





Bluetooth Classic Template: Release May 28th, 2020

# **TEST REPORT**

#### N°: 172319-764277-B

Version: 02

Subject

Issued to

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

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

#### Apparatus under test

♥ Product

- 🗞 Trade mark
- ♦ Manufacturer
- School with the second second
- Serial number
- ♥ FCC ID

#### Conclusion

Test date Test location Test Site Registration Number Designation Number Sample receipt date Composition of document Document issued on

> Written by : Armand MAHOUNGOU Tests operator



See Test Program chapter

April 8, 2021 to April 15, 2021 Moirans 6500A-1 & 6500A-3 197516 FR0008 April 6, 2021 94 pages June 8, 2021



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#### LCIE

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## **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.



### SUMMARY

1.	TEST PROGRAM	4
2.	EQUIPMENT UNDER TEST: CONFIGURATION (DECLARED BY PROVIDER)	5
3.	OCCUPIED BANDWIDTH	. 11
4.	20DB EMISSION BANDWIDTH	. 16
5.	CARRIER FREQUENCY SEPARATION	. 21
6.	NUMBER OF HOPPING FREQUENCY	. 26
7.	TIME OF OCCUPANCY	. 31
8.	DUTY CYCLE	. 37
9.	MAXIMUM CONDUCTED OUTPUT POWER	. 42
10.	UNWANTED EMISSIONS INTO NON-RESTRICTED FREQUENCY BANDS AT THE BAND EDGE	E47
11.	UNWANTED EMISSIONS INTO NON-RESTRICTED FREQUENCY BANDS	. 56
12.	AC POWER LINE CONDUCTED EMISSIONS	. 65
13.	UNWANTED EMISSIONS IN RESTRICTED FREQUENCY BANDS	. 72
14.	UNCERTAINTIES CHART	. 94



#### 1. TEST PROGRAM

#### **References**

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

#### Radio requirement:

	Test result -	Comments	
☑ PASS			□ NP(1)
☑ PASS			□ NP(1)
☑ PASS			□ NP(1)
☑ PASS			□ NP(1)
☑ PASS			□ NP(1)
☑ PASS			□ NP(1)
☑ PASS			□ NP(1)
☑ PASS			□ NP(1)
☑ PASS		□ NA()	□ NP(1)
☑ PASS		□ NA(2)	□ NP(1)
☑ PASS			□ NP(1)
☑ PASS			□ NP(1)
	<ul> <li>✓ PASS</li> </ul>	Image: Pass       □ Fail         Image: Pass       □ Fail	Image: Pass       □ Fail       □ NA         Image: Pass       □ Fail       □ NA()         Image: Pass       □ Fail       □ NA(2)         Image: Pass       □ Fail       □ NA

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







#### Power supply:

Name	Туре	Rating	Reference / Sn	Comments
Supply1	☑ AC □ DC □ Battery	120-240V;50-60Hz	-	-

#### Inputs/outputs - Cable:

Access	Туре	Length used (m)	Declared <3m	Shielded	Under test	Comments
1	Mains power supply cable	1.2	$\checkmark$			-
2	HDMI cable	1.5	$\checkmark$	$\checkmark$		-
3	Ethernet cable	1.5	$\checkmark$	$\checkmark$		-

