

ISED TEST REPORT FOR CERTIFICATION
On Behalf of

Hui Zhou Gaoshengda Technology Co., Ltd

WIFI+BT Module

Model Number: WKCT27M2501

IC: 12290A-WKCT27

Applicant:	Hui Zhou Gaoshengda Technology Co.,LTD
Address:	NO.75 Zhongkai Development Area, Huizhou, Guangdong, China
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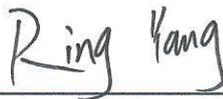
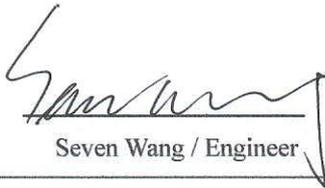
Report Number:	ESTE-R2201205
Date of Test:	Dec. 17, 2021~Jan. 18, 2022
Date of Report:	Jan. 24, 2022

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EST Technology Co., Ltd.

Applicant: Address:	Hui Zhou Gaoshengda Technology Co.,LTD NO.75 Zhongkai Development Area, Huizhou, Guangdong, China		
Manufacturer: Address:	Hui Zhou Gaoshengda Technology Co.,LTD NO.75 Zhongkai Development Area, Huizhou, Guangdong, China		
Factory: Address:	Hui Zhou Gaoshengda Technology Co.,LTD NO.75 Zhongkai Development Area, Huizhou, Guangdong, China		
E.U.T:	WIFI+BT Module		
Model Number:	WKCT27M2501		
Power Supply:	DC 3.3V From PC		
Trade Name:	GSD	Serial No.:	-----
Date of Receipt:	Dec. 17, 2021	Date of Test:	Dec. 17, 2021~Jan. 18, 2022
Test Specification:	RSS-247 Issue 2 RSS-Gen Issue 5 ANSI C63.10:2013		
Test Result:	<p>The device described above is tested by EST Technology Co., Ltd. The measurement results were contained in this test report and EST Technology Co., Ltd. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the Regulations RSS-247 and RSS-Gen requirements.</p> <p>This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd.</p>		
		Date:	Jan. 24, 2022
Prepared by:	Reviewed by:	Approved by:	
			
Ring Yang / Assistant	Seven Wang / Engineer	Iceman Hu / Manager	
Other Aspects:	None.		
<i>Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested</i>			
<i>This test report is based on a single evaluation of one sample of above mentioned products ,It is not permitted to be duplicated in extracts without written approval of EST Technology Co., Ltd.</i>			

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Product Name	:	WIFI+BT Module
Model Number	:	WKCT27M2501
Operation frequency	:	2402MHz~2480MHz
Number of channel	:	79
Max Output Power (PEAK)	:	4.51dBm
Modulation Type	:	BT BDR(1Mbps): GFSK BT EDR(2Mbps): $\pi/4$ -DQPSK BT EDR(3Mbps): 8-DPSK
Software Version	:	V01
Hardware Version	:	V01
Sample Type	:	Prototype production

Note:

For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

1.2. Antenna Information

Ant No.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	-	-	PCB	-	2.8

Note: This information is provided by the applicant.

1.3. Information of RF Cable

Cable Loss(dB)	Provided by
1.0	Hui Zhou Gaoshengda Technology Co., Ltd

Note: 1.The customer declared the loss value of the RF Cable, and the test results of this report only apply to the sample as received.
2. This information is provided by the applicant.

2. SUMMARY OF TEST

2.1. Summary of test result

Report Section	Description of Test Item	IC Standards Section	Results
3	Maximum Peak Output Power	RSS-247 5.1 (b)	PASS
4	20dB Bandwidth&99% Occupied Bandwidth	RSS-247 5.1 (a) RSS-247 5.1 (b) RSS-Gen 6.7	PASS
5	Carrier Frequency Separation	RSS-247 5.1 (b)	PASS
6	Number Of Hopping Channel	RSS-247 5.1 (d)	PASS
7	Dwell Time	RSS-247 5.1 (d)	PASS
8	Conducted Band Edge	RSS-247 5.5	PASS
9	Conducted Spurious Emissions	RSS-247 5.5	PASS
10	Radiated Spurious Emissions and Band Edge	RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	PASS
11	AC Power Line Conducted Emissions	RSS-Gen 8.8	PASS
12	Transmit Antenna	RSS-Gen 6.8	PASS

Note:

(1) "N/A" denotes test is not applicable in this test report

2.2. Test Facilities

EMC Lab : Certificated by CNAS, CHINA
Registration No.: L5288
This Certificate is valid until: November 12, 2023

Certificated by FCC, USA
Designation Number: CN1215
This Certificate is valid until: January 31, 2022

Certificated by A2LA, USA
Registration No.: 4366.01
This Certificate is valid until: January 31, 2022

Certificated by Industry Canada
CAB identifier No.: CN0035
This Certificate is valid until: January 31, 2022

Certificated by VCCI, Japan
Registration No.:C-14103; T-20073; R-13663;
R-20103; G-20097
Date of registration: Apr. 20, 2020
This Certificate is valid until: Apr. 19, 2023

Certificated by TUV Rheinland, Germany
Registration No.: UA 50413872 0001
Date of registration: July 31, 2018

Certificated by Intertek
Registration No.: 2011-RTL-L2-64
Date of registration: November 08, 2018

Name of Firm : EST Technology Co., Ltd.

Site Location : Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China

2.3. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test	±3.48dB
Uncertainty for spurious emissions test (Below 30MHz)	±1.62 dB
Uncertainty for spurious emissions test (30MHz-1GHz)	±4.60 dB(Polarize: H)
	±4.68 dB(Polarize: V)
Uncertainty for spurious emissions test (1GHz to 25GHz)	±4.96dB
Uncertainty for radio frequency	7×10^{-8}
Uncertainty for conducted RF Power	1.08dB
Uncertainty for Power density test	0.26dB

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.4. Assistant equipment used for test

Item	Equipment	Brand	Model Name/Type No.	IC ID	Series No.
A	Notebook	-	Thinkpad X280	-	-

Item	Shielded Type	Ferrite Core	Length	Note
-	-	-	-	-

2.5. Block Diagram

For radiated emissions test: EUT was placed on a turn table, which is 0.8 (or 1.5) meter high above ground. EUT was beset into Bluetooth test mode by software before test.



DC 3.3V From PC

(EUT: WIFI+BT Module)

2.6. Test mode

Combining all the rates, modulations, and packet types, the Pre-scans had been carried out. The worst case test mode was selected for the final test as listed below.

Test Item	Modulation Type	Operating Mode	Packet Type	Test Channel
Maximum Peak Output Power	GFSK&8-DPSK	Non Hopping	DH5	Low/Middle/High
20dB Bandwidth&99% Occupied Bandwidth	GFSK&8-DPSK	Non Hopping	DH5	Low/Middle/High
Carrier Frequency Separation	GFSK&8-DPSK	Hopping	DH5	Low/Middle/High
Number Of Hopping Channel	GFSK&8-DPSK	Hopping	DH5	All Channel Hopping
Dwell Time	GFSK&8-DPSK	Hopping	DH1/DH3/DH5	Middle(All Channel Hopping)
Conducted Band Edge	GFSK&8-DPSK	Non Hopping &Hopping	DH5	Low/ High& All Channel Hopping
Conducted Spurious Emissions	GFSK&8-DPSK	Non Hopping	DH5	Low/Middle/High
Radiated Spurious Emissions(Below 1GHz)	GFSK&8-DPSK	Non Hopping	DH5	Low/Middle/High
Radiated Spurious Emissions(Above 1GHz)	GFSK&8-DPSK	Non Hopping	DH5	Low/Middle/High
Radiated Band Edge	GFSK&8-DPSK	Non Hopping	DH5	Low/High
AC Power Line Conducted Emissions	GFSK&8-DPSK	Non Hopping	DH5	Low/Middle/High

Note:

1. In radiated measurement, the EUT had been pre-scan on the positioned of each 3 axis(X,Y,Z), the worst case was found when positioned on **X-plane**.

2.7. Channel List

Channel No.	Frequency (MHz)						
0	2402	1	2403	2	2404	3	2405
4	2406	5	2407	6	2408	7	2409
8	2410	9	2411	10	2412	11	2413
12	2414	13	2415	14	2416	15	2417
16	2418	17	2419	18	2420	19	2421
20	2422	21	2423	22	2424	23	2425
24	2426	25	2427	26	2428	27	2429
28	2430	29	2431	30	2432	31	2433
32	2434	33	2435	34	2436	35	2437
36	2438	37	2439	38	2440	39	2441
40	2442	41	2443	42	2444	43	2445
44	2446	45	2447	46	2448	47	2449
48	2450	49	2451	50	2452	51	2453
52	2454	53	2455	54	2456	55	2457
56	2458	57	2459	58	2460	59	2461
60	2462	61	2463	62	2464	63	2465
64	2466	65	2467	66	2468	67	2469
68	2470	69	2471	70	2472	71	2473
72	2474	73	2475	74	2476	75	2477
76	2478	77	2479	78	2480	-	-

2.8. Power Setting of Test Software

Software Name	WCN_Combo_Tool		
Frequency(MHz)	2402	2441	2480
GFSK(1Mbps) Setting	5	5	5
8-DPSK(3Mbps) Setting	5	5	5

Note: This information is provided by the applicant.

2.9. Test Equipment

For conducted emission test						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESHS30	EST-E001	LISAI	June 13,21	1 Year
Artificial Mains Network	Rohde & Schwarz	ENV216	EST-E002	LISAI	June 13,21	1 Year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	EST-E078	LISAI	June 13,21	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A

For radiated emission test(9kHz-30MHz)						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESR7	EST-E047	LISAI	June 13,21	1 Year
Active Loop Antenna	SCHWARZECK	FMZB 1519B	EST-E054	LISAI	June 13,21	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A
9kHz-30MHz Cable	N/A	EST-001	N/A	N/A	N/A	N/A

For radiated emissions test (30MHz-1000MHz)						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESR7	EST-E047	LISAI	June 13,21	1 Year
Bilog Antenna	Teseq	CBL 6111D	EST-E034	LISAI	June 13,21	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A
30-1000MHz Cable	N/A	EST-002	N/A	N/A	N/A	N/A

For radiated emission test(Above 1000MHz)						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
Horn Antenna	SCHWARZECK	BBHA9120D	EST-E031	LISAI	June 13,21	1 Year
Signal Amplifier	SCHWARZECK	BBV9718	EST-E032	LISAI	June 13,21	1 Year
Spectrum Analyzer	Rohde & Schwarz	FSV40	EST-E069	LISAI	July 19,21	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A
Above 1GHz Cable	N/A	EST-003	N/A	N/A	N/A	N/A

For connect EUT antenna terminal test						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
Spectrum Analyzer	Rohde & Schwarz	FSV40	EST-E069	LISAI	July 19,21	1 Year

3. MAXIMUM PEAK OUTPUT POWER

3.1. Limit

FHSs shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, FHSs operating in the band 2400-2483.5MHz may have hopping channel carrier frequencies that are separated by 25kHz or two thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125W.

3.2. Test Setup



3.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	3MHz
VBW	3MHz
Span	7.5MHz
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

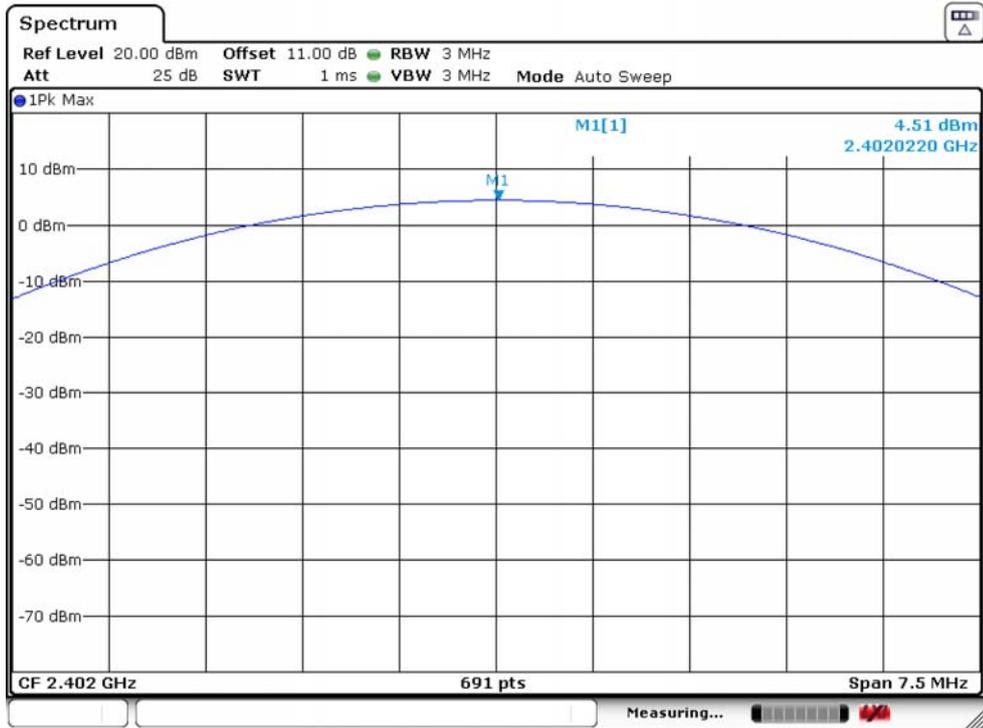
3.4. Test Procedure

- a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- b. Spectrum analyzer setting parameters in accordance with section 3.3.
- c. Set the EUT transmit continuously with maximum output power over fixed single hopping channel.
- d. Allow trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission.
- e. Repeat above procedures until all channels and test modes were measured.
- f. Record the results in the test report.

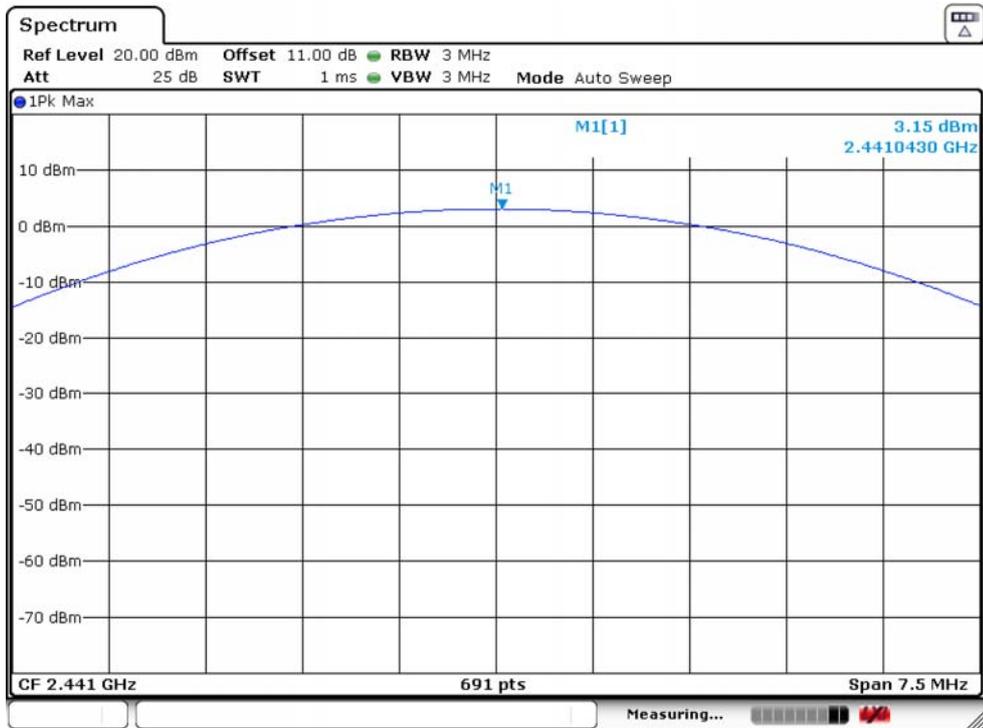
3.5. Test Result

Temperature	25.4°C	Relative Humidity	56%	Test Voltage		DC 3.3V
Mode	Freq (MHz)	Peak Output Power		Limit		Result
		dBm	W	dBm	W	
GFSK	2402	4.51	0.0028	20.97	0.1250	PASS
	2441	3.15	0.0021	20.97	0.1250	PASS
	2480	1.36	0.0014	20.97	0.1250	PASS
8-DPSK	2402	4.28	0.0027	20.97	0.1250	PASS
	2441	2.97	0.0020	20.97	0.1250	PASS
	2480	1.17	0.0013	20.97	0.1250	PASS

