

# FCC Radio Test Report

## FCC ID: 2AXVUTWS-1

**This report concerns: Original Grant**

**Project No.** : 2012H026  
**Equipment** : TWS Earphone  
**Brand Name** : Grell  
**Test Model** : Grell TWS-1  
**Series Model** : N/A  
**Applicant** : SX Innovation Limited  
**Address** : Sunbeam Plaza, Unit 703, 1155 Canton Road, Mongkok, Kowloon, Hong Kong  
**Manufacturer** : STRAX GmbH  
**Address** : Belgische Allee 52+54, DE-53842 Troisdorf  
**Date of Receipt** : Dec. 24, 2020  
**Date of Test** : Dec. 24, 2020 ~ Jan. 14, 2021  
**Issued Date** : Feb. 07, 2021  
**Report Version** : R02  
**Test Sample** : Engineering Sample No.: SH20201223118, SH20201223118-1  
**Standard(s)** : FCC Part15, Subpart C (15.247)  
ANSI C63.10-2013  
KDB 558074 D01 15.247 Meas Guidance v05r02

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

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### Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

Table of Contents	Page
<b>REPORT ISSUED HISTORY</b>	<b>6</b>
<b>1 . SUMMARY OF TEST RESULTS</b>	<b>7</b>
1.1 TEST FACILITY	8
1.2 MEASUREMENT UNCERTAINTY	8
1.3 TEST ENVIRONMENT CONDITIONS	8
<b>2 . GENERAL INFORMATION</b>	<b>9</b>
2.1 GENERAL DESCRIPTION OF EUT	9
2.2 DESCRIPTION OF TEST MODES	11
2.3 PARAMETERS OF TEST SOFTWARE	12
2.4 DUTY CYCLE	13
2.5 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	14
2.6 SUPPORT UNITS	14
<b>3 . AC POWER LINE CONDUCTED EMISSIONS TEST</b>	<b>15</b>
3.1 LIMIT	15
3.2 TEST PROCEDURE	15
3.3 DEVIATION FROM TEST STANDARD	15
3.4 TEST SETUP	16
3.5 EUT OPERATING CONDITIONS	16
3.6 TEST RESULTS	16
<b>4 . RADIATED EMISSION TEST</b>	<b>17</b>
4.1 LIMIT	17
4.2 TEST PROCEDURE	18
4.3 DEVIATION FROM TEST STANDARD	18
4.4 TEST SETUP	19
4.5 EUT OPERATING CONDITIONS	20
4.6 TEST RESULTS - 9 KHZ TO 30 MHZ	20
4.7 TEST RESULTS - 30 MHZ TO 1000 MHZ	20
4.8 TEST RESULTS - ABOVE 1000 MHZ	20
<b>5 . NUMBER OF HOPPING FREQUENCY</b>	<b>21</b>
5.1 LIMIT	21
5.2 TEST PROCEDURE	21
5.3 DEVIATION FROM STANDARD	21
5.4 TEST SETUP	21

Table of Contents	Page
5.5 EUT OPERATION CONDITIONS	21
5.6 TEST RESULTS	21
<b>6 . AVERAGE TIME OF OCCUPANCY</b>	<b>22</b>
6.1 LIMIT	22
6.2 TEST PROCEDURE	22
6.3 DEVIATION FROM STANDARD	22
6.4 TEST SETUP	22
6.5 EUT OPERATION CONDITIONS	22
6.6 TEST RESULTS	22
<b>7 . HOPPING CHANNEL SEPARATION MEASUREMENT</b>	<b>23</b>
7.1 LIMIT	23
7.2 TEST PROCEDURE	23
7.3 DEVIATION FROM STANDARD	23
7.4 TEST SETUP	23
7.5 EUT OPERATION CONDITIONS	23
7.6 TEST RESULTS	23
<b>8 . BANDWIDTH TEST</b>	<b>24</b>
8.1 LIMIT	24
8.2 TEST PROCEDURE	24
8.3 DEVIATION FROM STANDARD	24
8.4 TEST SETUP	24
8.5 EUT OPERATION CONDITIONS	24
8.6 TEST RESULTS	24
<b>9 . MAXIMUM OUTPUT POWER</b>	<b>25</b>
9.1 LIMIT	25
9.2 TEST PROCEDURE	25
9.3 DEVIATION FROM STANDARD	25
9.4 TEST SETUP	25
9.5 EUT OPERATION CONDITIONS	25
9.6 TEST RESULTS	25
<b>10 . CONDUCTED SPURIOUS EMISSION</b>	<b>26</b>
10.1 LIMIT	26
10.2 TEST PROCEDURE	26
10.3 DEVIATION FROM STANDARD	26

Table of Contents	Page
10.4 TEST SETUP	26
10.5 EUT OPERATION CONDITIONS	26
10.6 TEST RESULTS	26
11 . MEASUREMENT INSTRUMENTS LIST	27
12 . EUT TEST PHOTO	29
APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS	32
APPENDIX B - RADIATED EMISSION - 9 KHZ-30 MHZ	35
APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ	36
APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ	39
APPENDIX E - NUMBER OF HOPPING FREQUENCY	52
APPENDIX F - AVERAGE TIME OF OCCUPANCY	55
APPENDIX G - HOPPING CHANNEL SEPARATION MEASUREMENT	62
APPENDIX H - BANDWIDTH	65
APPENDIX I - MAXIMUM OUTPUT POWER	68
APPENDIX J - CONDUCTED SPURIOUS EMISSION	72

**REPORT ISSUED HISTORY**

Report Version	Description	Issued Date
R00	Original Issue.	Jan. 29, 2021
R01	Revised report to address TCB's comments.	Feb. 04, 2021
R02	Revised report to address TCB's comments.	Feb. 07, 2021

## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part15, Subpart C (15.247)				
Standard(s) Section	Test Item	Test Result	Judgment	Remark
15.207	AC Power Line Conducted Emissions	APPENDIX A	PASS	-----
15.247(d) 15.205(a) 15.209(a)	Radiated Emission	APPENDIX B APPENDIX C APPENDIX D	PASS	-----
15.247 (a)(1)(iii)	Number of Hopping Frequency	APPENDIX E	PASS	-----
15.247 (a)(1)(iii)	Average Time Of Occupancy	APPENDIX F	PASS	-----
15.247(a)(1)	Hopping Channel Separation	APPENDIX G	PASS	-----
15.247(a)(1)	Bandwidth	APPENDIX H	PASS	-----
15.247(a)(1)	Maximum Output Power	APPENDIX I	PASS	-----
15.247(d)	Conducted Spurious Emission	APPENDIX J	PASS	-----
15.203	Antenna Requirement	-----	PASS	Note(2)

Note:

- (1) "N/A" denotes test is not applicable in this test report
- (2) The device what use a permanently attached antenna were considered sufficient to comply with the provisions of 15.203.

## 1.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No. 29, Jintang Road, Tangzhen Industry Park, Pudong New Area, Shanghai 201210, China  
BTL's Test Firm Registration Number for FCC: 476765  
BTL's Designation Number for FCC: CN1241

## 1.2 MEASUREMENT UNCERTAINTY

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))  
The BTL measurement uncertainty as below table:

A. AC Power Line Conducted Emissions test:

Test Site	Method	Measurement Frequency Range	U, (dB)
SH-C01	CISPR	9 kHz ~ 150 MHz	2.92

B. Radiated emissions test:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
SH-CB01	CISPR	9 KHz~30 MHz	V	3.79
		9 KHz~30 MHz	H	3.57
		30 MHz~200 MHz	V	4.04
		30 MHz~200 MHz	H	3.76
		200 MHz~1,000 MHz	V	4.24
		200 MHz~1,000 MHz	H	3.84
		1 GHz~18 GHz	V	4.46
		1 GHz~18 GHz	H	4.40
		18 GHz~40 GHz	V	3.95
		18 GHz~40 GHz	H	3.95

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

## 1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By
AC Power Line Conducted Emissions	15°C	35%	AC 120V/60Hz	Joven Xiong
Radiated Emissions-30 MHz to 1GHz	24°C	58%	AC 120V/60Hz	Forest Li
Radiated Emissions-Above 1000 MHz	24°C	58%	AC 120V/60Hz	Forest Li
Number of Hopping Frequency	22°C	46%	AC 120V/60Hz	Vince Zong
Average Time Of Occupancy	22°C	46%	AC 120V/60Hz	Vince Zong
Hopping Channel Separation	22°C	46%	AC 120V/60Hz	Vince Zong
Bandwidth	22°C	46%	AC 120V/60Hz	Vince Zong
Maximum Output Power & e.i.r.p.	22°C	46%	AC 120V/60Hz	Vince Zong
Conducted Spurious Emission	22°C	46%	AC 120V/60Hz	Vince Zong

## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	TWS Earphone
Brand Name	Grell
Test Model	Grell TWS-1
Series Model	N/A
Model Difference(s)	N/A
Software Version	STX01A ADK R173 FW 1.6 @1607668222
Hardware Version	MLB L/R Ver.2.0
Power Source	Supplied from notebook USB port.
Power Rating	DC 5V 1A
Operation Frequency	2402 MHz ~ 2480 MHz
Modulation Technology	GFSK, $\pi/4$ -DQPSK, 8-DPSK
Bit Rate of Transmitter	1 Mbps, 2Mbps, 3Mbps
Max. Avg. Output Power	9.10 dBm (0.0081 W) For 1Mbps 6.16 dBm (0.0041 W) For 2Mbps 6.15 dBm (0.0041W) For 3Mbps

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. The product has two appearances: with wingtips and without wingtips. The wingtips are made of silicone rubber, which does not affect the test results.

## 2. Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

## 3 Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Mechanical	N/A	-2.3

## Note:

The antenna gain is provided by the manufacturer.

## 2.2 DESCRIPTION OF TEST MODES

The test system was pre-tested based on the consideration of all possible combinations of EUT operation mode.

Pretest Mode	Description
Mode 1	TX Mode NOTE (1)
Mode 2	TX Mode Channel 00 _3Mbps

Following mode(s) was (were) found to be the worst case(s) and selected for the final test.

AC Power Line Conducted Emissions	
Final Test Mode	Description
Mode 2	TX Mode Channel 00 _3Mbps

Radiated emissions test - Below 1GHz	
Final Test Mode	Description
Mode 2	TX Mode Channel 00 _3Mbps

Radiated emissions test - Above 1GHz	
Final Test Mode	Description
Mode 1	TX Mode NOTE (1)

Conducted test	
Final Test Mode	Description
Mode 1	TX Mode NOTE (1)

Note:

- (1) The measurements are performed at the high, middle, low available channels.
- (2) The measurements for Hopping Channel Separation and Bandwidth were tested during 1Mbps, 2Mbps and 3Mbps, the worst case are 1Mbps and 3Mbps, only worst case was documented
- (3) The measurements for output power were tested during 1Mbps, 2Mbps and 3Mbps. The worst case is 3Mbps. So, only worst case were documented for radiated emissions and ac power line conducted emissions test.

### 2.3 PARAMETERS OF TEST SOFTWARE

During testing, channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

Test Software	BlueTest3		
Frequency (MHz)	2402	2441	2480
Parameters(1Mbps)	Default	Default	Default
Parameters(2Mbps)	Default	Default	Default
Parameters(3Mbps)	Default	Default	Default

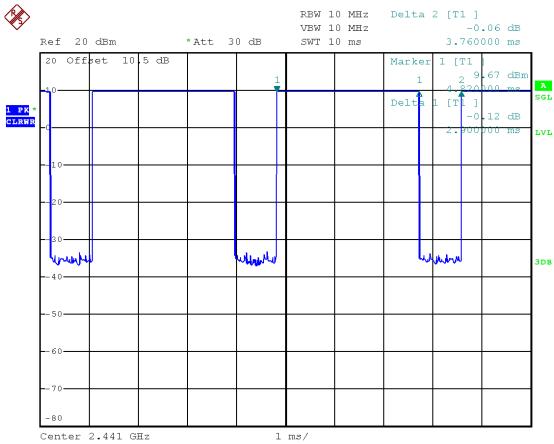
## 2.4 DUTY CYCLE

If duty cycle is  $\geq 98\%$ , duty factor is not required.

If duty cycle is  $< 98\%$ , duty factor shall be considered.

The output power = measured power + duty factor.

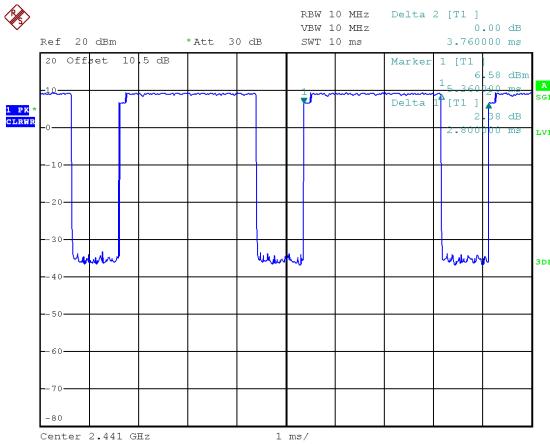
**1DH5**



Date: 14.JAN.2021 16:58:01

Duty cycle =  $2.900 \text{ ms} / 3.760 \text{ ms} = 77.13\%$   
Duty Factor =  $10 \log(1/\text{Duty cycle}) = 1.13$

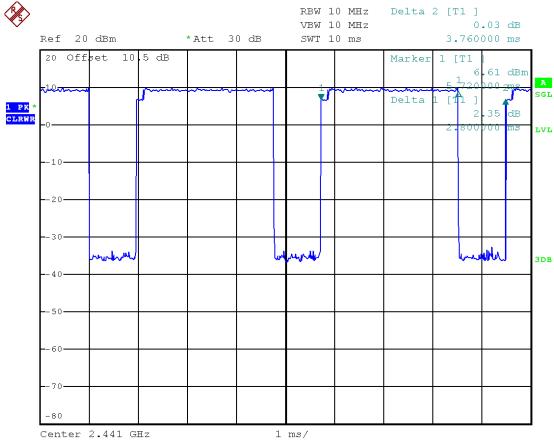
**2DH5**



Date: 14.JAN.2021 16:59:29

Duty cycle =  $2.800 \text{ ms} / 3.760 \text{ ms} = 74.47\%$   
Duty Factor =  $10 \log(1/\text{Duty cycle}) = 1.28$

**3DH5**



Date: 14.JAN.2021 17:06:00

Duty cycle =  $2.800 \text{ ms} / 3.760 \text{ ms} = 74.47\%$   
Duty Factor =  $10 \log(1/\text{Duty cycle}) = 1.28$ ,

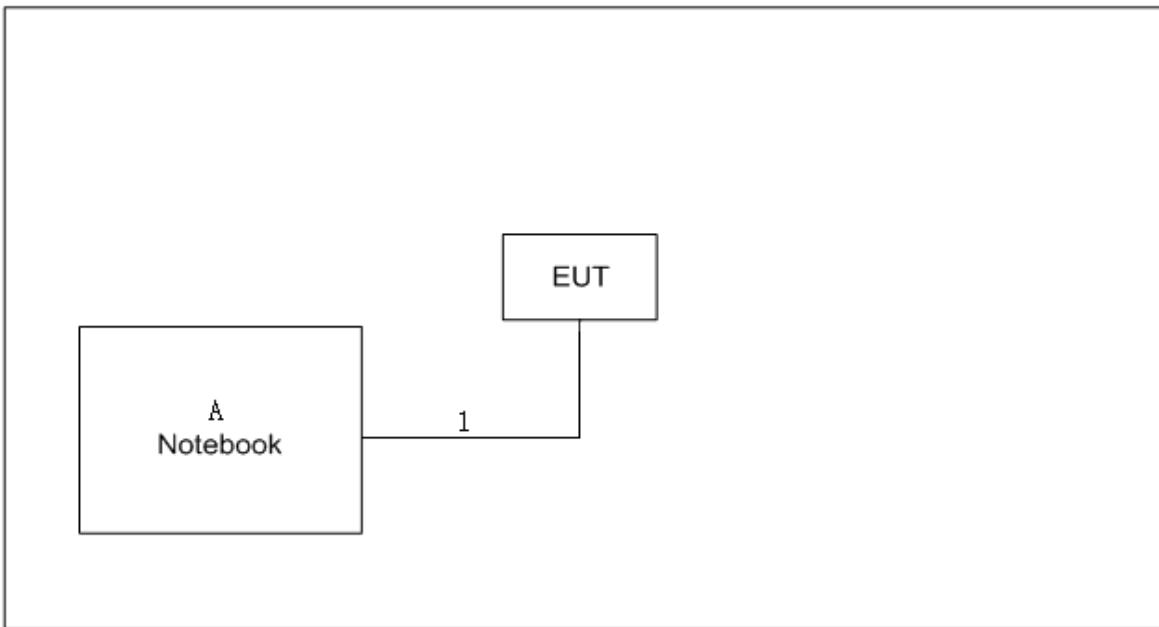
### NOTE:

For DH5 and 2DH5:

For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1 kHz (Duty cycle  $< 98\%$ ).

For 3DH5:

For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1 kHz (Duty cycle  $< 98\%$ ).

**2.5 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED****2.6 SUPPORT UNITS**

Item	Equipment	Brand	Model No.	Series No.
A	Notebook	Dell	Inspiron 15-7559	N/A

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	USB Cable	NO	NO	1m

### 3. AC POWER LINE CONDUCTED EMISSIONS TEST

#### 3.1 LIMIT

Frequency of Emission (MHz)	Limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

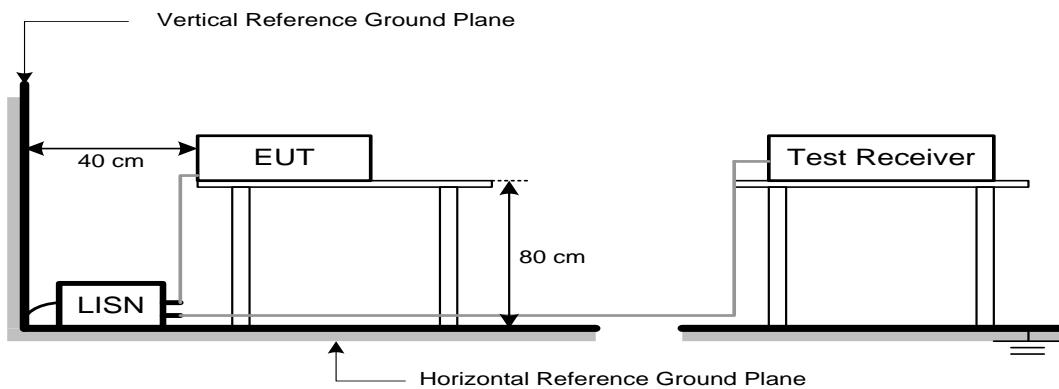
#### 3.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 3.3 DEVIATION FROM TEST STANDARD

No deviation

### 3.4 TEST SETUP



### 3.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical function (as a customer would normally use it), EUT was programmed to be in continuously transmitting data or hopping on mode.

