



# TEST REPORT

**Application No.:** HR/2021/B0010

**Applicant:** Quectel Wireless Solutions Co., Ltd.

**Address of Applicant:** Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

**Manufacturer:** Quectel Wireless Solutions Co., Ltd.

**Address of Manufacturer:** Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

**EUT Description:** Wi-Fi & Bluetooth Module

**Model No.:** AF51Y

**Trade Mark:** QUECTEL

**FCC ID:** XMR202201AF51Y

**Standards:** 47 CFR FCC Part 2, Subpart J  
47 CFR Part 15, Subpart C

**Date of Receipt:** 2022/2/12

**Date of Test:** 2022/2/20 to 2022/3/11

**Date of Issue:** 2022/4/2

<b>Test Result :</b>	<b>PASS *</b>
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\* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

*Panta Sun*

Panta Sun  
Wireless Laboratory Manager



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Report No.: SUHR/2021/B001001  
Rev.: 02  
Page: 2 of 97

## 1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2022/3/15		Original
02		2022/4/2		Add A2LA+ILAC logo

Prepared By		Weller Liu
		(Weller Liu) / Test Supervisor
Checked By		Well Wei
		(Well Wei) / Reviewer

Remark: This report supersedes our previous report SUHR/2021/B001001, issued on 2021-03-15, which is hereby deemed null and void.



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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 3 of 97

## 2 Test Summary

Test Item	FCC Rules No.	Test Method	Test Result	Result
Antenna Requirement	15.203/247(b)	--	Clause 4.1	PASS
AC Power Line Conducted Emission	15.207	ANSI C63.10 (2013)	Clause 4.3	PASS
Conducted Peak Output Power	15.247 (b)(1)	ANSI C63.10 (2013)	Clause 4.4	PASS
20dB Emission Bandwidth & 99% Occupied Bandwidth	15.247 (a)(1)	ANSI C63.10 (2013)	Clause 4.5	PASS
Carrier Frequencies Separation	15.247 (a)(1)	ANSI C63.10 (2013)	Clause 4.6	PASS
Hopping Channel Number	15.247 (a)(1)	ANSI C63.10 (2013)	Clause 4.7	PASS
Dwell Time	15.247 (a)(1)	ANSI C63.10 (2013)	Clause 4.8	PASS
Band-edge for RF Conducted Emissions	15.247(d)	ANSI C63.10 (2013)	Clause 4.9	PASS
RF Conducted Spurious Emissions	15.247(d)	ANSI C63.10 (2013)	Clause 4.10	PASS
Radiated Spurious emissions	15.247(d); 15.205/15.209	ANSI C63.10 (2013)	Clause 4.11	PASS
Restricted bands around fundamental frequency (Radiated Emission)	15.247(d); 15.205/15.209	ANSI C63.10 (2013)	Clause 4.12	PASS



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## Contents

1	Version .....	2
2	Test Summary .....	3
3	General Information .....	5
3.1	Details of Client .....	5
3.2	Test Location .....	5
3.3	Test Facility .....	5
3.4	General Description of EUT .....	6
3.5	Test Environment .....	8
3.6	Description of Support Units .....	8
4	Test results and Measurement Data .....	9
4.1	Antenna Requirement .....	9
4.2	Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence .....	10
4.2.1	Test Requirement: .....	10
4.2.2	Conclusion .....	10
4.3	AC Power Line Conducted Emissions .....	12
4.4	Conducted Output Power .....	16
4.5	20dB Emission Bandwidth .....	17
4.6	Carrier Frequencies Separation .....	18
4.7	Hopping Channel Number .....	19
4.8	Dwell Time .....	20
4.9	Band-edge for RF Conducted Emissions .....	21
4.10	Spurious RF Conducted Emissions .....	22
4.11	Radiated Spurious Emissions .....	23
4.12	Restricted bands around fundamental frequency .....	26
5	Measurement Uncertainty (95% confidence levels, k=2) .....	28
6	Equipment List .....	29
7	Photographs - EUT Constructional Details .....	31





Report No.: SUHR/2021/B001001  
Rev.: 02  
Page: 5 of 97

### 3 General Information

#### 3.1 Details of Client

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Address of Applicant:	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
Manufacturer:	Quectel Wireless Solutions Co., Ltd.
Address of Manufacturer:	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

#### 3.2 Test Location

Company:	SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd
Address:	South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone
Post code:	215000
Test engineer:	Weller Liu, King-p Li, Nature Shen, Tizzy Song

#### 3.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **A2LA (Certificate No. 6336.01)**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

• **Innovation, Science and Economic Development Canada**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

• **FCC –Designation Number: CN1312**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number: 717327



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Report No.: SUHR/2021/B001001  
 Rev.: 02  
 Page: 6 of 97

### 3.4 General Description of EUT

EUT Description:	Wi-Fi & Bluetooth Module
Model No.:	AF51Y
Trade Mark:	QUECTEL
Hardware Version:	R1.0
Software Version:	AG525RGLAAR01A16M4G_OCPU_01.011 (Remark: the SW of branch is Post-CS[13]0.0.125.1)
Operation Frequency:	2400MHz~2483.5MHz $f_c = 2402 \text{ MHz} + N * 1 \text{ MHz}$ , where: - $f_c$ = "Operating Frequency" in MHz, - $N$ = "Channel Number" with the range from 0 to 78.
Bluetooth version:	Bluetooth V5.2
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	<input type="checkbox"/> Portable Device, <input checked="" type="checkbox"/> Module
Antenna Type:	<input checked="" type="checkbox"/> External, <input type="checkbox"/> Integrated
Antenna Gain*:	<input checked="" type="checkbox"/> Provided by client -1.38dBi(Ant2);
RF Cable*:	<input checked="" type="checkbox"/> Provided by client 0.5dB
<p>Note: *Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information, SGS is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.</p> <p>Remark:          As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.</p>	



Report No.: SUHR/2021/B001001

Rev.: 02

Page: 7 of 97

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

Remark:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The Lowest channel(CH0)	2402MHz
The Middle channel(CH39)	2441MHz
The Highest channel(CH78)	2480MHz



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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 8 of 97

### 3.5 Test Environment

Environment Parameter	101.0 kPa Selected Values During Tests	
Relative Humidity	44-46 % RH Ambient	
Value	Temperature(°C)	Voltage(V)
NTNV	22~23	3.8
LTNV	-40	3.8
HTNV	85	3.8
Remark: NV: Normal Voltage NT: Normal Temperature LT: Low Extreme Test Temperature HT: High Extreme Test Temperature		

### 3.6 Description of Support Units

Manufacturer	Description	Model
Quectel	Mother board	V2X&5G-EVB
Qualcomm	Test Software	QRCT4 tool
Dong Guan City GangQi Electronic Co.,Ltd	Adapter	QG36-120300-AX
JONKEY	USB cable	XY02-354-SAM-TYPE-C
Amphenol	Antenna	M3 MIMO Antenna

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## 4 Test results and Measurement Data

### 4.1 Antenna Requirement

<b>Standard requirement:</b>	47 CFR Part 15C Section 15.203 /247(c)
<p>15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> <p>15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p>	
<p>The antenna is External on the main PCB and no consideration of replacement. The best case gain of the antenna is -1.38dBi(Ant2).</p>	



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## 4.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

### 4.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)

### 4.2.2 Conclusion

Standard Requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1):

According to Technical Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones.

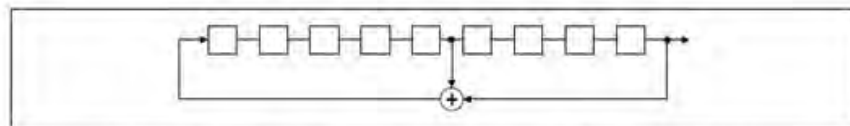
> Number of shift register stages: 9

> Length of pseudo-random sequence:  $2^9 - 1 = 511$  bits

> Longest sequence of zeros: 8 (non-inverted signal)

Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

20	62	46	77	7	64	8	73	16	75	1



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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 11 of 97

Each frequency used equally on the average by each transmitter.

According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g):

According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the RF system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels. The system is designed not have the ability to coordinated with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.



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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 12 of 97

### 4.3 AC Power Line Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150kHz to 30MHz		
Receiver Setup:	RBW = 9kHz, VBW = 30kHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test Procedure:	<ol style="list-style-type: none"> <li>1) The mains terminal disturbance voltage test was conducted in a shielded room.</li> <li>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.</li> <li>3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.</li> <li>4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.</li> <li>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</li> </ol>		



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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 13 of 97

Test Setup:	
Test Mode:	Non-hopping transmitting mode with all kind of modulation and all kind of data type at the lowest, middle, high channel. Charge + Transmitting mode.
Final Test Mode:	Through Pre-scan, find the DH5 of data type and GFSK modulation at the lowest channel is the worst case. Charge + Transmitting mode Only the worst case is recorded in the report.
Instruments Used:	Refer to section 6 for details.
Test Results:	Pass



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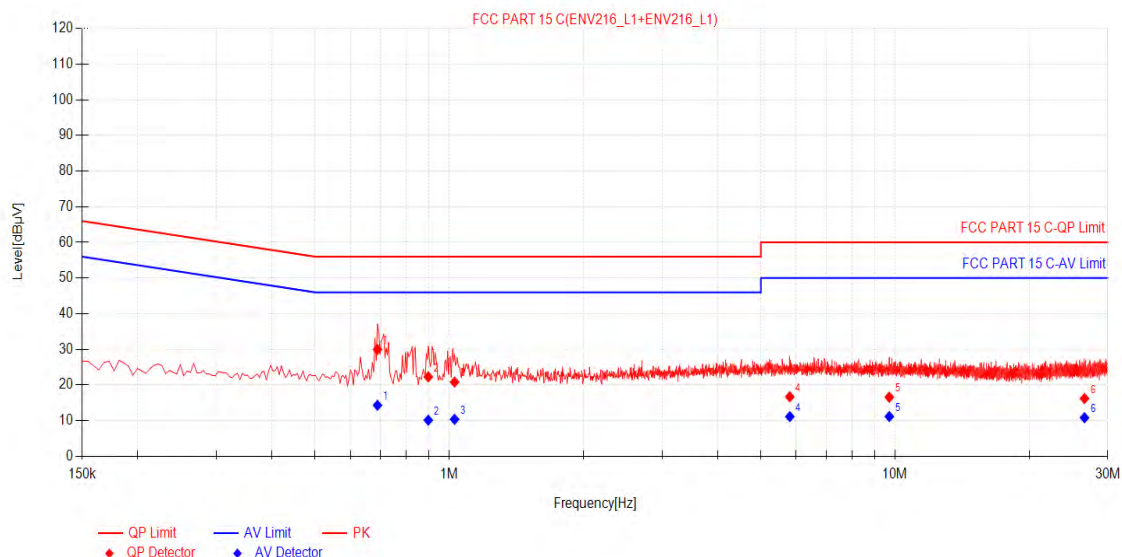
Page: 14 of 97

## Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live Line:



## Final Data List

NO.	Frequency [MHz]	Factor [dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Verdict
1	0.6900	10.57	29.97	56.00	26.03	14.31	46.00	31.69	PASS
2	0.8970	10.60	22.29	56.00	33.71	10.14	46.00	35.86	PASS
3	1.0275	10.53	20.83	56.00	35.17	10.38	46.00	35.62	PASS
4	5.8065	10.67	16.68	60.00	43.32	11.13	50.00	38.87	PASS
5	9.7080	10.64	16.59	60.00	43.41	11.16	50.00	38.84	PASS
6	26.6145	10.29	16.22	60.00	43.78	10.82	50.00	39.18	PASS

## Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.



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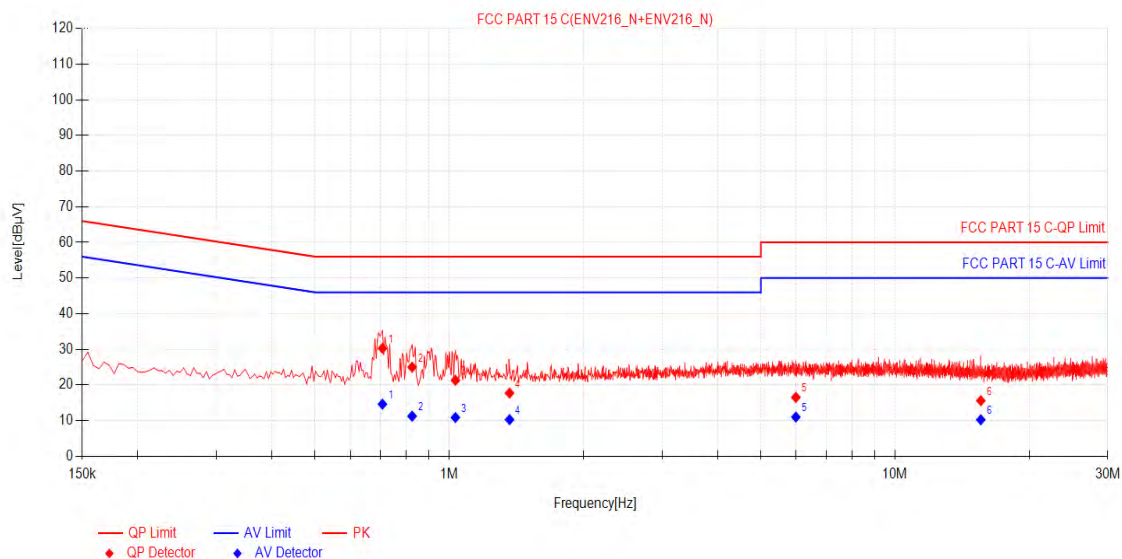
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Rev.: 02

Page: 15 of 97

Neutral Line:



### Final Data List

NO.	Frequency [MHz]	Factor [dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Verdict
1	0.7080	10.81	30.29	56.00	25.71	14.64	46.00	31.36	PASS
2	0.8250	10.80	25.01	56.00	30.99	11.25	46.00	34.75	PASS
3	1.0320	10.66	21.33	56.00	34.67	10.88	46.00	35.12	PASS
4	1.3650	10.77	17.73	56.00	38.27	10.29	46.00	35.71	PASS
5	5.9910	10.58	16.55	60.00	43.45	11.01	50.00	38.99	PASS
6	15.5760	10.59	15.60	60.00	44.40	10.25	50.00	39.75	PASS

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.



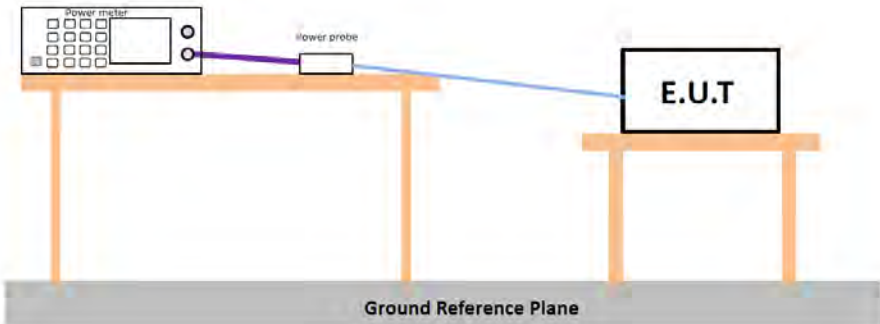
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Rev.: 02  
Page: 16 of 97

#### 4.4 Conducted Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(1)
Test Method:	ANSI C63.10:2013 Section 7.8.5
Test Setup:	 <p>* Test with power meter (Detector function: Peak)</p>
Test Instruments:	Refer to section 6 for details
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type.
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of $\pi/4$ DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type.
Limit:	For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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Rev.: 02  
Page: 17 of 97

## 4.5 20dB Emission Bandwidth & 99% Occupied Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013 Section 6.9.2 and 6.9.3
Test Setup:	
Instruments Used:	Refer to section 6 for details
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type.
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of $\pi/4$ DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type.
Limit:	NA
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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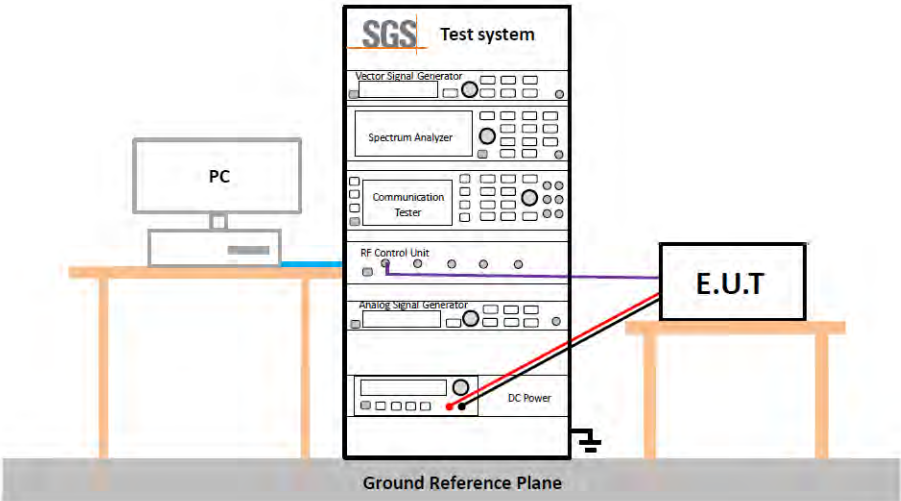
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Rev.: 02  
Page: 18 of 97

