ACCREDITED
CERTIFICATE #5473.01

Test Report No.:
FCC2022-0020-RF1

RF Test Report

EUT	:	**ActivPanel 9 WiFi and Bluetooth Module**
MODEL	:	**AP9-WIFIBT-AB-02**
BRAND NAME	:	**Promethean**
APPLICANT	:	**Promethean Limited**
Classification Of Test	:	**N/A**

CVC Testing Technology Co., Ltd.

Client	**Name : Promethean Limited** **Address : Promethean House,Lower Philips Rd,whitebirk Industrial Estate,Blackburn,Bb1 5th United Kingdom**
Manufacturer	**Name : Promethean Limited** **Address : Promethean House,Lower Philips Rd,whitebirk Industrial Estate,Blackburn,Bb1 5th United Kingdom**
Factor	**Name : Promethean Limited** **Address : Promethean House,Lower Philips Rd,whitebirk Industrial Estate,Blackburn,Bb1 5th United Kingdom**
Equipment Under Test	**Name : ActivPanel 9 WiFi and Bluetooth Module** **Model/Type: AP9-WIFIBT-AB-02** **Trade mark : Promethean** **Serial NO.:N/A** **Sampe NO.:3-1**

Date of Receipt.	**2022.03.25**	Date of Testing	**2022.03.25～2022.05.24**

Test Specification	**Test Result**
FCC Part 15, Subpart C, Section 15.247 **Canada RSS-247 Issue 2 (2017-02)** **Canada RSS-Gen Issue 5 (2019-03)**	PASS

Evaluation of Test Result	The equipment under test was found to comply with the requirements of the standards applied. **Issue Date: 2022.05.25**

Tested by:	Reviewed by:	Approved by:
Xu ZhenFei	Liu YongHai	Chen HuaWen
Name Signature	Name Signature	Name Signature

Other Aspects: NONE.

Abbreviations:OK, Pass= passed Fail = failed N/A= not applicable EUT= equipment, sample(s) under tested

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FCC2022-0020-RF1	Original release	2022.05.25

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
FCC STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**REMARK**
15.207 RSS-Gen 8.8	AC Power Conducted Emission	N/A	Power form battery
RSS-Gen 6.7	Occupied Bandwidth Measurement	PASS	Meet the requirement of limit
15.247(a)(1) RSS-247 5.1(d)	Number of Hopping Frequency Used	PASS	Meet the requirement of limit.
15.247(a)(1) RSS-247 5.1(b)	Hopping Channel Separation	PASS	Meet the requirement of limit.
15.247(a)(1) RSS-247 5.1(d)	Dell Time of Each Channel	PASS	Meet the requirement of limit.
15.247(a)(1)	20dB EMISSION BANDWIDTH	PASS	Meet the requirement of limit.
15.247(b) RSS-247 5.4(b)	Conducted Output Power	PASS	Meet the requirement of limit.
15.247(d), 15.209,15.205 RSS-Gen 8.10 Table 7 RSS-Gen 8.9 Table 5	Radiated Emissions	PASS	Meet the requirement of limit.
15.247(d) RSS-247 5.5	Out of band Emission Measurement	PASS	Meet the requirement of limit.
15.203 14.247(b)	Antenna Requirement	PASS	No antenna connector is used.

1.1 LIST OF TEST AND MEASUREMENT INSTRUMENTS

Test Equipment	Type/Mode	SERIAL NO.	Equipment No.	Manufacturer	Cal. Due
WIFI & Bluetooth Test System 1					/
Communication Shielded Room 1	4m*3m*3m	CRTDSWKSR44301	VGDS-0699	CRT	2024/04/24
Spectrum Analyzer	FSV30	104337	DZ-000235	R&S	2022/11/03
Comprehensive Test Instrument	CMW500	137779	DZ-000220	R&S	2022/06/30
Comprehensive Test Instrument	CMW500	169888	DZ-000342	R&S	2022/12/01
LTE Comprehensive Test Instrument	E7515A	MY58010639	DZ-000173	KEYSIGHT	2022/04/14
Analog Signal Generator	SMA100B	103663	DZ-000239-2	R&S	2022/06/30
Vector Signal Generator	SMBV100B	101757	DZ-000239-1	R&S	2022/06/30
Programmable DC Power Supply	E3642A	MY59108106	DZ-000242-2	KEYSIGHT	2022/08/05
Radiation SpuriousTest System					/
3m Semi-Anechoic Chamber	FACT-4	ST08035	WKNA-0024	ETS	2024/12/12
Spectrum Analyzer	N9010B	MY57470323	DZ-000174	KEYSIGHT	2023/03/02
EMI Test Receiver	N9038A-508	MY532290079	EM-000397	Agilent	2023/03/02
Broadband Antenna	VULB 9163	9163-530	EM-000342	SCHWARZBECK	2022/06/26
Waveguide Horn Antenna	HF906	360306/008	WKNA-0024-8	R&S	2023/03/04
Waveguide Horn Antenna	BBHA9170	00949	DZ-000209-2	SCHWARZBECK	2022/08/27
Preamplifier	BBV 9721	9721-050	DZ-000209-1	SCHWARZBECK	2022/06/30
5G Bandstop Filters	WRCJV12-4900-5100-5900-6100-50EE	1	DZ-000186	WI	2022/12/20
Comprehensive tester	CMW500	159000	DZ-000240-2	R&S	2022/12/20
Conducted emission					/
EMI Test Receiver	ESCI	100857	WKNB-0081	R&S	2022-12-08
EMI Test Receiver	ESR3	102394	VGDY-0705	R&S	2023-03-04
LISN	NSLK 8127	8127644	VGDY-0150	SCHWARZBECK	2022-09-01
DC LISN	PVDC8301-017	PVDC8301#17	VGDY-0692	SCHWARZBECK	2022-06-07
LISN	NSLK 8129	8129-268	EM-000388	SCHWARZBECK	2023-03-03
Plus Limiter（#1）	VTSD 9561 F-N	00515	VGDY-0808	SCHWARZBECK	2023-03-04
Impedance Stabilization Network	ISN T800	27095	WKNE-0195	TESEQ	2022-09-01
Impedance Stabilization Network	NTFM8158	8158-0092	VGDY-0356	SCHWARZBECK	2022-06-07
ImpedanceStabilizationNetwork	NTFM8131	#184	EM-000498	SCHWARZBECK	2022-06-05
Voltage Probe	TK9420	9420-499	VGDY-0128	SCHWARZBECK	2023-03-04
Power Divider	4901.17.B	22643830	DB-0016	HUBER+SUHNER	2023-09-01
Video Signal Generator	GV-798+	151064920001	VGDS-0215	PROMAX	2022-06-07
AudioSignalGenerator	GAG-810	EK871591	EM-000309	GW	2022-12-08
Shielding Room(#1)	GP1A	001	WKNF-0001	LEINING	2024-08-08

1.2 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:

No.	ITEM	FREQUENCY	UNCERTAINTY
1	Conducted Emissions	9kHz~30MHz	±2.66dB
2	Radiated Spurious Emissions	9KHz ~ 30MHz	±0.769dB
		30MHz ~ 1GMHz	±0.877dB
		1GHz ~ 18GHz	±0.777dB
		18GHz ~ 40GHz	±1.315dB

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

1.3 TEST LOCATION

The tests and measurements refer to this report were performed by EMC testing Lab. of CVC Testing Technology Co., Ltd.

Address: No.3,TiantaiyiRoad,KaitaiAvenue,ScienceCity,Guangzhou,China
Post Code：510663 Tel：020-32293888
FAX：020-32293889 E-mail：office@cvc.org.cn

2 GENERAL INFORMATION

2.1 GENERAL PRODUCT INFORMATION

PRODUCT	ActivPanel 9 WiFi and Bluetooth Module
BRAND	Promethean
MODEL	AP9-WIFIBT-AB-02
ADDITIONAL MODEL	N/A
FCC ID	QAM023
IC ID	5459A-023
POWER SUPPLY	DC 5V from USB host unit
MODULATION TYPE	GFSK, π/4 DQPSK, 8DPSK
OPERATING FREQUENCY	2402MHz~2480MHz
NUMBER OF CHANNEL	79
PEAK OUTPUT POWER	6.66dBm (Max. Measured)
ANTENNA TYPE（Remark 5）	External Antenna, with 2.9dBi gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	N/A

Remark:

1. For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
3. This product is wireless earphone, divided into left ear and right ear.
4. EUT photo refer to the report (Report NO.: FCC2022-0020-E).
5. Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information, CVC is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.
6. The EUT have SISO function, provides 1 completed transmitter and 1 receiver.

2.2 OTHER INFORMATION

Operation frequency each of channel.

Operation Frequency Each of Channel							
For BT (GFSK, π/4 DQPSK, 8 DPSK)							
CHANNEL	**FREQ. (MHz)**	**CHANNEL**	**FREQ. (MHz)**	**CHANNEL**	**FREQ. (MHz)**	**CHANNEL**	**FREQ. (MHz)**
0	**2402**	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	**78**	**2480**
19	2421	**39**	**2441**	59	2461		

1. The channels which were indicated in bold type of the above channel list were selected as representative test channel. Therefore only the data of the test channels were recorded in this report.
2. By means of test software which provided by manufacture, the power levels during the tests were set according to the following codes:

GFSK		π/4-DQPSK		8DPSK	
CHANNEL	**POWER SETTING**	**CHANNEL**	**POWER SETTING**	**CHANNEL**	**POWER SETTING**
0	3	**0**	3	**0**	3
39	3	**39**	3	**39**	3
78	3	**78**	3	**78**	3

2.3 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, xyz axis and antenna ports

The worst case was found when positioned on xaxis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	APPLICABLE TEST ITEMS				DESCRIPTION
	RSE<1G	RSE≥1G	PLC	APCM	
A	√	√	√	√	BT LINK

Where **RSE<1G:** Radiated Emission below 1GHz. **RSE≥1G:** Radiated Emission above 1GHz.
PLC: Power Line Conducted Emission. **APCM:** Antenna Port Conducted Measurement.

RADIATED EMISSION TEST (BELOW 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
A	0	FHSS	GFSK	DH5

RADIATED EMISSION TEST (ABOVE 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
A	0, 39, 78	FHSS	GFSK	DH5
A	0, 39, 78	FHSS	π/4 DQPSK	2DH5
A	0, 39, 78	FHSS	8DPSK	3DH5

POWER LINE CONDUCTED EMISSION TEST:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CONDITION
-	BT Link

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
A	0, 39, 78	FHSS	GFSK	DH5
A	0, 39, 78	FHSS	π/4 DQPSK	2DH5
A	0, 39, 78	FHSS	8DPSK	3DH5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE (SYSTEM)	TESTED BY
RSE<1G	24deg. C, 55%RH	DC 5V from USB host unit	Liu ShiWei
RSE≥1G	24deg. C, 55%RH	DC 5V from USB host unit	Liu ShiWei
PLC	24deg. C, 55%RH	DC 5V from USB host unit	Liu ShiWei
APCM	25deg. C, 58%RH	DC 5V from USB host unit	Liu ShiWei

2.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

FCC PART 15, Subpart C. Section 15.247
KDB 558074 D01 15.247 Meas Guidance v05r02
ANSI C63.10-2020
Canada RSS-247 Issue 2 (2017-02)
Canada RSS-Gen Issue 5 (2019-03)

All test items have been performed and recorded as per the above standards

2.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Support Equipment					
NO	Description	Brand	Model No.	Serial Number	Supplied by
1	Latop	Lenovo	V14	PFNXB1628023	Lab

Support Cable							
NO	Description	Quantity (Number)	Length (m)	Detachable (Yes/ No)	Shielded (Yes/ No)	Cores (Number)	Supplied by
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

3 TEST TYPES AND RESULTS

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 Limit

Frequency (MHz)	Conducted Limits(dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46*
0.5 - 5	56	46
5 - 30	60	50
NOTE: 1. The lower limit shall apply at the transition frequencies. NOTE: 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.		

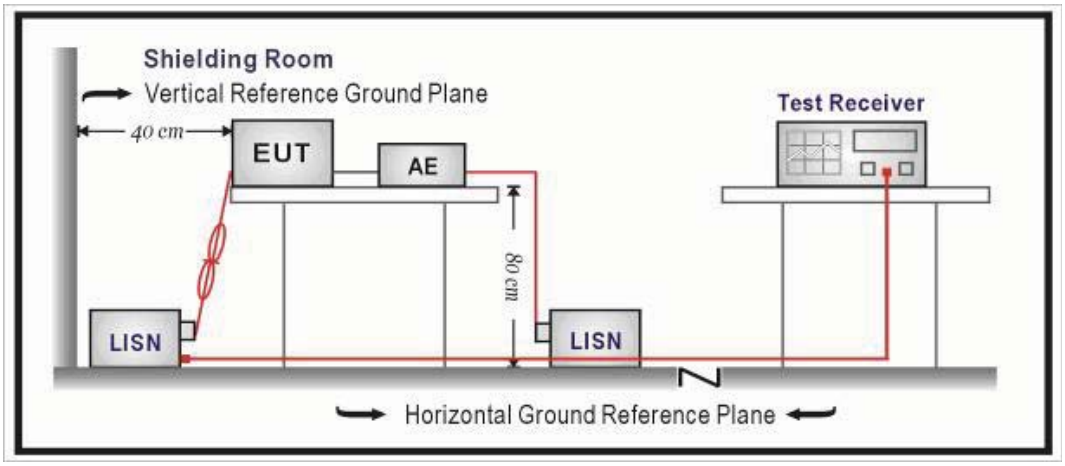
3.1.2 Measurement procedure

a. 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. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the Test photographs) 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.The equipment under test shall be placed on a support of non-metallic material, the height of which shall be1.5m above the ground,

b. 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.

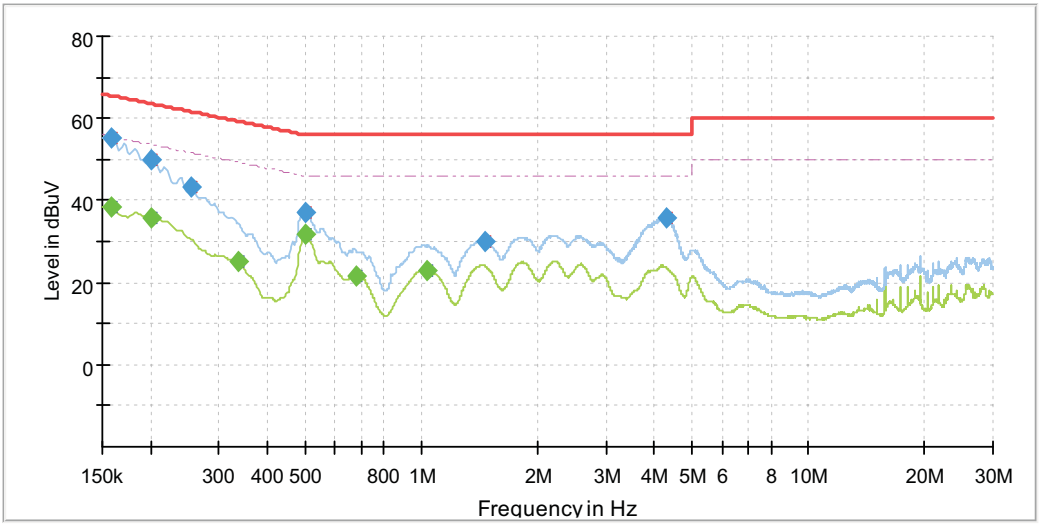
c. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

3.1.3 Test setup



3.1.4 Test results

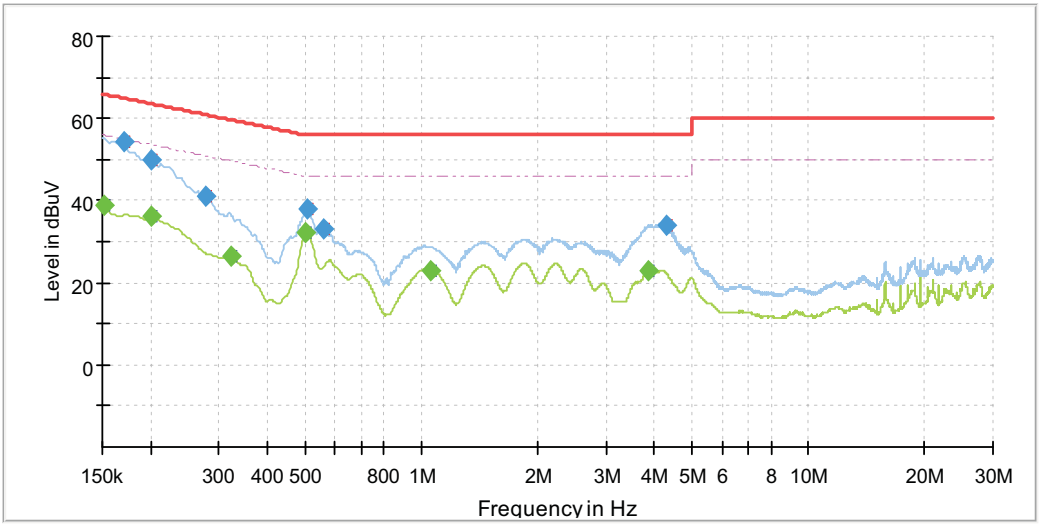
Test Mode	BT Link+2.4G WIFI Link	Frequency Range	150KHz ~ 30MHz
PHASE	Line (L)		



NO	Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr.Factor (dB)
1	0.159	---	38.5	55.5	17.0	L1	19.5
2	0.159	55.3	---	65.5	10.2	L1	19.5
3	0.202	---	35.9	53.5	17.7	L1	19.5
4	0.202	49.8	---	63.5	13.7	L1	19.5
5	0.256	43.1	---	61.6	18.4	L1	19.5
6	0.337	---	25.3	49.3	23.9	L1	19.5
7	0.501	---	31.6	46.0	14.4	L1	19.5
8	0.503	37.0	---	56.0	19.0	L1	19.5
9	0.677	---	21.7	46.0	24.3	L1	19.6
10	1.030	---	23.0	46.0	23.0	L1	19.5
11	**1.469**	**30.0**	**---**	**56.0**	**26.0**	**L1**	**19.6**
12	4.281	35.8	---	56.0	20.2	L1	19.6

Remark: The emission levels of other frequencies were very low against the limit.

