



LCIE

Bluetooth Classic Template: Release October 03rd, 2016

TEST REPORT

N°: 146019-698067B

Version : 01

Subject

Radio spectrum matters
tests according to standards:
47 CFR Part 15.247

Issued to

SAGEMCOM BROADBAND SAS
250 Route de l' Empereur
92500 - RUEIL MALMAISON
FRANCE

Apparatus under test

- Product
- Trade mark
- Manufacturer
- Model under test
- Serial number
- FCC ID

DCIWA384 UHD Alt US
SAGEMCOM
SAGEMCOM
MiniBox (253697290)
616476080862
VW3DCIWA384

Test date

: December 5, 2016 to January 5, 2017

Test location

Fontenay Aux Roses & Ecuelles

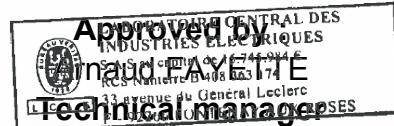
Composition of document

84 pages

Document issued on

February 13, 2017

Written by :
Mathieu CERISIER
Tests operator



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PUBLICATION HISTORY

Version	Date	Author	Modification
01	January 31, 2017	Mathieu CERISIER	Creation of the document



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1. TEST PROGRAM

References

- 47 CFR Part 15.247
- ANSI C63.10-2013
- FCC DA 00-705

Radio requirement:

Clause (47CFR Part 15.247) Test Description	Test result - Comments			
Occupied Bandwidth [1]	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
20dB Bandwidth [2]	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Number of Hopping Frequency [3]	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Carrier Frequency Separation [4]	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Time of Occupancy [5]	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Duty Cycle [6]	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Maximum Conducted Output Power [7]	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Conducted Spurious Emission at the Band Edge [8]	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Unwanted Emissions into Non-Restricted Frequency Bands [9]	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA()	<input type="checkbox"/> NP(1)
AC Power Line Conducted Emission [10]	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA(2)	<input type="checkbox"/> NP(1)
Unwanted Emissions into Restricted Frequency Bands [11]	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Receiver Radiated emissions [12]	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
This table is a summary of test report, see conclusion of each clause of this test report for detail.				

(1): Limited program

(2): EUT not directly or indirectly connected to the AC Power Public Network

PASS: EUT complies with standard's requirement

FAIL: EUT does not comply with standard's requirement

NA: Not Applicable

NP: Test Not Performed



L C I E

2. EQUIPMENT UNDER TEST: CONFIGURATION (DECLARED BY PROVIDER)

2.1. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):

DCIWA384 UHD Alt US

Serial Number: 253697290-A01



Equipment Under Test



L C I E



Equipment Under Test

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
1	Power supply	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
2	Ethernet	2.5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	-

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Laptop	-	-	Use to set the EUT
CBT Bluetooth Tester	A4120005	-	-
Horn antenna	C2042051	-	-
Power supply°1	MSA-Z3800IC12.0-48W-P	191360131-XX	-
Power supply°2	NBS42C120380M2	191357366-XX	-
Power supply°3	LPL-C64612038026	191359307-XX	-



L C I E

Equipment information:

Bluetooth Classic Type:	<input type="checkbox"/> v1.2	<input type="checkbox"/> v2.0	<input type="checkbox"/> v2.1+EDR	<input type="checkbox"/> v3.0+HS
Frequency band:	<input type="checkbox"/> v4.0	<input checked="" type="checkbox"/> v4.1	<input type="checkbox"/> v4.2	
Spectrum Modulation:	<input checked="" type="checkbox"/> FHSS			
Number of Channel:	Maximum:	79	Minimum:	20
Spacing channel:	1MHz			
Channel bandwidth:	1MHz			
Antenna Type:	<input checked="" type="checkbox"/> Integral	<input type="checkbox"/> External	<input type="checkbox"/> Dedicated	
Antenna connector:	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Temporary for test	
Transmit chains:	1 Single antenna			
Beam forming gain:	No			
Receiver chains	1			
Type of equipment:	<input checked="" type="checkbox"/> Stand-alone	<input type="checkbox"/> Plug-in	<input type="checkbox"/> Combined	
Ad-Hoc mode:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No		
Dwell time:	400ms			
Duty cycle:	<input checked="" type="checkbox"/> Continuous duty	<input type="checkbox"/> Intermittent duty	<input type="checkbox"/> 100% duty	
Equipment type:	<input checked="" type="checkbox"/> Production model	<input type="checkbox"/> Pre-production model		
Operating temperature range:	Tmin:	<input type="checkbox"/> -20°C	<input checked="" type="checkbox"/> 0°C	<input type="checkbox"/> X°C
	Tnom:	20°C		
	Tmax:	<input type="checkbox"/> 35°C	<input type="checkbox"/> 55°C	<input checked="" type="checkbox"/> 45°C
Type of power source:	<input checked="" type="checkbox"/> AC power supply	<input type="checkbox"/> DC power supply	<input type="checkbox"/> Battery	
Operating voltage range:	Vnom:	<input checked="" type="checkbox"/> 120V/60Hz	<input type="checkbox"/> X Vdc	

Antenna Characteristic

Antenna assembly	Gain (dBi)	Frequency Band (MHz)	Impedance(Ω)
1	3.1	2400-2483.5	50



L C I E

CHANNEL PLAN

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
Cmin: 0	2402	27	2429	54	2456
1	2403	28	2430	55	2457
2	2404	29	2431	56	2458
3	2405	30	2432	57	2459
4	2406	31	2433	58	2460
5	2407	32	2434	59	2461
6	2408	33	2435	60	2462
7	2409	34	2436	61	2463
8	2410	35	2437	62	2464
9	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	Cmax: 78	2480
25	2427	52	2454		
26	2428	53	2455		

DATA RATE

Available for EUT	Modulation type	Max. Data Rate (Mbps)	Packet type	Worst Case Modulation
<input checked="" type="checkbox"/>	GFSK	1	1-DM1	<input type="checkbox"/>
	GFSK	1	1-DH1	<input type="checkbox"/>
	GFSK	1	1-DM3	<input type="checkbox"/>
	GFSK	1	1-DH3	<input type="checkbox"/>
	GFSK	1	1-DM5	<input type="checkbox"/>
	GFSK	1	1-DH5	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	GFSK	1	AUX1	<input type="checkbox"/>
<input checked="" type="checkbox"/>	$\pi/4$ DQPSK	2	2-DH1	<input type="checkbox"/>
	$\pi/4$ DQPSK	2	2-DH3	<input type="checkbox"/>
	$\pi/4$ DQPSK	2	2-DH5	<input checked="" type="checkbox"/>
	8DPSK	3	3-DH1	<input type="checkbox"/>
	8DPSK	3	3-DH3	<input type="checkbox"/>
	8DPSK	3	3-DH5	<input checked="" type="checkbox"/>



2.2. RUNNING MODE

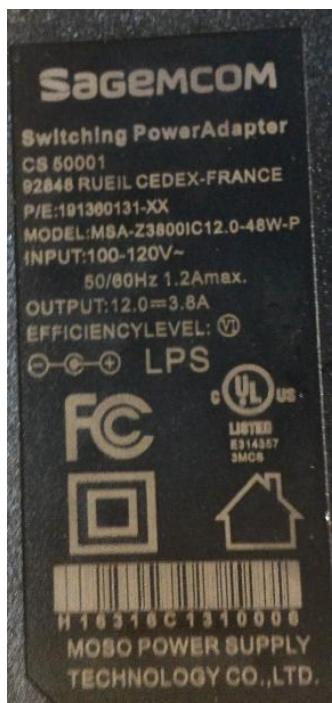
The EUT is set in the following modes during tests:

- Permanent emission with modulation on a fixed channel in the data rate that produced the highest power
- Permanent emission with modulation & hopping in the data rate that produced the highest power
- Permanent reception

Following commands with the specific test software “TERATERM” are used to set the product:

- See document “FCC part15 - Bluetooth compliance test commands of M384US-4L mainboard.pdf” for the command used during test.

2.3. EQUIPMENT LABELLING



Power supply n°1

Power supply n°2

Power supply n°3

2.4. EQUIPMENT MODIFICATION

None Modification:



3. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

Test performed by : Mathieu CERISIER
Date of test : January 5, 2017
Ambient temperature : 23 °C
Relative humidity : 42 %

3.2. TEST SETUP

- The Equipment Under Test is installed:

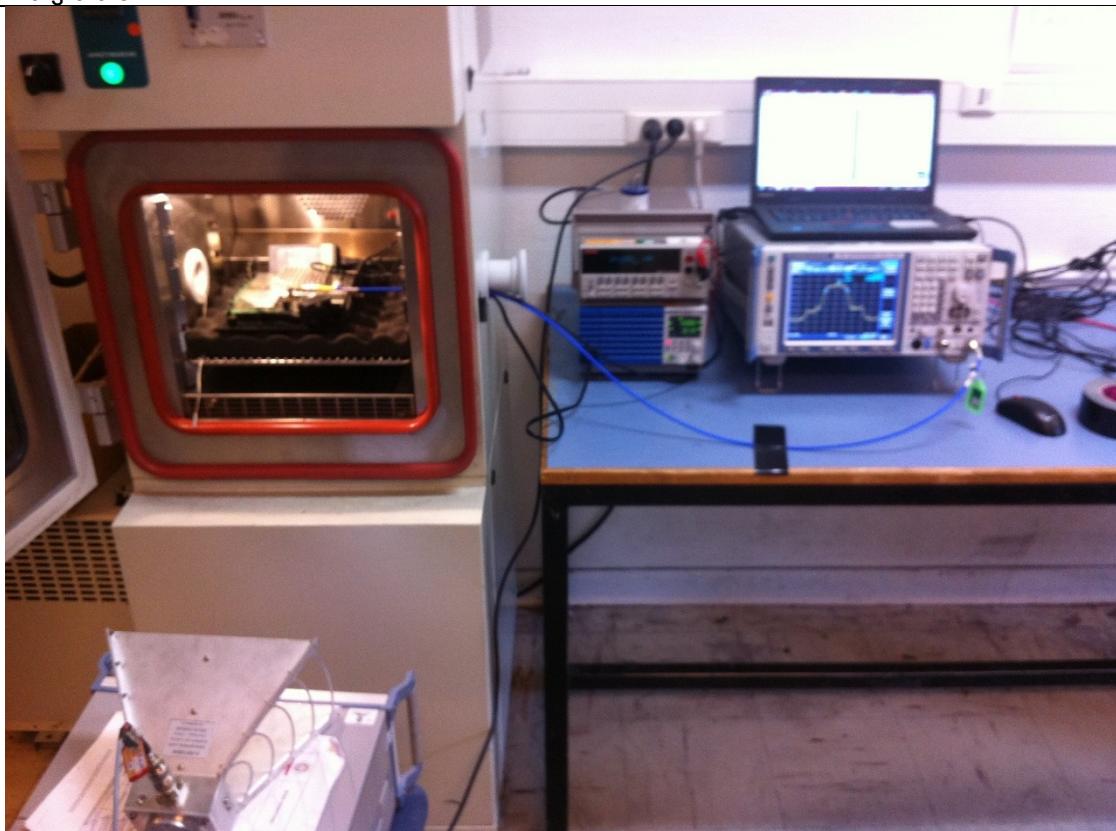
- On a table
- In an anechoic chamber
- In climatic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- RSS-Gen Issue 4 § 6.6
- ANSI C63.10 § 6.9.3