### 4.6 Carrier Frequencies Separationy

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013 Section 7.8.2
Test Setup:	
Test Instruments:	Refer to section 6 for details
Exploratory Test Mode:	Hopping transmitting with all kind of modulation and all kind of data type.
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of $\pi/4$ DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type.
Limit:	2/3 of the 20dB bandwidth Remark: the transmission power is less than 0.125W.
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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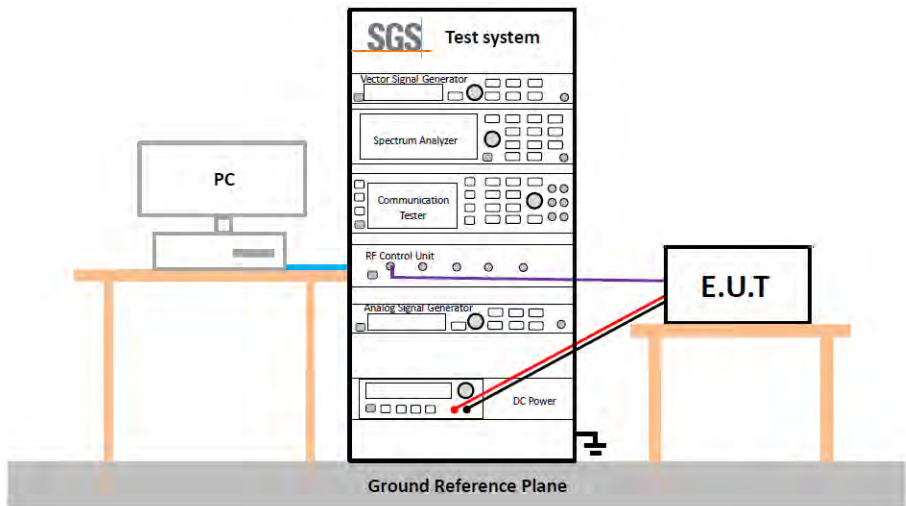
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Page: 19 of 97

## 4.7 Hopping Channel Number

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013 Section 7.8.3
Test Setup:	
Instruments Used:	Refer to section 6 for details
Test Mode:	Hopping transmitting with all kind of modulation
Limit:	At least 15 channels
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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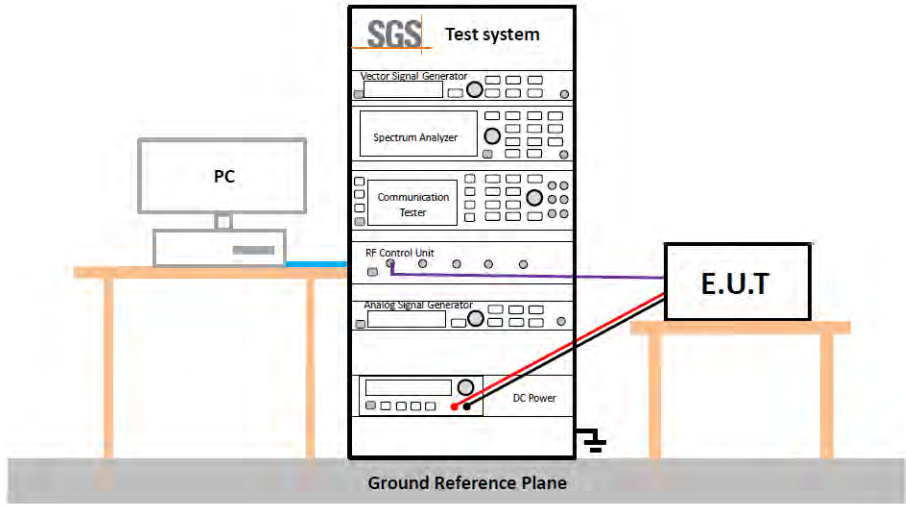
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Rev.: 02

Page: 20 of 97

## 4.8 Dwell Time

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013 Section 7.8.4
Test Setup:	
Instruments Used:	Refer to section 6 for details
Test Mode:	Hopping transmitting with all kind of modulation and all kind of data type.
Limit:	0.4 Second
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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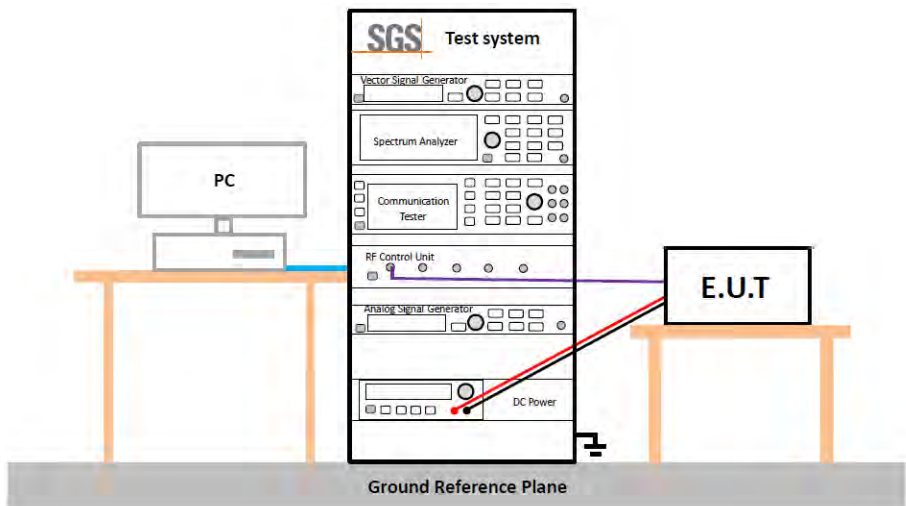
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Rev.: 02  
Page: 21 of 97

## 4.9 Band-edge for RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 Section 7.8.6
Test Setup:	
Instruments Used:	Refer to section 6 for details
Exploratory Test Mode:	Hopping and Non-hopping transmitting with all kind of modulation and all kind of data type.
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of $\pi/4$ DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type.
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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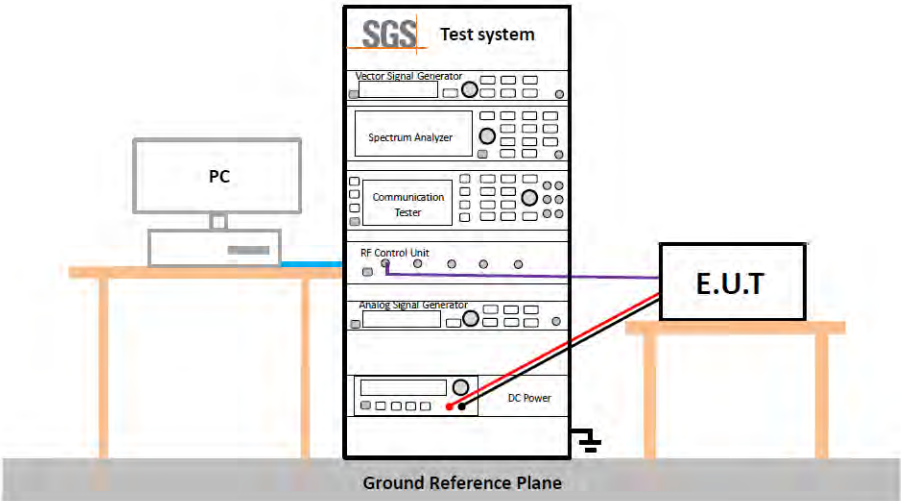
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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 22 of 97

### 4.10 Spurious RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 Section 7.8.8
Test Setup:	
Instruments Used:	Refer to section 6 for details
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type.
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of $\pi/4$ DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type.
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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### 4.11 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205				
Test Method:	ANSI C63.10 :2013 Section 11.12				
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
Remark: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.					

#### Test Setup:

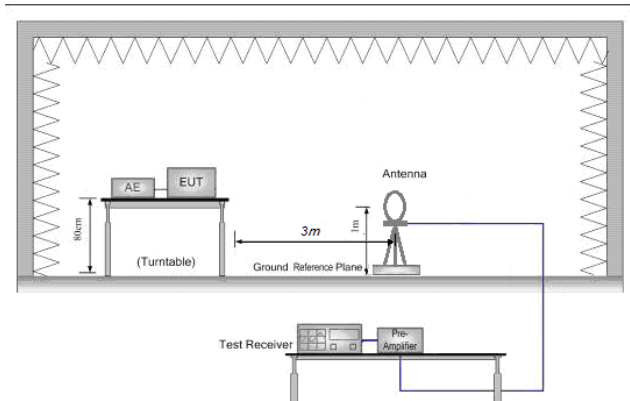


Figure 1. Below 30MHz

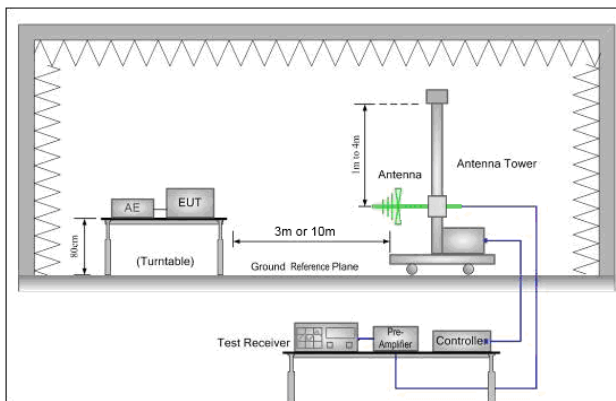


Figure 2. 30MHz to 1GHz



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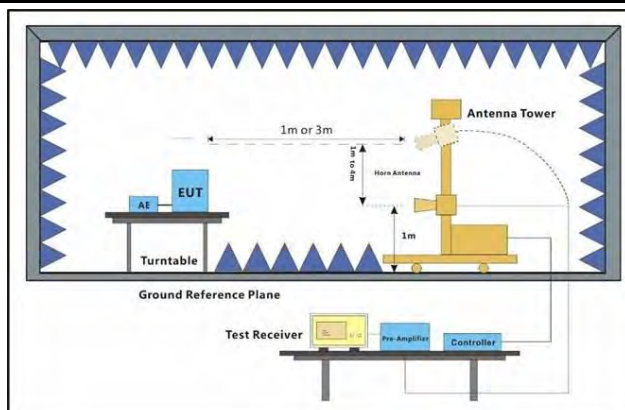


Figure 3. Above 1 GHz

Test Procedure:	<ol style="list-style-type: none"> <li>For below 1GHz(9KHz start), the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>For above 1GHz(10th harmonic), the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation</li> <li>The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters(for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> <li>Test the EUT in the lowest channel, the middle channel ,the Highest channel.</li> <li>The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.</li> <li>Repeat above procedures until all frequencies measured was complete.</li> <li>The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported</li> <li>The disturbance above 18GHz was very low, and the harmonics were the highest point could be found when testing, so only the harmonics had been displayed.</li> </ol>
Test Configuration:	<p>Measurements Below 1000MHz</p> <ul style="list-style-type: none"> <li>RBW = 120 kHz</li> <li>VBW = 300 kHz</li> <li>Detector = Peak</li> </ul>

Report No.: SUHR/2021/B001001

Rev.: 02

Page: 25 of 97

	<ul style="list-style-type: none"> <li>• Trace mode = max hold</li> </ul> <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW <math>\geq</math> 3 MHz</li> <li>• Detector = Peak</li> <li>• Sweep time = auto</li> <li>• Trace mode = max hold</li> </ul> <p>Average Measurements Above 1000MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW = 10 Hz, when duty cycle is no less than 98 percent.</li> <li>• VBW <math>\geq</math> 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.</li> </ul> <p>Value = Reading + Factor(Antenna Factor + Cable loss – Preamplifier Factor).</p>
Exploratory Test Mode:	<p>Non-hopping transmitting mode with all kind of modulation and all kind of data type</p> <p>Charge + Transmitting mode.</p>
Final Test Mode:	<p>Through Pre-scan, find the DH5 of data type and GFSK modulation is the worst case.</p> <p>Pretest the EUT at Charge + Transmitting mode</p> <p>For below 1GHz part, through pre-scan, the worst case is the lowest channel.</p> <p>Only the worst case is recorded in the report.</p>
Instruments Used:	Refer to section 6 for details
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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## 4.12 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205		
Test Method:	ANSI C63.10: 2013		
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)		
Limit:	Frequency	Limit (dBuV/m)	Remark
	30MHz-88MHz	40.0	Quasi-peak
	88MHz-216MHz	43.5	Quasi-peak
	216MHz-960MHz	46.0	Quasi-peak
	960MHz-1GHz	54.0	Quasi-peak
	Above 1GHz	54.0	Average Value
		74.0	Peak Value

### Test Setup:

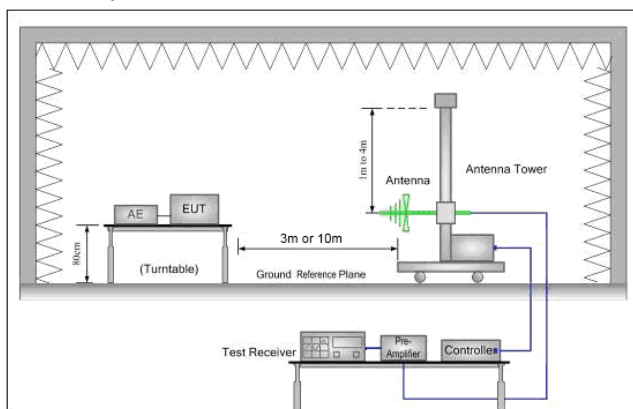


Figure 1. 30MHz to 1GHz

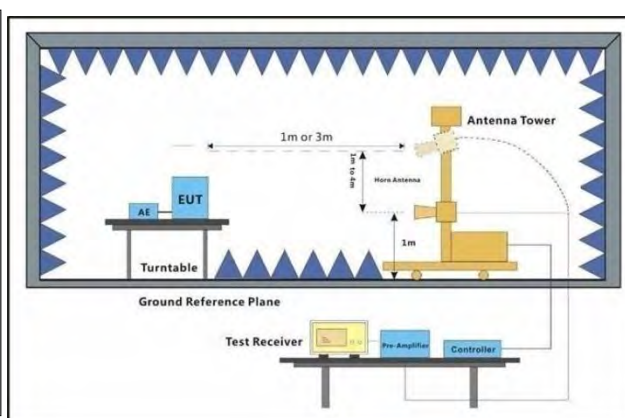


Figure 2. Above 1 GHz

### Test Procedure:

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- Place a marker at the end of the restricted band closest to the transmit

Report No.: SUHR/2021/B001001

Rev.: 02

Page: 27 of 97

	<p>frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel</p> <p>h. Test the EUT in the lowest channel , the Highest channel</p> <p>i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.</p> <p>j. Repeat above procedures until all frequencies measured was complete.</p>
Test Configuration:	<p>Measurements Below 1000MHz</p> <ul style="list-style-type: none"> <li>• RBW = 120 kHz</li> <li>• VBW = 300 kHz</li> <li>• Detector = Peak</li> <li>• Trace mode = max hold</li> </ul> <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW ≥ 3 MHz</li> <li>• Detector = Peak</li> <li>• Sweep time = auto</li> <li>• Trace mode = max hold</li> </ul> <p>Average Measurements Above 1000MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW = 10 Hz, when duty cycle is no less than 98 percent.</li> <li>• VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.</li> </ul> <p>Value = Reading + Factor(Antenna Factor + Cable loss).</p>
Exploratory Test Mode:	<p>Non-hopping transmitting mode with all kind of modulation and all kind of data type</p> <p>Charge + Transmitting mode.</p>
Final Test Mode:	<p>Through Pre-scan, find the DH5 of data type and GFSK modulation is the worst case.</p> <p>Pretest the EUT at Charge + Transmitting mode,</p> <p>Only the worst case is recorded in the report.</p>
Instruments Used:	Refer to section 6 for details
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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Rev.: 02

Page: 28 of 97

## 5 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	$\pm 0.54\text{dB}$
2	RF power density, conducted	$\pm 1.03\text{dB}$
3	Spurious emissions, conducted	$\pm 0.54\text{dB}$
4	Radio Frequency	$\pm 7.25 \times 10^{-8} \text{ GHz}$
5	Duty Cycle	$\pm 0.37\%$
6	Occupied Bandwidth	$\pm 7.25 \times 10^{-8} \text{ GHz}$
7	Conduction Emission	$\pm 2.9\text{dB}$ (150kHz to 30MHz)
8	Radiated Emission	$\pm 3.13\text{dB}$ (9k -30MHz)
		$\pm 4.8\text{dB}$ (30M -1GHz)
		$\pm 4.8\text{dB}$ (1GHz to 18GHz)
		$\pm 4.8\text{dB}$ (Above 18GHz)



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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 29 of 97

## 6 Equipment List

Tonscend Test System					
Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal.Due date
				(yyyy-mm-dd)	(yyyy-mm-dd)
Shielding Room	Brilliant-emc	N/A	SUWI-04-01-06	2021/5/8	2024/5/7
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-07	2022/2/16	2023/2/15
Signal Analyzer	ROHDE&SCHWARZ	FSV3030	SUWI-01-02-02	2021/5/28	2022/5/27
DC Power Supply	HYELEC	HY3005B	SUWI-01-18-01	2022/2/19	2023/2/18
Power meter	Anritsu	ML2495A	SUWI-01-31-01	2021/12/4	2022/12/3
Pulse power sensor	Anritsu	MA2411B	SUWI-01-32-01	2021/12/4	2022/12/3
Measurement Software	Tonscend	JS1120-3 Test System V 2.6.88.0336	SUWI-02-09-09	NCR	NCR
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2021/5/28	2022/5/27

CE Test Equipment					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Shielding Room	Brilliant-emc	N/A	SUWI-04-03-01	2021/5/8	2024/5/7
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-01	2022/2/16	2023/2/15
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-02	2022/2/16	2023/2/15
Measurement Software	Tonscend	JS32-CE V3.0.0.1	SUWI-02-09-05	NCR	NCR
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-06	2022/2/16	2023/2/15
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2022/2/16	2023/2/15



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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 30 of 97

## RSE Test Equipment 996-01

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Semi-Anechoic Chamber	Brilliant-emc	N/A	SUWI-04-02-01	2021/5/8	2024/5/7
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-05	2022/2/16	2023/2/15
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2021/5/28	2022/5/27
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2022/2/16	2023/2/15
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	VULB 9163	SUWI-01-11-01	2021/5/16	2022/5/15
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9120D	SUWI-01-11-02	2021/5/16	2022/5/15
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9170	SUWI-01-11-03	2021/5/14	2022/5/13
Amplifier	Tonscend	TAP9K3G40	SUWI-01-14-01	2022/2/16	2023/2/15
Amplifier	Tonscend	TAP01018050	SUWI-01-14-02	2022/2/16	2023/2/15
Amplifier	Tonscend	TAP18040048	SUWI-01-14-03	2022/2/16	2023/2/15
Active Loop Antenna	SCHWRZBECK MESS-ELEKTRONIK	FMZB 1519B	SUWI-01-21-01	2021/6/10	2022/6/9
Measurement Software	Tonscend	JS32-RE V3.0.0.3	SUWI-02-09-04	NCR	NCR
Measurement Software	Tonscend	JS32-RSE 3.0.0.2	SUWI-02-09-04	NCR	NCR



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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 31 of 97

## 7 Photographs – Setup Photos

Refer to Appendix A.2 WLAN Setup Photos.



