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TEST REPORT

N°: 172319-764277-B

Version : 02

Subject

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

Issued to

Technicolor Connected Home USA, LLC
5030 Sugarloaf Parkway, Building 6
Lawrenceville – GA 30044
USA

Apparatus under test

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

IP Set-Top Box
TECHNICOLOR
TECHNICOLOR
UIW4059MIL
LAB3-V0 nr.030
G95UIW4059

Conclusion

See Test Program chapter

Test date

April 8, 2021 to April 15, 2021

Test location

Moirans

Test Site

6500A-1 & 6500A-3

Registration Number

197516

Designation Number

FR0008

Sample receipt date

April 6, 2021

Composition of document

94 pages

Document issued on

June 8, 2021

Written by :
Armand MAHOUNGOU
Tests operator



Fayet

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LCIE

Laboratoire Central des Industries Electriques
Une société de Bureau Veritas

ZI Centr'alp
170 rue de Chatagnon
38430 Moirans FRANCE

Tél : +33 4 76 07 36 36
contact@lcie.fr
www.lcie.fr



PUBLICATION HISTORY

Version	Date	Author	Modification
01	June 8, 2021	Armand MAHOUNGOU	Creation of the document
02	June 8, 2021	Armand MAHOUNGOU	Device internal picture removing

Each new edition of this test report replaces and cancels the previous edition. The control of the old editions of report is under responsibility of client.



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1. TEST PROGRAM

References

- 47 CFR Part 15.247
- KDB 558074 D01 DTS Meas Guidance v05r02
- ANSI C63.10-2013

Radio requirement:

Clause (47CFR Part 15.247) Test Description	Test result - Comments			
Occupied Bandwidth	☒ PASS	☐ FAIL	☐ NA	☐ NP(1)
20dB Bandwidth	☒ PASS	☐ FAIL	☐ NA	☐ NP(1)
Number of Hopping Frequency	☒ PASS	☐ FAIL	☐ NA	☐ NP(1)
Carrier Frequency Separation	☒ PASS	☐ FAIL	☐ NA	☐ NP(1)
Time of Occupancy	☒ PASS	☐ FAIL	☐ NA	☐ NP(1)
Duty Cycle	☒ PASS	☐ FAIL	☐ NA	☐ NP(1)
Maximum Conducted Output Power	☒ PASS	☐ FAIL	☐ NA	☐ NP(1)
Conducted Spurious Emission at the Band Edge	☒ PASS	☐ FAIL	☐ NA	☐ NP(1)
Unwanted Emissions into Non-Restricted Frequency Bands	☒ PASS	☐ FAIL	☐ NA()	☐ NP(1)
AC Power Line Conducted Emission	☒ PASS	☐ FAIL	☐ NA(2)	☐ NP(1)
Unwanted Emissions into Restricted Frequency Bands	☒ PASS	☐ FAIL	☐ NA	☐ NP(1)
Receiver Radiated emissions	☒ PASS	☐ FAIL	☐ NA	☐ 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):
TECHNICOLOR UIW4059MIL

Serial Number: LAB3-V0 nr.030



Equipment Under Test



Equipment Under Test

Power supply:

Name	Type	Rating	Reference / Sn	Comments
Supply1	☒ AC ☐ DC ☐ Battery	120-240V;50-60Hz	-	-

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
1	Mains power supply cable	1.2	☒	☐	☐	-
2	HDMI cable	1.5	☒	☒	☐	-
3	Ethernet cable	1.5	☒	☒	☐	-

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Laptop computer	-	-	Use to set the EUT



Equipment information:

Bluetooth Classic Type:	☐ v1.2	☐ v2.0	☐ v2.1+EDR	☐ v3.0+HS
	☐ v4.0	☐ v4.1	☒ v4.2	
Frequency band:	[2400 – 2483.5] MHz			
Spectrum Modulation:	☒ FHSS			
Number of Channel:	Maximum:	79	Minimum:	20
Spacing channel:	1MHz			
Channel bandwidth:	1MHz			
Antenna Type:	☒ Integral	☐ External	☐ Dedicated	
Antenna connector:	☒ Yes	☐ No	☐ Temporary for test	
Transmit chains:	1			
	Single antenna			
Beam forming gain:	No			
Receiver chains:	1			
Type of equipment:	☒ Stand-alone	☐ Plug-in	☐ Combined	
Equipment arrangement:	☒ Tabletop	☐ Floor-standing	☐ Multiple orientations	
Ad-Hoc mode:	☒ Yes		☐ No	
Duty cycle:	☒ Continuous duty	☐ Intermittent duty	☐ 100% duty	
Equipment type:	☒ Production model		☐ Pre-production model	
Operating temperature range:	Tmin:	☐ -20°C	☐ 0°C	☒ 5°C
	Tnom:	20°C		
	Tmax:	☐ 35°C	☐ 55°C	☒ 45°C
Type of power source:	☒ AC power supply	☒ DC power supply	☐ Battery	
Operating voltage range:	Vnom:	☒ 120V/60Hz	☒ 12 VDC +/-5%	
		☒ 240V/50Hz	☐ X VDC	

Antenna Characteristic			
Antenna assembly	Gain (dBi)	Frequency Band (MHz)	Impedance(Ω)
1	2.9	2400 – 2483.5	50

Hardware information		
Software (if applicable):	V. :	UIW4059MIL_HSW 0.7

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	Cnom=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
☒	GFSK	1	1-DM1	☐
	GFSK	1	1-DH1	☐
	GFSK	1	1-DM3	☐
	GFSK	1	1-DH3	☐
	GFSK	1	1-DM5	☐
	GFSK	1	1-DH5	☒
☐	GFSK	1	AUX1	☐
☒	$\pi/4$ DQPSK	2	2-DH1	☐
	$\pi/4$ DQPSK	2	2-DH3	☐
	$\pi/4$ DQPSK	2	2-DH5	☒
	8DPSK	3	3-DH1	☐
	8DPSK	3	3-DH3	☐
	8DPSK	3	3-DH5	☒

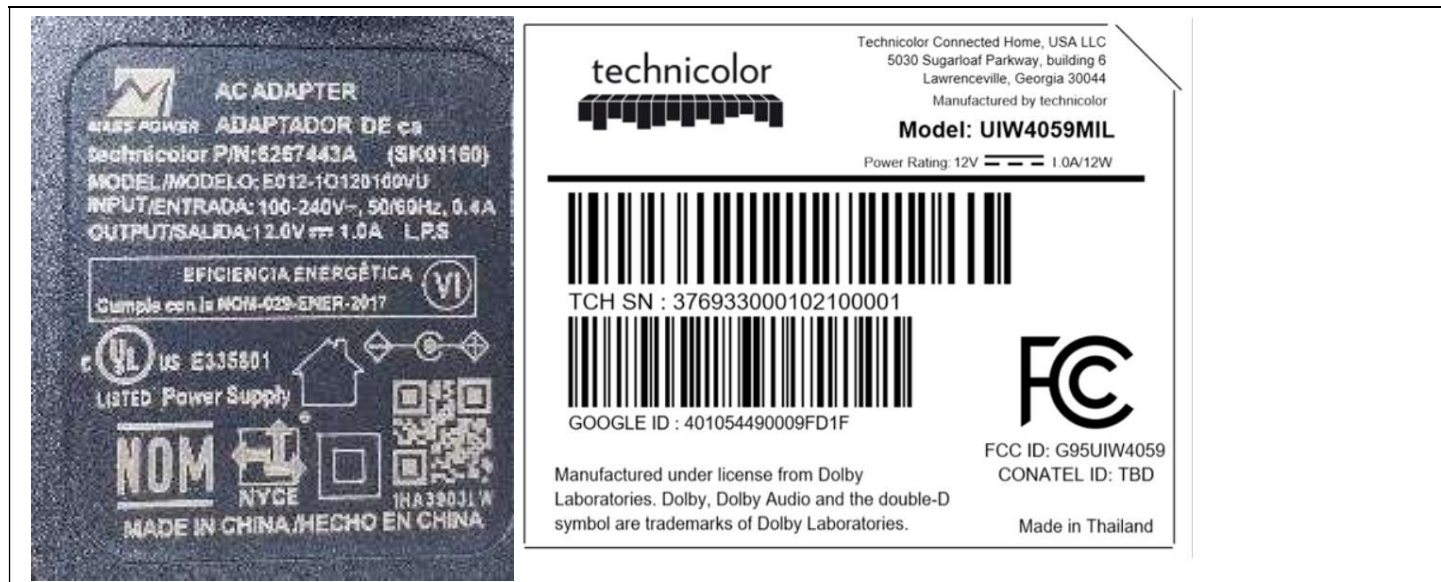
2.2. RUNNING MODE

Test mode	Description of test mode
Test mode 1	Permanent emission with modulation on a fixed channel in the data rate that produced the highest power
Test mode 2	Permanent emission with modulation & hopping in the data rate that produced the highest power

Test	Running mode	
Occupied Bandwidth	☒ Test mode 1 (1)	☐ Alternative test mode()
20dB Bandwidth	☒ Test mode 1 (1)	☐ Alternative test mode()
Number of Hopping Frequency	☒ Test mode 2 (1)	☐ Alternative test mode()
Carrier Frequency Separation	☒ Test mode 1 (1)	☐ Alternative test mode()
Time of Occupancy	☒ Test mode 2 (1)	☐ Alternative test mode()
Duty Cycle	☒ Test mode 1 (1)	☐ Alternative test mode()
Maximum Conducted Output Power	☒ Test mode 1 (1)	☐ Alternative test mode()
Conducted Spurious Emission at the Band Edge	☒ Test mode 1 (1)	☐ Alternative test mode()
Unwanted Emissions into Non-Restricted Frequency Bands	☒ Test mode 1 (1)	☐ Alternative test mode()
AC Power Line Conducted Emission	☒ Test mode 2 (1)	☐ Alternative test mode()
Unwanted Emissions into Restricted Frequency Bands	☒ Test mode 1 (1)	☐ Alternative test mode()

- (1) Following commands with the specific test software "Teraterm" are used to set the product:
- See document "UIW4059MIL_ BT control_V1.docx"(provided by customer) for the command used during test.

