



LCIE

TEST REPORT

N°: 157205-726501-B

Version : 02

Subject

Radio spectrum matters
tests according to standards:
47 CFR Part 15.247 [P](#)

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

Sound Box
Sagemcom®
SAGEMCOM
Sound Box SBDV01
253770742
VW3SBDV01

Test date

: September 13, 2018 to October 2, 2018

Test location

Fontenay Aux Roses

Test Site

6230B-1

Composition of document

83 pages

Document issued on

November 19, 2018

Written by :
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Tests operator

Approved by :
Arnaud AYETTE
Technical manager



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PUBLICATION HISTORY

Version	Date	Author	Modification
01	October 8, 2018	Armand MAHOUNGOU	Creation of the document
02	November 19, 2018	Armand MAHOUNGOU	Customer request withdraw all picture of the EUT from test report Add conducted measurement at 240V / 50 Hz P61-62/83



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1. TEST PROGRAM

References

- 47 CFR Part 15.247
- ANSI C63.10-2013
- 558074 D01 DTS Measurement Guidance v04

Radio requirement:

Clause (47CFR Part 15.247) Test Description	Test result - Comments			
Occupied Bandwidth ℱ	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
20dB Bandwidth ℱ	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Number of Hopping Frequency ℱ	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Carrier Frequency Separation ℱ	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Time of Occupancy ℱ	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Duty Cycle ℱ	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Maximum Conducted Output Power ℱ	<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 ℱ	<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 ℱ	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA()	<input type="checkbox"/> NP(1)
AC Power Line Conducted Emission ℱ	<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 ℱ	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Receiver Radiated emissions ℱ	<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



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

2.1. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):

Sagemcom® Sound Box SBDV01

Serial Number: 253770742

Power supply : NBC80A200400M2

Inputs/outputs - Cable:

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

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Laptop computer	-	-	-

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
	<input type="checkbox"/> v4.0	<input type="checkbox"/> v4.1	<input checked="" type="checkbox"/> v4.2	
Frequency band:	[2400 – 2483.5] MHz			
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"/> 40°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	
	Vnom:	<input checked="" type="checkbox"/> 240V/50Hz	<input type="checkbox"/> X Vdc	

Antenna Characteristic

Antenna assembly	Gain (dBi)	Frequency Band (MHz)	Impedance(Ω)
1	4.72	2400 – 2483.5	50



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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 checked="" type="checkbox"/>
	GFSK	1	1-DM3	<input type="checkbox"/>
	GFSK	1	1-DH3	<input checked="" 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 checked="" type="checkbox"/>
	$\pi/4$ DQPSK	2	2-DH3	<input checked="" type="checkbox"/>
	$\pi/4$ DQPSK	2	2-DH5	<input checked="" type="checkbox"/>
	8DPSK	3	3-DH1	<input checked="" type="checkbox"/>
	8DPSK	3	3-DH3	<input checked="" type="checkbox"/>
	8DPSK	3	3-DH5	<input checked="" type="checkbox"/>

2.2. RUNNING MODE

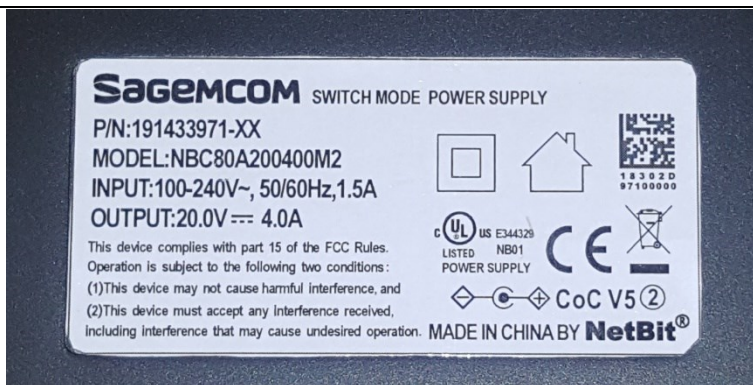
The EUT is set in the following modes during tests:


- 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 “Tera-Term” are used to set the product:

- See document: 998050_02_Bluetooth test commands of PONY 2,4GHz, for the commands used during test.

2.3. EQUIPMENT LABELLING



Factory S/N Code barre type 128	Code barre type 128	 LISTED I.T.E. E308616	SAGEMCOM Sound Box SBDV01 253770742-ind 20V --- 4A Date Code: WW/YY SSID : amplify-CCDDEE Made in CZECH Republic
	MSO Part Number: 12345		
	Code barre type 128		
	SGC S/N: 123456789012		
MAC Address : aa:bb:cc:dd:ee	FCC ID: VW3SBDV01	Manufactured under license from Dolby Laboratories. Dolby, Dolby Audio and the double-D symbol are trademarks of Dolby Laboratories.	
TYM S/N : XXXXXXXXXX			

2.4. EQUIPMENT MODIFICATION

- None Modification:

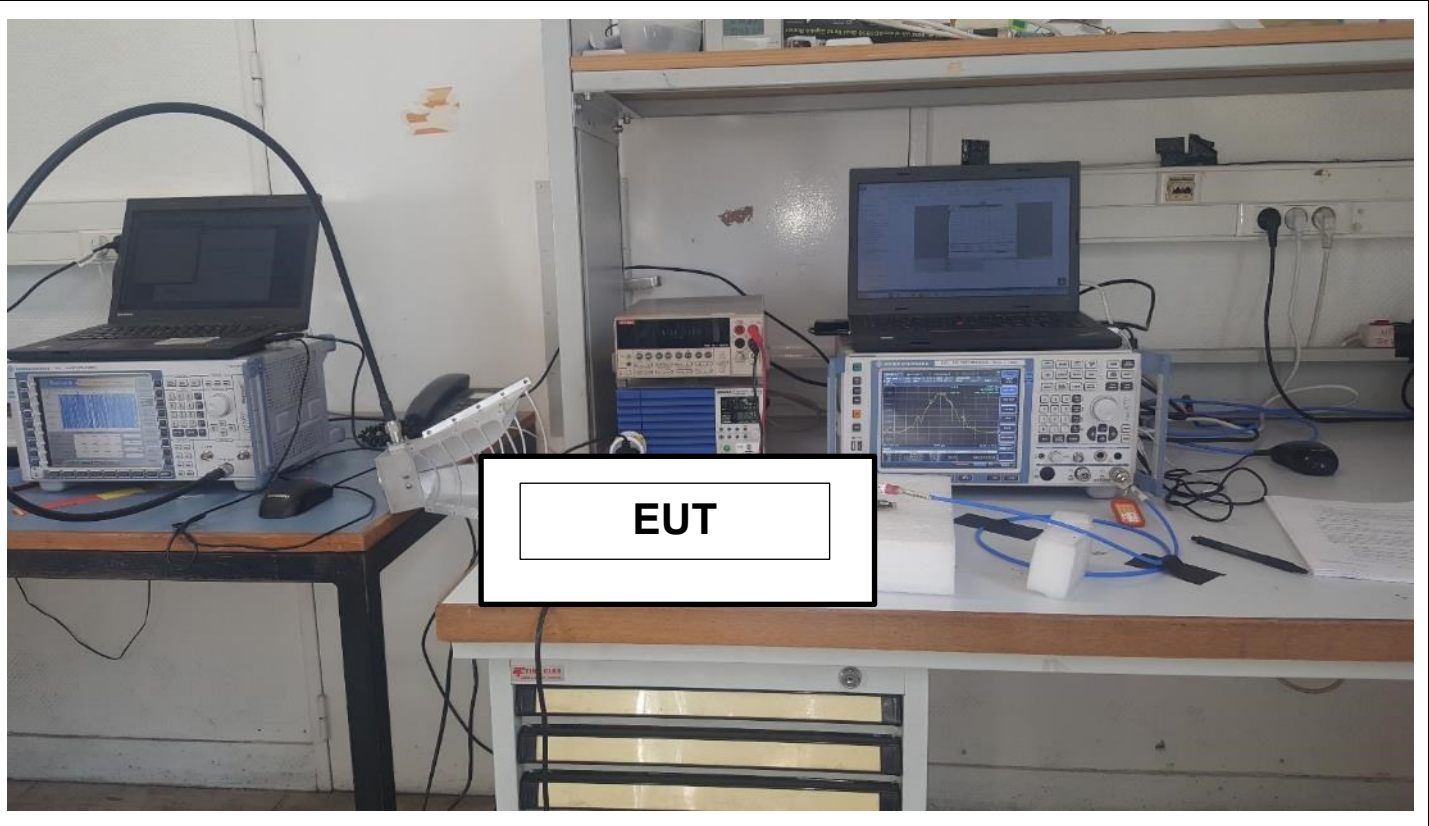
3. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : October 1, 2018
Ambient temperature : 26°C & 24°C
Relative humidity : 44% & 47%

3.2. TEST SETUP

- The Equipment Under Test is installed:
 - On a table
 - In an anechoic chamber
- Measurement is performed with a spectrum analyzer in:
 - Conducted Method
 - Radiated Method
- Test Procedure:
 - ANSI C63.10 § 6.9.3



Photograph for Occupied bandwidth



3.1. LIMIT

No Limit

3.2. TEST EQUIPMENT LIST

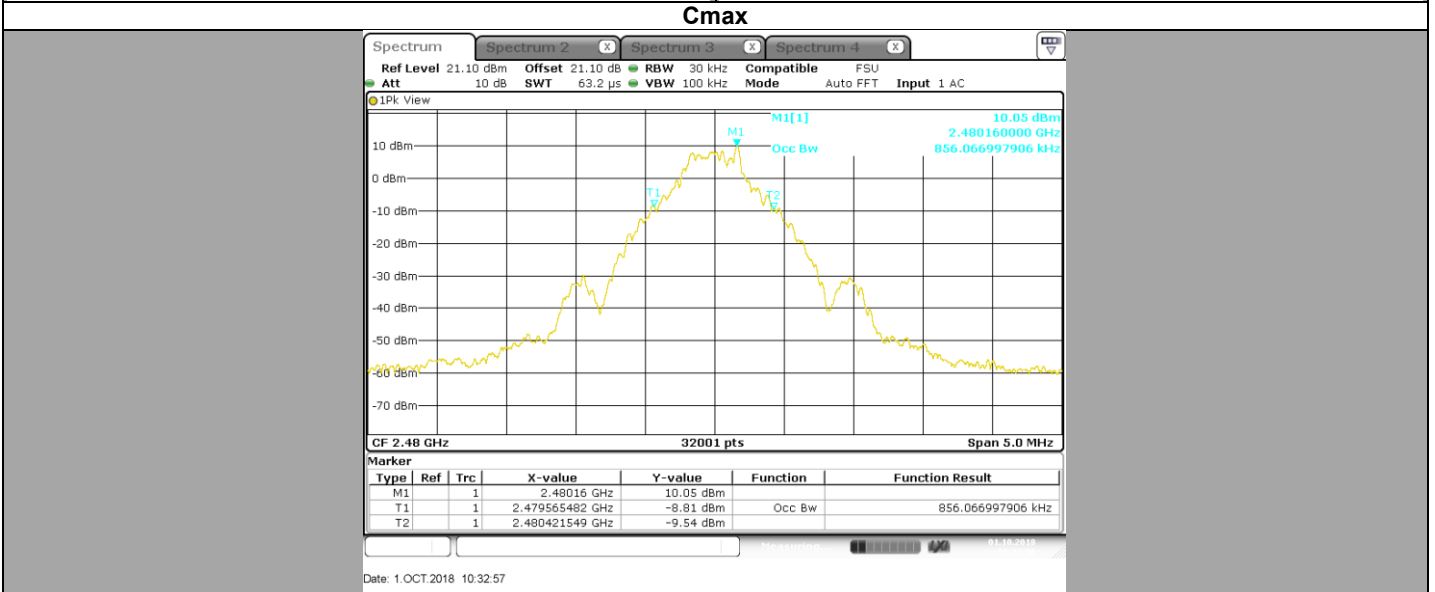
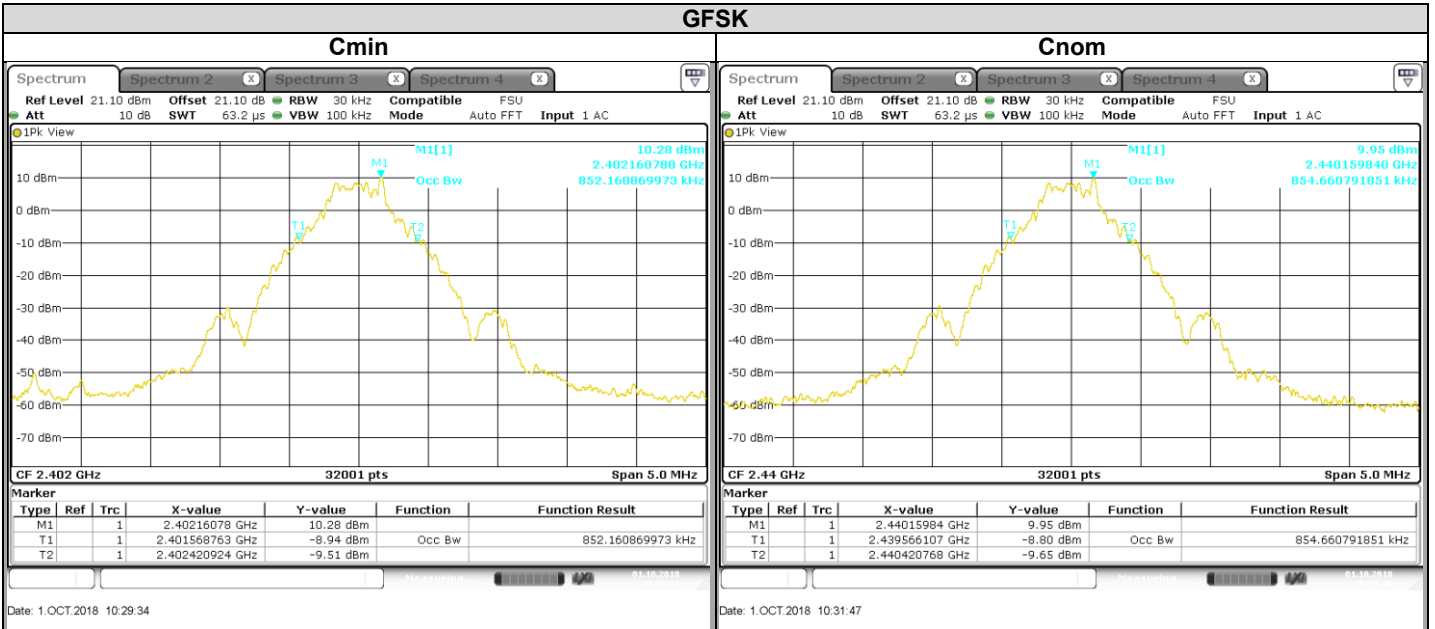
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/11	2018/11
Multimeter	KEITHLEY	2000	A1242090	2017/05	2019/05
Power supply	KIKUSUI	PCR500M	A7040079	Cal with Multimeter	Cal with Multimeter
Cable	TELEDYNE	920-0202-048	A5329674	2018/10	2019/10

