MEASUREMENT REPORT

FCC PART 27

FCC ID:	XIA-CFW2591
Applicant:	NetComm Wireless Pty Ltd
Application Type:	Certification
Product:	5G High Power mmWave Outdoor CPE
Model No.:	CFW-2591
Brand Name:	Casa Systems
FCC Rule Part(s):	Part 27
Test Procedure(s):	ANSI C63.26: 2015
Test Date:	October 25 ~ November 09, 2021

Reviewed By: Sunny Sun

Approved By: Robin Wu

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.26-2015. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date	Note
2110RSU037-U3	Rev. 01	Initial Report	12-08-2021	Valid

CONTENTS

Description Page

1. GENERAL INFORMATION

1.1. Applicant

NetComm Wireless Pty Ltd

Level 5, 18-20 Orion Road, Lane Cove, NSW, 2066, Australia

1.2. Manufacturer

CASA SYSTEMS, INC.

100 Old River Road, Andover MA 01810 USA

1.3. Testing Facility

<table>
<tr><td>☒</td><td colspan="5">Test Site - MRT Suzhou Laboratory</td></tr>
<tr><td></td><td colspan="5">Laboratory Location (Suzhou - Wuzhong)
D8 Building, No.2 Tian’edang Rd., Wuzhong Economic Development Zone, Suzhou, China
Laboratory Location (Suzhou - SIP)
4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China</td></tr>
<tr><td></td><td colspan="5">Laboratory Accreditations</td></tr>
<tr><td></td><td colspan="5">A2LA: 3628.01 CNAS: L10551
FCC: CN1166 ISED: CN0001</td></tr>
<tr><td></td><td>VCCI:</td><td>☐R-20025</td><td>☐G-20034</td><td>☐C-20020</td><td>☐T-20020</td></tr>
<tr><td></td><td></td><td>☐R-20141</td><td>☐G-20134</td><td>☐C-20103</td><td>☐T-20104</td></tr>
<tr><td>☐</td><td colspan="5">Test Site - MRT Shenzhen Laboratory</td></tr>
<tr><td></td><td colspan="5">Laboratory Location (Shenzhen)
1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China</td></tr>
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<tr><td></td><td colspan="5">A2LA: 3628.02 CNAS: L10551
FCC: CN1284 ISED: CN0105</td></tr>
<tr><td>☐</td><td colspan="5">Test Site - MRT Taiwan Laboratory</td></tr>
<tr><td></td><td colspan="5">Laboratory Location (Taiwan)
No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)</td></tr>
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<tr><td></td><td colspan="5">TAF: L3261-190725
FCC: 291082, TW3261 ISED: TW3261</td></tr>
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1.4. Product Information

Product Name	5G High Power mmWave Outdoor CPE
Model No.	CFW-2591
Brand Name	Casa Systems
IMEI	Conducted Measurement: 354796430000971 Radiated Measurement: 35479630001250
E-UTRA Band	Band 4, 5, 12, 17, 41, 48, 66
FR1 NR Band	n66
FR2 NR Band	n261
Bluetooth Specification	V4.1 BLE only
Antenna Information	Refer to section 1.6
Operating Temperature	-40 ~ 55 °C
Remark: 1. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Radio Specification under Test

EN-DC Band	DC_48A_n66A
FDD T_X Frequency Range	n66: 1710 ~ 1780 MHz
FDD R_X Frequency Range	n66: 2110 ~ 2180 MHz
Modulation	UL & DL up to 256QAM

1.6. Description of Available Antennas

Technology	Frequency Range (MHz)	Antenna Type	Max Peak Gain (dBi)
LTE Band 4	1710 ~ 1755	Dipole	4.4
LTE Band 5	824 ~ 849		2.1
LTE Band 12	699 ~ 716		1.6
LTE Band 17	704 ~ 716		1.6
LTE Band 41	2496 ~ 2690		5.1
LTE Band 48	3550 ~ 3700		4.3
LTE/NR Band 66	1710 ~ 1780		4.4
Bluetooth	2402 ~ 2480		3.0

1.7. Test Methodology

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ANSI C63.26:2015
- FCC CFR 47 Part 27
- FCC KDB 971168 D01 v03r01: Power Meas License Digital Systems
- FCC KDB 971168 D02 v02r01: Misc Rev Approv License Devices
- FCC KDB 412172 D01 v01r01: Determining ERP and EIRP

1.8. Device Capabilities

This device contains 5G NR EN-DC the following capabilities: Working on DC_48A_n66A.

PI/2 BPSK modulation applied for 5G NR band frequencies and has the same tune up power as QPSK modulations.

The DFT-s-OFDM and CP-OFDM waveforms were investigated, and DFT-s-OFDM was found to be the worst case.

The worst-case scenario for all measurements is based on an engineering evaluation and QPSK was observed as the worst one and set for all conducted and radiated. Output power measurements were measured on PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM, and BPSK modulations.

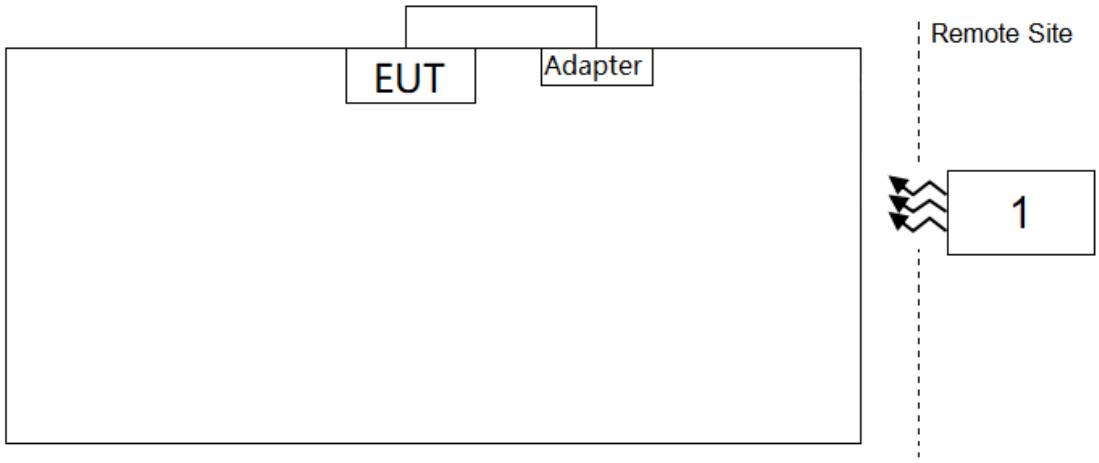
1.9. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

1.10. Maximum Power, Frequency Tolerance, and Emission Designator

n66_ENDC		PI/2 BPSK			QPSK		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	Designator	Tolerance (ppm)	Max Power (W))
5	1712.5 ~ 1752.5	4M48F9W	--	0.6745	4M48G7D	--	0.6918
10	1715.0 ~ 1750.0	8M90F9W	--	0.6745	8M92G7D	--	0.6730
15	1717.5 ~ 1747.5	13M4F9W	--	0.6714	13M4G7D	--	0.6668
20	1720.0 ~ 1745.0	17M9F9W	--	0.6792	17M9G7D	-0.0082	0.6745
n66_ENDC		16QAM			64QAM		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	Designator	Tolerance (ppm)	Max Power (W)
5	1712.5 ~ 1752.5	4M45W7D	--	0.6531	4M48W7D	--	0.4764
10	1715.0 ~ 1750.0	8M91W7D	--	0.6577	8M90W7D	--	0.4955
15	1717.5 ~ 1747.5	13M4W7D	--	0.6397	13M4W7D	--	0.5129
20	1720.0 ~ 1745.0	17M8W7D	--	0.6699	17M8W7D	--	0.4764
n66_ENDC		256QAM					
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)			
5	1712.5 ~ 1752.5	4M47W7D	--	0.3141			
10	1715.0 ~ 1750.0	8M92W7D	--	0.2951			
15	1717.5 ~ 1747.5	13M4W7D	--	0.3041			
20	1720.0 ~ 1745.0	17M9W7D	--	0.2979			

1.11. Configuration of Tested System



Product		Manufacturer	Model No.
1	UXM 5G Wireless Test Platform	Keysight	E7515B

1.12. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20% ~ 75%RH

2. TEST EQUIPMENT CALIBRATION DATE

Radiated Emission (WZ- AC1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2022/01/04
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2022/10/10
PXA Signal Analyzer	Keysight	9030B	MRTSUE06395	1 year	2022/08/08
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2022/10/28
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2022/08/05
Broad Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2022/09/16
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2021/12/14
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2022/11/14
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2022/06/09
Thermohygrometer	Testo	608-H1	MRTSUE06403	1 year	2022/06/28
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2022/04/29

Radiated Emission (WZ-AC2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Keysight	N9038A	MRTSUE06125	1 year	2022/06/24
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2022/10/10
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2022/10/28
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2022/05/24
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2022/10/21
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2021/12/14
Broad Band Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2022/11/14
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2022/06/09
Temperature/Humidity Meter	Minggao	ETH529	MRTSUE06170	1 year	2021/12/15
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2022/04/29

Conducted Test Equipment (WZ-SR6, WZ-TR3)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2022/04/13
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06452	1 year	2022/07/10
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2022/04/13
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2022/10/10
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2022/10/10
DC Power Supply	GWINSTEK	DPS-3303C	MRTSUE06064	N/A	N/A
True RMS Clamp Meter	Fluke	319	MRTSUE06080	1 year	2022/05/05
Directional Coupler	Agilent	87301D	MRTSUE06082	1 year	2022/03/24
Dual Directional Coupler	Agilent	7778D	MRTSUE06083	1 year	2022/03/24
Attenuator	MVE	6dB	MRTSUE06534	1 year	2021/12/12
Attenuator	MVE	10dB	MRTSUE06543	1 year	2021/12/12
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2022/10/10
Thermohygrometer	testo	608-H1	MRTSUE06401	1 year	2022/06/28

Software	Version	Function
EMI Software	V3	EMI Test Software

3. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Radiated Spurious Emissions
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Horizontal: 9kHz ~ 300MHz: 5.04dB 300MHz ~ 1GHz: 4.95dB 1GHz ~ 40GHz: 6.40dB Vertical: 9kHz ~ 300MHz: 5.24dB 300MHz ~ 1GHz: 6.03dB 1GHz ~ 40GHz: 6.40dB
Conducted Spurious Emissions
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%
Frequency Stability
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 76.2Hz

4. TEST RESULT

4.1. Summary

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A	Conducted	Pass	Section 4.2
2.1055, 27.54	Frequency Stability	< 2.5 ppm		Pass	Section 4.3
27.50(d)(4)	Equivalent Isotropic Radiated Power	< 1 Watts Max EIRP		Pass	Section 4.4
27.50(d)(5)	Peak to Average Ratio	< 13dB		Pass	Section 4.6
2.1051, 27.53(h)	Band Edge	< 43 + 10log10 (P[Watts])		Pass	Section 4.5, 4.7
2.1051, 27.53(h)	Spurious Emission	< 43 + 10log10 (P[Watts])			
2.1051,27.53(h)	Spurious Emissions	< 43 + 10log10 (P[Watts])	Radiated	Pass	Section 4.8

Notes:

1) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
2) All supported modulation types were evaluated. The worst-case emission of modulation was selected. Therefore, the Frequency Stability, Channel Band Edge, Conducted & Radiated Spurious Emission were presented worst-case in the test report.