2.3. EQUIPMENT LABELLING



2.4. EQUIPMENT MODIFICATION

☒ None ☐ Modification:

2.5. FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follow:

$$FS = RA + AF + CF - AG$$

Where
 FS = Field Strength
 RA = Receiver Amplitude
 AF = Antenna Factor
 CF = Cable Factor
 AG = Amplifier Gain

Assume a receiver reading of 52.5dB μ V is obtained. The antenna factor of 7.4 and a cable factor of 1.1 are added. The amplifier gain of 29dB is subtracted, giving a field strength of 32 dB μ V/m.

$$FS = 52.5 + 7.4 + 1.1 - 29 = 32 \text{ dB}\mu\text{V/m}$$

The 32 dB μ V/m value can be mathematically converted to its corresponding level in μ V/m.

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32\text{dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}.$$

2.6. CALIBRATION DATE

The calibration intervals are extended at 12+2 months. This extended interval is based on the fact that there is sufficient calibration data to statistically establish a trend or based on experience of use of the test equipment to assure good measurement results for a longer period.

3. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : April 8, 2021
Ambient temperature : 27°C
Relative humidity : 46%

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:

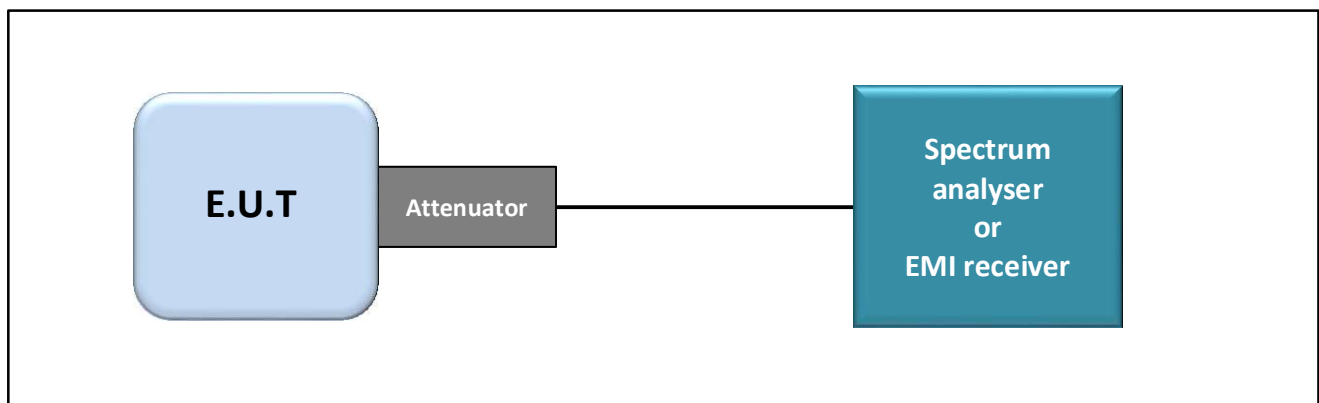
- ☒ Conducted Method
- ☐ Radiated Method

- Test Procedure:

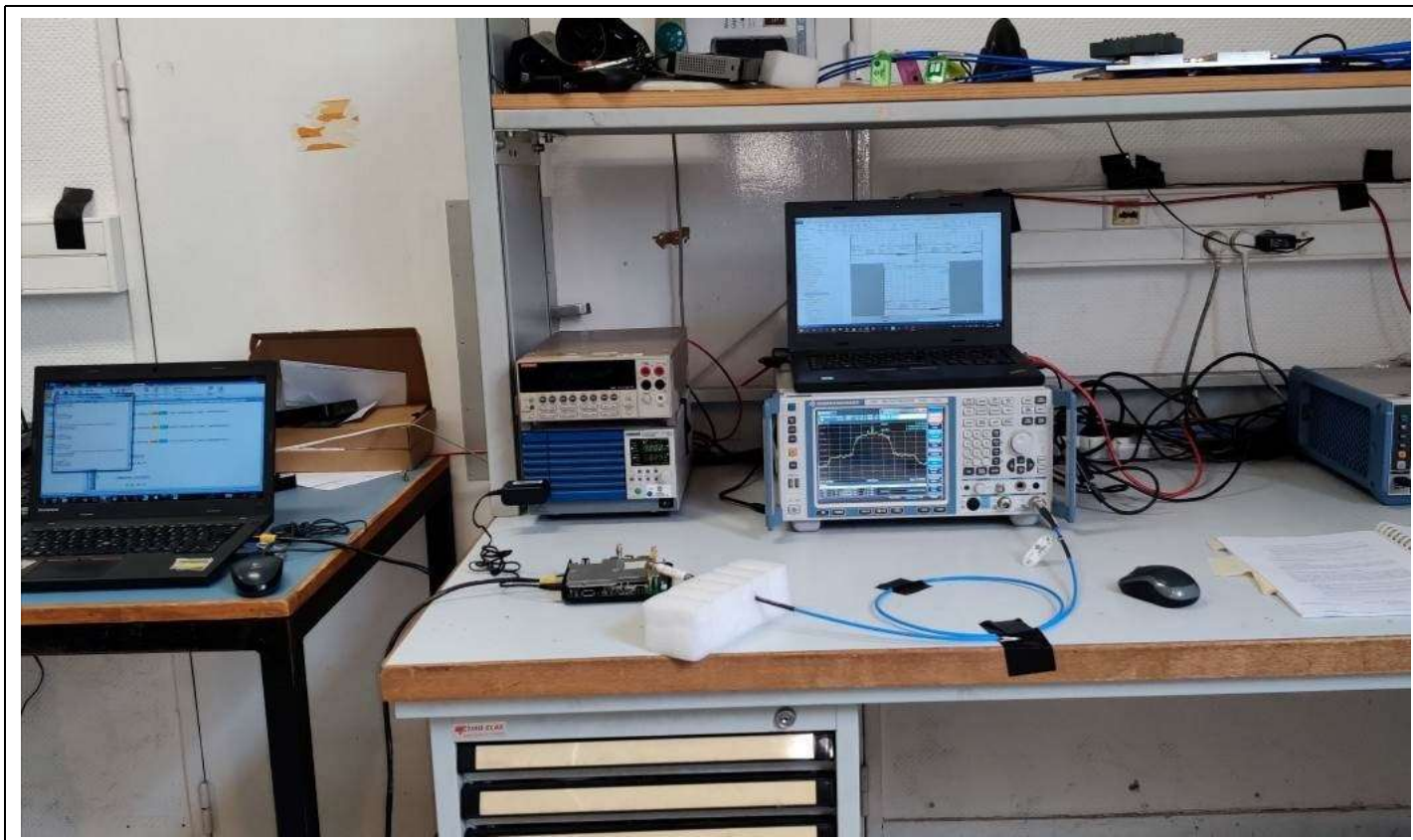
- ☐ RSS-Gen Issue 5 § 6.7
- ☒ ANSI C63.10 § 6.9.2

Measurement Procedure:

- a) RBW shall be in the range of 1% to 5% of the anticipated occupied bandwidth
- b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW
- c) SPAN = Capture all products of the modulation process
- d) Detector = Peak.
- e) Trace mode = max hold.
- f) Sweep = auto couple.
- g) Allow the trace to stabilize.
- h) OBW 99% function of spectrum analyzer used



