

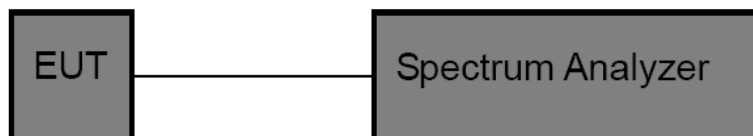


3.5. Bandwidth

Limit

N/A

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. OCB and 20dB Spectrum Setting:
 - (1) Set RBW = 1% ~ 5% occupied bandwidth.
 - (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.

Test Mode

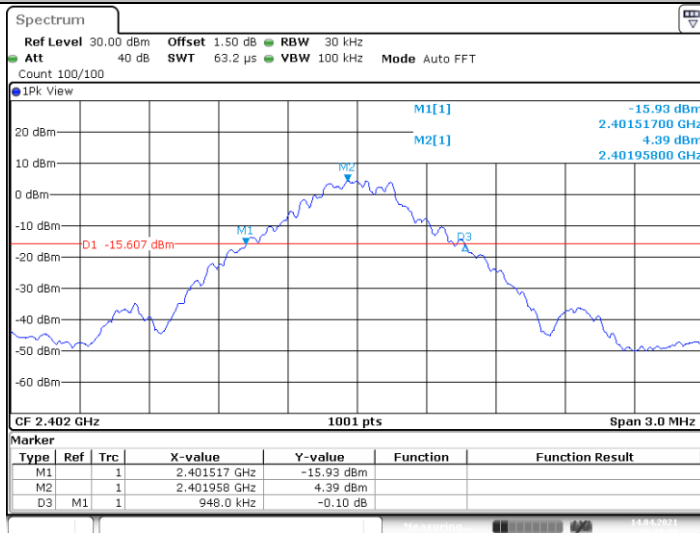
Please refer to the clause 2.4.

Test Result

Test Mode	Frequency (MHz)	20dB EBW[MHz]	FL[MHz]	FH[MHz]	20dB Bandwidth *2/3 (kHz)	Verdict
GFSK	2402	0.948	2401.517	2402.465	632.00	PASS
	2441	0.945	2440.517	2441.462	630.00	PASS
	2480	0.945	2479.517	2480.462	630.00	PASS
$\pi/4$ -DQPSK	2402	1.326	2401.319	2402.645	884.00	PASS
	2441	1.323	2440.322	2441.645	882.00	PASS
	2480	1.323	2479.322	2480.645	882.00	PASS
8-DPSK	2402	1.308	2401.331	2402.639	872.00	PASS
	2441	1.308	2440.331	2441.639	872.00	PASS
	2480	1.308	2479.331	2480.639	872.00	PASS

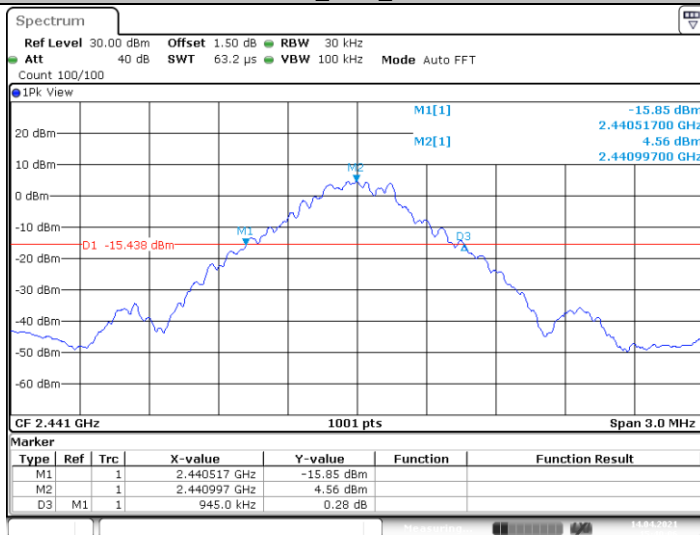


DH5_Ant1_2402



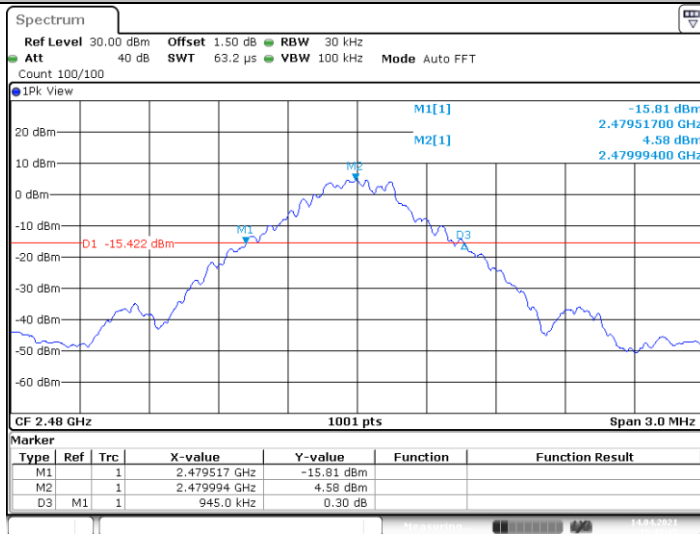
Date: 14.APR.2021 15:36:38

DH5_Ant1_2441



Date: 14.APR.2021 15:40:06

DH5_Ant1_2480



Date: 14.APR.2021 15:42:15

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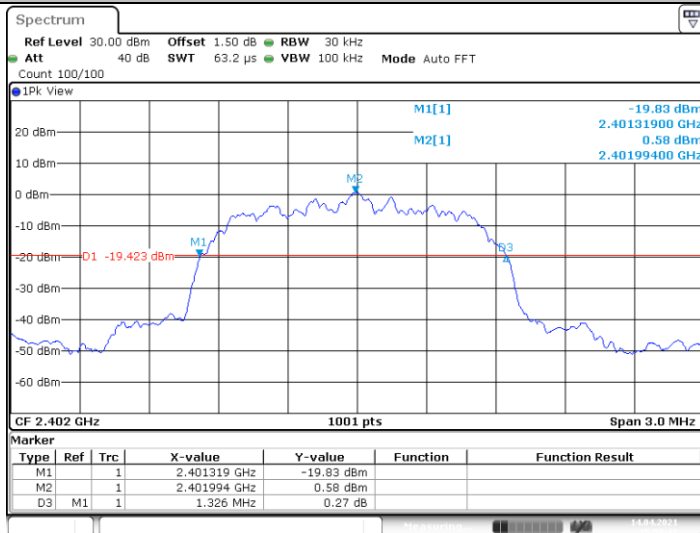
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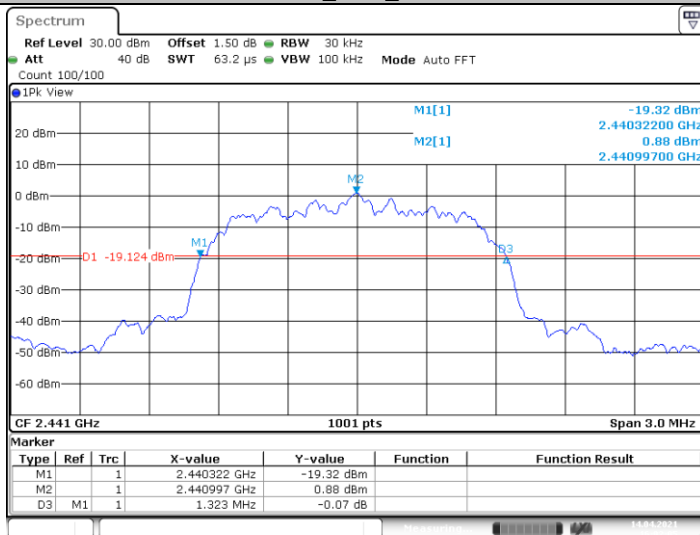


