



RADIO EXPOSURE TEST REPORT

FCC ID : WR932181716523
Equipment : Video doorbell
Brand Name : ecobee
Model Name : EB-CAMSDB-01
Applicant : Ecobee Incorporated
25, Dockside Drive Suite 700, Toronto, Canada,
M5A0B5
Standard : 47 CFR Part 2.1091

The product was received on Jul. 10, 2023, and testing was started from Jul. 21, 2023 and completed on Aug. 07, 2023. We, Sporton International Inc. Hsinchu 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 report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



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Photographs of EUT v01



Summary of Test Result

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

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacture who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Sam Chen

Report Producer: Sophia Shiung



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)
5GHz WLAN	5150-5250 5725-5850	5180-5240 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Bluetooth	2400-2483.5	2402-2480	BR / EDR: FHSS (GFSK / $\pi/4$ -DQPSK / 8DPSK) LE: GFSK
24GHz	24000-24250	24050-24240	FMCW
Thread	2400-2483.5	2401.5-2478.75	O-QPSK
Sub-G (Hopping)	902-928	920.5-929.7	BPSK
Sub-G (Hybrid)	902-928	920, 927.35	BPSK



1.2 Antenna Information

Ant.	Port			Brand	Model Name	Antenna Type	Connector	Gain (dBi)
	WLAN / Bluetooth	Thread	Sub-G					
1	1	-	-	PSA	RFMTA160900NNLB001	PIFA	N/A	Note 1
2	-	1	-	PSA	RFPCA361205IMAB401	PIFA	I-PEX	
3	-	-	1	PSA	RFMTA341100NNUB001	PIFA	N/A	

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
4	Socionext	SC1233AR3	Chip	N/A	2

Note 1:

Ant.	Antenna Gain (dBi)				
	WLAN		Bluetooth	Thread	Sub-G
	2.4GHz	5GHz			
1	2.81	4.99	2.81	-	-
2	-	-	-	3.00	-
3	-	-	-	-	1.66

Note 2: The above information was declared by manufacturer.

Note 3: For 2.4GHz function:

For IEEE 802.11 b/g/n (TX/1RX):

Only Port 1 can be used as transmitting/receiving antenna.

For 5GHz function:

For IEEE 802.11a/n/ac (1TX/1RX):

Only Port 1 can be used as transmitting/receiving antenna.

For bluetooth function (1TX/1RX):

Only Port 1 can be used as transmitting/receiving antenna.

For Thread function (1TX/1RX):

Only Port 1 can be used as transmitting/receiving antenna.

For Sub-G function (1TX/1RX):

Only Port 1 can be used as transmitting/receiving antenna.

For 24GHz function (1TX/2RX):

Only Ant. 4 can be used as transmitting/receiving antenna.



1.3 Accessories

Accessories
CHIME adapter*1: Non-shielded, 0.2m
Backplate*1

1.4 Applicable Standards

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

- ♦ 47 CFR Part 2.1091
- ♦ KDB 447498 D04 Interim General RF Exposure Guidance v01

The following reference test guidance is not within the scope of accreditation of TAF.

- ♦ 47 CFR Part 1.1307
- ♦ 47 CFR Part 1.1310

1.5 Testing Location

Testing Location Information
Test Lab. : Sporton International Inc. Hsinchu Laboratory
Hsinchu ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)
(TAF: 3787) TEL: 886-3-656-9065 FAX: 886-3-656-9085
Test site Designation No. TW3787 with FCC.
Conformity Assessment Body Identifier (CABID) TW3787 with ISED.



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:

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

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 MPE Exemption

Option (A): 1.1307(b)(3)(i)(A): Available maximum time-averaged power is < 1 mW

Option (B): 1.1307(b)(3)(i)(B): Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <= Pth.

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

Option (C): 1.1307(b)(3)(i)(C): ERP is below a threshold calculated based on the distance R between the person and the antenna / radiating structure, where $R > \lambda / 2 \pi$.

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R ² .
1.34-30	3,450 R ² /f ² .
30-300	3.83 R ² .
300-1,500	0.0128 R ² f.
1,500-100,000	19.2R ² .

Note: R is in meters, f is in MHz.



