FCC/IC - TEST REPORT

Report Number	:	**68.950.20.0154.01**	Date of Issue:	2020-04-22
Model	:	**SPBL1**		
Product Type	:	Camera		
Applicant	:	GoPro, Inc.		
Address	:	3000 Clearview Way, San Mateo, CA 94402, USA		
Production Facility	:	GoPro, Inc.		
Address	:	3000 Clearview Way, San Mateo, CA 94402, USA		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	**60**		

TÜV SÜD Certification and Testing (China) Co., Ltd. – Shenzhen Branch is a subcontractor to TÜV SÜD Product Service GmbH according to the principles outlined in ISO 17025.

TÜV SÜD Certification and Testing (China) Co., Ltd. – Shenzhen Branch reports apply only to the specific samples tested under stated test conditions. Construction of the actual test samples has been documented. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. The manufacturer/importer is responsible to the Competent Authorities in Europe for any modifications made to the production units which result in non-compliance to the relevant regulations. TÜV SÜD Certification and Testing (China) Co., Ltd. – Shenzhen Branch shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD Certification and Testing (China) Co., Ltd. – Shenzhen Branch issued reports.

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

1 Table of Contents

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

2 Details about the Test Laboratory

Details about the Test Laboratory
Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District, Shenzhen City, 518052, P. R. China
FCC Designation Number:	CN5009
FCC Registration No.:	514049
ISED#:	10320A
Telephone:	86 755 8828 6998
Fax:	86 755 8828 5299

3 Description of the Equipment Under Test

Product:	Camera
Model no.:	SPBL1
FCC ID:	CNFSPBL1
IC:	10193A-SPBL1
PMN:	SPBL1
HVIN:	SPBL1
Rating:	3.85VDC
RF Transmission Frequency:	2402MHz-2480MHz
No. of Operated Channel:	79
Modulation:	GFSK, π/4-DQPSK, 8DPSK
Antenna Type:	Internal Integrated Metal Antenna
Antenna Gain:	-0.7dBi max for 2.4GHz
Description of the EUT:	The Equipment Under Test (EUT) is a Camera supports 2.4GHz Bluetooth/WIFI, 5GHz WIFI functions.

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2018 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 5, Amendment 1, March 2019	General Requirements and Information for the Certification of Radio Apparatus
RSS-247 Issue 2 February 2017	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices

All the test methods were according to KDB 558074 D01 15.247 Meas Guidance v05r02 and ANSI C63.10 (2013).

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

5 Summary of Test Results

Technical Requirements			
FCC Part 15 Subpart C/RSS-247 Issue 2/RSS-Gen Issue 5			
Test Condition		Test Result	Test Site
§15.207& RSS-Gen 8.8	Conducted emission AC power port	Pass	Site 1
§15.247(b)(1) & RSS-247 5.4(b)	Conducted output power	Pass	Site 1
RSS-247 5.4(b)	Equivalent Isotropic Radiated Power	Pass	Site 1
§15.247(e) & RSS-247 5.2(b)	Power spectral density	N/A	--
§15.247(a)(2) & RSS-247 5.2(a) & RSS-Gen 6.7	6dB bandwidth and 99% Occupied Bandwidth	N/A	--
§15.247(a)(1) & RSS-247 5.1(a) & RSS-Gen 6.7	20dB bandwidth and 99% Occupied Bandwidth	Pass	Site 1
§15.247(a)(1) & RSS-247 5.1(b)	Min. of Hopping Channel Carrier Frequency Separation	Pass	Site 1
§15.247(a)(1)(iii) & RSS-247 5.1(d)	Min number of hopping frequencies	Pass	Site 1
§15.247(a)(1)(iii) & RSS-247 5.1(d)	Dwell Time - Average Time of Occupancy	Pass	Site 1
§15.247(d) & RSS-247 5.5	Spurious RF conducted emissions	Pass	Site 1
§15.247(d) & RSS-247 5.5	Band edge	Pass	Site 1
§15.247(d) & §15.209 & RSS-247 5.5 & RSS-Gen 6.13	Spurious radiated emissions for transmitter	Pass	Site 1
§15.203 & RSS-Gen 6.8	Antenna requirement	See note 1	--

Note 1: N/A=Not Applicable.
Note 2: The EUT uses an Integrated antenna, which gain is -0.7dBi. In accordance to §15.203 & RSS-Gen 6.8, it is considered sufficiently to comply with the provisions of this section.

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: CNFSPBL1, complies with Section 15.207, 15.209, 15.205, 15.247 of the FCC Part 15, Subpart C

This submittal(s) (test report) is intended for IC: 10193A-SPBL1, complies with RSS-247, RSS-GEN.

The Model: SPBL1 supports Bluetooth Low Energy/Bluetooth BR+EDR /WIFI/GPS & Galileo receiving functions, power by 3.85Vdc, 1720mAh supplied by an rechargeable Lithium Ion Battery or 5Vdc supplied by USB type C port.

The TX and RX range is 2402MHz-2480MHz for Bluetooth, 2412MHz – 2462MHz for 2.4GHzWIFI, 5180MHz – 5320MHz, 5500MHz – 5700MHz, 5745MHz – 5825MHz for 5GHzWIFI, 1575.42MHz for GNSS (only GPS and Galileo) Receiver.

This report is for the Bluetooth BR+EDR part.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: 2020-04-03

Testing Start Date: 2020-04-03

Testing End Date: 2020-04-20

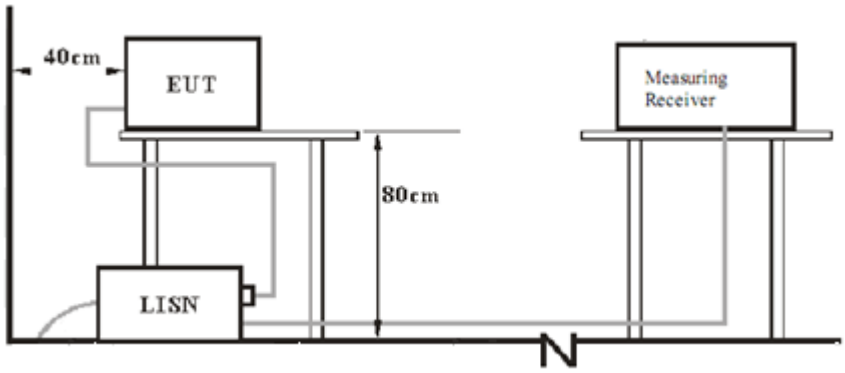
- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Reviewed by:	Prepared by:	Tested by:
John Zhi	Joe Gu	Tree Zhan
EMC Project Manager	EMC Project Engineer	EMC Test Engineer

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

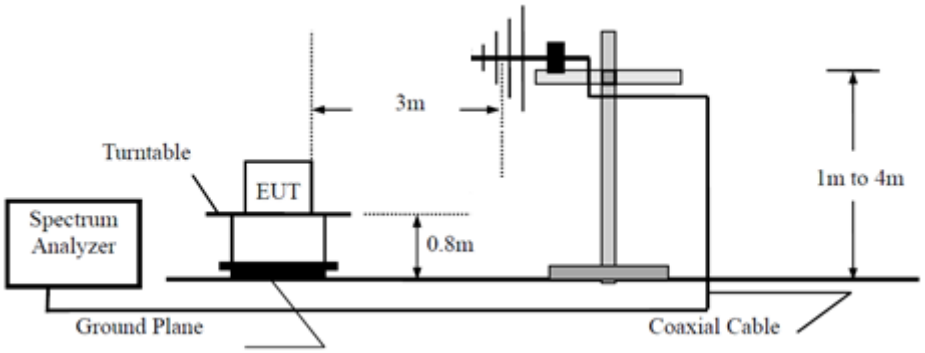
7 Test Setups

7.1 AC Power Line Conducted Emission test setups

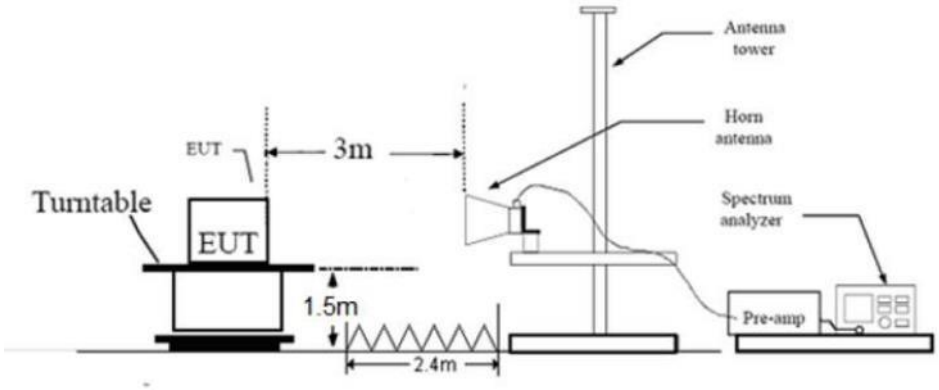


7.2 Radiated test setups

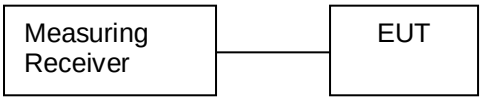
Below 1GHz



Above 1GHz



7.3 Conducted RF test setups



TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.	S/N
Laptop	Lenovo	T460S	---
USB Type C cable	GoPro	0.46m (Length)	---
AC Adapter	Apple	A1401	---

Test software information:

TEST SOFTWARE VERSION	QRCT (V3.0-186.0) FROM QUALCOMM
MODULATION	SETTING TX POWER
GFSK	9
Π/4-DQPSK	9
8-DPSK	9

The system was configured to hopping mode and non-hopping mode.

Hopping mode: typical working mode (normal hopping status)

Non-hopping mode: The system was configured to operate at a signal channel transmitting.

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. Both sides of AC line were checked for maximum conducted interference.
6. The frequency range from 150 kHz to 30 MHz was searched.
7. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

Limit

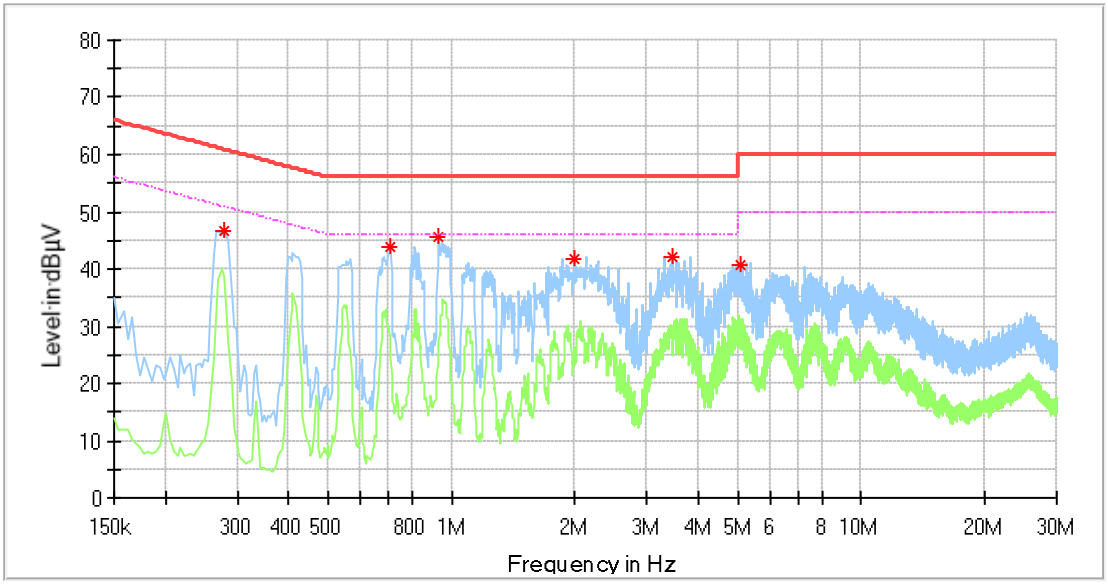
Frequency MHz	QP Limit dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

Conducted Emission

Product Type	:	Camera
M/N	:	SPBL1
Operating Condition	:	Charging + TX
Test Specification	:	Power Line, Live
Comment	:	AC 120V/60Hz (External adapter)



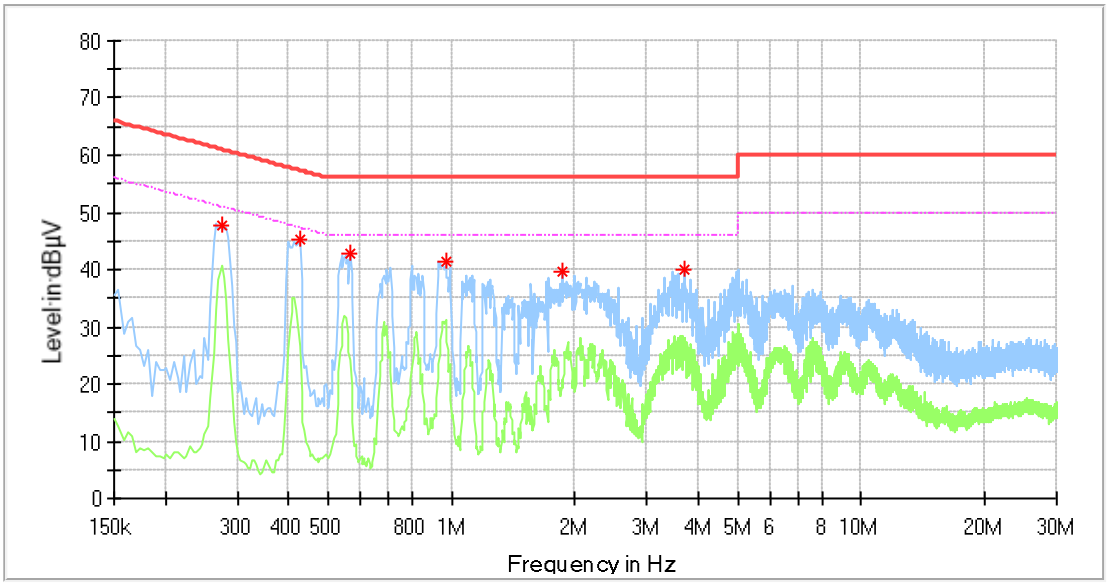
Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.278000	46.82	---	60.88	14.05	L1	10.3
0.710000	43.93	---	56.00	12.07	L1	10.3
0.930000	45.52	---	56.00	10.48	L1	10.3
1.994000	41.70	---	56.00	14.30	L1	10.3
3.454000	42.21	---	56.00	13.79	L1	10.4
5.050000	40.86	---	60.00	19.14	L1	10.5

Remark：
Level=Reading Level + Correction Factor
Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

Conducted Emission

Product Type	:	Camera
M/N	:	SPBL1
Operating Condition	:	Charging + TX
Test Specification	:	Power Line, Neutral
Comment	:	AC 120V/60Hz (External adapter)



Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.274000	47.70	---	61.00	13.30	N	10.3
0.426000	45.14	---	57.33	12.20	N	10.3
0.566000	42.69	---	56.00	13.31	N	10.3
0.970000	41.41	---	56.00	14.59	N	10.3
1.862000	39.50	---	56.00	16.50	N	10.4
3.690000	39.89	---	56.00	16.11	N	10.4

Remark：
*Level=Reading Level + Correction Factor
**Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

9.2 Conducted output power & EIRP

Test Method

1. The EUT was placed on 0.8m height table, the RF output of EUT was connected to the power meter by RF cable. The path loss was compensated to the results for each measurement.
2. Setting the highest output power level of the EUT
3. Record the power value.

Limits

According to §15.247 (b) (1) & RSS-247 5.4(b), conducted output power limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

According to & RSS-247 5.4(b), EIRP limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤4	≤36.2

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

Conducted output power

Bluetooth Mode GFSK modulation Test Result

Frequency MHz	Conducted Output Power dBm	Antenna Gain dBi	EIRP dBm	Result
Low channel 2402MHz	11.94	-0.7	11.24	Pass
Middle channel 2441MHz	11.77	-0.7	11.07	Pass
High channel 2480MHz	11.52	-0.7	10.82	Pass

Bluetooth Mode π/4-DQPSK modulation Test Result

Frequency MHz	Conducted Output Power dBm	Antenna Gain dBi	EIRP dBm	Result
Low channel 2402MHz	8.77	-0.7	8.07	Pass
Middle channel 2441MHz	8.50	-0.7	7.80	Pass
High channel 2480MHz	8.20	-0.7	7.50	Pass

Bluetooth Mode 8DPSK modulation Test Result

Frequency MHz	Conducted Output Power dBm	Antenna Gain dBi	EIRP dBm	Result
Low channel 2402MHz	8.76	-0.7	8.06	Pass
Middle channel 2441MHz	8.51	-0.7	7.81	Pass
High channel 2480MHz	8.22	-0.7	7.52	Pass

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

9.3 20 dB bandwidth and 99% Occupied Bandwidth

Test Method

1. The RF output of EUT was connected to the test receiver by RF cable. The path loss 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 test receiver settings:
   Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel
   RBW > the 20dB bandwidth of the emission being measured, VBW≥RBW,
   Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth. Record the results.
5. Repeat above procedures until all frequencies measured were complete.