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Page: 32 of 97

# Appendix



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Report No.: SUHR/2021/B001001  
 Rev.: 02  
 Page: 33 of 97

## 20dB Emission Bandwidth Test Result

TestMode	Antenna	Frequency[MHz]	20dB EBW[MHz]	FL[MHz]	FH[MHz]
DH5	Ant2	2402	0.95	2401.54	2402.48
		2441	0.94	2440.54	2441.48
		2480	0.94	2479.54	2480.48
2DH5	Ant2	2402	1.32	2401.34	2402.65
		2441	1.31	2440.34	2441.65
		2480	1.31	2479.34	2480.65
3DH5	Ant2	2402	1.30	2401.35	2402.65
		2441	1.30	2440.35	2441.65
		2480	1.30	2479.35	2480.65



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### Test Graphs

DH5\_Ant2\_2402



15:07:31 25.02.2022

DH5\_Ant2\_2441



15:09:29 25.02.2022



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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 35 of 97

### DH5\_Ant2\_2480



### 2DH5\_Ant2\_2402



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Rev.: 02

Page: 36 of 97

### 2DH5\_Ant2\_2441



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### 2DH5\_Ant2\_2480



15:19:19 25.02.2022



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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 37 of 97

### 3DH5\_Ant2\_2402



15:24:11 25.02.2022

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Page: 38 of 97

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Rev.: 02

Page: 39 of 97

## Occupied Channel Bandwidth Test Result

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]
DH5	Ant2	2402	0.842	2401.579	2402.420
		2441	0.846	2440.576	2441.422
		2480	0.842	2479.573	2480.416
2DH5	Ant2	2402	1.173	2401.409	2402.582
		2441	1.174	2440.409	2441.583
		2480	1.171	2479.409	2480.580
3DH5	Ant2	2402	1.179	2401.409	2402.588
		2441	1.180	2440.409	2441.589
		2480	1.178	2479.410	2480.587



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Rev.: 02

Page: 40 of 97

### Test Graphs

DH5\_Ant2\_2402



DH5\_Ant2\_2441



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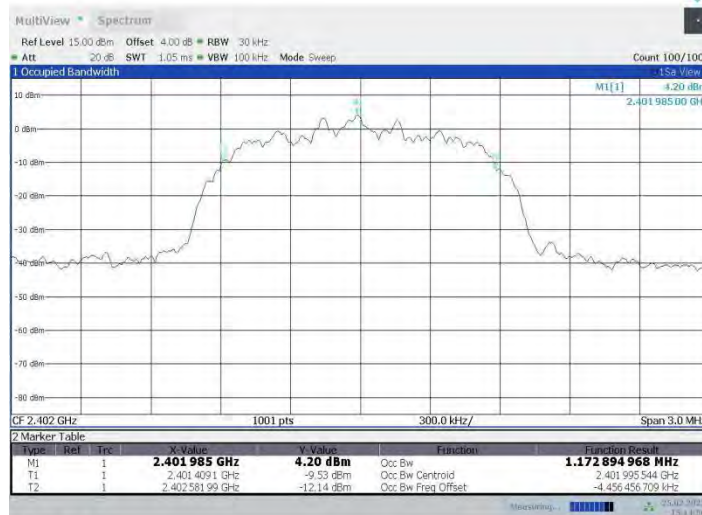
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### DH5\_Ant2\_2480



### 2DH5\_Ant2\_2402



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Rev.: 02

Page: 42 of 97

### 2DH5\_Ant2\_2441



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### 3DH5\_Ant2\_2402



### 3DH5\_Ant2\_2441



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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 44 of 97

3DH5\_Ant2\_2480



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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 45 of 97

## Maximum conducted output power

### Test Result Peak

Test Mode	Antenna	Frequency[MHz]	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant2	2402	10.59	≤30.00	PASS
		2441	9.46	≤30.00	PASS
		2480	9.97	≤30.00	PASS
2DH5	Ant2	2402	8.13	≤20.97	PASS
		2441	6.93	≤20.97	PASS
		2480	7.56	≤20.97	PASS
3DH5	Ant2	2402	8.21	≤20.97	PASS
		2441	6.91	≤20.97	PASS
		2480	7.58	≤20.97	PASS



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Report No.: SUHR/2021/B001001  
Rev.: 02  
Page: 46 of 97

## Carrier frequency separation Test Result

TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant2	Hop	1.030	≥0.950	PASS
2DH5	Ant2	Hop	1.012	≥0.880	PASS
3DH5	Ant2	Hop	0.996	≥0.867	PASS



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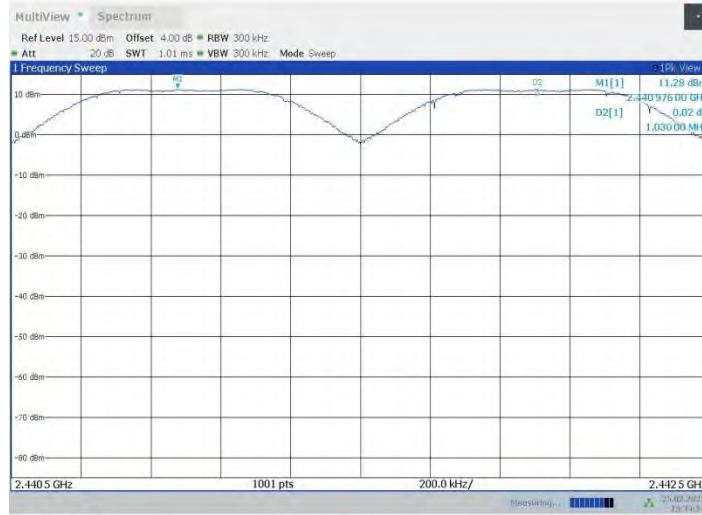
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Rev.: 02

Page: 47 of 97

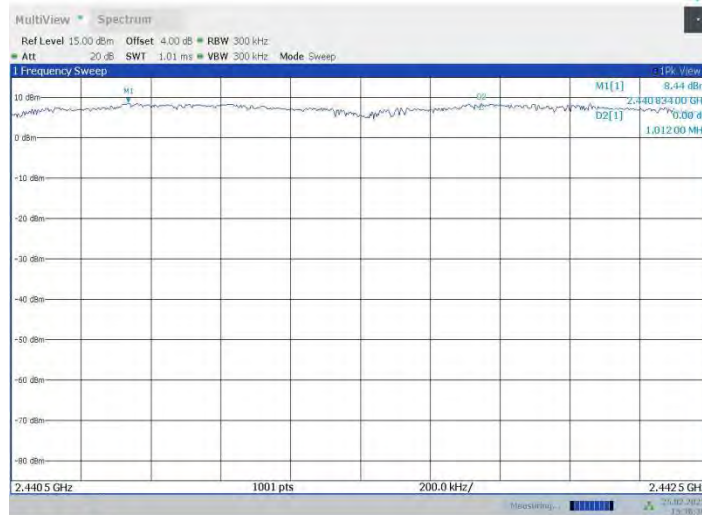
### Test Graphs

DH5\_Ant2\_Hop



15:34:15 25.02.2022

2DH5\_Ant2\_Hop



15:38:31 25.02.2022



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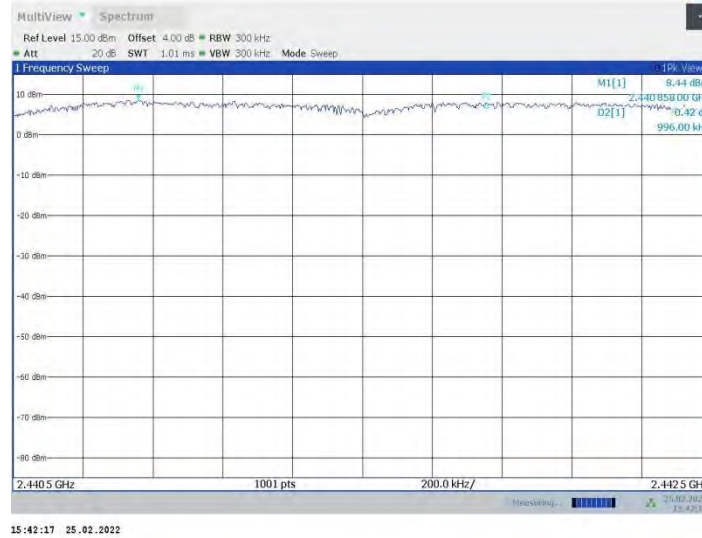
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Page: 48 of 97

### 3DH5\_Ant2\_Hop



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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 49 of 97

## Time of occupancy Test Result

TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant2	Hop	0.36	320	0.115	≤0.4	PASS
DH3	Ant2	Hop	1.62	160	0.259	≤0.4	PASS
DH5	Ant2	Hop	2.87	106.67	0.306	≤0.4	PASS
2DH1	Ant2	Hop	0.36	320	0.115	≤0.4	PASS
2DH3	Ant2	Hop	1.62	160	0.259	≤0.4	PASS
2DH5	Ant2	Hop	2.87	106.67	0.306	≤0.4	PASS
3DH1	Ant2	Hop	0.37	320	0.118	≤0.4	PASS
3DH3	Ant2	Hop	1.62	160	0.259	≤0.4	PASS
3DH5	Ant2	Hop	2.87	106.67	0.306	≤0.4	PASS



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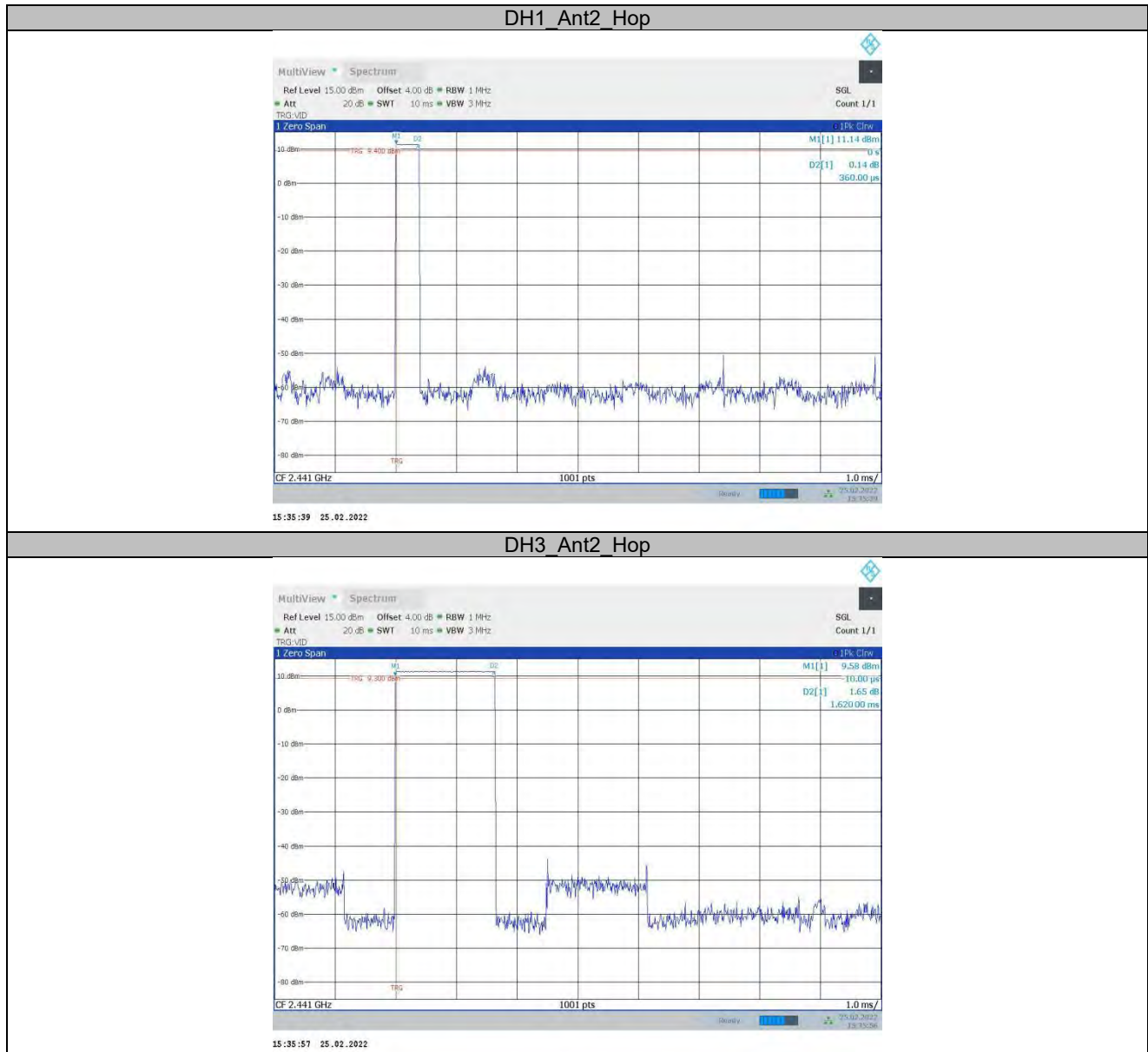
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Page: 50 of 97

### Test Graphs



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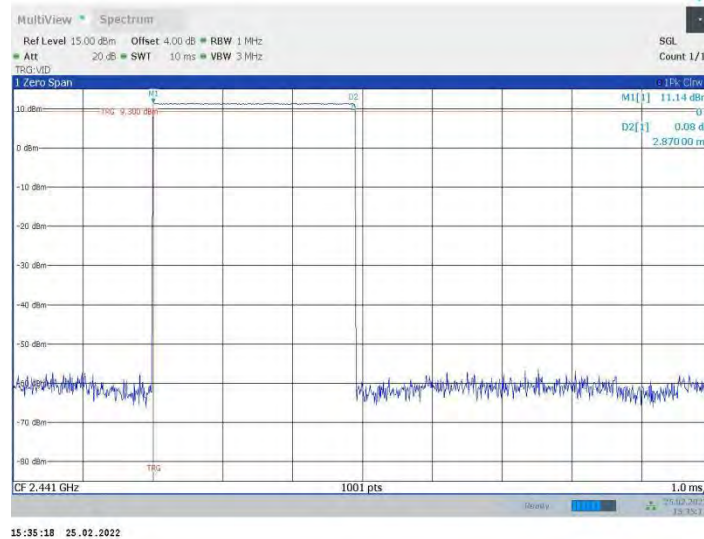
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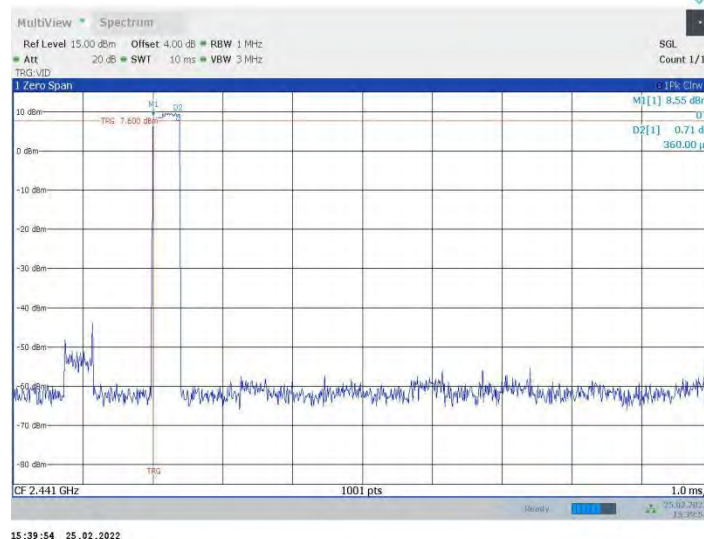
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### DH5\_Ant2\_Hop



### 2DH1\_Ant2\_Hop



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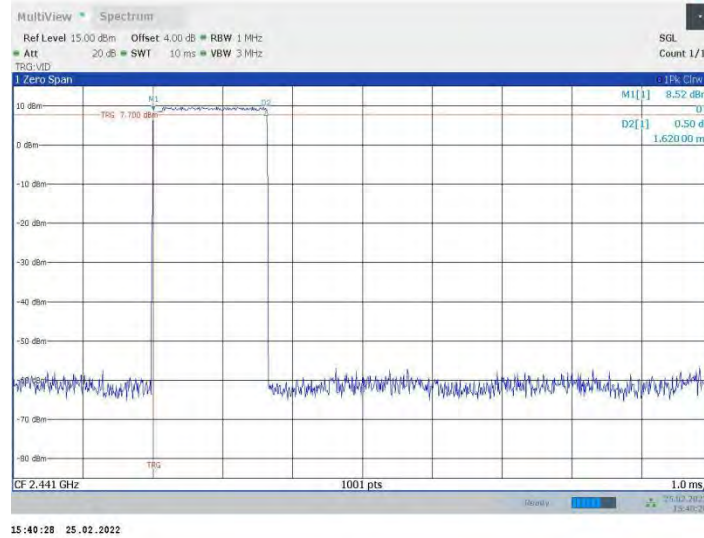
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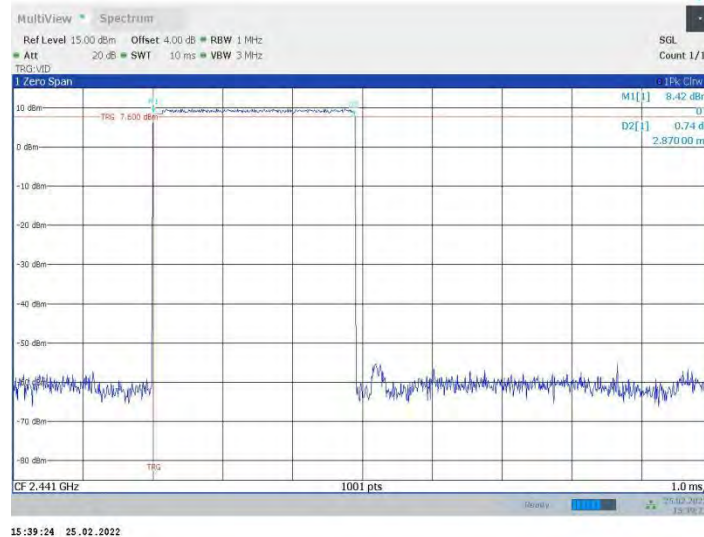
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### 2DH3\_Ant2\_Hop



