



Canada

# EMC & RF Test Report

As per

## RSS-247 Issue 2:2017 & FCC Part 15 Subpart 15.247

Unlicensed Intentional Radiators  
DTS System  
on the

### ECB601/ECB501

Issued by:

**TÜV SÜD Canada Inc.**  
11 Gordon Collins Dr,  
Gormley, ON, L0H 1G0  
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Testing produced for

ecobee

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EMC Team Lead

See Appendix A for full client &  
EUT details.



Innovation, Science and  
Economic Development Canada

Registration #  
6844A-3



Testing Laboratory  
Certificate #2955.02

Report Issued:  
7/25/2022



R-14023, G-20072  
C-14498, T-20060



Registration #  
CA6844

Client	<b>Ecobee Inc.</b>	
Product	<b>ECB601/ECB501</b>	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

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Client	<b>Ecobee Inc.</b>	
Product	<b>ECB601/ECB501</b>	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

## Report Scope

This report addresses the EMC verification testing and test results of the **Ecobee Inc.'s** Model: **ECB601/ECB501** (2.4 GHz DTS) and is herein referred to as EUT (Equipment Under Test). The EUT was tested for compliance against the following standards:

RSS-247 Issue 2:2017

FCC Part 15 Subpart C 15.247

Test procedures, results, justifications, and engineering considerations, if any, follow later in this report. The purpose of this report is to verify that the EUT is still in compliance with the rules after a C2PC. Refer to the original test report, TÜV SÜD Canada Report # **7169010244RA-001 (DTS – 2.4 GHz Thread)** for full testing and test results.

This report does not imply product endorsement by any government, accreditation agency, or TÜV SÜD Canada Inc.

Opinions or interpretations expressed in this report, if any, are outside the scope of TÜV SÜD Canada Inc. accreditations. Any opinions expressed do not necessarily reflect the opinions of TÜV SÜD Canada Inc., unless otherwise stated.


Client	<b>Ecobee Inc.</b>	
Product	<b>ECB601/ECB501</b>	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

## Summary

The results contained in this report relate only to the item(s) tested.

EUT:	ECB601/ECB501
FCC Certification #, FCC ID:	WR955470766937
Industry Canada Certification #, IC:	7981A-55470766937
EUT passed all tests performed	Yes
Tests conducted by	Min Xie
Report reviewed by	Sanjiv Vyas


For testing dates, see "Testing Environmental Conditions and Dates".

Client	<b>Ecobee Inc.</b>	
Product	<b>ECB601/ECB501</b>	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

## Test Results Summary

Standard/Method	Description	Class/Limit	Result
FCC 15.205 RSS-GEN (Table 6)	Restricted Bands for Intentional Operation	QuasiPeak Average	Pass
FCC 15.209 RSS-GEN (Table 4)	Spurious Radiated Emissions	QuasiPeak Average	Pass
<b>Overall Result</b>			<b>Pass</b>

If the product as tested or otherwise complies with the specification, the EUT is deemed to comply with the requirement and is deemed a 'PASS' grade. If not 'FAIL' grade will be issued. Note that 'PASS' / 'FAIL' grade is independent of any measurement uncertainties.

Client	<b>Ecobee Inc.</b>	
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### ***Notes, Justifications, or Deviations***


The following notes, justifications for tests not performed or deviations from the above listed specifications apply:

This report is only an update based on Class II Permissive Changes. Refer to the original test report, TÜV SÜD Canada Report # **7169010244RA-001 (DTS-2.4GHz Thread)**, for full testing and test results.

As per the manufacturer, the new sample is electrically the same to the sample previously tested. None transmitter components were replaced with parts of same dimension and electrical characteristics. The following test was re-evaluated on the EUT to verify if this change did not degrade the radiated data previously reported.

- Spurious radiated emission
- Restricted band Band Edge measurements

Band edge testing was performed with high channels.

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### ***Sample Calculation(s)***

#### **Radiated Emission Test**

E-Field Level = Received Signal + Antenna Factor + Cable Loss – Pre-Amp Gain

E-Field Level = 50dB $\mu$ V + 10dB/m + 2dB – 20dB

E-Field Level = 42dB $\mu$ V/m

Margin = Limit – E-Field Level

Margin = 50dB $\mu$ V/m – 42dB $\mu$ V/m

Margin = 8.0 dB (pass)

#### **Power Line Conducted Emission Test**

E-Field Level = Received Signal + Attenuation Factor + Cable Loss + LISN Factor


E-Field Level = 50dB $\mu$ V + 10dB + 2.5dB + 0.5dB

E-Field Level = 63dB $\mu$ V

Margin = Limit – E-Field Level

Margin = 73dB $\mu$ V – 63dB $\mu$ V


Margin = 10.0 dB (pass)

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## Applicable Standards, Specifications and Methods


ANSI C63.4:2014	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10:2013	American National Standard For Testing Unlicensed Wireless Devices
CFR 47 FCC 15 Subpart C	Code of Federal Regulations – Radio Frequency Devices, Intentional Radiators
FCC KDB 558074: 2019	FCC KDB 558074 Digital Transmission Systems, measurements and procedures
FCC KDB 447498: 2015	RF exposure procedures and equipment authorization policies for mobile and portable devices
RSS-GEN Issue 5: 2018+A1:2019+A2:2021	General Requirements and Information for the Certification of Radio Apparatus
RSS-247 Issue 2:2017	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
ISO 17025:2017	General Requirements for the Competence of Testing and Calibration Laboratories



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## Document Revision Status

Revision	Date	Description	Initials
000	2022-07-18	Initial Release	MX
001	2022-07-25	Updated graph title on page 27	MX

Client	<b>Ecobee Inc.</b>	
Product	<b>ECB601/ECB501</b>	
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## Definitions and Acronyms

The following definitions and acronyms are applicable in this report.  
See also ANSI C63.14.

**DTS** – Digital Transmission System

**LISN** – Line Impedance Stabilization Network

**NCR** – No Calibration Required

**NSA** – Normalized Site Attenuation

**N/A** – Not Applicable

**RF** – Radio Frequency

**AE** – Auxiliary Equipment. A digital accessory that feeds data into or receives data from another device (host) that in turn, controls its operation.

**Antenna Port** – Port, other than a broadcast receiver tuner port, for connection of an antenna used for intentional transmission and/or reception of radiated RF energy.


**BW** – Bandwidth. Unless otherwise stated, this refers to the 6 dB bandwidth.

**EMC** – Electro-Magnetic Compatibility. The ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment.

**EMI** – Electro-Magnetic Immunity. The ability to maintain a specified performance when the equipment is subjected to disturbance (unwanted) signals of specified levels.

**EUT** – Equipment Under Test. A device or system being evaluated for compliance that is representative of a product to be marketed.

**ITE** – Information Technology Equipment. Has a primary function of entry, storage, display, retrieval, transmission, processing, switching, or control of data and/or telecommunication messages and which may be equipped with one or more ports typically for information transfer.

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## Testing Facility

Testing for EMC on the EUT was carried out at TÜV SÜD Canada testing lab near Toronto, Ontario. The testing lab has calibrated 3m semi-anechoic chambers which allow measurements on a EUT that has a maximum width or length of up to 2m and a height of up to 3m. The testing lab also has a calibrated 10m Open Area Test Site (OATS). The chambers are equipped with a turntable that is capable of testing devices up to 5000lb in weight and are equipped with a mast that controls the polarization and height of the antenna. Control of the mast occurs in the control room adjoining the shielded chamber. This facility is capable of testing products that are rated for single phase or 3-phase AC input and DC capability is also available. Radiated emission measurements are performed using a BiLog antenna and a Horn antenna where applicable. Conducted emissions, unless otherwise stated, are performed using a LISN and using the vertical ground plane if applicable.

### **Calibrations and Accreditations**


The 3m semi-anechoic chamber is registered with Federal Communications Commission (FCC, CA6844), Innovation, Science and Economic Development Canada (ISED, 6844A-3) and Voluntary Control Council for Interference (VCCI, R-14023, G-20072, C-14498, and T-20060). This chamber was calibrated for Normalized Site Attenuation (NSA) using test procedures outlined in ANSI C63.4 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The chamber is lined with ferrite tiles and absorption cones to minimize any undesired reflections. The NSA data is kept on file at TÜV SÜD Canada. For radiated susceptibility testing, a 16 point field calibration has been performed on the chamber. The field uniformity data is kept on file at TÜV SÜD Canada. TÜV SÜD Canada Inc. is accredited to ISO 17025 by A2LA with Testing Certificate #2955.02. The laboratory's current scope of accreditation listing can be found as listed on the A2LA website. All measuring equipment is calibrated on an annual or biennial basis as listed for each respective test.

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### ***Testing Environmental Conditions and Dates***

Following environmental conditions were recorded in the facility during time of testing

Date	Test	Initials	Temperature (°C)	Humidity (%)	Pressure (kPa)
2022-05-18	Radiated Emissions	MX	22.3	30.3	101.3

Client	<b>Ecobee Inc.</b>	 Canada
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## Detailed Test Results Section

Client	Ecobee Inc.	
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## ***Transmitter Spurious Radiated Emissions***

### **Purpose**

The purpose of this test is to ensure that the RF energy unintentionally emitted from the EUT does not exceed the limits listed below as defined in the applicable test standard, as measured from a receiving antenna. This helps protect broadcast radio services such as television, FM radio, pagers, cellular telephones, emergency services, and so on, from unwanted interference.

### **Limits and Method**

The method is as defined in FCC KDB 558074 Section 12.2 and ANSI C63.10.

The limits, as defined in 15.247(d) for unintentional radiated emissions, apply for those emissions that fall in the restricted bands, as defined in Section 15.205(a). These emissions must comply with the radiated emission limits specified in Section 15.209(a).


Frequency	Field Strength Limit ( $\mu\text{V/m}$ )	Field Strength at 3m (dB $\mu\text{V/m}$ )
0.009 MHz – 0.490 MHz	2400/F(kHz) <sup>a</sup> (at 300m)	128.5 to 93.8 <sup>a</sup>
0.490 MHz – 1.705 MHz	24000/F(kHz) <sup>a</sup> (at 30m)	73.8 to 63.0 <sup>a</sup>
1.705 MHz – 30 MHz	30 <sup>a</sup> (at 30m)	69.5 <sup>a</sup>
30 MHz – 88 MHz	100 <sup>a</sup> (at 3m)	40.0 <sup>a</sup>
88 MHz – 216 MHz	150 <sup>a</sup> (at 3m)	43.5 <sup>a</sup>
216 MHz – 960 MHz	200 <sup>a</sup> (at 3m)	46.0 <sup>a</sup>
Above 960 MHz	500 <sup>a</sup> (at 3m)	54.0 <sup>a</sup>
Above 1000 MHz	500 <sup>b</sup> (at 3m)	54.0 <sup>b</sup>
Above 1000 MHz	5 mV/m <sup>c</sup> (at 3m)	74.0 <sup>c</sup>

<sup>a</sup>Limit is with Quasi Peak detector with bandwidths as defined in CISPR-16-1-1

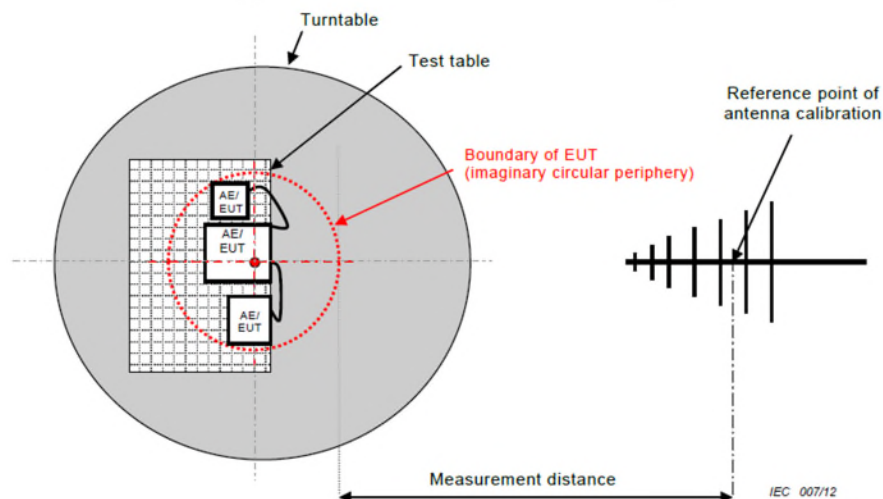
<sup>b</sup>Limit is with 1 MHz measurement bandwidth and using an Average detector

<sup>c</sup>Limit is with 1 MHz measurement bandwidth and using a Peak detector

Based on ANSI C63.4 Section 4.2, if the Peak detector measurements do not exceed the Quasi-Peak limits, where defined, then the EUT is deemed to have passed the requirements.

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### Typical Radiated Emissions Setup



### Measurement Uncertainty

The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2 and is  $\pm 5.67\text{dB}$  for 30MHz – 1GHz and  $\pm 4.58\text{dB}$  for 1GHz – 18GHz with a 'k=2' coverage factor and a 95% confidence level.


### Preliminary Graphs

The graphs shown below are maximized peak measurement graphs measured with a resolution bandwidth greater than or equal to the final required detector over a full 0-360°. This peaking process is done as a worst-case measurement and enables the detection of frequencies of concern for final measurement. For final measurements with the appropriate detector, where applicable, please refer to the tables under Final Measurements.

In accordance with FCC Part 15, Subpart A, Section 15.33, the device was scanned to the 10<sup>th</sup> harmonic (a minimum of 24.835 GHz).