Photograph for Occupied bandwidth



3.1. LIMIT

No Limit

3.2. TEST EQUIPMENT LIST

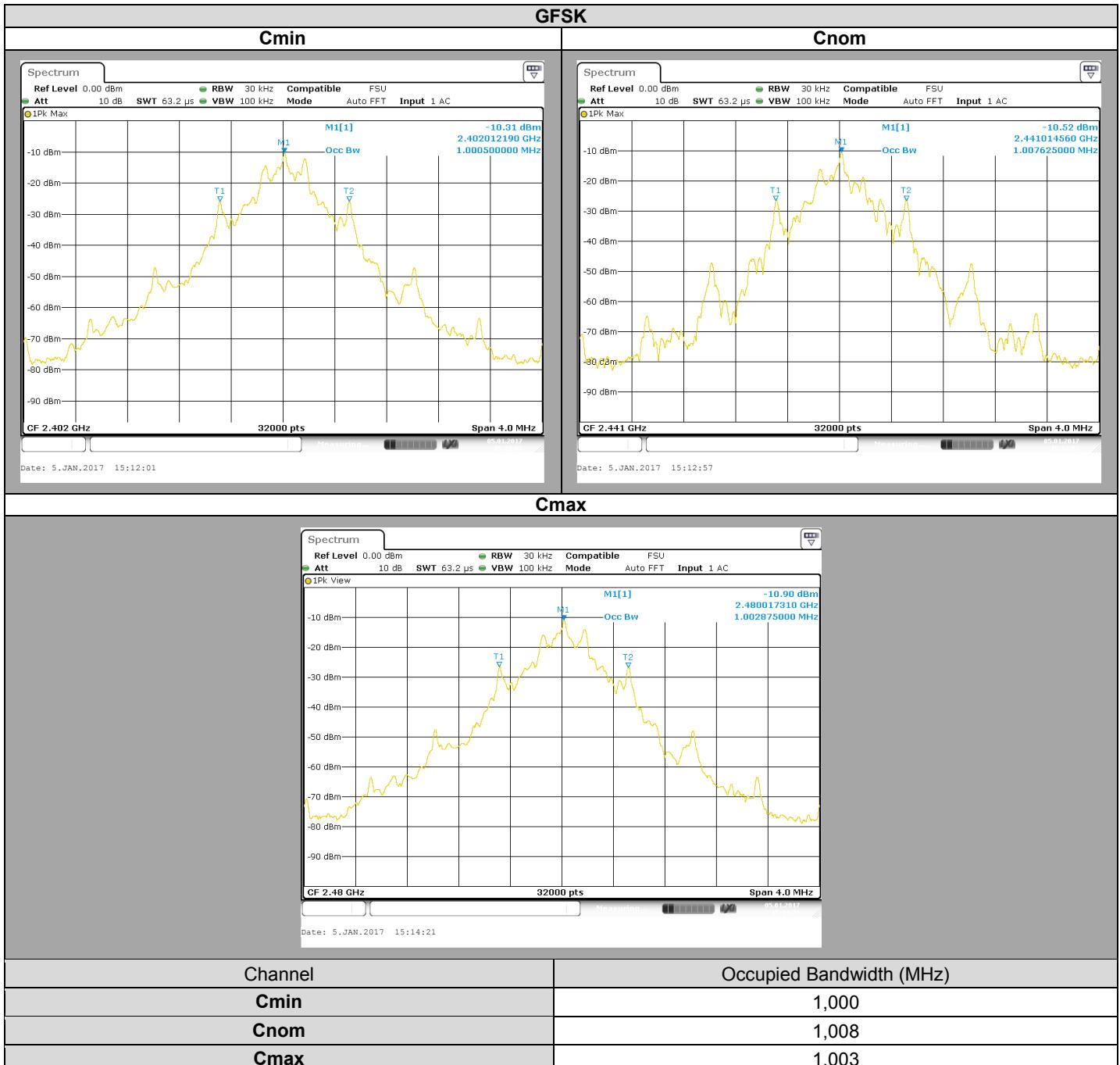
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Calibration date	Calibration due
Multi-meter	KEITHLEY	2000	A1241084	2016/05	2018/05
Programmable AC/DC power supply	-; KIKUSUI	PCR500M	A7049006	Verified with calibrated multimeter	Verified with calibrated multimeter
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/09	2017/09
RF cable & 20 dB attenuator	Télédyne	920-0202-048	A5329676	2016/09	2017/09

Note: In our quality system, the test equipment calibration due is more & less 2 months



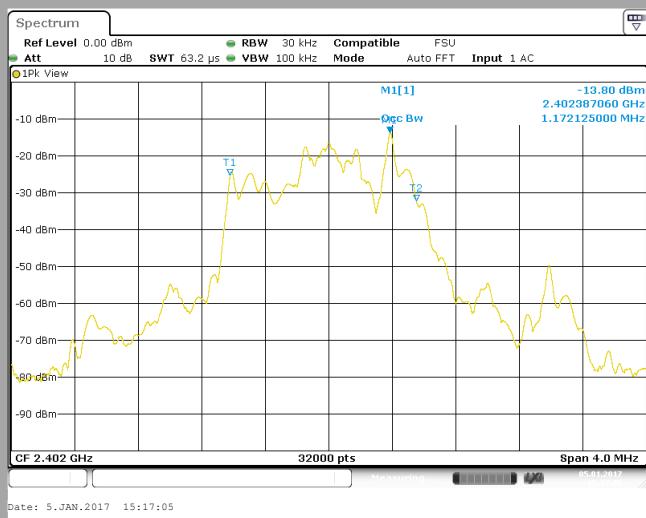
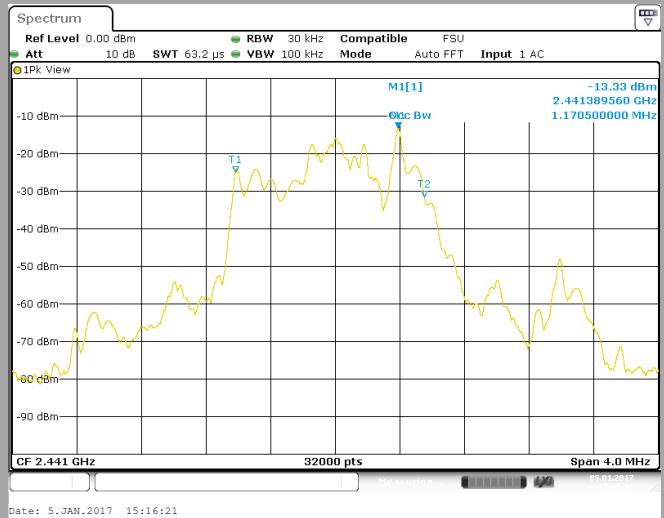
L C I E

3.3. RESULTS





L C I E

π/4 DQPSK**Cmin****Cnom****Cmax**

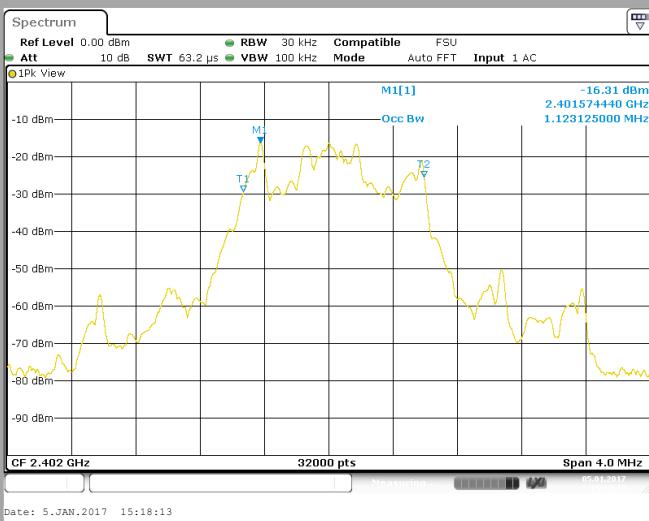
Channel	Occupied Bandwidth (MHz)
Cmin	1,172
Cnom	1,705
Cmax	1,171



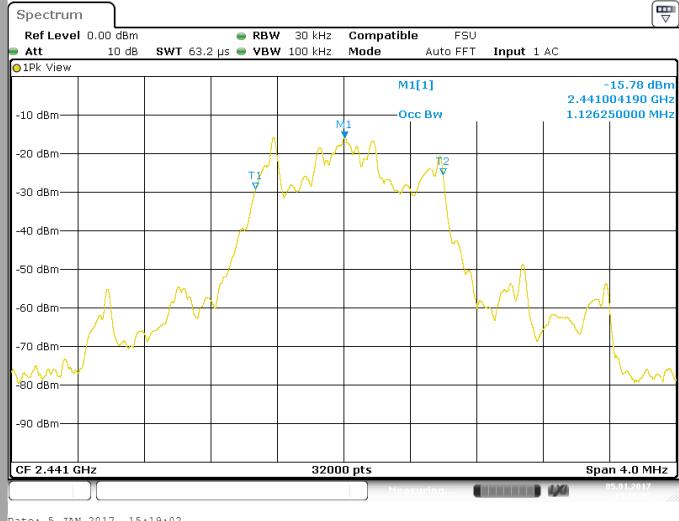
L C I E

8DPSK

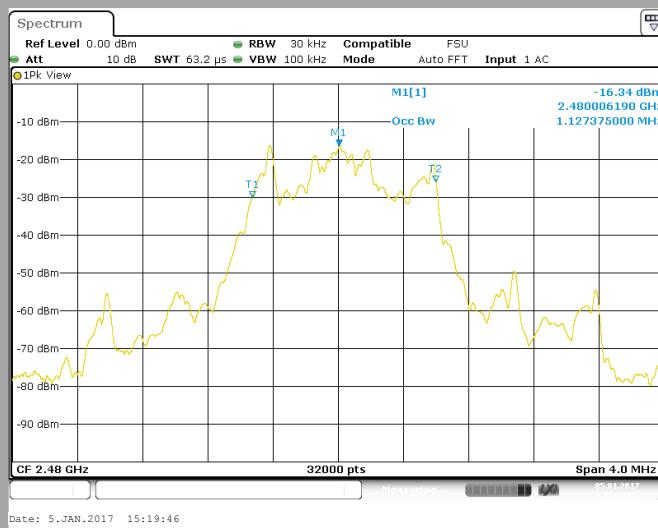
Cmin



Cnom



Cmax



Channel	Occupied Bandwidth (MHz)
Cmin	1,123
Cnom	1,126
Cmax	1,127

3.4. CONCLUSION

Occupied Bandwidth measurement performed on the sample of the product **SAGEMCOM DCIWA384 UHD Alt US**, SN: **616476080862**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247** limits.



