shenzhen City,Guangdong Province, P. R. China

This test report may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by KSIGN. The test results in the report only apply to the tested sample. The test report shall be invalid without all the signatures of testing engineers, reviewer and approver. Any objections must be raised to KSIGN within 15 days since the date when the report is received. It will not be taken into consideration beyond this limit. The test report merely correspond to the test sample.

TABLE OF CONTENTS**Page**

1. TEST SUMMARY.....	3
1.1. TEST STANDARDS.....	3
1.2. REPORT VERSION.....	3
1.3. TEST DESCRIPTION.....	4
1.4. TEST FACILITY.....	5
1.5. MEASUREMENT UNCERTAINTY.....	6
1.6. ENVIRONMENTAL CONDITIONS.....	6
2. GENERAL INFORMATION.....	7
2.1. CLIENT INFORMATION.....	7
2.2. GENERAL DESCRIPTION OF EUT.....	7
2.3. OPERATION STATE.....	8
2.4. MEASUREMENT INSTRUMENTS LIST.....	9
2.5. TEST SOFTWARE.....	10
3. TEST ITEM AND RESULTS.....	11
3.1. ANTENNA REQUIREMENT.....	11
3.2. CONDUCTED EMISSION.....	12
3.3. PEAK OUTPUT POWER.....	15
3.4. 99% OCCUPIED BANDWIDTH & 20dB BANDWIDTH.....	22
3.5. CARRIER FREQUENCIES SEPARATION.....	29
3.6. NUMBER OF HOPPING CHANNEL.....	33
3.7. DWELL TIME.....	36
3.8. BAND EDGE EMISSIONS(RADIATED).....	40
3.9. BAND EDGE AND SPURIOUS EMISSION (CONDUCTED).....	45
3.10. RADIATED SPURIOUS EMISSIONS.....	52
3.11. PSEUDORANDOM FREQUENCY HOPPING SEQUENCE.....	63
4. EUT TEST PHOTOS.....	64
5. PHOTOGRAPHS OF EUT CONSTRUCTIONAL.....	66

1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.247: Operation within the bands of 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

1.2. Report version

Revised No.	Date of issue	Description
01	Nov. 20, 2020	Original

1.3. Test Description

FCC Part 15 Subpart C(15.247)			
Test Item	Standard Section	Result	Test Engineer
	FCC		
Antenna Requirement	15.203	Pass	Rory Huang
Conducted Emission	15.207	Pass	Rory Huang
Restricted Bands	15.205	Pass	Rory Huang
Hopping Channel Separation	15.247(a)(1)	Pass	Rory Huang
Dwell Time	15.247(a)(1)	Pass	Rory Huang
Peak Output Power	15.247(b)(1)	Pass	Rory Huang
Number of Hopping Frequency	15.247(b)(1)	Pass	Rory Huang
Band Edge Emissions	15.247(d)	Pass	Rory Huang
Radiated Spurious Emission	15.247(c)&15.209	Pass	Rory Huang
99% Occupied Bandwidth & 20dB Bandwidth	15.247(a)	Pass	Rory Huang
Pseudorandom Frequency Hopping Sequence	15.247 (a)(1)	Pass	Rory Huang

Note: The measurement uncertainty is included in the test result.

1.4. Test Facility

Address of the report laboratory

KSIGN(Guangdong) Testing Co., Ltd.

First Floor West Side, Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu Village, Shatou Community, Shajing Street, Bao'an District, Shenzhen City, Guangdong Province, P. R. China

Laboratory accreditation

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

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.

IC Registration No.: CN0096

The 3m alternate test site of KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: CN0096

FCC-Registration No.: CN1272

KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

CNAS-Registration No.: L13261

KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (CNAS) China National Accreditation Service for Conformity Assessment. The acceptance letter from the CNAS is maintained in our files.

1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the KSIGN(Guangdong) Testing Co., Ltd. system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device. Below is the best measurement capability for KSIGN(Guangdong) Testing Co., Ltd.

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth	2.80 dB	(1)

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

1.6. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

2. GENERAL INFORMATION

2.1. Client Information

Applicant:	Shenzhen Moldull Acoustic Technology
Address:	403 Huiyi Wealth Center No.9, Zhongxin Road, Dalang, Longhua New Area, ShenZhen City,Guangdong Province,China
Manufacturer:	Shenzhen Moldull Acoustic Technology
Address:	403 Huiyi Wealth Center No.9, Zhongxin Road, Dalang, Longhua New Area, ShenZhen City,Guangdong Province,China
Factory:	Shenzhen Moldull Acoustic Technology
Address:	403 Huiyi Wealth Center No.9, Zhongxin Road, Dalang, Longhua New Area, ShenZhen City,Guangdong Province,China

2.2. General Description of EUT

Product Name:	TWS Bluetooth Headset
Marketing Name:	/
Model/Type reference:	MD002
Listed Model(s):	/
Model Difference:	/
Power supply(Charge):	AC 120V
Power supply(Battery):	Input: DC 3.7 V; Battery: DC 3.7 V; 50 mAh; Input (Storage box battery): Input: DC 5 V; Battery: DC3.7 V; 300 mAh
Hardware version:	MD002_V3.0_L_2020_0820.PCB
Software version:	AB1536U_V2.3.0_BT5.1_MD002_V0.011_20200723_agent_L.7z
Bluetooth 5.0	
Modulation:	GFSK, $\pi/4$ DQPSK, 8DPSK
Operation frequency:	2402MHz~2480MHz
Max Peak Output Power:	DH5:-2.09dBm 2DH5:-1.34dBm 3DH5:-1.13dBm
Channel number:	79
Channel separation:	1MHz
Antenna type:	Ceramic Antenna
Antenna gain:	3.5dBi
Note: The right ear frame was tested.	

2.3. Operation state

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. BT EDR, 79 channels are provided to the EUT. Channels 00/39/78 were selected for testing.

Operation Frequency List:

Channel	Frequency (MHz)
00	2402
01	2403
⋮	⋮
38	2440
39	2441
40	2442
⋮	⋮
77	2479
78	2480

Note: The display in grey were the channel selected for testing.

Test mode

For RF test items:

The engineering test program was provided and enabled to make EUT continuous transmit

For AC power line conducted emissions:

The EUT was set to connect with the Bluetooth instrument under large package sizes transmission.

For Radiated spurious emissions test item:

The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

2.4. Measurement Instruments List

Tonscend JS0806-2 Test system					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSV40-N	101798	04/07/2021
2	Vector Signal Generator	Agilent	N5182A	MY50142520	04/07/2021
3	Analog Signal Generator	HP	83752A	3344A00337	04/07/2021
4	Power Sensor	Agilent	E9304A	MY50390009	04/07/2021
5	Power Sensor	Agilent	E9300A	MY41498315	04/07/2021
6	Wideband Radio Communication Tester	R&S	CMW500	115297	04/07/2021
7	Climate Chamber	Angul	AGNH80L	1903042120	04/07/2021
8	Dual Output DC Power Supply	Agilent	E3646A	MY40009992	04/07/2021
9	RF Control Unit	Tonscend	JS0806-2	/	04/07/2021
10	Spectrum Analyzer	Keysight	N9020A	MY46471971	04/07/2021

Transmitter spurious emissions & Receiver spurious emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESR	102525	04/07/2021
2	High Pass Filter	Chengdu E-Microwave	OHF-3-18-S	0E01901038	04/07/2021
3	High Pass Filter	Chengdu E-Microwave	OHF-6.5-18-S	0E01901039	04/07/2021
4	Spectrum Analyzer	HP	8593E	3831U02087	04/07/2021
5	Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	01230	04/07/2021
6	Loop Antenna	Beijin ZHINAN	ZN30900C	18050	04/07/2021
7	Horn Antenna	R&S	Sep-60	69483	04/07/2021
8	Spectrum Analyzer	R&S	FSV40-N	101798	04/07/2021
9	Horn Antenna	Schwarzbeck	BBHA 9120 D	2023	04/07/2021
10	Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	04/07/2021
11	Pre-Amplifier	EMCI	EMC051835SE	980662	04/07/2021
12	Power Meter	Agilent	E4419B	GB41293710	04/07/2021

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	LISN	R&S	ENV432	1326.6105.02	03/27/2021
2	EMI Test Receiver	R&S	ESR	102524	04/07/2021
3	Manual RF Switch	JS TOYO	/	MSW-01/002	04/07/2021

Note:

1)The Cal. Interval was one year.

2)The cable loss has calculated in test result which connection between each test instruments.

KSIGN(Guangdong) Testing Co., Ltd.

2.5. Test Software

Software name	Model	Version
Conducted emission Measurement Software	EZ-EMC	EMC-Con 3A1.1
Radiated emission Measurement Software	EZ-EMC	FA-03A.2.RE
Bluetooth and WIFI Test System	JS1120-3	2.5.77.0418

3. TEST ITEM AND RESULTS

3.1. Antenna requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

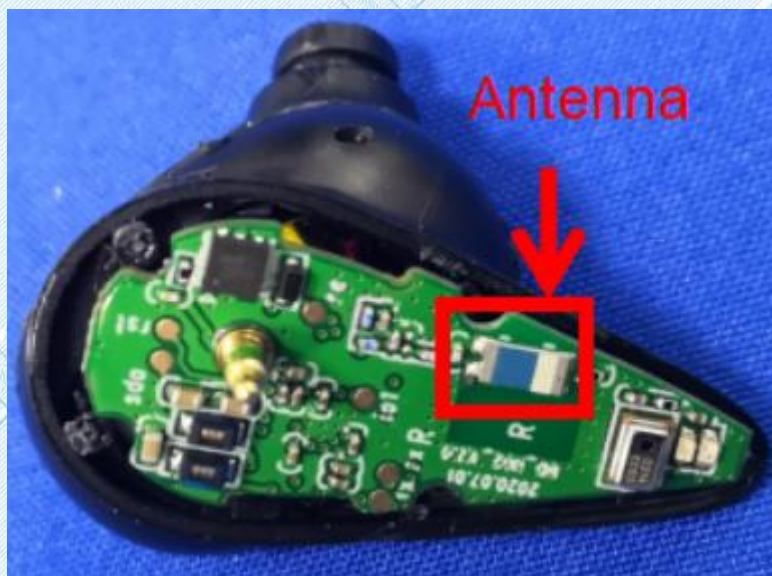
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

Test Result

The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.