Test Mode	BT Link+2.4G WIFI Link	Frequency Range	150KHz ~ 30MHz
PHASE	Line (N)		



NO	Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr.Factor (dB)
1	0.152	---	38.7	55.9	17.2	N	19.5
2	0.170	54.5	---	64.9	10.5	N	19.5
3	0.202	50.0	---	63.5	13.6	N	19.5
4	0.202	---	36.0	53.5	17.5	N	19.5
5	0.278	40.9	---	60.9	20.0	N	19.6
6	0.321	---	26.3	49.7	23.3	N	19.5
7	0.503	---	32.4	46.0	13.6	N	19.6
8	0.508	37.8	---	56.0	18.2	N	19.6
9	0.557	33.0	---	56.0	23.0	N	19.6
10	1.061	---	23.0	46.0	23.0	N	19.6
11	3.860	---	23.1	46.0	22.9	N	19.6
12	4.304	34.0	---	56.0	22.0	N	19.7

Remark: The emission levels of other frequencies were very low against the limit.

3.2 RADIATED EMISSIONS

3.2.1 Limits

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a). Other emissions shall be at least 20dB below the highest level of the desired power.

FREQUENCIES (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

NOTE: 1. The lower limit shall apply at the transition frequencies.
NOTE: 2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
NOTE: 3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

3.2.2 Measurement procedure

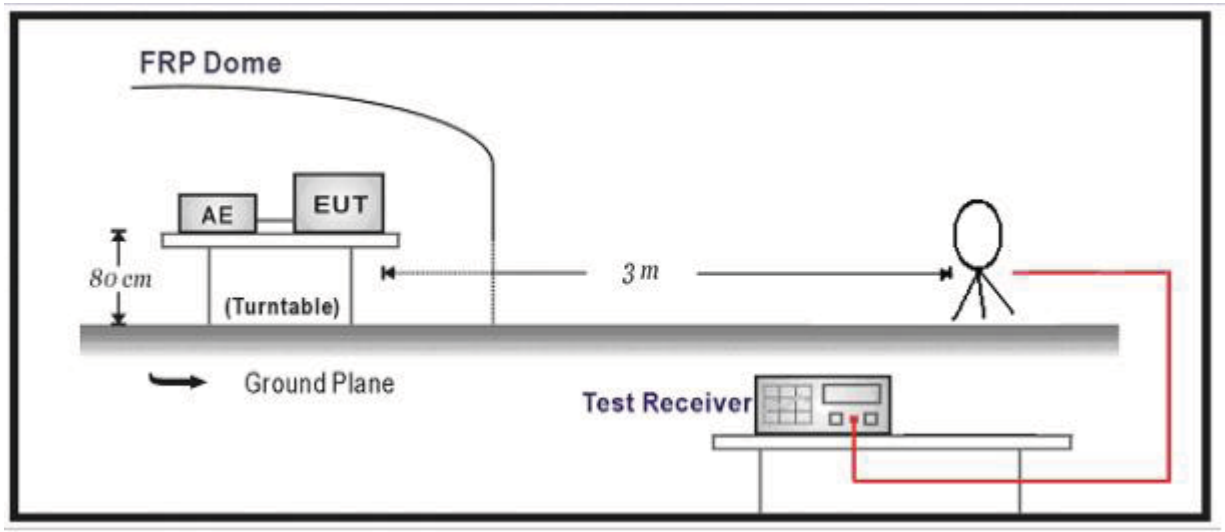
a. The EUT was placed on the top of a rotating table 1.5 meters(above 1GHz) and 0.8 meters(below 1GHz) above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. For below 1GHz was used bilog antenna, and above 1GHz was used horn antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. For below 30MHz, a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.
g. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using fresh batteries. The turntable was rotated to maximize the emission level.

NOTE:

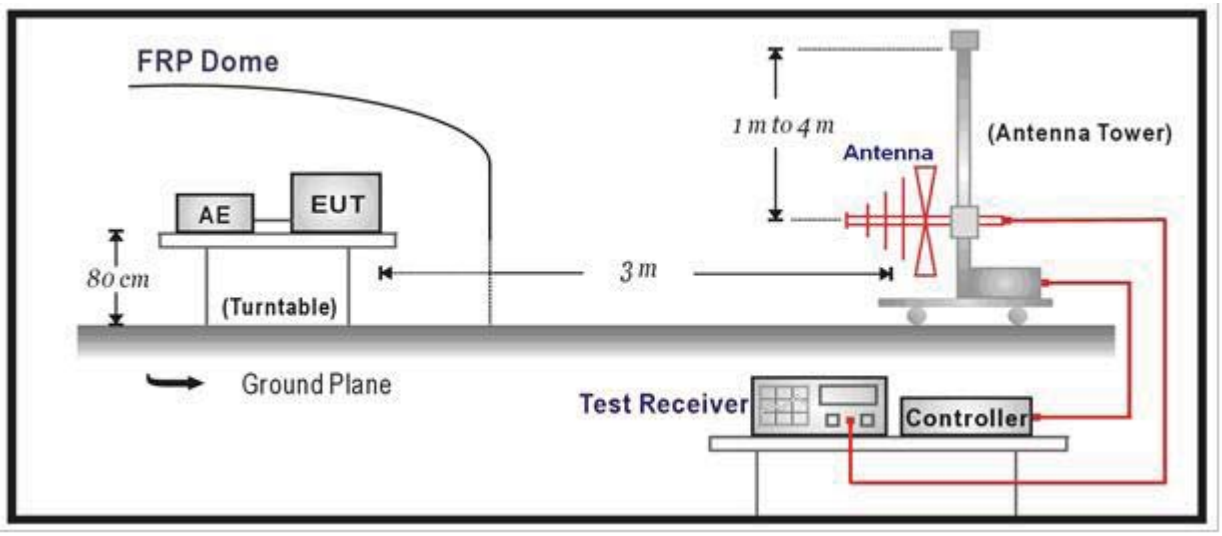
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ⩾ 1/T (Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The testing of the EUT was performed on all 3 orthogonal axes; the worst-case test configuration was reported on the file test setup photo.

3.2.3 Test setup

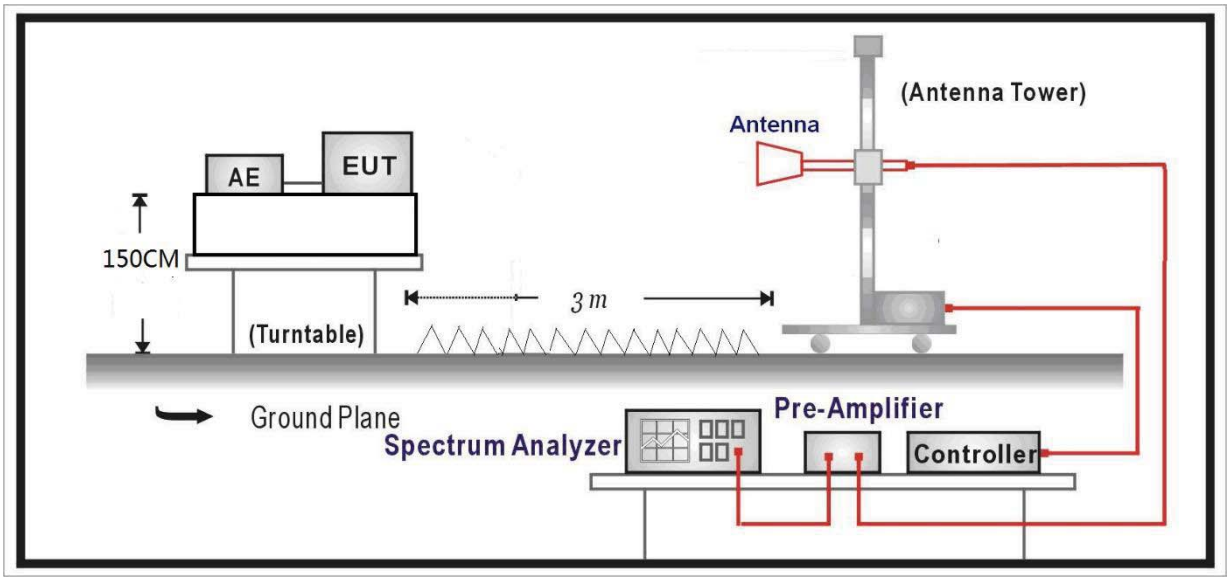
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:

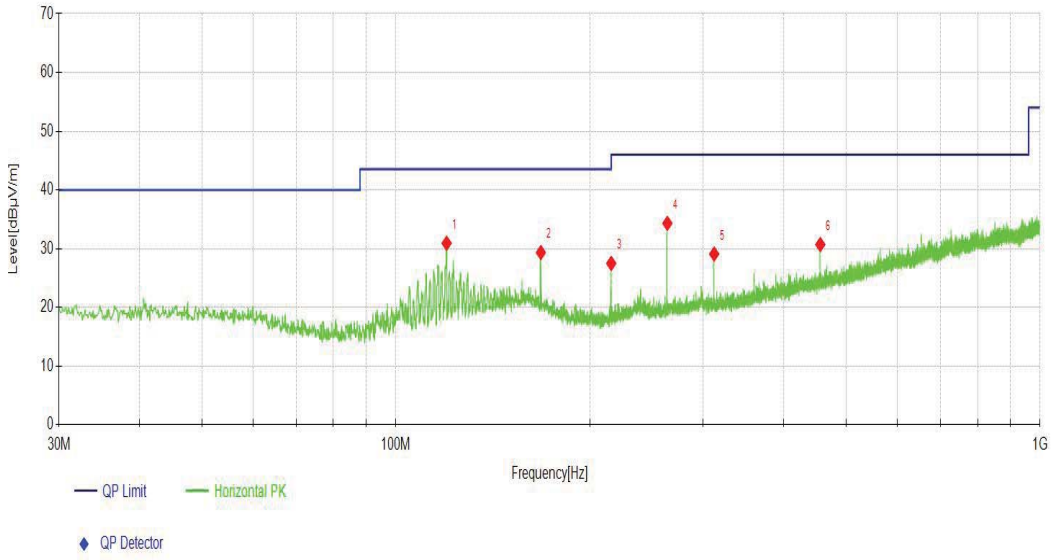


3.2.4 Test results

BELOW 1GHz WORST-CASE DATA:

Worst Test Mode	DH5	Channel	CH 0
Frequency Range	9KHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

Horizontal

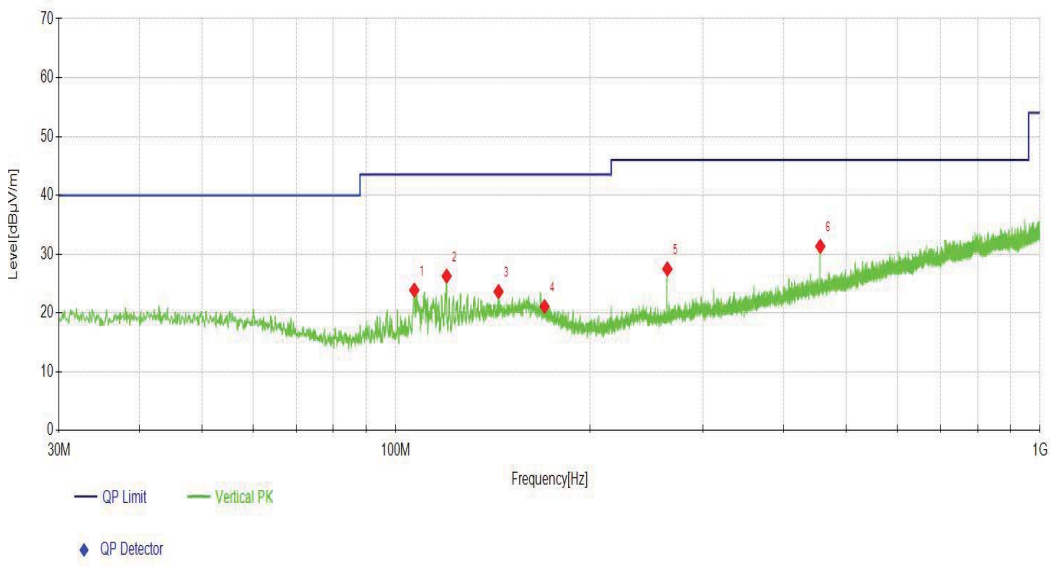


NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]
1	119.9280	13.30	17.60	30.90	43.50	12.60	300	74
2	167.9478	9.09	20.23	29.32	43.50	14.18	200	37
3	215.9676	10.25	17.22	27.47	43.50	16.03	100	345
4	263.9874	15.71	18.59	34.30	46.00	11.70	100	300
5	312.0072	8.94	20.13	29.07	46.00	16.93	100	311
6	455.9696	7.39	23.29	30.68	46.00	15.32	200	252

Remark: 1. 9KHz~30MHz have been test and test data more than 20dB margin.
2. The emission levels of other frequencies were greater than 20dB margin.
3. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
4. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
5. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]

Worst Test Mode	DH5	**Channel**	CH 0
Frequency Range	9KHz ~ 1GHz	**Detector Function**	Quasi-Peak (QP)

Vertical



NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]
1	106.8317	7.17	16.68	23.85	43.50	19.65	300	201
2	119.9280	8.64	17.60	26.24	43.50	17.26	200	159
3	144.3744	3.55	20.04	23.59	43.50	19.91	200	182
4	170.1790	1.05	20.02	21.07	43.50	22.43	300	360
5	263.9874	8.86	18.59	27.45	46.00	18.55	200	18
6	455.9696	8.01	23.29	31.30	46.00	14.70	100	218

Remark: 1. 9KHz~30MHz have been test and test data more than 20dB margin.
2. The emission levels of other frequencies were greater than 20dB margin.
3. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
4. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
5. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]

ABOVE 1GHz DATA

DH5-CH 0

Channel	CH 0	Frequency	2402MHz
Frequency Range	Above 1G	Detector Function	PK/AV

Horizontal

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2390.0000	43.72	-0.15	43.57	74.00	30.43	385	219	PK
2	2390.0000	36.09	-0.15	35.94	54.00	18.06	249	79	AV
3	2401.9122	93.60	-0.03	93.57			129	46	PK
4	2401.9882	93.28	-0.03	93.25			277	46	AV
5	4804.0000	41.80	9.29	51.09	74.00	22.91	326	321	PK
6	4804.0000	34.55	9.29	43.84	54.00	10.16	365	342	AV
7	7206.0000	19.83	12.81	32.64	54.00	21.36	225	251	AV
8	7206.0000	27.37	12.81	40.18	74.00	33.82	309	251	PK
9	9608.0000	27.99	13.32	41.31	74.00	32.69	358	93	PK
10	9608.0000	19.30	13.32	32.62	54.00	21.38	245	47	AV

Vertical

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2390.0000	36.49	-0.15	36.34	54.00	17.66	116	359	AV
2	2390.0000	43.75	-0.15	43.60	74.00	30.40	123	120	PK
3	2401.9502	93.76	-0.03	93.73			279	33	PK
4	2401.9502	93.39	-0.03	93.36			150	33	AV
5	4804.0000	42.39	9.29	51.68	74.00	22.32	208	72	PK
6	4804.0000	34.22	9.29	43.51	54.00	10.49	107	66	AV
7	7206.0000	19.45	12.81	32.26	54.00	21.74	399	334	AV
8	7206.0000	26.02	12.81	38.83	74.00	35.17	330	334	PK
9	9608.0000	27.27	13.32	40.59	74.00	33.41	175	82	PK
10	9608.0000	19.37	13.32	32.69	54.00	21.31	230	89	AV

Remark: 1. The emission levels of other frequencies were greater than 20dB margin.
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
4. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]

DH5-CH 39

Channel	CH 39	Frequency	2441MHz
Frequency Range	Above 1G	Detector Function	PK/AV

Horizontal

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	4882.0000	42.53	9.84	52.37	74.00	21.63	161	197	PK
2	4882.0000	34.14	9.84	43.98	54.00	10.02	124	346	AV
3	7323.0000	20.85	10.96	31.81	54.00	22.19	127	332	AV
4	7323.0000	28.55	10.96	39.51	74.00	34.49	265	339	PK
5	9764.0000	27.34	13.23	40.57	74.00	33.43	226	67	PK
6	9764.0000	18.70	13.23	31.93	54.00	22.07	331	67	AV

Vertical

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	4882.0000	41.98	9.84	51.82	74.00	22.18	200	190	PK
2	4882.0000	34.10	9.84	43.94	54.00	10.06	279	122	AV
3	7323.0000	20.61	10.96	31.57	54.00	22.43	233	346	AV
4	7323.0000	28.45	10.96	39.41	74.00	34.59	301	21	PK
5	9764.0000	26.74	13.23	39.97	74.00	34.03	248	96	PK
6	9764.0000	19.33	13.23	32.56	54.00	21.44	271	96	AV