### 3.6 TEST RESULTS

Please refer to the APPENDIX A.

Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of 『Note』 . If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform in this case, a “\*” marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150 kHz to 30 MHz.

#### 4. RADIATED EMISSION TEST

##### 4.1 LIMIT

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

##### LIMITS OF RADIATED EMISSION MEASUREMENT (9 kHz-1000 MHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

##### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000 MHz)

Frequency (MHz)	(dBuV/m at 3 m)	
	Peak	Average
Above 1000	74	54

Note:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

(4) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)

Margin Level = Measurement Value - Limit Value

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	RBW 1 MHz VBW 3 MHz peak detector for Pk value RMS detector for AV value

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30 MHz~1000 MHz for QP detector

#### 4.2 TEST PROCEDURE

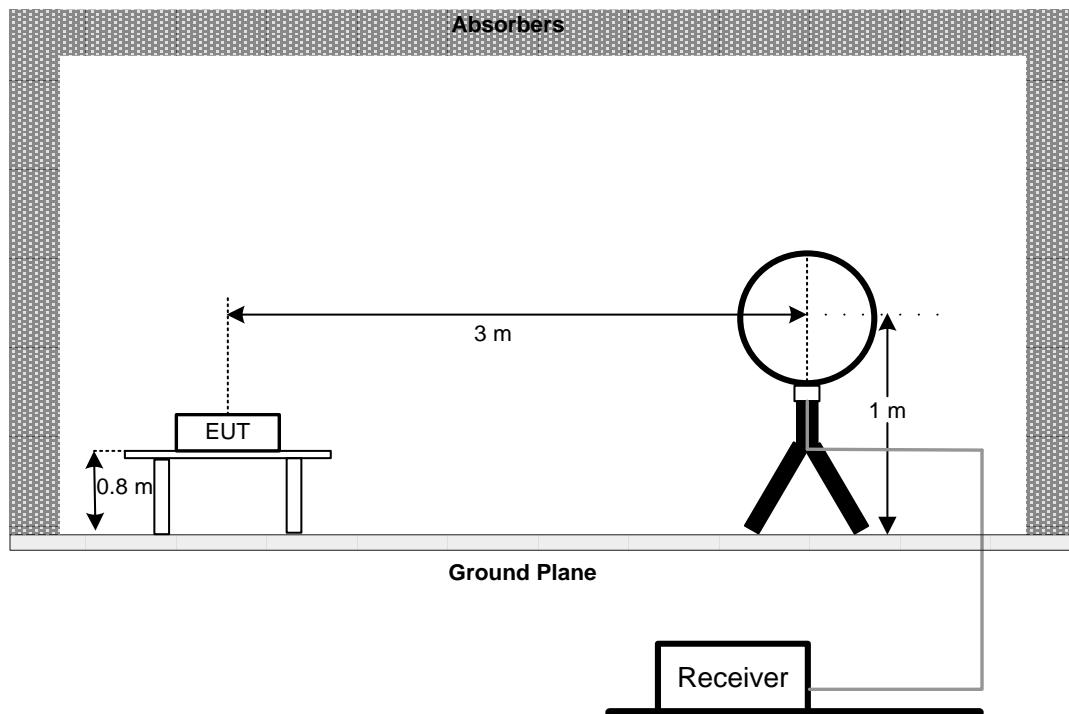
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)
- b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1 GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.  
(below 1 GHz)
- h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1 GHz)
- i. For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 4.3 DEVIATION FROM TEST STANDARD

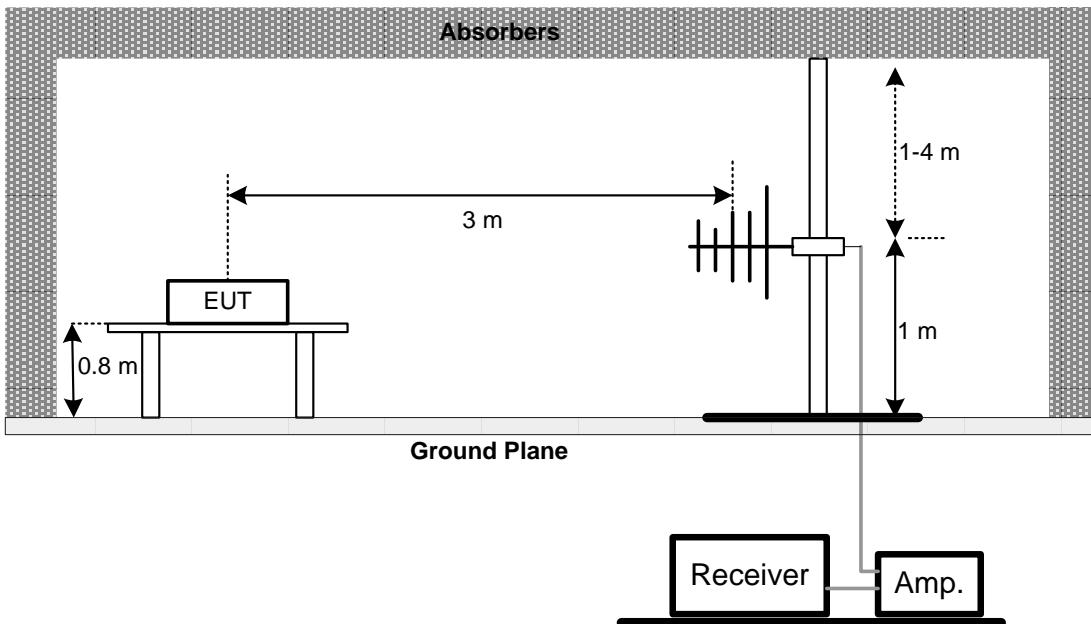
No deviation

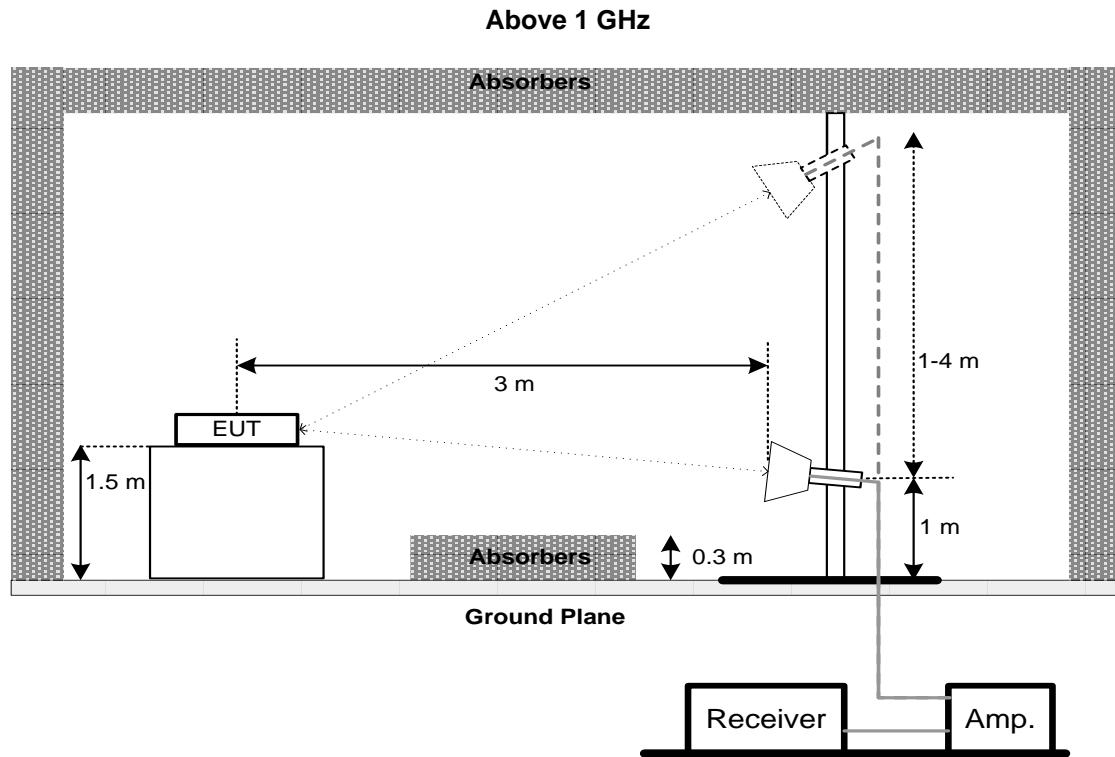
#### 4.4 TEST SETUP

**9 kHz-30 MHz**



**30 MHz to 1 GHz**





#### 4.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

#### 4.6 TEST RESULTS - 9 kHz TO 30 MHz

Please refer to the APPENDIX B

Remark:

- (1) Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB).
- (2) Limit line = specific limits (dBuV) + distance extrapolation factor.

#### 4.7 TEST RESULTS - 30 MHz TO 1000 MHz

Please refer to the APPENDIX C.

#### 4.8 TEST RESULTS - ABOVE 1000 MHz

Please refer to the APPENDIX D.

Remark:

- (1) No limit: This is fundamental signal, the judgment is not applicable.  
For fundamental signal judgment was referred to Peak output test.

## 5. NUMBER OF HOPPING FREQUENCY

### 5.1 LIMIT

FCC Part15, Subpart C (15.247)	
Section	Test Item
15.247(a)(1)(iii)	Number of Hopping Frequency

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RBW	100 kHz
VBW	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

### 5.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- Spectrum Setting: RBW=100 kHz, VBW=100 kHz, Sweep time = Auto.

### 5.3 DEVIATION FROM STANDARD

No deviation.

### 5.4 TEST SETUP



### 5.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

### 5.6 TEST RESULTS

Please refer to the APPENDIX E

## 6. AVERAGE TIME OF OCCUPANCY

### 6.1 LIMIT

FCC Part15, Subpart C (15.247)		
Section	Test Item	Limit
15.247(a)(1)(iii)	Average Time of Occupancy	0.4sec

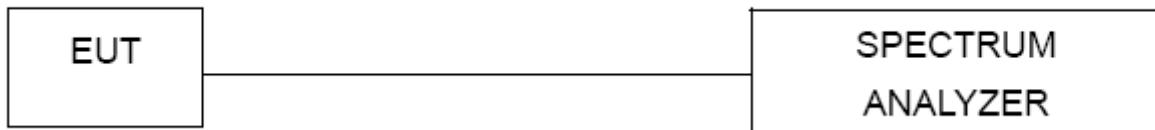
### 6.2 TEST PROCEDURE

- a. The transmitter output (antenna port) was connected to the spectrum analyzer
- b. Set RBW of spectrum analyzer to 1 MHz and VBW to 1 MHz
- c. Use a video trigger with the trigger level set to enable triggering only on full pulses
- d. Sweep Time is more than once pulse time
- e. Set the center frequency on any frequency would be measure and set the frequency span to zero span
- f. Measure the maximum time duration of one single pulse
- g. Set the EUT for DH1, DH3 and DH5 packet transmitting
- h. Measure the maximum time duration of one single pulse
- i. DH1 Packet permit maximum  $1600 / 79 / 2 = 10.12$  hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $10.12 \times 31.6 = 320$  within 31.6 seconds
- j. DH3 Packet permit maximum  $1600 / 79 / 4 = 5.06$  hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $5.06 \times 31.6 = 160$  within 31.6 seconds
- k. DH5 Packet permit maximum  $1600 / 79 / 6 = 3.37$  hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $3.37 \times 31.6 = 106.6$  within 31.6 seconds

### 6.3 DEVIATION FROM STANDARD

No deviation.

### 6.4 TEST SETUP



### 6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

### 6.6 TEST RESULTS

Please refer to the APPENDIX F

## 7. HOPPING CHANNEL SEPARATION MEASUREMENT

### 7.1 LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RBW	30 kHz
VBW	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

### 7.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- Span = wide enough to capture the peaks of two adjacent channels  
Resolution (or IF) Bandwidth (RBW)  $\geq$  1% of the span  
Video (or Average) Bandwidth (VBW)  $\geq$  RBW  
Sweep = Auto  
Detector function = Peak  
Trace = Max Hold

### 7.3 DEVIATION FROM STANDARD

No deviation.

### 7.4 TEST SETUP



### 7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

### 7.6 TEST RESULTS

Please refer to the APPENDIX G

## 8. BANDWIDTH TEST

### 8.1 LIMIT

FCC Part15, Subpart C (15.247)

Section	Test Item
15.247(a)(1)	Bandwidth

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth
RBW	30 kHz
VBW	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

### 8.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- Spectrum Setting: RBW= 30 kHz, VBW=100 kHz, Sweep Time = Auto.

### 8.3 DEVIATION FROM STANDARD

No deviation.

### 8.4 TEST SETUP



### 8.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

### 8.6 TEST RESULTS

Please refer to the APPENDIX H

## 9. MAXIMUM OUTPUT POWER

### 9.1 LIMIT

FCC Part15 , Subpart C (15.247)		
Section	Test Item	Limit
15.247(a)(1)	Maximum Output Power	0.125 Watt or 21 dBm

Note: Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### 9.2 TEST PROCEDURE

- For peak output power:
- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
  - Spectrum Setting: RBW= 1 MHz/3 MHz, VBW= 1 MHz/3 MHz, Sweep time = Auto.
- For average output power:
- The EUT was directly connected to the power meter and antenna output port as show in the block diagram below.

### 9.3 DEVIATION FROM STANDARD

No deviation.

### 9.4 TEST SETUP

For peak output power:



For average output power:



### 9.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

### 9.6 TEST RESULTS

Please refer to the APPENDIX I

## 10. CONDUCTED SPURIOUS EMISSION

### 10.1 LIMIT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak Output Power limits. If the transmitter complies with the Output Power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

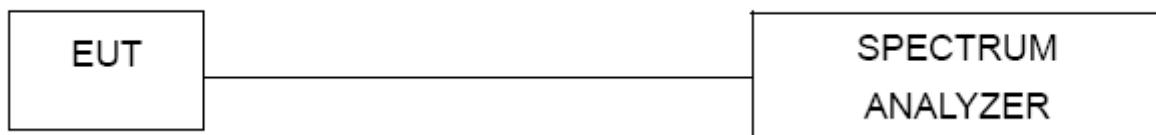
### 10.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW= 100 kHz, VBW=100 kHz, Sweep time = Auto.

### 10.3 DEVIATION FROM STANDARD

No deviation.

### 10.4 TEST SETUP



### 10.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

### 10.6 TEST RESULTS

Please refer to the APPENDIX J

## 11. MEASUREMENT INSTRUMENTS LIST

AC Power Line Conducted Emissions					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Line Impedance Stabilisation Network	Schwarzbeck	NNLK 8121	8121-822	Mar. 21, 2021
2	TWO-LINE V-NETWORK	R&S	ENV216	101340	Aug. 23, 2021
3	Test Cable	emci	EMCRG400-BM-N M-10000	170628	Jul. 15, 2021
4	EMI Test Receiver	R&S	ESCI	100082	Mar. 28, 2021
5	50Ω Terminator	SHX	TF2-1G-A	17051602	Mar. 21, 2021
6	50Ω coaxial switch	Anritsu	MP59B	6201750902	Mar. 21, 2021
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated Emissions - 9 kHz to 30 MHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Loop Antenna	EMCI	EMCI LPA600	275	Mar. 28, 2021
2	EMI Test Receiver	R&S	ESCI	100082	Mar. 28, 2021
3	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated Emissions - 30 MHz to 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	719	Mar. 28, 2021
2	Pre-Amplifier	emci	EMC9135	980400	Mar. 21, 2021
3	MXE EMI Receiver	Keysight	N9038A	MY57150106	Mar. 21, 2021
4	Test Cable	emci	EMC104-SM-SM-7000	170330	Apr. 16, 2021
5	Test Cable	emci	EMC104-SM-SM-1000	170331	Apr. 16, 2021
6	Test Cable	emci	EMC104-SM-NM-3500	170621	Apr. 16, 2021
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated Emissions - Above 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Double-Ridged Waveguide Horn Antenna	ETS-Lindgren	9120D	00206960	Mar. 28, 2021
2	Pre-Amplifier	emci	EMC012645SE	980421	Mar. 28, 2021
3	EXA Spectrum Analyzer	Keysight	N9010A	MY56480545	Mar. 21, 2021
4	Test Cable	emci	EMC104-SM-SM-7000	170330	Apr. 16, 2021
5	Test Cable	emci	EMC104-SM-SM-1000	170331	Apr. 16, 2021
6	Test Cable	emci	EMC104-SM-NM-3500	170621	Apr. 16, 2021
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
8	MXE EMI Receiver	Keysight	N9038A	MY57150106	Mar. 28, 2021
9	Double-Ridged Waveguide Horn Antenna	ETS-Lindgren	3116C	00203919	Mar. 28, 2021
10	Pre-Amplifier	emci	EMC184045SE	980409	Mar. 28, 2021
11	EXA Spectrum Analyzer	Keysight	N9010A	MY56480579	Mar. 21, 2021
12	Test Cable	emci	EMC102-KM-KM-800	170654	Apr. 16, 2021
13	Test Cable	emci	Super Reliable-40G-SS11-7000	W0030860001	Apr. 16, 2021
14	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Number of Hopping Frequency					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100626	Mar. 21, 2021

Average Time of Occupancy					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100626	Mar. 21, 2021

Hopping Channel Separation Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100626	Mar. 21, 2021