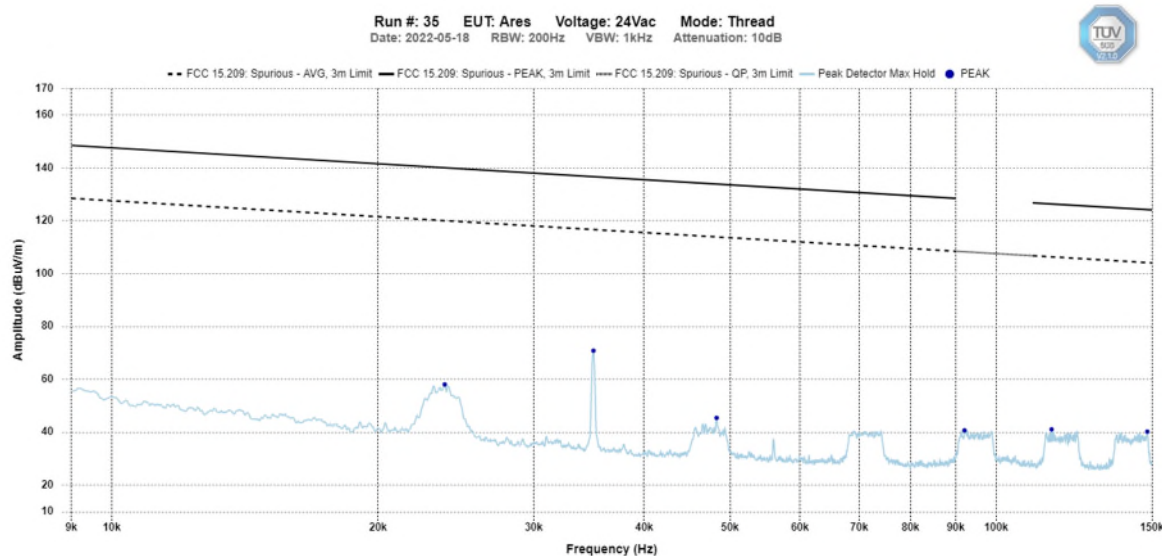
Devices scanned may be scanned at alternate test distances and in accordance with FCC Part 15, Subpart A, Section 15.31, an extrapolation factor of 20 dB/decade was used above 30 MHz and 40 dB/decade below 30 MHz. For example, for 1 meter measurements, an extrapolation factor 9.5 dB from 20 Log (1m / 3m) is applied.

Band-edge measurement graphs are shown for illustration purposes. See final measurement section for all measurements.

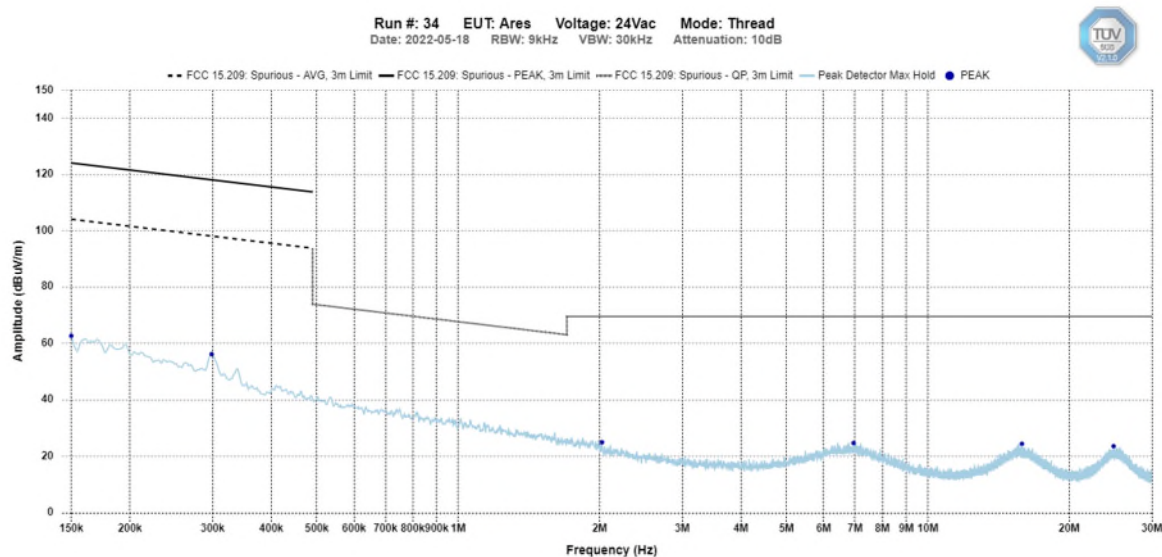
Client	Ecobee Inc.	 Canada
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Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

## Spurious Emissions – ECB601

### Mid Channel 9 kHz – 150 kHz Peak Emission Graph



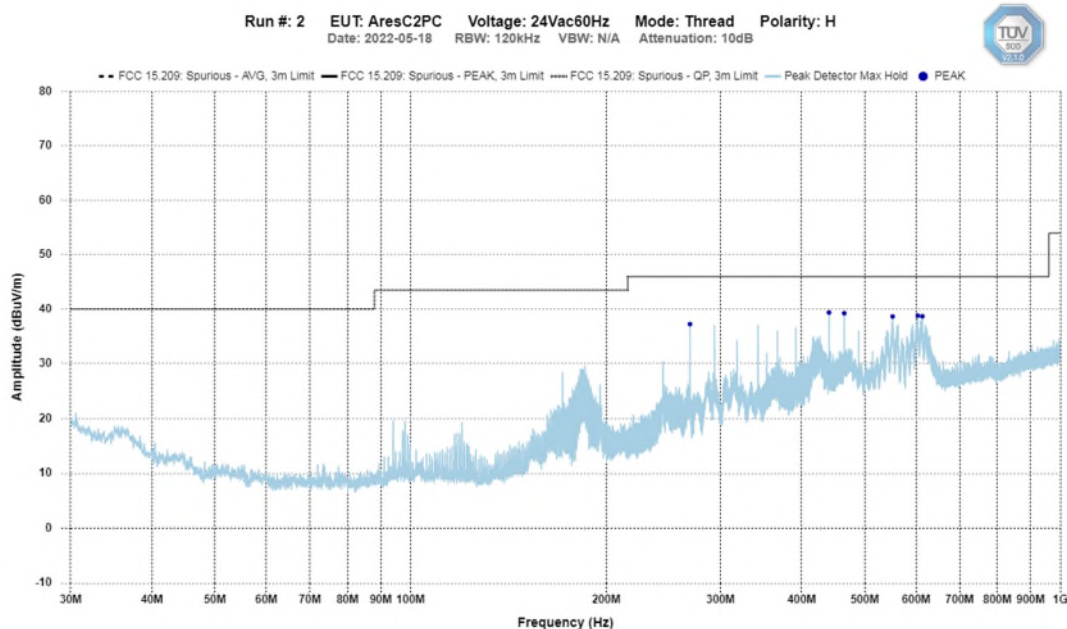
### Mid Channel 150 kHz – 30 MHz Peak Emission Graph



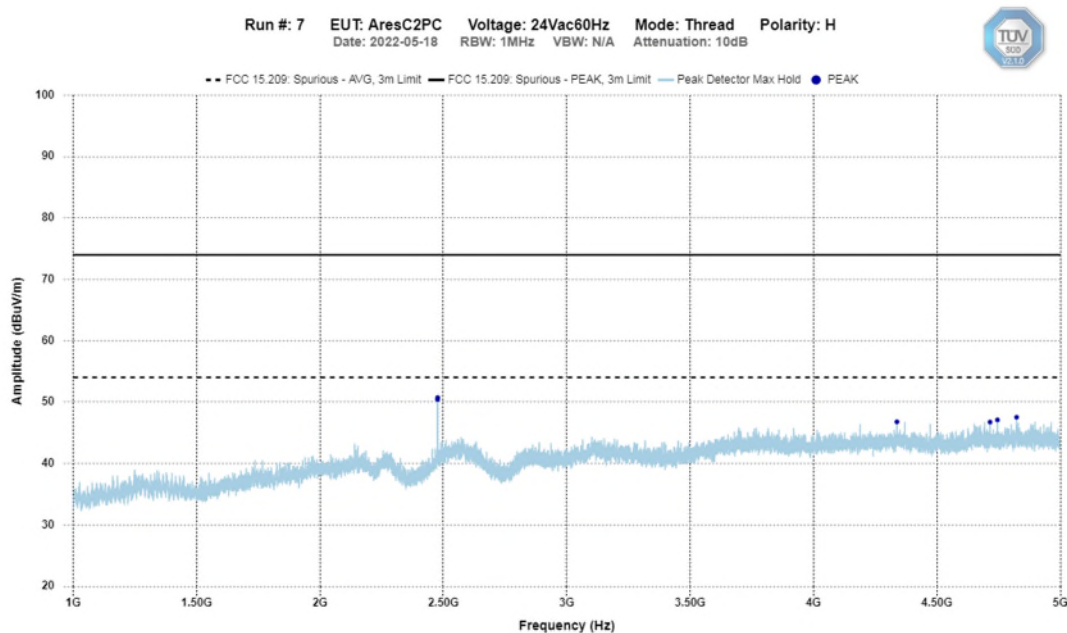


Client	Ecobee Inc.	
Product	ECB601/ECB501	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

### Mid Channel – 30 MHz – 1 GHz Horizontal - Peak Emission Graph

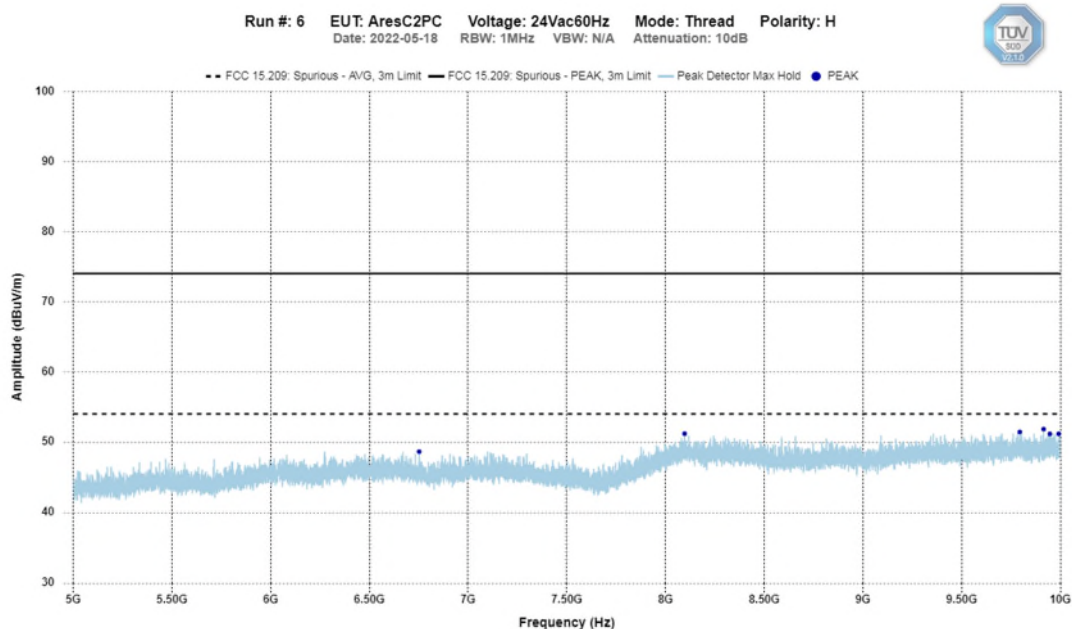


### Mid Channel – 1 GHz – 5 GHz Horizontal - Peak Emission Graph

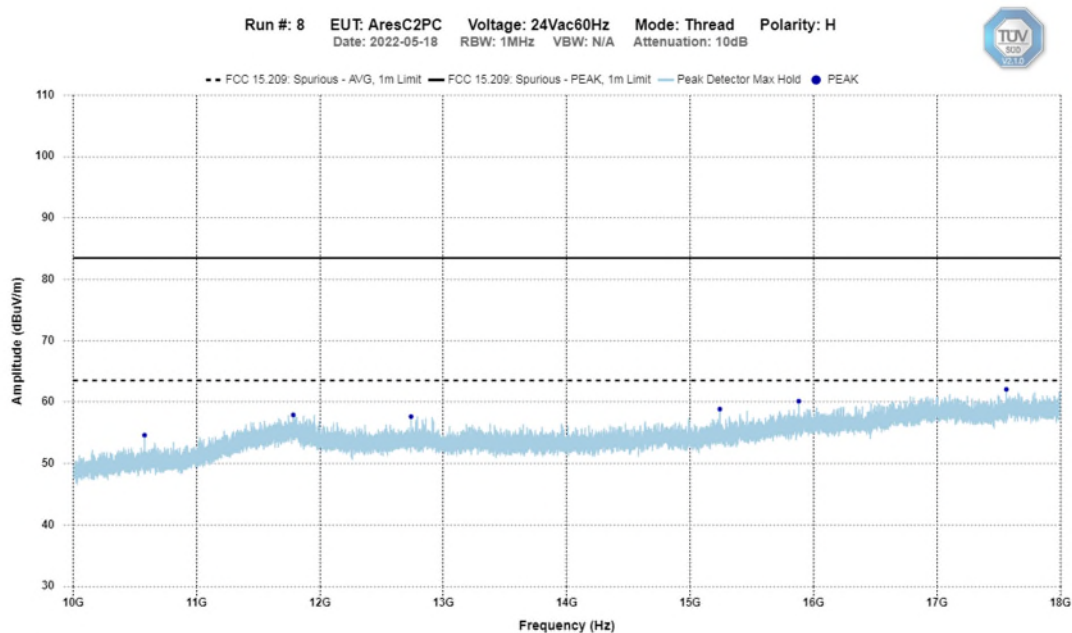


Client	Ecobee Inc.	
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### Mid Channel – 5 GHz – 10 GHz Horizontal - Peak Emission Graph



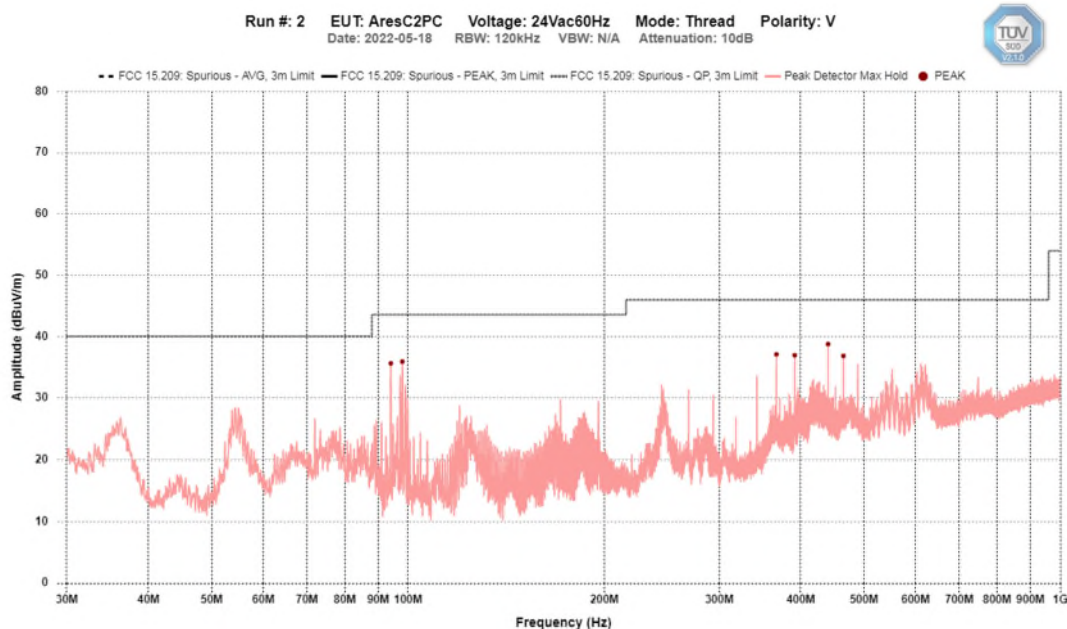
### Mid Channel – 10 GHz – 18 GHz Horizontal - Peak Emission Graph