Remark: 1. The emission levels of other frequencies were greater than 20dB margin.
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
4. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]

DH5-CH 78

Channel	CH 78	Frequency	2480MHz
Frequency Range	Above 1G	Detector Function	PK/AV

Horizontal

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2479.8770	96.13	0.32	96.45			213	52	AV
2	2480.0480	96.50	0.32	96.82			338	52	PK
3	2483.5000	36.21	0.46	36.67	54.00	17.33	237	3	AV
4	2483.5000	46.01	0.46	46.47	74.00	27.53	339	3	PK
5	4960.0000	42.17	10.69	52.86	74.00	21.14	391	328	PK
6	4960.0000	34.06	10.69	44.75	54.00	9.25	310	61	AV
7	7440.0000	20.91	9.75	30.66	54.00	23.34	299	1	AV
8	7440.0000	28.59	9.75	38.34	74.00	35.66	284	340	PK
9	9920.0000	27.62	13.83	41.45	74.00	32.55	381	159	PK
10	9920.0000	18.81	13.83	32.64	54.00	21.36	183	79	AV

Vertical

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2479.9340	96.44	0.32	96.76			209	52	PK
2	2479.9720	96.06	0.32	96.38			369	73	RMS
3	2483.5000	36.19	0.46	36.65	54.00	17.35	375	46	AV
4	2483.5000	43.39	0.46	43.85	74.00	30.15	380	39	PK
5	4960.0000	42.01	10.69	52.70	74.00	21.30	289	75	PK
6	4960.0000	34.58	10.69	45.27	54.00	8.73	300	55	AV
7	7440.0000	20.45	9.75	30.20	54.00	23.80	374	173	AV
8	7440.0000	28.03	9.75	37.78	74.00	36.22	117	58	PK
9	9920.0000	26.36	13.83	40.19	74.00	33.81	296	31	PK
10	9920.0000	18.74	13.83	32.57	54.00	21.43	136	314	AV

Remark: 1. The emission levels of other frequencies were greater than 20dB margin.
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
4. Margin(dB) = Limit[dBμV/m] - Level [dBμV/m]

2DH5-CH 0

Channel	CH 0	Frequency	2402MHz
Frequency Range	Above 1G	Detector Function	PK/AV

Horizontal

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2390.0000	36.16	-0.15	36.01	54.00	17.99	329	39	AV
2	2390.0000	44.40	-0.15	44.25	74.00	29.75	195	274	PK
3	2402.1782	93.84	-0.03	93.81			334	46	PK
4	2402.1782	92.82	-0.03	92.79			345	46	RMS
5	4804.0000	43.68	9.29	52.97	74.00	21.03	138	188	PK
6	4804.0000	34.48	9.29	43.77	54.00	10.23	271	155	AV
7	7206.0000	19.37	12.81	32.18	54.00	21.82	363	306	AV
8	7206.0000	26.01	12.81	38.82	74.00	35.18	384	313	PK
9	9608.0000	27.86	13.32	41.18	74.00	32.82	142	220	PK
10	9608.0000	18.74	13.32	32.06	54.00	21.94	337	220	AV

Vertical

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2390.0000	36.02	-0.15	35.87	54.00	18.13	262	0	AV
2	2390.0000	43.40	-0.15	43.25	74.00	30.75	113	72	PK
3	2402.0262	92.00	-0.03	91.97			186	166	AV
4	2402.2162	92.88	-0.03	92.85			153	172	PK
5	4804.0000	42.41	9.29	51.70	74.00	22.30	332	285	PK
6	4804.0000	34.40	9.29	43.69	54.00	10.31	354	339	AV
7	7206.0000	19.50	12.81	32.31	54.00	21.69	331	289	AV
8	7206.0000	27.28	12.81	40.09	74.00	33.91	162	3	PK
9	9608.0000	27.83	13.32	41.15	74.00	32.85	291	357	PK
10	9608.0000	19.18	13.32	32.50	54.00	21.50	295	68	AV

Remark: 1. The emission levels of other frequencies were greater than 20dB margin.
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
4. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]

2DH5-CH 39

Channel	CH 39	Frequency	2441MHz
Frequency Range	Above 1G	Detector Function	PK/AV

Horizontal

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	4882.0000	41.87	9.84	51.71	74.00	22.29	379	61	PK
2	4882.0000	34.15	9.84	43.99	54.00	10.01	332	314	AV
3	7323.0000	20.06	10.96	31.02	54.00	22.98	236	4	AV
4	7323.0000	28.17	10.96	39.13	74.00	34.87	148	255	PK
5	9764.0000	26.74	13.23	39.97	74.00	34.03	257	154	PK
6	9764.0000	19.07	13.23	32.30	54.00	21.70	176	160	AV

Vertical

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	4882.0000	44.37	9.84	54.21	74.00	19.79	160	339	PK
2	4882.0000	34.91	9.84	44.75	54.00	9.25	261	339	AV
3	7323.0000	20.35	10.96	31.31	54.00	22.69	300	259	AV
4	7323.0000	28.46	10.96	39.42	74.00	34.58	268	259	PK
5	9764.0000	28.09	13.23	41.32	74.00	32.68	329	39	PK
6	9764.0000	18.84	13.23	32.07	54.00	21.93	383	153	AV

Remark: 1. The emission levels of other frequencies were greater than 20dB margin.
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
4. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]

2DH5-CH 78

Channel	CH 78	Frequency	2480MHz
Frequency Range	Above 1G	Detector Function	PK/AV

Horizontal

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2479.9340	95.74	0.32	96.06			326	79	AV
2	2480.1810	96.26	0.32	96.58			292	73	PK
3	2483.5000	35.88	0.46	36.34	54.00	17.66	193	333	AV
4	2483.5000	44.56	0.46	45.02	74.00	28.98	136	306	PK
5	4960.0000	33.84	10.69	44.53	54.00	9.47	377	159	AV
6	4960.0000	41.76	10.69	52.45	74.00	21.55	344	341	PK
7	7440.0000	29.37	9.75	39.12	74.00	34.88	378	85	PK
8	7440.0000	20.58	9.75	30.33	54.00	23.67	118	52	AV
9	9920.0000	19.32	13.83	33.15	54.00	20.85	114	100	AV
10	9920.0000	26.02	13.83	39.85	74.00	34.15	337	100	PK

Vertical

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2480.1430	95.93	0.32	96.25			137	33	PK
2	2480.1430	95.22	0.32	95.54			103	33	AV
3	2483.5000	36.13	0.46	36.59	54.00	17.41	253	221	AV
4	2483.5000	44.47	0.46	44.93	74.00	29.07	366	221	PK
5	4960.0000	41.28	10.69	51.97	74.00	22.03	139	1	PK
6	4960.0000	33.90	10.69	44.59	54.00	9.41	358	245	AV
7	7440.0000	20.34	9.75	30.09	54.00	23.91	179	134	AV
8	7440.0000	29.26	9.75	39.01	74.00	34.99	100	114	PK
9	9920.0000	27.27	13.83	41.10	74.00	32.90	390	27	PK
10	9920.0000	18.54	13.83	32.37	54.00	21.63	250	87	AV

Remark: 1. The emission levels of other frequencies were greater than 20dB margin.
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
4. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]

3DH5-CH 0

Channel	CH 0	Frequency	2402MHz
Frequency Range	Above 1G	Detector Function	PK/AV

Horizontal

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2390.0000	36.52	-0.15	36.37	54.00	17.63	398	281	AV
2	2390.0000	43.76	-0.15	43.61	74.00	30.39	250	85	PK
3	2401.8172	93.69	-0.03	93.66			148	39	PK
4	2401.9502	93.23	-0.03	93.20			337	39	AV
5	4804.0000	42.75	9.29	52.04	74.00	21.96	392	128	PK
6	4824.0000	34.84	9.68	44.52	54.00	9.48	111	254	AV
7	7206.0000	27.71	12.81	40.52	74.00	33.48	275	258	PK
8	7236.0000	20.28	12.39	32.67	54.00	21.33	138	225	AV
9	9608.0000	27.28	13.32	40.60	74.00	33.40	341	325	PK
10	9648.0000	19.34	13.13	32.47	54.00	21.53	332	39	AV

Vertical

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2390.0000	36.07	-0.15	35.92	54.00	18.08	330	359	AV
2	2390.0000	44.08	-0.15	43.93	74.00	30.07	213	36	PK
3	2402.0262	93.21	-0.03	93.18			281	29	AV
4	2402.1402	93.71	-0.03	93.68			119	29	PK
5	4824.0000	42.76	9.68	52.44	74.00	21.56	318	192	PK
6	4882.0000	34.22	9.84	44.06	54.00	9.94	231	58	AV
7	7236.0000	27.48	12.39	39.87	74.00	34.13	151	1	PK
8	7323.0000	20.15	10.96	31.11	54.00	22.89	190	287	AV
9	9648.0000	27.60	13.13	40.73	74.00	33.27	126	280	PK
10	9764.0000	18.34	13.23	31.57	54.00	22.43	312	207	AV

Remark: 1. The emission levels of other frequencies were greater than 20dB margin.
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
4. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]

3DH5-CH 39

Channel	CH 39	Frequency	2441MHz
Frequency Range	Above 1G	Detector Function	PK/AV

Horizontal

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	4882.0000	42.28	9.84	52.12	74.00	21.88	318	57	PK
2	4882.0000	34.24	9.84	44.08	54.00	9.92	231	236	AV
3	7323.0000	19.84	10.96	30.80	54.00	23.20	151	298	AV
4	7323.0000	28.00	10.96	38.96	74.00	35.04	190	258	PK
5	9764.0000	27.41	13.23	40.64	74.00	33.36	126	99	PK
6	9764.0000	18.66	13.23	31.89	54.00	22.11	312	251	AV

Vertical

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	4882.0000	43.19	9.84	53.03	74.00	20.97	186	335	PK
2	4882.0000	34.15	9.84	43.99	54.00	10.01	251	274	AV
3	7323.0000	20.11	10.96	31.07	54.00	22.93	206	140	AV
4	7323.0000	27.85	10.96	38.81	74.00	35.19	261	220	PK
5	9764.0000	26.19	13.23	39.42	74.00	34.58	298	293	PK
6	9764.0000	18.64	13.23	31.87	54.00	22.13	390	306	AV

Remark: 1. The emission levels of other frequencies were greater than 20dB margin.
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
4. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]

3DH5-CH 78

Channel	CH 78	Frequency	2480MHz
Frequency Range	Above 1G	Detector Function	PK/AV

Horizontal

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2479.9150	83.09	0.32	83.41			379	46	AV
2	2480.1430	83.73	0.32	84.05			307	40	PK
3	2483.5000	35.84	0.46	36.30	54.00	17.70	226	3	AV
4	2483.5000	43.60	0.46	44.06	74.00	29.94	396	183	PK
5	4960.0000	42.80	10.69	53.49	74.00	20.51	309	160	PK
6	4960.0000	34.66	10.69	45.35	54.00	8.65	300	281	AV
7	7440.0000	20.91	9.75	30.66	54.00	23.34	282	20	AV
8	7440.0000	28.66	9.75	38.41	74.00	35.59	340	120	PK
9	9920.0000	27.63	13.83	41.46	74.00	32.54	199	147	PK
10	9920.0000	18.99	13.83	32.82	54.00	21.18	363	360	AV

Vertical

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2479.9150	96.02	0.32	96.34			182	54	PK
2	2479.9530	95.57	0.32	95.89			390	54	RMS
3	2483.5000	35.94	0.46	36.40	54.00	17.60	189	225	AV
4	2483.5000	43.90	0.46	44.36	74.00	29.64	306	244	PK
5	4960.0000	42.21	10.69	52.90	74.00	21.10	323	61	PK
6	4960.0000	34.00	10.69	44.69	54.00	9.31	256	335	AV
7	7440.0000	20.38	9.75	30.13	54.00	23.87	129	214	AV
8	7440.0000	29.00	9.75	38.75	74.00	35.25	336	315	PK
9	9920.0000	27.83	13.83	41.66	74.00	32.34	317	0	PK
10	9920.0000	18.92	13.83	32.75	54.00	21.25	154	322	AV

Remark: 1. The emission levels of other frequencies were greater than 20dB margin.
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
4. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]

3.3 NUMBER OF HOPPING FREQUENCY USED

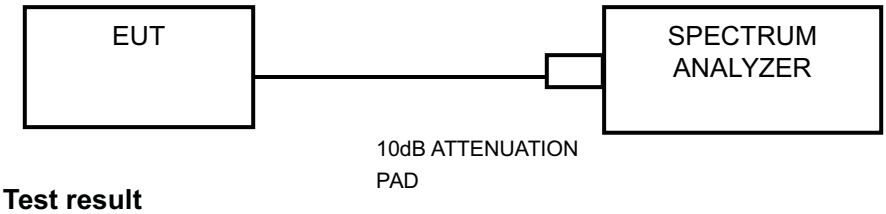
3.3.1 Limits

At least 15 channels frequencies, and should be equally spaced.

3.3.2 Measurement procedure

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect its antenna terminal to measurement 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.
c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
d. Set the SA on View mode and then plot the result on SA screen.
e. Repeat above procedures until all frequencies measured were completed.

3.3.3 Test setup



3.3.4 Test result

Refer to Appendix A.

3.4 DWELL TIME ON EACH CHANNEL

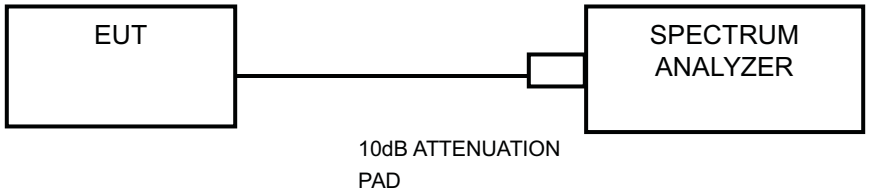
3.4.1 Limits

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.

3.4.2 Measurement procedure

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect its antenna terminal to measurement 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.
c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
e. Repeat above procedures until all different time-slot modes have been completed.

3.4.3 Test setup



3.4.4 Test result

Refer to Appendix A.

3.5 20dB EMISSION BANDWIDTH

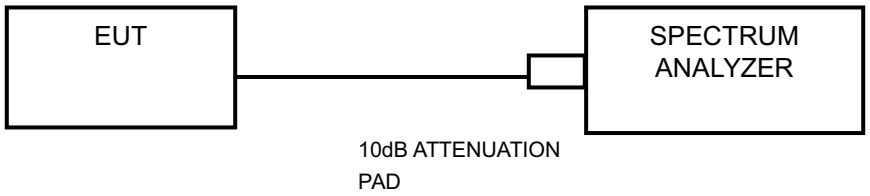
3.5.1 Limits

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dBbandwidth of hopping channel shell be a minimum limit for the hopping channel separation

3.5.2 Measurement procedure

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
d. Repeat above procedures until all frequencies measured were complete.

3.5.3 Test setup



3.5.4 Test result

Refer to Appendix A.

3.6 HOPPING CHANNEL SEPARATION

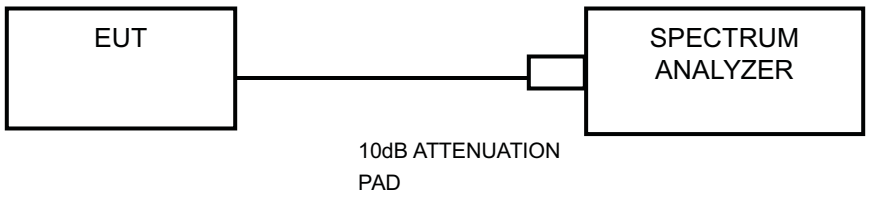
3.6.1 Limits

At least 25kHz or two-third of 20dB hopping channel bandwidth (whichever is greater).

3.6.2 Measurement procedure

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) ⩾ RBW.
d. Sweep: Auto.
e. Detector function: Peak.
f. Trace: Max hold.
g. Allow the trace to stabilize.

3.6.3 Test setup



3.6.4 Test result

Refer to Appendix A.

3.7 CONDUCTED OUTPUT POWER

3.7.1 Limits(FCC)

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.

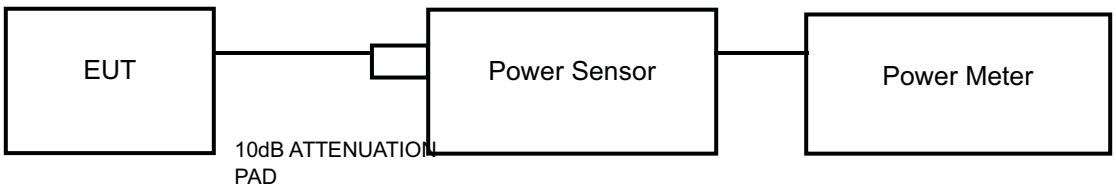
3.7.2 Limits(IC)

For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W if the hopset uses 75 or more hopping channels; the maximum peak conducted output power shall not exceed 0.125 W if the hopset uses less than 75 hopping channels. The e.i.r.p. shall not exceed 4 W

3.7.3 Measurement procedure

a. A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor and set the detector to PEAK. Record the power level.
b. Anaverage power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power senso and set the detector to AVERAGE. Record the power level.

3.7.4 Test setup



3.7.5 Test result

Refer to Appendix A.

