

FCC PART 15C TEST REPORT FOR CERTIFICATION

On Behalf of

Soundlab Technology Company Limited

Soundbar

Model Number: Klipsch Cinema 800 Sound bar

FCC ID: 2ATKO-BAR800

Prepared for:	Soundlab Technology Company Limited
	No.101,202,Building 1, Microlab Industrial Park, No.2 Baozi South
	Road, Kengzi, Pingshan District, ShenZhen, China
Prepared By:	EST Technology Co., Ltd.
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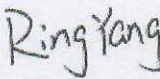
Report Number:	ESTE-R2008097
Date of Test:	Jul. 14~Aug. 18, 2020
Date of Report:	Aug. 19, 2020

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EST Technology Co., Ltd.

Applicant:	Soundlab Technology Company Limited		
Address:	No.101,202,Building 1, Microlab Industrial Park, No.2 Baozi South Road, Kengzi, Pingshan District, ShenZhen, China		
Manufacturer:	Klipsch Group Inc.		
Address:	3502 Woodview Trace, Indianapolis, IN 46268		
E.U.T:	Soundbar		
Model Number:	Klipsch Cinema 800 Sound bar		
Power Supply:	AC 100~240V, 50/60Hz		
Trade Name:	Klipsch	Serial No.:	-----
Date of Receipt:	Jul. 14, 2020	Date of Test:	Jul. 14~Aug. 18, 2020
Test Specification:	FCC Part 15 Subpart C (15.247) ANSI C63.10:2013 FCC KDB 558074 D01 15.247 Meas Guidance v05r02		
Test Result:	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 FCC Rules and Regulations Part 15 Subpart C requirements. This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd.		
Prepared by:	Reviewed by:	Date: Aug. 19, 2020	
 Ring Yang / Assistant	 Seven Wang / Engineer	Approved by:  Iceman Hu / Manager	
Other Aspects:			
None.			
Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested			
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.			

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Product Name	:	Soundbar
Model Number	:	Klipsch Cinema 800 Sound bar
Software Version	:	V28
Hardware Version	:	V1.0.
Operation frequency	:	2402MHz~2480MHz
Number of channel	:	40
Max Output Power (PEAK)	:	3.77dBm
Modulation Type	:	GFSK (1M) GFSK (2M)
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	N/A	N/A	Internal	N/A	2.34
2	N/A	N/A	Internal	N/A	2.34
Only one antenna transmission is supported, Simultaneous transmission is not supported.					

2. SUMMARY OF TEST

2.1. Summary of test result

Report Section	Description of Test Item	FCC Standard Section	Results
3	6dB Bandwidth	15.247(a)(2)	PASS
4	Maximum Peak Output Power	15.247(b)(3)	PASS
5	Power Spectral Density	15.247(e)	PASS
6	Conducted Band Edge	15.247(d)	PASS
7	Conducted Spurious Emissions	15.247(d)	PASS
8	Radiated Spurious Emissions and Band Edge	15.205 15.209 15.247(d)	PASS
9	AC Power Line Conducted Emissions	15.207	PASS
10	Antenna Requirement	15.203	PASS

Note:

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

2.2. Test Facilities

EMC Lab

: Certified 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	$\pm 3.48\text{dB}$
Uncertainty for spurious emissions test (30MHz-1GHz)	$\pm 4.60\text{ dB(Polarize: H)}$
	$\pm 4.68\text{ dB(Polarize: V)}$
Uncertainty for spurious emissions test (1GHz to 25GHz)	$\pm 4.96\text{dB}$
Uncertainty for radio frequency	7×10^{-8}
Uncertainty for conducted RF Power	0.20dB
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.

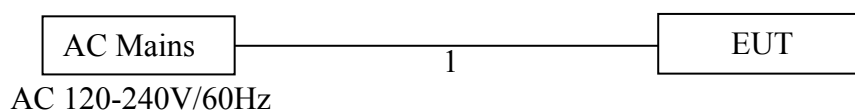
2.4. Assistant equipment used for test

Item	Equipment	Brand	Model Name/Type No.	FCC ID	Series No.
-	-	-	-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	1.5m	AC Cable

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 BLE test mode by software before test.



(EUT: Soundbar)

2.6. Test Mode

The test mode was selected for the final test as listed below.

Test Item	Modulation Type	Test Channel
6dB Bandwidth	GFSK	Low/Middle/High
Maximum Peak Output Power	GFSK	Low/Middle/High
Power Spectral Density	GFSK	Low/Middle/High
Conducted Band Edge	GFSK	Low/ High
Conducted Spurious Emissions	GFSK	Low/Middle/High
Radiated Spurious Emissions(Below 1GHz)	GFSK	Low/Middle/High
Radiated Spurious Emissions(Above 1GHz)	GFSK	Low/Middle/High
Radiated Band Edge	GFSK	Low/High
AC Power Line Conducted Emissions	GFSK	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. Power Setting of Test Software

Software Name	SecureCRT 5.50		
Frequency(MHz)	2402	2440	2480
Setting	Default	Default	Default

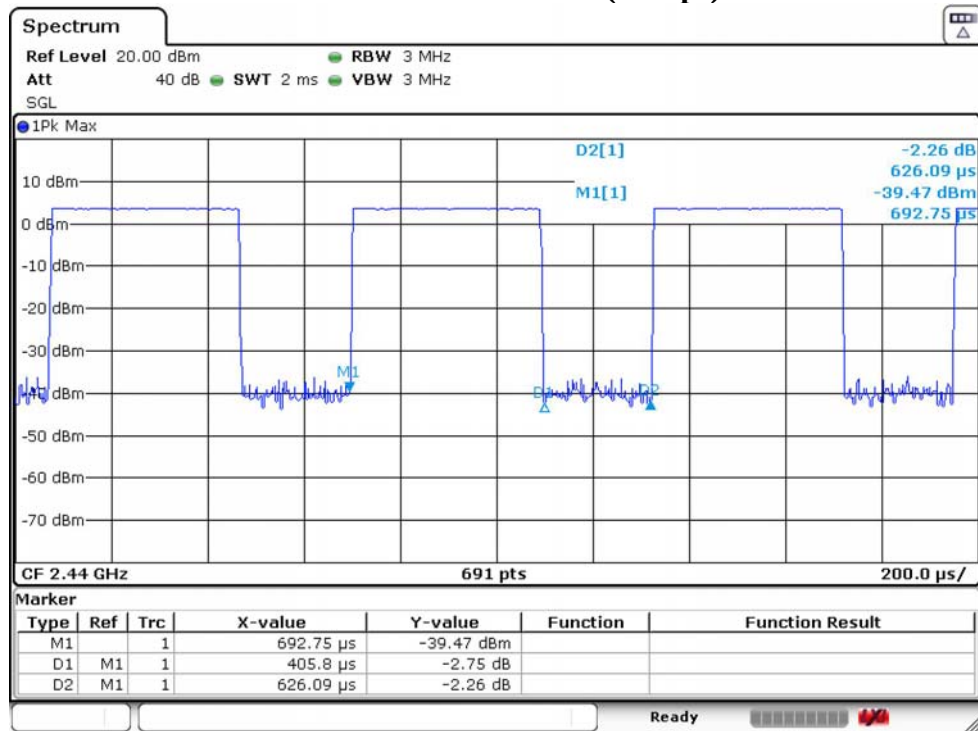
2.8. Duty Cycle

Antenna	Temperature	23.5℃	Relative Humidity	49%	Test Voltage	120V/60Hz
	Mode	Fre(MHz)	On time(ms)	Total Time(ms)	Duty Cycle	Duty Factor
ANT 1	GFSK (1Mbps)	2440	0.40580	0.62609	64.81%	1.88
	GFSK (2Mbps)	2440	0.22029	0.62609	35.19%	4.54
ANT 2	GFSK (1Mbps)	2440	0.40580	0.62609	64.81%	1.88
	GFSK (2Mbps)	2440	0.22029	0.62609	35.19%	4.54

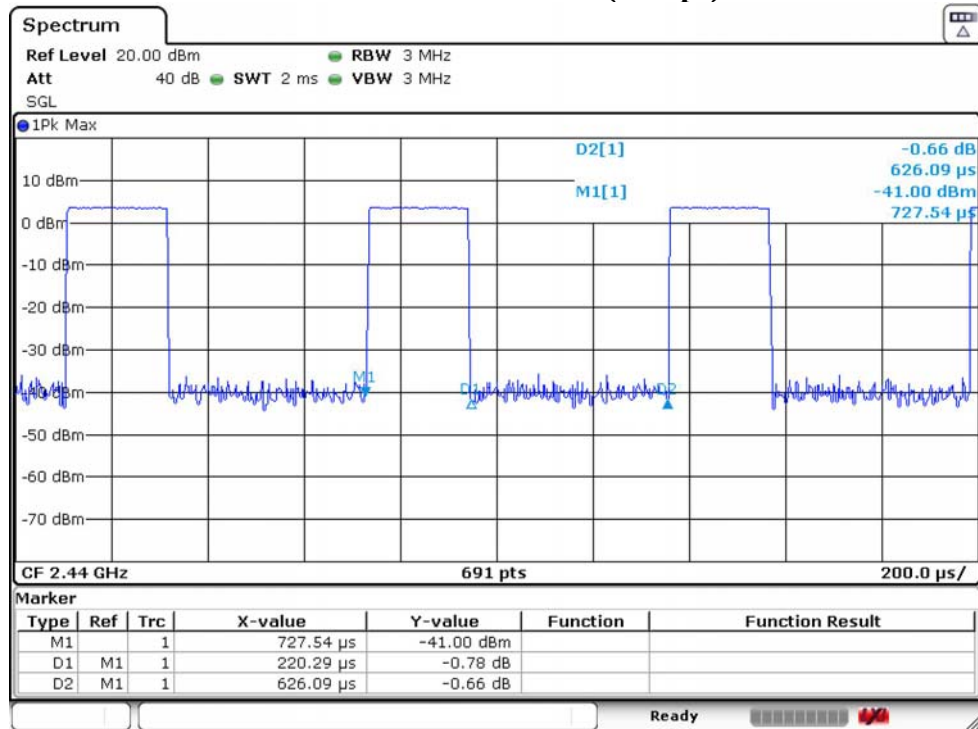
Note:

1. If duty cycle <98 %, the conducted average output power and average power spectral density should be add duty factor.
2. If duty cycle $\geq$ 98 %,the EUT is consider to be transmitting continuously,the conducted average output power and average power spectral density no need to add duty factor(consider to be zero).
3. The conducted peak output power and peak power spectral density no need to consider duty factor.
4. The on-time time is transmission duration(T).

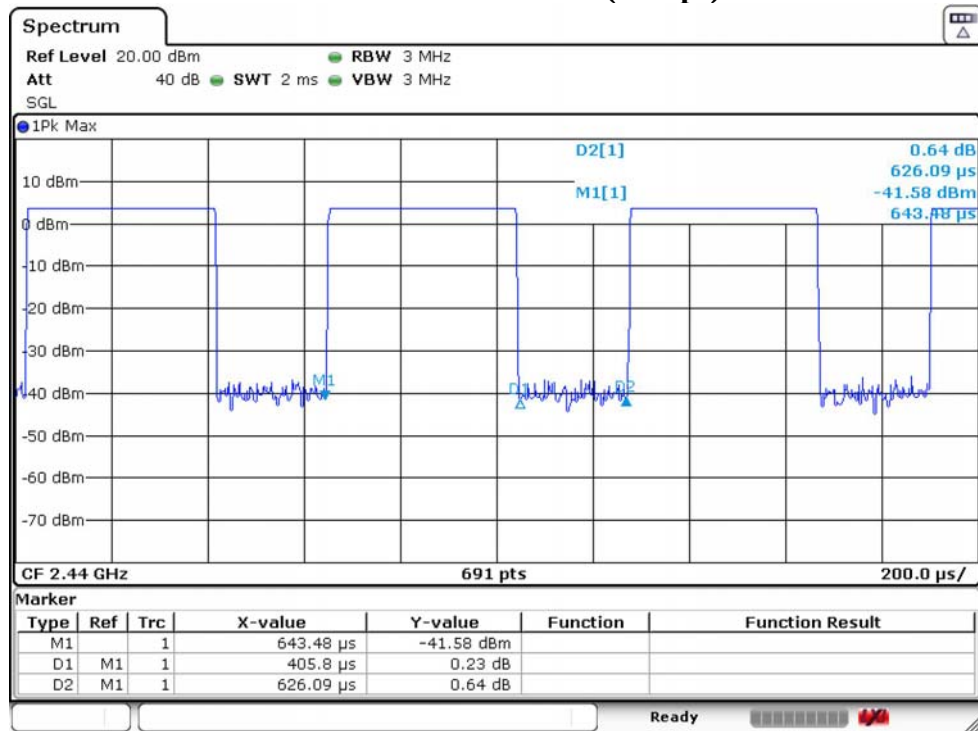
GFSK 2440MHz ANT 1 (1Mbps)



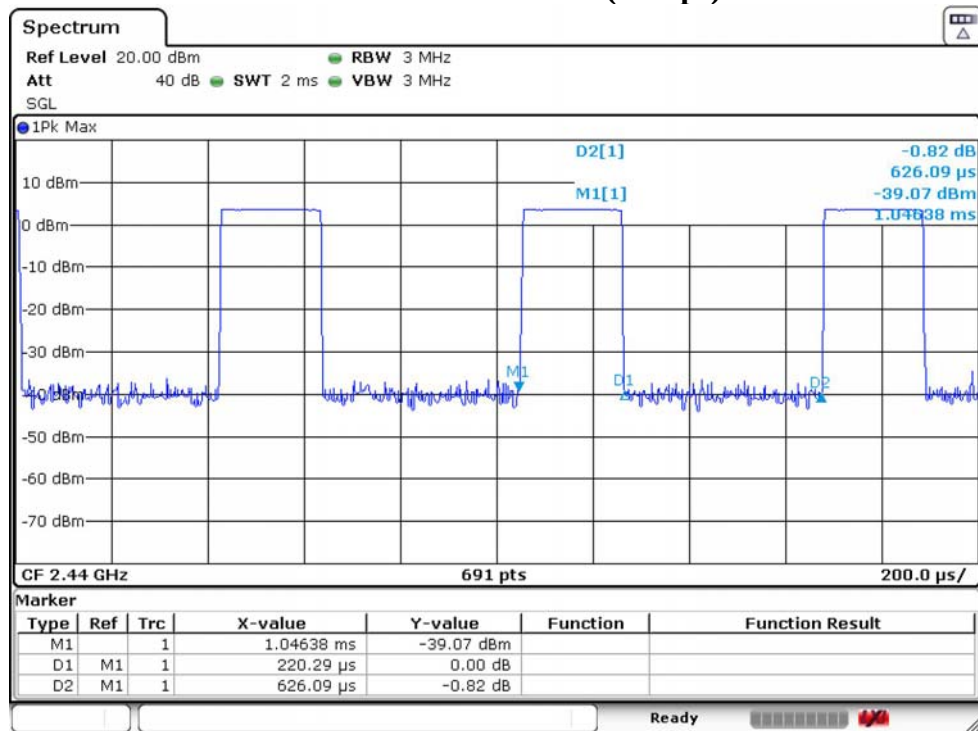
GFSK 2440MHz ANT 1 (2Mbps)



GFSK 2440MHz ANT 2 (1Mbps)



GFSK 2440MHz ANT 2 (2Mbps)



2.9. Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	1	2404
2	2406	3	2408
4	2410	5	2412
6	2414	7	2416
8	2418	9	2420
10	2422	11	2424
12	2426	13	2428
14	2430	15	2432
16	2434	17	2436
18	2438	19	2440
20	2442	21	2444
22	2446	23	2448
24	2450	25	2452
26	2454	27	2456
28	2458	29	2460
30	2462	31	2464
32	2466	33	2468
34	2470	35	2472
36	2474	37	2476
38	2478	39	2480

2.10. Test Equipment List

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 13,20	1 Year
Artificial Mains Network	Rohde & Schwarz	ENV216	EST-E002	LISAI	June 13,20	1 Year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	EST-E078	LISAI	June 13,20	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 13,20	1 Year
Active Loop Antenna	SCHWARZB ECK	FMZB 1519B	EST-E054	LISAI	June 13,20	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 13,20	1 Year
Bilog Antenna	Teseq	CBL 6111D	EST-E034	LISAI	June 13,20	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	SCHWARZB ECK	BBHA9120D	EST-E031	LISAI	June 13,20	1 Year
Signal Amplifier	SCHWARZB ECK	BBV9718	EST-E032	LISAI	June 13,20	1 Year
Spectrum Analyzer	Rohde & Schwarz	FSV40	EST-E069	LISAI	June 13,20	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

