



FCC RADIO EXPOSURE TEST REPORT

FCC ID : UXX-S5A052A

Equipment : R1900-5GB

Brand Name : Cradlepoint

Model Name : S5A052A

Applicant : Cradlepoint, Inc.
1111 West Jefferson Street ,Boise ,Idaho,United States 83702

Manufacturer : Cradlepoint, Inc.
1111 West Jefferson Street ,Boise ,Idaho,United States 83702

Standard : 47 CFR Part 2.1091

The product was received on Nov. 05, 2020, and testing was started from Nov. 06, 2020 and completed on Jan. 23, 2021. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Sam Chen

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



Table of Contents

History of this test report.....	3
Summary of Test Result.....	4
1 General Description	5
1.1 EUT General Information	5
1.2 Antenna Information	7
1.3 Accessories	8
1.4 Table of WWAN Module Function	9
1.5 Table for Class III Change.....	9
1.6 Table for EUT Supports Functions	9
1.7 Testing Location	9
2 Maximum Permissible Exposure	10
2.1 Limit of Maximum Permissible Exposure	10
2.2 MPE Calculation Method.....	10
2.3 Calculated Result and Limit.....	11

Photographs of EUT v01



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

1. The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.
2. The presented declaration output power of WWAN for EUT in the report are provided by the manufacturer, and We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory does not guarantee its accuracy.

Reviewed by: Sam Chen

Report Producer: Vicky Huang



1 General Description

1.1 EUT General Information

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
2.4GHz WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5240 5260-5320 5500-5720 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Bluetooth	2400-2483.5	2402-2480	LE: GFSK

RF General Information			
Evaluation Mode	Band	Frequency (MHz)	Modulation Type
WCDMA	2	1852.4~1907.6	RMC 12.2kbps HSDPA HSUPA DC-HSDPA HSPA+(16QAM uplink is not supported)
	4	1712.4~1752.6	
	5	826.4~846.6	



LTE	2	1850.7~1909.3	QPSK, 16QAM, 64QAM, 256QAM
	4	1710.7~1754.3	
	5	824.7~848.3	
	7	2502.5~2567.5	
	12	699.7~715.3	
	13	779.5~784.5	
	14	790.5~795.5	
	17	706.5~713.5	
	25	1850.7~1914.3	
	26	814.7~848.3	
	30	2307.5~2312.5	
	38	2572.5~2617.5	
	41	2498.5~2687.5	
	42	3552.5~3597.5	
	48	3552.5~3697.5	
	66	1710.7~1779.3	
	71	665.5~695.5	
5G (Note1)	NR n2	1852.5~1907.5	DFT-s-OFDM (PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM) CP-OFDM(QPSK / 16QAM / 64QAM / 256QAM)
	NR n5	826.5~846.5	
	NR n41	2506.02~2679.99	
	NR n66	1712.5~1777.5	
	NR n71	665.5~695.5	

Note1:

5GEN-DC support Band:

DC_5A_n2A,DC_12A_n2A,DC_2A_n5A,DC_7A_n5A,DC_30A_n5A,DC_66A_n5A,DC_2A_n41A,DC_66A_n41A,
DC_5A_n66A,DC_12A_n66A,DC_13A_n66A,DC_2A_n71A,DC_7A_n71A,DC_66A_n71A

Note2: This device contains WWAN module FCC ID: N7NEM91



1.2 Antenna Information

Set	Port	Function	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	WLAN	PANORAMA	LG-IN2445	Combination	RP-SMA	Note 1
	2						
	-	GPS					
	-	WWAN					
	-						
	-						
	-						
2	1	WLAN	Cradlepoint	Test antenna 1	Monopole	RP-SMA	Note 1
	2						
3	1	Bluetooth	Master Wave	98242MRSX011	Dipole	RP-SMA	Note 1

Note 1:

Set	Port	Gain (dBi)					Cable loss (dB)		True Gain (dBi)				
		2.4 GHz	5GHz B1	5GHz B2	5GHz B3	5GHz B4	2.4 GHz	5GHz	2.4 GHz	5GHz B1	5GHz B2	5GHz B3	5GHz B4
1	1	2.1	2.4	2.35	2.25	2	0.7	1.1	1.4	1.3	1.25	1.15	0.9
	2												
2	1	5.5069	5.8125	5.7725	5.7133	5.9957	0.7	1.1	4.8069	4.7125	4.6725	4.6133	4.8957
	2												

Set	GPS Gain (dB)
1	26

Set	Port	Bluetooth		
		Gain (dBi)	Cable loss (dB)	True Gain (dBi)
3	1	2.16	0.7	1.46



Set	Brand	Frequency (GHz)	Gain (dBi)	Cable loss (dB)	True Gain (dBi)
1	2	1850-1920	0.25	0.42	-0.17
	4	1710-1785	0.05	0.42	-0.37
	5	807-862	0.80	0.28	0.52
	7	2496-2690	2.00	0.42	1.58
	12	699-714	0.15	0.25	-0.10
	13	777-787	0.85	0.25	0.60
	17	699-714	0.15	0.25	-0.10
	25	1850-1920	0.25	0.42	-0.17
	26	807-862	0.80	0.28	0.52
	30	2300-2400	1.50	0.42	1.08
	38	2496-2690	2.00	0.42	1.58
	41	2496-2690	2	0.42	1.58
	42	3300-3800	2.9	0.81	2.09
	48	3300-3800	2.9	0.81	2.09
	66	1710-1785	0.05	0.42	-0.37
	71	617-698	0.05	0.25	-0.20

Note: The above information was declared by manufacturer.

For 2.4GHz function:

For IEEE 802.11b/g/n/VHT/ax (2TX/2RX):

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

For 5GHz function:

For IEEE 802.11a/n/ac/ax (2TX/2RX):

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

For Bluetooth Function:

For Bluetooth mode (1TX/1RX)

Only Port 1 can be use as transmit and receive antenna.

1.3 Accessories

DC power cable 4 pin*1, non-shielded, 3m



1.4 Table of WWAN Module Function

Brand Name	Model Name	FCC ID	IC	Function
Sierra	EM9190	N7NEM91	2417C-EM91	3G Band:2,4,5 4G Band:2,4,5,7,12,13,14,17,25,26,30,38,41,42,48,66,71 5G Band:n2,n5,n41,n66,n71 5G EN-DC Band: DC_5A_n2A,DC_12A_n2A,DC_2A_n5A,DC_7A_n5A,DC_30A_n5A,DC_66A_n5A,DC_2A_n41A,DC_66A_n41A,DC_5A_n66A,DC_12A_n66A,DC_13A_n66A,DC_2A_n71A,DC_7A_n71A,DC_66A_n71A

1.5 Table for Class III Change

This product is an extension of original one reported under Sporton project number: FA0N0310

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Adding 5GHz Band 2 and Band 3 (5250~5350 MHz, 5470~5725 MHz) for this device.	MPE test.
2. Adding Slave with Radar function for this device.	Do not effect the test results.

Note: Maximum Permissible Exposure of 2.4GHz Band and 5GHz Band 1, 4 are based on original test report.

1.6 Table for EUT Supports Functions

Function	Support Type
AP Router	Master
Slave	Slave with radar
Slave	Slave without radar

1.7 Testing Location

Testing Location		
☐	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL : 886-3-327-3456 FAX : 886-3-327-0973
☒	JHUBEI	ADD : No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302, Taiwan (R.O.C.) TEL : 886-3-656-9065 FAX : 886-3-656-9085

Test site Designation No. TW3787 with FCC.

Conformity Assessment Body Identifier (CABID) TW3787 with ISCED.