3.8 OUT OF BAND EMISSION MEASUREMENT

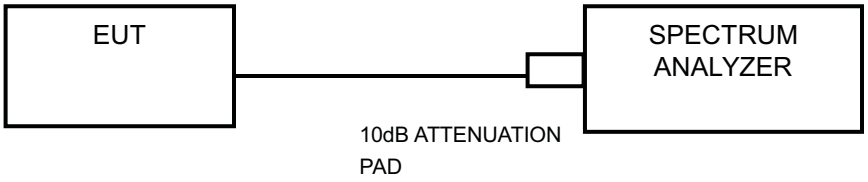
3.8.1 Limits

Below –20dB of the highest emission level of operating band (in 100KHz RBW).

3.8.2 Measurement procedure

The transmitter output was connected to the spectrum analyzer via a low loss cable. of Spectrum Analyzer was set RBW to 100 kHz and VBW to 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. Detector = PEAK and Trace mode = Max Hold. The band edges was measured and recorded.

3.8.3 Test setup



3.8.4 Test result

Refer to Appendix A.

3.9 OCCUPIED BANDWIDTH MEASUREMENT

3.9.1 Measurement procedure

The transmitter antenna output was connected to the spectrum analyzer through an attenuator. The resolution bandwidth shall be set to the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth.
below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

3.9.2 TEST SETUP

3.9.3 Test result

Please refer Annex A.

4 PHOTOGRAPHS OF TEST SETUP

Please refer to the attached file (Test Photos).

5 PHOTOGRAPHS OF THE EUT

Please refer to the attached file (External Photos report and Internal Photos).

6 Appendix A

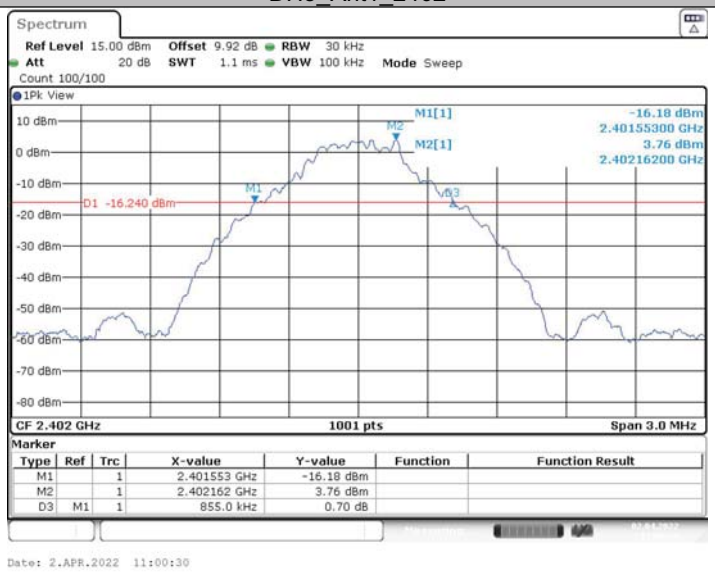
6.1 20dB Emission Bandwidth

6.1.1 Test Result

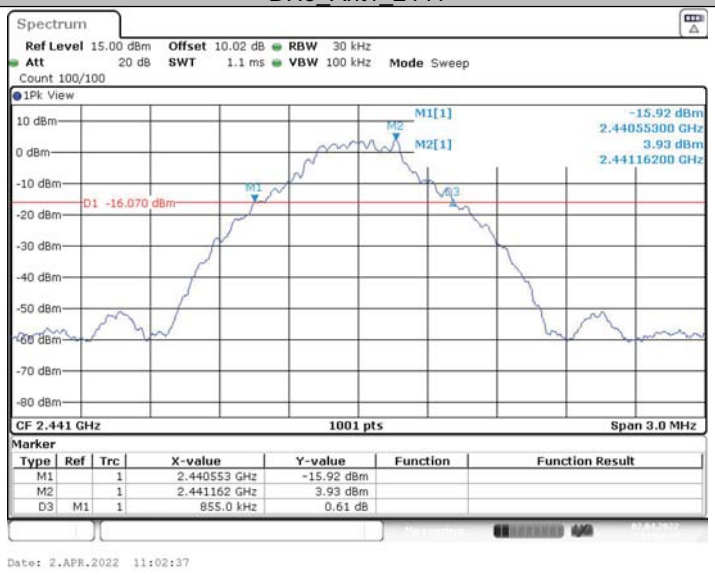
TestMode	Antenna	Frequency[MHz]	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.86	2401.55	2402.41	---	---
		2441	0.86	2440.55	2441.41	---	---
		2480	0.86	2479.55	2480.41	---	---
2DH5	Ant1	2402	1.25	2401.37	2402.62	---	---
		2441	1.25	2440.37	2441.62	---	---
		2480	1.25	2479.37	2480.63	---	---
3DH5	Ant1	2402	1.25	2401.37	2402.62	---	---
		2441	1.25	2440.37	2441.62	---	---
		2480	1.25	2479.37	2480.62	---	---

6.1.2 Test Graphs

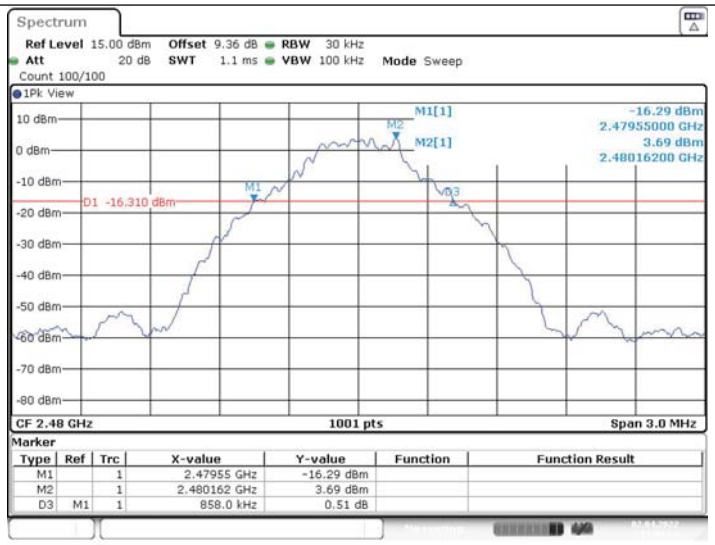
DH5_Ant1_2402



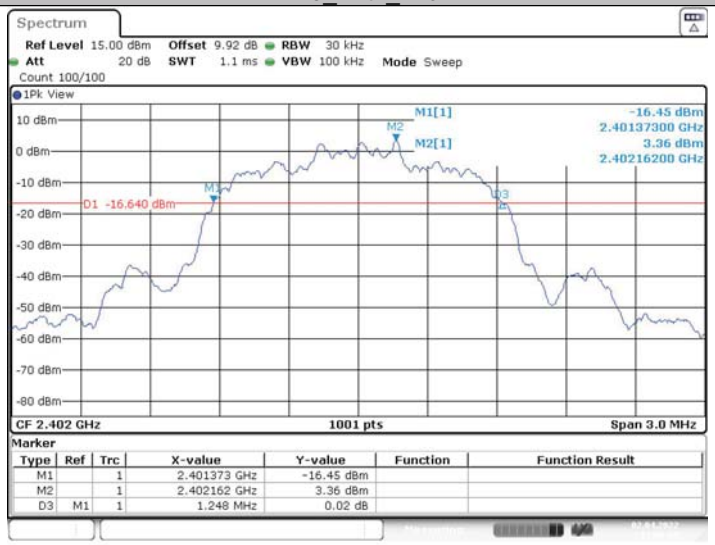
DH5_Ant1_2441



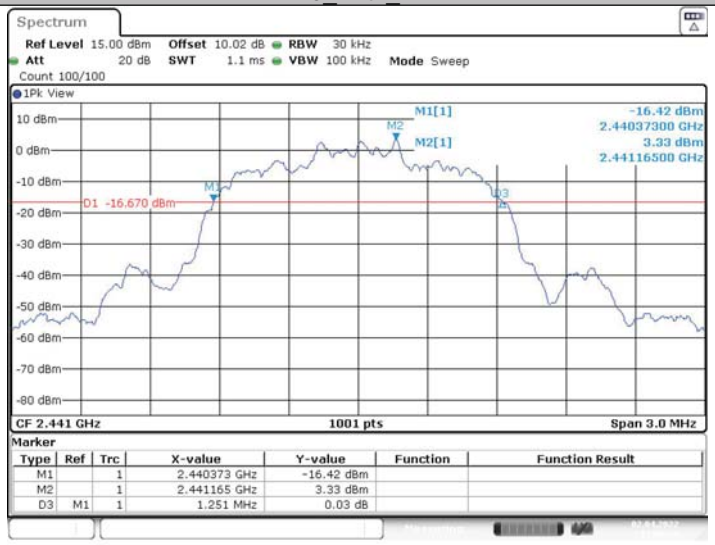
DH5_Ant1_2480



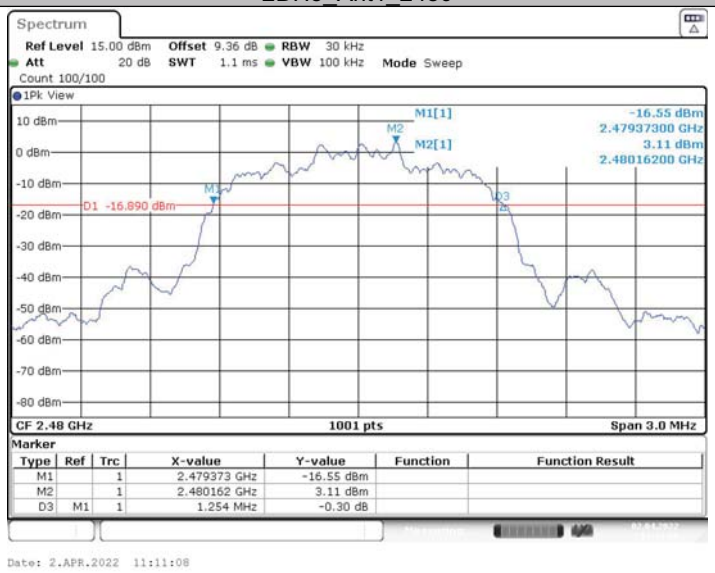
2DH5_Ant1_2402



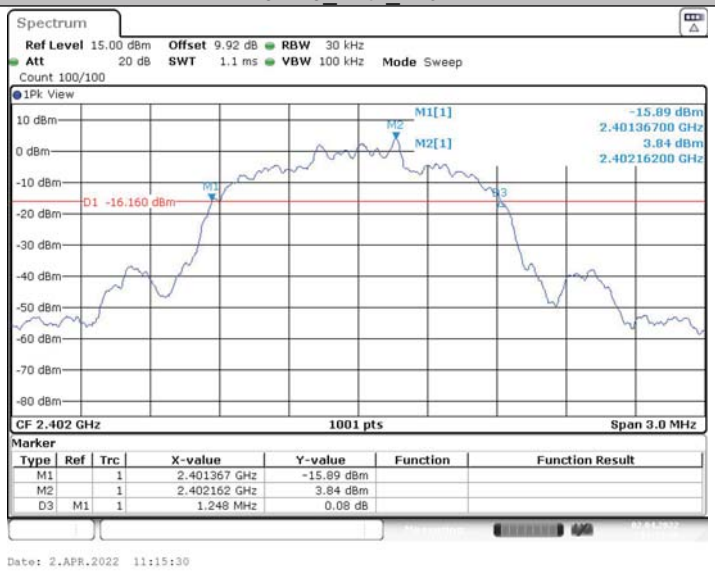
2DH5_Ant1_2441



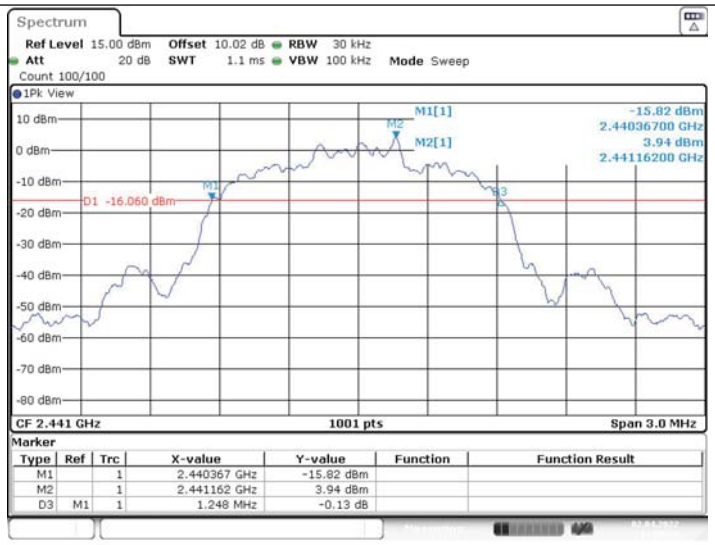
2DH5_Ant1_2480



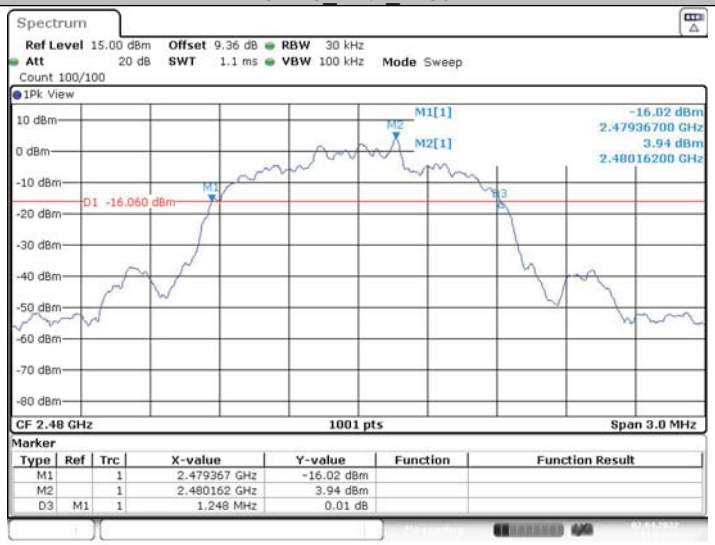
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



6.2 Conducted Output Power

6.2.1 Test Result Peak

Test Mode	Antenna	Frequency[MHz]	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant1	2402	6.57	≤20.97	PASS
		2441	6.66	≤20.97	PASS
		2480	6.56	≤20.97	PASS
2DH5	Ant1	2402	6.39	≤20.97	PASS
		2441	6.49	≤20.97	PASS
		2480	6.33	≤20.97	PASS
3DH5	Ant1	2402	6.56	≤20.97	PASS
		2441	6.61	≤20.97	PASS
		2480	6.51	≤20.97	PASS

6.2.1 Test Result Average

Test Mode	Antenna	Frequency[MHz]	Result [dBm]	Limit [dBm]	Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Verdict
DH5	Ant1	2402	5.10	≤20.97	2.90	8.00	≤36.00	PASS
		2441	5.25	≤20.97	2.90	8.15	≤36.00	PASS
		2480	5.13	≤20.97	2.90	8.03	≤36.00	PASS
2DH5	Ant1	2402	2.53	≤20.97	2.90	5.43	≤36.00	PASS
		2441	2.50	≤20.97	2.90	5.40	≤36.00	PASS
		2480	2.58	≤20.97	2.90	5.48	≤36.00	PASS
3DH5	Ant1	2402	2.57	≤20.97	2.90	5.47	≤36.00	PASS
		2441	2.53	≤20.97	2.90	5.43	≤36.00	PASS
		2480	2.41	≤20.97	2.90	5.31	≤36.00	PASS

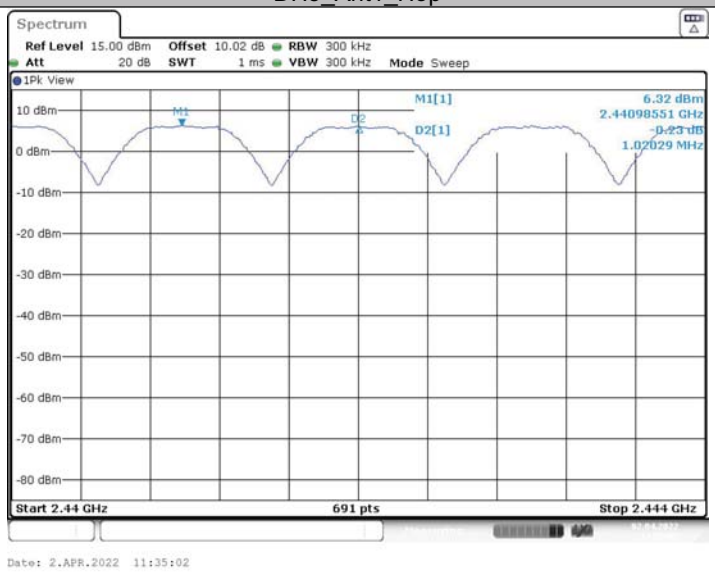
6.3 Hopping Channel Separation

6.3.1 Test Result

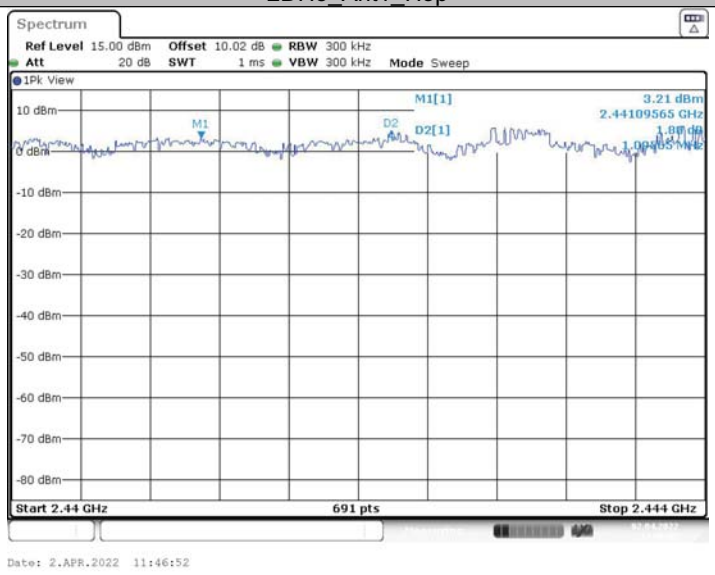
TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1.02	≥0.860	PASS
2DH5	Ant1	Hop	1.096	≥0.833	PASS
3DH5	Ant1	Hop	1.043	≥0.833	PASS

