

# RF Test Report

## 2.4 GHz WLAN 802.11b/g/n

**Report No.** : FCCBVCO-WAY-P21090030-2R2  
**Customer** : Samsung Electronics Co., Ltd.  
**Address** : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do,  
16677, Korea  
**Use of Report** : Certification  
**Model Name** : SM-R875U (Alt. SM-R875F)  
**FCC ID (Model)** : A3LSMR875 (SM-R875U, SM-R875F)  
**IC No. (Model)** : 649E-SMR8751 (SM-R875F)  
**Date of Test** : 2021.10.07 to 2021.10.15  
**Test Method Used** : FCC 47 CFR PART 15 Subpart C (Section §15.247) /  
ISED RSS-247  
**Testing Environment** : Refer to the Test Condition  
**ISED# / CAB Identifier** : 26316 / KR0158

**Test Result** :  Pass  Fail

**ISSUED BY:** BV CPS ADT Korea Ltd., EMC/RF Laboratory

**ADDRESS:** Innoplex No.2 106, Sinwon-ro 306, Yeongtong-gu,  
Suwon-si, Gyeonggi-do, Korea 16675

**TEST LOCATION:** HeungAn-daero 49, DongAn-gu, Anyang-si,  
Gyeonggi-do, Korea, 14119

Tested by

Name : Donghwa Shin



Technical Manager

Name : Jongha Choi



(Signature)

2021. 10. 28

**BV CPS ADT Korea Ltd.**

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## RELEASE CONTROL RECORD

REPORT NO.	REASON FOR CHANGE	DATE ISSUED
FCCBVCO-WAY-P21090030-2	Original release	2021.10.18
FCCBVCO-WAY-P21090030-2R1	Update	2021.10.26
FCCBVCO-WAY-P21090030-2R2	Update	2021.10.28

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## 1 Summary of Test Results

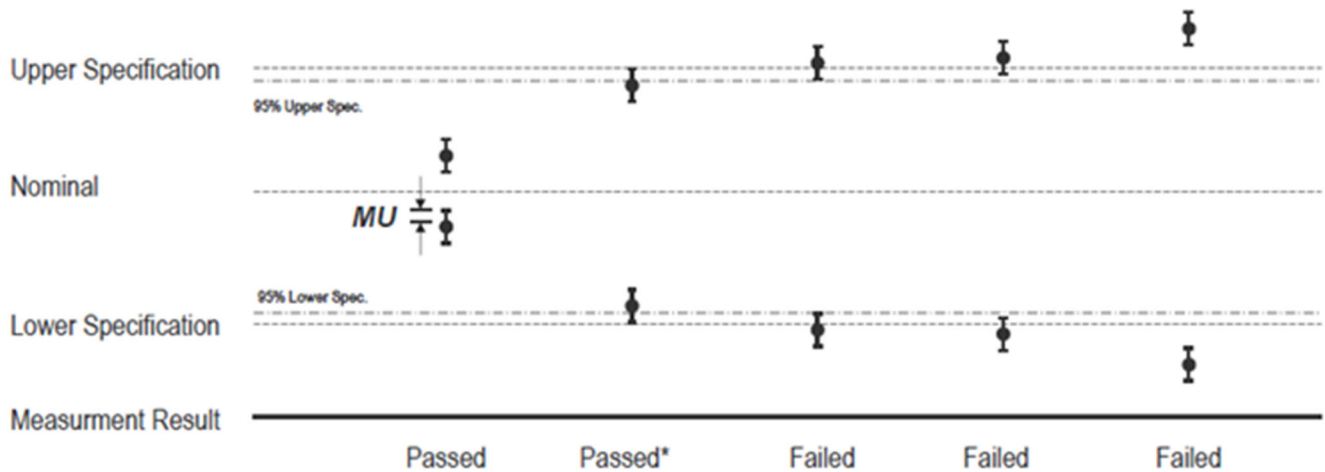
The EUT has been tested according to the following specifications

Applied Standard : FCC Part 15, Subpart C 15.247, RSS-247					
FCC Part Section(s)	RSS Section(s)	Test Description	Limit	Test Result	Reference
15.247(a)(2)	RSS-247 [5.2]	6 dB Bandwidth	> 500 kHz	PASS	Section 3.2
-	-	Occupied Bandwidth (99 % Bandwidth)	N/A	PASS	Section 2.5
15.247(b)(3)	RSS-247 [5.4(4)]	Maximum Conducted Output Power	< 1 Watt	PASS	Section 3.3
15.247(e)	RSS-247 [5.2]	Power Spectral Density	< 8 dBm / 3 kHz Band	PASS	Section 3.4
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions (Conducted Spurious Emission)	≥ 30 dBc	PASS	Section 3.5
15.205 15.209	RSS-Gen [8.9]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in Restricted bands must meet the radiated limits detailed in 15.209 (RSS-247 limits)	PASS	Section 3.5
15.207	RSS-Gen [8.8]	AC Conducted Emissions (150 kHz – 30 MHz)	< FCC 15.207 limits (RSS-Gen [8.8] limits)	PASS	Section 3.6

### NOTES

- 1) The general test methods used to test on this devices are ANSI C63.10.
- 2) Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

## 1.1 Decision Rules for Statement of Conformity



**QUA-52 Decision Rule(QA Document) was applied.**

**Step 1) :** Reference Check, Daily Check, Peripheral device Check

**Step 2) :** Re-test Procedure (Repeat the test maximum 3 times, Different Test Engineer)

- 1) If the original test results are subject to retesting and the judgement is unclear, the retest is carried out.
- 2) If the result of the first retest is the same as the initial test, the judgement is made based on the value.
- 3) If the result of the first retest differ from the results of the initial test, the second re-test is carried out.
- 4) After completion of the second retest, the average of the three test results is determined as the final result. However, if the deviation of the three test values is more than 5 % of the reference value, the technical manager should review the reproducibility of the test from the beginning.