#### Auxiliary equipment used during test:

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



#### Equipment information:

Plustaath Classia Type:	□ v1.2		□ v2.0	🗆 v2.1+ED	)R	□ v3.0+HS
Bluetooth Classic Type:	□ v4.0		□ <b>v</b>	4.1		<b>☑ v4.2</b>
Frequency band:	[2400 – 2483.5] MHz					
Spectrum Modulation:			⊠ FH	ISS		
Number of Channel:	Maximum:		79	Minimum	:	20
Spacing channel:			1M	Hz		
Channel bandwidth:			1M	Hz		
Antenna Type:	⊠ Integral		🗆 Ext	ernal		Dedicated
Antenna connector:	⊠ Yes			No	🗆 T	emporary for test
Transmit chains:			1			
	Single antenna					
Beam forming gain:	No					
Receiver chains			1			
Type of equipment:	☑ Stand-alon	е	🗆 Plug-in		Combined	
Equipment arrangement:	☑ Tabletop		Floor-standing		$\Box$ M	ultiple orientations
Ad-Hoc mode:	$\checkmark$	Yes			□ No	
Duty cycle:	Continuous d	uty	🗆 Intermi	ttent duty 🛛 🗆 100% duty		□ 100% duty
Equipment type:	☑ Produce	ction mo		Pre-production model		
	Tmin:		□ -20°C	□ 0°C	;	⊠ 5°C
Operating temperature range:	Tnom:			20°C		
	Tmax:		□ 35°C	□ 55°C	2	⊠ 45°C
Type of power source:	AC power sup	ply	☑ DC power supply			□ Battery
Operating voltage range:	Vnom:		☑ 120V/60Hz		☑ 12 VDC +/-5%	
Operating voltage range.	vnom.		☑ 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):	<b>V</b> . :	UIW4059MIL_HSW 0.7	



		CHA	NNEL 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	$\checkmark$			
	GFSK	1	AUX1				
	π/4 DQPSK	2	2-DH1				
	π/4 DQPSK	2	2-DH3				
	π/4 DQPSK	2	2-DH5	$\checkmark$			
V	8DPSK	3	3-DH1				
	8DPSK	3	3-DH3				
	8DPSK	3	3-DH5	$\checkmark$			



#### 2.2. **RUNNING MODE**

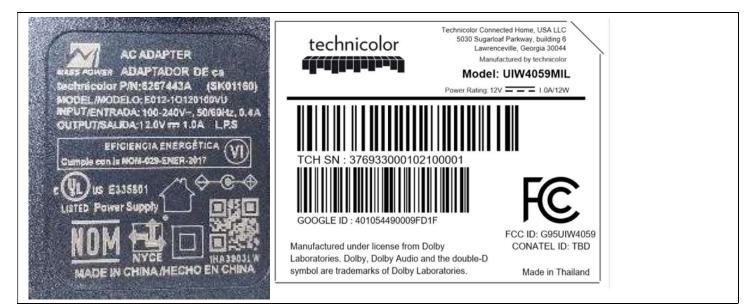
Test mode	Description of test mode
Test mode 1	Permanent emission with modulation on a fixed channel in the data rate that produced the highest power
Test mode 2	Permanent emission with modulation & hopping in the data rate that produced the highest power

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:
 a. – See document "UIW4059MIL\_ BT control\_V1.docx" (provided by customer) for the command used during test.



#### 2.3. EQUIPMENT LABELLING



#### 2.4. EQUIPMENT MODIFICATION

 $\square$  None  $\square$  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 $\mu$ 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 $\mu$ V/m.

FS = 52.5 + 7.4 + 1.1 – 29 = 32 dBµV/m

The 32 dB $\mu$ V/m value can be mathematically converted to its corresponding level in  $\mu$ V/m. Level in  $\mu$ V/m = Common Antilogarithm [(32dB $\mu$ V/m)/20] = 39.8  $\mu$ 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

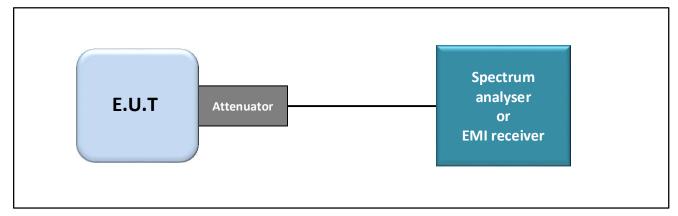
- □ In an anechoic chamber
- Measurement is performed with a spectrum analyzer in:
- ☑ Conducted Method
- □ Radiated Method

- 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)  $\ge$  3 x 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