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



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3.3. RESULTS

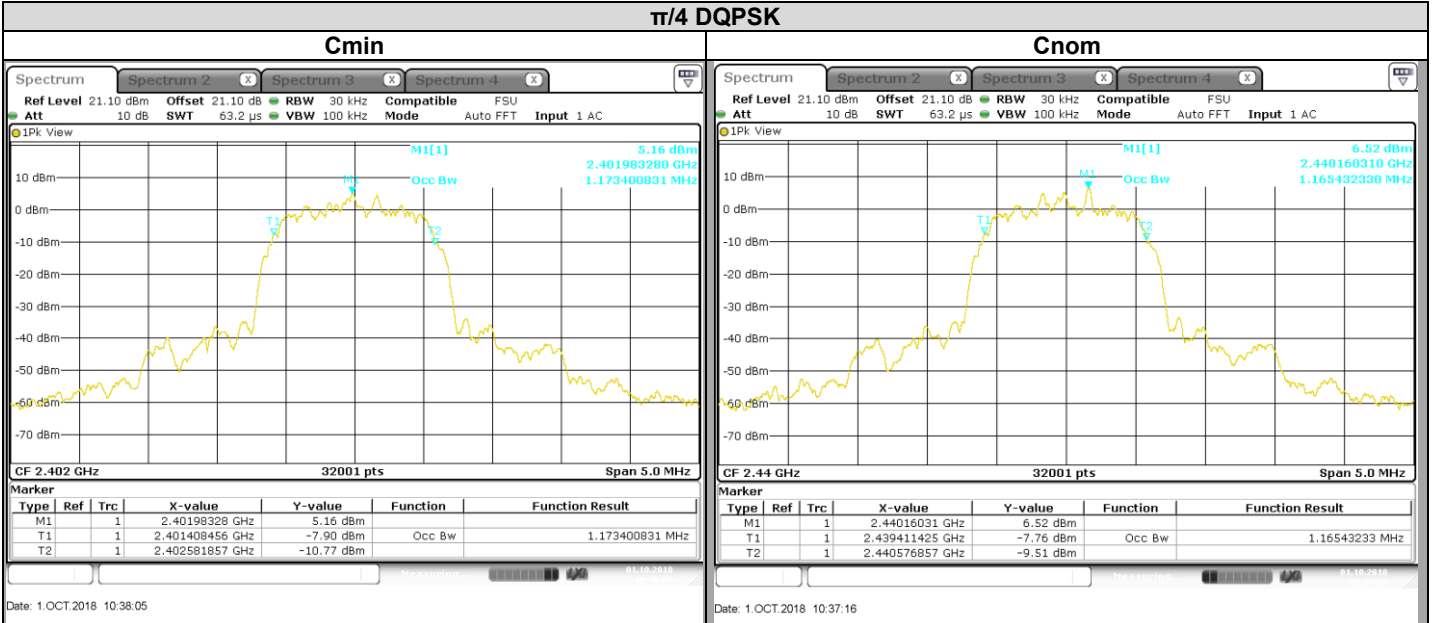


Channel	Occupied Bandwidth (MHz)
Cmin	0.852
Cnom	0.855
Cmax	0.856

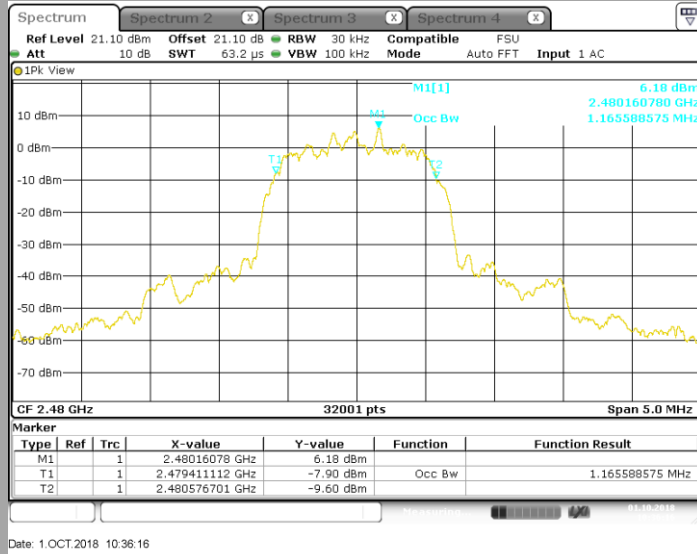


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$\pi/4$ DQPSK



Cmax



Channel	Occupied Bandwidth (MHz)
Cmin	1.17
Cnom	1.16
Cmax	1.16



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3.4. CONCLUSION

Occupied Bandwidth measurement performed on the sample of the product Sagemcom® Sound Box **SBDV01**, SN: **253770742**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247**.

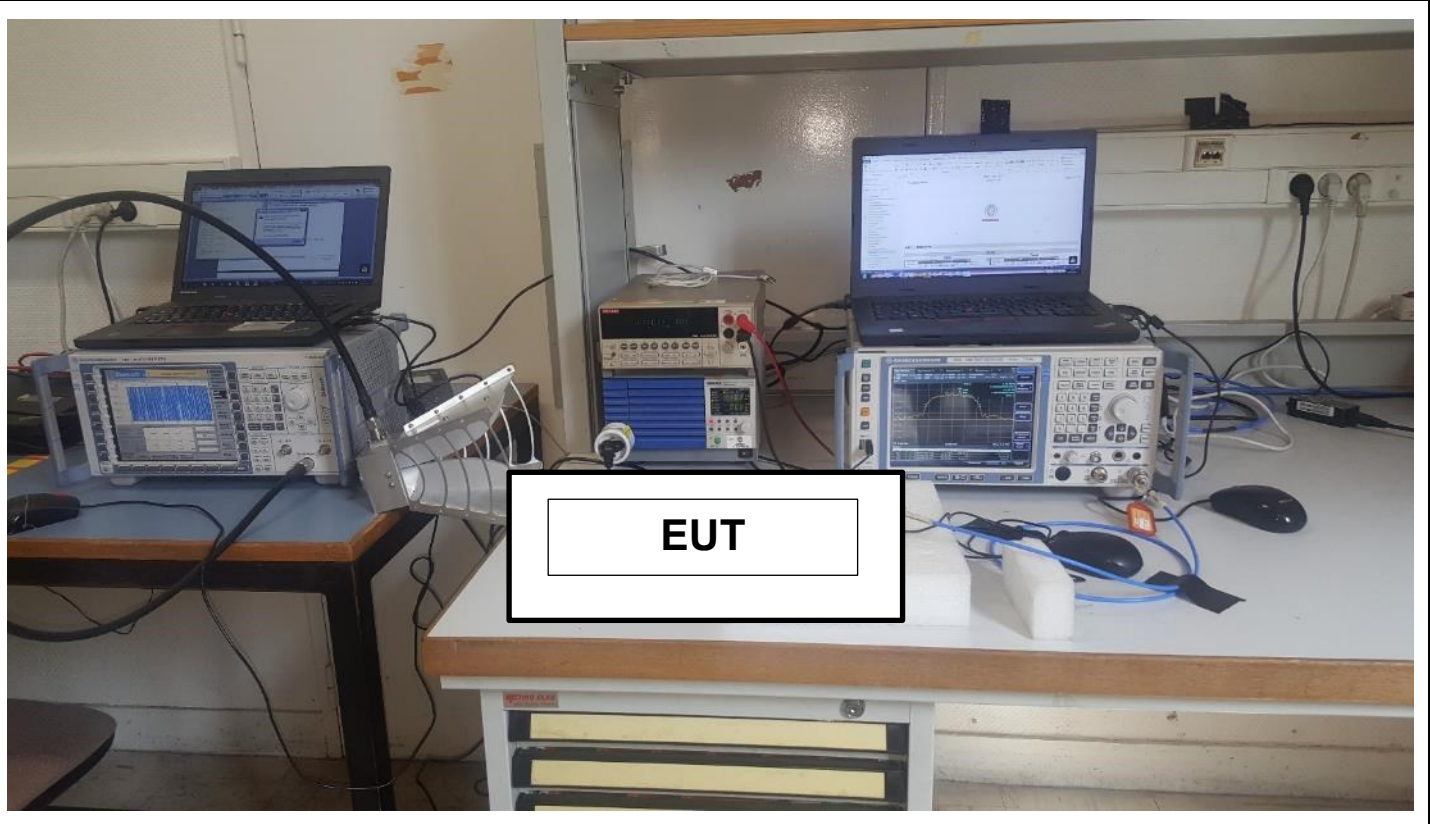
4. 20dB EMISSION BANDWIDTH

4.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : September 26, 2018 to September 27, 2018
Ambient temperature : 26°C & 24°C
Relative humidity : 44% & 47%

4.2. TEST SETUP

- The Equipment Under Test is installed:
 - On a table
 - In an anechoic chamber
- Measurement is performed with a spectrum analyzer in:
 - Conducted Method
 - Radiated Method
- Test Procedure:
 - ANSI C63.10 § 6.9.2