## 1.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2

Measurement Items	Frequency Range	Expanded Uncertainty $U = kU_c (k = 2)$
Conducted Emissions at main ports	150 kHz – 30 MHz	2.99
Radiated Spurious Emissions	9 kHz – 30 MHz	1.92
	30 MHz – 1 GHz	4.00
	1 GHz – 18 GHz	5.68
	18 GHz – 26.5 GHz	5.24

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of  $k = 2$ .



## 2 General Information

### 2.1 General Description of EUT

Product	Smart Wearable
Brand	Samsung
Model	SM-R875U (Alt. SM-R875F) for FCC ID : A3LSMR875
Identification No. of EUT	-
Series Model	SM-R875F for IC No. : 649E-SMR8751
HVIN	SM-R875F1
Model Difference	-
Power Supply	DC 3.88 V
Modulation Type	DSSS, OFDM
Transfer Rate	1, 2, 5.5, 11 Mbps (802.11b) 6, 9, 12, 18, 24, 36, 48, 54 Mbps (802.11g) MCS0 to MCS7 (802.11n(HT20))
Operating Frequency	2 412 to 2 472 MHz
Number of Channel	13 Channels
Output Power	24.23 dBm (264.85 mW)
Antenna Type	LDS Antenna
Antenna Connector	Internal
H/W Version	REV1.0
S/W Version	R875U.001(SM-R875U), R875F.001(SM-R875F)
Test device Information	Model : SM-R875U Serial number - Conducted(R3AR400CDNM, 41000837e49a4861), Radiated(R3AR400CDEH, R3AR400CD5P, R3AR400CDAR, R3AR400CDDX)

#### NOTES

- 1) The above equipment has been tested by **Bureau Veritas Consumer Products Services ADT Korea**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.
- 2) The following antennas were provided to the EUT

Antenna	Type	Connector	Peak Gain (dBi)				
			2.4 GHz	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
Bluetooth/ Wi-Fi	LDS Antenna	Internal	-7.7	-9.2	-7.3	-8.1	-7.6

1) Spurious emission of the simultaneous operation and the test data please refer to report no. FCCBVCO-WAY-P21090030-3 (U-NII Test Report).

3) **List of Accessories**

Accessories	Brand	Model	Manufacturer	Specification
Wireless Charger	Samsung	EP-OR825	Samsung	FCC ID : A3LEPOR825/ IC : 649E-EPOR825

## 2.2 Description of Test Mode

[Test Channel of EUT]

- **2.4 GHz DTS 802.11b/g/n (20 MHz BW)**

Channel	Frequency [MHz]	Channel	Frequency [MHz]
1	2 412	8	2 447
2	2 417	9	2 452
3	2 422	10	2 457
4	2 427	11	2 462
5	2 432	12	2 467
6	2 437	13	2 472
7	2 442		

### 2.2.1 Test Mode Applicability and Tested Channel Details

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. All Radiated emission tests have been performed two mode(with charger and without charger). The worst case was found when positioned on Y axis and without charger mode for radiated emission. Following channel(s) was(were) selected for the final test as listed below :

EUT Configure mode	Applicable to				Description
	RE < 1G	RE ≥ 1G	PLC	APCM	
Without Charger	√	√	-	√	-
With Charger	-	-	√	-	-

Where RE ≥ 1 G : Radiated Emission above 1 GHz & Bandedge Measurement  
 RE < 1 G : Radiated Emission below 1 GHz  
 PLC : Power Line Conducted Emission  
 APCM : Antenna Port Conducted Measurement





### **Radiated Emission Test (Below 1 GHz)**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and data rate.
- Following channel(s) was (were) selected for the final test as listed below.

EUT mode	Available Channel	Tested Channel	Modulation Type	Data Rate
802.11b	1 to 13	11	DSSS	1 Mbps

#### **NOTES**

According to exploratory test no any obvious emission were detected from 9 kHz to 30 MHz.

Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

### **Radiated Emission Test (Above 1 GHz)**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and data rate.
- Following channel(s) was (were) selected for the final test as listed below.

EUT mode	Available Channel	Tested Channel	Modulation Type	Data Rate
802.11b	1 to 13	1, 6, 11, 12, 13	DSSS	1 Mbps
802.11g	1 to 13	1, 6, 11, 12, 13	OFDM	6 Mbps
802.11n(HT20)	1 to 13	1, 6, 11, 12, 13	OFDM	MCS0

### **Radiated Emission Test (Above 18 GHz)**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and data rate.
- Following channel(s) was (were) selected for the final test as listed below.

