

Test Report # 3514 B

Equipment Under Test: Mobile Patient Monitor

Requirement(s): FCC 15.407, FCC 15.247, FCC 15.209
RSS-247, RSS-GEN

Test Date(s): September 20th to October 4th, 2021


Prepared for: GE Healthcare
Attn: Matthew Pekarske
8200 Tower Avenue
Milwaukee, WI 53223

Report Issued by: Zach Wilson, EMC Engineer

Signature: 

Date: 10/7/2021

Report Reviewed by: Adam Alger, Laboratory Manager

Signature: 

Date: 10/07/2021

Report Constructed by: Zach Wilson, EMC Engineer

Signature: 

Date: 9/29/2021

This test report may not be reproduced, except in full, without approval of Laird Connectivity, Inc.

Company: GE Healthcare	Page 1 of 48	Name: Mobile Patient Monitor
Report: TR3514 B		Model: Portrait HUB01
Quote: NBO-09-2021-004136		Serial: SRW20440005SP

CONTENTS

Contents	2
Laird Connectivity Test Services in Review	3
1 Test Report Summary	4
2 Client Information	6
2.1 Equipment Under Test (EUT) Information	6
2.2 Product Description	6
2.3 Modifications Incorporated for Compliance.....	6
2.4 Deviations and Exclusions from Test Specifications	6
2.5 Radio Programming Information	6
2.6 Antenna Information	7
3 References	8
4 Uncertainty Summary	9
5 Test Data	10
5.1 Antenna Port Conducted Emissions.....	10
5.2 Radiated Emissions	39
6 Revision History	48

Laird Connectivity Test Services in Review

The Laird Connectivity, Inc. laboratory located at W66 N220 Commerce Court Cedarburg, Wisconsin, 53012 USA is recognized through the following organizations:



A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025:2017 with Electrical (EMC) Scope

A2LA Certificate Number: 1255.01

Scope of accreditation includes all test methods listed herein unless otherwise noted



Federal Communications Commission (FCC) – USA

Accredited Test Firm Registration Number: 953492

Recognition of two 3 meter Semi-Anechoic Chambers



**Government
of Canada**

Innovation, Science and Economic Development Canada

Accredited U.S. Identification Number: US0218

Recognition of two 3 meter Semi-Anechoic Chambers

Company: GE Healthcare	Page 3 of 48	Name: Mobile Patient Monitor
Report: TR3514 B		Model: Portrait HUB01
Quote: NBO-09-2021-004136		Serial: SRW20440005SP

1 TEST REPORT SUMMARY

During **September 20th to October 4th, 2021** the Equipment Under Test (EUT), **Mobile Patient Monitor**, as provided by **GE Healthcare** was tested to the following requirements of the **Federal Communications Commission** and **Innovation, Science and Economic Development Canada**:

Operation in the 5.25 – 5.35 GHz and 5.47 – 5.725 GHz bands

FCC	ISED Canada	Test Description	Limit	Compliant
15.407 (a)(2)	RSS-247 §6.2.2.1 RSS-247 §6.2.3.1	Maximum Conducted Output Power	24.0 dBm	Yes
15.407 (a)(2)	RSS-247 §6.2.2.1 RSS-247 §6.2.3.1	Power Spectral Density	11 dBm/MHz	Yes
15.1049	RSS-GEN §6.7	26dB / 99% Bandwidth	Reference Only	Yes
15.407 (b)(2) 15.407 (b)(10) 15.205 (a)	RSS-247 §6.2.3.2 RSS-247 §6.2.2.2 RSS-GEN	Radiated Emissions: Restricted and Band Edges	Peak: 68.2 dBµV/m Avg: 54.0 dBµV/m (RB only)	Yes

Notice:

The results relate only to the item tested as configured and described in this report. Any additional configurations, modes of operation, or modifications made to the equipment under test after the specified test date(s) are at the decision of the client and may not apply to the data seen in this test report.

The decision rule for Pass / Fail assessment to the specification or standard listed in this test report has been agreed upon by the client and laboratory to be as follows:

Measurement Type	Rule
Emissions – Amplitude	1 dB below specified limit
Emissions – Frequency	1% less than the specification
Immunity	Tested at specified level

2 CLIENT INFORMATION

Company Name	GE Healthcare
Contact Person	Matt Pekarske
Address	8200 Tower Avenue Milwaukee, WI 53223

2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

Product Name	Mobile Patient Monitor
Model Number	Portrait HUB01
Serial Number	SRW20440005SP
Module FCC ID	2A08L-WL18DBMOD
Host FCC ID	2A08L-HUB01
Module ISED ID	25821-WL18DBMOD
Host ISED ID	25821-HUB01

2.2 Product Description

GE WL18DBMOD WLAN 2.4/5 GHz Module. Battery powered. Dual antennas (top, bottom).

2.3 Modifications Incorporated for Compliance

None noted at time of test

2.4 Deviations and Exclusions from Test Specifications

None noted at time of test

2.5 Radio Programming Information

TI calibrator SW with the shell scripts from GE GIT repository wearable-wireless-tools rev. 4c3f017. Customer put device into the proper test modes.

2.6 Antenna Information

- Integrated dual band monopole with parasitic element for 5GHz
- Top antenna (free space) max gain:
 - +6.0 dBi @ 2400-2483.5 MHz
 - +6.8 dBi @ 5170-5835 MHz
- Bottom antenna max gain:
 - +4.0 dBi @ 5170-5835 MHz

Tests using top antenna: Radiated Emissions, Power Spectral Density, Emission Bandwidth, Occupied Bandwidth, Output Power

Tests using bottom antenna: Power Spectral Density, Output Power

Company: GE Healthcare	Page 7 of 48	Name: Mobile Patient Monitor
Report: TR3514 B		Model: Portrait HUB01
Quote: NBO-09-2021-004136		Serial: SRW20440005SP

3 REFERENCES

Publication	Edition	Date	AMD 1	AMD 2
eCFR	-	2021	-	-
ANSI C63.10	-	2013	-	-
RSS-247	2	2017	-	-
RSS-GEN	5	2018	2019	2021

4 UNCERTAINTY SUMMARY

Using the guidance of the following publications the calculated measurement uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of $k = 2$.

References	Version / Date
CISPR 16-4-1	Ed. 2 (2009-02)
CISPR 16-4-2	Ed. 2 (2011-06)
CISPR 32	Ed. 1 (2012-01)
ANSI C63.23	2012
A2LA P103	February 4, 2016
A2LA P103c	August 10, 2015
ETSI TR 100-028	V1.3.1 (2001-03)

Measurement Type	Configuration	Uncertainty \pm
Radiated Emissions	Biconical Antenna	5.0 dB
Radiated Emissions	Log Periodic Antenna	5.3 dB
Radiated Emissions	Horn Antenna	4.7 dB
AC Line Conducted Emissions	Artificial Mains Network	3.4 dB
Telecom Conducted Emissions	Asymmetric Artificial Network	4.9 dB
Disturbance Power Emissions	Absorbing Clamp	4.1 dB
Radiated Immunity	3 Volts/meter	2.2 dB
Conducted Immunity	CDN/EM/BCI	2.4/3.5/3.4 dB
EFT Burst/Surge	Peak pulse voltage	164 volts
ESD Immunity	15 kV level	1377 Volts

