Report Number: 68.950.15.235.01

FCC/IC - TEST REPORT

Report Number	:	**68.950.15.235.01**	Date of Issue:	October 20, 2015
Model	:	**NM204**		
Product Type	:	Video Baby Monitor (Parent Unit)		
Applicant	:	Cvision (HK) Limited		
Address	:	Rm 902, Wilson House, 19-27 Wyndham Street, Central, Hong Kong.		
Production Facility	:	TATUNG COMPANY		
Address	:	22 Chungshan N. Rd. 3rd Sec. Taipei 104 Taiwan.		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	35		

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1 Table of Contents

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2 Details about the Test Laboratory

Details about the Test Laboratory
Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District, Shenzhen City, 518052, P. R. China
FCC Registration No.:	502708
IC Registration No:	10320A-1
Telephone:	86 755 8828 6998
Fax:	86 755 8828 5299

3 Description of the Equipment Under Test

Product:	Video Baby Monitor (Parent Unit)
Model no.:	NM204
FCC ID:	2AC9F-204PU
IC ID:	12001A-204PU
Options and accessories:	NIL
Rating:	DC 3.7V by Li-ion Battery or 5VDC, 600mA Powered by external power supply: Adaptor Input: 100-240VAC, 50/60Hz; 200mA Adaptor Output: 5.0V, 600mA
RF Transmission Frequency:	2402-2479MHz
No. of Operated Channel:	23
Modulation:	GFSK
Antenna Type:	Integral Antenna
Antenna Gain:	0dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Baby Monitor operated at 2.4GHz

Channel List		
CH1=2402MHz	CH2=2404MHz	CH3=2406MHz
CH4=2408MHz	CH5=2410MHz	CH6=2415MHz
CH7=2420MHz	CH8=2425MHz	CH9=2430MHz
CH10=2435MHz	CH11=2440MHz	CH12=2445MHz
CH13=2450MHz	CH14=2455MHz	CH15=2460MHz
CH16=2465MHz	CH17=2467MHz	CH18=2469MHz
CH19=2471MHz	CH20=2473MHz	CH21=2475MHz
CH22=2477MHz	CH23=2479MHz	

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2014 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 4 November 2014	General Requirements for the Certification of Radio Apparatus
RSS-247 Issue 1 May 2015	RSS-247 —Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices

All the test methods were according to Public Notice DA 00-705 -Frequency Hopper Spread Spectrum Test Procedure released by FCC on March 30, 2000 and C63.10 (2014).

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5 Summary of Test Results

Technical Requirements							
FCC Part 15 Subpart C, RSS-Gen, RSS-247							
Test Condition			Pages	Test Site	Test Result		
					Pass	Fail	N/A
§15.207	RSS-GEN A8.8	Conducted emission AC power port	10	Site 1	☒	☐	☐
§15.247 (b) (1)	RSS-247 5.4(4)	Conducted peak output power	13	Site 1	☒	☐	☐
§15.247(a)(1)	RSS-247 5.1(2)	20dB bandwidth	15	Site 1	☒	☐	☐
§15.247(a)(1)	RSS-247 5.1(2)	Carrier frequency separation	18	Site 1	☒	☐	☐
§15.247(a)(1)(iii)	RSS-247 5.1(3)	Number of hopping frequencies	21	Site 1	☒	☐	☐
§15.247(a)(1)(iii)	RSS-247 5.1(3)	Dwell Time	23	Site 1	☒	☐	☐
§15.247(a)(2)	RSS-247 5.2 (1)	6dB bandwidth	---	---	☐	☐	☒
§15.247(e)	RSS-247 5.2 (2)	Power spectral density	---	---	☐	☐	☒
§15.247(d)	RSS-247 5.5	Spurious RF conducted emissions	25	Site 1	☒	☐	☐
§15.247(d)	RSS-247 5.5	Band edge	29	Site 1	☒	☐	☐
§15.247(d) & §15.209	RSS-247 5.5 & RSS-GEN 6.13	Spurious radiated emissions for transmitter	32	Site 1	☒	☐	☐
§15.203	RSS-GEN 8.3	Antenna requirement	See note 2		☒	☐	☐

Note 1: N/A=Not Applicable.
Note 2: The EUT uses an integral antenna, which gain is 0dBi. In accordance to §15.203 and § RSSGEN 8.3, It is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AC9F-204PU, IC: 12001A-204PU complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules, RSS-Gen and RSS-247.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

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

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

Sample Received Date: September 21, 2015

Testing Start Date: September 21, 2015

Testing End Date: October 19, 2015

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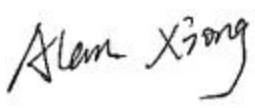
Reviewed by:

John Zhi
EMC Project Manager

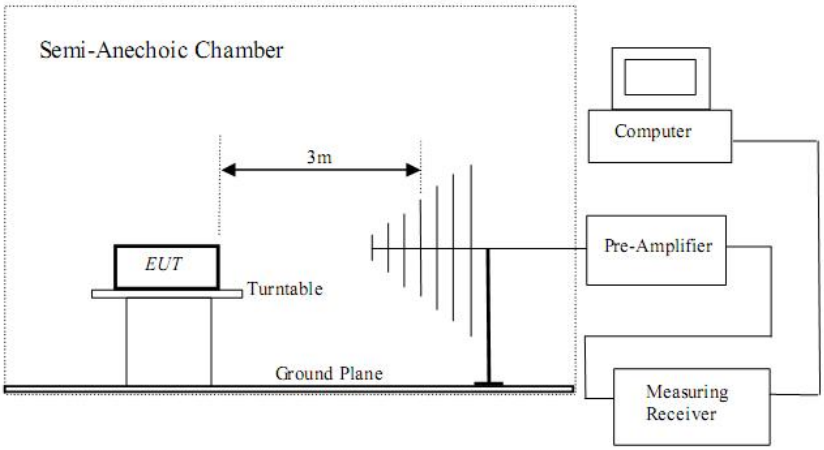
Prepared by:



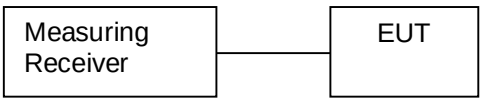
Alan Xiong
EMC Project Engineer

7 Test Setups

7.1 Radiated test setups



7.2 Conducted RF test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook	Lenovo	X240	---

Test software which used to control the EUT in continues transmitting mode

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

Hopping mode: typical working mode (normal hopping status)

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power

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9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

According to §15.207 & RSS-GEN A8.8, conducted emissions limit as below:

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

Decreasing linearly with logarithm of the frequency

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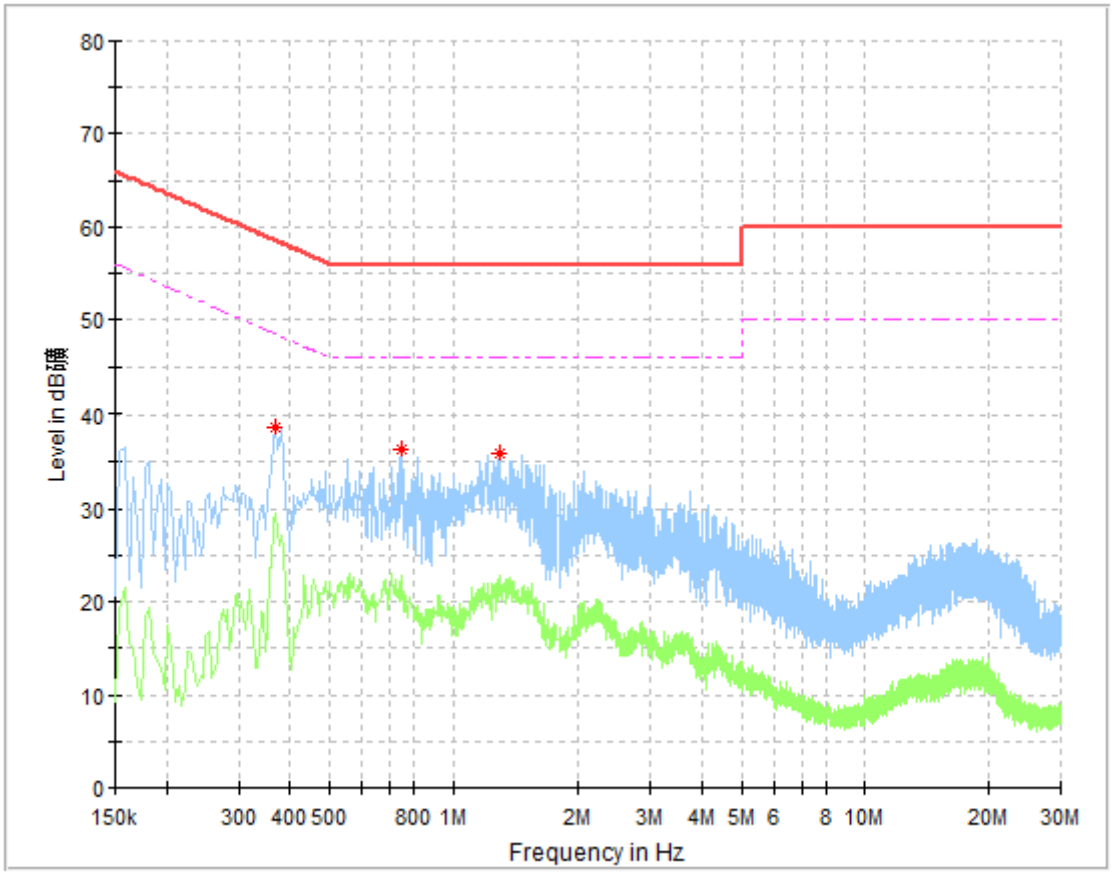
Product Type	:	Video Baby Monitor (Parent Unit)
M/N	:	NM204
Operating Condition	:	Transmitting
Test Specification	:	Line
Comment	:	AC 120V/60Hz



Frequency (MHz)	MaxPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.370000	38.57	58.50	19.93	L1	10.2
0.746000	36.31	56.00	19.69	L1	9.9
1.294000	35.98	56.00	20.02	L1	9.8

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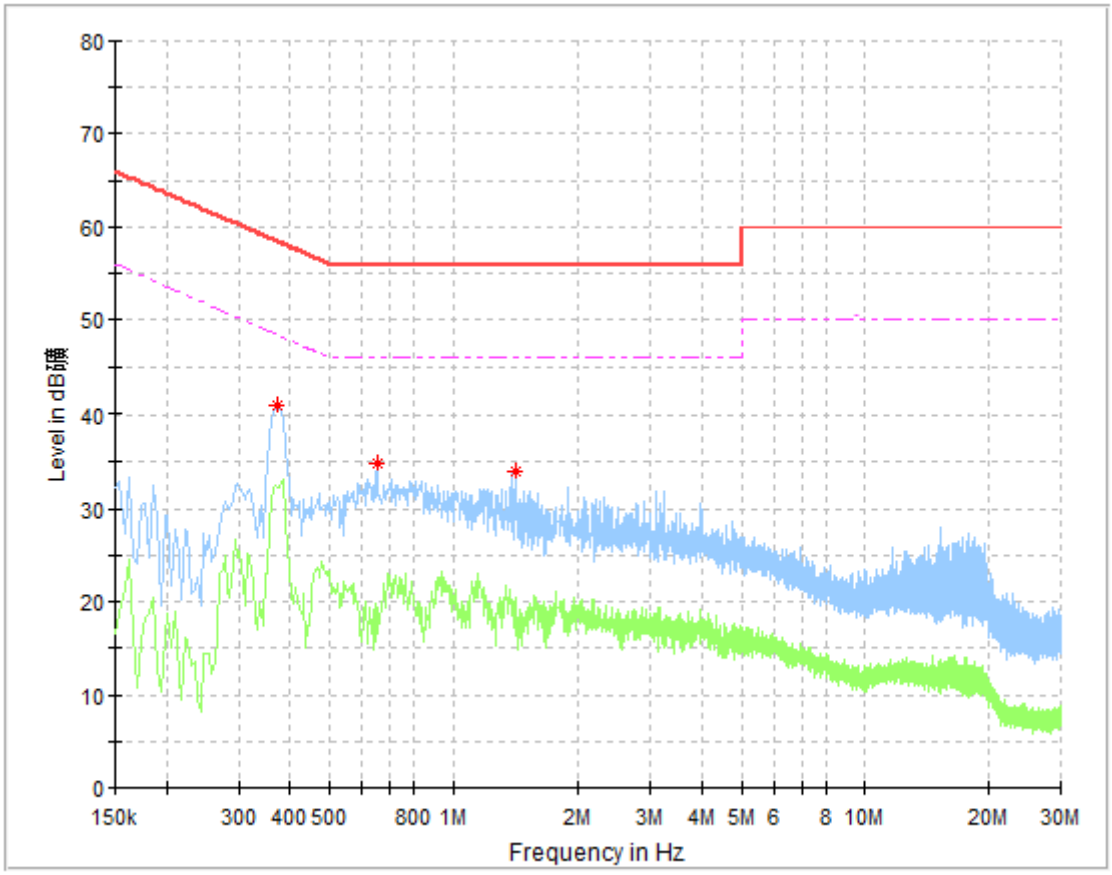
Product Type	:	Video Baby Monitor (Parent Unit)
M/N	:	NM204
Operating Condition	:	Transmitting
Test Specification	:	Neutral
Comment	:	AC 120V/60Hz