4.2. Occupied Bandwidth

4.2.1.Test Limit

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

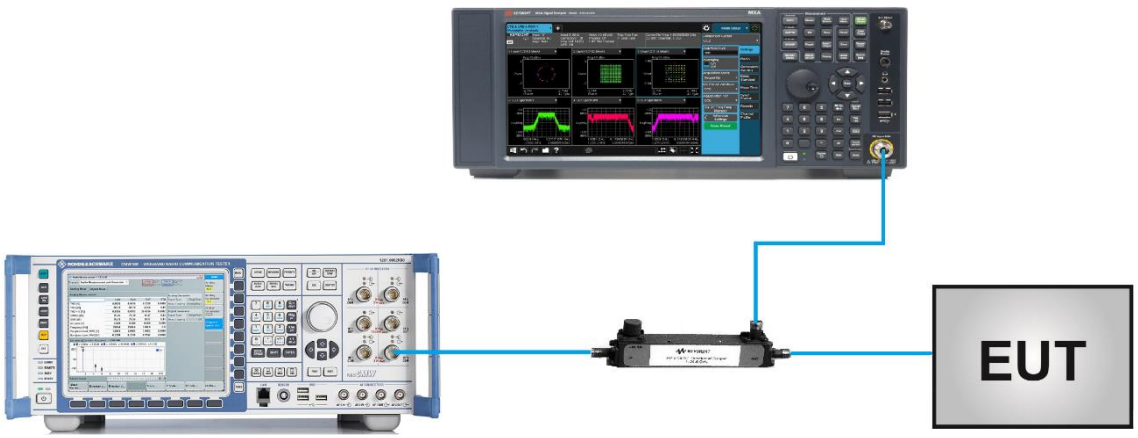
4.2.2.Test Procedure

ANSI C63.26-2015 - Section 5.4

4.2.3.Test Setting

1. Set center frequency to the nominal EUT channel center frequency
2. RBW = The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace to stabilize
8. Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

4.2.4.Test Setup



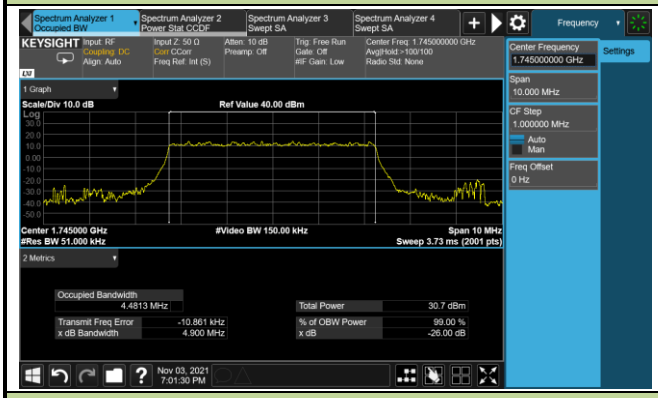
4.2.5.Test Result

Product	5G High Power mmWave Outdoor CPE	Test Site	WZ-SR6
Test Engineer	Cloud Guo	Test Date	2021/11/03
Test Band	DC_48A_n66A		

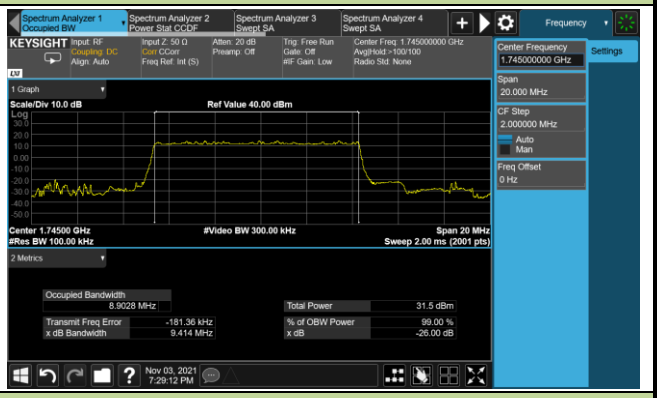
Channel	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
PI/2 BPSK			
349000	1745.0	5	4.48
349000	1745.0	10	8.90
349000	1745.0	15	13.40
349000	1745.0	20	17.85
QPSK			
349000	1745.0	5	4.48
349000	1745.0	10	8.92
349000	1745.0	15	13.41
349000	1745.0	20	17.85
16QAM			
349000	1745.0	5	4.45
349000	1745.0	10	8.91
349000	1745.0	15	13.41
349000	1745.0	20	17.84
64QAM			
349000	1745.0	5	4.48
349000	1745.0	10	8.90
349000	1745.0	15	13.40
349000	1745.0	20	17.83
256QAM			
349000	1745.0	5	4.47
349000	1745.0	10	8.92
349000	1745.0	15	13.41
349000	1745.0	20	17.85