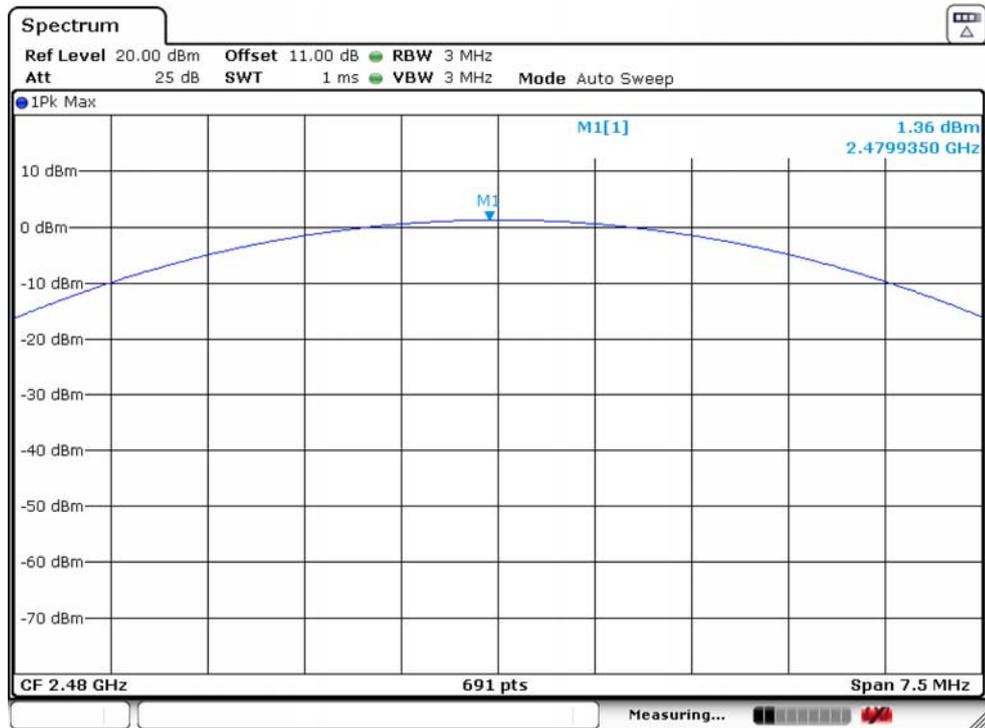
GFSK 2402 MHz



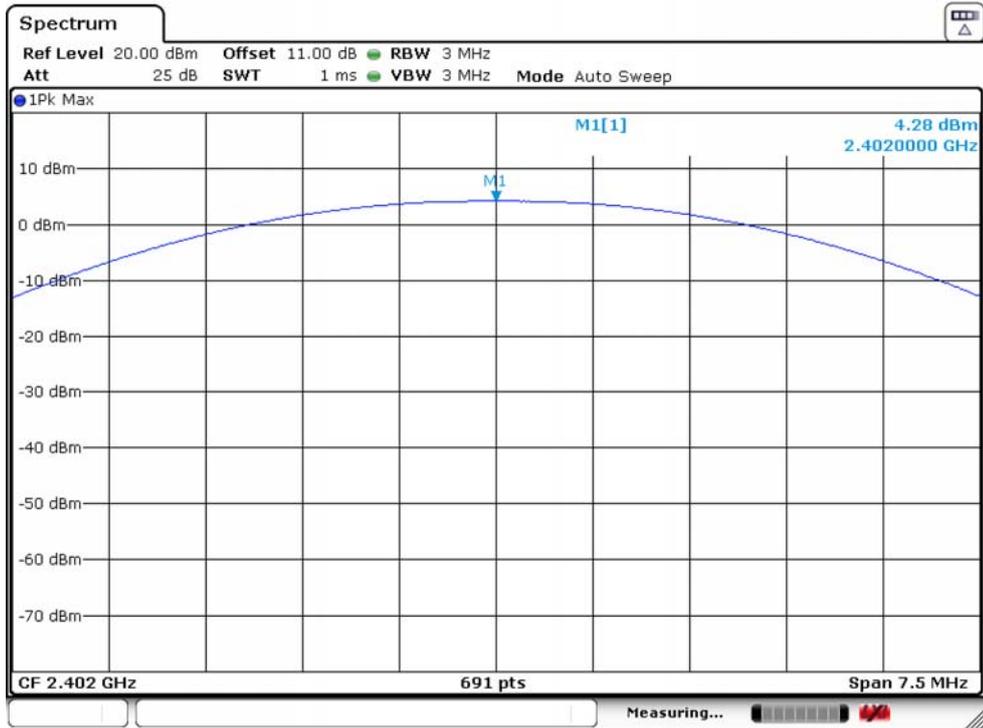
GFSK 2441 MHz



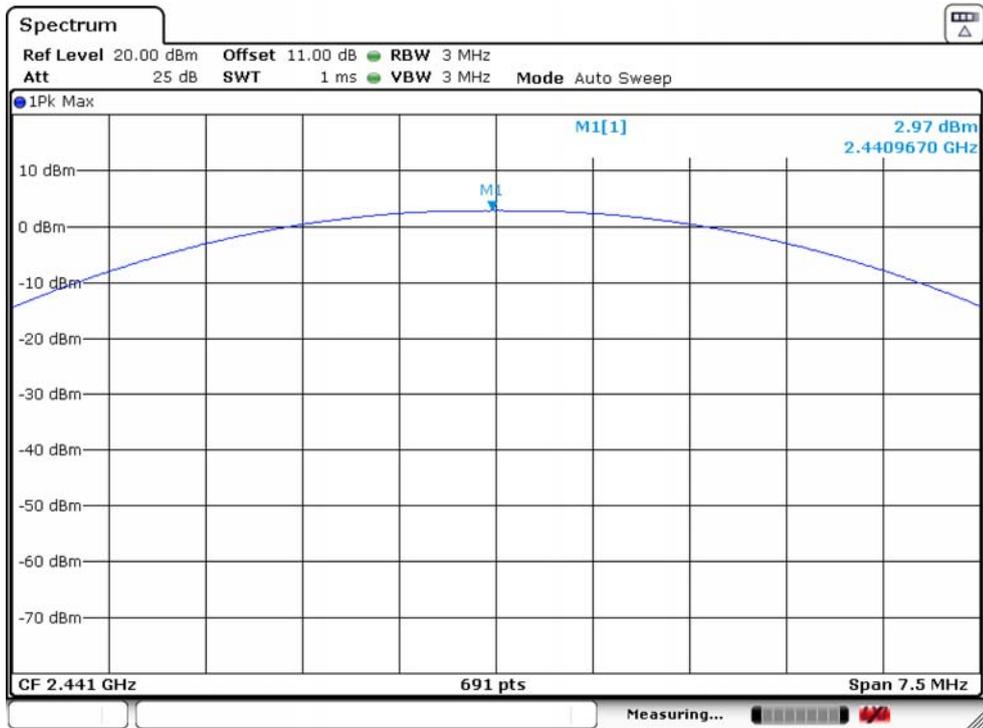
GFSK 2480 MHz



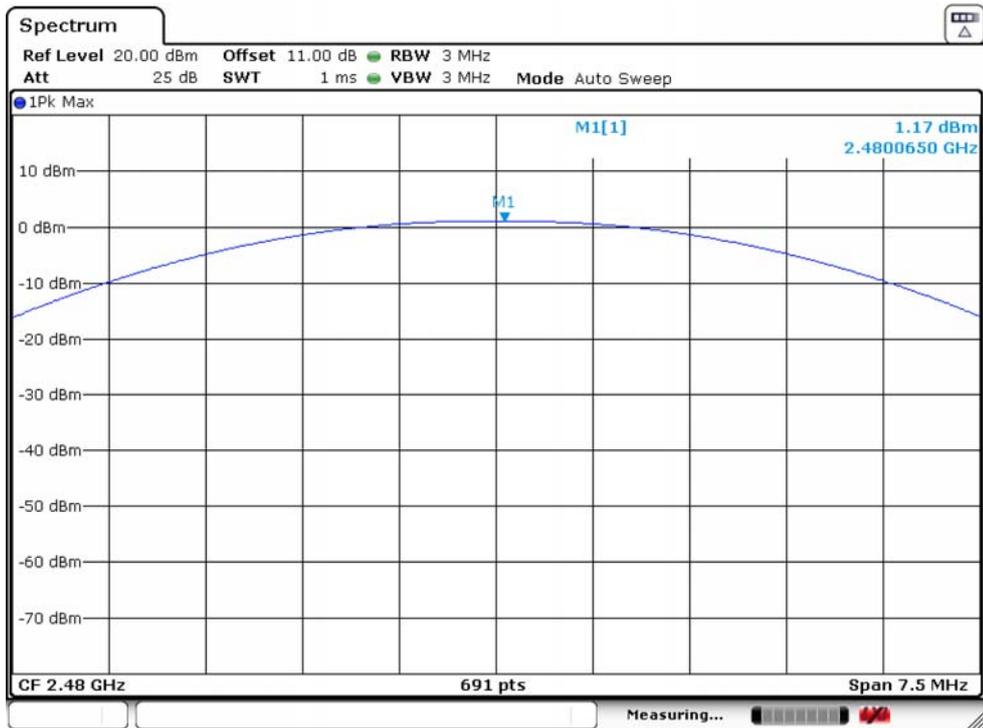
8-DPSK 2402 MHz



8-DPSK 2441 MHz



8-DPSK 2480 MHz

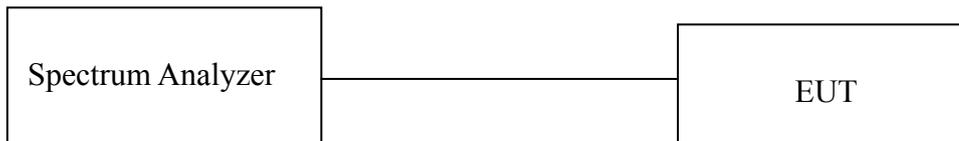


4. 20dB BANDWIDTH&99% OCCUPIED BANDWIDTH

4.1. Limit

The bandwidth of a frequency hopping channel is the 20 dB emission bandwidth, measured with the hopping stopped. FHSs shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, FHSs operating in the band 2400-2483.5MHz may have hopping channel carrier frequencies that are separated by 25kHz or two thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125W.

4.2. Test Setup



4.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	30KHz
VBW	100KHz
Span	3MHz
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

4.4. Test Procedure

For 20dB Bandwidth Measurement :

- a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- b. Spectrum analyzer setting parameters in accordance with section 4.3.
- c. Set the EUT transmit continuously with maximum output power over fixed single hopping channel.
- d. Allow trace to stabilize, use the ndB down function to measure 20dB Bandwidth.
- e. Repeat above procedures until all channels and test modes were measured.
- f. Record the results in the test report.

For 99% Occupied Bandwidth Measurement:

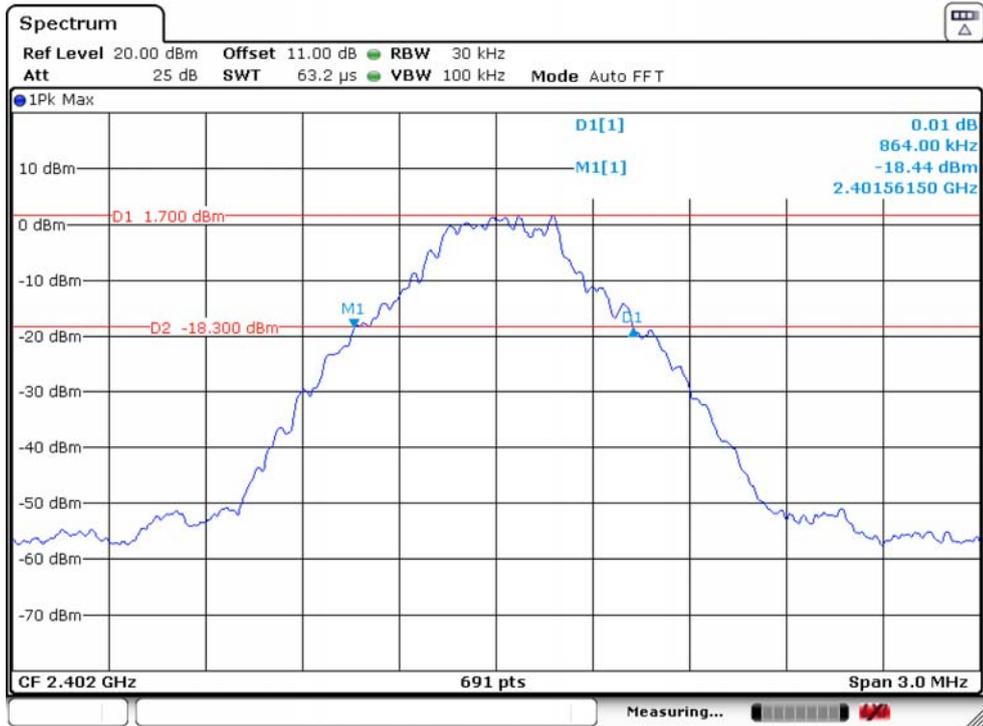
- a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- b. Spectrum analyzer setting parameters in accordance with section 4.3.
- c. Set the EUT transmit continuously with maximum output power over fixed single hopping channel.
- d. Allow trace to stabilize, use the 99% occupied bandwidth function to measure 20dB Bandwidth.
- e. Repeat above procedures until all channels and test modes were measured.
- f. Record the results in the test report.

4.5. Test Result

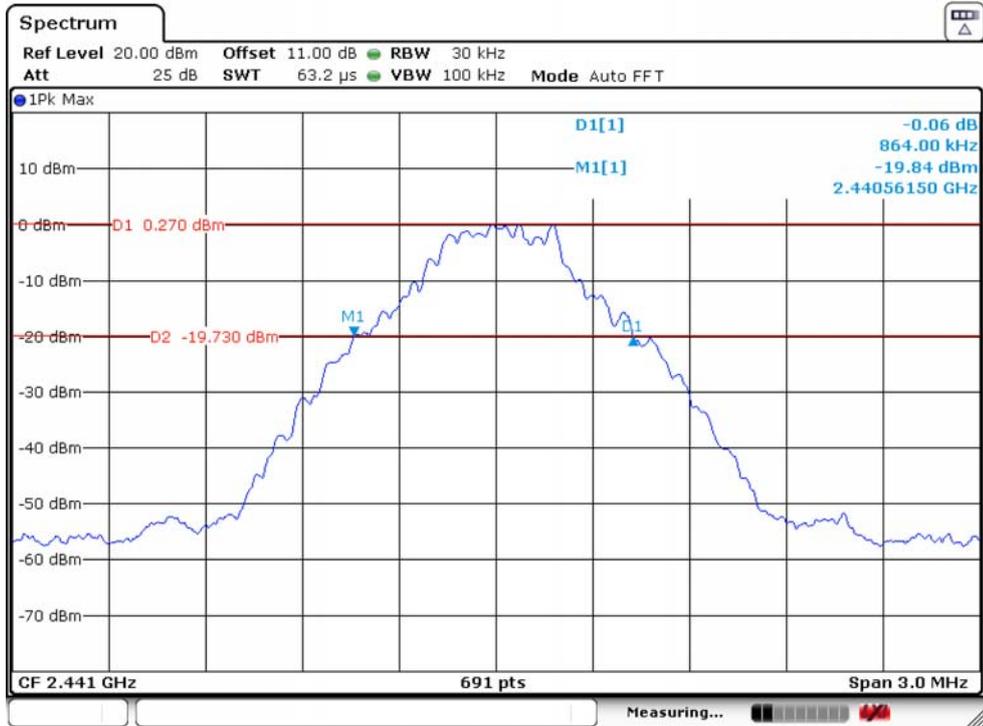
Temperature	25.4℃	Relative Humidity	56%	Test Voltage	DC 3.3V
Mode	Freq (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK	2402	0.8640	0.7598	/	PASS
	2441	0.8640	0.7598	/	PASS
	2480	0.8640	0.7598	/	PASS
8-DPSK	2402	1.2156	1.1418	/	PASS
	2441	1.2156	1.1375	/	PASS
	2480	1.2156	1.1375	/	PASS