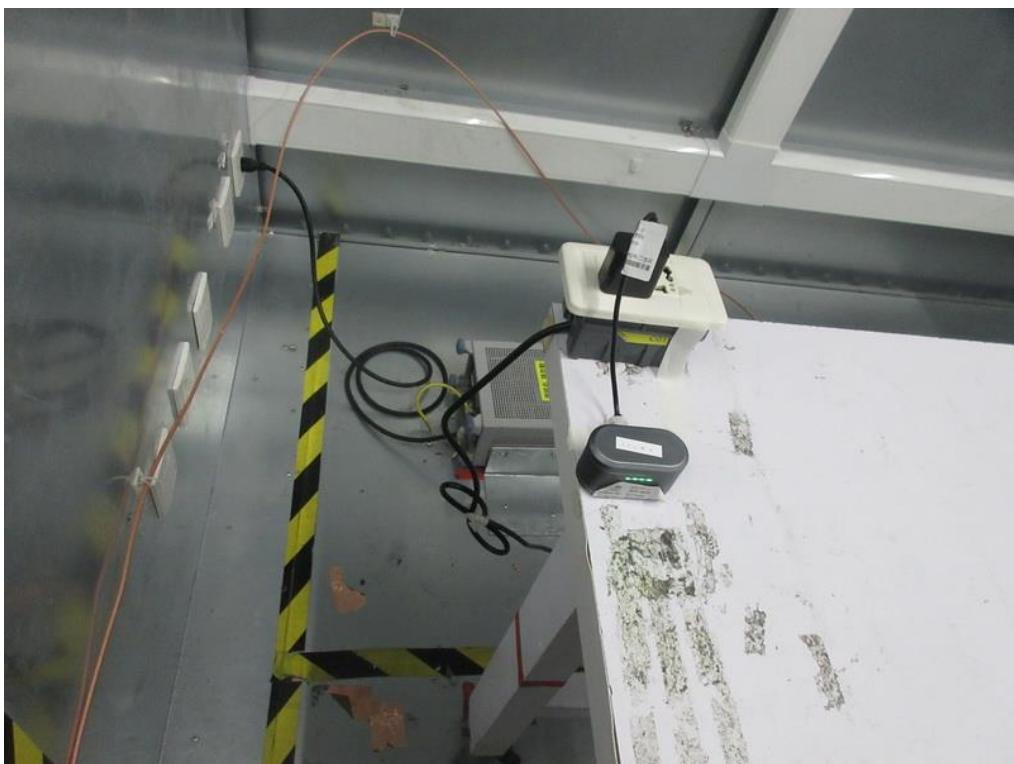
Bandwidth					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100626	Mar. 21, 2021

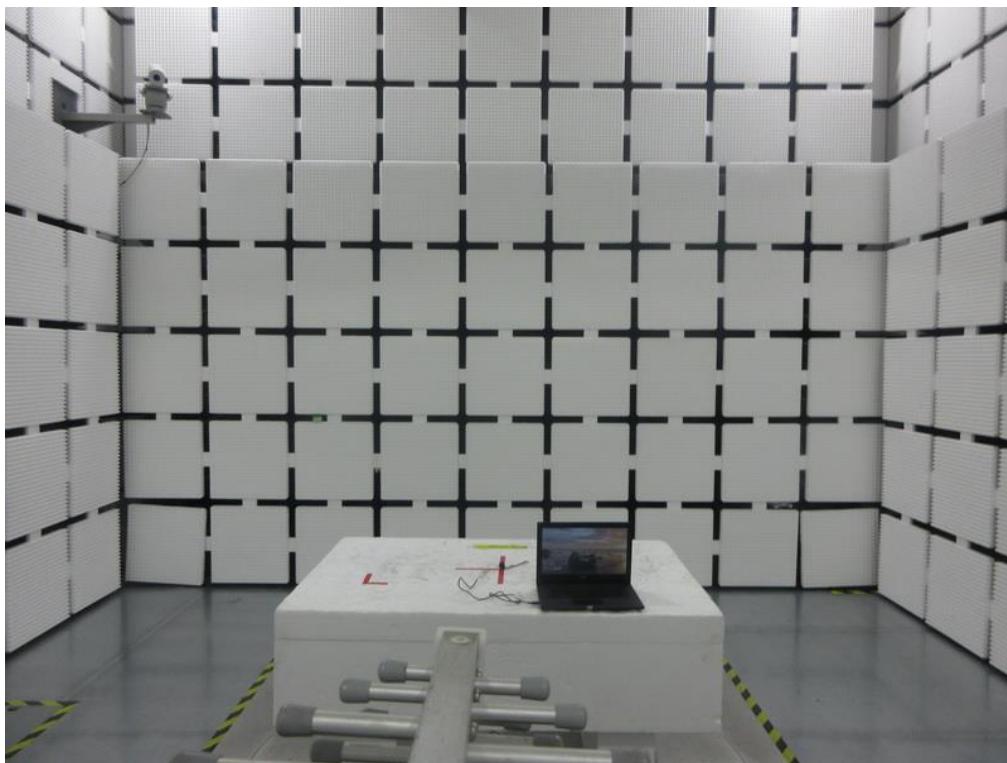
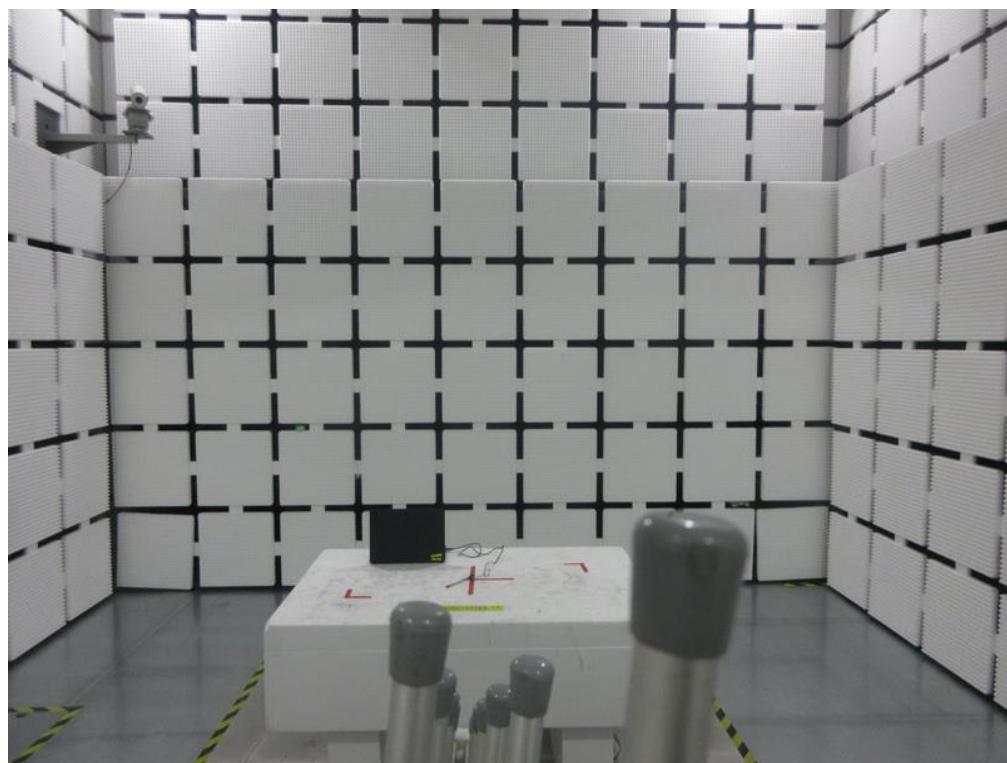
Maximum Output Power					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100626	Mar. 21, 2021

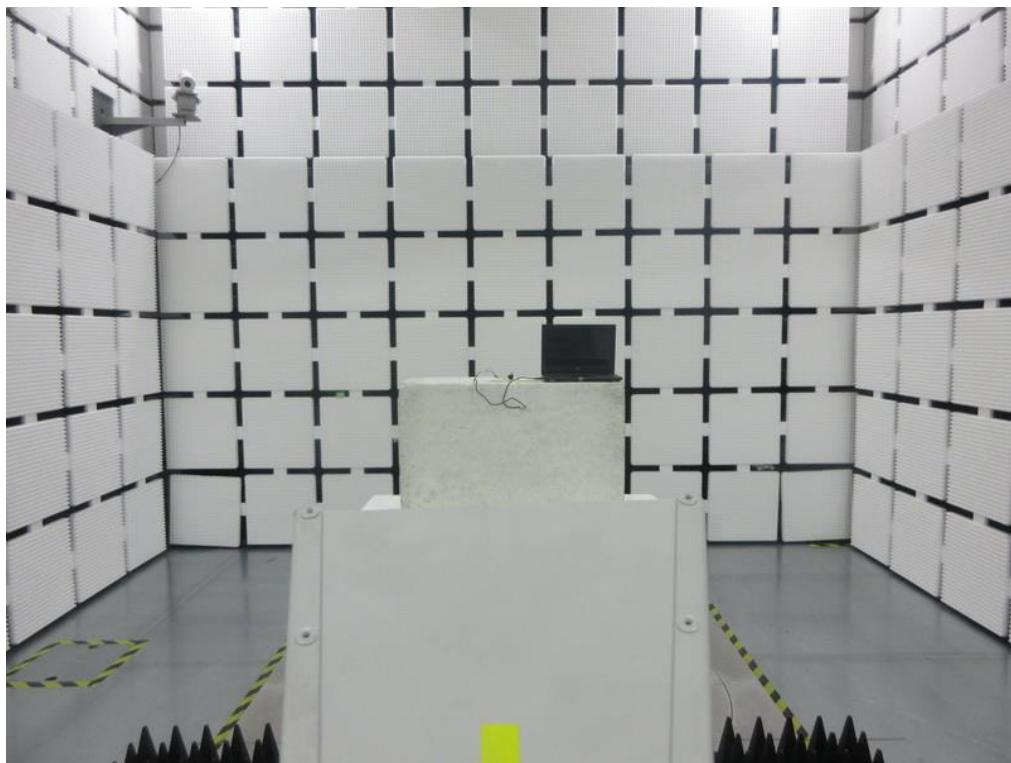
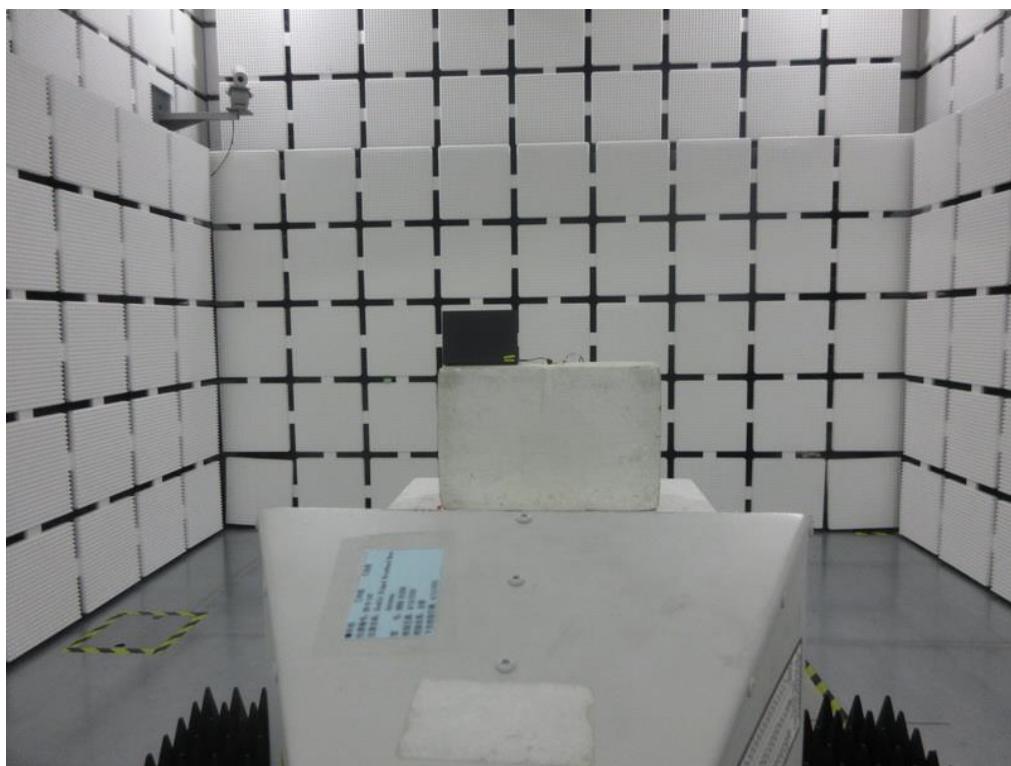
Antenna Conducted Spurious Emission					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100626	Mar. 21, 2021

Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

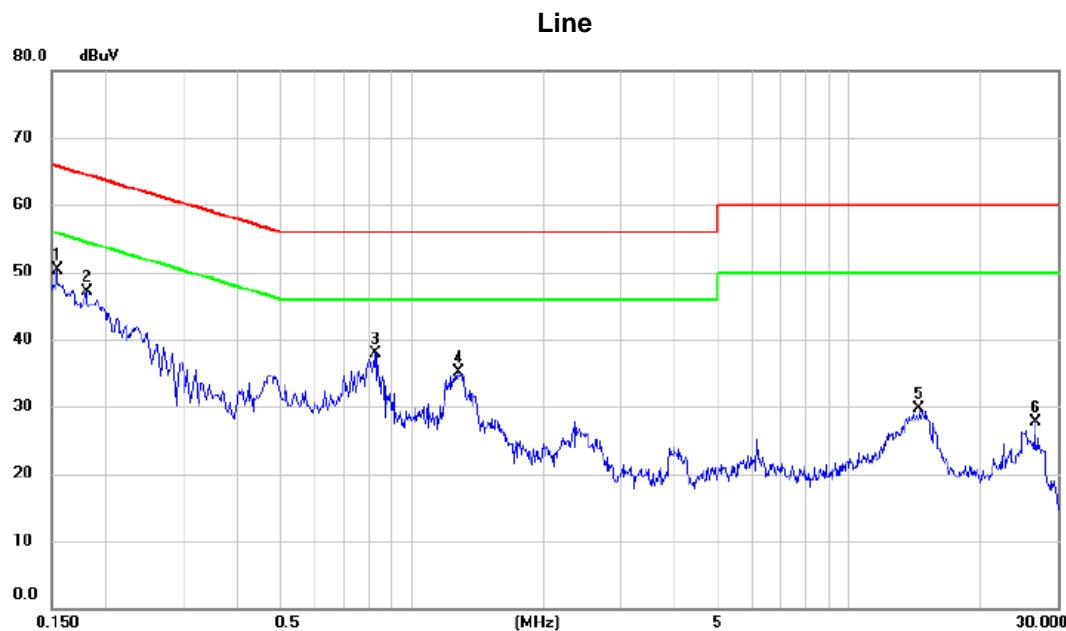
**12. EUT TEST PHOTO****Conducted Emissions Test Photos**

**Radiated Emissions Test Photos****30 MHz to 1000 MHz**

**Radiated Emissions Test Photos****Above 1 GHz**

## APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS

Test Mode: TX Mode Channel 00 \_3Mbps

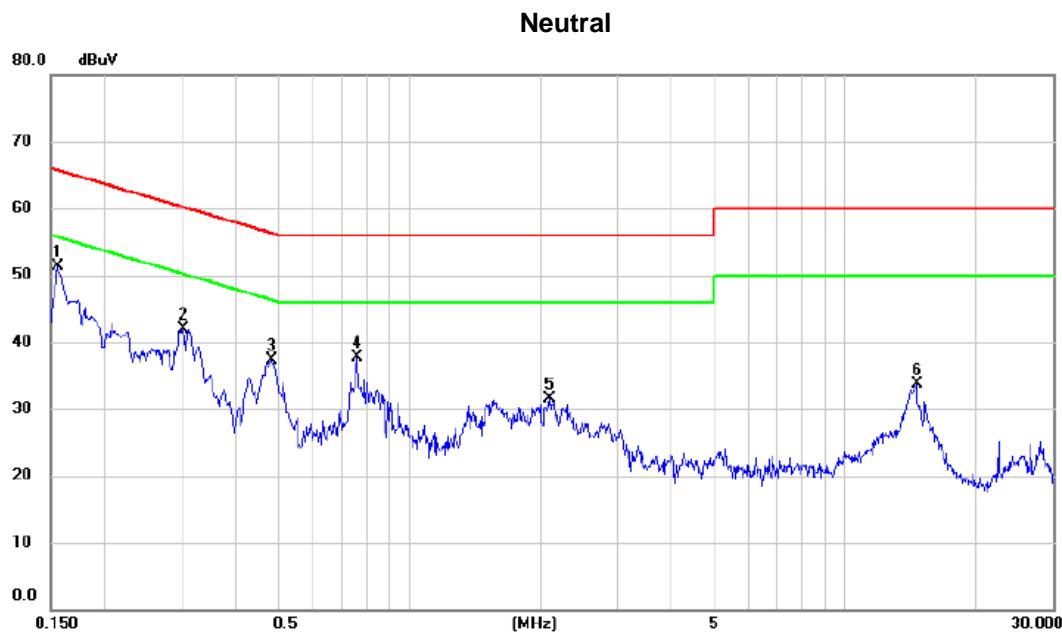


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector Comment
1	*	0.1544	40.56	9.72	50.28	65.76	-15.48	peak
2		0.1815	37.35	9.73	47.08	64.42	-17.34	peak
3		0.8250	28.16	9.82	37.98	56.00	-18.02	peak
4		1.2840	25.31	9.86	35.17	56.00	-20.83	peak
5		14.4735	19.19	10.45	29.64	60.00	-30.36	peak
6		26.6235	16.93	10.69	27.62	60.00	-32.38	peak

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.  
(2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX Mode Channel 00 \_3Mbps



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV	dB	Detector	Comment
1	*	0.1555	41.62	9.69	51.31	65.70	-14.39	peak
2		0.3030	32.20	9.73	41.93	60.16	-18.23	peak
3		0.4830	27.62	9.77	37.39	56.29	-18.90	peak
4		0.7573	27.83	9.81	37.64	56.00	-18.36	peak
5		2.0940	21.66	9.88	31.54	56.00	-24.46	peak
6		14.6084	23.28	10.45	33.73	60.00	-26.27	peak

**REMARKS:**

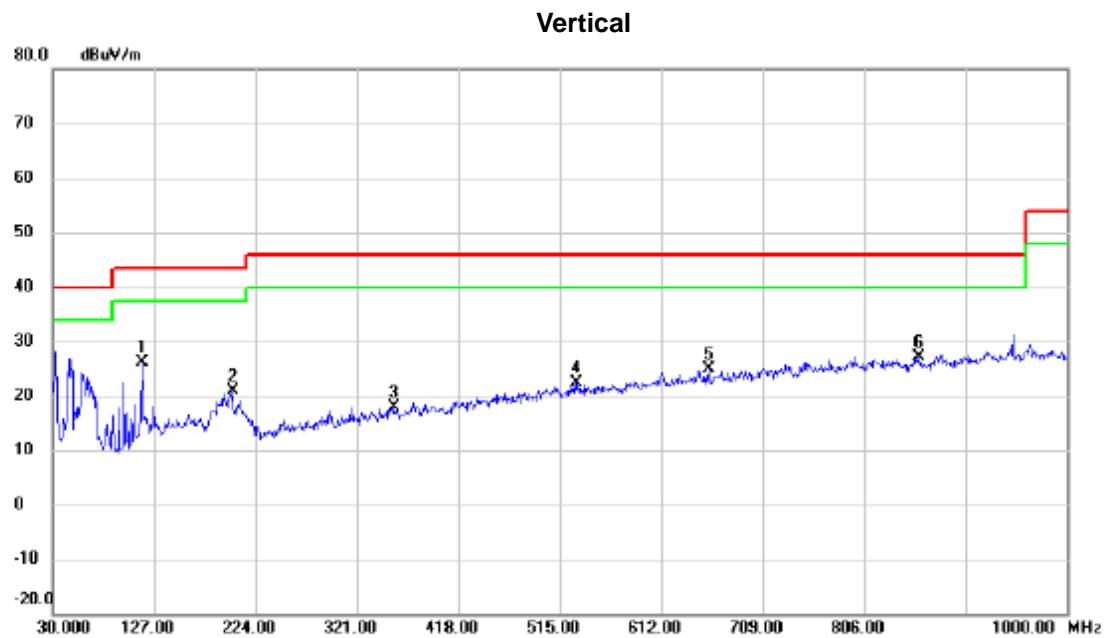
- (1) Measurement Value = Reading Level + Correct Factor.  
(2) Margin Level = Measurement Value - Limit Value.