### 2DH5\_Ant2\_Hop



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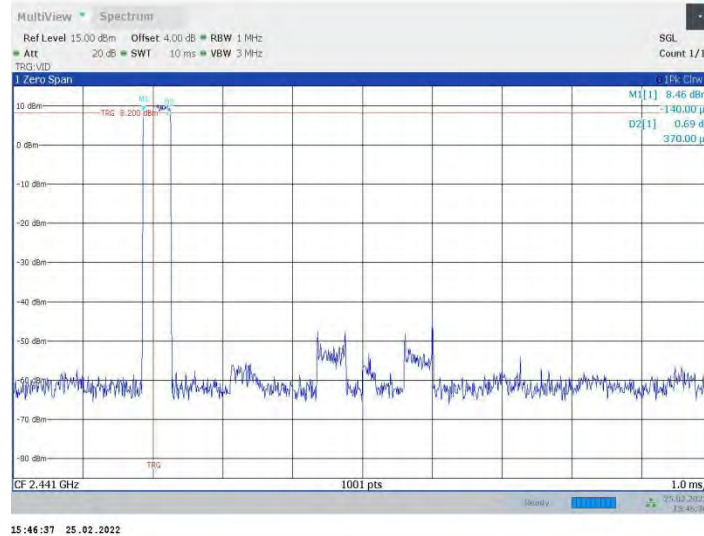


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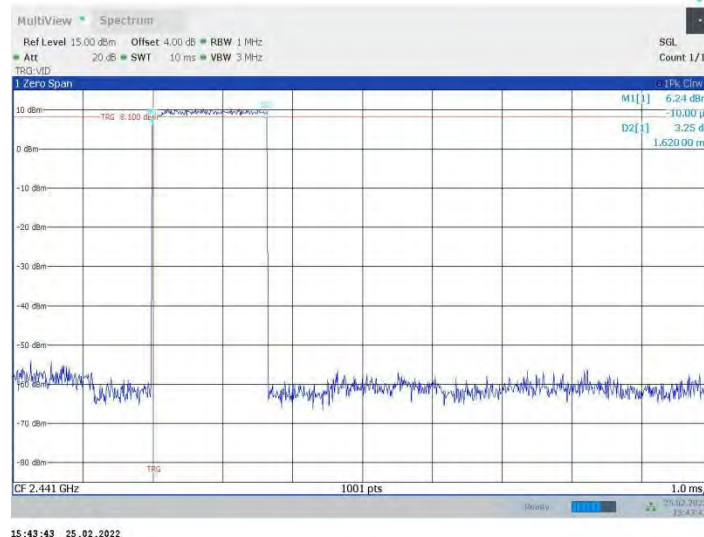
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### 3DH1\_Ant2\_Hop



### 3DH3\_Ant2\_Hop



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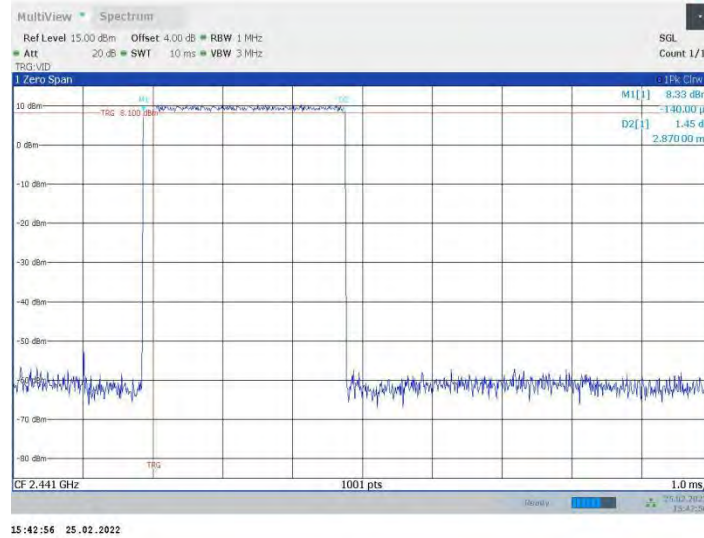
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### 3DH5\_Ant2\_Hop



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Rev.: 02  
Page: 55 of 97

## Number of hopping channels Test Result

TestMode	Antenna	Frequency[MHz]	Result[Num]	Limit[Num]	Verdict
DH5	Ant2	Hop	79	≥15	PASS
2DH5	Ant2	Hop	79	≥15	PASS
3DH5	Ant2	Hop	79	≥15	PASS



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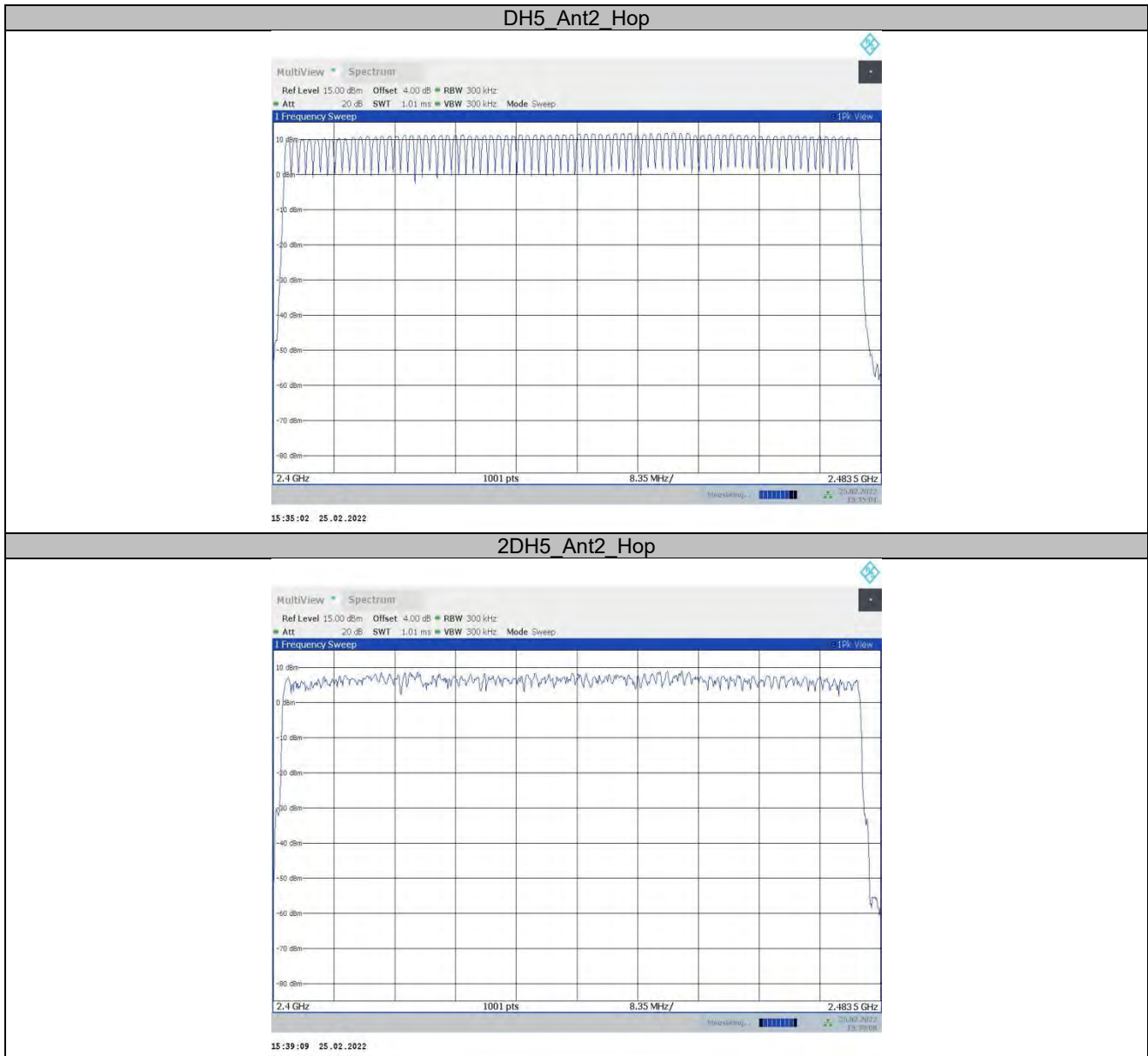
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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 56 of 97

### Test Graphs



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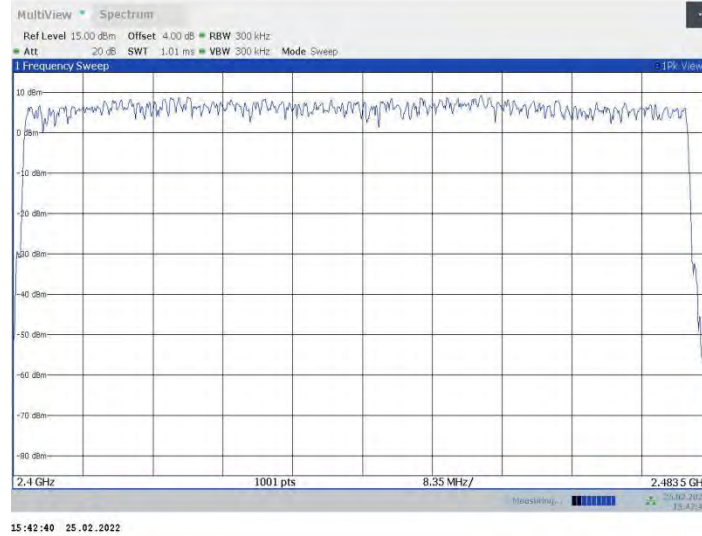


Report No.: SUHR/2021/B001001

Rev.: 02

Page: 57 of 97

3DH5\_Ant2\_Hop



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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 58 of 97

## Band edge measurements

### Test Result

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant2	Low	2402	8.92	-55.58	≤-11.08	PASS
		High	2480	9.57	-59.61	≤-10.43	PASS
		Low	Hop 2402	9.51	-66.28	≤-10.49	PASS
		High	Hop 2480	10.38	-63.14	≤-9.62	PASS
2DH5	Ant2	Low	2402	6.56	-56.05	≤-13.44	PASS
		High	2480	5.66	-61.26	≤-14.34	PASS
		Low	Hop 2402	5.86	-66.59	≤-14.14	PASS
		High	Hop 2480	5.20	-63.32	≤-14.8	PASS
3DH5	Ant2	Low	2402	6.60	-55.37	≤-13.4	PASS
		High	2480	6.32	-62.50	≤-13.68	PASS
		Low	Hop 2402	6.61	-66.35	≤-13.39	PASS
		High	Hop 2480	6.45	-63.94	≤-13.55	PASS



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Rev.: 02

Page: 59 of 97

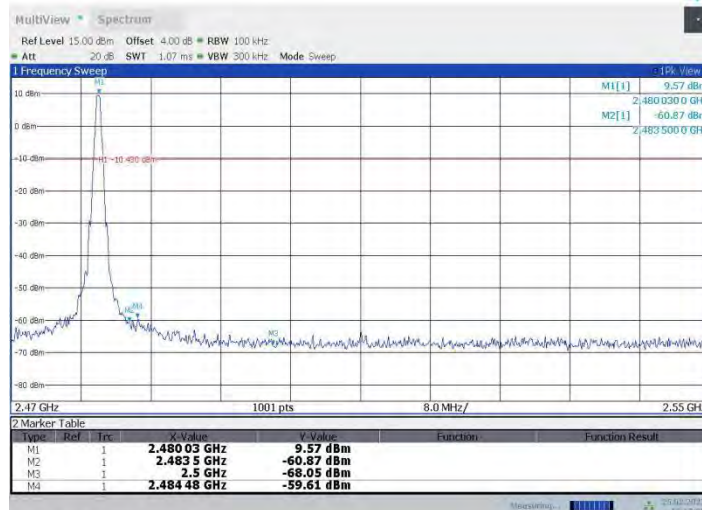
### Test Graphs

DH5\_Ant2\_Low\_2402



15:07:51 25.02.2022

DH5\_Ant2\_High\_2480



15:12:00 25.02.2022



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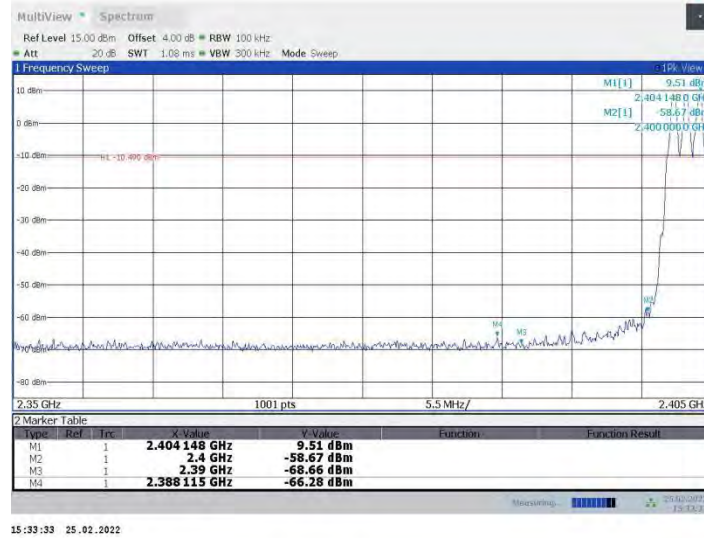
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Rev.: 02

Page: 60 of 97

### DH5\_Ant2\_Low\_Hop\_2402



15:33:33 25.02.2022

### DH5\_Ant2\_High\_Hop\_2480



15:36:53 25.02.2022



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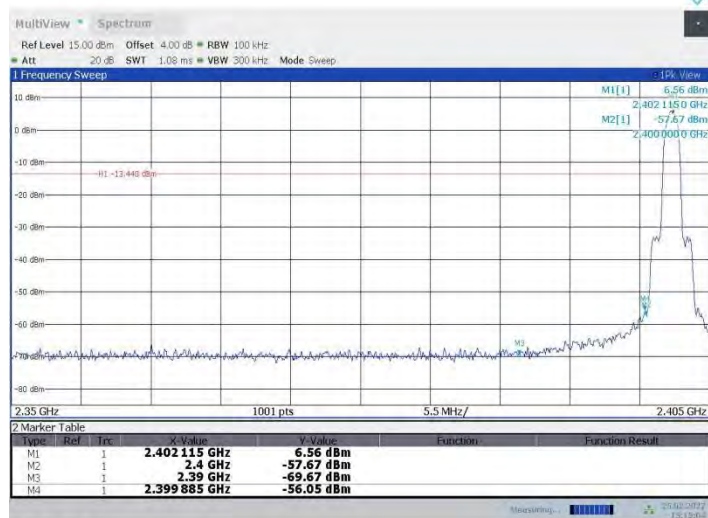


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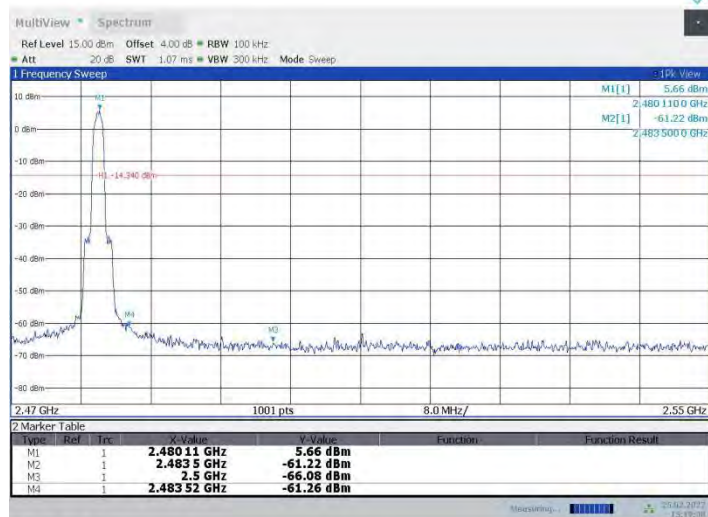
Page: 61 of 97

### 2DH5\_Ant2\_Low\_2402



15:15:05 25.02.2022

### 2DH5\_Ant2\_High\_2480



15:19:39 25.02.2022



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Rev.: 02

Page: 62 of 97

### 2DH5\_Ant2\_Low\_Hop\_2402



15:37:59 25.02.2022

### 2DH5\_Ant2\_High\_Hop\_2480



15:40:59 25.02.2022



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### 3DH5\_Ant2\_Low\_2402



15:24:31 25.02.2022

### 3DH5\_Ant2\_High\_2480



15:31:26 25.02.2022



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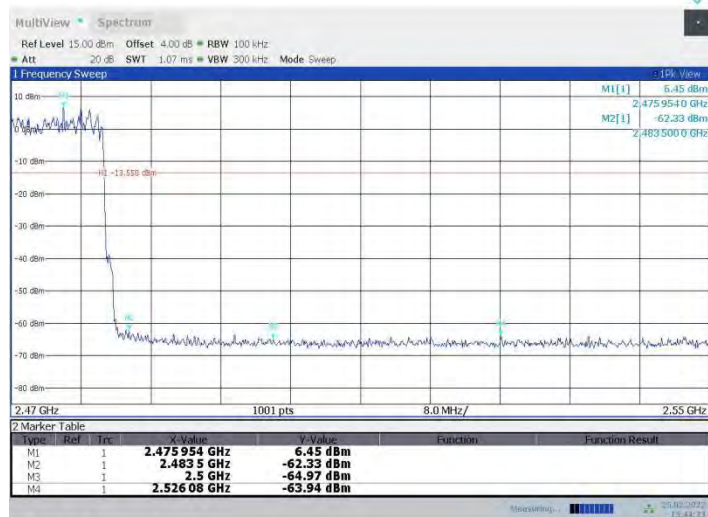
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### 3DH5\_Ant2\_Low\_Hop\_2402



