

# RF Exposure Evaluation Declaration

Product Name : Mesh Wi-Fi Router  
Trade Name : CastleNet  
Model No. : EBM552U, EBM552  
FCC ID : RK9-EBM552

Applicant : CastleNet Technology Inc.

Address : No. 14, Ln. 141, Sec. 3, Beishen Rd. Shenkeng Dist., New  
Taipei City, 22244 Taiwan

Date of Receipt : Dec. 29, 2020

Date of Declaration : Mar. 10, 2021

Report No. : 20C1060R-E3032410101

Report Version : V1.0



The declaration results relate only to the samples calculated.

The declaration shall not be reproduced except in full without the written approval of DEKRA Testing and Certification Co., Ltd..

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Applicant : CastleNet Technology Inc.

Address : No. 14, Ln. 141, Sec. 3, Beishen Rd. Shenkeng Dist., New Taipei City, 22244 Taiwan

Manufacturer : CastleNet Technology Inc.

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Model No. : EBM552U, EBM552

FCC ID : RK9-EBM552

EUT Voltage : AC 100~240V, 50/60Hz

Testing Voltage : AC 120V/60Hz

Trade Name : CastleNet

Applicable Standard : FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices.

Test Lab : Hsin Chu Laboratory

Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C.  
TEL: +886-3-582-8001 / FAX: +886-3-582-8958

Test Result : Complied

Tested By

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( Clemens Fang / Senior Engineer )

Approved By

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( Louis Hsu / Deputy Manager )

### Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	Mar. 10, 2021

## 1.1. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required	Test Site
Temperature (°C)	Peak Output Power	15 - 35	1
Humidity (%RH)		25 - 75	

Note: Test site information refers to Laboratory Information.

**USA** : FCC Registration Number: TW3024  
**Canada** : IC Registration Number: 22397-1 / 22397-2 / 22397-3

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: <http://www.dekra.com.tw>

If you have any comments, please don't hesitate to contact us. Our test sites as below:

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	1. No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. 2. No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
Phone number	1. +886-3-582-8001 2. +886-3-582-8001
Fax number	1. +886-3-582-8958 2. +886-3-582-8958
Email address	<a href="mailto:info.tw@dekra.com">info.tw@dekra.com</a>
Website	<a href="http://www.dekra.com.tw">http://www.dekra.com.tw</a>

## 1.2. List of Test Equipment

Peak Output Power / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	2020/11/30	2021/11/29
Pulse Power Sensor	Anritsu	MA2411B	1531043	2020/11/30	2021/11/29
Pulse Power Sensor	Anritsu	MA2411B	1531044	2020/11/30	2021/11/29
Power Meter	Keysight	8990B	MY51000248	2020/05/20	2021/05/19
Power Sensor	Keysight	N1923A	MY57240005	2020/05/20	2021/05/19

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

## 1.3. Uncertainty

Test item	Uncertainty
Peak Output Power	$\pm 2.26$ dB

Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

## 2. RF Exposure Evaluation

### 2.1. 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 <sup>2</sup> )	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

#### RF Field Strength Limits for Controlled Use Devices (Controlled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m <sup>2</sup> )	Reference Period (minutes)
0.003-1023	170	180	-	Instantaneous*
0.1-10	-	1.6/ <i>f</i>	-	6**
1.29-10	193/ <i>f</i> 0.5	-	-	6**
10-20	61.4	0.163	10	6
20-48	129.8/ <i>f</i> 0.25	0.3444/ <i>f</i> 0.25	44.72/ <i>f</i> 0.5	6
48-100	49.33	0.1309	6.455	6
100-6000	15.60 <i>f</i> 0.25	0.04138 <i>f</i> 0.25	0.6455 <i>f</i> 0.5	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	616000/ <i>f</i> 1.2
150000-300000	0.354 <i>f</i> 0.5	9.40 x 10 <sup>-4</sup> <i>f</i> 0.5	3.33 x 10 <sup>-4</sup> <i>f</i>	616000/ <i>f</i> 1.2

**Note:** *f* is frequency in MHz. \*Based on nerve stimulation (NS). \*\* Based on specific absorption rate (SAR).

Friis Formula

Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

$P_d$  = power density in  $mW/cm^2$

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi$  = 3.1416

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

$P_d$  is the limit of MPE,  $1 mW/cm^2$ . 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 Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

### 2.3. Test Result of RF Exposure Evaluation

Product	Mesh Wi-Fi Router		
Test Mode	Transmit Mode		
Test Condition	RF Exposure Evaluation		
Date of Test	2021/01/25~2021/02/08	Test Site	SR12-H
Temperature (°C)	20.0	Humidity (%RH)	66.0