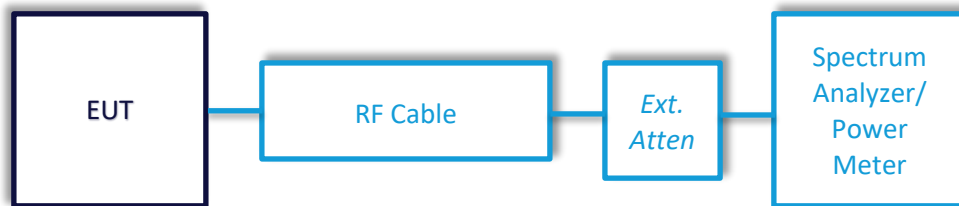
Parameter	ETSI U.C. \pm	U.C. \pm
Radio Frequency, from F0	1×10^{-7}	0.55×10^{-7}
Occupied Channel Bandwidth	5 %	2 %
RF conducted Power (Power Meter)	1.5 dB	1.2 dB
RF conducted emissions (Spectrum Analyzer)	3.0 dB	1.7 dB
All emissions, radiated	6.0 dB	5.3 dB
Temperature	1° C	0.65° C
Humidity	5 %	2.9 %
Supply voltages	3 %	1 %

5 TEST DATA

5.1 Antenna Port Conducted Emissions

Description of Measurement	<p>The direct measurement of emissions at the antenna port of the EUT is achieved by use of a RF connection to a spectrum analyzer or power meter.</p> <p>The cable and attenuator factors are loaded into the analyzer or power meter allowing for direct measurement readings without the need for further corrections.</p>
Example Calculations	<p>Measurement (dBm) + Cable factor (dB) + External Attenuator (dB) = Corrected Reading (dBm)</p> <p>Margin (dB) = Limit (dBm) – Corrected Reading (dBm)</p>

Block Diagram



5.1.1 Operation in the 5250-5350 MHz and 5470-5725 MHz Bands (UNII 2A, 2C) – 26 dB Emission Bandwidth

Operator	Anthony Smith	QA	Zach Wilson
Temperature	21.2°C, 20.1°C, 20.5°C	R.H. %	47.3%, 45.7%, 48.9%
Test Date	9/22/2021, 9/23/2021, 9/24/2021	Location	Conducted RF Bench
Requirement	FCC 15.407, RSS-247	Method	ANSI C63.10 §12.4.1

Limits

Reference Only

Test Parameters

Frequency	5260 MHz, 5300 MHz, 5320 MHz, 5500 MHz, 5580 MHz, 5700 MHz	Setup	Conducted
VBW	1 MHz	RBW	270 kHz
Span	40 MHz	Detector	Peak Max Hold

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960143	Cable	Gore	EKD01D01048.0	5546519	2/3/2021	2/3/2022	Active Verification
EE 960087	Analyzer - Spectrum	Agilent	N9010A	MY53400296	7/28/2021	7/28/2022	Active Calibration
EE 960090	Meter - RF Power	Anritsu	ML2495A	1335006	4/22/2021	4/22/2022	Active Calibration
EE 960091	Sensor - RF Power	Anritsu	MA2491A	1249277	4/22/2021	4/22/2022	Active Calibration

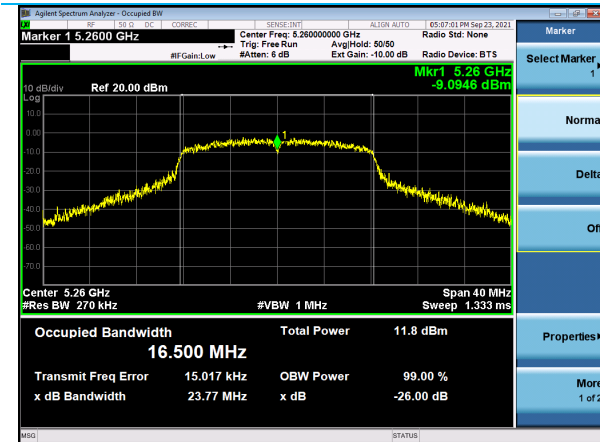
EUT Parameters

Input Power	5VDC via USB	Mode	WLAN 5GHz Transmit
Frequency	UNII 2A, 2C Band	Channel	52, 60, 64, 100, 116, 140
Serial	SRW20440013SP	Data Rates	802.11a (6Mbps, 54Mbps) 802.11n (MCS0, MCS7)
Antenna Port	Top		

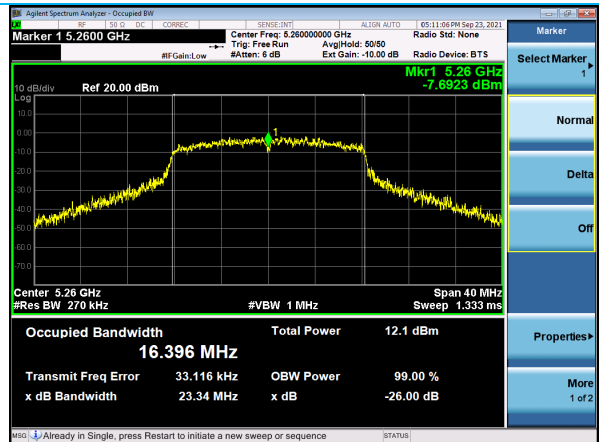
Data Table

Channel	Data Rate	26dB BW (MHz)
52	6 Mbps	23.8
52	54 Mbps	23.3
52	MCS0	23.0
52	MCS7	22.7
60	6 Mbps	23.9
60	54 Mbps	21.7
60	MCS0	24.6
60	MCS7	24.7
64	6 Mbps	22.4
64	54 Mbps	21.4
64	MCS0	24.8
64	MCS7	24.4
100	6 Mbps	26.0
100	54 Mbps	21.4
100	MCS0	28.7
100	MCS7	21.7
116	6 Mbps	28.7
116	54 Mbps	22.7
116	MCS0	27.4
116	MCS7	22.4
140	6 Mbps	23.1
140	54 Mbps	21.7
140	MCS0	23.1
140	MCS7	22.6