Limit

Limit [kHz]
N/A

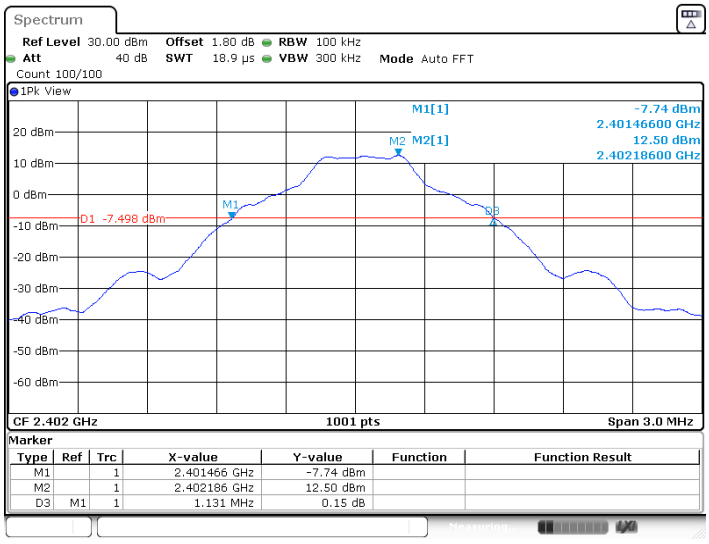
TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

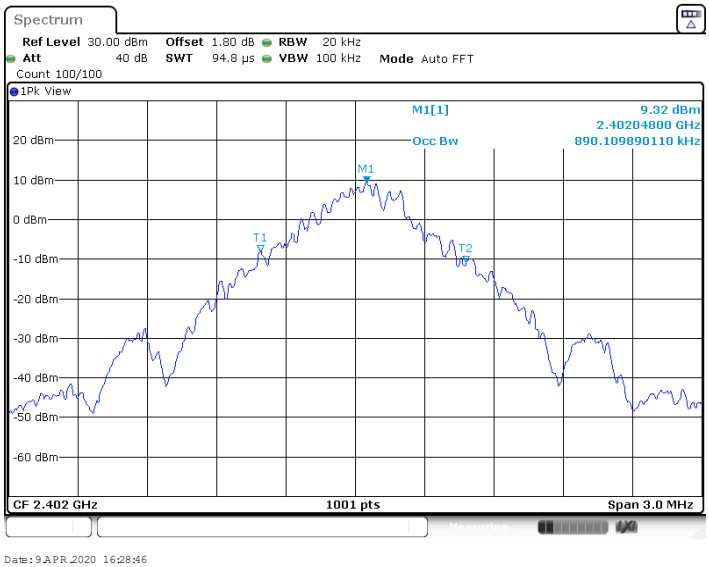
20 dB bandwidth and 99% Occupied Bandwidth

Bluetooth Mode GFSK Modulation test result

Frequency MHz	20 dB Bandwidth kHz	99% Bandwidth kHz	Limit kHz	Result
2402	1131	890	--	Pass
2441	1131	890	--	Pass
2480	1131	893	--	Pass

Low channel 2402MHz

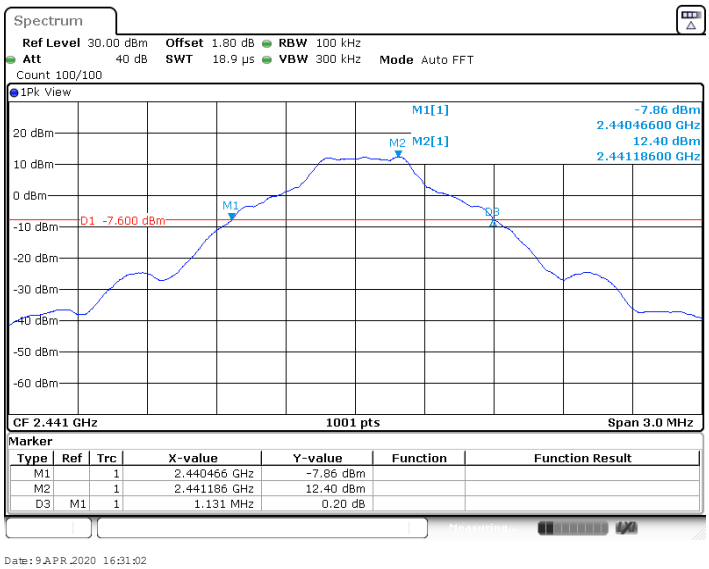


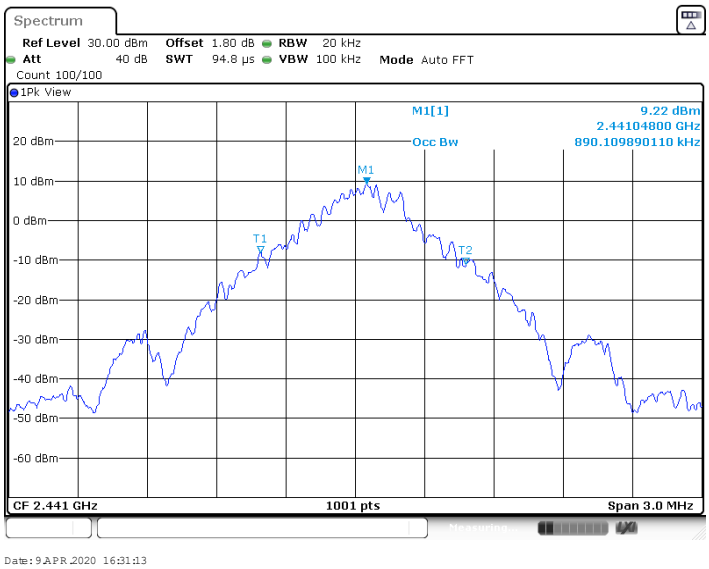


TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

20 dB bandwidth and 99% Occupied Bandwidth

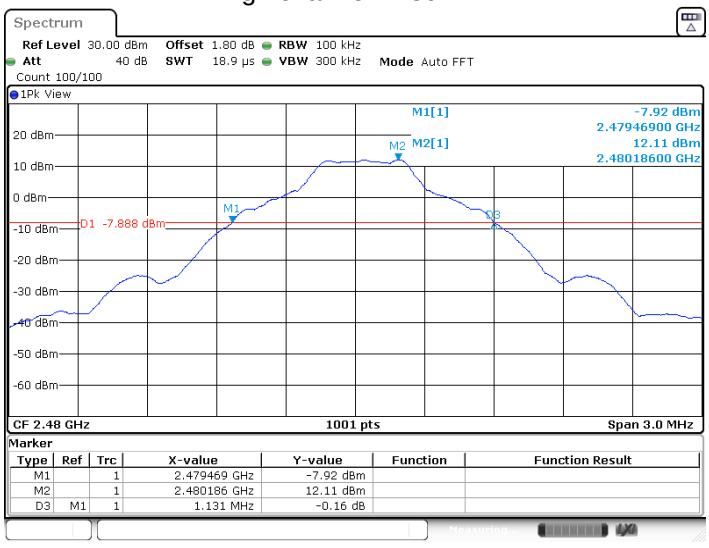
Middle channel 2441MHz



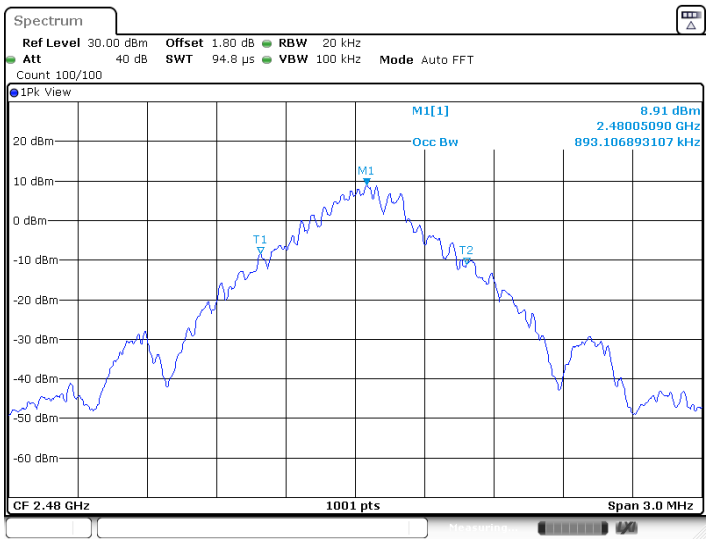


20 dB bandwidth and 99% Occupied Bandwidth

High channel 2480MHz



Date: 9.APR.2020 16:33:19



Date: 9.APR.2020 16:33:30

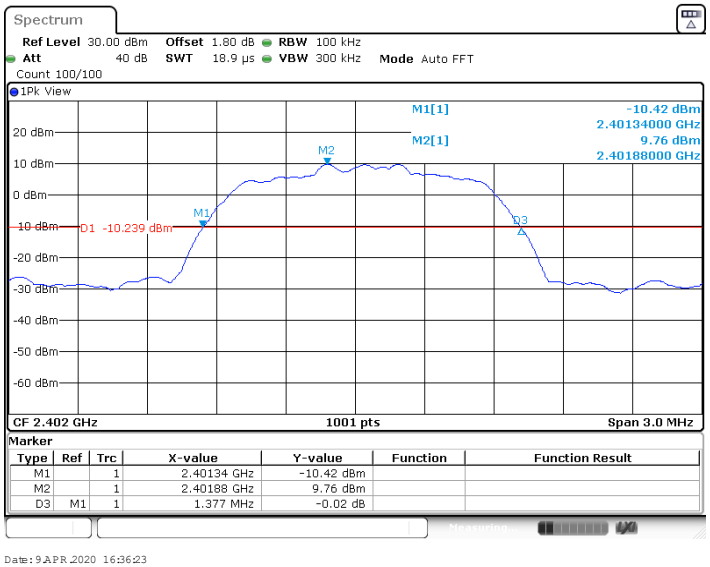
TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

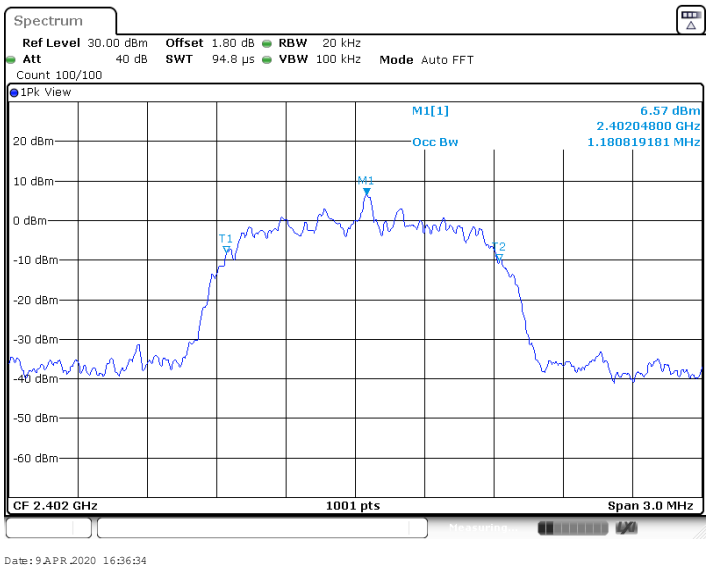
20 dB bandwidth and 99% Occupied Bandwidth

Bluetooth Mode π/4-DQPSK Modulation test result

Frequency	20 dB Bandwidth	99% Bandwidth	Limit	Result
MHz	kHz	kHz	kHz	
2402	1377	1181	--	Pass
2441	1377	1181	--	Pass
2480	1380	1181	--	Pass