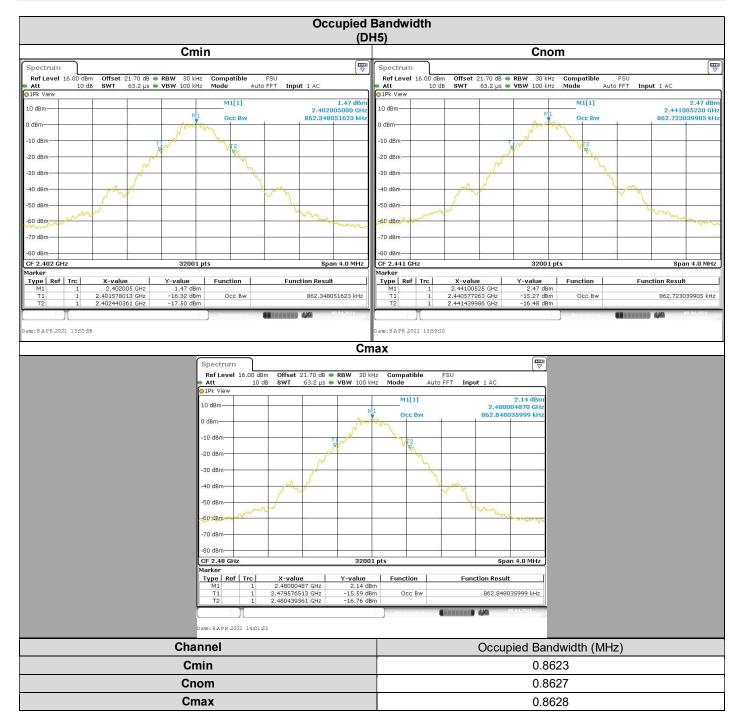
#### 3.4. TEST EQUIPMENT LIST

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	PASTERNACK	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

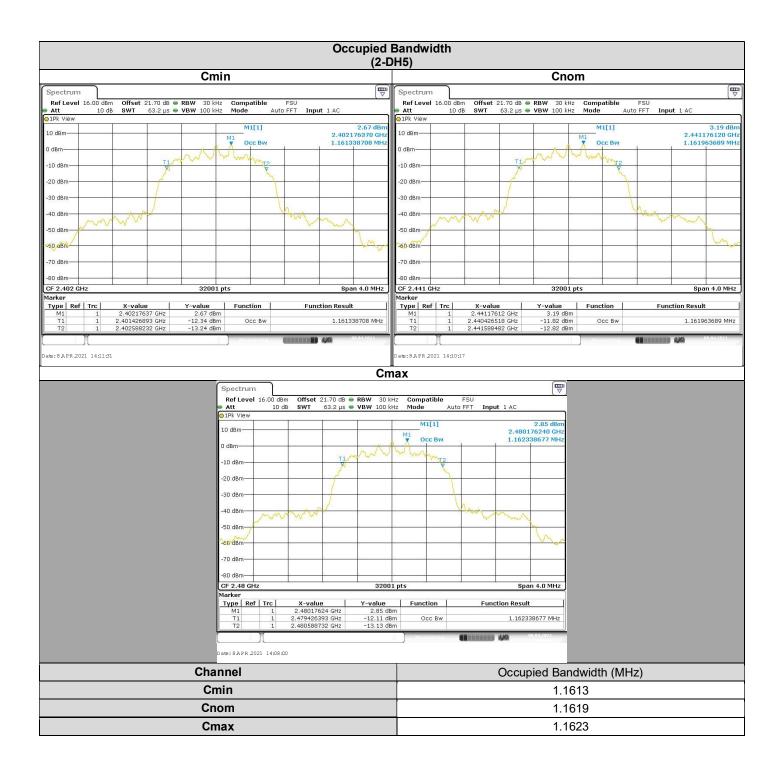
Note: In our quality system, the test equipment calibration due is more & less 2 months