15:41:56 25.02.2022

### 3DH5\_Ant2\_High\_Hop\_2480



15:44:24 25.02.2022



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Rev.: 02

Page: 65 of 97

## Conducted Spurious Emission Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant2	2402	Reference	9.50	9.50	---	PASS
			30~1000	9.50	-57.18	≤-10.5	PASS
			1000~26500	9.50	-52.43	≤-10.5	PASS
		2441	Reference	10.97	10.97	---	PASS
			30~1000	10.97	-57.94	≤-9.03	PASS
			1000~26500	10.97	-52.60	≤-9.03	PASS
		2480	Reference	10.22	10.22	---	PASS
			30~1000	10.22	-57.81	≤-9.78	PASS
			1000~26500	10.22	-43.03	≤-9.78	PASS
2DH5	Ant2	2402	Reference	6.70	6.70	---	PASS
			30~1000	6.70	-58.33	≤-13.3	PASS
			1000~26500	6.70	-52.79	≤-13.3	PASS
		2441	Reference	8.11	8.11	---	PASS
			30~1000	8.11	-58.27	≤-11.89	PASS
			1000~26500	8.11	-52.42	≤-11.89	PASS
		2480	Reference	6.85	6.85	---	PASS
			30~1000	6.85	-57.86	≤-13.15	PASS
			1000~26500	6.85	-53.08	≤-13.15	PASS
3DH5	Ant2	2402	Reference	6.85	6.85	---	PASS
			30~1000	6.85	-58.35	≤-13.15	PASS
			1000~26500	6.85	-52.58	≤-13.15	PASS
		2441	Reference	8.29	8.29	---	PASS
			30~1000	8.29	-58.20	≤-11.71	PASS
			1000~26500	8.29	-52.02	≤-11.71	PASS
		2480	Reference	7.05	7.05	---	PASS
			30~1000	7.05	-58.09	≤-12.95	PASS
			1000~26500	7.05	-50.69	≤-12.95	PASS



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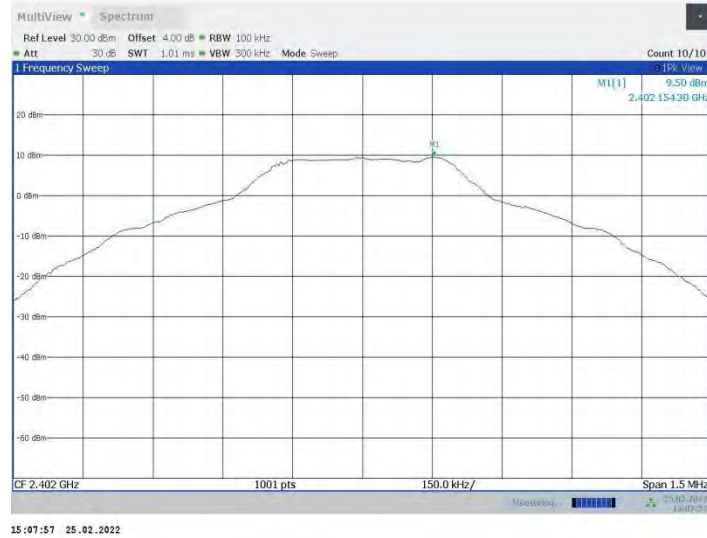
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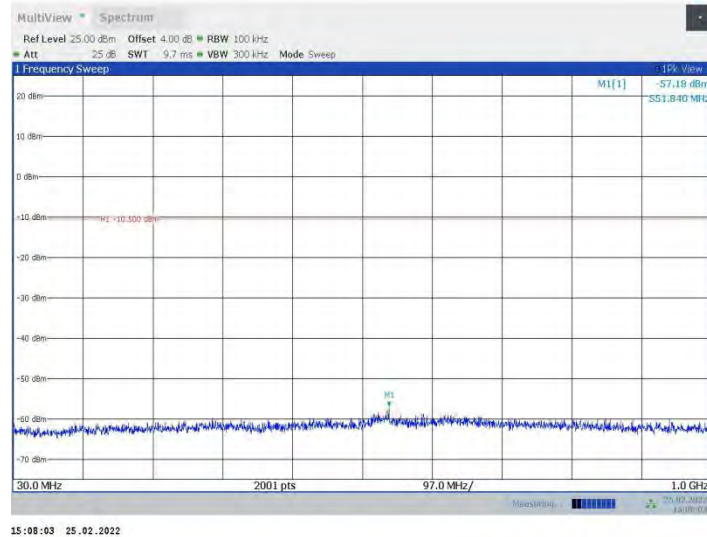
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### Test Graphs

DH5\_Ant2\_2402\_0~Reference



DH5\_Ant2\_2402\_30~1000



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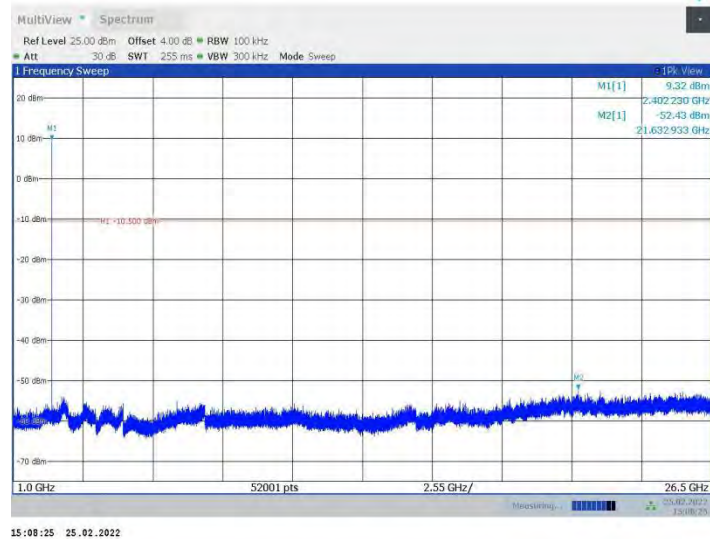
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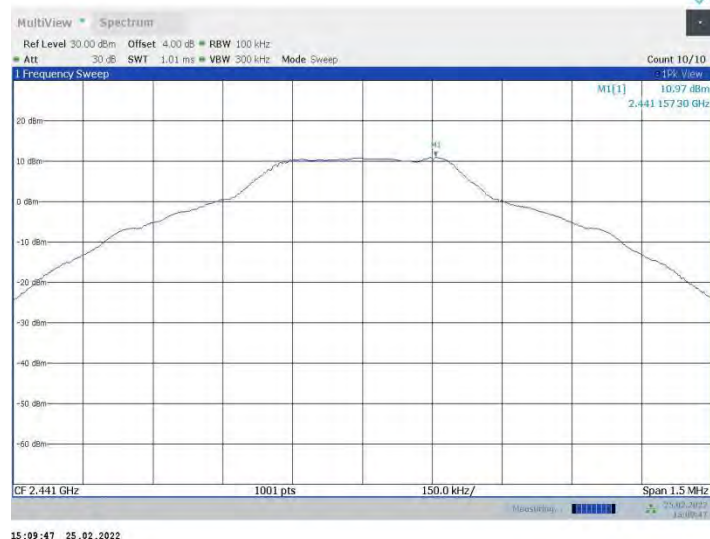
Rev.: 02

Page: 67 of 97

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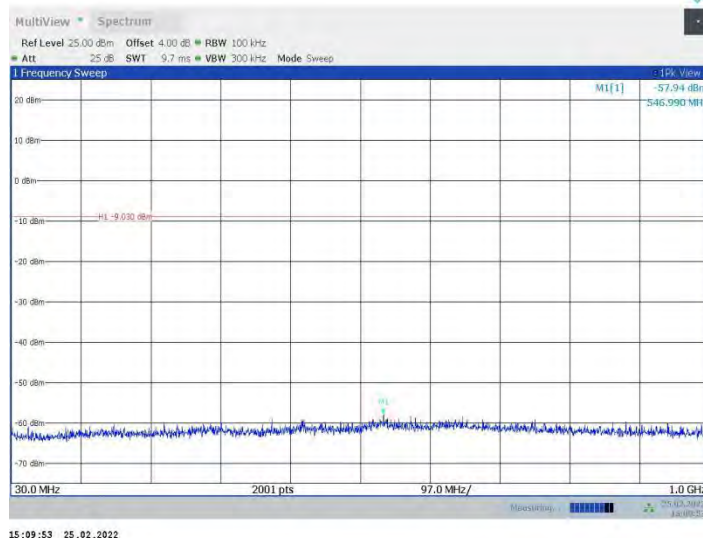
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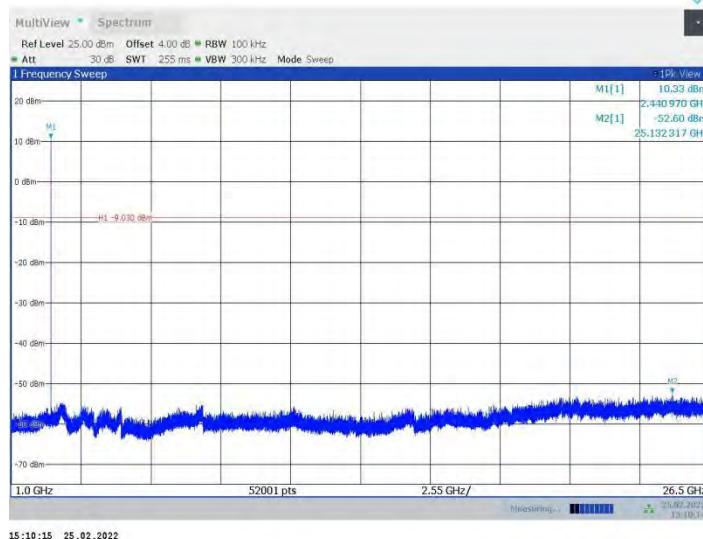
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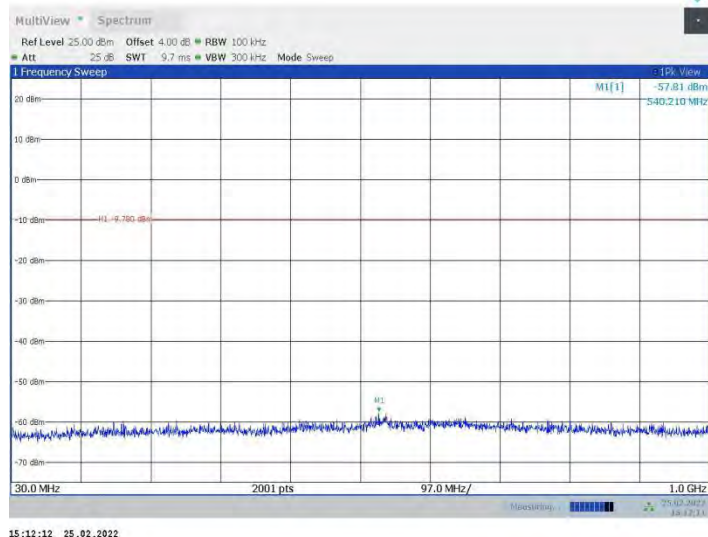
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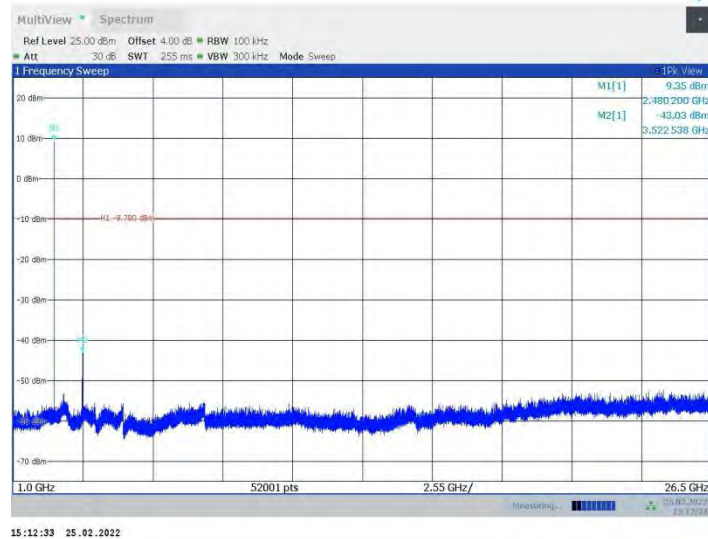
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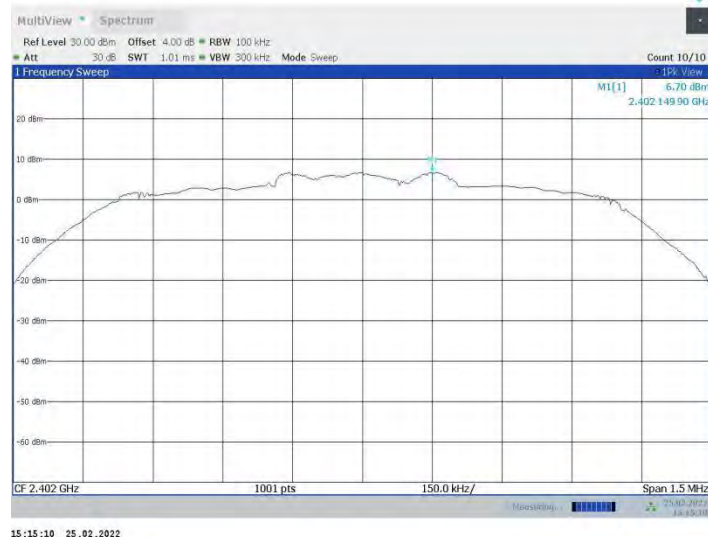
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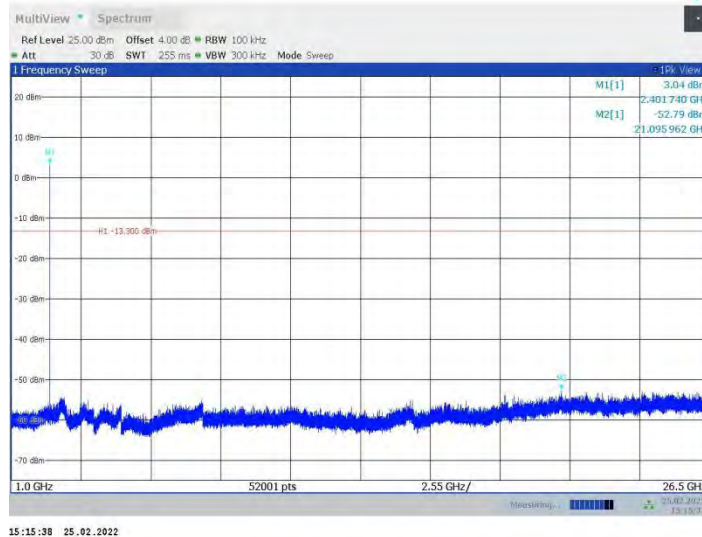
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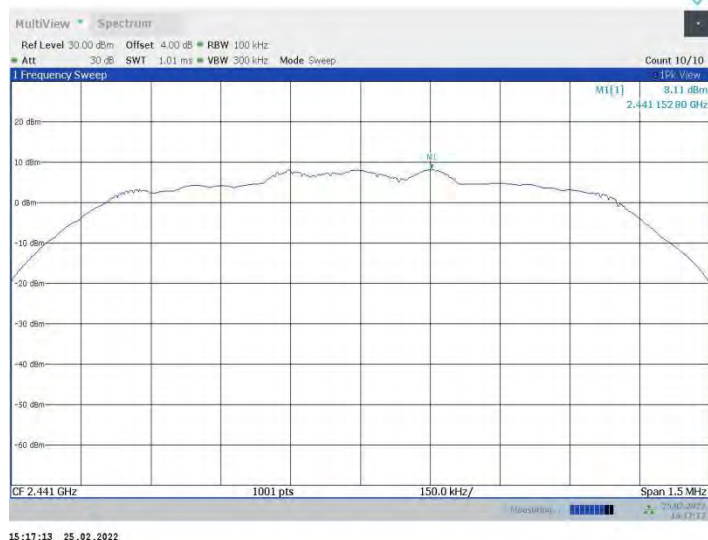


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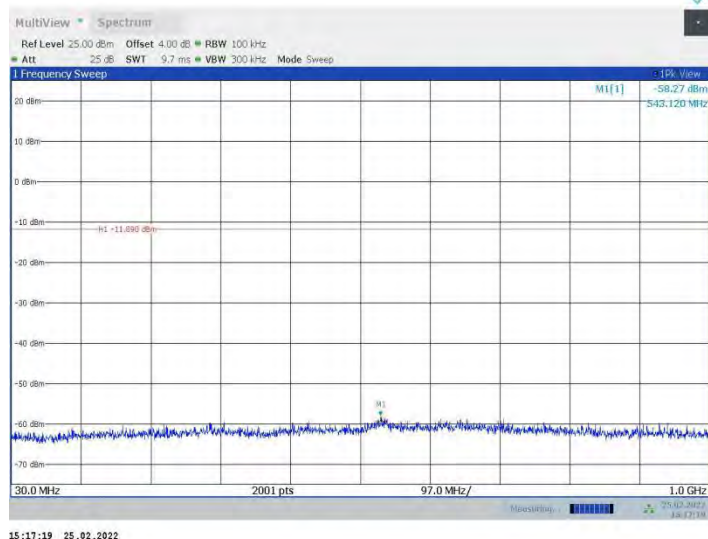
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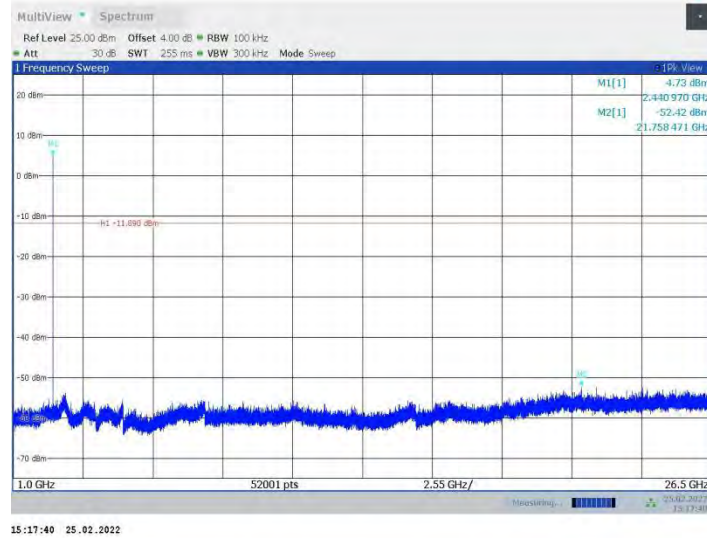