3.2. Conducted Emission

Limit

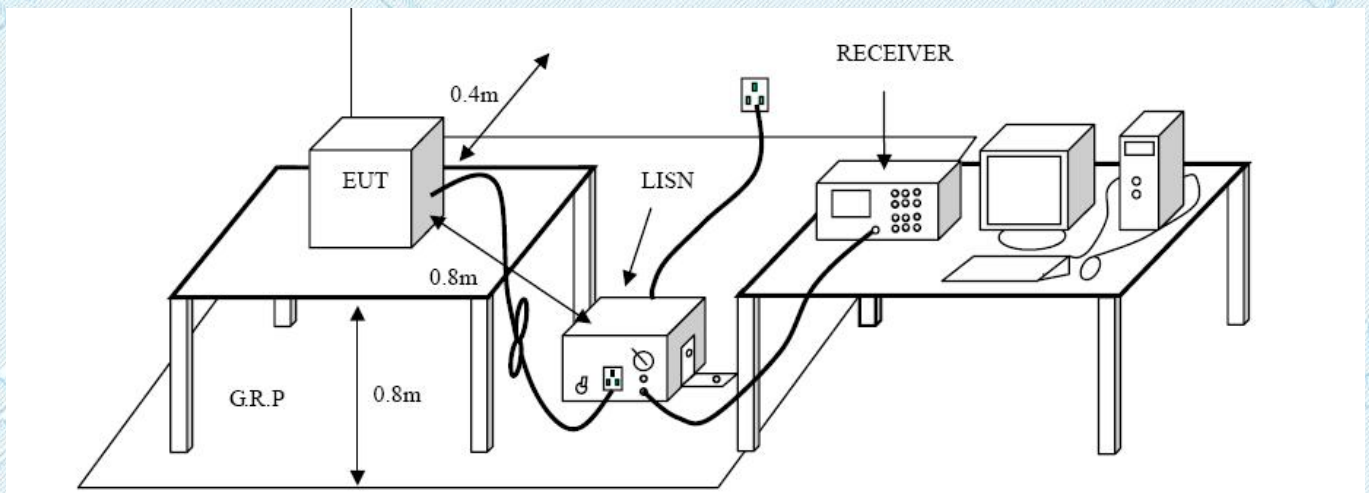
Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dB μ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Notes:

- (1) *Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Test Configuration



Test Procedure

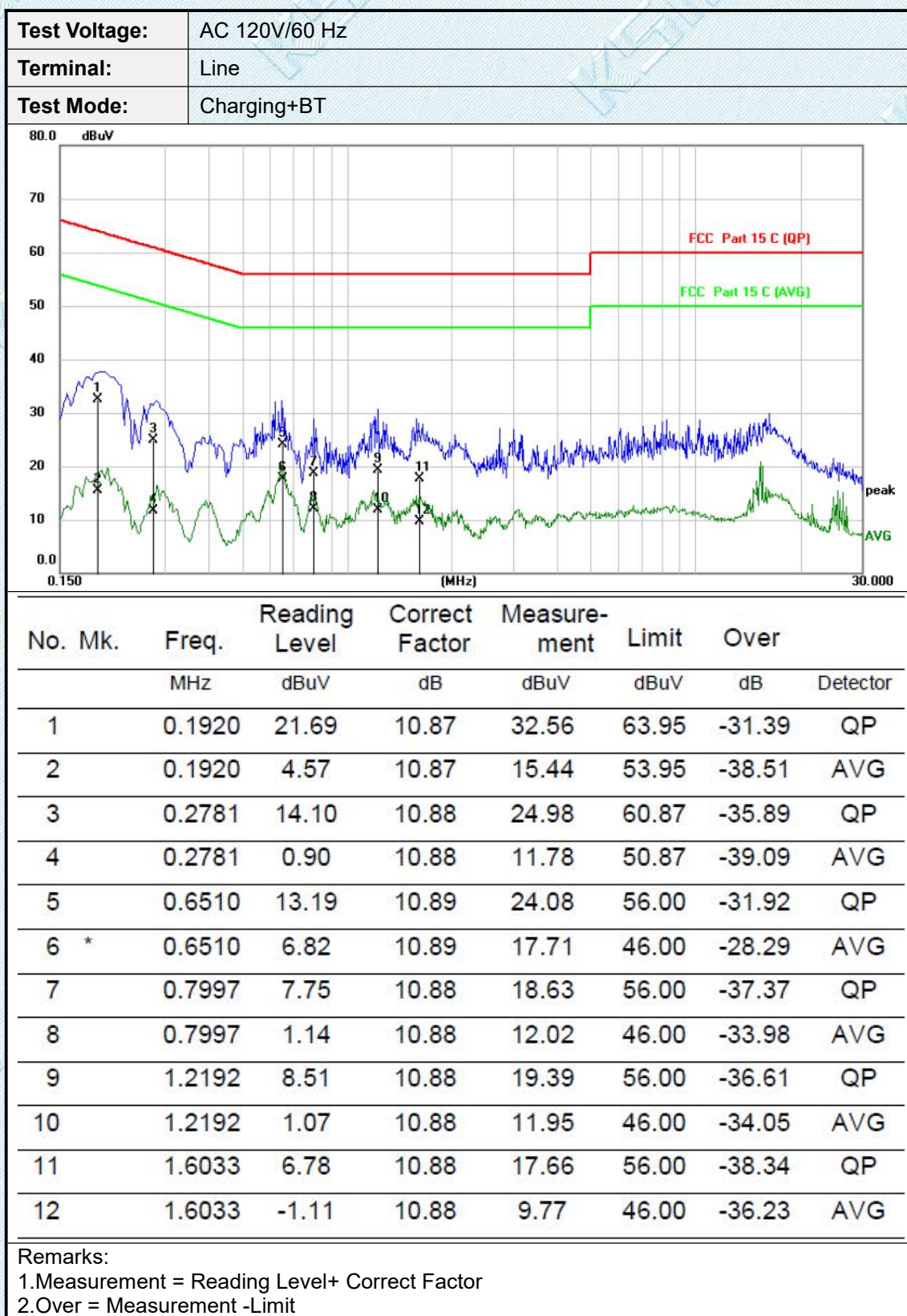
1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
7. During the above scans, the emissions were maximized by cable manipulation.

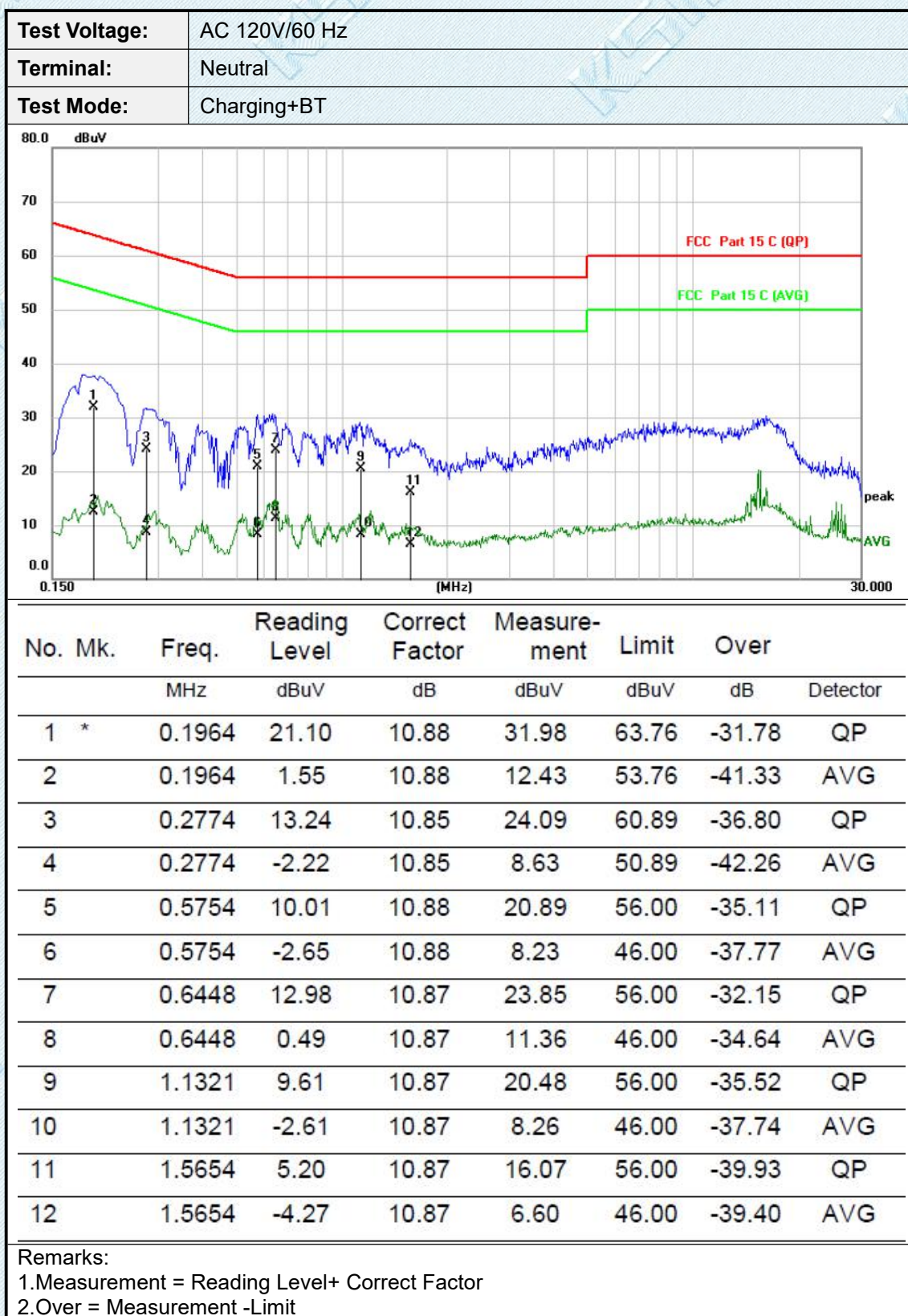
Test Mode:

Please refer to the clause 2.3.

Test Results

Pre-scan DH5, 2DH5,3DH5 modulation, and found the 2DH5 modulation 2402MHz which it is worse case, so only show the test data for worse case.



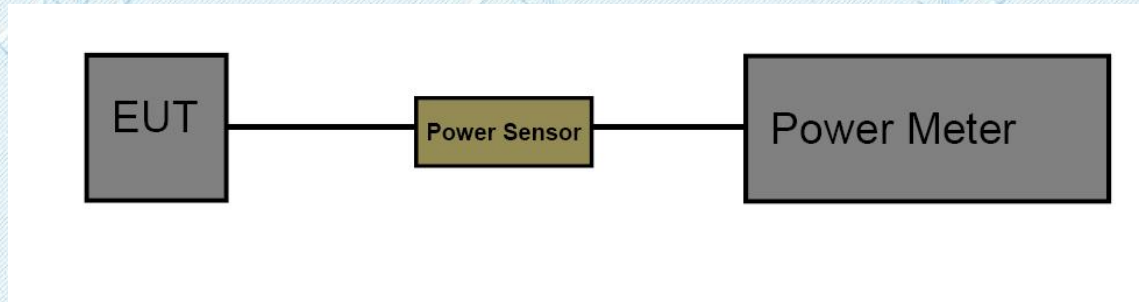


3.3. Peak Output Power

Limit

Test Item	Limit	Frequency Range(MHz)
Peak Output Power	Hopping Channels>75 Power<1W(30dBm) Other <125mW(21dBm)	2400~2483.5