Frequency (MHz)	MaxPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.374000	40.95	58.41	17.46	N	10.1
0.654000	34.89	56.00	21.11	N	9.9
1.422000	33.89	56.00	22.11	N	9.8

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9.2 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
   Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
   RBW > the 20 dB bandwidth of the emission being measured, VBW≥RBW,
   Sweep = auto, Detector function = peak, Trace = max hold
2. Add a correction factor to the display.
3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power

Limits

According to §15.247 (b) (1) & RSS-247 5.4(4), conducted peak output power limit as below:

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

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Conducted peak output power

GFSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	17.65	Pass
Middle channel 2440MHz	18.23	Pass
High channel 2479MHz	17.72	Pass

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9.3 20 dB bandwidth

Test Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit [kHz]
N/A

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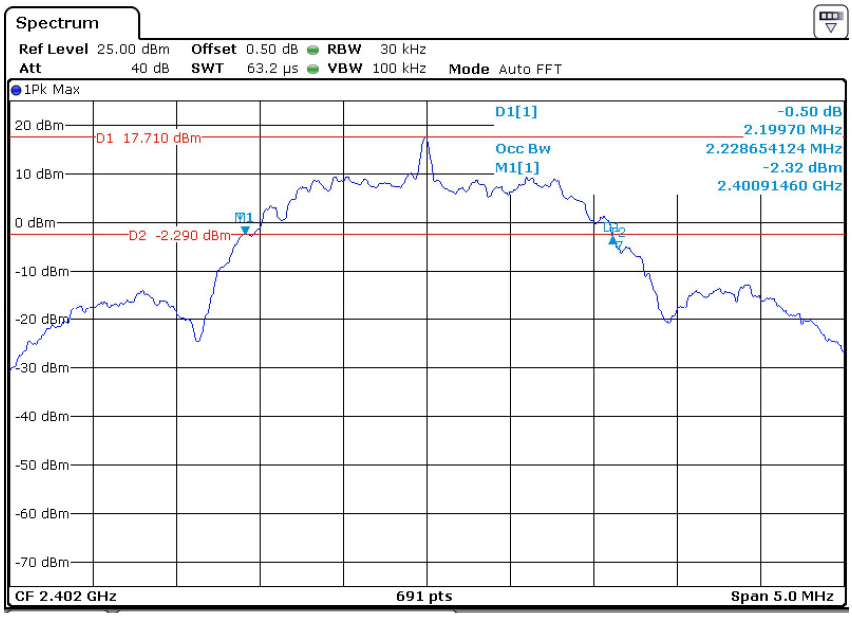
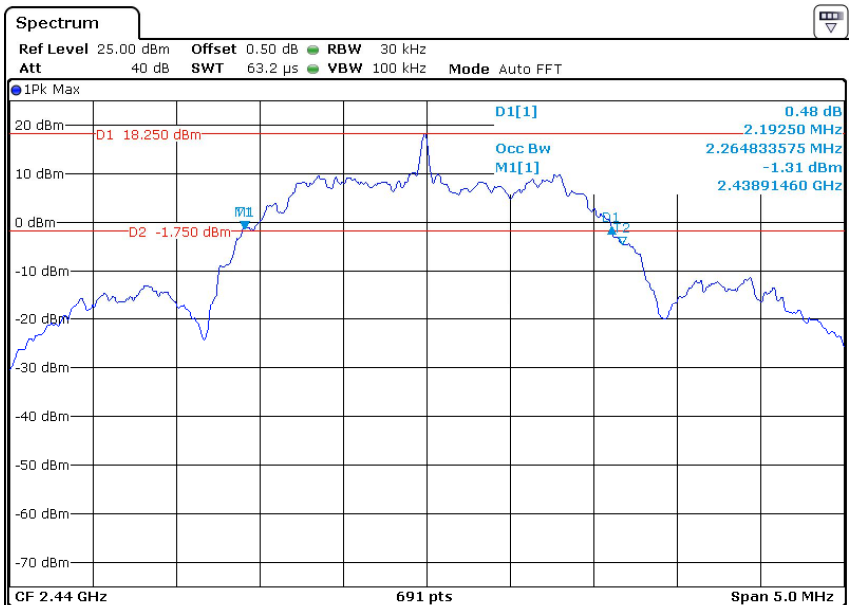
20 dB bandwidth

GFSK Modulation test result

Frequency MHz	20 dB Bandwidth kHz	Limit kHz	Result
2402	2199.7	--	Pass
2440	2192.5	--	Pass
2479	2250.4	--	Pass





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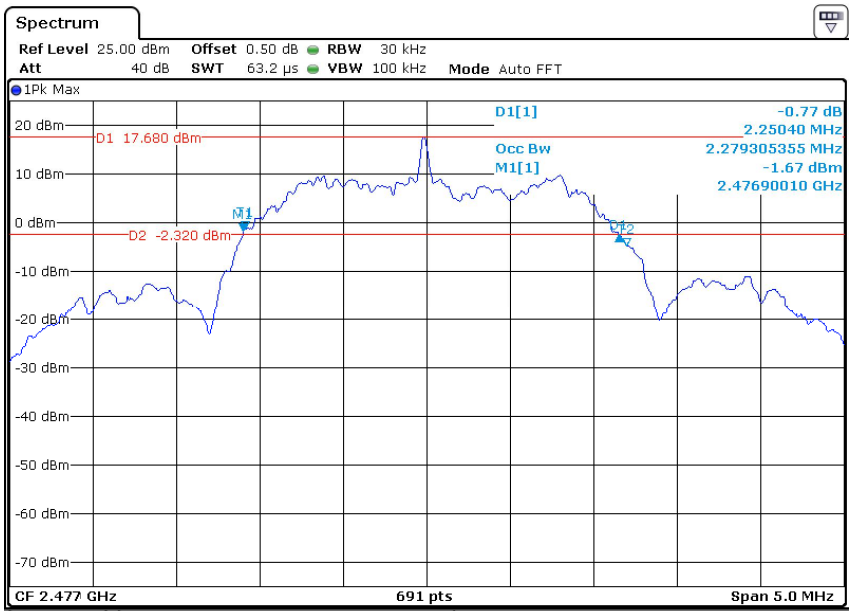
20 dB bandwidth



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9.4 Carrier Frequency Separation

Test Method

1. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, VBW) ≥RBW, Sweep = auto, Detector function = peak
2. By using the Max-Hold function record the separation of two adjacent channels.
3. Measure the frequency difference of these two adjacent channels by spectrum analyzer marker function.
4. Repeat above procedures until all frequencies measured were complete.