Test set up of Occupied Bandwidth



Photograph for Occupied bandwidth

3.3. LIMIT

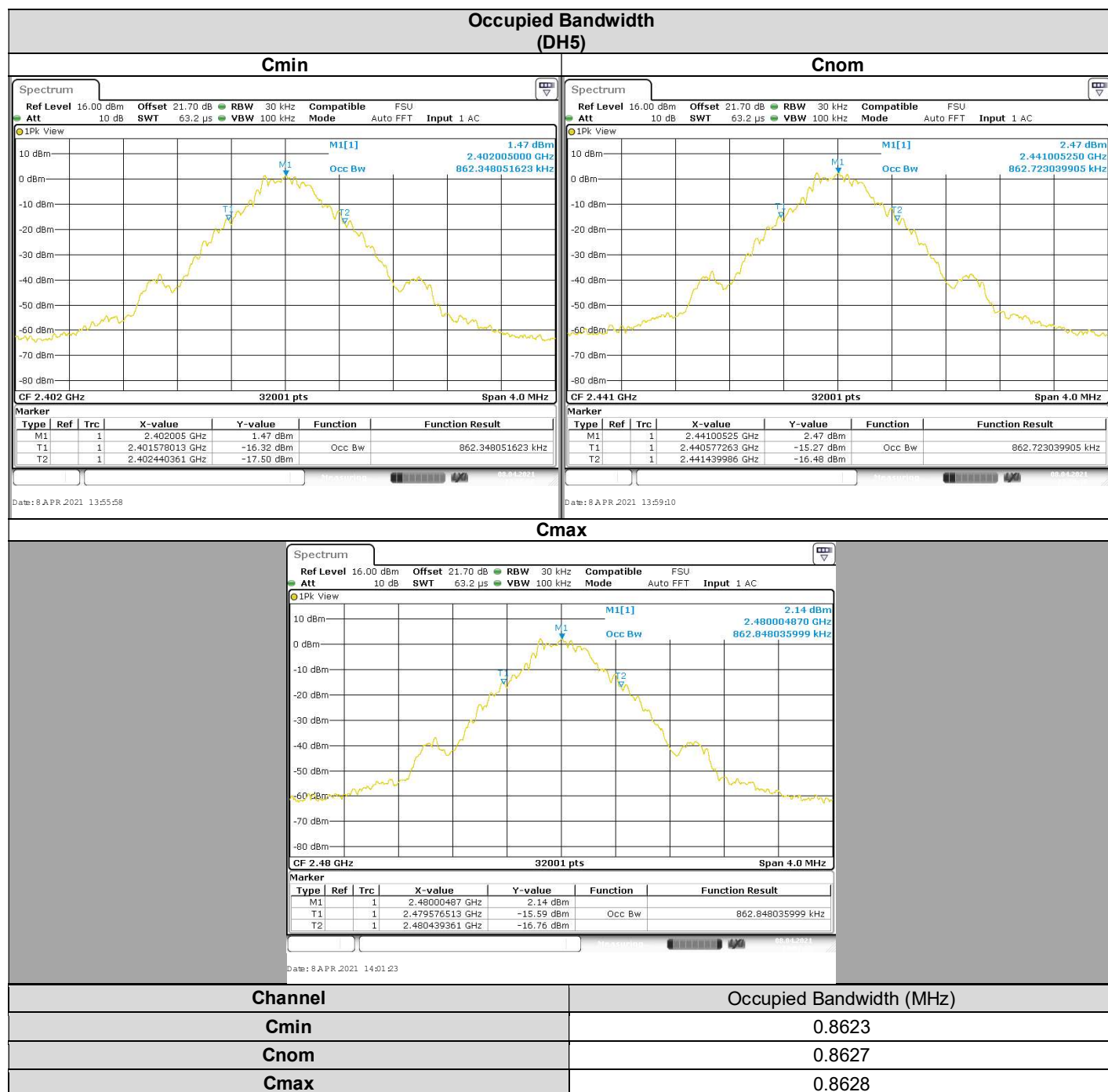
None

3.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR7	A2642026	2019/07	2021/07
Multimeter	KEITHLEY	2000	A1242090	2019/05	2021/05
Power supply	KIKUSUI	PCR500M	A7040079	See Multimeter	See Multimeter
Cable + Attenuateur 20dB	PASTERNAK	PE350-150CM	A5329973	2020/08	2021/08
Load 50 ohms	TELEGARTNER	-	A7150105	2019/04	2021/04
Load 50 ohms	TELEGARTNER	-	A7150104	2019/04	2021/04

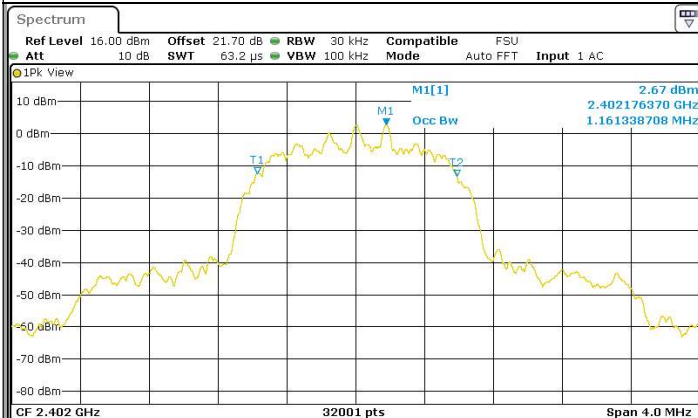
Note: In our quality system, the test equipment calibration due is more & less 2 months

3.5. RESULTS



Occupied Bandwidth (2-DH5)

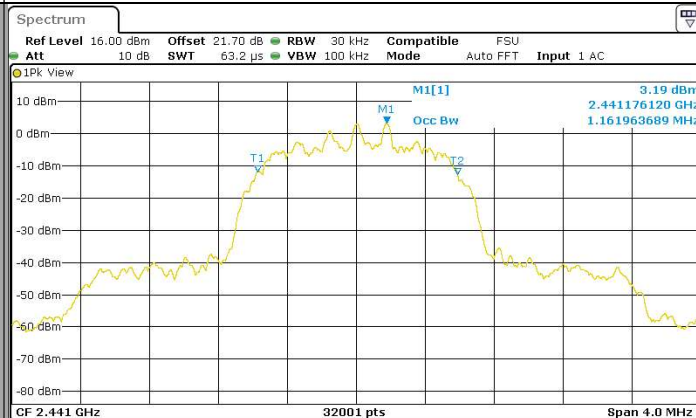
Cmin



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1	1		2.40217637 GHz	2.67 dBm		
T1	1		2.401426893 GHz	-12.34 dBm	Occ Bw	1.161338708 MHz
T2	1		2.402588232 GHz	-13.24 dBm		

Date: 8 APR 2021 14:11:31

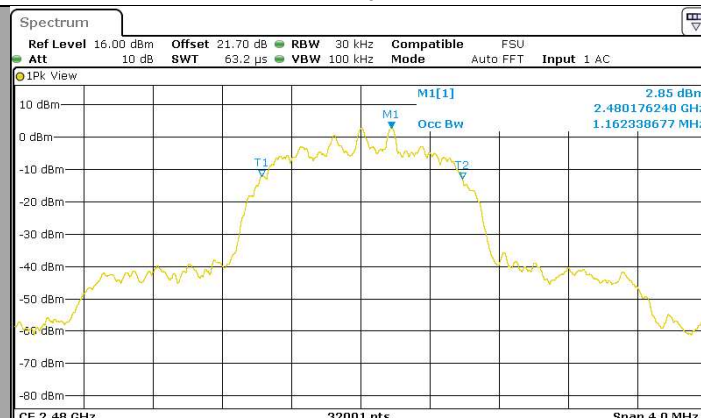
Cnom



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1	1		2.44117612 GHz	3.19 dBm		
T1	1		2.440426518 GHz	-11.82 dBm	Occ Bw	1.161963689 MHz
T2	1		2.441588482 GHz	-12.82 dBm		

Date: 8 APR 2021 14:00:17

Cmax



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1	1		2.48017624 GHz	2.85 dBm		
T1	1		2.479426393 GHz	-12.11 dBm	Occ Bw	1.162338677 MHz
T2	1		2.480588732 GHz	-13.13 dBm		

Date: 8 APR 2021 14:08:00

Channel

Occupied Bandwidth (MHz)

Cmin

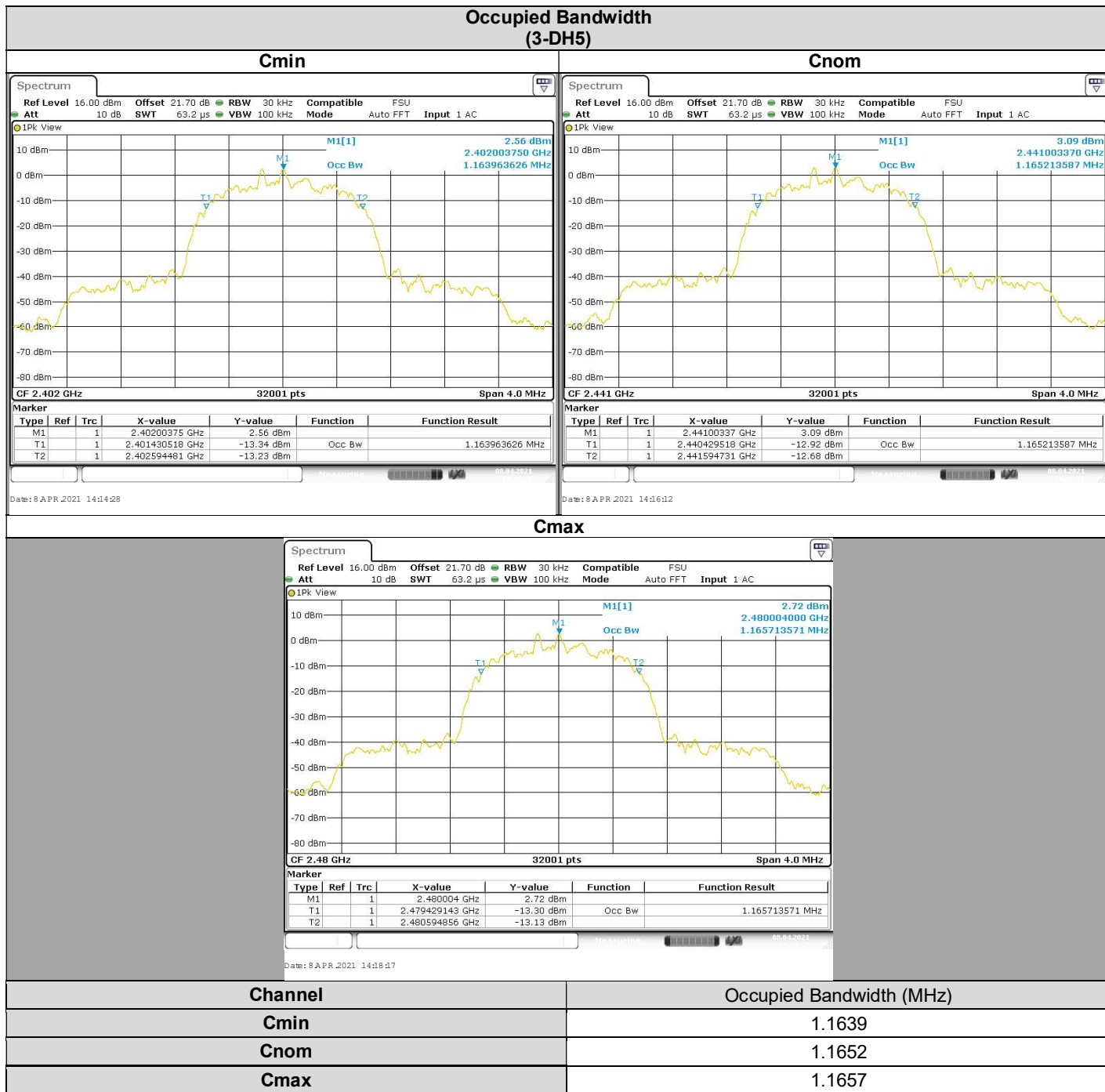
1.1613

Cnom

1.1619

Cmax

1.1623



3.6. CONCLUSION

Occupied Channel Bandwidth measurement performed on the sample of the product **TECHNICOLOR UIW4059MIL**, SN: **LAB3-V0 nr.030**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247** limits.