Low channel 2402MHz

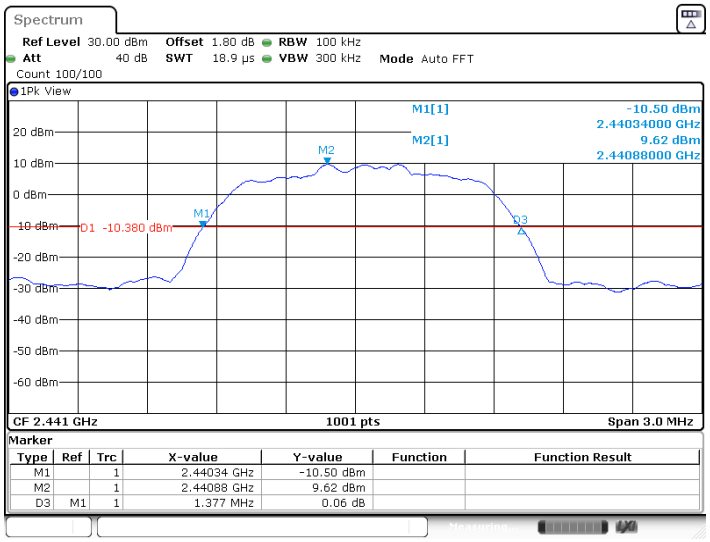


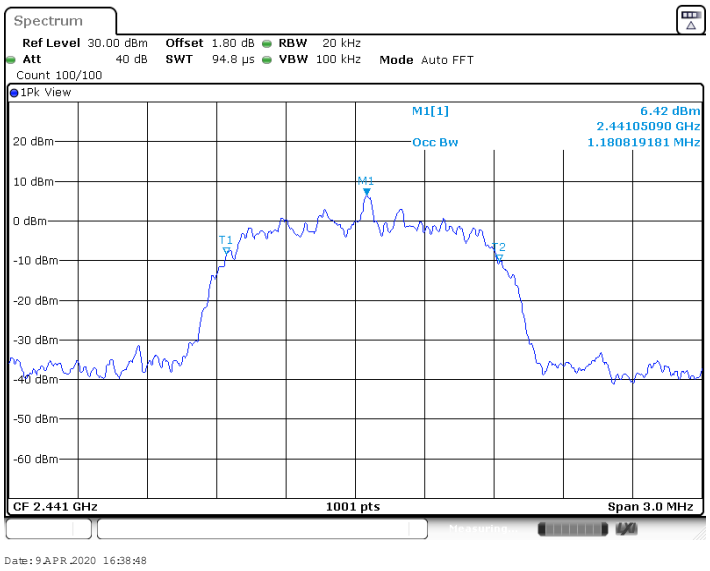


TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

20 dB bandwidth and 99% Occupied Bandwidth

Middle channel 2441MHz

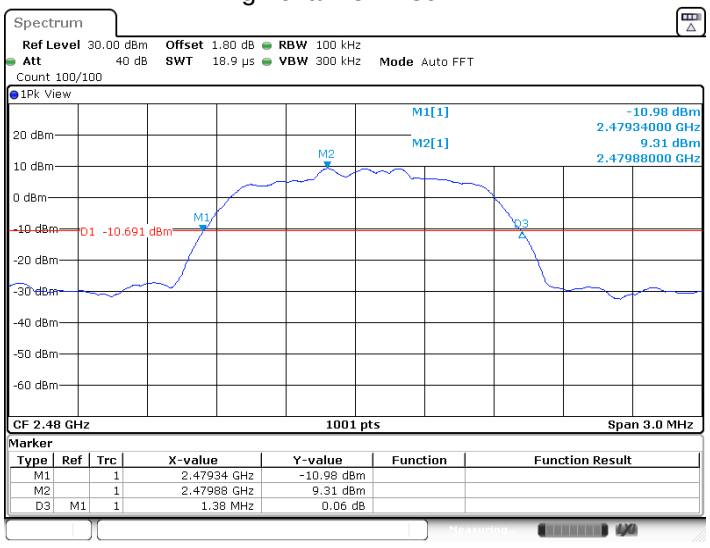


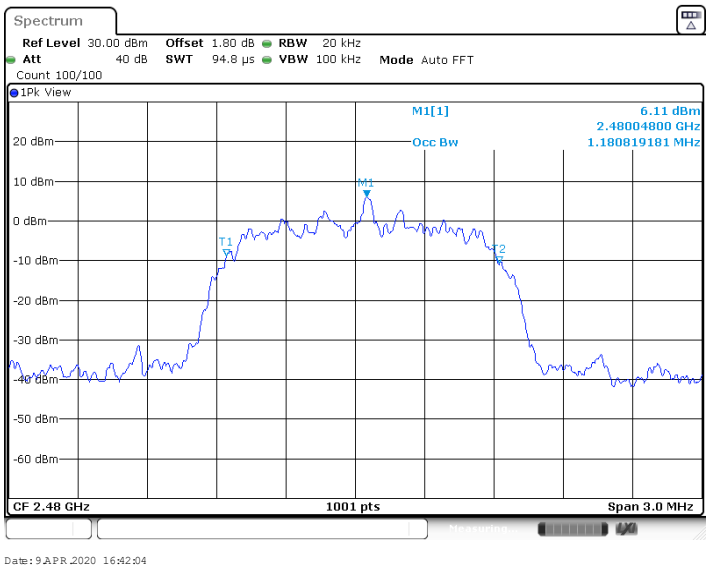


TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

20 dB bandwidth and 99% Occupied Bandwidth

High channel 2480MHz





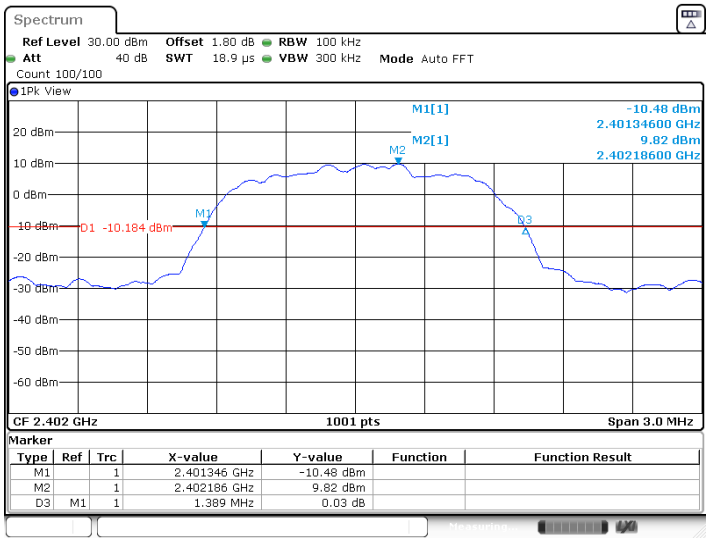
TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

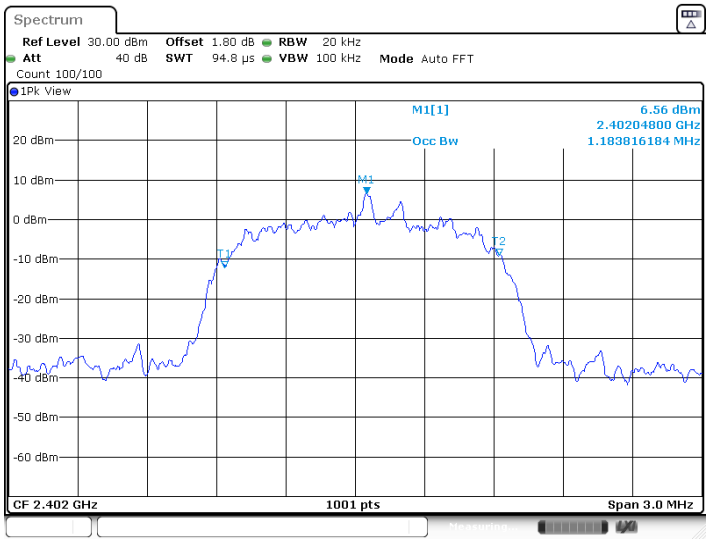
20 dB bandwidth and 99% Occupied Bandwidth

Bluetooth Mode 8DPSK Modulation test result

Frequency MHz	20 dB Bandwidth kHz	99% Bandwidth kHz	Limit kHz	Result
2402	1389	1184	--	Pass
2441	1389	1187	--	Pass
2480	1389	1187	--	Pass

Low channel 2402MHz

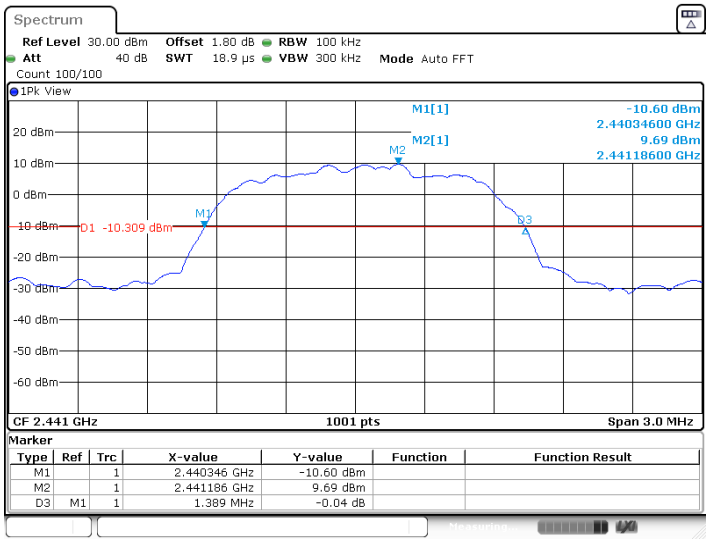


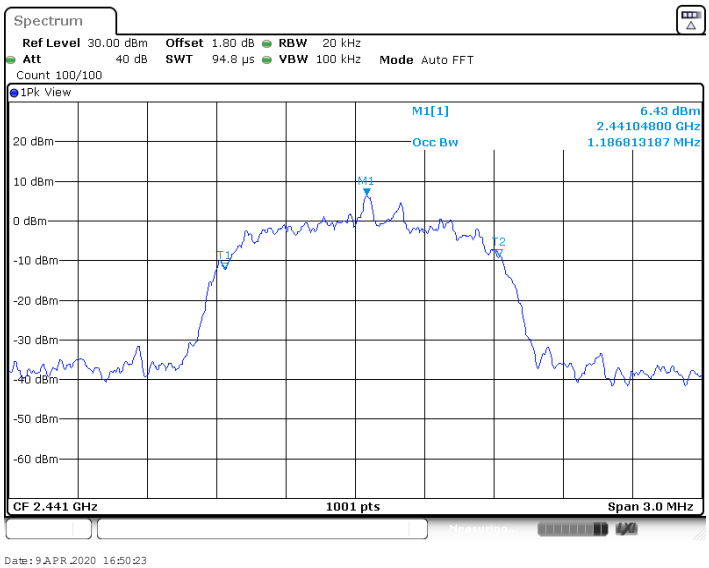


TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

20 dB bandwidth and 99% Occupied Bandwidth

Middle channel 2441MHz

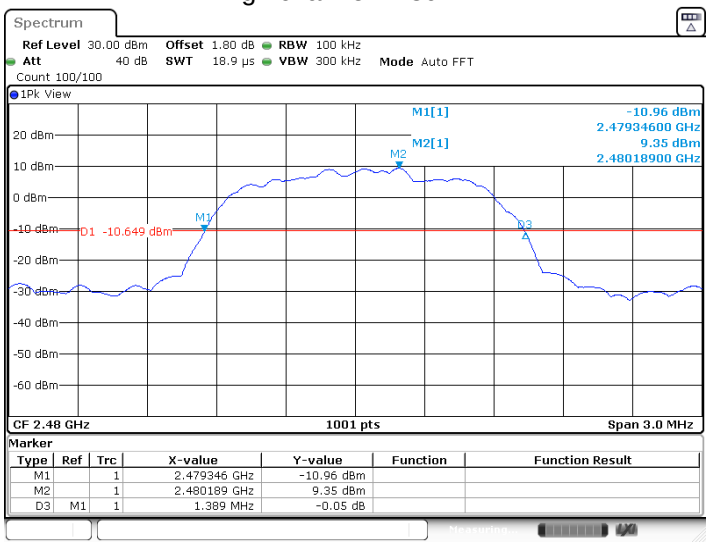


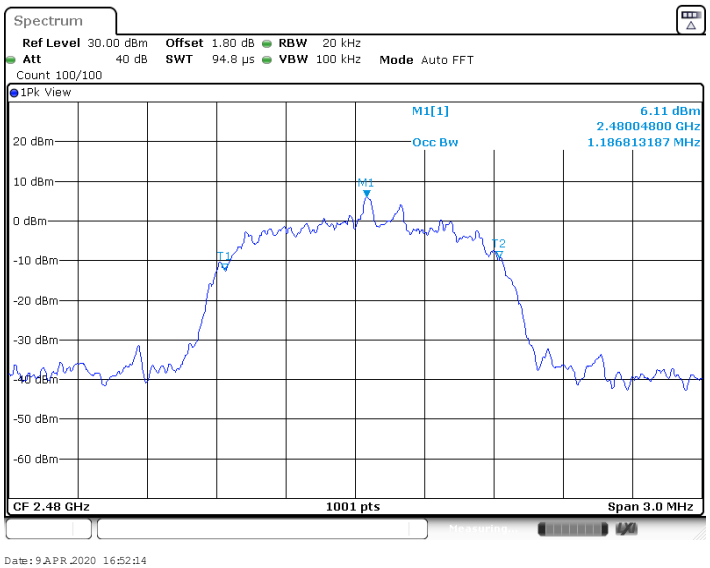


TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

20 dB bandwidth and 99% Occupied Bandwidth

High channel 2480MHz





TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

9.4 Carrier Frequency Separation

Test Method

1. The RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit to hopping mode.
3. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, VBW) ≥RBW, Sweep = auto, Detector function = peak
4. By using the Max-Hold function record the separation of two adjacent channels.
5. Measure the frequency difference of these two adjacent channels by spectrum analyzer marker function. Record the results.
6. Repeat above procedures until all frequencies measured were complete.

Limit

Limit kHz
≥25KHz or 2/3 of the 20 dB bandwidth which is greater

Frequency MHz	2/3 of 20 dB Bandwidth kHz
GFSK	754
π/4-DQPSK	920
8DPSK	926

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

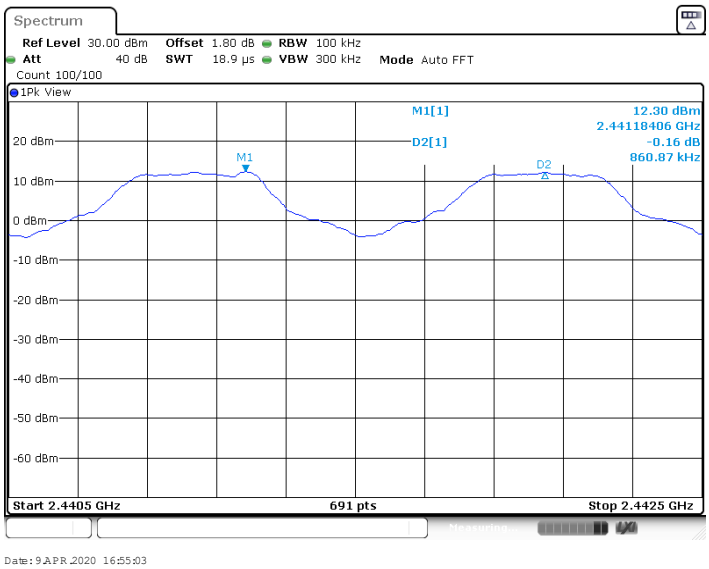
Carrier Frequency Separation

Test result: The measurement was performed with the typical configuration (normal hopping status).

GFSK Modulation test result

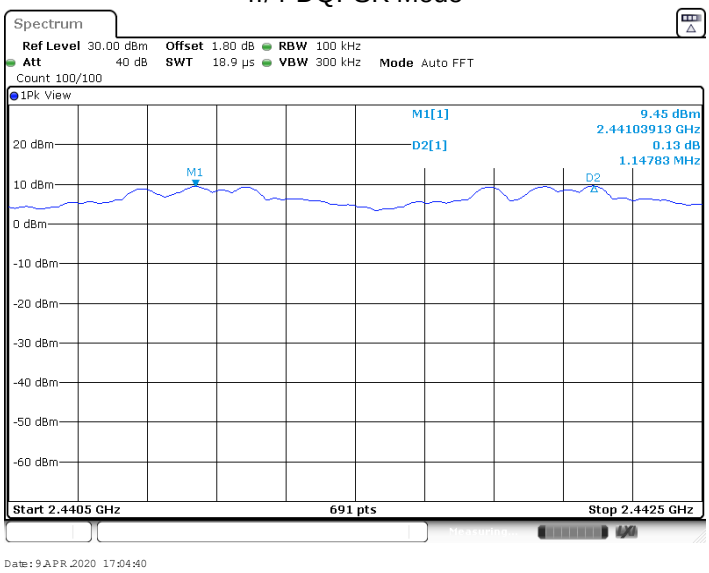
Modulation	Frequency MHz	Carrier Frequency Separation kHz	Result
GFSK	Hop	861	Pass
π/4-DQPSK	Hop	1148	Pass
8DPSK	Hop	1000	Pass

GFSK Mode

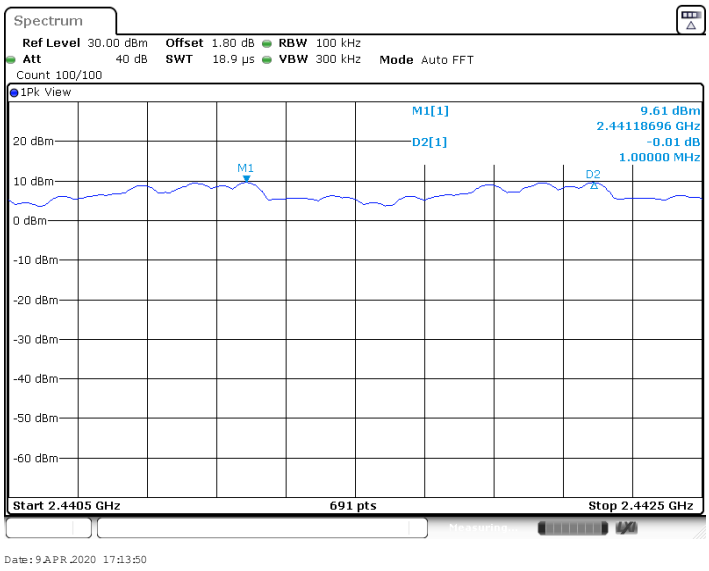


TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

π/4-DQPSK Mode



8DPSK Mode



TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

9.5 Number of hopping frequencies

Test Method

1. The RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit to hopping mode.
3. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, VBW) ≥RBW, Sweep = auto, Detector function = peak
4. Set the spectrum analyzer on Max-Hold Mode,
5. Record all the signals from each channel until each one has been recorded.
6. Repeat above procedures until all frequencies measured were complete.