Limit

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

GFSK Modulation Limit

Frequency MHz	2/3 of 20 dB Bandwidth kHz
2402	1466.5
2440	1461.7
2479	1500.3

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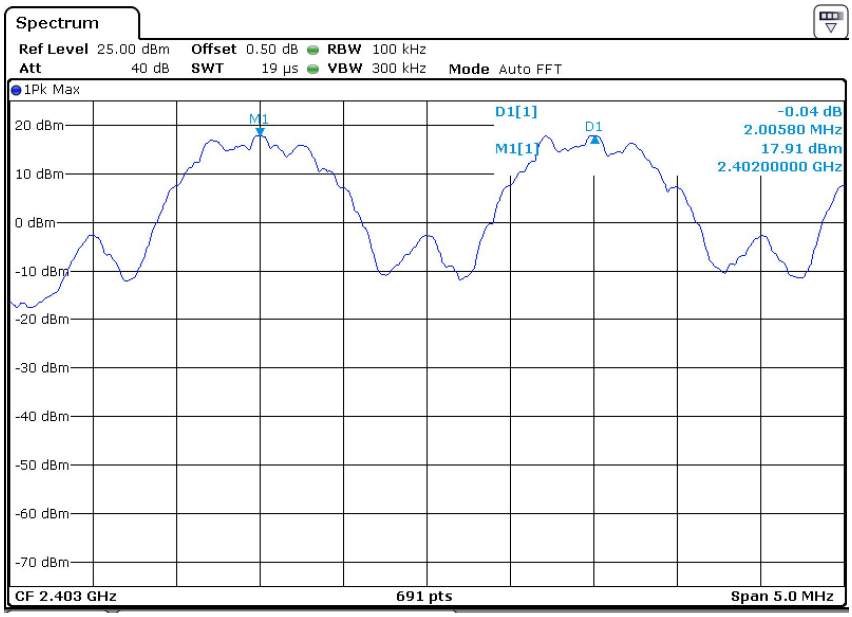
Carrier Frequency Separation

Test result: The measurement was performed with the typical configuration (normal hopping status), here GFSK modulation mode was used to show compliance.

GFSK Modulation test result

Frequency MHz	Carrier Frequency Separation kHz	Result
2402	2005.8	Pass
2440	5010.0	Pass
2479	2005.8	Pass



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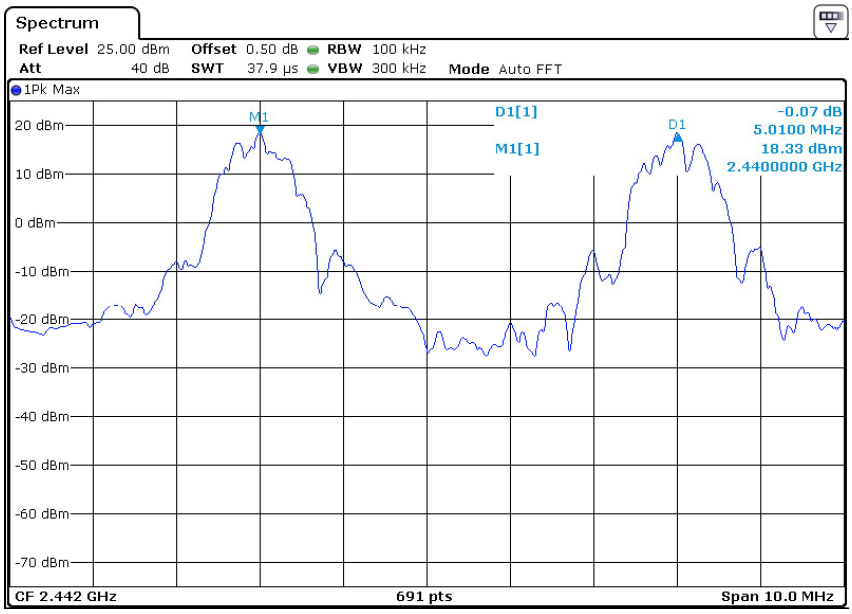
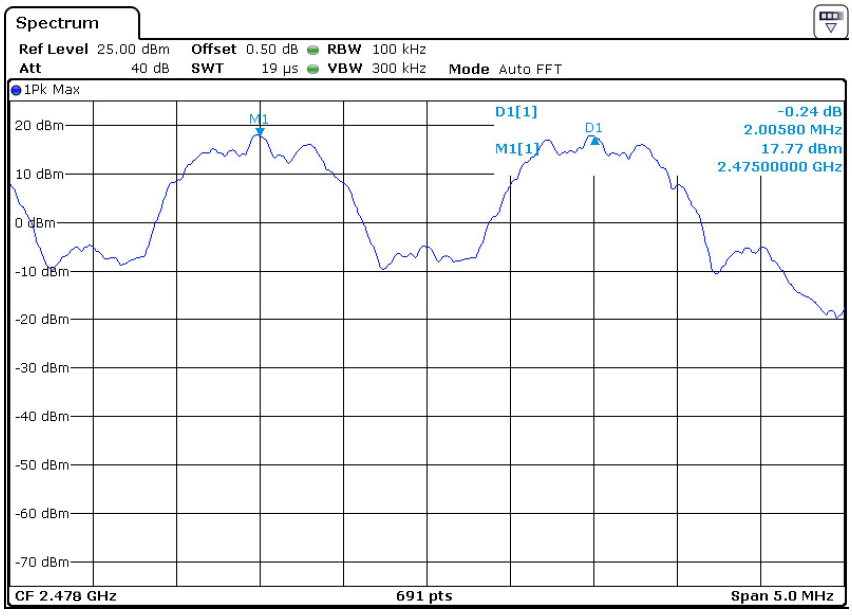
Carrier Frequency Separation





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9.5 Number of hopping frequencies

Test Method

1. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, VBW) ≥RBW, Sweep = auto, Detector function = peak
2. Set the spectrum analyzer on Max-Hold Mode, and then keep the EUT in hopping mode.
3. Record all the signals from each channel until each one has been recorded.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit number
≥ 15

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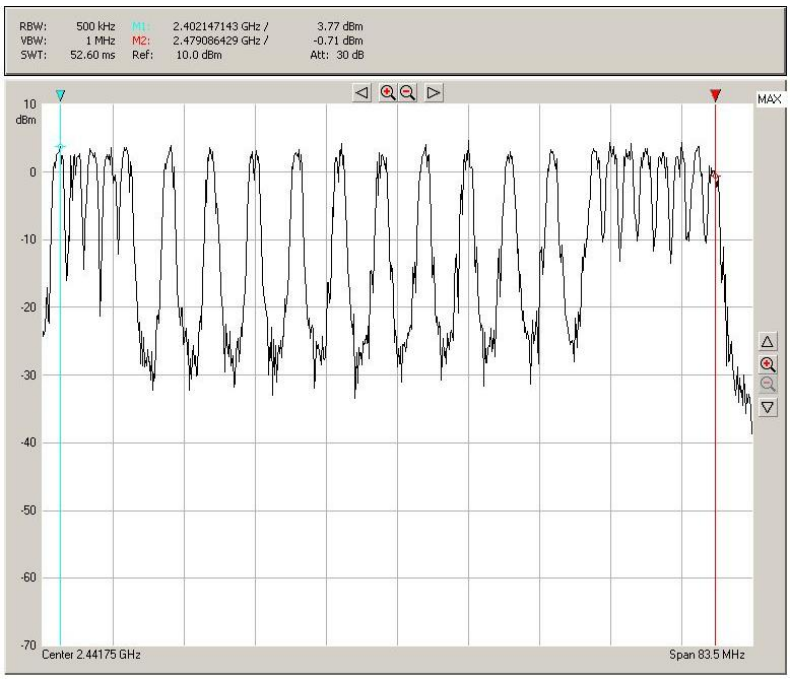
Number of hopping frequencies

Test result: The measurement was performed with the typical configuration (normal hopping status), Here GFSK modulation mode was used to show compliance.