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4. 20dB EMISSION BANDWIDTH

4.1. TEST CONDITIONS

Test performed by : Mathieu CERISIER
Date of test : December 15, 2016
Ambient temperature : 24 °C
Relative humidity : 41 %

4.2. TEST SETUP

- The Equipment Under Test is installed:

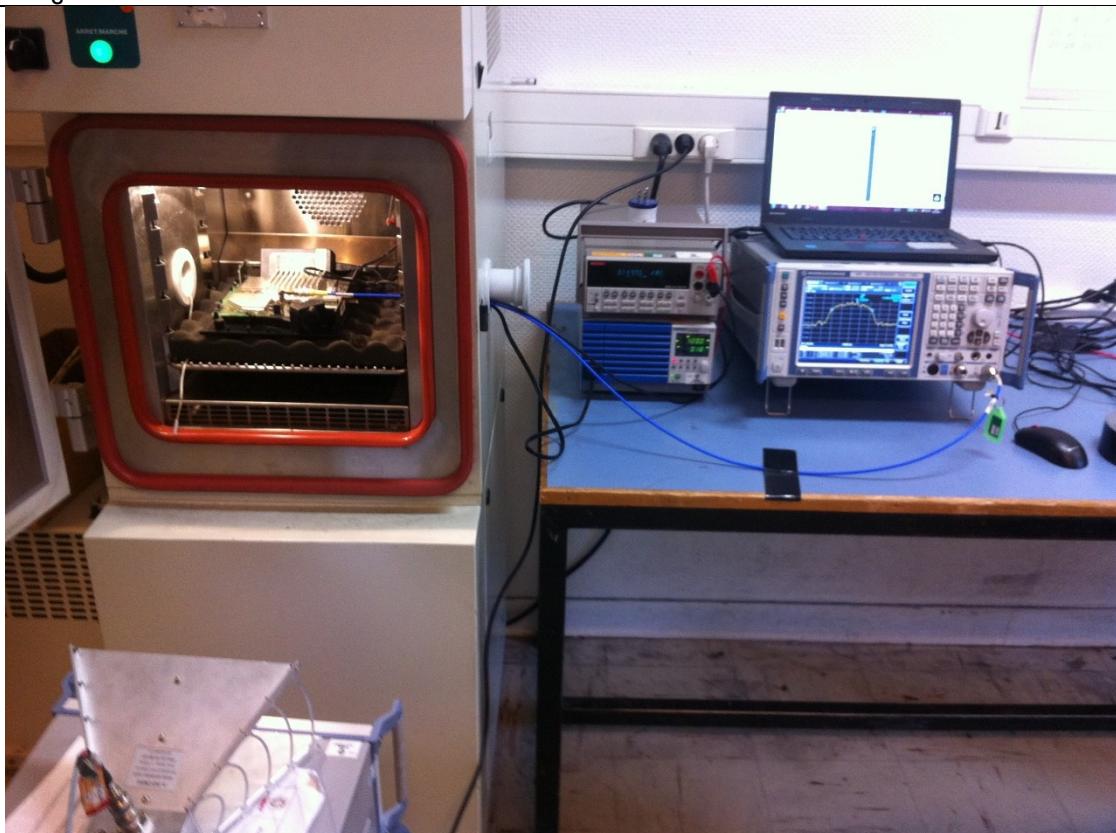
- On a table
- In an anechoic chamber
- In climatic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- FCC DA 00-705 (20dB Bandwidth)
- ANSI C63.10 § 6.9.2



Photograph for 20dB emission bandwidth



4.3. LIMIT

No Limit

4.4. TEST EQUIPMENT LIST

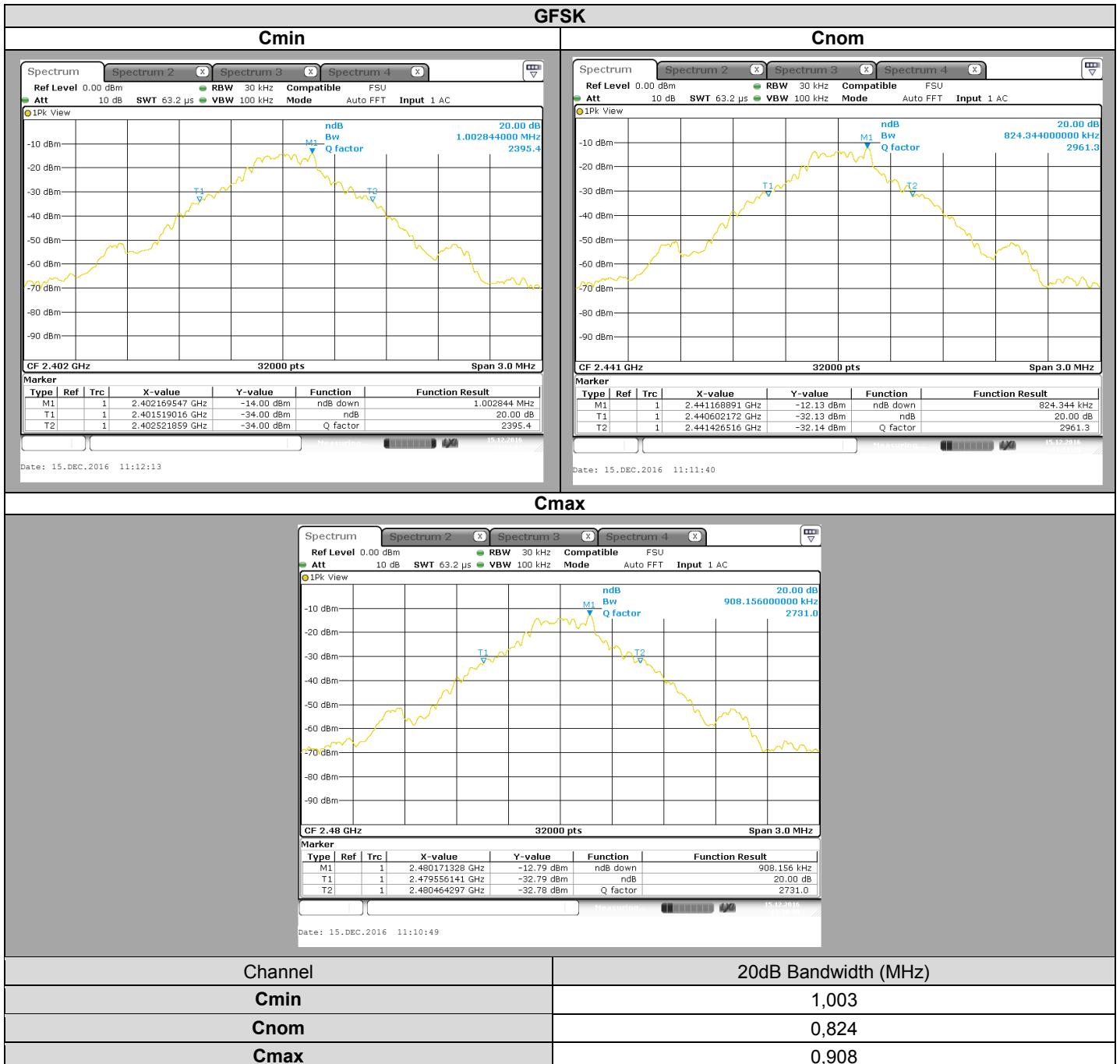
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Calibration date	Calibration due
Multi-meter	KEITHLEY	2000	A1241084	2016/05	2018/05
Programmable AC/DC power supply	-; KIKUSUI	PCR500M	A7049006	Verified with calibrated multimeter	Verified with calibrated multimeter
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/09	2017/09
RF cable & 20 dB attenuator	Télédyne	920-0202-048	A5329676	2016/09	2017/09

Note: In our quality system, the test equipment calibration due is more & less 2 months