Test Configuration



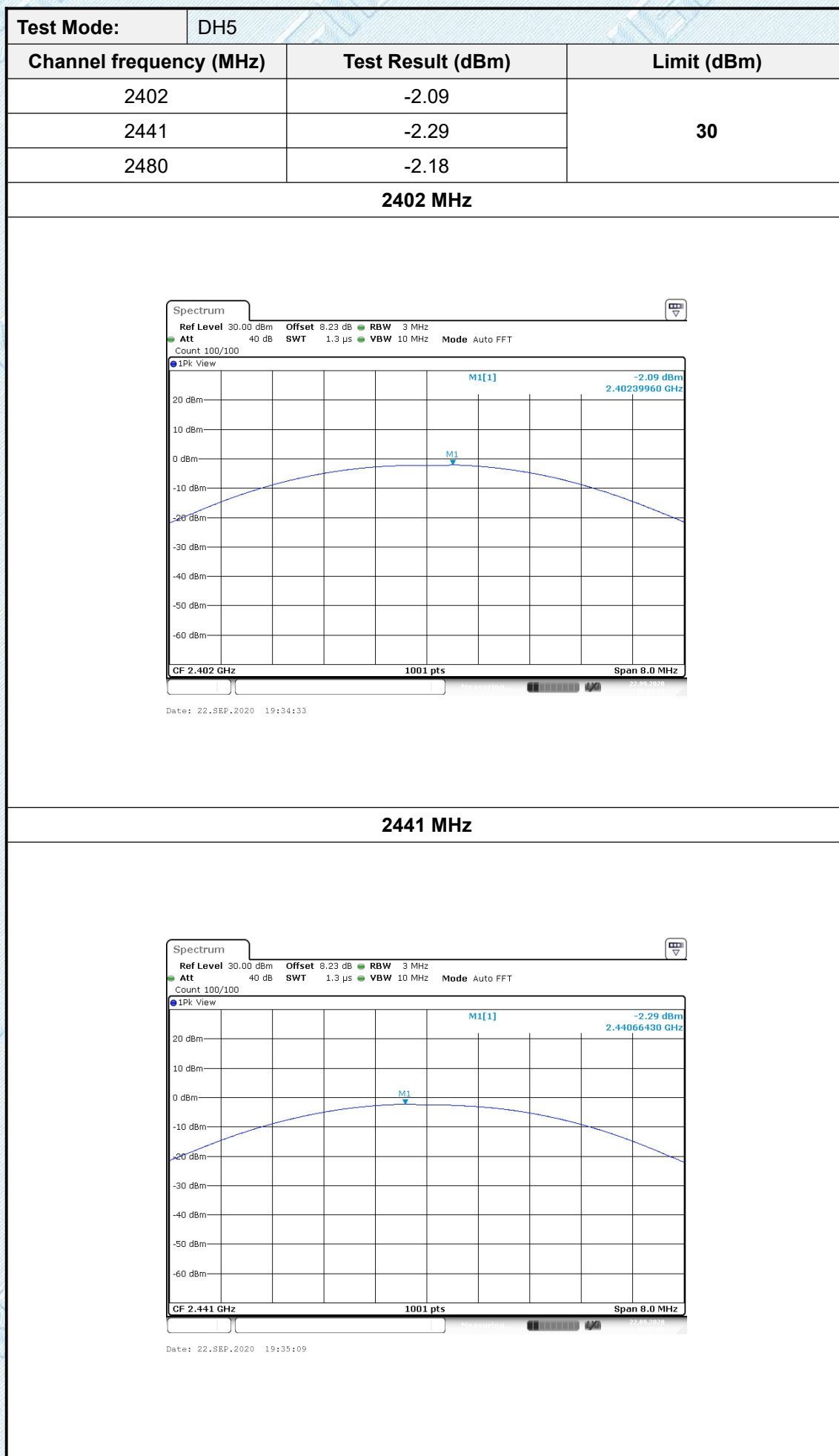
Test Procedure

1. Connect EUT RF Output port to the Spectrum Analyzer through an RF attenuator.
2. Spectrum Setting:
Peak Detector: RBW=1 MHz, VBW=3 MHz for bandwidth less than 1MHz.
RBW=3 MHz, VBW=10 MHz for bandwidth more than 1MHz.

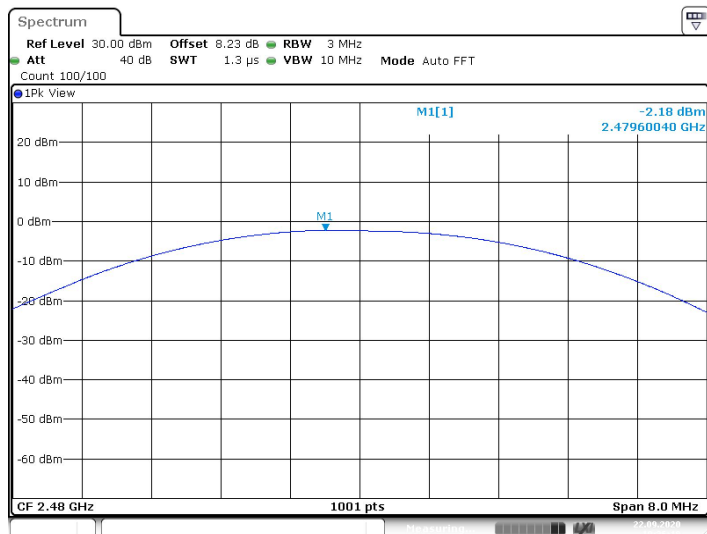
Test Mode

Please refer to the clause 2.3

Test Result

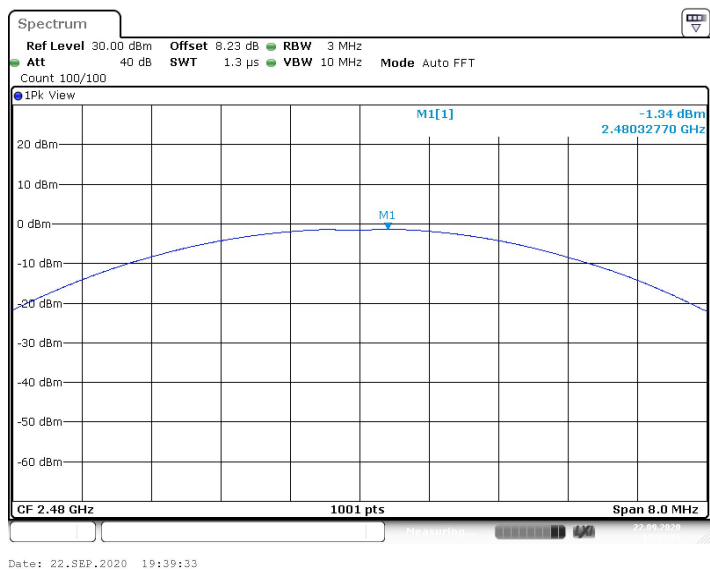


2480 MHz

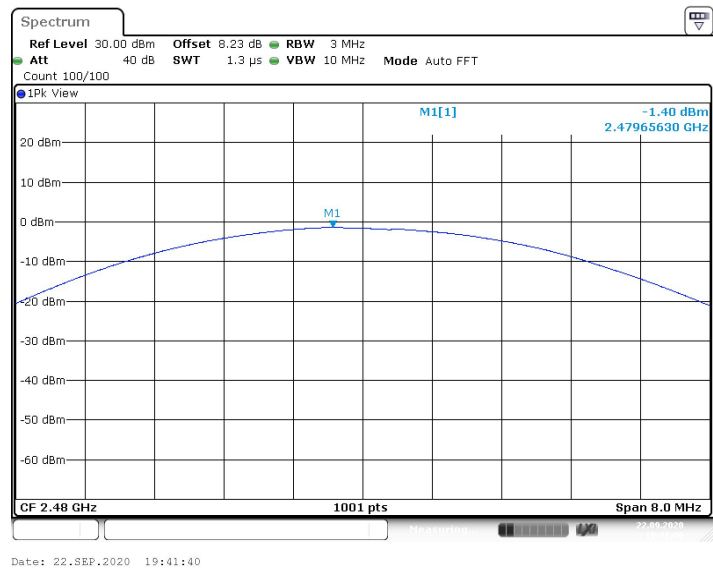


Date: 22.SEP.2020 19:36:19

Test Mode:	2DH5	
Channel frequency (MHz)	Test Result (dBm)	Limit (dBm)
2402	-1.46	30
2441	-1.7	
2480	-1.34	
2402 MHz		
Spectrum Ref Level 30.00 dBm Offset 8.23 dB RBW 3 MHz Att 40 dB SWT 1.3 μs VBW 10 MHz Mode Auto FFT Count 100/100 IPk View M1[1] -1.46 dBm 2.40235960 GHz 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm CF 2.402 GHz 1001 pts Span 8.0 MHz Date: 22.SEP.2020 19:38:04		
2441 MHz		
Spectrum Ref Level 30.00 dBm Offset 8.23 dB RBW 3 MHz Att 40 dB SWT 1.3 μs VBW 10 MHz Mode Auto FFT Count 100/100 IPk View M1[1] -1.70 dBm 2.44060040 GHz 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm CF 2.441 GHz 1001 pts Span 8.0 MHz Date: 22.SEP.2020 19:38:47		
2480 MHz		





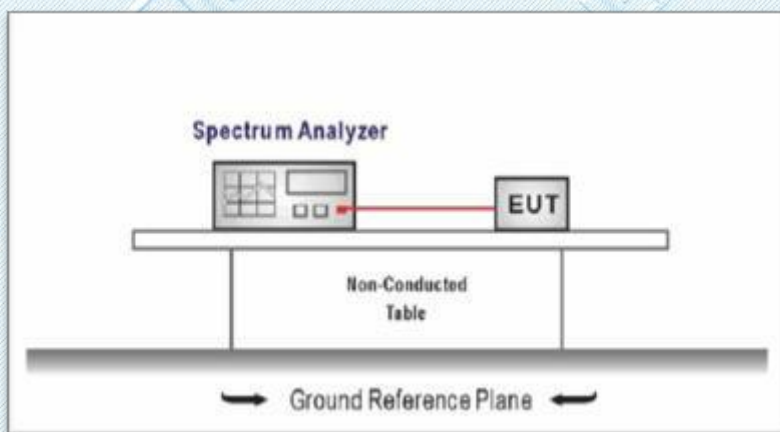


3.4. 99% Occupied Bandwidth & 20dB Bandwidth

Limit

Test Item	Limit	Frequency Range(MHz)
Bandwidth	N/A	2400~2483.5

Test Configuration



Test Procedure

1. Connect EUT RF Output port to the Spectrum Analyzer through an RF attenuator.
 2. Spectrum Setting:
Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel.
The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5%.
bandwidth (VBW) shall be approximately three times RBW of the OBW and video.
 - (3) Detector = Peak.
 - (4) Trace mode = Max hold.
 - (5) Sweep = Auto couple.
- NOTE: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

Test Mode

Please refer to the clause 2.3.

Test Results

Test Mode:	DH5				
Channel frequency (MHz)	99% OCB [MHz]	20dB Bandwidth [MHz]	FL[MHz]	FH[MHz]	Verdict
2402	0.90512	1.023	2401.562	2402.447	PASS
2441	0.90032	0.957	2440.550	2441.423	PASS
2480	0.90014	0.955	2479.547	2480.423	PASS

2402 MHz



2441 MHz



2480 MHz



Test Mode:	2DH5				
Channel frequency (MHz)	99% OCB [MHz]	20dB Bandwidth [MHz]	FL[MHz]	FH[MHz]	Verdict
2402	1.1848	1.307	2401.413	2402.584	PASS
2441	1.2007	1.360	2440.407	2441.572	PASS
2480	1.1871	1.314	2479.407	2480.572	PASS
2402 MHz					
 Keysight Spectrum Analyzer - Occupied BW Center Freq: 2.40200000 GHz Center Freq: 2.40200000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS #IFGain: Low #Atten: 40 dB Ref Offset 8.23 dB Ref 30.00 dBm Mkr1 2.401826 GHz -1.4083 dBm 10 dB/div Log Center 2.402 GHz #Res BW 30 kHz #VBW 100 kHz Span 3 MHz Sweep 3.2 ms Occupied Bandwidth 1.1848 MHz Total Power 7.88 dBm Transmit Freq Error -14.348 kHz % of OBW Power 99.00 % x dB Bandwidth 1.307 MHz x dB -20.00 dB MSG STATUS					
2441 MHz					
 Keysight Spectrum Analyzer - Occupied BW Center Freq: 2.44100000 GHz Center Freq: 2.44100000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS #IFGain: Low #Atten: 40 dB Ref Offset 8.23 dB Ref 30.00 dBm Mkr1 2.441036 GHz -6.1288 dBm 10 dB/div Log Center 2.441 GHz #Res BW 30 kHz #VBW 100 kHz Span 3 MHz Sweep 3.2 ms Occupied Bandwidth 1.2007 MHz Total Power 6.37 dBm Transmit Freq Error -14.736 kHz % of OBW Power 99.00 % x dB Bandwidth 1.360 MHz x dB -20.00 dB MSG STATUS					
2480 MHz					