99% Bandwidth - PI/2 BPSK

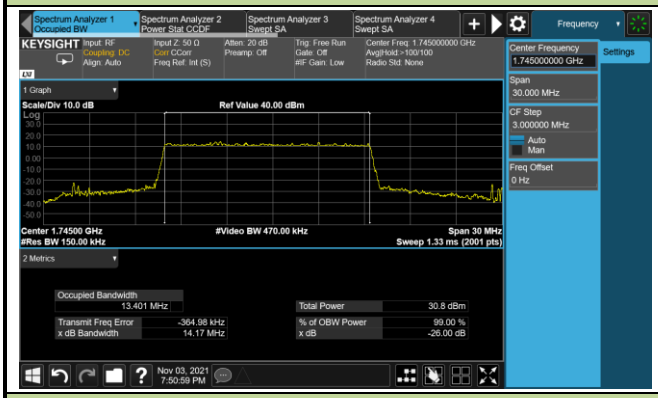
5MHz Channel Bandwidth



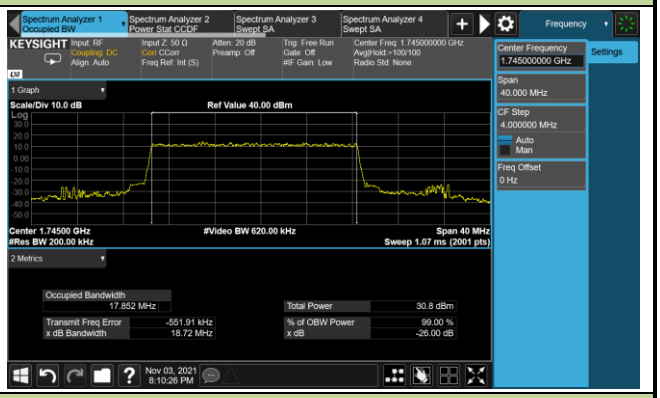
10MHz Channel Bandwidth



15MHz Channel Bandwidth

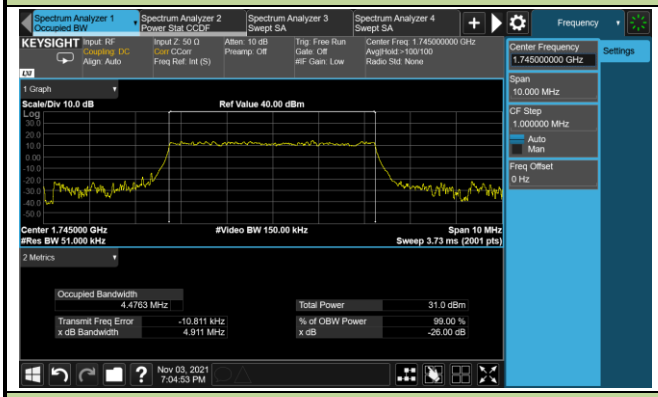


20MHz Channel Bandwidth

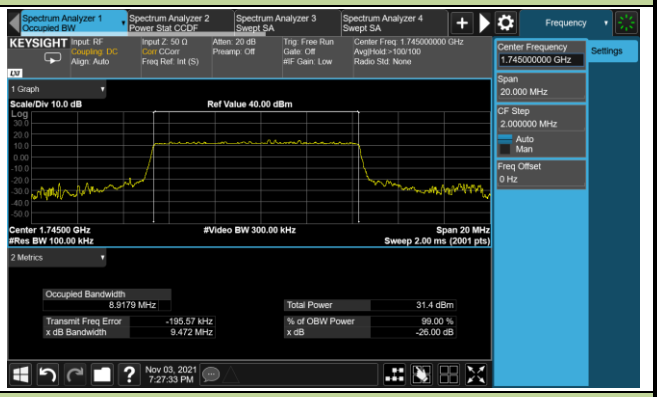


99% Bandwidth - QPSK

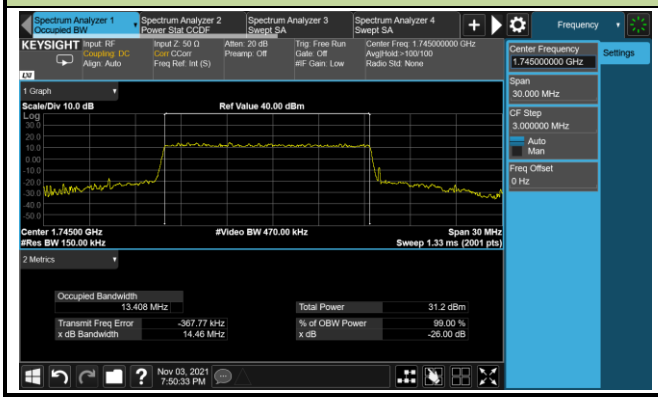
5MHz Channel Bandwidth



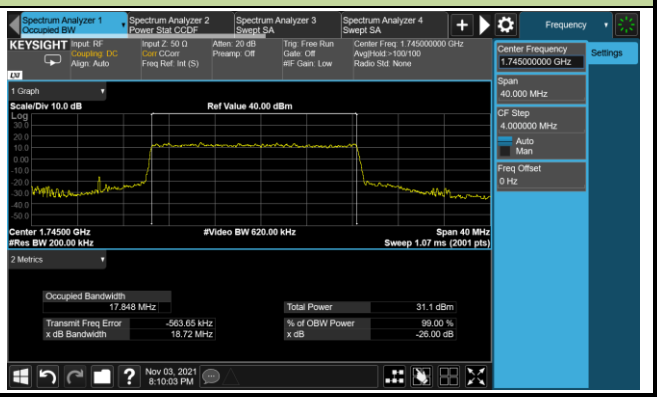
10MHz Channel Bandwidth



15MHz Channel Bandwidth

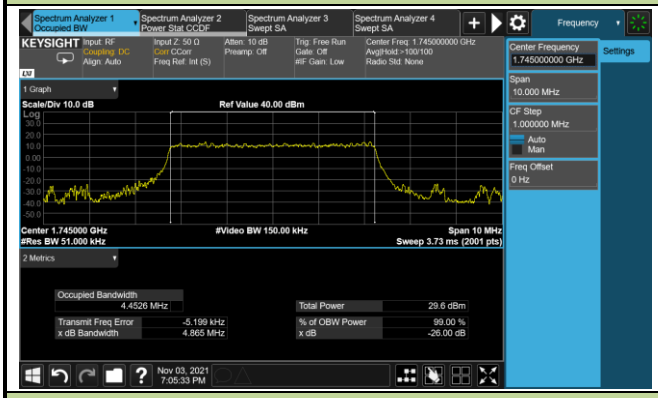


20MHz Channel Bandwidth

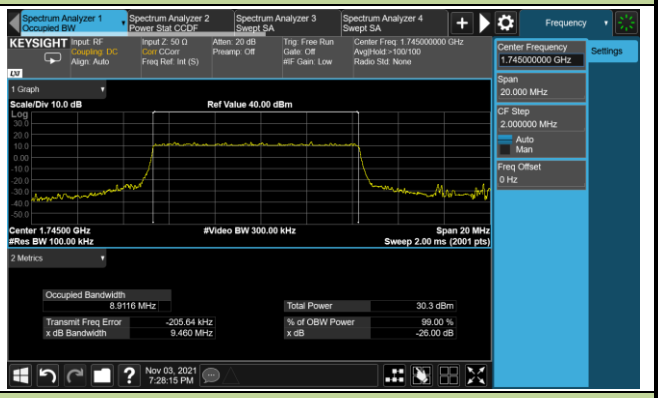


99% Bandwidth - 16QAM

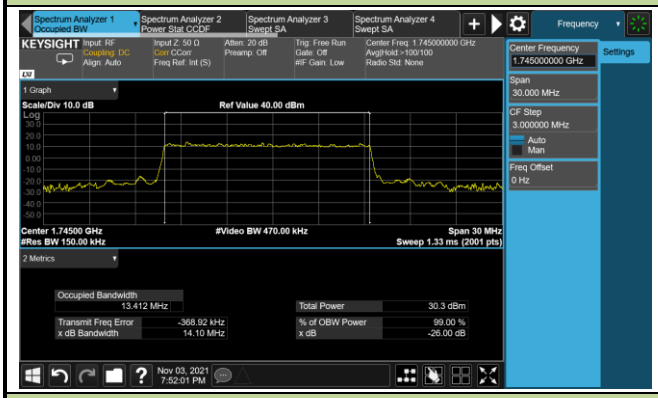
5MHz Channel Bandwidth



10MHz Channel Bandwidth



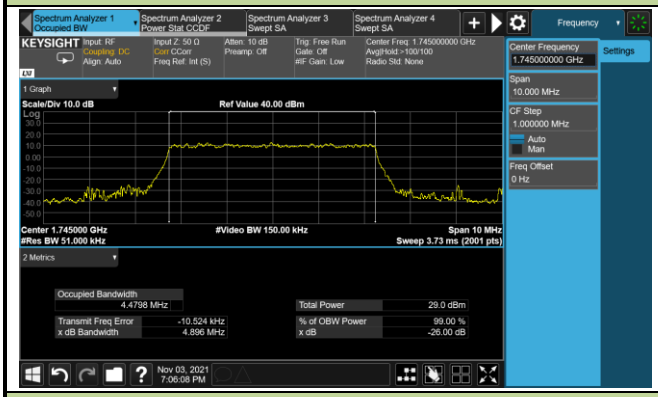
15MHz Channel Bandwidth



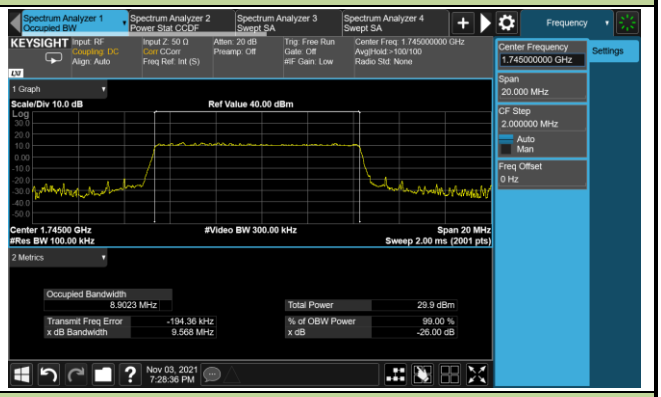
20MHz Channel Bandwidth

99% Bandwidth - 64QAM

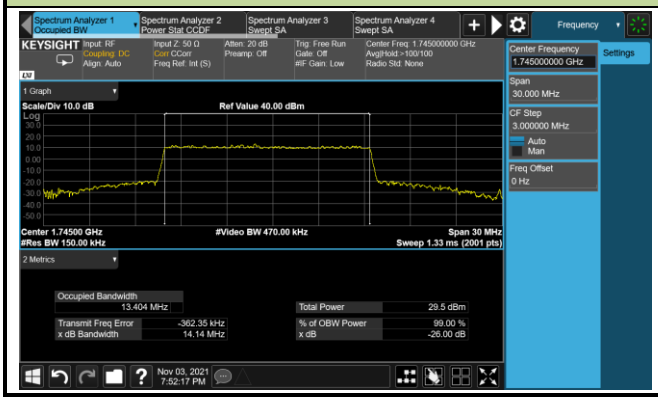
5MHz Channel Bandwidth



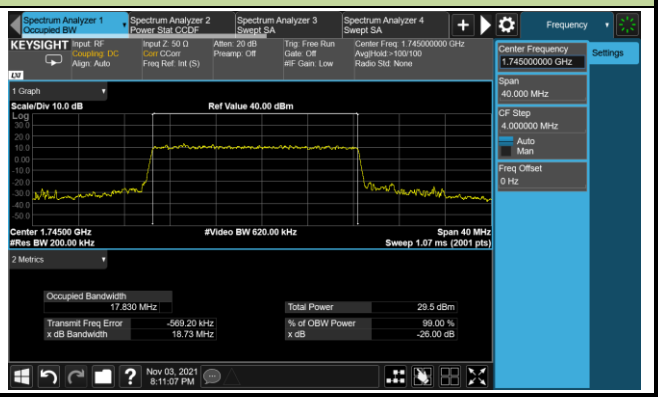
10MHz Channel Bandwidth

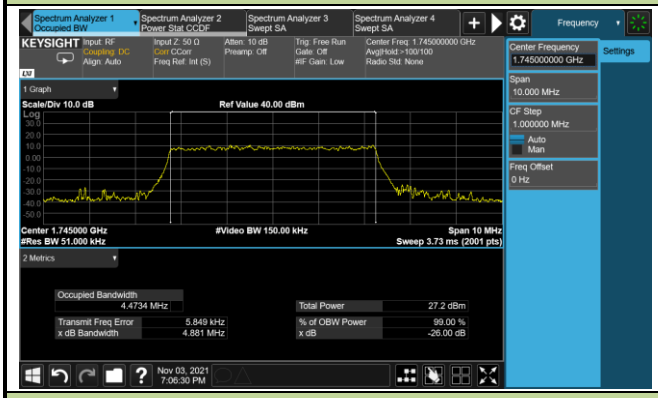
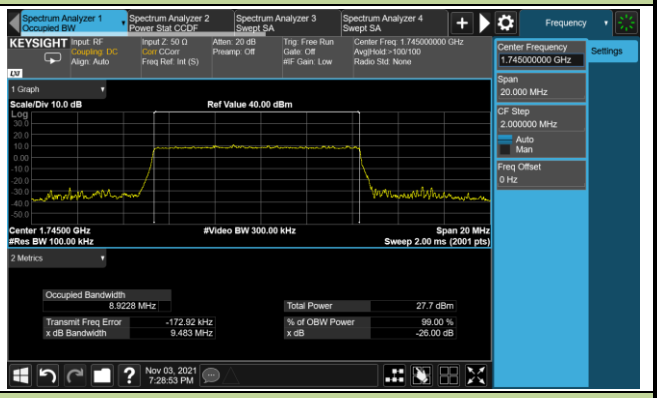
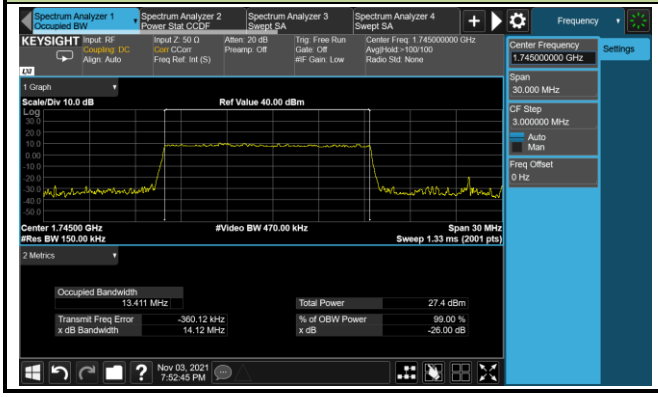
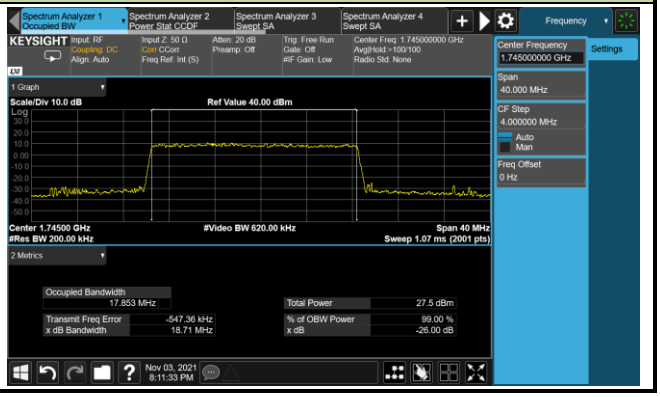


15MHz Channel Bandwidth



20MHz Channel Bandwidth



99% Bandwidth - 256QAM	
5MHz Channel Bandwidth	10MHz Channel Bandwidth
	
15MHz Channel Bandwidth	20MHz Channel Bandwidth
	

4.3. Frequency Stability Measurement

4.3.1.Test Limit

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

4.3.2.Test Procedures Used

ANSI C63.26-2015 - Section 5.6

4.3.3.Test Setting

Frequency Stability Under Temperature Variations:

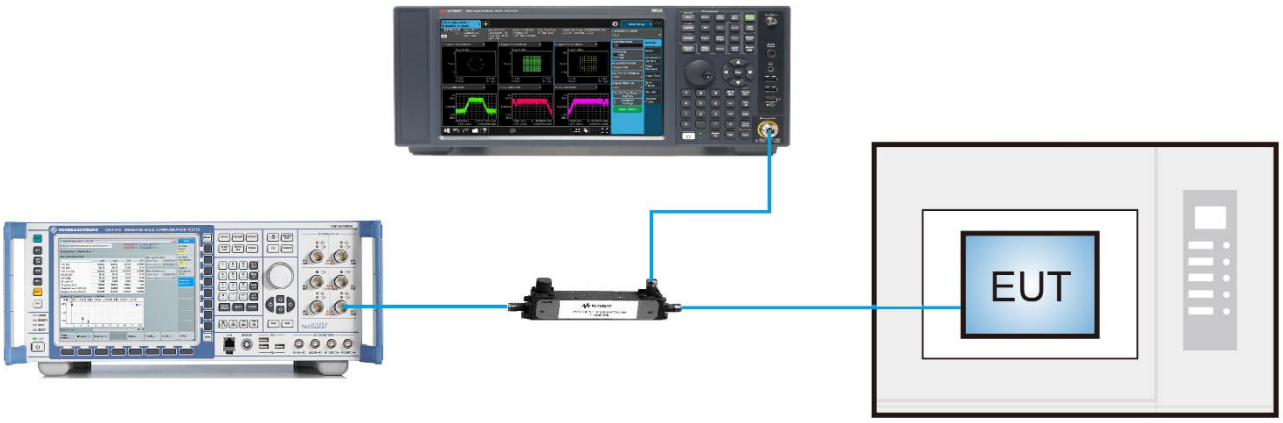
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, recordthe maximum frequency change.

4.3.4.Test Setup



4.3.5.Test Result

Product	5G High Power mmWave Outdoor CPE	Test Site	WZ-TR3
Test Engineer	Cloud Guo	Test Date	2021/11/08
Test Band	DC_48A_n66A		

Power (VDC)	Temp (°C)	Frequency Tolerance (ppm)
120	- 30	-0.0082
	- 20	-0.0014
	- 10	-0.0015
	0	-0.0025
	+ 10	-0.0042
	+ 20	-0.0032
	+ 30	-0.0046
	+ 40	-0.0044
	+ 50	-0.0054
138	+ 20	-0.0063
102	+ 20	-0.0058

4.4. Equivalent Isotropically Radiated Power Measurement

4.4.1.Test Limit

n66:

Fixed, mobile stations operating in the 1710-1755 MHz band and mobile in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1watt EIRP.