L C I E

4.5. RESULTS





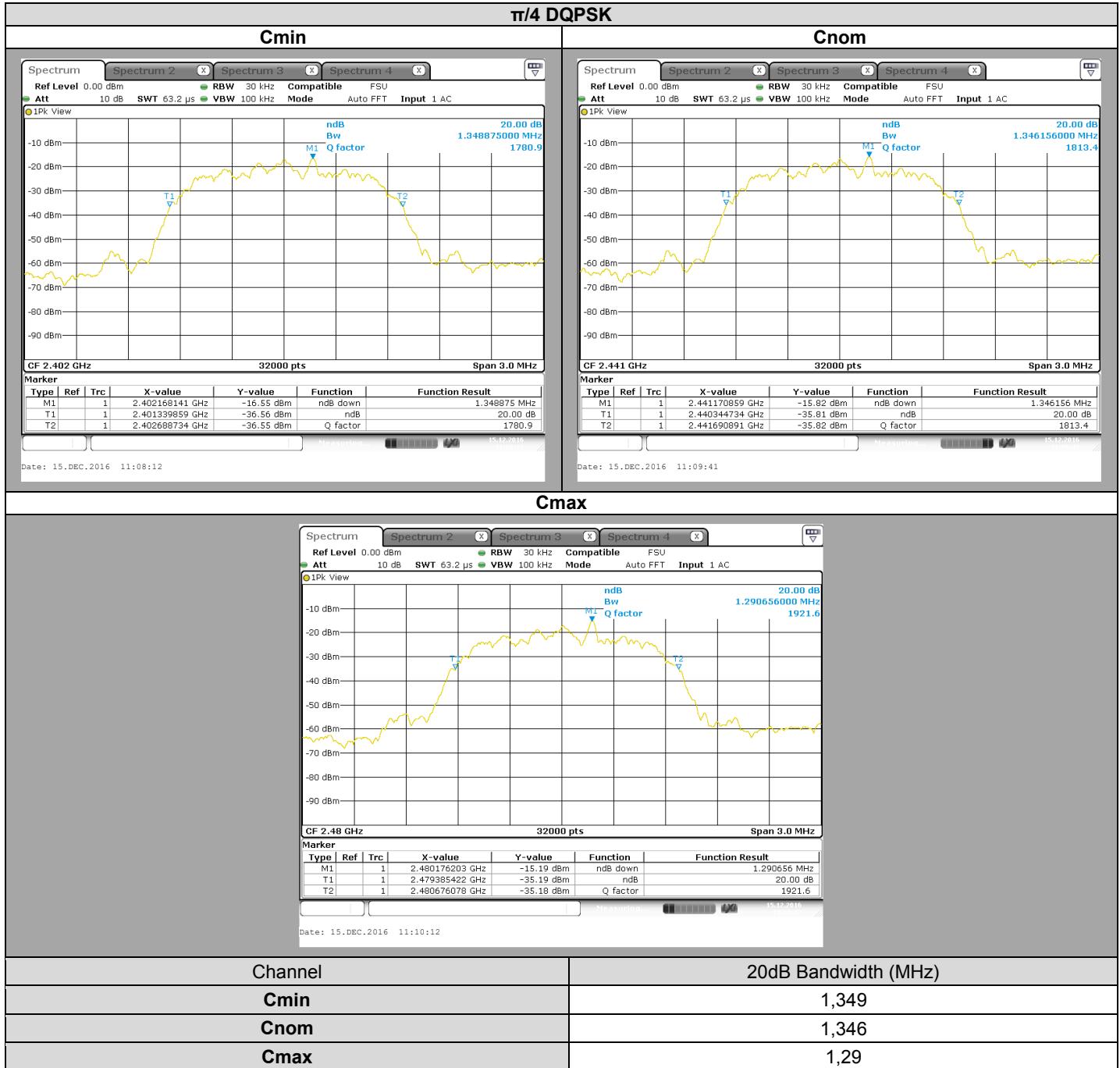
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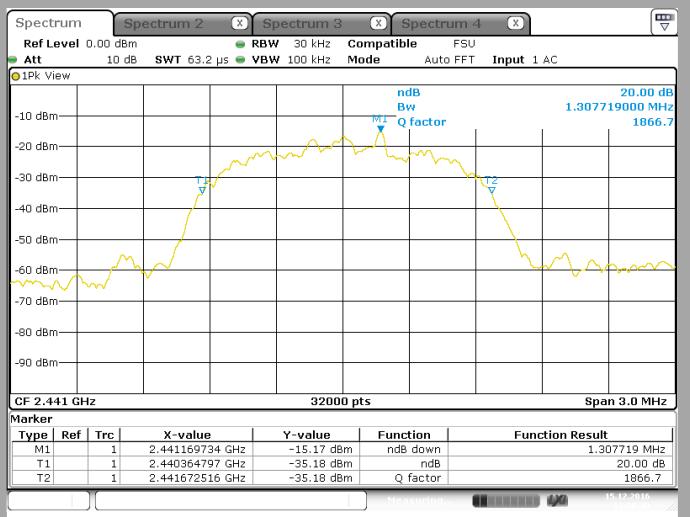
L C I E

8DPSK

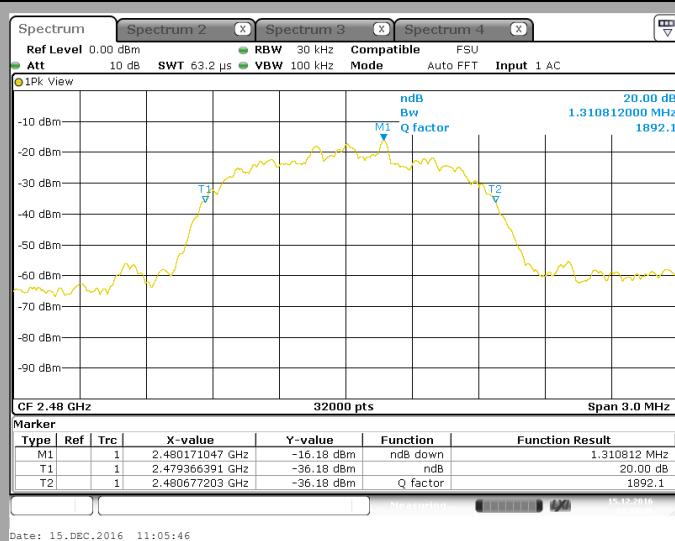
Cmin



Cnom



Cmax



Channel	20dB Bandwidth (MHz)
Cmin	1,306
Cnom	1,308
Cmax	1,31

4.6. CONCLUSION

20dB Emission Bandwidth measurement performed on the sample of the product **SAGEMCOM DCIWA384 UHD Alt US**, SN: **616476080862**, in configuration and description presented in this test report, show levels compliant to the 47 CFR PART 15.247 limits.



L C I E

5. NUMBER OF HOPPING FREQUENCY

5.1. TEST CONDITIONS

Test performed by : Mathieu CERISIER
Date of test : December 15, 2016
Ambient temperature : 24 °C
Relative humidity : 41 %

5.2. TEST SETUP

- The Equipment Under Test is installed:

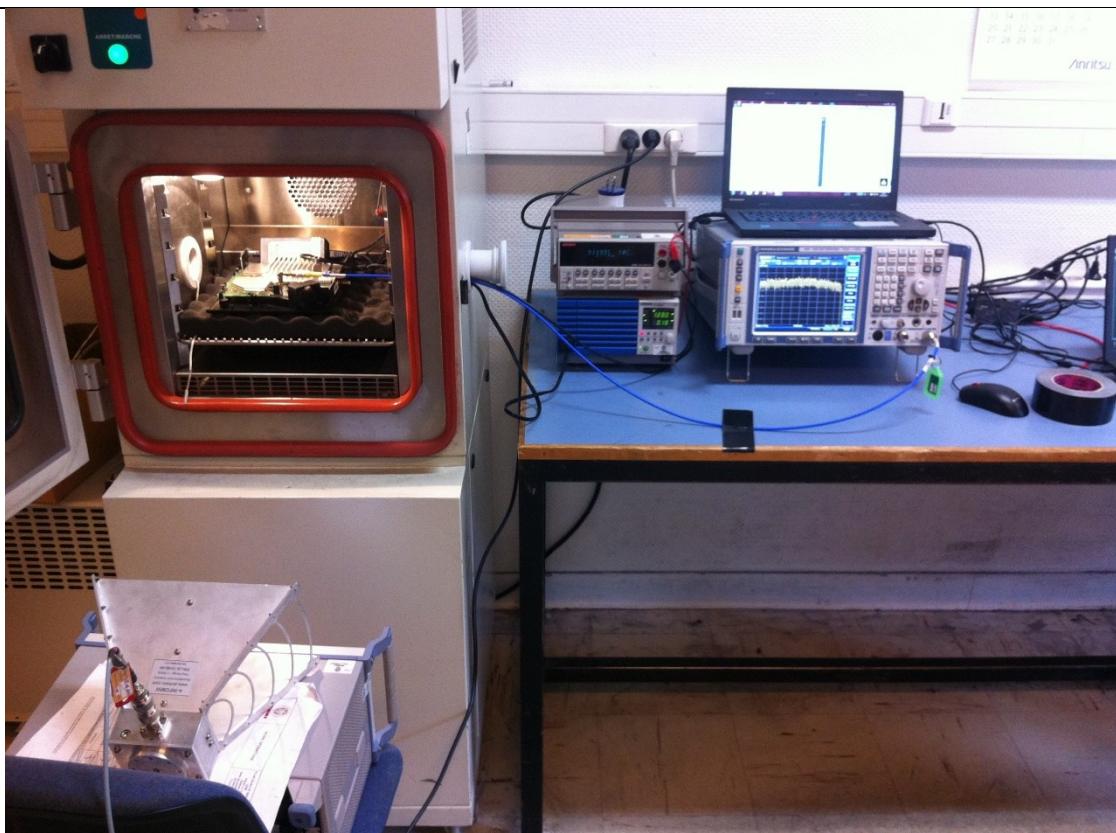
- On a table
- In an anechoic chamber
- In climatic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- FCC DA 00-705 (Number of Hopping Frequencies)
- ANSI C63.10 § 7.8.3