2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	*(100)	<6
3.0-30	1842/f	4.89/f	*(900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1500	-	-	f/300	<6
1500-100,000	-	-	5	<6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f ²)	<30
30-300	27.5	0.073	0.2	<30
300-1500	-	-	f/1500	<30
1500-100,000	-	-	1.0	<30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Method

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$



2.3 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

For WLAN Antenna Set 1:

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;G1D	1.40	26.75	28.15	0.50	28.65	0.73282	20	0.14579	1.00000
5.2G;D1D	4.31	22.06	26.37	0.50	26.87	0.48641	20	0.09677	1.00000
5.3G;D1D	4.26	23.49	27.75	0.50	28.25	0.66834	20	0.13296	1.00000
5.6G;D1D	4.16	23.88	28.04	0.50	28.54	0.71450	20	0.14214	1.00000
5.8G;D1D	3.91	22.49	26.40	0.50	26.90	0.48978	20	0.09744	1.00000

For WLAN Antenna Set 2:

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;G1D	4.8069	25.81	30.62	0.50	31.12	1.29327	20	0.25728	1.00000
5.2G;D1D	7.7228	22.06	29.78	0.50	30.28	1.06728	20	0.21232	1.00000
5.3G;D1D	7.6828	22.16	29.84	0.15	29.99	0.99834	20	0.19861	1.00000
5.6G;D1D	7.6236	22.33	29.95	0.04	29.99	0.99853	20	0.19865	1.00000
5.8G;D1D	7.9060	22.49	30.40	0.50	30.90	1.22914	20	0.24452	1.00000

For Bluetooth and WWAN:

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;BT-LE	1.46	17.75	19.21	0.50	19.71	0.09354	20	0.01861	1.00000
WCDMA B5	0.52	24.50	25.02	0.50	25.52	0.35645	20	0.07091	0.55093
LTE B41	1.58	26.00	27.58	0.50	28.08	0.64269	20	0.12786	1.00000
5G NR n71	-0.20	24.00	23.80	0.50	24.30	0.26915	20	0.05355	0.44367



Simultaneous Transmission Analysis Mode:

Mode 1: WLAN 2.4GHz+WLAN 5GHz+Bluetooth+WWAN(WCDMA)

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
2.4G;G1D	4.8069	25.81	30.62	0.50	31.12	1.29327	20	0.25728	1.00000	0.25728
5.8G;D1D	7.9060	22.49	30.40	0.50	30.90	1.22914	20	0.24452	1.00000	0.24452
2.4G;BT-LE	1.46	17.75	19.21	0.50	19.71	0.09354	20	0.01861	1.00000	0.01861
WCDMA B5	0.52	24.50	25.02	0.50	25.52	0.35645	20	0.07091	0.55093	0.12871
									Sum Ratio	0.64912
									Ratio Limit	1

Mode 2: WLAN 2.4GHz+WLAN 5GHz+Bluetooth+WWAN(LTE)

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
2.4G;G1D	4.8069	25.81	30.62	0.50	31.12	1.29327	20	0.25728	1.00000	0.25728
5.8G;D1D	7.9060	22.49	30.40	0.50	30.90	1.22914	20	0.24452	1.00000	0.24452
2.4G;BT-LE	1.46	17.75	19.21	0.50	19.71	0.09354	20	0.01861	1.00000	0.01861
LTE B41	1.58	26.00	27.58	0.50	28.08	0.64269	20	0.12786	1.00000	0.12786
									Sum Ratio	0.64827
									Ratio Limit	1

Mode 3: WLAN 2.4GHz+WLAN 5GHz+Bluetooth+WWAN(5G)

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
2.4G;G1D	4.8069	25.81	30.62	0.50	31.12	1.29327	20	0.25728	1.00000	0.25728
5.8G;D1D	7.9060	22.49	30.40	0.50	30.90	1.22914	20	0.24452	1.00000	0.24452
2.4G;BT-LE	1.46	17.75	19.21	0.50	19.71	0.09354	20	0.01861	1.00000	0.01861
5G NR n71	-0.20	24.00	23.80	0.50	24.30	0.26915	20	0.05355	0.44367	0.12070
									Sum Ratio	0.64111
									Ratio Limit	1

Note: The above antenna gain was declared by manufacturer.

—THE END—