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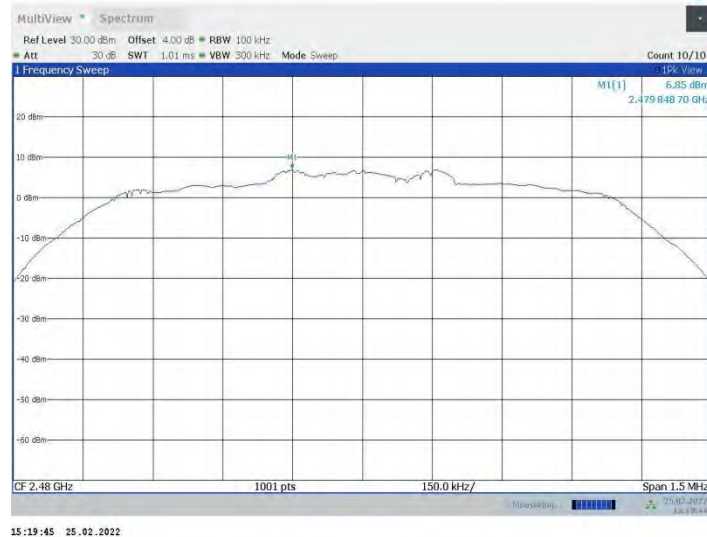
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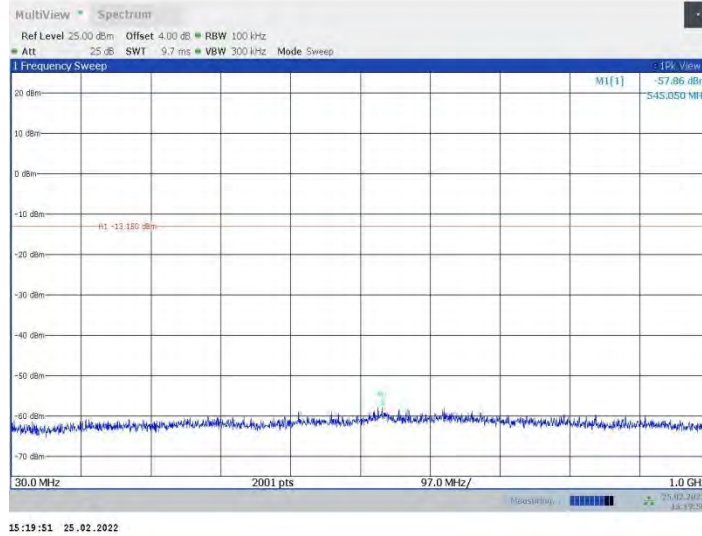
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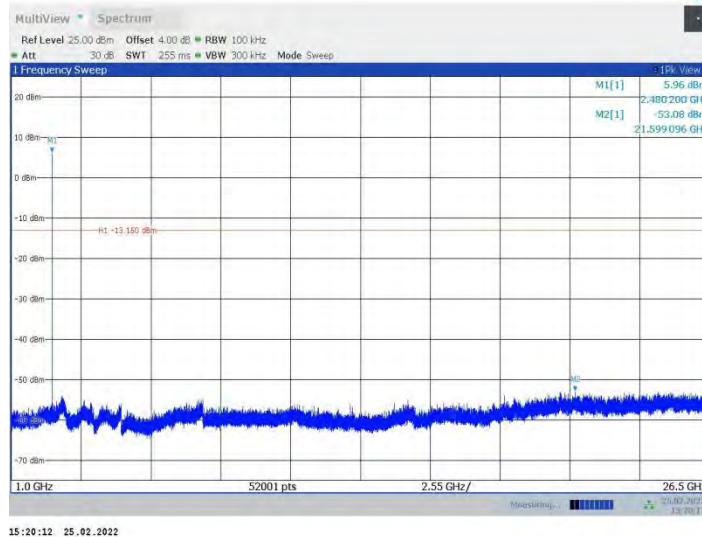
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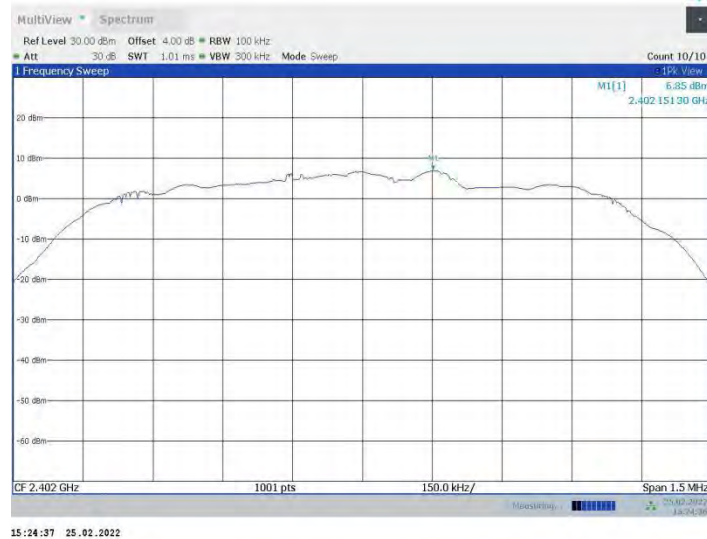
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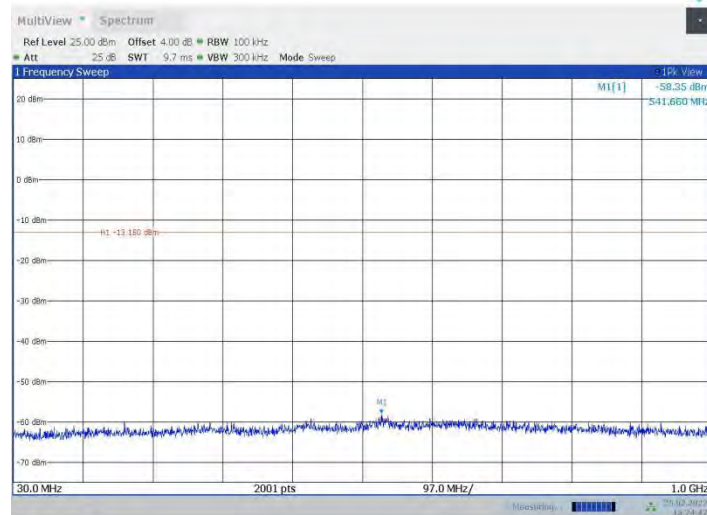
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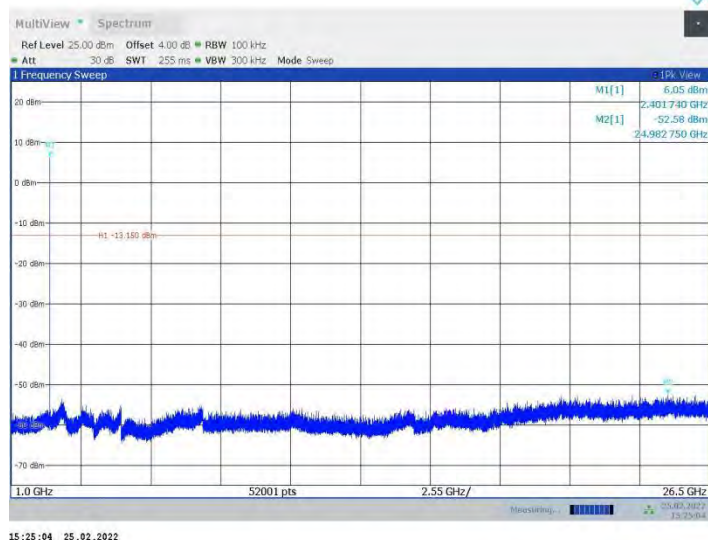


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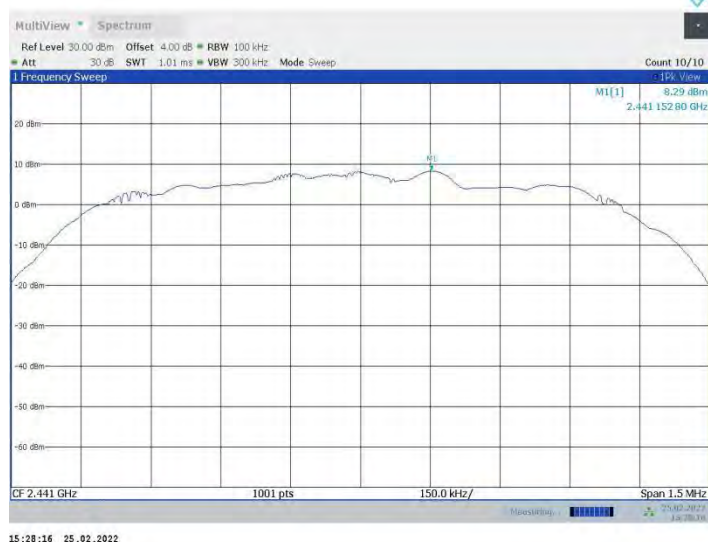
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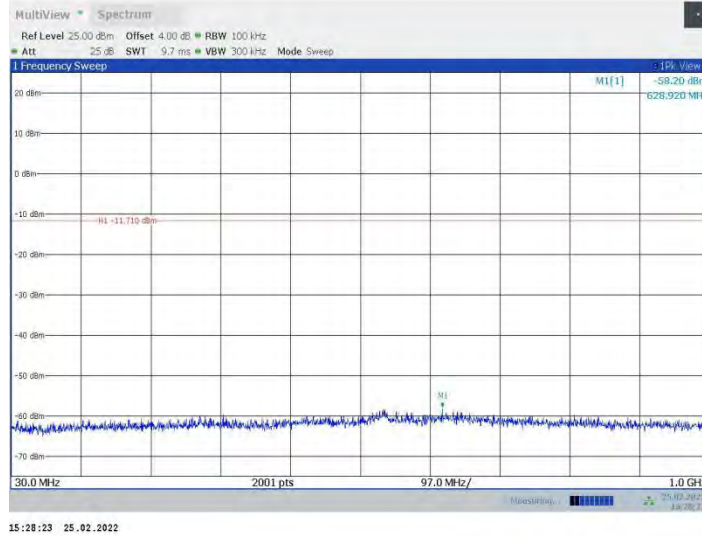


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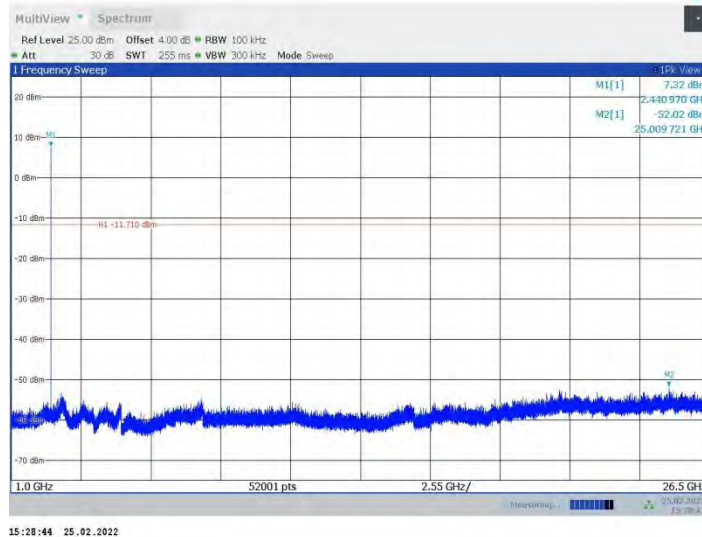
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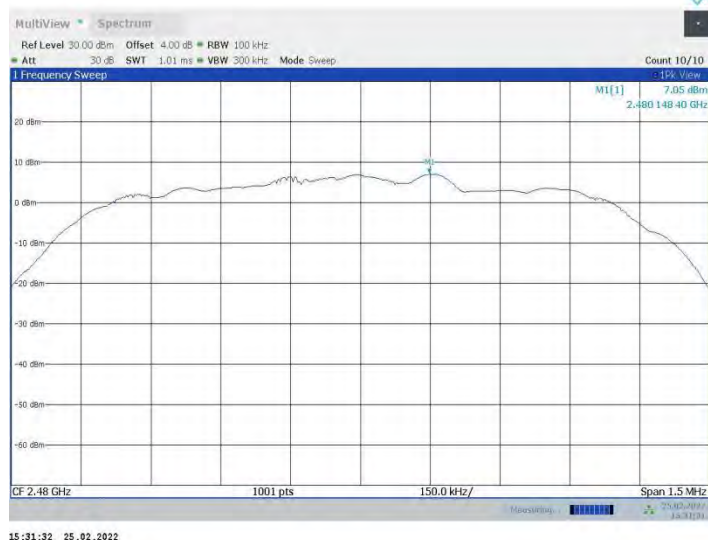
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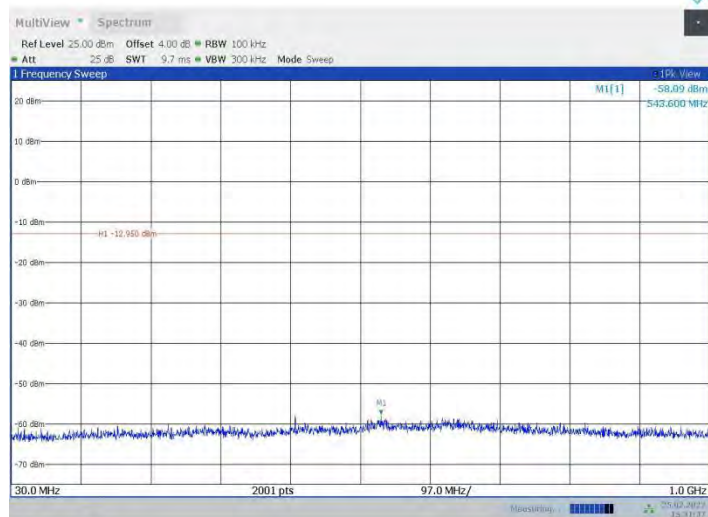
Page: 78 of 97

### 3DH5\_Ant2\_2480\_0~Reference



15:31:32 25.02.2022

### 3DH5\_Ant2\_2480\_30~1000



15:31:38 25.02.2022



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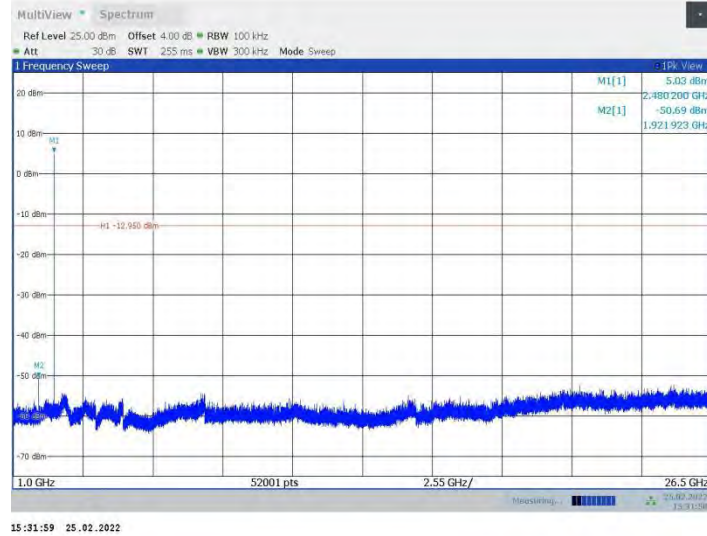
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Page: 79 of 97

3DH5\_Ant2\_2480\_1000~26500



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Rev.: 02

Page: 80 of 97

## Duty Cycle Test Result

TestMode	Antenna	Frequency[MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
DH5	Ant2	2402	2.89	3.76	76.86	1.14
		2441	2.88	3.75	76.80	1.15
		2480	2.89	3.76	76.86	1.14
2DH5	Ant2	2402	2.89	3.76	76.86	1.14
		2441	2.88	3.75	76.80	1.15
		2480	2.89	3.76	76.86	1.14
3DH5	Ant2	2402	2.89	3.75	77.07	1.13
		2441	2.89	3.76	76.86	1.14
		2480	2.89	3.75	77.07	1.13



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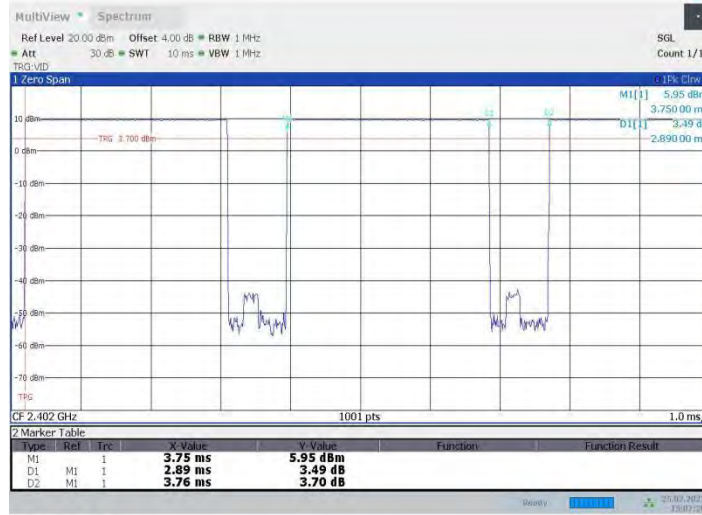
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Rev.: 02