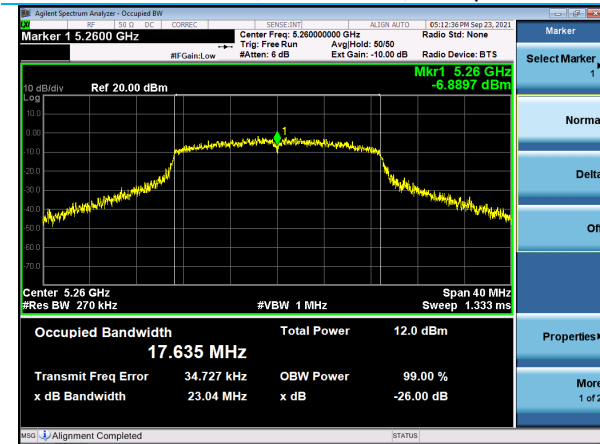
Plots



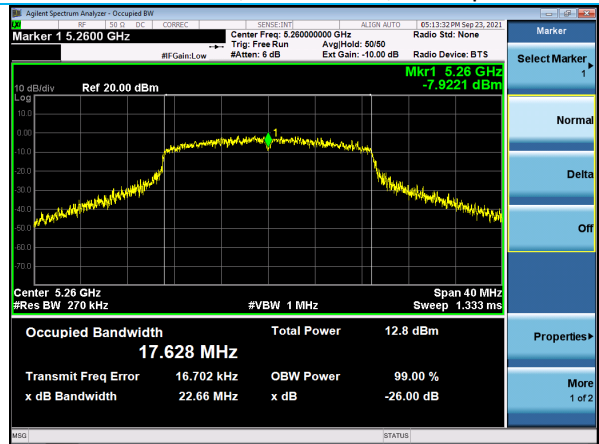
26 dB EBW, Channel 52, 6Mbps



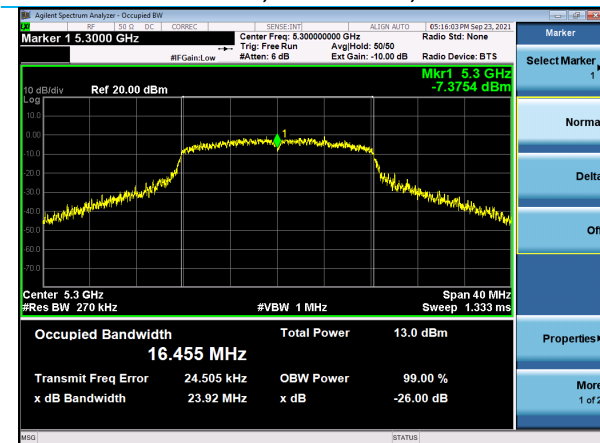
26 dB EBW, Channel 52, 54Mbps



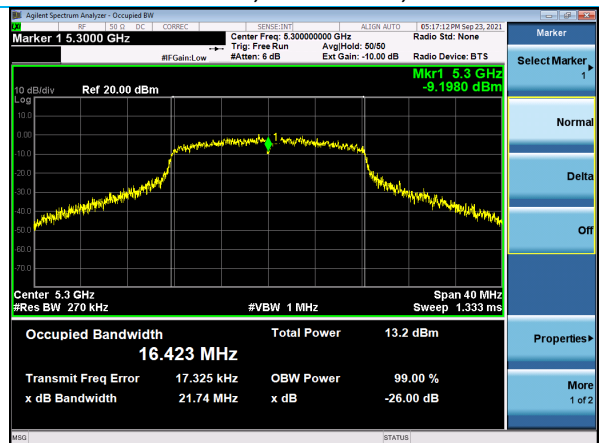
26 dB EBW, Channel 52, MCS0



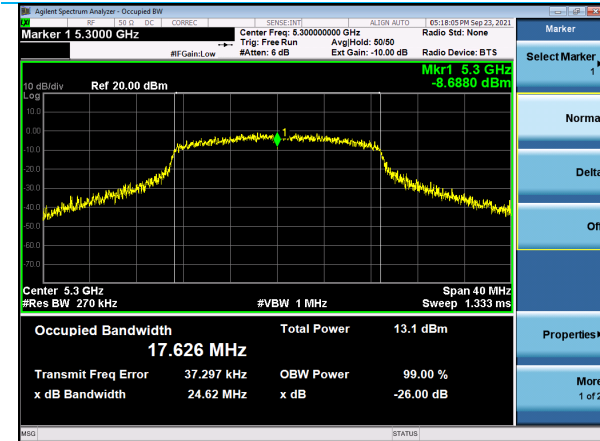
26 dB EBW, Channel 52, MCS7



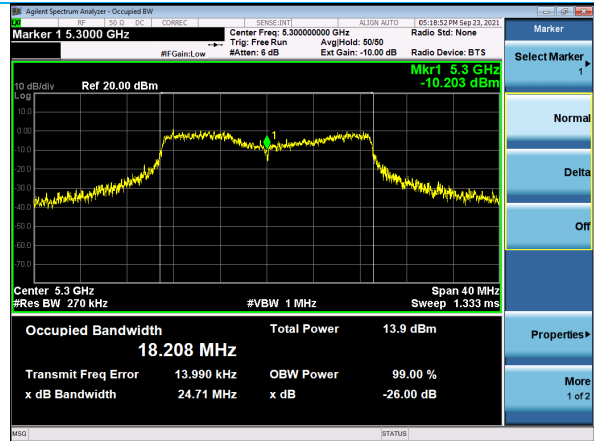
26 dB EBW, Channel 60, 6Mbps



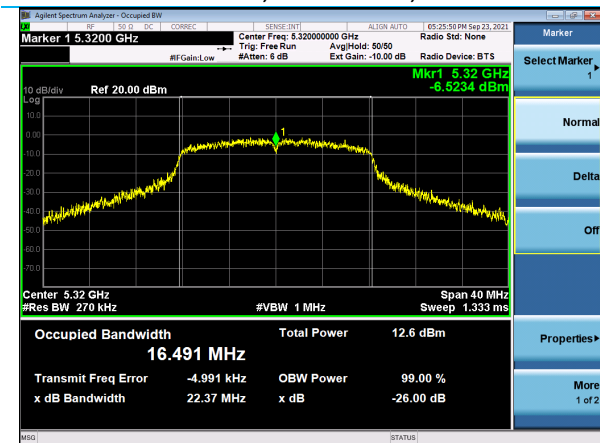
26 dB EBW, Channel 60, 54Mbps



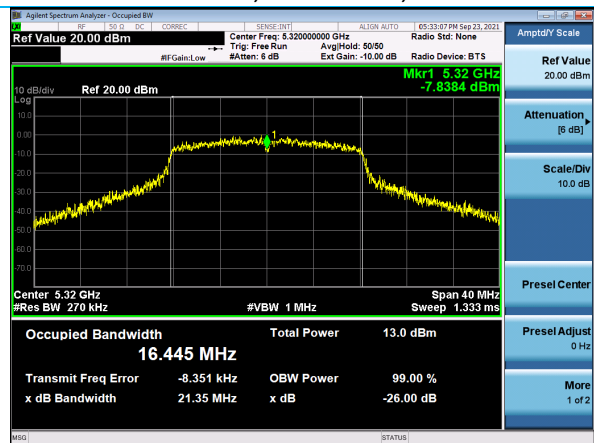
26 dB EBW, Channel 60, MCS0



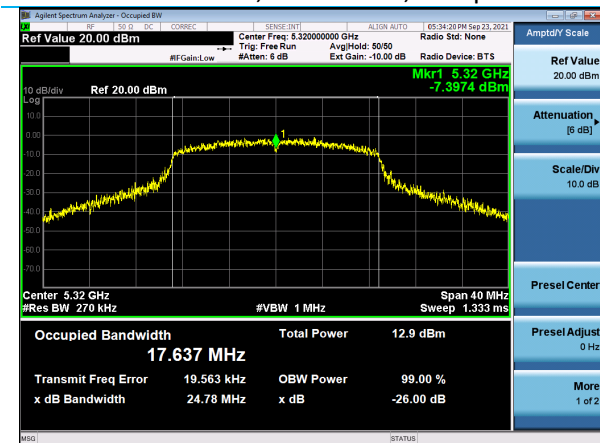
26 dB EBW, Channel 60, MCS7



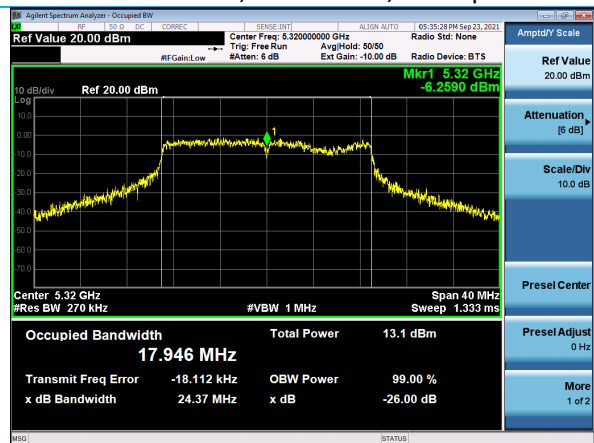
26 dB EBW, Channel 64, 6Mbps



26 dB EBW, Channel 64, 54Mbps

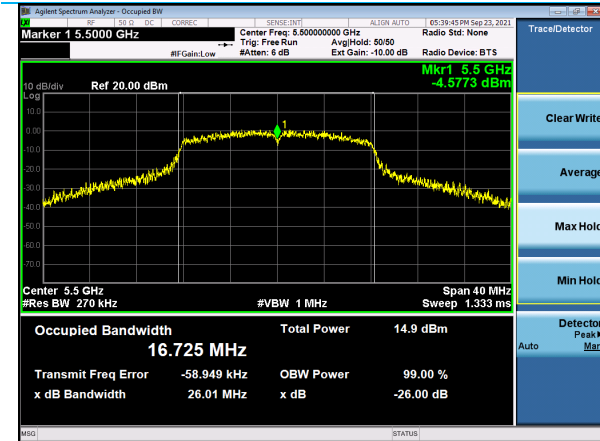


26 dB EBW, Channel 64, MCS0

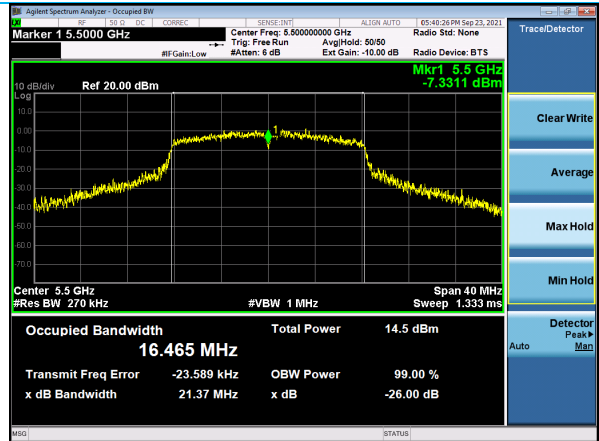


26 dB EBW, Channel 64, MCS7

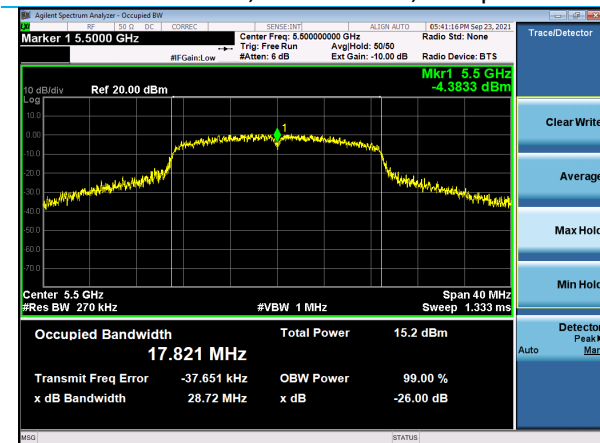
Company: GE Healthcare	Page 14 of 48	Name: Mobile Patient Monitor
Report: TR3514 B		Model: Portrait HUB01
Quote: NBO-09-2021-004136		Serial: SRW20440005SP