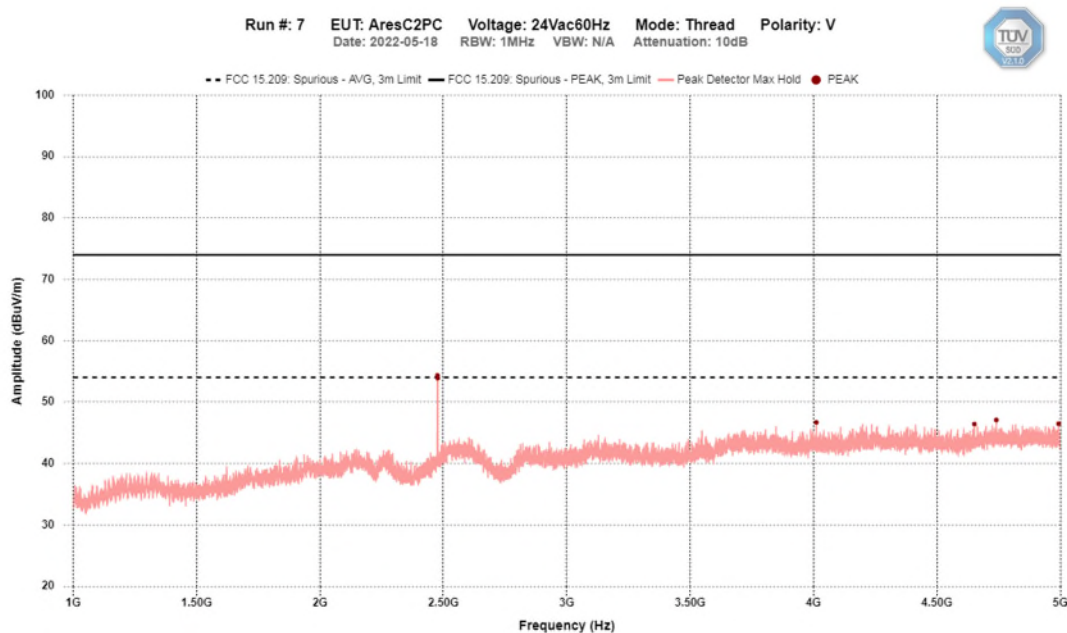
**Note: 10 GHz – 18 GHz plots were taken at 1 meter distance. All emissions from 10 GHz to 25 GHz were noise floor of measurement instrument. No emissions were found in this frequency range..**

Client	Ecobee Inc.	 Canada
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### Mid Channel – 30 MHz – 1 GHz Vertical - Peak Emission Graph

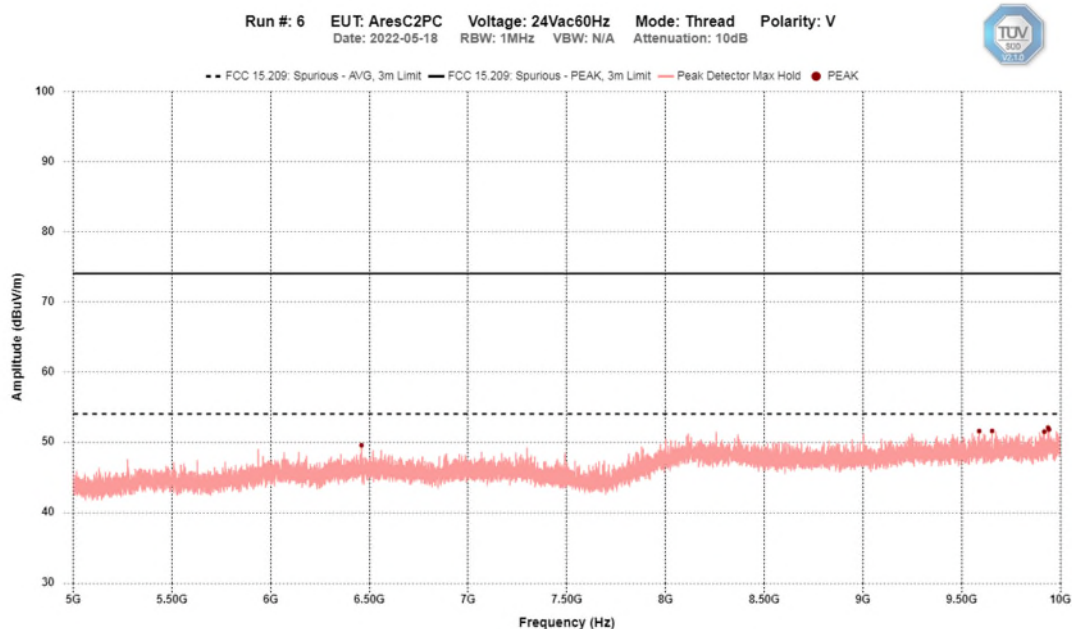


### Mid Channel – 1 GHz – 5 GHz Vertical - Peak Emission Graph

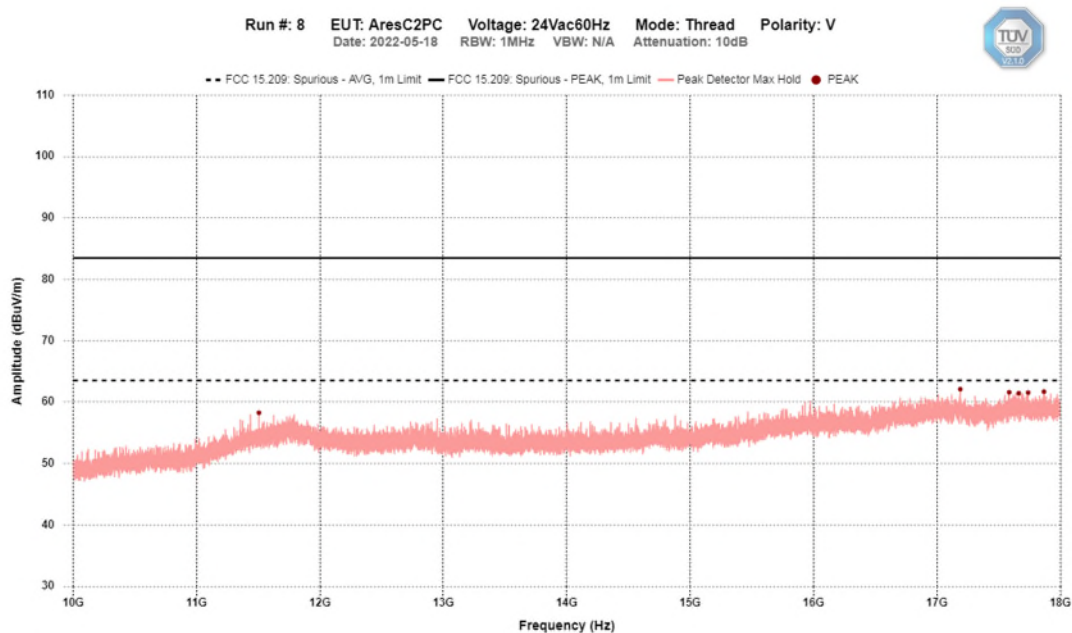


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Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

### Mid Channel – 5 GHz – 10 GHz Vertical - Peak Emission Graph




### Mid Channel – 10 GHz – 18 GHz Vertical - Peak Emission Graph



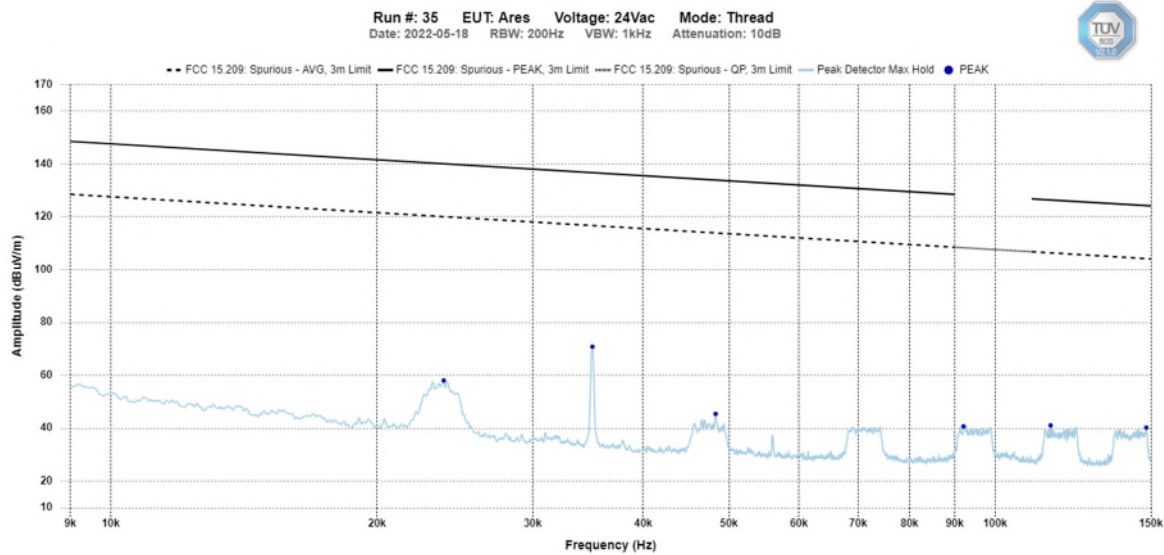
**Note: 10 GHz – 18 GHz plots were taken at 1 meter distance. All emissions from 10 GHz to 25 GHz were noise floor of measurement instrument. No emissions were found in this frequency range.**



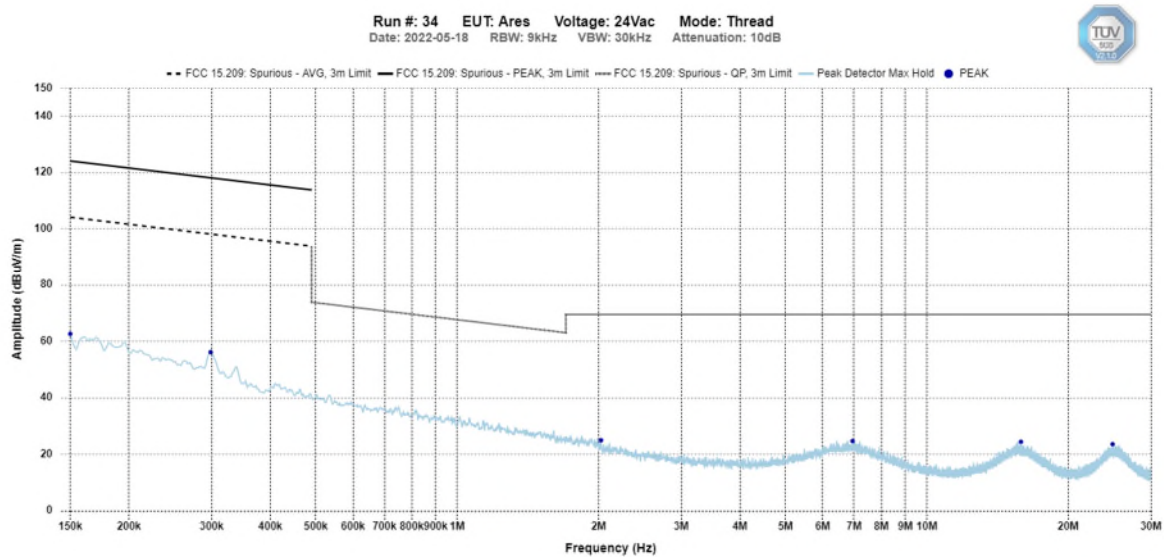
Client	Ecobee Inc.	 Canada
Product	ECB601/ECB501	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