2.4 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option	TL EIRP (dBm)
2.4G;G1D	2.81	24.18	26.99	0.50	27.49	20	0.11162	1.00000	B	37.006
5.2G;D1D	4.99	21.49	26.48	0.50	26.98	20	0.09925	1.00000	B	37.006
5.8G;D1D	4.99	19.51	24.50	0.50	25.00	20	0.06291	1.00000	B	37.006
2.4G;BT-BR	2.81	9.86	12.67	0.50	13.17	20	0.00413	1.00000	B	37.006
2.4G;BT-LE	2.81	6.04	8.85	0.50	9.35	20	0.00171	1.00000	B	37.006
24G	2.00	-	-6.89	0.50	-6.39	20	0.00005	1.00000	C	-
2.4G;G1D (Thread)	3.00	13.88	16.88	0.50	17.38	20	0.01088	1.00000	B	37.006
0.9G (Sub-G: Hopping)	1.66	25.02	26.68	0.50	27.18	20	0.10393	0.61333	B	35.588
0.9G (Sub-G: Hybrid)	1.66	14.19	15.85	0.50	16.35	20	0.00858	0.61333	B	35.588

Note: For 24GHz, EIRP=(Field Strength -104.74)×99% Occupied Bandwidth

MPE Exemption Option B						
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	MPE Exemption
2437	0.2	27.49	25.34	0.342	3.060	Complies
2401.5		17.38	15.23	0.033	3.060	Complies
5200		26.98	24.83	0.304	3.060	Complies
920 (Hybrid)		16.35	14.20	0.026	1.877	Complies
920 (Hopping)		27.18	25.03	0.318	1.877	Complies
2440		13.17	11.02	0.013	3.060	Complies

MPE Exemption Option C							
Frequency (MHz)	$\lambda/2\pi$ (m)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	MPE Exemption
24145	0.0020	0.2	-6.39	-8.54	0.000	0.768	Complies



Simultaneous Transmission Analysis Mode

Test Mode 1: WLAN 2.4GHz + Thread + 24GHz radar

Simultaneous Transmissions								
Option	Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
B	2437	0.2	27.49	25.34	0.342	3.060	0.12284	<= 1
B	2401.5		17.38	15.23	0.033	3.060		
C	24145		-6.39	-8.54	0.000	0.768		

Test Mode 2: WLAN 2.4GHz + Sub-G (Hopping mode) + 24GHz radar

Simultaneous Transmissions								
Option	Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
B	2437	0.2	27.49	25.34	0.342	3.060	0.28158	<= 1
B	920		27.18	25.03	0.318	1.877		
C	24145		-6.39	-8.54	0.000	0.768		

Test Mode 3: WLAN 2.4GHz + Sub-G (Hybrid mode) + 24GHz radar

Simultaneous Transmissions								
Option	Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
B	2437	0.2	27.49	25.34	0.342	3.060	0.12595	<= 1
B	920		16.35	14.20	0.026	1.877		
C	24145		-6.39	-8.54	0.000	0.768		

Test Mode 4: WLAN 5GHz + Thread + 24GHz radar

Simultaneous Transmissions								
Option	Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
B	5200	0.2	26.98	24.83	0.304	3.060	0.11045	<= 1
B	2401.5		17.38	15.23	0.033	3.060		
C	24145		-6.39	-8.54	0.000	0.768		

Test Mode 5: WLAN 5GHz + Sub-G (Hopping mode) + 24GHz radar

Simultaneous Transmissions								
Option	Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
B	5200	0.2	26.98	24.83	0.304	3.060	0.26920	<= 1
B	920		27.18	25.03	0.318	1.877		
C	24145		-6.39	-8.54	0.000	0.768		



Test Mode 6: WLAN 5GHz + Sub-G (Hybrid mode) + 24GHz radar

Simultaneous Transmissions								
Option	Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
B	5200	0.2	26.98	24.83	0.304	3.060	0.11357	<= 1
B	920		16.35	14.20	0.026	1.877		
C	24145		-6.39	-8.54	0.000	0.768		

Test Mode 7: Bluetooth + Thread + 24GHz radar

Simultaneous Transmissions								
Option	Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
B	2440	0.2	13.17	11.02	0.013	3.060	0.01521	<= 1
B	2401.5		17.38	15.23	0.033	3.060		
C	24145		-6.39	-8.54	0.000	0.768		

Test Mode 8: Bluetooth + Sub-G (Hopping mode) + 24GHz radar

Simultaneous Transmissions								
Option	Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
B	2440	0.2	13.17	11.02	0.013	3.060	0.17396	<= 1
B	920		27.18	25.03	0.318	1.877		
C	24145		-6.39	-8.54	0.000	0.768		

Test Mode 9: Bluetooth + Sub-G (Hybrid mode) + 24GHz radar

Simultaneous Transmissions								
Option	Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
B	2440	0.2	13.17	11.02	0.013	3.060	0.01833	<= 1
B	920		16.35	14.20	0.026	1.877		
C	24145		-6.39	-8.54	0.000	0.768		

————THE END————