Photograph for 20dB emission bandwidth



4.3. LIMIT

No Limit

4.4. TEST EQUIPMENT LIST

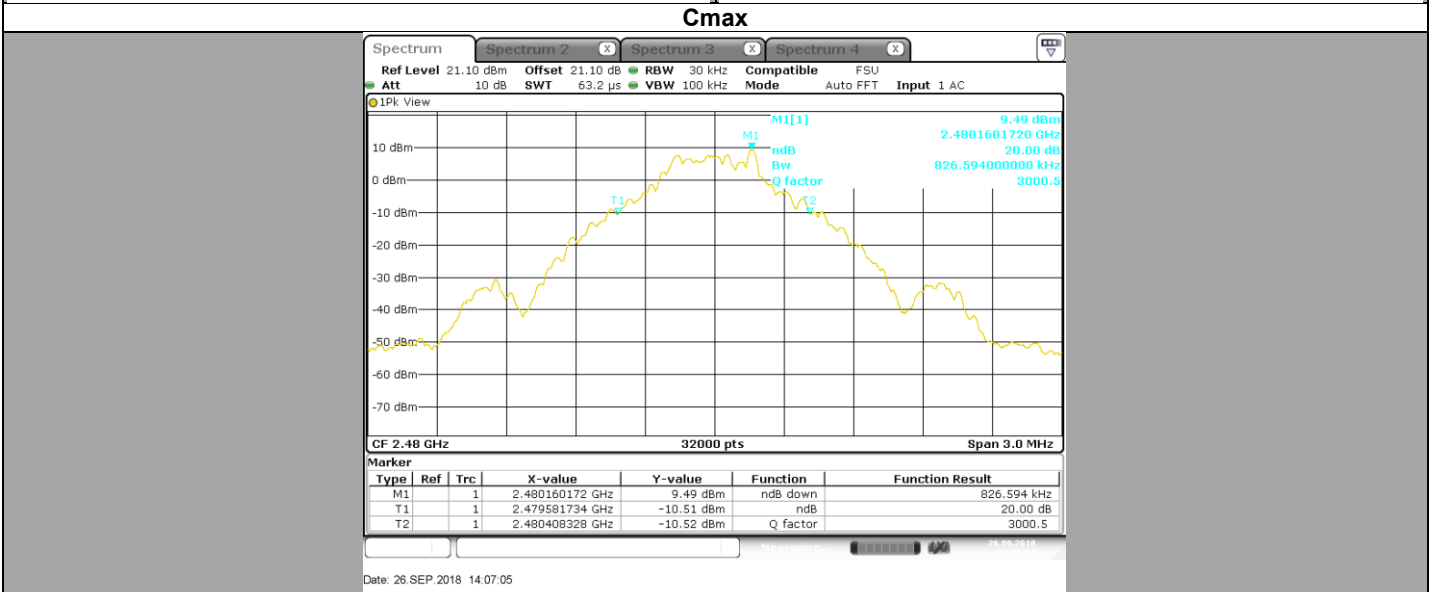
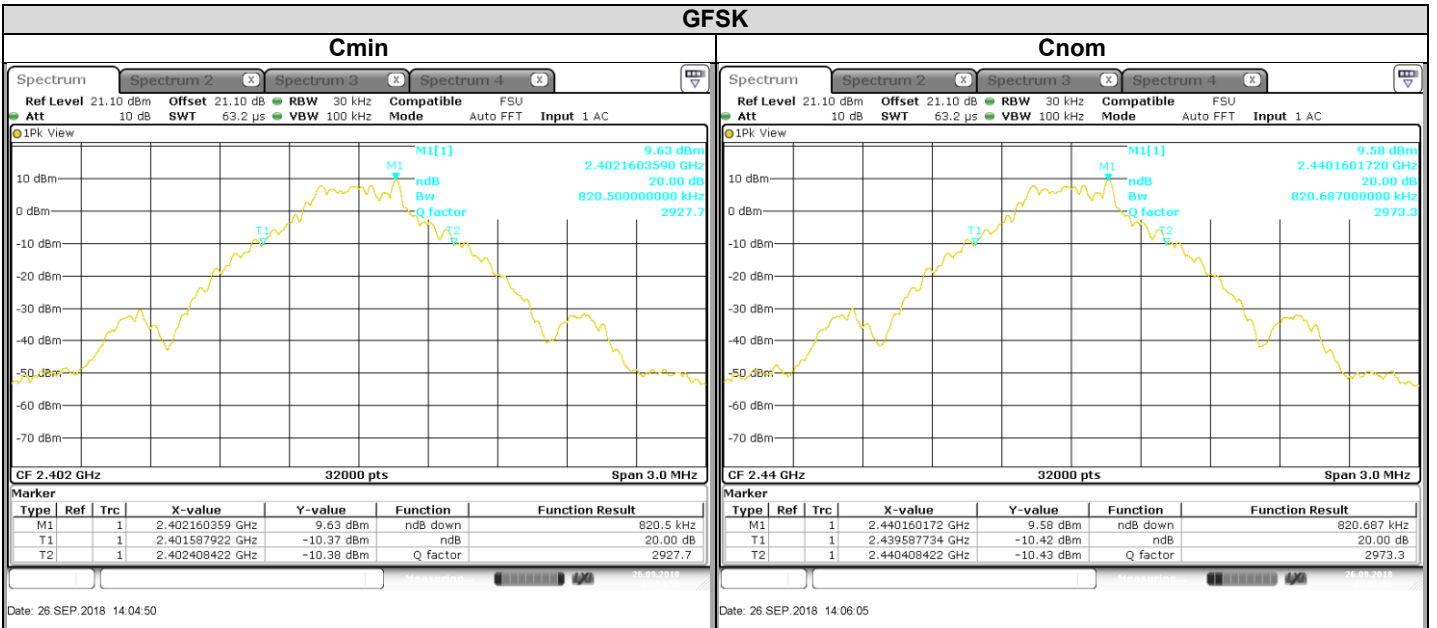
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/11	2018/11
Multimeter	KEITHLEY	2000	A1242090	2017/05	2019/05
Power supply	KIKUSUI	PCR500M	A7040079	Cal with Multimeter	Cal with Multimeter
Cable	TELEDYNE	920-0202-048	A5329674	2017/10	2018/10

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



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4.5. RESULTS

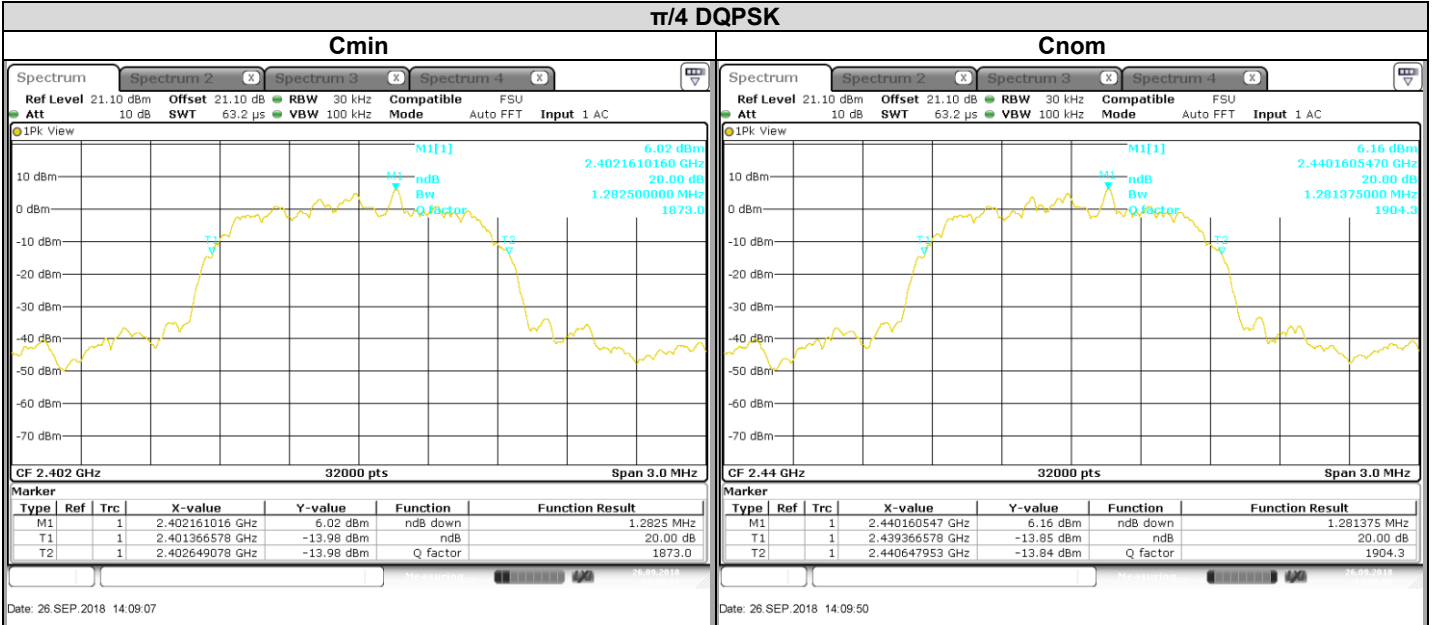


Channel	20dB Bandwidth (MHz)
Cmin	0.82
Cnom	0.82
Cmax	0.86

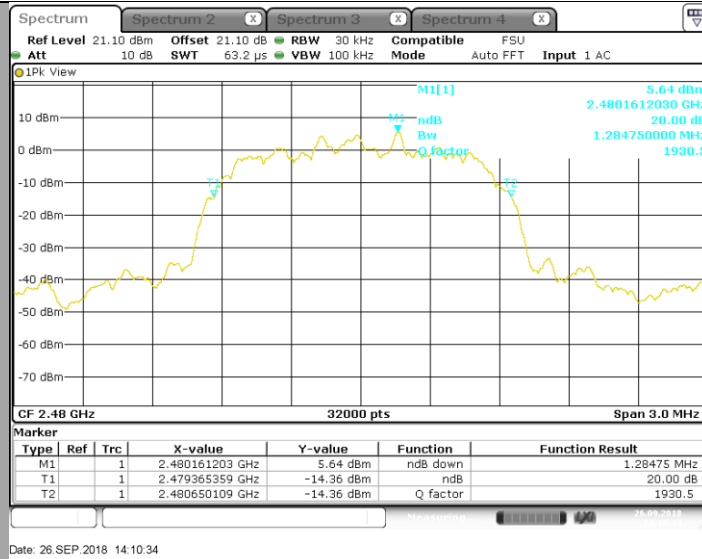


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$\pi/4$ DQPSK



Cmax



Channel	20dB Bandwidth (MHz)
Cmin	1.28
Cnom	1.28
Cmax	1.28



L C I E



4.6. CONCLUSION

20dB Emission Bandwidth measurement performed on the sample of the product **Sagemcom® Sound Box SBDV01**, SN: **253770742**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247** limits.

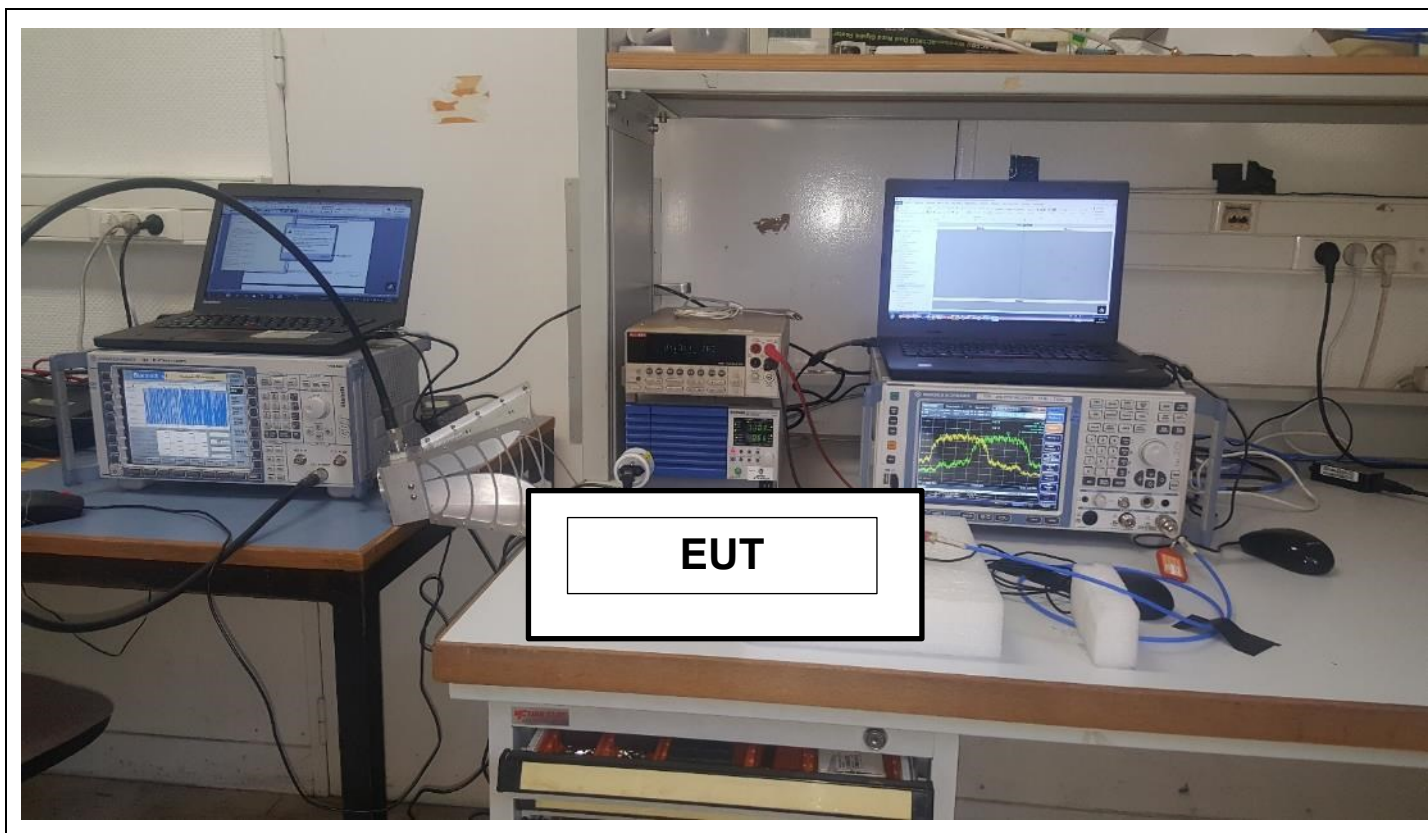
5. CARRIER FREQUENCY SEPARATION

5.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : September 26, 2018 to September 27, 2018
Ambient temperature : 26°C & 24°C
Relative humidity : 44% & 47%

5.2. TEST SETUP

- The Equipment Under Test is installed:
 - On a table
 - In an anechoic chamber
- Measurement is performed with a spectrum analyzer in:
 - Conducted Method
 - Radiated Method
- Test Procedure:
 - ANSI C63.10 § 7.8.2