EUT mode	Available Channel	Tested Channel	Modulation Type	Data Rate
802.11b	1 to 13	11	DSSS	1 Mbps

### **Power line Conducted Emission Test**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and data rate.
- Following channel(s) was (were) selected for the final test as listed below.

EUT mode	Available Channel	Tested Channel	Modulation Type	Data Rate
802.11b	1 to 13	11	DSSS	1 Mbps

### Antenna Port Conducted Measurement

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and data rate.
- Following channel(s) was (were) selected for the final test as listed below.

EUT mode	Available Channel	Tested Channel	Modulation Type	Data Rate
802.11b	1 to 13	1, 6, 11, 12, 13	DSSS	1 Mbps
802.11g	1 to 13	1, 6, 11, 12, 13	OFDM	6 Mbps
802.11n(HT20)	1 to 13	1, 6, 11, 12, 13	OFDM	MCS0

### Test Condition

Applicable to	Environmental Conditions	Test Voltage	Tested by
RE < 1G	22 °C, 48 % RH	DC 3.88 V	Donghwa Shin
RE ≥ 1G	22 °C, 50 % RH	DC 3.88 V	Donghwa Shin
PLC	23 °C, 47 % RH	DC 3.88 V	Donghwa Shin
APCM	22 °C, 46 % RH	DC 3.88 V	Donghwa Shin

## 2.3 Maximum Output Power

Frequency Range [MHz]	Test Mode	Average Power [dBm]	Average Power [mW]	Peak Power [dBm]	Peak Power [mW]
2 412 - 2 472	802.11b	17.76	59.70	21.10	128.82
	802.11g	15.68	36.98	24.23	264.85
	802.11n(HT20)	14.77	29.99	23.98	250.03