Limit

Limit number
≥ 15

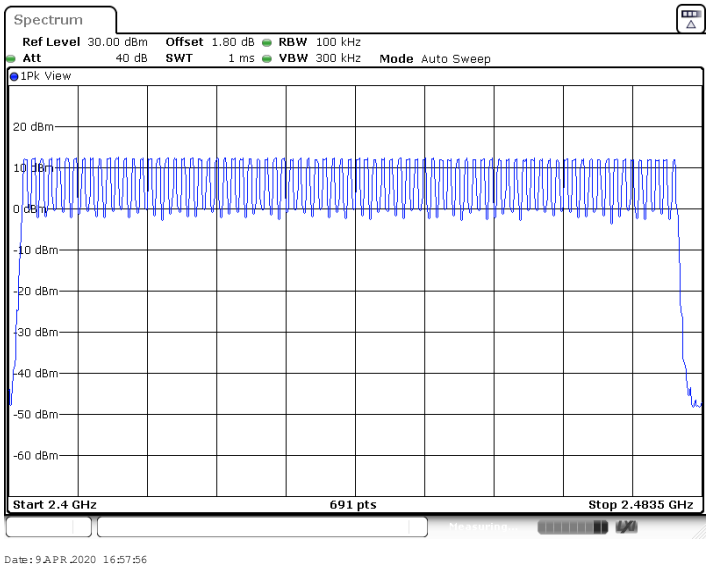
TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

Number of hopping frequencies

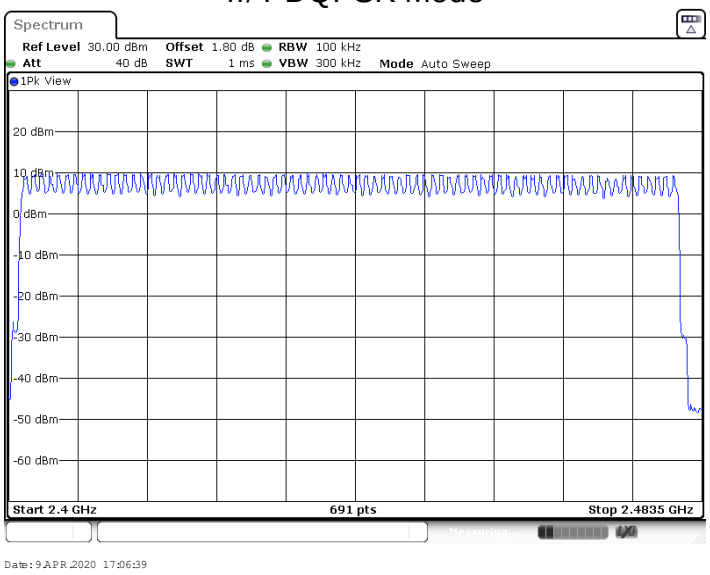
Test result: The measurement was performed with the typical configuration (normal hopping status), and the total hopping channels is constant for the all modulation mode according with the Bluetooth Core Specification.

Number of hopping frequencies	Result
79	Pass

GFSK Mode

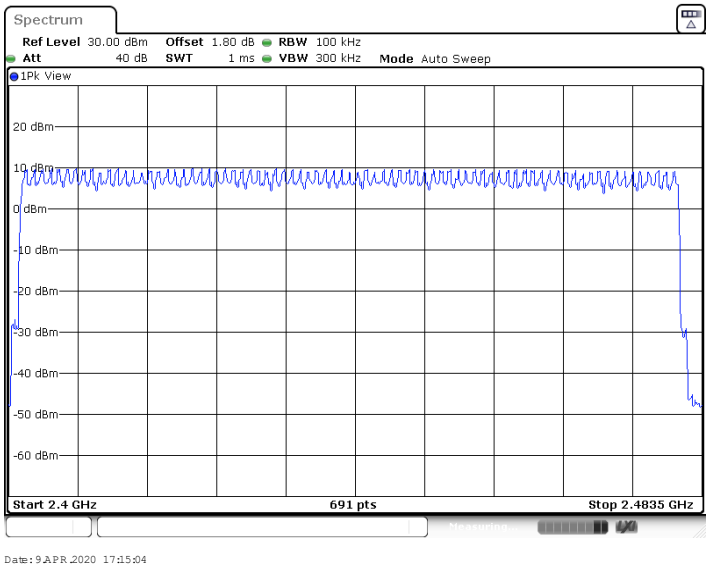


π/4-DQPSK Mode



TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

8DPSK Mode



TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

9.6 Dwell Time

Test Method

1. The RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit to hopping mode.
3. Use the following spectrum analyzer settings:
   RBW: 1MHz; VBW: 1MHz; SPAN: Zero Span
   Set the spectrum analyzer on Max-Hold Mode,
4. Adjust the center frequency of spectrum analyzer on any frequency be measured.
5. Measure the Dwell Time by spectrum analyzer Marker function. Record the results.
   Dwell Time = Burst Width * Total Hops
6. Repeat above procedures until all frequencies measured were complete.

Limit

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

Dwell Time

Dwell time

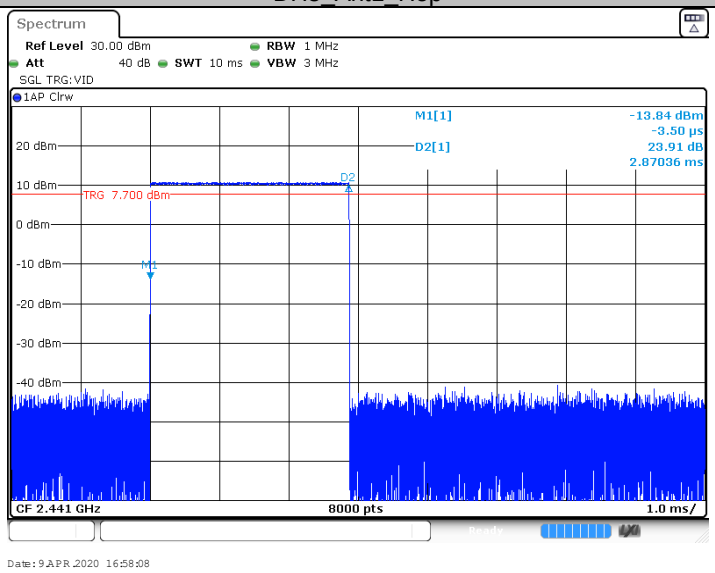
The maximum dwell time shall be 0.4 s.
The Dwell Time = Burst Width * Total Hops. The detailed calculations are showed as follows:
The duration for dwell time calculation: 0.4 [s] * hopping number = 0.4 [s] * 79 [ch] = 31.6 [s*ch];

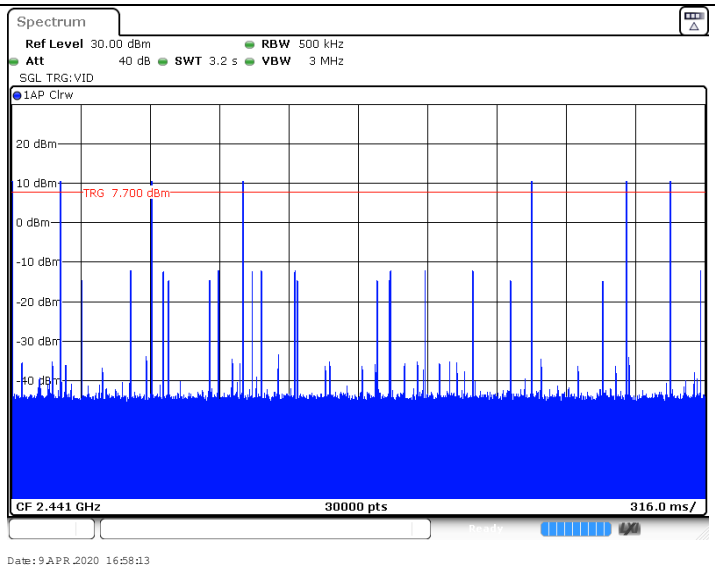
Test Result

Modulation	Mode	BurstWidth (ms)	Total Hops	Test Result (s)	Limit (s)	Result
GFSK	DH5	2.87	70	0.201	0.4	Pass
π/4-DQPSK	2DH5	2.87	110	0.316	0.4	Pass
8-DPSK	3DH5	2.88	120	0.345	0.4	Pass

GFSK Modulation

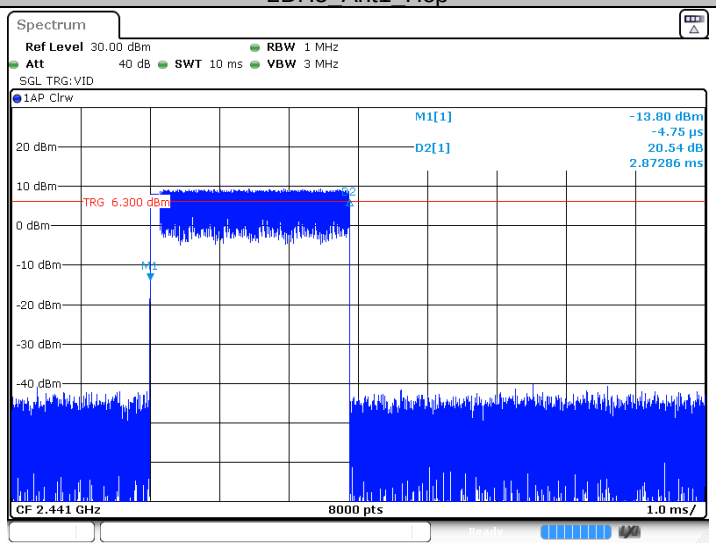
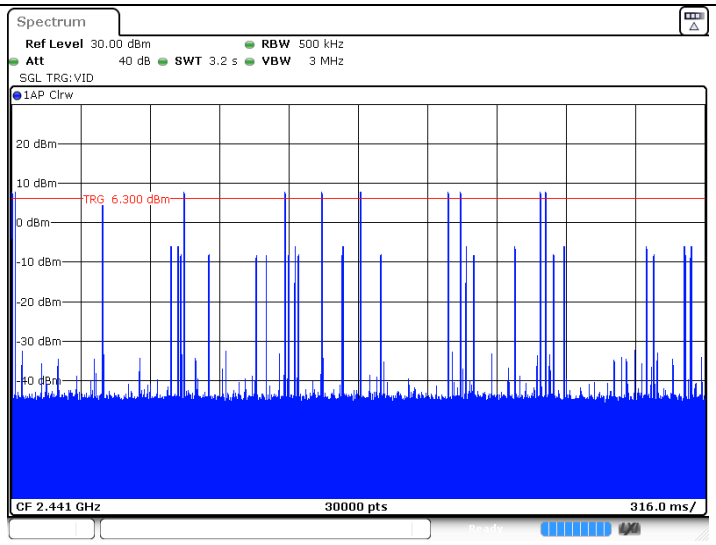
DH5_Ant1_Hop





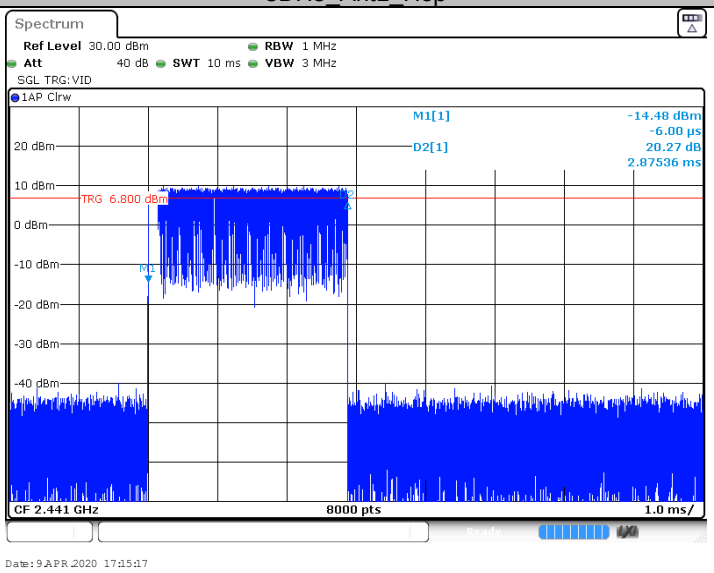
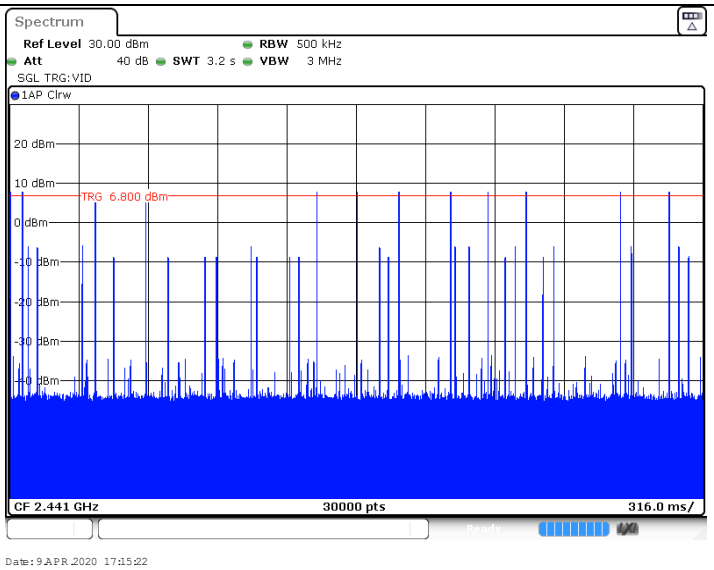
TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

π/4-DQPSK Modulation

2DH5_Ant1_Hop



TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

8-DPSK Modulation

3DH5_Ant1_Hop



TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

9.7 Spurious RF conducted emissions

Test Method

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
4. Measure and record the results in the test report.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency

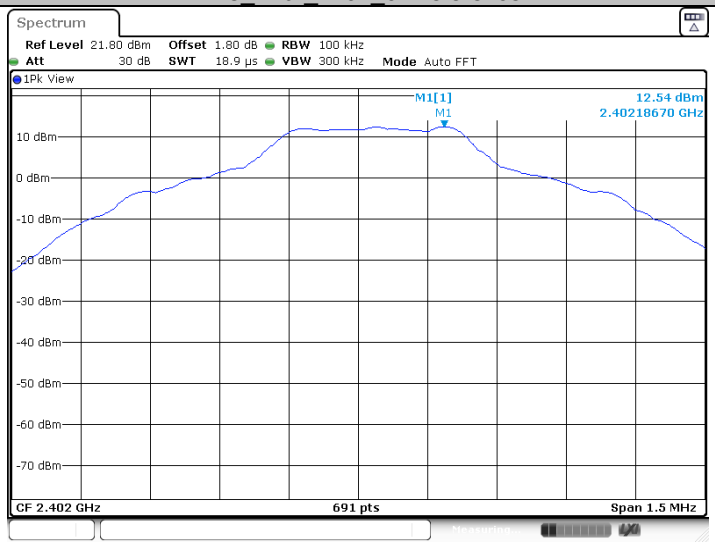
Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

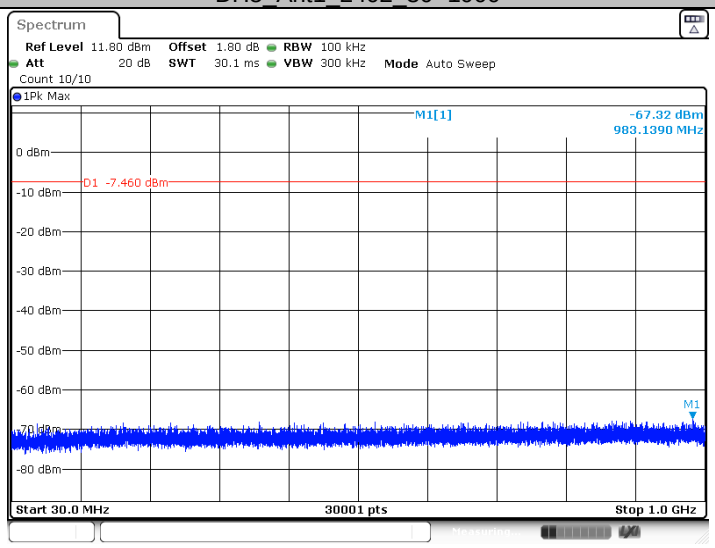
TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

Spurious RF conducted emissions

DH5_Ant1_2402_0~Reference

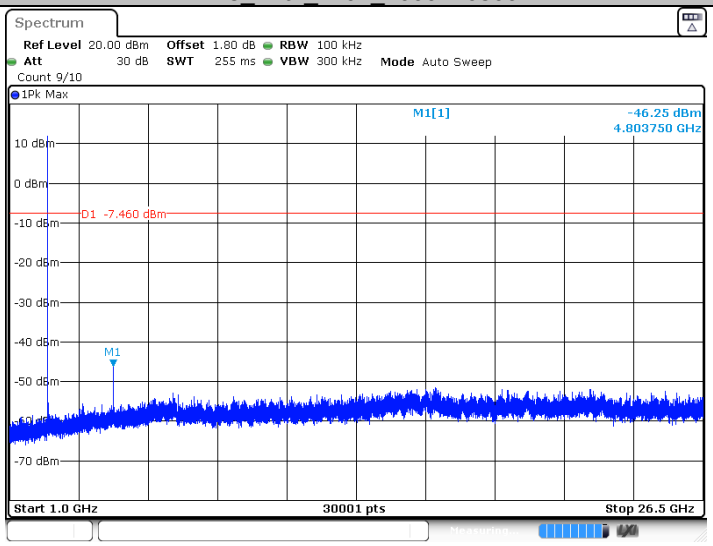


DH5_Ant1_2402_30~1000



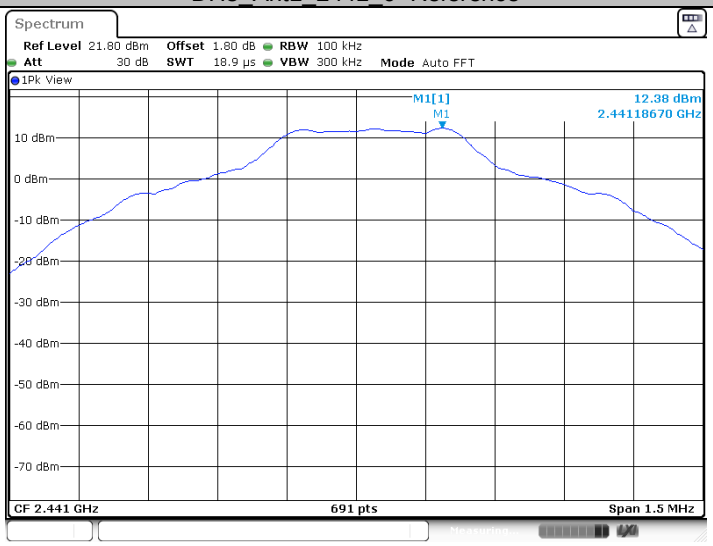
TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