Photograph for Carrier Frequency Separation



5.3. LIMIT

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

5.4. TEST EQUIPMENT LIST

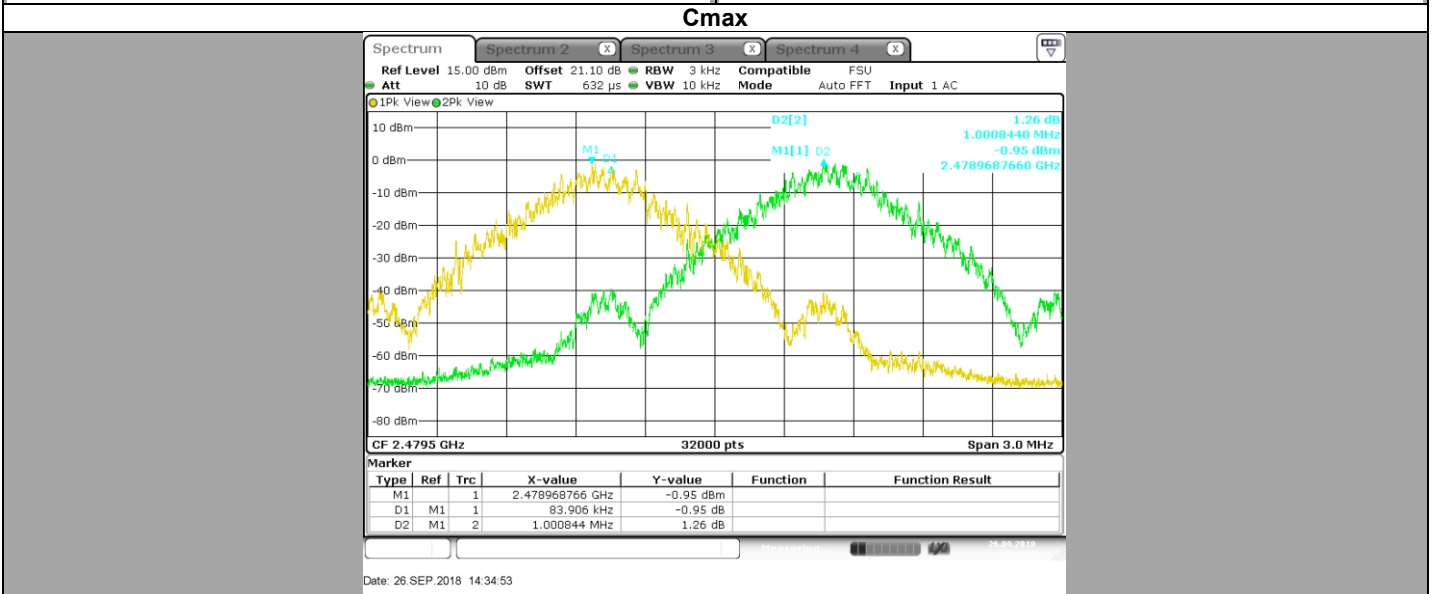
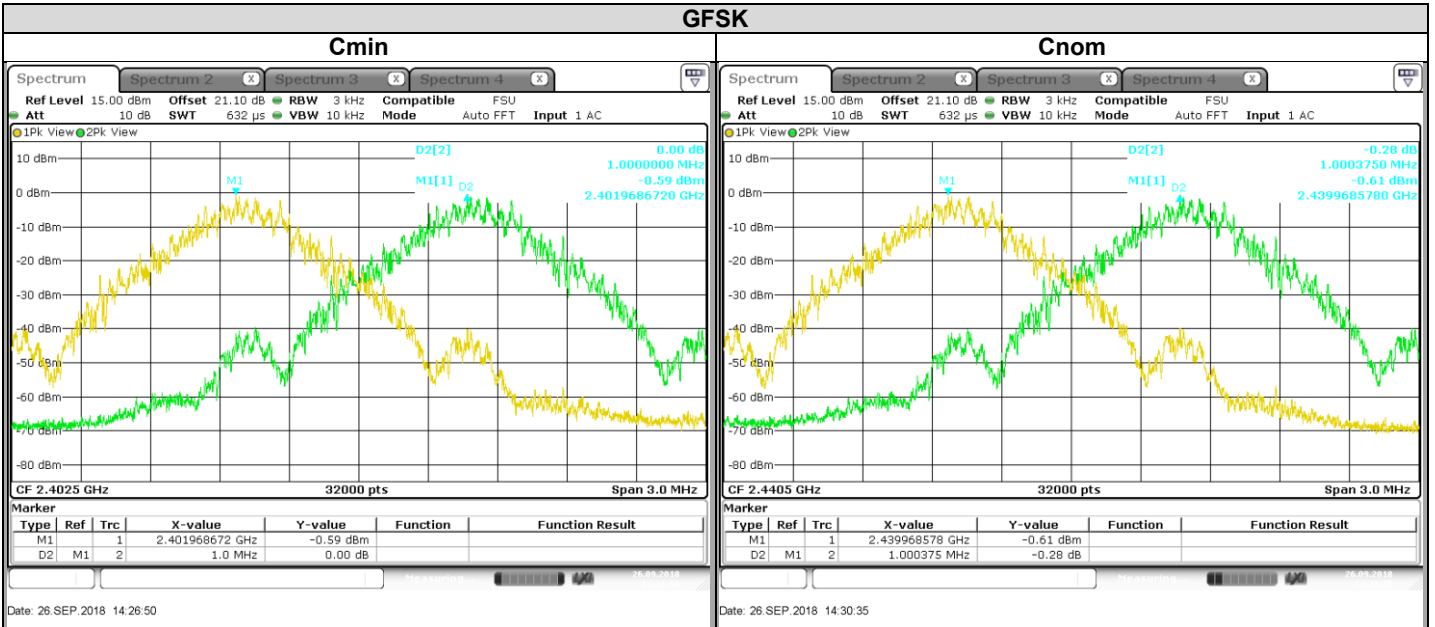
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/11	2018/11
Multimeter	KEITHLEY	2000	A1242090	2017/05	2019/05
Power supply	KIKUSUI	PCR500M	A7040079	Cal with Multimeter	Cal with Multimeter
Cable	TELEDYNE	920-0202-048	A5329674	2017/10	2018/10

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



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5.5. RESULTS

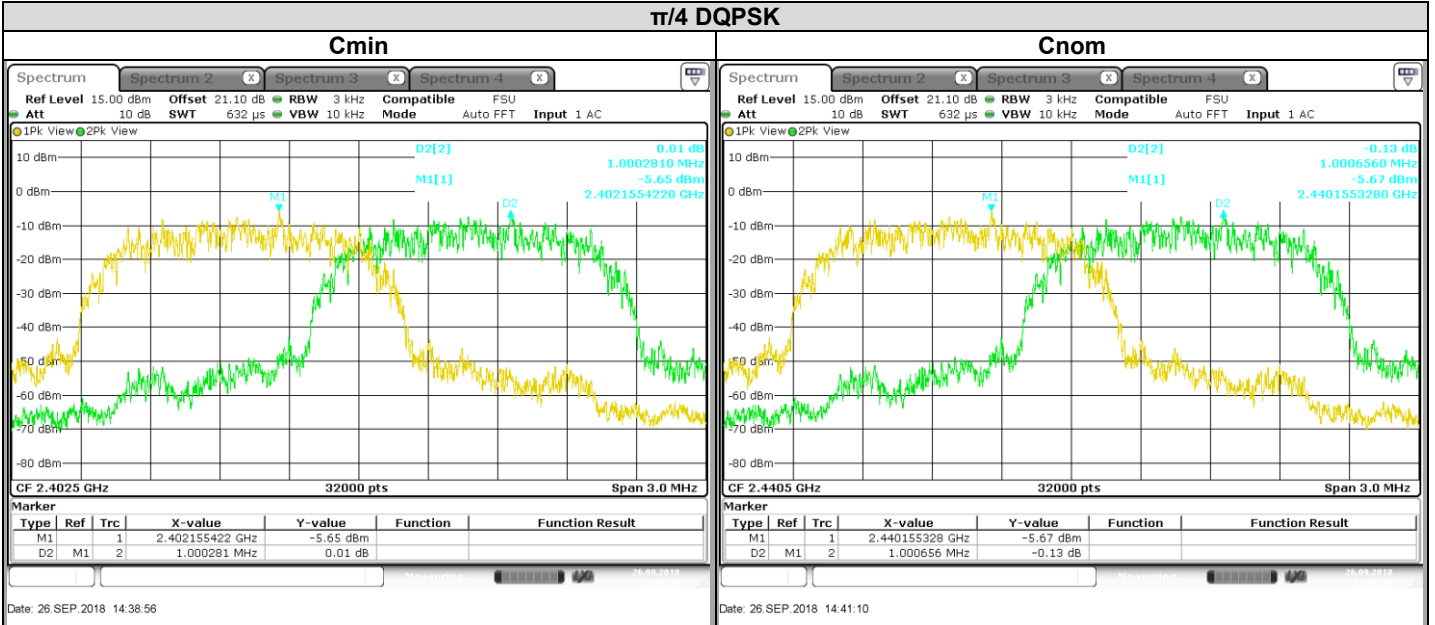


Channel	Carrier Frequency Separation (MHz)	Limit (MHz)
Cmin	1.00	Minimum 2/3 of 20dB Emission Bandwidth
Cnom	1.00	Minimum 2/3 of 20dB Emission Bandwidth
Cmax	1.00	Minimum 2/3 of 20dB Emission Bandwidth

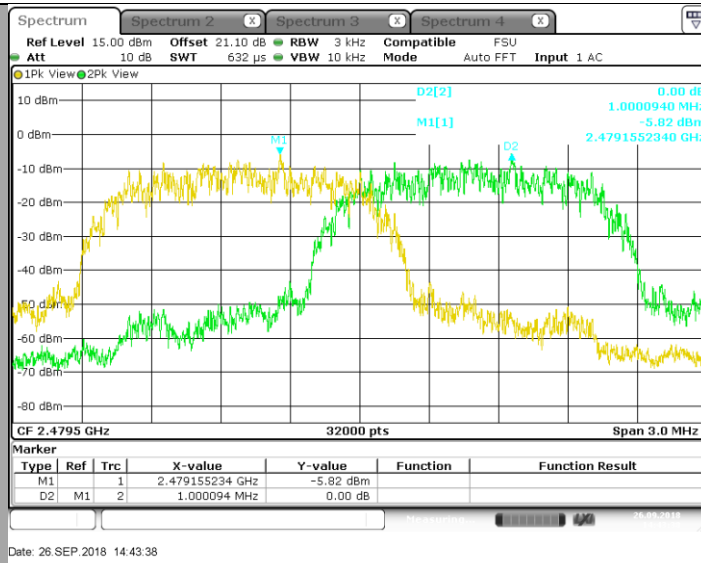


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$\pi/4$ DQPSK



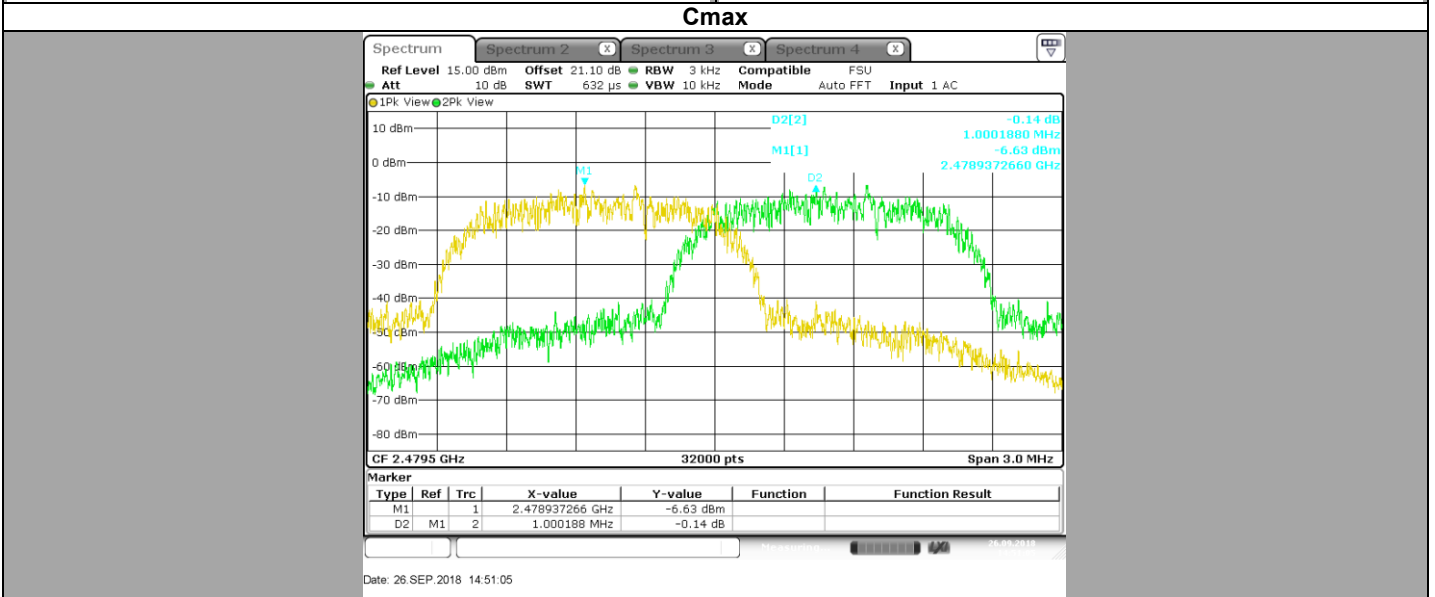
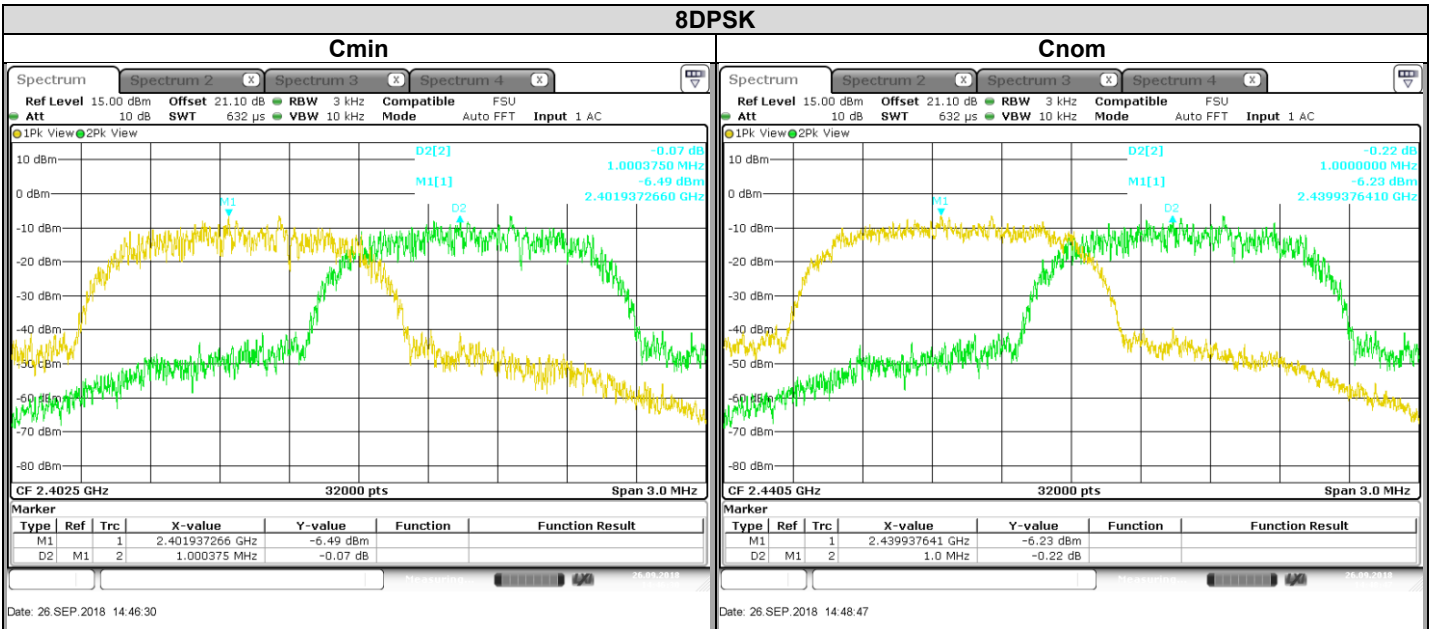
Cmax