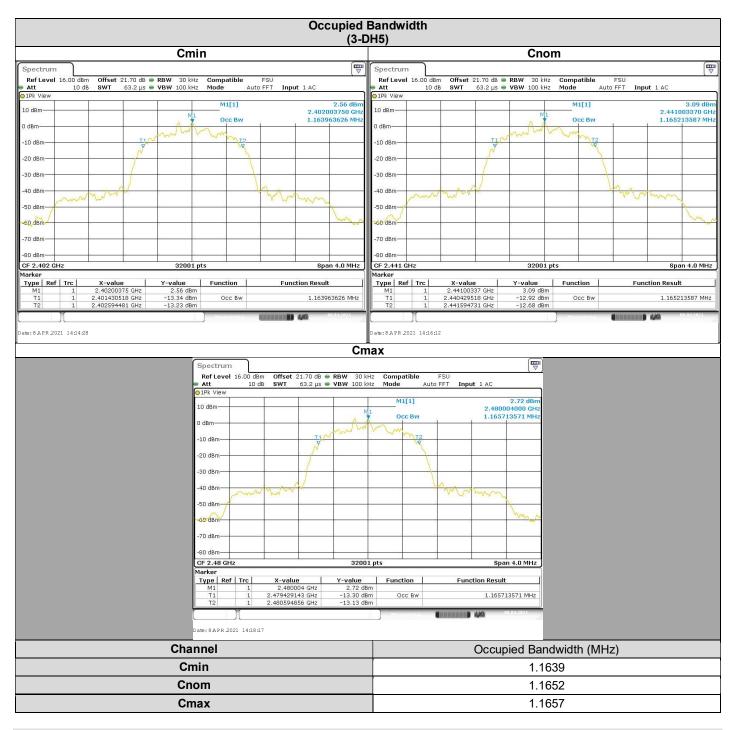
#### 3.5. RESULTS











#### 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

: Armand MAHOUNGOU
: April 8, 2021
: 27°C
: 46%

#### 4.2. TEST SETUP

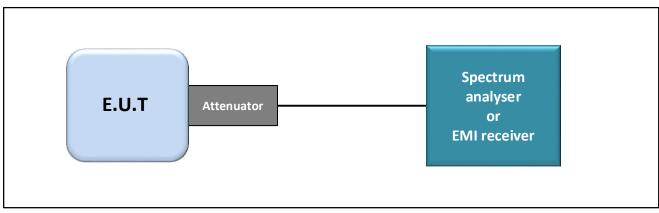
The Equipment Under Test is installed:
 ☑ On a table
 □ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

☑ Conducted Method
 □ Radiated Method

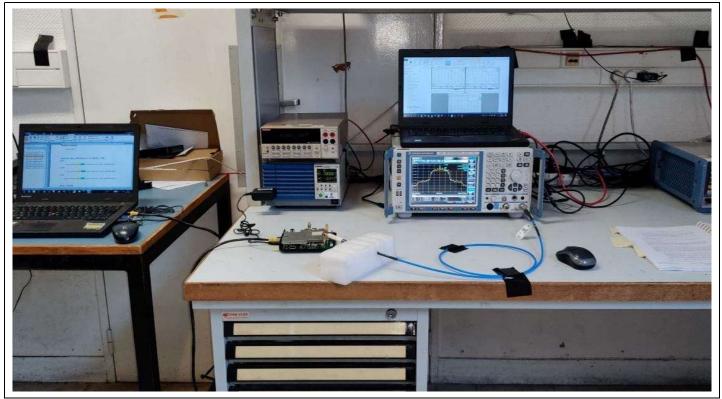
- Test Procedure: ☑ ANSI C63.10 § 6.9.2:

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

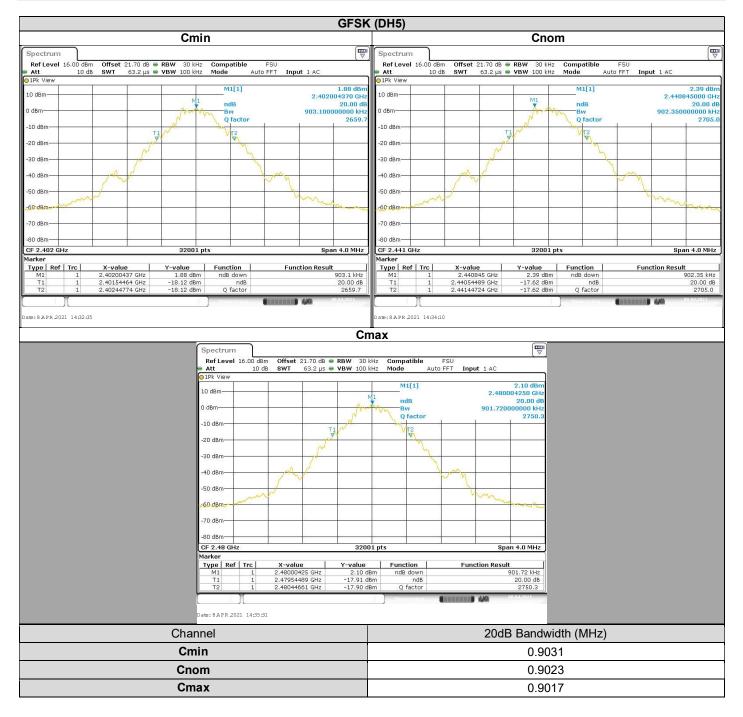
#### 4.4. TEST EQUIPMENT LIST

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	PASTERNACK	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

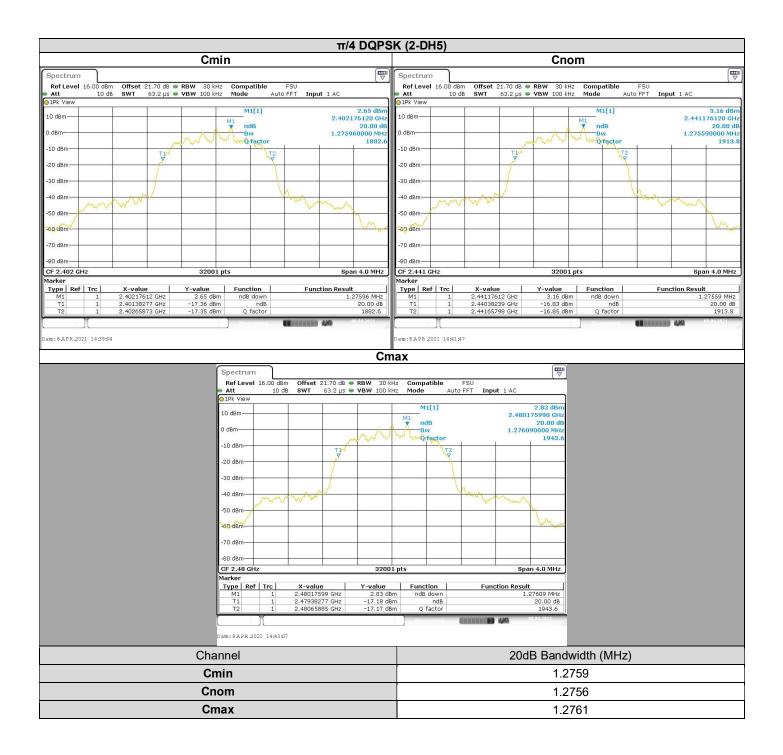
Note: In our quality system, the test equipment calibration due is more & less 2 months



#### 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

: Armand MAHOUNGOU
: April 8, 2021
: 27°C
: 46%

#### 5.2. TEST SETUP

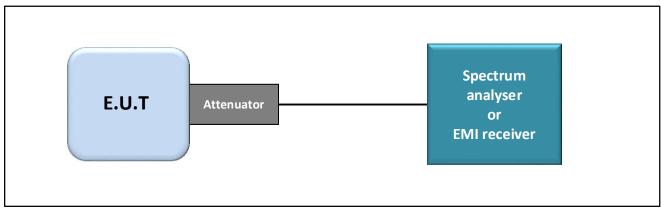
The Equipment Under Test is installed:
☑ On a table
□ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:  $\ensuremath{\boxtimes}$  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