## Spurious Emissions – ECB501

### Mid Channel 9 kHz – 150 kHz Peak Emission Graph

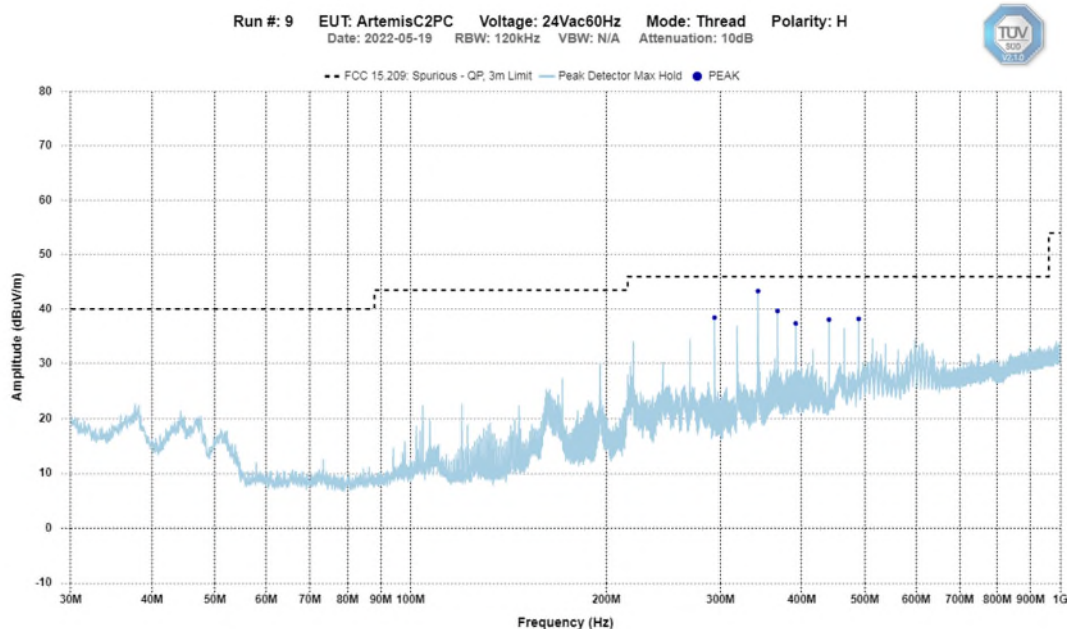


### Mid Channel 150 kHz – 30 MHz Peak Emission Graph

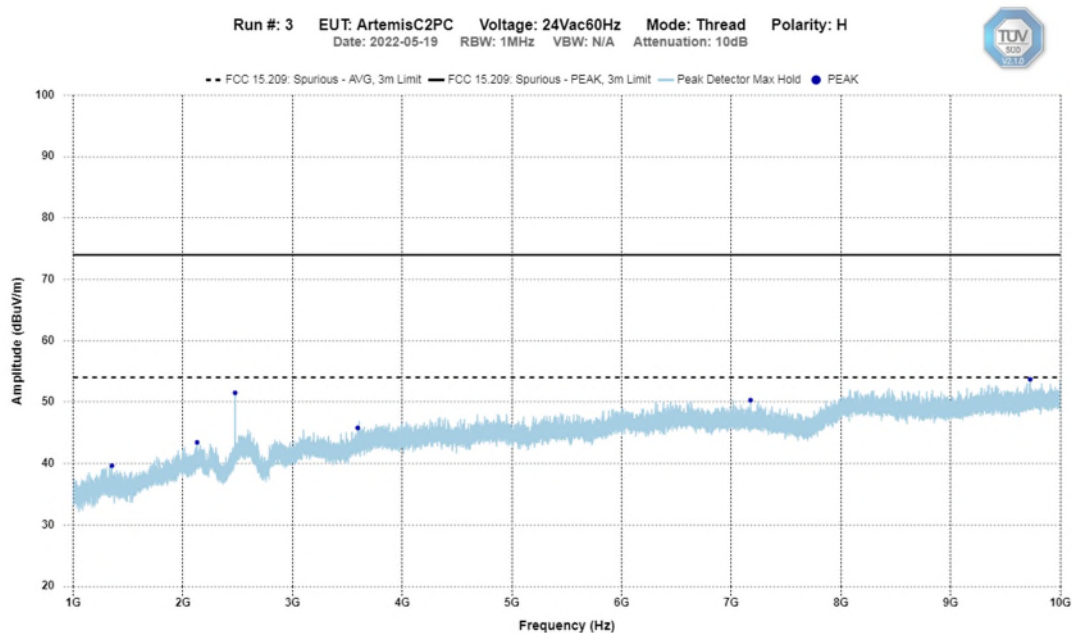


Client	Ecobee Inc.	
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Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

### Mid Channel – 30 MHz – 1 GHz Horizontal - Peak Emission Graph

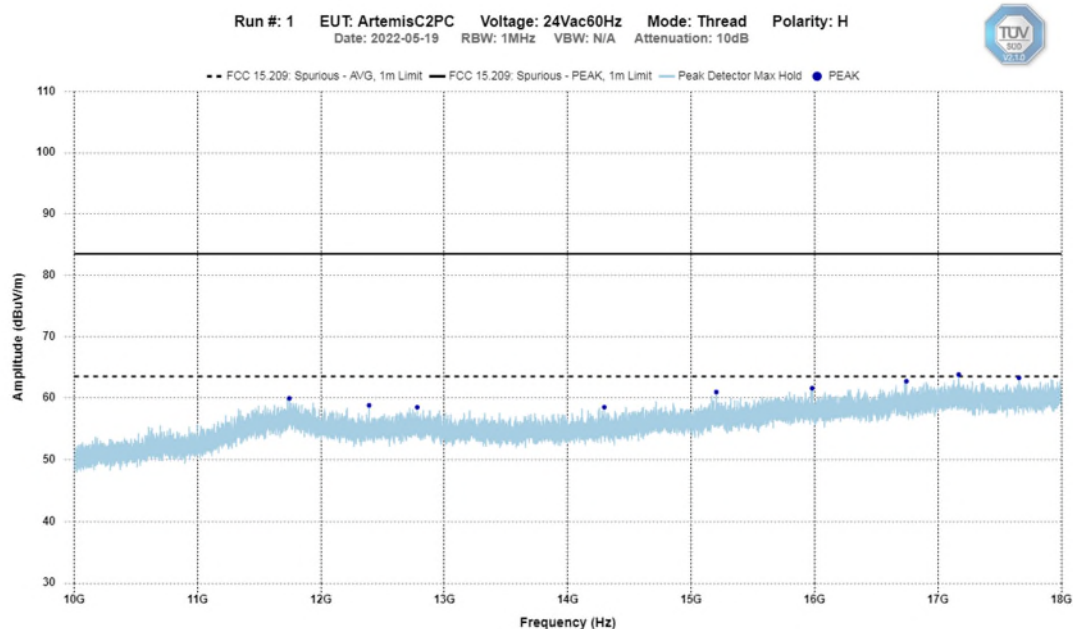


### Mid Channel – 1 GHz – 10 GHz Horizontal - Peak Emission Graph



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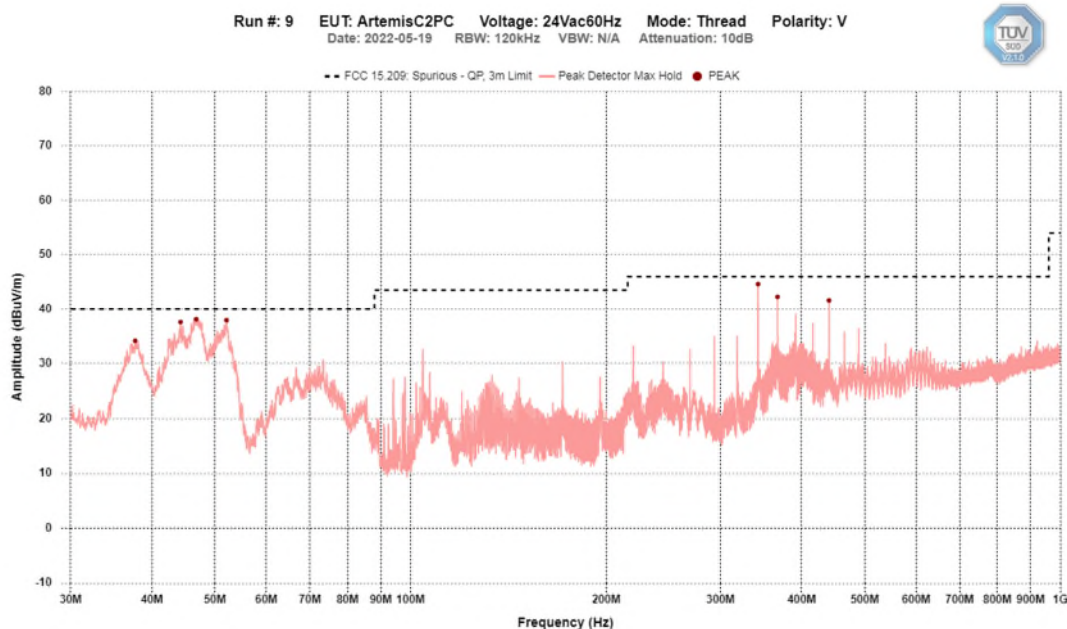
### Mid Channel – 10 GHz – 18 GHz Horizontal - Peak Emission Graph



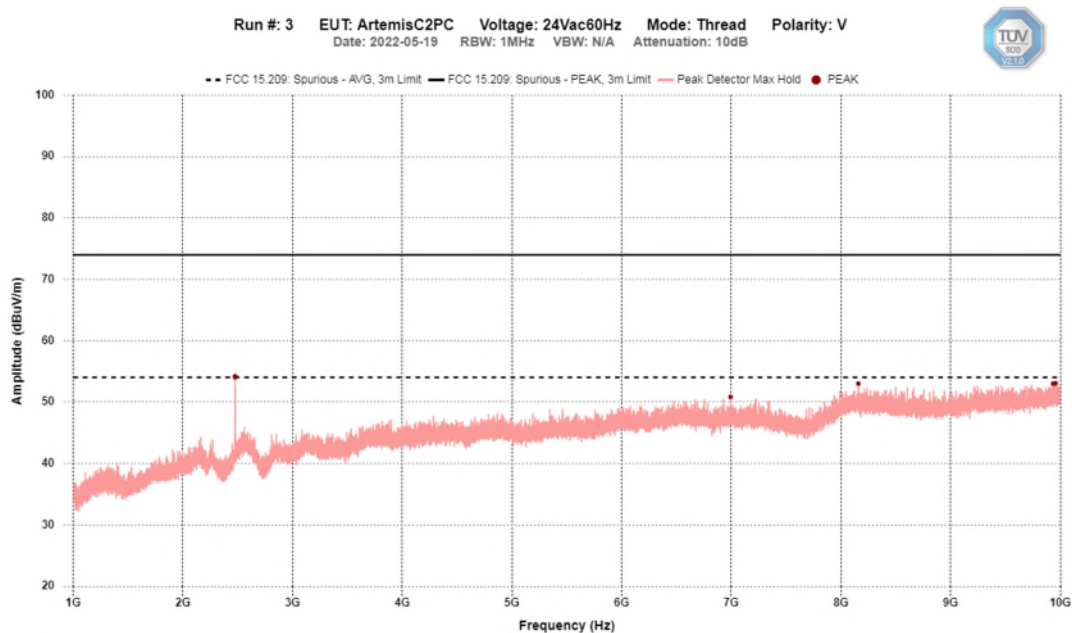
**Note: 10 GHz – 18 GHz plots were taken at a 1 meter distance. All emissions from 10 GHz to 25 GHz were noise floor of measurement instrument. No emissions were found in this frequency range.**

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### Mid Channel – 30 MHz – 1 GHz Vertical - Peak Emission Graph



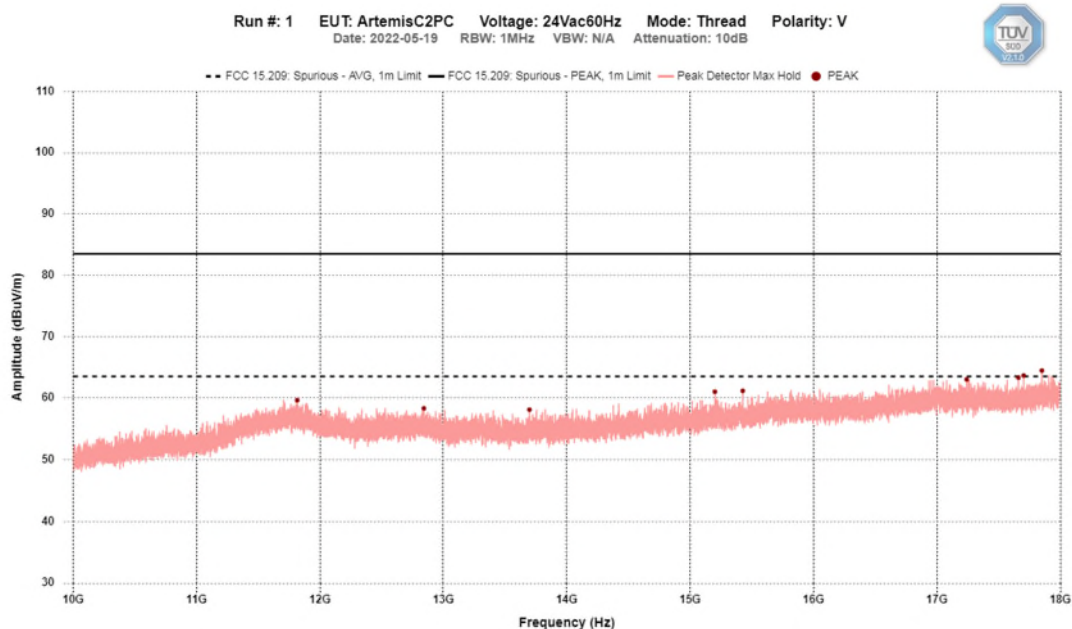
### Mid Channel – 1 GHz – 10 GHz Vertical - Peak Emission Graph





Client	Ecobee Inc.	 Canada
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Mid Channel – 10 GHz – 18 GHz  
Vertical - Peak Emission Graph

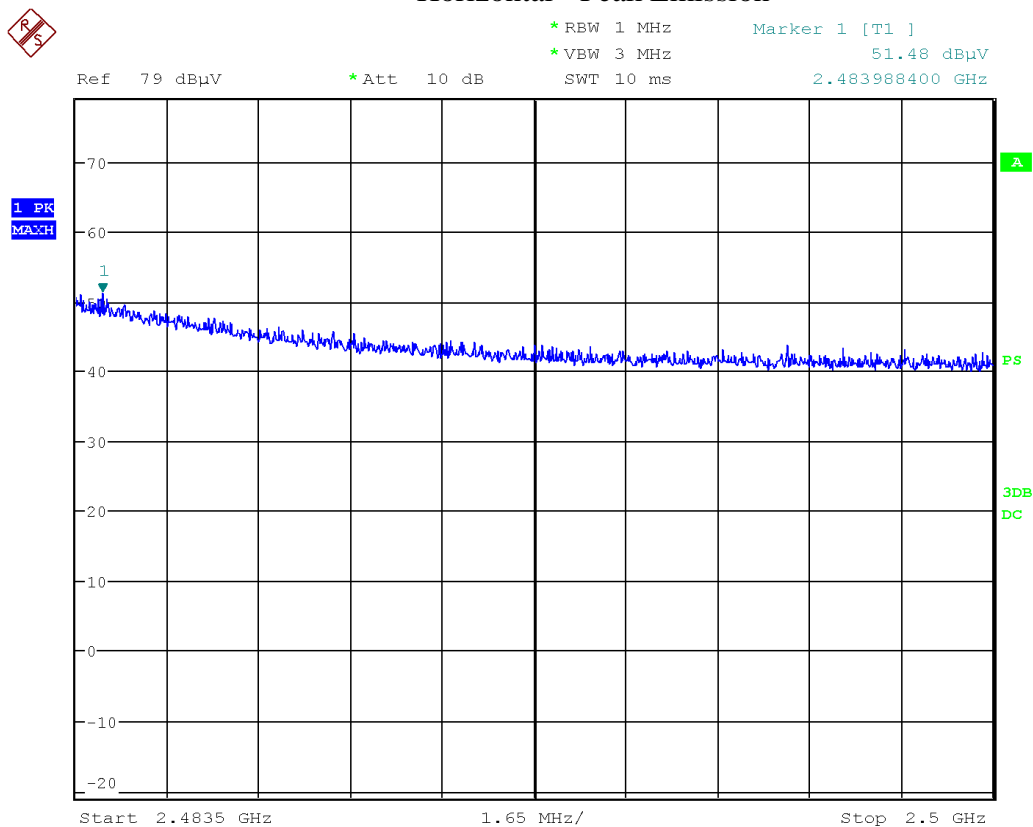


**Note: 10 GHz – 18 GHz plots were taken at a 1 meter distance. All emissions from 10 GHz to 25 GHz were noise floor of measurement instrument. No emissions were found in this frequency range.**