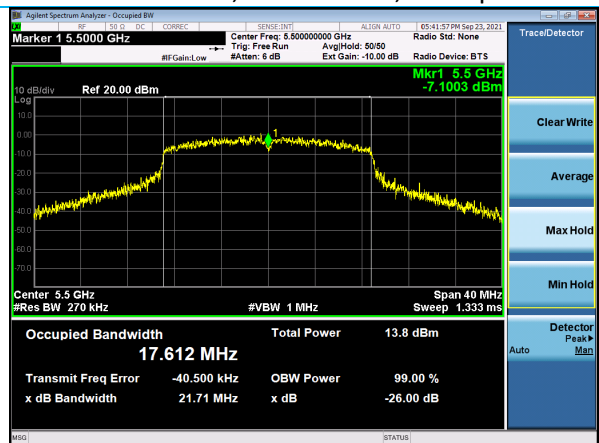
26 dB EBW, Channel 100, 6Mbps



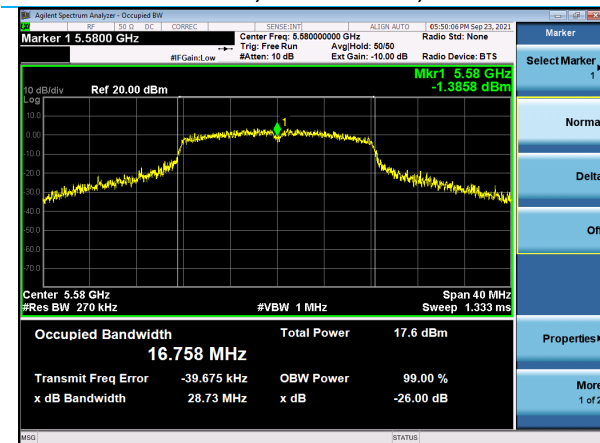
26 dB EBW, Channel 100, 54Mbps



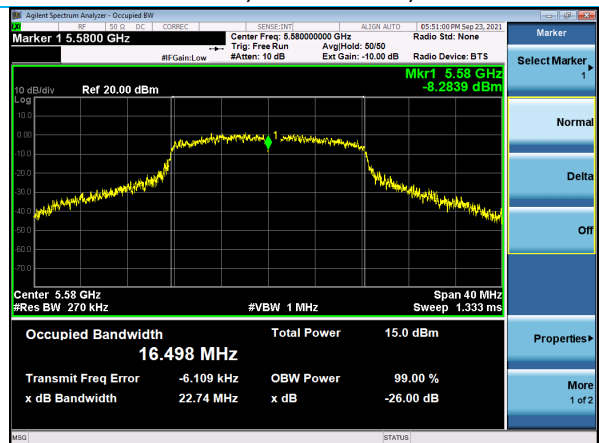
26 dB EBW, Channel 100, MCS0



26 dB EBW, Channel 100, MCS7

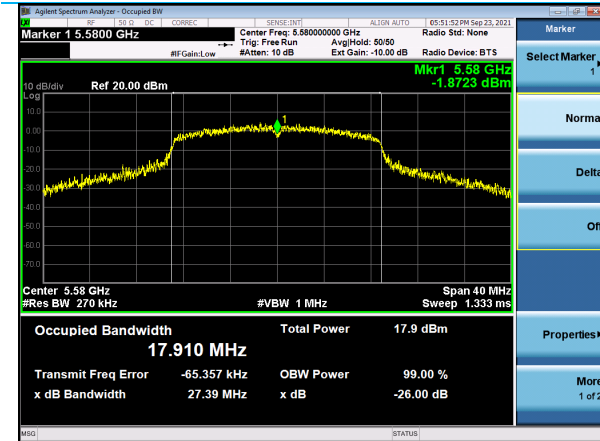


26 dB EBW, Channel 116, 6Mbps

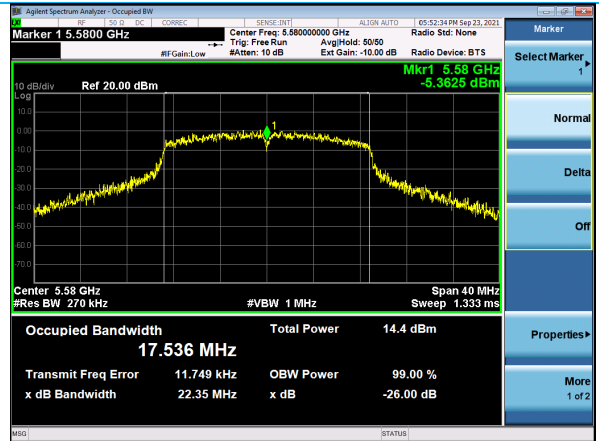


26 dB EBW, Channel 116, 54Mbps

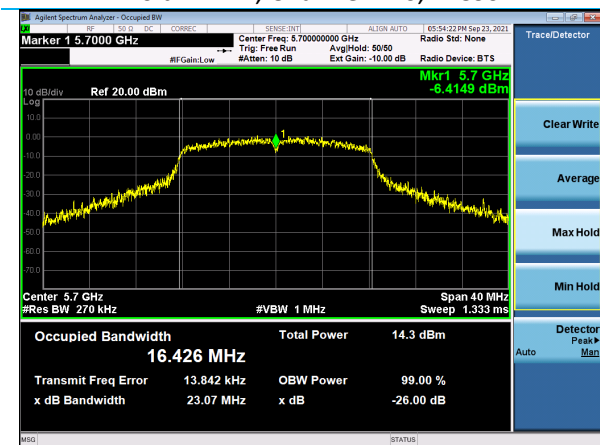
Company: GE Healthcare	Page 15 of 48	Name: Mobile Patient Monitor
Report: TR3514 B		Model: Portrait HUB01
Quote: NBO-09-2021-004136		Serial: SRW20440005SP



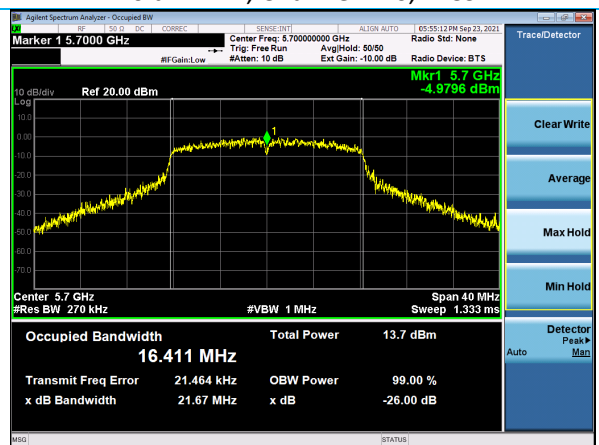
26 dB EBW, Channel 116, MCS0



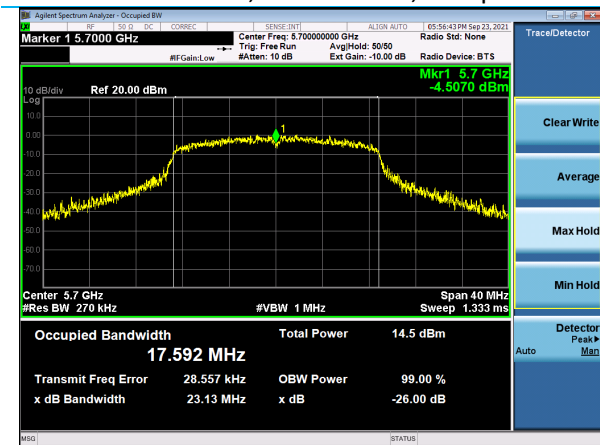
26 dB EBW, Channel 116, MCS7



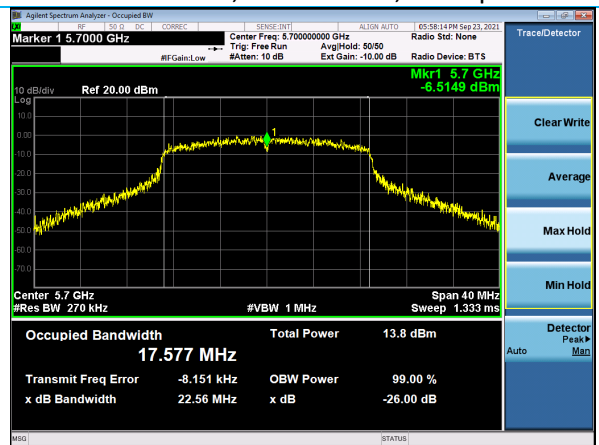
26 dB EBW, Channel 140, 6Mbps



26 dB EBW, Channel 140, 54Mbps



26 dB EBW, Channel 140, MCS0



26 dB EBW, Channel 140, MCS7

Company: GE Healthcare	Page 16 of 48	Name: Mobile Patient Monitor
Report: TR3514 B		Model: Portrait HUB01
Quote: NBO-09-2021-004136		Serial: SRW20440005SP

5.1.2 Operation in the 5250-5350 MHz and 5470-5725 MHz Bands (UNII 2A, 2C) – 99% Occupied Bandwidth