4. 20dB EMISSION BANDWIDTH

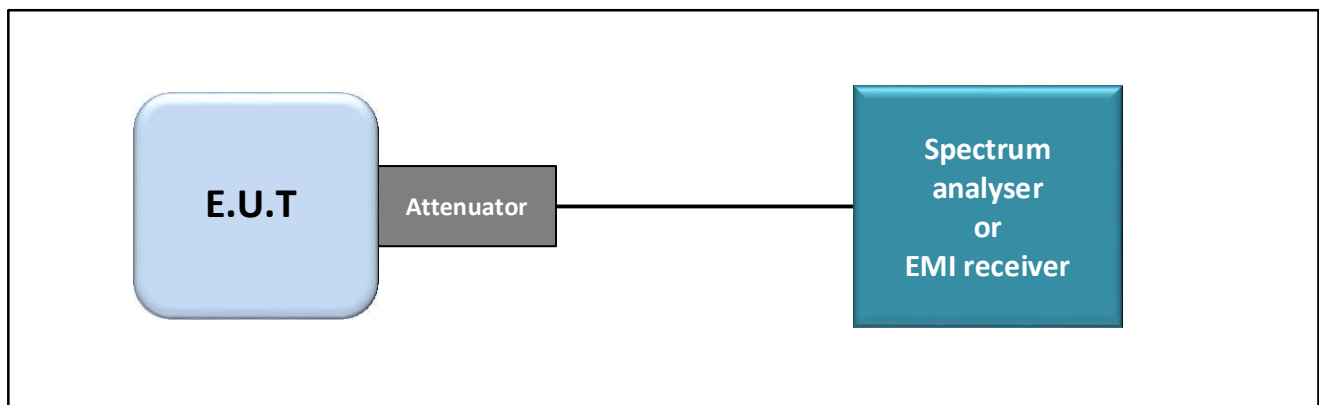
4.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : April 8, 2021
Ambient temperature : 27°C
Relative humidity : 46%

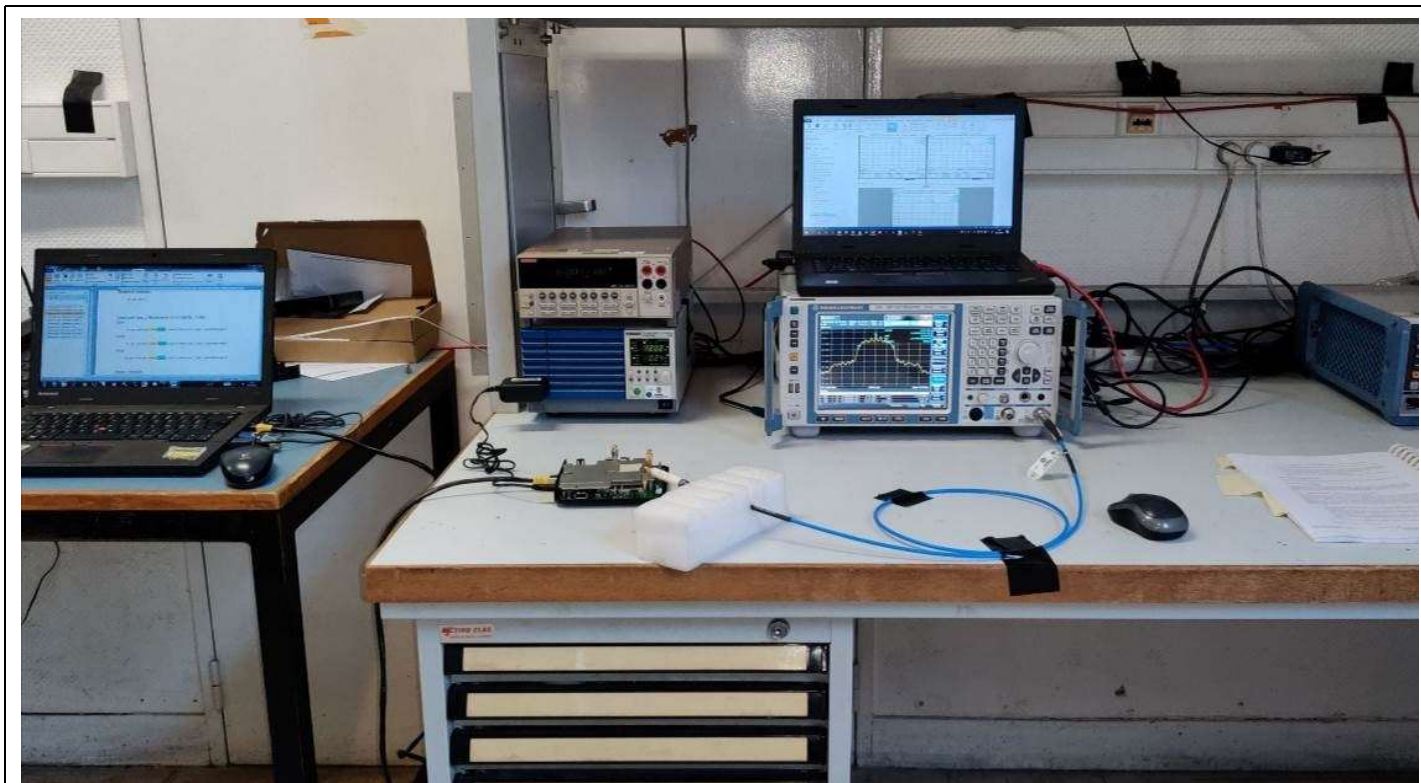
4.2. TEST SETUP

- 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:

The EUT is placed in an anechoic chamber; levels have been corrected to be in compliant with the Peak Output Power measured. The EUT is turn ON and using the MaxHold function, the frequency separation of two frequencies that were attenuated 20dB from the Peak Output Power level. A delta marker is used to measure the frequency difference as the emission bandwidth.