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## Band Edges – ECB601

### Band Edge – Channel 48 Horizontal - Peak Emission

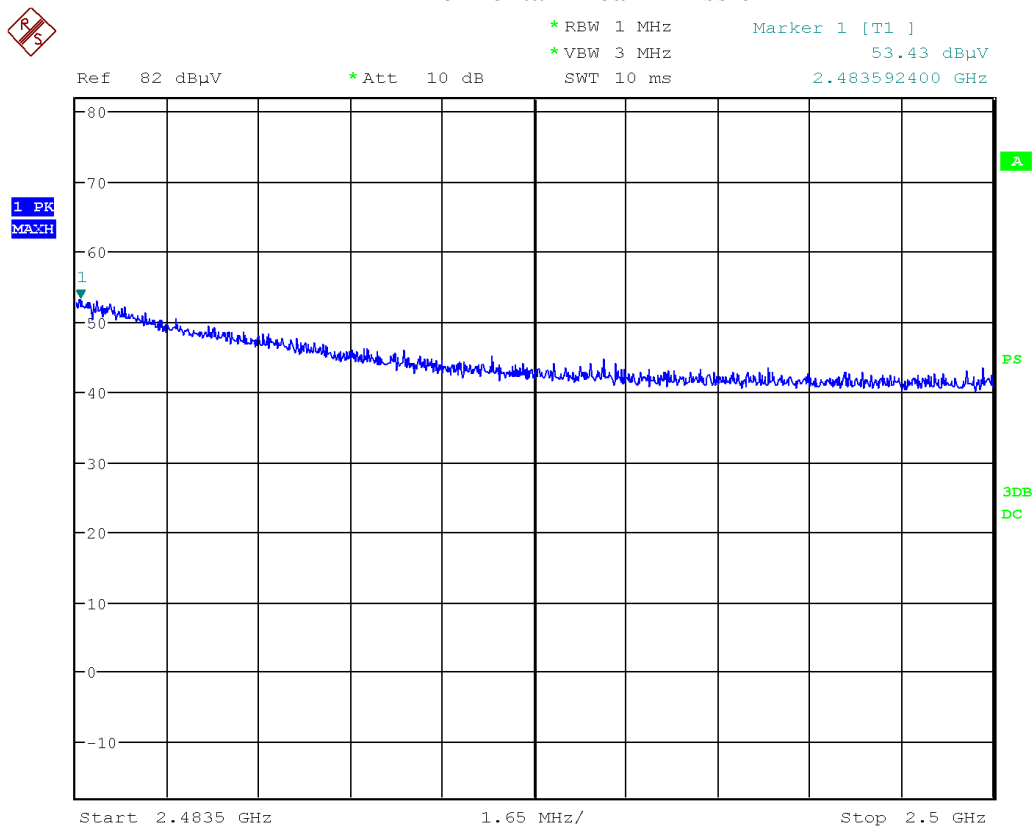


Date: 18.MAY.2022 16:49:46

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

Client	Ecobee Inc.	 Canada
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Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

### Band Edge – Channel 49 Horizontal - Peak Emission

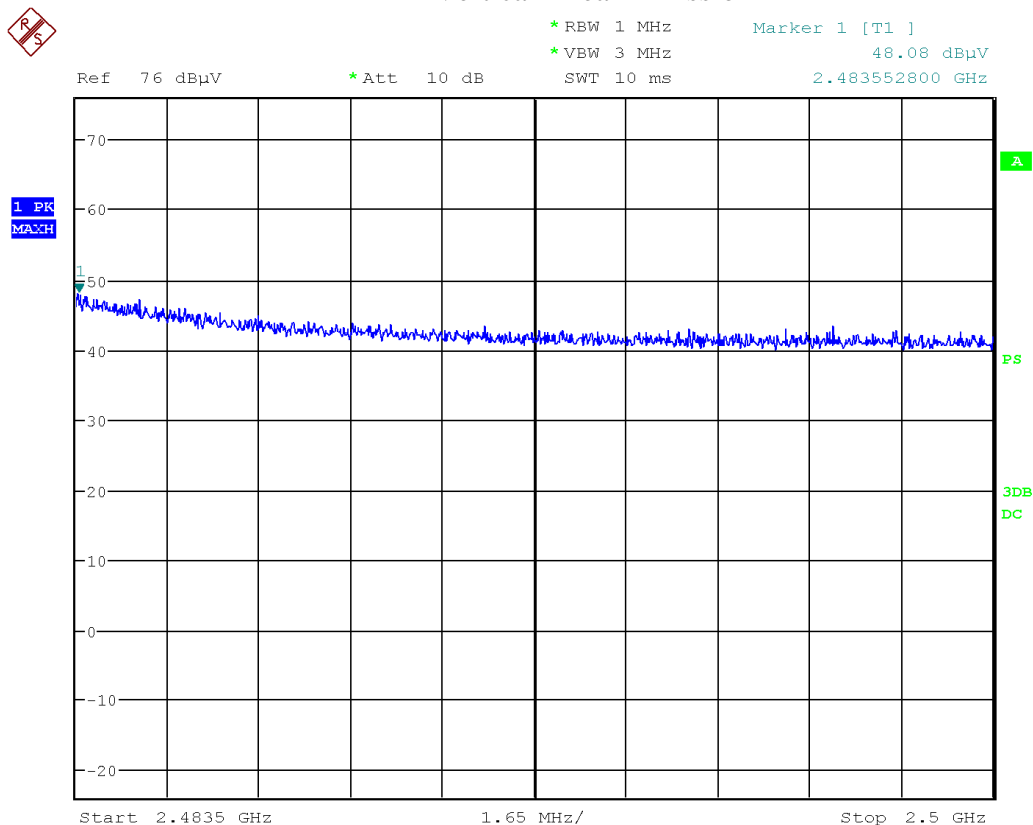


Date: 18.MAY.2022 16:32:53

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.


Client	Ecobee Inc.	 Canada
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Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

### Band Edge – Channel 48 Vertical - Peak Emission

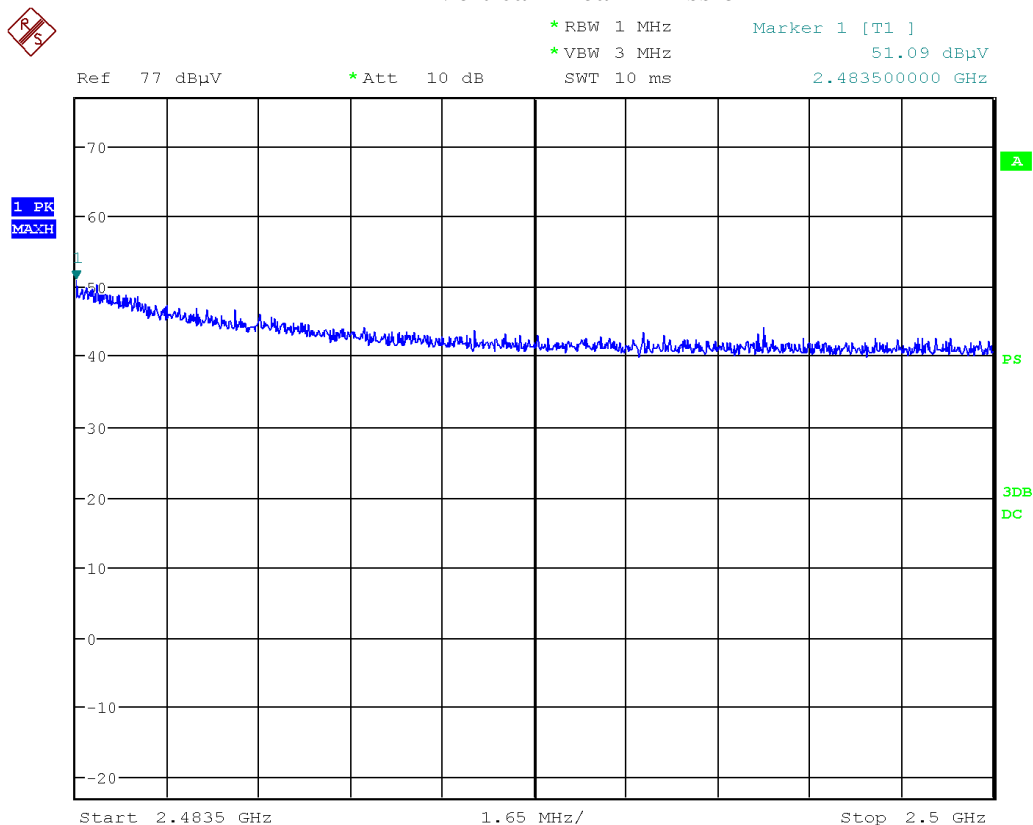


Date: 18.MAY.2022 16:45:45

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.


Client	Ecobee Inc.	 Canada
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Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

### Band Edge – Channel 49 Vertical - Peak Emission

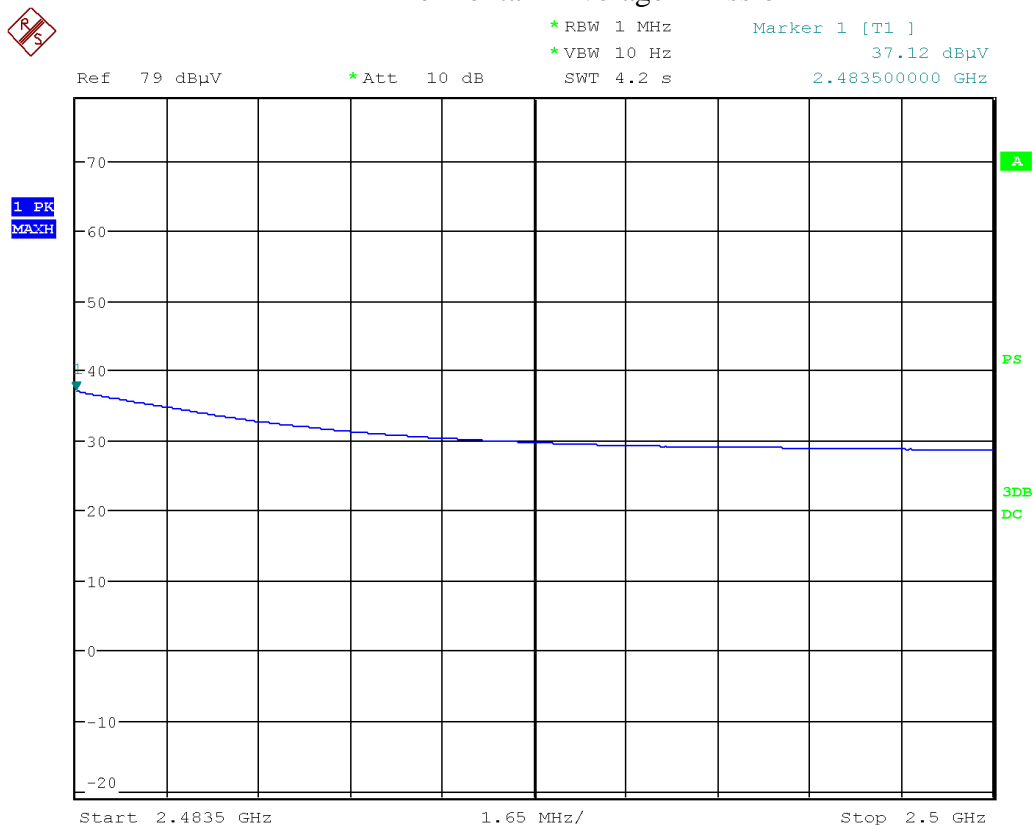


Date: 18.MAY.2022 16:38:35

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.


Client	Ecobee Inc.	 Canada
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### Band Edge – Channel 48 Horizontal - Average Emission

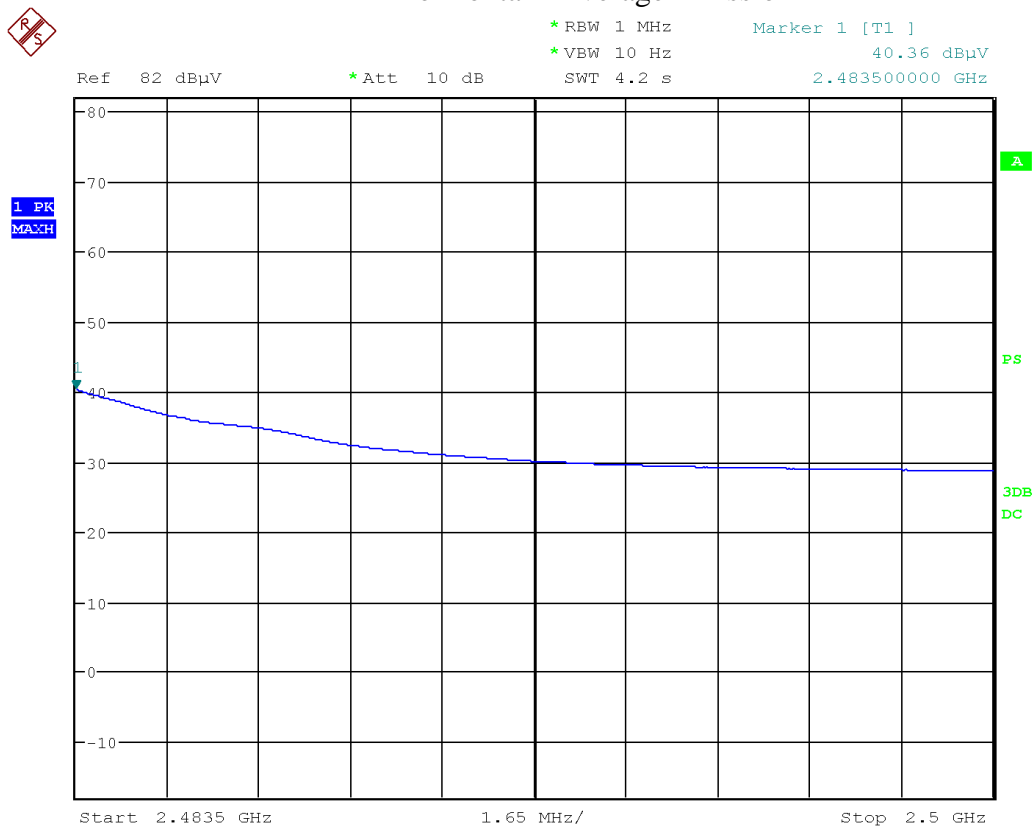


Date: 18.MAY.2022 16:50:04

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.