Photograph for Number of Frequency Hopping



5.3. LIMIT

Number of Hopping Frequencies shall be at least 15 channels

5.4. TEST EQUIPMENT LIST

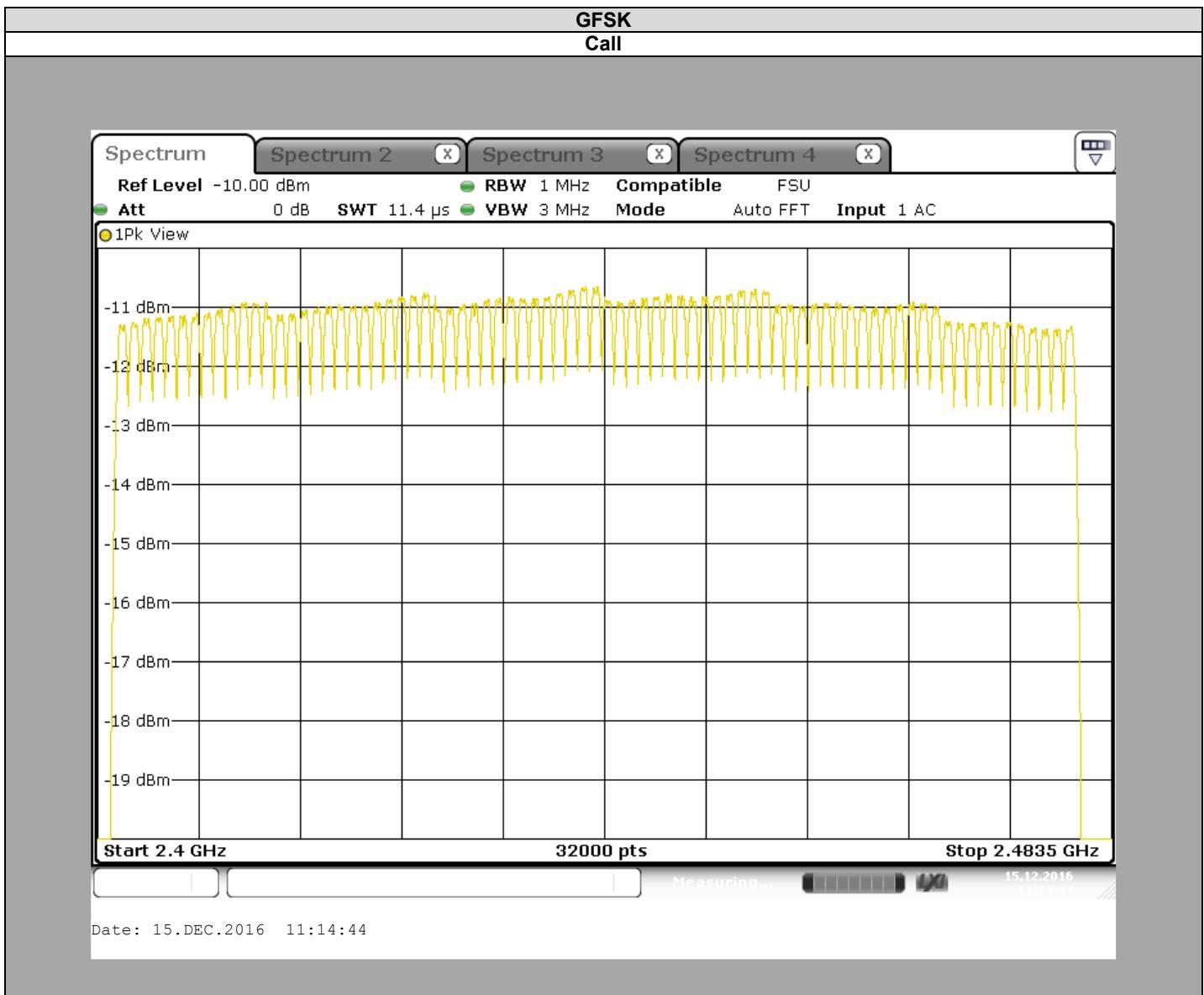
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Calibration date	Calibration due
Multi-meter	KEITHLEY	2000	A1241084	2016/05	2018/05
Programmable AC/DC power supply	-; KIKUSUI	PCR500M	A7049006	Verified with calibrated multimeter	Verified with calibrated multimeter
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/09	2017/09
RF cable & 20 dB attenuator	Télédyne	920-0202-048	A5329676	2016/09	2017/09

Note: In our quality system, the test equipment calibration due is more & less 2 months



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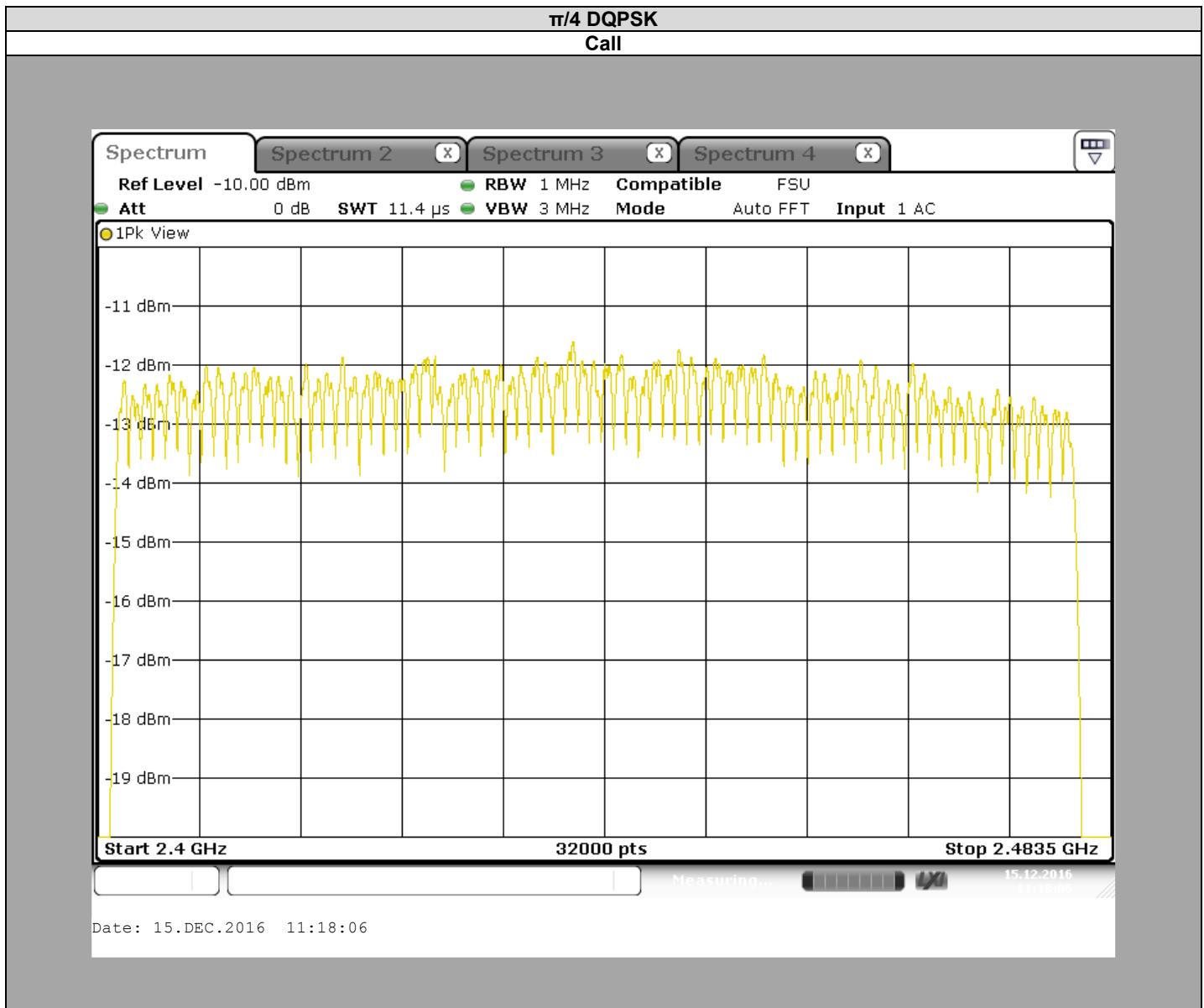
5.5. RESULTS



Channel	Number of Hopping Frequencies	Limit
Call	79	Minimum 15



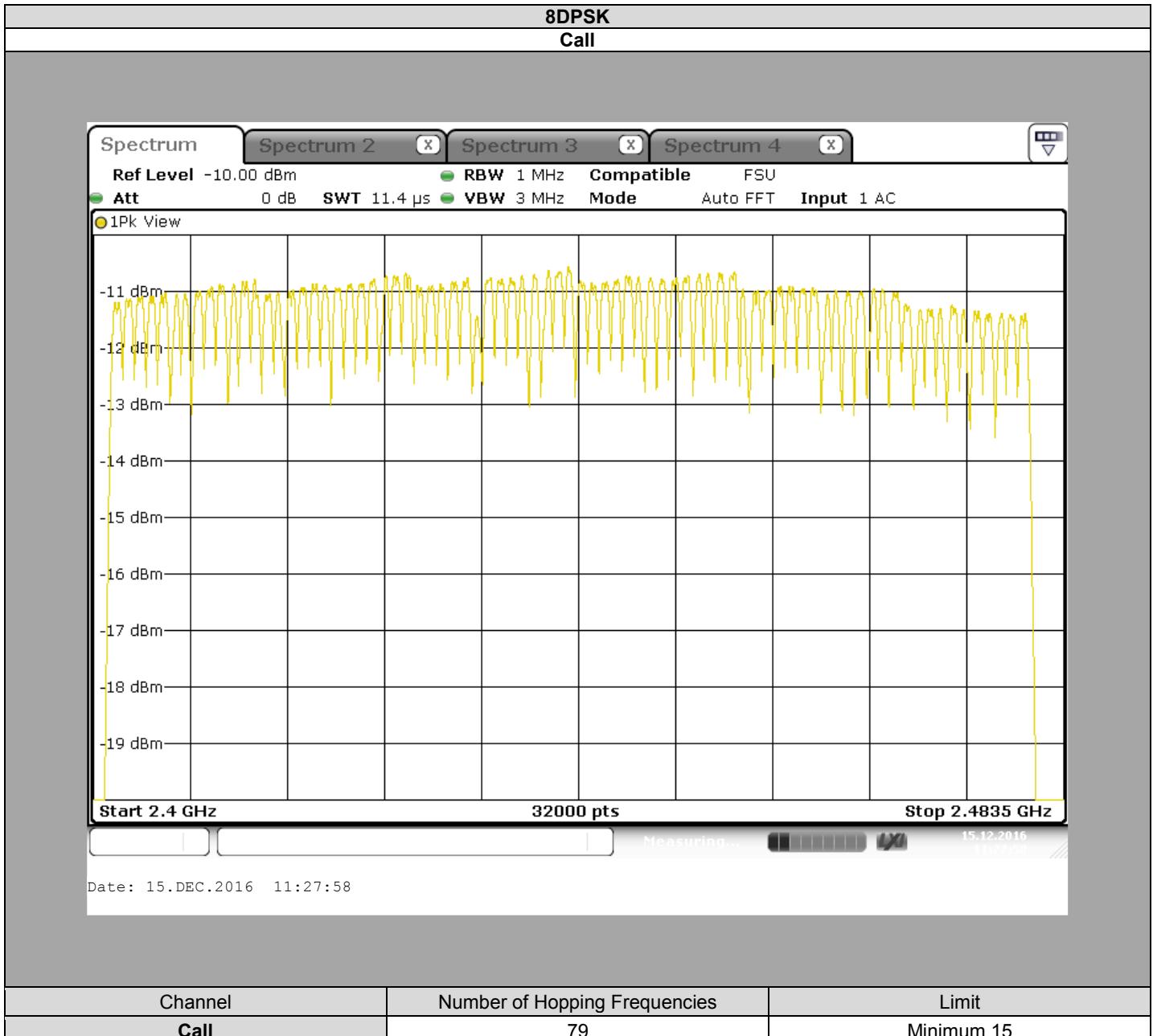
L C I E



Channel	Number of Hopping Frequencies	Limit
Call	79	Minimum 15



L C I E



5.6. CONCLUSION

Number of Frequency Hopping measurement performed on the sample of the product **SAGEMCOM DCIWA384 UHD Alt US, SN: 616476080862**, in configuration and description presented in this test report, show levels compliant to the **47 CFR PART 15.247** limits.