Test Mode:	3DH5				
Channel frequency (MHz)	99% OCB [MHz]	20dB Bandwidth [MHz]	FL[MHz]	FH[MHz]	Verdict
2402	1.2023	1.302	2401.416	2402.587	PASS
2441	1.2138	1.334	2440.401	2441.578	PASS
2480	1.1954	1.311	2479.404	2480.578	PASS
2402 MHz					
 Keysight Spectrum Analyzer - Occupied BW Center Freq 2.402000000 GHz Ref Offset 8.23 dB Ref 30.00 dBm Occupied Bandwidth 1.2023 MHz Total Power 7.86 dBm Transmit Freq Error -21.372 kHz x dB Bandwidth 1.302 MHz % of OBW Power 99.00 % x dB -20.00 dB					
2441 MHz					



2480 MHz



3.5. Carrier Frequencies Separation

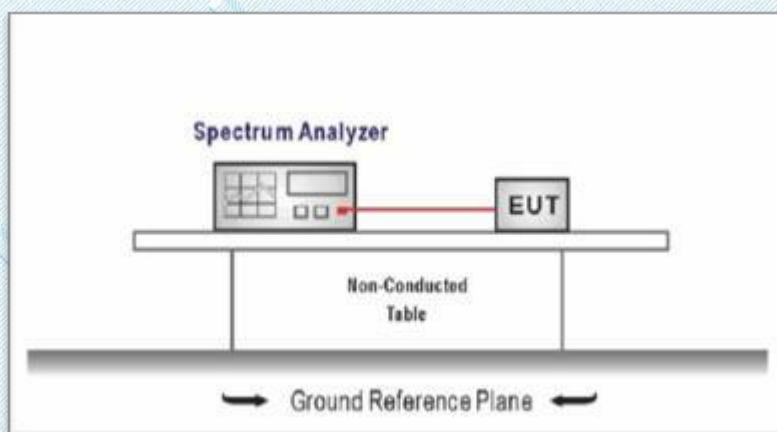
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):

frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25kHz or the $\frac{2}{3} \times 20\text{dB}$ bandwidth of the hopping channel, whichever is greater.

Test Item	Limit	Frequency Range(MHz)
Channel Separation	>25KHz or >two-thirds of the 20 dB bandwidth Which is greater	2400~2483.5

Test Configuration



Test Procedure

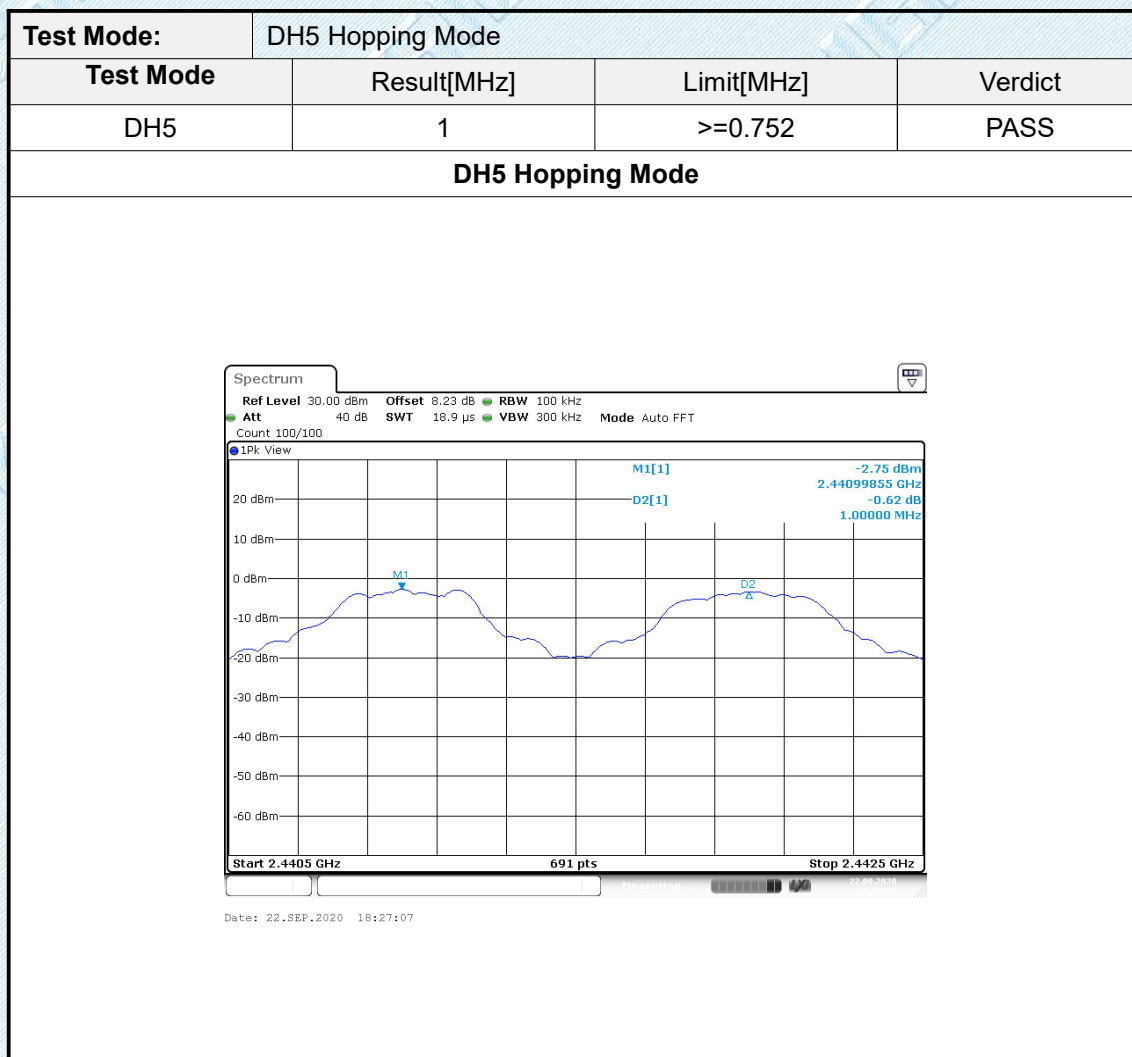
1. Connect EUT RF Output port to the Spectrum Analyzer through an RF attenuator.
2. Spectrum Setting:
 - (1) Set RBW = 100 kHz.
 - (2) Set the video bandwidth (VBW) ≥ 3 RBW.
 - (3) Detector = Peak.
 - (4) Trace mode = Max hold.
 - (5) Sweep = Auto couple.

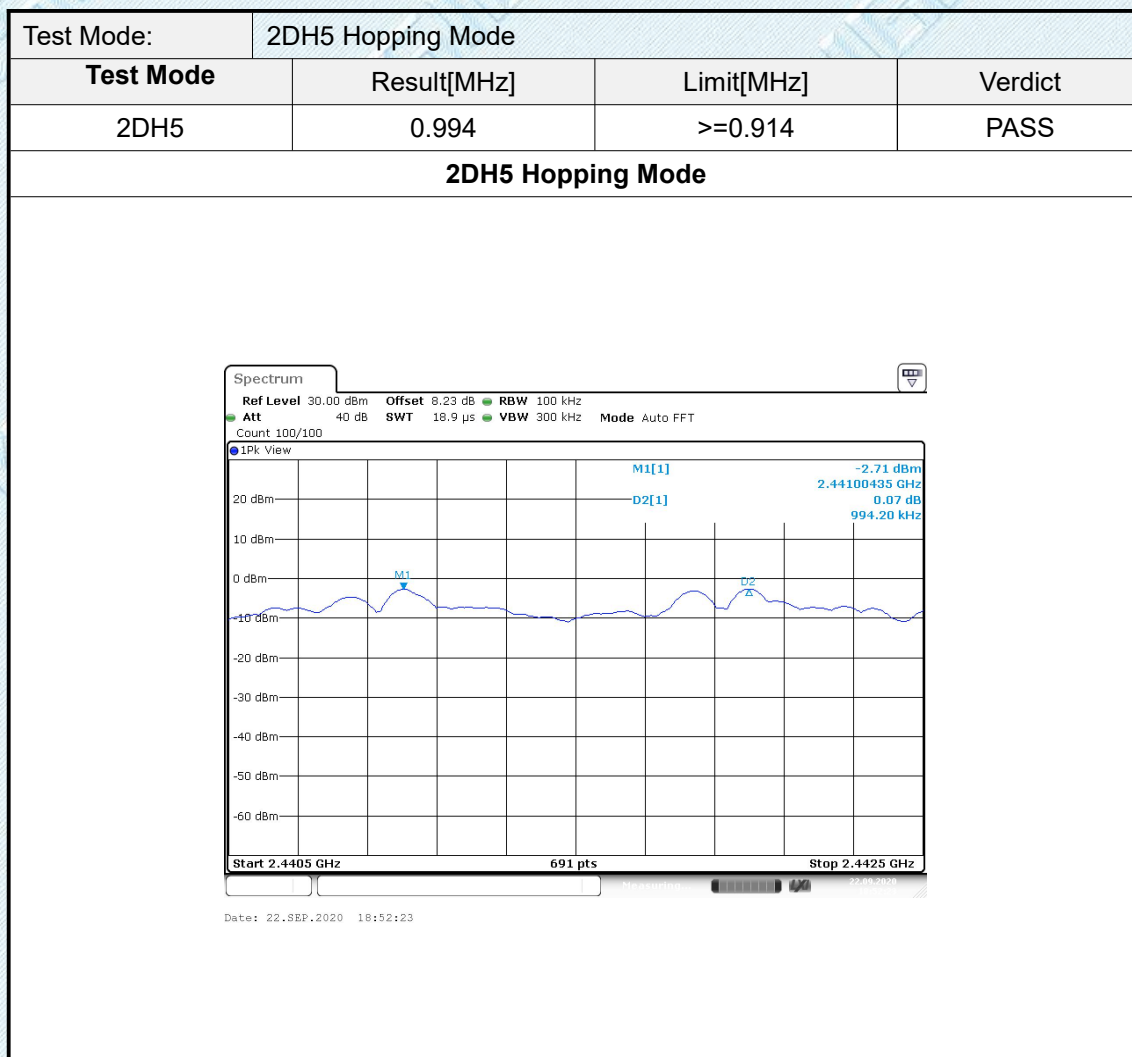
NOTE: The EUT was set to continuously transmitting in each mode and low, middle and high channel for the test, and found the middle channel which is the worse case, so only show the test date for worse case.