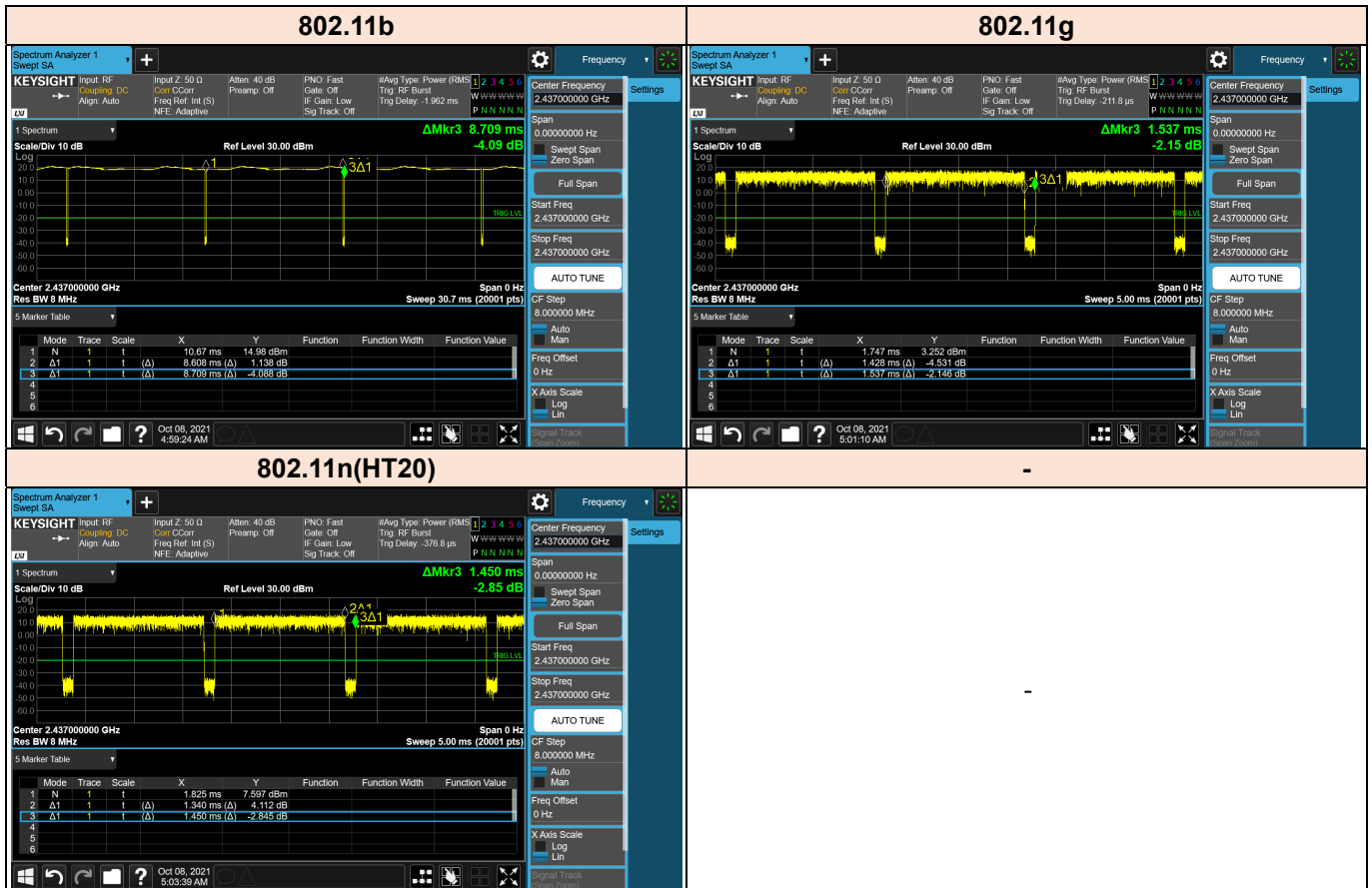
## 2.4 Duty Cycle of Test Signal

Test Items	Mode	On Time B [msec]	Period [msec]	Duty Cycle X [Linear]	Duty Cycle [%]	DCF [dB]
Duty Cycle	802.11b	8.61	8.71	0.988	98.84	0.00
	802.11g	1.43	1.54	0.929	92.91	0.32
	802.11n(HT20)	1.34	1.45	0.924	92.41	0.34



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### [Test Plot of Duty Cycle]



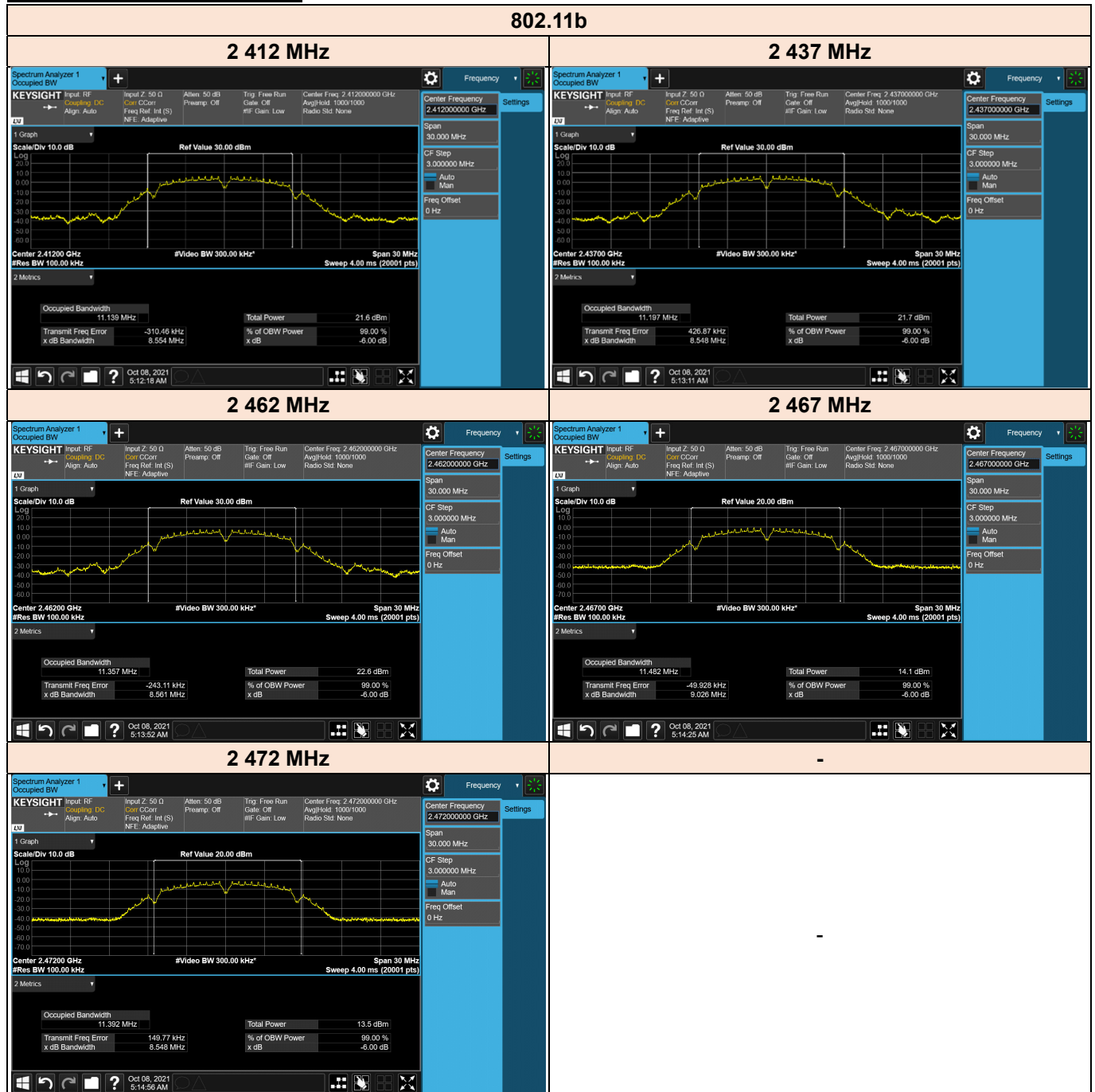
## 2.5 99 % Bandwidth

### [Test Data of 99 % Bandwidth]

Test Mode	Channel	Frequency [MHz]	99 % Bandwidth [MHz]
802.11b	1	2 412	11.139
	6	2 437	11.197
	11	2 462	11.357
	12	2 467	11.482
	13	2 472	11.392
Worst Result			11.482
802.11g	1	2 412	16.602
	6	2 437	16.569
	11	2 462	16.585
	12	2 467	16.617
	13	2 472	16.567
Worst Result			16.617
802.11n (HT20)	1	2 412	17.742
	6	2 437	17.715
	11	2 462	17.741
	12	2 467	17.773
	13	2 472	17.734
Worst Result			17.773