Client	Ecobee Inc.	 Canada
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Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

### Band Edge – Channel 49 Horizontal - Average Emission

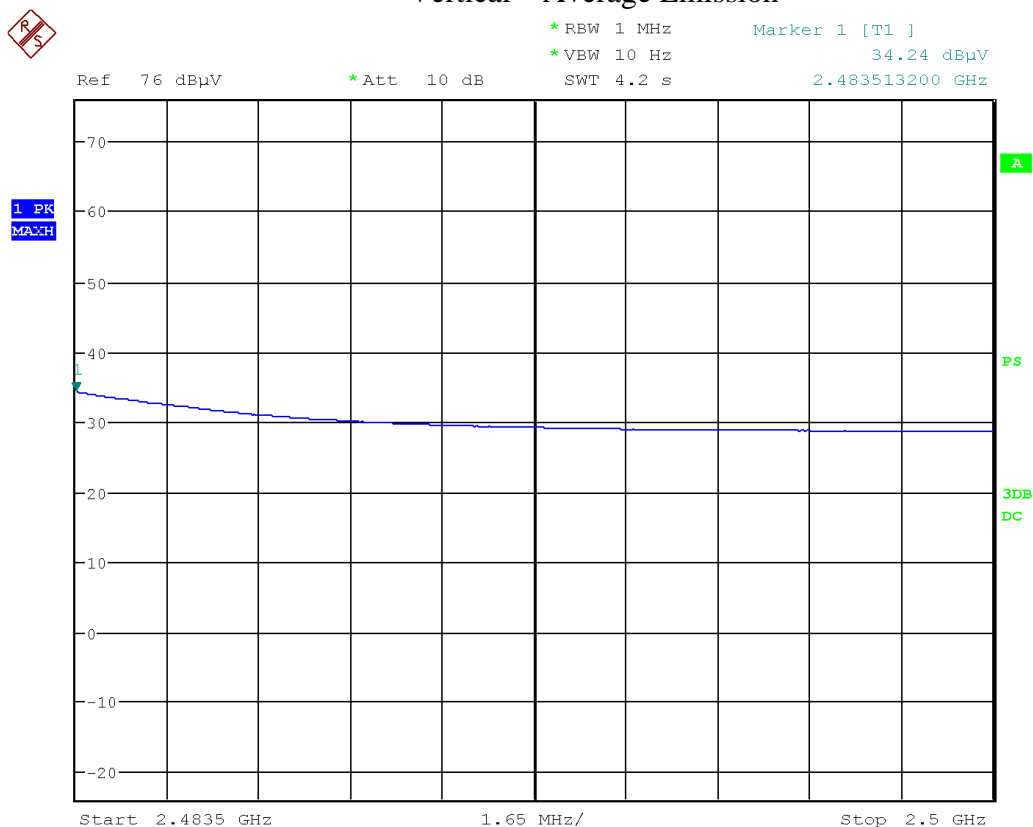


Date: 18.MAY.2022 16:33:11

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

Client	Ecobee Inc.	 Canada
Product	ECB601/ECB501	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

### Band Edge – Channel 48 Vertical – Average Emission



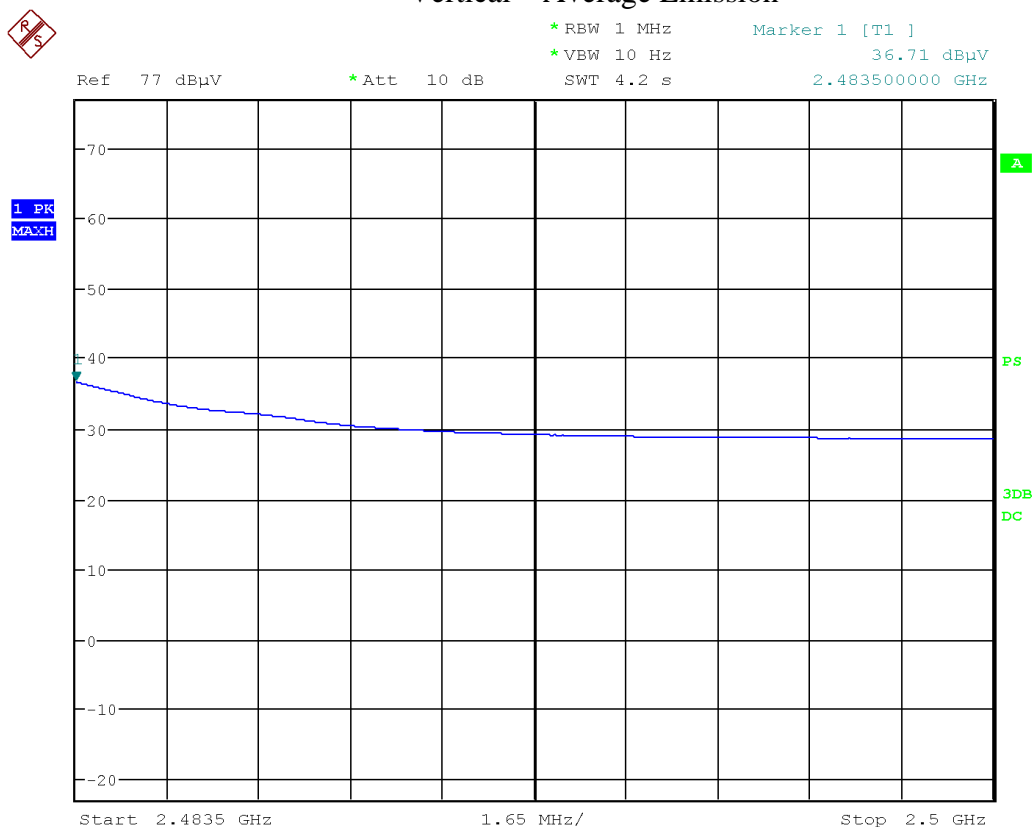
Date: 18.MAY.2022 16:46:03

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.



Client	Ecobee Inc.	 Canada
Product	ECB601/ECB501	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

### Band Edge – Channel 49 Vertical – Average Emission



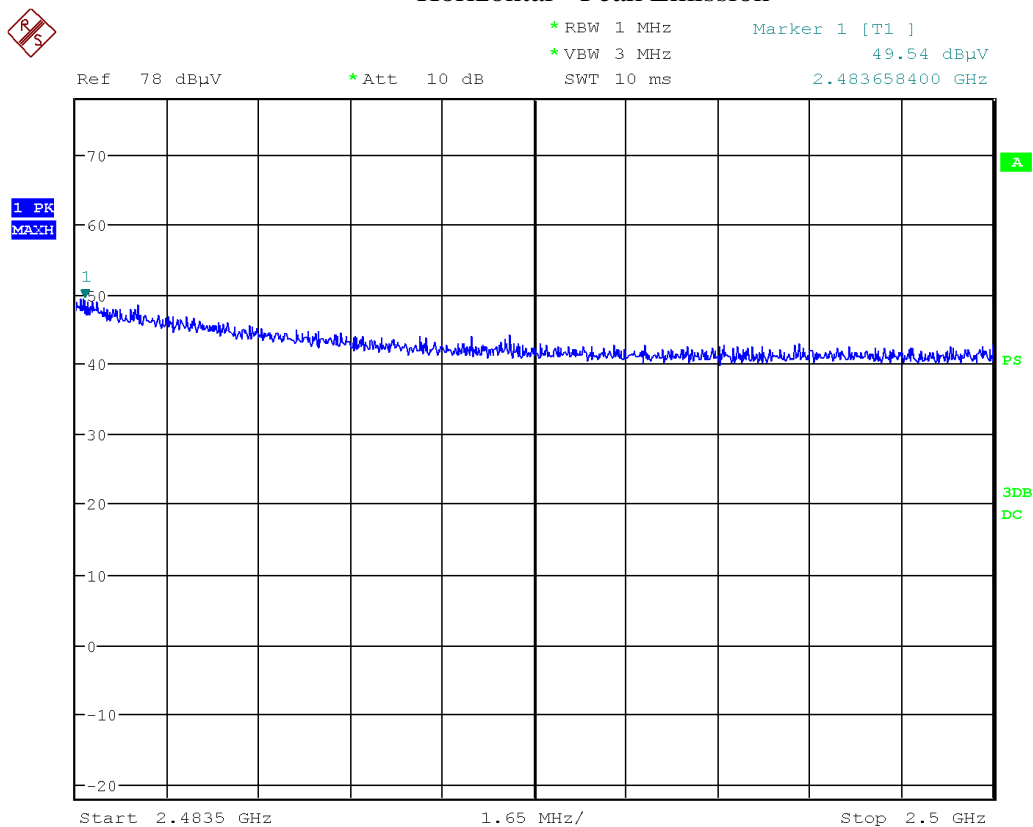
Date: 18.MAY.2022 16:38:53

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

Client	Ecobee Inc.	 Canada
Product	ECB601/ECB501	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	


## Band Edges – ECB501

### Band Edge – Channel 48 Horizontal - Peak Emission

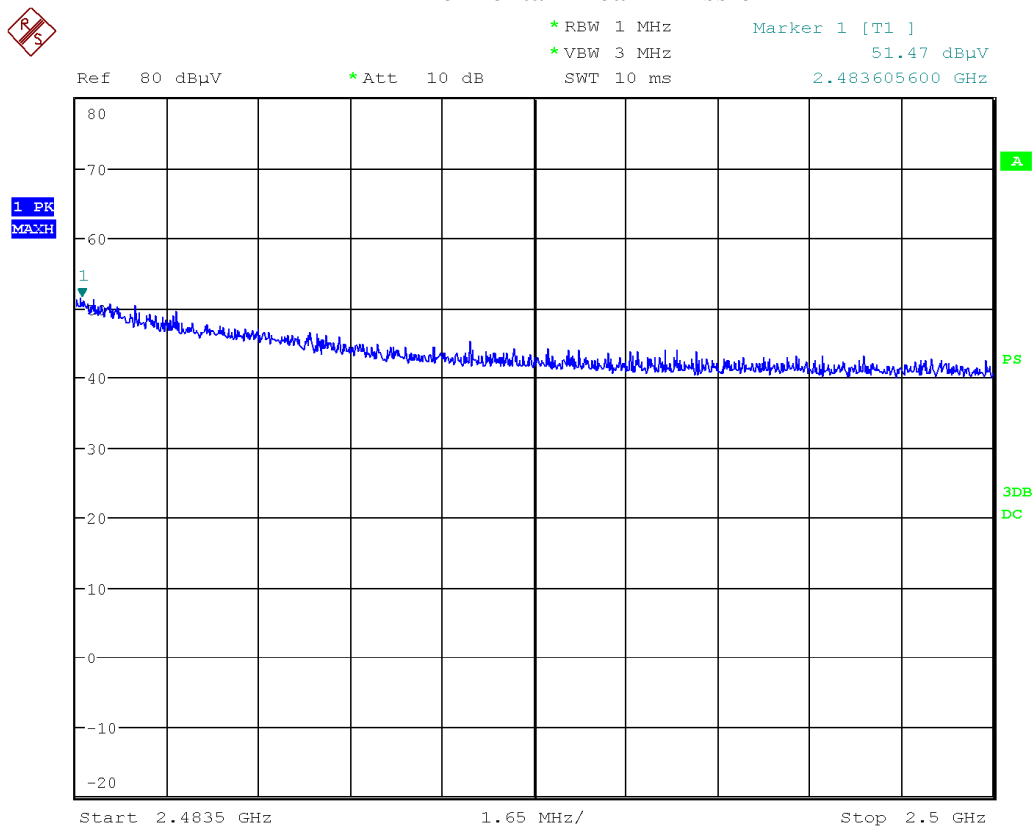


Date: 19.MAY.2022 12:45:14

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

Client	Ecobee Inc.	 Canada
Product	ECB601/ECB501	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

### Band Edge – Channel 49 Horizontal - Peak Emission

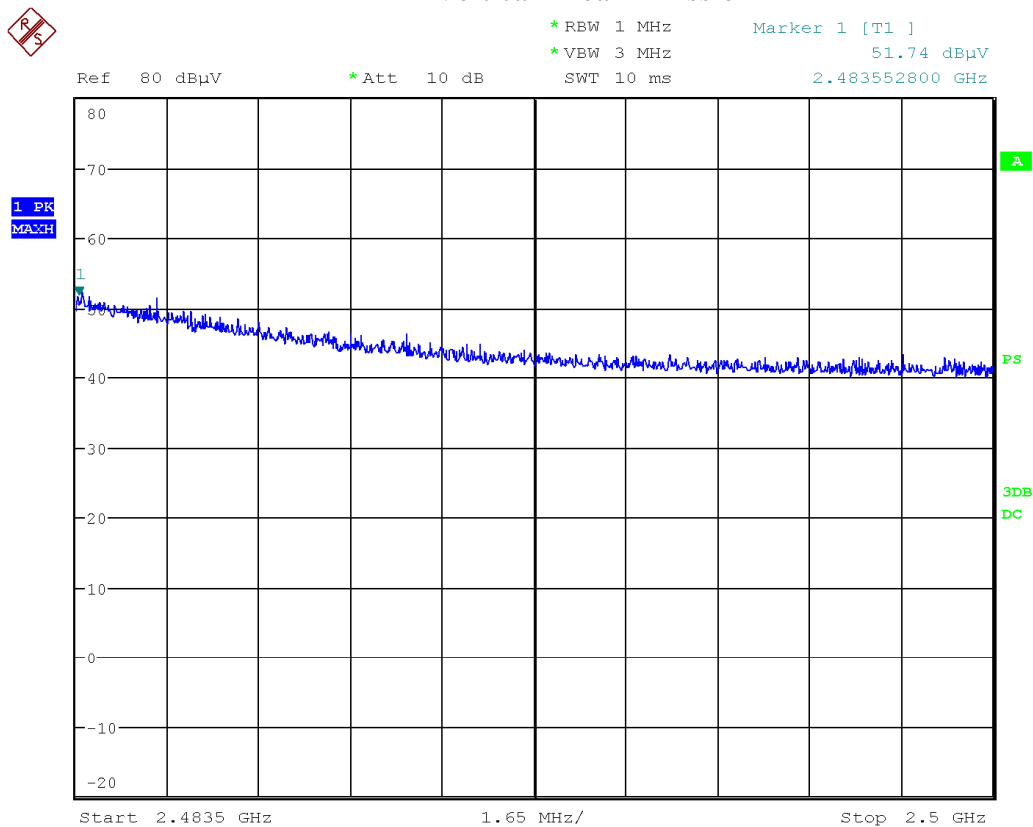


Date: 19.MAY.2022 12:59:00

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.