Number of hopping frequencies	Result
23	Pass



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9.6 Dwell Time

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable. Equipment mode: Spectrum analyzer
2. RBW: 1MHz; VBW: 1MHz; SPAN: Zero Span
3. Adjust the center frequency of spectrum analyzer on any frequency be measured.
4. Measure the Dwell Time by spectrum analyzer Marker function.
5. Repeat above procedures until all frequencies measured were complete.

Limit

According to §15.247(a)(1)(iii) & RSS-210 A8.1(c) The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Dwell time

The maximum dwell time shall be 0,4 s.
We test all mode and worse case recorded in the report.

The Dwell Time = Burst Width * Total Hops. The detailed calculations are showed as follows:
The duration for dwell time calculation: 0.4 [s] * hopping number = 0.4 [s] * 22 [ch] = 8.8 [s*ch];

The burst width, which is directly measured, refers to the duration on one channel hop.

The maximum number of hopping channels in 8.8s =66*(8.8/4.4) =132

Test Result

Modulation	Frequency	Reading (µs)	Total Hops	Test Result (ms)	Limit (ms)	Result
GFSK	2440MHz	144.93	132	19.13	< 400	Pass

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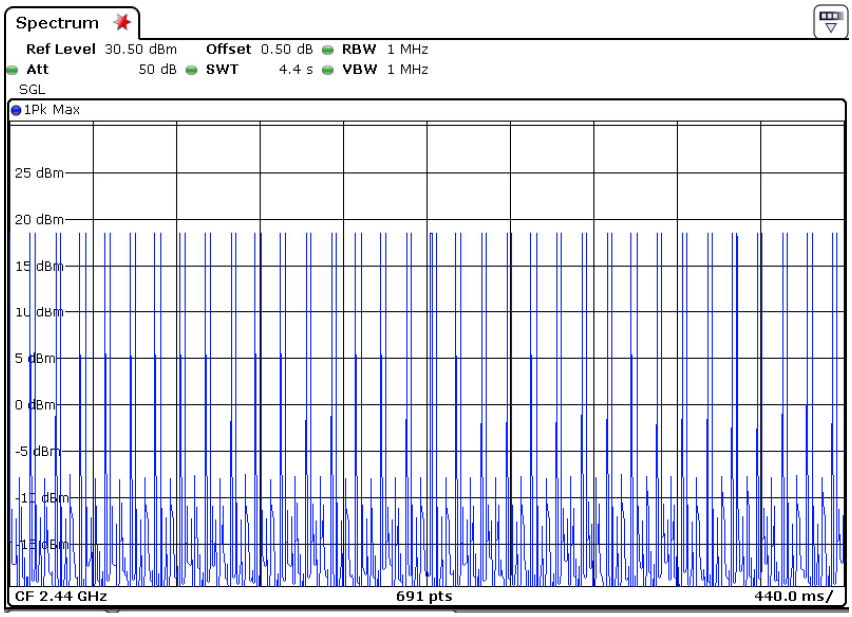
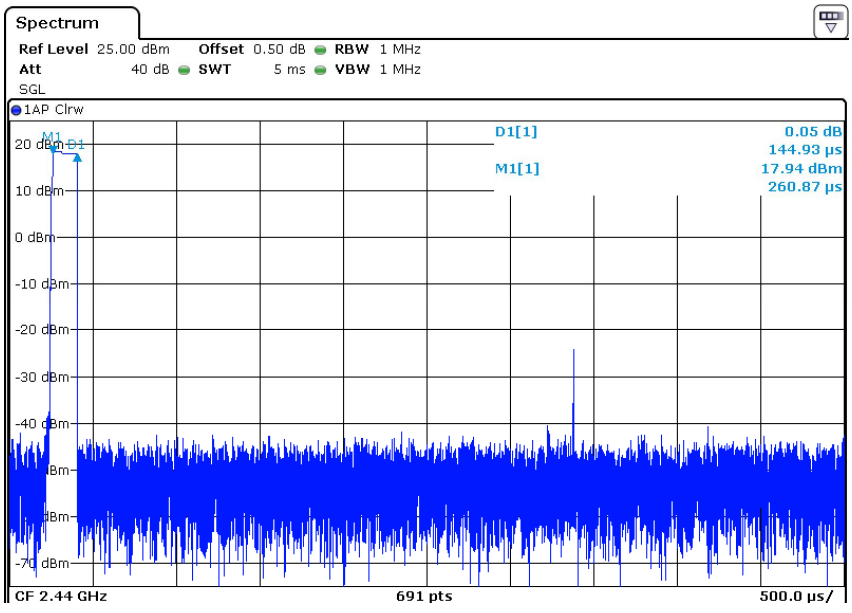
GFSK Modulation





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9.7 Spurious RF conducted emissions

Test Method

1. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
   RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
3. The level displayed must comply with the limit specified in this Section. Submit these plots.
4. Repeat above procedures until all frequencies measured were complete.