20dB Bandwidth

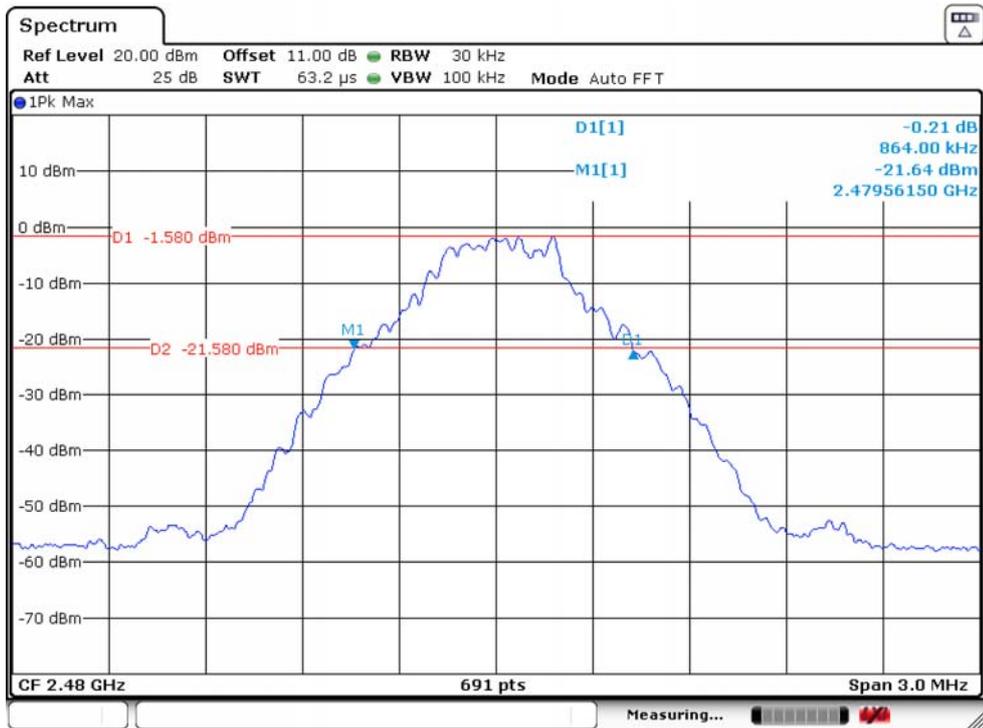
GFSK 2402MHz



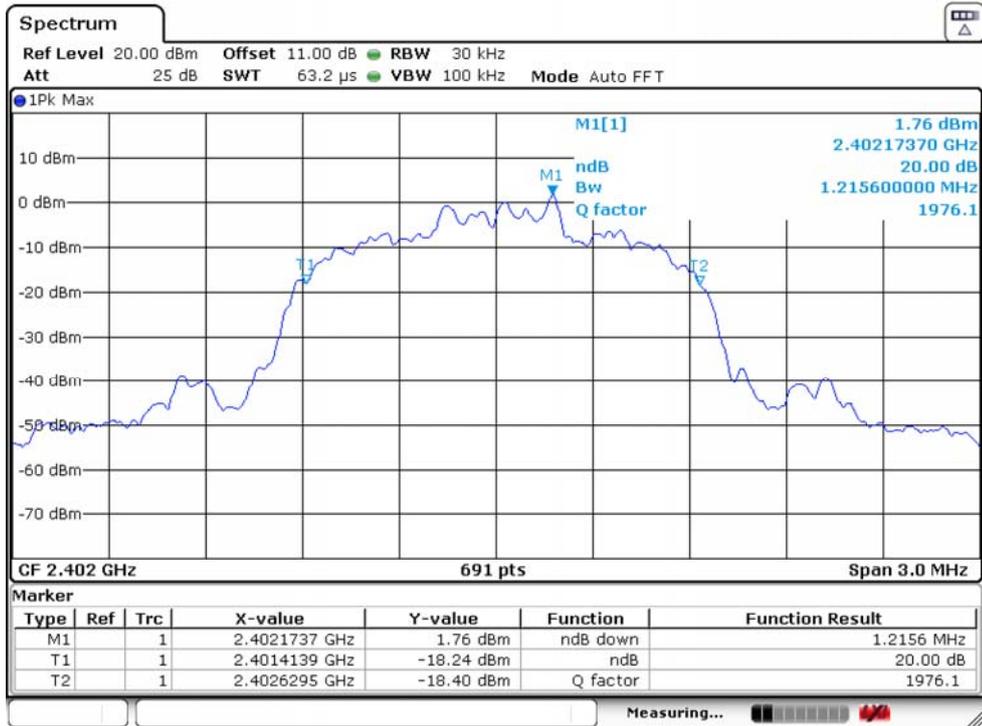
GFSK 2441MHz



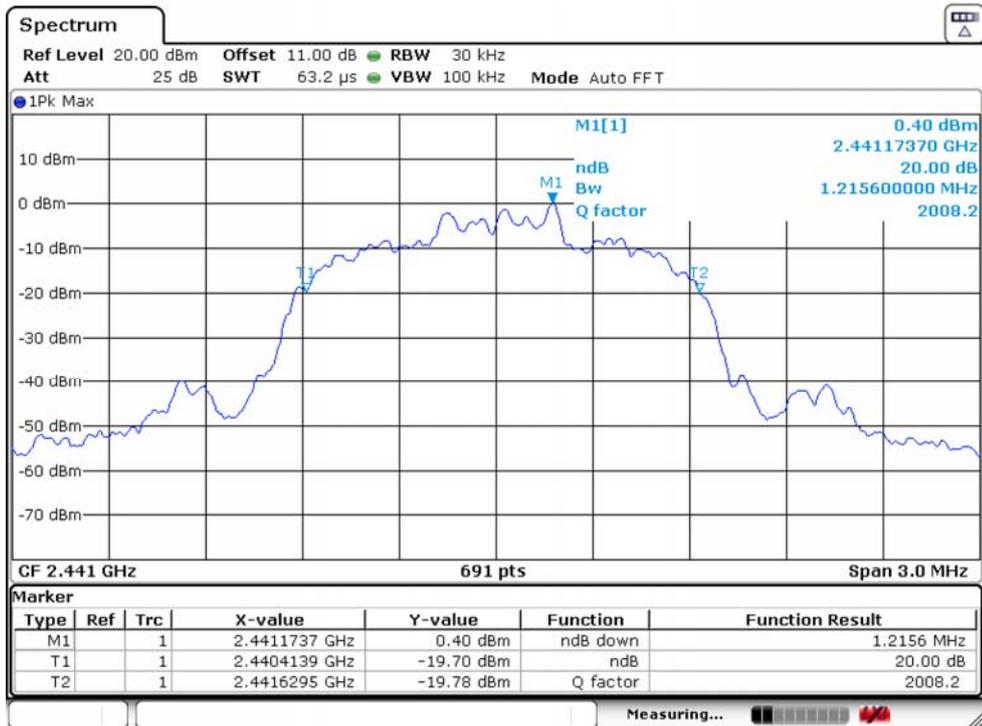
GFSK 2480MHz



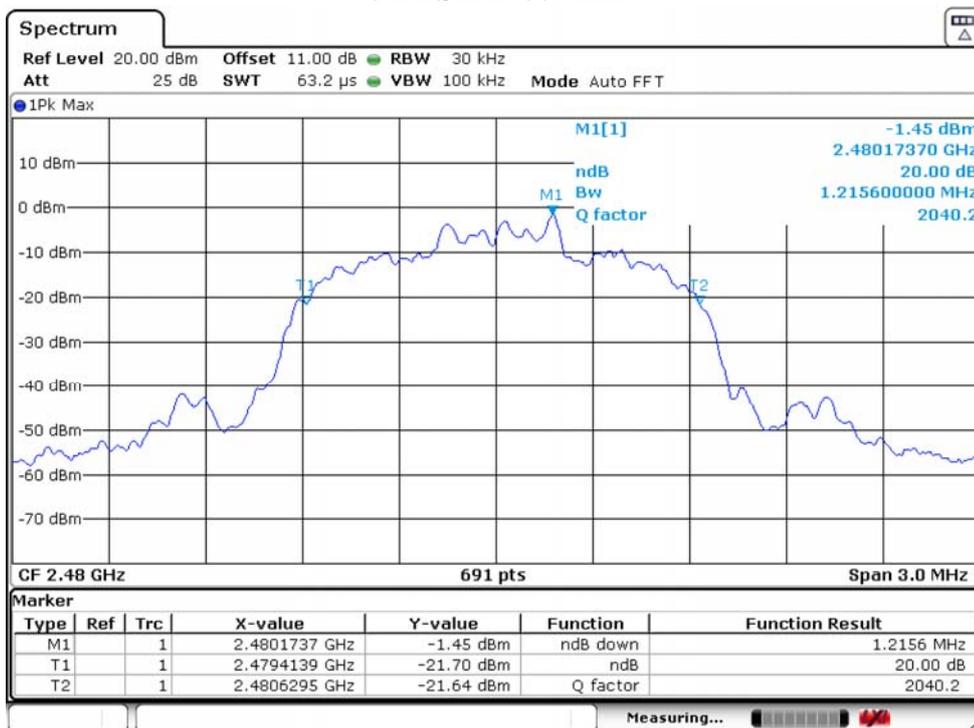
8-DPSK 2402MHz



8-DPSK 2441MHz

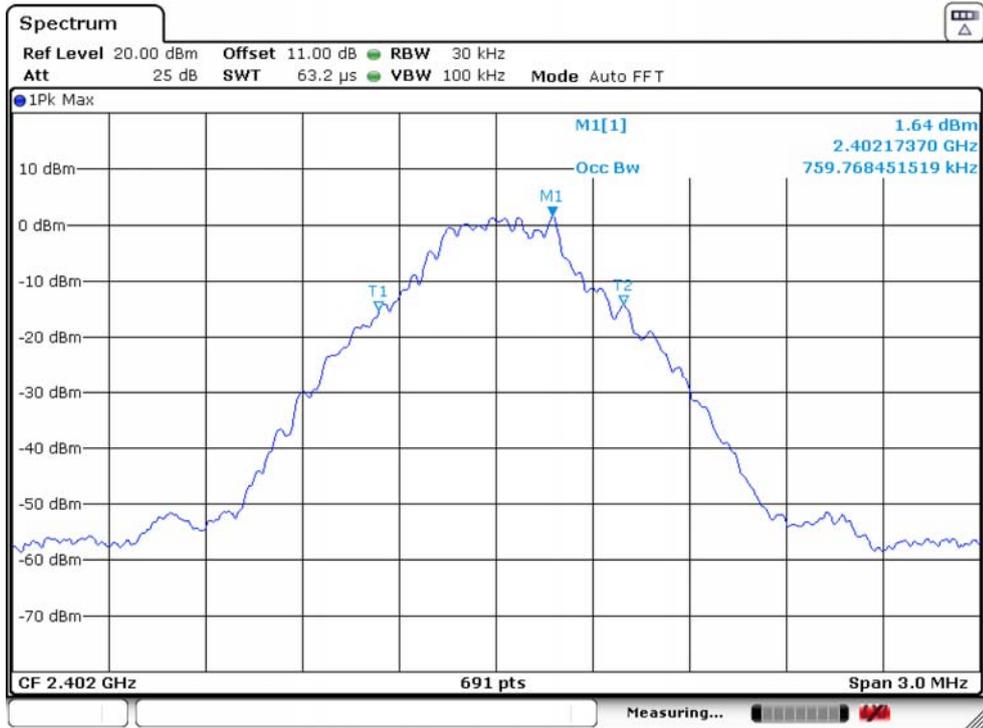


8-DPSK 2480MHz

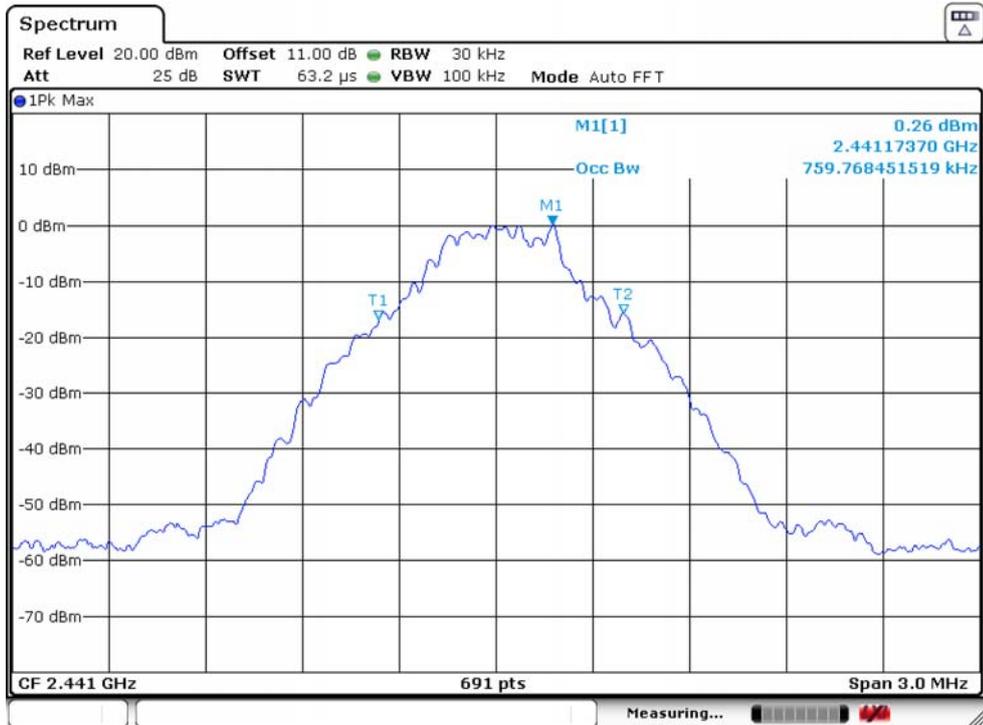


99% Occupied Bandwidth

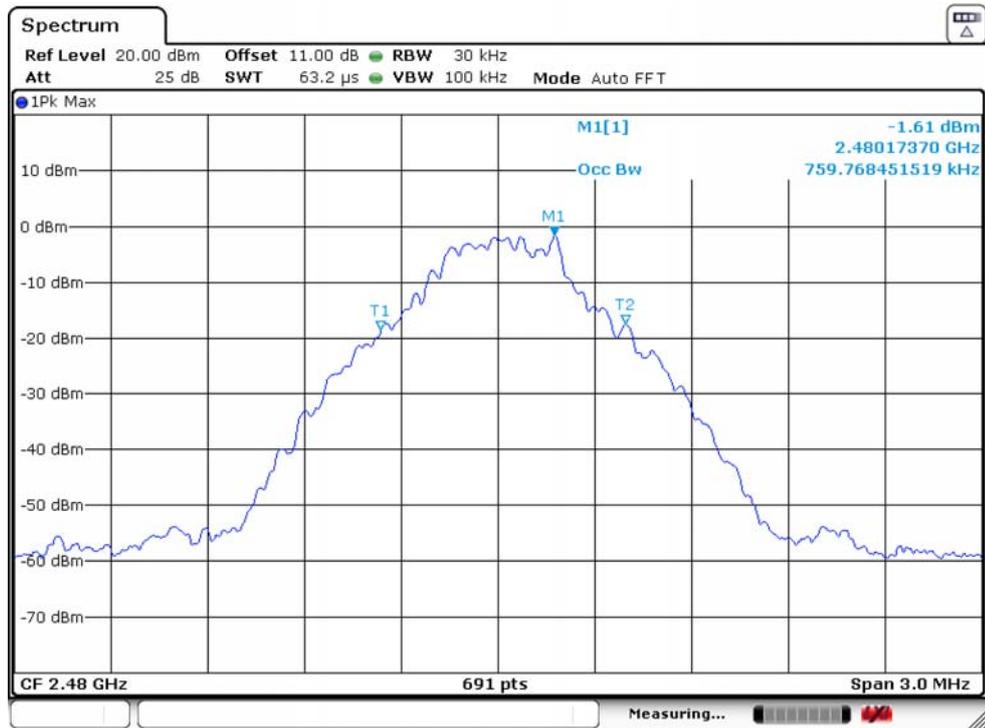
GFSK 2402MHz



GFSK 2441MHz



GFSK 2480MHz



8-DPSK 2402MHz



8-DPSK 2441MHz



8-DPSK 2480MHz

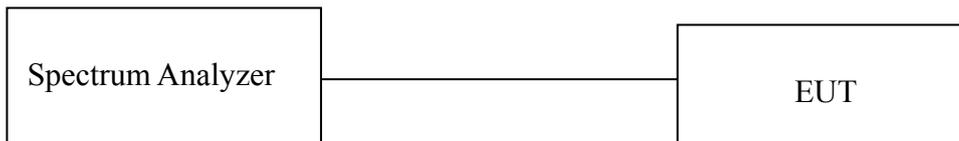


5. CARRIER FREQUENCY SEPARATION

5.1. Limit

The bandwidth of a frequency hopping channel is the 20 dB emission bandwidth, measured with the hopping stopped. FHSs shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, FHSs operating in the band 2400-2483.5MHz may have hopping channel carrier frequencies that are separated by 25kHz or two thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125W.

5.2. Test Setup



5.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	30KHz
VBW	100KHz
Span	3MHz
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

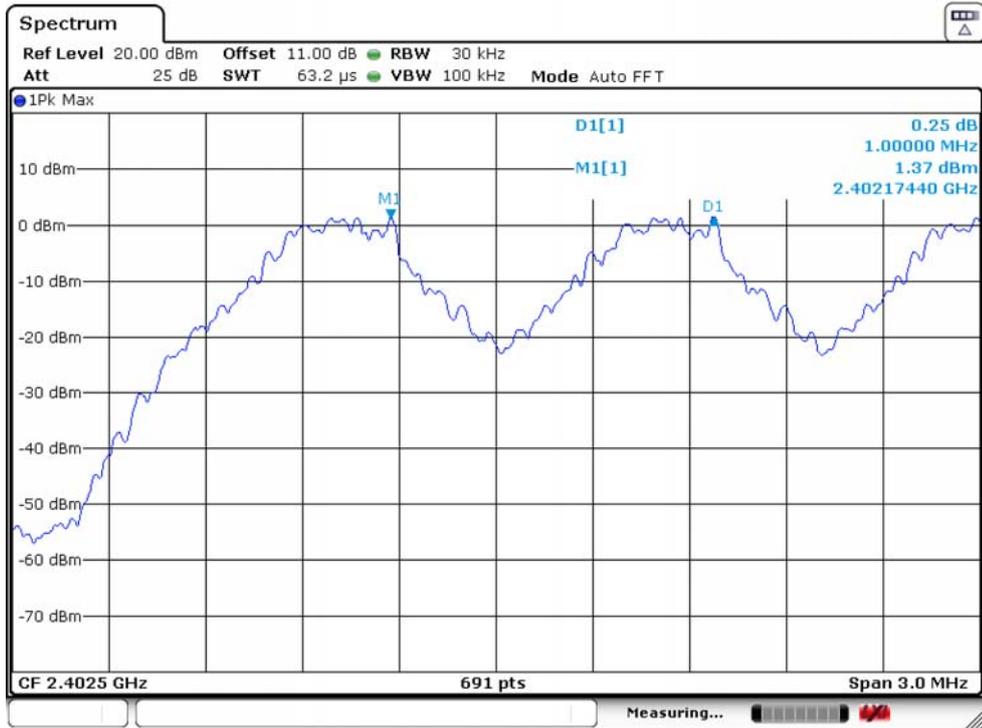
5.4. Test Procedure

- a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- b. Spectrum analyzer setting parameters in accordance with section 5.3.
- c. Set the EUT transmit continuously with maximum output power in all channel hopping mode.
- d. Allow trace to stabilize, use the marker-delta function to measure channel separation between two adjacent channels.
- e. Repeat above procedures until all channels and test modes were measured.
- f. Record the results in the test report.

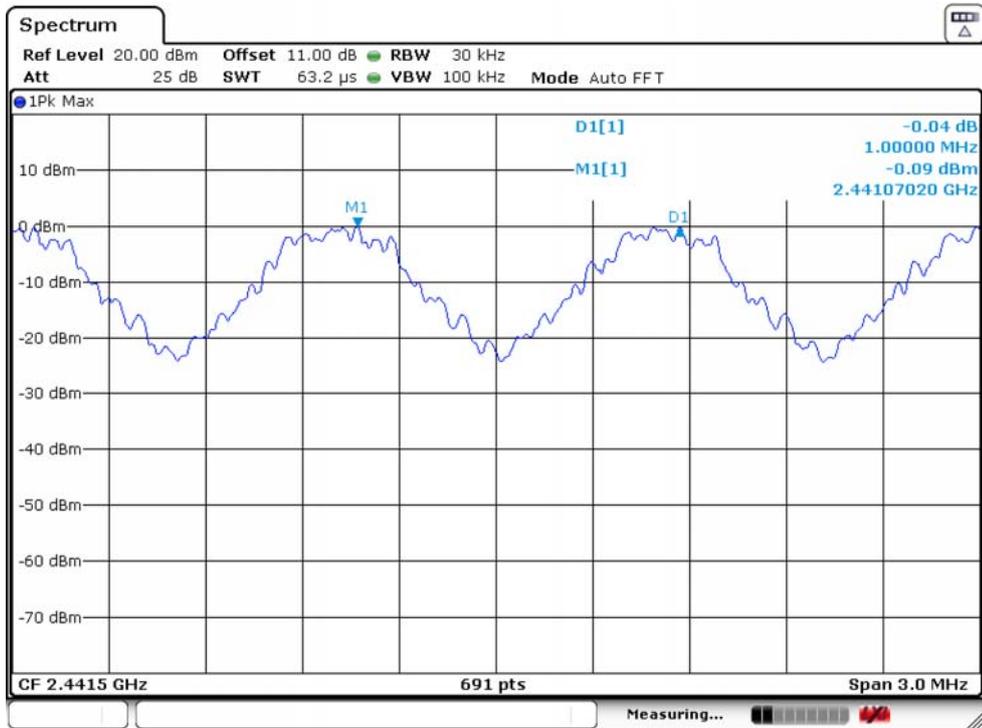
5.5. Test Result

Temperature	25.4°C	Relative Humidity	56%	Test Voltage	DC 3.3V
Mode	Channel	Channel Separation (MHz)	2/3 of 20dB Bandwidth Limit (MHz)	Result	
GFSK	Low CH	1.0000	0.5760	PASS	
	Mid CH	1.0000	0.5760	PASS	
	High CH	1.0000	0.5760	PASS	
8-DPSK	Low CH	1.0000	0.8104	PASS	
	Mid CH	1.0000	0.8104	PASS	
	High CH	1.0000	0.8104	PASS	

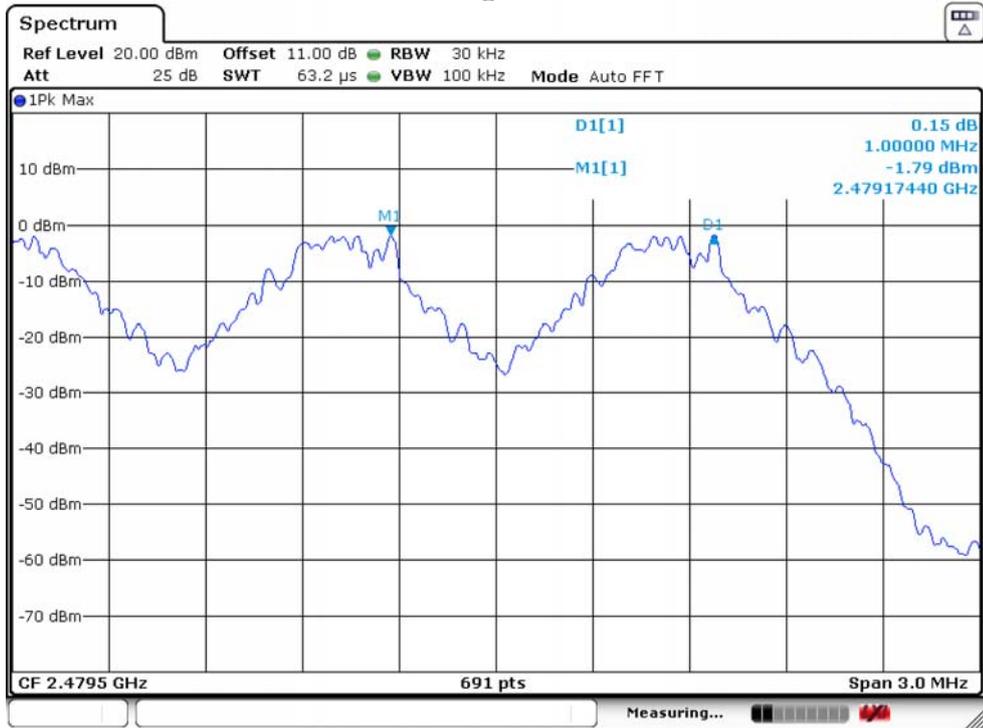
GFSK Low Channel



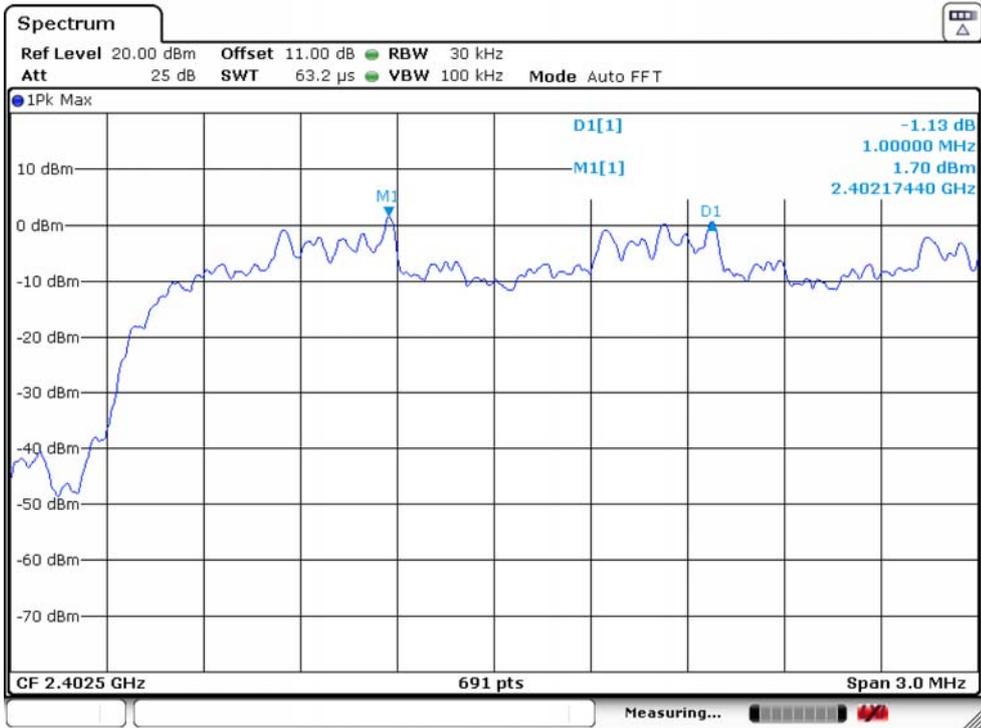
GFSK Mid Channel



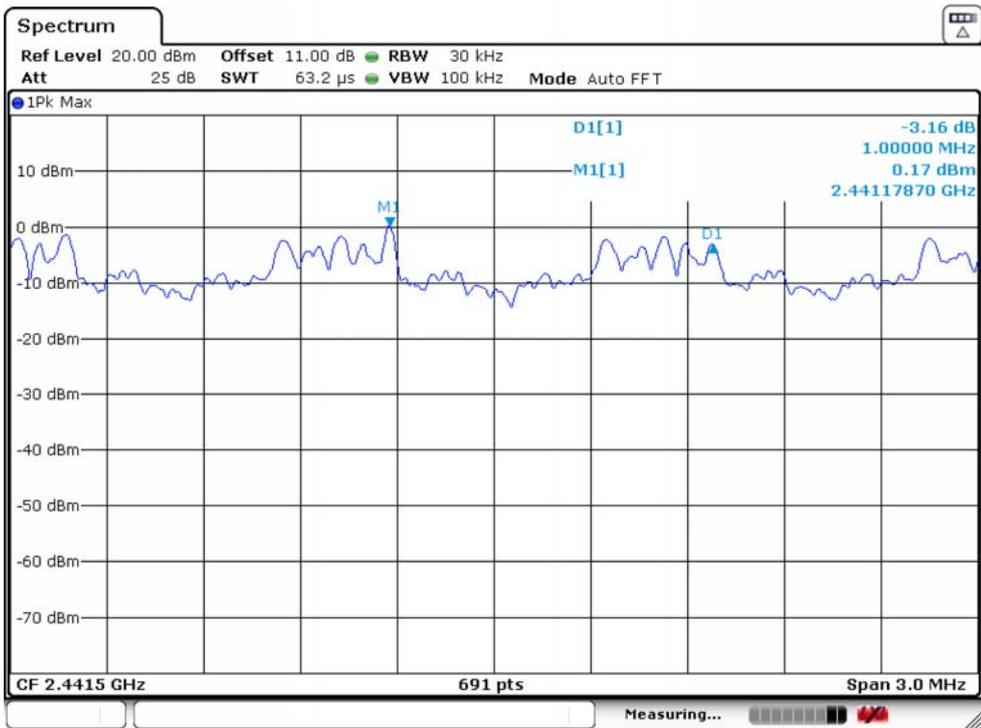
GFSK High Channel



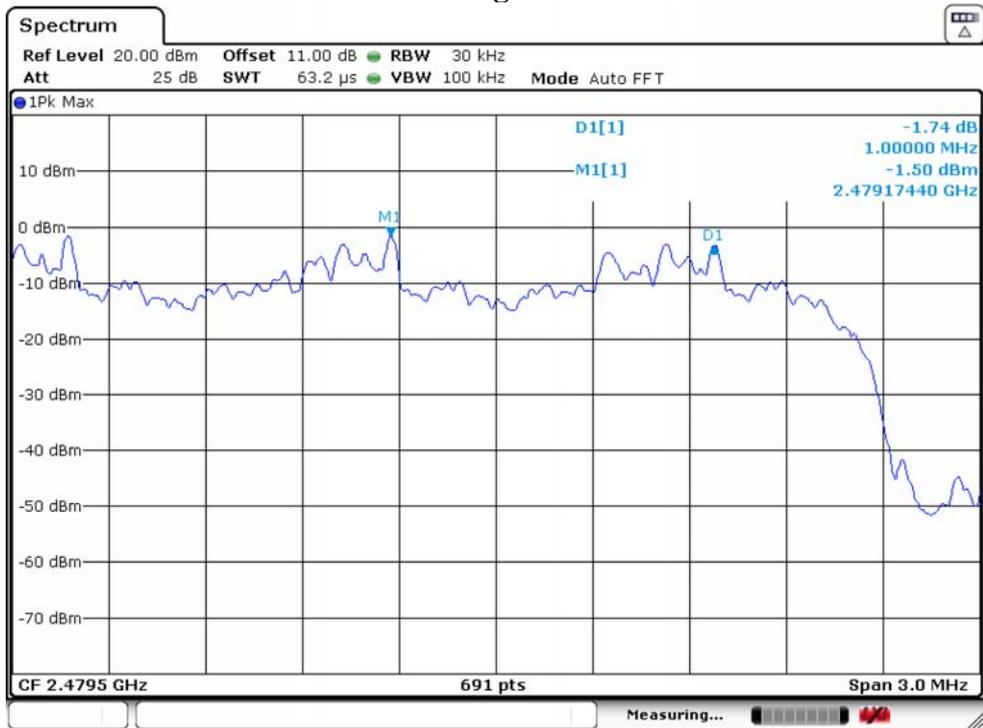
8-DPSK Low Channel



8-DPSK Mid Channel



8-DPSK High Channel



6. NUMBER OF HOPPING CHANNEL

6.1. Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

6.2. Test Setup



6.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	300KHz
VBW	300KHz
Start frequency	2400MHz
Stop frequency	2483.5MHz
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

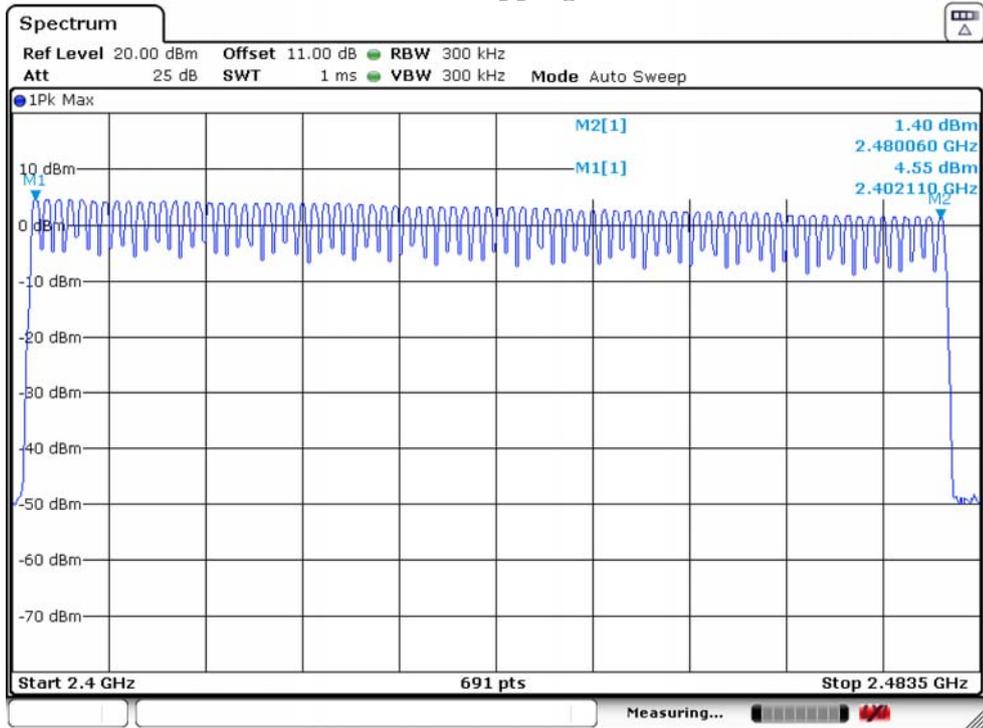
6.4. Test Procedure

- a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- b. Spectrum analyzer setting parameters in accordance with section 6.3.
- c. Set the EUT transmit continuously with maximum output power in all channel hopping mode.
- d. Allow trace to stabilize, use the marker-peak function to mark the first and last frequency hopping channel.
- e. Repeat above procedures until all test modes were measured.
- f. Record the results in the test report.