DH5_Ant1_2402_1000~26500



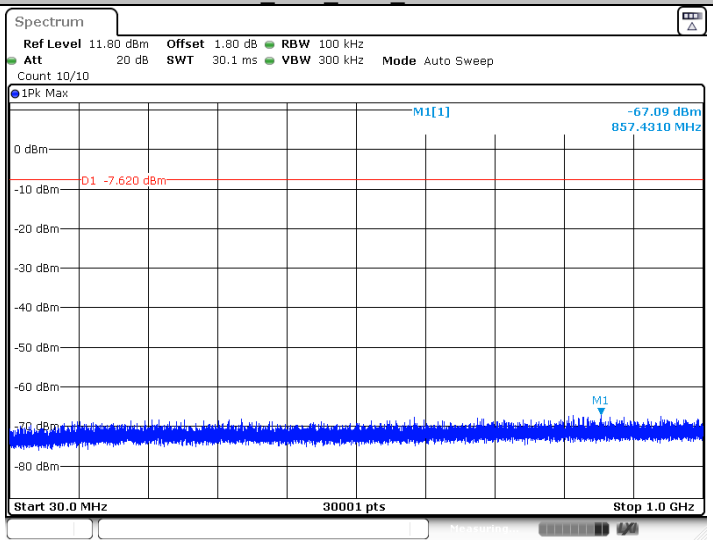
Date: 9.APR.2020 16:29:22

DH5_Ant1_2441_0~Reference



Date: 9.APR.2020 16:31:19

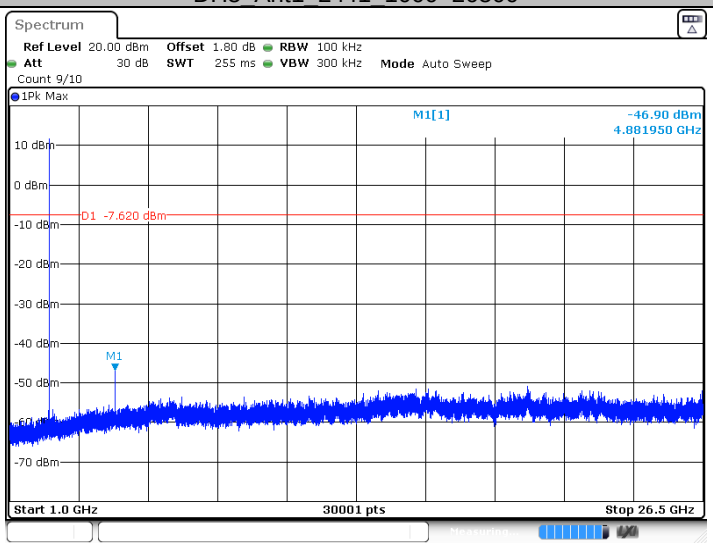
DH5_Ant1_2441_30~1000



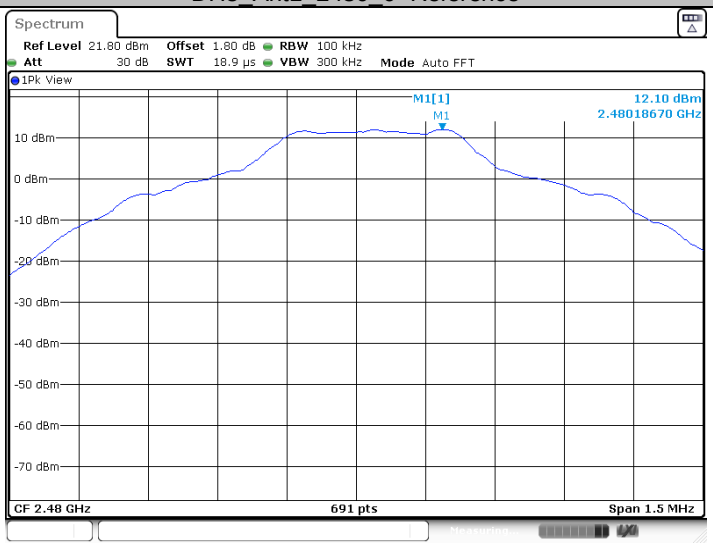
Date: 9.APR.2020 16:31:29

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

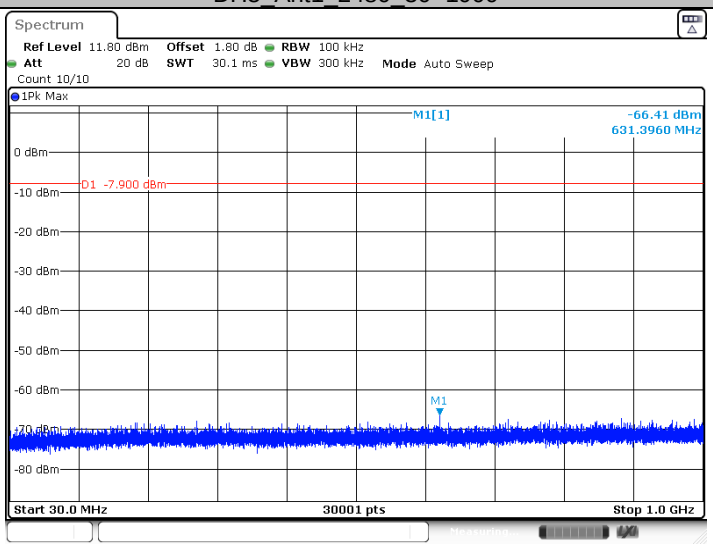
DH5_Ant1_2441_1000~26500



DH5_Ant1_2480_0~Reference

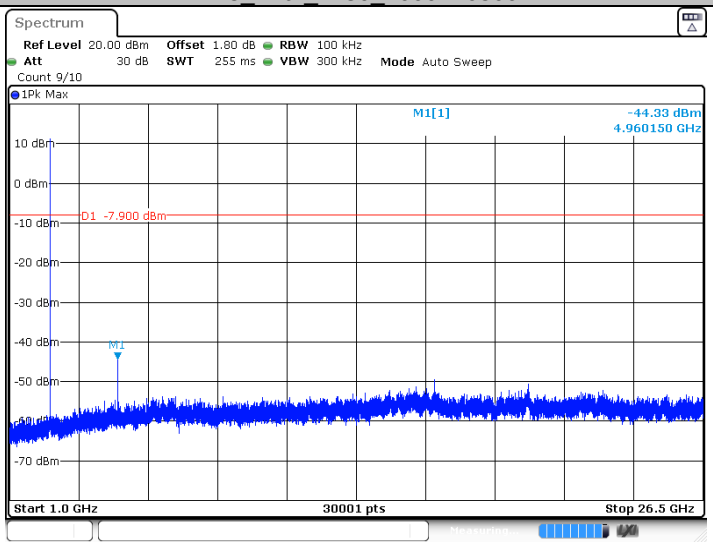


DH5_Ant1_2480_30~1000



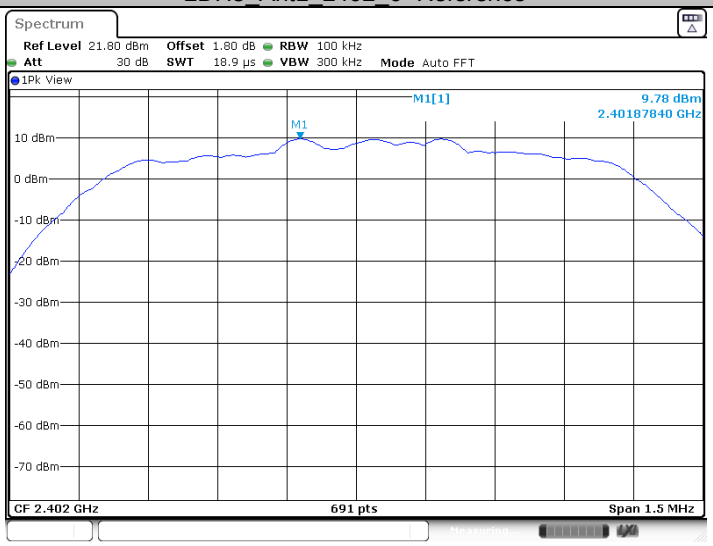
TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