6. CARRIER FREQUENCY SEPARATION

6.1. TEST CONDITIONS

Test performed by : Mathieu CERISIER
Date of test : December 15, 2016
Ambient temperature : 24 °C
Relative humidity : 41 %

6.2. TEST SETUP

- The Equipment Under Test is installed:

- On a table
- In an anechoic chamber
- In climatic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- FCC DA 00-705 (Carrier Frequency Separation)
- ANSI C63.10 § 7.8.2



Photograph for Carrier Frequency Separation



6.3. LIMIT

Carrier Frequency Separation shall be at least two-thirds of the 20dB Bandwidth

6.4. TEST EQUIPMENT LIST

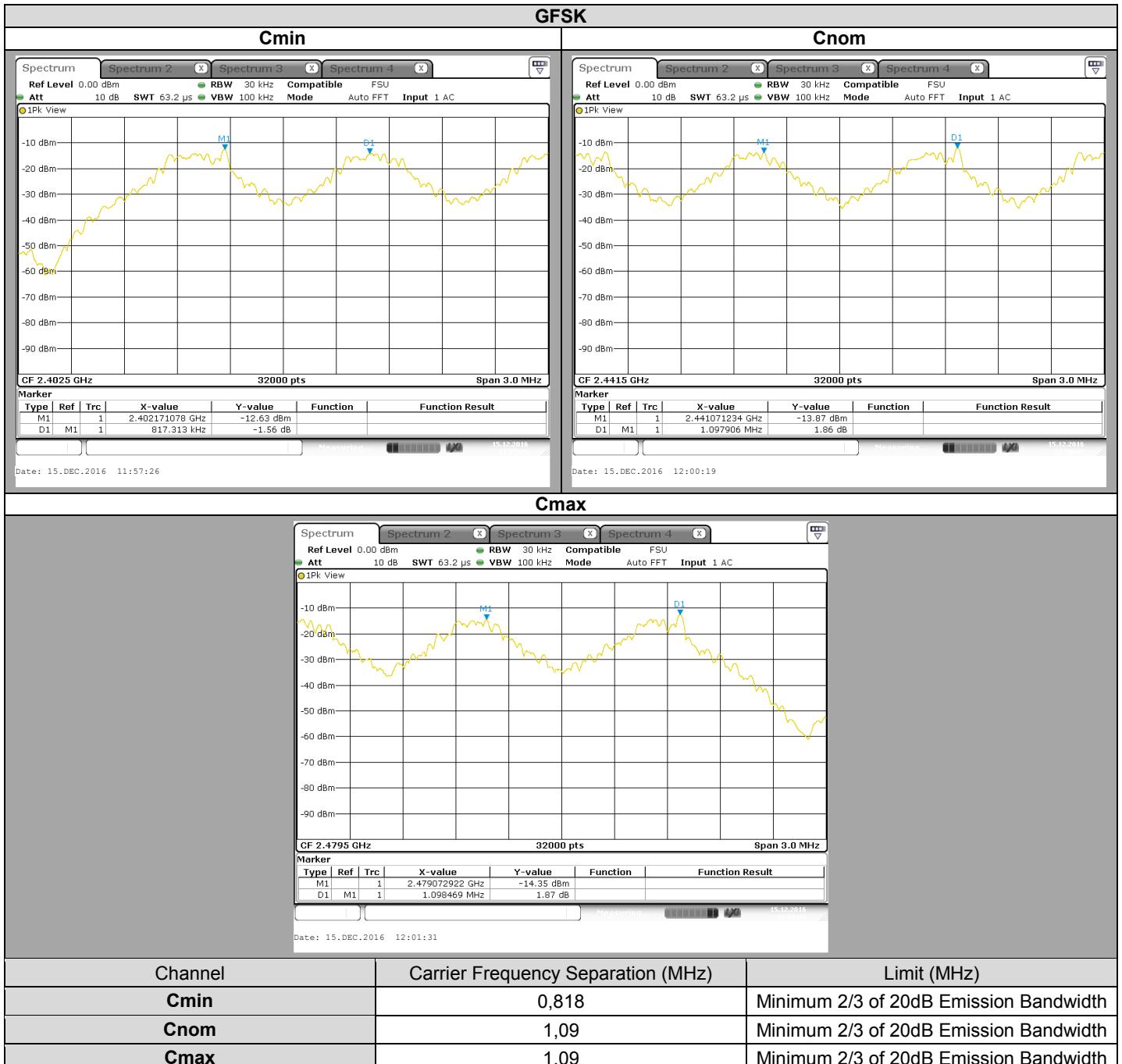
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Calibration date	Calibration due
Multi-meter	KEITHLEY	2000	A1241084	2016/05	2018/05
Programmable AC/DC power supply	-; KIKUSUI	PCR500M	A7049006	Verified with calibrated multimeter	Verified with calibrated multimeter
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/09	2017/09
RF cable & 20 dB attenuator	Télédyne	920-0202-048	A5329676	2016/09	2017/09

Note: In our quality system, the test equipment calibration due is more & less 2 months