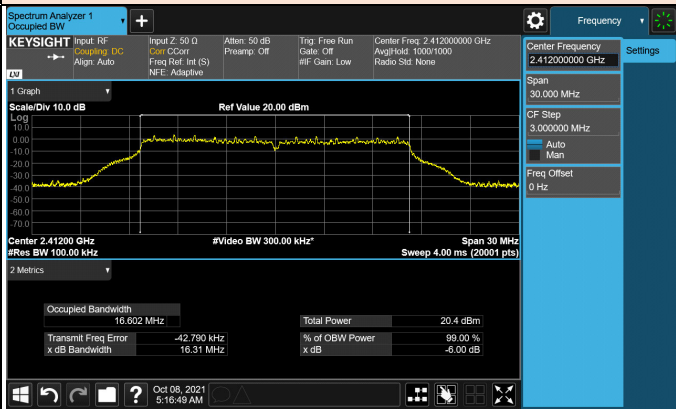
### Test Plot of 99 % Bandwidth



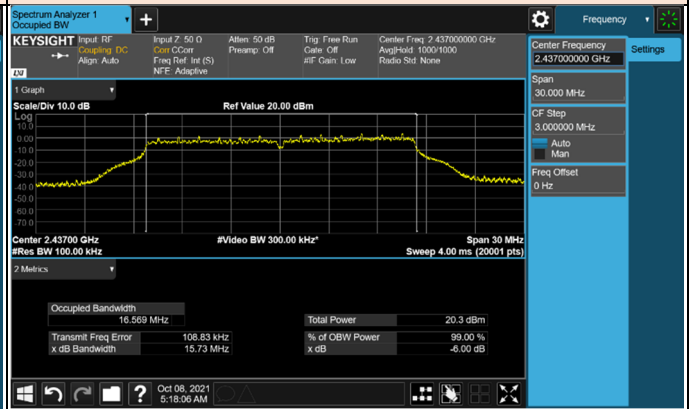


802.11g

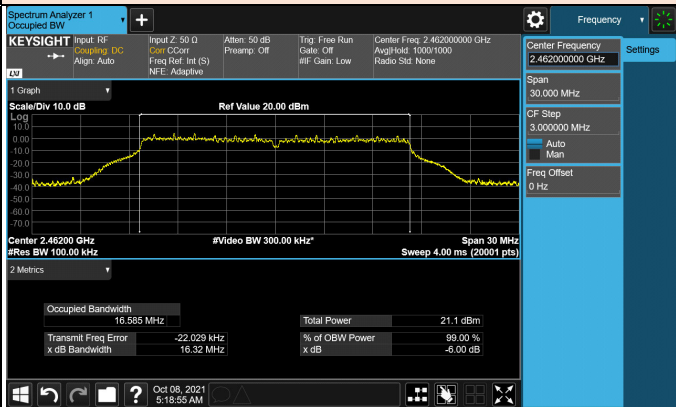
2 412 MHz



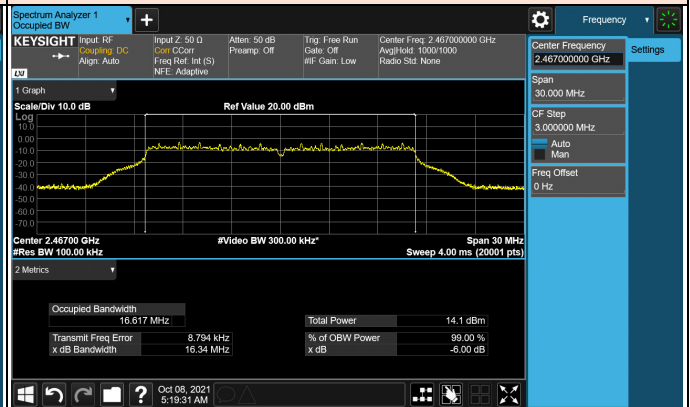
2 437 MHz



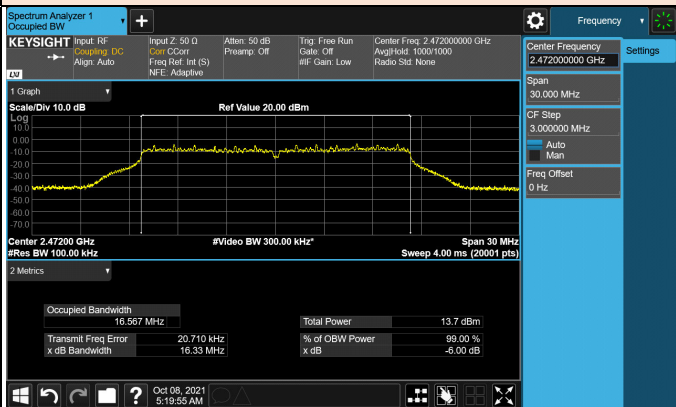
2 462 MHz



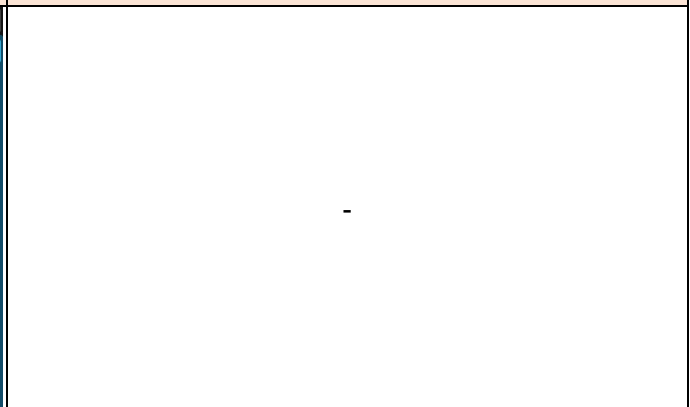