Page: 81 of 97

### Test Graphs

DH5\_Ant2\_2402



15:07:20 25.02.2022

DH5\_Ant2\_2441



15:09:18 25.02.2022



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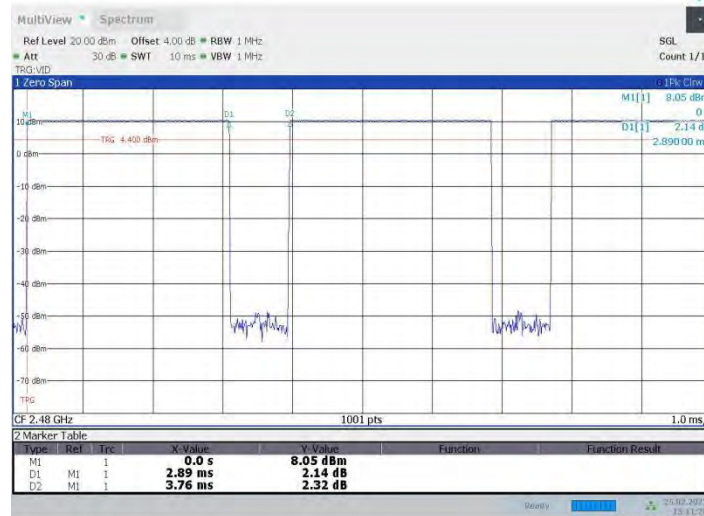
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Page: 82 of 97

### DH5\_Ant2\_2480



### 2DH5\_Ant2\_2402



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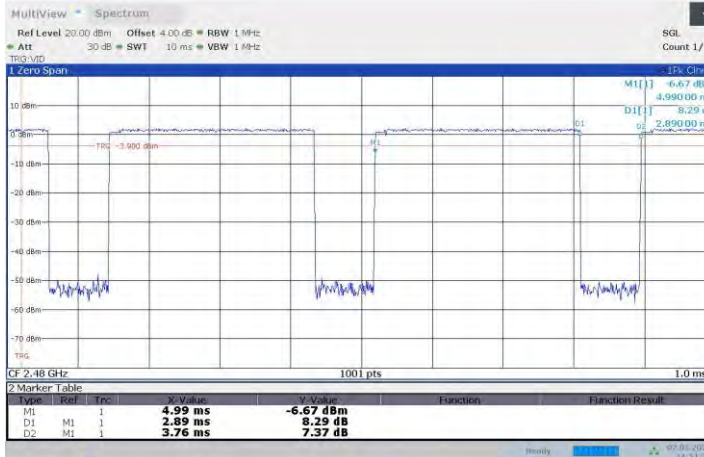
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### 2DH5\_Ant2\_2441



15:16:44 25.02.2022

### 2DH5\_Ant2\_2480



14:51:33 07.03.2022



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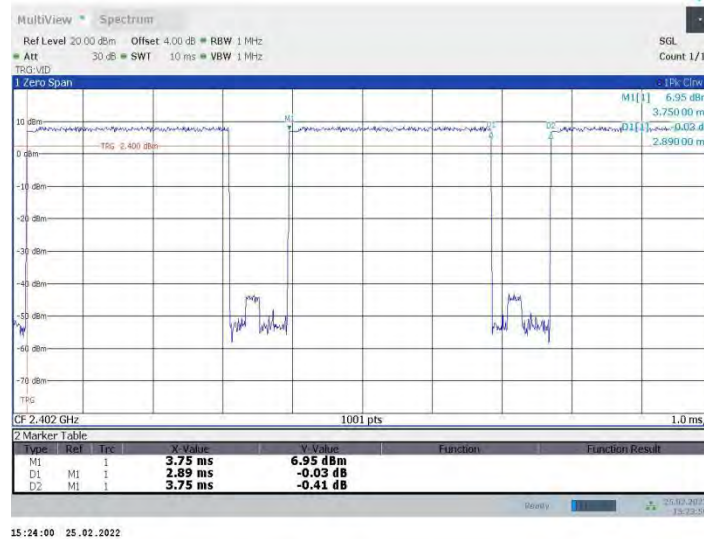


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### 3DH5\_Ant2\_2402



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### 3DH5\_Ant2\_2441



15:27:47 25.02.2022



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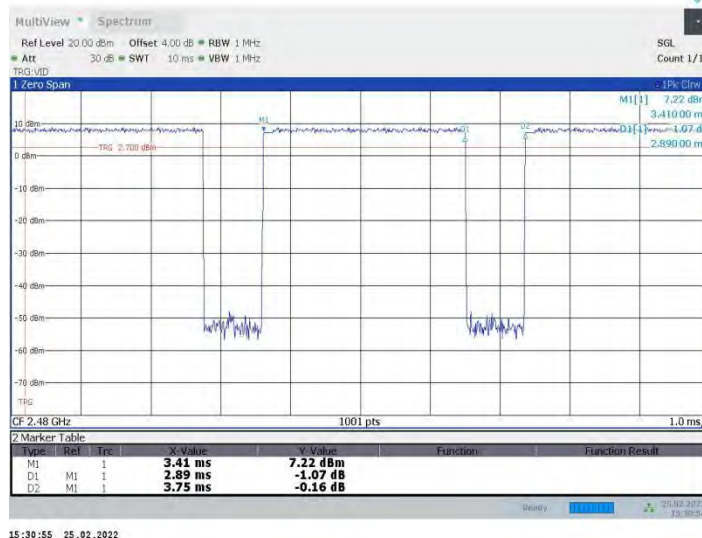


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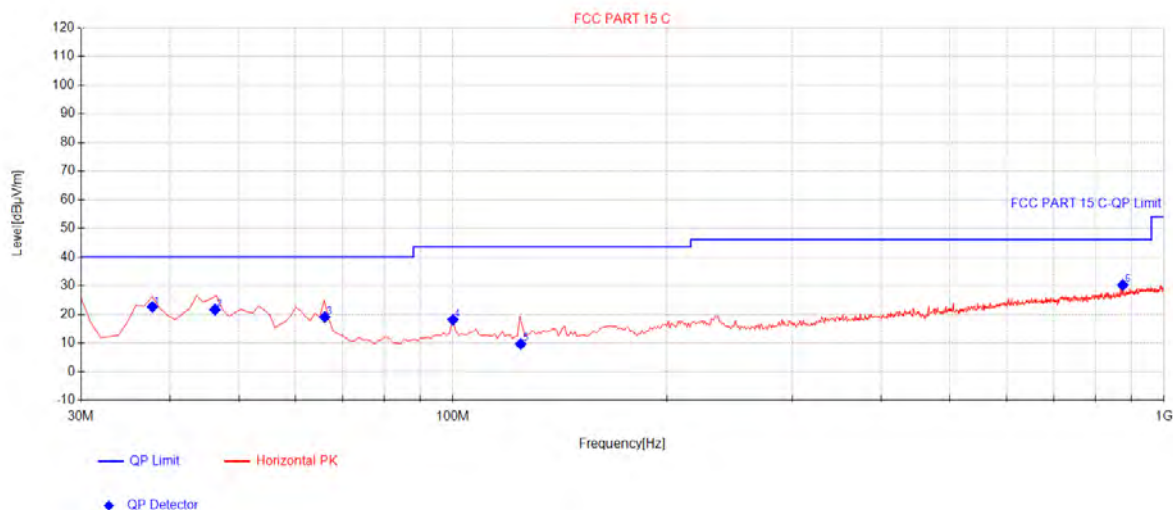
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Page: 86 of 97

### Radiated Spurious Emissions

### Radiated emission below 1GHz

### Worst case mode:GFSK (DH5\_Channel 00)



Final Data List									
NO.	Frequency [MHz]	Reading [dBμV]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	37.7990	39.33	-16.72	22.61	40.00	17.39	162	156	Horizontal
2	46.2918	36.33	-14.72	21.61	40.00	18.39	185	257.6	Horizontal
3	66.0490	36.91	-17.90	19.01	40.00	20.99	264	299.5	Horizontal
4	100.0054	34.67	-16.57	18.10	43.50	25.40	199	73	Horizontal
5	124.5508	28.29	-18.64	9.65	43.50	33.85	244	166.1	Horizontal
6	874.9931	32.05	-1.84	30.21	46.00	15.79	152	181.4	Horizontal



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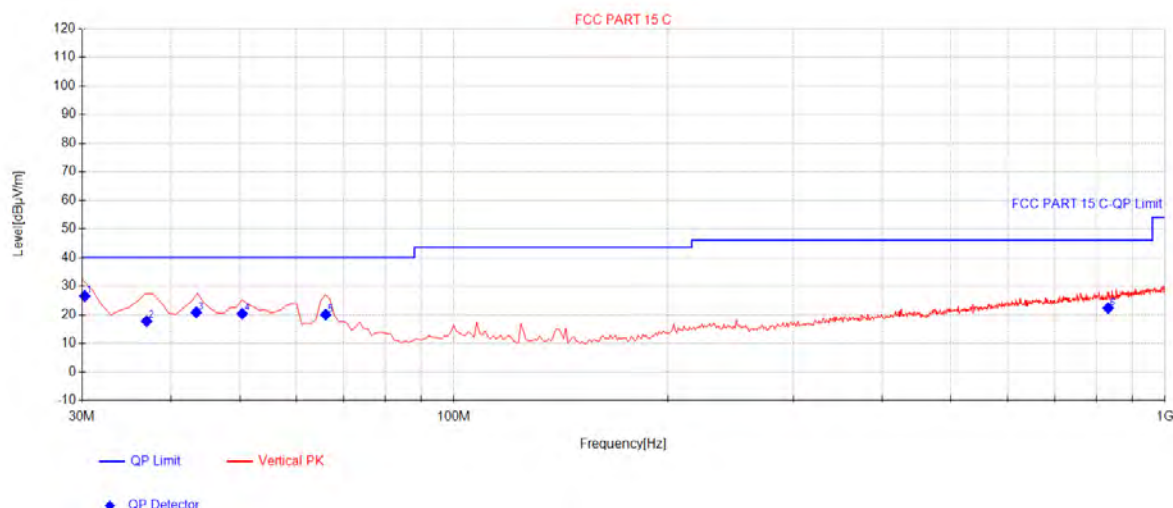
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Rev.: 02

Page: 87 of 97



### Final Data List

NO.	Frequency [MHz]	Reading [dBμV]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	30.2620	44.80	-18.28	26.52	40.00	13.48	261	165.4	Vertical
2	36.9715	34.76	-17.04	17.72	40.00	22.28	185	4	Vertical
3	43.4207	36.03	-15.23	20.80	40.00	19.20	264	309.3	Vertical
4	50.3977	34.63	-14.29	20.34	40.00	19.66	196	151.9	Vertical
5	66.0299	37.92	-17.90	20.02	40.00	19.98	244	277.2	Vertical
6	831.7209	24.72	-2.44	22.28	46.00	23.72	122	89.9	Vertical



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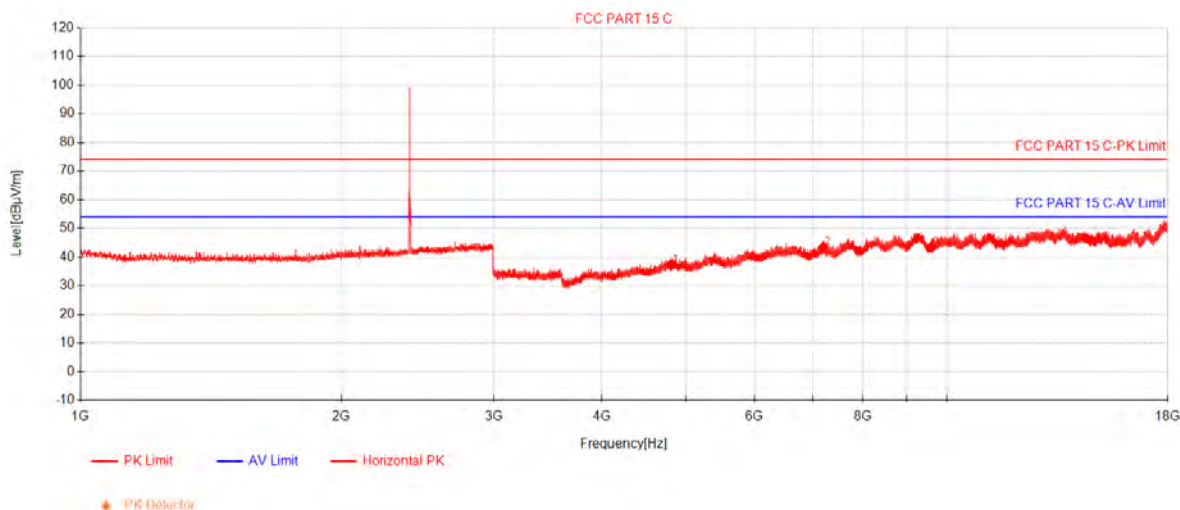
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Rev.: 02

Page: 88 of 97

### Radiated emission Above 1GHz

#### GFSK\_Channel 00



Data List									
NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4804	49.55	-12.33	37.22	74.00	36.78	341	319	Horizontal
2	4804	-	-	12.43	54.00	41.57	341	319	Horizontal
3	7206	49.38	-5.91	43.47	74.00	30.53	196	0	Horizontal
4	7206	-	-	18.68	54.00	35.32	196	0	Horizontal
5	9608	42.89	0.49	43.38	74.00	30.62	141	62	Horizontal
6	9608	-	-	18.59	54.00	35.41	141	62	Horizontal



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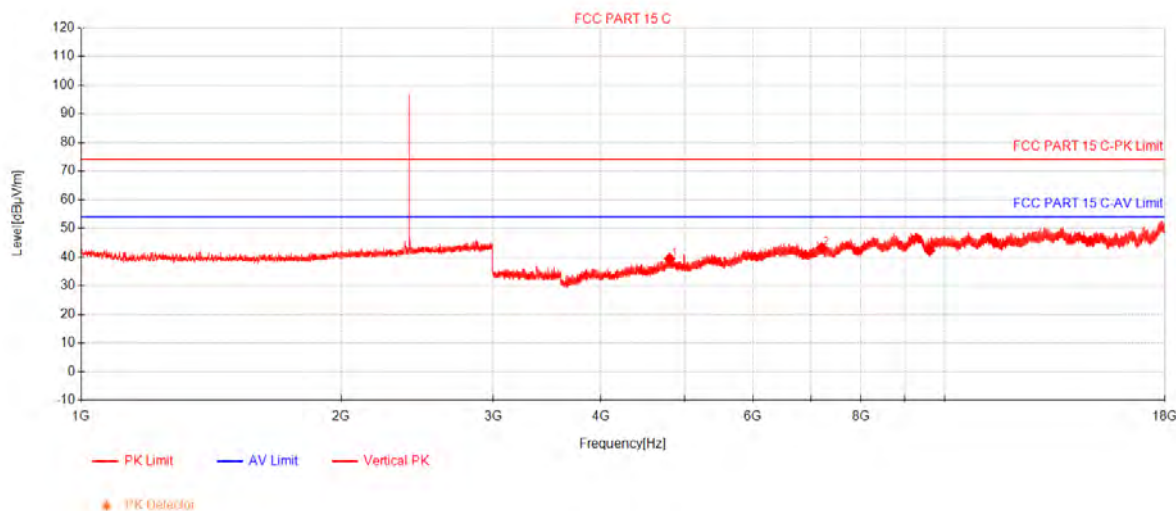


Report No.: SUHR/2021/B001001

Rev.: 02

Page: 89 of 97

## GFSK\_Channel 00



## Data List

NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4804	51.76	-12.33	39.43	74.00	34.57	162	301	Vertical
2	4804	-	-	14.64	54.00	39.36	162	301	Vertical
3	7206	49.14	-5.91	43.23	74.00	30.77	185	20	Vertical
4	7206	-	-	18.44	54.00	35.56	185	20	Vertical
5	9608	41.77	0.49	42.26	74.00	31.74	294	258	Vertical
6	9608	-	-	17.47	54.00	36.53	294	258	Vertical



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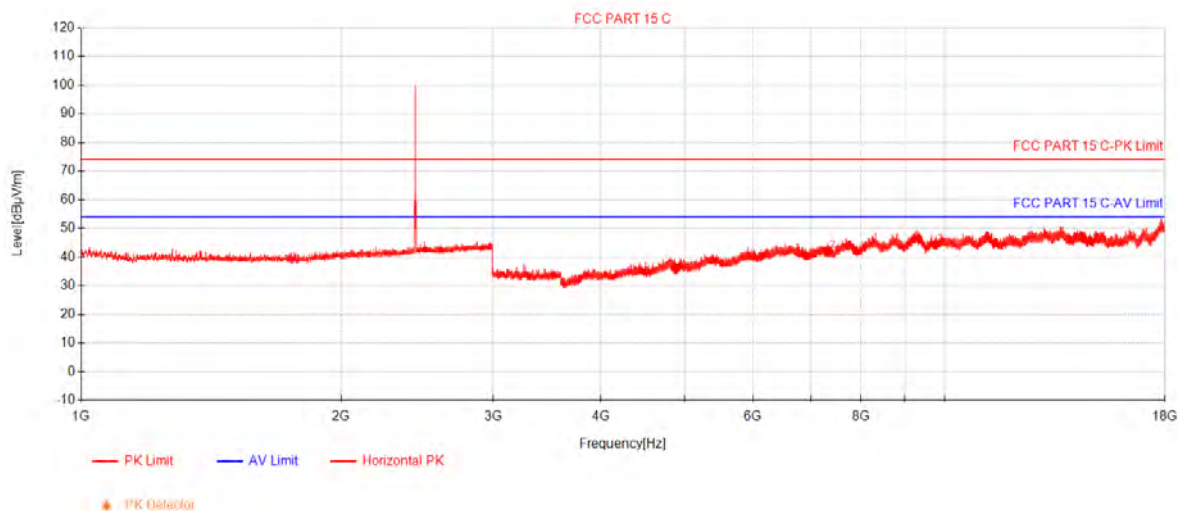
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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 90 of 97

## GFSK\_Channel 39



## Data List

NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4882	48.43	-12.48	35.95	74.00	38.05	142	57	Horizontal
2	4882	-	-	11.16	54.00	42.84	142	57	Horizontal
3	7323	47.49	-5.42	42.07	74.00	31.93	264	157	Horizontal
4	7323	-	-	17.28	54.00	36.72	264	157	Horizontal
5	9764	43.34	1.02	44.36	74.00	29.64	171	336	Horizontal
6	9764	-	-	19.57	54.00	34.43	171	336	Horizontal