6.3.2 Test Graphs

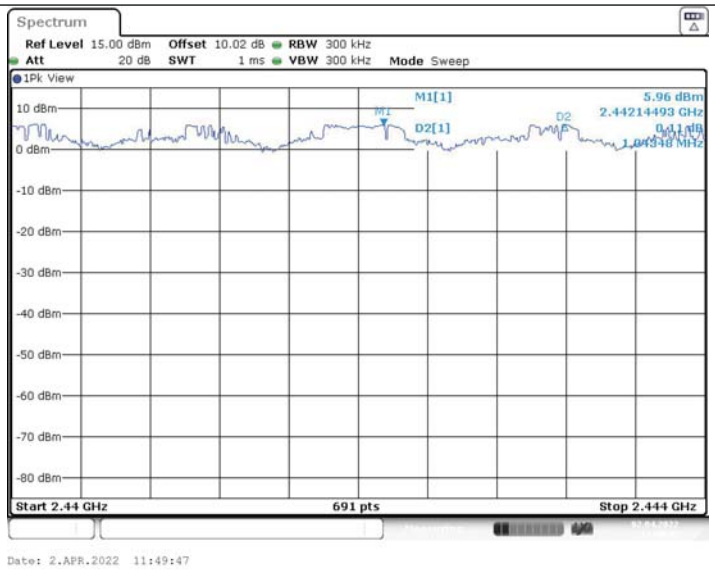
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop


Spectrum
Ref Level 15.00 dBm Offset 10.02 dB RBW 300 kHz
Att 20 dB SWT 1 ms VBW 300 kHz Mode Sweep
1Pk View
M1[1] 5.96 dBm
2.44214493 GHz
D2[1]
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
Start 2.44 GHz
691 pts
Stop 2.444 GHz
Date: 2.APR.2022 11:49:47

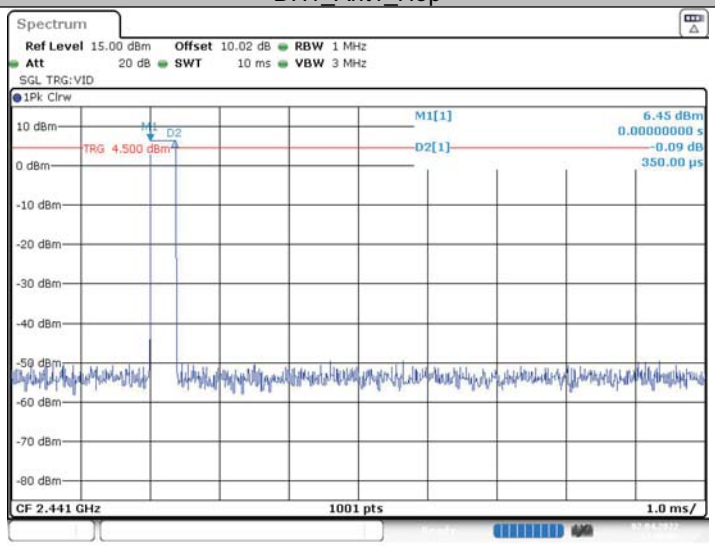
6.4 Dell Time of Each Channel

6.4.1 Test Result

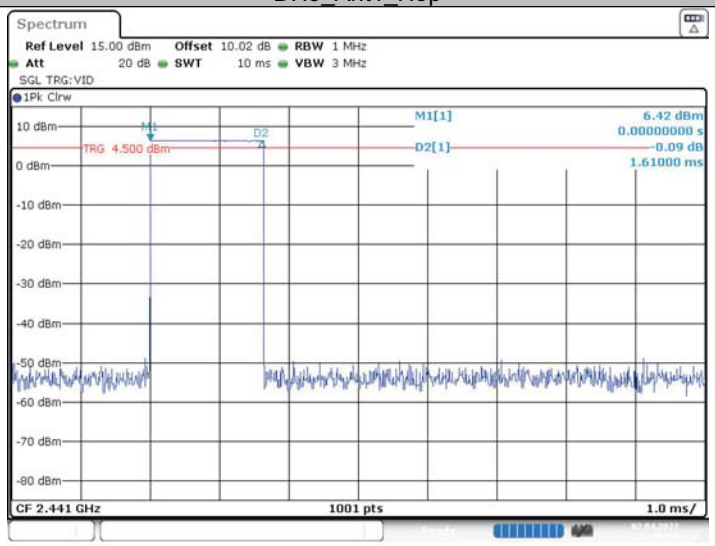
TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.35	320	0.112	≤0.4	PASS
DH3	Ant1	Hop	1.61	160	0.258	≤0.4	PASS
DH5	Ant1	Hop	2.86	106.67	0.305	≤0.4	PASS
2DH1	Ant1	Hop	0.37	320	0.118	≤0.4	PASS
2DH3	Ant1	Hop	1.62	160	0.259	≤0.4	PASS
2DH5	Ant1	Hop	2.87	106.67	0.306	≤0.4	PASS
3DH1	Ant1	Hop	0.36	320	0.115	≤0.4	PASS
3DH3	Ant1	Hop	1.62	160	0.259	≤0.4	PASS
3DH5	Ant1	Hop	2.87	106.67	0.306	≤0.4	PASS

6.4.1 Test Graphs

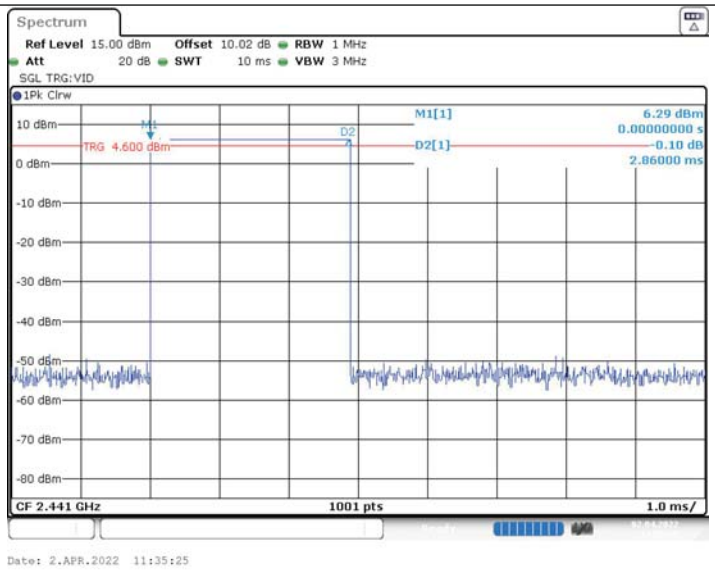
DH1_Ant1_Hop



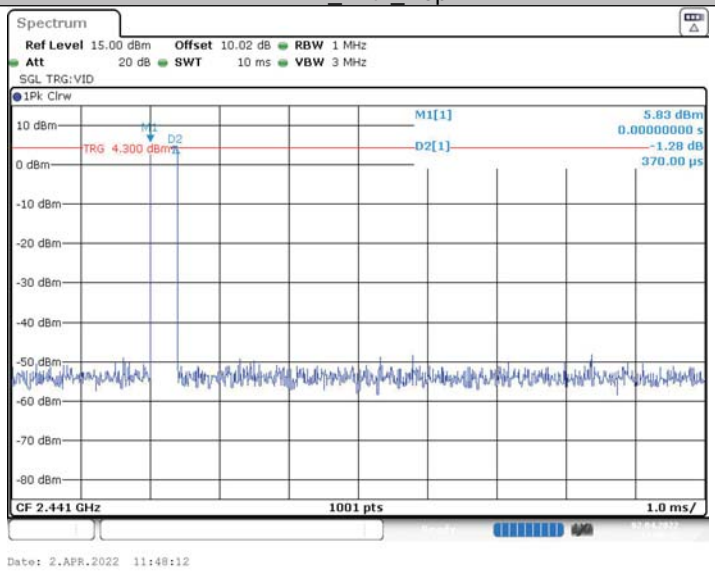
DH3_Ant1_Hop



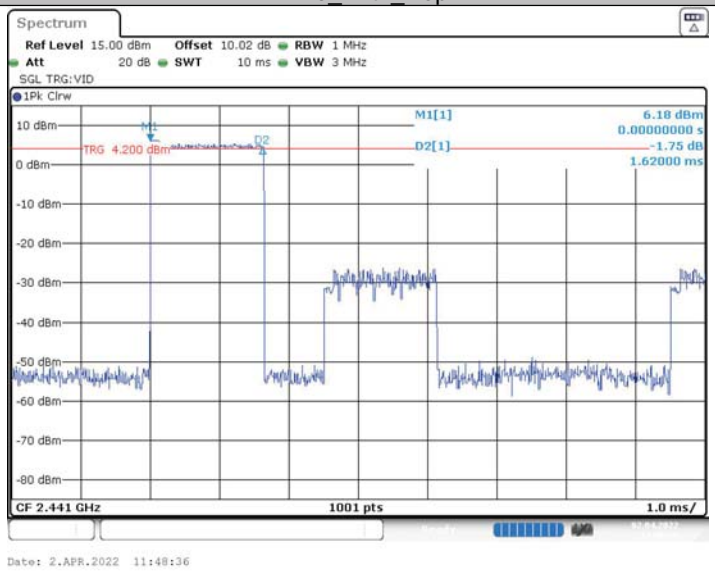
DH5_Ant1_Hop



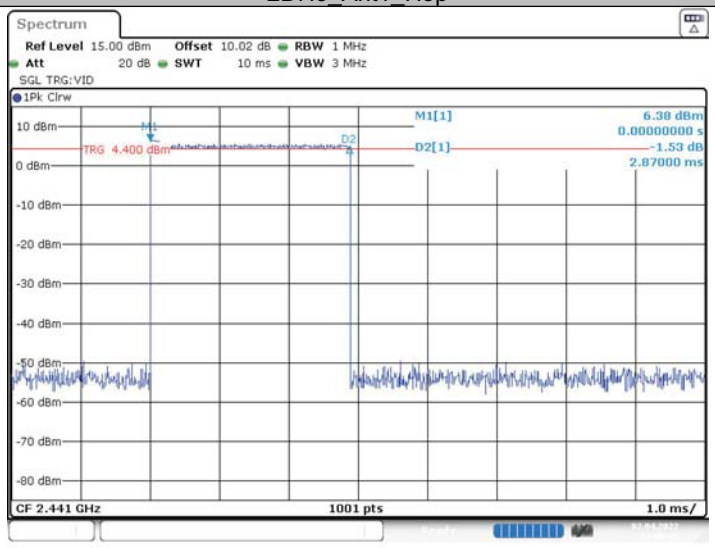
2DH1_Ant1_Hop



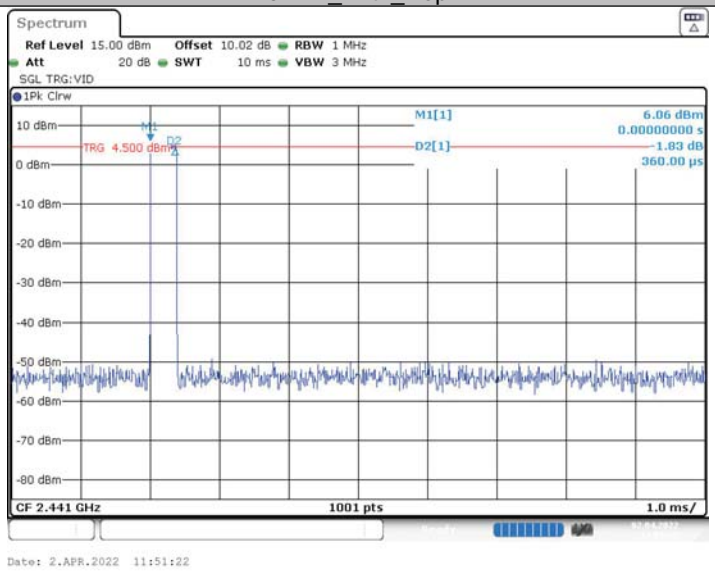
2DH3_Ant1_Hop



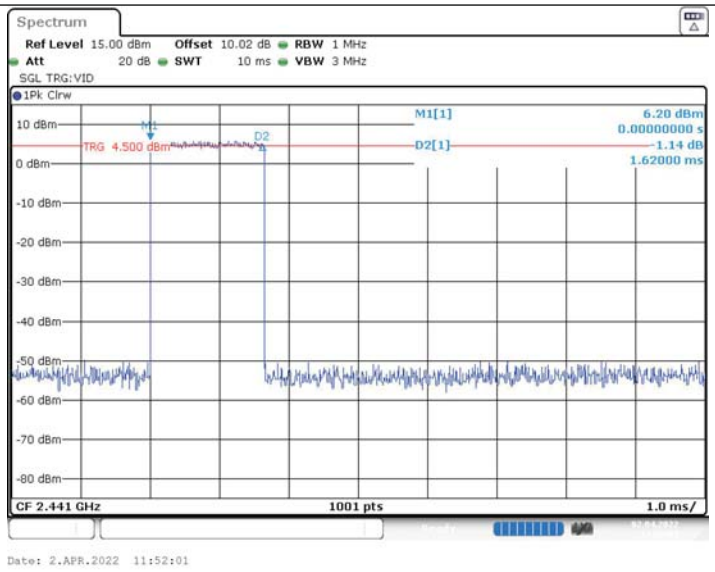
2DH5_Ant1_Hop



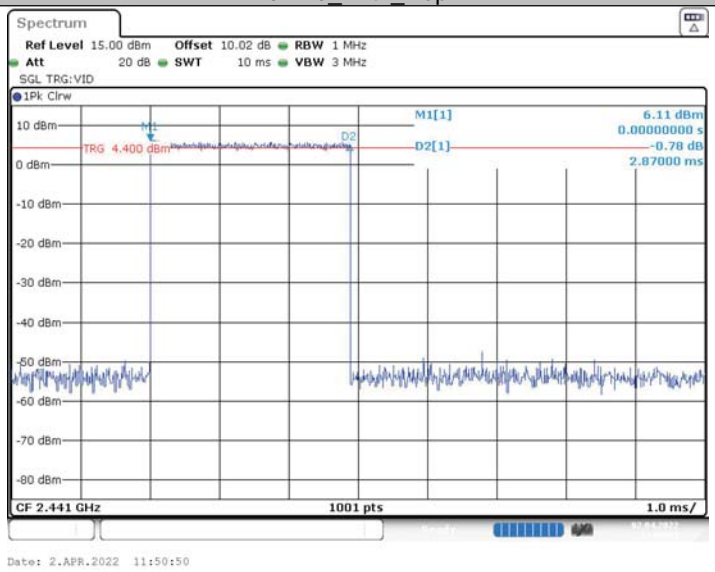
3DH1_Ant1_Hop



3DH3_Ant1_Hop



3DH5_Ant1_Hop



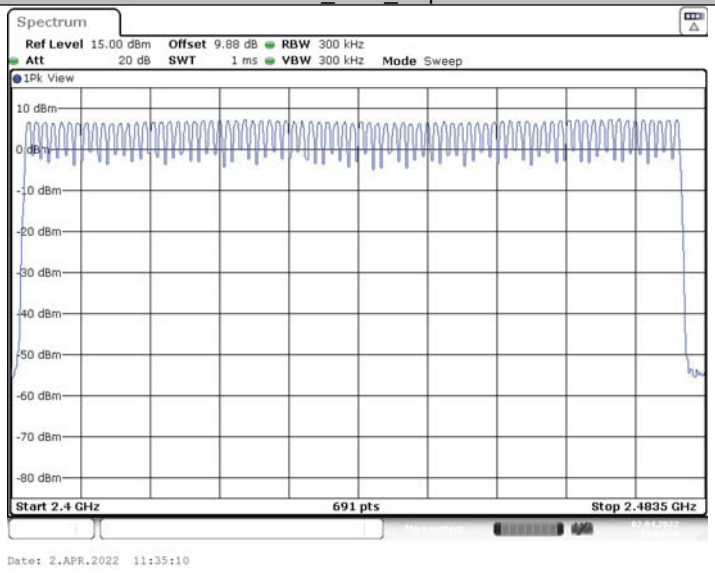
6.5 Number of hopping channels

6.5.1 Test Result

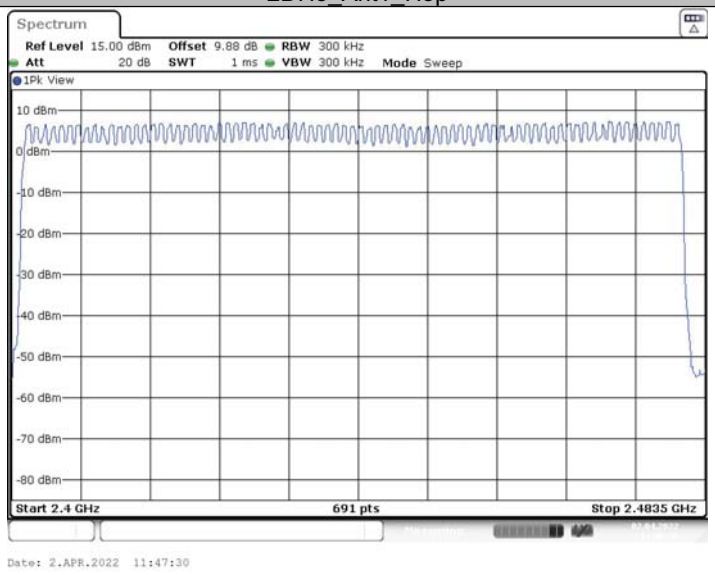
TestMode	Antenna	Frequency[MHz]	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS
3DH5	Ant1	Hop	79	≥15	PASS