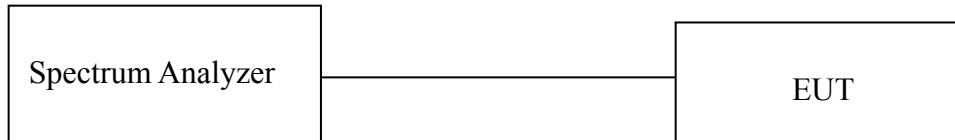
For connect EUT antenna terminal test						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
Spectrum Analyzer	Rohde&Schwarz	FSV40	EST-E069	LISAI	June 13,20	1 Year

3. 6dB BANDWIDTH

3.1. Limit

Systems using digital modulation techniques operate in the 2400-2483.5 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

3.2. Test Setup



3.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	100KHz
VBW	300KHz
Span	3MHz
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

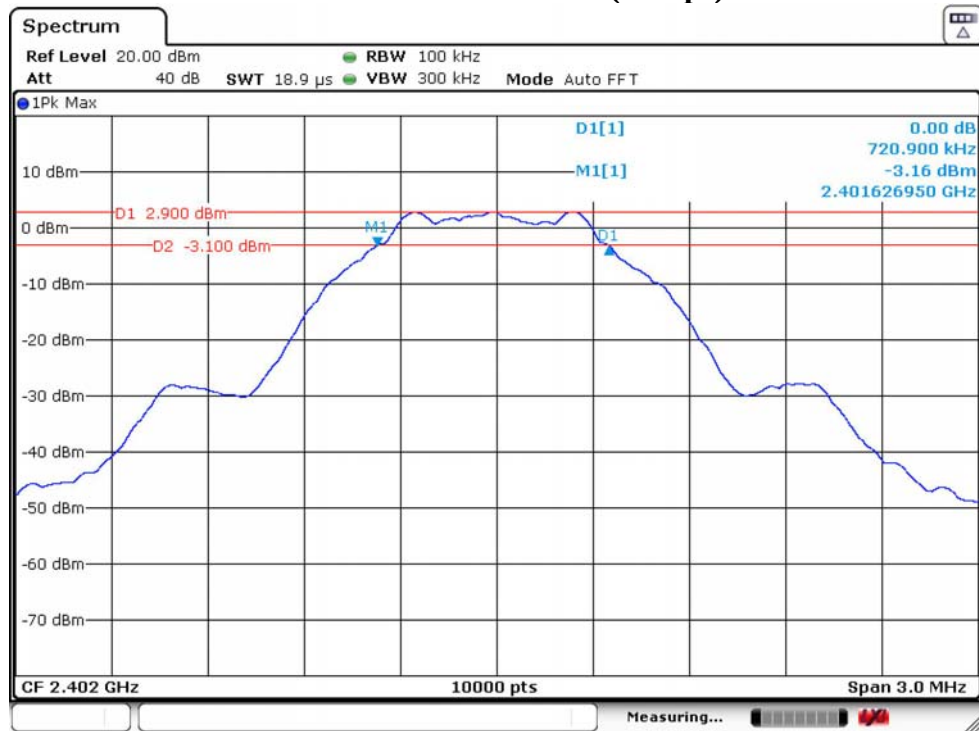
3.4. Test Procedure

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 3.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, use the ndB down function to measure 6dB Bandwidth.
- Repeat above procedures until all channels were measured.
- Record the results in the test report.

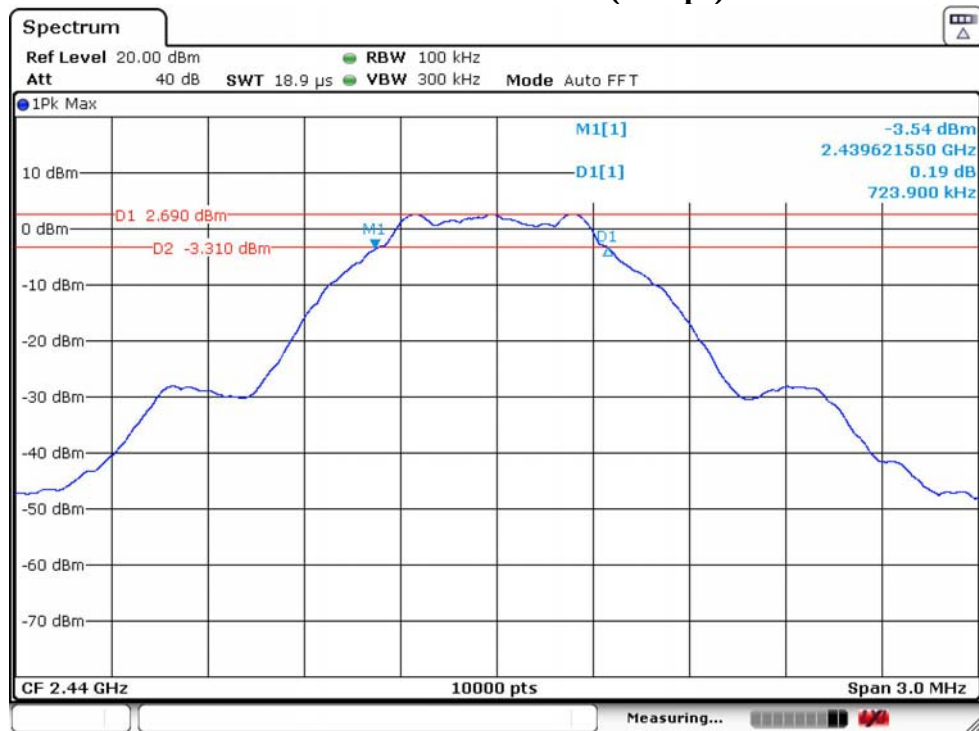
3.5. Test Result

Antenna	Temperature	23.5℃	Relative Humidity	49%	
	Test Voltage	120V/60Hz			
	Mode	Freq (MHz)	6dB Bandwidth (MHz)	6dB BW Limit (MHz)	Result
ANT 1	GFSK (1Mbps)	2402	0.7209	≥0.5	PASS
		2440	0.7239	≥0.5	PASS
		2480	0.7215	≥0.5	PASS
	GFSK (2Mbps)	2402	1.1580	≥0.5	PASS
		2440	1.1598	≥0.5	PASS
		2480	1.1556	≥0.5	PASS
ANT 2	GFSK (1Mbps)	2402	0.7215	≥0.5	PASS
		2440	0.7212	≥0.5	PASS
		2480	0.7212	≥0.5	PASS
	GFSK (2Mbps)	2402	1.1556	≥0.5	PASS
		2440	1.1526	≥0.5	PASS
		2480	1.1568	≥0.5	PASS

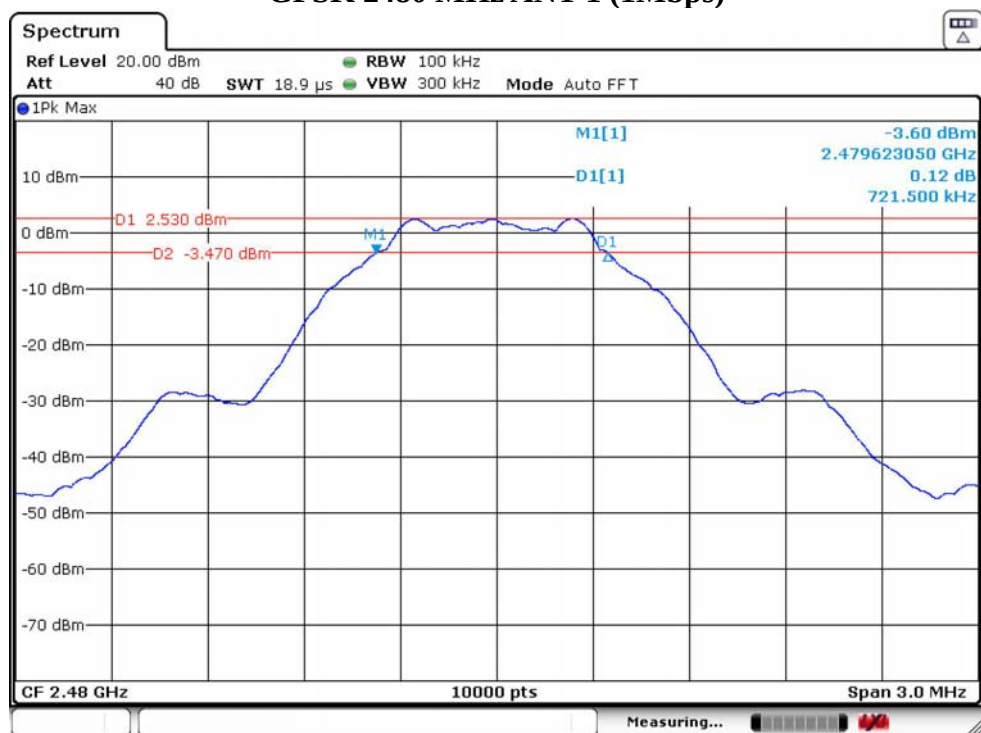
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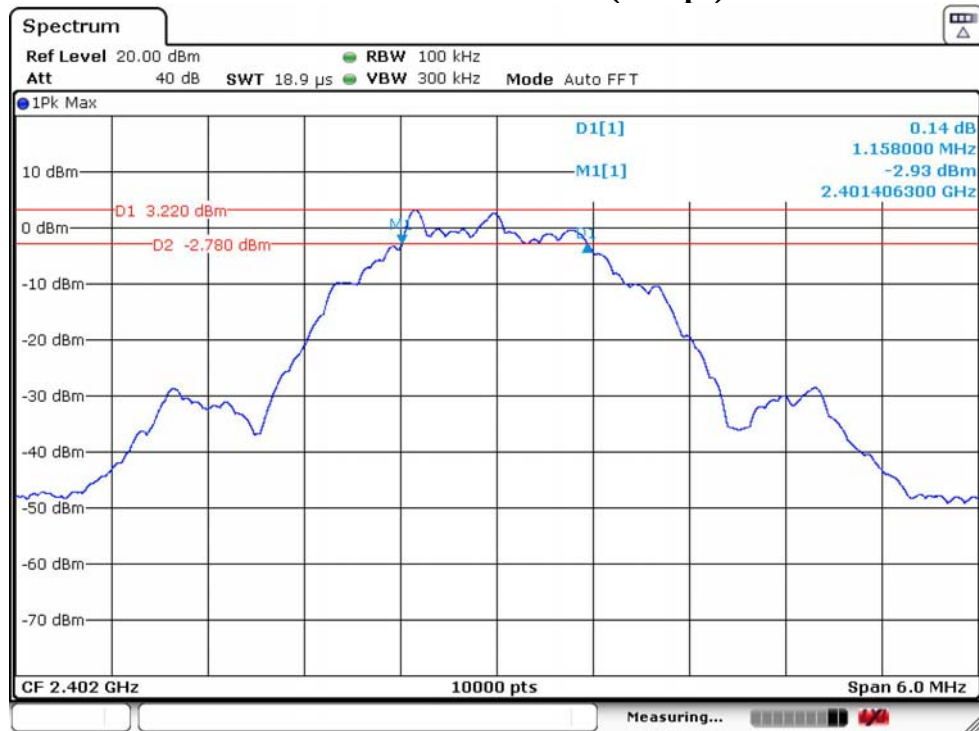
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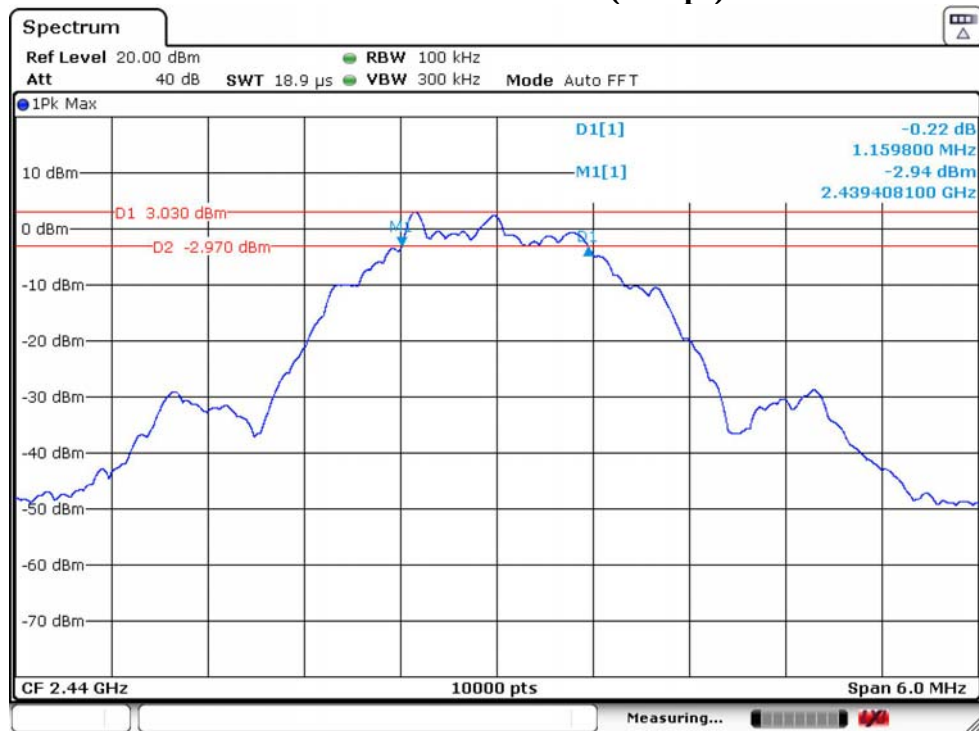
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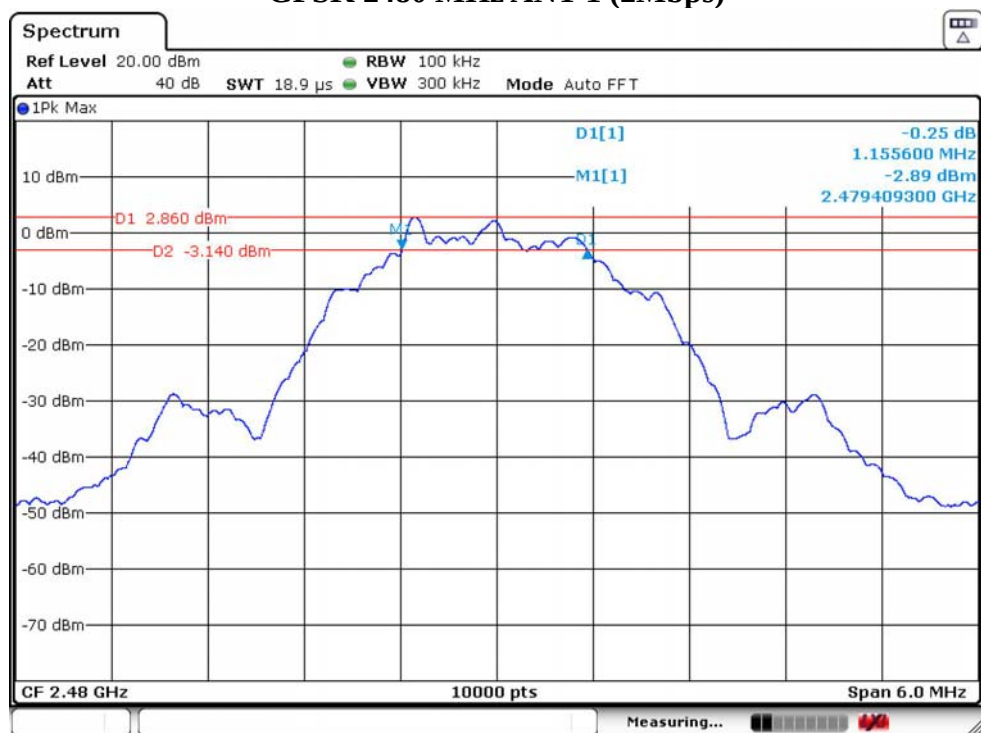
GFSK 2402 MHz ANT 1 (2Mbps)