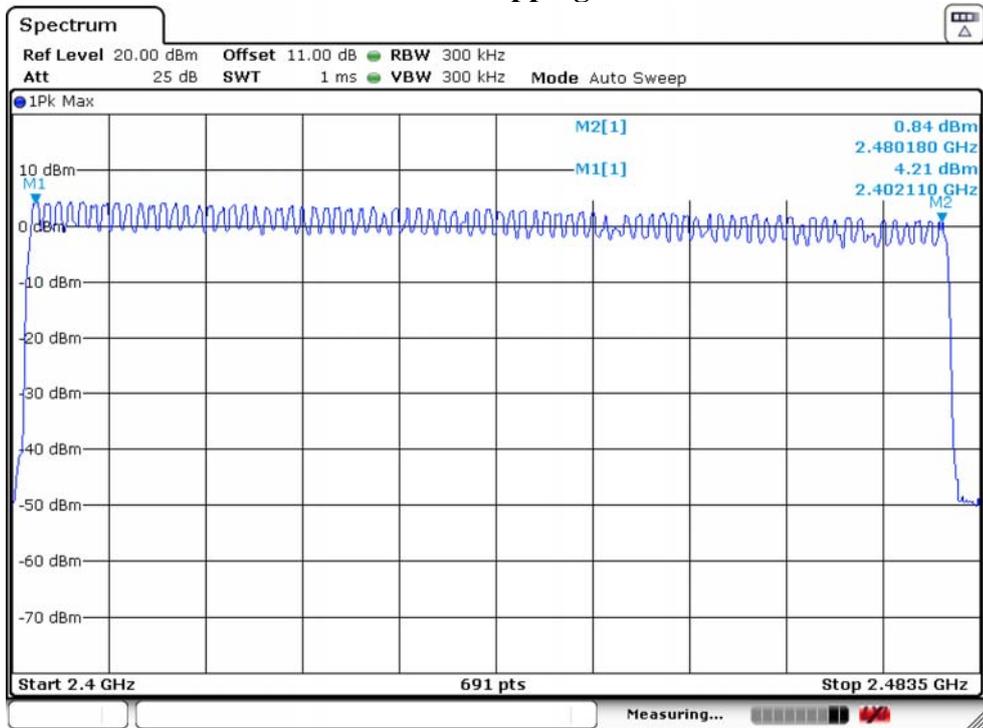
6.5. Test Result

Temperature	25.4℃	Relative Humidity	56%	Test Voltage	DC 3.3V
Mode	Number of Hopping Channel		Limit	Result	
GFSK	79		≥ 15	PASS	
8-DPSK	79		≥ 15	PASS	

GFSK Hopping On



8-DPSK Hopping On



7. DWELL TIME

7.1. Limit

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. Transmissions on particular hopping frequencies may be avoided or suppressed provided that at least 15 hopping channels are used.

7.2. Test Setup



7.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	1MHz
VBW	1MHz
Span	Zero
Detector	Peak
Sweep Time	2.5ms(DH1)/10ms(DH3)/20ms(DH5)
Sweep Mode	Single Sweep

7.4. Test Procedure

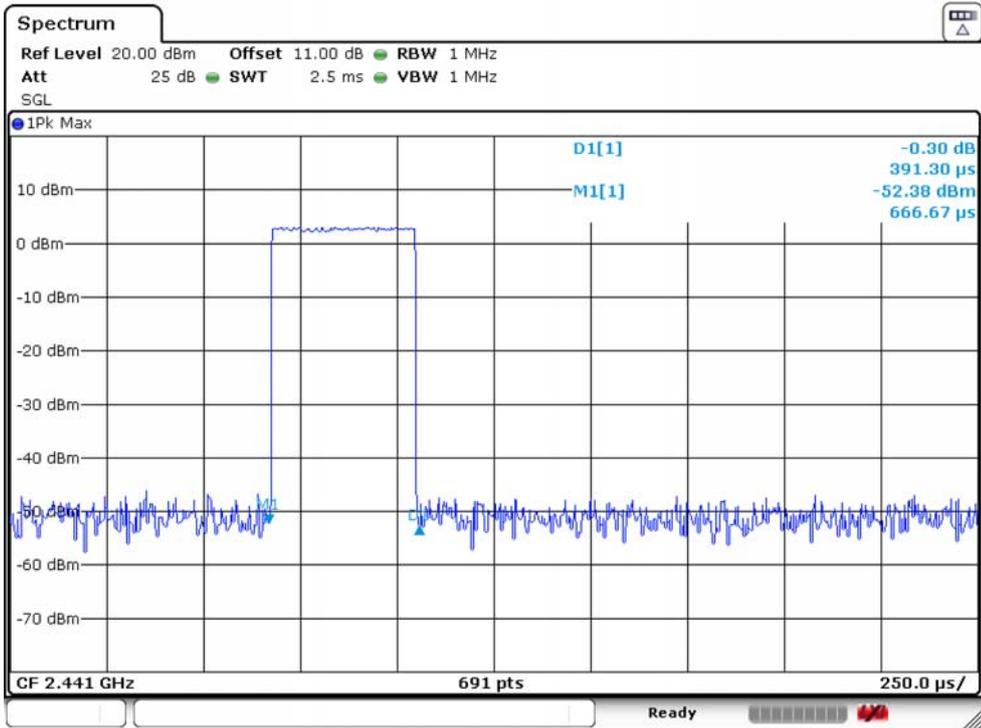
- a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- b. Spectrum analyzer setting parameters in accordance with section 7.3.
- c. Set the EUT transmit continuously with maximum output power in all channel hopping mode.
- d. Allow trace to stabilize, use the marker-delta function to measure single pulse duration.
- e. Repeat above procedures until all test modes were measured.
- f. Record the results in the test report.

7.5. Test Result

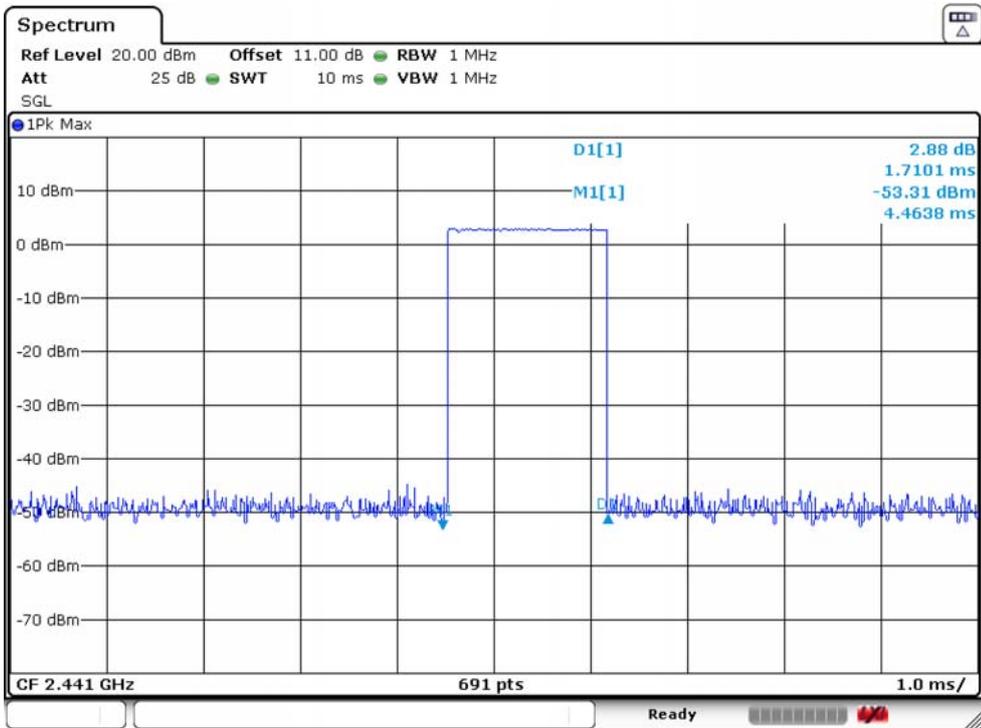
Temperature	25.4°C	Relative Humidity		56%	Test Voltage	DC 3.3V
Mode	Freq (MHz)	Hops in Observation Period(hops)	Pulse Duration (ms)	Dwell time (ms)	Limit	Result
GFSK DH1	2441	320	0.3913	125.22	<400ms	PASS
GFSK DH3	2441	160	1.7101	273.62	<400ms	PASS
GFSK DH5	2441	106.67	2.9565	315.36	<400ms	PASS
8-DPSK DH1	2441	320	0.4058	129.86	<400ms	PASS
8-DPSK DH3	2441	160	1.6957	271.31	<400ms	PASS
8-DPSK DH5	2441	106.67	3.0725	327.73	<400ms	PASS

1. DH1 Packet permit maximum 1600 hops/s with 2 timeslot in 79 channels (1 timeslot TX, 1 timeslot RX),So the hops in Observation Period($0.4s \times 79$ channel)= $(1600/79/2)$ hops/s $\times 0.4s \times 79=320$ hops.
2. DH3 Packet permit maximum 1600 hops/s with 4 timeslot in 79 channels (3 timeslot TX, 1 timeslot RX),So the hops in Observation Period($0.4s \times 79$ channel)= $(1600/79/4)$ hops/s $\times 0.4s \times 79=160$ hops.
3. DH5 Packet permit maximum 1600 hops/s with 6 timeslot in 79 channels (5 timeslot TX, 1 timeslot RX),So the hops in Observation Period($0.4s \times 79$ channel)= $(1600/79/6)$ hops/s $\times 0.4s \times 79=106.67$ hops.
- 4.Dwell Time= Hops in Observation Period \times Pulse Duration.

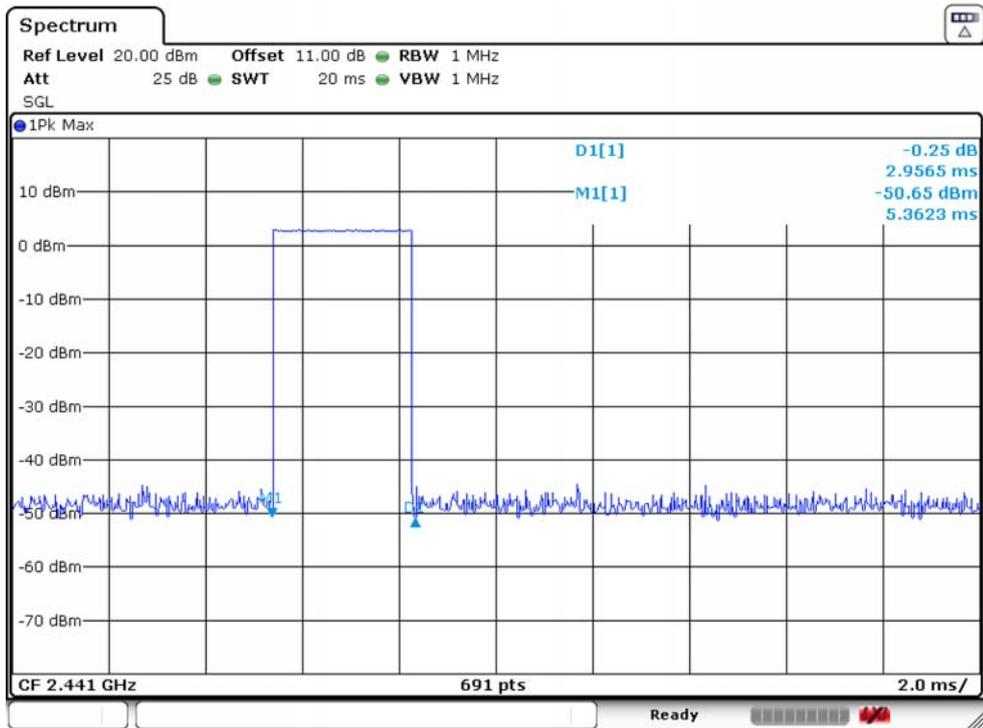
GFSK DH1



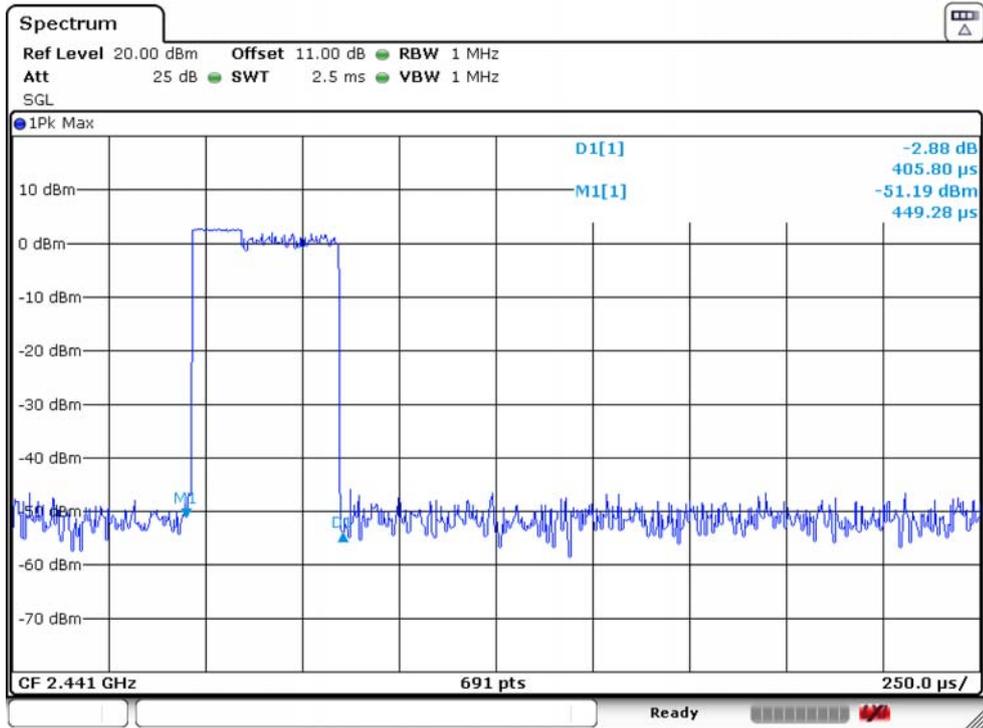
GFSK DH3



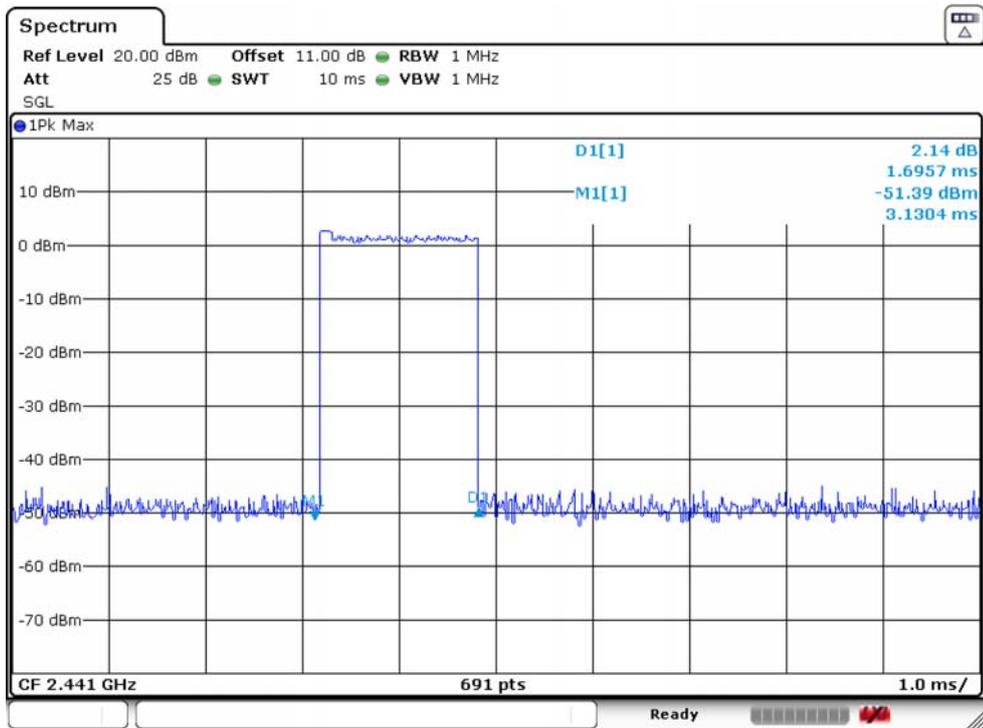
GFSK DH5



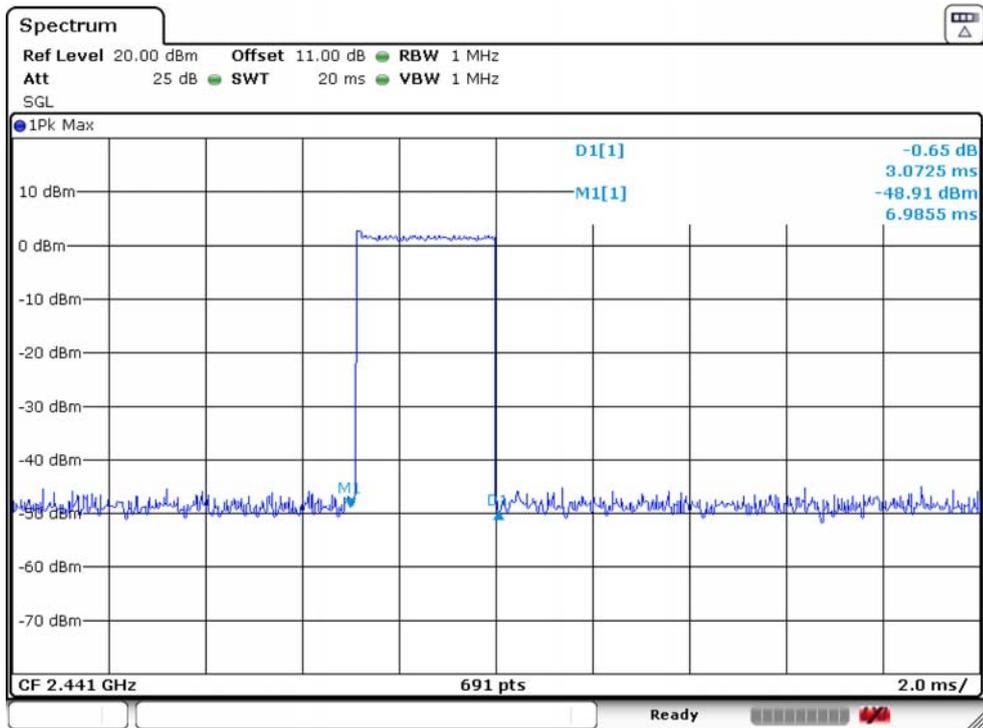
8-DPSK DH1



8-DPSK DH3



8-DPSK DH5



8. CONDUCTED BAND EDGE

8.1. Limit

In any 100 kHz 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 the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

8.2. Test Setup



8.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	100KHz
VBW	300KHz
Span	100MHz
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

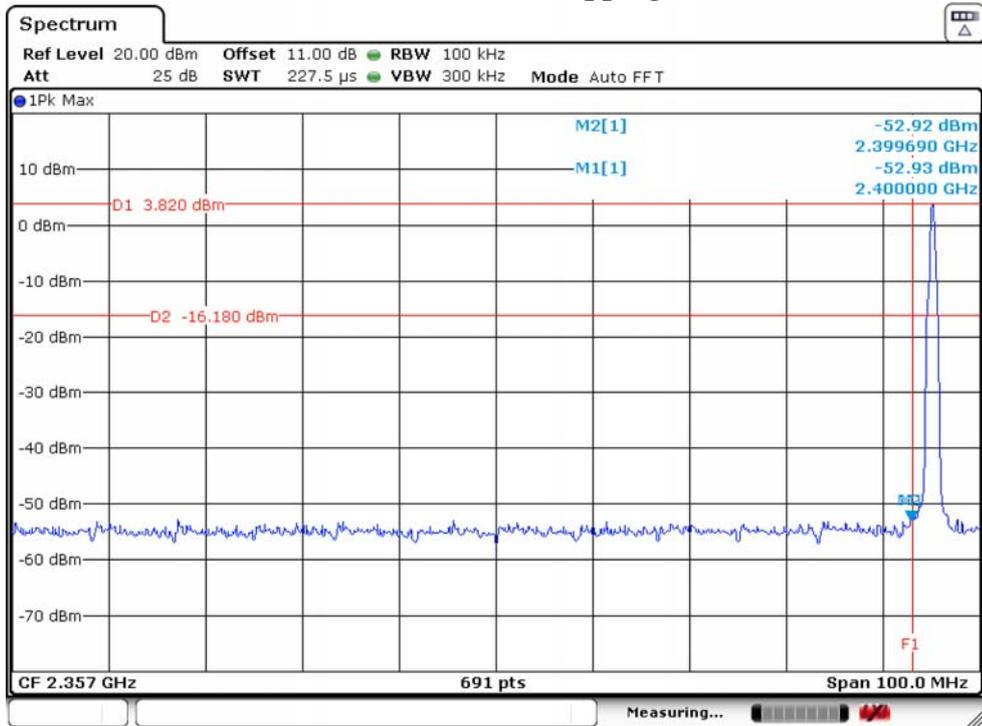
8.4. Test Procedure

- a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- b. Spectrum analyzer setting parameters in accordance with section 8.3.
- c. Set the EUT transmit continuously with maximum output power over fixed single hopping channel.
- d. Allow trace to stabilize, use the marker function to mark the highest emission level outside the authorized band.
- e. Repeat above procedures until all channels and test modes were measured(including frequency hopping off and frequency hopping on).
- f. Record the results in the test report.