**Antenna Gain:** The maximum antenna gain is 4.52dBi.

#### Output Power into Antenna & RF Exposure Evaluation Distance:

WLAN Function 2.4GHz Band					
Mode	Frequency (MHz)	Maximum Conducted Output Power		Maximum Power Density at R = 20 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
		dBm	mW		
802.11b (Non-BF Mode)	2412	23.964	249.103	0.050	1
	2437	25.035	318.778	0.063	1
	2462	24.290	268.522	0.053	1
802.11g (Non-BF Mode)	2412	18.720	74.482	0.015	1
	2437	25.064	320.956	0.064	1
	2462	19.048	80.317	0.016	1
802.11ax (20MHz) (Non-BF Mode)	2412	19.096	81.207	0.016	1
	2437	24.922	310.596	0.062	1
	2462	19.591	91.013	0.018	1
802.11ax (40MHz) (Non-BF Mode)	2422	18.291	67.466	0.013	1
	2437	19.960	99.090	0.020	1
	2452	18.996	79.366	0.016	1
802.11ax (20MHz) (BF Mode)	2412	18.675	73.713	0.015	1
	2437	25.365	343.978	0.068	1
	2462	19.100	81.292	0.016	1
802.11ax (40MHz) (BF Mode)	2422	18.300	67.614	0.013	1
	2437	20.626	115.492	0.023	1
	2452	19.631	91.848	0.018	1

Note:

1. The results are evaluated using the maximum power from test report no. 20C1060R-E3032110113.
2. The antenna information is from the customer declaration.



Product	Mesh Wi-Fi Router		
Test Mode	Transmit Mode		
Test Condition	RF Exposure Evaluation		
Date of Test	2021/01/25	Test Site	SR12-H
Temperature(°C)	20.0	Humidity (%RH)	66.0

**Antenna Gain:** The maximum antenna gain is 5.43dBi.

**Output Power into Antenna & RF Exposure Evaluation Distance:**

WLAN Function 5GHz Band					
Mode	Frequency (MHz)	Conducted Output Power		Power Density at R = 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
		dBm	mW		
802.11a (Non-BF Mode)	5180	23.791	239.389	0.048	1
	5220	25.385	345.576	0.069	1
	5240	25.391	346.008	0.069	1
	5260	19.566	90.498	0.018	1
	5300	19.617	91.557	0.018	1
	5320	19.540	89.949	0.018	1
	5500	19.611	91.437	0.018	1
	5580	19.533	89.796	0.018	1
	5700	19.720	93.765	0.019	1
	5745	28.290	674.549	0.134	1
	5785	27.101	512.984	0.102	1
	5825	26.691	466.752	0.093	1
802.11ax (20MHz) (Non-BF Mode)	5180	23.176	207.776	0.041	1
	5220	26.115	408.825	0.081	1
	5240	26.166	413.585	0.082	1
	5260	20.026	100.609	0.020	1
	5300	20.090	102.086	0.020	1
	5320	19.893	97.575	0.019	1
	5500	20.092	102.147	0.020	1
	5580	20.123	102.862	0.020	1
	5700	20.306	107.295	0.021	1
	5745	28.535	713.728	0.142	1
	5785	27.681	586.217	0.117	1
	5825	27.161	520.144	0.103	1

WLAN Function 5GHz Band					
Mode	Frequency (MHz)	Conducted Output Power		Power Density at R = 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
		dBm	mW		
802.11ax (40MHz) (Non-BF Mode)	5190	20.711	117.780	0.023	1
	5230	24.811	302.764	0.060	1
	5270	22.861	193.235	0.038	1
	5310	20.318	107.602	0.021	1
	5510	19.840	96.382	0.019	1
	5550	23.237	210.696	0.042	1
	5670	21.038	127.012	0.025	1
	5755	26.111	408.387	0.081	1
	5795	24.798	301.837	0.060	1
802.11ax (80MHz) (Non-BF Mode)	5210	19.278	84.685	0.017	1
	5290	19.249	84.126	0.017	1
	5530	20.660	116.416	0.023	1
	5610	22.733	187.624	0.037	1
	5775	22.464	176.378	0.035	1

WLAN Function 5GHz Band					
Mode	Frequency (MHz)	Conducted Output Power		Power Density at R = 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
		dBm	mW		
802.11ax (20MHz) (BF Mode)	5180	23.276	212.624	0.042	1
	5220	26.347	431.203	0.086	1
	5240	26.290	425.638	0.085	1
	5260	20.506	112.354	0.022	1
	5300	20.533	113.052	0.022	1
	5320	20.392	109.452	0.022	1
	5500	20.132	103.079	0.021	1
	5580	20.238	105.626	0.021	1
	5700	20.305	107.283	0.021	1
	5745	27.705	589.566	0.117	1
	5785	27.586	573.560	0.114	1
	5825	26.418	438.335	0.087	1
802.11ax (40MHz) (BF Mode)	5190	20.946	124.333	0.025	1
	5230	25.032	318.584	0.063	1
	5270	21.760	149.985	0.030	1
	5310	20.140	103.284	0.021	1
	5510	20.126	102.935	0.020	1
	5550	21.836	152.604	0.030	1
	5670	21.554	143.022	0.028	1
	5755	26.516	448.310	0.089	1
	5795	24.666	292.842	0.058	1
802.11ax (80MHz) (BF Mode)	5210	20.273	106.485	0.021	1
	5290	19.431	87.725	0.017	1
	5530	20.618	115.294	0.023	1
	5610	21.710	148.268	0.029	1
	5775	21.705	148.096	0.029	1

## Note:

1. The results are evaluated using the maximum power from test report no. 20C1060R-E3032110125.
2. The antenna information is from the customer declaration.