DH5_Ant1_2480_1000~26500



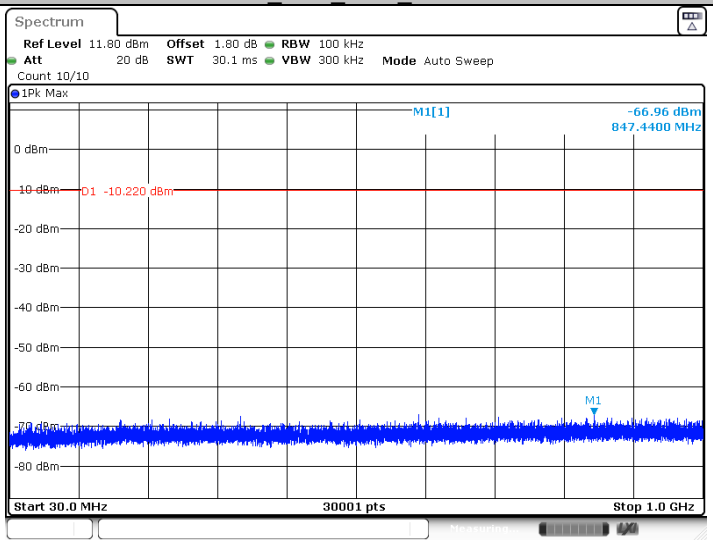
Date: 9.APR.2020 16:34:07

2DH5_Ant1_2402_0~Reference



Date: 9.APR.2020 16:36:50

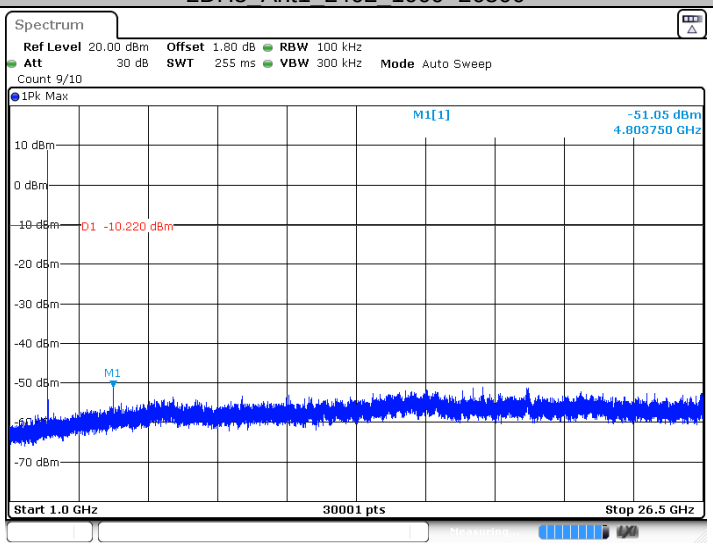
2DH5_Ant1_2402_30~1000



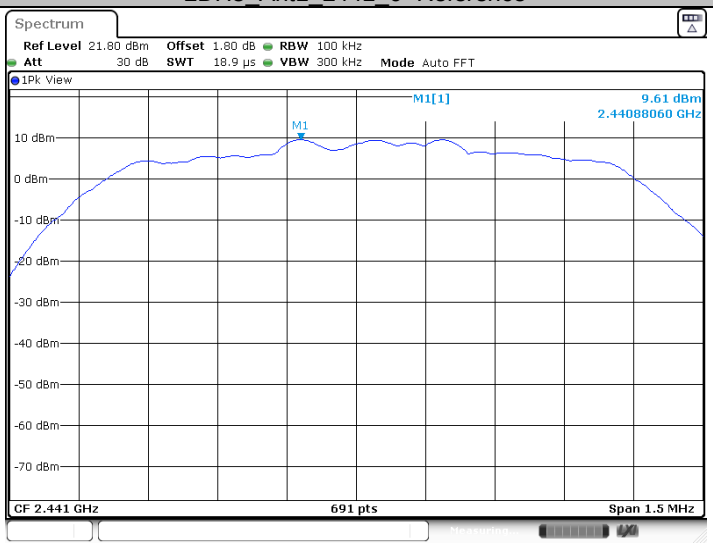
Date: 9.APR.2020 16:37:00

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

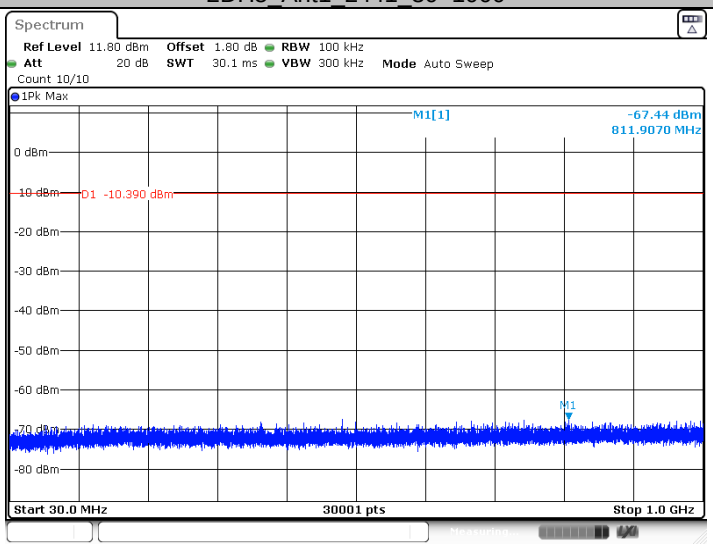
2DH5_Ant1_2402_1000~26500



2DH5_Ant1_2441_0~Reference

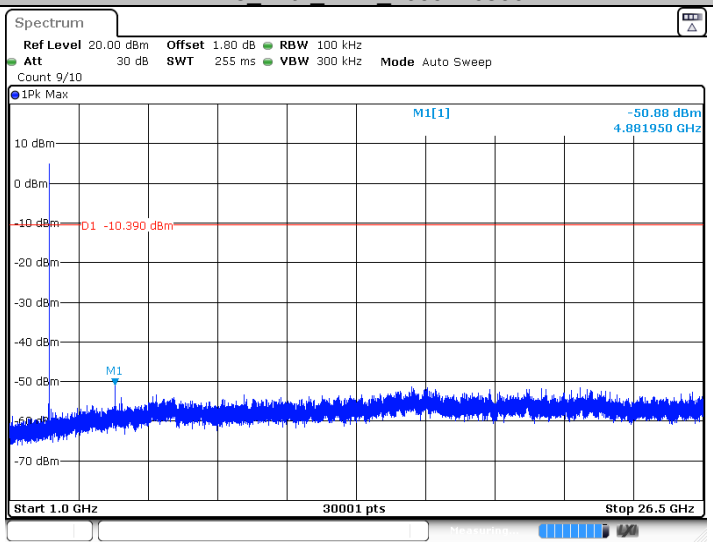


2DH5_Ant1_2441_30~1000

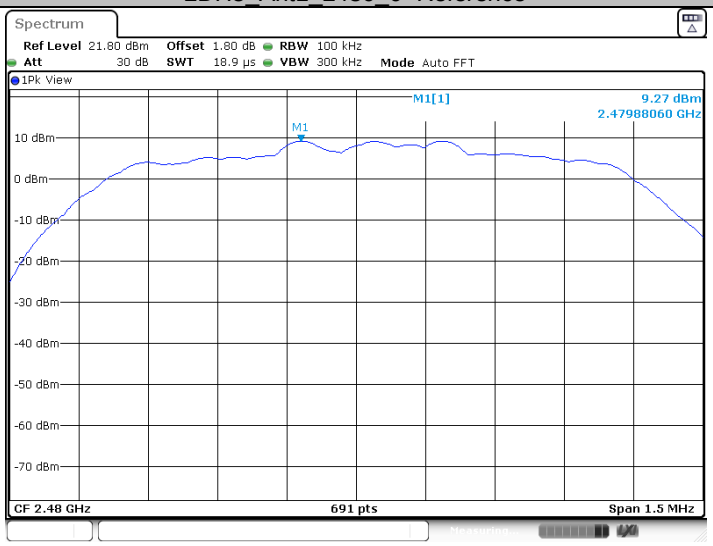


TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

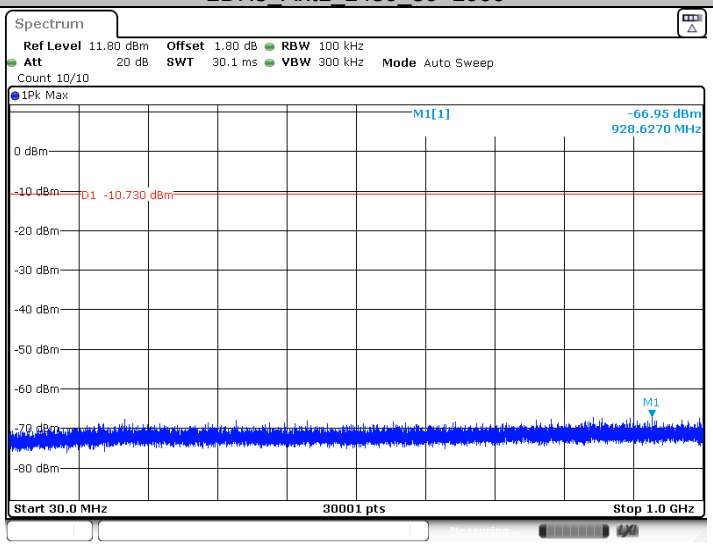
2DH5_Ant1_2441_1000~26500



2DH5_Ant1_2480_0~Reference

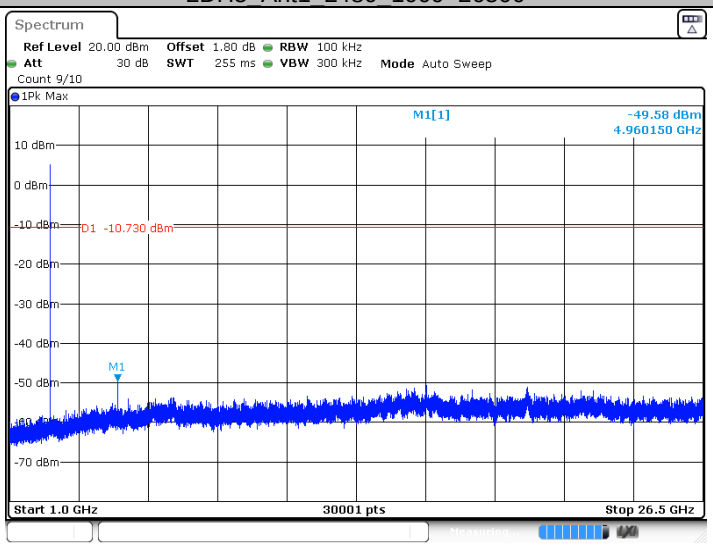


2DH5_Ant1_2480_30~1000

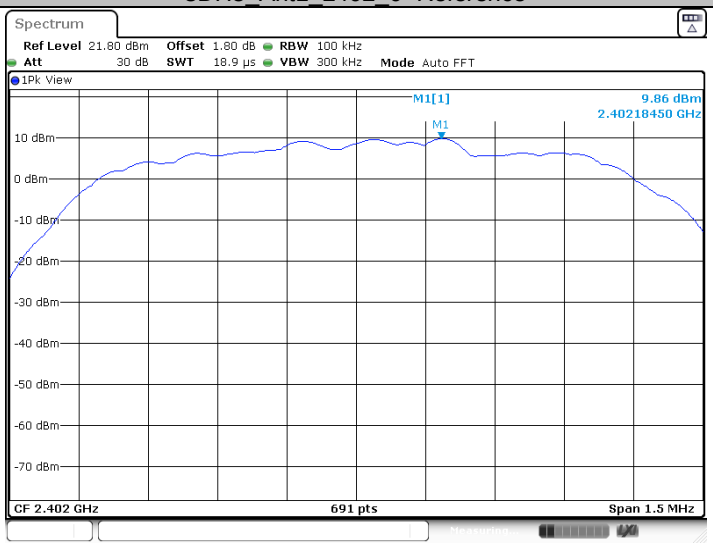


TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

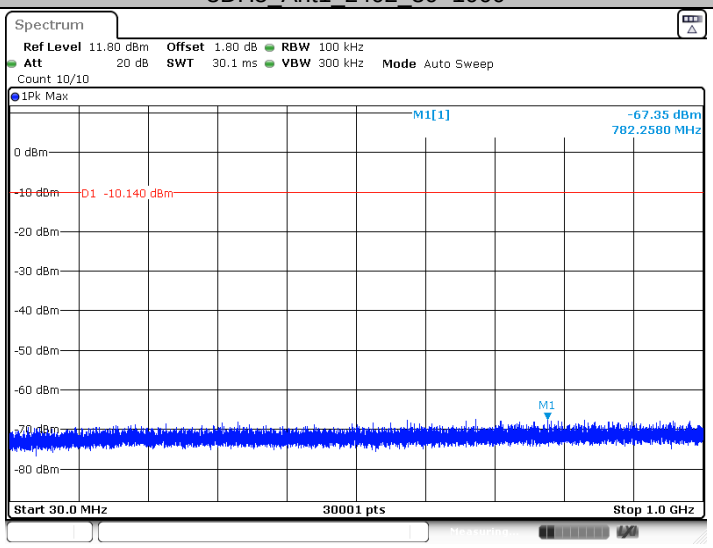
2DH5_Ant1_2480_1000~26500



3DH5_Ant1_2402_0~Reference

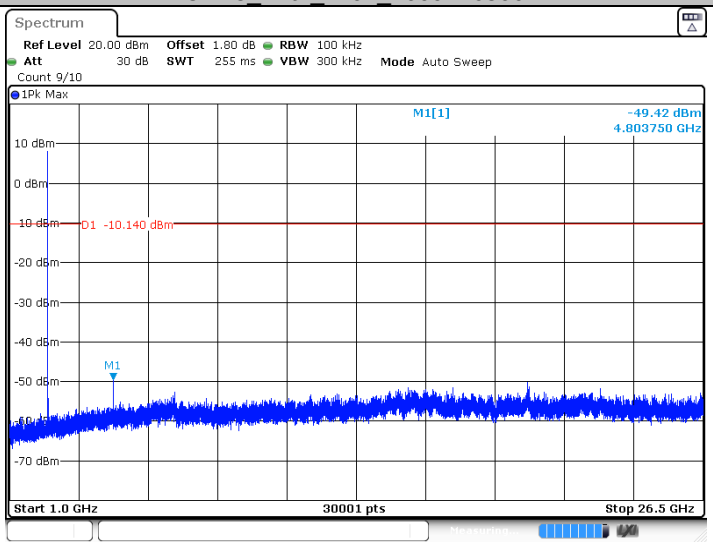


3DH5_Ant1_2402_30~1000



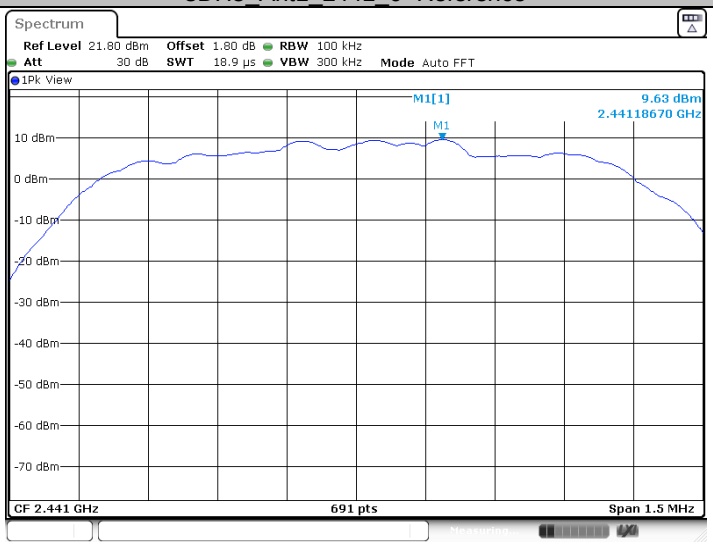
TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

3DH5_Ant1_2402_1000~26500



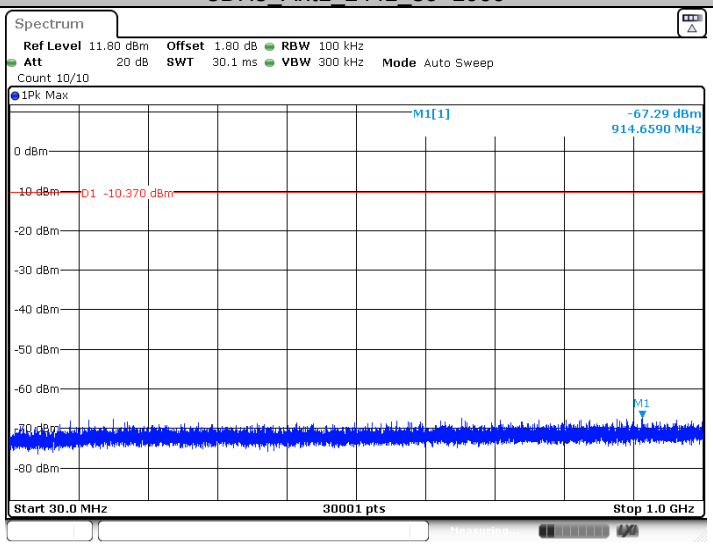
Date: 9.APR.2020 16:46:53

3DH5_Ant1_2441_0~Reference



Date: 9.APR.2020 16:50:29

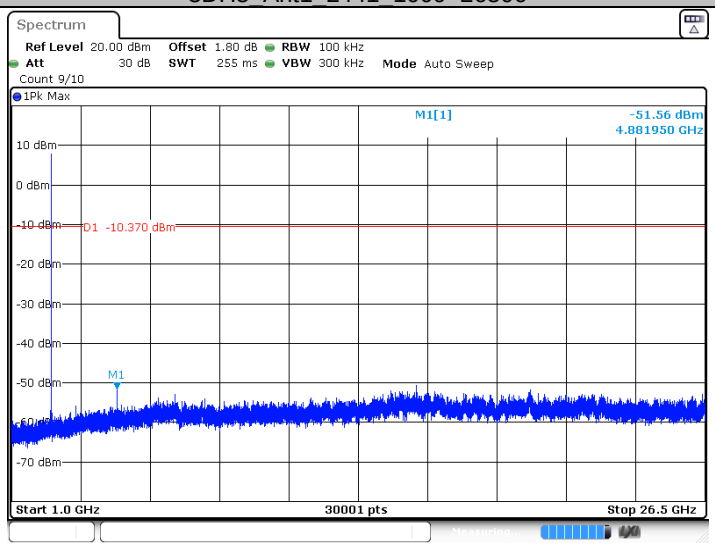
3DH5_Ant1_2441_30~1000



Date: 9.APR.2020 16:50:39

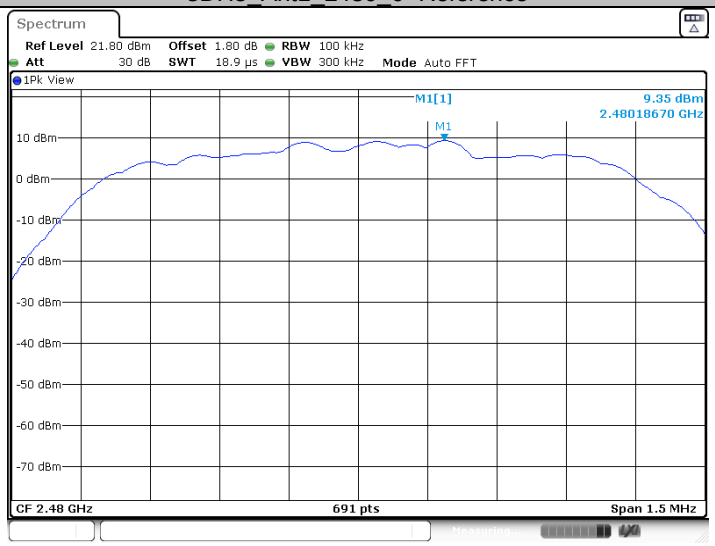
TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

3DH5_Ant1_2441_1000~26500



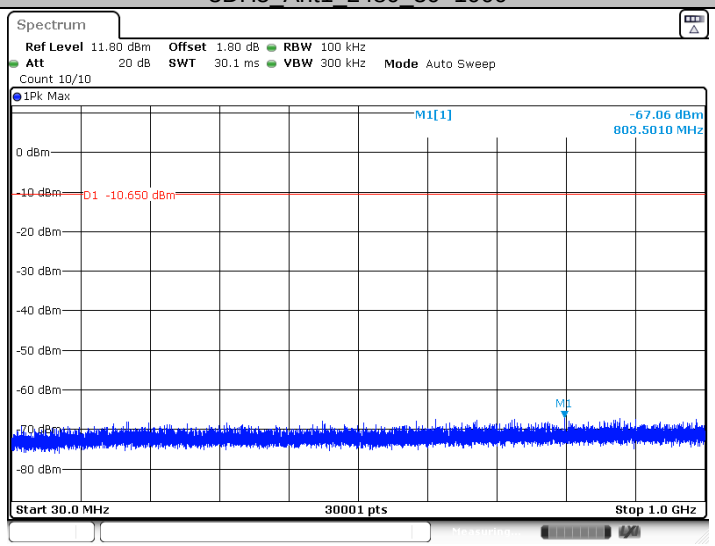
Date: 9.APR.2020 16:50:50

3DH5_Ant1_2480_0~Reference



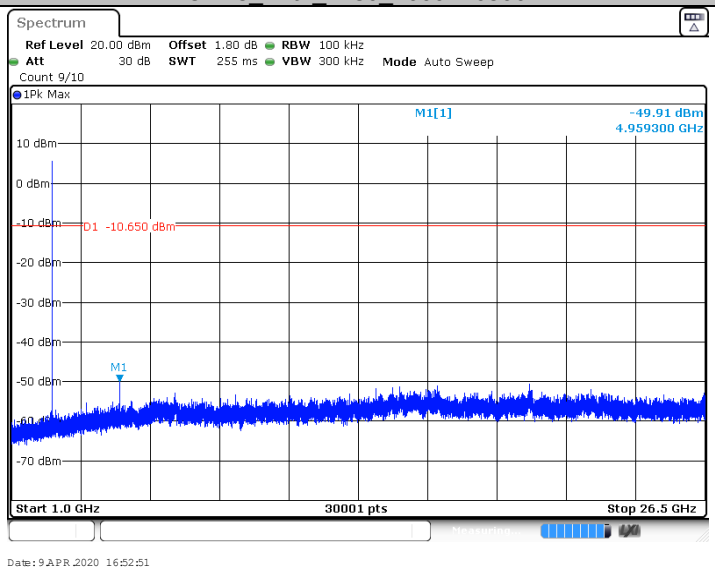
Date: 9.APR.2020 16:52:30

3DH5_Ant1_2480_30~1000



Date: 9.APR.2020 16:52:40

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

3DH5_Ant1_2480_1000~26500


TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

9.8 Band edge testing

Test Method

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
4. Measure and record the results in the test report.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency
6. Set to the maximum power setting and enable the EUT hopping mode, repeat the test.