2 467 MHz



2 472 MHz



-



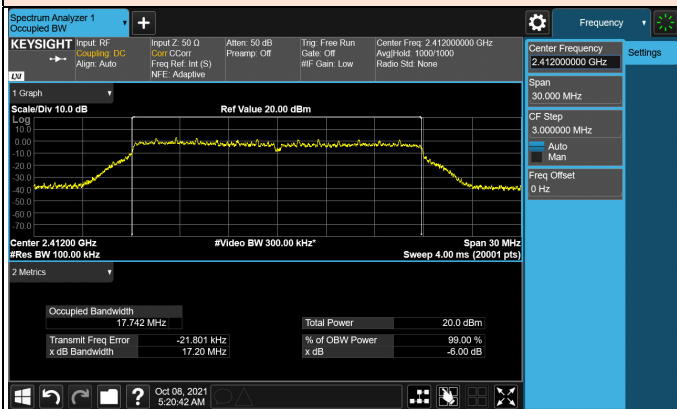




### 802.11n(HT20)

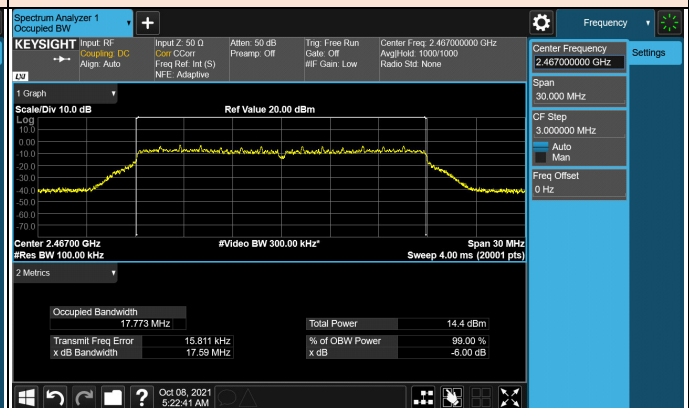
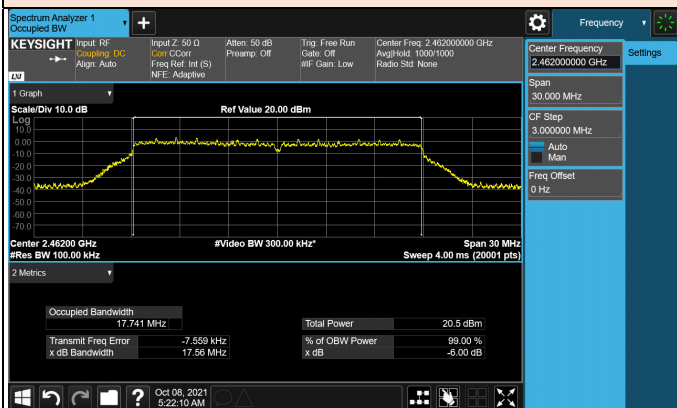
#### 2 412 MHz

#### 2 437 MHz



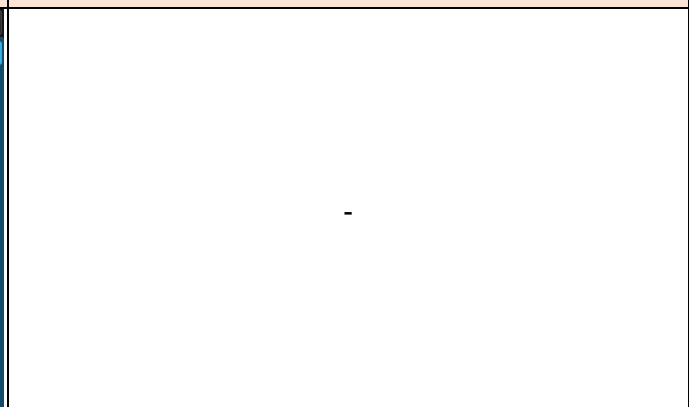
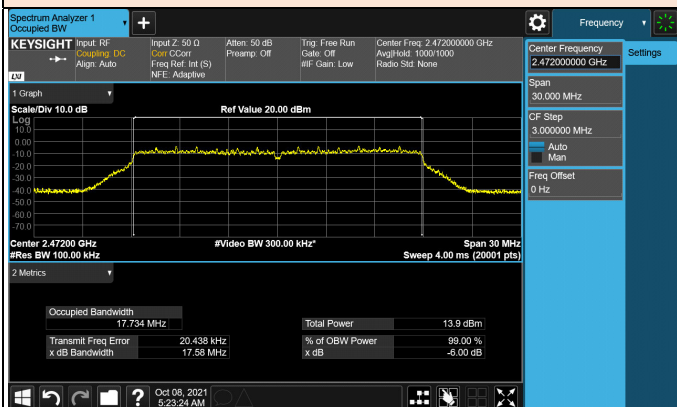
#### 2 462 MHz