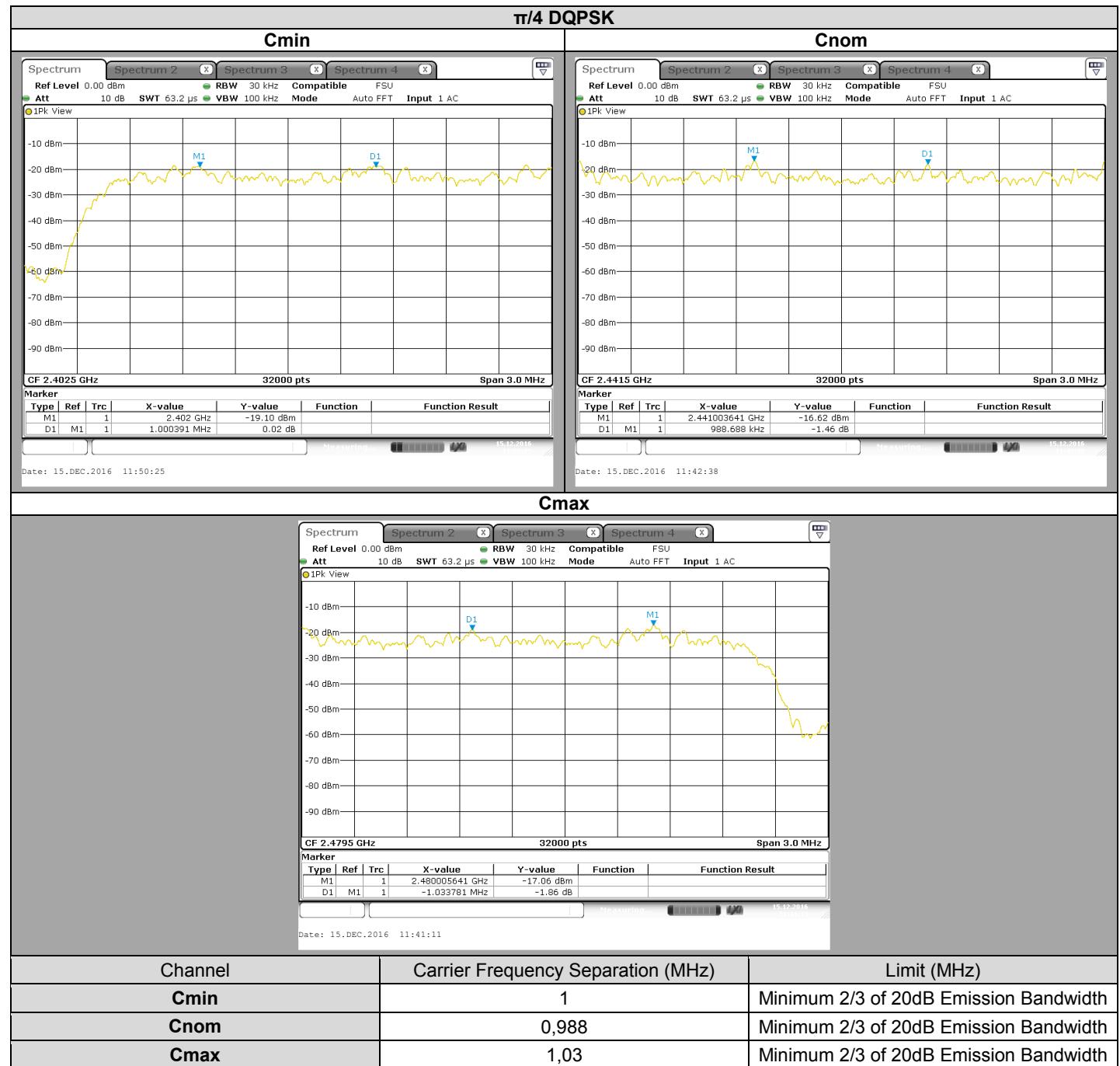
L C I E

6.5. RESULTS



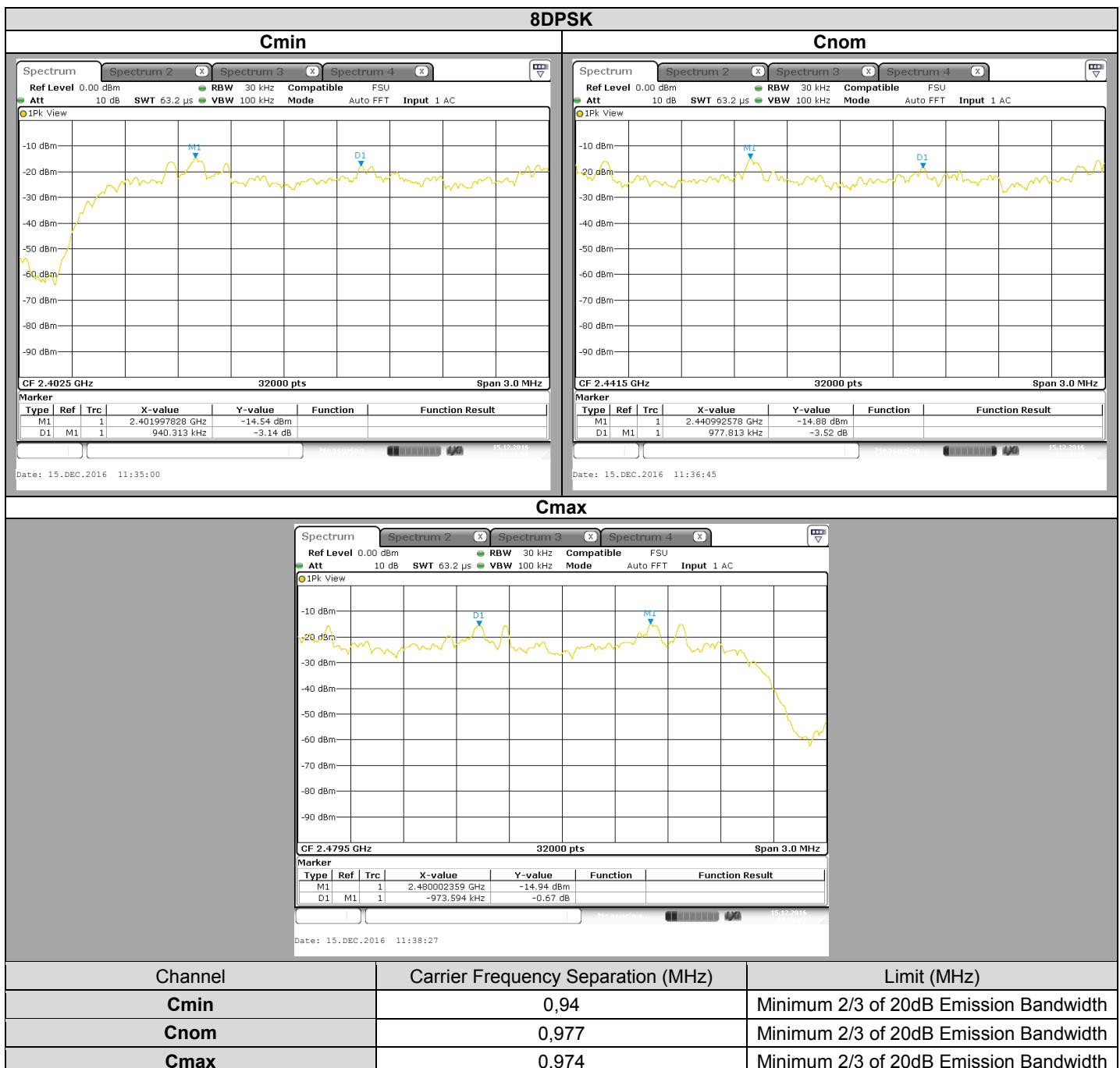


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6.6. CONCLUSION

Carrier Frequency Separation measurement performed on the sample of the product **SAGEMCOM DCIWA384 UHD Alt US, SN: 616476080862**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247** limits.



7. TIME OF OCCUPANCY

7.1. TEST CONDITIONS

Test performed by : Mathieu CERISIER
Date of test : December 15, 2016
Ambient temperature : 24 °C
Relative humidity : 41 %

7.2. TEST SETUP

- The Equipment Under Test is installed:

- On a table
- In an anechoic chamber
- In climatic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- FCC DA 00-705 (Time of Occupancy)
- ANSI C63.10 § 7.8.4



Photograph for Time of Occupancy



7.3. LIMIT

The Time of Occupancy shall not exceed 0.4s within any period of 0.4s multiplied by the number of hopping channels employed

7.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Calibration date	Calibration due
Multi-meter	KEITHLEY	2000	A1241084	2016/05	2018/05
Programmable AC/DC power supply	-; KIKUSUI	PCR500M	A7049006	Verified with calibrated multimeter	Verified with calibrated multimeter
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/09	2017/09
RF cable & 20 dB attenuator	Télédyne	920-0202-048	A5329676	2016/09	2017/09

Note: In our quality system, the test equipment calibration due is more & less 2 months



L C I E

7.5. RESULTS





L C I E

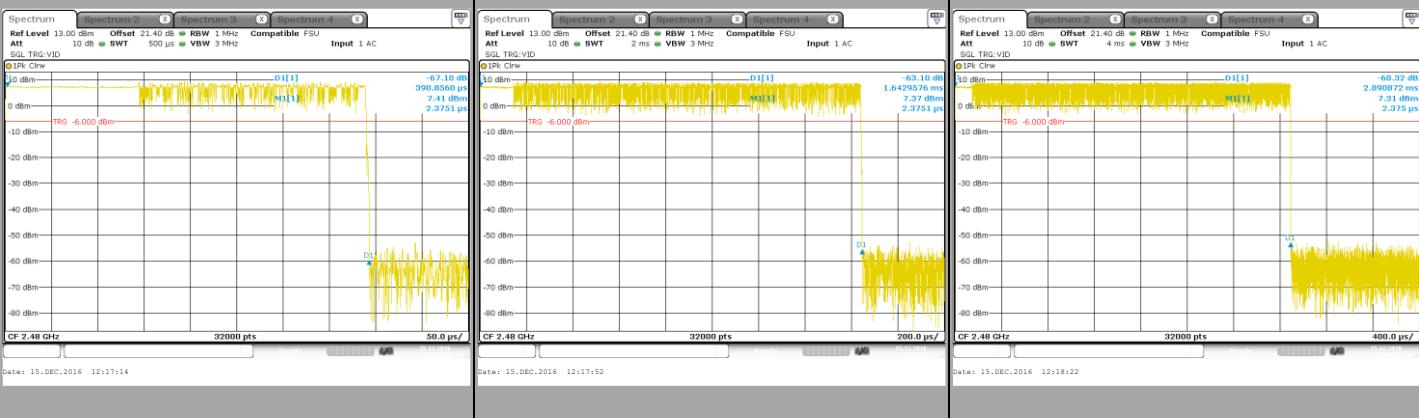
Burst Length

$\pi/4$ DQPSK

2DH1

2DH3

2DH5

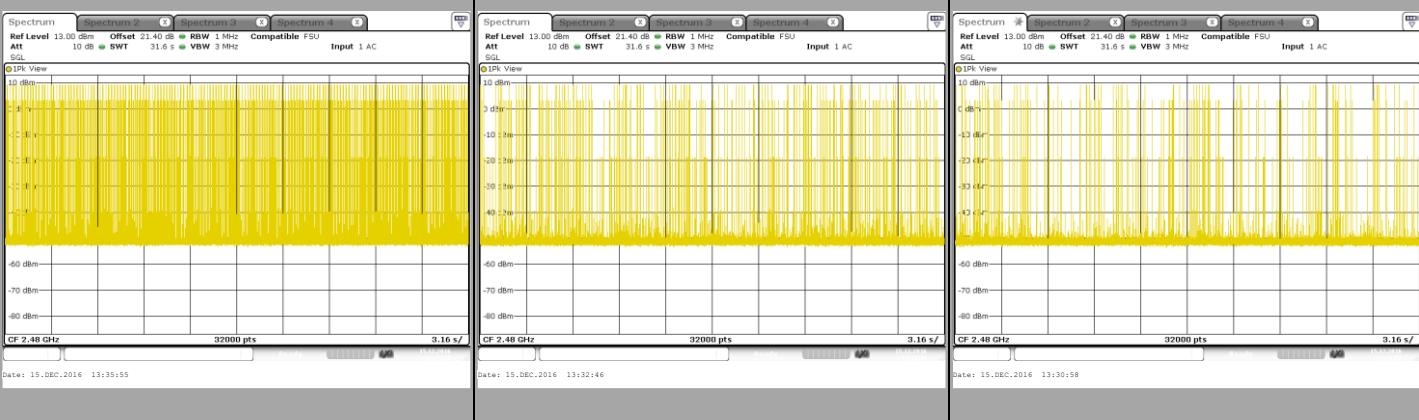


Time of Occupancy

2DH1

2DH3

2DH5



Packet Type	Burst Length (ms)	Number of Hopping during Time of Occupancy	Time of Occupancy (ms)	Limit of Time of Occupancy (ms)
2DH1	0,391	282	110,3	400
2DH3	1,64	113	185,3	400
2DH5	2,89	73	211	400



L C I E



7.6. CONCLUSION

Time of Occupancy measurement performed on the sample of the product **SAGEMCOM DCIWA384 UHD Alt US**, SN: **616476080862**, in configuration and description presented in this test report, show levels compliant to the **47 CFR PART 15.247** limits.



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8. DUTY CYCLE

8.1. TEST CONDITIONS

Test performed by : Mathieu CERISIER
Date of test : December 15, 2016
Ambient temperature : 24 °C
Relative humidity : 41 %

8.2. TEST SETUP

- The Equipment Under Test is installed:

- On a table
- In an anechoic chamber
- In climatic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- ANSI C63.10 § 11.6



Photograph for Duty Cycle



L C I E

8.3. LIMIT

None

8.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Calibration date	Calibration due
Multi-meter	KEITHLEY	2000	A1241084	2016/05	2018/05
Programmable AC/DC power supply	-; KIKUSUI	PCR500M	A7049006	Verified with calibrated multimeter	Verified with calibrated multimeter
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/09	2017/09
RF cable & 20 dB attenuator	Télédyne	920-0202-048	A5329676	2016/09	2017/09

Note: In our quality system, the test equipment calibration due is more & less 2 months

8.5. RESULTS

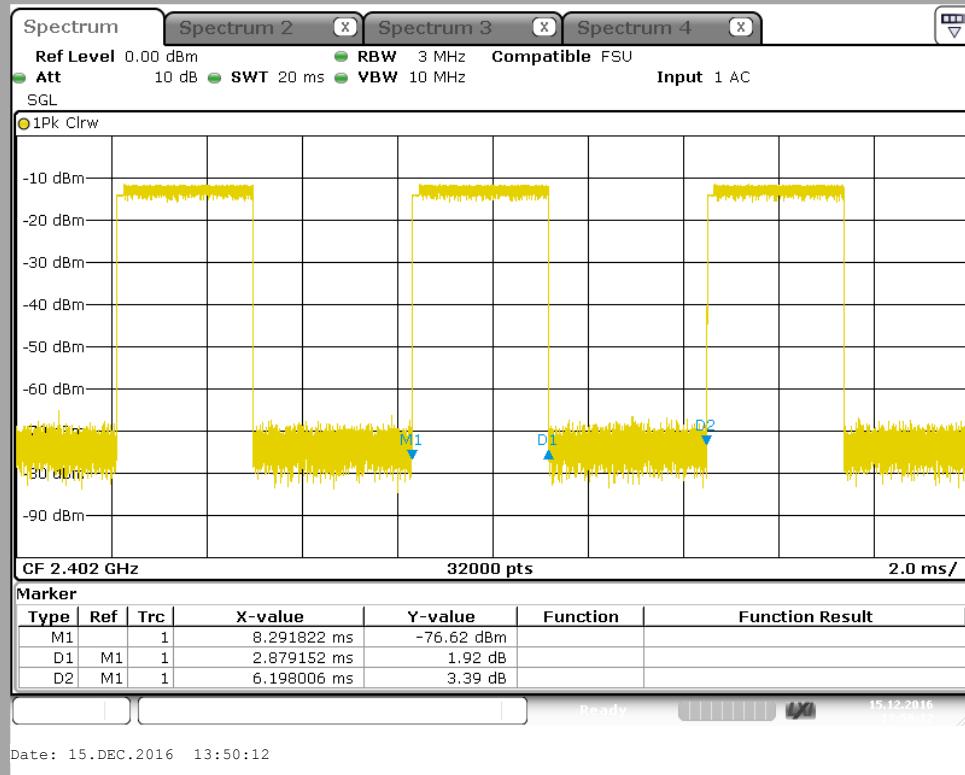




L C I E

$\pi/4$ DQPSK

Cmin



Channel	Duty Cycle (%)	Duty Cycle Correction (dB)
Channel	46,5	3.33



L C I E



8.6. CONCLUSION

Duty Cycle measurement performed on the sample of the product **SAGEMCOM DCIWA384 UHD Alt US**, SN: **616476080862** in configuration and description presented in this test report, show levels compliant to the **47 CFR PART 15.247** limits.