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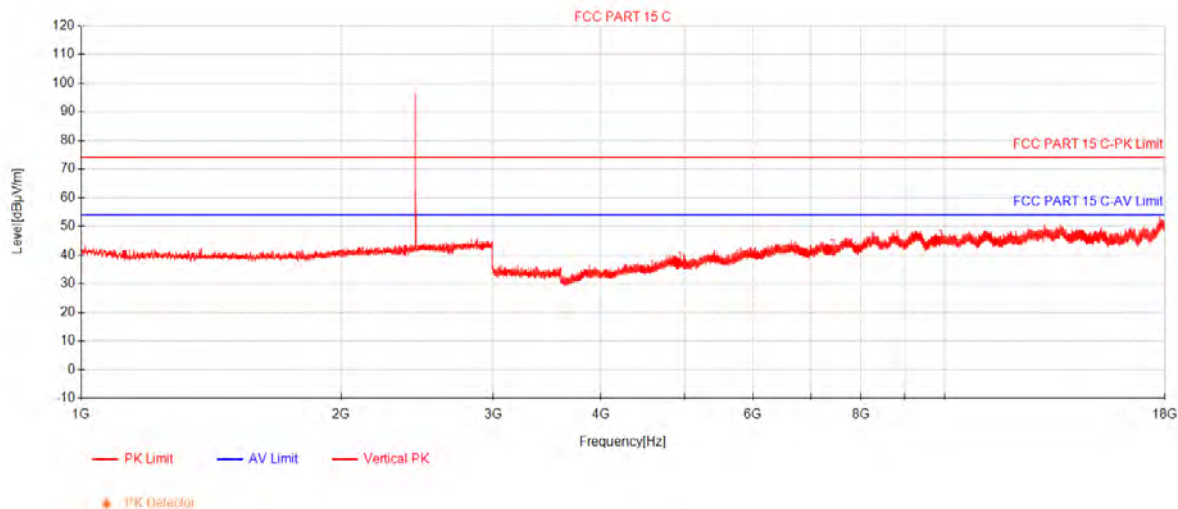
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Report No.: SUHR/2021/B001001

Rev.: 02

Page: 91 of 97

## GFSK\_Channel 39



## Data List

NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4882	50.18	-12.48	37.70	74.00	36.30	268	120	Vertical
2	4882	-	-	12.91	54.00	41.09	268	120	Vertical
3	7323	47.28	-5.42	41.86	74.00	32.14	175	204	Vertical
4	7323	-	-	17.07	54.00	36.93	175	204	Vertical
5	9764	44.15	1.02	45.17	74.00	28.83	241	343	Vertical
6	9764	-	-	20.38	54.00	33.62	241	343	Vertical



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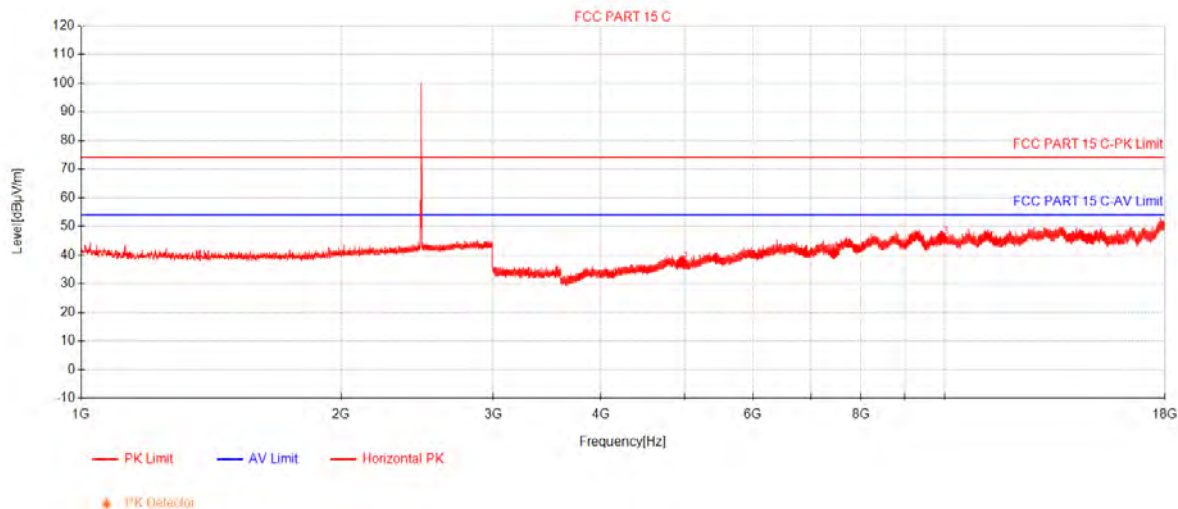
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Rev.: 02

Page: 92 of 97

## GFSK\_Channel 78



## Data List

NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4960	50.08	-12.41	37.67	74.00	36.33	296	343	Horizontal
2	4960	-	-	12.88	54.00	41.12	296	343	Horizontal
3	7440	45.85	-5.36	40.49	74.00	33.51	341	266	Horizontal
4	7440	-	-	15.70	54.00	38.30	341	266	Horizontal
5	9920	45.05	1.29	46.34	74.00	27.66	175	124	Horizontal
6	9920	-	-	21.55	54.00	32.45	175	124	Horizontal



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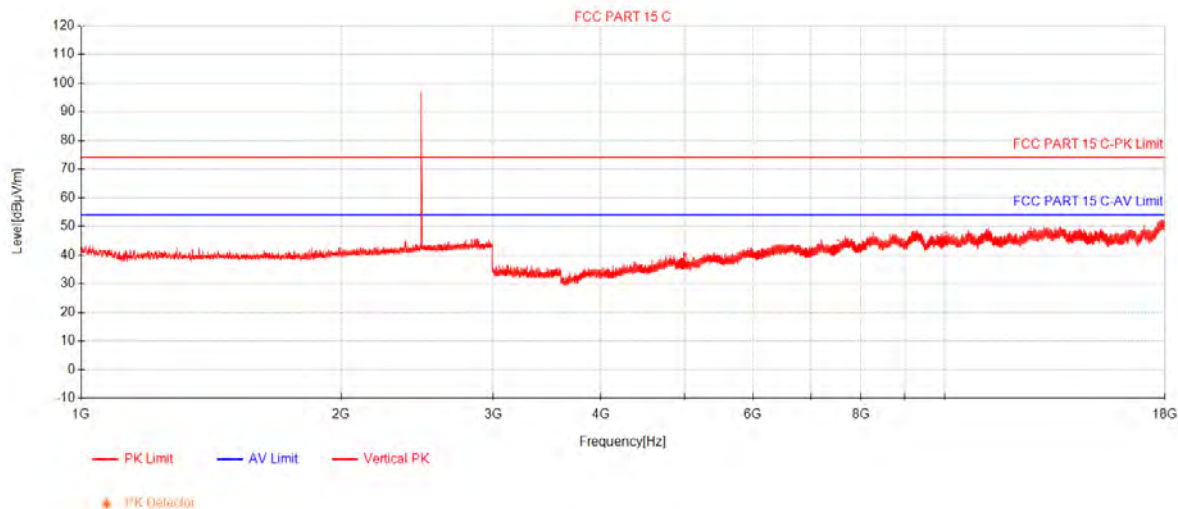


Report No.: SUHR/2021/B001001

Rev.: 02

Page: 93 of 97

### GFSK\_Channel 78



### Data List

NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4960	49.49	-12.41	37.08	74.00	36.92	177	226	Vertical
2	4960	-	-	12.29	54.00	41.71	177	226	Vertical
3	7440	47.07	-5.36	41.71	74.00	32.29	264	0	Vertical
4	7440	-	-	16.92	54.00	37.08	264	0	Vertical
5	9920	42.84	1.29	44.13	74.00	29.87	186	40	Vertical
6	9920	-	-	19.34	54.00	34.66	186	40	Vertical



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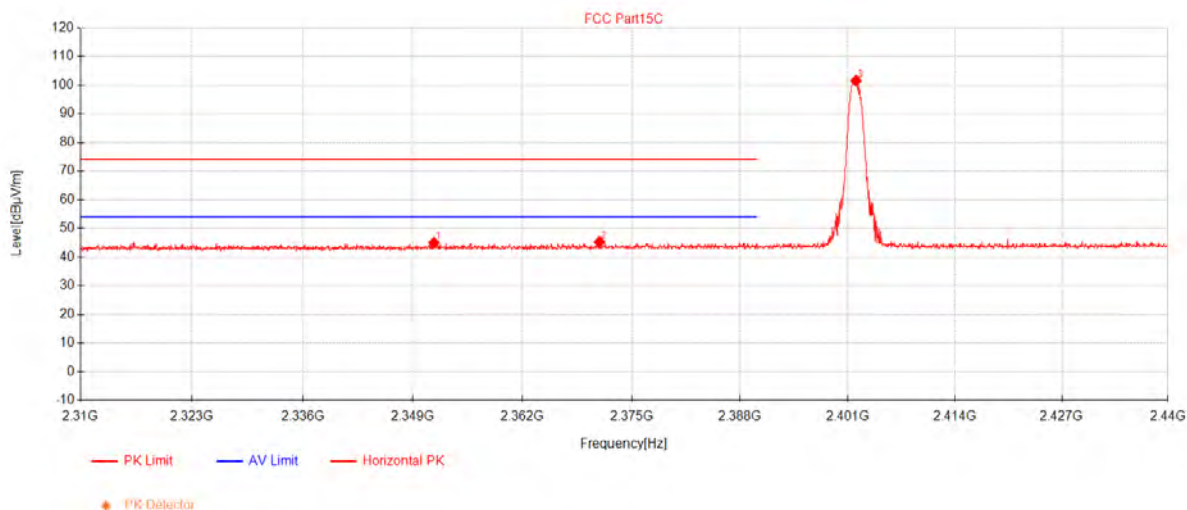
Report No.: SUHR/2021/B001001

Rev.: 02

Page: 94 of 97

### Restricted bands around fundamental frequency

#### GFSK\_Channel 00



Data List									
NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2351.4838	41.88	3.10	44.98	74.00	29.02	162	203	Horizontal
2	2351.4838	-	-	20.19	54.00	33.81	162	203	Horizontal
3	2371.1637	42.07	3.18	45.25	74.00	28.75	162	203	Horizontal
4	2371.1637	-	-	20.46	54.00	33.54	162	203	Horizontal
5	2402	98.18	3.31	101.49	-	-	162	203	Horizontal
6	2402	-	-	76.70	-	-	162	203	Horizontal



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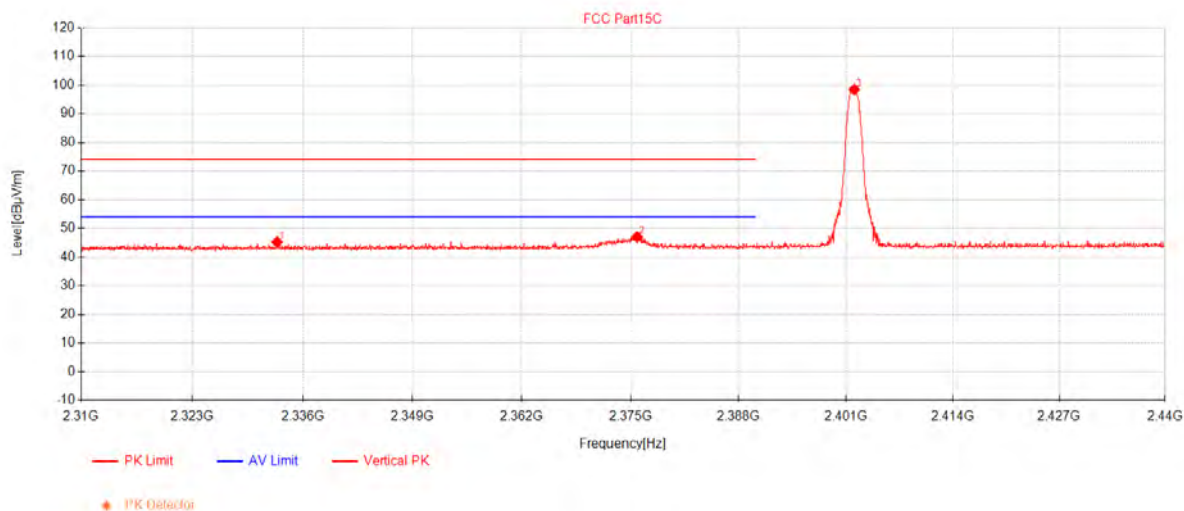
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Page: 95 of 97

## GFSK\_Channel 00



## Data List

NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2332.9743	42.21	3.02	45.23	74.00	28.77	268	333	Vertical
2	2332.9743	-	-	20.44	54.00	33.56	268	333	Vertical
3	2375.8019	43.86	3.20	47.06	74.00	26.94	268	333	Vertical
4	2375.8019	-	-	22.27	54.00	31.73	268	333	Vertical
5	2402	95.08	3.31	98.39	-	-	268	333	Vertical
6	2402	-	-	73.60	-	-	268	333	Vertical



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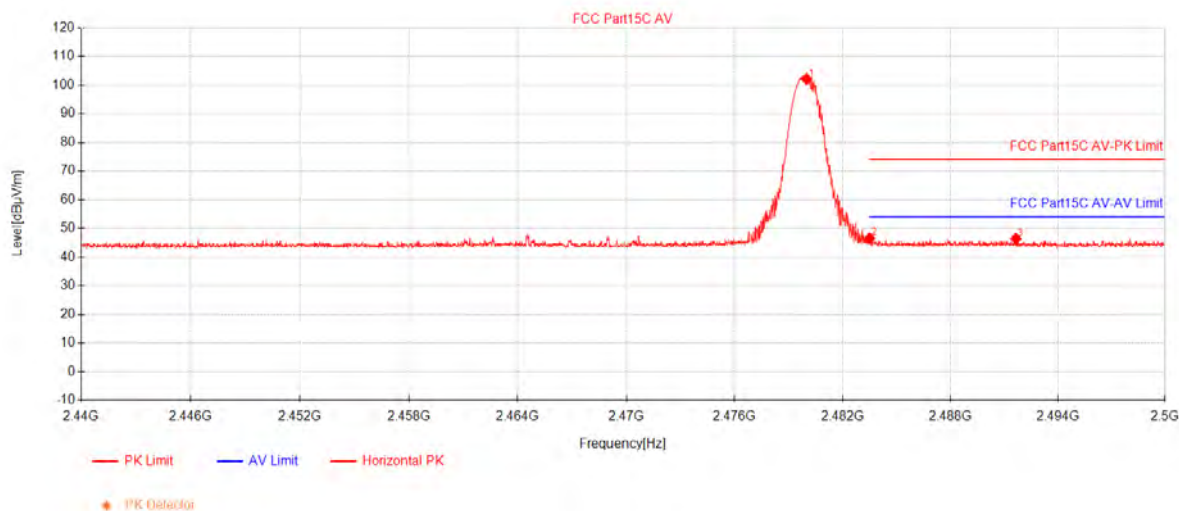
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Rev.: 02

Page: 96 of 97

## GFSK\_Channel 78



## Data List

NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2480	98.15	3.88	102.03	-	-	178	210	Horizontal
2	2480	-	-	77.24	-	-	178	210	Horizontal
3	2483.5	42.59	3.91	46.50	74.00	27.50	178	210	Horizontal
4	2483.5	-	-	21.71	54.00	32.29	178	210	Horizontal
5	2491.6572	42.41	3.97	46.38	74.00	27.62	178	210	Horizontal
6	2491.6572	-	-	21.59	54.00	32.41	178	210	Horizontal



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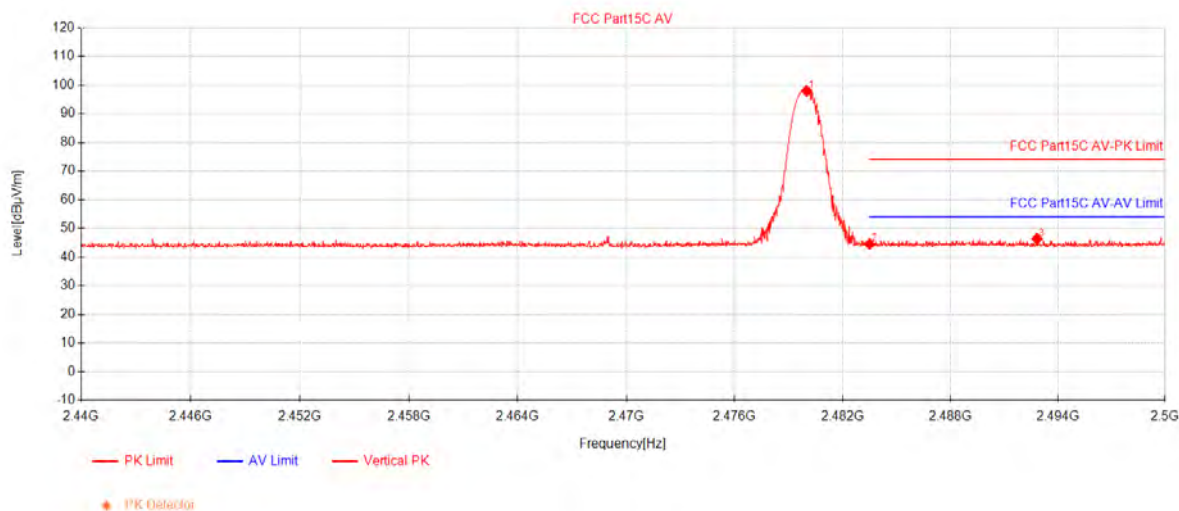


Report No.: SUHR/2021/B001001

Rev.: 02

Page: 97 of 97

## GFSK\_Channel 78



## Data List

NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2480	94.03	3.88	97.91	-	-	332	330	Vertical
2	2480	-	-	73.12	-	-	332	330	Vertical
3	2483.5	40.56	3.91	44.47	74.00	29.53	332	330	Vertical
4	2483.5	-	-	19.68	54.00	34.32	332	330	Vertical
5	2492.8376	42.36	3.98	46.34	74.00	27.66	332	330	Vertical
6	2492.8376	-	-	21.55	54.00	32.45	332	330	Vertical

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