**APPENDIX B - RADIATED EMISSION - 9 KHZ-30 MHZ**

Note: Below 30MHz, The measured value have enough margin over 20dB than the limit, therefore they are not reported

**APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ**

Test Mode: TX Mode Channel 00 \_3Mbps

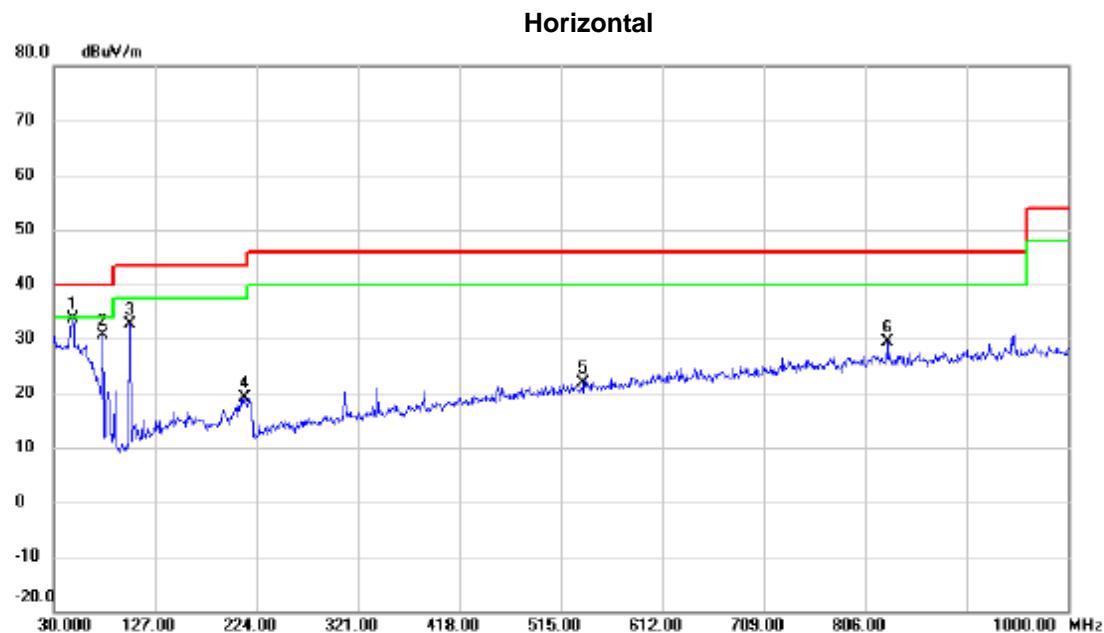


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB	Margin Detector	Comment
1	*	115.8450	45.20	-19.11	26.09	43.50	-17.41	peak
2		202.1750	40.08	-19.23	20.85	43.50	-22.65	peak
3		356.8900	32.25	-14.42	17.83	46.00	-28.17	peak
4		531.0050	33.02	-10.76	22.26	46.00	-23.74	peak
5		658.0750	33.24	-8.47	24.77	46.00	-21.23	peak
6		857.8950	33.34	-6.30	27.04	46.00	-18.96	peak

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.  
(2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX Mode Channel 00 \_3Mbps



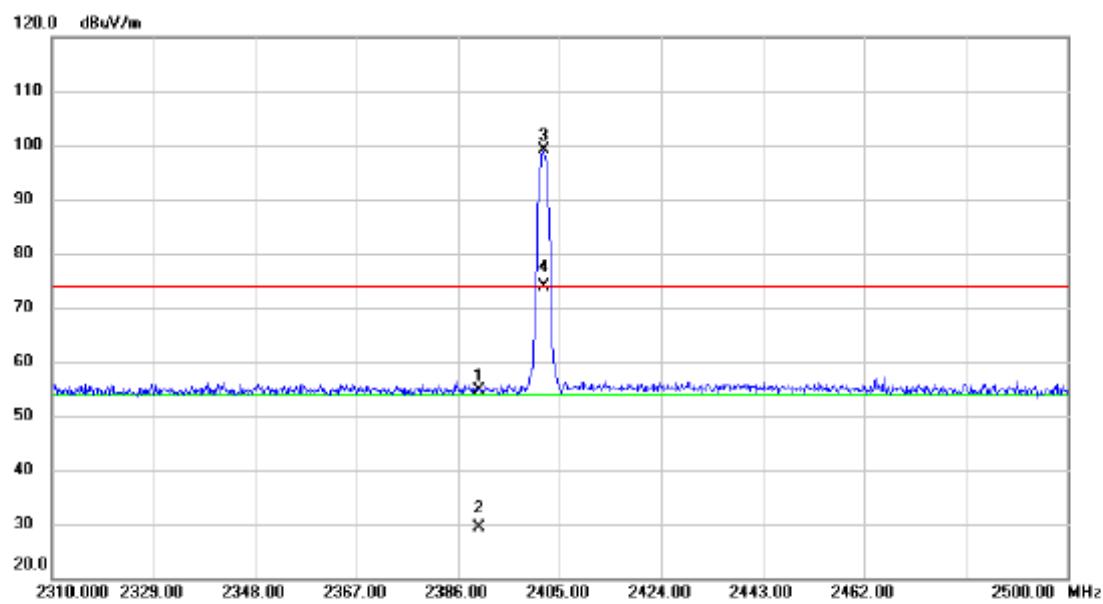
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1	*	48.9150	50.51	-16.78	33.73	40.00	-6.27	peak
2		76.5600	50.76	-20.07	30.69	40.00	-9.31	peak
3		102.7500	53.44	-20.77	32.67	43.50	-10.83	peak
4		212.3600	38.58	-19.37	19.21	43.50	-24.29	peak
5		536.3400	32.63	-10.67	21.96	46.00	-24.04	peak
6		826.8550	35.84	-6.45	29.39	46.00	-16.61	peak

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

**APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ**

Test Mode: TX 2402 MHz \_CH00\_3Mbps

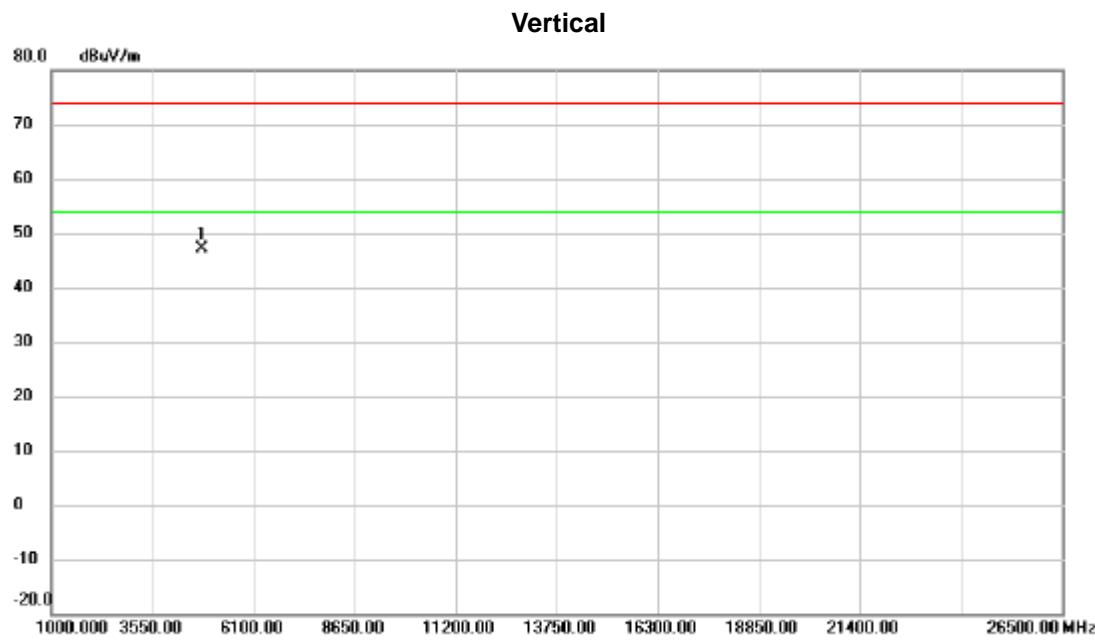
**Vertical**

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	22.79	31.74	54.53	74.00	-19.47	peak	
2		2390.000	-2.25	31.74	29.49	54.00	-24.51	AVG	
3	*	2402.055	67.29	31.72	99.01	74.00	25.01	peak	
4	X	2402.055	42.25	31.72	73.97	54.00	19.97	AVG	

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2402 MHz \_CH00\_3Mbps

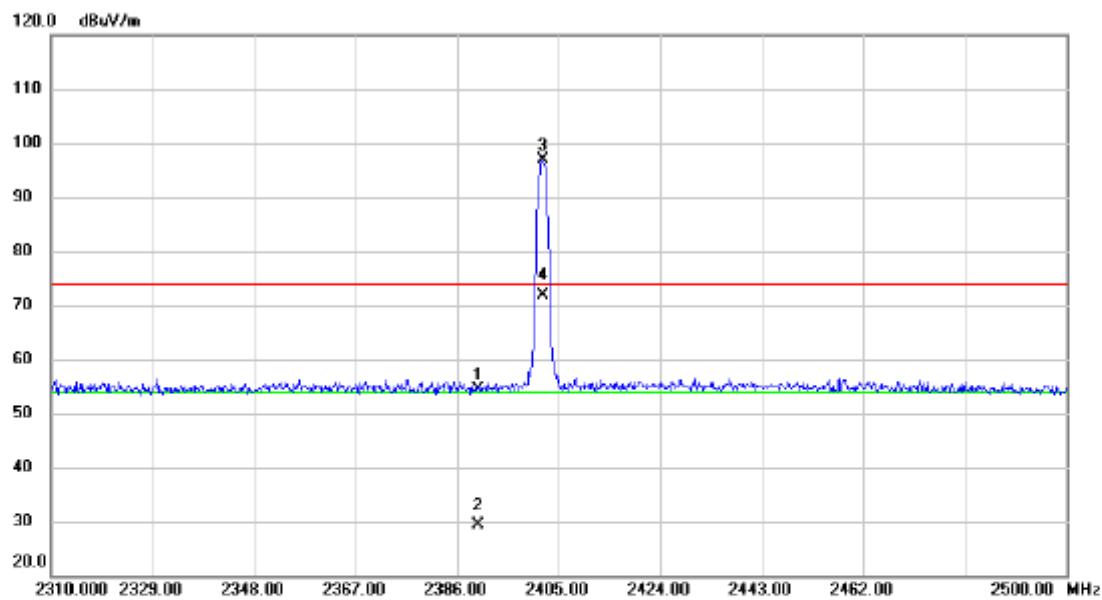


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1	*	4804.600	58.14	-10.95	47.19	74.00	-26.81	peak

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2402 MHz \_CH00\_3Mbps

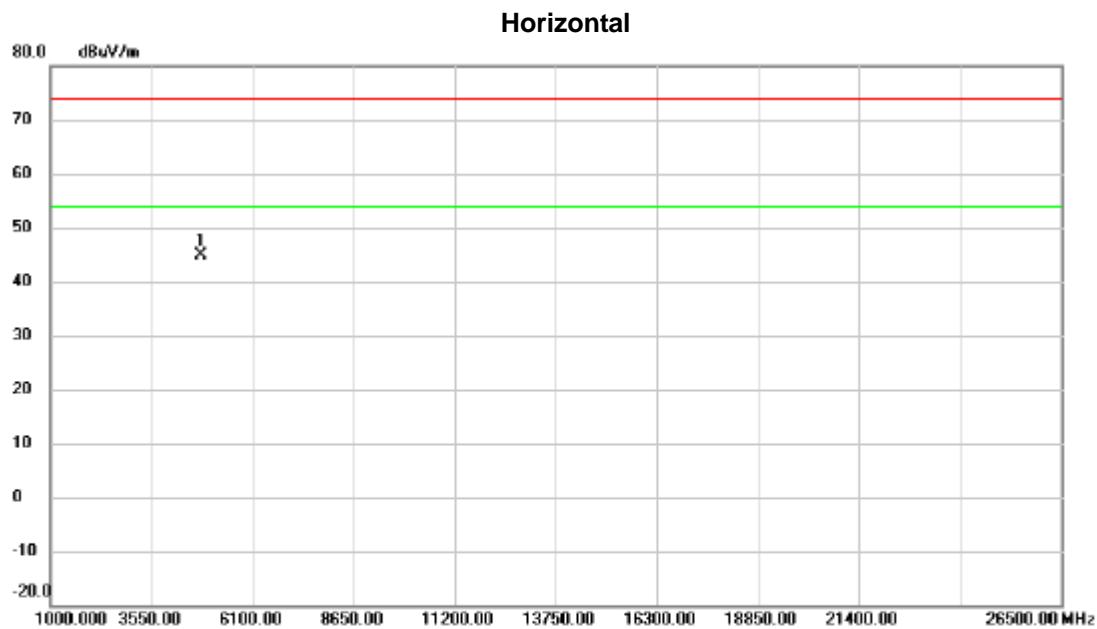
**Horizontal**

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV/m	dB			
1		2390.000	22.74	31.74	54.48	74.00	-19.52	peak	
2		2390.000	-2.30	31.74	29.44	54.00	-24.56	AVG	
3	*	2401.960	65.17	31.72	96.89	74.00	22.89	peak	
4	X	2401.960	40.13	31.72	71.85	54.00	17.85	AVG	

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.  
(2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2402 MHz \_CH00\_3Mbps

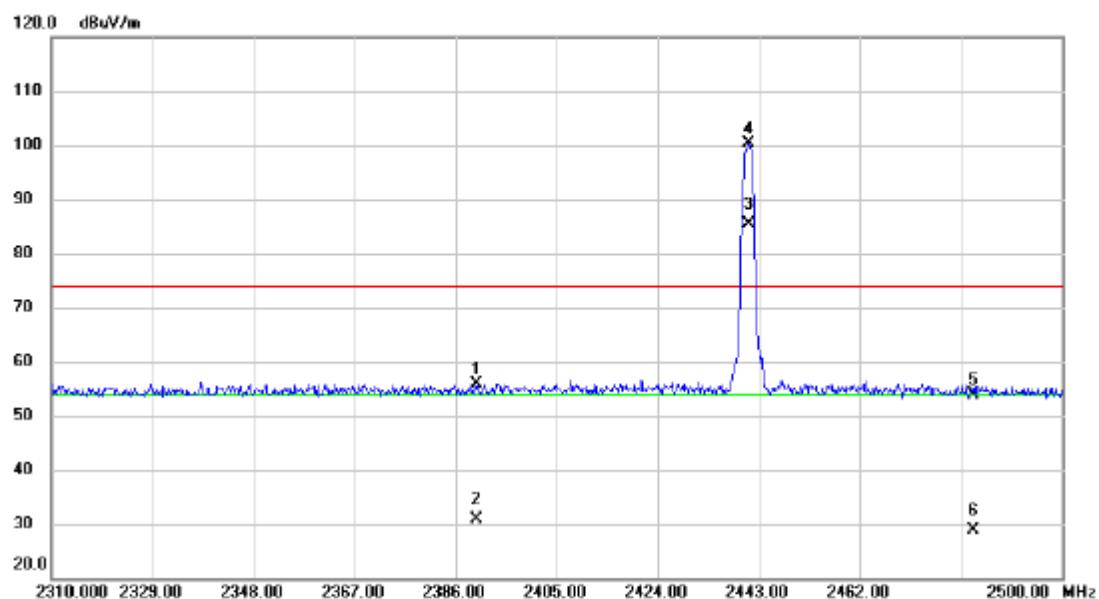


No.	Mk.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1	*	4803.325	55.83	-10.95	44.88	74.00	-29.12 peak