Limit

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

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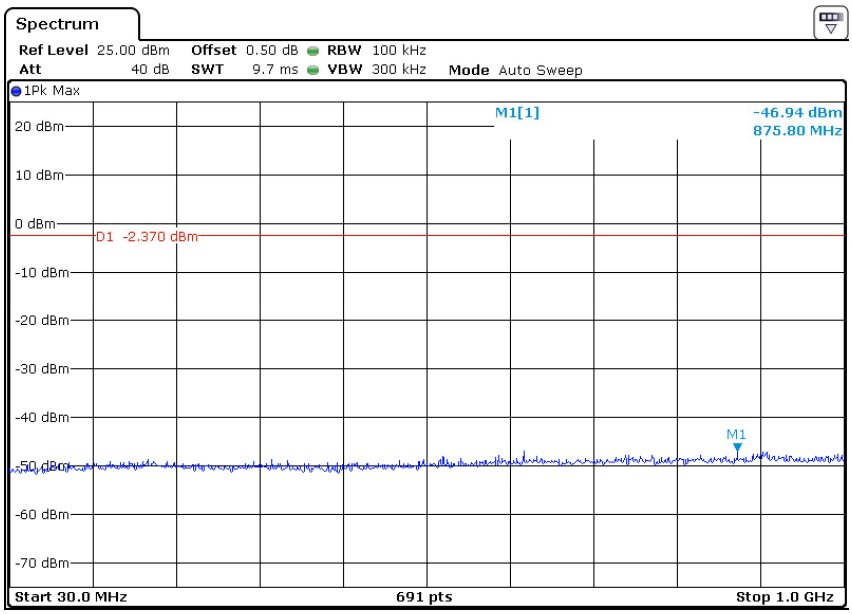
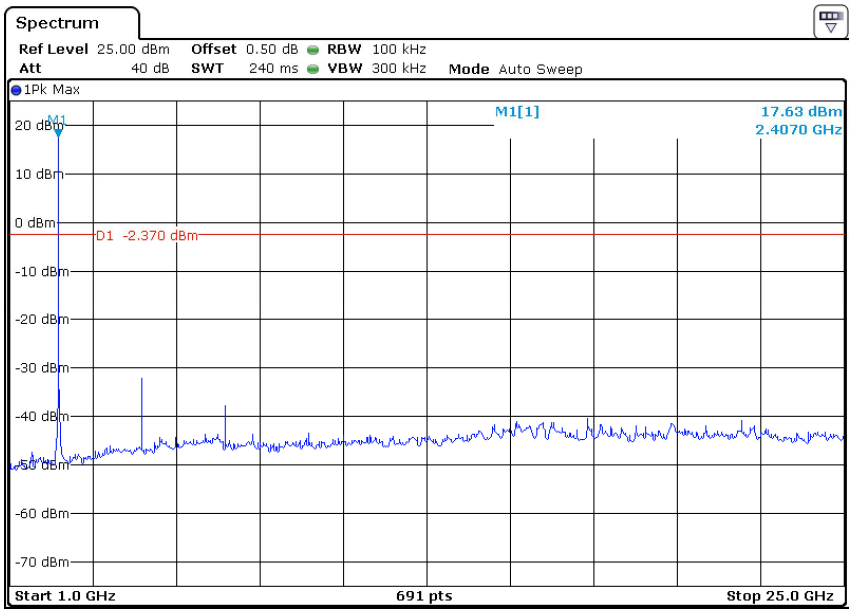
Spurious RF conducted emissions

2402MHz





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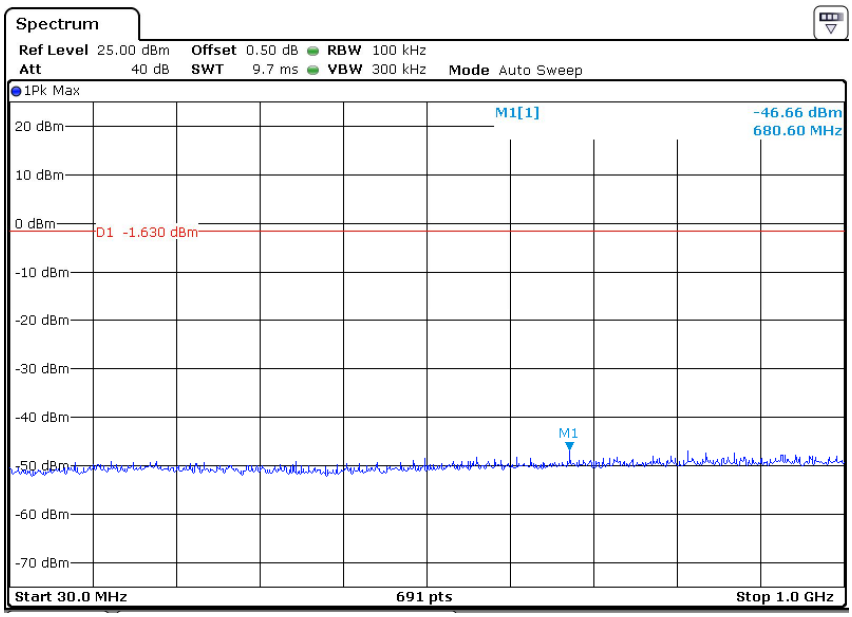
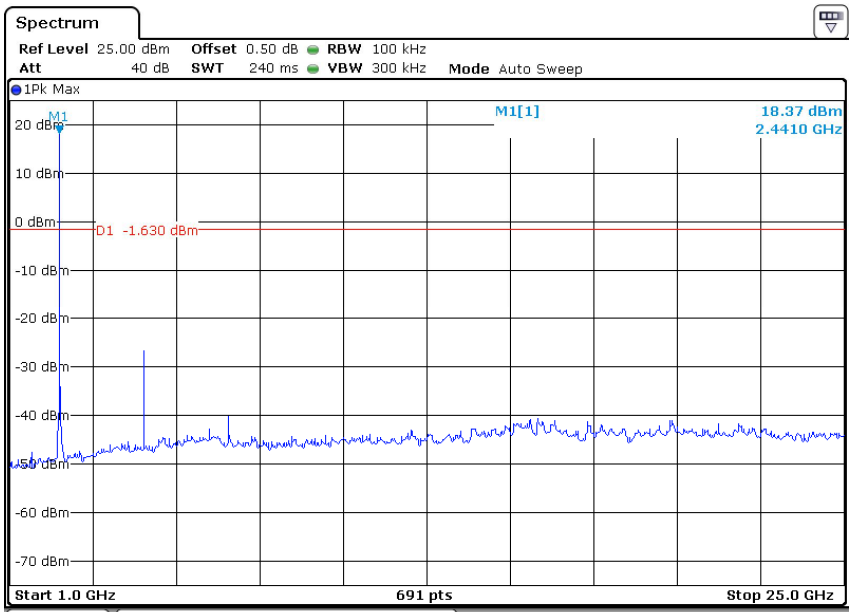
Spurious RF conducted emissions