#### 2 467 MHz



#### 2 472 MHz

#### -



## 2.6 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards.

**FCC CFR 47 Part 15, Subpart C (§15.247)**

**KDB 558074 D01 15.247 Meas Guidance v05r02**

**KDB 662911 D01 Multiple Transmitter Output v02r01**

**ANSI C63.10-2013**

**RSS-247 Issue 2**

**RSS-GEN Issue 5**

All test items in this test report have been performed and recorded as per the above standards.



## 2.7 Test Equipment

Test Equipment is traceable to the National Institute of Standards and Technology (NIST). Measurement antenna used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Serial Number	Cal Date	Cal Due
R&S	HFH2-Z2E	Active Loop Antenna, 30 MHz	349806	2021.02.18	2023.02.18
Schwarzbeck	VULB 9163	Trilog Antenna, 3 GHz (with 6 dB ATT.)	01199	2021.02.22	2023.02.22
Schwarzbeck	VUBA 9117	30 MHz ~ 1 GHz	403	2020.01.09	2022.01.09
R&S	HF907	Horn Antenna, 18 GHz	102772	2020.12.09	2021.12.09
R&S	SCU08F2	Signal Conditioning Unit, 8 GHz	08400016	2020.12.09	2021.12.09
R&S	SCU-18F	Signal Conditioning Unit, 18 GHz	180111	2020.12.09	2021.12.09
Schwarzbeck	BBHA9170	15 - 40 GHz, 10 W (cont.) 25 W (peak)	00955	2020.12.09	2021.12.09
L3 Narda-MITEQ	JS44-18004000-33- 8P	Amplifier, 40 GHz	2142086	2021.01.05	2022.01.05
R&S	FSW50	DC Coupled : 2 Hz to 50 GHz AC Coupled : 10 MHz to 50 GHz	101403	2020.12.09	2021.12.09
R&S	ESW44	EMI Test Receiver, 44 GHz	101812	2020.12.09	2021.12.09
R&S	FSV30	Spectrum Analyzer, 30 GHz	103017	2020.12.07	2021.12.07
Aeroflex	40AH2W-3	Attenuator, 3 dB	1	2020.12.24	2021.12.24
Mini-Circuits	VAT-10W2+	Attenuator, 10 dB	1531	2020.12.08	2021.12.08
Pasternack	PE7087-10	10 dB Atten / 2 W / DC to 26 GHz	1712-2	2021.06.04	2022.06.04
Aeroflex	40AH2W-10	Attenuator, 10 dB	1	2021.06.04	2022.06.01
Micro-Tronics	HPM17543	High Pass Filter 3 GHz	028	2021.06.04	2022.06.04
R&S	NRP6A	Average Power Sensor	102045	2020.12.07	2021.12.07
R&S	NRP6A	Average Power Sensor	102044	2020.12.07	2021.12.07
R&S	NRX	Power Meter, 110 GHz	100947	2020.12.07	2021.12.07
Keysight Technologies	MP400B	MIMO Power Set Master, 18 GHz	None	2020.12.31	2021.12.31
R&S	ENV216	LISN	102437	2020.12.08	2021.12.08
R&S	ESR	EMI Test Receiver, 3.6 GHz	102529	2020.12.08	2021.12.08

### 3 Test Results

#### 3.1 Antenna Requirement

**Except from §15.203 of the FCC Rules/Regulations:**

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 shall be considered sufficient to comply with the provisions of the section.

- The antenna(s) of the EUT are Permanently attached.
- There are no provisions for connection to an external antenna.

**Result**

The EUT complies with the requirement of §15.203

## 3.2 6 dB Bandwidth

### 3.2.1 Regulation

§15.247(a)(2) : Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

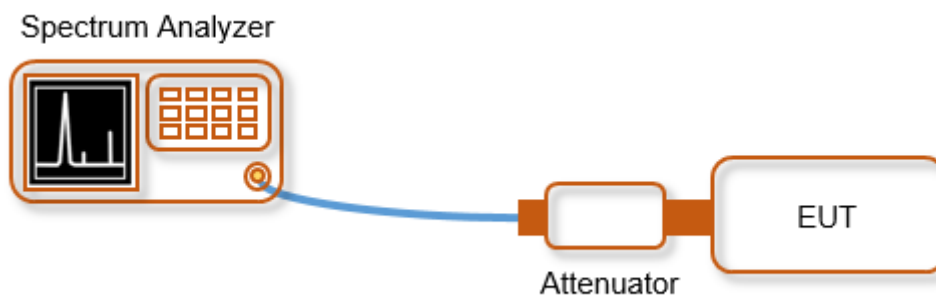
### 3.2.2 Test Procedure

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e.,  $RBW = 100 \text{ kHz}$ ,  $VBW \geq 3 \times RBW$ , and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be  $\geq 6 \text{ dB}$ .