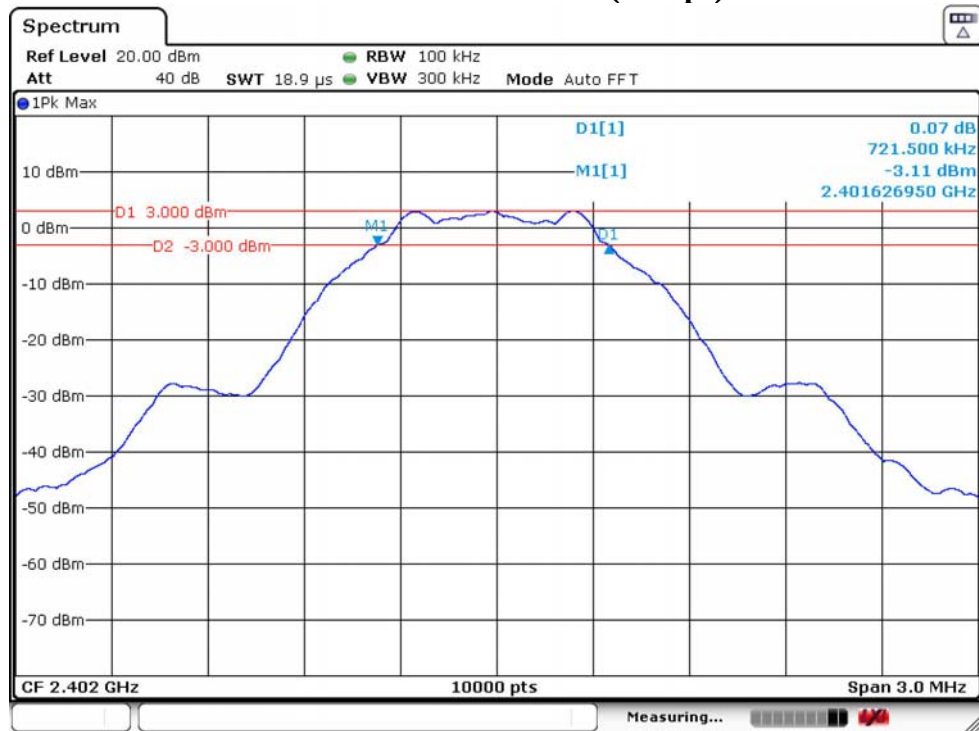
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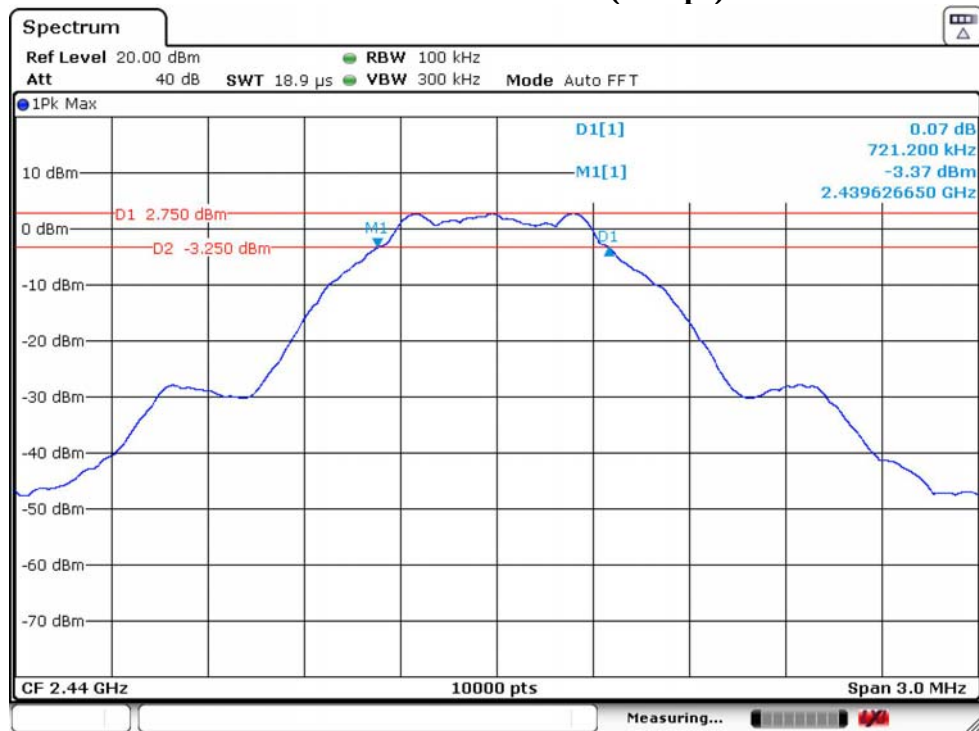
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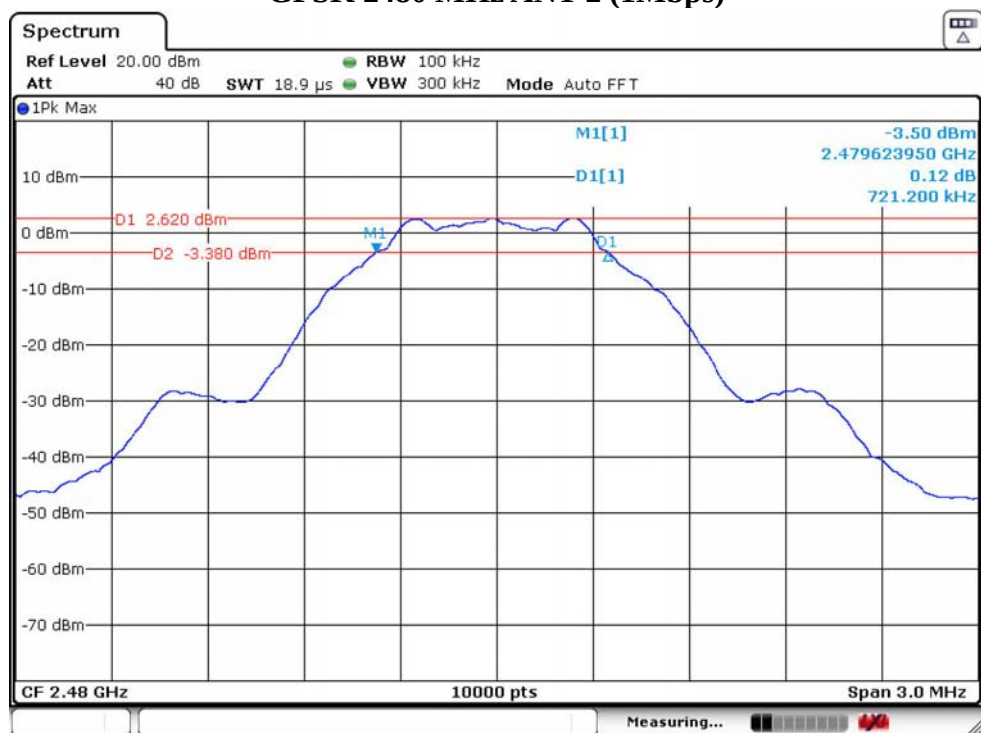
GFSK 2402 MHz ANT 2 (1Mbps)



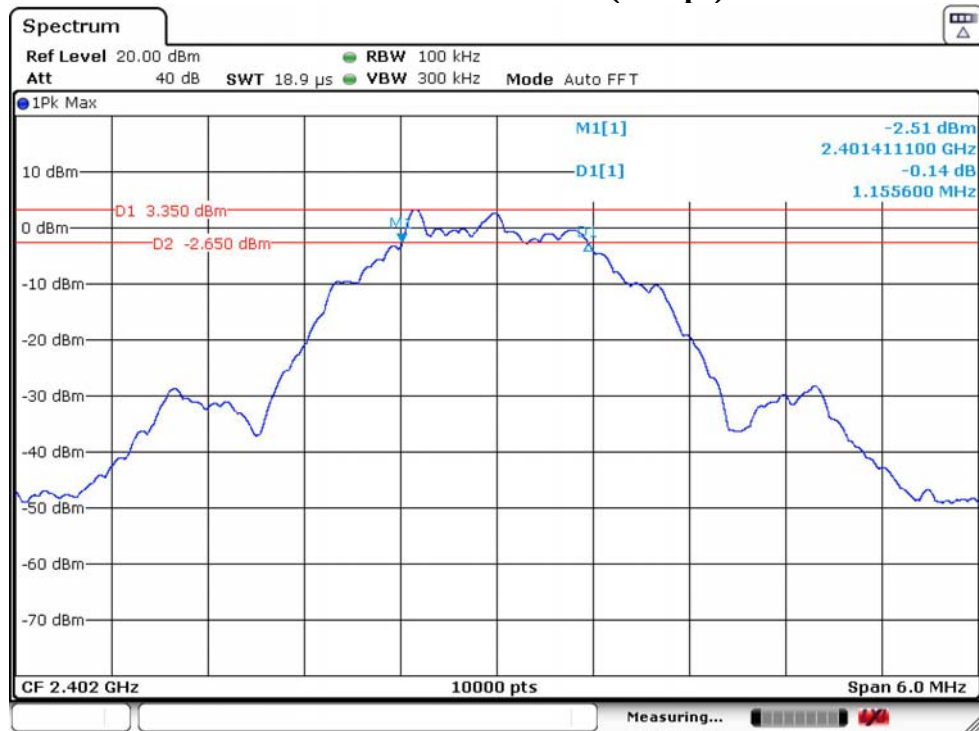
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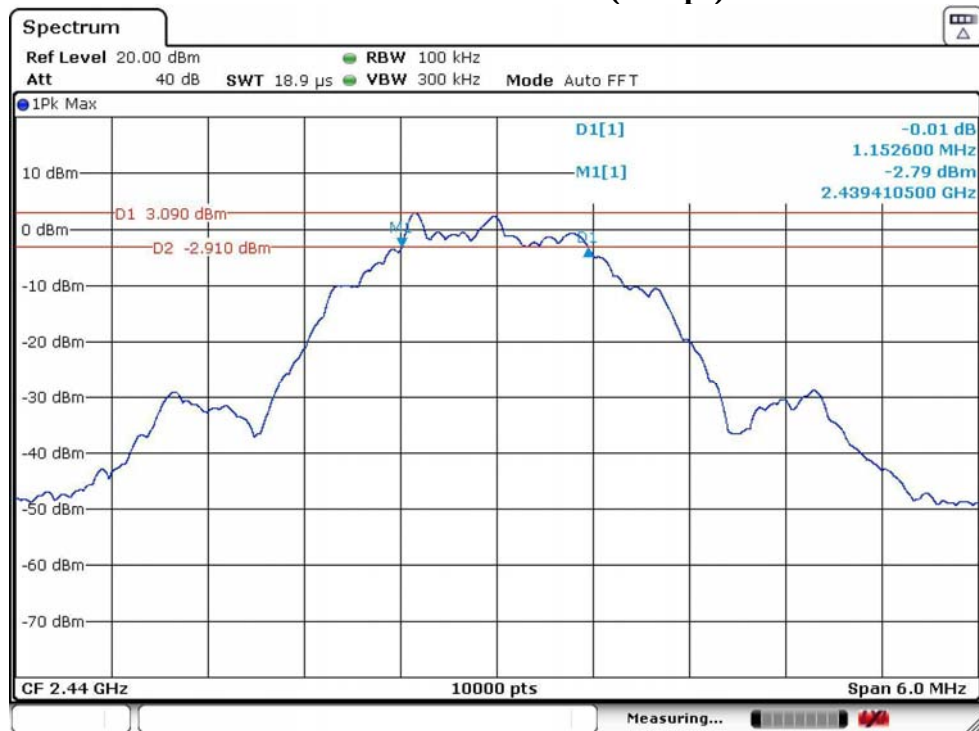
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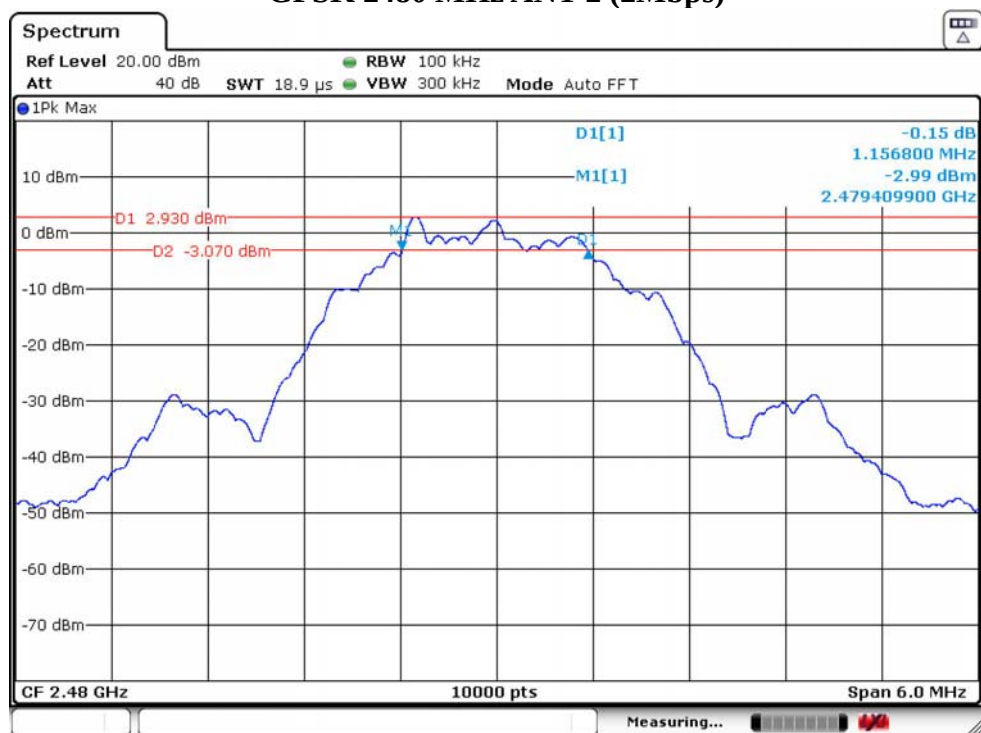
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GFSK 2440 MHz ANT 2 (2Mbps)



GFSK 2480 MHz ANT 2 (2Mbps)



4. MAXIMUM PEAK OUTPUT POWER

4.1. Limit

For systems using digital modulation in 2400-2483.5 MHz, the maximum peak output power is 1 Watt(30dBm).

4.2. Test Setup



4.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	1MHz
VBW	3MHz
Span	3MHz
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

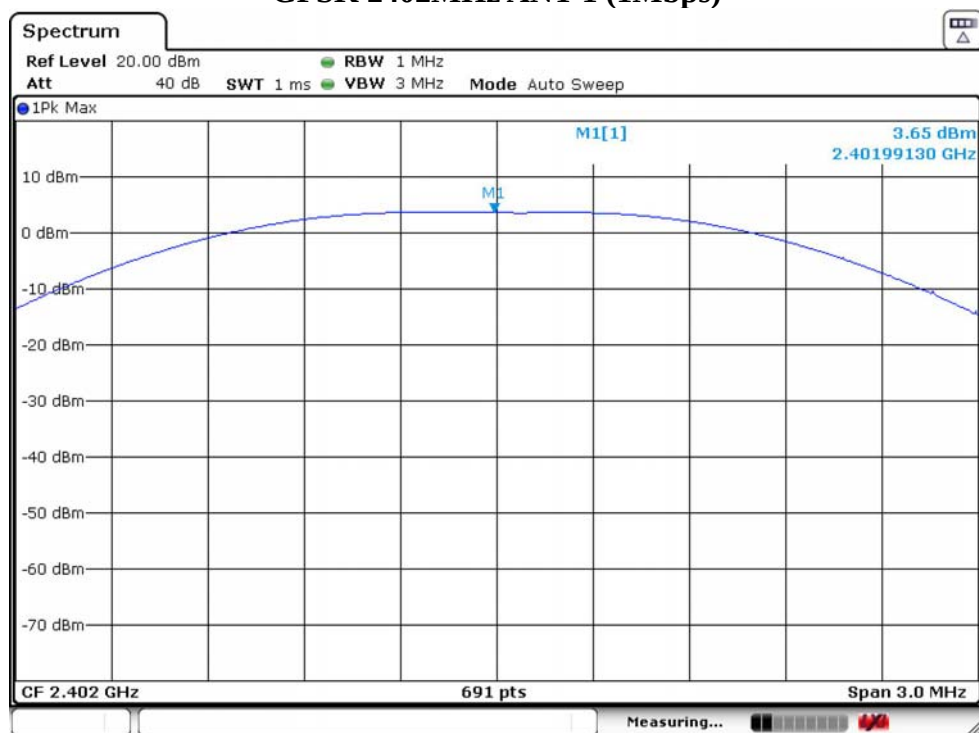
4.4. Test Procedure

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 4.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission.
- Repeat above procedures until all channels were measured.
- Record the results in the test report.