2440MHz





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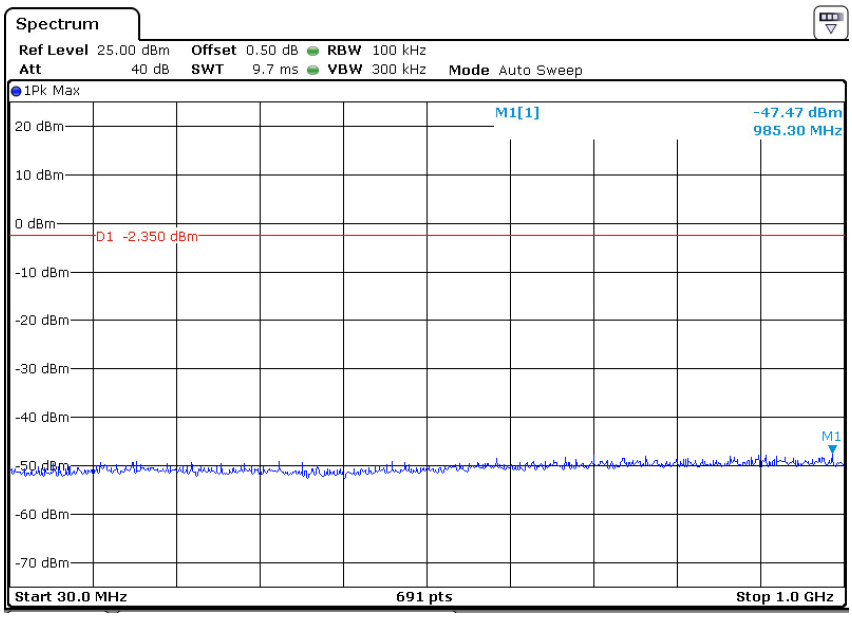
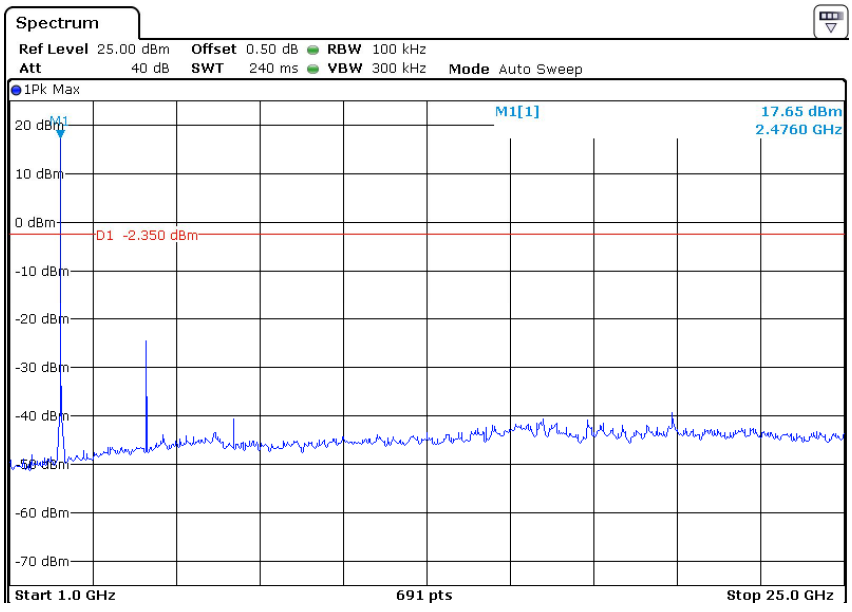
Spurious RF conducted emissions

2479MHz





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9.8 Band edge testing

Test Method

1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
3 The level displayed must comply with the limit specified in this Section. .
4 Repeat the test at the hopping off and hopping on mode, submit all the plots.

Limit:

According to §15.247(d) & RSS-210 A8.5, in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) and RSS-Gen7.2.2, must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)) and RSS-Gen.

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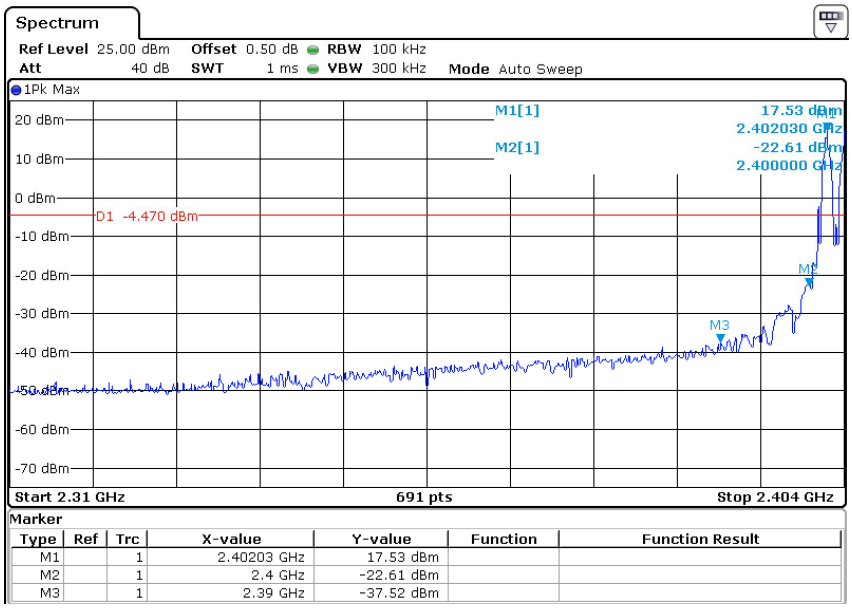
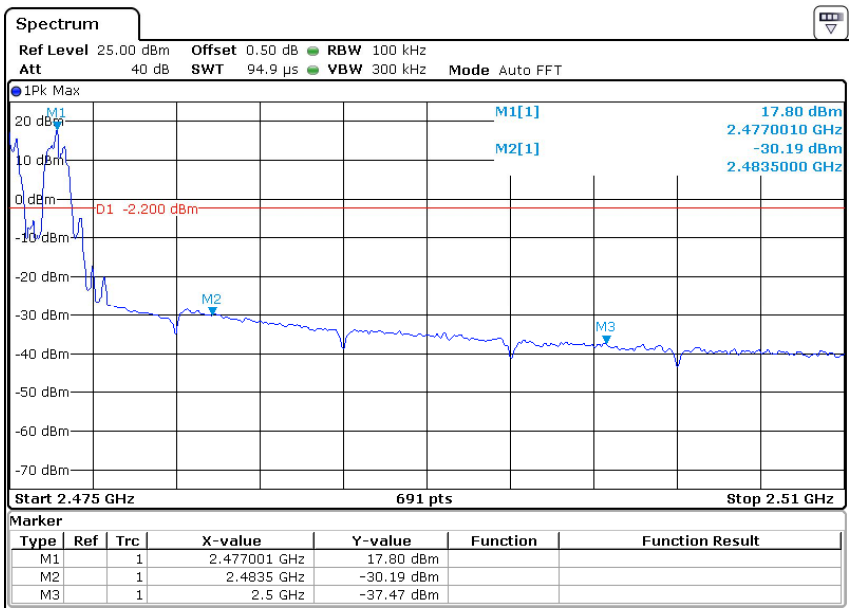
Band edge testing

GFSK Modulation Test Result:
Hopping on mode:



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40203 GHz	17.53 dBm		
M2		1	2.4 GHz	-22.61 dBm		
M3		1	2.39 GHz	-37.52 dBm		