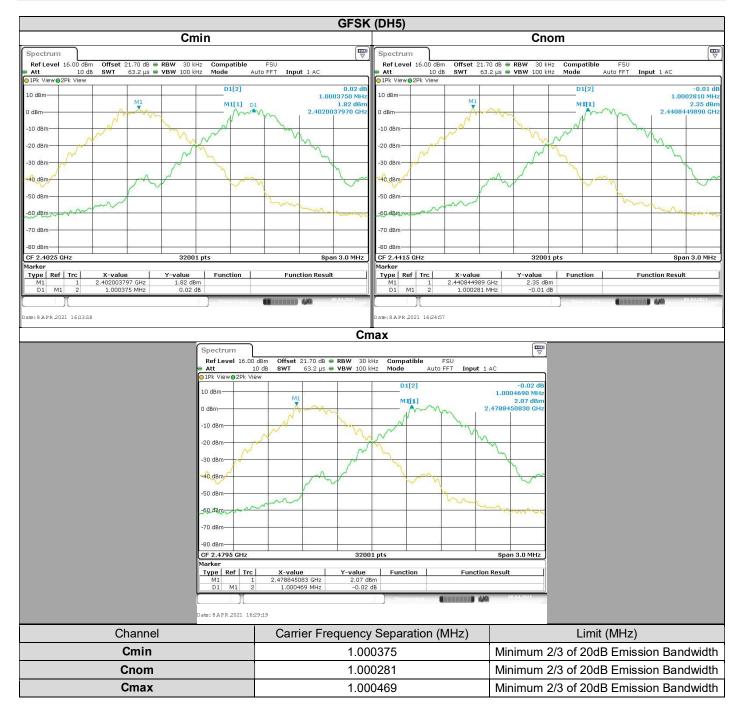
#### 5.4. TEST EQUIPMENT LIST

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	PASTERNACK	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

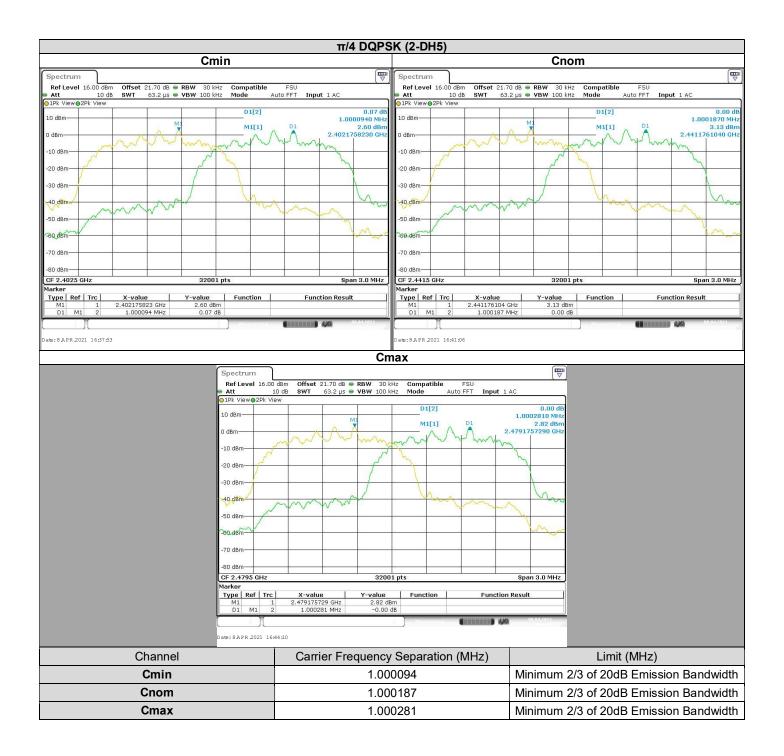
Note: In our quality system, the test equipment calibration due is more & less 2 months