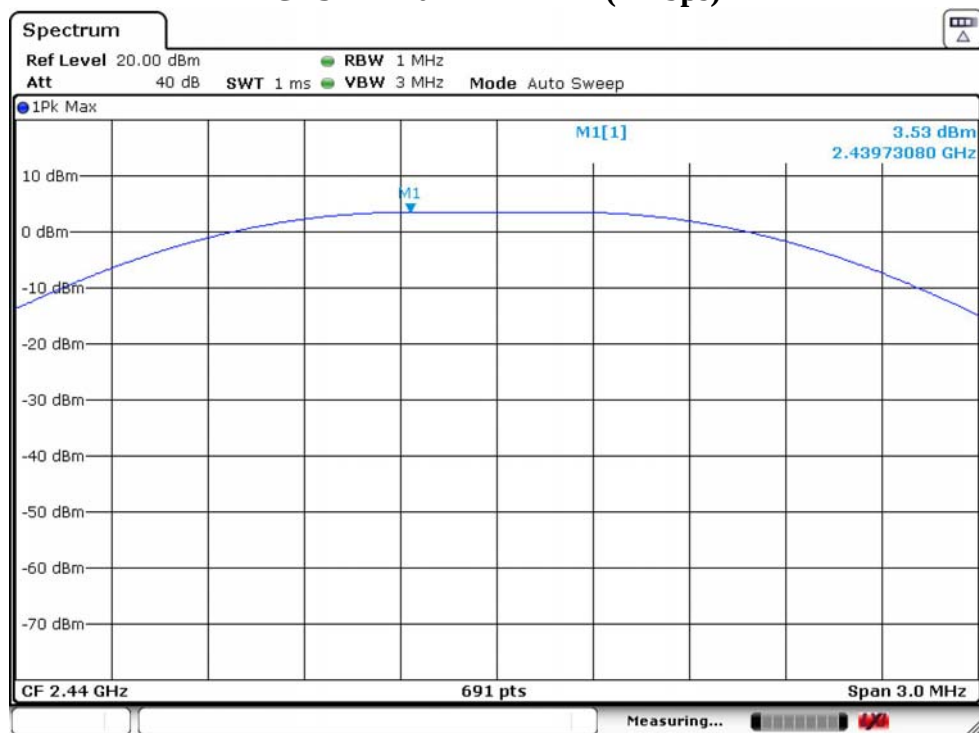
4.5. Test Result

Antenna	Temperature	23.5℃	Relative Humidity	49%	Test Voltage		120V/60Hz
	Mode	Freq (MHz)	Peak Output Power		Limit		Result
			dBm	W	dBm	W	
ANT 1	GFSK (1Mbps)	2402	3.65	0.0023	30.00	1.0000	PASS
		2440	3.53	0.0023	30.00	1.0000	PASS
		2480	3.31	0.0021	30.00	1.0000	PASS
	GFSK (2Mbps)	2402	3.66	0.0023	30.00	1.0000	PASS
		2440	3.54	0.0023	30.00	1.0000	PASS
		2480	3.30	0.0021	30.00	1.0000	PASS
ANT 2	GFSK (1Mbps)	2402	3.75	0.0024	30.00	1.0000	PASS
		2440	3.58	0.0023	30.00	1.0000	PASS
		2480	3.36	0.0022	30.00	1.0000	PASS
	GFSK (2Mbps)	2402	3.77	0.0024	30.00	1.0000	PASS
		2440	3.57	0.0023	30.00	1.0000	PASS
		2480	3.35	0.0022	30.00	1.0000	PASS

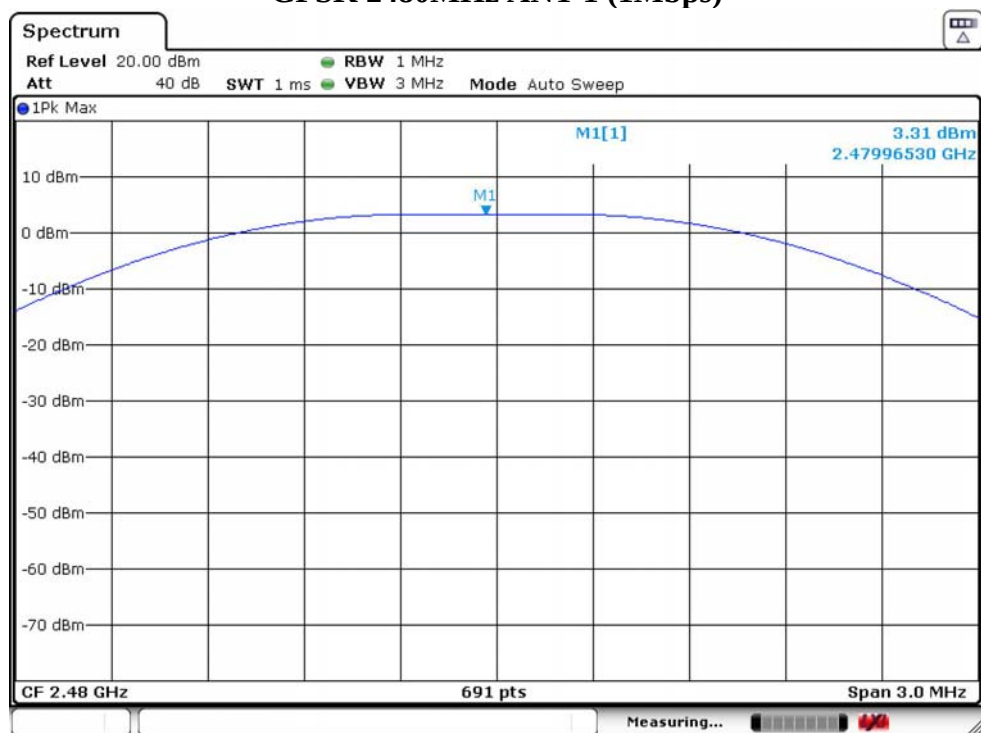
GFSK 2402MHz ANT 1 (1Mbps)



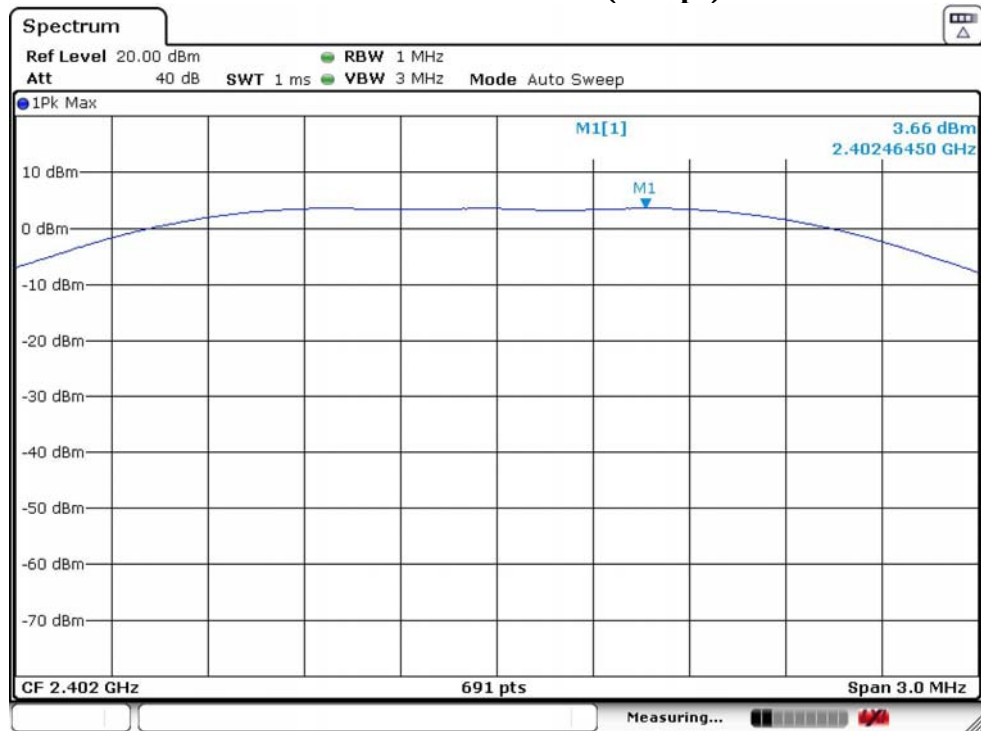
GFSK 2440MHz ANT 1 (1Mbps)



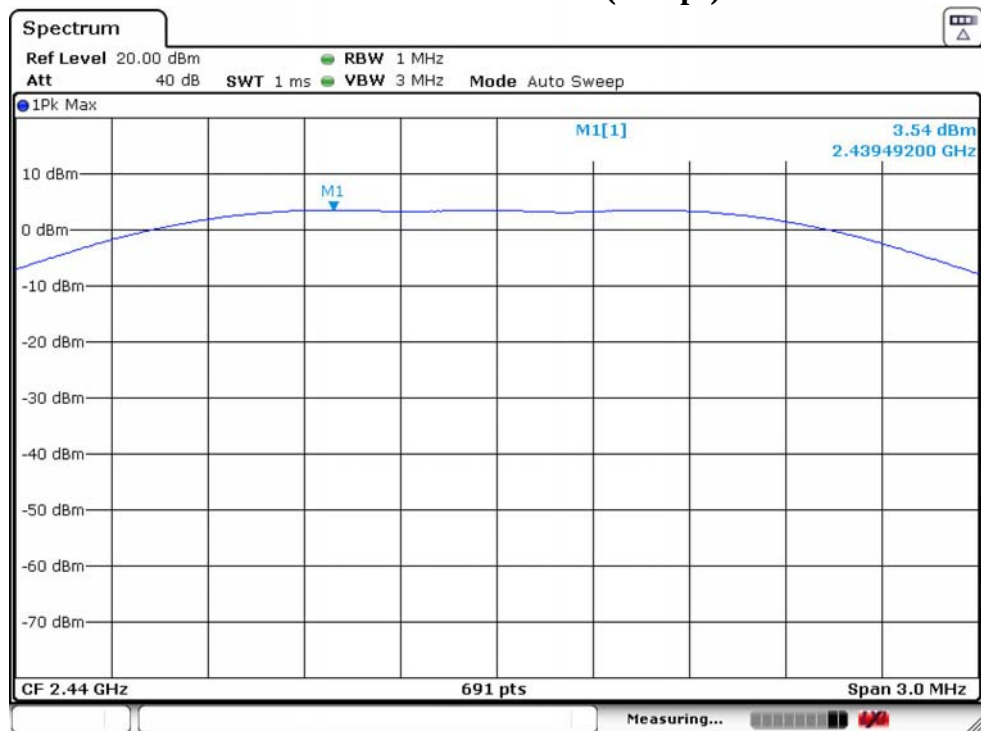
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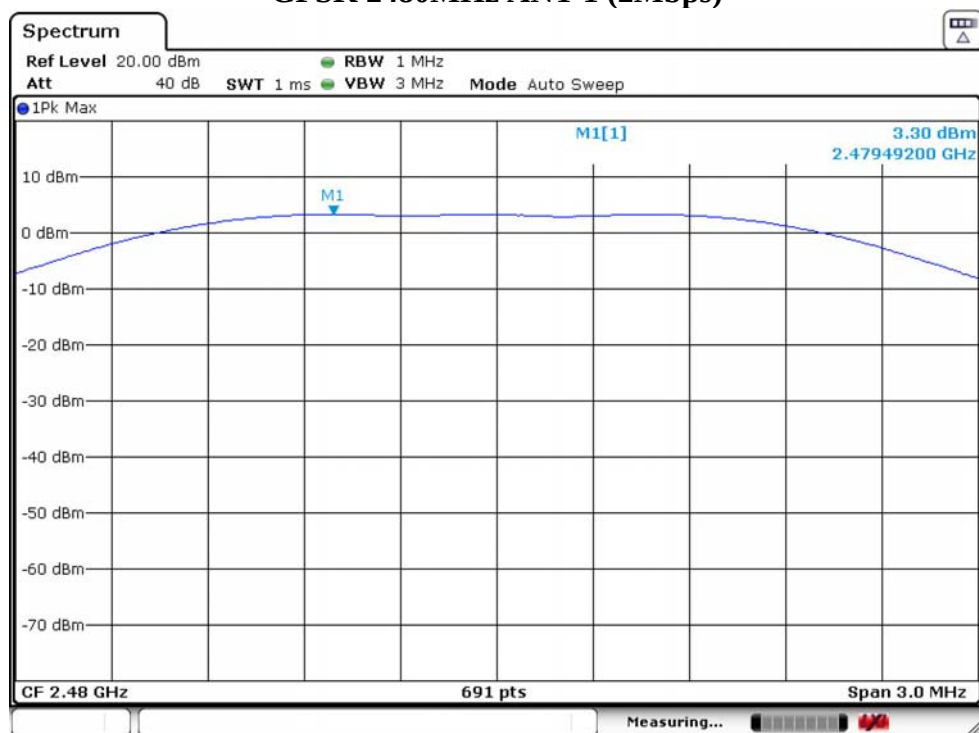
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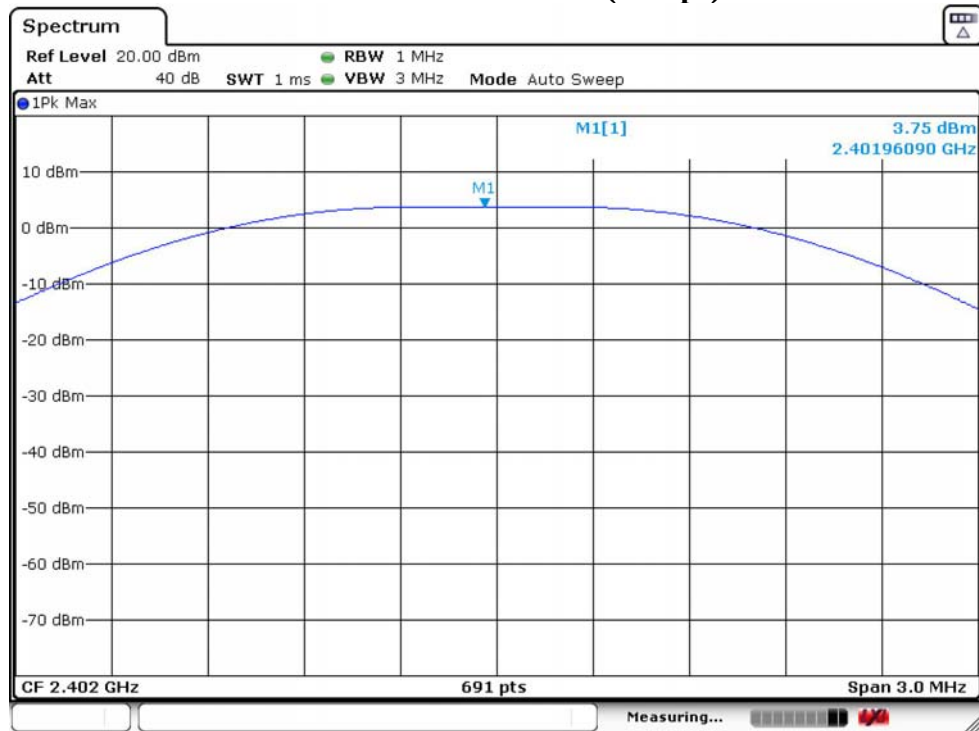
GFSK 2440MHz ANT 1 (2Mbps)