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2441 MHz \_CH39\_3Mbps

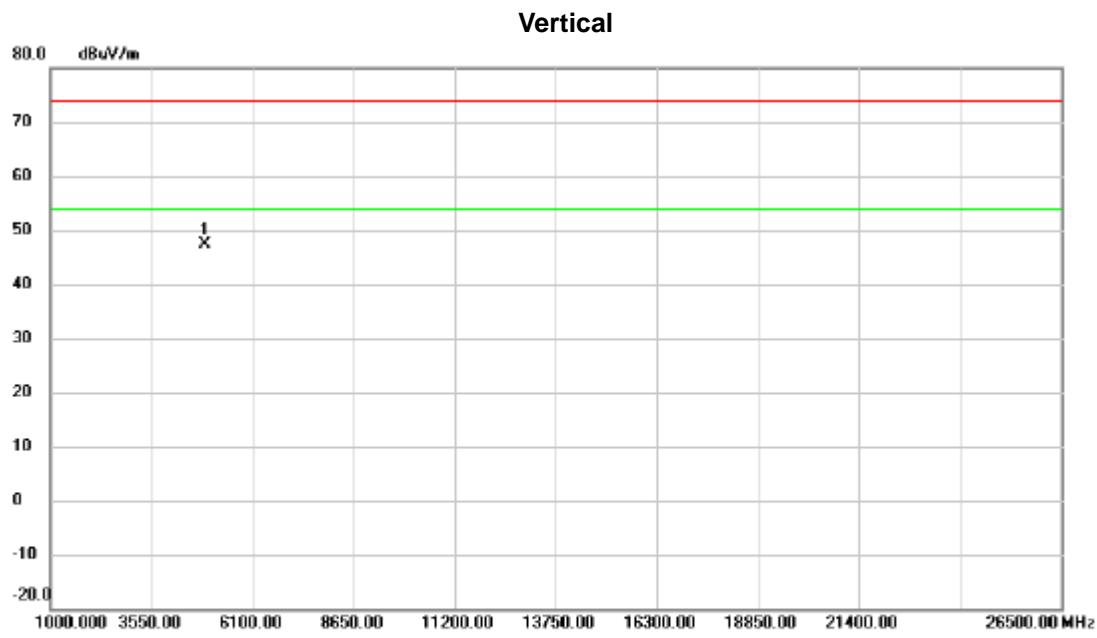
**Vertical**

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		2390.000	24.06	31.74	55.80	74.00	-18.20	peak	
2		2390.000	-0.98	31.74	30.76	54.00	-23.24	AVG	
3	*	2441.100	53.65	31.72	85.37	54.00	31.37	AVG	
4	X	2441.100	68.69	31.72	100.41	74.00	26.41	peak	
5		2483.500	22.22	31.72	53.94	74.00	-20.06	peak	
6		2483.500	-2.82	31.72	28.90	54.00	-25.10	AVG	

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2441 MHz \_CH39\_3Mbps

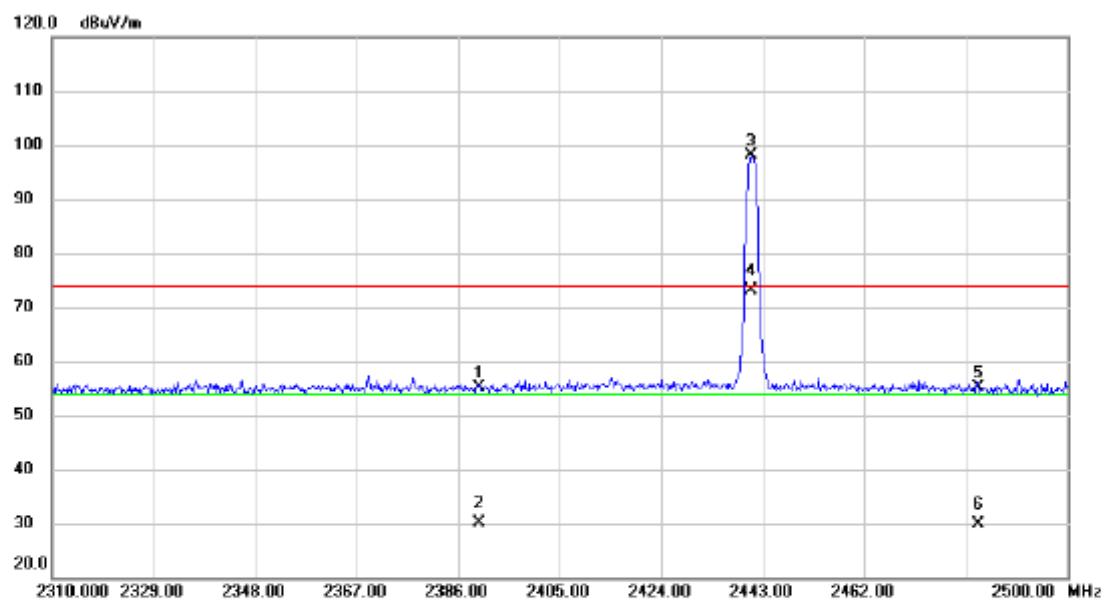


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1	*	4882.375	58.09	-10.78	47.31	74.00	-26.69	peak

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2441 MHz \_CH39\_3Mbps

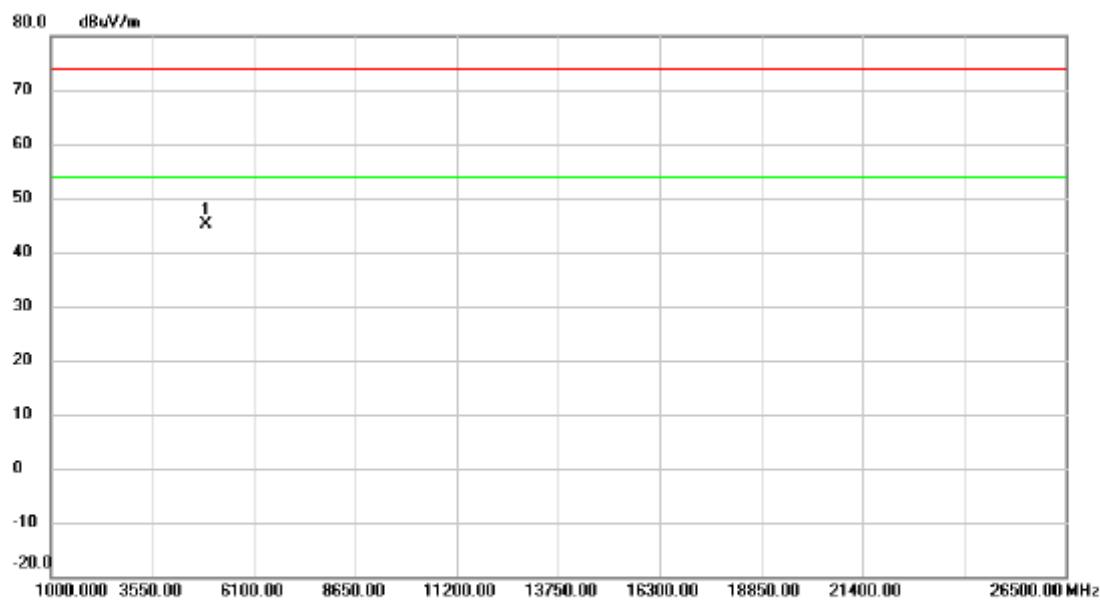
**Horizontal**

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1		2390.000	23.43	31.74	55.17	74.00	-18.83	peak
2		2390.000	-1.61	31.74	30.13	54.00	-23.87	AVG
3	*	2440.910	66.42	31.72	98.14	74.00	24.14	peak
4	X	2440.910	41.38	31.72	73.10	54.00	19.10	AVG
5		2483.500	23.30	31.72	55.02	74.00	-18.98	peak
6		2483.500	-1.74	31.72	29.98	54.00	-24.02	AVG

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2441 MHz \_CH39\_3Mbps

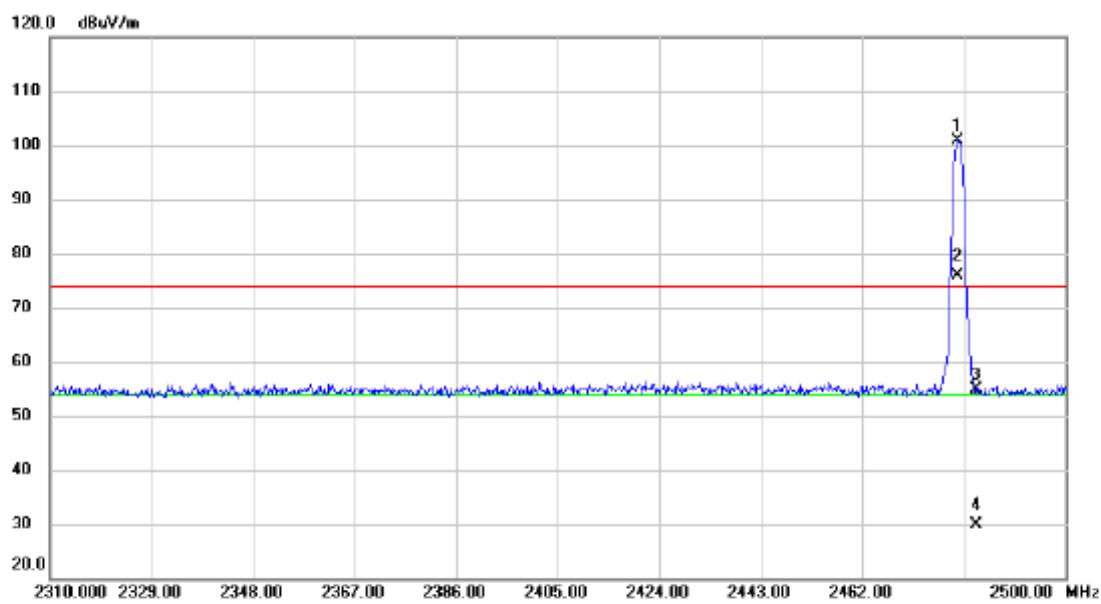
**Horizontal**

No.	Mk.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4882.375	55.79	-10.78	45.01	74.00	-28.99	peak

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2480 MHz \_CH78\_3Mbps

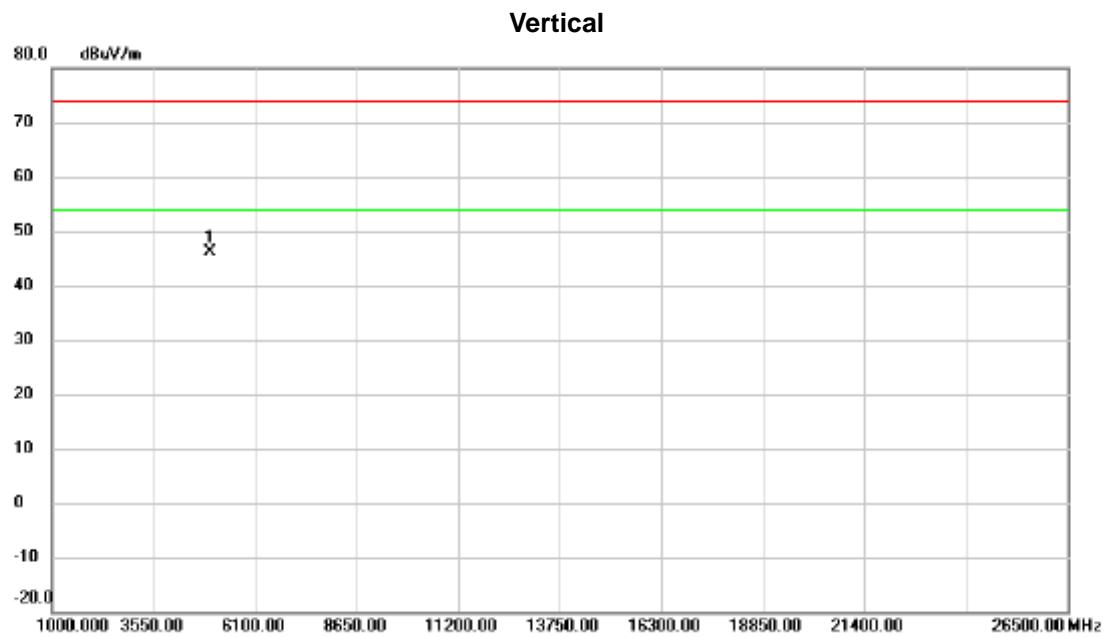
**Vertical**

No.	Mk.	Freq. MHz	Reading Level	Correct Factor	Measure- ment	Limit dBuV/m	Margin dB	Detector	Comment
			dBuV	dB	dBuV/m				
1	*	2479.860	69.27	31.71	100.98	74.00	26.98	peak	
2	X	2479.860	44.23	31.71	75.94	54.00	21.94	AVG	
3		2483.500	23.14	31.72	54.86	74.00	-19.14	peak	
4		2483.500	-1.90	31.72	29.82	54.00	-24.18	AVG	

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2480 MHz \_CH78\_3Mbps

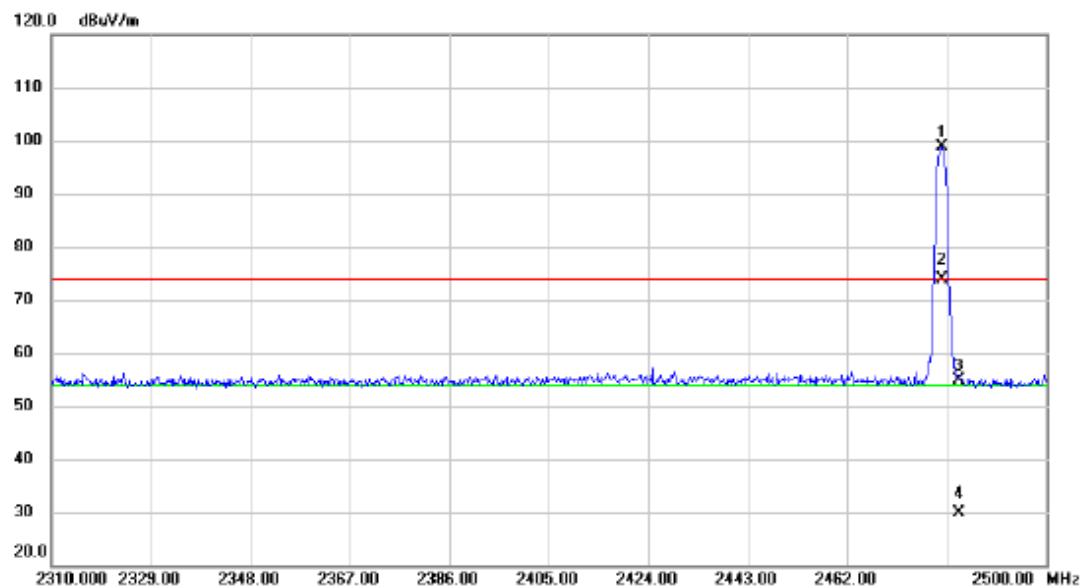


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4960.150	56.65	-10.46	46.19	74.00	-27.81	peak	

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2480 MHz \_CH78\_3Mbps

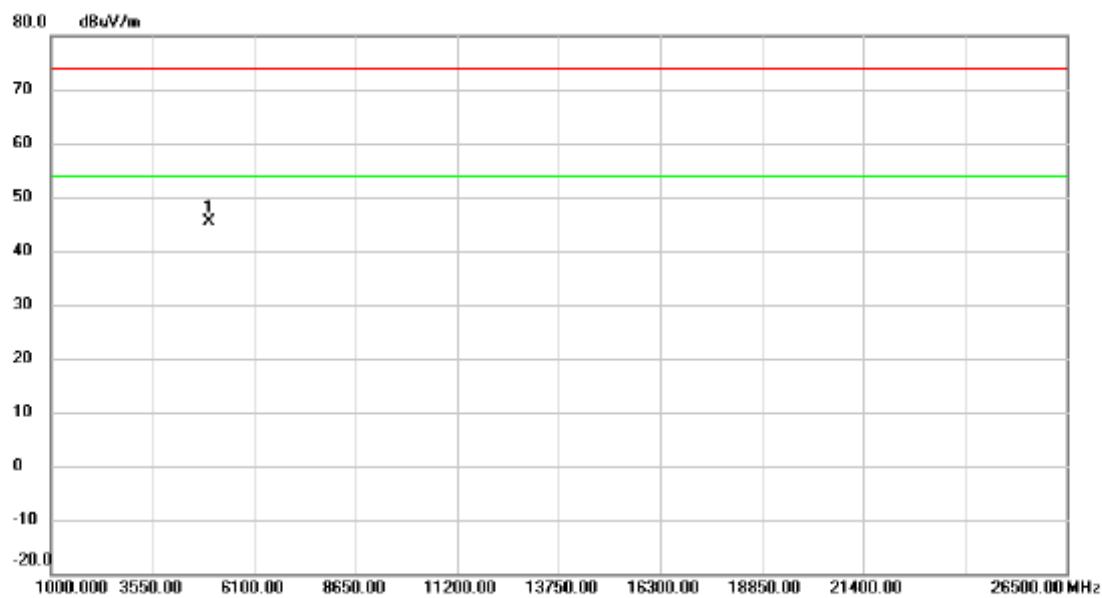
**Horizontal**

No.	Mk.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
	MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1	*	2480.145	67.29	31.71	99.00	74.00	25.00 peak
2	X	2480.145	42.25	31.71	73.96	54.00	19.96 AVG
3		2483.500	23.23	31.72	54.95	74.00	-19.05 peak
4		2483.500	-1.81	31.72	29.91	54.00	-24.09 AVG

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX 2480 MHz \_CH78\_3Mbps

**Horizontal**

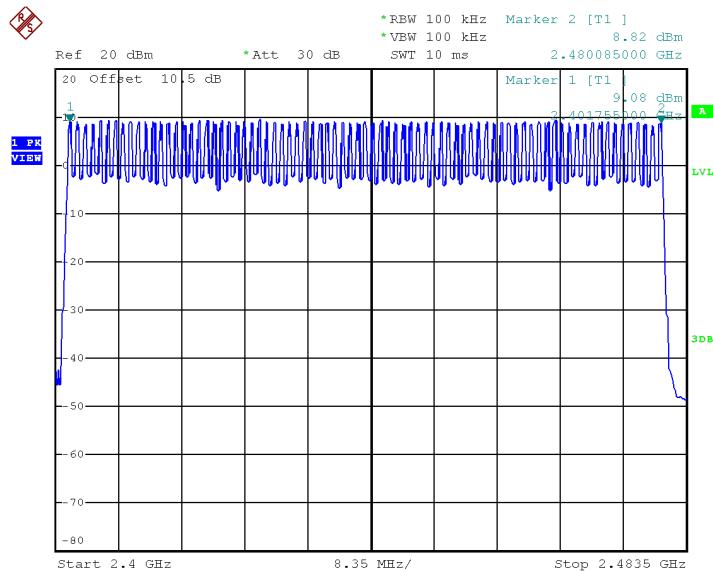
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1	*	4960.150	55.83	-10.46	45.37	74.00	-28.63	peak