Test set up of 20dB Emission Bandwidth



Photograph for 20dB emission bandwidth

4.3. LIMIT

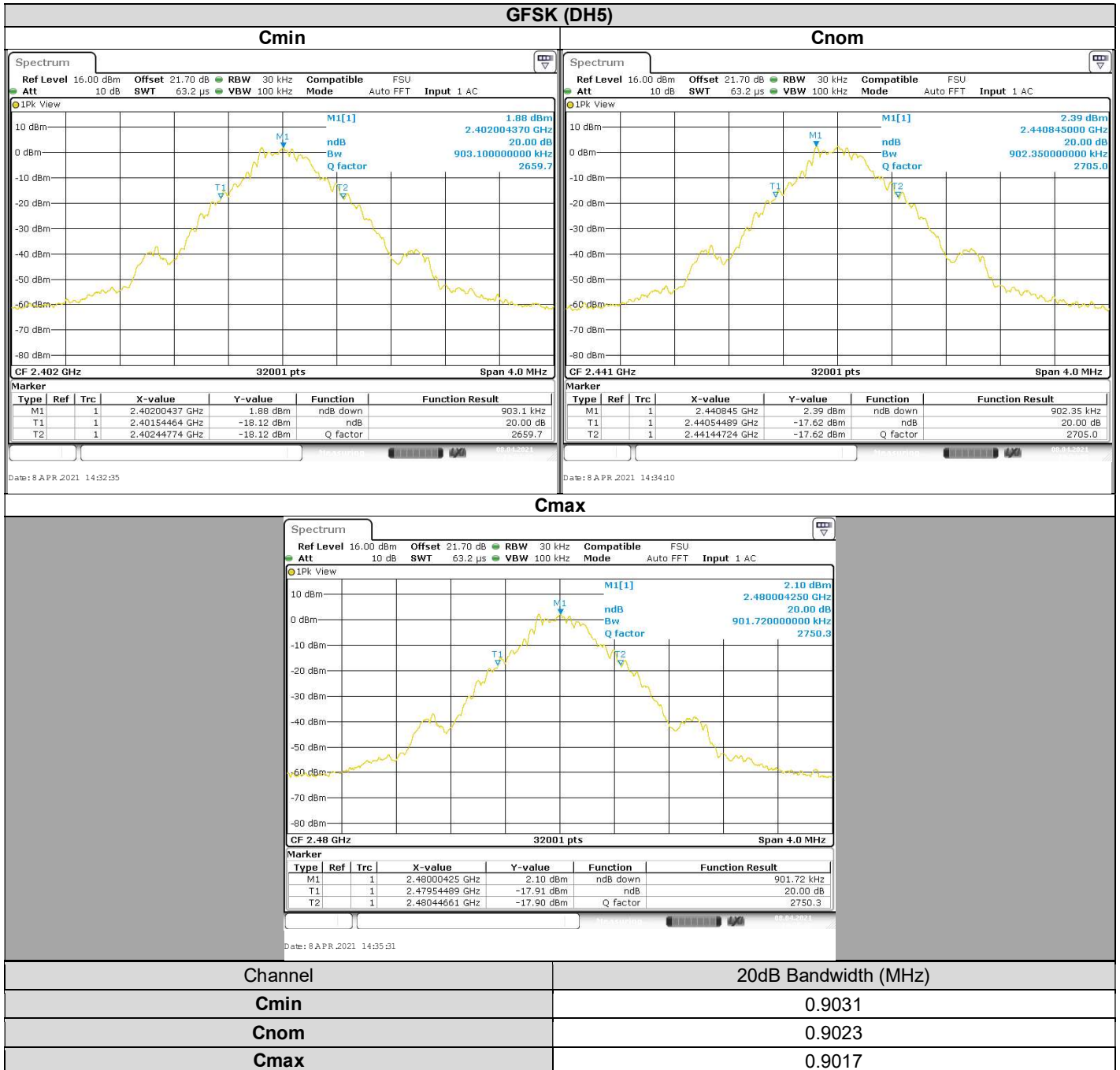
No Limit

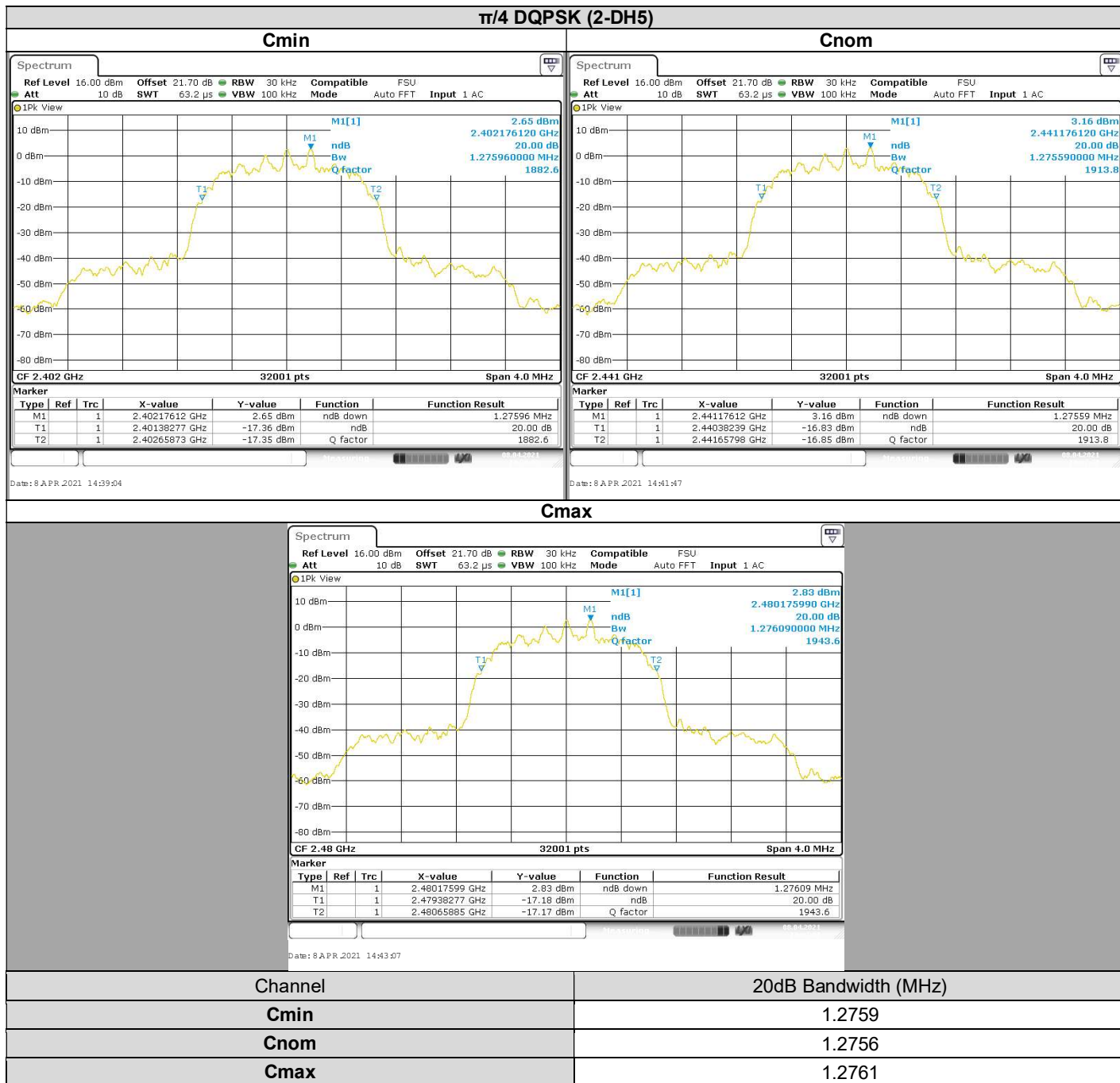
4.4. TEST EQUIPMENT LIST

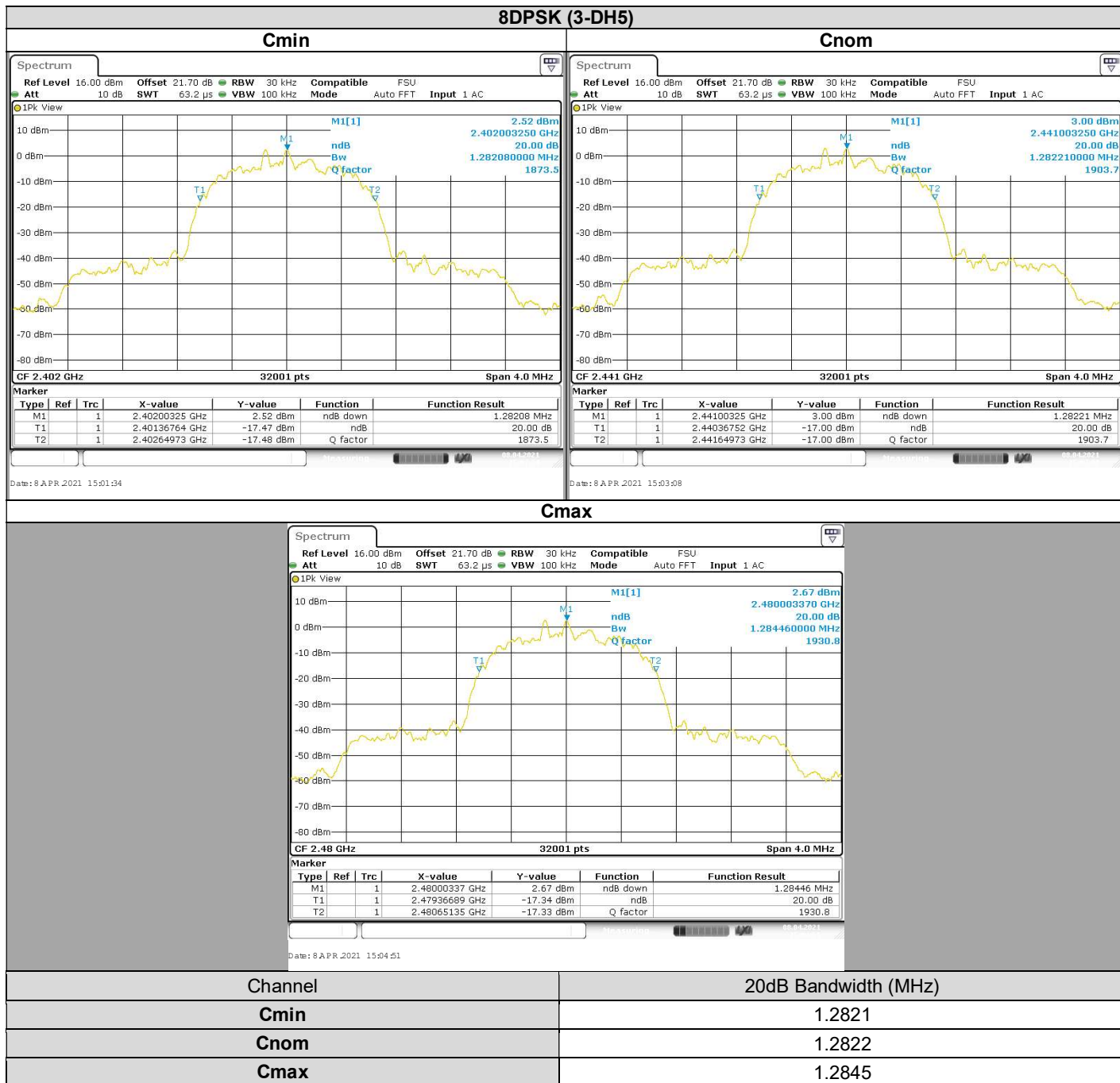
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR7	A2642026	2019/07	2021/07
Multimeter	KEITHLEY	2000	A1242090	2019/05	2021/05
Power supply	KIKUSUI	PCR500M	A7040079	See Multimeter	See Multimeter
Cable + Attenuateur 20dB	PASTERNAK	PE350-150CM	A5329973	2020/08	2021/08
Load 50 ohms	TELEGARTNER	-	A7150105	2019/04	2021/04
Load 50 ohms	TELEGARTNER	-	A7150104	2019/04	2021/04

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

4.5. RESULTS







4.6. CONCLUSION

20dB Emission Bandwidth measurement performed on the sample of the product **TECHNICOLOR** UIW4059MIL, SN: **LAB3-V0 nr.030**, 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 : April 8, 2021
Ambient temperature : 27°C
Relative humidity : 46%

5.2. TEST SETUP

- The Equipment Under Test is installed:

- ☒ On a table
- ☐ In an anechoic chamber

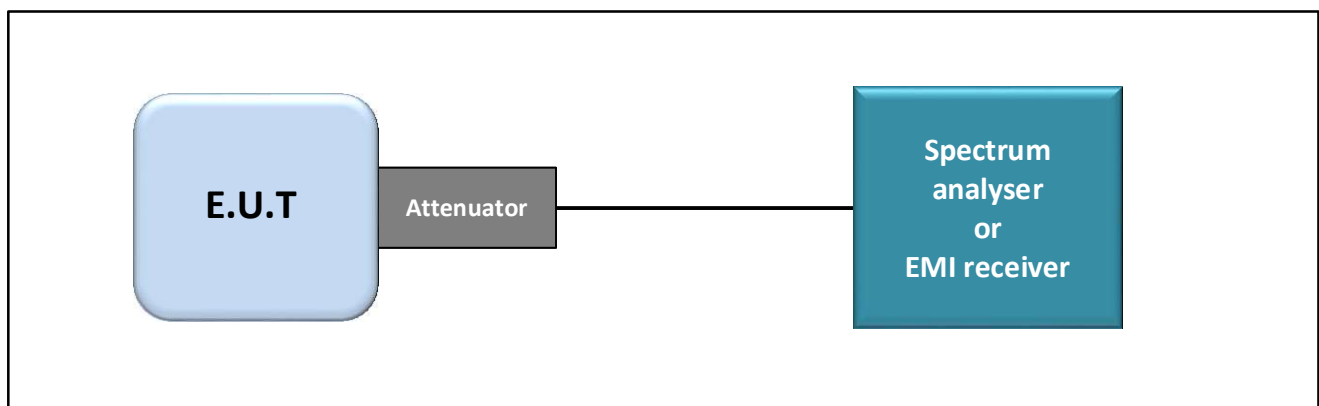
- Measurement is performed with a spectrum analyzer in:

- ☒ Conducted Method
- ☐ Radiated Method

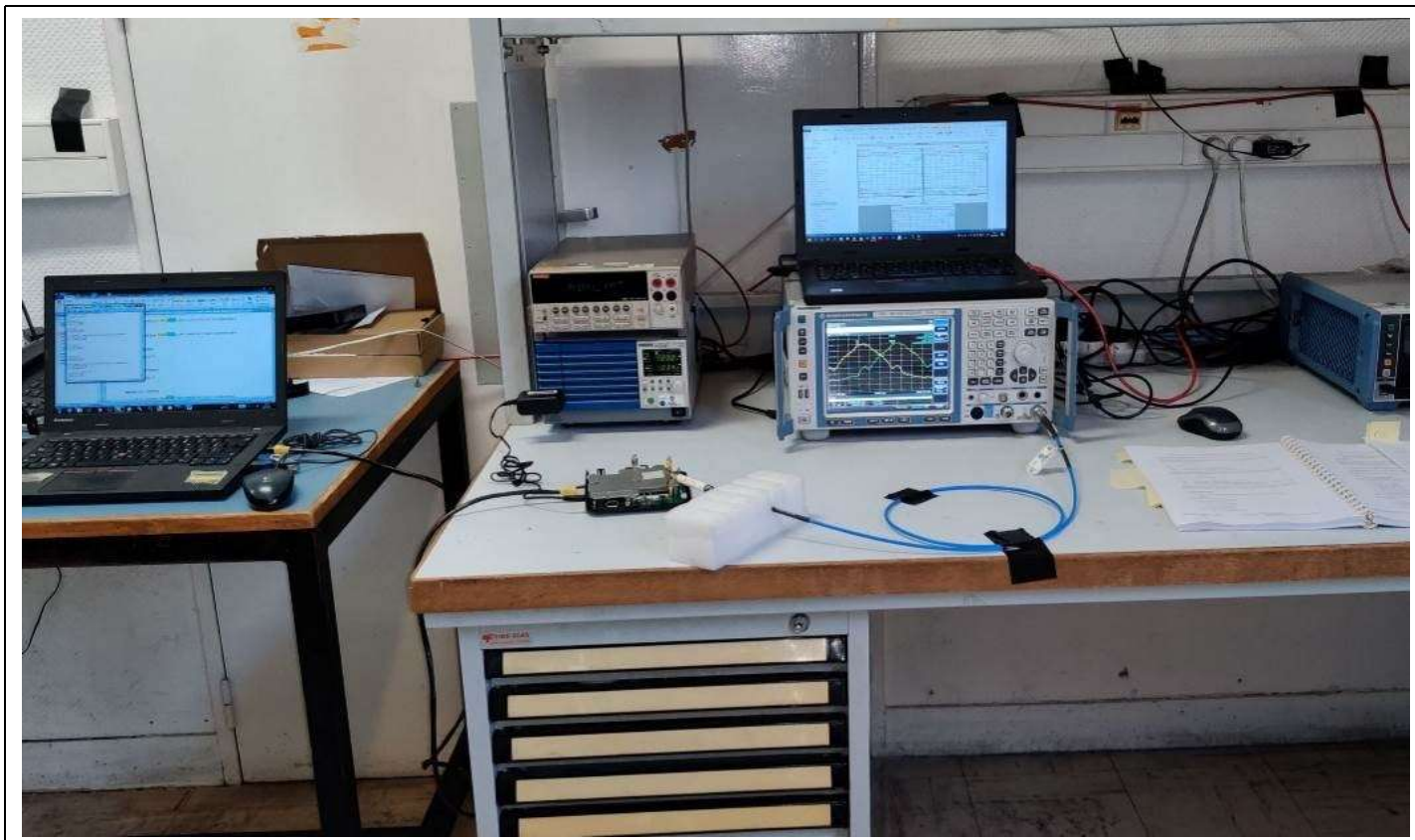
- Test Procedure:

- ☒ ANSI C63.10 § 7.8.2:

The EUT is placed in an anechoic chamber; levels have been corrected to be in compliant with the Peak Output Power measured. The EUT is turn ON and using the MaxHold function, the separation of two adjacent channels is recorded. A delta marker is used to measure the frequency difference.



Test set up of Carrier Frequency Separation



Photograph for Carrier Frequency Separation

5.3. LIMIT

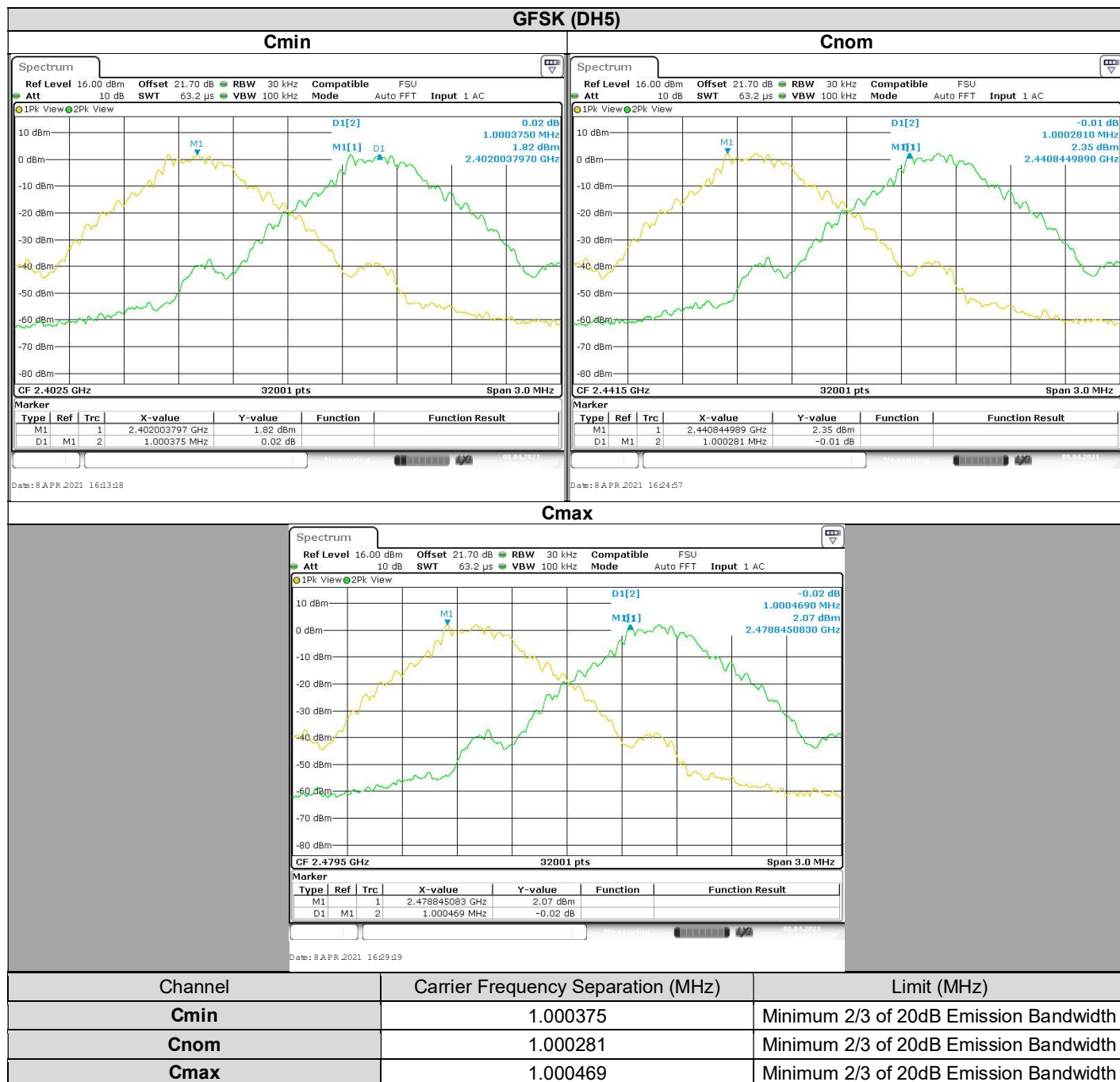
Carrier Frequency Separation shall be at least two-thirds of the 20dB Bandwidth