4.4.2.Test Procedures Used

ANSI C63.26-2015 - Section 5.2

4.4.3.Test Setting

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation (1) as follows:

ERP or EIRP = P_{Meas} + G_T

where

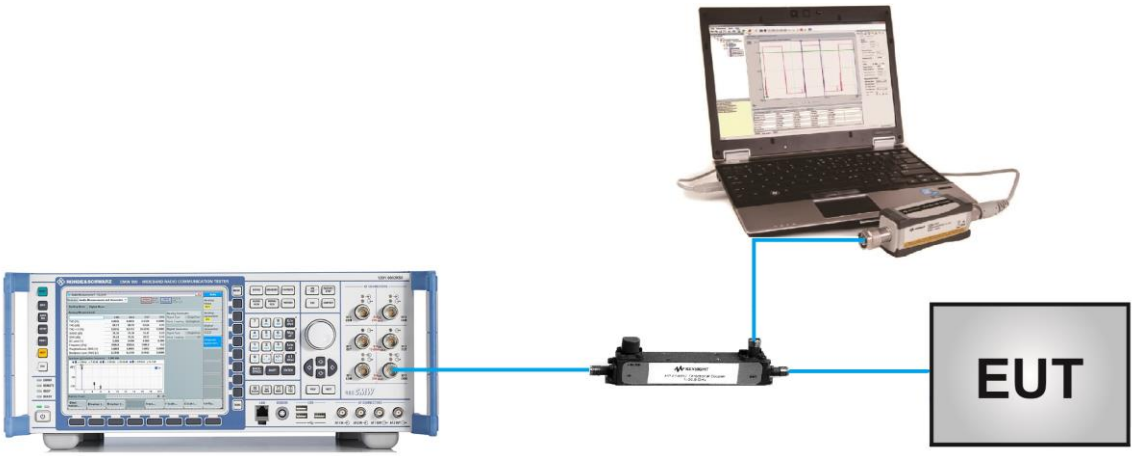
ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, e.g., dBm or dBW)

P_{Meas} measured transmitter output power or PSD, in dBm or dBW

G_T gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

ERP = EIRP -2.15

4.4.4.Test Setup



4.4.5.Test Result

Product	5G High Power mmWave Outdoor CPE	Test Site	WZ-SR6
Test Engineer	Cloud Guo	Test Date	2021/11/08
Test Band	DC_48A_n66A		

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm)	EIRP (dBm)	Limit (dBm)
PI/2 BPSK							
342500	1712.5	5	1	0	23.63	28.03	< 30.00
			1	1	23.84	28.24	< 30.00
			12	6	23.77	28.17	< 30.00
			25	0	23.79	28.19	< 30.00
349000	1745.0	5	1	0	23.71	28.11	< 30.00
			1	1	23.59	27.99	< 30.00
			12	6	23.70	28.10	< 30.00
			25	0	23.69	28.09	< 30.00
355500	1777.5	5	1	0	23.36	27.76	< 30.00
			1	1	23.41	27.81	< 30.00
			12	6	23.56	27.96	< 30.00
			25	0	23.89	28.29	< 30.00
343000	1715.0	10	1	0	23.88	28.28	< 30.00
			1	1	23.89	28.29	< 30.00
			25	12	23.73	28.13	< 30.00
			50	0	23.71	28.11	< 30.00
349000	1745.0	10	1	0	23.54	27.94	< 30.00
			1	1	23.59	27.99	< 30.00
			25	12	23.75	28.15	< 30.00
			50	0	23.70	28.10	< 30.00
355000	1775.0	10	1	0	23.59	27.99	< 30.00
			1	1	23.53	27.93	< 30.00
			25	12	23.49	27.89	< 30.00
			50	0	23.72	28.12	< 30.00
Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm)	EIRP (dBm)	Limit (dBm)
PI/2 BPSK							
343500	1717.5	15	1	0	23.77	28.17	< 30.00
			1	1	23.81	28.21	< 30.00
			36	18	23.78	28.18	< 30.00
			75	0	23.87	28.27	< 30.00
349000	1745.0	15	1	0	23.66	28.06	< 30.00
			1	1	23.67	28.07	< 30.00
			36	18	23.66	28.06	< 30.00
			75	0	23.54	27.94	< 30.00
354500	1772.5	15	1	0	23.50	27.90	< 30.00
			1	1	23.47	27.87	< 30.00
			36	18	23.47	27.87	< 30.00
			75	0	23.53	27.93	< 30.00
344000	1720.0	20	1	0	23.87	28.27	< 30.00
			1	1	23.85	28.25	< 30.00
			50	25	23.83	28.23	< 30.00
			100	0	23.84	28.24	< 30.00
349000	1745.0	20	1	0	23.92	28.32	< 30.00
			1	1	23.75	28.15	< 30.00
			50	25	23.84	28.24	< 30.00
			100	0	23.66	28.06	< 30.00
354000	1770.0	20	1	0	23.68	28.08	< 30.00
			1	1	23.87	28.27	< 30.00
			50	25	23.52	27.92	< 30.00
			100	0	23.56	27.96	< 30.00
Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm)	EIRP (dBm)	Limit (dBm)
QPSK							
342500	1712.5	5	1	0	23.59	27.99	< 30.00
			1	1	23.70	28.10	< 30.00
			12	6	23.81	28.21	< 30.00
			25	0	23.74	28.14	< 30.00
349000	1745.0	5	1	0	24.00	28.40	< 30.00
			1	1	23.62	28.02	< 30.00
			12	6	23.66	28.06	< 30.00
			25	0	23.68	28.08	< 30.00
355500	1777.5	5	1	0	23.34	27.74	< 30.00
			1	1	23.40	27.80	< 30.00
			12	6	23.48	27.88	< 30.00
			25	0	23.43	27.83	< 30.00
343000	1715.0	10	1	0	23.74	28.14	< 30.00
			1	1	23.86	28.26	< 30.00
			25	12	23.75	28.15	< 30.00
			50	0	23.73	28.13	< 30.00
349000	1745.0	10	1	0	23.57	27.97	< 30.00
			1	1	23.45	27.85	< 30.00
			25	12	23.73	28.13	< 30.00
			50	0	23.76	28.16	< 30.00
355000	1775.0	10	1	0	23.35	27.75	< 30.00
			1	1	23.88	28.28	< 30.00
			25	12	23.42	27.82	< 30.00
			50	0	23.51	27.91	< 30.00
Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm)	EIRP (dBm)	Limit (dBm)
QPSK							
343500	1717.5	15	1	0	23.78	28.18	< 30.00
			1	1	23.84	28.24	< 30.00
			36	18	23.82	28.22	< 30.00
			75	0	23.64	28.04	< 30.00
349000	1745.0	15	1	0	23.64	28.04	< 30.00
			1	1	23.58	27.98	< 30.00
			36	18	23.38	27.78	< 30.00
			75	0	23.79	28.19	< 30.00
354500	1772.5	15	1	0	23.43	27.83	< 30.00
			1	1	23.37	27.77	< 30.00
			36	18	23.55	27.95	< 30.00
			75	0	23.52	27.92	< 30.00
344000	1720.0	20	1	0	23.78	28.18	< 30.00
			1	1	23.89	28.29	< 30.00
			50	25	23.86	28.26	< 30.00
			100	0	23.88	28.28	< 30.00
349000	1745.0	20	1	0	23.77	28.17	< 30.00
			1	1	23.65	28.05	< 30.00
			50	25	23.72	28.12	< 30.00
			100	0	23.70	28.10	< 30.00
354000	1770.0	20	1	0	23.66	28.06	< 30.00
			1	1	23.54	27.94	< 30.00
			50	25	23.63	28.03	< 30.00
			100	0	23.55	27.95	< 30.00
Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm)	EIRP (dBm)	Limit (dBm)
16QAM							
342500	1712.5	5	1	0	22.67	27.07	< 30.00
			1	1	23.61	28.01	< 30.00
			12	6	23.71	28.11	< 30.00
			25	0	22.80	27.20	< 30.00
349000	1745.0	5	1	0	22.35	26.75	< 30.00
			1	1	23.45	27.85	< 30.00
			12	6	23.75	28.15	< 30.00
			25	0	22.72	27.12	< 30.00
355500	1777.5	5	1	0	22.24	26.64	< 30.00
			1	1	23.40	27.80	< 30.00
			12	6	23.66	28.06	< 30.00
			25	0	22.50	26.90	< 30.00
343000	1715.0	10	1	0	22.20	26.60	< 30.00
			1	1	23.56	27.96	< 30.00
			25	12	23.78	28.18	< 30.00
			50	0	22.77	27.17	< 30.00
349000	1745.0	10	1	0	22.44	26.84	< 30.00
			1	1	23.42	27.82	< 30.00
			25	12	23.77	28.17	< 30.00
			50	0	22.71	27.11	< 30.00
355000	1775.0	10	1	0	22.26	26.66	< 30.00
			1	1	23.45	27.85	< 30.00
			25	12	23.41	27.81	< 30.00
			50	0	22.44	26.84	< 30.00
Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm)	EIRP (dBm)	Limit (dBm)
16QAM							
343500	1717.5	15	1	0	22.63	27.03	< 30.00
			1	1	23.66	28.06	< 30.00
			36	18	23.21	27.61	< 30.00
			75	0	22.86	27.26	< 30.00
349000	1745.0	15	1	0	22.81	27.21	< 30.00
			1	1	23.52	27.92	< 30.00
			36	18	23.33	27.73	< 30.00
			75	0	22.35	26.75	< 30.00
354500	1772.5	15	1	0	22.31	26.71	< 30.00
			1	1	23.66	28.06	< 30.00
			36	18	23.00	27.40	< 30.00
			75	0	22.17	26.57	< 30.00
344000	1720.0	20	1	0	22.83	27.23	< 30.00
			1	1	23.70	28.10	< 30.00
			50	25	23.86	28.26	< 30.00
			100	0	22.80	27.20	< 30.00
349000	1745.0	20	1	0	22.67	27.07	< 30.00
			1	1	23.61	28.01	< 30.00
			50	25	23.68	28.08	< 30.00
			100	0	22.70	27.10	< 30.00
354000	1770.0	20	1	0	22.53	26.93	< 30.00
			1	1	23.62	28.02	< 30.00
			50	25	23.59	27.99	< 30.00
			100	0	22.47	26.87	< 30.00
Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm)	EIRP (dBm)	Limit (dBm)
64QAM							
342500	1712.5	5	1	0	22.17	26.57	< 30.00
			1	1	22.26	26.66	< 30.00
			12	6	22.27	26.67	< 30.00
			25	0	22.29	26.69	< 30.00
349000	1745.0	5	1	0	22.22	26.62	< 30.00
			1	1	22.22	26.62	< 30.00
			12	6	22.31	26.71	< 30.00
			25	0	22.38	26.78	< 30.00
355500	1777.5	5	1	0	21.97	26.37	< 30.00
			1	1	21.98	26.38	< 30.00
			12	6	21.94	26.34	< 30.00
			25	0	21.96	26.36	< 30.00
343000	1715.0	10	1	0	22.18	26.58	< 30.00
			1	1	22.21	26.61	< 30.00
			25	12	22.28	26.68	< 30.00
			50	0	22.29	26.69	< 30.00
349000	1745.0	10	1	0	22.53	26.93	< 30.00
			1	1	22.55	26.95	< 30.00
			25	12	22.20	26.60	< 30.00
			50	0	22.21	26.61	< 30.00
355000	1775.0	10	1	0	22.05	26.45	< 30.00
			1	1	22.13	26.53	< 30.00
			25	12	21.77	26.17	< 30.00
			50	0	22.03	26.43	< 30.00
Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm)	EIRP (dBm)	Limit (dBm)
64QAM							
343500	1717.5	15	1	0	22.70	27.10	< 30.00
			1	1	22.68	27.08	< 30.00
			36	18	22.36	26.76	< 30.00
			75	0	22.34	26.74	< 30.00
349000	1745.0	15	1	0	22.13	26.53	< 30.00
			1	1	22.12	26.52	< 30.00
			36	18	22.21	26.61	< 30.00
			75	0	22.16	26.56	< 30.00
354500	1772.5	15	1	0	22.41	26.81	< 30.00
			1	1	22.41	26.81	< 30.00
			36	18	22.03	26.43	< 30.00
			75	0	22.05	26.45	< 30.00
344000	1720.0	20	1	0	22.38	26.78	< 30.00
			1	1	22.37	26.77	< 30.00
			50	25	22.32	26.72	< 30.00
			100	0	22.31	26.71	< 30.00
349000	1745.0	20	1	0	22.36	26.76	< 30.00
			1	1	22.35	26.75	< 30.00
			50	25	22.21	26.61	< 30.00
			100	0	22.09	26.49	< 30.00
354000	1770.0	20	1	0	22.31	26.71	< 30.00
			1	1	22.22	26.62	< 30.00
			50	25	22.05	26.45	< 30.00
			100	0	21.97	26.37	< 30.00
Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm)	EIRP (dBm)	Limit (dBm)
256QAM							
342500	1712.5	5	1	0	20.00	24.40	< 30.00
			1	1	19.99	24.39	< 30.00
			12	6	20.27	24.67	< 30.00
			25	0	20.29	24.69	< 30.00
349000	1745.0	5	1	0	19.84	24.24	< 30.00
			1	1	19.87	24.27	< 30.00
			12	6	19.97	24.37	< 30.00
			25	0	20.29	24.69	< 30.00
355500	1777.5	5	1	0	19.70	24.10	< 30.00
			1	1	20.57	24.97	< 30.00
			12	6	19.91	24.31	< 30.00
			25	0	19.94	24.34	< 30.00
343000	1715.0	10	1	0	19.98	24.38	< 30.00
			1	1	19.88	24.28	< 30.00
			25	12	20.25	24.65	< 30.00
			50	0	20.30	24.70	< 30.00
349000	1745.0	10	1	0	19.95	24.35	< 30.00
			1	1	19.75	24.15	< 30.00
			25	12	20.07	24.47	< 30.00
			50	0	20.13	24.53	< 30.00
355000	1775.0	10	1	0	19.63	24.03	< 30.00
			1	1	19.64	24.04	< 30.00
			25	12	19.91	24.31	< 30.00
			50	0	20.00	24.40	< 30.00
Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm)	EIRP (dBm)	Limit (dBm)
256QAM							
343500	1717.5	15	1	0	19.96	24.36	< 30.00
			1	1	19.90	24.30	< 30.00
			36	18	20.23	24.63	< 30.00
			75	0	20.35	24.75	< 30.00
349000	1745.0	15	1	0	20.43	24.83	< 30.00
			1	1	19.95	24.35	< 30.00
			36	18	20.11	24.51	< 30.00
			75	0	20.19	24.59	< 30.00
354500	1772.5	15	1	0	19.70	24.10	< 30.00
			1	1	19.69	24.09	< 30.00
			36	18	19.94	24.34	< 30.00
			75	0	19.99	24.39	< 30.00
344000	1720.0	20	1	0	20.15	24.55	< 30.00
			1	1	20.15	24.55	< 30.00
			50	25	20.24	24.64	< 30.00
			100	0	20.34	24.74	< 30.00
349000	1745.0	20	1	0	20.02	24.42	< 30.00
			1	1	20.11	24.51	< 30.00
			50	25	20.16	24.56	< 30.00
			100	0	20.07	24.47	< 30.00
354000	1770.0	20	1	0	19.87	24.27	< 30.00
			1	1	19.87	24.27	< 30.00
			50	25	20.02	24.42	< 30.00
			100	0	20.10	24.50	< 30.00
Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)							