Channel	Carrier Frequency Separation (MHz)	Limit (MHz)
Cmin	1.00	Minimum 2/3 of 20dB Emission Bandwidth
Cnom	1.00	Minimum 2/3 of 20dB Emission Bandwidth
Cmax	1.00	Minimum 2/3 of 20dB Emission Bandwidth



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Channel	Carrier Frequency Separation (MHz)	Limit (MHz)
Cmin	1.00	Minimum 2/3 of 20dB Emission Bandwidth
Cnom	1.00	Minimum 2/3 of 20dB Emission Bandwidth
Cmax	1.00	Minimum 2/3 of 20dB Emission Bandwidth

5.6. CONCLUSION

Carrier Frequency Separation measurement performed on the sample of the product **Sagemcom® Sound Box SBDV01**, SN: **253770742**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247** limits.

6. NUMBER OF HOPPING FREQUENCY

6.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : September 26, 2018
Ambient temperature : 26°C
Relative humidity : 44%

6.2. TEST SETUP

- The Equipment Under Test is installed:

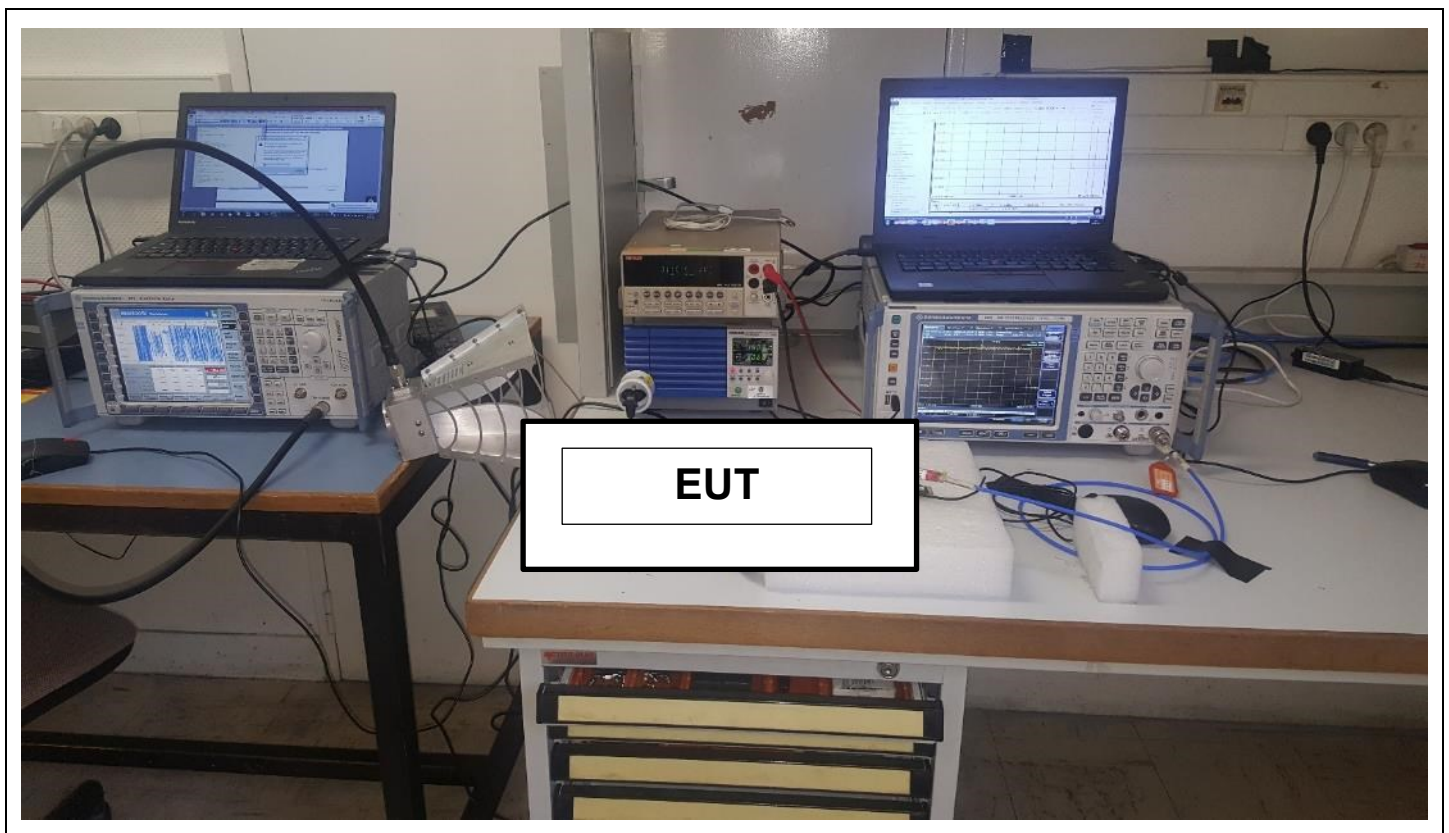
- On a table
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- ANSI C63.10 § 7.8.3



Photograph for Number of Frequency Hopping



6.3. LIMIT

Number of Hopping Frequencies shall be at least 15 channels

6.4. TEST EQUIPMENT LIST

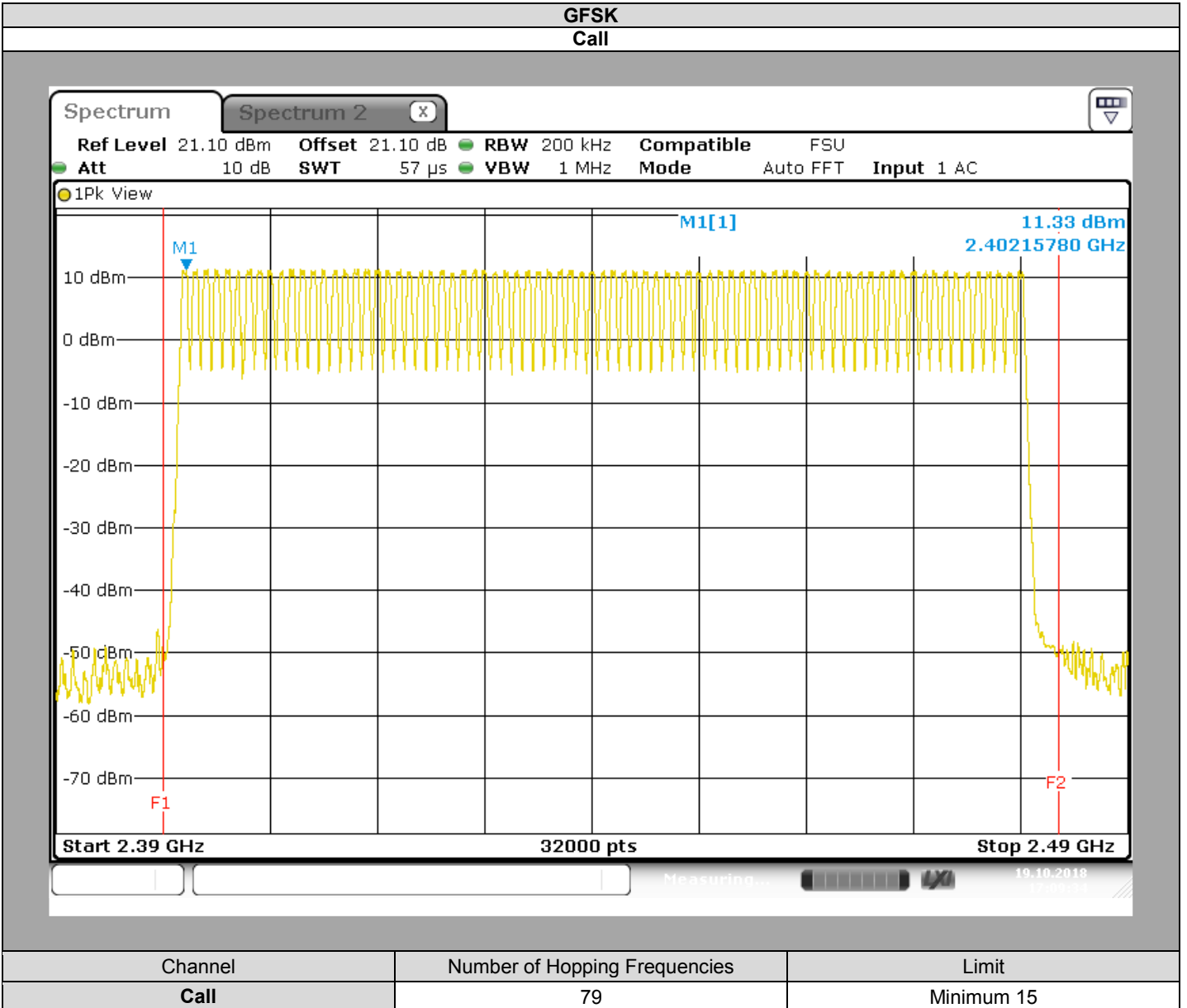
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/11	2018/11
Multimeter	KEITHLEY	2000	A1242090	2017/05	2019/05
Power supply	KIKUSUI	PCR500M	A7040079	Cal with Multimeter	Cal with Multimeter
Cable	TELEDYNE	920-0202-048	A5329674	2017/10	2018/10