Operator	Anthony Smith	QA	Zach Wilson
Temperature	21.2°C, 20.1°C, 20.5°C	R.H. %	47.3%, 45.7%, 48.9%
Test Date	9/22/2021, 9/23/2021, 9/24/2021	Location	Conducted RF Bench
Requirement	FCC 2.1049, RSS-GEN	Method	ANSI C63.10 §6.9.3

Limits

Reference Only

Test Parameters

Frequency	5260 MHz, 5300 MHz, 5320 MHz, 5500 MHz, 5580 MHz, 5700 MHz	Setup	Conducted
VBW	620 kHz	RBW	200 kHz
Span	30 MHz	Detector	Peak Max Hold

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960143	Cable	Gore	EKD01D01048.0	5546519	2/3/2021	2/3/2022	Active Verification
EE 960087	Analyzer - Spectrum	Agilent	N9010A	MY53400296	7/28/2021	7/28/2022	Active Calibration
EE 960090	Meter - RF Power	Anritsu	ML2495A	1335006	4/22/2021	4/22/2022	Active Calibration
EE 960091	Sensor - RF Power	Anritsu	MA2491A	1249277	4/22/2021	4/22/2022	Active Calibration

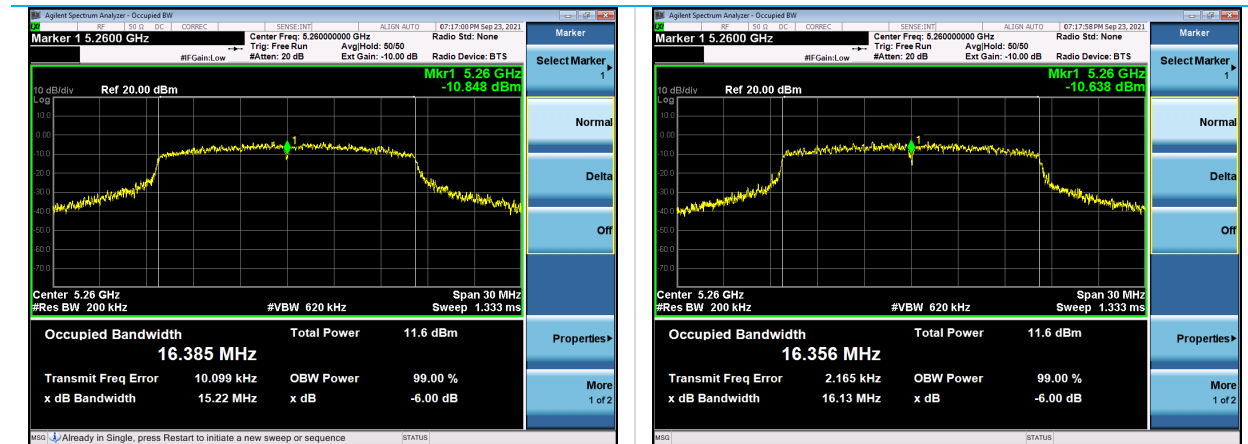
EUT Parameters

Input Power	5VDC via USB	Mode	WLAN 5GHz Transmit
Frequency	UNII 2A, 2C Band	Channels	52, 60, 64, 100, 116, 140
Serial	SRW20440013SP	Data Rates	802.11a (6Mbps, 54Mbps) 802.11n (MCS0, MCS7)
Antenna Port	Top		