4.5. Band Edge Measurement

4.5.1.Test Limit

27.53 (h)

For operations in the 1710 ~ 1780 MHz, the FCC limit is 43 + 10log10(P[$_{Watts}$]) dB below the transmitter power P(Watts) in a 1 MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

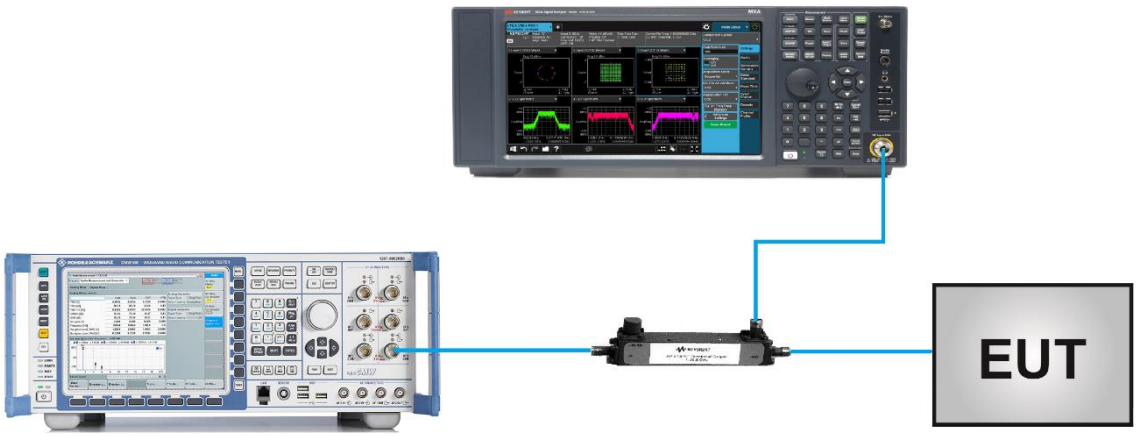
4.5.2.Test Procedure Used

ANSI C63.26-2015 - Section 5.7

4.5.3.Test Setting

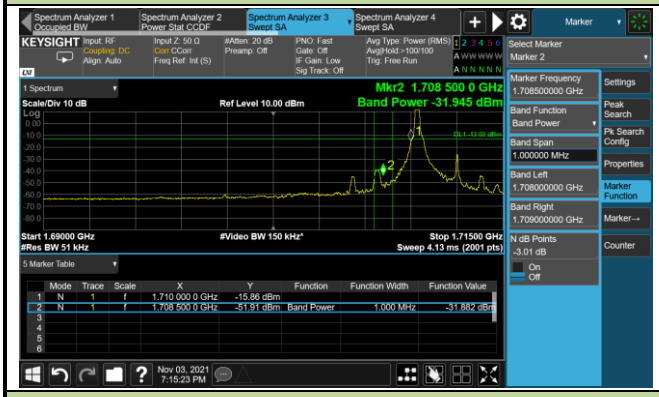
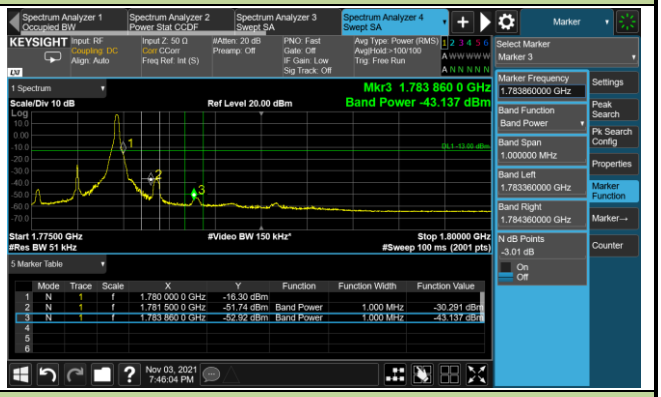
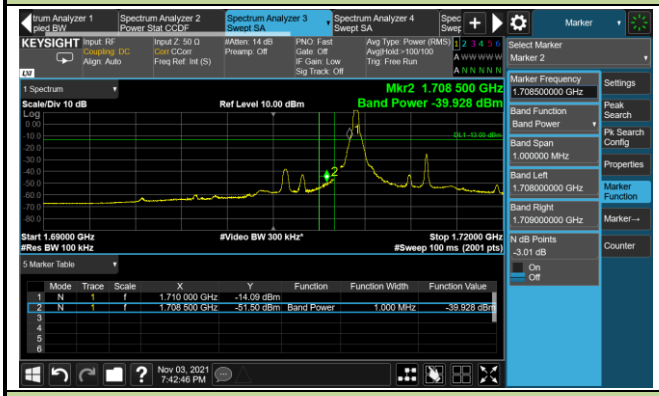
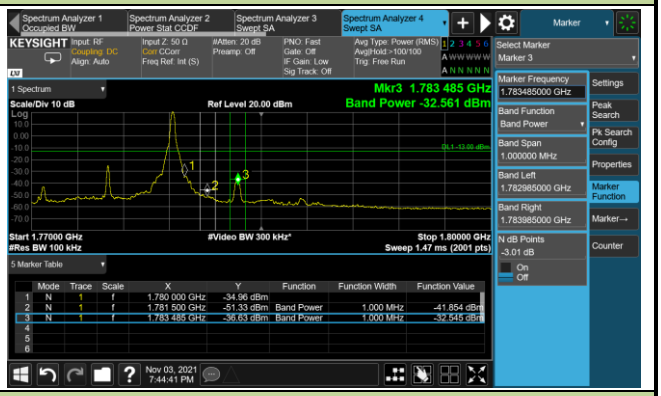
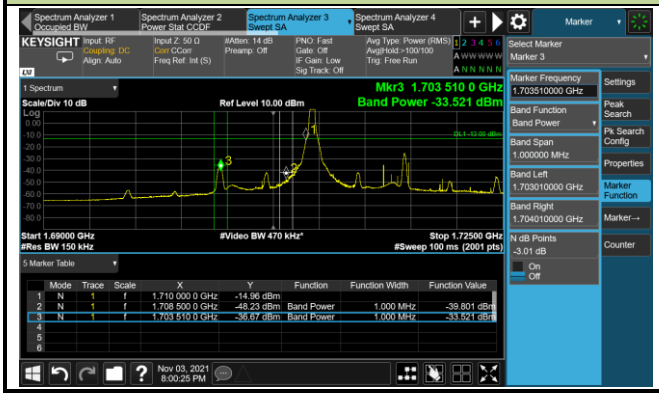
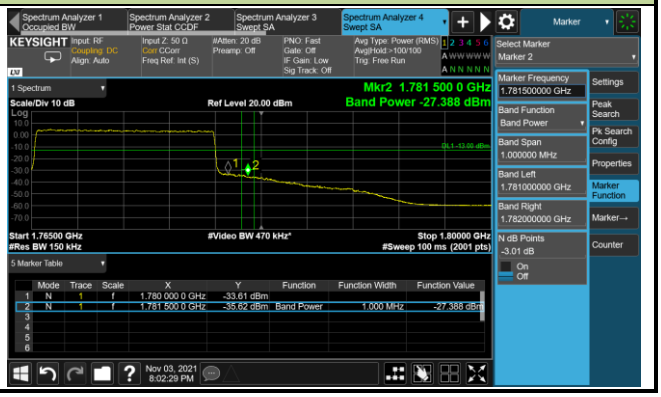
1. Set the analyzer frequency to low or high channel
2. RBW ≥ The nominal RBW shall be in the range of 1% of the anticipated OBW (in the 1MHz band immediately outside and adjacent to the band edge). For improvement of the accuracy in the measurement of the average power of a noise-like emission, a RBW narrower than the specified reference bandwidth can be used (generally limited to no less than 1% of the OBW), provided that a subsequent integration is performed over the full required measurement bandwidth. This integration should be performed using the spectrum analyzer’s band power functions.
3. VBW ≥ 3*RBW
4. Sweep time = auto
5. Detector = power averaging (rms)
6. Set sweep trigger to “free run.”
7. User gate triggered such that the analyzer only sweeps when the device is transmitting at full power
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.