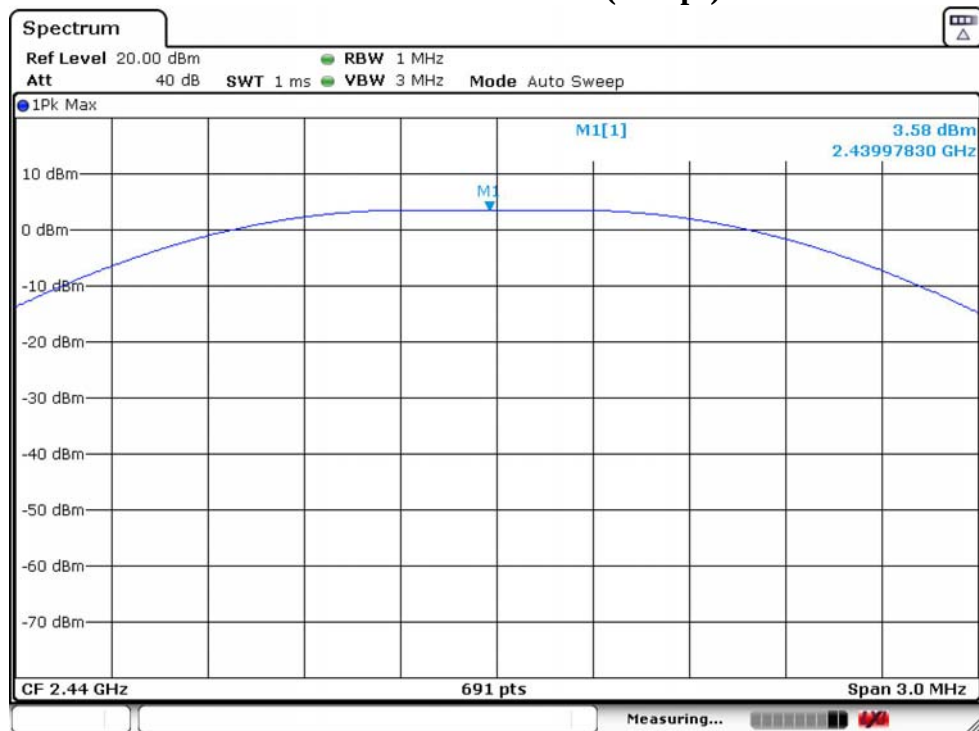
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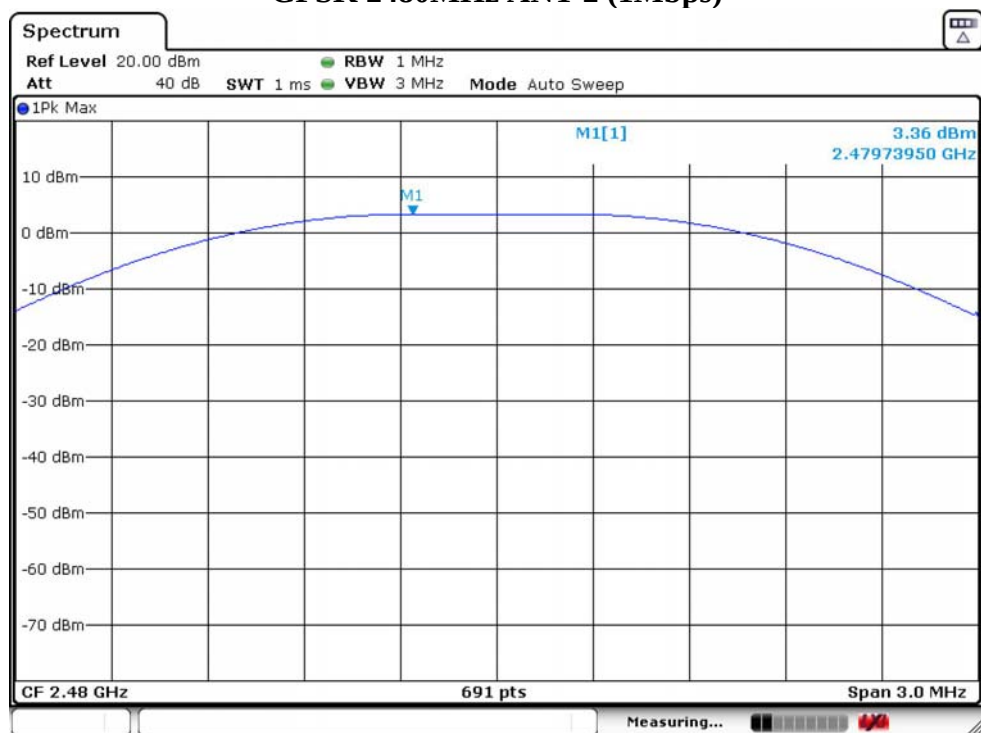
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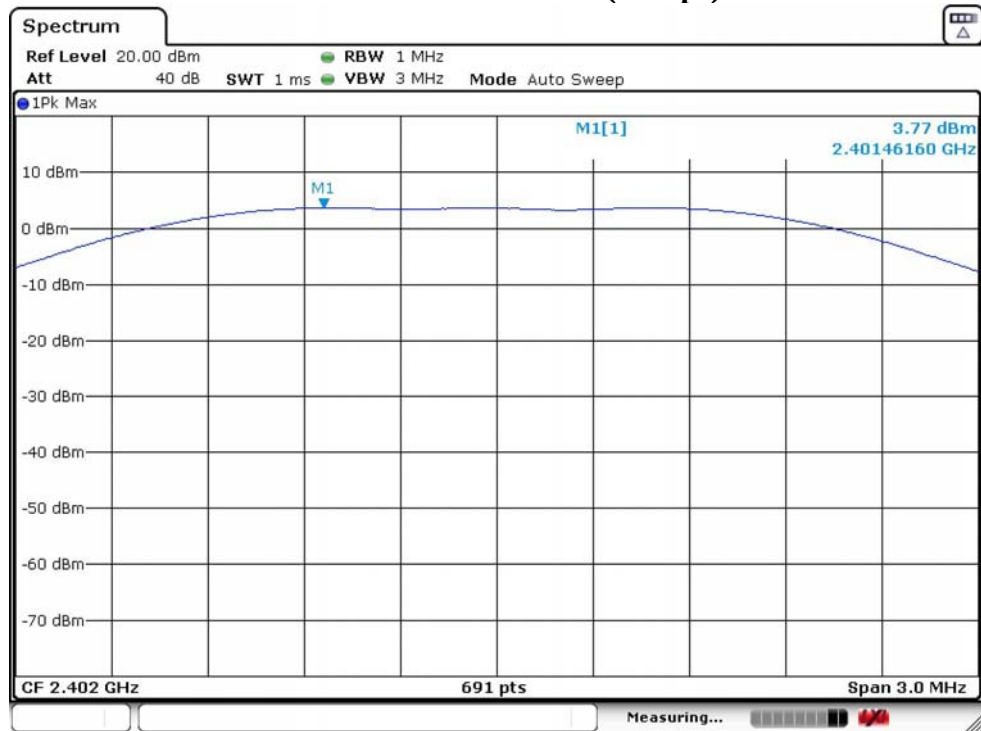
GFSK 2440MHz ANT 2 (1Mbps)



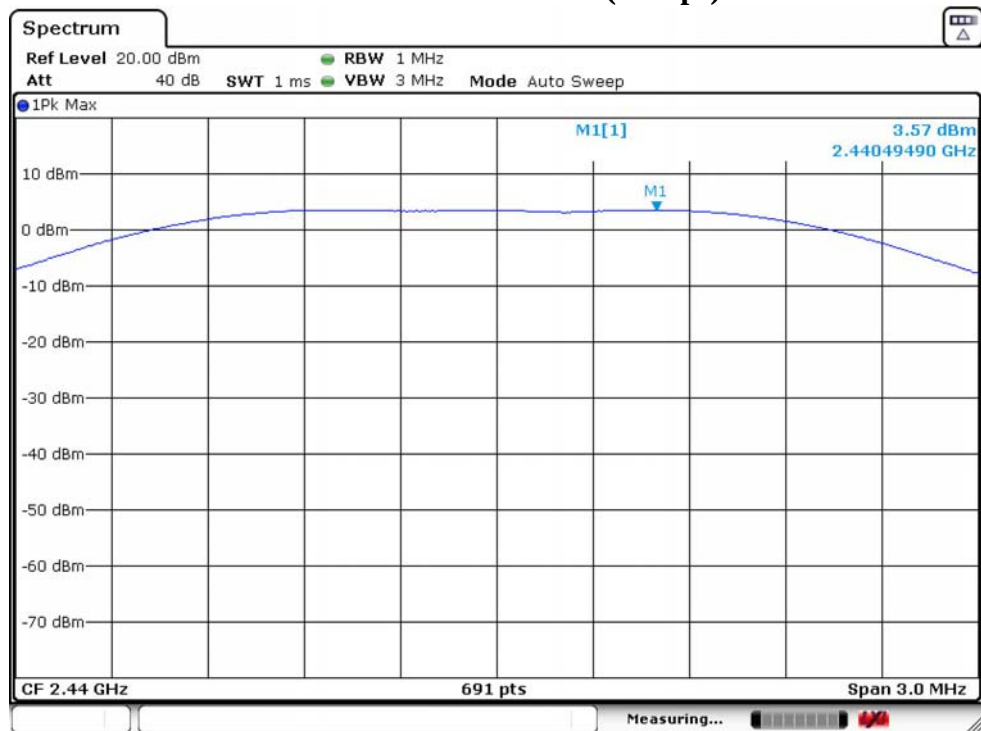
GFSK 2480MHz ANT 2 (1Mbps)



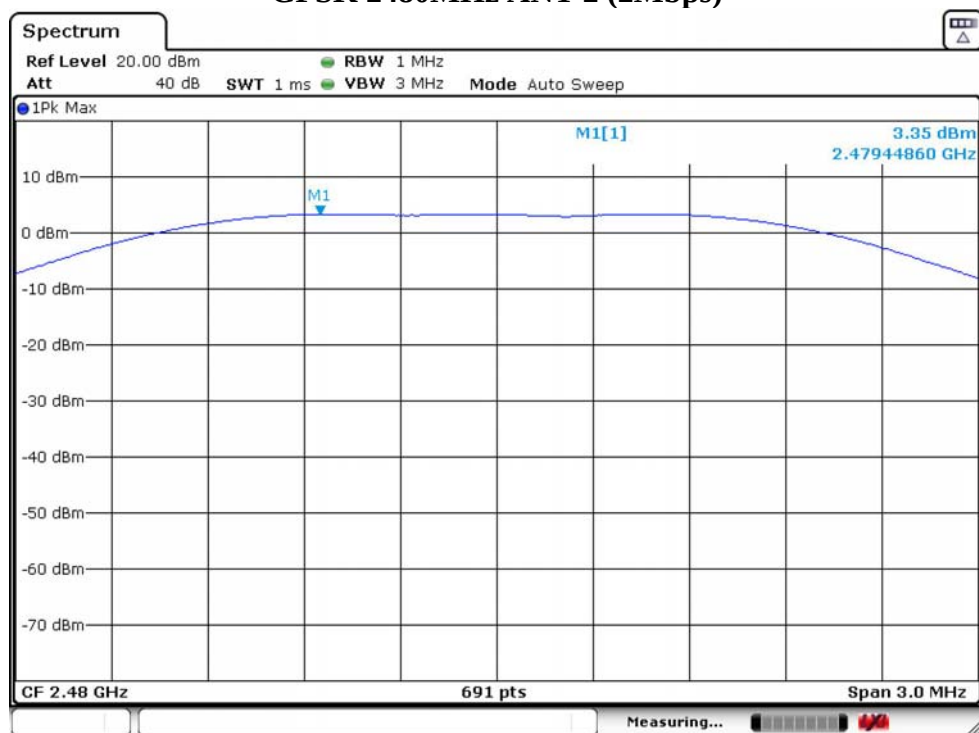
GFSK 2402MHz ANT 2 (2Mbps)



GFSK 2440MHz ANT 2 (2Mbps)



GFSK 2480MHz ANT 2 (2Mbps)

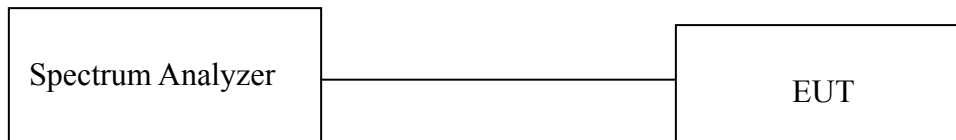


5. POWER SPECTRAL DENSITY

5.1. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.2. Test Setup



5.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	3KHz
VBW	10KHz
Span	2MHz
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

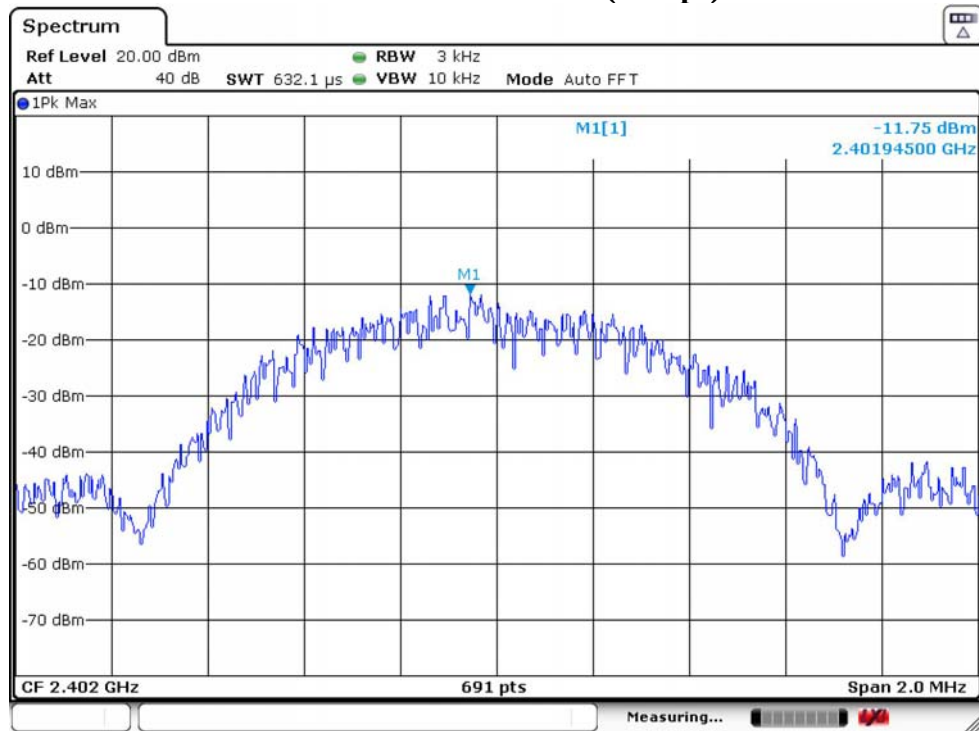
5.4. Test Procedure

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 5.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission.
- Repeat above procedures until all channels were measured.
- Record the results in the test report.

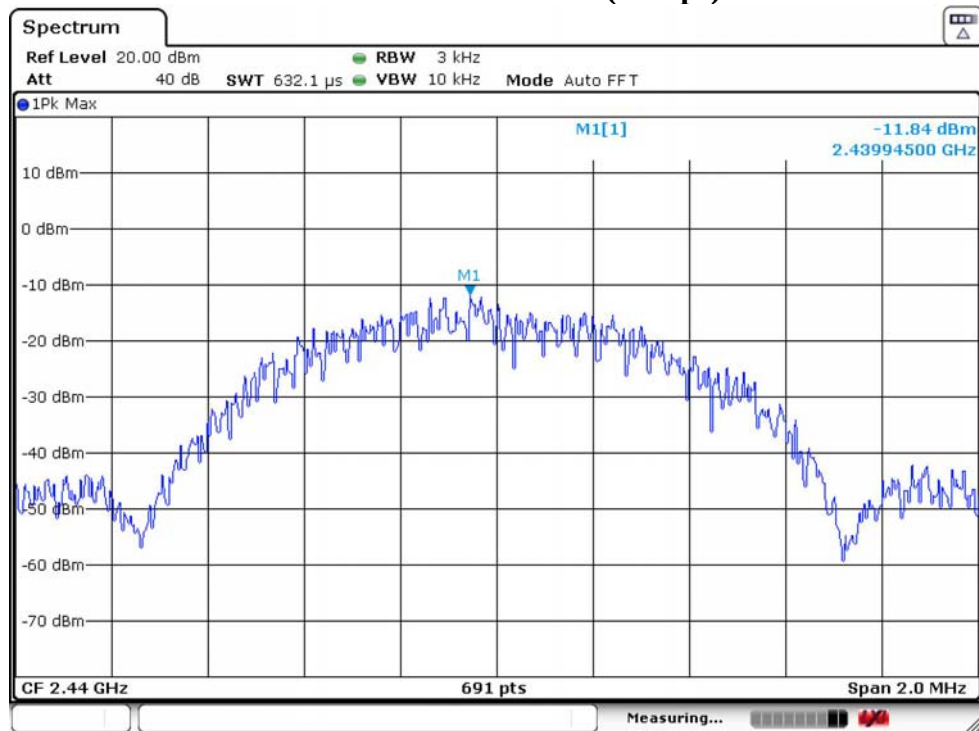
5.5. Test Result

Antenna	Temperature	23.5℃	Relative Humidity	49%	Test Voltage	120V/60Hz
	Mode	Freq (MHz)	Power Density (dBm/3kHz)		Limit (dBm/3kHz)	Result
ANT 1	GFSK (1Mbps)	2402	-11.75		8.00	PASS
		2440	-11.84		8.00	PASS
		2480	-11.99		8.00	PASS
	GFSK (2Mbps)	2402	-15.14		8.00	PASS
		2440	-15.25		8.00	PASS
		2480	-15.49		8.00	PASS
ANT 2	GFSK (1Mbps)	2402	-11.61		8.00	PASS
		2440	-11.75		8.00	PASS
		2480	-11.90		8.00	PASS
	GFSK (2Mbps)	2402	-15.04		8.00	PASS
		2440	-15.25		8.00	PASS
		2480	-15.48		8.00	PASS