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

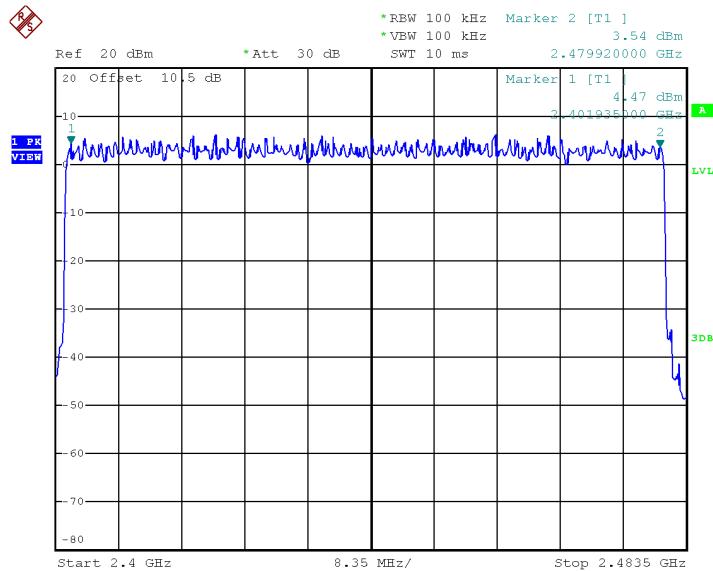
## APPENDIX E - NUMBER OF HOPPING FREQUENCY

Test Mode	Hopping Mode_1Mbps
Number of Hopping Frequency	79



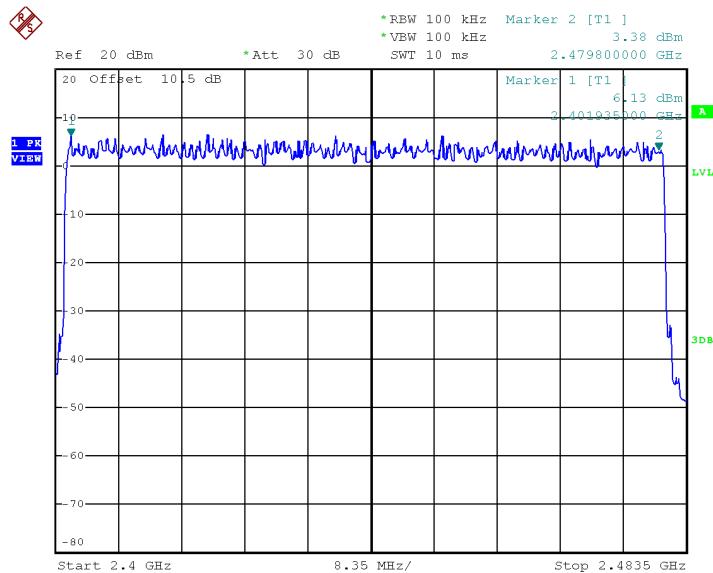
Date: 4.JAN.2021 17:11:47

Test Mode	Hopping Mode_2 Mbps
Number of Hopping Frequency	79



Date: 4.JAN.2021 17:42:39

Test Mode	Hopping Mode_3Mbps
Number of Hopping Frequency	79

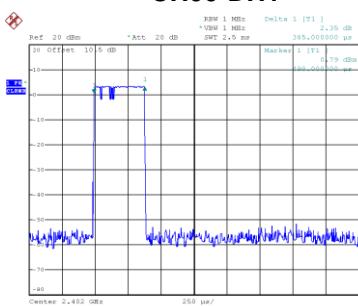


Date: 4.JAN.2021 18:05:36

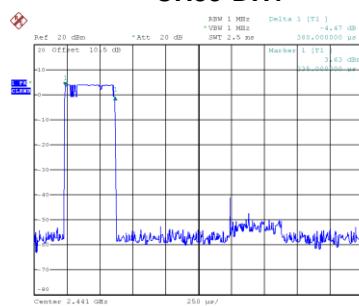
## APPENDIX F - AVERAGE TIME OF OCCUPANCY

Test Mode:	TX Mode_1Mbps
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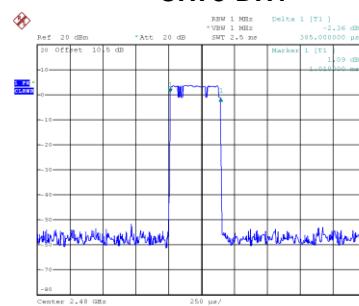
Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH1	2402	0.3850	0.1232	0.4000	Pass
DH3	2402	1.6600	0.2656	0.4000	Pass
DH5	2402	2.8800	0.3072	0.4000	Pass
DH1	2441	0.3800	0.1216	0.4000	Pass
DH3	2441	1.6400	0.2624	0.4000	Pass
DH5	2441	2.8800	0.3072	0.4000	Pass
DH1	2480	0.3850	0.1232	0.4000	Pass
DH3	2480	1.6600	0.2656	0.4000	Pass
DH5	2480	2.8800	0.3072	0.4000	Pass

**CH00-DH1**


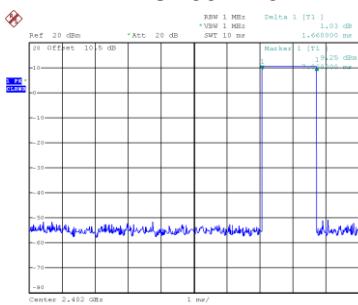
Date: 11.JAN.2021 11:13:01

**CH39-DH1**


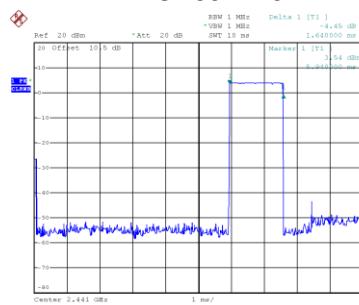
Date: 11.JAN.2021 11:13:20

**CH78-DH1**


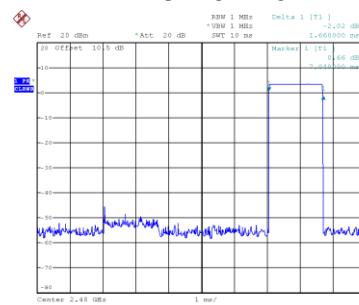
Date: 11.JAN.2021 11:13:37

**CH00-DH3**


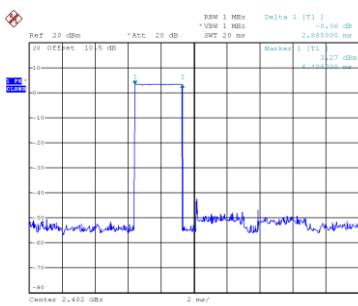
Date: 11.JAN.2021 11:17:44

**CH39-DH3**


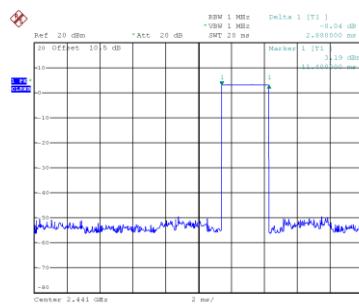
Date: 11.JAN.2021 11:17:55

**CH78-DH3**


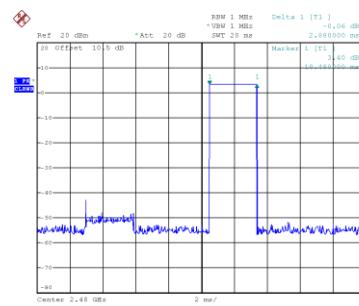
Date: 11.JAN.2021 11:18:07

**CH00-DH5**


Date: 11.JAN.2021 11:19:05

**CH39-DH5**


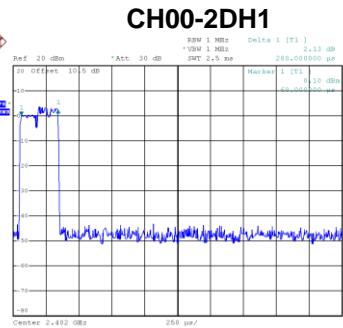
Date: 11.JAN.2021 11:19:19

**CH78-DH5**


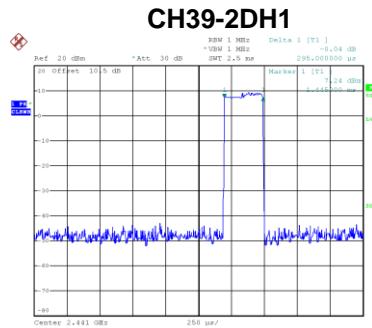
Date: 11.JAN.2021 11:19:25

Test Mode:	TX Mode_2Mbps
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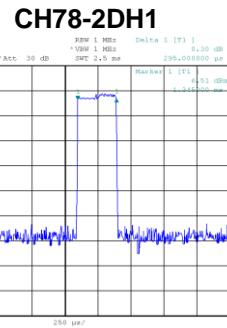
Data Packet	Frequency	Pulse Duration(ms)	Dwell Time(s)	Limits(s)	Test Result
2DH1	2402	0.2800	0.0896	0.4000	Pass
2DH3	2402	1.6000	0.2560	0.4000	Pass
2DH5	2402	2.8000	0.2987	0.4000	Pass
2DH1	2441	0.2950	0.0944	0.4000	Pass
2DH3	2441	1.5800	0.2528	0.4000	Pass
2DH5	2441	2.8000	0.2987	0.4000	Pass
2DH1	2480	0.2950	0.0944	0.4000	Pass
2DH3	2480	1.5800	0.2528	0.4000	Pass
2DH5	2480	2.7600	0.2944	0.4000	Pass



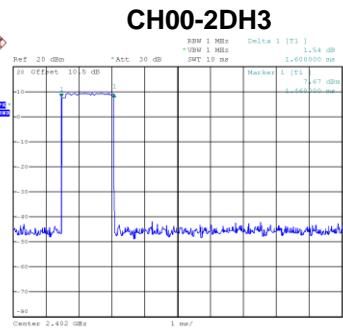
Date: 11.JAN.2021 11:26:36



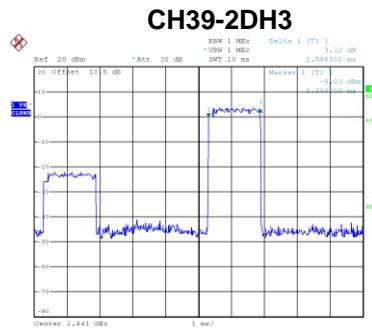
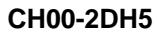
Date: 11.JAN.2021 11:25:46



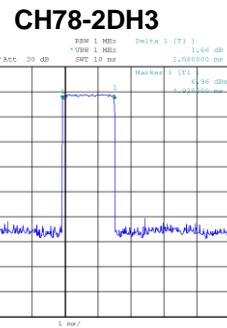
Date: 11.JAN.2021 11:25:51



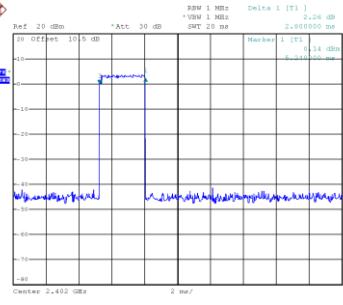
Date: 11.JAN.2021 11:28:17



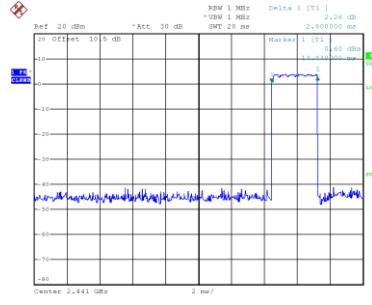
Date: 11.JAN.2021 11:28:21



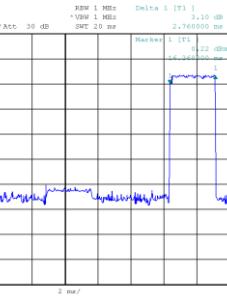
Date: 11.JAN.2021 11:28:21



Date: 11.JAN.2021 11:29:09



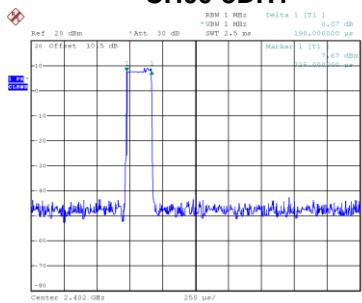
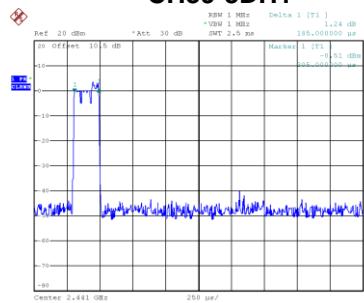
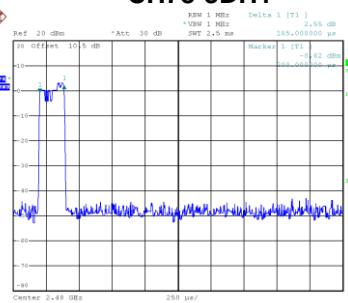
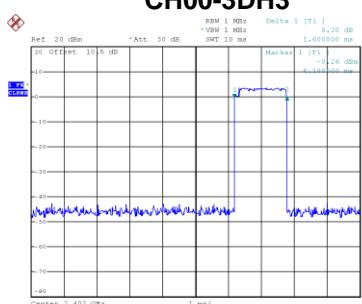
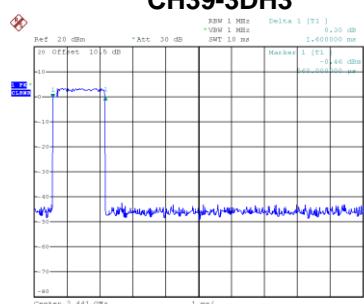
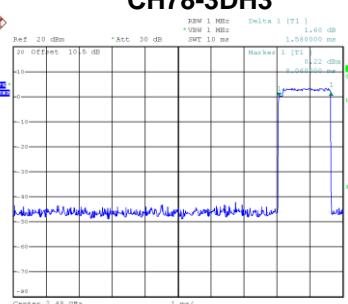
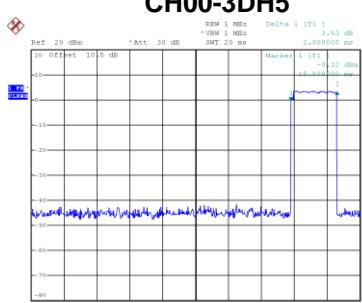
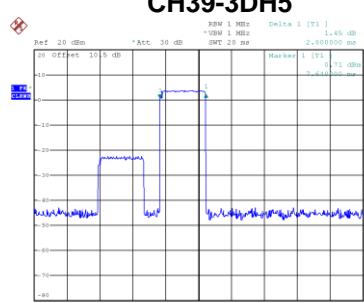
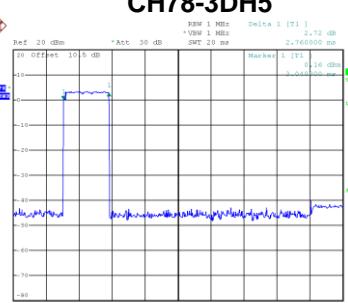
Date: 11.JAN.2021 11:29:12



Date: 11.JAN.2021 11:29:16

Test Mode:	TX Mode_3Mbps
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Data Packet	Frequency	Pulse Duration(ms)	Dwell Time(s)	Limits(s)	Test Result
3DH1	2402	0.1900	0.0608	0.4000	Pass
3DH3	2402	1.6000	0.2560	0.4000	Pass
3DH5	2402	2.8000	0.2987	0.4000	Pass
3DH1	2441	0.1850	0.0592	0.4000	Pass
3DH3	2441	1.6000	0.2560	0.4000	Pass
3DH5	2441	2.8000	0.2987	0.4000	Pass
3DH1	2480	0.1850	0.0592	0.4000	Pass
3DH3	2480	1.5800	0.2528	0.4000	Pass
3DH5	2480	2.7600	0.2944	0.4000	Pass