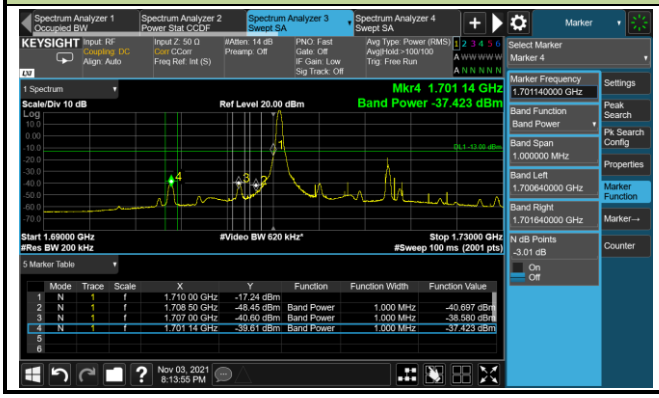
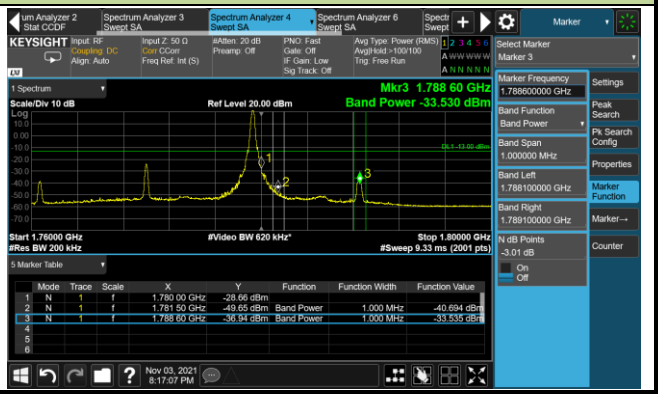
4.5.4.Test Setup

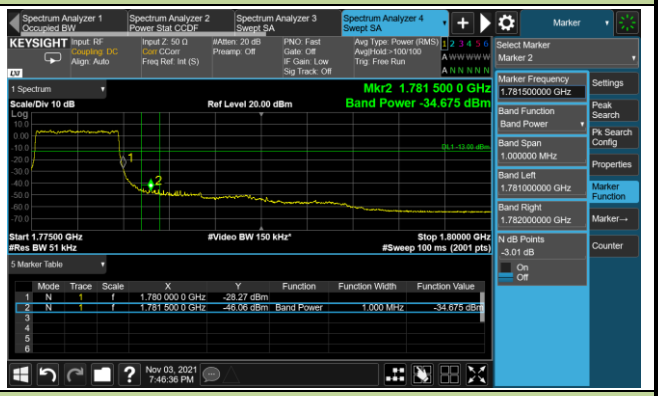
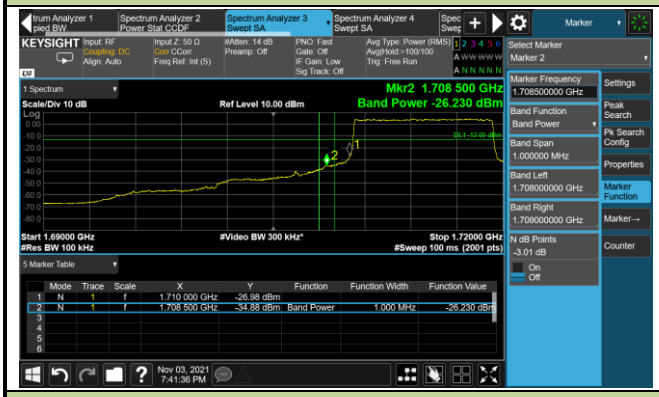
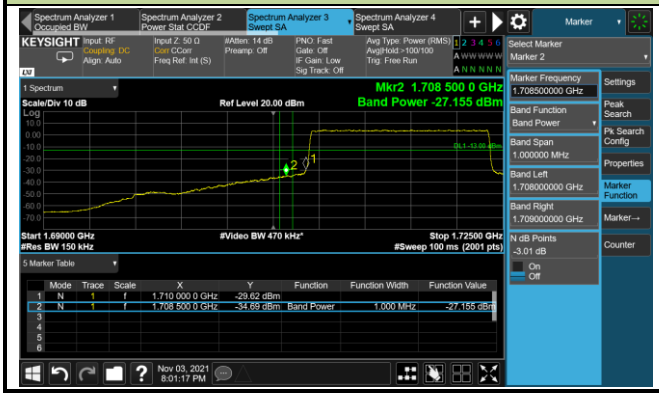
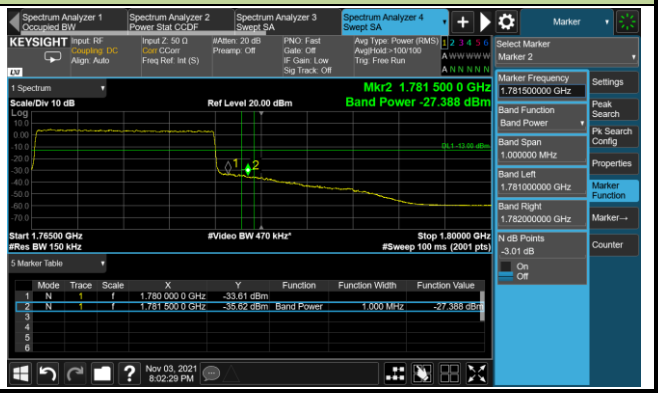


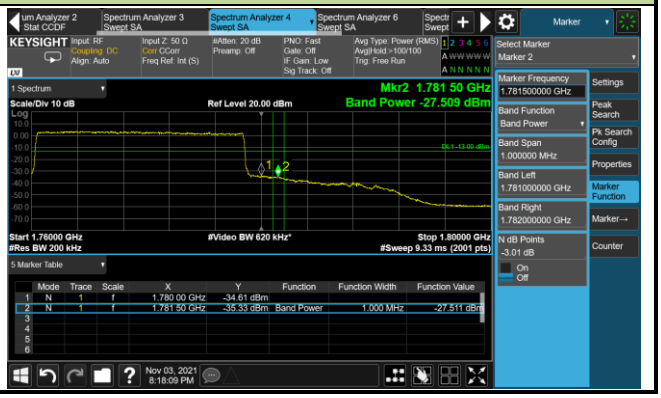
4.5.5.Test Result

Product	5G High Power mmWave Outdoor CPE	Test Site	WZ-SR6
Test Engineer	Cloud Guo	Test Date	2021/11/03
Test Band	DC_48A_n66A		

5MHz Channel Bandwidth - 1RB	
Lower Band Edge	Upper Band Edge
	
10MHz Channel Bandwidth - 1RB	
Lower Band Edge	Upper Band Edge
	
15MHz Channel Bandwidth - 1RB	
Lower Band Edge	Upper Band Edge
	

20MHz Channel Bandwidth - 1RB	
Lower Band Edge	Upper Band Edge
	

5MHz Channel Bandwidth - Full RB	
Lower Band Edge	Upper Band Edge
	
10MHz Channel Bandwidth - Full RB	
Lower Band Edge	Upper Band Edge
	
15MHz Channel Bandwidth - Full RB	
Lower Band Edge	Upper Band Edge
	

20MHz Channel Bandwidth - Full RB	
Lower Band Edge	Upper Band Edge
	

4.6. Peak to Average Ratio

4.6.1.Test Limit

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

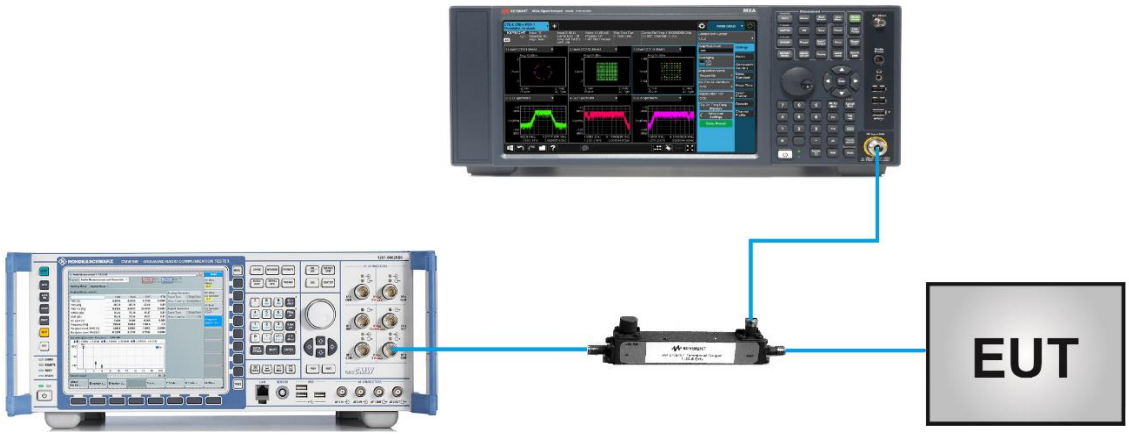
4.6.2.Test Procedure Used

ANSI C63.26-2015 - Section 5.2.3.4 (CCDF).

4.6.3.Test Setting

1. Set the resolution / measurement bandwidth ≥ signal's occupied bandwidth
2. Set the number of counts to a value that stabilizes the measured CCDF curve
3. Record the maximum PARR level associated with a probability of 0.1%

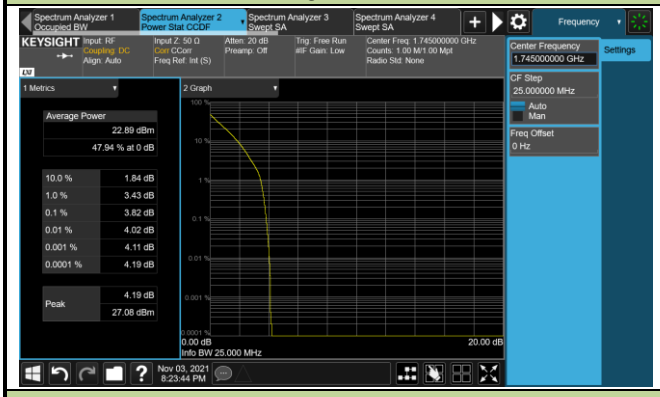
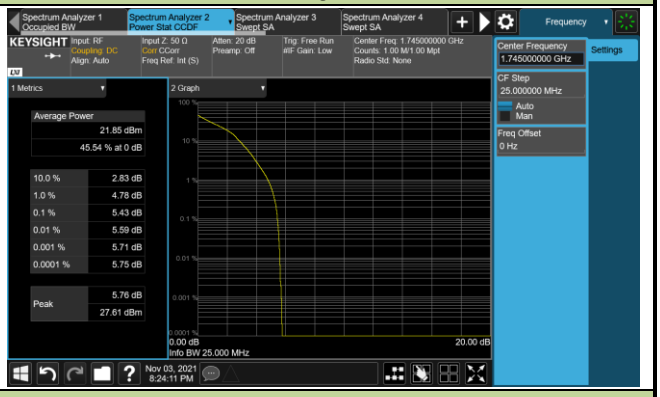
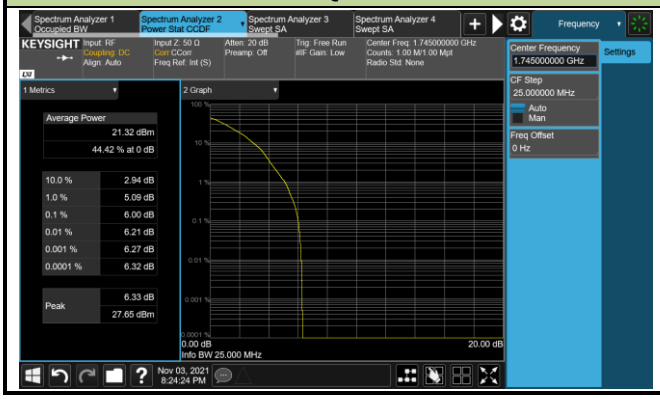
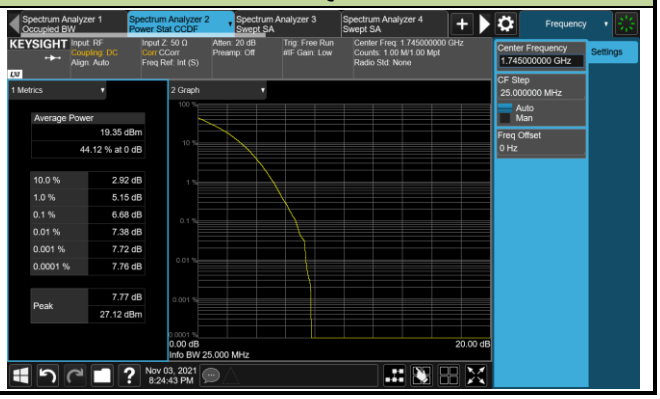
4.6.4.Test Setup



4.6.5.Test Result

Product	5G High Power mmWave Outdoor CPE	Test Site	WZ-SR6
Test Engineer	Cloud Guo	Test Date	2021/11/03
Test Band	DC_48A_n66A		

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	Peak to Average Ratio (dB)	Limit (dB)	Result
QPSK					
349000	1745.0	20	3.82	≤ 13.00	Pass
16QAM					
349000	1745.0	20	5.43	≤ 13.00	Pass
64QAM					
349000	1745.0	20	6.00	≤ 13.00	Pass
256QAM					
349000	1745.0	20	6.68	≤ 13.00	Pass

QPSK	16QAM
	
64QAM	256QAM
	

4.7. Conducted Spurious Emissions

4.7.1.Test Limit

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

For Band 41 the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 55 + 10 log(P) dB.