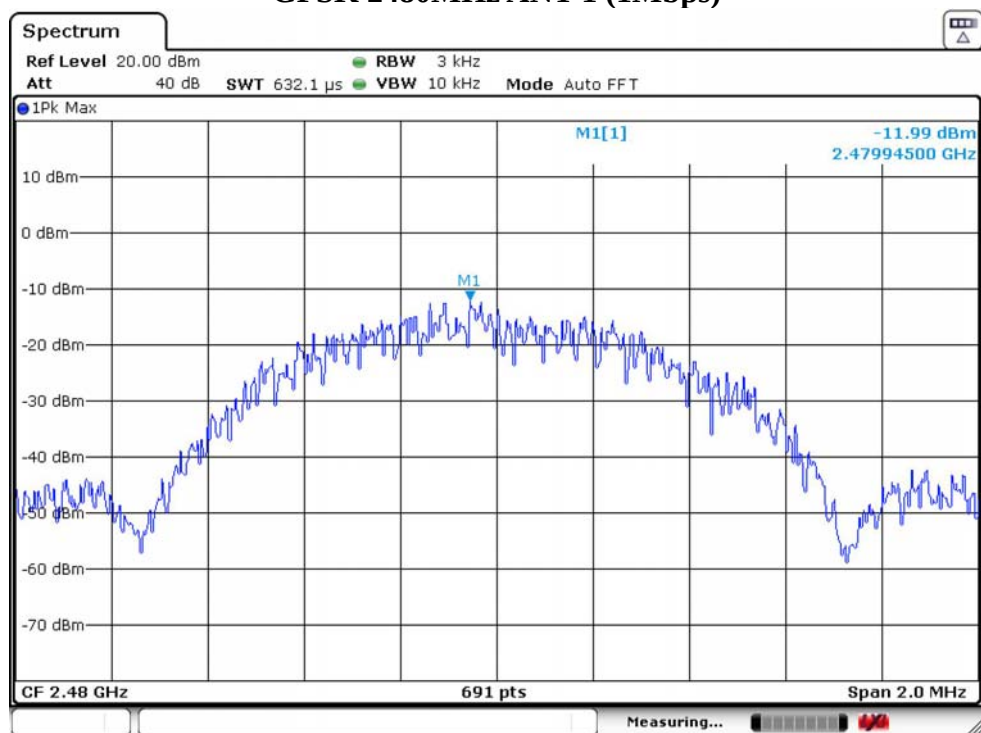
GFSK 2402MHz ANT 1 (1Mbps)



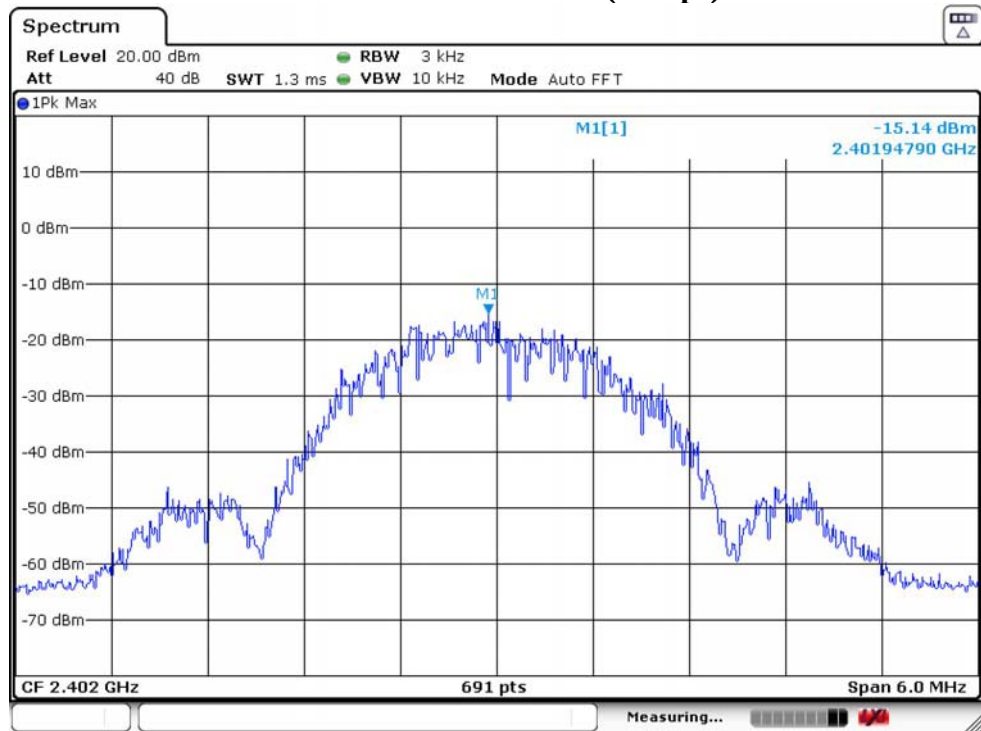
GFSK 2440MHz ANT 1 (1Mbps)



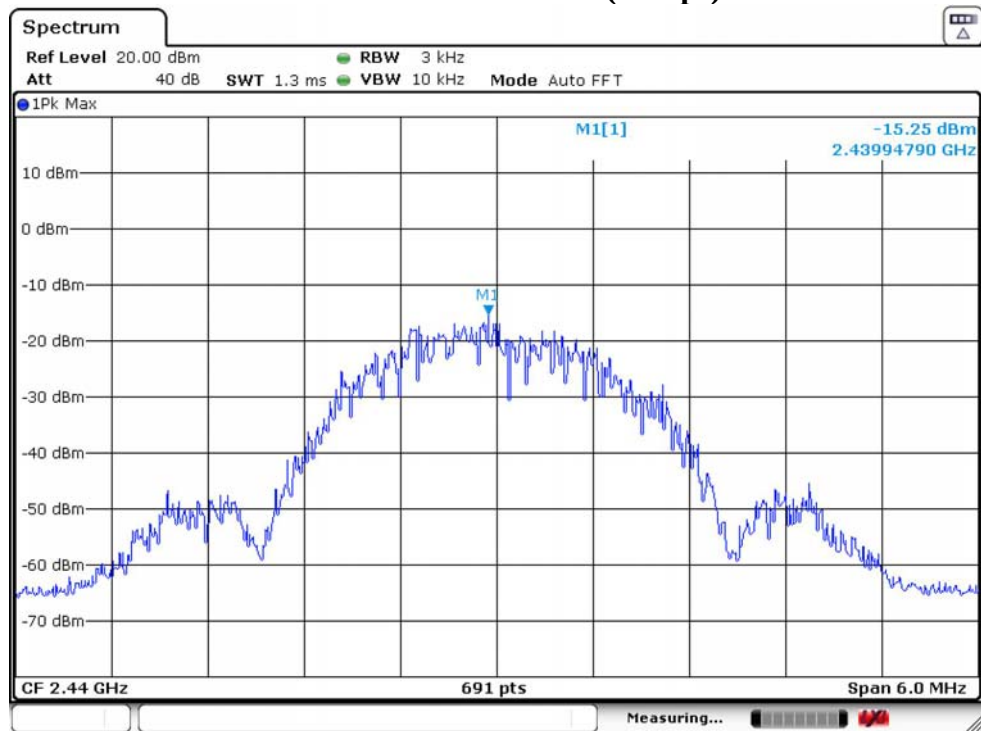
GFSK 2480MHz ANT 1 (1Mbps)



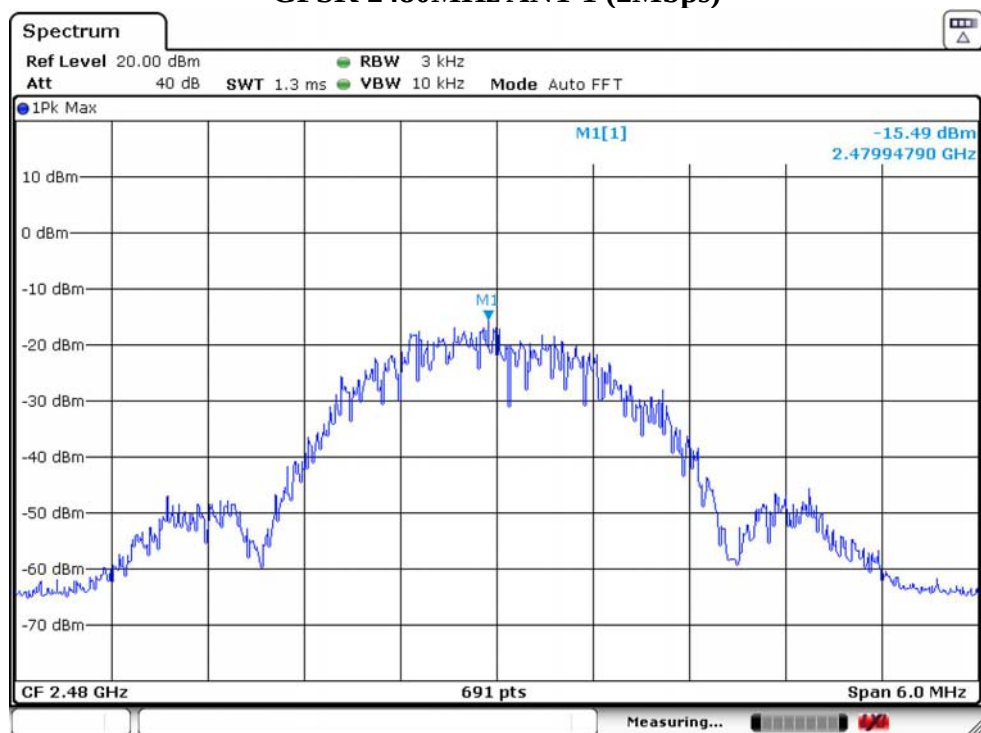
GFSK 2402MHz ANT 1 (2Mbps)



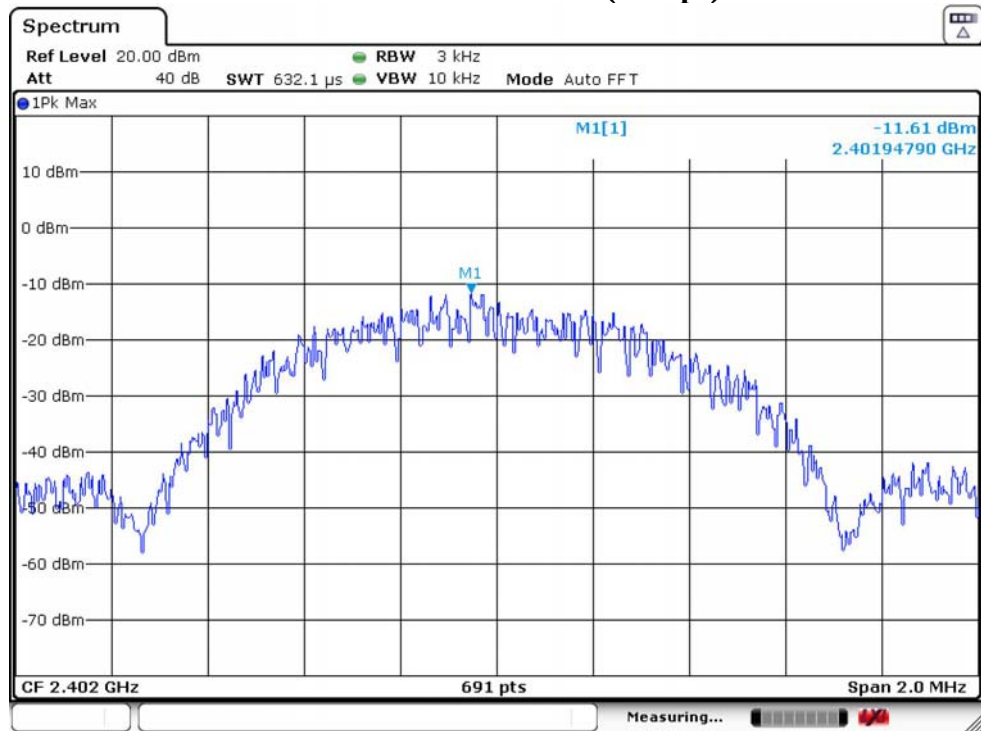
GFSK 2440MHz ANT 1 (2Mbps)



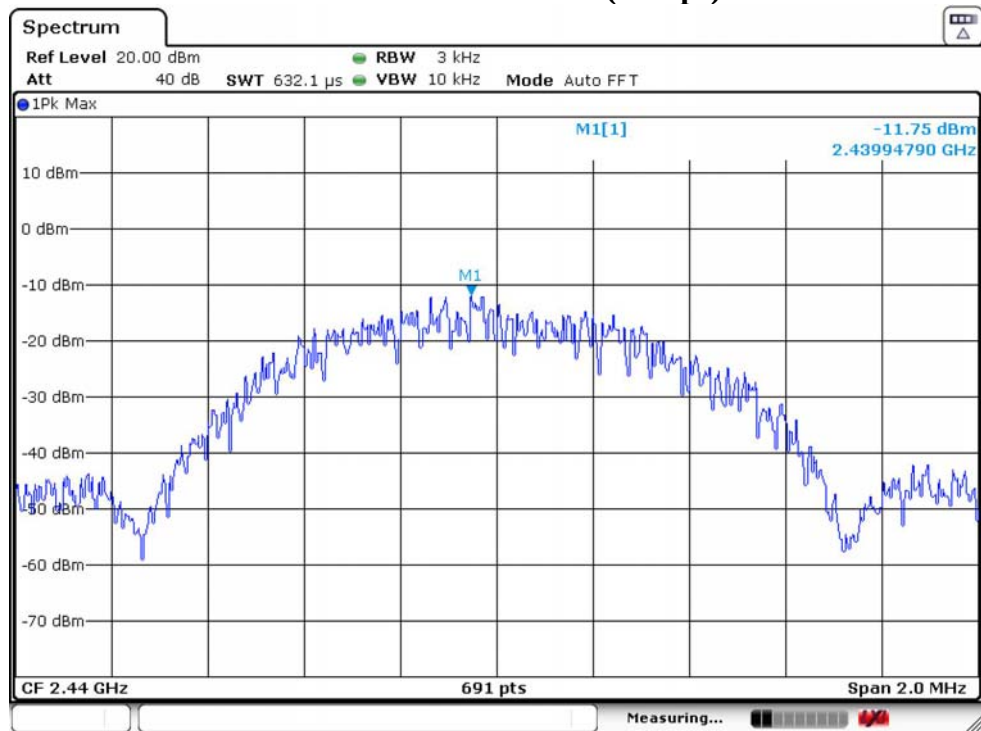
GFSK 2480MHz ANT 1 (2Mbps)



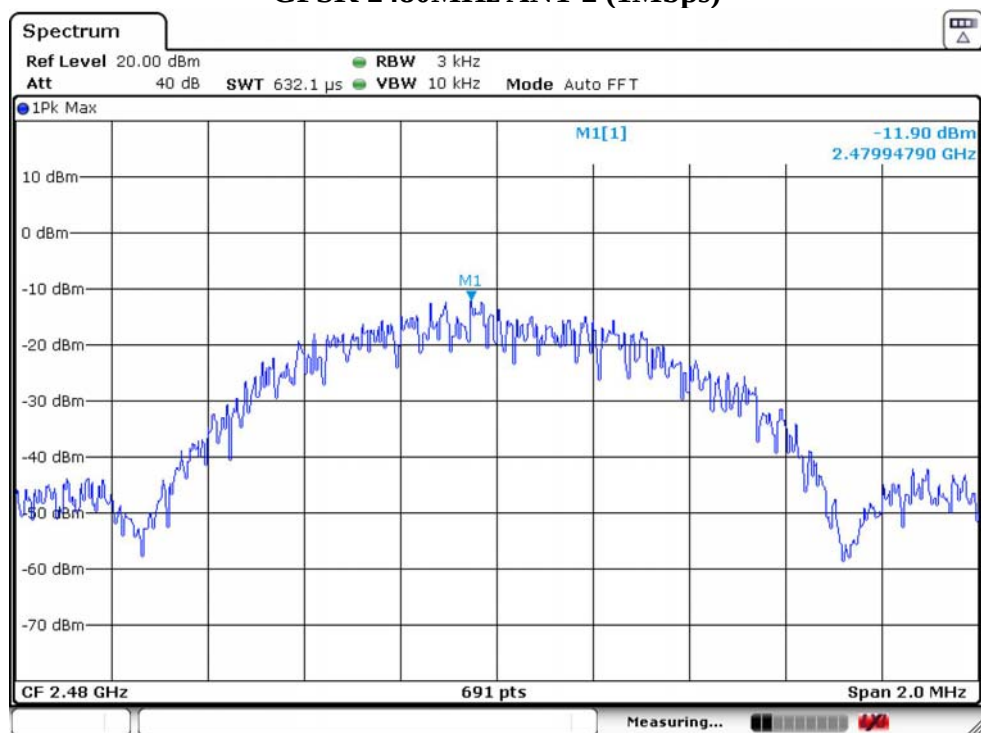
GFSK 2402MHz ANT 2 (1Mbps)