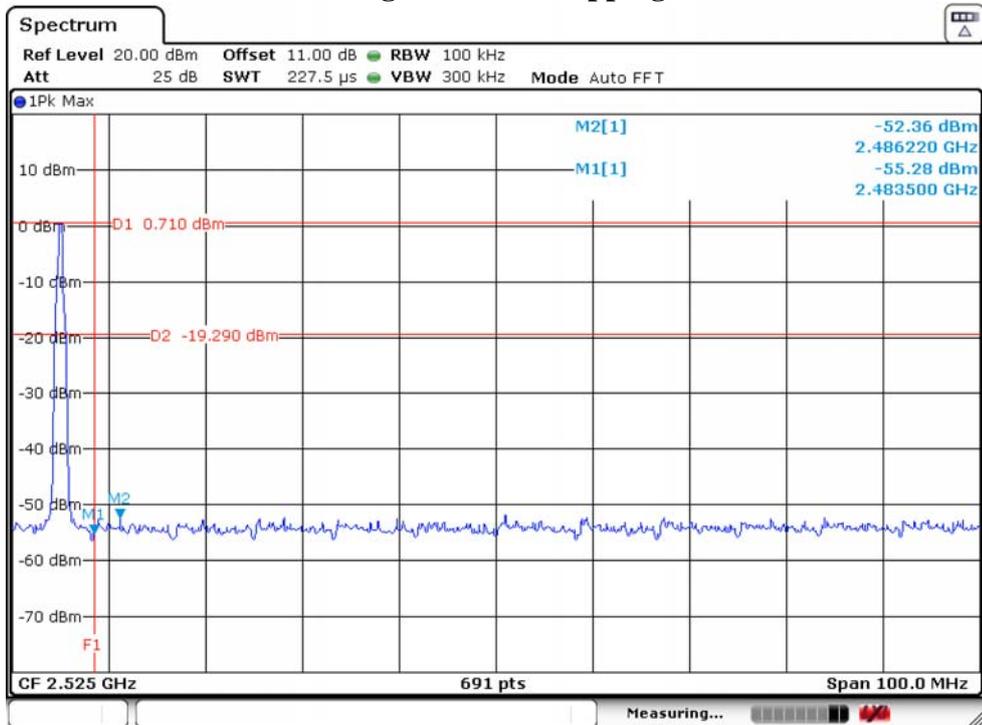
8.5. Test Result

Temperature	25.4°C	Relative Humidity	56%	Test Voltage	DC 3.3V
Result	PASS				

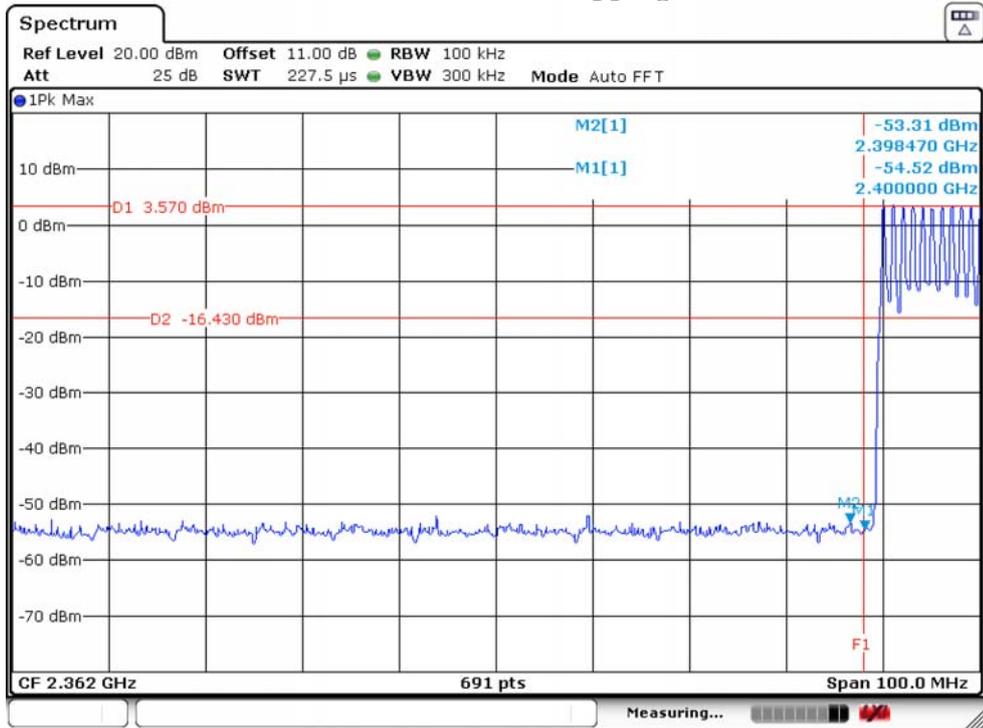
GFSK Low Channel Hopping OFF



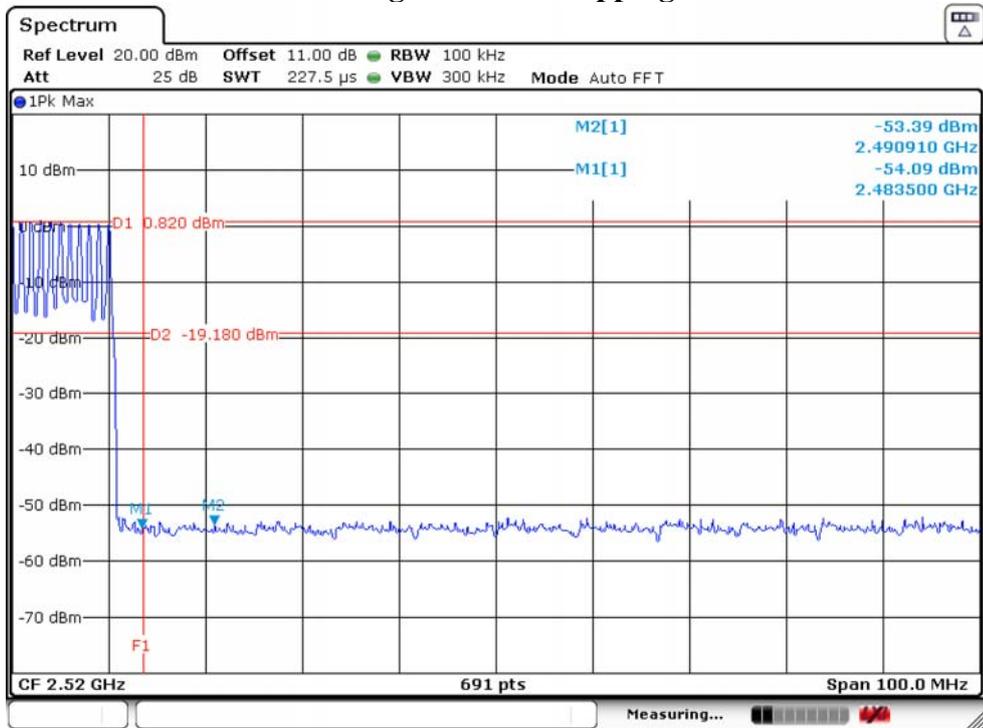
GFSK High Channel Hopping OFF



GFSK Low Channel Hopping ON



GFSK High Channel Hopping ON



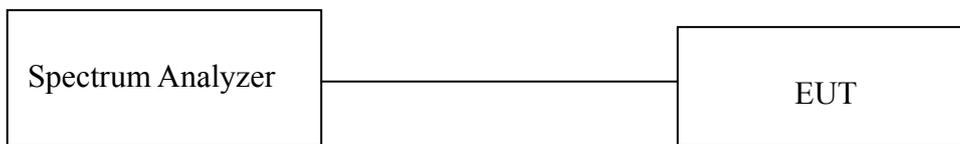
All modulations are all tested ,only worst case is reported

9. CONDUCTED SPURIOUS EMISSIONS

9.1. Limit

In any 100 kHz 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 the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

9.2. Test Setup



9.3. Spectrum Analyzer Setting

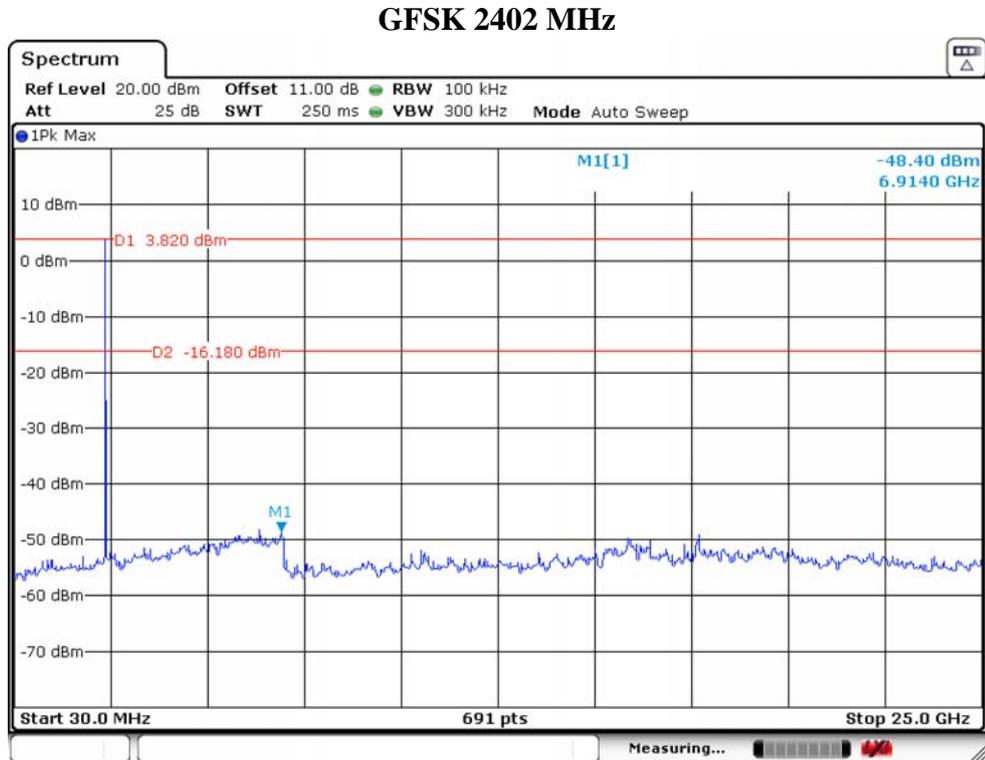
Spectrum Parameters	Setting
RBW	100KHz
VBW	300KHz
Start frequency	30MHz
Stop frequency	25GHz
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

9.4. Test Procedure

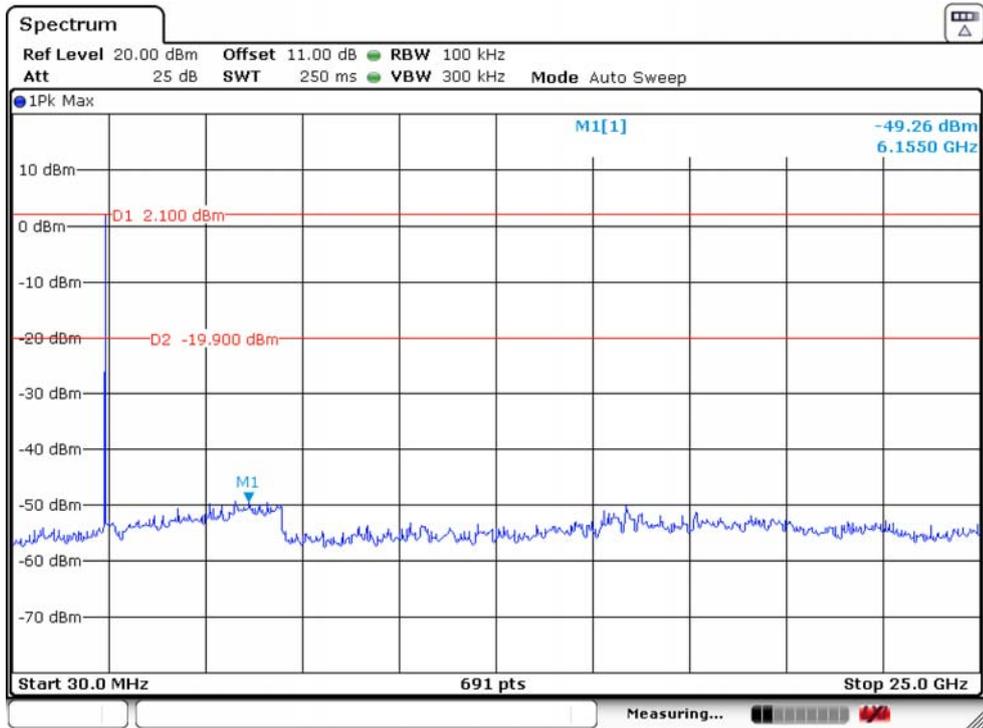
- a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- b. Spectrum analyzer setting parameters in accordance with section 9.3.
- c. Set the EUT transmit continuously with maximum output power over fixed single hopping channel.
- d. Allow trace to stabilize, use the marker function to mark the highest emission level outside the authorized band.
- e. Repeat above procedures until all channels and test modes were measured.
- f. Record the results in the test report.

9.5. Test Result

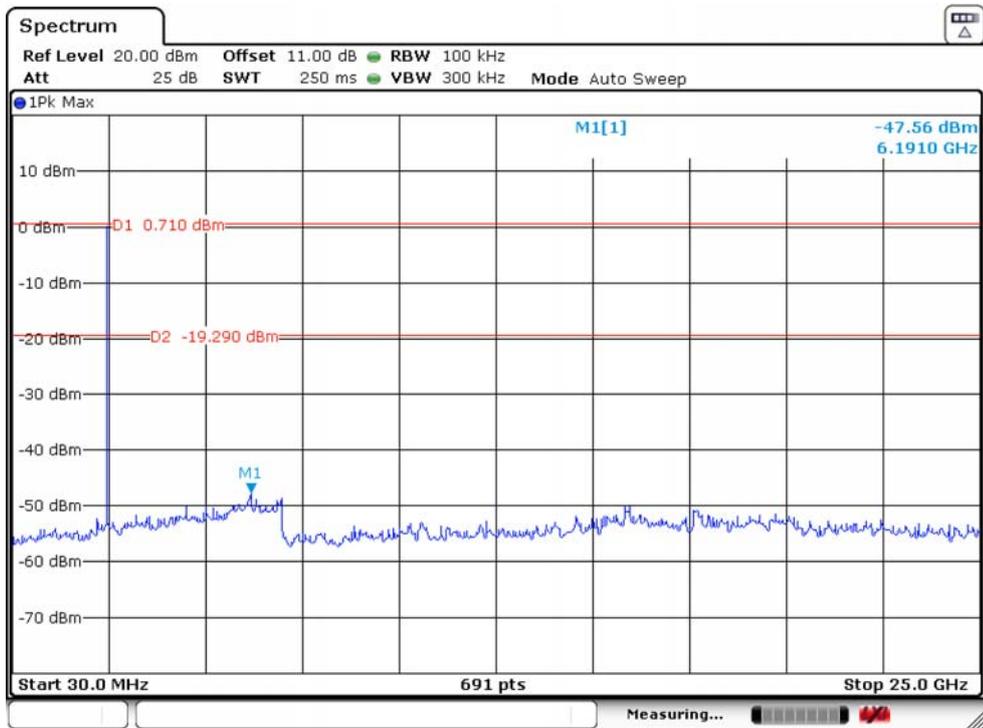
Temperature	25.4°C	Relative Humidity	56%	Test Voltage	DC 3.3V
Result	PASS				



GFSK 2441 MHz



GFSK 2480 MHz



All modulations are all tested ,only worst case is reported

10. RADIATED SPURIOUS EMISSIONS AND BAND EDGE

10.1. Limit

Except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in below. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter’s fundamental emission.

Restricted frequency band

MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 - 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 - 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 - 8500	
108 - 138	--	

General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) ($\mu\text{A}/\text{m}$)	Measurement distance (m)
9 - 490 kHz	$6.37/F$ (F in kHz)	300
490 - 1705 kHz	$63.7/F$ (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note:

1. The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

General field strength limits at frequencies above 30 MHz

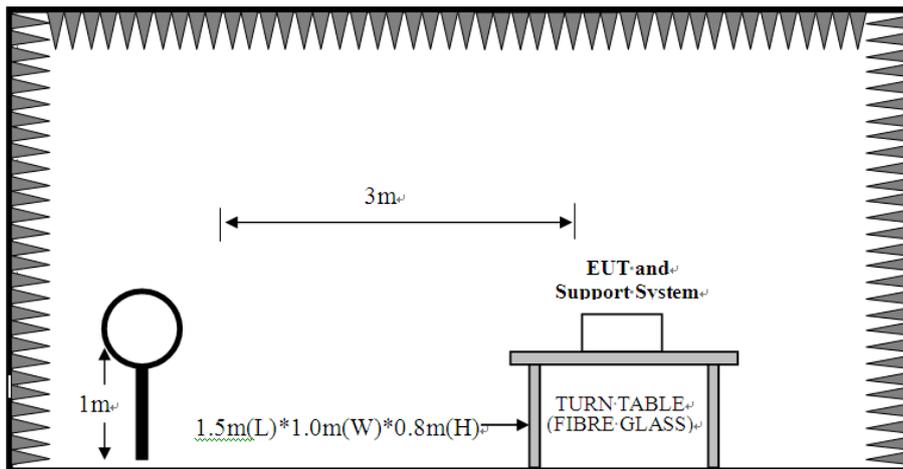
Frequency(MHz)	Field Strength($\mu\text{V}/\text{m}$ at 3 m)
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

Note:

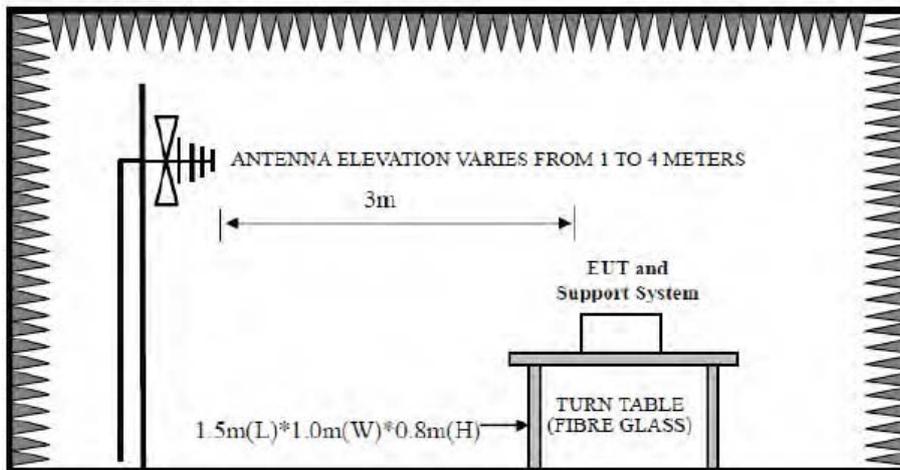
1. Emission level $\text{dB}\mu\text{V} = 20 \log$ Emission level $\mu\text{V}/\text{m}$.
2. The smaller limit shall apply at the cross point between two frequency bands.
3. Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

10.2. Test Setup

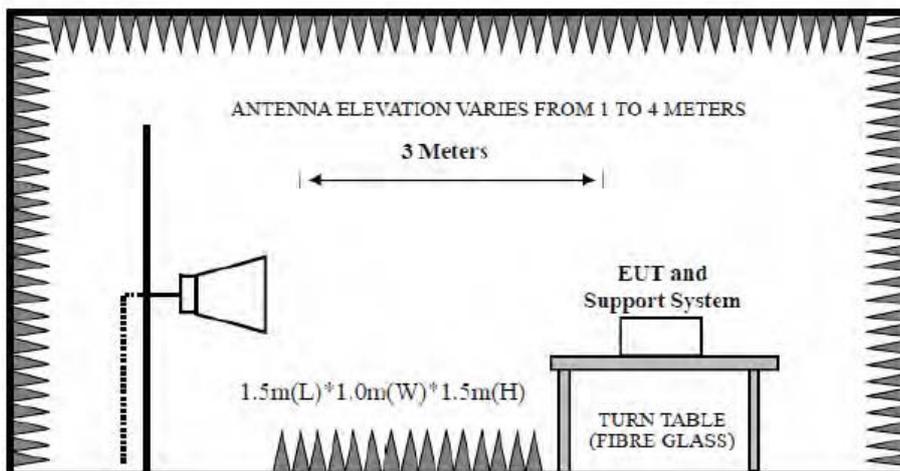
9kHz~30MHz



30~1000MHz



Above 1GHz



10.3. Spectrum Analyzer Setting

For 9KHz-150KHz

Spectrum Parameters	Setting
RBW	300Hz(for Peak&AVG)/CISPR 200Hz(for QP)
VBW	300Hz(for Peak&AVG)/CISPR 200Hz(for QP)
Start frequency	9KHz
Stop frequency	150KHz
Sweep Time	Auto
Detector	PEAK/QP/AVG
Trace Mode	Max Hold

For 150KHz-30MHz

Spectrum Parameters	Setting
RBW	9KHz
VBW	9KHz
Start frequency	150KHz
Stop frequency	30MHz
Sweep Time	Auto
Detector	QP
Trace Mode	Max Hold

For 30MHz-1GHz

Spectrum Parameters	Setting
RBW	120KHz
VBW	300KHz
Start frequency	30MHz
Stop frequency	1GHz
Sweep Time	Auto
Detector	QP
Trace Mode	Max Hold

For Above 1GHz

Spectrum Parameters	Setting	
RBW	1MHz	
VBW	PEAK Measurement	
	3MHz	Duty cycle $\geq 98\%$, VBW=10Hz
		Duty cycle $< 98\%$, VBW $\geq 1/T$
Start frequency	1GHz	
Stop frequency	25GHz	
Sweep Time	Auto	
Detector	PEAK	
Trace Mode	Max Hold	

10.4. Test Procedure

- a. EUT was placed on a turn table, which is 0.8 meter high above ground for below 1GHz test, and which is 1.5 meter high above ground for above 1GHz test.
- b. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower.
- c. Set the EUT transmit continuously with maximum output power.
- d. The turn table can rotate 360 degrees to determine the position of the maximum emission level.
- e. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.
- f. Spectrum analyzer setting parameters in accordance with section 10.3.
- g. Repeat above procedures until all channels and test modes were measured.
- h. Record the results in the test report.