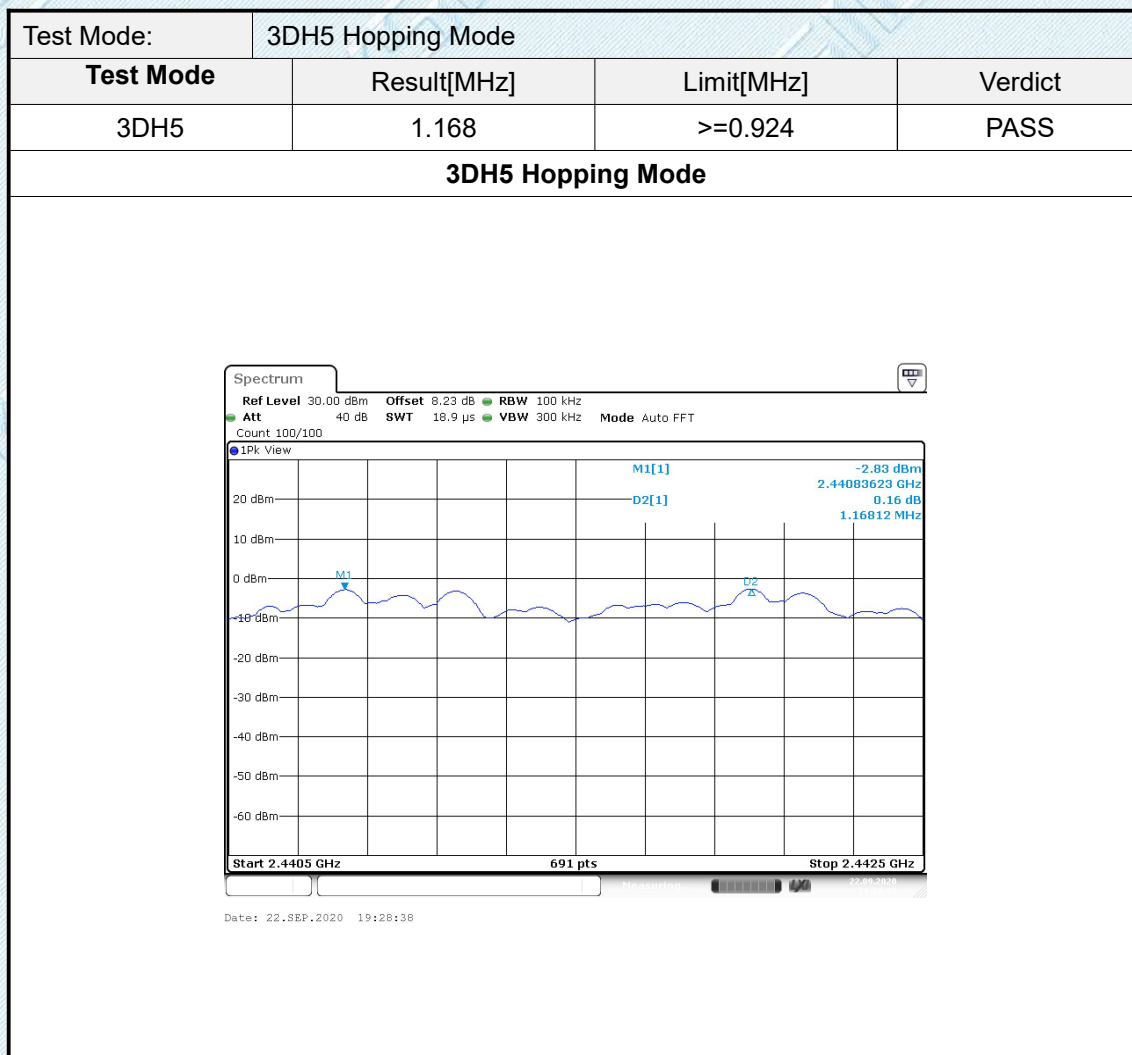
Test Mode

Please refer to the clause 2.3.

Test Results





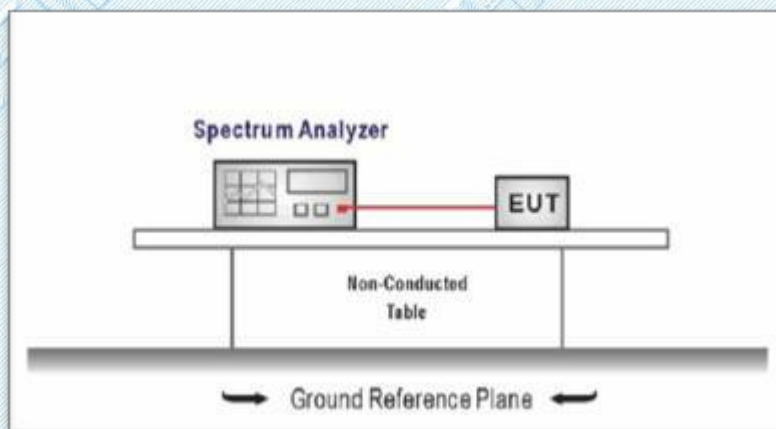


3.6. Number of Hopping Channel

Limit

Section	Test Item	Limit
15.247	Number of Hopping Channel	>15

Test Configuration



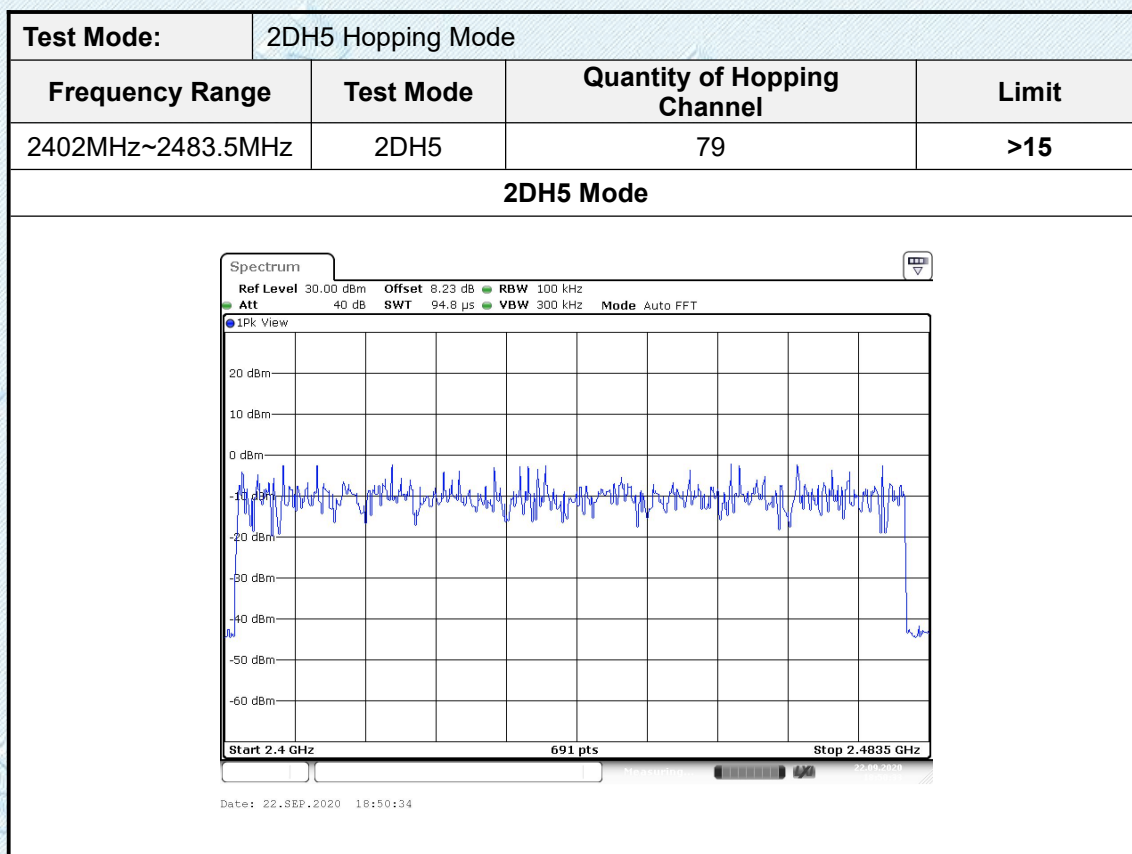
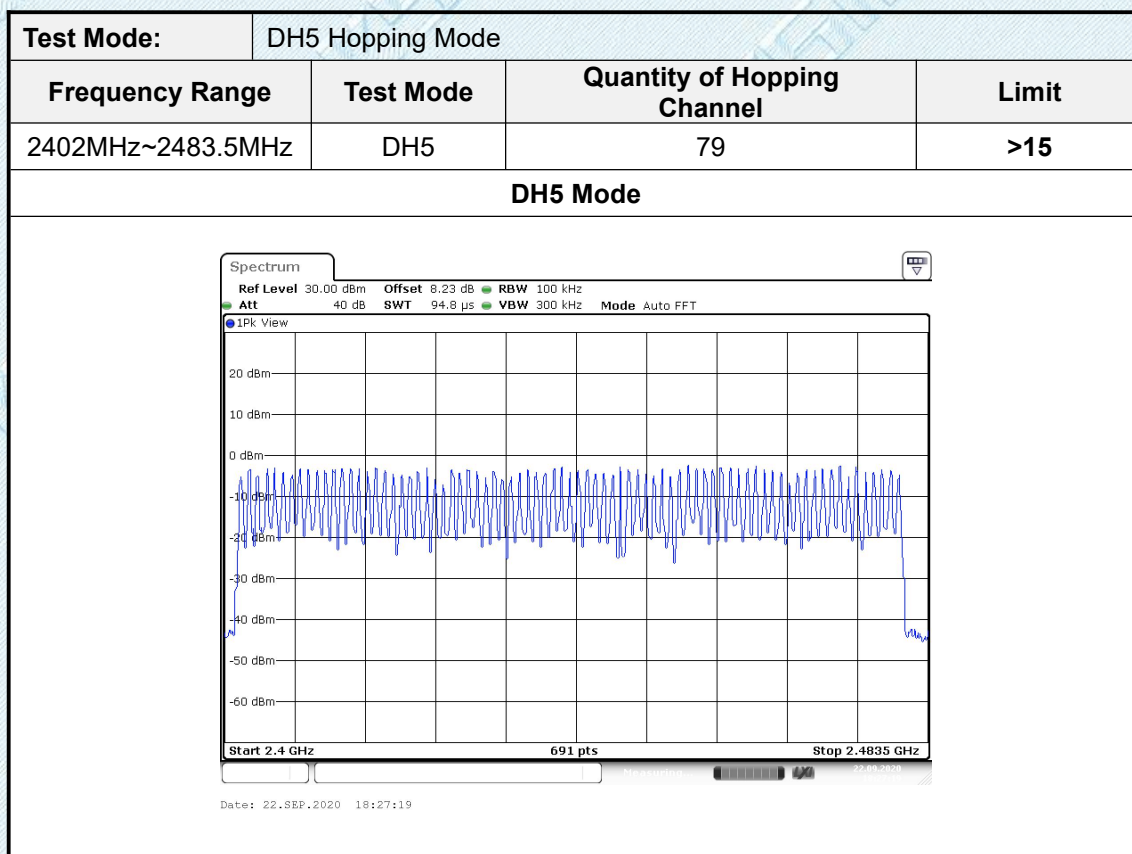
Test Procedure