2DH5_Ant1_2402



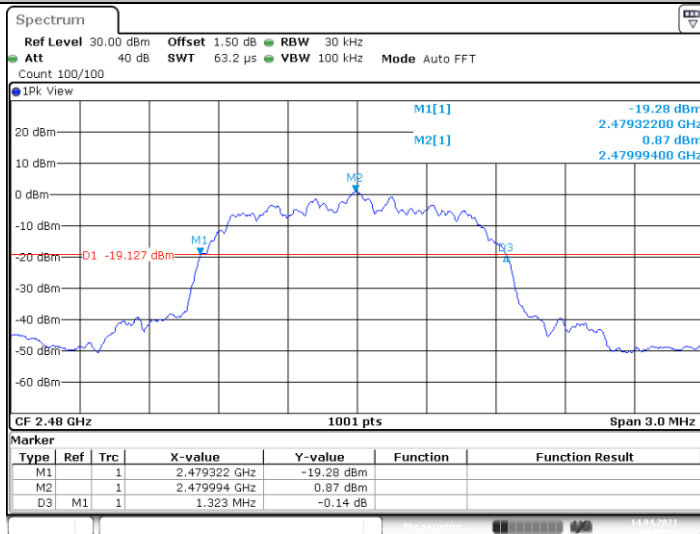
Date: 14.APR.2021 15:59:12

2DH5_Ant1_2441



Date: 14.APR.2021 16:02:05

2DH5_Ant1_2480



Date: 14.APR.2021 16:03:55

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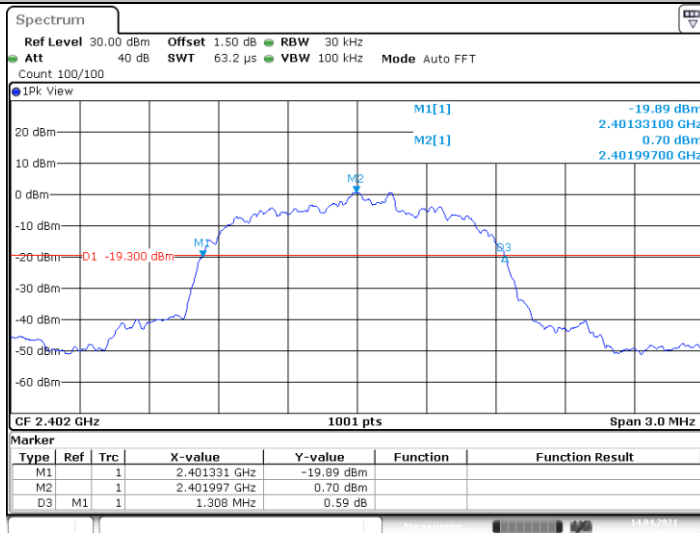
Fax: (86)755-27521011

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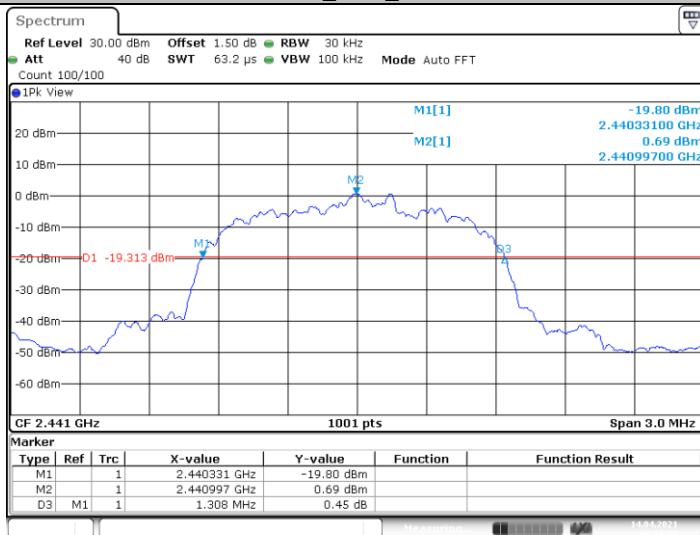
中国国家认证认可监督管理委员会
Certification and Accreditation Administration of the People's Republic of ChinaFor anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : yz.cnca.cn



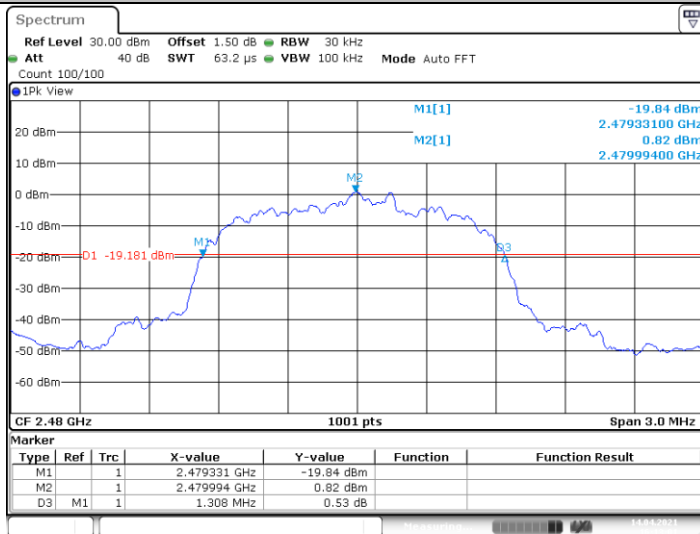
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



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Fax: (86)755-27521011

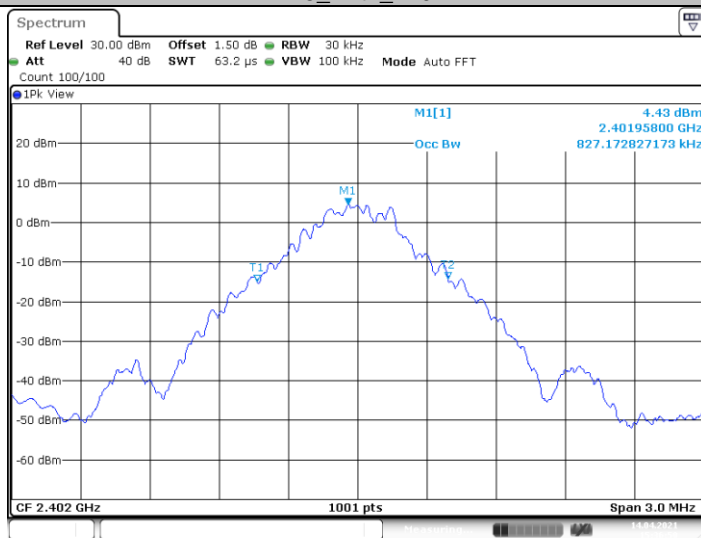
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**Test Result**

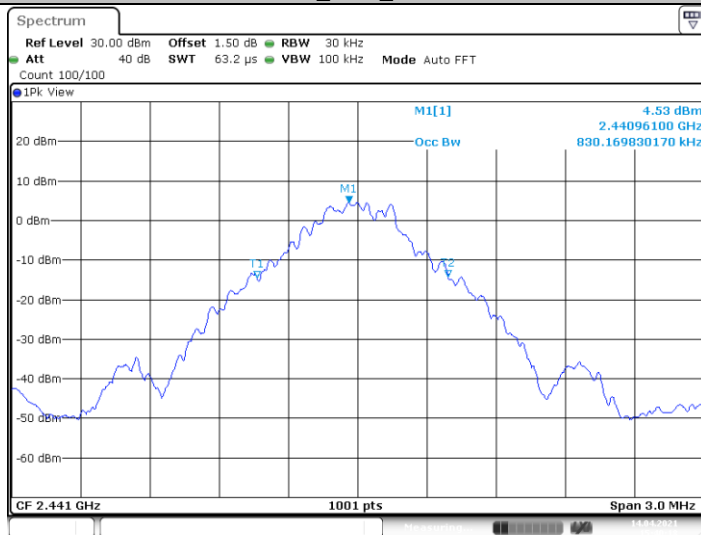
Test Mode	Antenna	Frequency (MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
DH5	Ant1	2402	0.827	2401.565	2402.393	PASS
		2441	0.830	2440.562	2441.393	PASS
		2480	0.830	2479.562	2480.393	PASS
2DH5	Ant1	2402	1.175	2401.395	2402.569	PASS
		2441	1.175	2440.395	2441.569	PASS
		2480	1.178	2479.395	2480.572	PASS
3DH5	Ant1	2402	1.175	2401.398	2402.572	PASS
		2441	1.175	2440.398	2441.572	PASS
		2480	1.175	2479.398	2480.572	PASS