### 3.2.3 Deviation from Test Standard

No deviation.

### 3.2.4 Test Setup





### 3.2.5 Test Result

#### [Test Data of 6 dB Bandwidth]

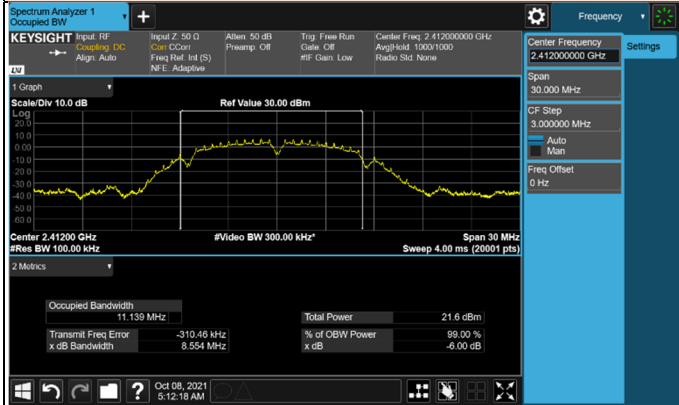
Test Mode	Channel	Frequency [MHz]	6 dB Bandwidth [MHz]		Limit [MHz]
			DTS BW	DTS BW x 1.5	
802.11b	1	2 412	8.554	12.831	0.500
	6	2 437	8.548	12.822	
	11	2 462	8.561	12.842	
	12	2 467	9.026	13.539	
	13	2 472	8.548	12.822	
Worst Result			8.548	12.822	
802.11g	1	2 412	16.310	24.465	0.500
	6	2 437	15.730	23.595	
	11	2 462	16.320	24.480	
	12	2 467	16.340	24.510	
	13	2 472	16.330	24.495	
Worst Result			15.730	23.595	
802.11n (HT20)	1	2 412	17.200	25.800	0.500
	6	2 437	17.190	25.785	
	11	2 462	17.560	26.340	
	12	2 467	17.590	26.385	
	13	2 472	17.580	26.370	
Worst Result			17.190	25.785	



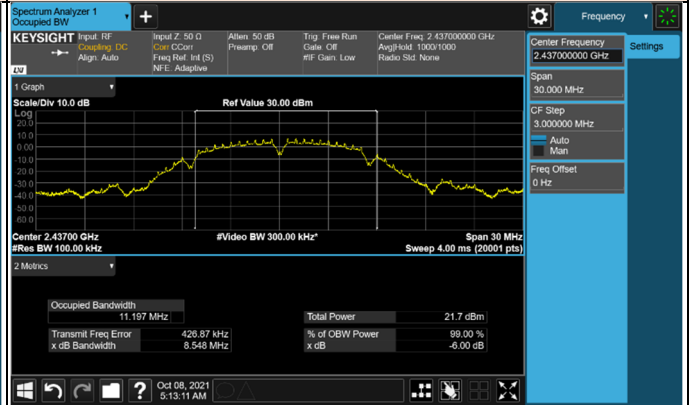
[Test Plot of 6 dB Bandwidth]

802.11b

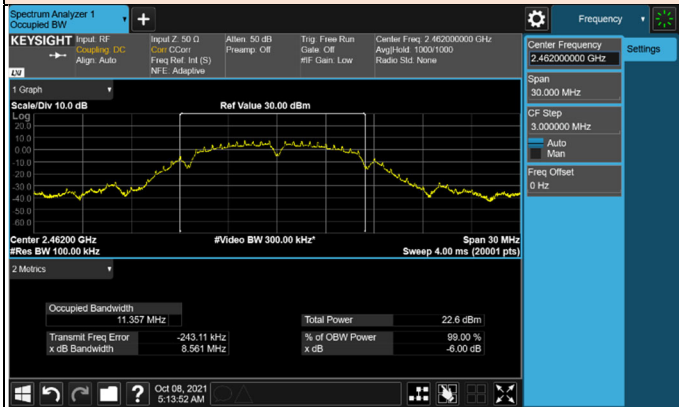
2 412 MHz



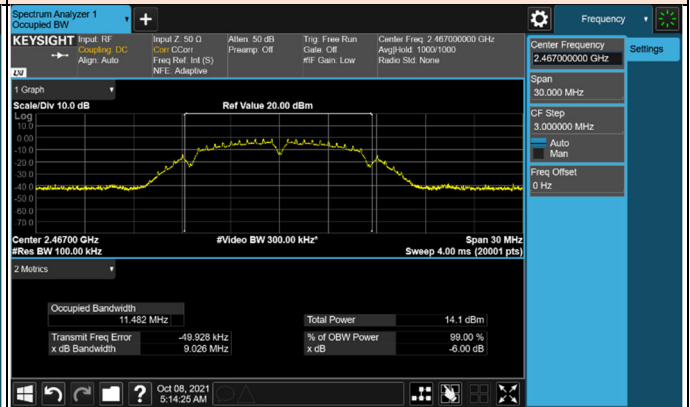
2 437 MHz



2 462 MHz



2 467 MHz



2 472 MHz