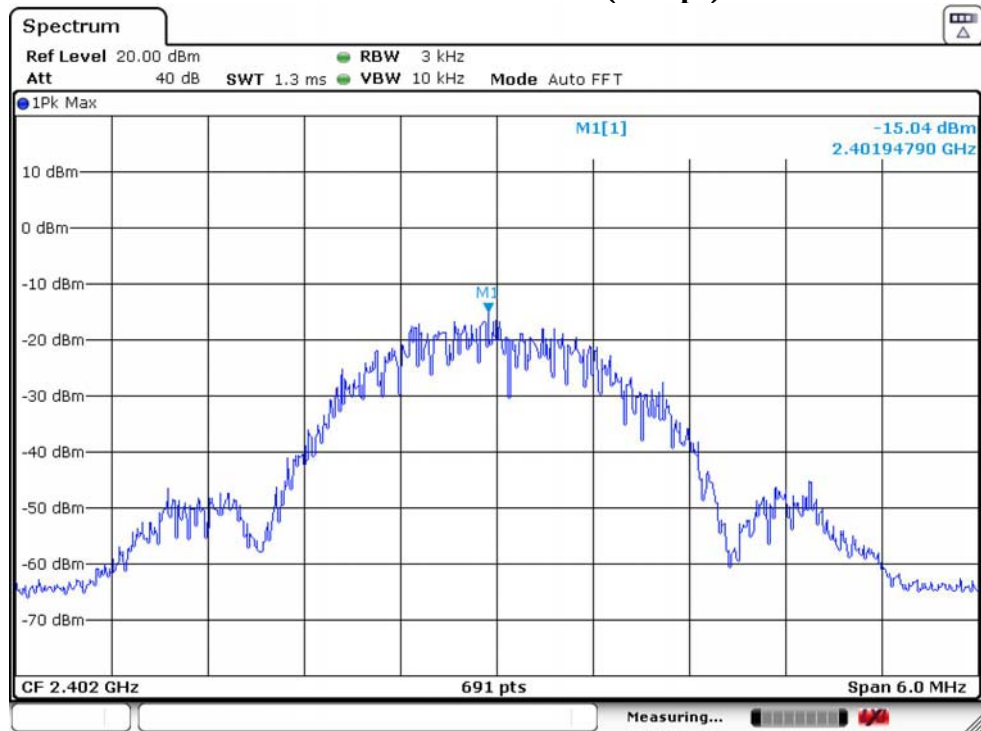
GFSK 2440MHz ANT 2 (1Mbps)



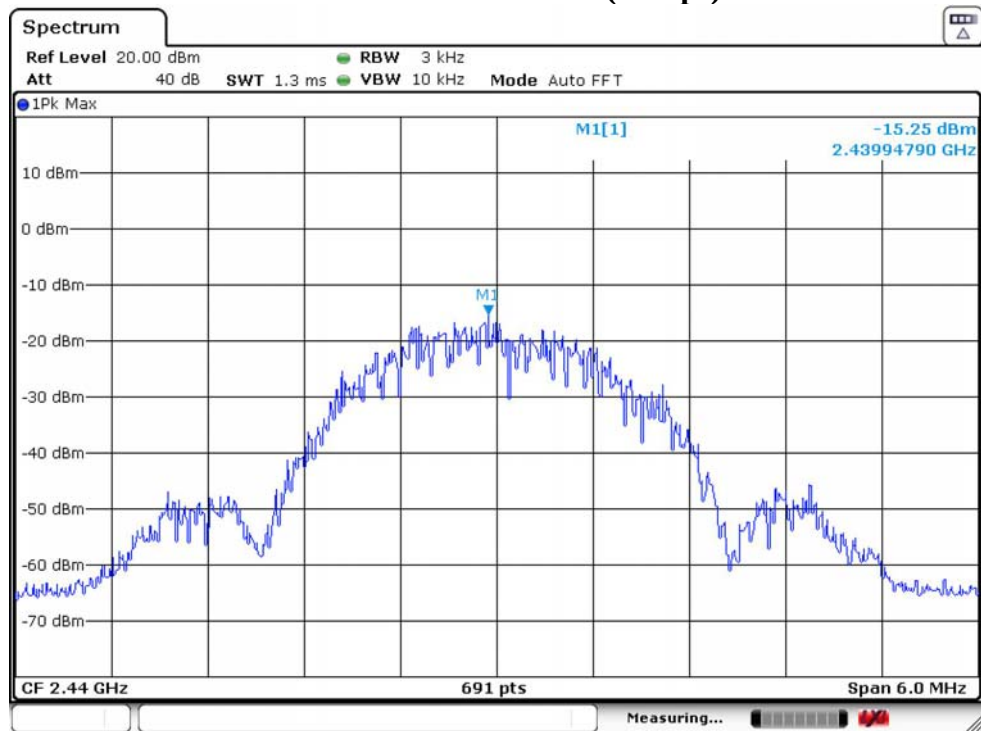
GFSK 2480MHz ANT 2 (1Mbps)



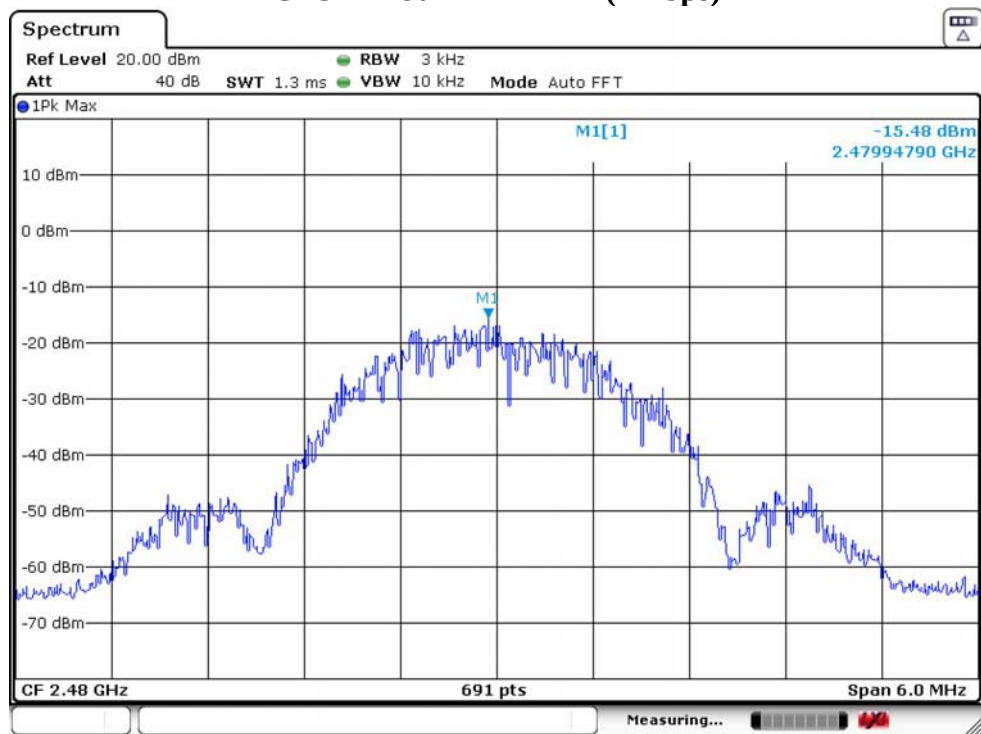
GFSK 2402MHz ANT 2 (2Mbps)



GFSK 2440MHz ANT 2 (2Mbps)



GFSK 2480MHz ANT 2 (2Mbps)

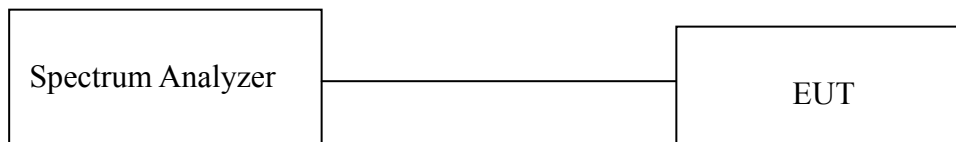


6. CONDUCTED BAND EDGE

6.1. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

6.2. Test Setup



6.3. Spectrum Analyzer Setting

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

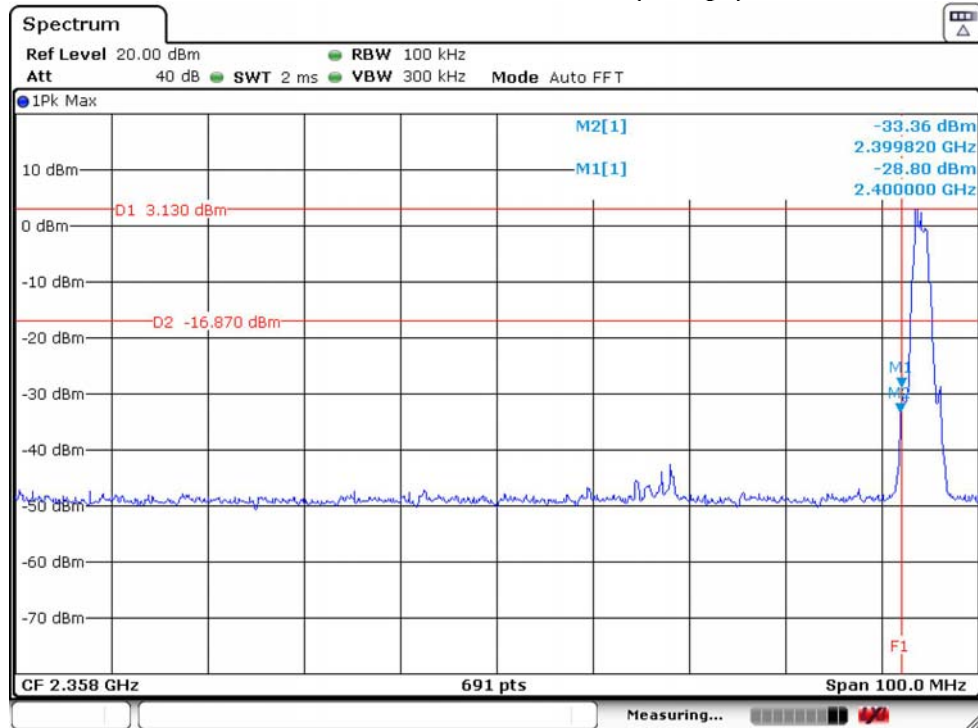
6.4. Test Procedure

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 6.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, use the marker function to mark the highest emission level outside the authorized band.
- Repeat above procedures until all channels were measured.
- Record the results in the test report.

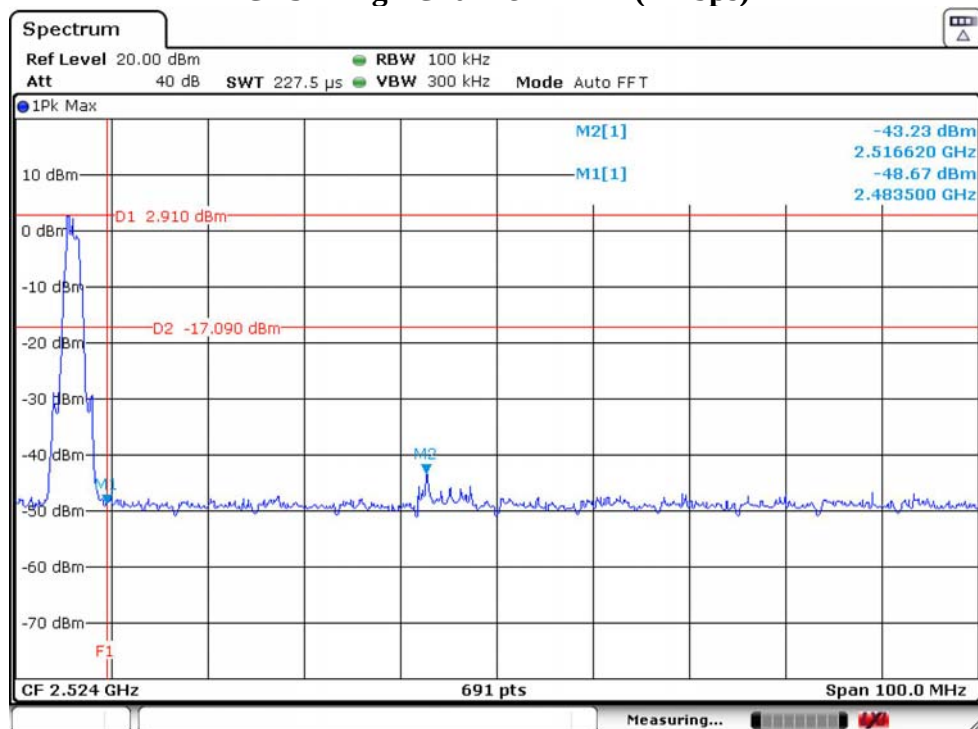
6.5. Test Result

Temperature	23.5°C	Relative Humidity	49%	Test Voltage	120V/60Hz
Result	PASS				

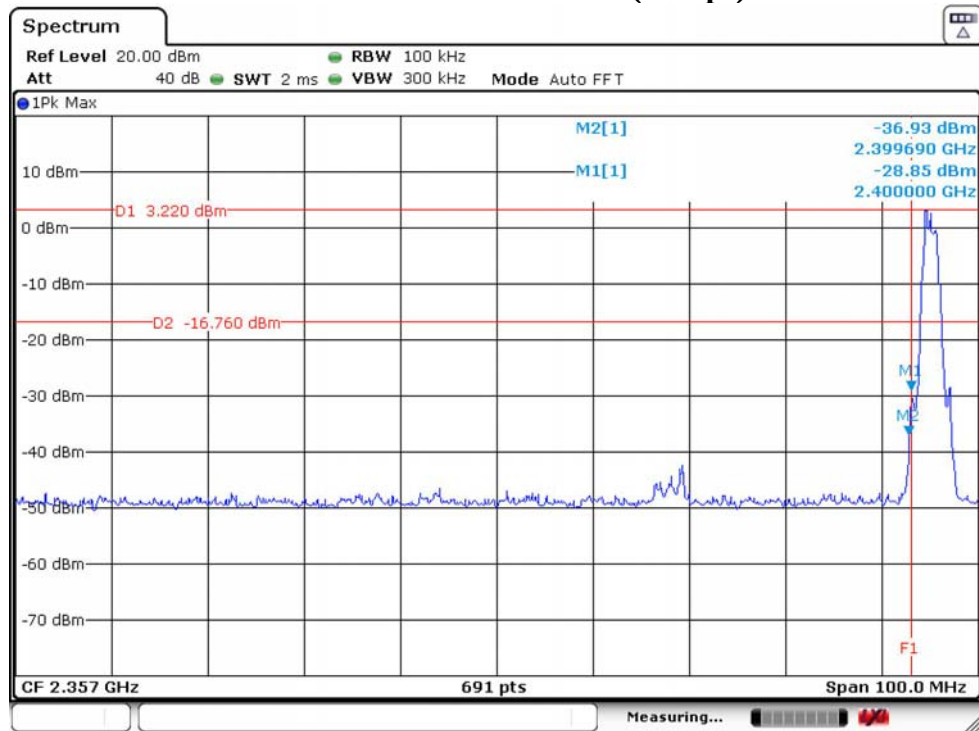
GFSK Low Channel ANT 1 (2Mbps)