**CH00-3DH1**

**CH39-3DH1**

**CH78-3DH1**

**CH00-3DH3**

**CH39-3DH3**

**CH78-3DH3**

**CH00-3DH5**

**CH39-3DH5**

**CH78-3DH5**


Date: 11.JAN.2021 11:31:50

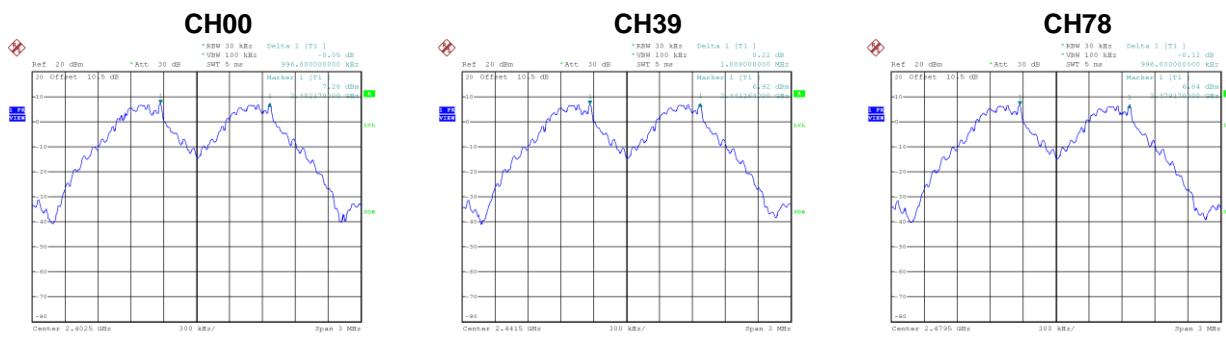
Date: 11.JAN.2021 11:31:05

Date: 11.JAN.2021 11:31:09

## **APPENDIX G - HOPPING CHANNEL SEPARATION MEASUREMENT**

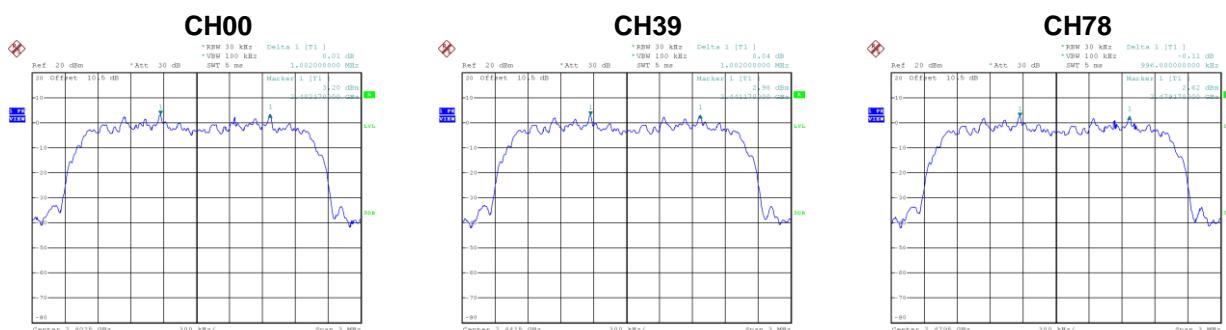
Test Mode:	Hopping on _1Mbps
------------	-------------------

Channel	Frequency (MHz)	Channel Separation (MHz)	2/3 of 20 dB Bandwidth (MHz)	Test Result
00	2402	0.996	0.639	Pass
39	2441	1.008	0.641	Pass
78	2480	0.996	0.641	Pass



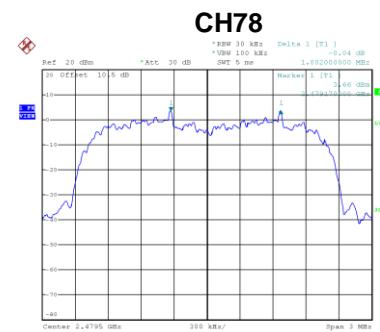
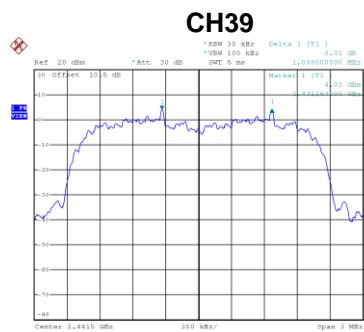
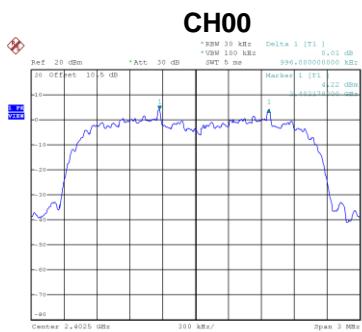
Test Mode:	Hopping on _2Mbps
------------	-------------------

Channel	Frequency (MHz)	Channel Separation (MHz)	2/3 of 20 dB Bandwidth (MHz)	Test Result
00	2402	1.002	0.896	Pass
39	2441	1.002	0.884	Pass
78	2480	0.996	0.895	Pass



Test Mode:	Hopping on _3Mbps
------------	-------------------

Channel	Frequency (MHz)	Channel Separation (MHz)	2/3 of 20 dB Bandwidth (MHz)	Test Result
00	2402	0.996	0.861	Pass
39	2441	1.008	0.871	Pass
78	2480	1.002	0.864	Pass



Date: 4.JAN.2021 18:03:08

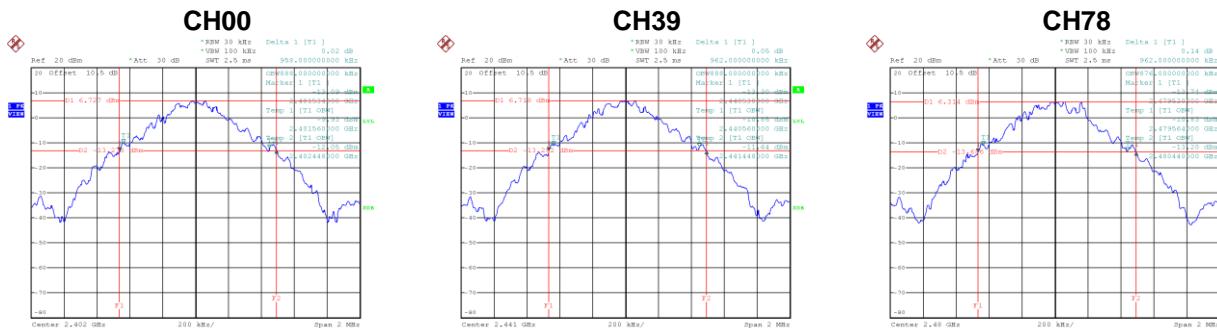
Date: 4.JAN.2021 17:58:11

Date: 4.JAN.2021 17:55:59

## APPENDIX H - BANDWIDTH

Test Mode: TX Mode \_1Mbps

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99 % Emission Bandwidth (MHz)
00	2402	0.958	0.888
39	2441	0.962	0.888
78	2480	0.962	0.876



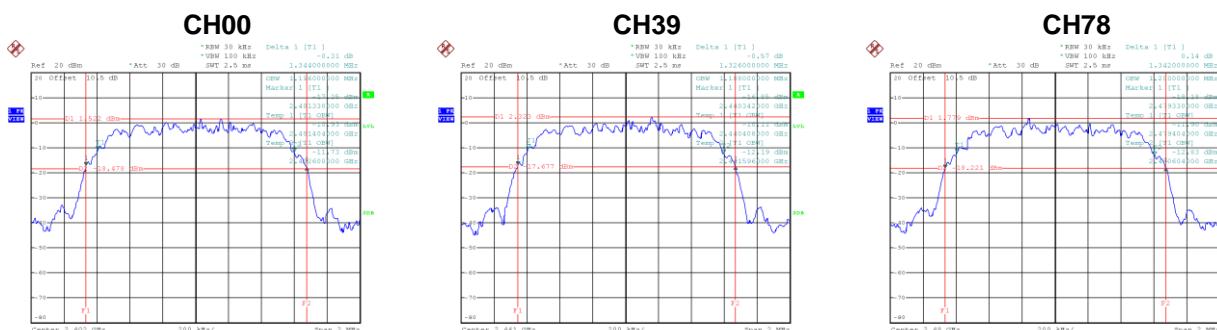
Date: 4-JAN-2021 16:35:43

Date: 4-JAN-2021 16:40:04

Date: 4-JAN-2021 16:42:15

Test Mode: TX Mode \_2Mbps

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99 % Emission Bandwidth (MHz)
00	2402	1.344	1.196
39	2441	1.326	1.188
78	2480	1.342	1.200



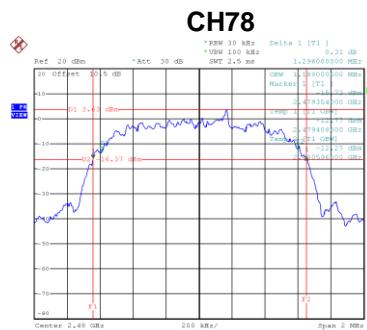
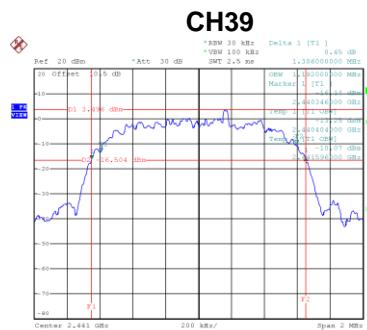
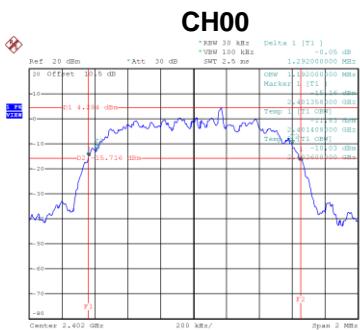
Date: 4-JAN-2021 17:23:51

Date: 4-JAN-2021 18:13:27

Date: 4-JAN-2021 17:33:24

Test Mode: TX Mode \_3Mbps

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99 % Emission Bandwidth (MHz)
00	2402	1.292	1.192
39	2441	1.306	1.192
78	2480	1.296	1.188



Date: 4.JAN.2021 17:45:01

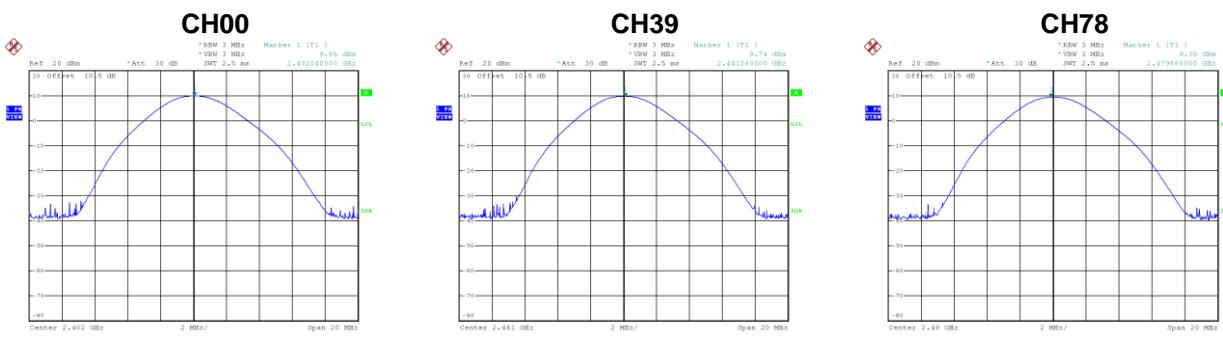
Date: 4.JAN.2021 17:47:23

Date: 4.JAN.2021 17:50:22

## APPENDIX I - MAXIMUM OUTPUT POWER

Test Mode:	TX Mode _1Mbps
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Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
00	2402	9.85	0.0097	21.00	0.125	Pass
39	2441	9.74	0.0094	21.00	0.125	Pass
78	2480	9.35	0.0086	21.00	0.125	Pass

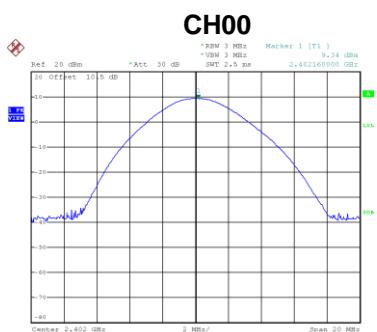


Channel	Frequency (MHz)	Avg Conducted Power (dBm)	Duty Factor	Conducted Power + Duty Factor (dBm)	Conducted Power + Duty Factor (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
00	2402	7.89	1.13	9.02	0.0080	21.00	0.125	Pass
39	2441	7.97	1.13	9.10	0.0081	21.00	0.125	Pass
78	2480	7.68	1.13	8.81	0.0077	21.00	0.125	Pass

Note: Output Power (AVG)=Conducted Power(AVG)+Duty Factor

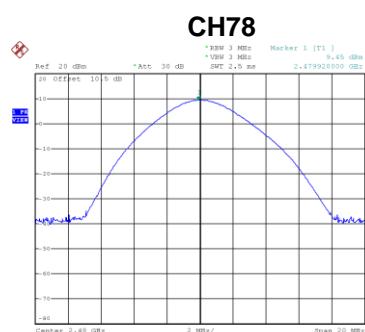
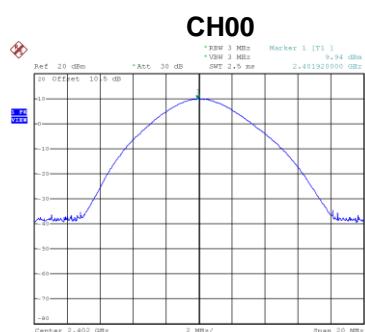
Test Mode:	TX Mode _2Mbps
------------	----------------

Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
00	2402	9.34	0.0086	21.00	0.125	Pass
39	2441	9.12	0.0082	21.00	0.125	Pass
78	2480	8.86	0.0077	21.00	0.125	Pass



Test Mode:	TX Mode _3Mbps
------------	----------------

Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
00	2402	9.94	0.0099	21.00	0.125	Pass
39	2441	9.82	0.0096	21.00	0.125	Pass
78	2480	9.45	0.0088	21.00	0.125	Pass



Date: 4.JAN.2021 17:45:34

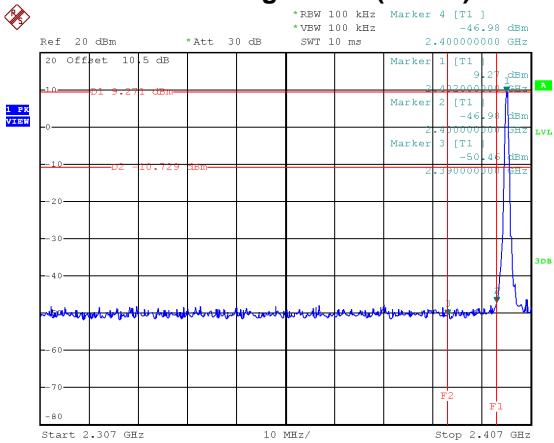
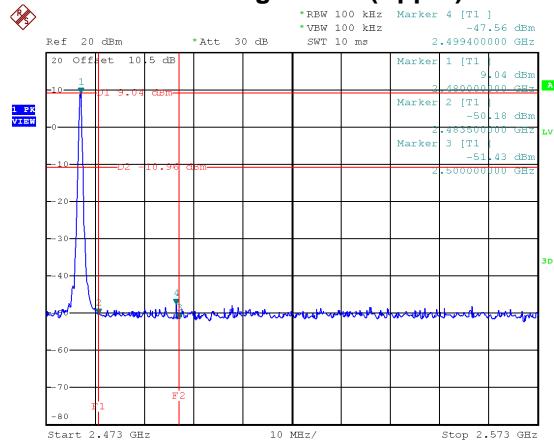
Date: 4.JAN.2021 17:47:29

Date: 4.JAN.2021 17:50:55

Channel	Frequency (MHz)	Avg Conducted Power (dBm)	Duty Factor	Conducted Power + Duty Factor (dBm)	Conducted Power + Duty Factor (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
00	2402	4.87	1.28	6.15	0.0041	21.00	0.125	Pass
39	2441	4.85	1.28	6.13	0.0041	21.00	0.125	Pass
78	2480	4.53	1.28	5.81	0.0038	21.00	0.125	Pass

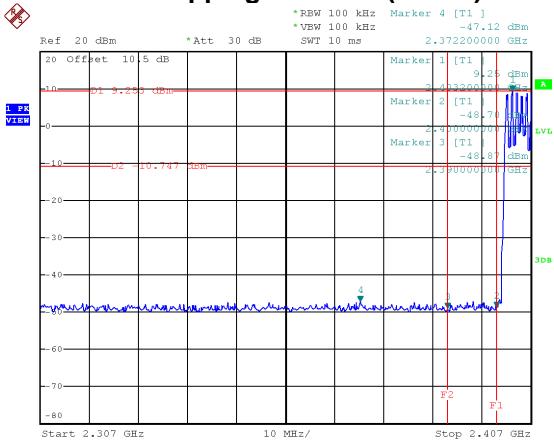
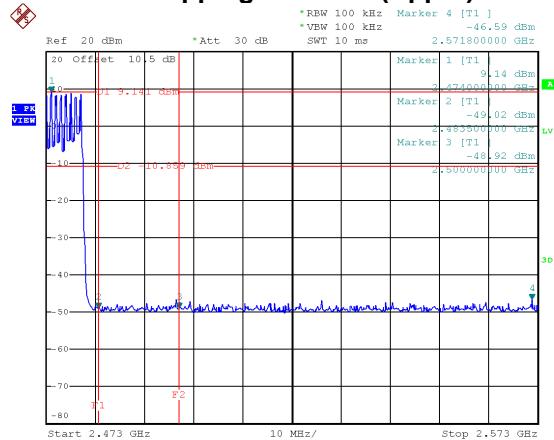
Note: Output Power(AVG)=Conducted Power(AVG)+Duty Factor