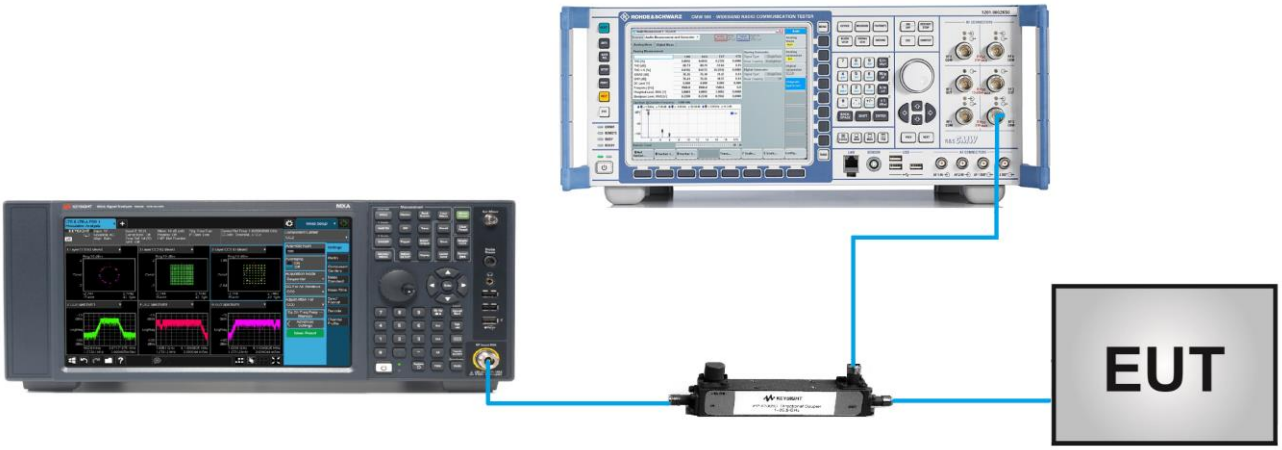
4.7.2.Test Procedure Used

ANSI C63.26-2015 - Section 5.7

4.7.3.Test Setting

1. Set the analyzer frequency to low, mid, high channel.
2. RBW = 1MHz
3. VBW ≥ 3*RBW
4. Sweep time = auto
5. Detector = power averaging (rms)
6. Set sweep trigger to “free run.”
7. User gate triggered such that the analyzer only sweeps when the device is transmitting at full power.
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.

4.7.4.Test Setup



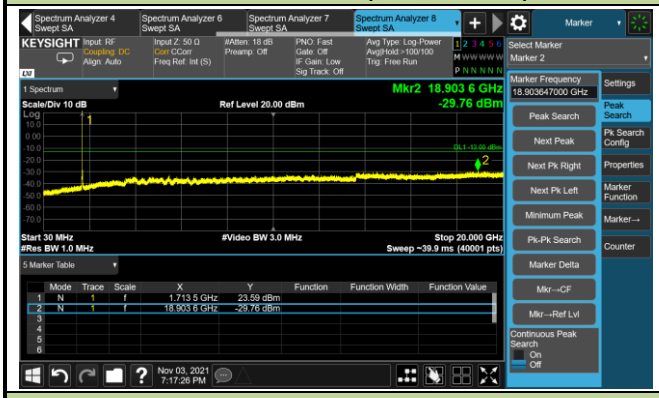
4.7.5.Test Result

Product	5G High Power mmWave Outdoor CPE	Test Site	WZ-SR6
Test Engineer	Cloud Guo	Test Date	2021/11/03
Test Band	DC_48A_n66A		

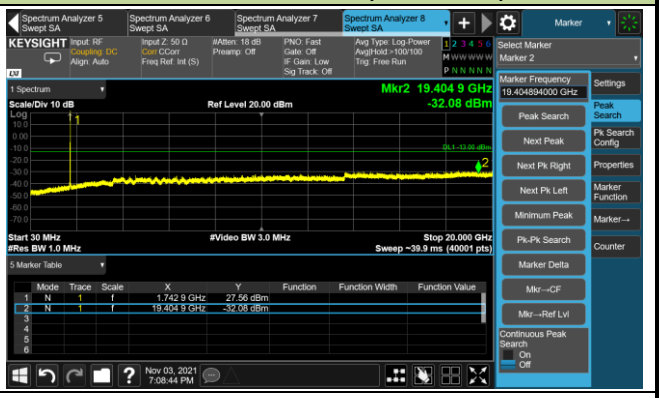
Channel	Frequency (MHz)	Channel Bandwidth (MHz)	Frequency Range (MHz)	Max Spurious Emissions (dBm)	Limit (dBm)	Result
342500	1712.5	5	30 ~ 20000	-29.76	≤ -13.00	Pass
349000	1745.0	5	30 ~ 20000	-32.08	≤ -13.00	Pass
355500	1777.5	5	30 ~ 20000	-29.61	≤ -13.00	Pass
343000	1715.0	10	30 ~ 20000	-32.70	≤ -13.00	Pass
349000	1745.0	10	30 ~ 20000	-32.65	≤ -13.00	Pass
355000	1775.0	10	30 ~ 20000	-30.99	≤ -13.00	Pass
343500	1717.5	15	30 ~ 20000	-31.28	≤ -13.00	Pass
349000	1745.0	15	30 ~ 20000	-31.57	≤ -13.00	Pass
354500	1772.5	15	30 ~ 20000	-30.67	≤ -13.00	Pass
344000	1720.0	20	30 ~ 20000	-29.49	≤ -13.00	Pass
349000	1745.0	20	30 ~ 20000	-32.78	≤ -13.00	Pass
354000	1770.0	20	30 ~ 20000	-29.21	≤ -13.00	Pass

5MHz Channel Bandwidth

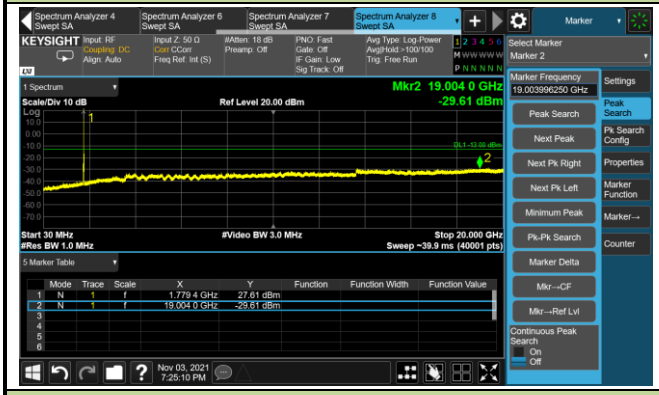
Channel 342500 (1712.5MHz)



Channel 349000 (1745MHz)

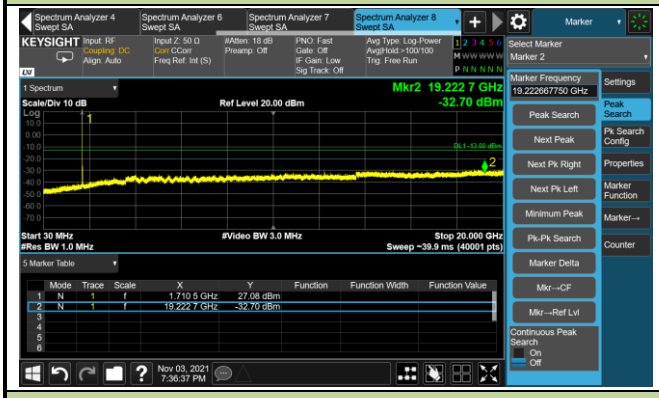


Channel 355500 (1777.5MHz)

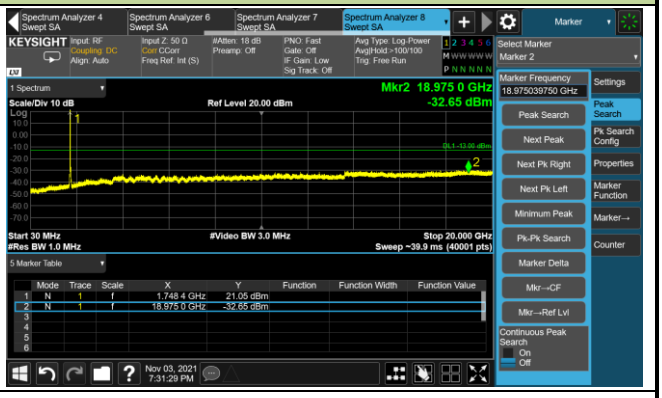


10MHz Channel Bandwidth

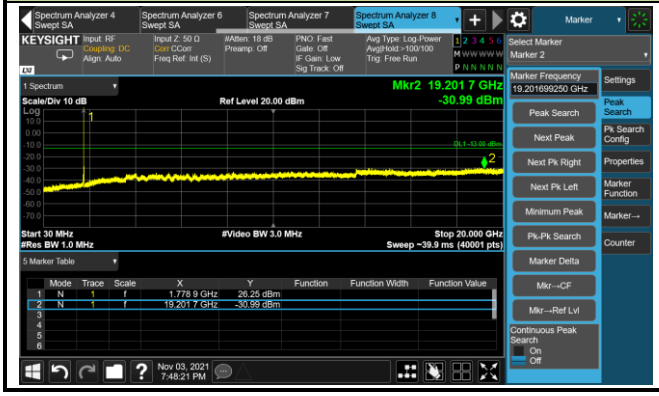
Channel 343000 (1715MHz)

