



# Radio Frequency Exposure Evaluation Report

**FOR:**  
Innophase Inc.

**Model Number:**  
INP2045 Module

**Product Description:**  
Low Power Wi-Fi/BLE IOT Module

**FCC ID:** 2AVAL-INP2045  
**IC ID:** 25715-INP2045

**Per:**

CFR Part Part1 (1.1307 &1.1310), Part 2 (2.1091),  
FCC KDB 447498 D01 General RF Exposure Guidance v06  
ISED RSS-102 Issue 5

**Report number:** EMC\_INNOP-005-19001\_FCC\_ISED\_MPE

**DATE:** 2020-01-06



**CETECOM Inc.**  
411 Dixon Landing Road • Milpitas, CA 95035 • U.S.A.  
Phone: + 1 (408) 586 6200 • Fax: + 1 (408) 586 6299 • E-mail: [info@cetecom.com](mailto:info@cetecom.com) • <http://www.cetecom.com>  
CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

## 1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 &1.1310), Part 2 (2.1091) and IC standard RSS-102 issue 5 under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant).

In addition, maximum antenna gain or minimum distance towards the human body is calculated respectively, where relevant.

The device meets the limits as stipulated by the above given FCC and IC rule parts based on available specifications for worst case conditions at 20cm distance to the body.

Company	Description	Model #
Innophase Inc.	Low Power Wi-Fi/BLE IOT Module	INP2045 Module

### Report reviewed by: TCB Evaluator

2020-01-06	Compliance	Cindy Li (Lab Manager)

### Responsible for the Report:

2020-01-06	Compliance	Kevin Wang (Senior EMC Engineer)

## 2 Administrative Data

### 2.1 Identification of the Testing Laboratory Issuing the Test Report

<b>Company Name:</b>	CETECOM Inc.
<b>Department:</b>	Compliance
<b>Street Address:</b>	411 Dixon Landing Road
<b>City/Zip Code</b>	Milpitas, CA 95035
<b>Country</b>	USA
<b>Telephone:</b>	+1 (408) 586 6200
<b>Fax:</b>	+1 (408) 586 6299
<b>Lab Manager:</b>	Cindy Li
<b>Responsible Project Leader:</b>	Trina Noor

### 2.2 Identification of the Client / Manufacturer

<b>Client's Name:</b>	Innophase Inc.
<b>Street Address:</b>	6815 Flanders Drive, Suite 150
<b>City/Zip Code</b>	San Diego, CA 92121
<b>Country</b>	USA

#### Identification of the Manufacturer

<b>Manufacturer's Name:</b>	
<b>Manufacturers Address:</b>	Same as Client
<b>City/Zip Code</b>	
<b>Country</b>	