DH5_Ant1_2402



Date: 14.APR.2021 15:36:50

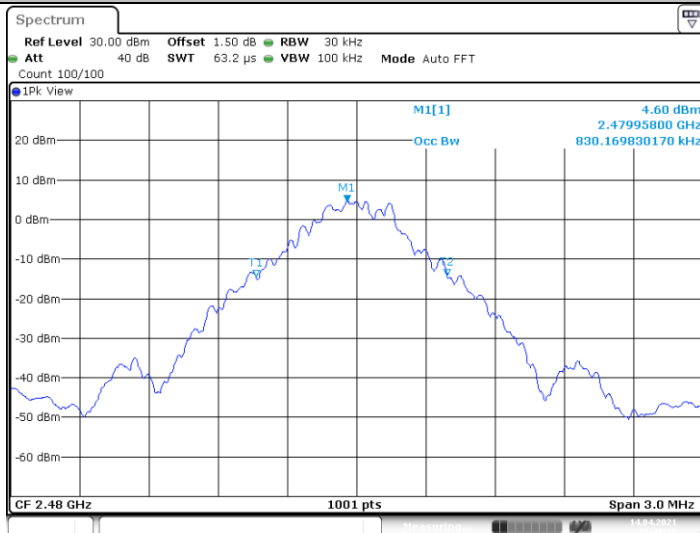
DH5_Ant1_2441



Date: 14.APR.2021 15:40:18

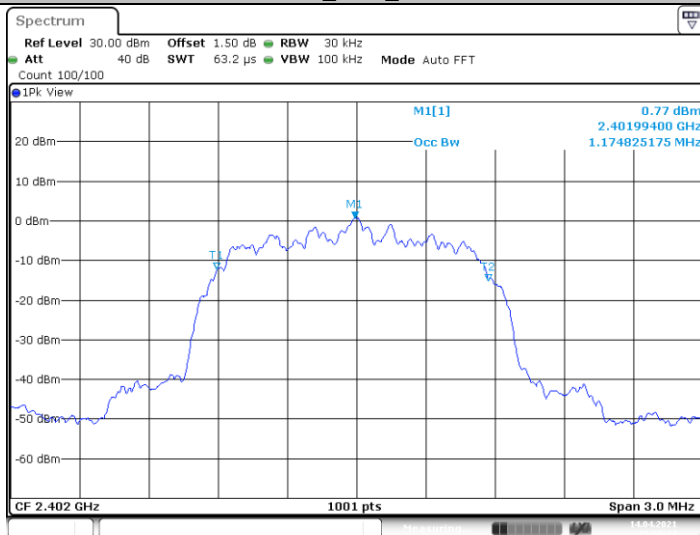


DH5_Ant1_2480



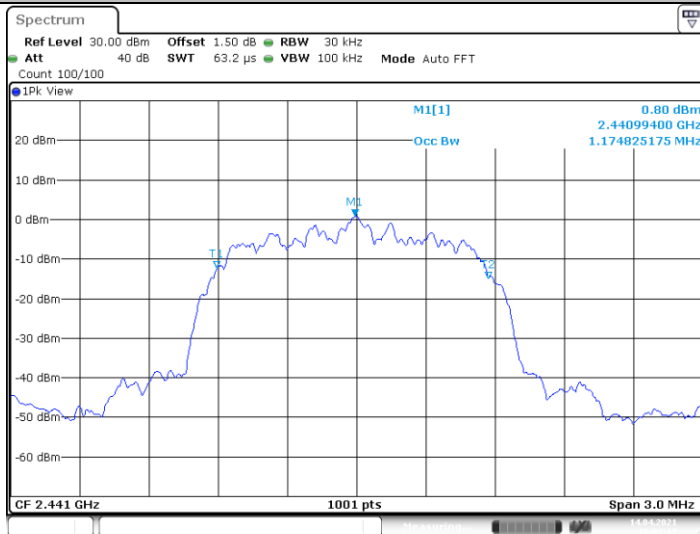
Date: 14.APR.2021 15:42:27

2DH5_Ant1_2402



Date: 14.APR.2021 15:59:24

2DH5_Ant1_2441



Date: 14.APR.2021 16:02:17

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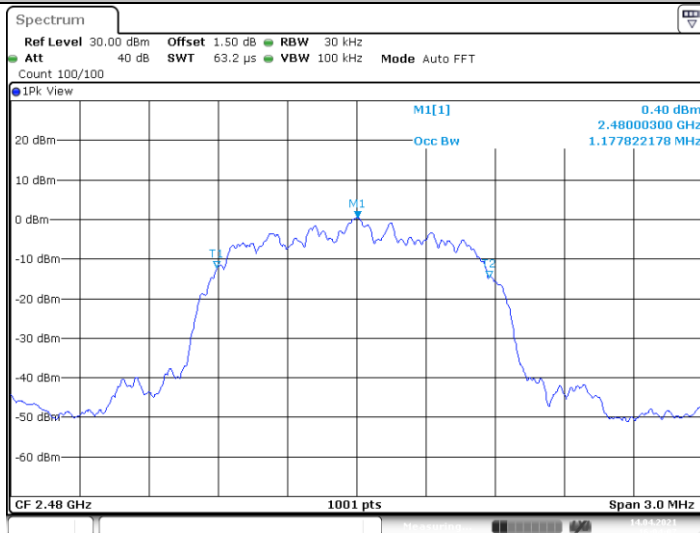
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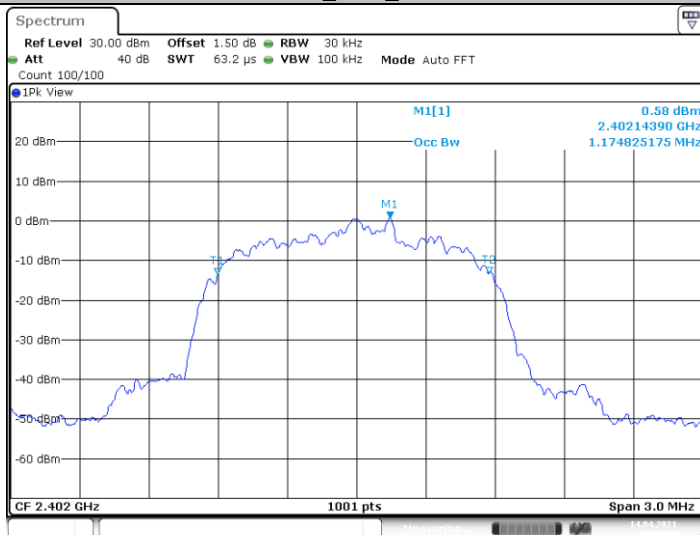