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



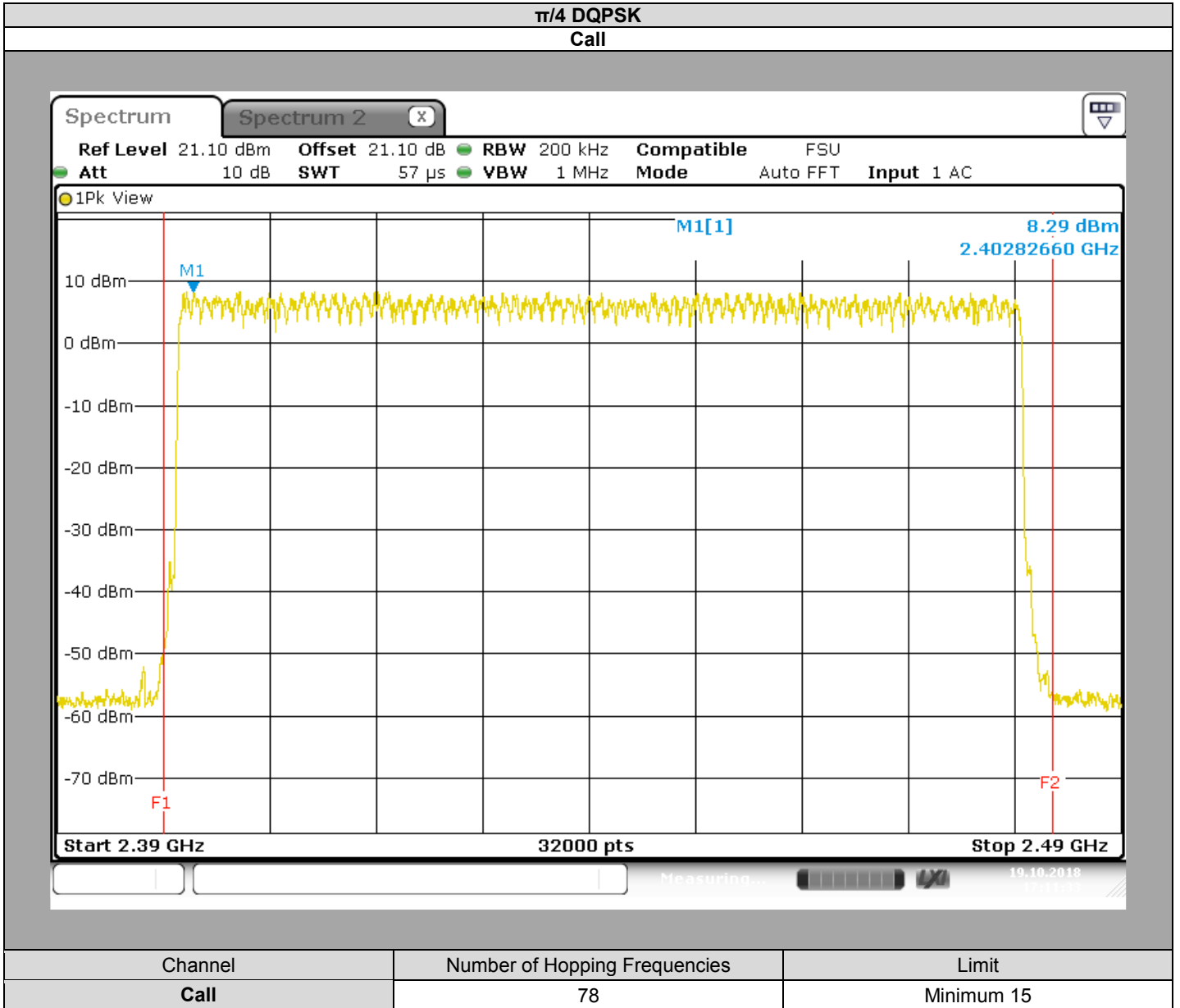
L C I E

6.5. RESULTS



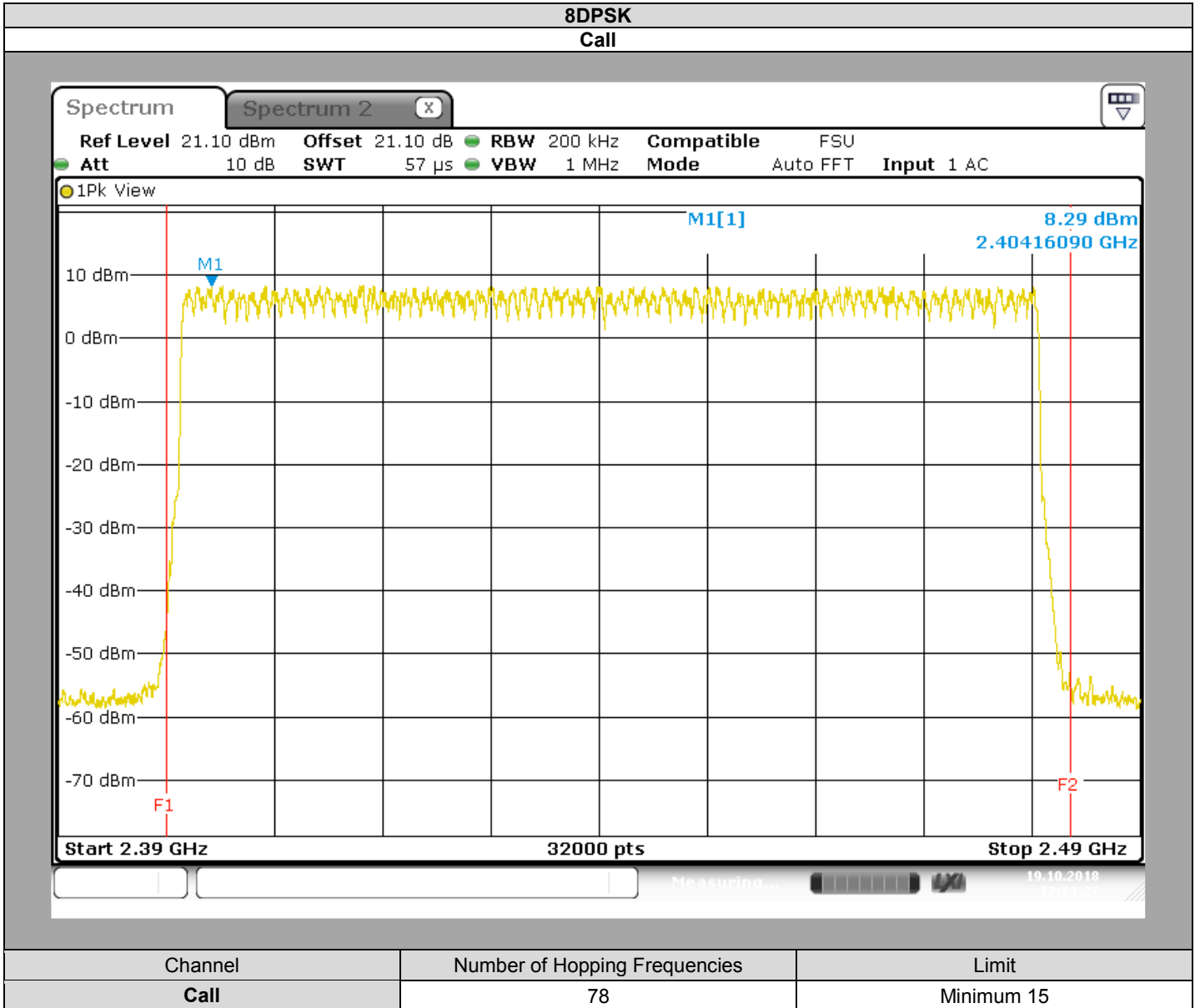


L C I E





L C I E



6.6. CONCLUSION

Number of Frequency Hopping measurement performed on the sample of the product **Sagemcom® Sound Box SBDV01**, SN: **253770742**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247** limits.

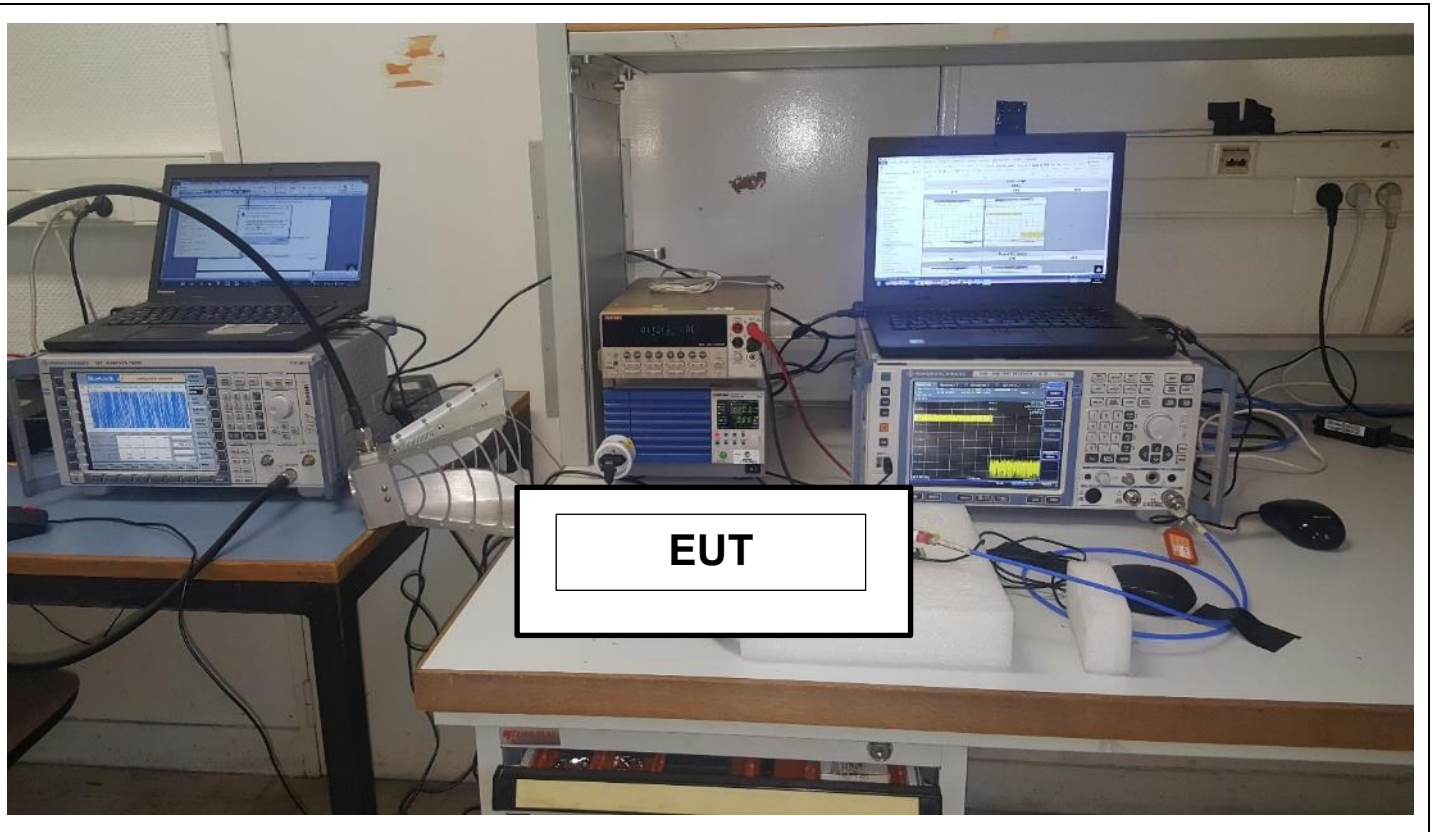
7. TIME OF OCCUPANCY

7.1. TEST CONDITIONS

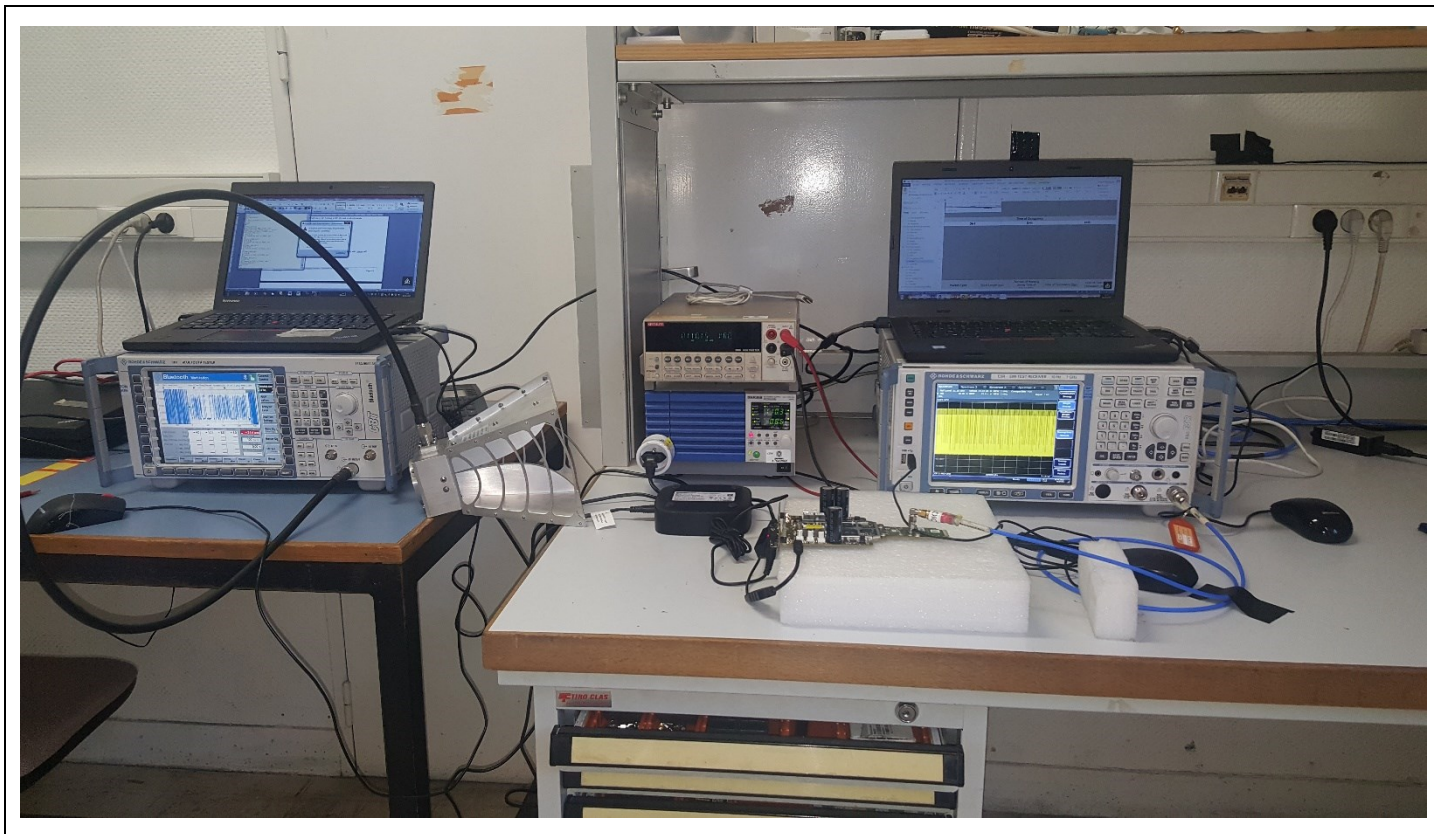
Test performed by : Armand MAHOUNGOU
Date of test : September 26, 2018 to September 27, 2018
Ambient temperature : 26°C & 24°C
Relative humidity : 44% & 47%