Client	Ecobee Inc.	 Canada
Product	ECB601/ECB501	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

### Band Edge – Channel 48 Vertical - Peak Emission

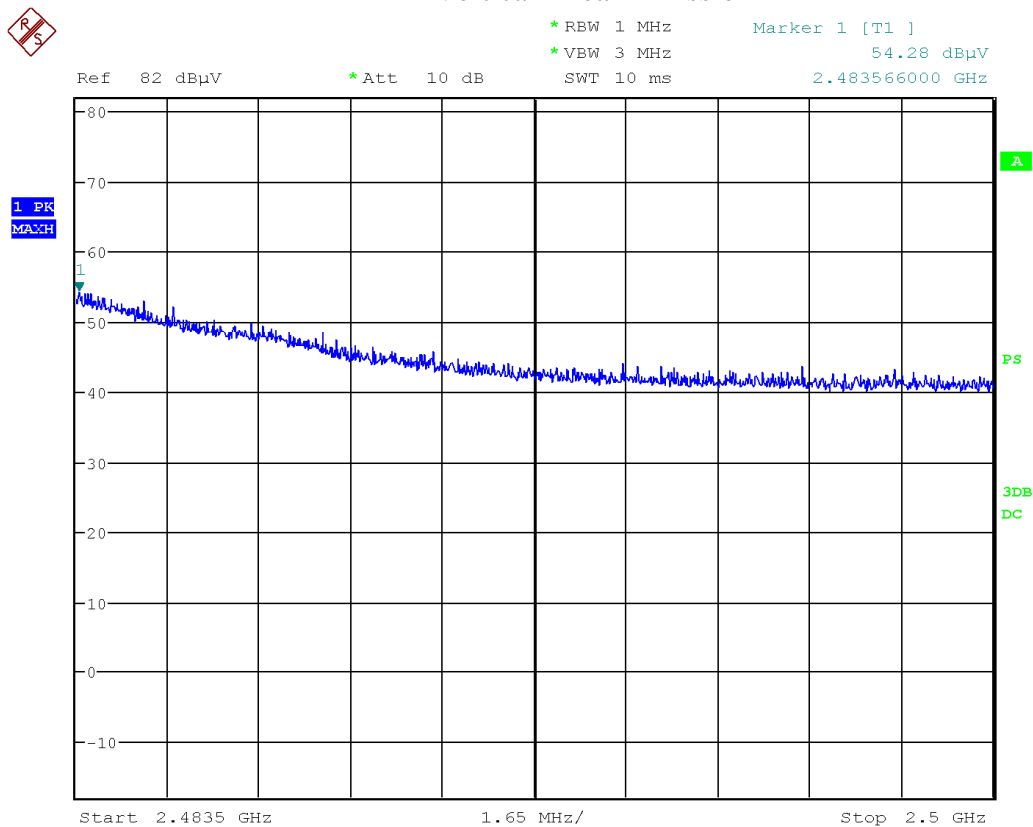


Date: 19.MAY.2022 12:41:23

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.


Client	Ecobee Inc.	 Canada
Product	ECB601/ECB501	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

### Band Edge – Channel 49 Vertical - Peak Emission

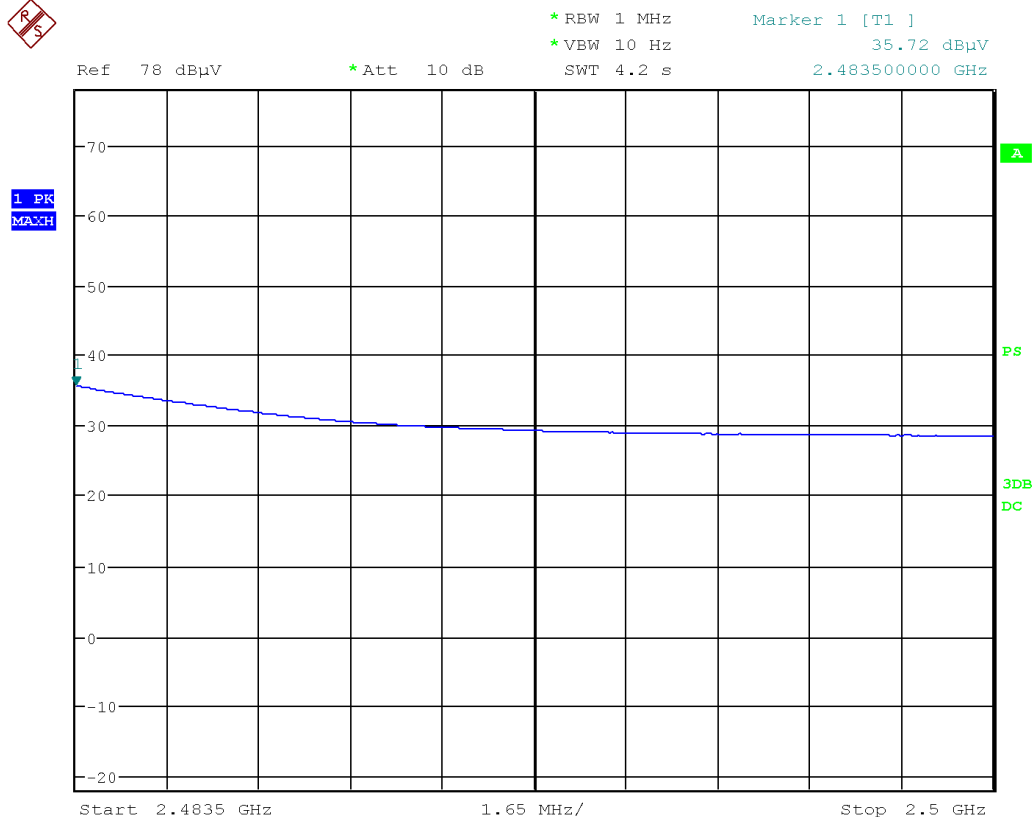


Date: 19.MAY.2022 12:55:45

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.


Client	Ecobee Inc.	 Canada
Product	ECB601/ECB501	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

### Band Edge – Channel 48 Horizontal - Average Emission

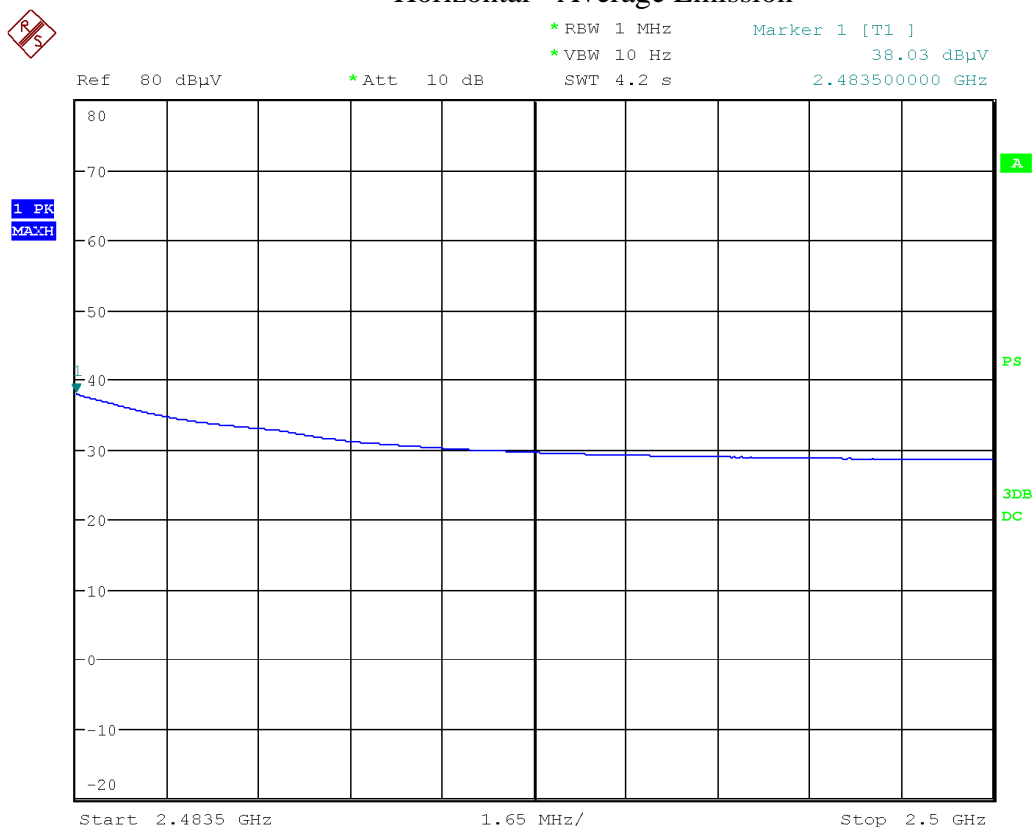


Date: 19.MAY.2022 12:45:32

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.


Client	Ecobee Inc.	 Canada
Product	ECB601/ECB501	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

### Band Edge – Channel 49 Horizontal - Average Emission

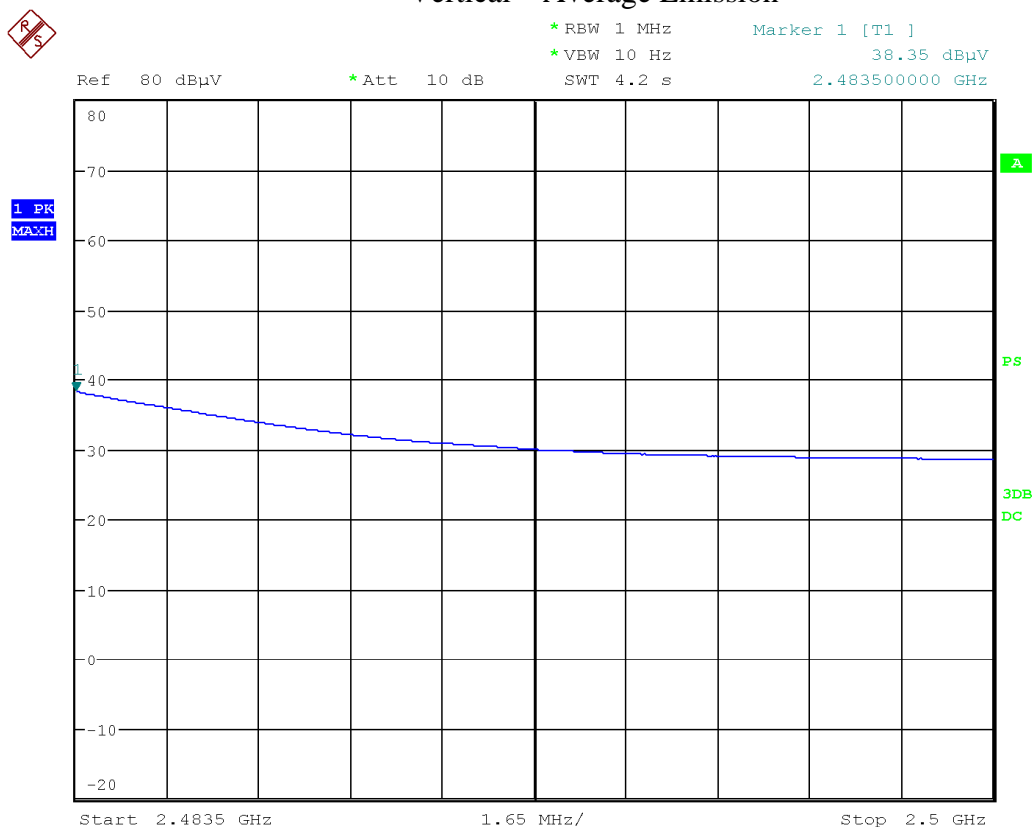


Date: 19.MAY.2022 12:59:18

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

Client	Ecobee Inc.	 Canada
Product	ECB601/ECB501	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	


### Band Edge – Channel 48 Vertical – Average Emission



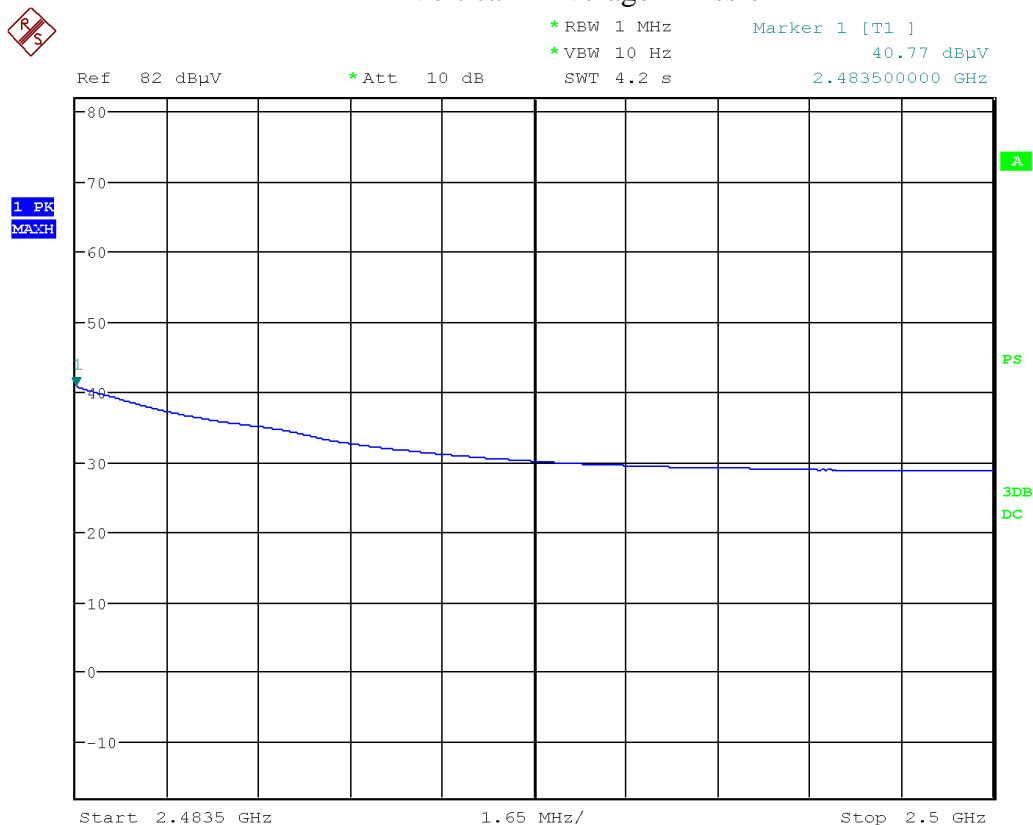
Date: 19.MAY.2022 12:41:41

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.