2DH5_Ant1_2480



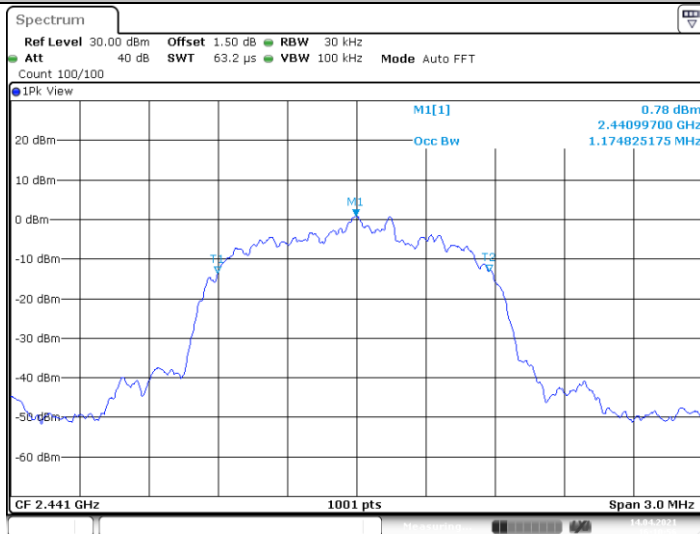
Date: 14.APR.2021 16:04:07

3DH5_Ant1_2402



Date: 14.APR.2021 16:07:09

3DH5_Ant1_2441



Date: 14.APR.2021 16:10:55

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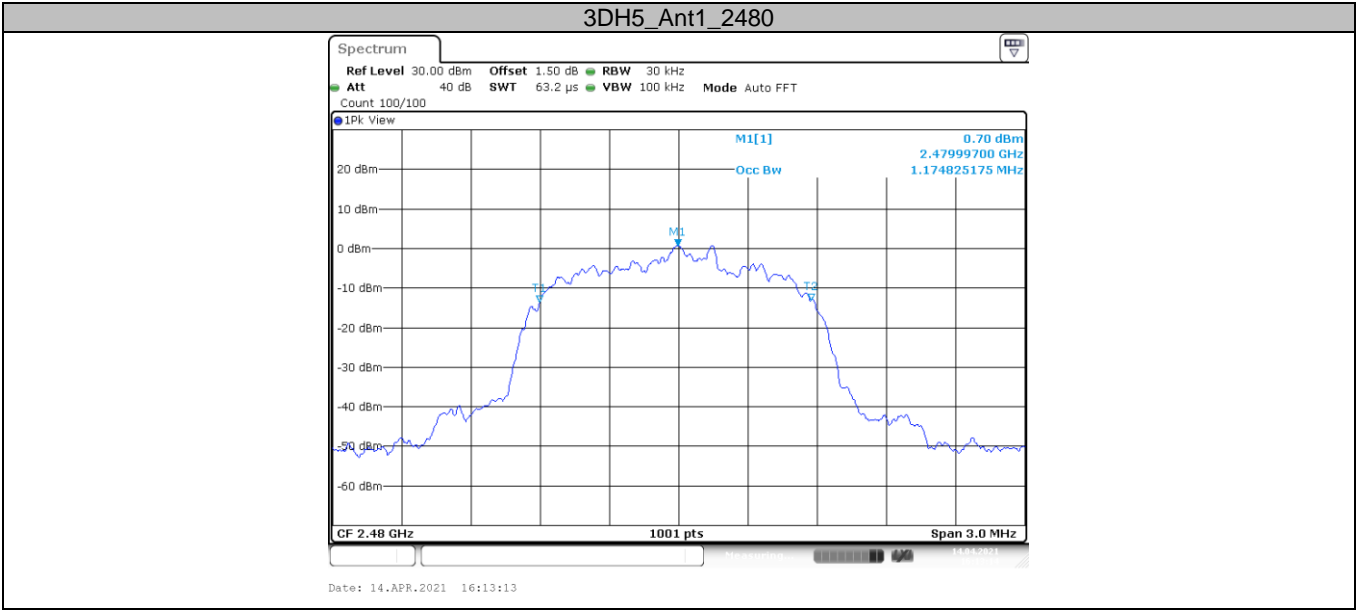
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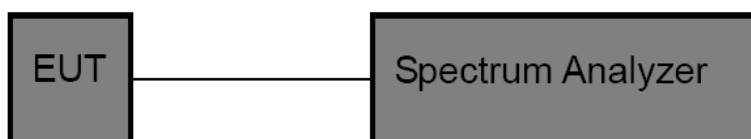
3.6. Channel Separation

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1)/ RSS-247 5.1 b :

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. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
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.

Test Mode

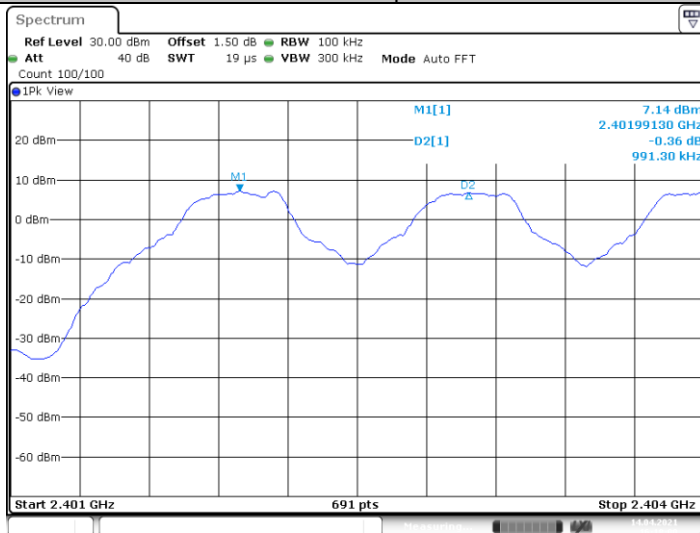
Please refer to the clause 2.4.

Test Result

Test Mode	Frequency(MHz)	Result[MHz]	Limit[MHz]	Verdict
GFSK	Hop_2402	0.991	≥ 632.00	PASS
	Hop_2441	1.022	≥ 630.00	PASS
	Hop_2480	1.047	≥ 630.00	PASS
$\pi/4$ -DQPSK	Hop_2402	1.004	≥ 884.00	PASS
	Hop_2441	1.004	≥ 882.00	PASS
	Hop_2480	1.004	≥ 882.00	PASS
8-DPSK	Hop_2402	1.009	≥ 872.00	PASS
	Hop_2441	1.009	≥ 872.00	PASS
	Hop_2480	1.004	≥ 872.00	PASS

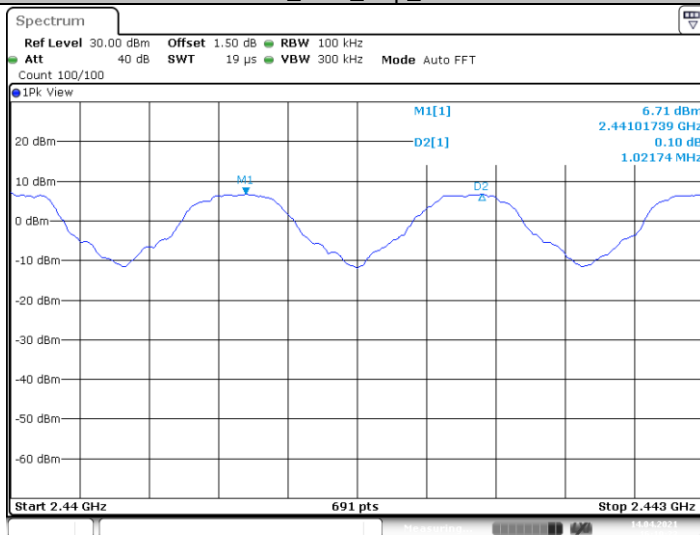


DH5_Ant1_Hop_2402



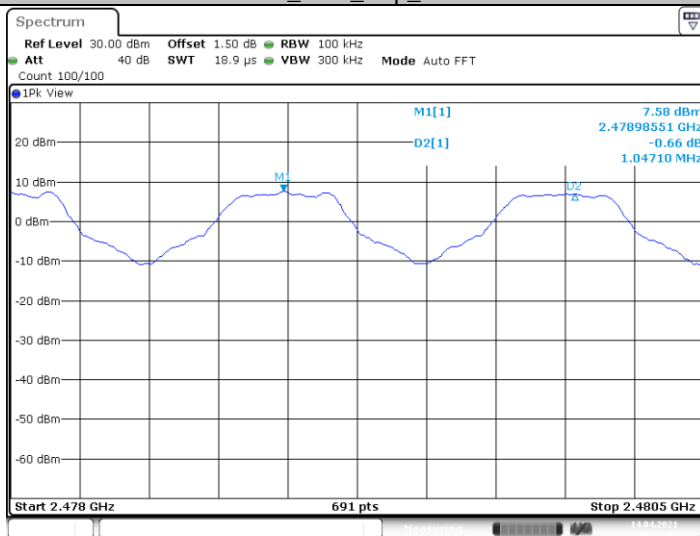
Date: 14.APR.2021 16:17:59

DH5_Ant1_Hop_2441



Date: 14.APR.2021 16:19:23

DH5_Ant1_Hop_2480



Date: 14.APR.2021 16:21:02

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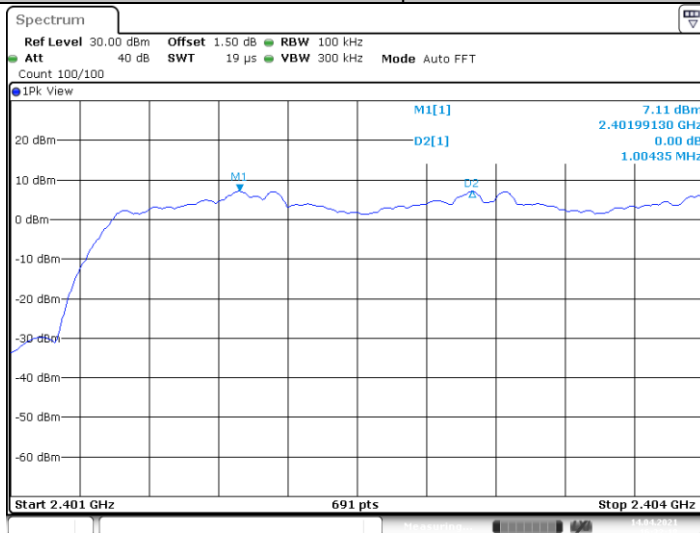
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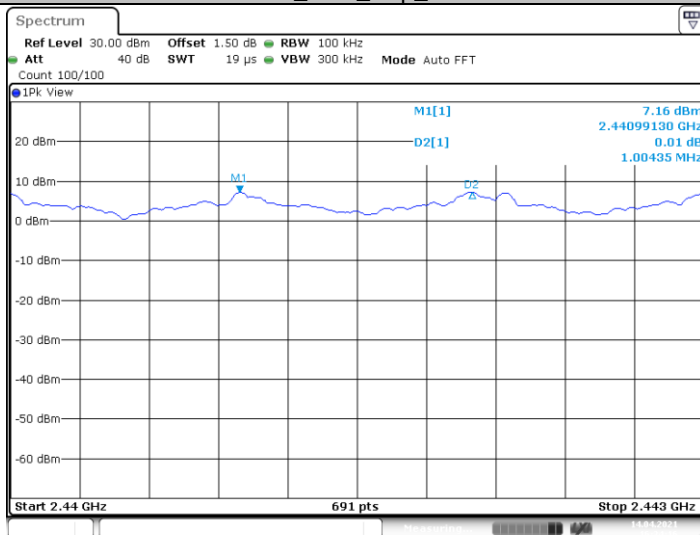