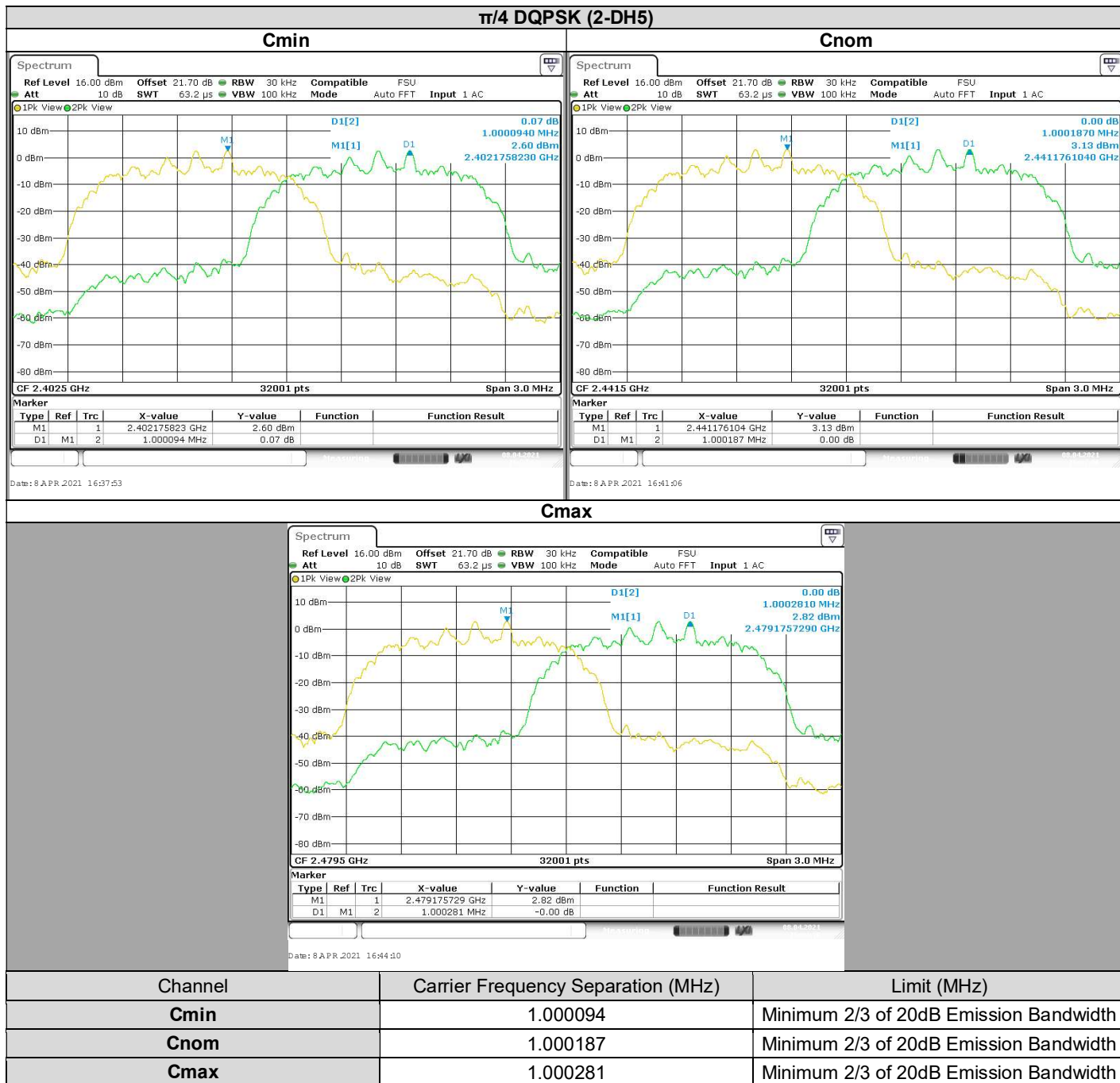
5.4. TEST EQUIPMENT LIST

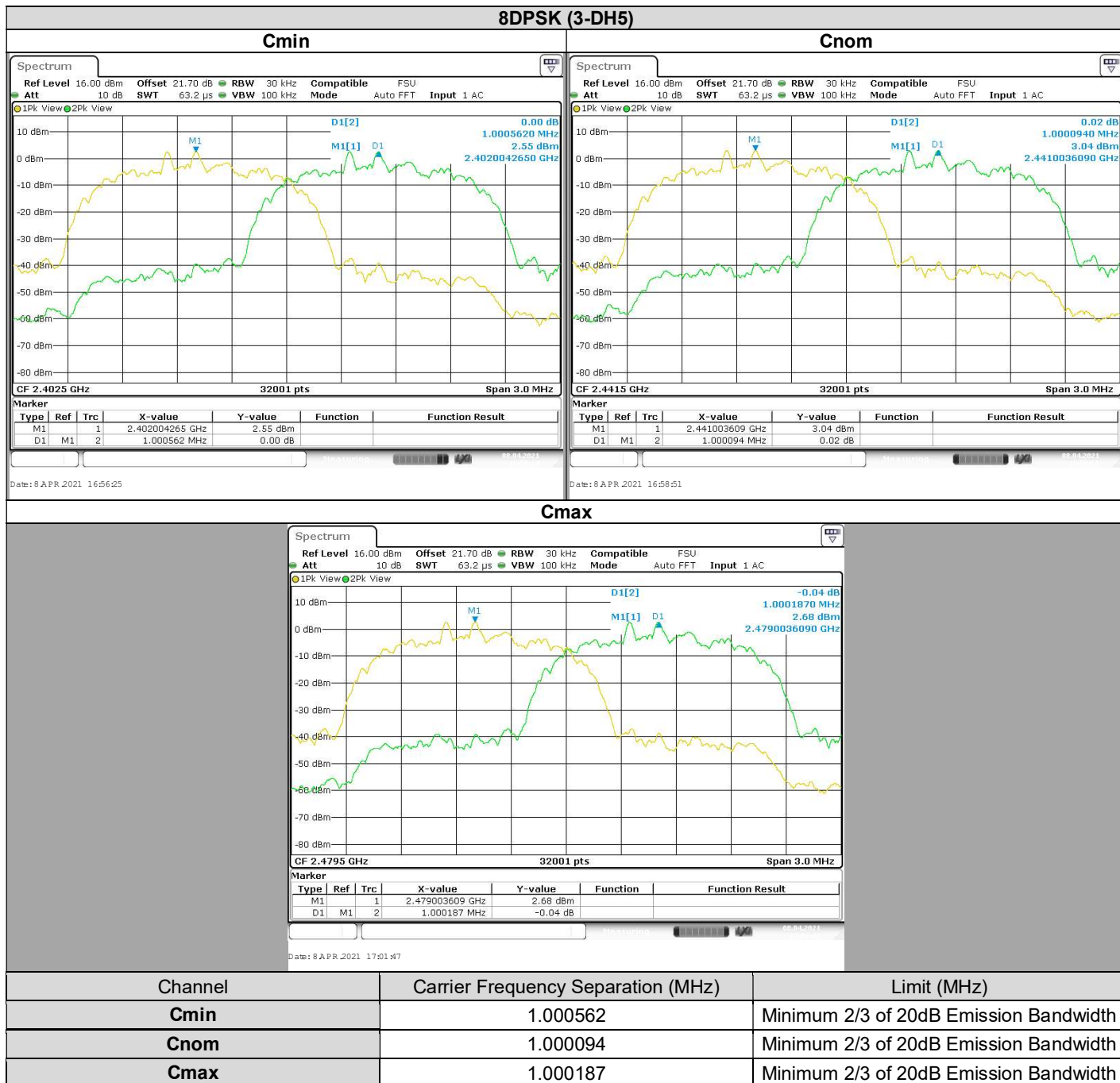
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR7	A2642026	2019/07	2021/07
Multimeter	KEITHLEY	2000	A1242090	2019/05	2021/05
Power supply	KIKUSUI	PCR500M	A7040079	See Multimeter	See Multimeter
Cable + Attenuateur 20dB	PASTERNAK	PE350-150CM	A5329973	2020/08	2021/08
Load 50 ohms	TELEGARTNER	-	A7150105	2019/04	2021/04
Load 50 ohms	TELEGARTNER	-	A7150104	2019/04	2021/04

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

5.5. RESULTS







5.6. CONCLUSION

Carrier Frequency Separation measurement performed on the sample of the product **TECHNICOLOR** UIW4059MIL, SN: **LAB3-V0 nr.030**, 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 MAHOOUNGOU
Date of test : April 8, 2021
Ambient temperature : 27°C
Relative humidity : 46%

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

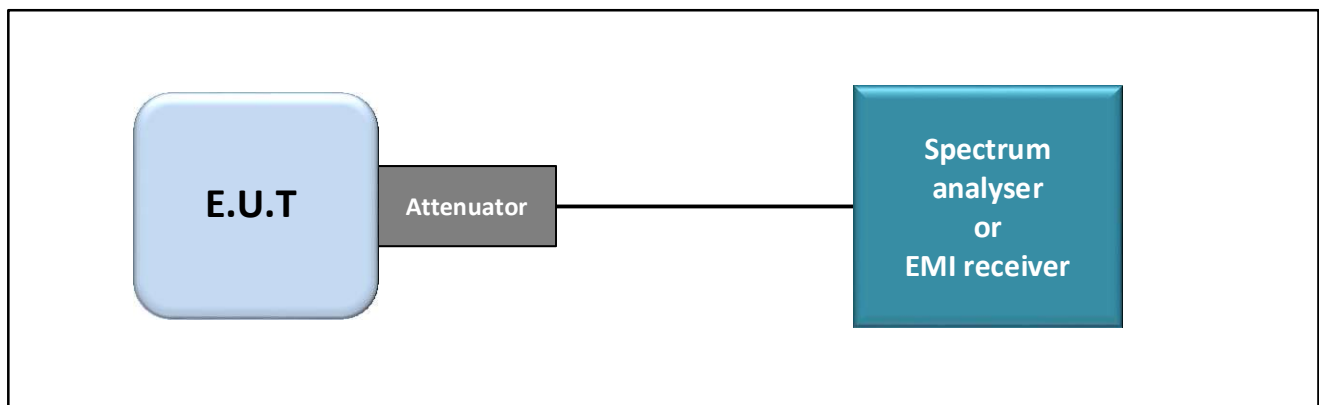
- Test Procedure:

- ☒ ANSI C63.10 § 7.8.3:

The EUT is turn ON and using the MaxHold function and a delta marker the number of frequencies used for this FHSS system is recorded, see following graphs.