Note:

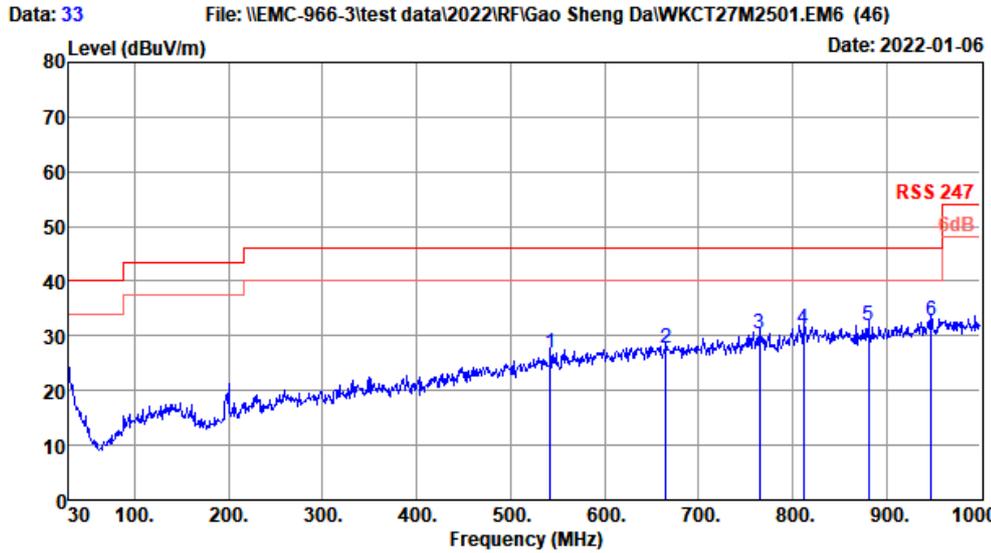
1. For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.
2. The frequency 2402MHz ,2441MHz and 2480MHz is fundamental frequency which no limit, the limit on plots is automatically generated by the software, it's not fundamental limit, we can't remove it.

10.5. Test Result

Radiated Emissions Below 1GHz

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan, Guangdong, China
Tel: +86-769-83081888
Fax: +86-769-83081878



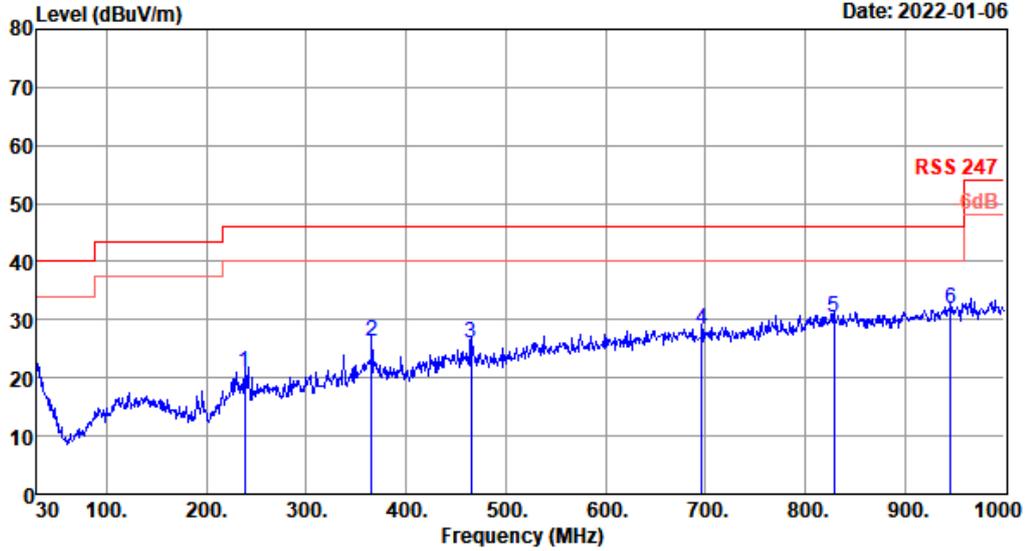
Site no. : 3# 966 Chamber Data no. : 33
 Dis. / Ant. : 3m 31218 Ant. pol. : VERTICAL
 Limit : RSS 247
 Env. / Ins. : Temp:23.6'; Humi:56%; Press:101.52kPa
 Engineer : Carlos
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : TX Mode

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	542.16	19.62	2.42	4.77	26.81	46.00	19.19	QP
2	665.35	21.45	2.76	3.44	27.65	46.00	18.35	QP
3	765.26	22.45	2.96	4.92	30.33	46.00	15.67	QP
4	811.82	23.42	3.14	4.61	31.17	46.00	14.83	QP
5	880.69	23.77	3.30	4.73	31.80	46.00	14.20	QP
6	947.62	24.56	3.89	4.24	32.69	46.00	13.31	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.



Data: 34 File: \\EMC-966-3\test data\2022\RF\Gao Sheng Da\WKCT27M2501.EM6 (46) Date: 2022-01-06

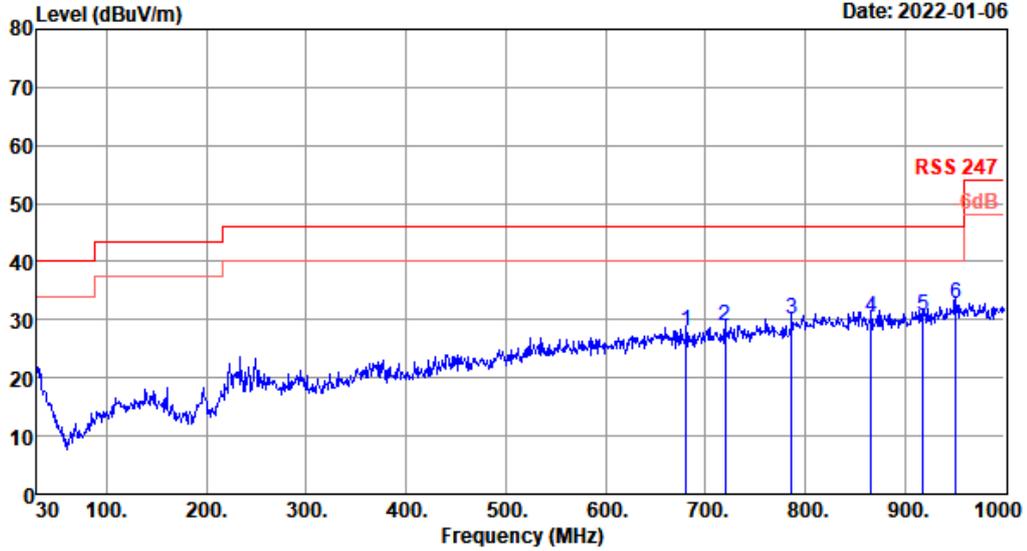


Site no. : 3# 966 Chamber Data no. : 34
 Dis. / Ant. : 3m 31218 Ant. pol. : HORIZONTAL
 Limit : RSS 247
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Carlos
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : TX Mode

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	238.55	11.42	1.39	8.23	21.04	46.00	24.96	QP
2	365.62	15.39	1.89	8.96	26.24	46.00	19.76	QP
3	465.53	17.81	2.25	6.04	26.10	46.00	19.90	QP
4	696.39	21.46	2.72	4.03	28.21	46.00	17.79	QP
5	829.28	23.59	3.18	3.78	30.55	46.00	15.45	QP
6	945.68	24.52	3.86	3.52	31.90	46.00	14.10	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.

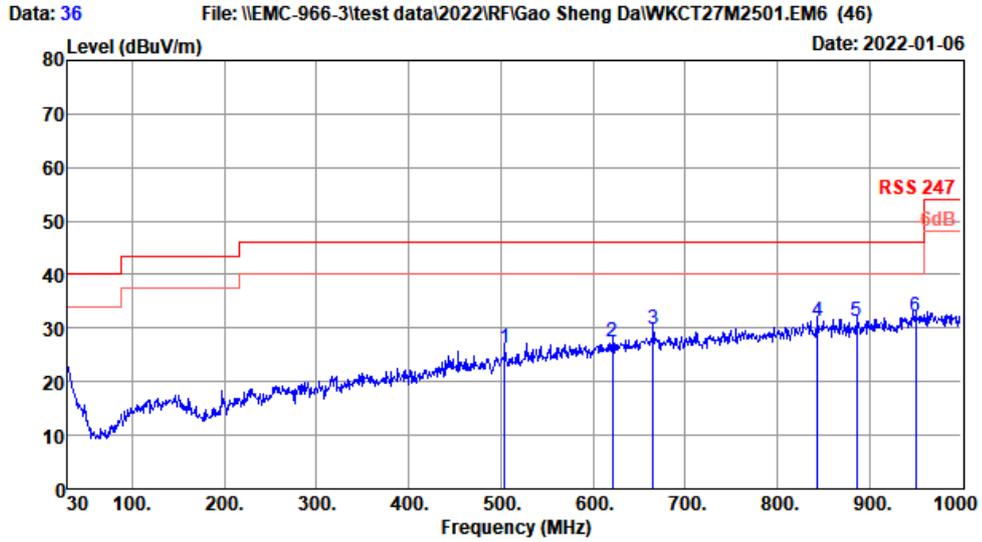
Data: 35 File: \\EMC-966-3\test data\2022\RF\Gao Sheng Da\WKCT27M2501.EM6 (46) Date: 2022-01-06



Site no. : 3# 966 Chamber Data no. : 35
 Dis. / Ant. : 3m 31218 Ant. pol. : HORIZONTAL
 Limit : RSS 247
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Carlos
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : RX Mode

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	680.87	21.49	2.75	3.80	28.04	46.00	17.96	QP
2	719.67	21.40	2.92	4.48	28.80	46.00	17.20	QP
3	786.60	22.61	2.97	4.49	30.07	46.00	15.93	QP
4	866.14	23.40	3.25	3.82	30.47	46.00	15.53	QP
5	918.52	24.09	3.36	3.38	30.83	46.00	15.17	QP
6	951.50	24.62	3.87	4.15	32.64	46.00	13.36	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3# 966 Chamber Data no. : 36
 Dis. / Ant. : 3m 31218 Ant. pol. : VERTICAL
 Limit : RSS 247
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Carlos
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : RX Mode

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	504.33	18.58	2.31	5.35	26.24	46.00	19.76	QP
2	620.73	20.62	2.63	4.08	27.33	46.00	18.67	QP
3	665.35	21.45	2.76	5.46	29.67	46.00	16.33	QP
4	843.83	23.46	3.17	4.63	31.26	46.00	14.74	QP
5	886.51	23.61	3.33	4.26	31.20	46.00	14.80	QP
6	950.53	24.61	3.84	3.85	32.30	46.00	13.70	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.

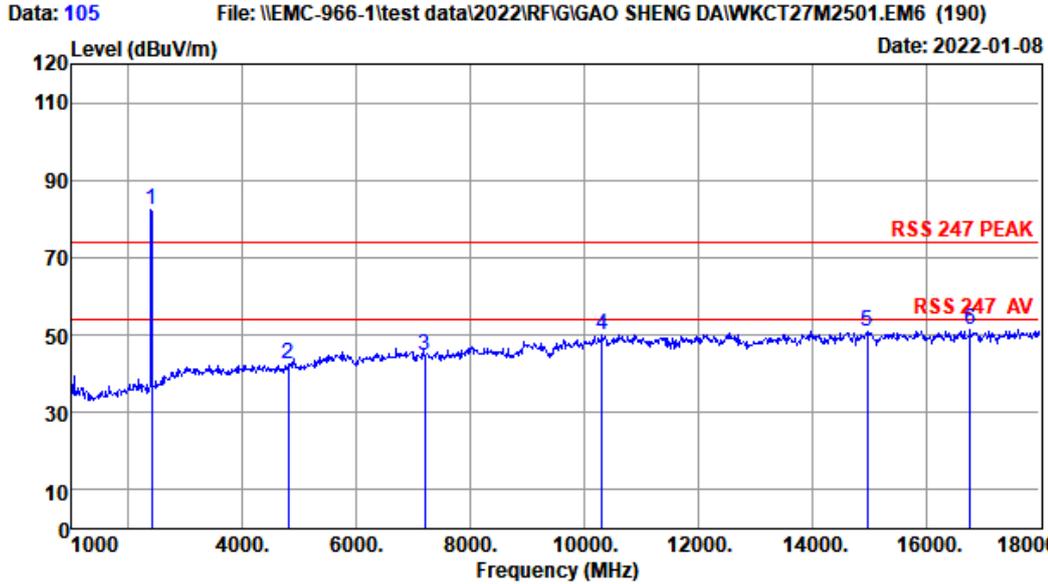
Note:

1. The amplitude of 9KHz to 30MHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
2. All test mode had been pre-test, only the worst case was reported.

Radiated Emissions Above 1G

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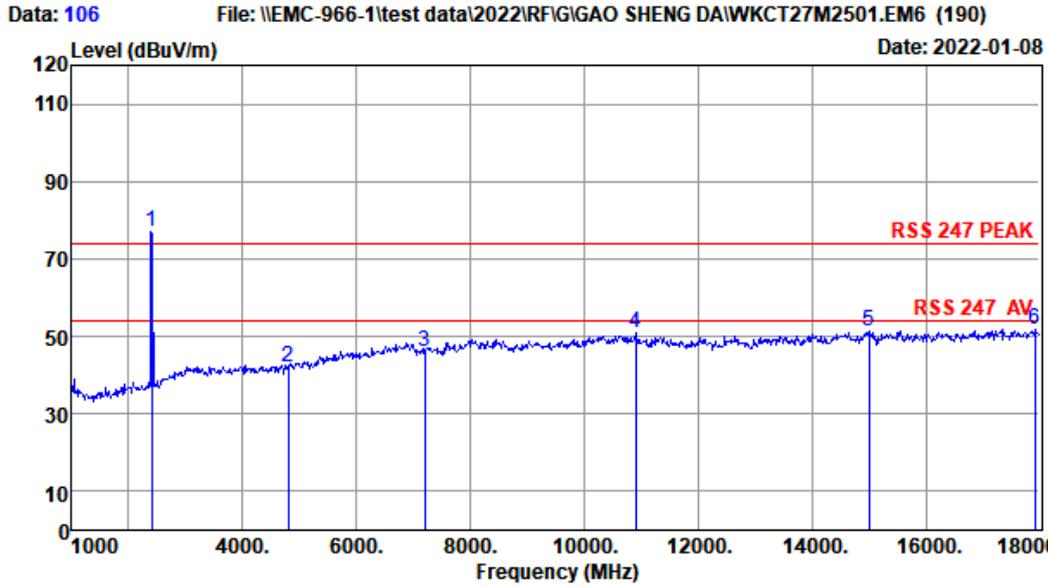


Site no. : 1# 966 Chamber Data no. : 105
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
 Limit : RSS 247 PEAK
 Env. / Ins. : Temp:22.8';Humi:51%;Press:101.52kPa
 Engineer : JBR
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : 8-DPSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.26	1.45	34.64	88.36	82.43	74.00	-8.43	Peak
2	4804.00	31.12	3.25	34.66	42.65	42.36	74.00	31.64	Peak
3	7206.00	36.21	5.19	34.82	38.20	44.78	74.00	29.22	Peak
4	10316.00	39.22	5.97	34.30	39.12	50.01	74.00	23.99	Peak
5	14974.00	40.91	6.82	34.59	37.78	50.92	74.00	23.08	Peak
6	16776.00	40.66	7.29	34.36	37.74	51.33	74.00	22.67	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.

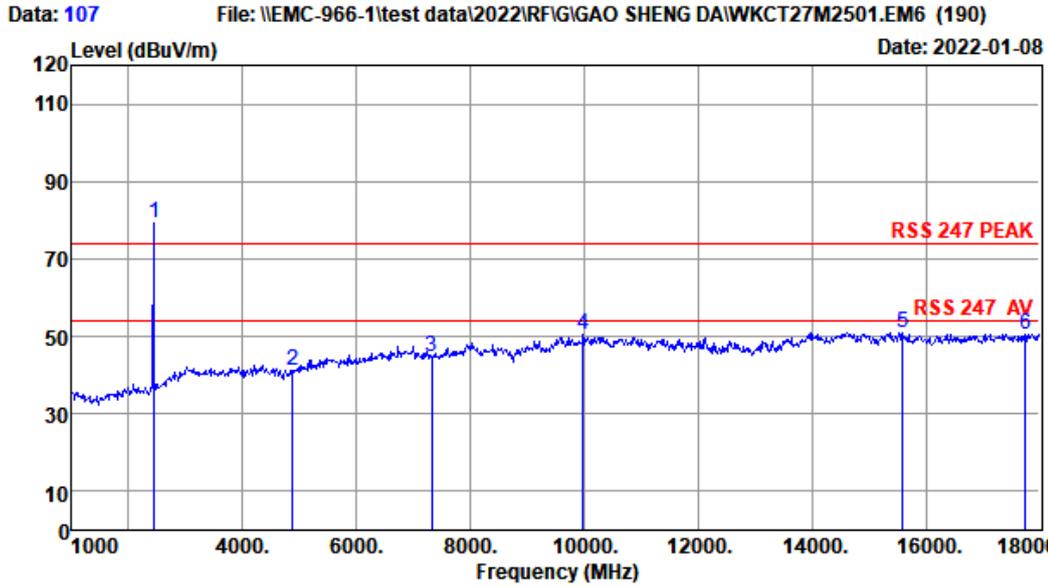




Site no. : 1# 966 Chamber Data no. : 106
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
 Limit : RSS 247 PEAK
 Env. / Ins. : Temp:22.8';Humi:51%;Press:101.52kPa
 Engineer : JBR
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : 8-DPSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.26	1.45	34.64	83.18	77.25	74.00	-3.25	Peak
2	4804.00	31.12	3.25	34.66	42.44	42.15	74.00	31.85	Peak
3	7206.00	36.21	5.19	34.82	39.28	45.86	74.00	28.14	Peak
4	10911.00	39.82	6.09	34.47	39.57	51.01	74.00	22.99	Peak
5	15008.00	40.90	6.81	34.60	38.08	51.19	74.00	22.81	Peak
6	17915.00	48.22	8.18	34.31	29.50	51.59	74.00	22.41	Peak

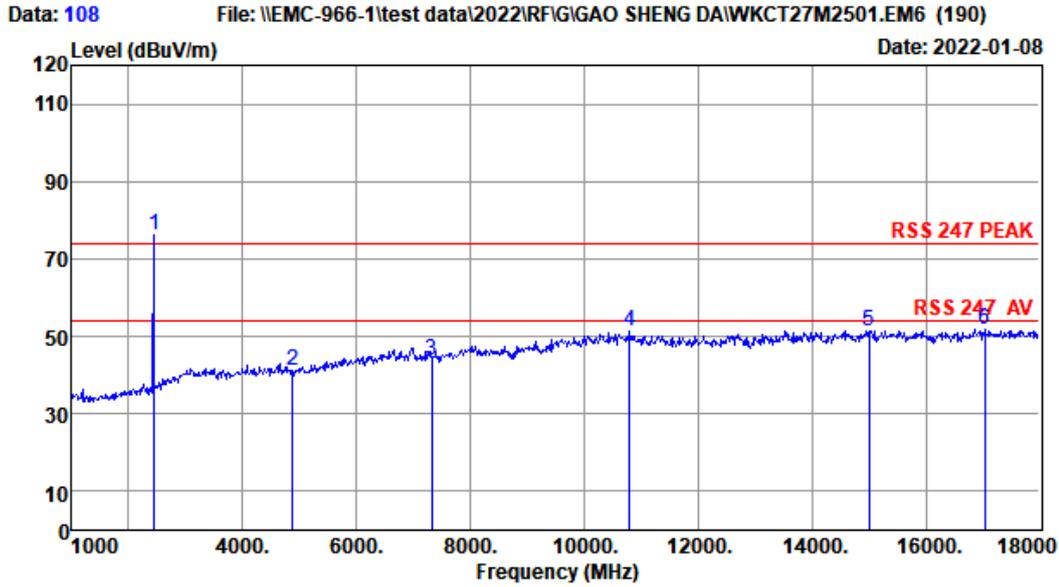
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.



Site no. : 1# 966 Chamber Data no. : 107
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
 Limit : RSS 247 PEAK
 Env. / Ins. : Temp:22.8';Humi:51%;Press:101.52kPa
 Engineer : JBR
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : 8-DPSK TX 2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.00	27.33	1.47	34.62	85.03	79.21	74.00	-5.21	Peak
2	4882.00	31.37	3.31	34.68	41.02	41.02	74.00	32.98	Peak
3	7323.00	36.46	5.22	34.83	38.06	44.91	74.00	29.09	Peak
4	9976.00	38.87	5.88	34.20	39.73	50.28	74.00	23.72	Peak
5	15603.00	40.24	6.53	34.36	38.52	50.93	74.00	23.07	Peak
6	17745.00	46.87	8.07	34.33	30.00	50.61	74.00	23.39	Peak

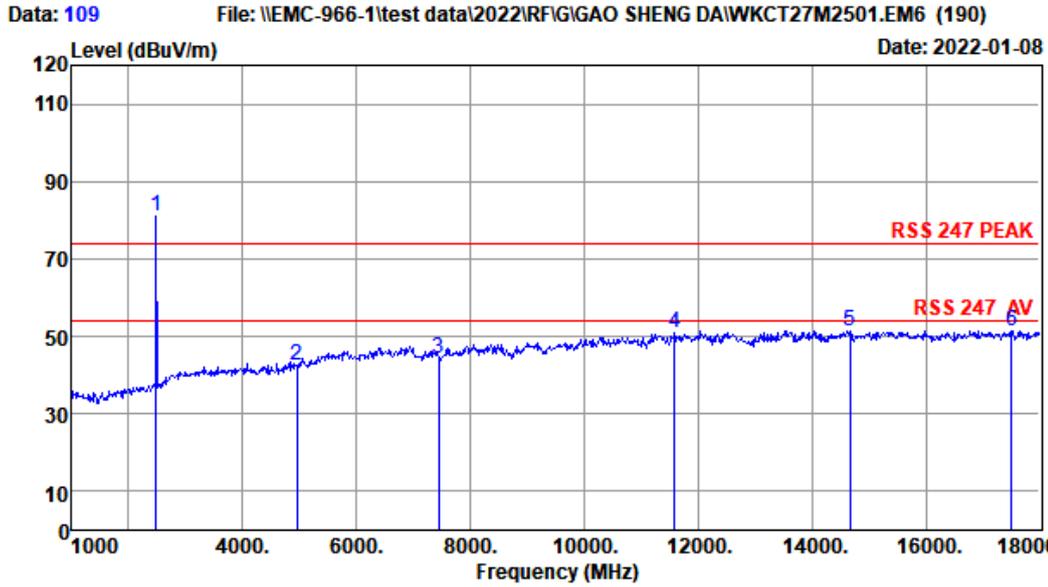
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.