2DH5_Ant1_Hop_2402



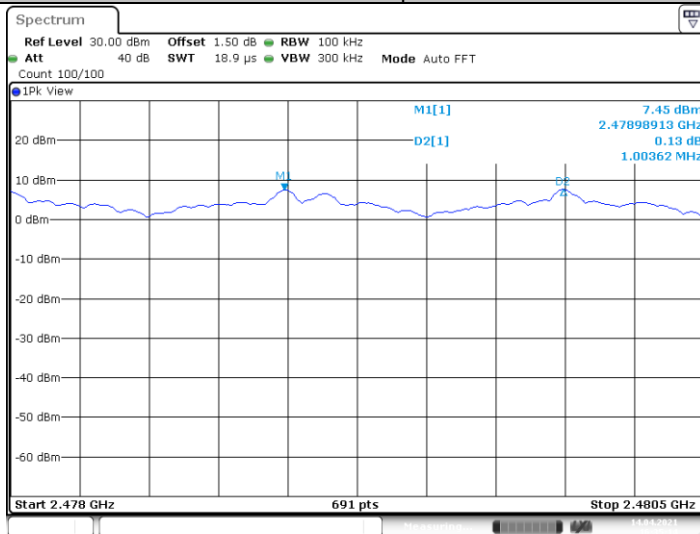
Date: 14.APR.2021 16:32:19

2DH5_Ant1_Hop_2441



Date: 14.APR.2021 16:34:16

2DH5_Ant1_Hop_2480



Date: 14.APR.2021 16:35:14

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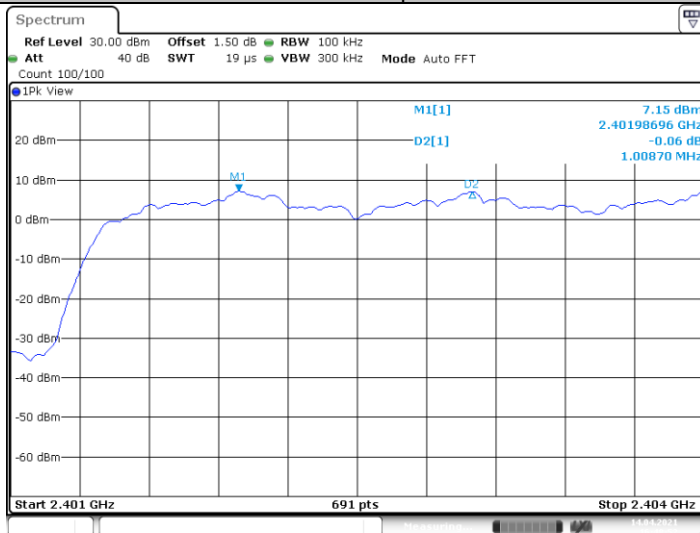
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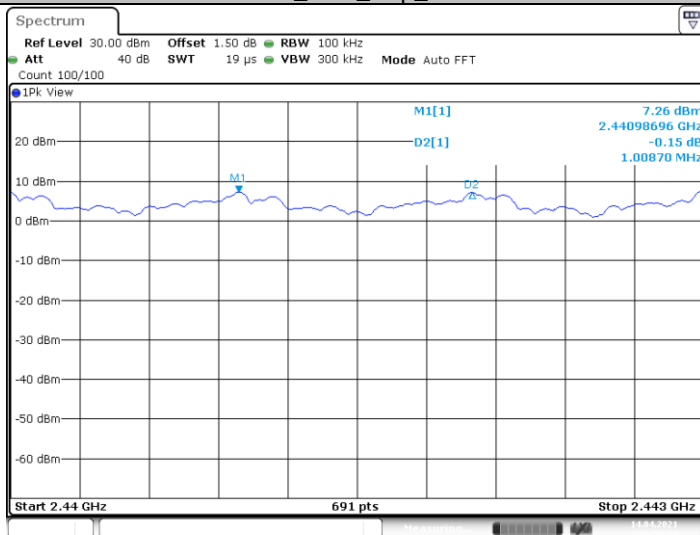


3DH5_Ant1_Hop_2402



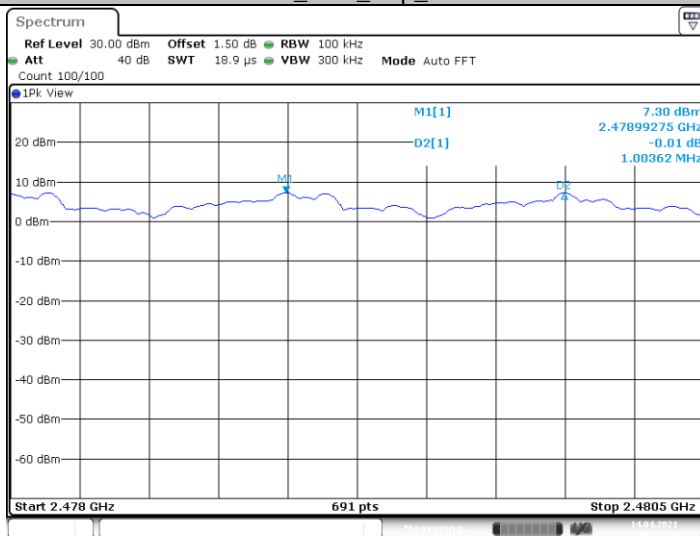
Date: 14.APR.2021 16:48:52

3DH5_Ant1_Hop_2441



Date: 14.APR.2021 16:50:34

3DH5_Ant1_Hop_2480



Date: 14.APR.2021 16:52:40

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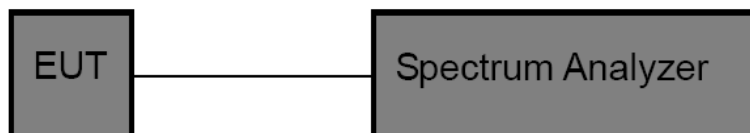
3.7. Number of Hopping Channel

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(iii)/ RSS-247 5.1 d:

Section	Test Item	Limit
15.247 (a)(iii)/ RSS-247 5.1 d:	Number of Hopping Channel	>15

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
 - (1) Peak Detector: RBW=100 kHz, VBW \geq RBW, Sweep time= Auto.

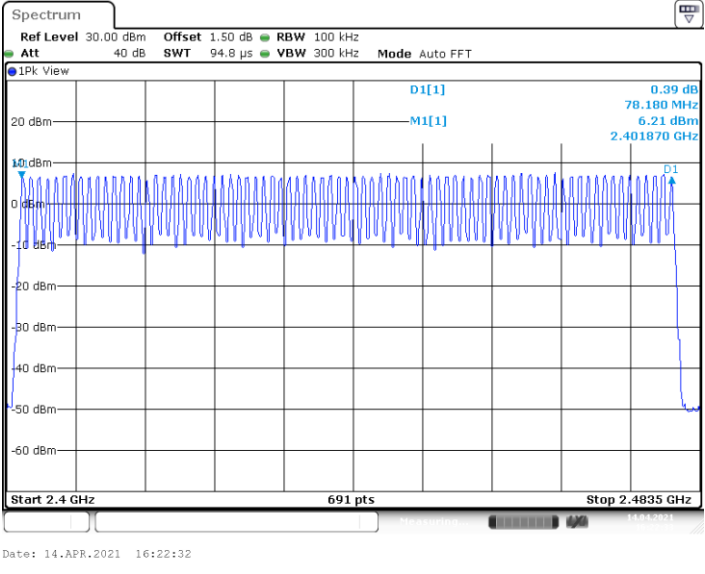
Test Mode

Please refer to the clause 2.4.

Test Result

Modulation type	Channel number	Limit	Result
GFSK	79	≥ 15.00	Pass
$\pi/4$ -DQPSK	79		
8DPSK	79		



GFSK	
$\pi/4$ -DQPSK	
8-DPSK	

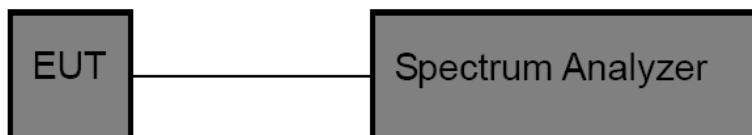


3.8. Dwell Time

Limit

Section	Test Item	Limit
15.247(a)(iii)/ RSS-247 5.1 d	Average Time of Occupancy	0.4 sec

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
 - (1) Spectrum Setting: RBW=1MHz, VBW≥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 2.4.