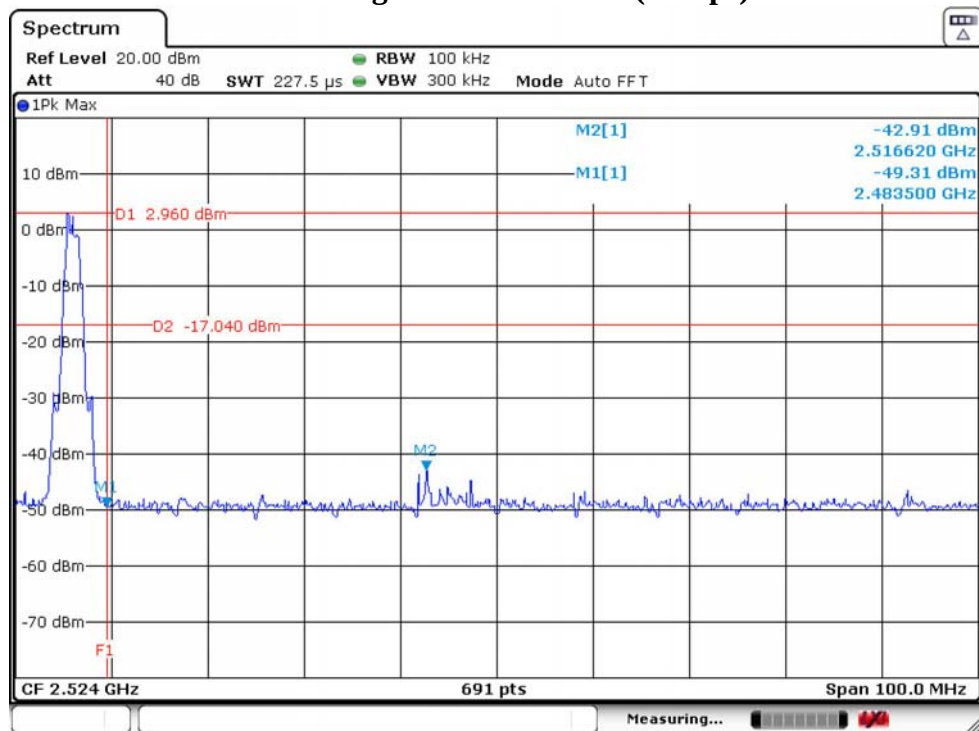
GFSK High Channel ANT 1 (2Mbps)



GFSK Low Channel ANT 2 (2Mbps)



GFSK High Channel ANT 2 (2Mbps)



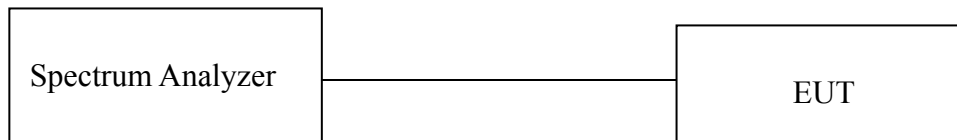
All modulations are all tested ,only worse case is reported

7. CONDUCTED SPURIOUS EMISSIONS

7.1. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

7.2. Test Setup



7.3. 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

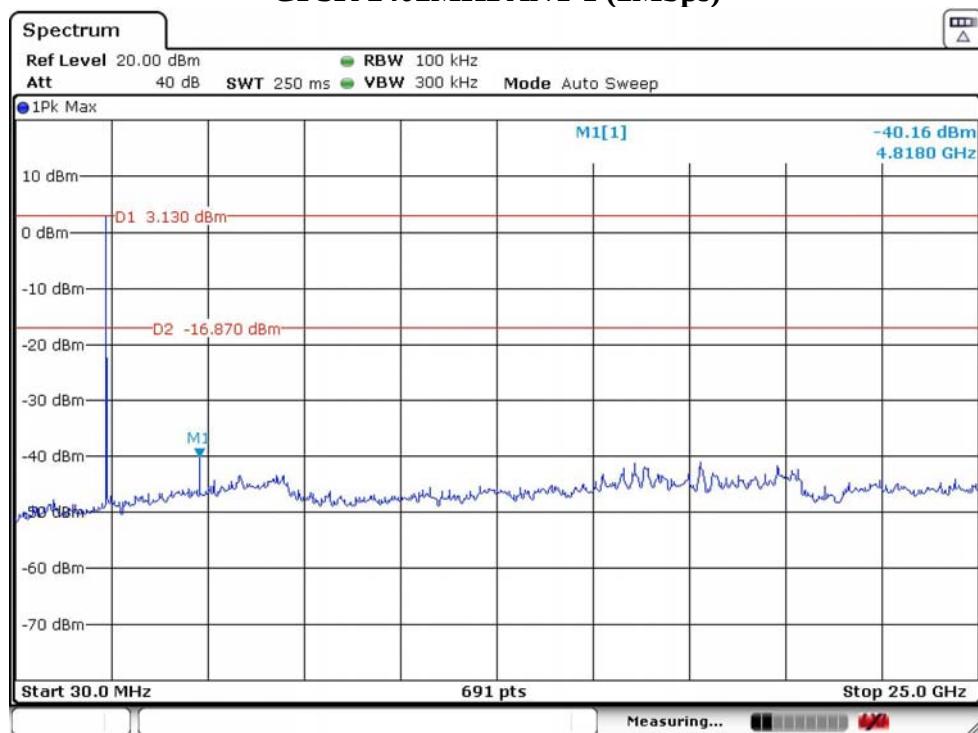
7.4. Test Procedure

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 7.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, use the marker function to mark the highest emission level outside the authorized band.
- Repeat above procedures until all channels were measured.
- Record the results in the test report.

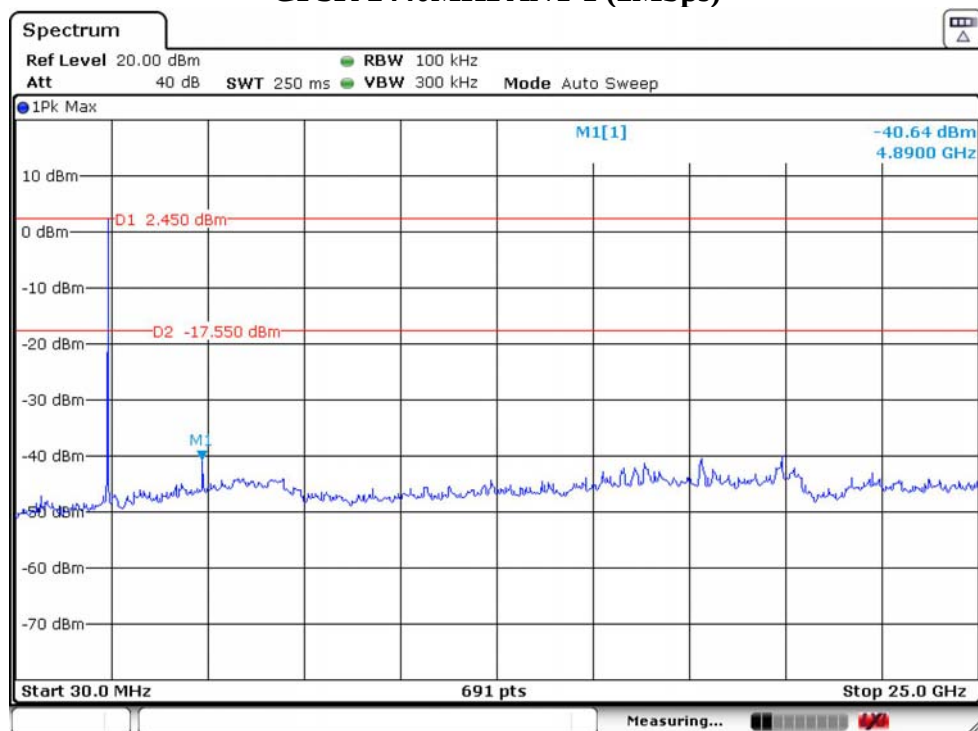
7.5. Test Result

Temperature	23.5℃	Relative Humidity	49%	Test Voltage	120V/60Hz
Result	PASS				

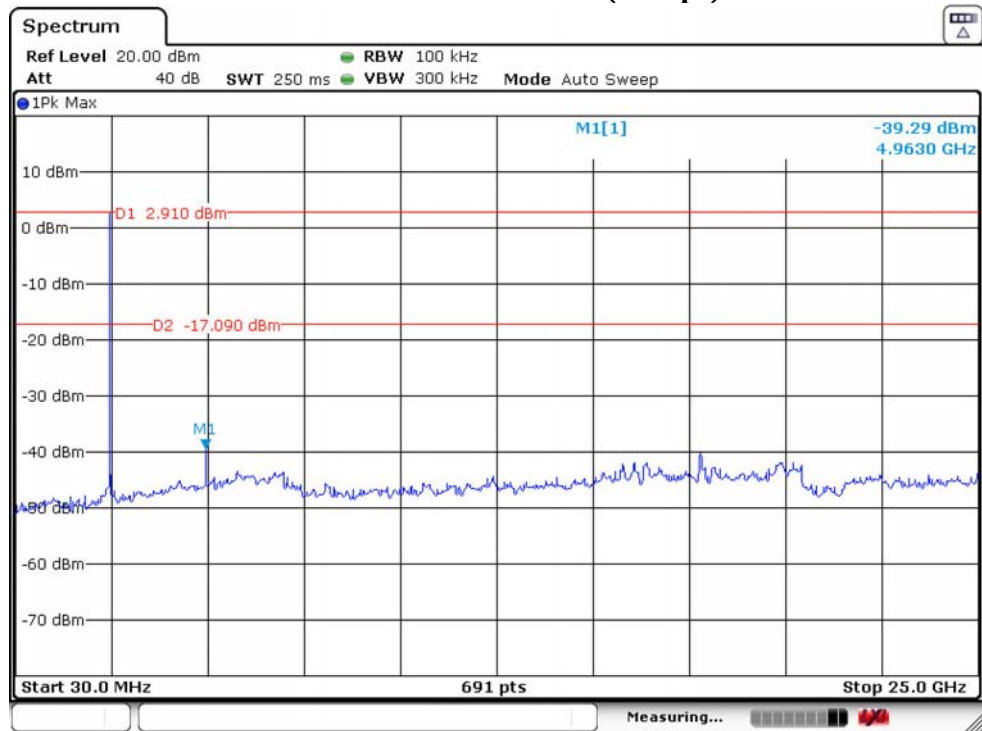
GFSK 2402MHz ANT 1 (2Mbps)



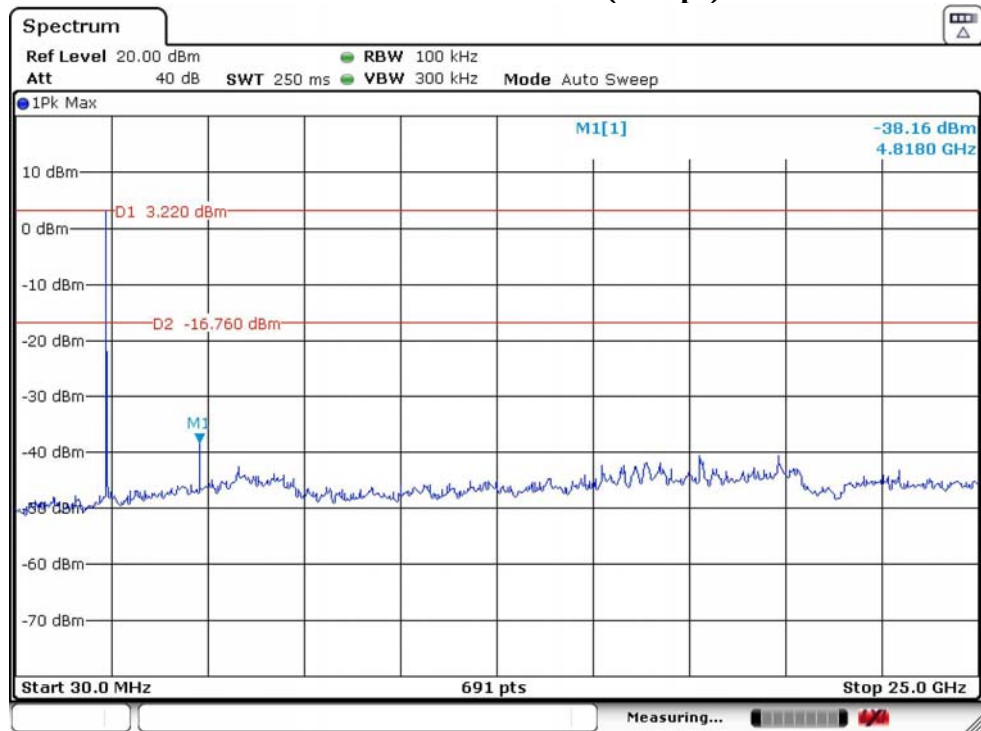
GFSK 2440MHz ANT 1 (2Mbps)



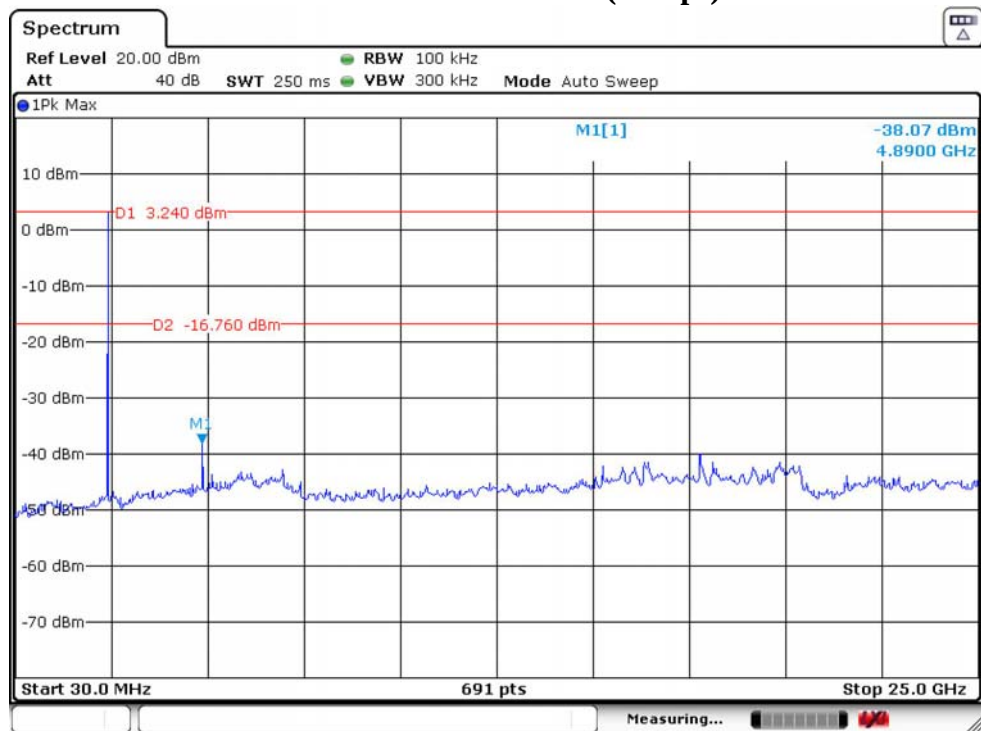
GFSK 2480MHz ANT 1 (2Mbps)



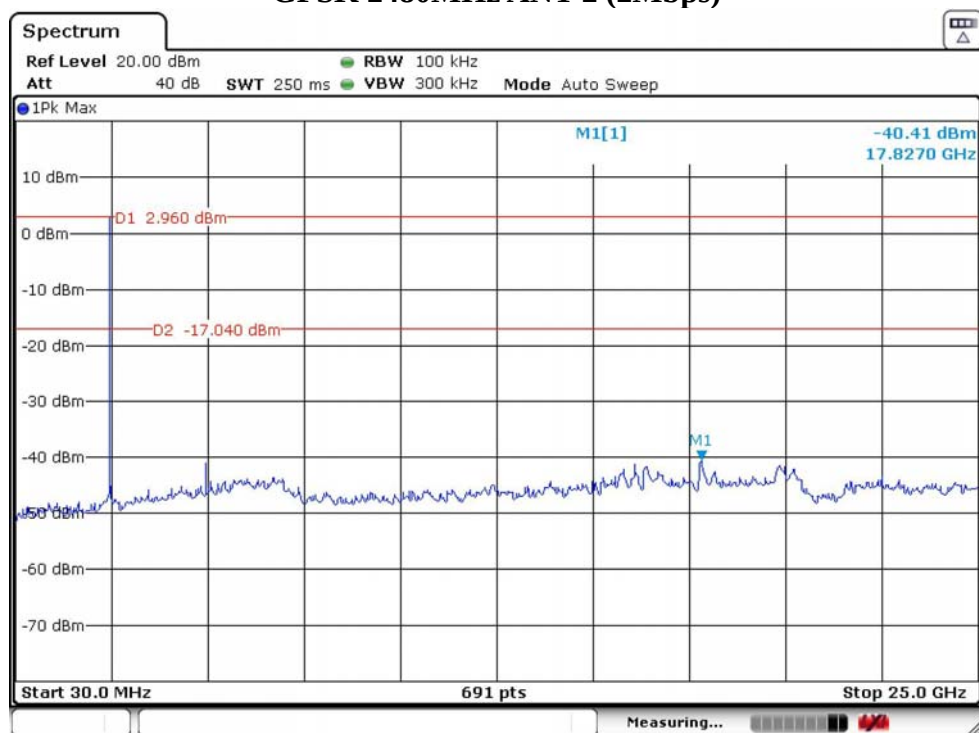
GFSK 2402MHz ANT 2 (2Mbps)



GFSK 2440MHz ANT 2 (2Mbps)



GFSK 2480MHz ANT 2 (2Mbps)



All modulations are all tested ,only worse case is reported