Site no. : 1# 966 Chamber Data no. : 108
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
 Limit : RSS 247 PEAK
 Env. / Ins. : Temp:22.8';Humi:51%;Press:101.52kPa
 Engineer : JBR
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : 8-DPSK TX 2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.00	27.33	1.47	34.62	82.02	76.20	74.00	-2.20	Peak
2	4882.00	31.37	3.31	34.68	41.13	41.13	74.00	32.87	Peak
3	7323.00	36.46	5.22	34.83	37.09	43.94	74.00	30.06	Peak
4	10792.00	39.70	6.07	34.44	40.06	51.39	74.00	22.61	Peak
5	15008.00	40.90	6.81	34.60	38.32	51.43	74.00	22.57	Peak
6	17031.00	41.17	7.45	34.40	37.64	51.86	74.00	22.14	Peak

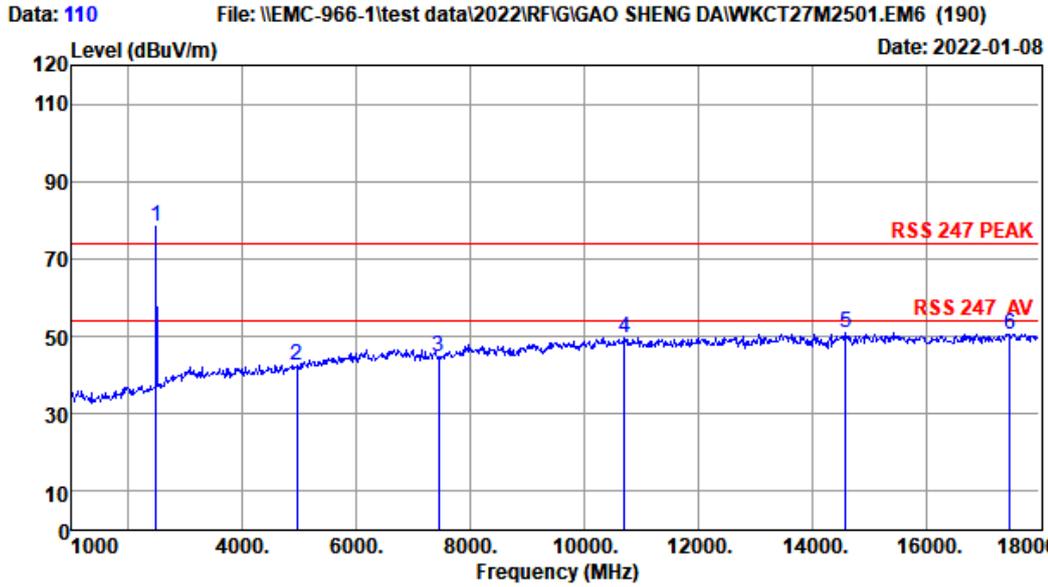
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.



Site no. : 1# 966 Chamber Data no. : 109
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
 Limit : RSS 247 PEAK
 Env. / Ins. : Temp:22.8';Humi:51%;Press:101.52kPa
 Engineer : JBR
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : 8-DPSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.38	1.48	34.61	86.82	81.07	74.00	-7.07	Peak
2	4960.00	31.68	3.38	34.69	42.31	42.68	74.00	31.32	Peak
3	7440.00	36.70	5.26	34.84	37.20	44.32	74.00	29.68	Peak
4	11591.00	39.90	6.11	34.68	39.76	51.09	74.00	22.91	Peak
5	14668.00	40.97	6.87	34.50	38.20	51.54	74.00	22.46	Peak
6	17507.00	44.97	7.92	34.35	32.84	51.38	74.00	22.62	Peak

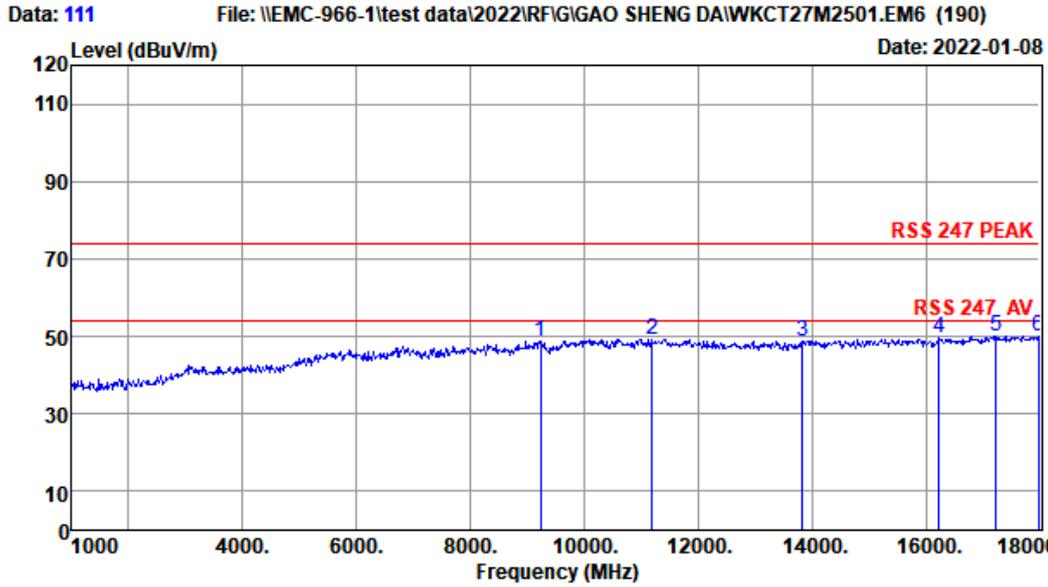
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.



Site no. : 1# 966 Chamber Data no. : 110
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
 Limit : RSS 247 PEAK
 Env. / Ins. : Temp:22.8';Humi:51%;Press:101.52kPa
 Engineer : JBR
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : 8-DPSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.38	1.48	34.61	84.32	78.57	74.00	-4.57	Peak
2	4960.00	31.68	3.38	34.69	42.02	42.39	74.00	31.61	Peak
3	7440.00	36.70	5.26	34.84	37.75	44.87	74.00	29.13	Peak
4	10707.00	39.61	6.06	34.41	38.27	49.53	74.00	24.47	Peak
5	14600.00	40.98	6.88	34.48	37.41	50.79	74.00	23.21	Peak
6	17473.00	44.70	7.89	34.35	32.42	50.66	74.00	23.34	Peak

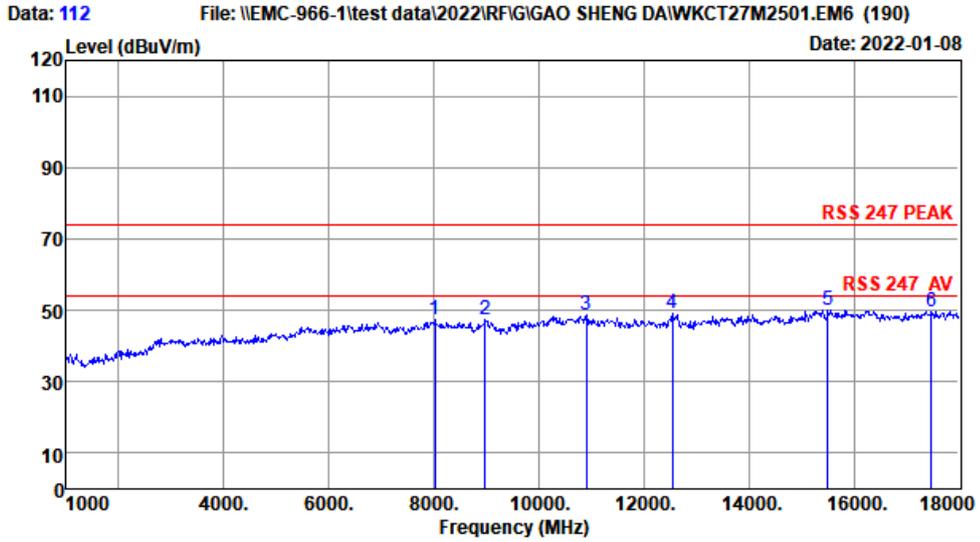
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.



Site no. : 1# 966 Chamber Data no. : 111
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
 Limit : RSS 247 PEAK
 Env. / Ins. : Temp:22.8';Humi:51%;Press:101.52kPa
 Engineer : JBR
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : RX Mode

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	9228.00	37.35	5.38	34.36	40.25	48.62	74.00	25.38	Peak
2	11200.00	39.90	6.13	34.56	37.80	49.27	74.00	24.73	Peak
3	13835.00	40.81	6.46	34.32	35.91	48.86	74.00	25.14	Peak
4	16232.00	40.06	7.01	34.25	36.56	49.38	74.00	24.62	Peak
5	17235.00	42.80	7.65	34.38	33.97	50.04	74.00	23.96	Peak
6	17983.00	48.76	8.23	34.30	27.51	50.20	74.00	23.80	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.



Site no. : 1# 966 Chamber Data no. : 112
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
 Limit : RSS 247 PEAK
 Env. / Ins. : Temp:22.8';Humi:51%;Press:101.52kPa
 Engineer : JBR
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : RX Mode

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	8021.00	36.90	5.80	34.89	39.54	47.35	74.00	26.65	Peak
2	8973.00	36.90	5.28	34.42	39.59	47.35	74.00	26.65	Peak
3	10911.00	39.82	6.09	34.47	37.18	48.62	74.00	25.38	Peak
4	12543.00	39.63	6.22	34.58	37.80	49.07	74.00	24.93	Peak
5	15501.00	40.35	6.43	34.40	37.69	50.07	74.00	23.93	Peak
6	17473.00	44.70	7.89	34.35	31.41	49.65	74.00	24.35	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.

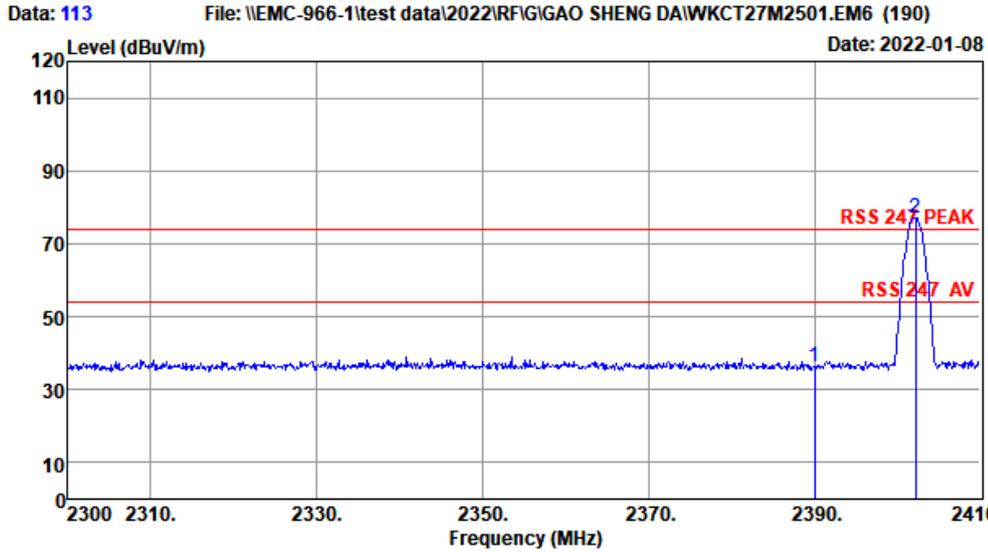
Note:

1. The amplitude of 18GHz to 25GHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
2. All test mode had been pre-test, only Low/Middle/High Channel of the worst case modulation mode was reported.

Radiated Band Edge

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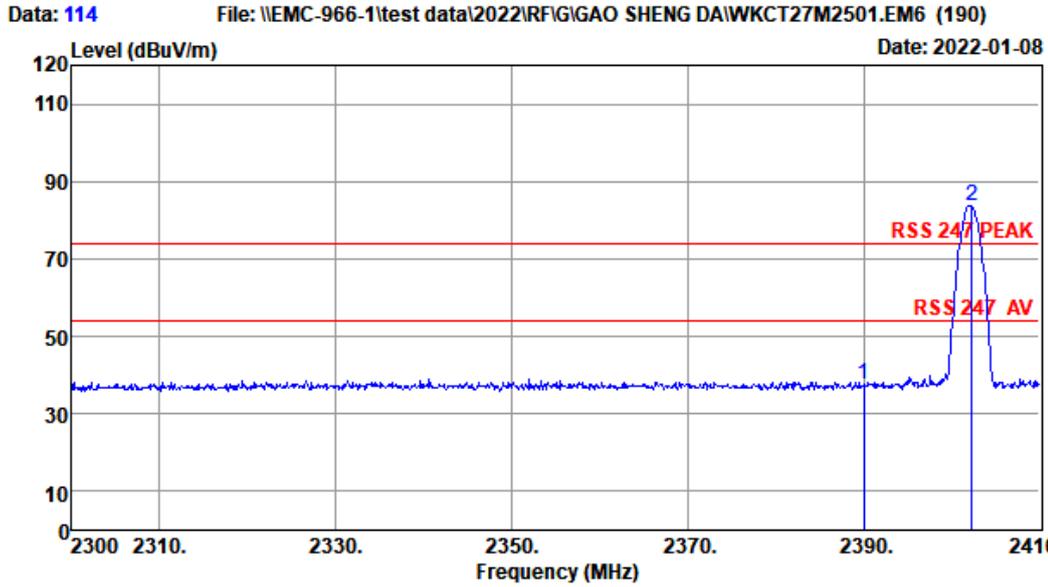


Site no. : 1# 966 Chamber Data no. : 113
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
 Limit : RSS 247 PEAK
 Env. / Ins. : Temp:22.8°;Humi:51%;Press:101.52kPa
 Engineer : JBR
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : 8-DPSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.26	1.45	34.64	42.11	36.18	74.00	37.82	Peak
2	2402.19	27.26	1.45	34.64	83.07	77.14	74.00	-3.14	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.

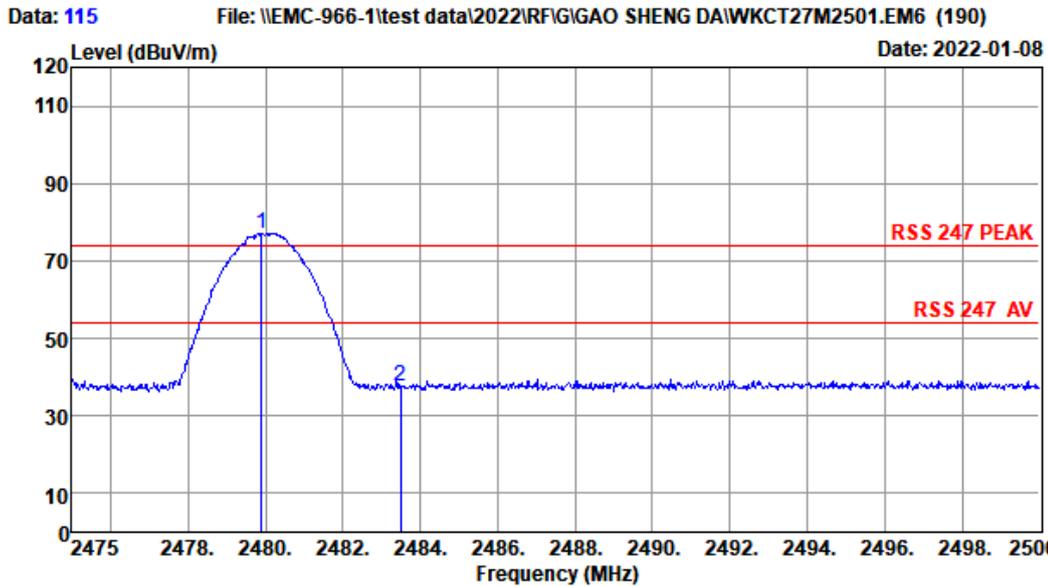




Site no. : 1# 966 Chamber Data no. : 114
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
 Limit : RSS 247 PEAK
 Env. / Ins. : Temp:22.8';Humi:51%;Press:101.52kPa
 Engineer : JBR
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : 8-DPSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.26	1.45	34.64	43.76	37.83	74.00	36.17	Peak
2	2402.30	27.26	1.45	34.64	89.71	83.78	74.00	-9.78	Peak

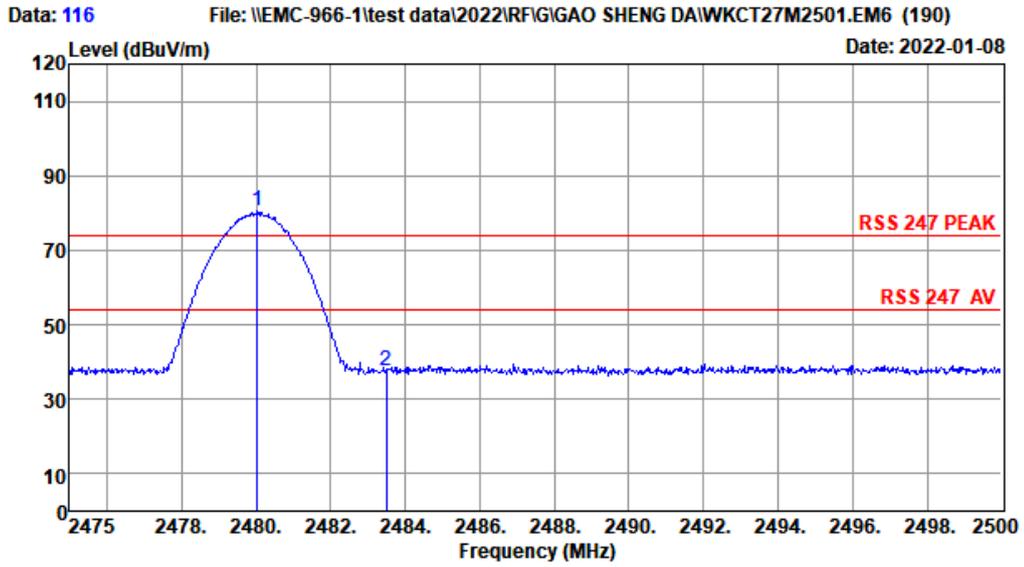
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.



Site no. : 1# 966 Chamber Data no. : 115
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
 Limit : RSS 247 PEAK
 Env. / Ins. : Temp:22.8';Humi:51%;Press:101.52kPa
 Engineer : JBR
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : 8-DPSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.90	27.38	1.48	34.61	82.89	77.14	74.00	-3.14	Peak
2	2483.50	27.38	1.48	34.61	43.37	37.62	74.00	36.38	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.



Site no. : 1# 966 Chamber Data no. : 116
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
 Limit : RSS 247 PEAK
 Env. / Ins. : Temp:22.8';Humi:51%;Press:101.52kPa
 Engineer : JBR
 EUT : WIFI+BT Module
 Power : DC 3.3V
 M/N : WKCT27M2501
 Test Mode : 8-DPSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.03	27.38	1.48	34.61	86.12	80.37	74.00	-6.37	Peak
2	2483.50	27.38	1.48	34.61	43.35	37.60	74.00	36.40	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. Margin= Limit - Emission Level.
 3. The emission levels that are 20dB below the official limit are not reported.

Note:

1. All test mode had been pre-test, only Low/High Channel of the worst case modulation mode was reported.

11. AC POWER LINE CONDUCTED EMISSIONS

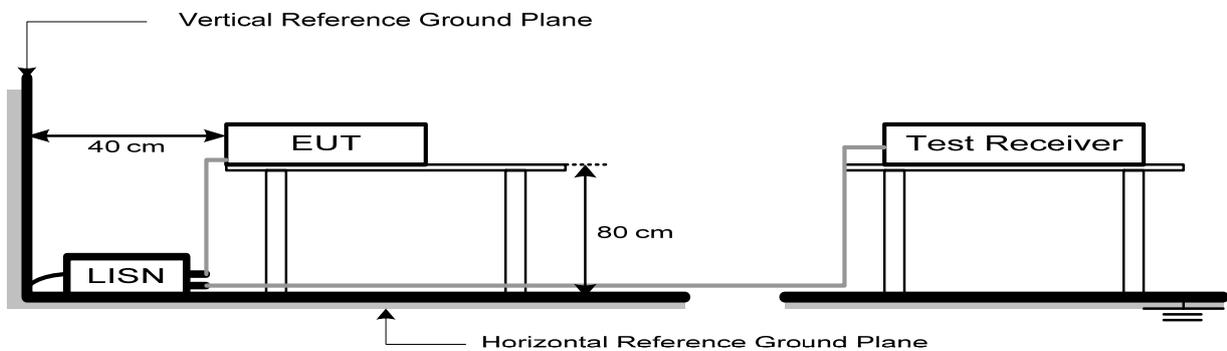
11.1. Limit

Frequency (MHz)	Conducted limit(dB μ V)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

Note:

1. * Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

11.2. Test Setup



11.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	9KHz
VBW	9KHz
Start frequency	150KHz
Stop frequency	30MHz
Sweep Time	Auto
Detector	QP/AVG
Trace Mode	Max Hold

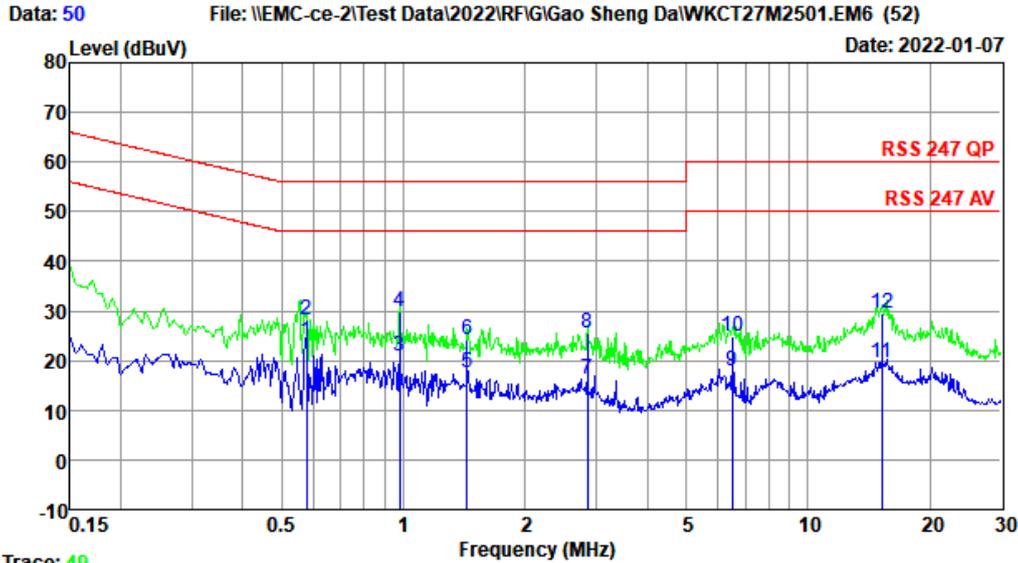
11.4. Test Procedure

- a. The EUT was placed on a non-metallic table, 80cm above the ground plane.
- b. The EUT Power connected to the power mains through a line impedance stabilization network.
- c. Provides a 50 ohm coupling impedance for the EUT (Please refer the block diagram of the test setup and photographs).
- d. Set the EUT transmit continuously with maximum output power.
- e. Spectrum analyzer setting parameters in accordance with section 11.3.
- f. The AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Test.
- g. Record the results in the test report.