L C I E

9. MAXIMUM CONDUCTED OUTPUT POWER

9.1. TEST CONDITIONS

Test performed by : Mathieu CERISIER
Date of test : December 15, 2016
Ambient temperature : 24 °C
Relative humidity : 41 %

9.2. TEST SETUP

- The Equipment Under Test is installed:

- On a table
- In an anechoic chamber
- In climatic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- FCC DA 00-705 (Peak Output Power)
- ANSI C63.10 § 7.8.5



Photograph for Maximum Conducted Output Power



9.3. LIMIT

Maximum Conducted Output power:

Shall not exceed 21dBm

Limits are reduced by G-6dBi if Antenna Gain above 6dBi

9.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Calibration date	Calibration due
Multi-meter	KEITHLEY	2000	A1241084	2016/05	2018/05
Programmable AC/DC power supply	-; KIKUSUI	PCR500M	A7049006	Verified with calibrated multimeter	Verified with calibrated multimeter
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/09	2017/09
RF cable & 20 dB attenuator	Télédyne	920-0202-048	A5329676	2016/09	2017/09

Note: In our quality system, the test equipment calibration due is more & less 2 months



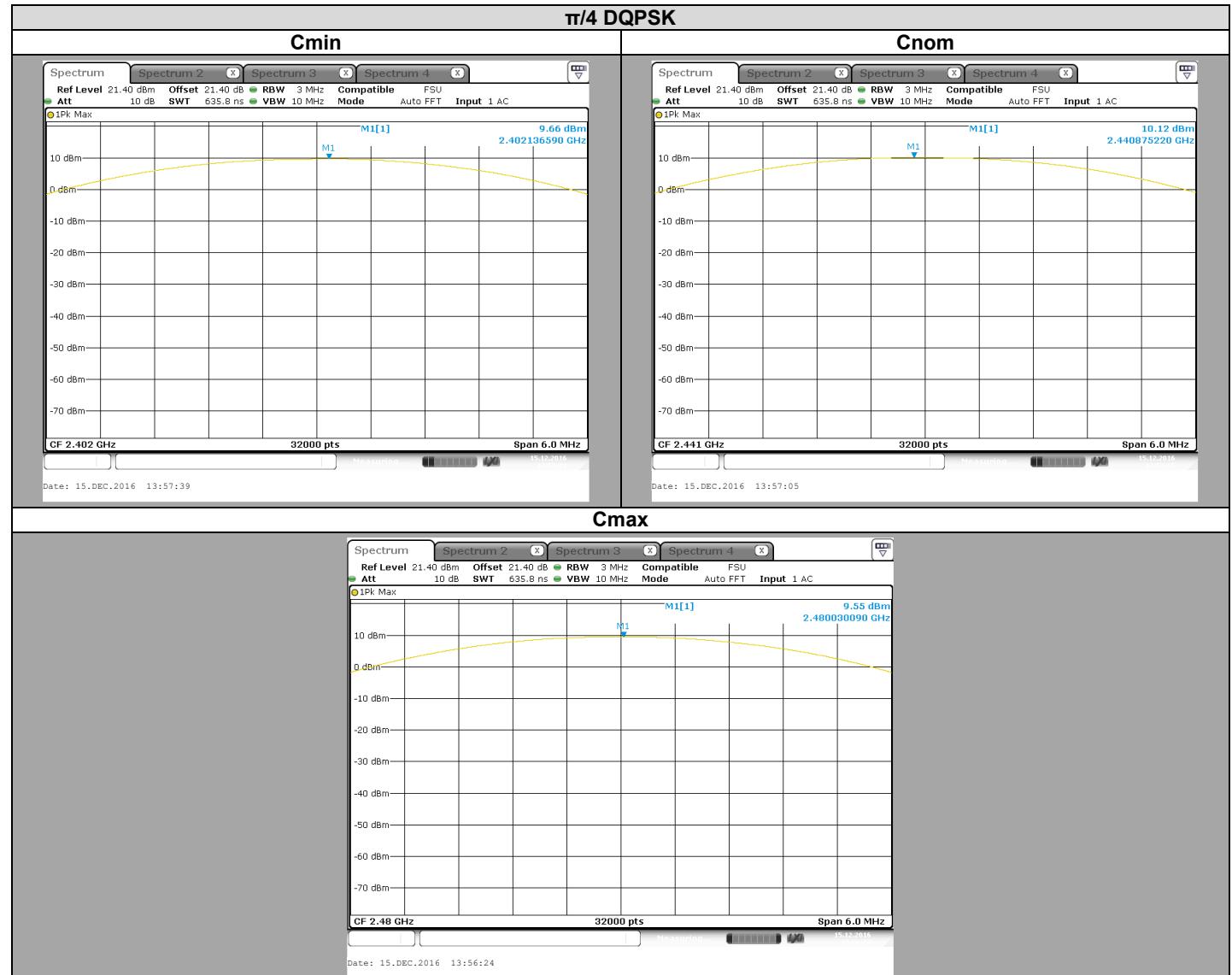
L C I E

9.5. RESULTS





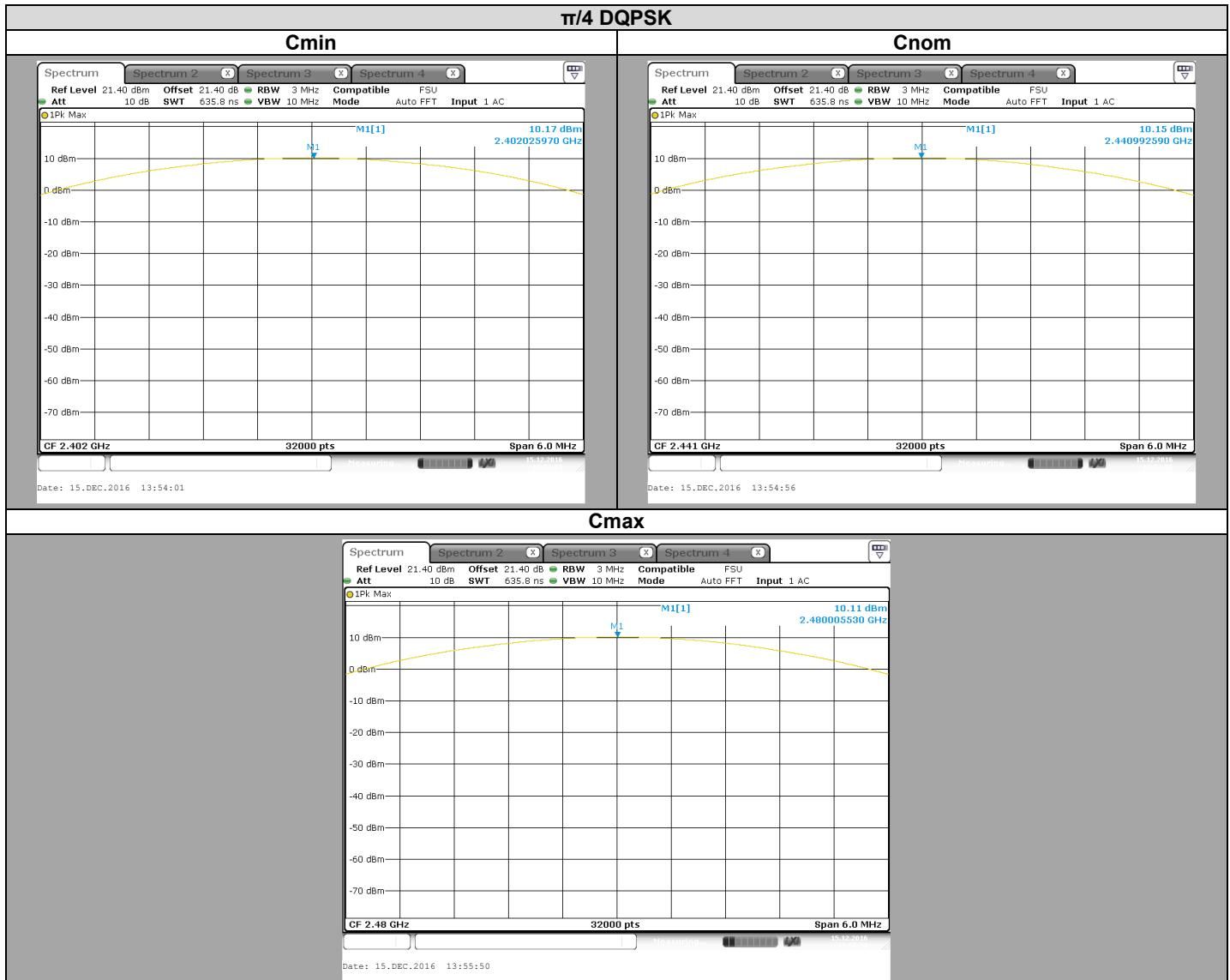
L C I E



Channel	Offset Cable + Att (dB)	Antenna Gain (dBi)	Maximum Conducted Power (dBm)	Limit (dBm)
Cmin	21,4	3,1	9,66	21dBm
Cnom	21,4	3,1	10,12	21dBm
Cmax	21,4	3,1	9,55	21dBm



L C I E



Channel	Offset Cable + Att (dB)	Antenna Gain (dBi)	Maximum Conducted Power (dBm)	Limit (dBm)
Cmin	21,4	3,1	10,17	21dBm
Cnom	21,4	3,1	10,15	21dBm
Cmax	21,4	3,1	10,11	21dBm

9.6. CONCLUSION

Maximum Conducted Output Power measurement performed on the sample of the product **SAGEMCOM DCIWA384 UHD Alt US**, SN: **616476080862**, in configuration and description presented in this test report, show levels compliant to the **47 CFR PART 15.247** limits.