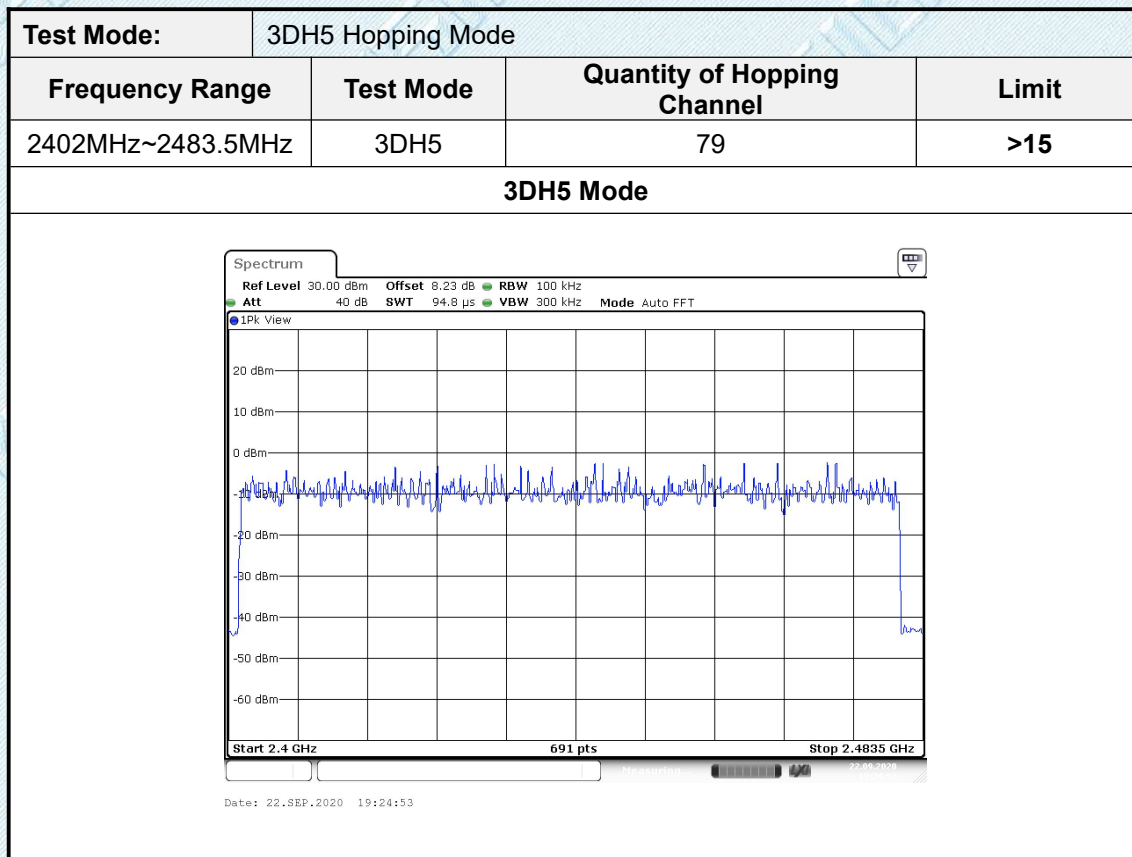
1. Connect EUT RF Output port to the Spectrum Analyzer through an RF attenuator.
2. Spectrum Setting:
 - (1) Peak Detector: RBW=100 kHz, VBW $\geq$ RBW, Sweep time= Auto.

Test Mode

Please refer to the clause 2.3.

Test Result



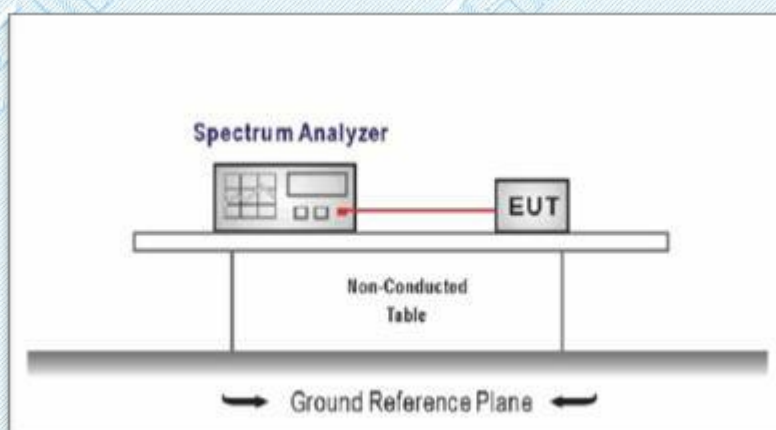


3.7. Dwell Time

Limit

Section	Test Item	Limit
15.247(a)(1)	Average Time of Occupancy	0.4 sec

Test Configuration



Test Procedure

1. Connect EUT RF Output port to the Spectrum Analyzer through an RF attenuator.
2. Spectrum Setting:
 - (1) Spectrum Setting: RBW=1MHz, VBW $\geq$ RBW.
 - (2) Use video trigger with the trigger level set to enable triggering only on full pulses.
 - (3) Sweep Time is more than once pulse time.
 - (4) Set the center frequency on any frequency would be measure and set the frequency span to zero.
 - (5) Measure the maximum time duration of one single pulse.
 - (6) Set the EUT for packet transmitting.

Test Mode

Please refer to the clause 2.3

Test Result

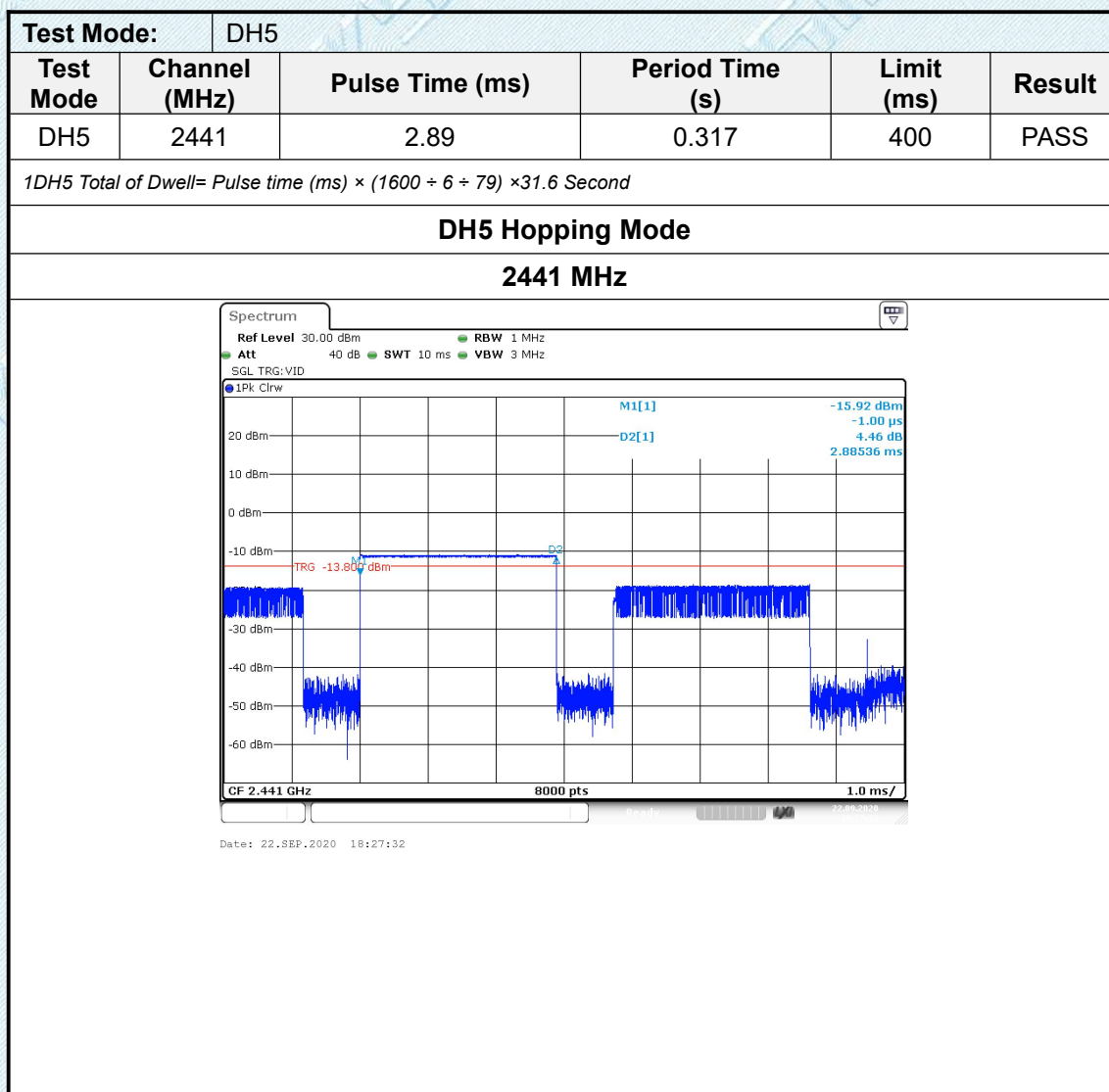
Note:

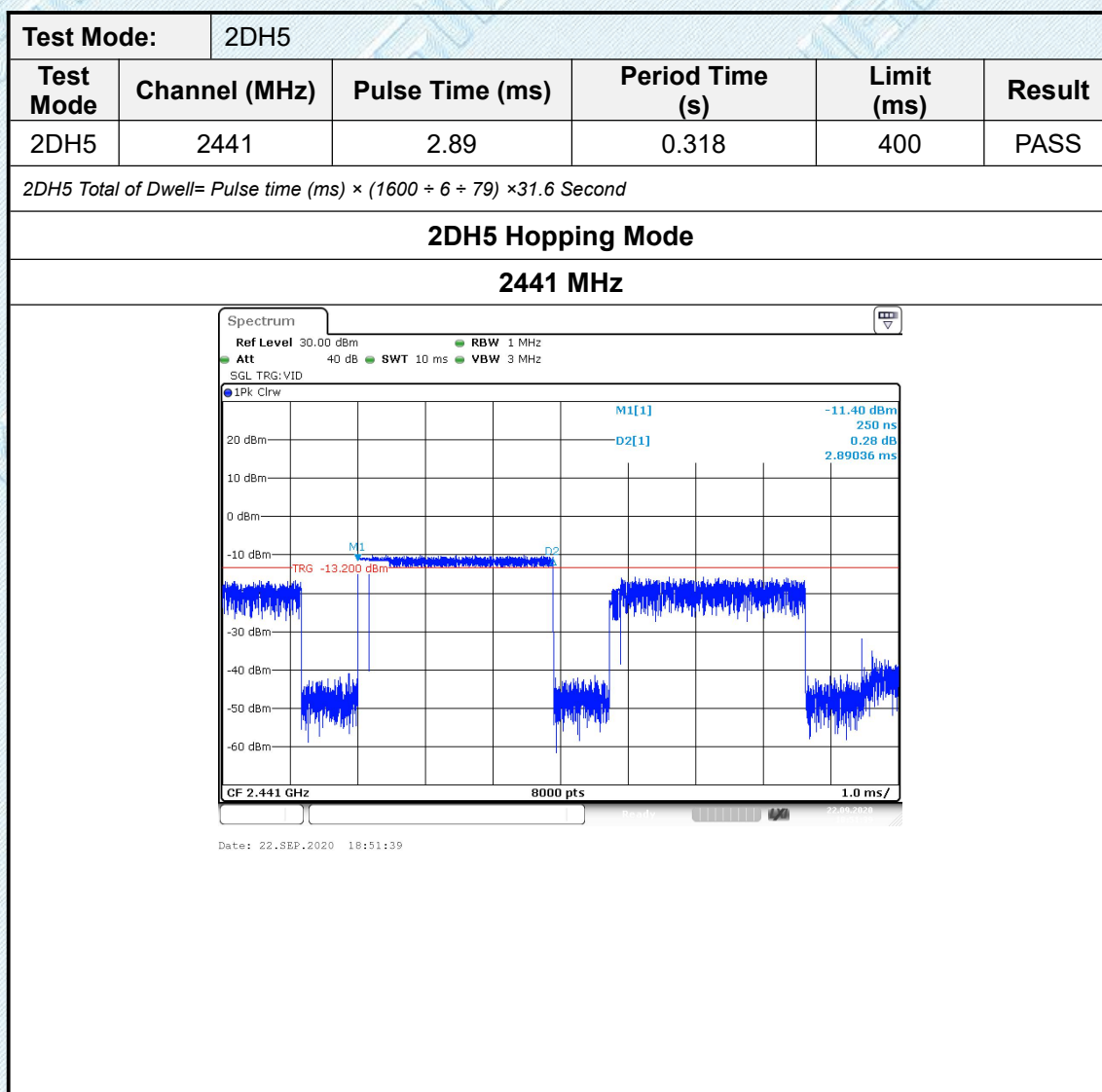
1.We have tested all mode at high,middle and low channel,and recoreded worst case at middle channel.