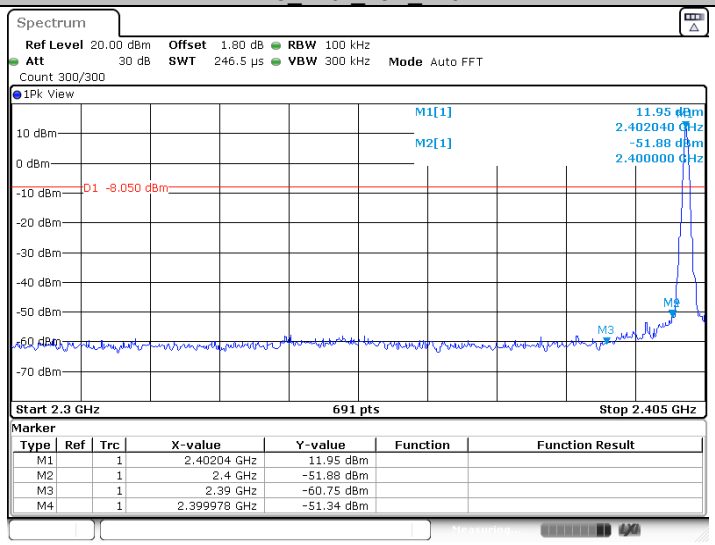
Limit:

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

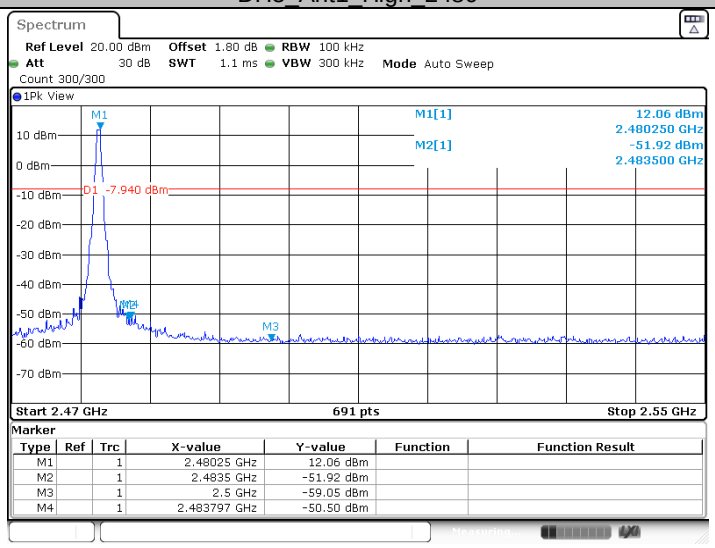
TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

Band edge

DH5_Ant1_Low_2402

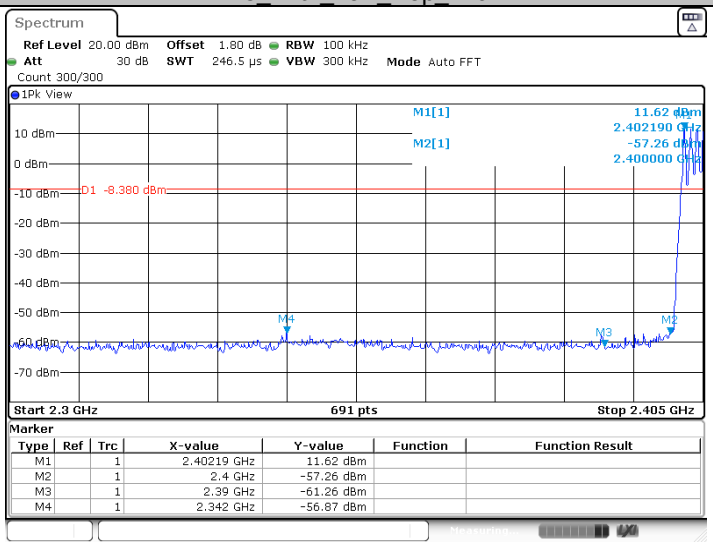


DH5_Ant1_High_2480



TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

DH5_Ant1_Low_Hop_2402

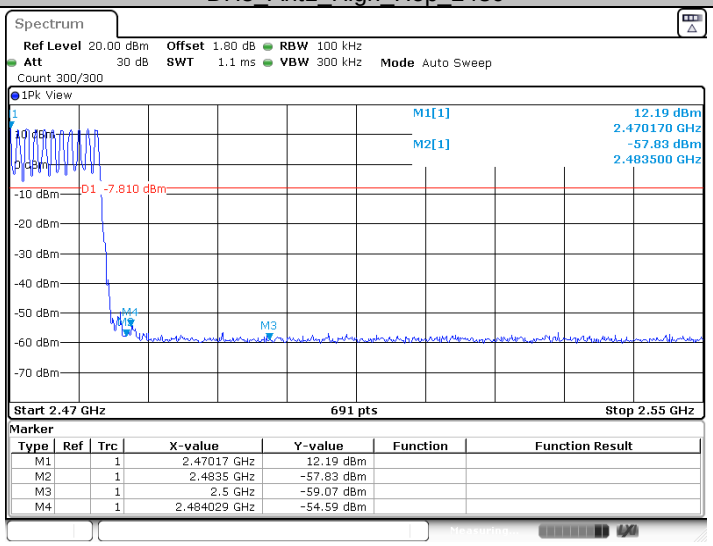


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40219 GHz	11.62 dBm		
M2		1	2.4 GHz	-57.26 dBm		
M3		1	2.39 GHz	-61.26 dBm		
M4		1	2.342 GHz	-56.87 dBm		

Date: 9.APR.2020 16:54:33

DH5_Ant1_High_Hop_2480

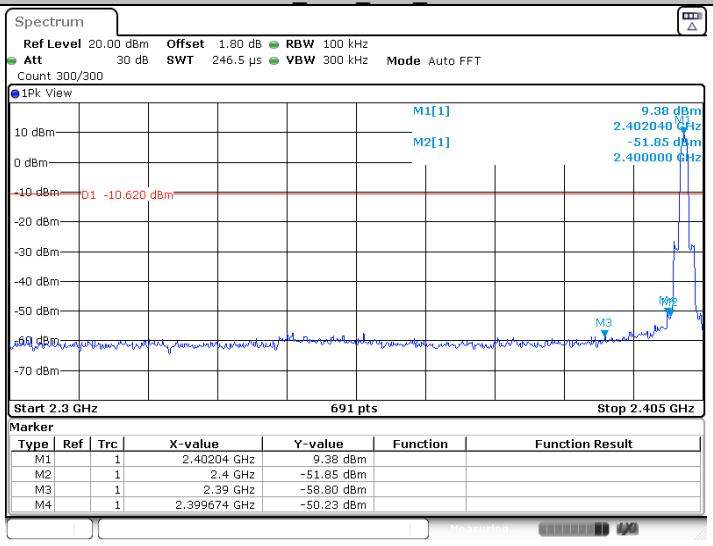


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47017 GHz	12.19 dBm		
M2		1	2.4835 GHz	-57.83 dBm		
M3		1	2.5 GHz	-59.07 dBm		
M4		1	2.484029 GHz	-54.59 dBm		

Date: 9.APR.2020 17:01:13

2DH5_Ant1_Low_2402

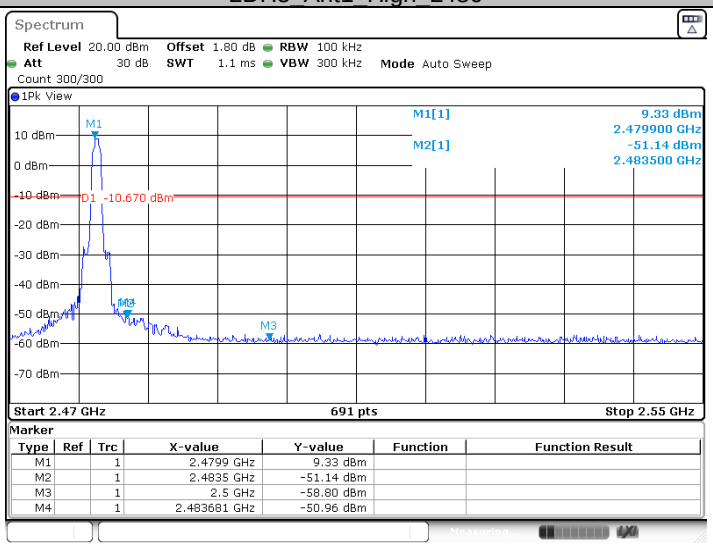


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40204 GHz	9.38 dBm		
M2		1	2.4 GHz	-51.85 dBm		
M3		1	2.39 GHz	-58.80 dBm		
M4		1	2.399674 GHz	-50.23 dBm		

Date: 9.APR.2020 16:36:44

2DH5_Ant1_High_2480

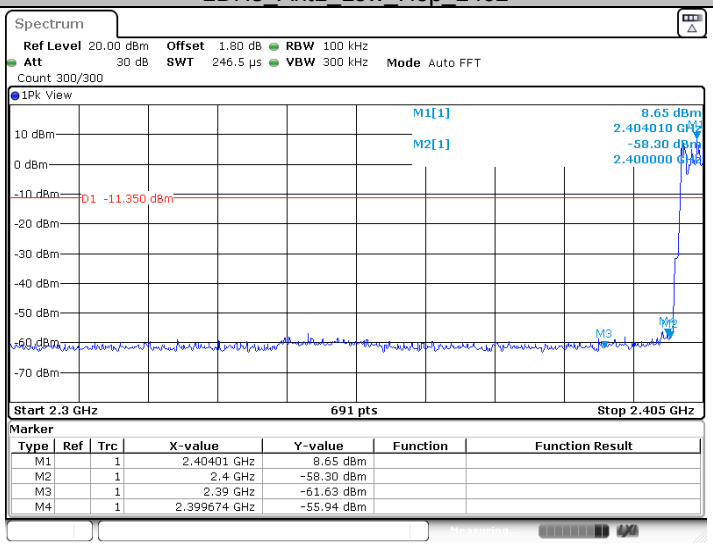


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4799 GHz	9.33 dBm		
M2		1	2.4835 GHz	-51.14 dBm		
M3		1	2.5 GHz	-58.80 dBm		
M4		1	2.483681 GHz	-50.96 dBm		

Date: 9.APR.2020 16:42:13

2DH5_Ant1_Low_Hop_2402

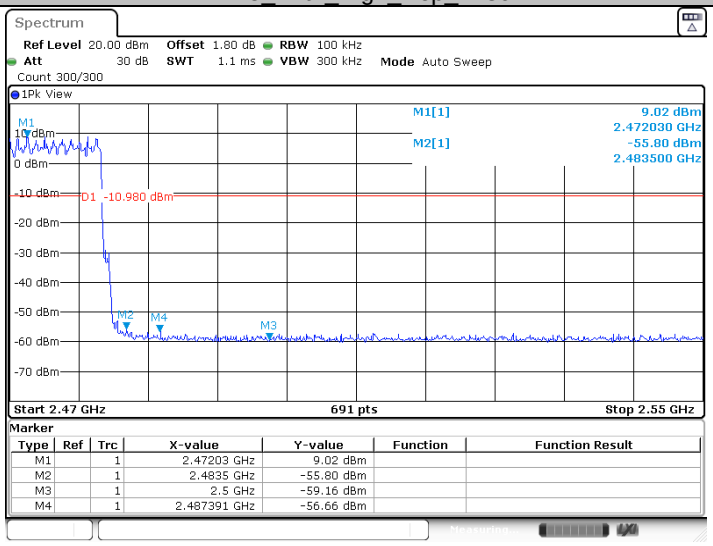


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40401 GHz	8.65 dBm		
M2		1	2.4 GHz	-58.30 dBm		
M3		1	2.39 GHz	-61.63 dBm		
M4		1	2.399674 GHz	-55.94 dBm		

Date: 9.APR.2020 17:02:45

2DH5_Ant1_High_Hop_2480



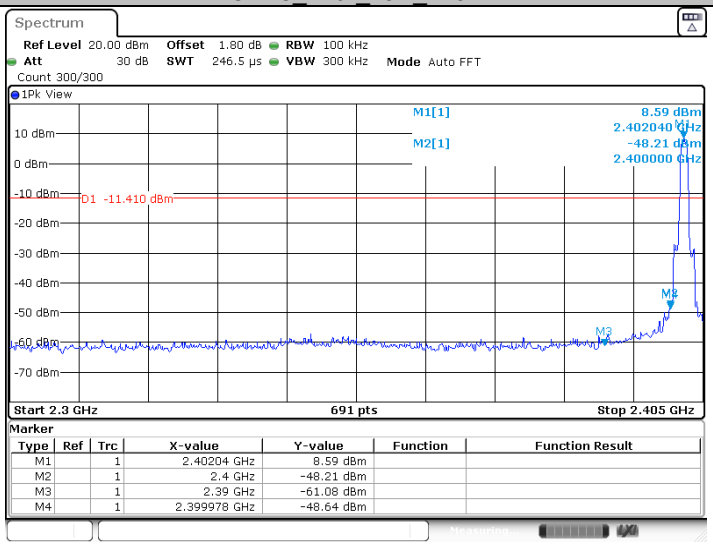
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47203 GHz	9.02 dBm		
M2		1	2.4835 GHz	-55.80 dBm		
M3		1	2.5 GHz	-59.16 dBm		
M4		1	2.487391 GHz	-56.66 dBm		

Date: 9.APR.2020 17:11:27

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

3DH5_Ant1_Low_2402

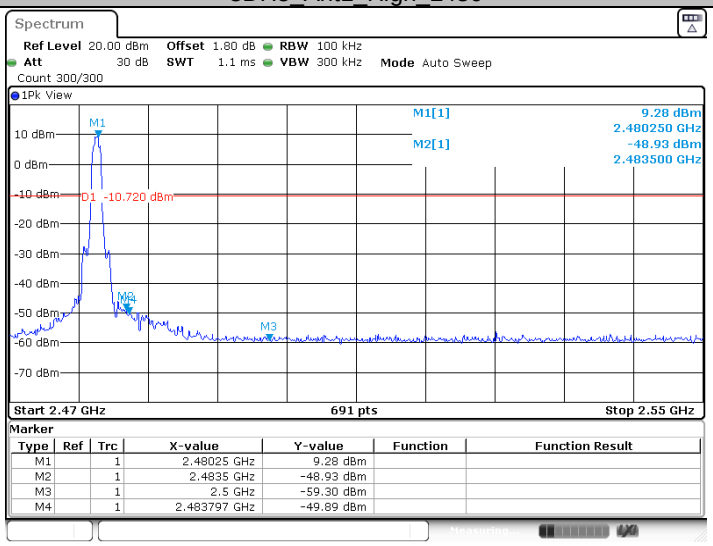


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40204 GHz	8.59 dBm		
M2		1	2.4 GHz	-48.21 dBm		
M3		1	2.39 GHz	-61.08 dBm		
M4		1	2.399978 GHz	-48.64 dBm		

Date: 9.APR.2020 16:46:26

3DH5_Ant1_High_2480

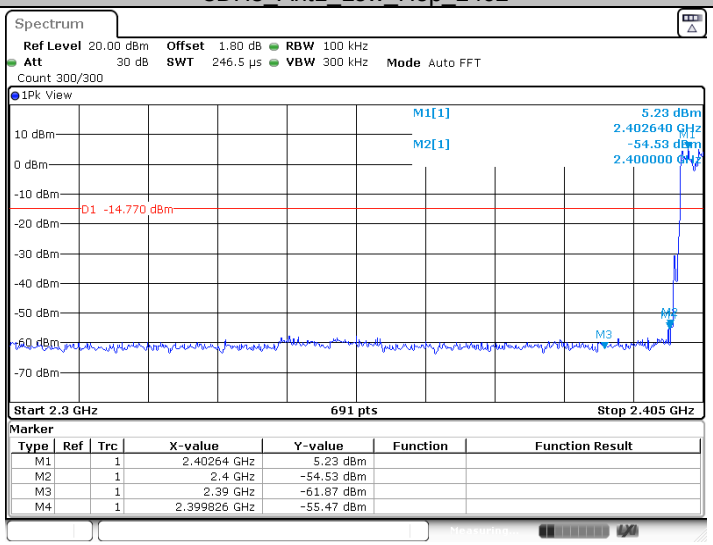


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.48025 GHz	9.28 dBm		
M2		1	2.4835 GHz	-48.93 dBm		
M3		1	2.5 GHz	-59.30 dBm		
M4		1	2.483797 GHz	-49.89 dBm		