Client	Ecobee Inc.	 Canada
Product	ECB601/ECB501	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

### Band Edge – Channel 49 Vertical – Average Emission



Date: 19.MAY.2022 12:56:03

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

Client	<b>Ecobee Inc.</b>	
Product	<b>ECB601/ECB501</b>	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

## Final Measurements and Results


The EUT passed. high bands were measured as the last two high channels have different power.

In accordance with 15.247(d), only frequencies exceeding the 15.209 limit that occur within the bands listed in 15.205 need to be verified with a final detector. Emissions outside the restricted bands were measured for informational purposes.


The measurements were maximized by rotating the turn table over a full 0-360 rotation and the antenna height was varied from 1 m to 4 m.

### ECB601

EUT Name		EB601				
Limit		FCC 15.209, Spurious				
Power Supply		24Vac60Hz				
Frequency (Hz)	Detector	Correction Factor (dB)	Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Test Result
Horizontal						
440.67M	PEAK	-6.5	39.4	46.0	6.6	Pass
465.15M	PEAK	-5.1	39.2	46.0	6.8	Pass
603.51M	PEAK	-0.3	38.8	46.0	7.2	Pass
613.5M	PEAK	0.0	38.7	46.0	7.3	Pass
552.15M	PEAK	-2.3	38.6	46.0	7.4	Pass
269.28M	PEAK	-12.0	37.2	46.0	8.8	Pass
Vertical						
440.67M	PEAK	-6.5	38.8	46.0	7.2	Pass
98.04M	PEAK	-18.2	35.9	43.5	7.6	Pass
94.14M	PEAK	-18.5	35.6	43.5	7.9	Pass
367.23M	PEAK	-7.7	37.1	46.0	8.9	Pass
391.71M	PEAK	-6.8	36.9	46.0	9.1	Pass
465.15M	PEAK	-5.1	36.8	46.0	9.2	Pass


Client	Ecobee Inc.	 Canada
Product	ECB601/ECB501	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

High Channel (CH 49)										
2478.4	Peak	Horz	94.6	32.2	3.2	10.0	-33.8	106.3		PASS
2478.4	Avg	Horz	92.0	32.2	3.2	10.0	-33.8	103.7		PASS
2478.4	Peak	Vert	90.6	32.2	3.2	10.0	-33.8	102.3		PASS
2478.4	Avg	Vert	87.9	32.2	3.2	10.0	-33.8	99.6		PASS
2375.6	Peak	Horz	43.4	32.0	3.2	10.0	-34.1	54.5	74.0	19.5
2389.9	Avg	Horz	29.3	32.0	3.2	10.0	-34.1	40.4	54.0	13.6
2381.2	Peak	Vert	43.9	32.0	3.2	10.0	-34.1	55.0	74.0	19.0
2389.6	Avg	Vert	29.3	32.0	3.2	10.0	-34.1	40.4	54.0	13.6
2484	Peak	Horz	53.4	32.2	3.2	10.0	-33.8	65.1	74.0	8.9
2483.5	Avg	Horz	40.4	32.2	3.2	10.0	-33.8	52.0	54.0	2.0
2484	Peak	Vert	51.1	32.2	3.2	10.0	-33.8	62.8	74.0	11.2
2483.5	Avg	Vert	36.7	32.2	3.2	10.0	-33.8	48.4	54.0	5.6
High Channel (Ch 48)										
2476.8	Peak	Horz	95.9	32.2	3.2	10.0	-33.8	107.6		PASS
2476.8	Avg	Horz	93.4	32.2	3.2	10.0	-33.8	105.1		PASS
2476.8	Peak	Vert	91.9	32.2	3.2	10.0	-33.8	103.6		PASS
2476.8	Avg	Vert	89.2	32.2	3.2	10.0	-33.8	100.9		PASS
2357	Peak	Horz	43.5	31.9	3.2	10.0	-34.2	54.5	74.0	19.5
2386.4	Avg	Horz	29.3	32.0	3.2	10.0	-34.1	40.4	54.0	13.6
2338.4	Peak	Vert	43.3	31.9	3.2	10.0	-34.2	54.2	74.0	19.8
2388.1	Avg	Vert	29.3	32.0	3.2	10.0	-34.1	40.4	54.0	13.6
2483.9	Peak	Horz	51.5	32.2	3.2	10.0	-33.8	63.2	74.0	10.8
2483.5	Avg	Horz	37.1	32.2	3.2	10.0	-33.8	48.8	54.0	5.2
2483.9	Peak	Vert	48.1	32.2	3.2	10.0	-33.8	59.8	74.0	14.2
2483.5	Avg	Vert	34.2	32.2	3.2	10.0	-33.8	45.9	54.0	8.1
4953.6	Peak	Horz	49.4	34.1	4.5	10.0	-32.5	65.4	74.0	8.6
4953.6	Avg	Horz	34.1	34.1	4.5	10.0	-32.5	50.2	54.0	3.8
4953.6	Peak	Vert	49.2	34.1	4.5	10.0	-32.5	65.3	74.0	8.7
4953.6	Avg	Vert	34.1	34.1	4.5	10.0	-32.5	50.2	54.0	3.8
7430.4	Peak	Horz	48.2	35.7	6.0	10.0	-33.1	66.8	74.0	7.2
7430.4	Avg	Horz	33.6	35.7	6.0	10.0	-33.1	52.2	54.0	1.8
7430.4	Peak	Vert	48.7	35.7	6.0	10.0	-33.1	67.3	74.0	6.7
7430.4	Avg	Vert	33.7	35.7	6.0	10.0	-33.1	52.3	54.0	1.7


Client	<b>Ecobee Inc.</b>	
Product	<b>ECB601/ECB501</b>	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

## ECB501

EUT Name		ECB501				
Limit		FCC 15.209, Spurious				
Power Supply		24Vac60Hz				
Frequency (Hz)	Detector	Correction Factor (dB)	Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)	Test Result
<b>Horizontal</b>						
367.23M	PEAK	-7.7	39.6	46.0	6.4	Pass
293.76M	PEAK	-12.1	38.4	46.0	7.6	Pass
489.63M	PEAK	-3.9	38.2	46.0	7.8	Pass
440.67M	PEAK	-6.5	38.0	46.0	8.0	Pass
391.68M	PEAK	-6.8	37.4	46.0	8.6	Pass
342.72M	QP	-9.1	42.6	46.0	3.4	Pass
<b>Vertical</b>						
440.67M	PEAK	-6.5	41.6	46.0	4.4	Pass
342.75M	QP	-9.1	41.6	46.0	4.4	Pass
46.8M	QP	-17.2	33.9	40.0	6.1	Pass
52.11M	QP	-18.6	32.1	40.0	7.9	Pass
44.28M	QP	-16.4	32.4	40.0	7.6	Pass
367.2M	QP	-7.7	41.0	46.0	5.0	Pass


Client	<b>Ecobee Inc.</b>	 Canada
Product	<b>ECB601/ECB501</b>	
Standard(s)	<b>RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247</b>	

High Channel (CH 49)										
2478.4	Peak	Horz	93.5	32.2	3.2	10.0	-33.8	105.1		PASS
2478.4	Avg	Horz	90.9	32.2	3.2	10.0	-33.8	102.6		PASS
2478.4	Peak	Vert	96.1	32.2	3.2	10.0	-33.8	107.8		PASS
2478.4	Avg	Vert	93.5	32.2	3.2	10.0	-33.8	105.2		PASS
2375.6	Peak	Horz	43.8	32.0	3.2	10.0	-34.1	54.9	74.0	19.1
2389.9	Avg	Horz	29.2	32.0	3.2	10.0	-34.1	40.3	54.0	13.7
2381.2	Peak	Vert	44.3	32.0	3.2	10.0	-34.1	55.3	74.0	18.7
2389.6	Avg	Vert	29.2	32.0	3.2	10.0	-34.1	40.3	54.0	13.7
2484	Peak	Horz	51.5	32.2	3.2	10.0	-33.8	63.2	74.0	10.8
2483.5	Avg	Horz	38.0	32.2	3.2	10.0	-33.8	49.7	54.0	4.3
2484	Peak	Vert	54.3	32.2	3.2	10.0	-33.8	66.0	74.0	8.0
2483.5	Avg	Vert	40.8	32.2	3.2	10.0	-33.8	52.5	54.0	1.5
High Channel (Ch 48)										
2476.8	Peak	Horz	94.7	32.2	3.2	10.0	-33.8	106.4		PASS
2476.8	Avg	Horz	92.2	32.2	3.2	10.0	-33.8	103.9		PASS
2476.8	Peak	Vert	97.1	32.2	3.2	10.0	-33.8	108.8		PASS
2476.8	Avg	Vert	94.5	32.2	3.2	10.0	-33.8	106.2		PASS
2357	Peak	Horz	43.3	31.9	3.2	10.0	-34.2	54.3	74.0	19.7
2386.4	Avg	Horz	29.2	32.0	3.2	10.0	-34.1	40.3	54.0	13.7
2338.4	Peak	Vert	43.4	31.9	3.2	10.0	-34.2	54.2	74.0	19.8
2388.1	Avg	Vert	29.2	32.0	3.2	10.0	-34.1	40.3	54.0	13.7
2483.9	Peak	Horz	49.5	32.2	3.2	10.0	-33.8	61.2	74.0	12.8
2483.5	Avg	Horz	35.7	32.2	3.2	10.0	-33.8	47.4	54.0	6.6
2483.9	Peak	Vert	51.7	32.2	3.2	10.0	-33.8	63.4	74.0	10.6
2483.5	Avg	Vert	38.3	32.2	3.2	10.0	-33.8	50.0	54.0	4.0
4953.6	Peak	Horz	41.8	34.1	4.5	10.0	-32.5	57.9	74.0	16.1
4953.6	Avg	Horz	27.3	34.1	4.5	10.0	-32.5	43.4	54.0	10.6
4953.6	Peak	Vert	42.1	34.1	4.5	10.0	-32.5	58.2	74.0	15.8
4953.6	Avg	Vert	27.4	34.1	4.5	10.0	-32.5	43.5	54.0	10.5
7430.4	Peak	Horz	43.6	35.7	6.0	10.0	-33.1	62.2	74.0	11.8
7430.4	Avg	Horz	29.3	35.7	6.0	10.0	-33.1	47.9	54.0	6.1
7430.4	Peak	Vert	42.9	35.7	6.0	10.0	-33.1	61.5	74.0	12.5
7430.4	Avg	Vert	29.7	35.7	6.0	10.0	-33.1	48.2	54.0	5.8


Client	<b>Ecobee Inc.</b>	
Product	<b>ECB601/ECB501</b>	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

## Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration Date	Next Calibration Date	Asset #
Spectrum Analyzer	ESU 40	Rohde & Schwarz	Feb. 11, 2022	Feb. 11, 2024	GEMC 233
Loop Antenna	EM 6871	Electro-Metrics	Feb 26, 2021	Feb 26, 2023	GEMC 70
Loop Antenna	EM 6872	Electro-Metrics	Feb 26, 2021	Feb 26, 2023	GEMC 71
BiLog Antenna	3142-C	ETS-Lindgren	Nov. 25, 2020	Nov. 25, 2022	GEMC 8
Horn Antenna 1 – 18 GHz	3117	ETS-Lindgren	Mar. 11, 2022	Mar. 11, 2024	GEMC 340
Attenuator 6 dB	6N5W-06	Inmet	NCR	NCR	GEMC 346
Attenuator 10 dB	8493B	Agilent	NCR	NCR	GEMC133
Pre-Amp 9 kHz – 1 GHz	CPA9230	Chase	May 22, 2020	May 22, 2022	GEMC 301
Pre-Amp 1 – 26.5 GHz	HP 8449B	HP	Mar. 11, 2022	Mar. 11, 2024	GEMC 189
2.4GHz-2.5GHz Notch Filter	BRM50702	Micro-Tronics	NCR	NCR	GEMC 230
RF Cable <1GHz	LMR-400	LexTec	NCR	NCR	GEMC 27
RF Cable <1GHz	HP305S	Semflex	NCR	NCR	GEMC 310
RF Cable >1GHz	EMC2	MegaPhase	NCR	NCR	GEMC 370
Emissions Software	V2.1.0	TUV SUD Canada, Inc.	NCR	NCR	GEMC 361

Client	<b>Ecobee Inc.</b>	 Canada
Product	<b>ECB601/ECB501</b>	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

## Appendix A – EUT Summary

Client	<b>Ecobee Inc.</b>	
Product	<b>ECB601/ECB501</b>	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

For further details for filing purposes, refer to filing package.

## General EUT Description


Client	
Organization / Address	Ecobee Inc. 25 Dockside Drive. Suite 700 Toronto, ON. M5A 0B5, Canada
Contact	John Russomanno
Phone	416-809-2405
Email	johnr@ecobee.com
EUT Details	
EUT Name	ECB601/ECB501
FCC ID	WR955470766937
IC	7981A-55470766937
Equipment Category	Unlicensed transmitter
Basic EUT Functionality	EUT is a smart thermostat that have a 2400 – 2483.5 MHz DTS (802.11 b/g/n) and FHSS transmitters and a 902 – 928 MHz FHSS/Hybrid transmitter. 5250-5350 MHz and 5725-5850 MHz UNII transmitter.
Input Voltage and Frequency	24 Vac 60 Hz
Connectors available on EUT	1 (terminals for HVAC control)
Peripherals Required for Test	120 Vac – 24 Vac step down transformer.
Release type	Final
Intentional Radiator Frequency Range	2400 – 2483.5 MHz for DTS and FHSS 902 – 928 MHz FHSS/Hybrid 5250-5350 MHz and 5725-5850 MHz UNII transmitter.
Antenna	Flexible PCB antennas
Type of Transmitter	Hybrid, Frequency Hopping and Digitally Modulated
Modulation	FSK for Sub Gig Various for 2.4 GHz 802.11 b/g/n, FSK, etc
EUT Configuration	Test software was configured to transmit continuously at 100% duty cycle and to control



Client	<b>Ecobee Inc.</b>	
Product	<b>ECB601/ECB501</b>	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

	hopping through its pseudo random sequence or single channel. Channels tested: Lowest and Highest
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Note the EUT is considered to have been received the date of the commencement of the first test, unless otherwise stated. For a close-up picture of the EUT, see ‘Appendix B – EUT and Test Setup Photos’.

Client	<b>Ecobee Inc.</b>	 Canada
Product	<b>ECB601/ECB501</b>	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247	

## Appendix B – EUT and Test Setup Photos

Refer to the files separate from this test report