### 3 Equipment under Assessment

<b>Model No:</b>	INP2045 Module
<b>HW Version :</b>	INP2045-H
<b>SW Version :</b>	7d721afe
<b>Hardware Version Identification Number (HVIN):</b>	INP2045-H
<b>Product Marketing Name (PMN):</b>	Talaria-TWO
<b>Regulatory Band:</b>	<ul style="list-style-type: none"> <li>❖ <b><u>WLAN:</u></b> <ul style="list-style-type: none"> <li>▪ Nominal band: 2400 MHz – 2483.5 MHz;</li> <li>▪ Center to center: 2412 MHz (ch 1) – 2462 MHz (ch 11), 11 channels</li> </ul> </li> <li>❖ <b><u>BT-LE:</u></b> <ul style="list-style-type: none"> <li>▪ Nominal band: 2400 MHz – 2483.5 MHz;</li> <li>▪ Center to center: 2402 MHz (ch 0) – 2480 MHz (ch 39), 40 channels</li> </ul> </li> </ul>
<b>Integrated Module Info:</b>	<ul style="list-style-type: none"> <li>❖ <b><u>WLAN:</u></b> <ul style="list-style-type: none"> <li>▪ Module name: INP2045 Module</li> <li>▪ FCC/IC ID: 2AVAL-INP2045/25715-INP2045</li> </ul> </li> <li>❖ <b><u>BT-LE:</u></b> <ul style="list-style-type: none"> <li>▪ Module name: INP2045 Module</li> <li>▪ FCC/IC ID: 2AVAL-INP2045/25715-INP2045</li> </ul> </li> </ul>
<b>Antenna Type:</b>	<ul style="list-style-type: none"> <li>❖ <b><u>WLAN / BT-LE:</u></b> <ul style="list-style-type: none"> <li>▪ Antenna gain: 0 dBi</li> </ul> </li> </ul>
<b>Maximum Conducted Output Power:</b>	<ul style="list-style-type: none"> <li>❖ <b><u>WLAN:</u></b> 0.054 W</li> <li>❖ <b><u>BT-LE:</u></b> 0.008 W</li> </ul>
<b>Power Supply/ Rated Operating Voltage Range:</b>	Vmin: 2.7 VDC/ Vnom: 3.3 VDC / Vmax: 3.6 VDC
<b>Operating Temperature Range:</b>	-10 °C to 75 °C
<b>Sample Revision:</b>	<input type="checkbox"/> Prototype Unit; <input checked="" type="checkbox"/> Production Unit; <input type="checkbox"/> Pre-Production

## 4 RF Exposure Limits and FCC and IC Basic Rules

For the specific described radio apparatus the following basic limits and rules apply for both, FCC and IC where not indicated differently.

### 4.1 Power Density Limits acc. to FCC 1.1310(e) / RSS-102 i5, cl. 4:

FCC

Frequency Range (MHz)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
300 – 1500	$f \text{ (MHz)} / 1500$	30
1500 – 100000	1.0	30

IC

300 – 6000	$0.02619 \times f \text{ (MHz)}^{0.6834}$	6
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### 4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.1091(c) / RSS-102, cl. 2.5 (rounded to 1 decimal point):

FCC

operating frequency < 1.5GHz: excluded if ERP < 1.5W / 31.8dBm (EIRP: 33.9 dBm);  
operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm (EIRP: 36.9 dBm);

IC

300MHz <= operating frequency < 6 GHz: excluded if EIRP <  $0.0131 \times f \text{ (MHz)}^{0.6834} \text{ W}$

### 4.3 RF Exposure Estimation (MPE Estimation)

Having available the source based average output power and peak antenna gain or the ERP/EIRP of the specified device and for a known minimum distance of its radiating structures from the body of persons according to its use cases (at least 20cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (mW/cm<sup>2</sup> or W/m<sup>2</sup>)

P = power input to the antenna (mW or W)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (cm or m)

## 5 Evaluations

### 5.1 Analysis of RF Exposure for simultaneous transmission

- Evaluations are based on worst case power density limits for Canada.
- Calculations are made for 20cm.
- Evaluations are based on ERP/EIRP measured or calculated from known gain and conducted output power.
- WLAN can transmit simultaneously with BT-LE.

Radio	freq [MHz]	Max Conducted power [W]	Gain [dBi]	Gain [lin]	EIRP [W]	IC Limit [W/m <sup>2</sup> ]	FCC Llimit [W/m <sup>2</sup> ]	Actual [W/m <sup>2</sup> ] <sup>2</sup>	How much of limit is used up
BT-LE	2400	0.00857	2	1.58	0.014	5.348	10.000	0.027	0.50%
WLAN	2400	0.05380	2	1.58	0.085	5.348	10.000	0.170	3.16%

**Note1:** The calculation is based on the distance of 20cm

### 5.2 Conclusion:

The worst-case simultaneous transmission is WLAN simultaneous with BT-LE, which is using 3.66 of a limit of 100%. The equipment is passing RF exposure requirements for 20cm distance.

## 6 Revision History

Date	Report Name	Changes to report	Report prepared by
2020-01-06	EMC_INNOP-005-19001_FCCISED_MPE	Initial Release	Kevin Wang

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