6.5.2 Test Graphs

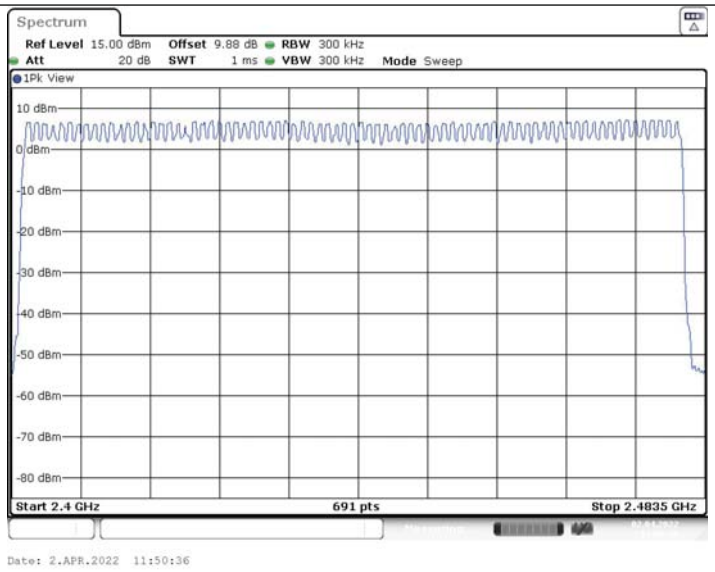
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop


Spectrum
Ref Level 15.00 dBm Offset 9.88 dB RBW 300 kHz
Att 20 dB SWT 1 ms VBW 300 kHz Mode Sweep
1Pk View
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
Start 2.4 GHz
691 pts
Stop 2.4835 GHz
Date: 2.APR.2022 11:50:36

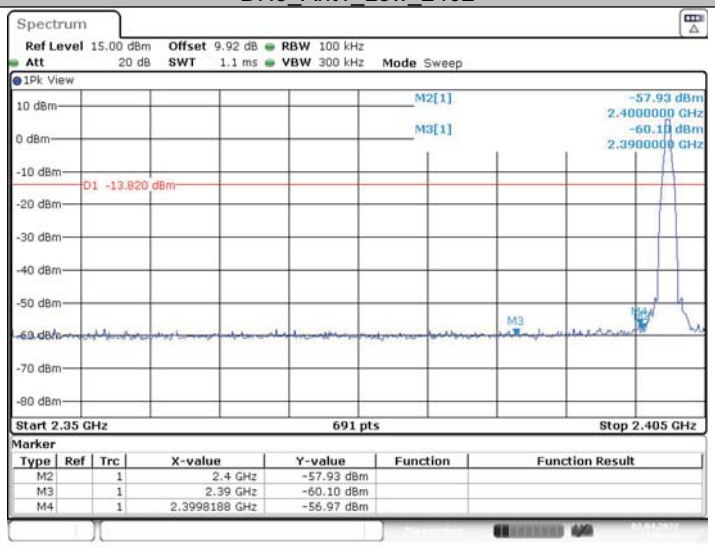
6.6 Band edge measurements

6.6.1 Test Result

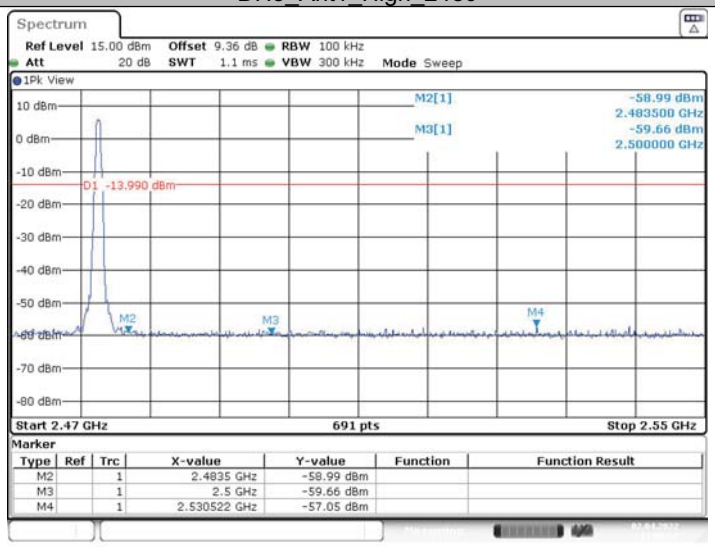
TestMode	Antenna	ChName	Frequency[MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	6.18	-56.97	≤-13.82	PASS
		High	2480	6.01	-57.05	≤-13.99	PASS
		Low	Hop_2402	5.83	-58.5	≤-14.17	PASS
		High	Hop_2480	6.02	-57.66	≤-13.98	PASS
2DH5	Ant1	Low	2402	6.40	-56.94	≤-13.6	PASS
		High	2480	6.08	-57.3	≤-13.92	PASS
		Low	Hop_2402	5.11	-58.39	≤-14.89	PASS
		High	Hop_2480	5.89	-56.62	≤-14.11	PASS
3DH5	Ant1	Low	2402	6.18	-57.99	≤-13.82	PASS
		High	2480	6.00	-56.92	≤-14	PASS
		Low	Hop_2402	3.65	-58.53	≤-16.35	PASS
		High	Hop_2480	5.69	-57.01	≤-14.31	PASS