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.477001 GHz	17.80 dBm		
M2		1	2.4835 GHz	-30.19 dBm		
M3		1	2.5 GHz	-37.47 dBm		

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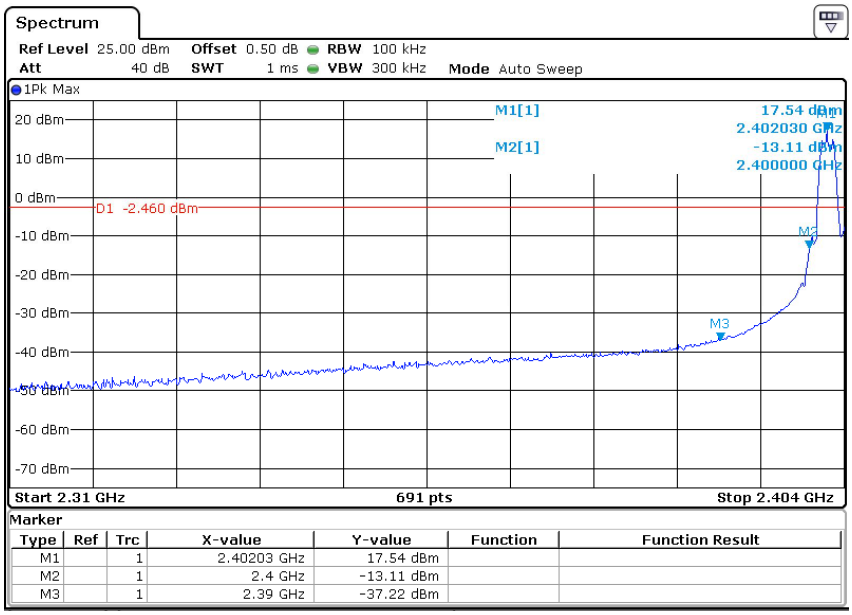
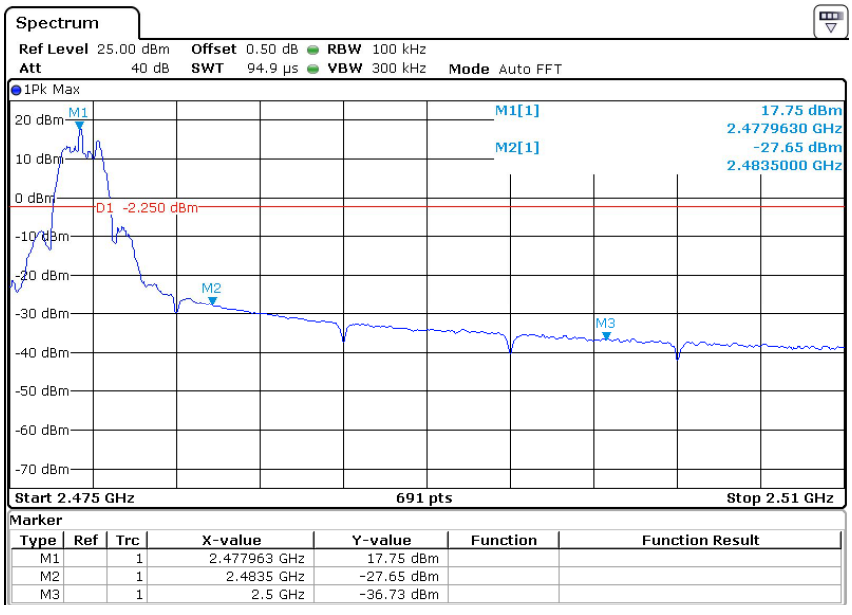
Band edge testing

Hopping off mode:



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40203 GHz	17.54 dBm		
M2		1	2.4 GHz	-13.11 dBm		
M3		1	2.39 GHz	-37.22 dBm		



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.477963 GHz	17.75 dBm		
M2		1	2.4835 GHz	-27.65 dBm		
M3		1	2.5 GHz	-36.73 dBm		

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9.9 Spurious radiated emissions for transmitter

Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:
   Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for f ≥ 1GHz, 100 kHz for f < 1 GHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-2009 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc.
   The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from 20log(duty cycle/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit

According to part 15.247(d) & RSS-247 5.5, the radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209 & RSSGEN 6.13.

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

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Spurious radiated emissions for transmitter

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

The only worse case (which is subject to the maximum EIRP, GFSK mode) test result is listed in the report.

Transmitting spurious emission test result as below:

GFSK Modulation 2402MHz Test Result

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBuV/m	
175.99	20.50	Horizontal	43.50	QP	23.00	Pass
431.94	35.12	Horizontal	46.00	QP	10.88	Pass
464.01	36.74	Horizontal	46.00	QP	9.26	Pass
175.99	27.34	Vertical	43.50	QP	16.16	Pass
359.98	29.79	Vertical	46.00	QP	16.21	Pass
720.03	32.93	Vertical	46.00	QP	13.07	Pass
*4804	59.56	Horizontal	74	PK	14.44	Pass
*4804	45.32	Horizontal	54	AV	8.68	Pass
7206	61.03	Horizontal	74	PK	12.97	Pass
7206	47.13	Horizontal	54	AV	6.87	Pass
9608	63.57	Horizontal	74	PK	10.43	Pass
9608	50.29	Horizontal	54	AV	3.71	Pass
12010	66.49	Horizontal	74	PK	7.51	Pass
12010	53.38	Horizontal	54	AV	0.62	Pass
*4804	57.90	Vertical	74	PK	16.1	Pass
*4804	46.73	Vertical	54	AV	7.27	Pass
7206	65.65	Vertical	74	PK	8.35	Pass
7206	53.02	Vertical	54	AV	0.98	Pass
9608	60.67	Vertical	74	PK	13.33	Pass
9608	49.95	Vertical	54	AV	4.05	Pass
12010	65.61	Vertical	74	PK	8.39	Pass
12010	52.94	Vertical	54	AV	1.06	Pass

Remark:

(1) AV Emission Level= PK Emission Level+20log(dutycycle)
(2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.
(3) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

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10 Test Equipment List

List of Test Instruments

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2016-7-24
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2016-8-14
Horn Antenna	Rohde & Schwarz	HF907	102294	2016-7-24
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2016-7-24
3m Semi-anechoic chamber	TDK	9X6X6	----	2019-5-29

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11 System Measurement Uncertainty

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

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Radiated Spurious Emission 25MHz-3000MHz	Horizontal: 4.95dB; Vertical: 5.02dB;
Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz	Horizontal: 4.89dB; Vertical: 4.88dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	Horizontal: 4.93dB; Vertical: 4.92dB;
Uncertainty for Conducted RF test with TS 8997	Power level test involved: 2.04dB Frequency test involved:1.1×10^{-7}

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