Data Table

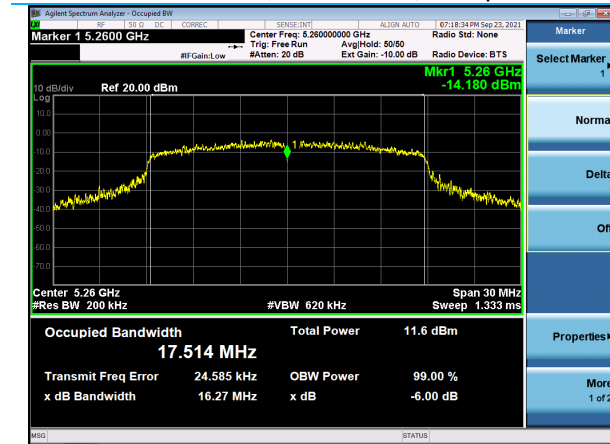
Channel	Data Rate	99% Bandwidth (MHz)
52	6 Mbps	16.4
52	54 Mbps	16.4
52	MCS0	17.5
52	MCS7	17.6
60	6 Mbps	16.4
60	54 Mbps	16.3
60	MCS0	17.5
60	MCS7	17.9
64	6 Mbps	16.4
64	54 Mbps	16.3
64	MCS0	17.5
64	MCS7	17.8
100	6 Mbps	16.5
100	54 Mbps	16.4
100	MCS0	17.6
100	MCS7	17.5
116	6 Mbps	16.5
116	54 Mbps	16.4
116	MCS0	17.7
116	MCS7	17.5
140	6 Mbps	16.3
140	54 Mbps	16.4
140	MCS0	17.5
140	MCS7	17.5

Plots

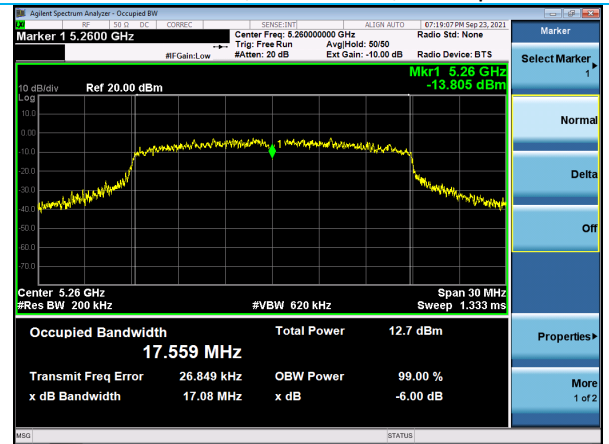


99% OCBW, Channel 52, 6Mbps

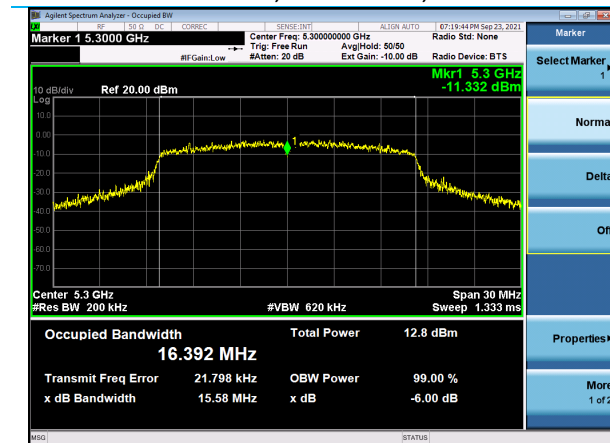
99% OCBW, Channel 52, 54Mbps



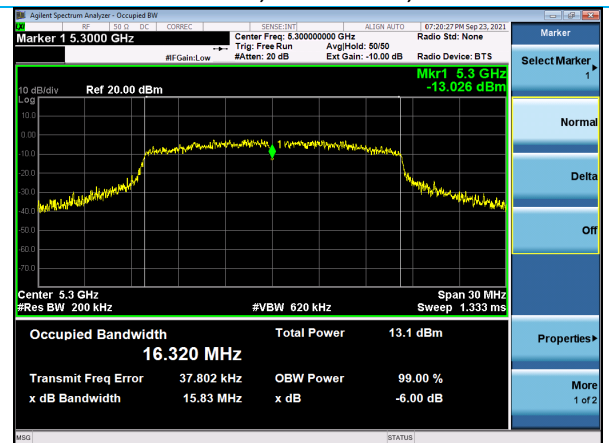
99% OCBW, Channel 52, MCS0



99% OCBW, Channel 52, MCS7

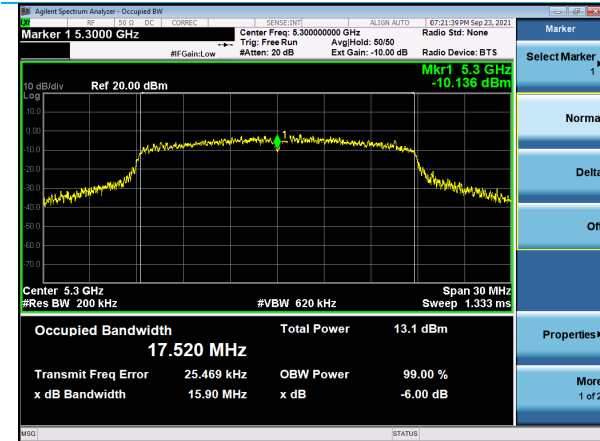


99% OCBW, Channel 60, 6Mbps

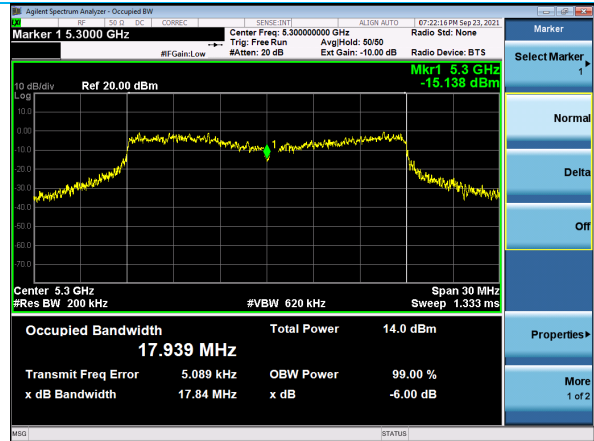


99% OCBW, Channel 60, 54Mbps

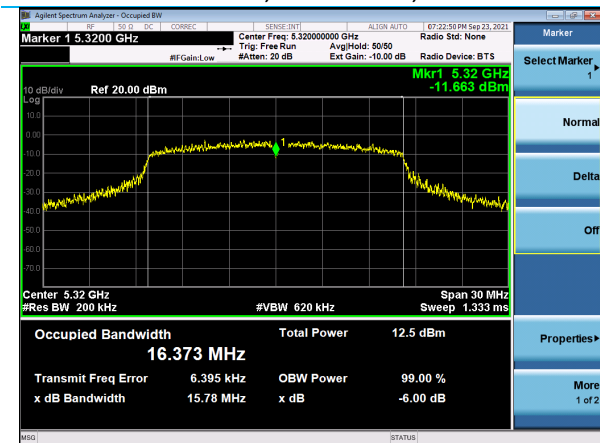
Company: GE Healthcare	Page 19 of 48	Name: Mobile Patient Monitor
Report: TR3514 B		Model: Portrait HUB01
Quote: NBO-09-2021-004136		Serial: SRW20440005SP