7.2. TEST SETUP

- The Equipment Under Test is installed:
 - On a table
 - In an anechoic chamber
- Measurement is performed with a spectrum analyzer in:
 - Conducted Method
 - Radiated Method
- Test Procedure:
 - ANSI C63.10 § 7.8.4



Photograph for Time of Occupancy



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	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/11	2018/11
Multimeter	KEITHLEY	2000	A1242090	2017/05	2019/05
Power supply	KIKUSUI	PCR500M	A7040079	Cal with Multimeter	Cal with Multimeter
Cable	TELEDYNE	920-0202-048	A5329674	2017/10	2018/10

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

7.5. RESULTS





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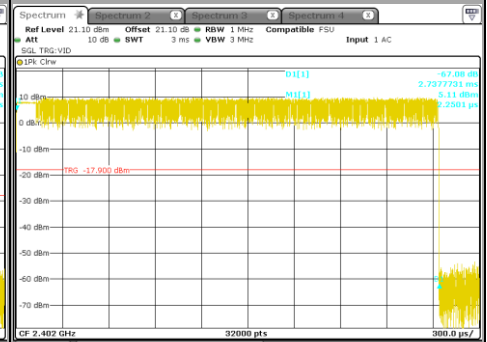
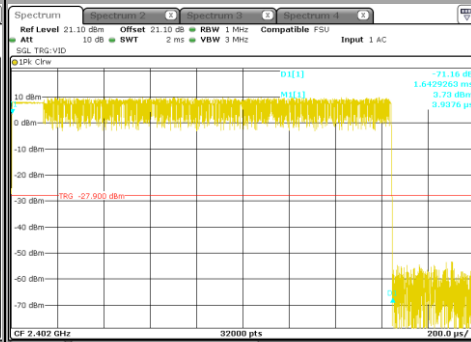
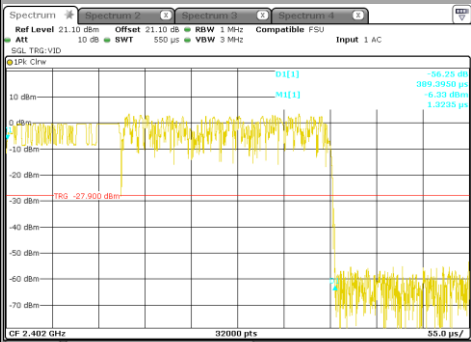
Burst Length

$\pi/4$ DQPSK

2DH1

2DH3

2DH5

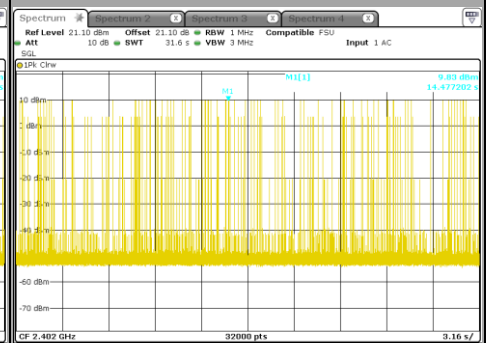
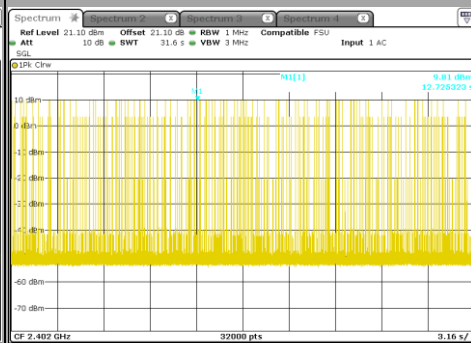
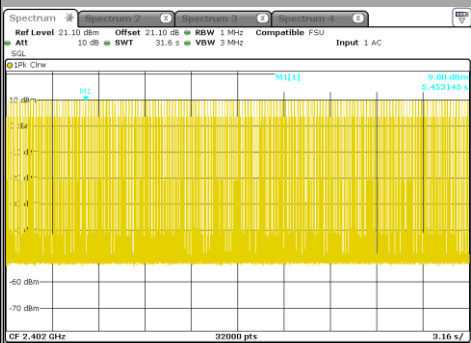


Time of Occupancy

2DH1

2DH3

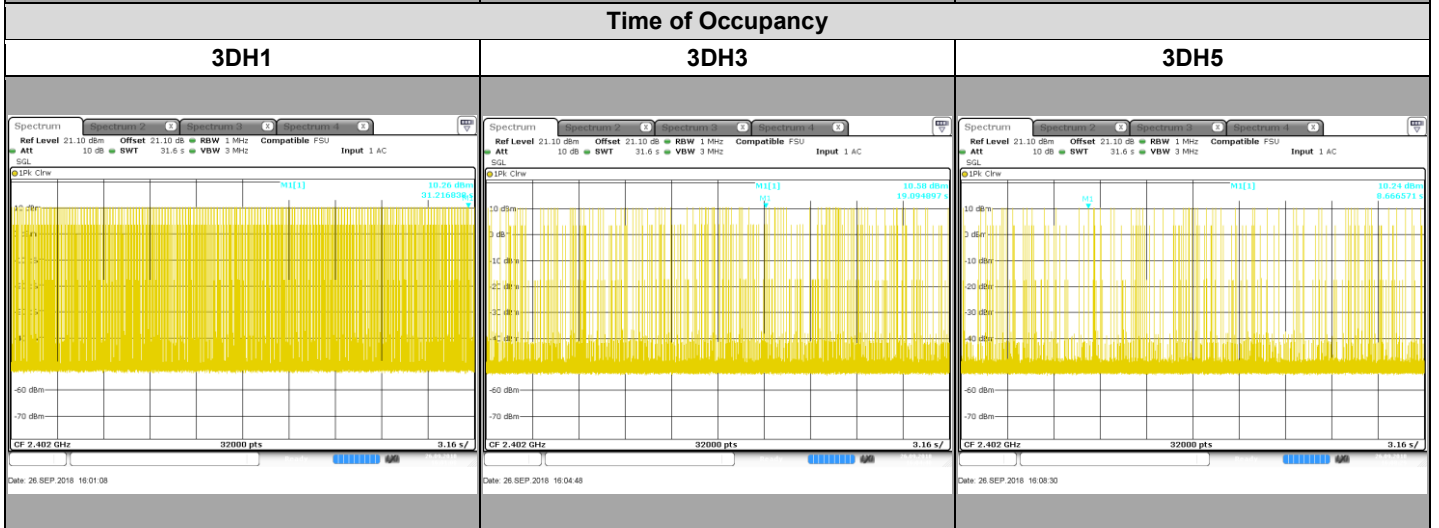
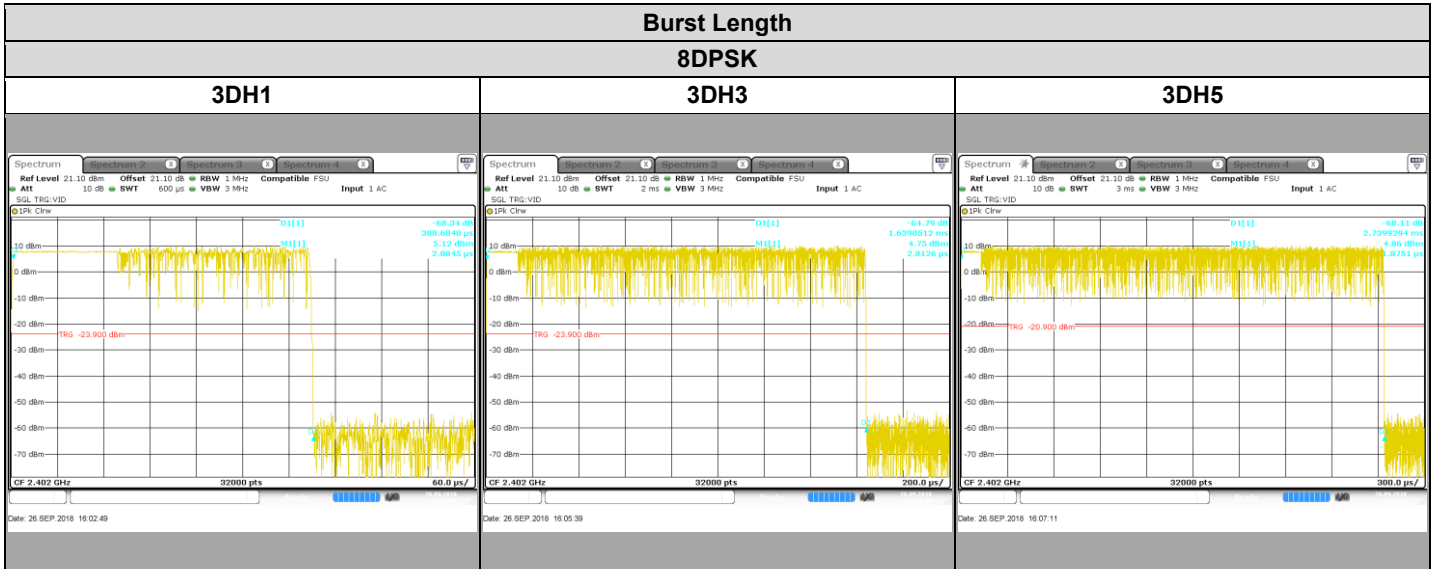
2DH5



Packet Type	Burst Length (ms)	Number of Hopping during Time of Occupancy	Time of Occupancy (ms)	Limit of Time of Occupancy (ms)
2DH1	0.389	210	81.69	400
2DH3	1.643	110	180.73	400
2DH5	2.738	92	251.89	400



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Packet Type	Burst Length (ms)	Number of Hopping during Time of Occupancy	Time of Occupancy (ms)	Limit of Time of Occupancy (ms)
DH1	0.388	225	87.30	400
DH3	1.64	122	200.08	400
DH5	2.74	89	243.86	400

7.6. CONCLUSION

Time of Occupancy measurement performed on the sample of the product **Sagemcom® Sound Box SBDV01**, SN: **253770742**, in configuration and description presented in this test report, show levels **compliant to the 47 CFR PART 15.247**.

8. DUTY CYCLE

8.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : September 26, 2018 to September 27, 2018
Ambient temperature : 26°C & 24°C
Relative humidity : 44% & 47%

8.2. TEST SETUP

- The Equipment Under Test is installed:

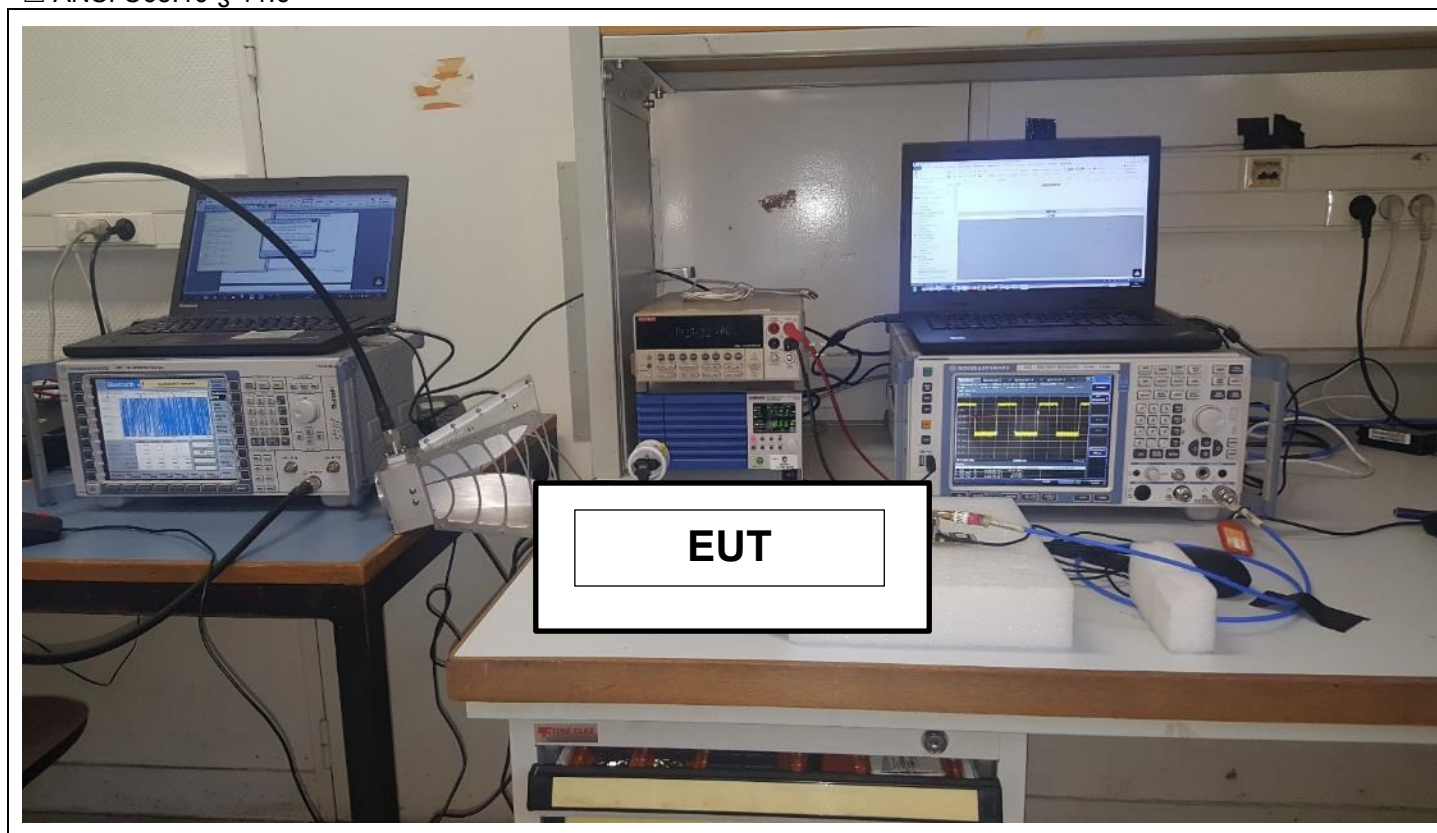
- On a table
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- ANSI C63.10 § 11.6