6.6.2 Test Graphs

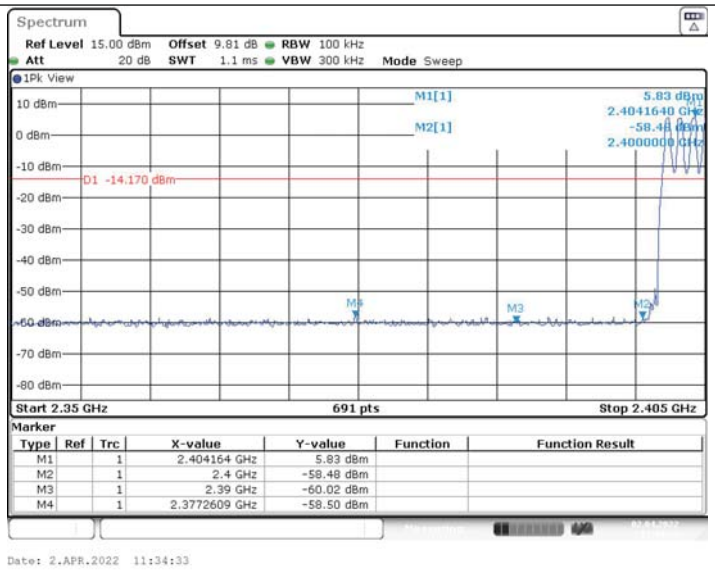
DH5_Ant1_Low_2402



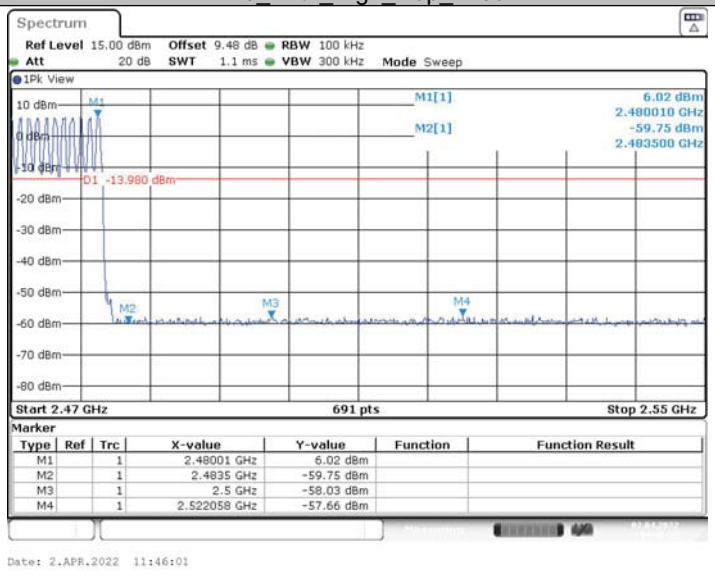
DH5_Ant1_High_2480



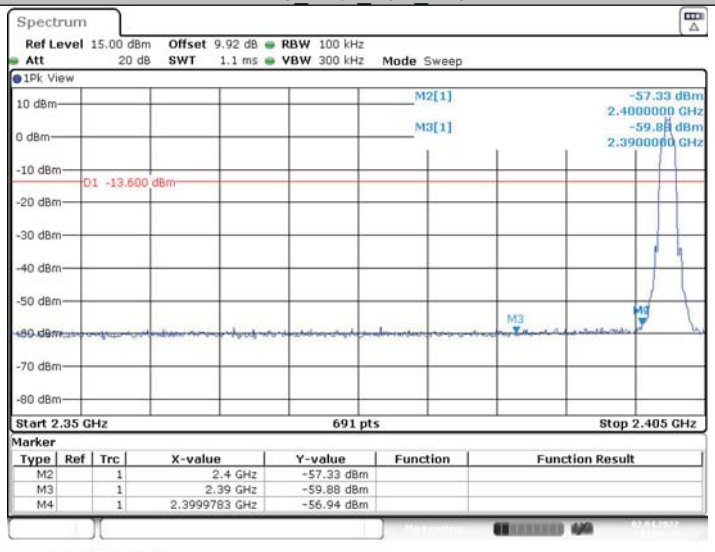
DH5_Ant1_Low_Hop_2402



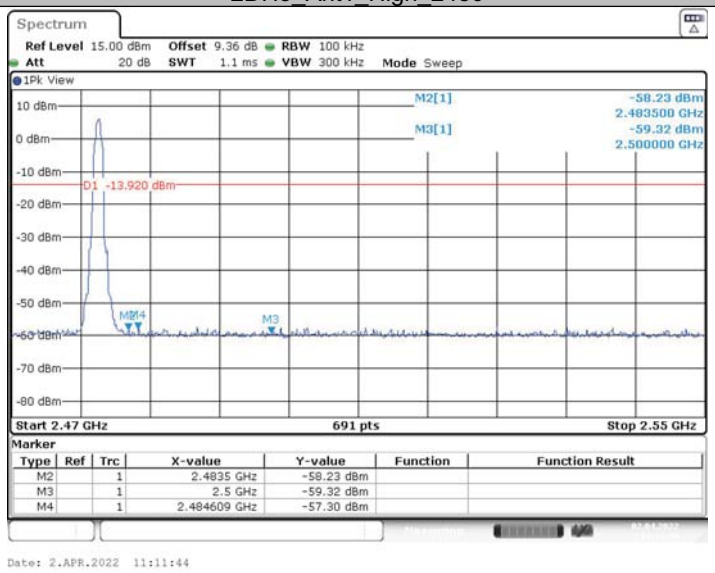
DH5_Ant1_High_Hop_2480



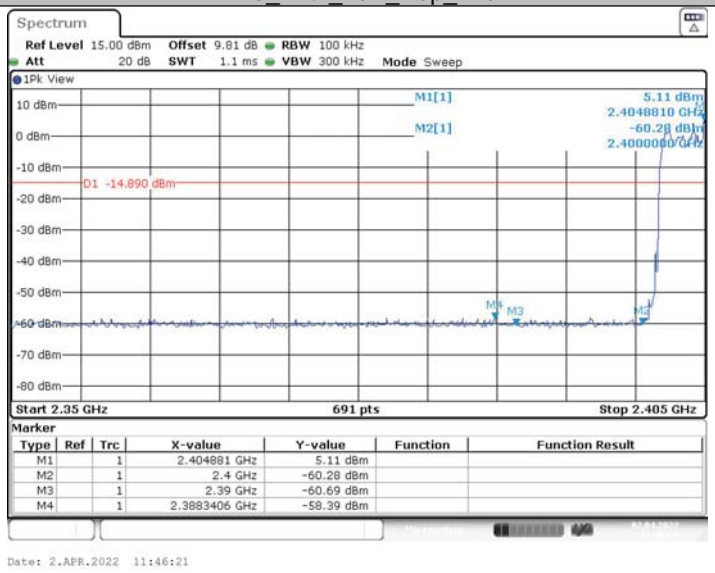
2DH5_Ant1_Low_2402



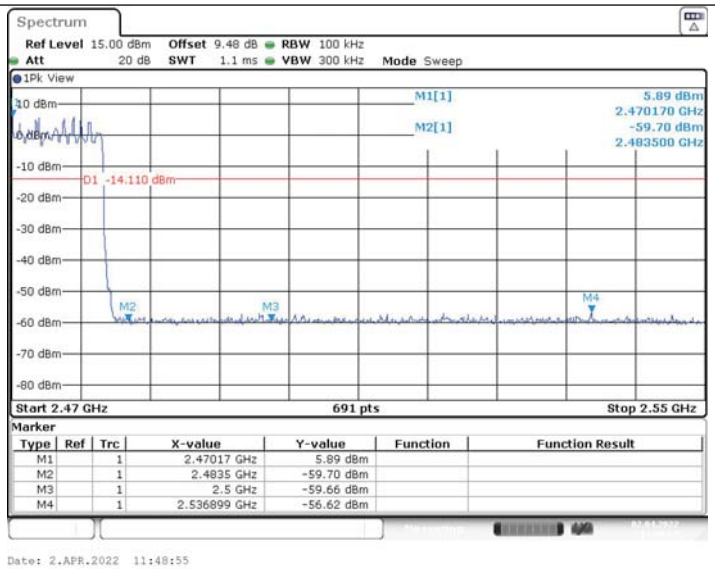
2DH5_Ant1_High_2480



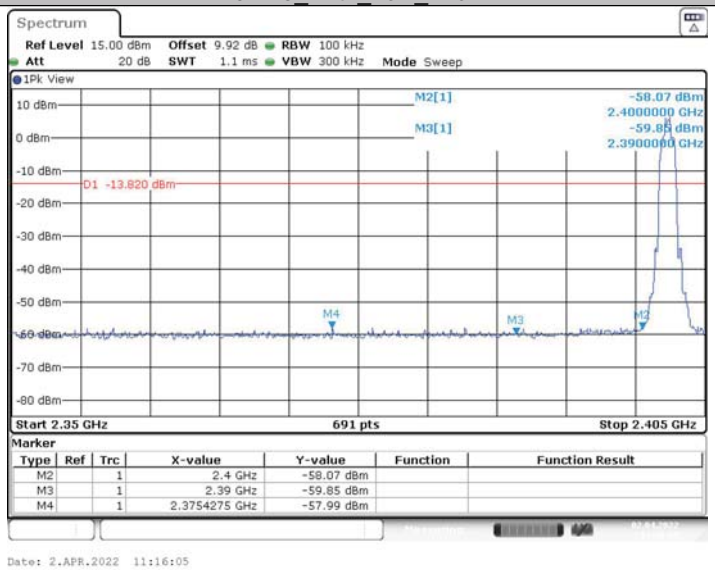
2DH5_Ant1_Low_Hop_2402



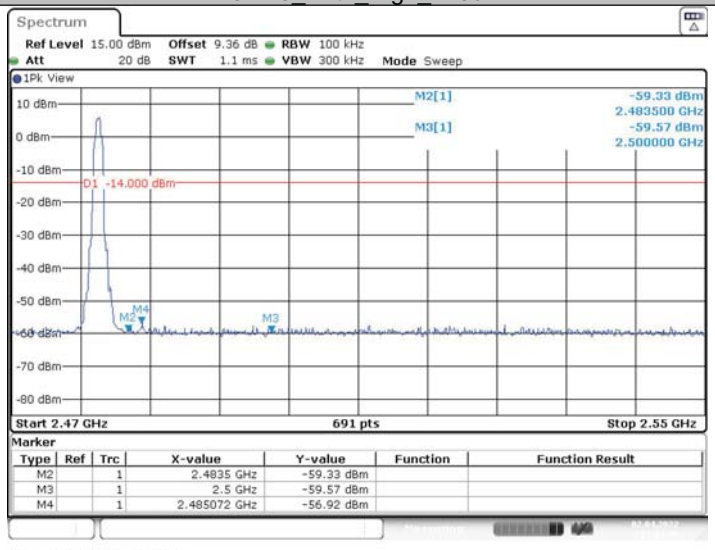
2DH5_Ant1_High_Hop_2480



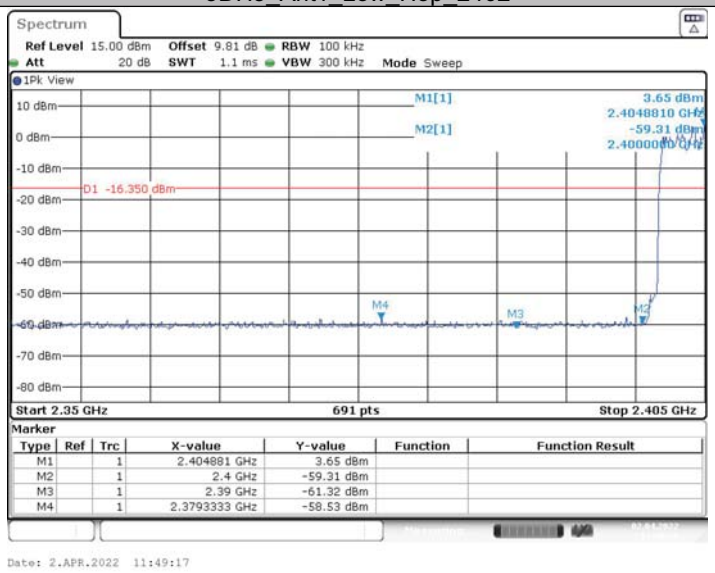
3DH5_Ant1_Low_2402



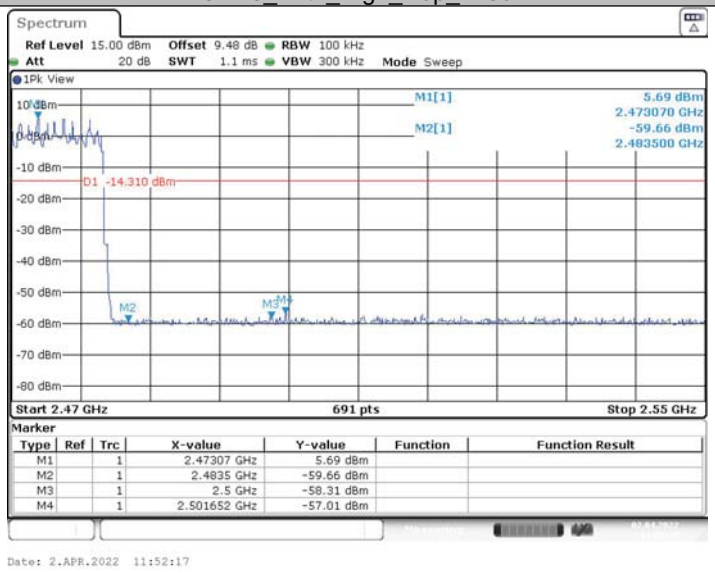
3DH5_Ant1_High_2480



3DH5_Ant1_Low_Hop_2402



3DH5_Ant1_High_Hop_2480



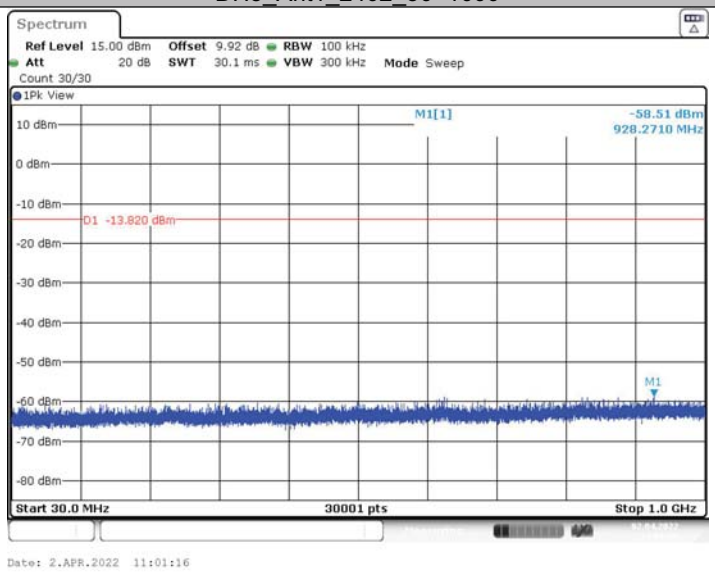
6.7 Out of band Emission Measurement

6.7.1 Test Result

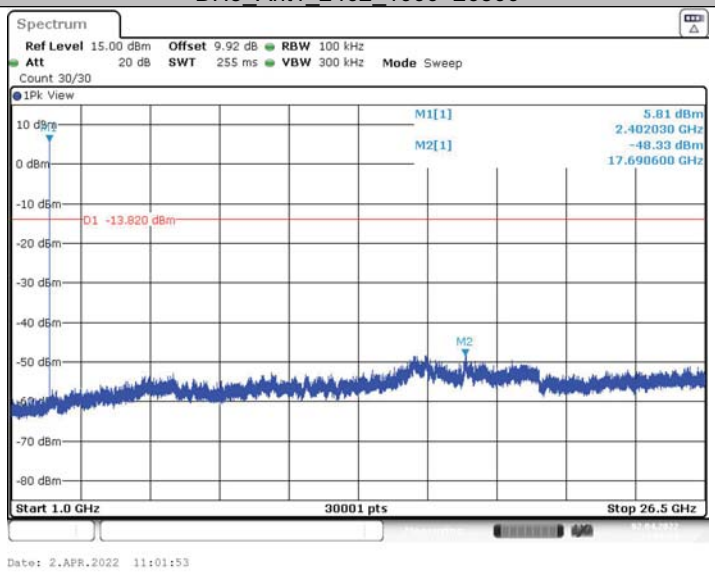
TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	30~1000	6.18	-58.51	≤-13.82	PASS
			1000~26500	6.18	-48.33	≤-13.82	PASS
		2441	30~1000	6.29	-58.37	≤-13.71	PASS
			1000~26500	6.29	-47.99	≤-13.71	PASS
		2480	30~1000	6.01	-59.21	≤-13.99	PASS
			1000~26500	6.01	-48.43	≤-13.99	PASS
2DH5	Ant1	2402	30~1000	6.40	-58.33	≤-13.6	PASS
			1000~26500	6.40	-48.02	≤-13.6	PASS
		2441	30~1000	6.20	-58.5	≤-13.8	PASS
			1000~26500	6.20	-46.96	≤-13.8	PASS
		2480	30~1000	6.08	-59.62	≤-13.92	PASS
			1000~26500	6.08	-47.97	≤-13.92	PASS
3DH5	Ant1	2402	30~1000	6.18	-59.17	≤-13.82	PASS
			1000~26500	6.18	-47.79	≤-13.82	PASS
		2441	30~1000	6.28	-58.85	≤-13.72	PASS
			1000~26500	6.28	-47.53	≤-13.72	PASS
		2480	30~1000	6.00	-59.05	≤-14	PASS
			1000~26500	6.00	-48.85	≤-14	PASS