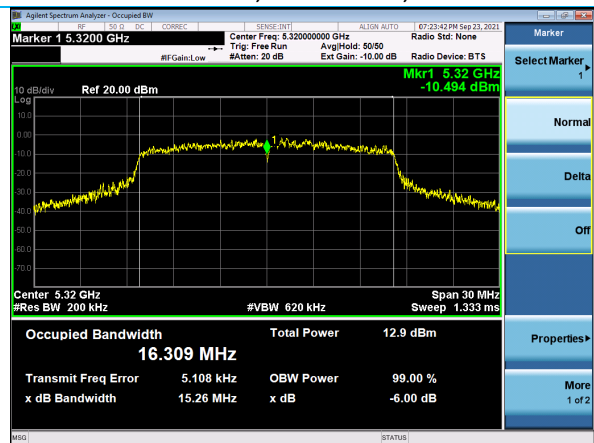
99% OCBW, Channel 60, MCS0



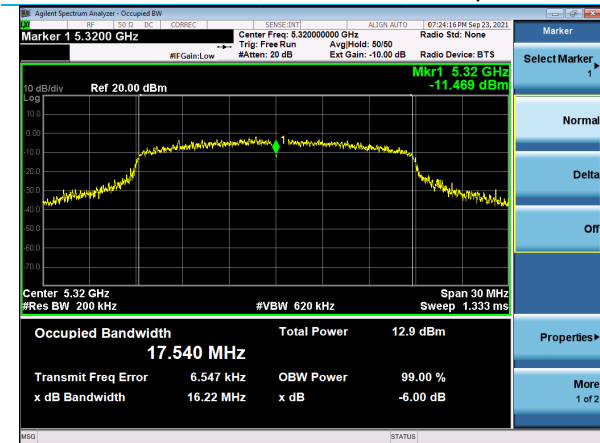
99% OCBW, Channel 60, MCS7



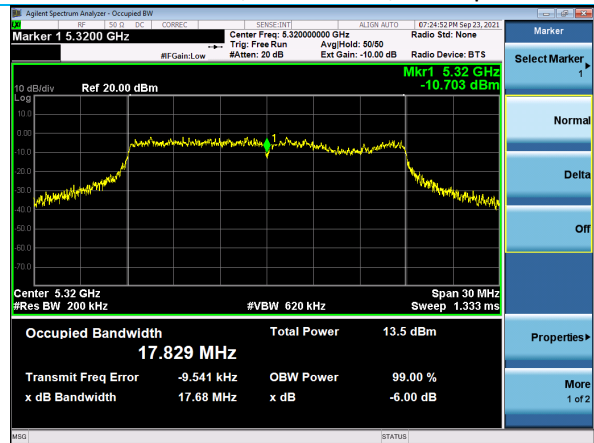
99% OCBW, Channel 64, 6Mbps



99% OCBW, Channel 64, 54Mbps

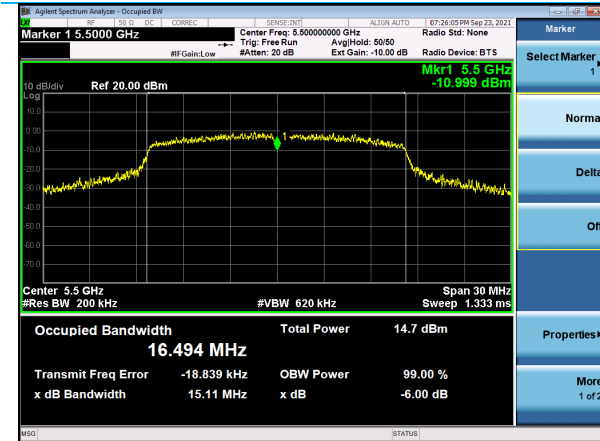


99% OCBW, Channel 64, MCS0

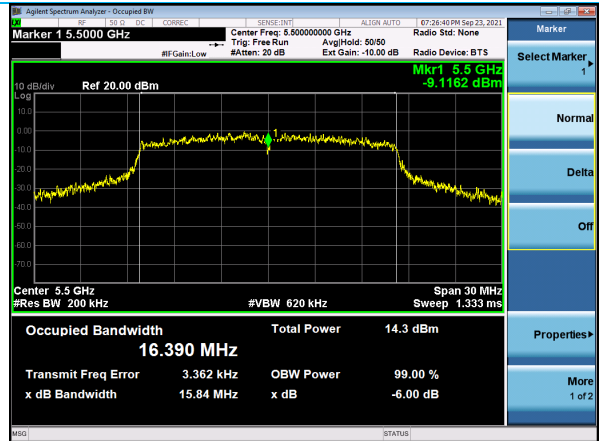


99% OCBW, Channel 64, MCS7

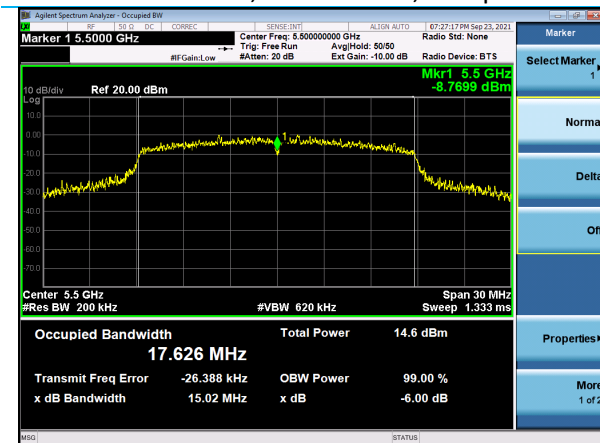
Company: GE Healthcare	Page 20 of 48	Name: Mobile Patient Monitor
Report: TR3514 B		Model: Portrait HUB01
Quote: NBO-09-2021-004136		Serial: SRW20440005SP