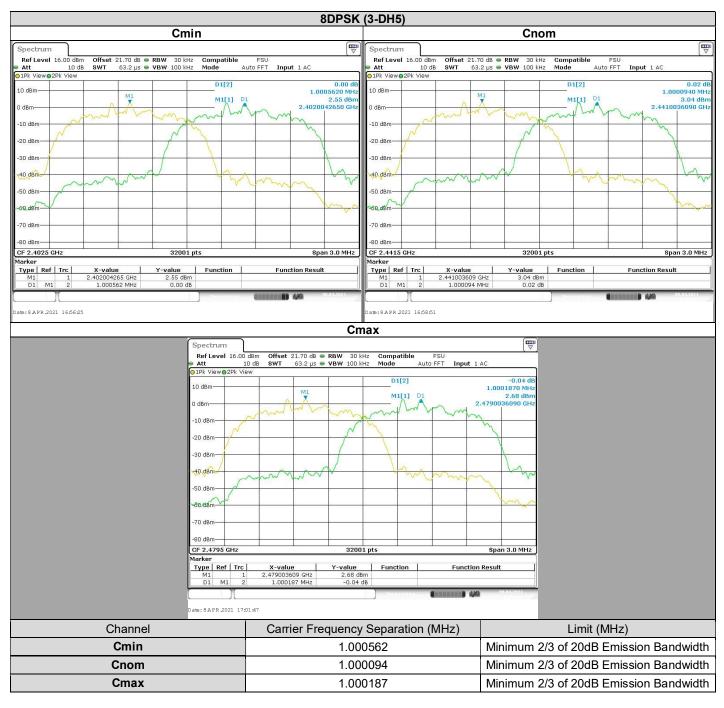
#### 5.5. RESULTS











#### 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

: Armand MAHOUNGOU
: April 8, 2021
: 27°C
: 46%

#### 6.2. TEST SETUP

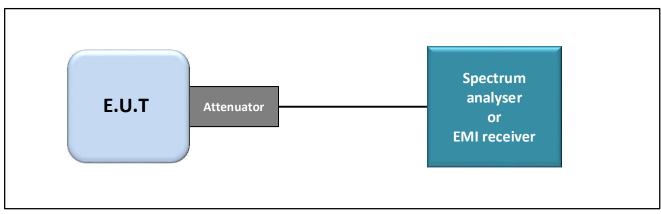
The Equipment Under Test is installed:
 ☑ On a table
 □ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:  $\ensuremath{\boxtimes}$  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

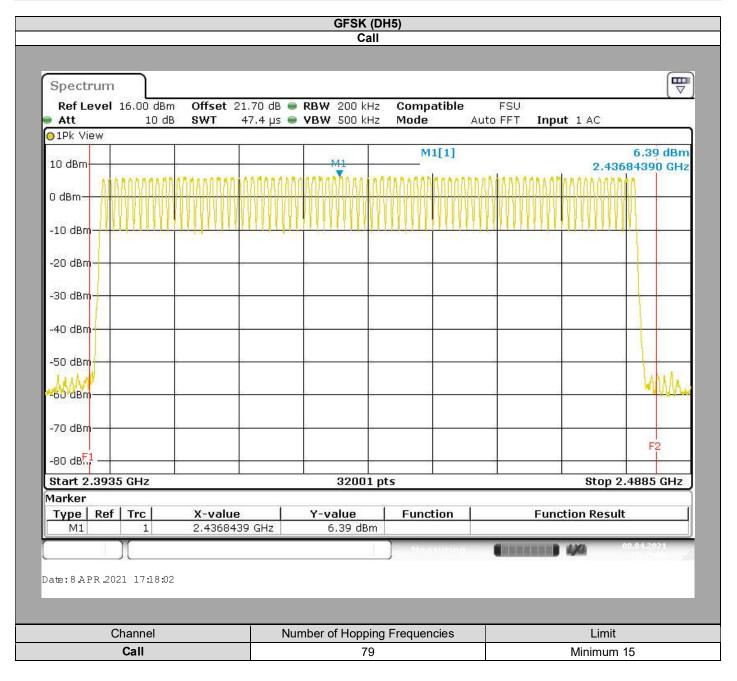
#### 6.4. TEST EQUIPMENT LIST

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	PASTERNACK	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