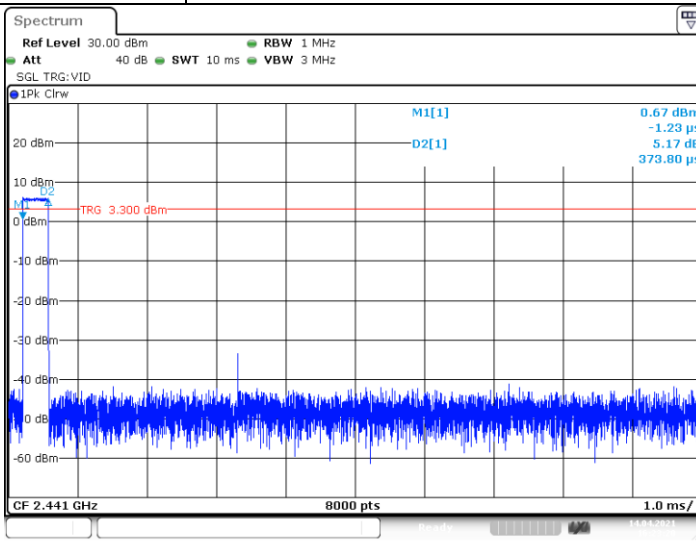
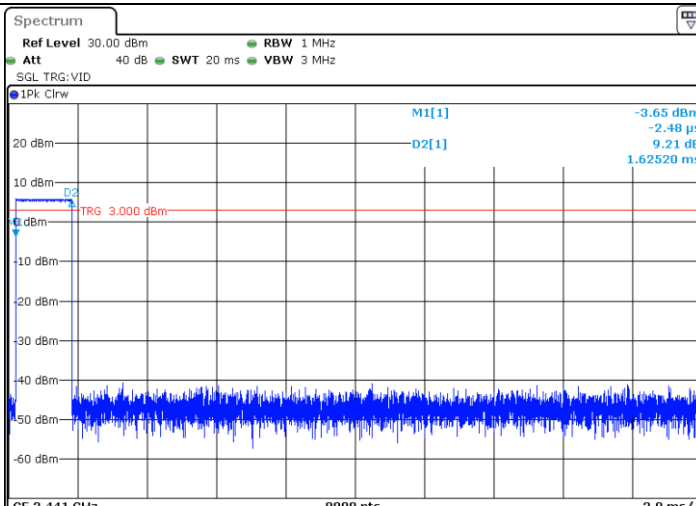
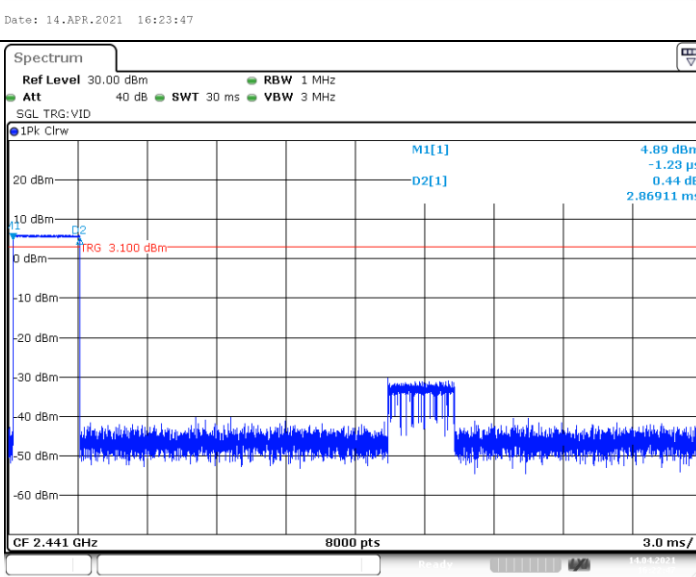
**Test Result**

Modulation type	Channel	Frequency (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (ms)	Limit (Second)	Result
GFSK	DH1	2441	0.37	118.40	31.60	≤ 0.40	Pass
	DH3	2441	1.63	260.80	31.60		
	DH5	2441	2.87	306.13	31.60		
$\pi/4$ -DQPSK	2DH1	2441	0.39	124.80	31.60	≤ 0.40	Pass
	2DH3	2441	1.63	260.80	31.60		
	2DH5	2441	2.88	307.20	31.60		
8-DPSK	3DH1	2441	0.39	124.80	31.60	≤ 0.40	Pass
	3DH3	2441	1.63	260.80	31.60		
	3DH5	2441	2.88	307.20	31.60		

Note: 1DH1/2DH1/3DH1 Total of Dwell= Pulse Time*(1600/2)*31.6/79

1DH3/2DH3/3DH3 Total of Dwell= Pulse Time*(1600/4)*31.6/79

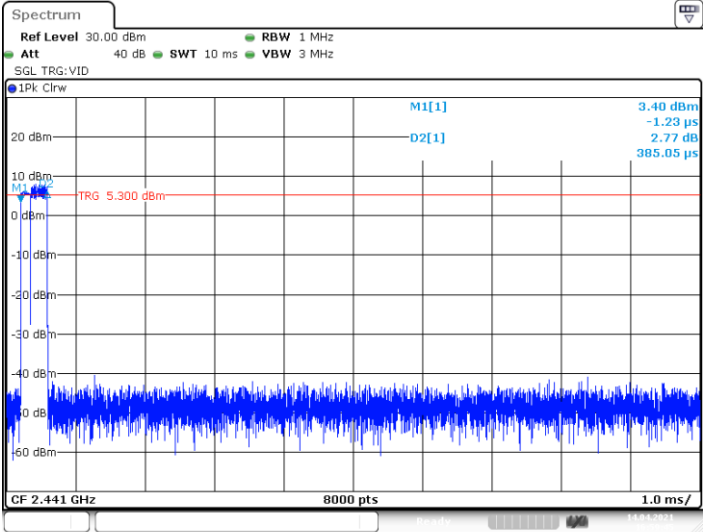
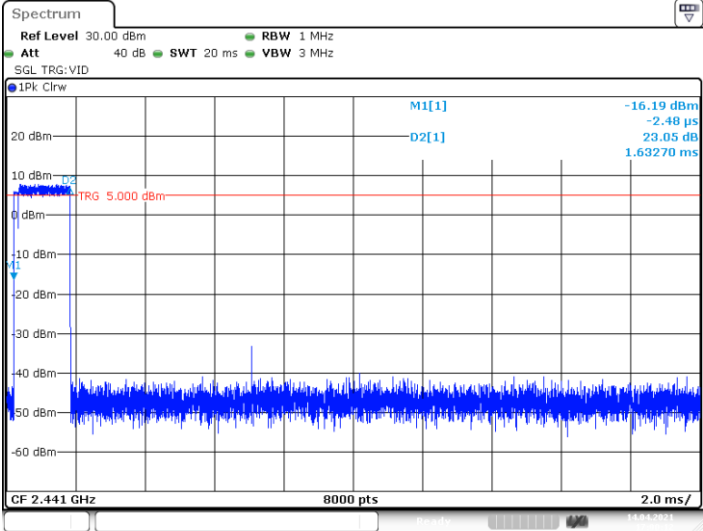
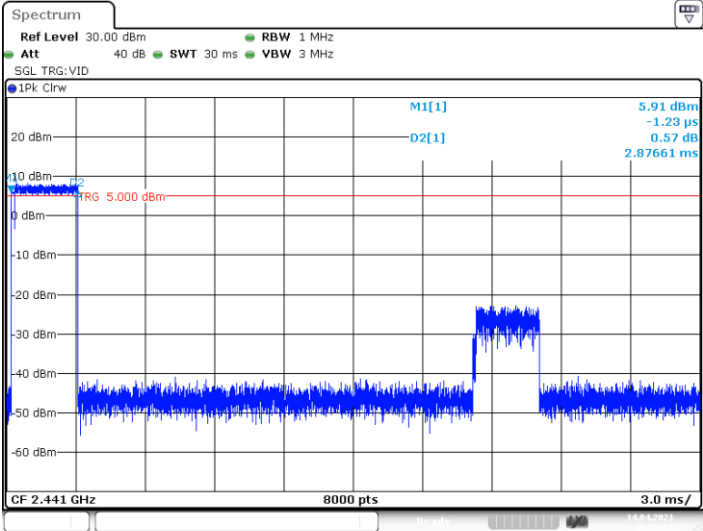
1DH5/2DH5/3DH5 Total of Dwell= Pulse Time*(1600/6)*31.6/79