RBW: 100kHz

VBW: 300kHz



Test set up of Number of Hopping Frequency



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	ESR7	A2642026	2019/07	2021/07
Multimeter	KEITHLEY	2000	A1242090	2019/05	2021/05
Power supply	KIKUSUI	PCR500M	A7040079	See Multimeter	See Multimeter
Cable + Attenuateur 20dB	PASTERNAK	PE350-150CM	A5329973	2020/08	2021/08
Load 50 ohms	TELEGARTNER	-	A7150105	2019/04	2021/04
Load 50 ohms	TELEGARTNER	-	A7150104	2019/04	2021/04

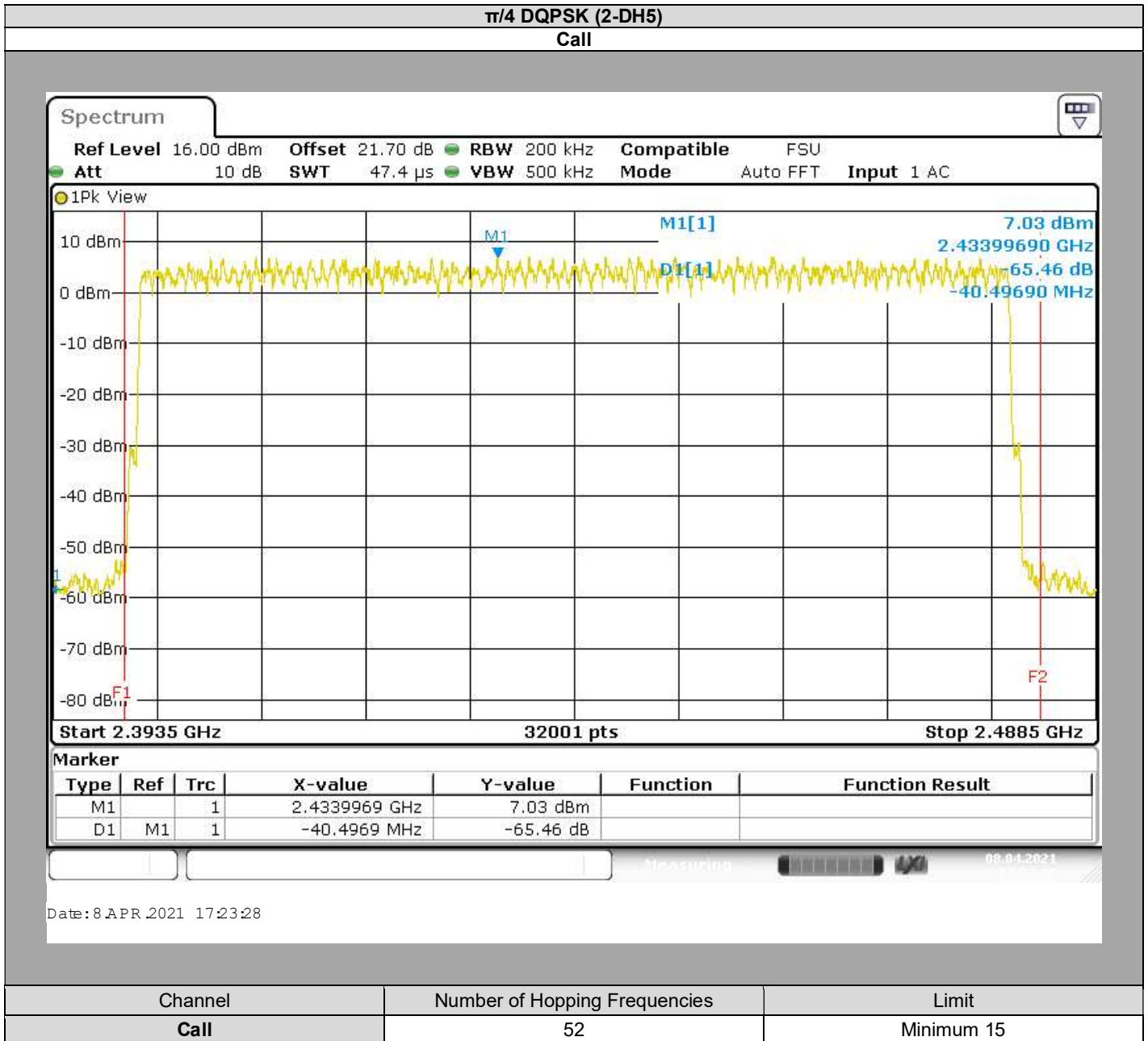
Note: In our quality system, the test equipment calibration due is more & less 2 months

6.5. RESULTS



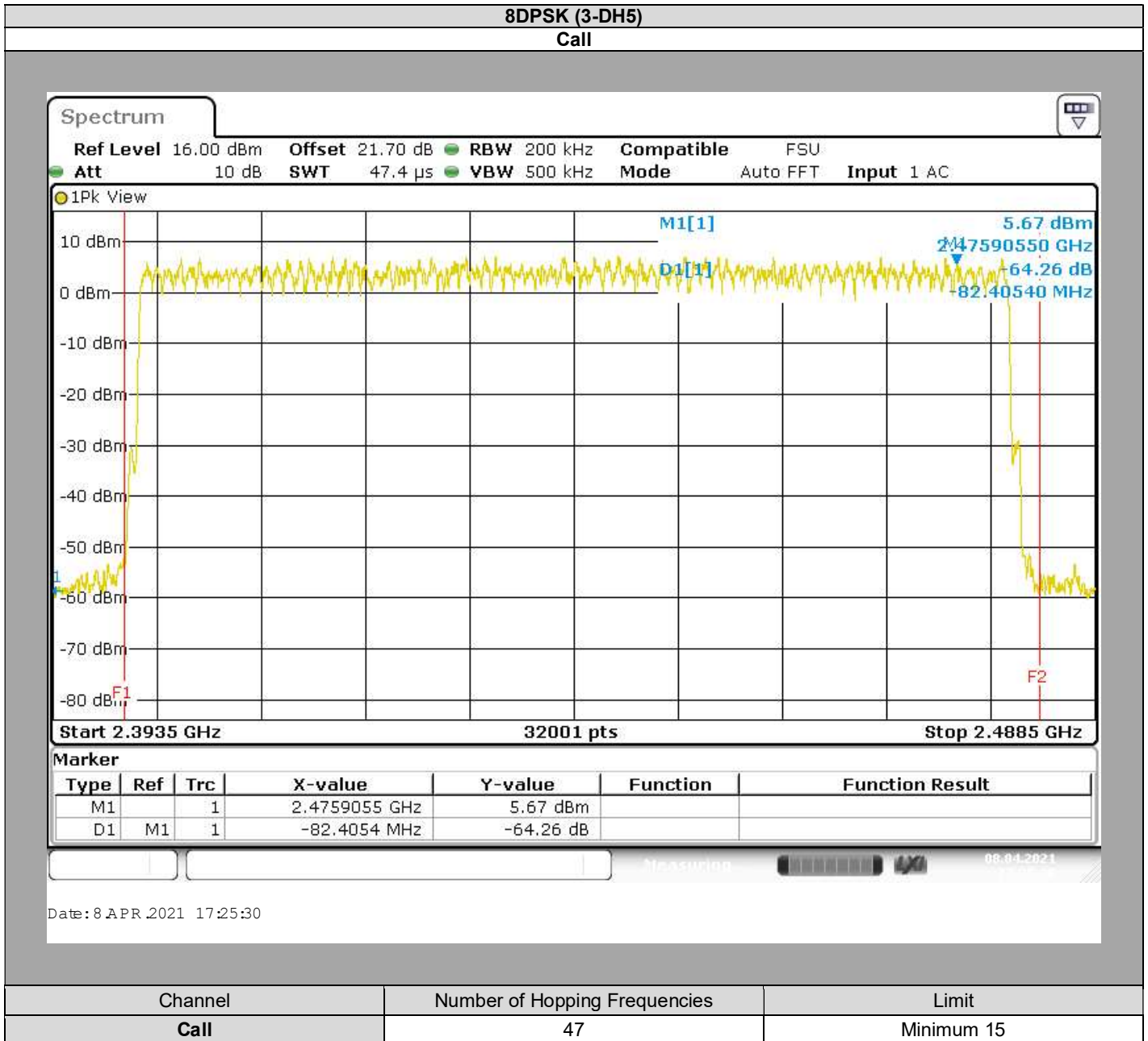


L C I E





L C I E



6.6. CONCLUSION

Number of Frequency Hopping measurement performed on the sample of the product **TECHNICOLOR UIW4059MIL**, SN: **LAB3-V0 nr.030**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247** limits.