**APPENDIX J - CONDUCTED SPURIOUS EMISSION**

**Test Mode : TX Mode \_1Mbps**
**Bandedge CH00 (Lower)**

**Bandedge CH78 (Upper)**


Date: 4.JAN.2021 16:35:10

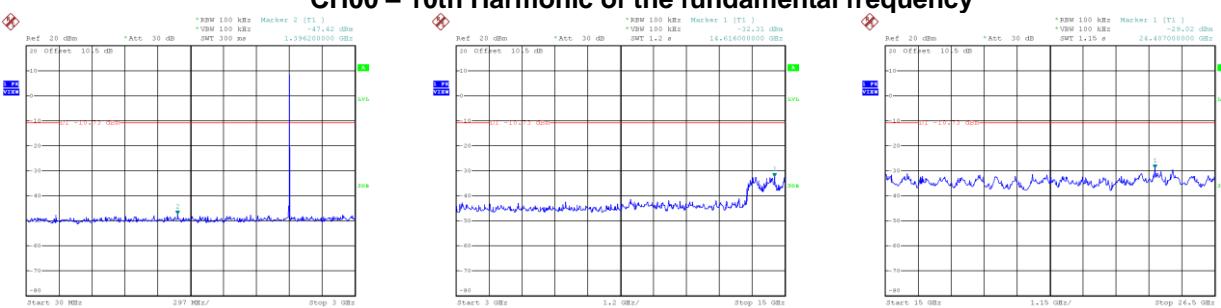
Date: 4.JAN.2021 16:41:43

**Hopping on mode (Lower)**

**Hopping on mode (Upper)**


Date: 4.JAN.2021 17:15:14

Date: 4.JAN.2021 17:14:33

### CH00 – 10th Harmonic of the fundamental frequency

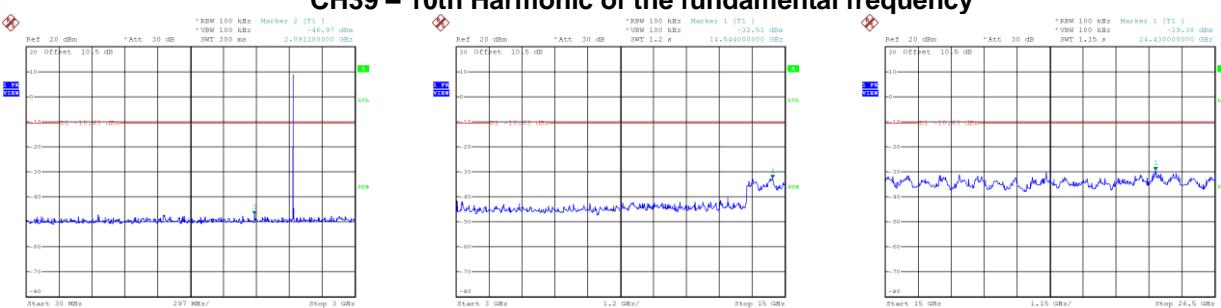


Date: 4.JAN.2021 16:35:56

Date: 4.JAN.2021 16:36:03

Date: 4.JAN.2021 16:36:11

### CH39 – 10th Harmonic of the fundamental frequency

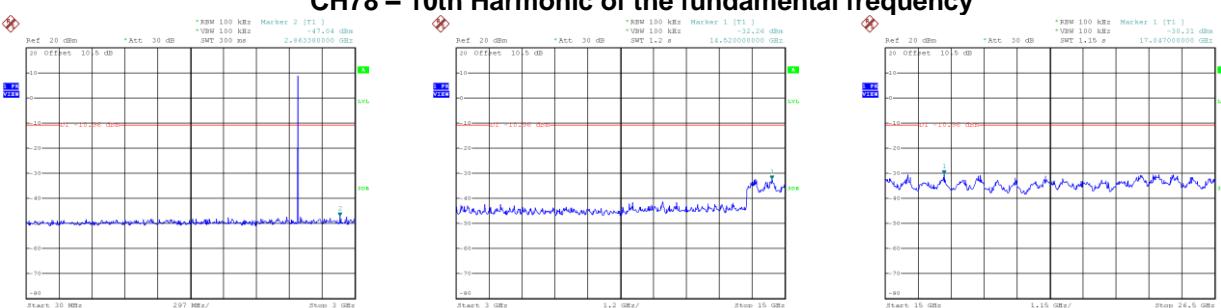


Date: 4.JAN.2021 16:39:10

Date: 4.JAN.2021 16:39:15

Date: 4.JAN.2021 16:39:22

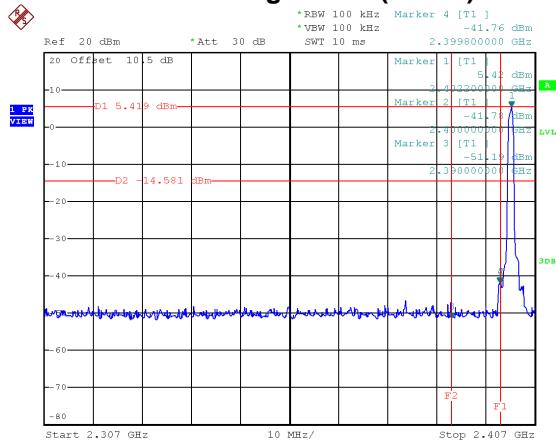
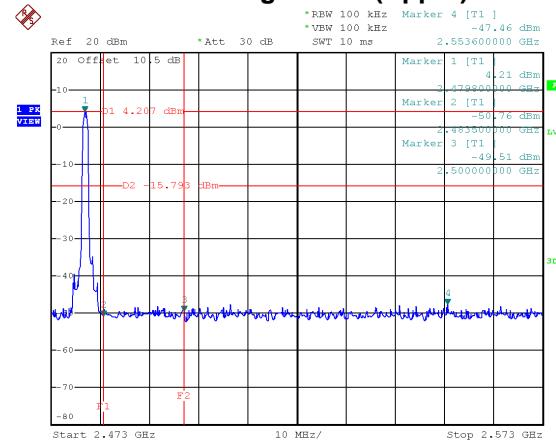
### CH78 – 10th Harmonic of the fundamental frequency



Date: 4.JAN.2021 16:42:27

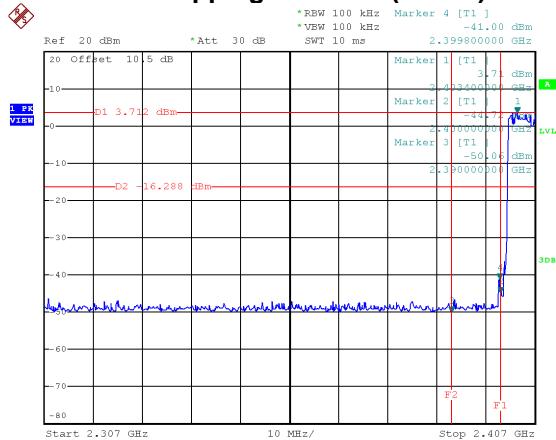
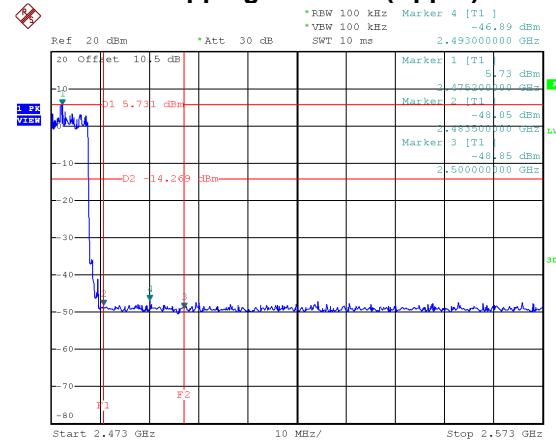
Date: 4.JAN.2021 16:42:34

Date: 4.JAN.2021 16:42:41

**Test Mode : TX Mode \_2Mbps**
**Bandedge CH00 (Lower)**

**Bandedge CH78 (Upper)**


Date: 4.JAN.2021 17:23:28

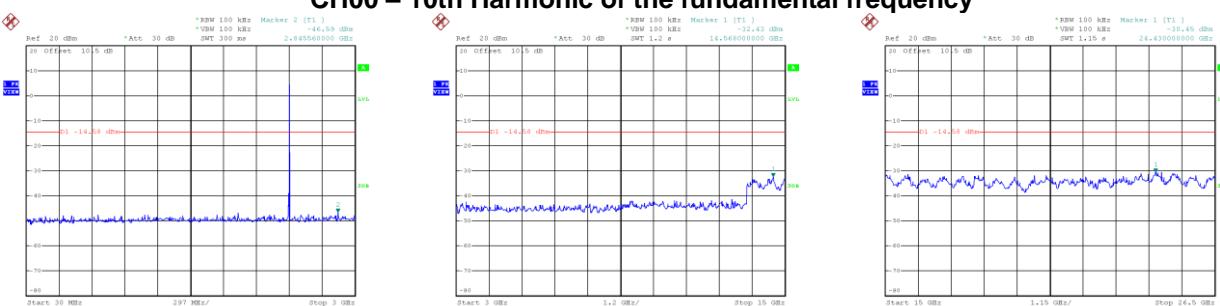
Date: 4.JAN.2021 17:32:56

**Hopping on mode (Lower)**

**Hopping on mode (Upper)**


Date: 4.JAN.2021 17:40:03

Date: 4.JAN.2021 17:40:51

### CH00 – 10th Harmonic of the fundamental frequency

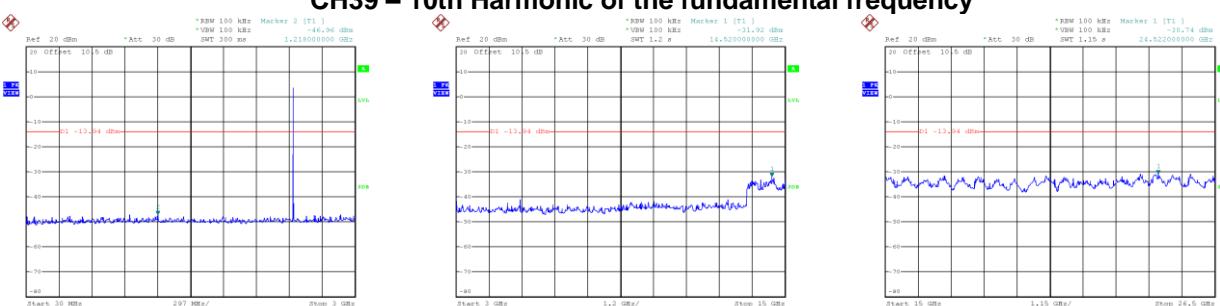


Date: 4.JAN.2021 17:24:04

Date: 4.JAN.2021 17:24:12

Date: 4.JAN.2021 17:24:19

### CH39 – 10th Harmonic of the fundamental frequency

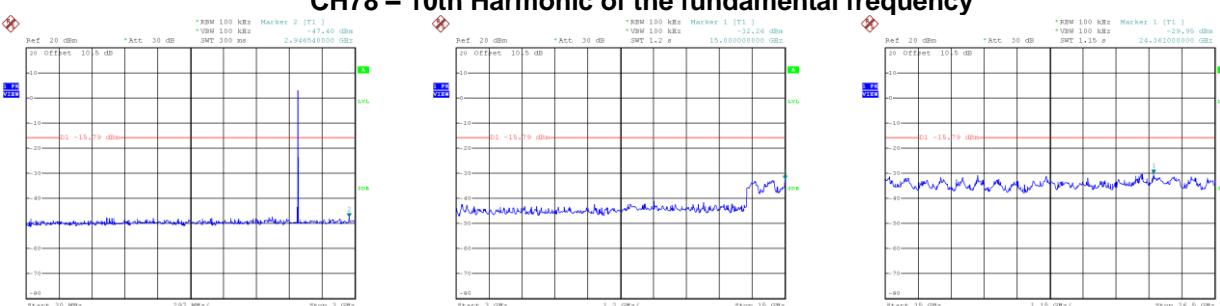


Date: 4.JAN.2021 18:12:46

Date: 4.JAN.2021 18:12:53

Date: 4.JAN.2021 18:13:00

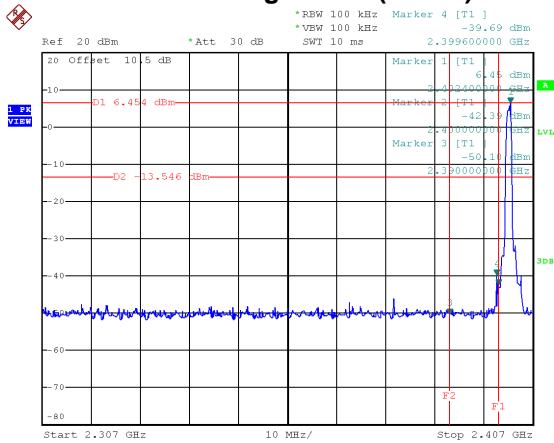
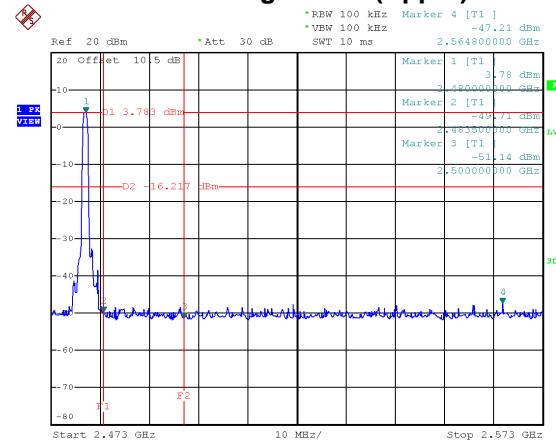
### CH78 – 10th Harmonic of the fundamental frequency



Date: 4.JAN.2021 17:33:38

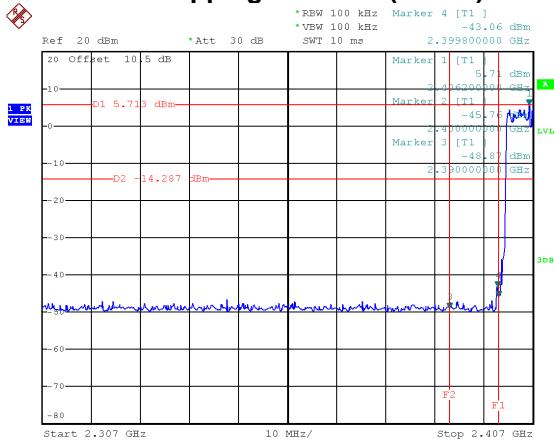
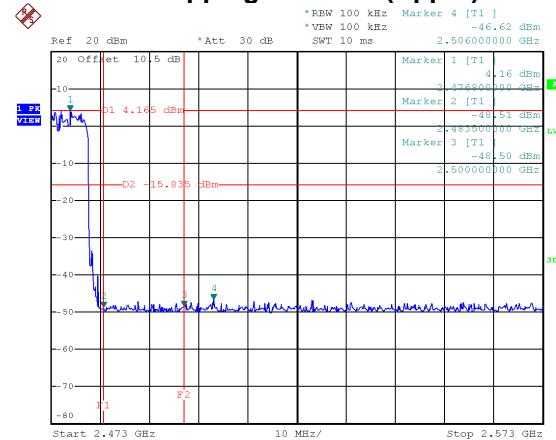
Date: 4.JAN.2021 17:33:45

Date: 4.JAN.2021 17:33:52

**Test Mode : TX Mode \_3Mbps**
**Bandedge CH00 (Lower)**

**Bandedge CH78 (Upper)**


Date: 4.JAN.2021 17:44:38

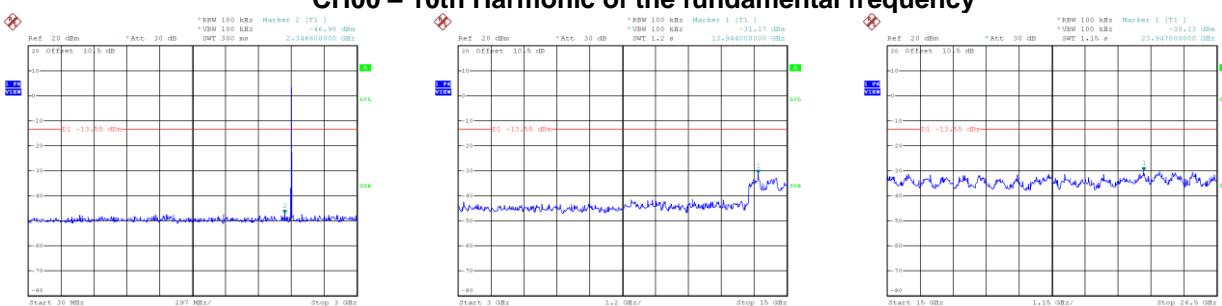
Date: 4.JAN.2021 17:49:53

**Hopping on mode (Lower)**

**Hopping on mode (Upper)**


Date: 4.JAN.2021 18:06:10

Date: 4.JAN.2021 18:06:44

### CH00 – 10th Harmonic of the fundamental frequency

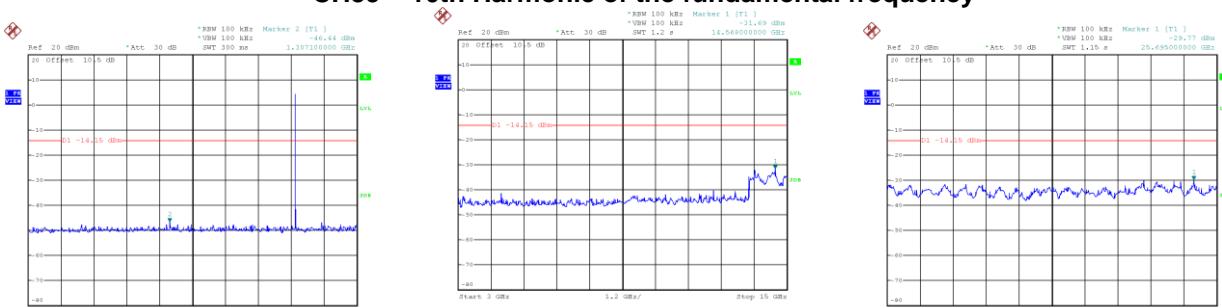


Date: 4.JAN.2021 17:45:14

Date: 4.JAN.2021 17:45:21

Date: 4.JAN.2021 17:45:28

### CH39 – 10th Harmonic of the fundamental frequency

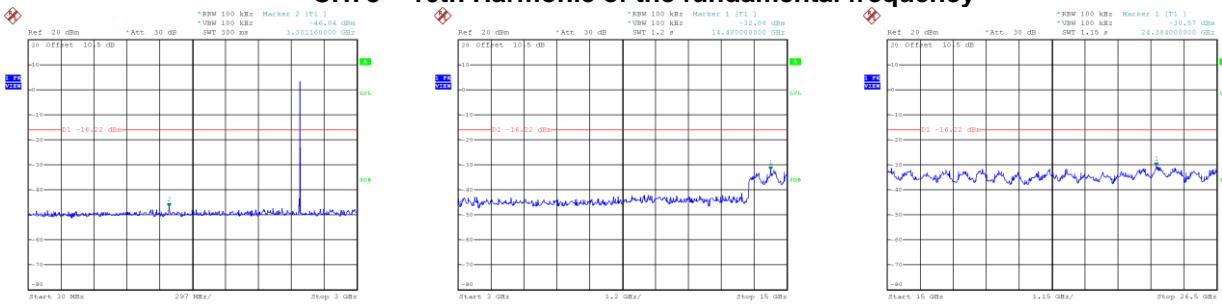


Date: 4.JAN.2021 17:46:13

Date: 4.JAN.2021 17:46:15

Date: 4.JAN.2021 17:46:17

### CH78 – 10th Harmonic of the fundamental frequency



Date: 4.JAN.2021 17:50:36

Date: 4.JAN.2021 17:50:43

Date: 4.JAN.2021 17:50:50

**End of Test Report**