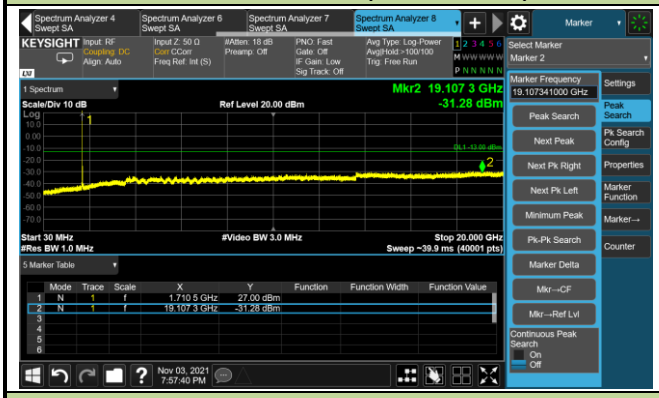
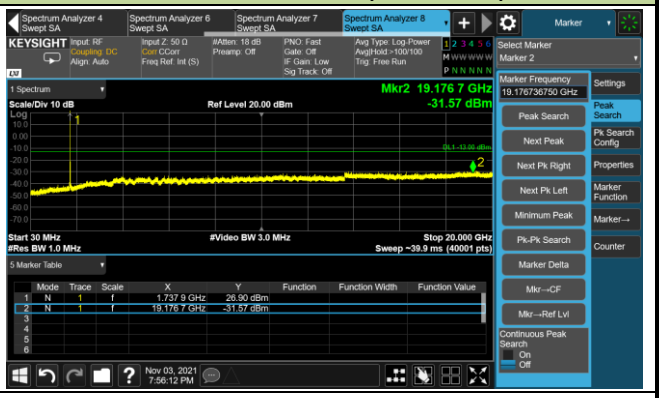
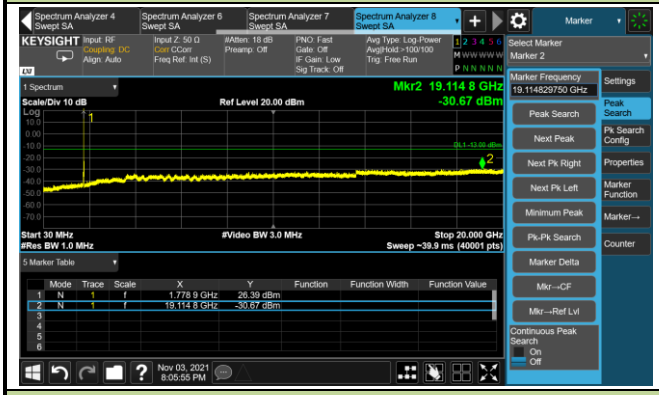


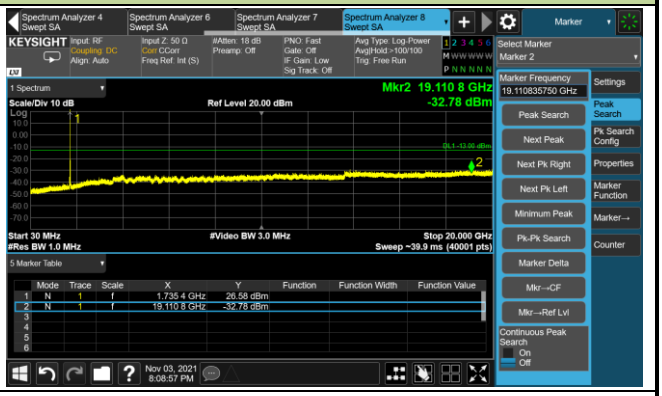
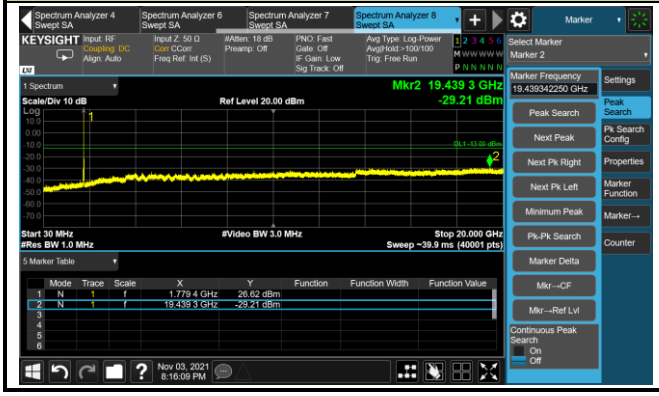
Channel 349000 (1745MHz)



Channel 355000 (1775MHz)



15MHz Channel Bandwidth	
Channel 343500 (1717.5MHz)	Channel 349000 (1745MHz)
	
Channel 354500 (1772.5Hz)	
	

20MHz Channel Bandwidth	
Channel 344000 (1720MHz)	Channel 349000 (1745MHz)
	
Channel 354000 (1770MHz)	
	

4.8. Radiated Spurious Emissions Measurements

4.8.1.Test Limit

The power of any emission outside of theauthorized operating frequency ranges must be attenuated below the transmitting power (P) by a factorof at least 43 + 10 log(P) dB. The emission limit equal to -13dBm.

E (dBμV/m) = EIRP (dBm) - 20 log D + 104.8; where D is the measurement distance in meters. The emission limit equal to 82.3dBμV/m.

4.8.2.Test Procedure Used

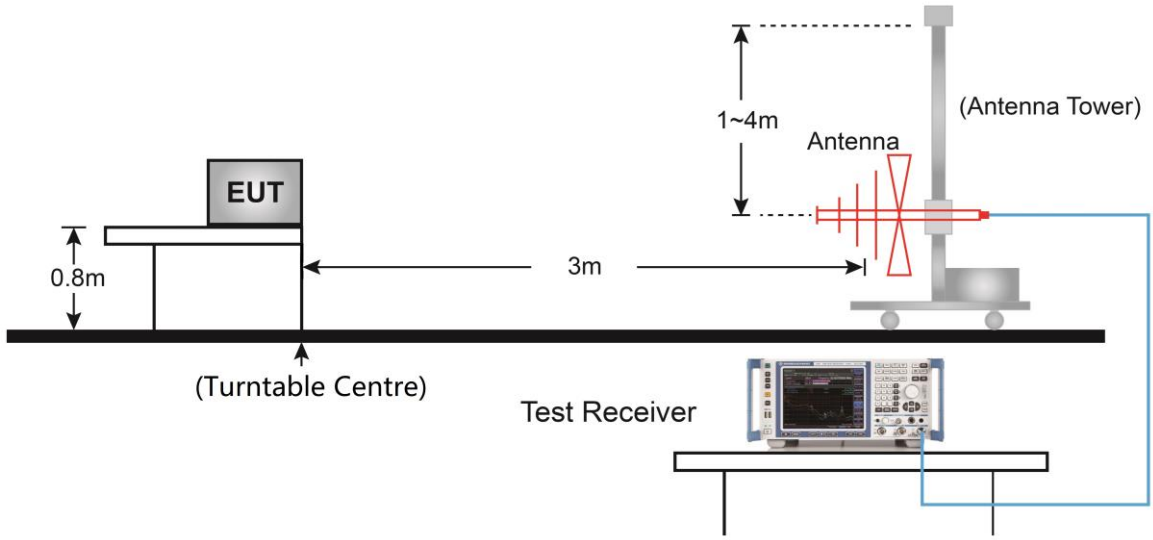
ANSI C63.26-2015 - Section 5.2.7 & 5.5

4.8.3.Test Setting

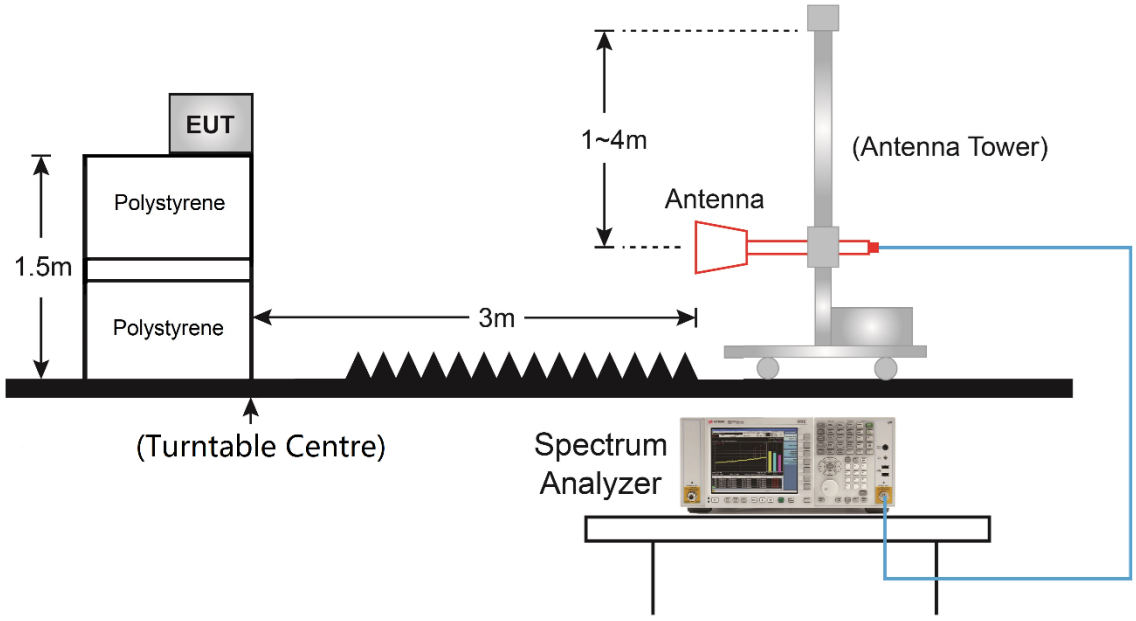
1. RBW = 1MHz
2. VBW ≥ 3*RBW
3. Sweep time ≥ 10 × (number of points in sweep) × (transmission symbol period)
4. Detector = Peak
5. Trace mode = max hold
6. The trace was allowed to stabilize

4.8.4.Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



4.8.5.Test Result

Product	5G High Power mmWave Outdoor CPE	Test Site	WZ-AC2
Test Engineer	Lucas Wang	Test Date	2021/10/31 ~ 2021/11/04
Test Band	DC_48A_n66A, 1RB, QPSK		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level(dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Low Channel							
129.91	9.93	15.69	25.62	82.30	-56.68	Peak	Horizontal
181.81	18.37	16.94	35.31	82.30	-46.99	Peak	Horizontal
157.07	16.88	15.51	32.39	82.30	-49.91	Peak	Vertical
181.81	18.01	16.94	34.95	82.30	-47.35	Peak	Vertical
7944.50	33.36	11.79	45.15	82.30	-37.15	Peak	Horizontal
10426.50	32.39	15.91	48.30	82.30	-34.00	Peak	Horizontal
7205.00	32.63	11.72	44.35	82.30	-37.95	Peak	Vertical
9372.50	32.48	14.36	46.84	82.30	-35.46	Peak	Vertical
Middle Channel							
161.44	19.52	15.80	35.32	82.30	-46.98	Peak	Horizontal
181.32	18.66	16.89	35.55	82.30	-46.75	Peak	Horizontal
156.59	17.04	15.48	32.52	82.30	-49.78	Peak	Vertical
181.32	17.80	16.89	34.69	82.30	-47.61	Peak	Vertical
6610.00	33.04	8.74	41.78	82.30	-40.52	Peak	Horizontal
8046.50	33.24	12.11	45.35	82.30	-36.95	Peak	Horizontal
6542.00	33.77	8.35	42.12	82.30	-40.18	Peak	Vertical
9304.50	32.39	14.39	46.78	82.30	-35.52	Peak	Vertical
High Channel							
130.40	7.94	15.64	23.58	82.30	-58.72	Peak	Horizontal
181.81	18.77	16.94	35.71	82.30	-46.59	Peak	Horizontal
156.59	17.40	15.48	32.88	82.30	-49.42	Peak	Vertical
181.81	17.38	16.94	34.32	82.30	-47.98	Peak	Vertical
6406.00	33.75	7.50	41.25	82.30	-41.05	Peak	Horizontal
8174.00	33.83	11.86	45.69	82.30	-36.61	Peak	Horizontal
7196.50	32.14	11.61	43.75	82.30	-38.55	Peak	Vertical
9466.00	33.11	14.04	47.15	82.30	-35.15	Peak	Vertical
Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB).							

5. CONCLUSION

The data collected relate only the item(s) tested and show that unit is compliance with FCC Rules.

The End

Appendix A - Test Setup Photograph

Refer to “2110RSU037-UT” file.

Appendix B - EUT Photograph

Refer to “2110RSU037-UE” file.