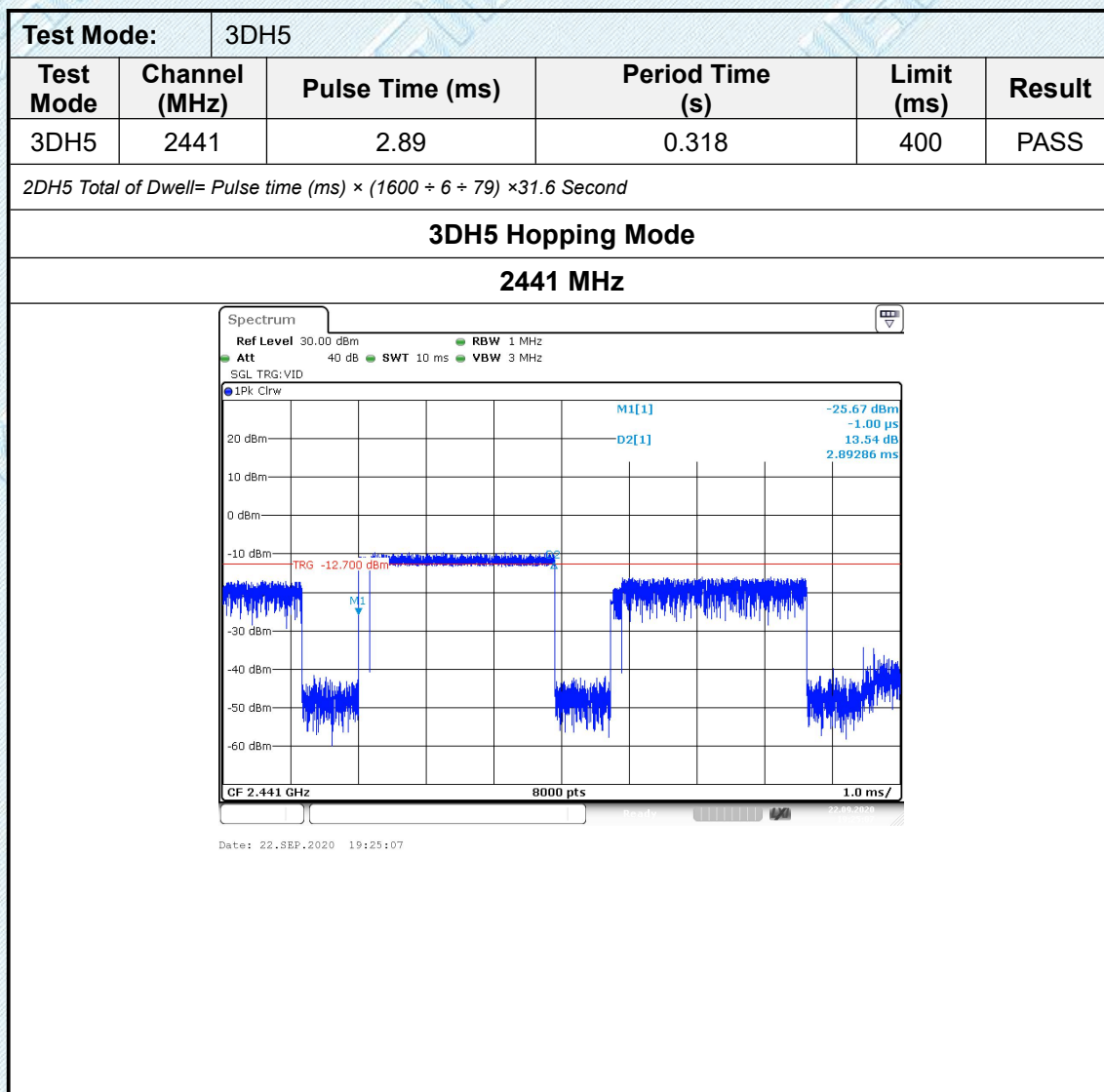
2.Dwell time=Pulse time (ms) $\times$ (1600 $\div$ 2 $\div$ 79) $\times$ 31.6 Second for DH1, 2DH1, 3DH1

Dwell time=Pulse time (ms) $\times$ (1600 $\div$ 4 $\div$ 79) $\times$ 31.6 Second for DH3, 2DH3, 3DH3

Dwell time=Pulse time (ms) $\times$ (1600 $\div$ 6 $\div$ 79) $\times$ 31.6 Second for DH5, 2DH5, 3DH5







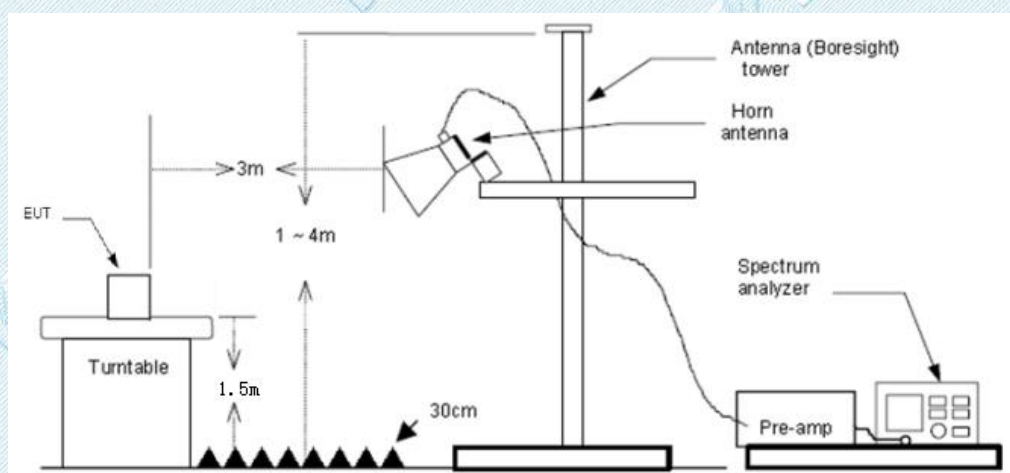
3.8. Band Edge Emissions(Radiated)

Limit

Restricted Frequency Band (MHz)	(dBuV/m)(at 3m)	
	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54

Note: All restriction bands have been tested, only the worst case is reported.

Test Configuration



Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. The receiver set as follow:
RBW=1MHz, VBW=3MHz PEAK detector for Peak value.
RBW=1MHz, VBW=10Hz with Peak Detector for Average Value.