Photograph for Duty Cycle



8.3. LIMIT

None

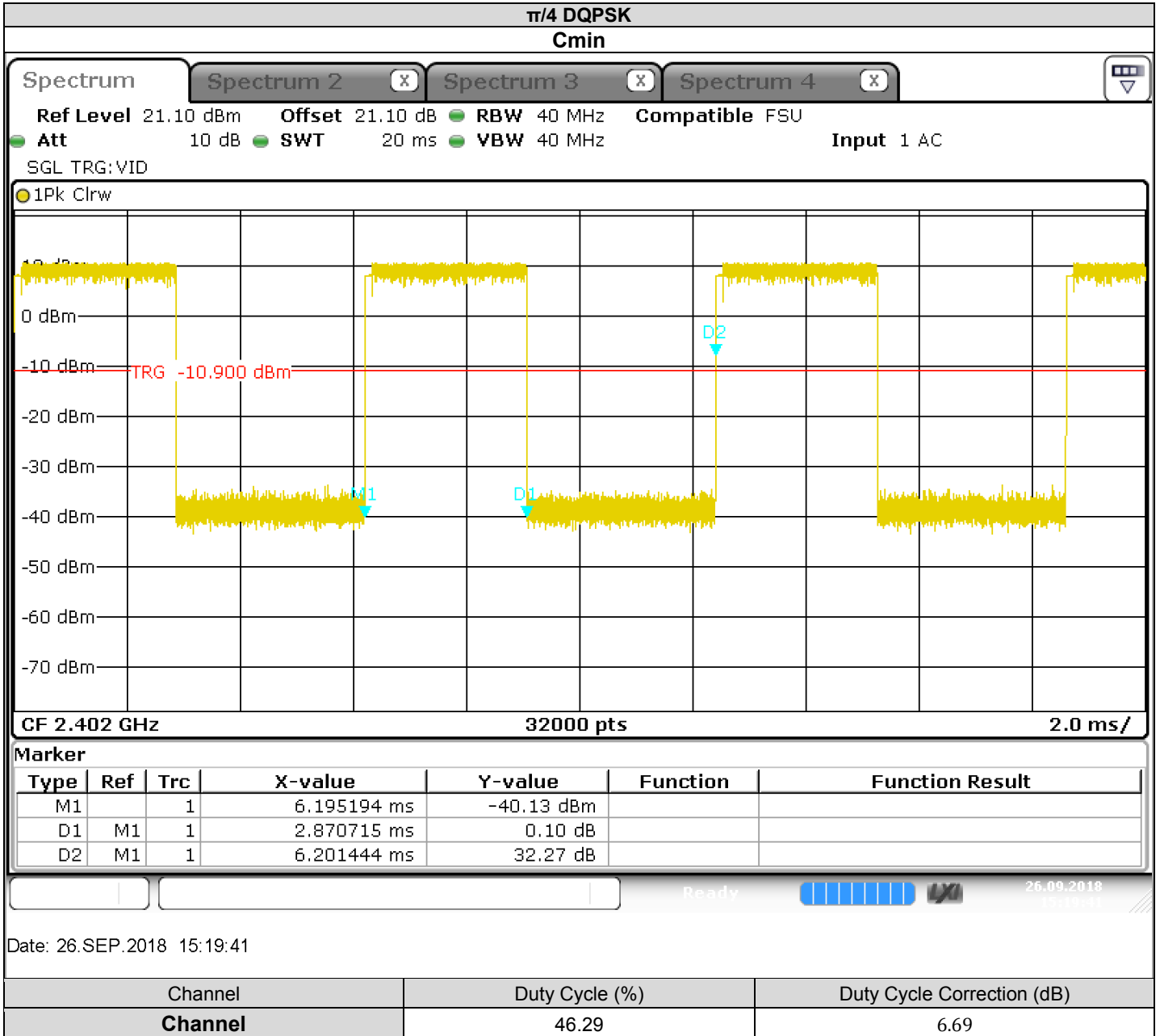
8.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/11	2018/11
Multimeter	KEITHLEY	2000	A1242090	2017/05	2019/05
Power supply	KIKUSUI	PCR500M	A7040079	Cal with Multimeter	Cal with Multimeter
Cable	TELEDYNE	920-0202-048	A5329674	2017/10	2018/10

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

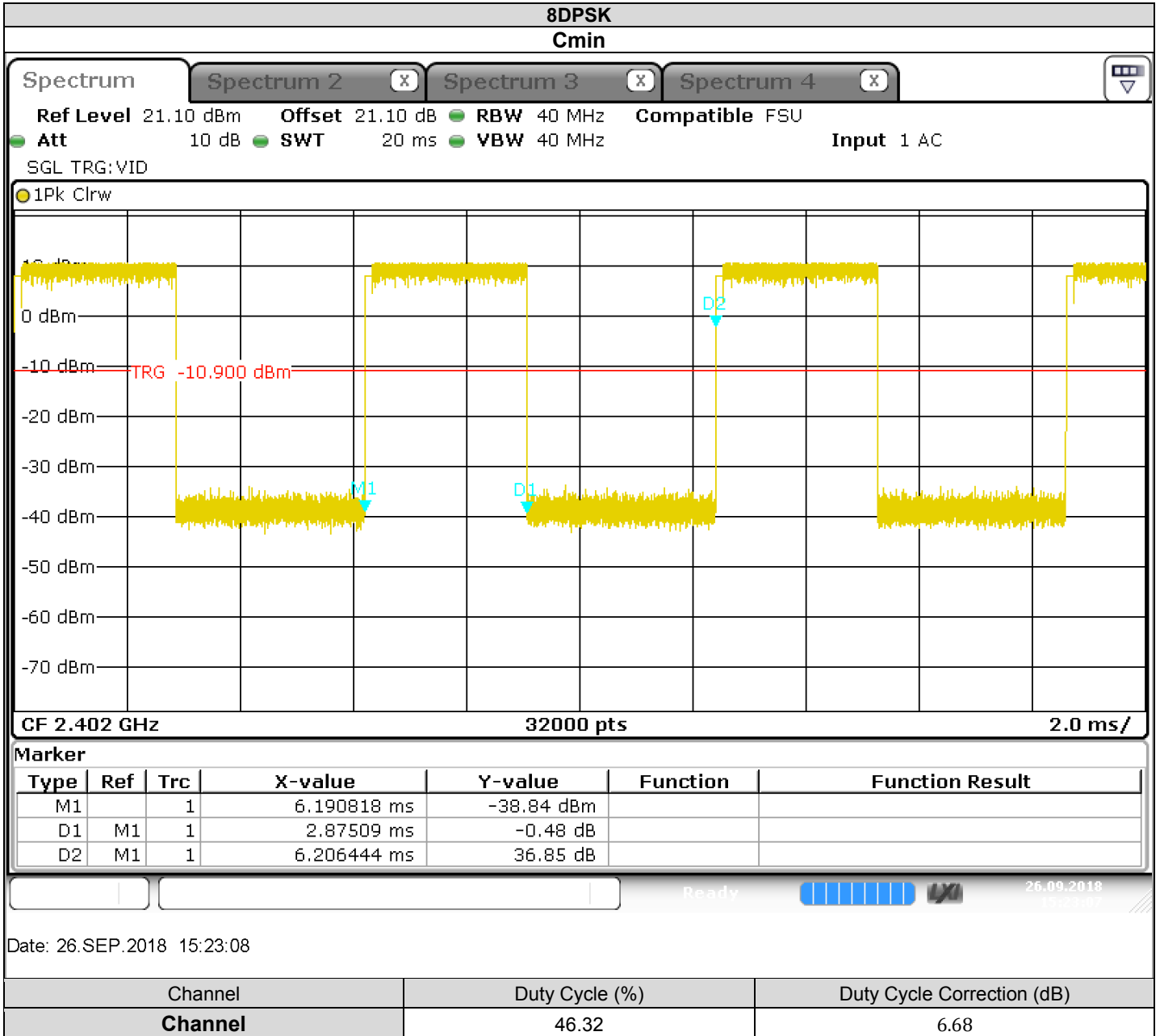


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8.6. CONCLUSION

Duty Cycle measurement performed on the sample of the product **Sagemcom® Sound Box SBDV01**, SN: **253770742**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247** limits.

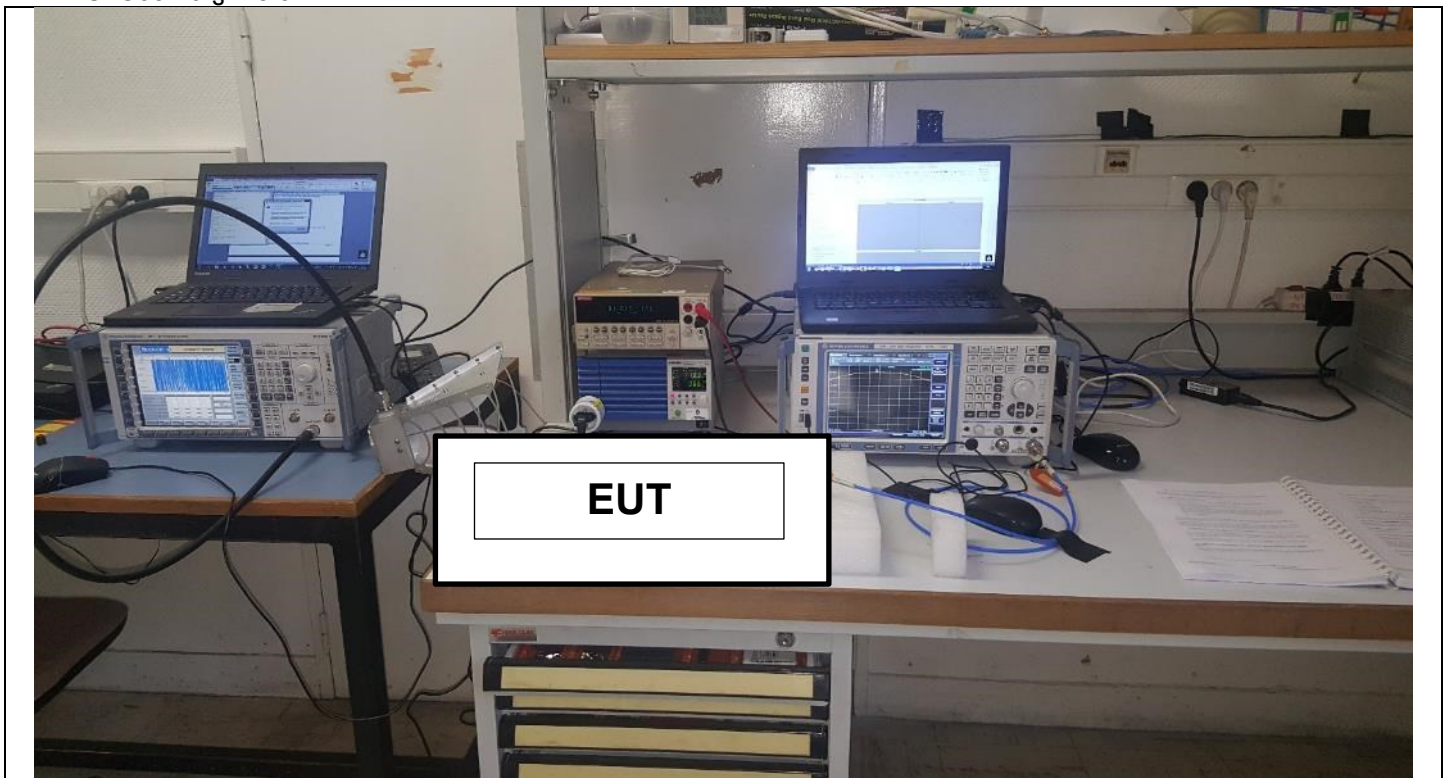
9. MAXIMUM CONDUCTED OUTPUT POWER

9.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : September 26, 2018 to September 27, 2018
Ambient temperature : 26°C & 24°C
Relative humidity : 44% & 47%

9.2. TEST SETUP

- The Equipment Under Test is installed:
 - On a table
 - In an anechoic chamber
- Measurement is performed with a spectrum analyzer in:
 - Conducted Method
 - Radiated Method
- Test Procedure:
 - 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	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/11	2018/11
Multimeter	KEITHLEY	2000	A1242090	2017/05	2019/05
Power supply	KIKUSUI	PCR500M	A7040079	Cal with Multimeter	Cal with Multimeter
Cable	TELEDYNE	920-0202-048	A5329674	2017/10	2018/10

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



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9.5. RESULTS