<div>Modulation Type:</div> <div>DH1</div>	<div>GFSK</div>  <div>Date: 14.APR.2021 16:23:20</div>
<div>DH3</div>	 <div>Date: 14.APR.2021 16:23:47</div>
<div>DH5</div>	 <div>Date: 14.APR.2021 16:22:46</div>



Modulation Type:		$\pi/4$ -DQPSK
2DH1		
2DH3		
2DH5		



Modulation Type:	8-DPSK
3DH1	 <p>Spectrum</p> <p>Ref Level 30.00 dBm RBW 1 MHz</p> <p>Att 40 dB SWT 10 ms VBW 3 MHz</p> <p>SGL TRG:VID</p> <p>1Pk Clrw</p> <p>M1[1] 3.40 dBm -1.23 μs</p> <p>D2[1] 2.77 dB 385.05 μs</p> <p>TRG 5.300 dBm</p> <p>CF 2.441 GHz 8000 pts 1.0 ms/</p> <p>Date: 14.APR.2021 16:59:45</p>
3DH3	 <p>Spectrum</p> <p>Ref Level 30.00 dBm RBW 1 MHz</p> <p>Att 40 dB SWT 20 ms VBW 3 MHz</p> <p>SGL TRG:VID</p> <p>1Pk Clrw</p> <p>M1[1] -16.19 dBm -2.48 μs</p> <p>D2[1] 23.05 dB 1.63270 ms</p> <p>TRG 5.000 dBm</p> <p>CF 2.441 GHz 8000 pts 2.0 ms/</p> <p>Date: 14.APR.2021 17:00:12</p>
3DH5	 <p>Spectrum</p> <p>Ref Level 30.00 dBm RBW 1 MHz</p> <p>Att 40 dB SWT 30 ms VBW 3 MHz</p> <p>SGL TRG:VID</p> <p>1Pk Clrw</p> <p>M1[1] 5.91 dBm -1.23 μs</p> <p>D2[1] 0.57 dB 2.87661 ms</p> <p>TRG 5.000 dBm</p> <p>CF 2.441 GHz 8000 pts 3.0 ms/</p> <p>Date: 14.APR.2021 16:59:02</p>



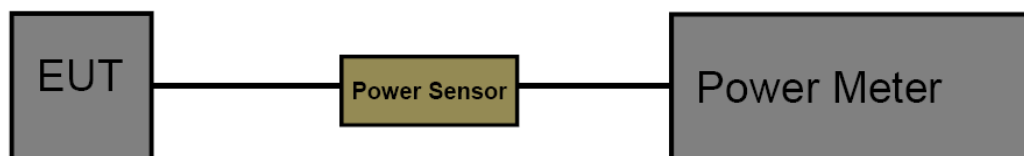
3.9. Peak Output Power

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1) / RSS-247 5.4 b:

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. The maximum conducted output power may be measured using a broadband Peak RF power meter.
2. Peak power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor.
3. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.
4. Record the measurement data.

Test Mode

Please refer to the clause 2.4.

Test Result

Test Mode	Frequency (MHz)	Result[dBm]	Limit[dBm]	Verdict
GFSK	2402	7.45	<=21	PASS
	2441	7.59	<=21	PASS
	2480	7.65	<=21	PASS
π/4-DQPSK	2402	6.04	<=21	PASS
	2441	6.23	<=21	PASS
	2480	6.42	<=21	PASS
8-DPSK	2402	6.64	<=21	PASS
	2441	6.62	<=21	PASS
	2480	6.83	<=21	PASS

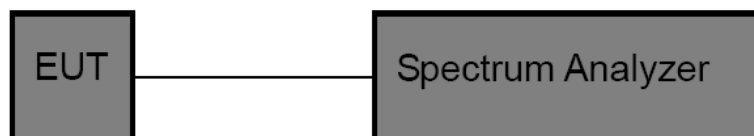


3.10. Duty Cycle

Limit

None, for report purposes only.

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v05r02.
3. Spectrum Setting:
Set analyzer center frequency to test channel center frequency.
Set the span to 0Hz
Set the RBW to 10MHz
Set the VBW to 10MHz
Detector: Peak
Sweep time: Auto
Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

Test Mode

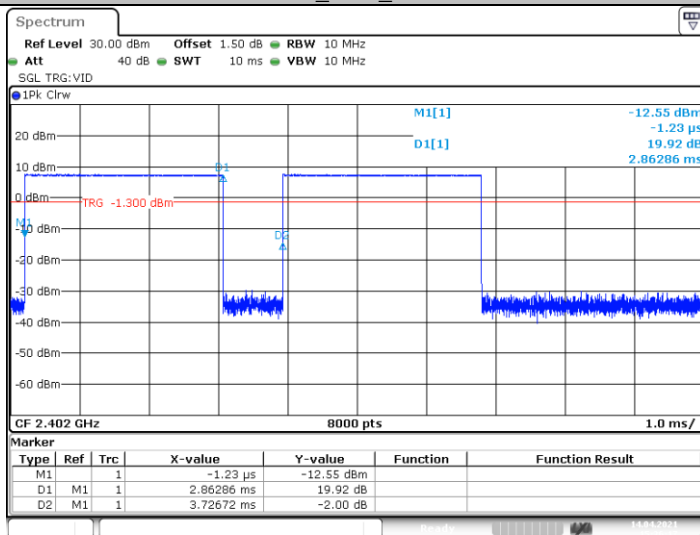
Please refer to the clause 2.4.

Test Result

Test Mode	Frequency (MHz)	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
GFSK	2402	2.86	3.73	76.82	0.35	1
	2441	2.86	3.73	76.79	0.35	1
	2480	2.86	3.73	76.79	0.35	1
$\pi/4$ -DQPSK	2402	2.86	3.74	76.47	0.35	1
	2441	2.86	3.74	76.47	0.35	1
	2480	2.86	3.74	76.47	0.35	1
8-DPSK	2402	2.87	3.74	76.74	0.35	1
	2441	2.87	3.75	76.53	0.35	1
	2480	2.87	3.75	76.53	0.35	1

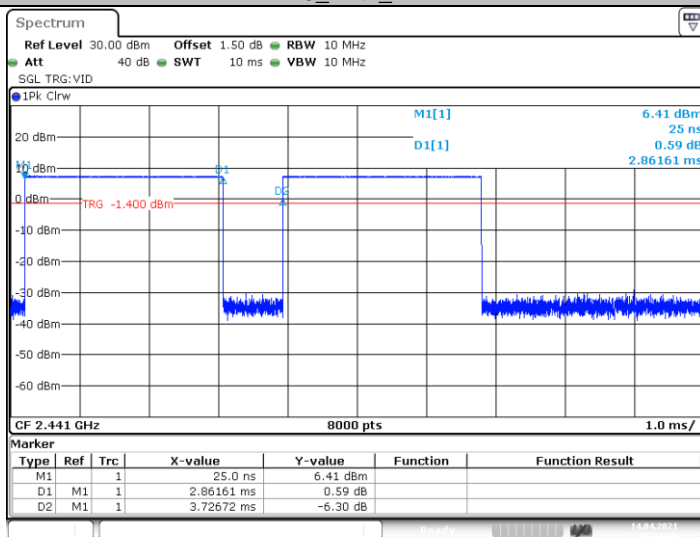


DH5_Ant1_2402



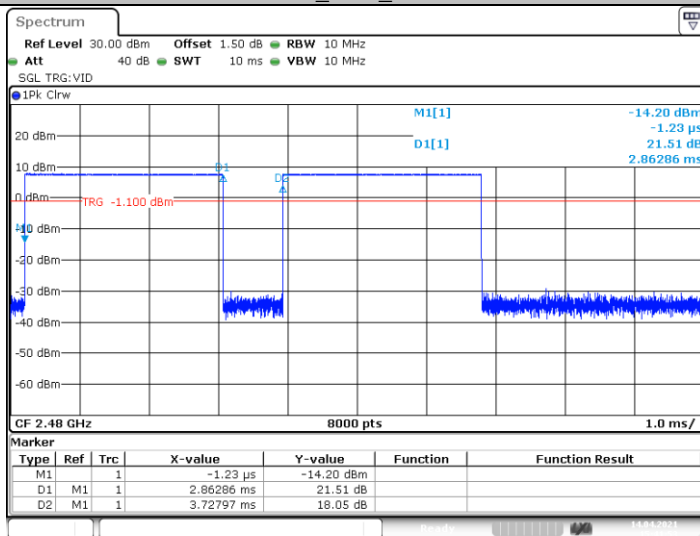
Date: 14.APR.2021 15:36:16

DH5_Ant1_2441



Date: 14.APR.2021 15:39:44

DH5_Ant1_2480



Date: 14.APR.2021 15:41:53

CTC Laboratories, Inc.