6.7.1 Test Graphs

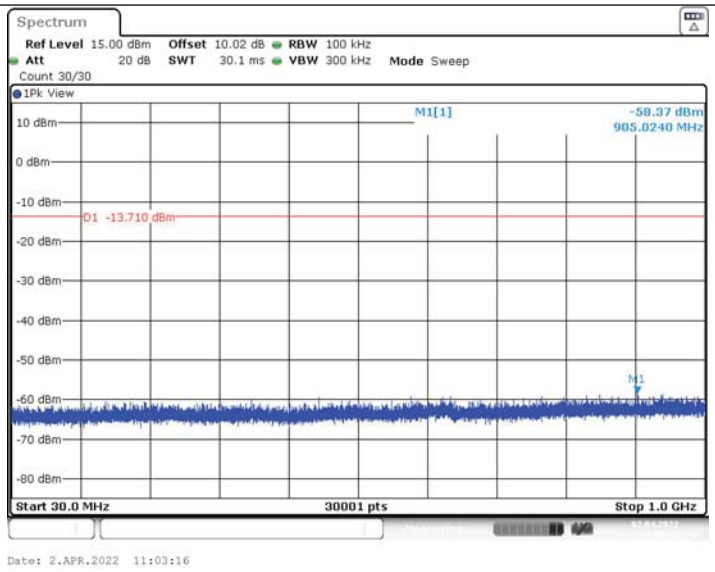
DH5_Ant1_2402_30~1000



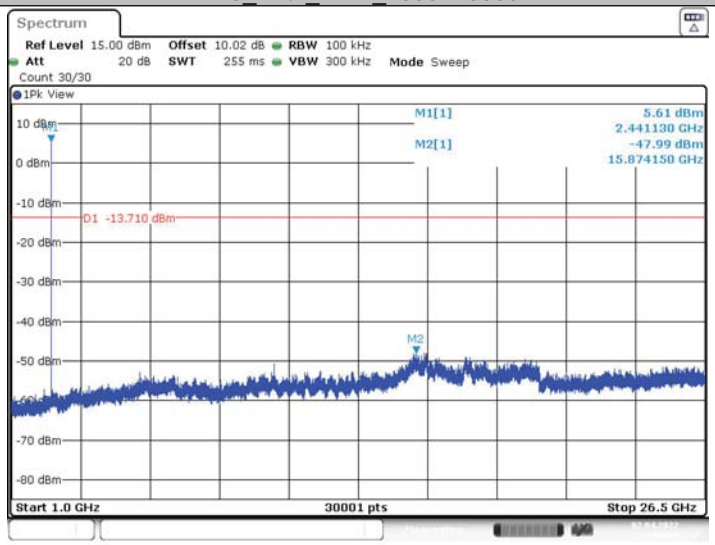
DH5_Ant1_2402_1000~26500



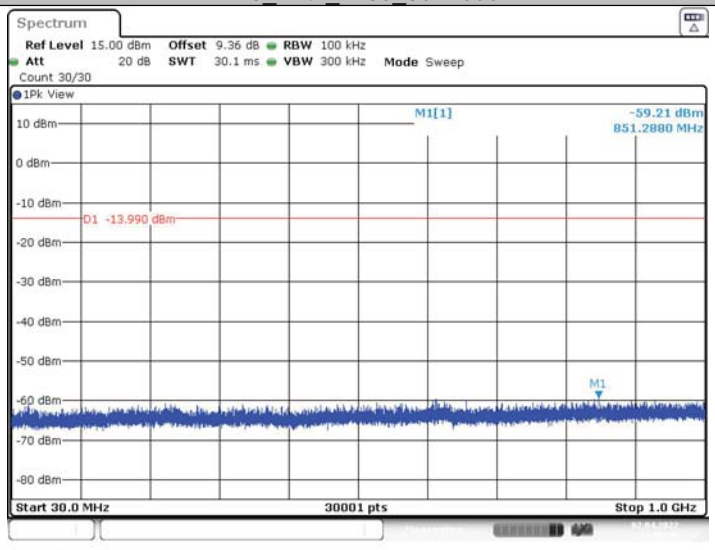
DH5_Ant1_2441_30~1000



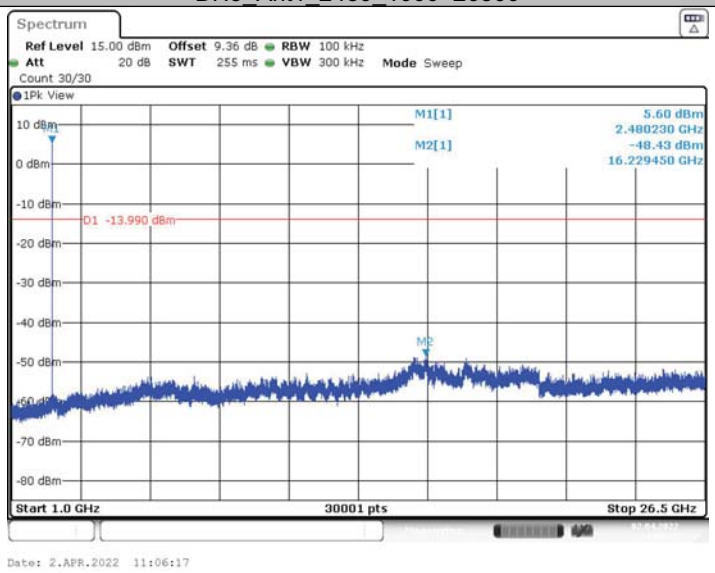
DH5_Ant1_2441_1000~26500



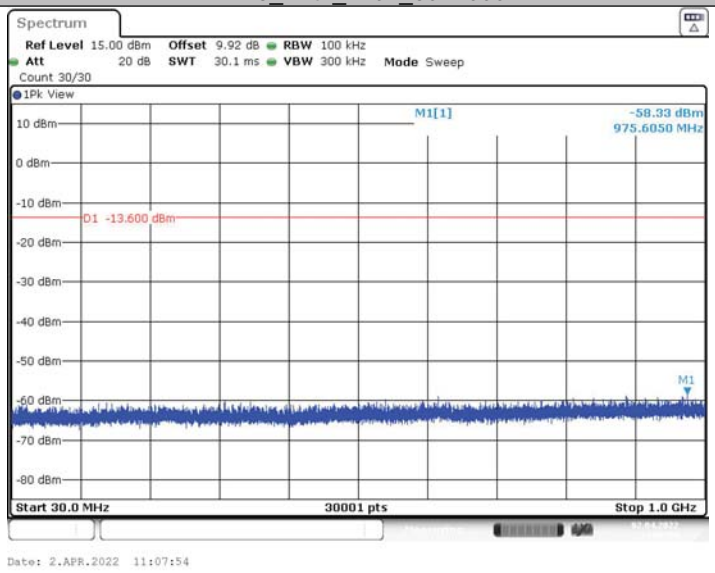
DH5_Ant1_2480_30~1000



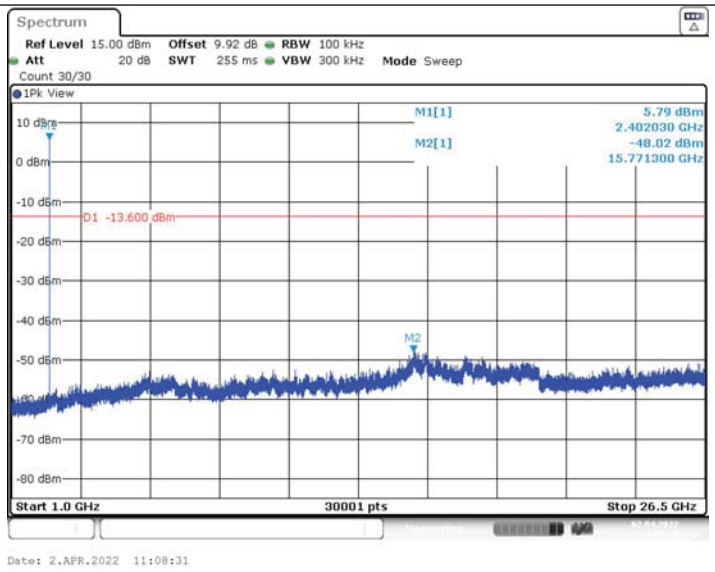
DH5_Ant1_2480_1000~26500



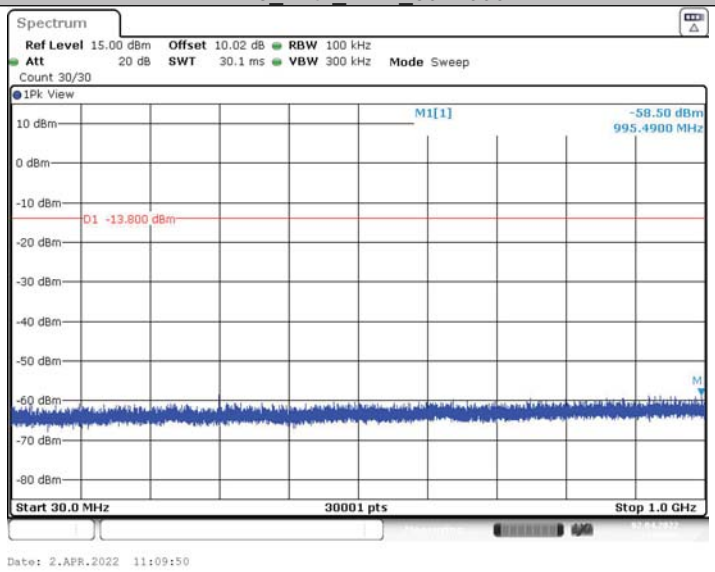
2DH5_Ant1_2402_30~1000



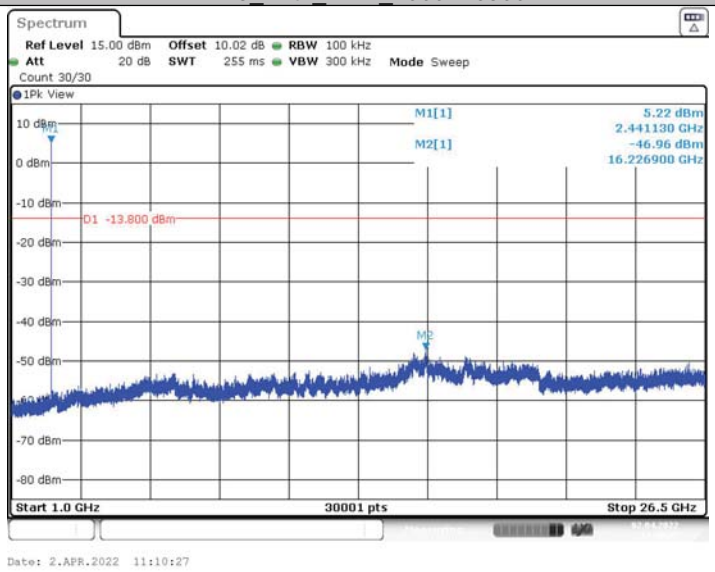
2DH5_Ant1_2402_1000~26500



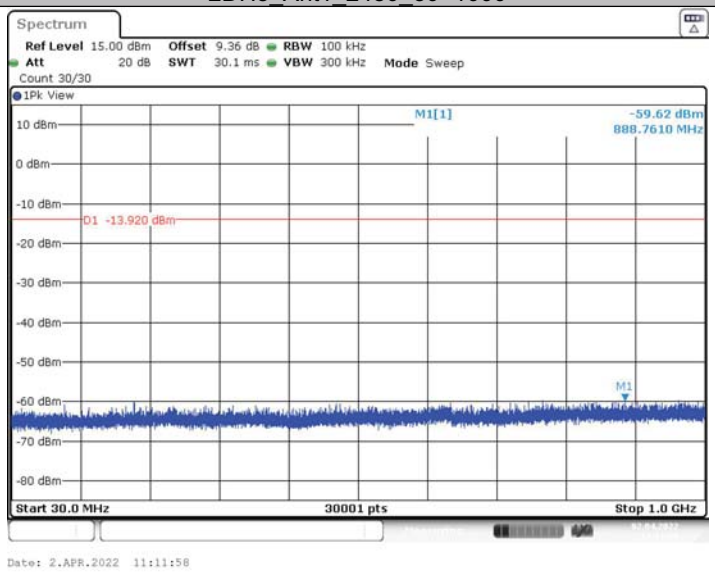
2DH5_Ant1_2441_30~1000



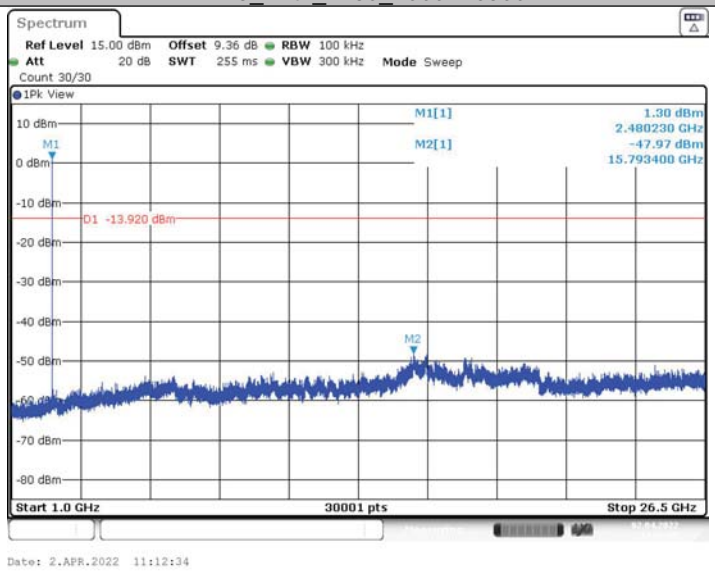
2DH5_Ant1_2441_1000~26500



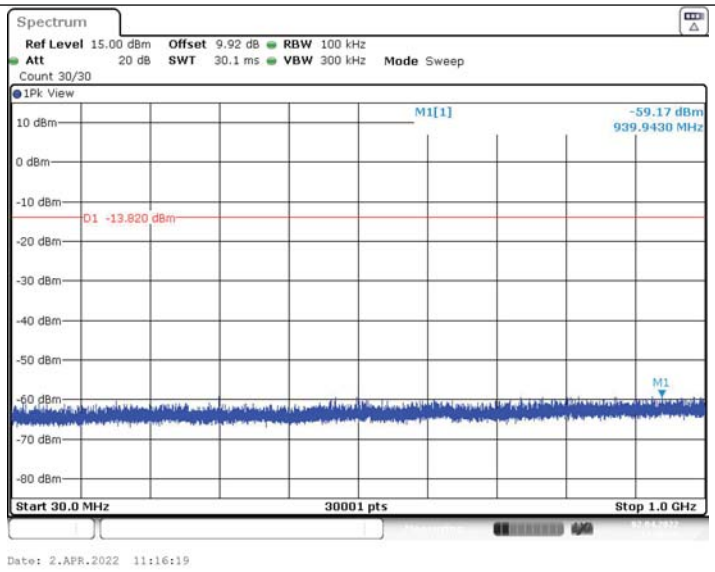
2DH5_Ant1_2480_30~1000



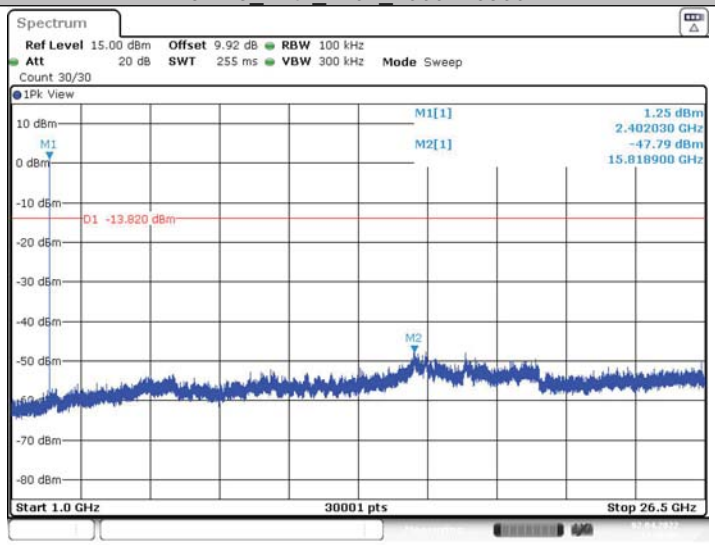
2DH5_Ant1_2480_1000~26500



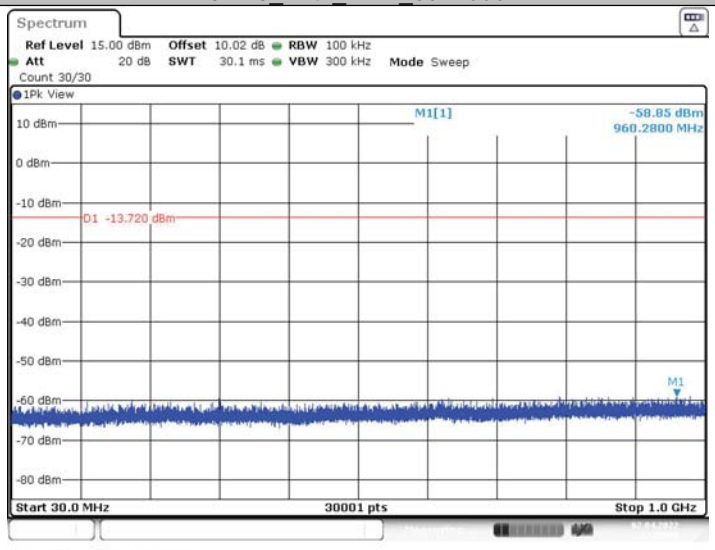
3DH5_Ant1_2402_30~1000



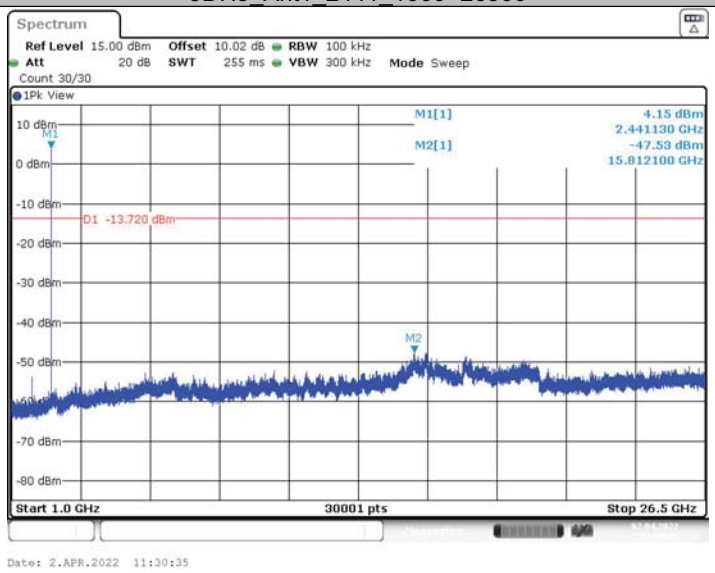
3DH5_Ant1_2402_1000~26500



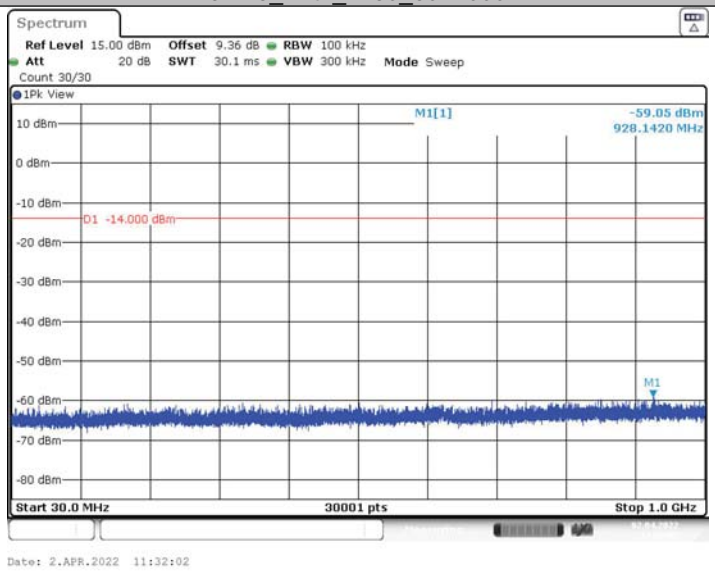
3DH5_Ant1_2441_30~1000



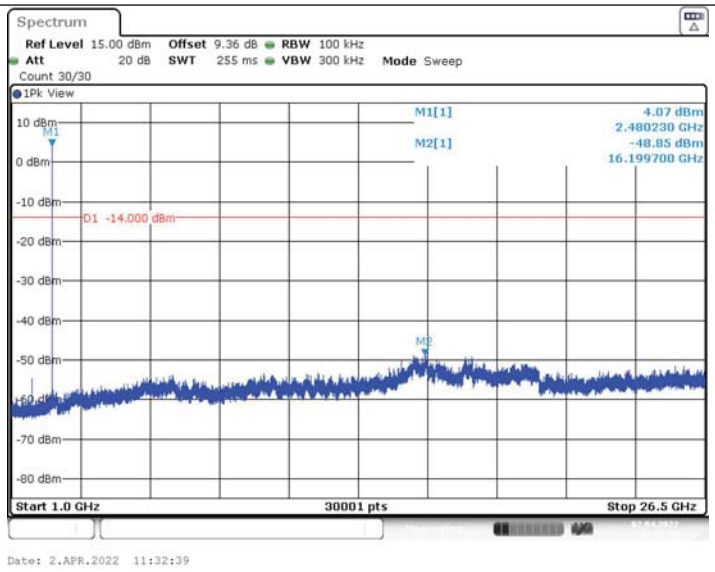
3DH5_Ant1_2441_1000~26500



3DH5_Ant1_2480_30~1000



3DH5_Ant1_2480_1000~26500


Spectrum
Ref Level 15.00 dBm Offset 9.36 dB RBW 100 kHz
Att 20 dB SWT 255 ms VBW 300 kHz Mode Sweep
Count 30/30
1Pk View
M1[1] 4.07 dBm
2.480230 GHz
M2[1] -48.85 dBm
16.199700 GHz
D1 -14.000 dBm
Start 1.0 GHz
30001 pts
Stop 26.5 GHz
Date: 2.APR.2022 11:32:39

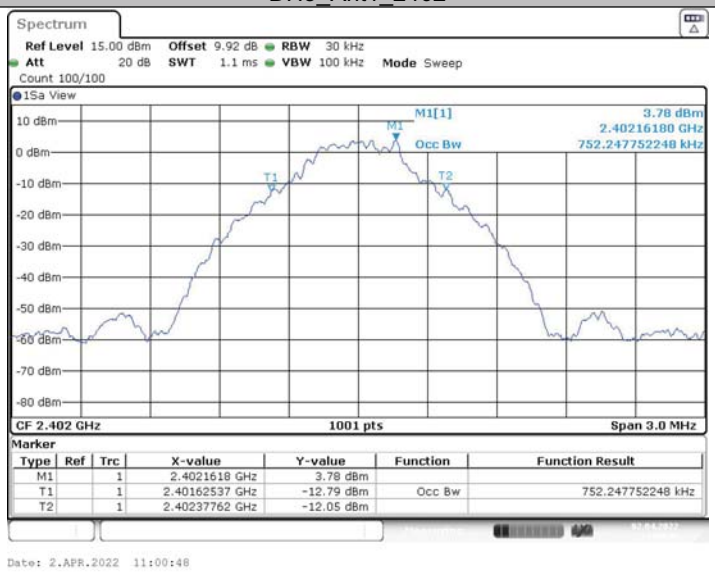
6.8 Occupied Channel Bandwidth

6.8.1 Test Result

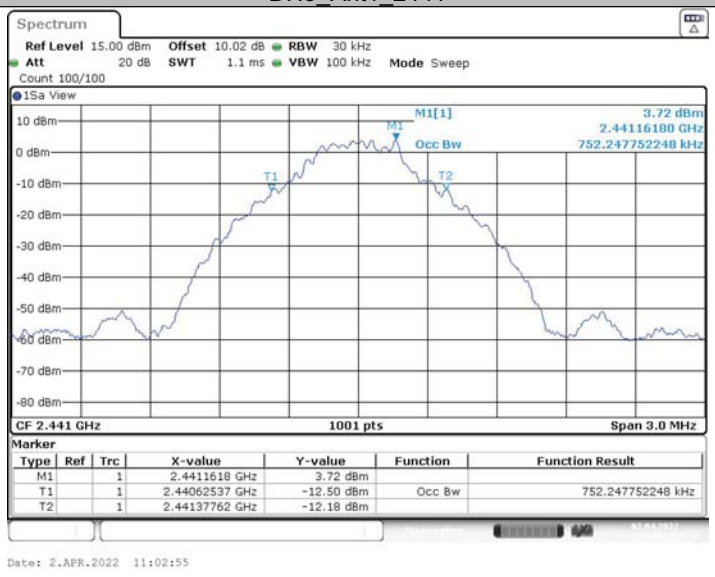
TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.752	2401.625	2402.378	---	---
		2441	0.752	2440.625	2441.378	---	---
		2480	0.752	2479.625	2480.378	---	---
2DH5	Ant1	2402	1.136	2401.428	2402.563	---	---
		2441	1.139	2440.425	2441.563	---	---
		2480	1.139	2479.425	2480.563	---	---
3DH5	Ant1	2402	1.139	2401.431	2402.569	---	---
		2441	1.139	2440.431	2441.569	---	---
		2480	1.139	2479.431	2480.569	---	---

6.8.2 Test Graphs

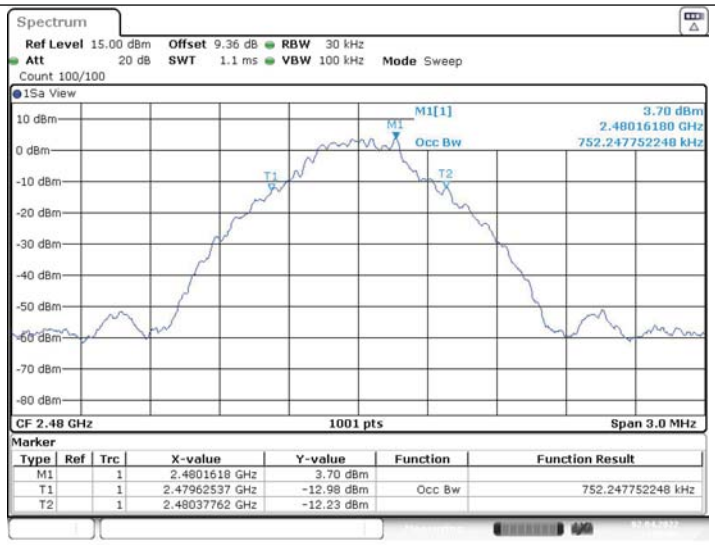
DH5_Ant1_2402



DH5_Ant1_2441



DH5_Ant1_2480



2DH5_Ant1_2402

2DH5_Ant1_2441

2DH5_Ant1_2480

3DH5_Ant1_2402

3DH5_Ant1_2441

3DH5_Ant1_2480

Important

(1) The test report is valid with the official seal of the laboratory and the signatures of Test engineer, Author and Reviewer simultaneously.

(2) The test report is invalid if altered.

(3) Any photocopies or part photocopies in the test report are forbidden without the written permission from the laboratory.

(4) Objections to the test report must be submitted to the laboratory within 15 days.

(5) Generally, commission test is responsible for the tested samples only.

(6)Any photocopies or part photocopies of the test report are forbidden without the written permission from CVC;

Address of the laboratory:

CVC Testing Technology Co., Ltd.
Address: No.3,TiantaiyiRoad,KaitaiAvenue,ScienceCity,Guangzhou,China
Post Code：510663 Tel：020-32293888
FAX：020-32293889 E-mail：office@cvc.org.cn