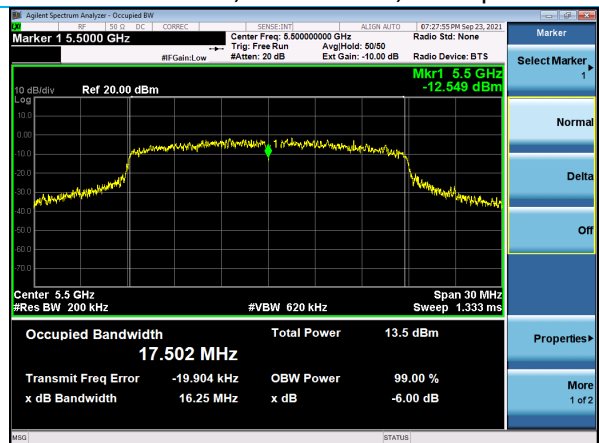
99% OCBW, Channel 100, 6Mbps



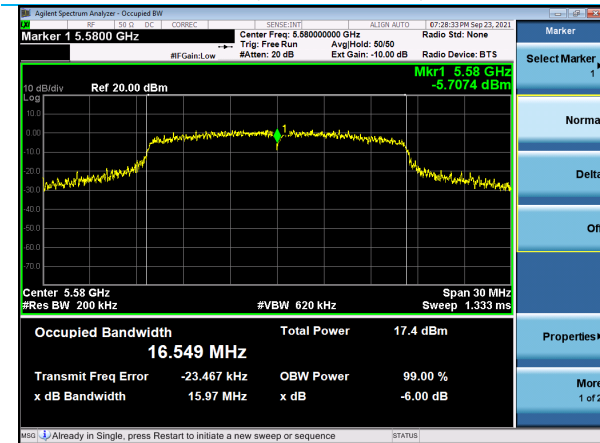
99% OCBW, Channel 100, 54Mbps



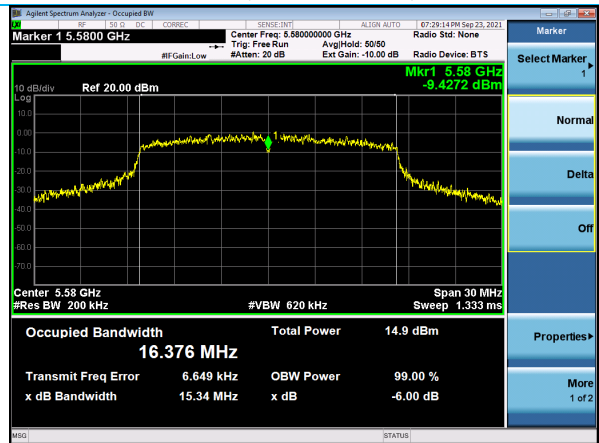
99% OCBW, Channel 100, MCS0



99% OCBW, Channel 100, MCS7

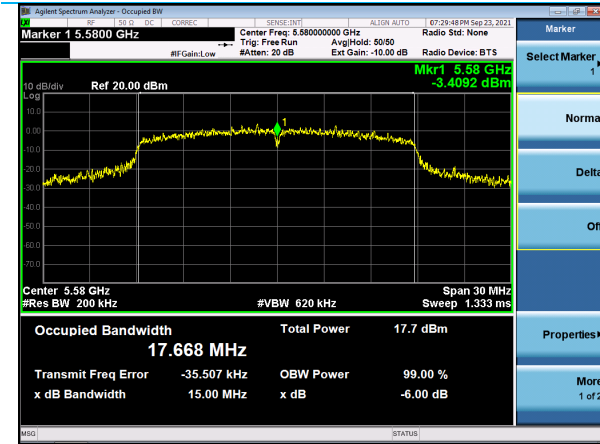


99% OCBW, Channel 116, 6Mbps

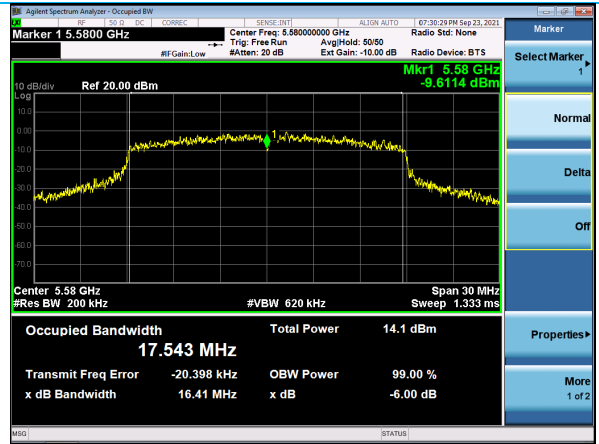


99% OCBW, Channel 116, 54Mbps

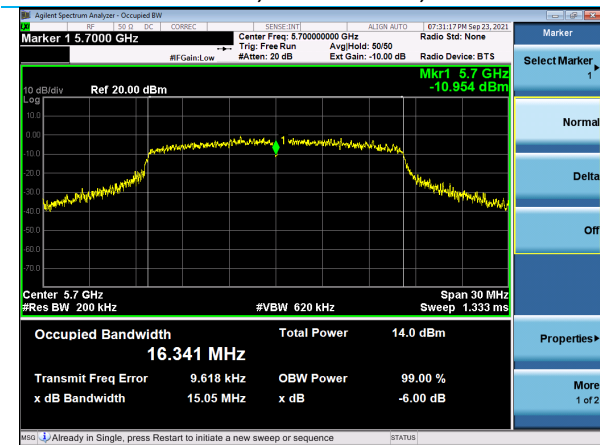
Company: GE Healthcare	Page 21 of 48	Name: Mobile Patient Monitor
Report: TR3514 B		Model: Portrait HUB01
Quote: NBO-09-2021-004136		Serial: SRW20440005SP



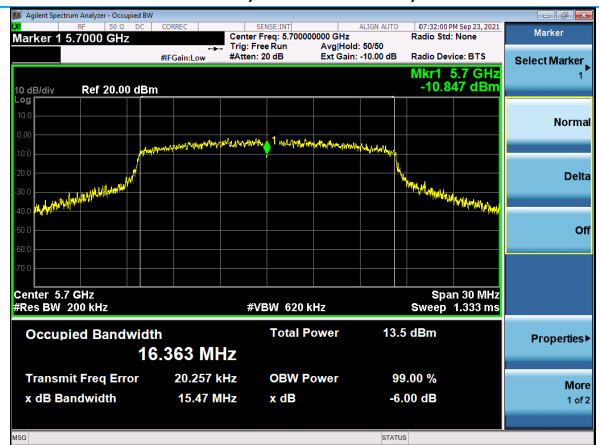
99% OCBW, Channel 116, MCS0



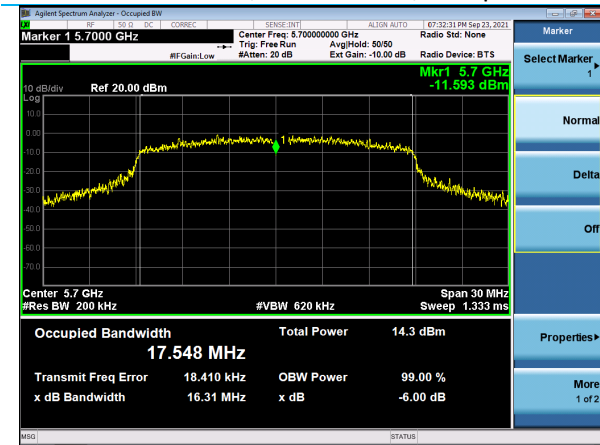
99% OCBW, Channel 116, MCS7



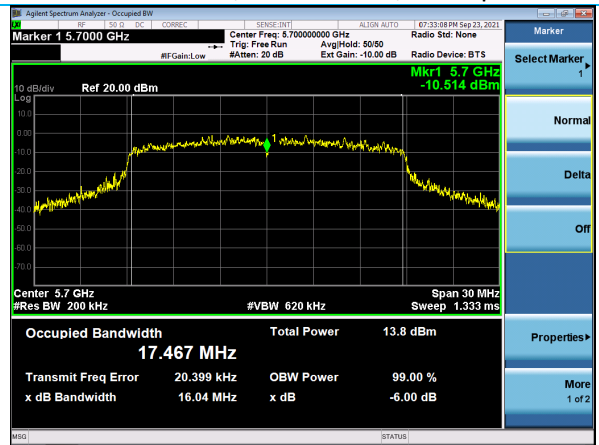
99% OCBW, Channel 140, 6Mbps



99% OCBW, Channel 140, 54Mbps



99% OCBW, Channel 140, MCS0



99% OCBW, Channel 140, MCS7

Company: GE Healthcare	Page 22 of 48	Name: Mobile Patient Monitor
Report: TR3514 B		Model: Portrait HUB01
Quote: NBO-09-2021-004136		Serial: SRW20440005SP