1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

Tel.: (86)755-27521059

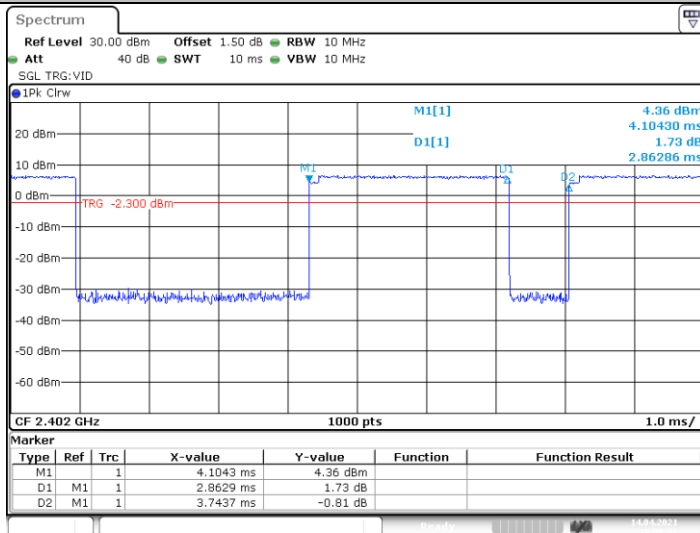
Fax: (86)755-27521011

Http://www.sz-ctc.org.cn

For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : yz.cnca.cn

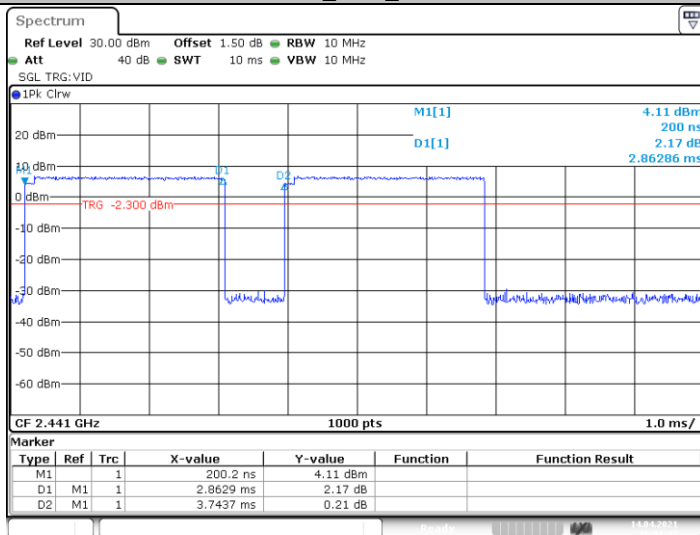


2DH5_Ant1_2402



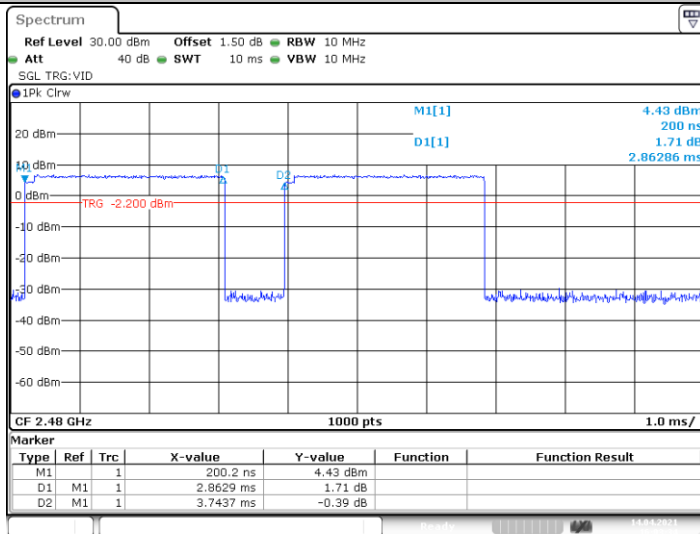
Date: 14.APR.2021 15:58:50

2DH5_Ant1_2441



Date: 14.APR.2021 16:01:43

2DH5_Ant1_2480



Date: 14.APR.2021 16:03:33

CTC Laboratories, Inc.

1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

Tel.: (86)755-27521059

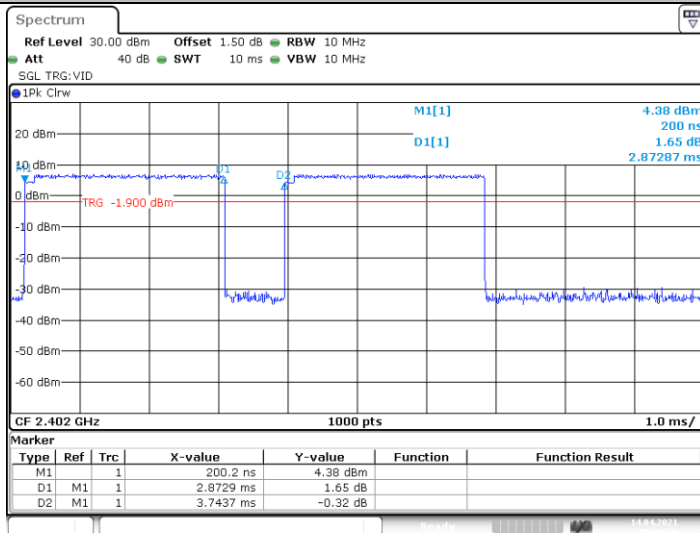
Fax: (86)755-27521011

Http://www.sz-ctc.org.cn

For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : yz.cnca.cn

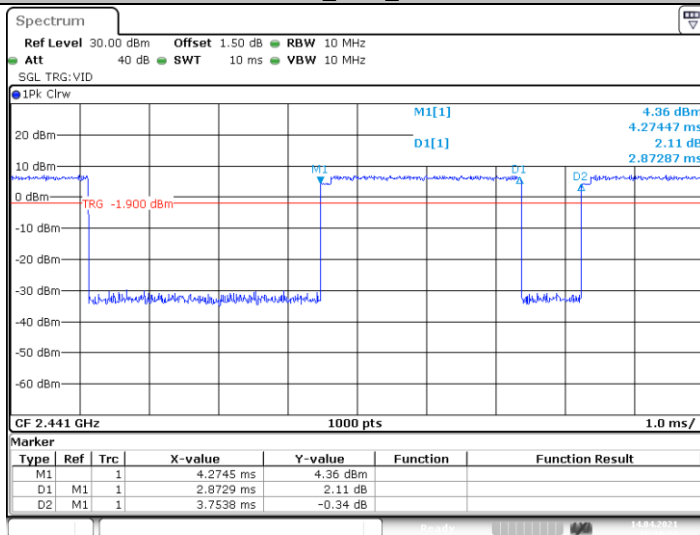


3DH5_Ant1_2402



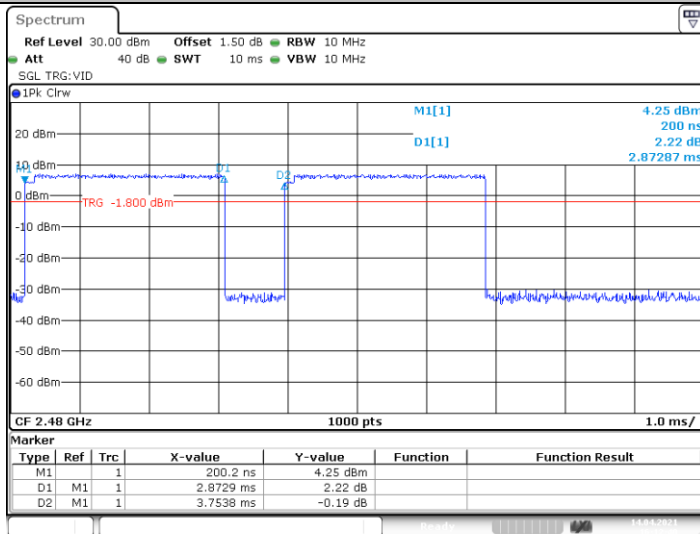
Date: 14.APR.2021 16:06:36

3DH5_Ant1_2441



Date: 14.APR.2021 16:10:22

3DH5_Ant1_2480



Date: 14.APR.2021 16:12:40

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3.11. 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 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 test result is PASS, because the directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.

*****THE END*****