Date: 9.APR.2020 16:52:24

3DH5_Ant1_Low_Hop_2402

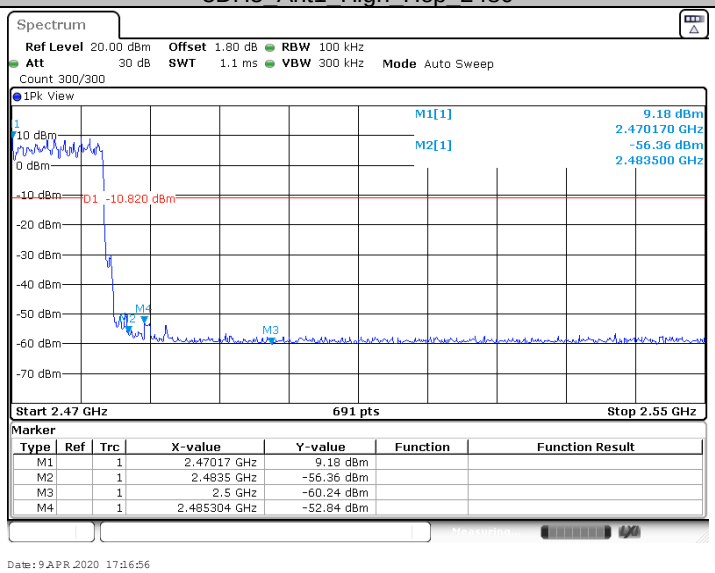


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40264 GHz	5.23 dBm		
M2		1	2.4 GHz	-54.53 dBm		
M3		1	2.39 GHz	-61.87 dBm		
M4		1	2.399826 GHz	-55.47 dBm		

Date: 9.APR.2020 17:12:17

3DH5_Ant1_High_Hop_2480



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47017 GHz	9.18 dBm		
M2		1	2.4835 GHz	-56.36 dBm		
M3		1	2.5 GHz	-60.24 dBm		
M4		1	2.485304 GHz	-52.84 dBm		

Date: 9.APR.2020 17:16:56

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

9.9 Spurious radiated emissions for transmitter

Test Method

1: The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
3: The height of antenna 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.
4: 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.
5: Use the following spectrum analyzer settings According to C63.10:
For Below 1GHz
Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 KHz to 120KHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Peak unwanted emissions Above 1GHz:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.
Procedures for average unwanted emissions measurements above 1000 MHz
a) RBW = 1MHz.
b) VBW \ [3 × RBW].
c) Detector = RMS (power averaging), if [span / (# of points in sweep)] \ RBW / 2. Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.
d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)
e) Sweep time = auto.
f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)
g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 log (1 / D)], where D is the duty cycle. For example, if the transmit duty

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

cycle was 50%, then 3 dB shall be added to the measured emission levels.
2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.
3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

Limit

The radio emission outside the operating frequency band 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. Radiated emissions which fall in the restricted bands, as defined in section15.205 and RSS-GEN 8.10, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

Spurious radiated emissions for transmitter

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

The only worse case (GFSK mode) test result is listed in the report.

Transmitting spurious emission test result as below:

GFSK Modulation 2402MHz Test Result

Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Correct factor	Result
	MHz	dBuV/m		dBµV/m		dBuV/m	(dB/m)	
30-1000MHz	359.23	33.21	H	46.00	QP	12.79	20	Pass
	734.21	31.21	H	46.00	QP	14.79	28	Pass
	534.51	25.87	V	46.00	QP	20.13	26	Pass
	934.34	31.67	V	46.00	QP	14.33	30	Pass
1000-25000MHz	4728.50*	48.55	H	74	PK	25.45	2.8	Pass
	5850.50	49.96	H	74	PK	24.04	4.1	Pass
	4582.50*	49.30	V	74	PK	24.70	2.8	Pass
	6380.00	50.63	V	74	PK	23.37	6.2	Pass

GFSK Modulation 2441MHz Test Result

Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Correct factor	Result
	MHz	dBuV/m		dBµV/m		dBuV/m	(dB/m)	
1000-25000MHz	4896.00*	49.40	H	74	PK	24.60	2.6	Pass
	6336.50	50.68	H	74	PK	23.32	6.0	Pass
	4547.50*	49.24	V	74	PK	24.76	3.0	Pass
	5766.50	49.98	V	74	PK	24.02	3.3	Pass

GFSK Modulation 2480MHz Test Result

Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Correct factor	Result
	MHz	dBuV/m		dBµV/m		dBuV/m	(dB/m)	
1000-25000MHz	4748.50*	48.64	H	74	PK	25.36	3.0	Pass
	6232.00	49.20	H	74	PK	24.80	5.6	Pass
	3781.50*	47.35	V	74	PK	26.65	0.0	Pass
	5368.500*	48.94	V	74	PK	25.06	3.1	Pass

Remark:

(1) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

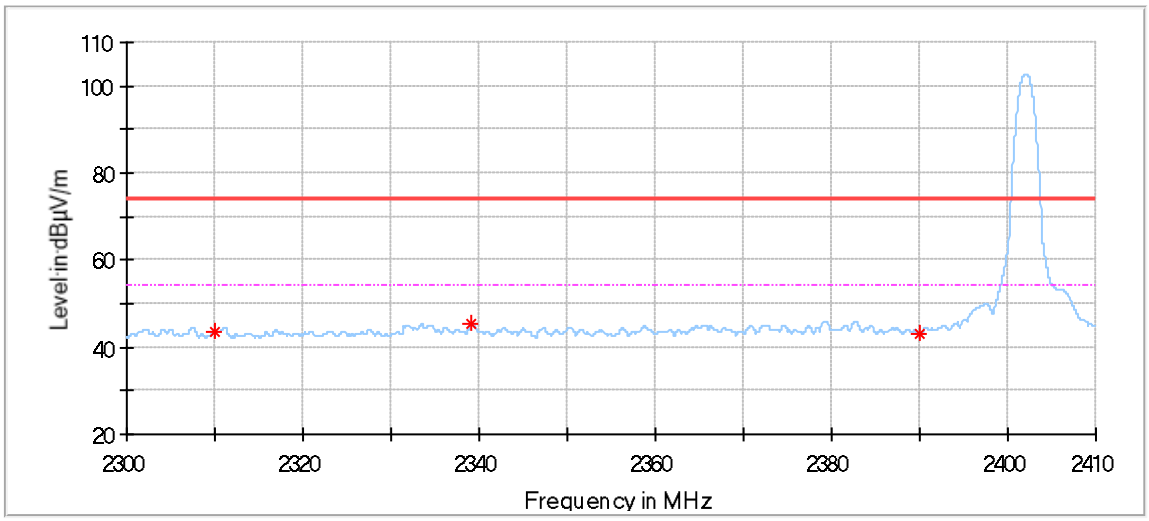
(2) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are the noise floor or attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

(3) Corrected Amplitude = Read level + Corrector factor
Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

Restricted bands of operation. test result as below:

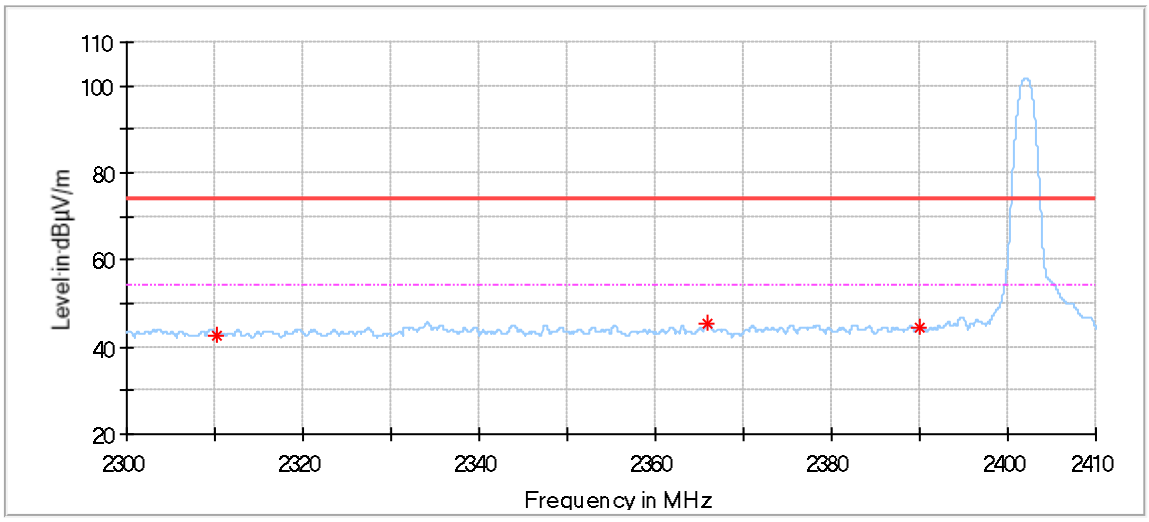
GFSK Modulation 2402MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2310.000000	43.48	74.00	30.52	150.0	H	234.0	-5.1
2339.187500	45.28	74.00	28.72	150.0	H	318.0	-4.9
2390.000000	43.23	74.00	30.77	150.0	H	177.0	-4.8

Remark:
Level=Reading Level + Correction Factor
Correction Factor=Antenna Factor + Cable Loss – Pre-amplifier
(The Reading Level is recorded by software which is not shown in the sheet)

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

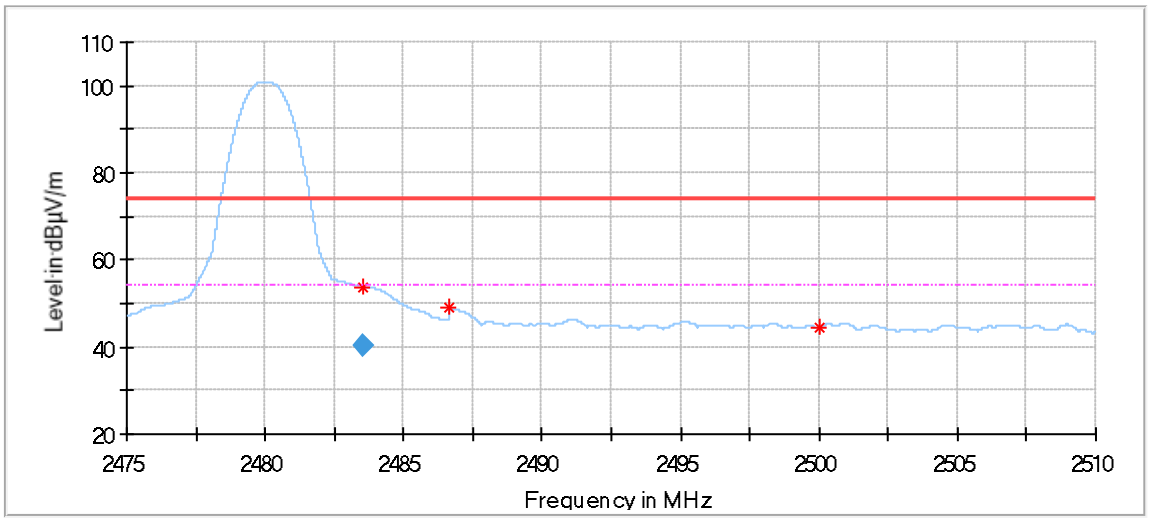


Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2310.257500	42.39	74.00	31.61	150.0	V	222.0	-5.1
2365.945000	45.32	74.00	28.68	150.0	V	304.0	-4.8
2390.090000	44.38	74.00	29.62	150.0	V	294.0	-4.8

Remark:
Level=Reading Level + Correction Factor
Correction Factor=Antenna Factor + Cable Loss – Pre-amplifier
(The Reading Level is recorded by software which is not shown in the sheet)

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

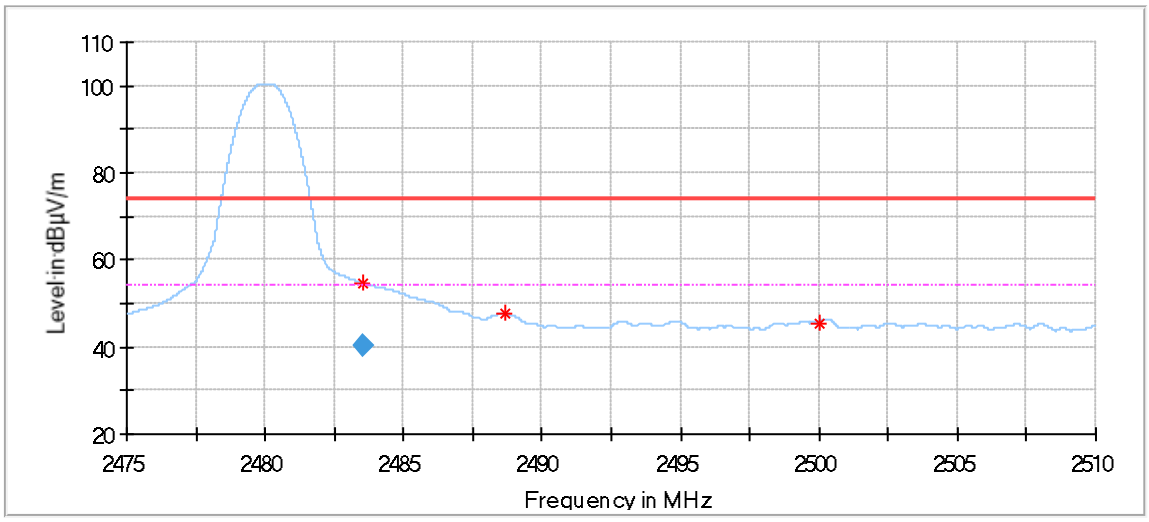
GFSK Modulation 2480MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.500000	53.65	74.00	20.35	150.0	H	110.0	-4.1
2486.672500	48.88	74.00	25.12	150.0	H	348.0	-4.2
2500.000000	44.45	74.00	29.55	150.0	H	10.0	-4.0
Frequency (MHz)	**Average (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**	**Height (cm)**	**Pol**	**Azimuth (deg)**	**Corr. (dB/m)**
2483.500000	40.21	54.00	13.79	150.0	H	110.0	-4.1

Remark:
Level=Reading Level + Correction Factor
Correction Factor=Antenna Factor + Cable Loss – Pre-amplifier
(The Reading Level is recorded by software which is not shown in the sheet)

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.500000	54.78	74.00	19.22	150.0	V	130.0	-4.2
2488.650000	47.64	74.00	26.36	150.0	V	316.0	-4.2
2500.000000	45.60	74.00	28.40	150.0	V	156.0	-4.0
Frequency (MHz)	**Average (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**	**Height (cm)**	**Pol**	**Azimuth (deg)**	**Corr. (dB/m)**
2483.500000	40.36	54.00	13.64	150.0	V	130.0	-4.2

Remark:
Level=Reading Level + Correction Factor
Correction Factor=Antenna Factor + Cable Loss – Pre-amplifier
(The Reading Level is recorded by software which is not shown in the sheet)

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

10 Test Equipment List

Conducted Emission Test

Description	Manufacturer	Model no.	Serial no.	cal. due date
EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2020-6-28
LISN	Rohde & Schwarz	ENV4200	100249	2020-6-28
Attenuator	Shanghai Huaxiang	TS2-26-3	080928189	2020-6-28
Test software	Rohde & Schwarz	EMC32	Version9.15.00	N/A

Radiated Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2020-6-28
High Pass Filter (HPF)	UCL	UCL-BPF1-7G	1504005103	2020-6-28
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2020-6-29
Horn Antenna	Rohde & Schwarz	HF907	102295	2020-6-22
Wideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	12827	2020-7-12
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2020-6-28
Pre-amplifier	Rohde & Schwarz	SCU 40A	100432	2020-7-16
Attenuator	Agilent	8491A	MY39264334	2020-6-28
3m Semi-anechoic chamber	TDK	9X6X6	----	2020-7-7
Test software	Rohde & Schwarz	EMC32	Version 9.15.00	N/A

RF conducted test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	101030	2020-6-28
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	2020-6-28
Power Splitter	Weinschel	1580	SC319	2020-7-7
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	2020-7-6
Test software	Tonscend	System for BT/WIFI	Version 2.6	N/A

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Conducted Emission 150kHz-30MHz (for test using AMN ENV432 or ENV4200)	3.62dB
Uncertainty for Radiated Spurious Emission 25MHz-3000MHz	Horizontal: 4.81dB; Vertical: 4.89dB;
Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz	Horizontal: 4.69dB; Vertical: 4.68dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	Horizontal: 4.89dB; Vertical: 4.87dB;
Uncertainty for Conducted RF test with TS 8997	RF Power Conducted: 1.16dB Frequency test involved: 0.6×10^{-7} or 1%

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299