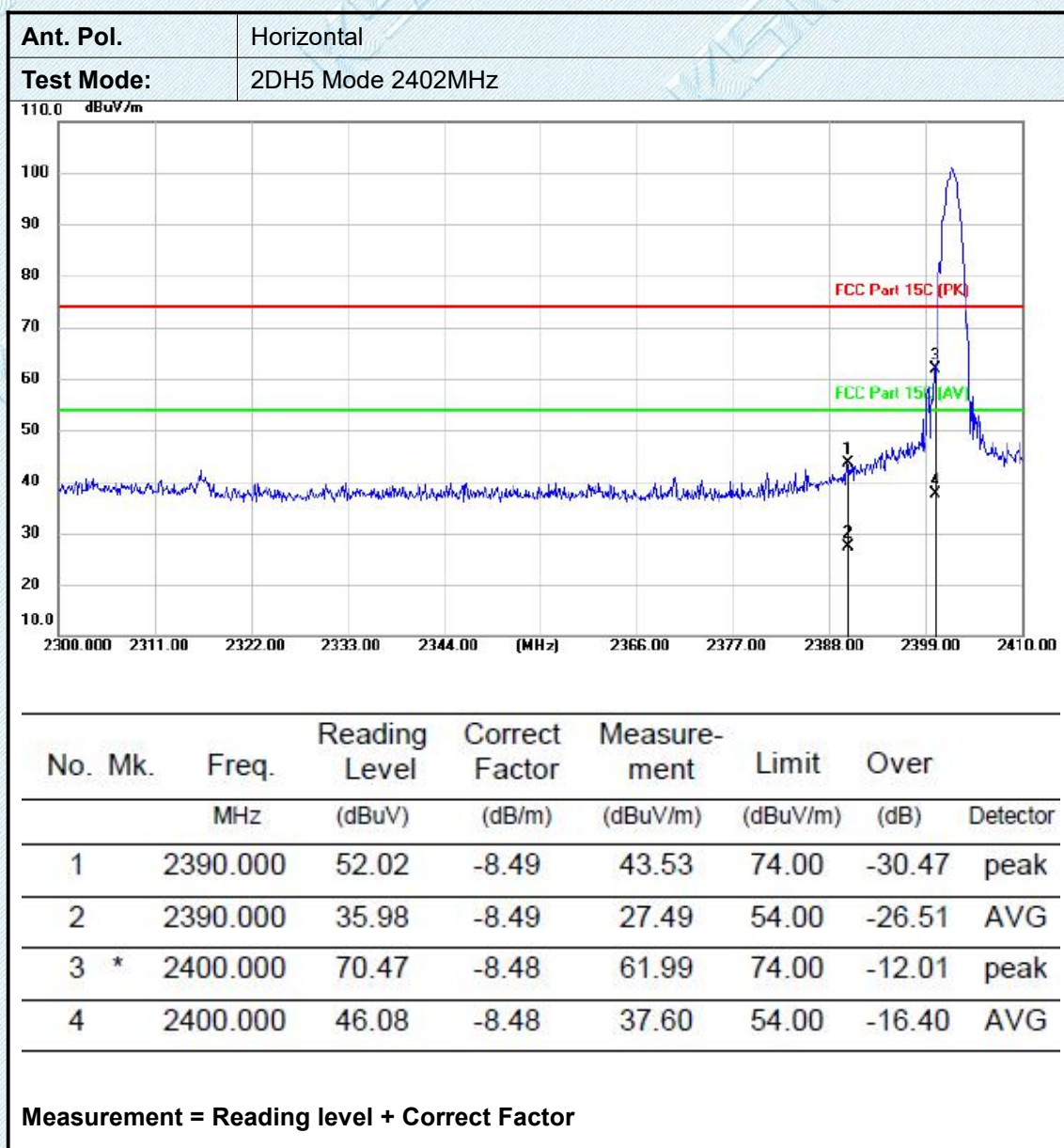
Test Mode

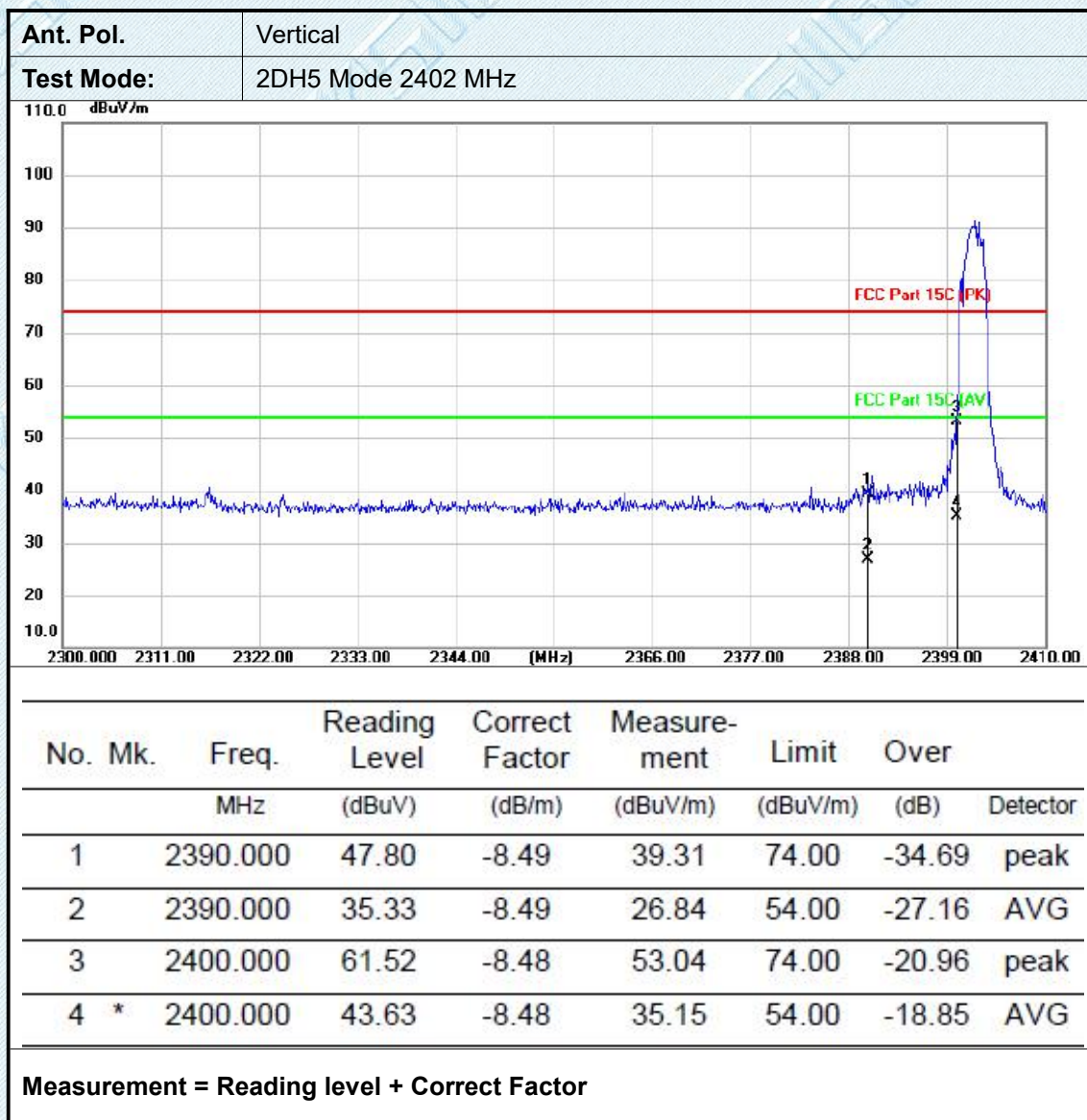
Please refer to the clause 2.3.

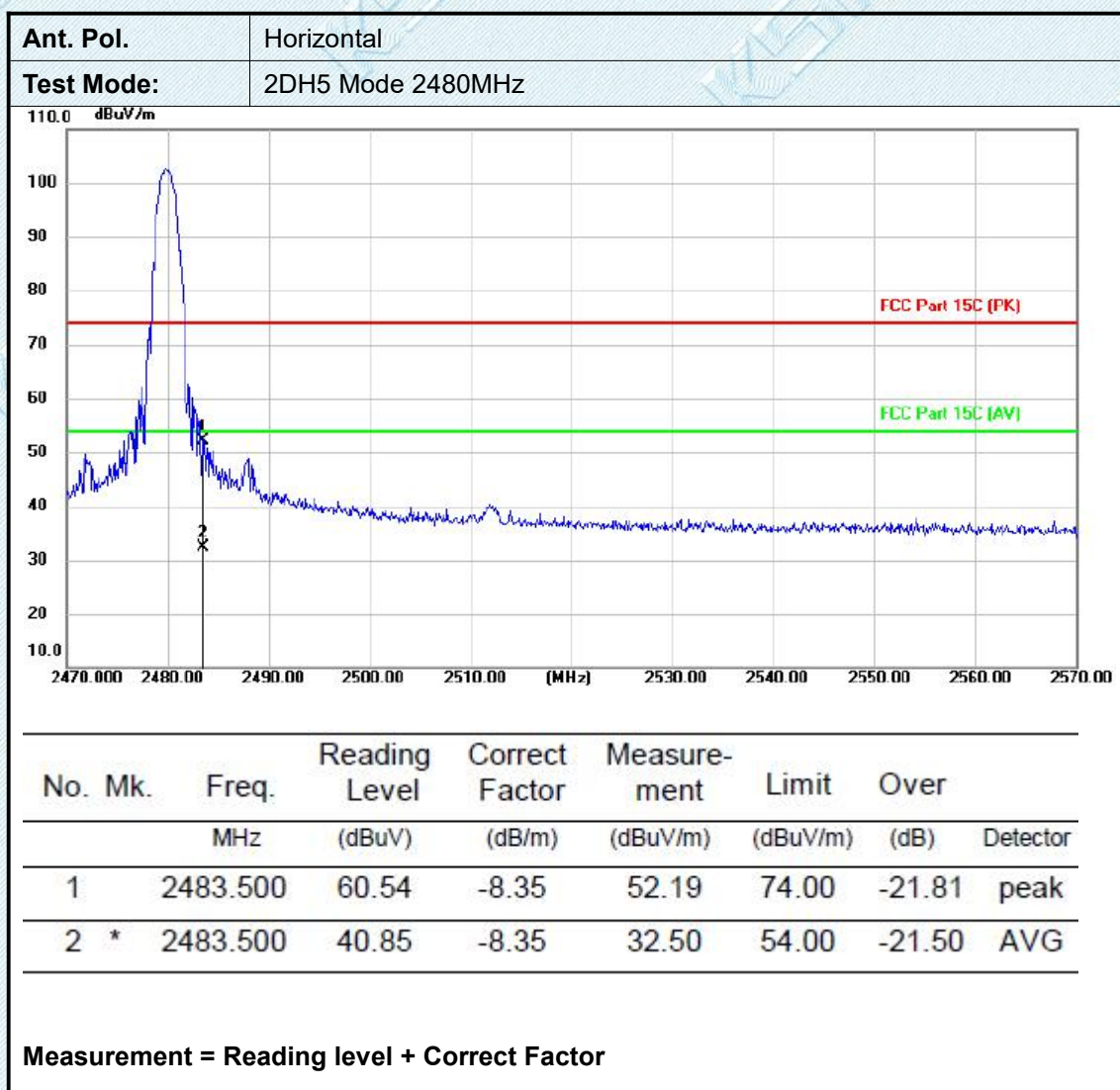
Test Results

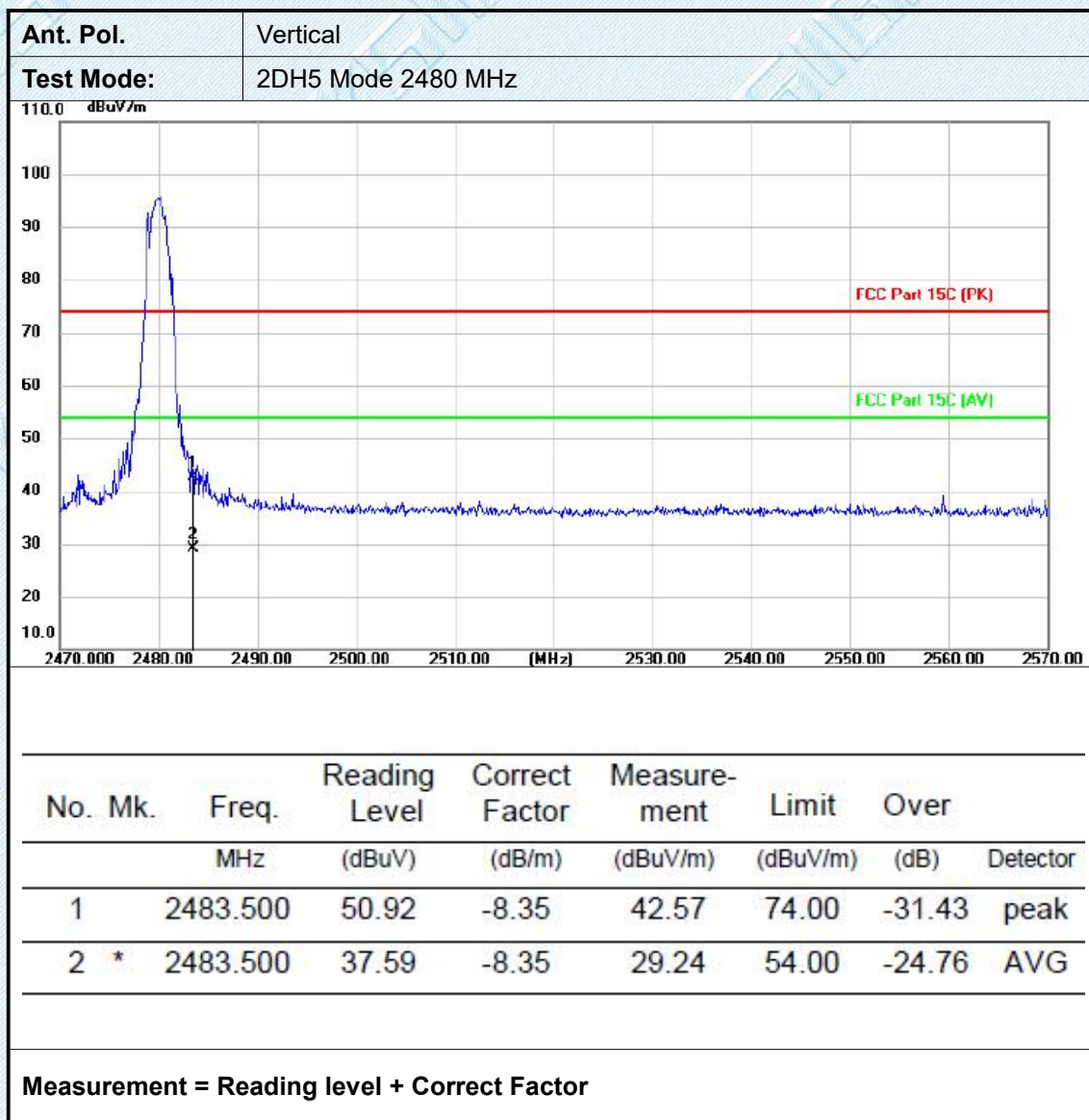
Note:

- 1.Measurement = Reading level + Correct Factor
Correct Factor=Antenna Factor + Cable Loss -Preamplifier Factor
- 2.Pre-scan DH5, 2DH5 , 3DH5modulation, and found the 2DH5 modulation which it is worse case, so only show the test data for worse case.









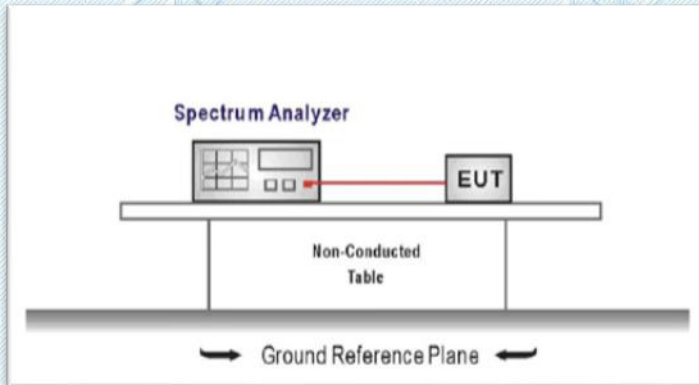
3.9. Band Edge and Spurious Emission (Conducted)

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the pathloss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
 RBW= 100 KHz,
 VBW=3*RBW
 Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE:

Please refer to the clause 2.3.

TEST RESULTS