



RF Exposure Evaluation Declaration

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
Test Procedure(s): KDB 447498 D01v06
Test Date: October 25 ~ December 02, 2021

Reviewed By:

Sunny Sun

Approved By:

Robin Wu



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

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Revision History

Report No.	Version	Description	Issue Date	Note
2110RSU037-U8	Rev. 01	Initial Report	12-08-2021	Valid

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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

<input checked="" type="checkbox"/>	Test Site – MRT Suzhou Laboratory <hr/> 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 <hr/> Laboratory Accreditations A2LA: 3628.01 CNAS: L10551 FCC: CN1166 ISED: CN0001 VCCI: <input type="checkbox"/> R-20025 <input type="checkbox"/> G-20034 <input type="checkbox"/> C-20020 <input type="checkbox"/> T-20020 <input type="checkbox"/> R-20141 <input type="checkbox"/> G-20134 <input type="checkbox"/> C-20103 <input type="checkbox"/> T-20104
<input type="checkbox"/>	Test Site – MRT Shenzhen Laboratory <hr/> Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China <hr/> Laboratory Accreditations A2LA: 3628.02 CNAS: L10551 FCC: CN1284 ISED: CN0105
<input type="checkbox"/>	Test Site – MRT Taiwan Laboratory <hr/> Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) <hr/> Laboratory Accreditations TAF: L3261-190725 FCC: 291082, TW3261 ISED: TW3261

1.4. Product Information

Product Name	5G High Power mmWave Outdoor CPE
Model No.	CFW-2591
Brand Name	Casa Systems
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. Antenna Details

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
n261	27500 ~ 28350	Patch Array	22.0

2. RF Exposure Evaluation

2.1. Test Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	f/1500	6
1500-100,000	--	--	1	30

f= Frequency in MHz

Calculation Formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

r = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2.2. Test Result

Product	5G High Power mmWave Outdoor CPE
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band (MHz)	Maximum Conducted Power (dBm)	Maximum EIRP (dBm)	Power Density at 57cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
Bluetooth	2402 ~ 2480	9.80	12.80	0.0005	1.0000	0.0005
LTE Band 4	1710 ~ 1755	23.50	27.90	0.0151	1.0000	0.0151
LTE Band 5	824 ~ 849	22.00	21.95	0.0038	0.5493	0.0069
LTE Band 12	699 ~ 716	22.50	21.95	0.0038	0.4660	0.0082
LTE Band 17	704 ~ 716	22.50	21.95	0.0038	0.4693	0.0081
LTE Band 41	2496 ~ 2690	23.00	28.10	0.0158	1.0000	0.0158
LTE Band 48	3550 ~ 3700	18.00	22.30	0.0042	1.0000	0.0042
LTE Band 66	1710 ~ 1780	23.50	27.90	0.0151	1.0000	0.0151
n66	1710 ~ 1780	24.00	28.40	0.0169	1.0000	0.0169
n261	27500 ~ 28350	--	46.00	0.9751	1.0000	0.9751

WWAN Power Density / Limit	FR1 Band Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit)
0.0042	0.0169	0.0005	0.0216
WWAN Power Density / Limit	FR2 Band Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit)
0.0158	0.9751	0.0005	0.9914

Note:

- For collocation analysis, LTE Band 41 is chosen for summation due to the highest (power density / limit) among all WWAN wireless modes.
- Σ(Power Density / Limit): This is a summation of [(power density for each transmitter / antenna included in the simultaneous transmission) / (corresponding MPE limit)], for WWAN + FR1 or FR2 + Bluetooth.
- Considering the WWAN module collocation with the Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 3 collocated transmitters is compliant.

The End

Appendix - EUT Photograph

Refer to "2110RSU037-UE" file.