11.5. Test Result

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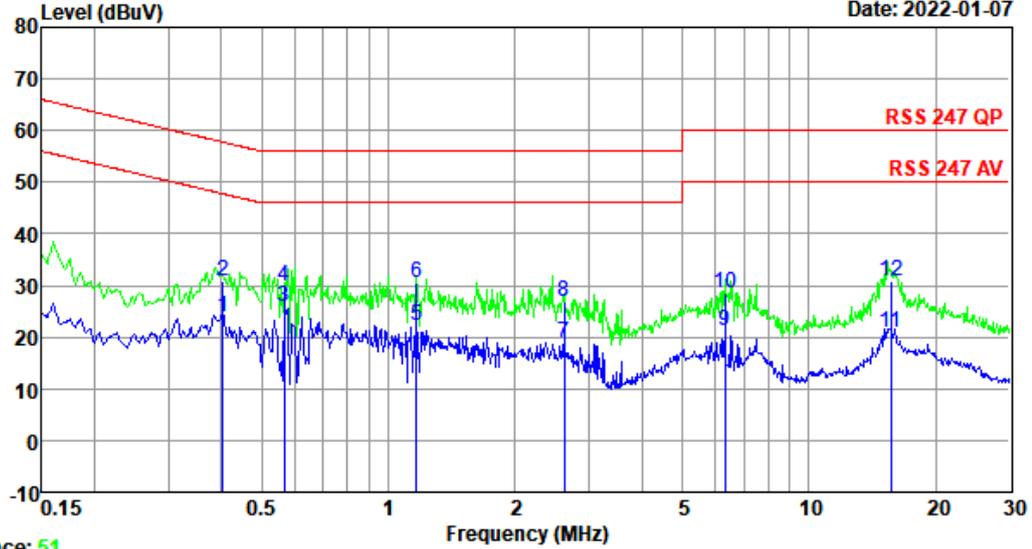
Trace: 49
 Site no. : 2#CE Shield Room Data no. : 50
 Env. / Ins. : Temp:22.8°C Humi:58% Press:101.30kPa. : NEUTRAL
 Limit : RSS 247 QP
 Engineer : ZSX
 EUT : WIFI+BT Module
 Power : DC 3.3V From PC Input AC 120V/60Hz
 M/N : WKCT27M2501
 Test Mode : TX Mode

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.5762	9.75	0.05	14.13	23.93	46.00	22.07	Average
2	0.5762	9.75	0.05	18.47	28.27	56.00	27.73	QP
3	0.9787	9.83	0.06	10.88	20.77	46.00	25.23	Average
4	0.9787	9.83	0.06	19.81	29.70	56.00	26.30	QP
5	1.4333	9.85	0.06	7.52	17.43	46.00	28.57	Average
6	1.4333	9.85	0.06	14.21	24.12	56.00	31.88	QP
7	2.8541	9.97	0.07	6.18	16.22	46.00	29.78	Average
8	2.8541	9.97	0.07	15.56	25.60	56.00	30.40	QP
9	6.4882	10.05	0.07	7.77	17.89	50.00	32.11	Average
10	6.4882	10.05	0.07	14.86	24.98	60.00	35.02	QP
11	15.2261	10.13	0.08	9.22	19.43	50.00	30.57	Average
12	15.2261	10.13	0.08	19.18	29.39	60.00	30.61	QP

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
 2. If the average limit is met when using a quasi-peak detector,
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.



Data: 52 File: \\EMC-ce-2\Test Data\2022\RF\G\Gao Sheng Da\WKCT27M2501.EM6 (52) Date: 2022-01-07



Trace: 51
 Site no. : 2#CE Shield Room Data no. : 52
 Env. / Ins. : Temp:22.8°C Humi:58% Press:101.30kPa. : LINE
 Limit : RSS 247 QP
 Engineer : ZSX
 EUT : WIFI+BT Module
 Power : DC 3.3V From PC Input AC 120V/60Hz
 M/N : WKCT27M2501
 Test Mode : TX Mode

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.4040	9.85	0.05	14.03	23.93	47.77	23.84	Average
2	0.4040	9.85	0.05	20.91	30.81	57.77	26.96	QP
3	0.5641	9.83	0.05	16.04	25.92	46.00	20.08	Average
4	0.5641	9.83	0.05	19.96	29.84	56.00	26.16	QP
5	1.1657	9.92	0.06	12.11	22.09	46.00	23.91	Average
6	1.1657	9.92	0.06	20.57	30.55	56.00	25.45	QP
7	2.6221	9.95	0.07	8.90	18.92	46.00	27.08	Average
8	2.6221	9.95	0.07	16.79	26.81	56.00	29.19	QP
9	6.3186	9.91	0.07	11.12	21.10	50.00	28.90	Average
10	6.3186	9.91	0.07	18.54	28.52	60.00	31.48	QP
11	15.6349	9.86	0.08	10.81	20.75	50.00	29.25	Average
12	15.6349	9.86	0.08	20.97	30.91	60.00	29.09	QP

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
 2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

12. TRANSMIT ANTENNA

12.1. Limit

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

12.2. Test Result

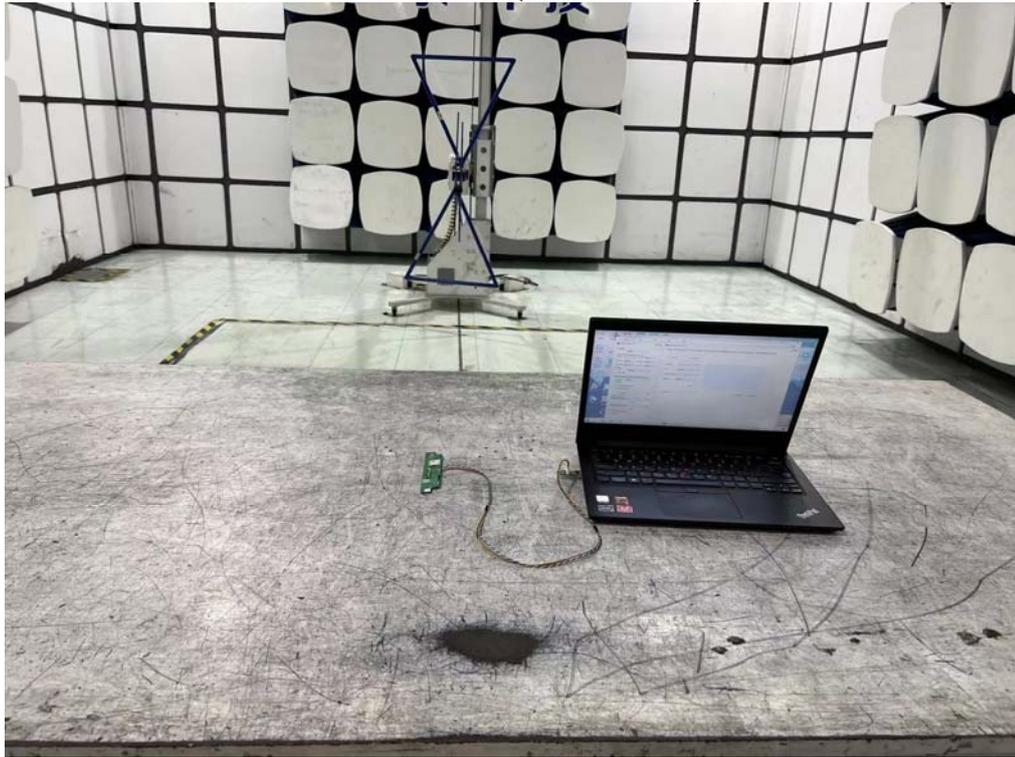
All antennas are listed in section 1.2. And the antennas used for this product is PCB antenna, So the notice does not need to be displayed in the user manual.

13. TEST SETUP PHOTO

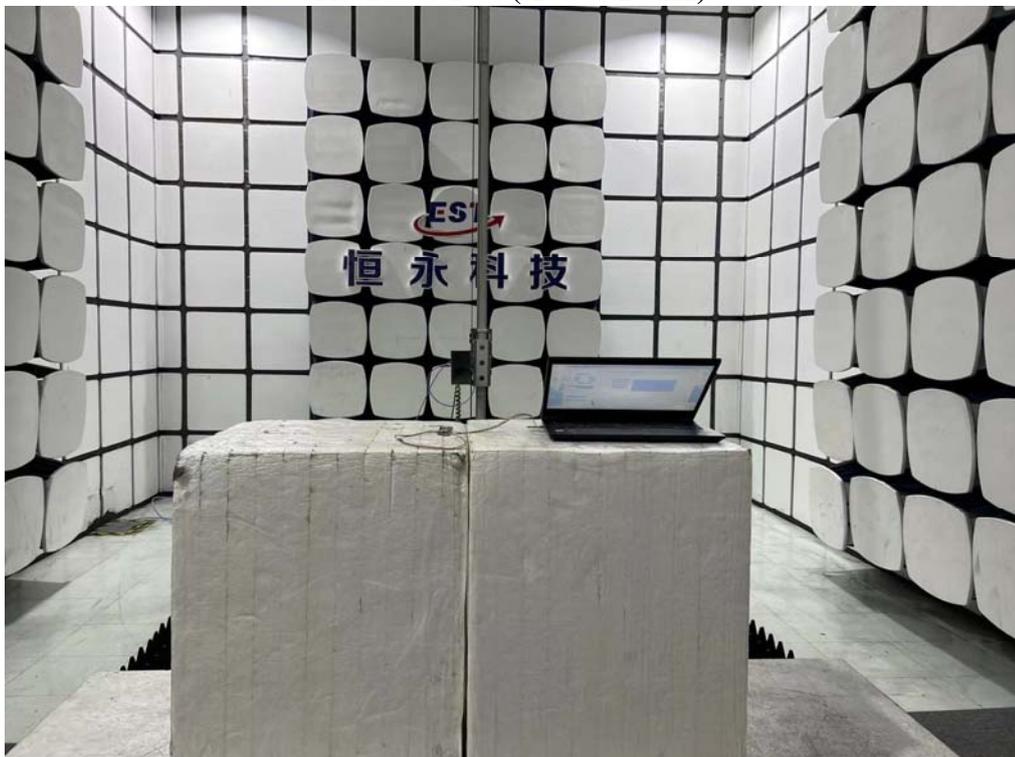
Conducted Test



Radiated Test (Below 1GHz)

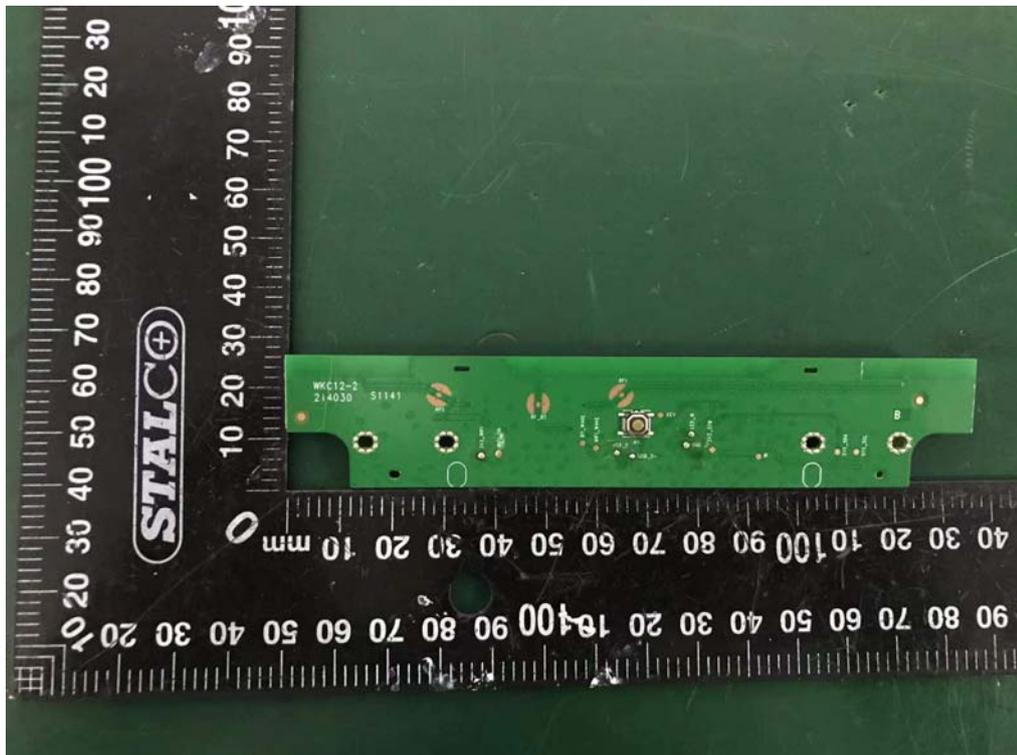
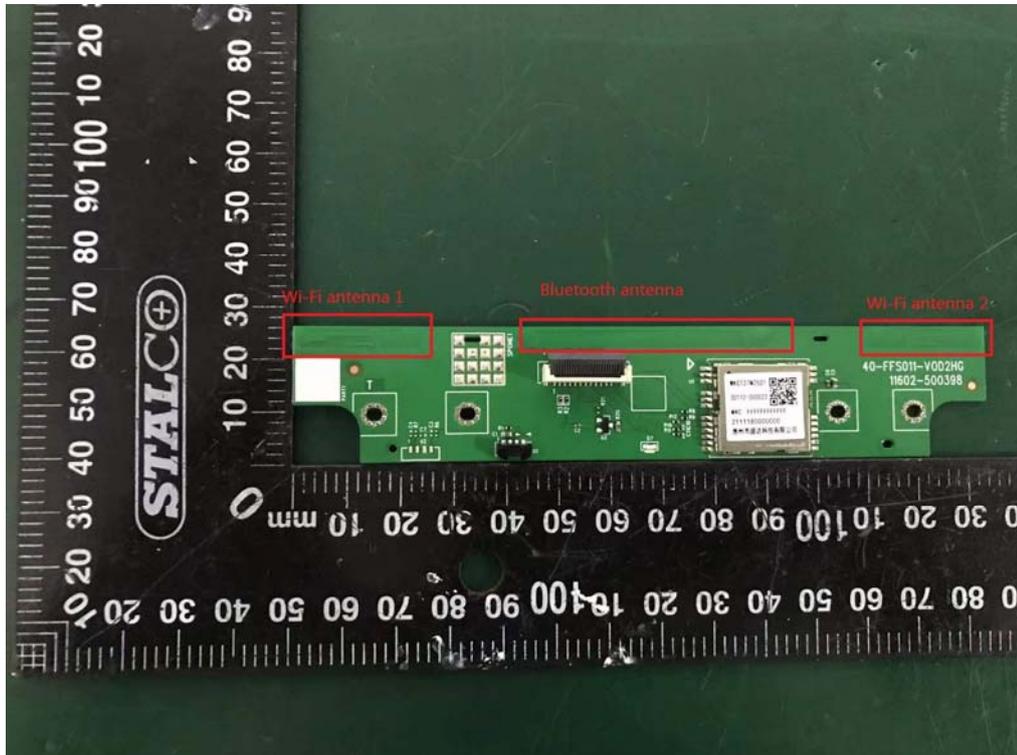


Radiated Test (Above 1GHz)

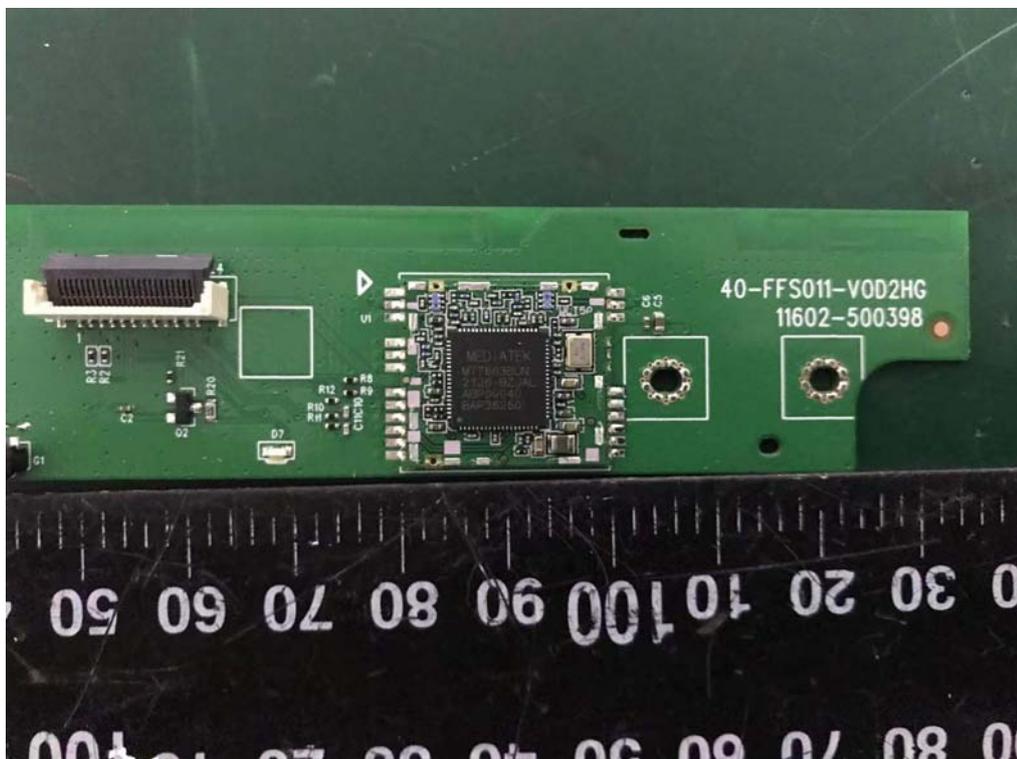
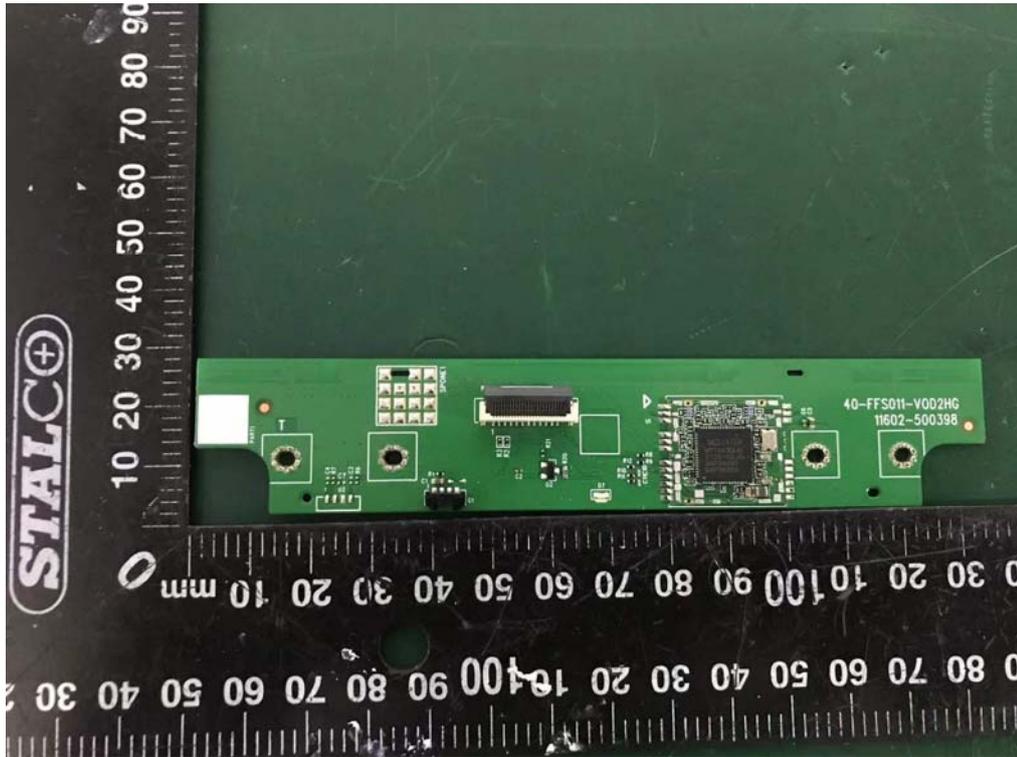


14. EUT PHOTO

External Photos
M/N: WKCT27M2501



Internal Photos
M/N: WKCT27M2501



End of Test Report