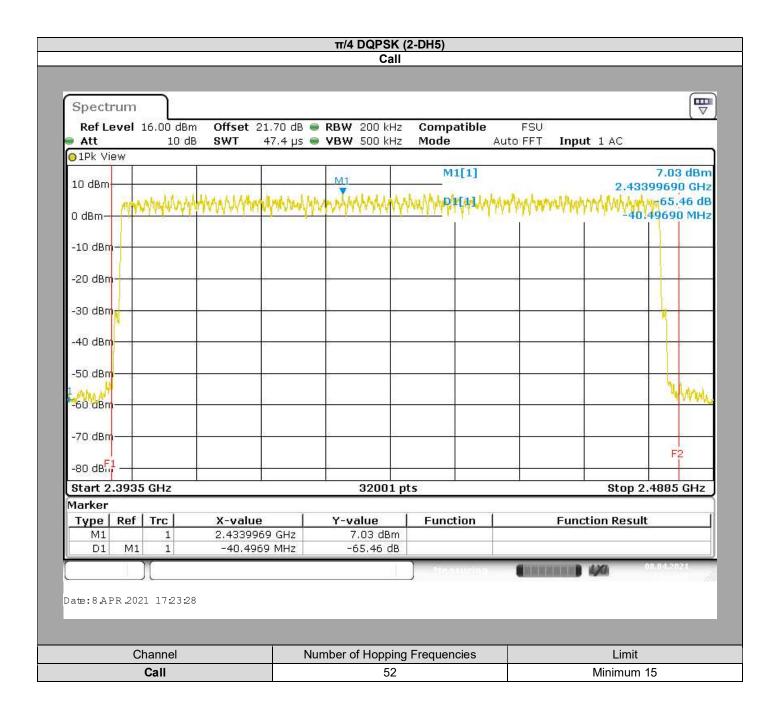
Note: In our quality system, the test equipment calibration due is more & less 2 months



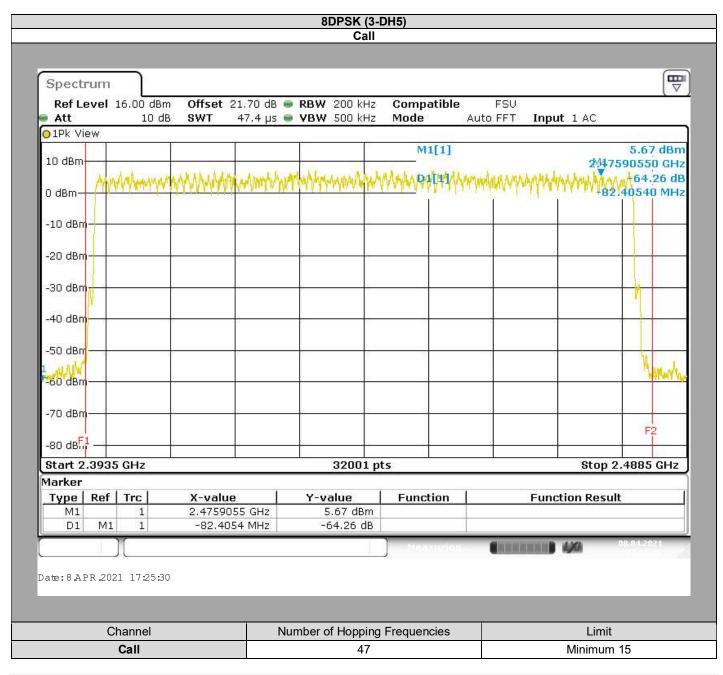
#### 6.5. RESULTS











#### 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.