



# Radio Frequency Exposure Evaluation Report

FOR: Compology

**Model Number:** R13 & R13L (Variant)

## Product Description:

Wireless device captures still images, GPS location and accelerometer information and transmits via the CAT-M1 network. Also includes BLE and NFC.

**FCC ID:** 2AO44-R13

**IC ID:** 23661-R13

**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\_COMPO\_012\_18001\_FCC\_ISED\_MPE\_rev3

**DATE:** 05/20/2019



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### 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 #
Compology	Wireless device captures still images, GPS location and accelerometer information and transmits via the CAT-M1 network. Also includes BLE and NFC.	R13, R13L *1

\*1: R13L is a Variant of R13. Check section 3 for more details.

#### Report reviewed by:

05/20/2019      Compliance      Cindy Li  
 (Lab Manager)

Date	Section	Name	Signature
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#### Responsible for the Report:

05/20/2019      Compliance      Issa Ghanma  
 (EMC Engineer)

Date	Section	Name	Signature
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**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
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<b>Lab Manager:</b>	Cindy Li
<b>Responsible Project Leader:</b>	Trina Noor

**2.2 Identification of the Client / Manufacturer**

<b>Applicant's Name:</b>	Compology
<b>Street Address:</b>	1045 Brayent St. Suite 101
<b>City/Zip Code</b>	San Francisco , CA 94103
<b>Country</b>	USA

**2.3 Identification of the Manufacturer**

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

### 3 Equipment under Assessment

<b>Marketing name:</b>	Oscar R13
<b>HW Version :</b>	Rev_D
<b>SW Version :</b>	Oscar-0300
<b>Hardware Version Identification Number (HVIN):</b>	R13, R13L
<b>Product Marketing Name (PMN):</b>	Oscar R13
<b>Regulatory Band:</b>	<ul style="list-style-type: none"> <li>❖ <b><u>Cellular Module:</u></b> <ul style="list-style-type: none"> <li>▪ LTE BAND 2 : 1852.5 ~ 1907.5MHz</li> <li>▪ LTE BAND 4 : 1715.0 ~ 1750.0MHz</li> <li>▪ LTE BAND 12 : 699.0 ~ 716.0MHz</li> </ul> </li> <li>❖ <b><u>Bluetooth low energy:</u></b> <ul style="list-style-type: none"> <li>▪ 2402 MHz (ch0) – 2480 MHz (ch39), 40 channels.</li> </ul> </li> </ul>
<b>Chipset manufacturer number:</b>	BLUENRG-232 (Bluetooth LE)
<b>Integrated Module Info:</b>	<ul style="list-style-type: none"> <li>❖ <b><u>Cellular:</u></b> <ul style="list-style-type: none"> <li>▪ Product name: U-blox SARA-R410M-02B</li> <li>▪ Model number: SARA-R410M-02B</li> <li>▪ FCC ID: XPY2AGQN4NNN</li> </ul> </li> <li>❖ <b><u>GPS:</u></b> <ul style="list-style-type: none"> <li>▪ Module name: U-blox EVA-M8M</li> <li>▪ Model number: EVA-M8M-0</li> </ul> </li> </ul>
<b>Power Supply/ Rated Operating Voltage Range:</b>	Low: 2.5, Nominal: 3.67, High: 3.9
<b>Operating Temperature Range:</b>	Low: -20, Nominal: 20, High: 85
<b>Sample Revision:</b>	<input type="checkbox"/> Prototype Unit; <input type="checkbox"/> Production Unit; <input checked="" type="checkbox"/> Pre-Production

<b>Antenna Type:</b>	<ul style="list-style-type: none"><li>❖ <b>Cellular:</b><ul style="list-style-type: none"><li>▪ Internal antenna</li><li>▪ Taoglas PCS.06.A, SMD</li><li>▪ Maximum peak gain:<ul style="list-style-type: none"><li>○ 698 ~ 803: -0.21 dBi</li><li>○ 824 ~ 1880: 3.05 dBi</li><li>○ 1850 ~ 1990: 2.92 dBi</li></ul></li></ul></li><li>❖ <b>Bluetooth LE:</b><ul style="list-style-type: none"><li>▪ Internal antenna</li><li>▪ P/N: 2450AT43B100E</li><li>▪ Maximum peak gain: 1.3 dBi</li></ul></li></ul>
<b>Maximum Conducted Output Power:</b>	<ul style="list-style-type: none"><li>❖ <b>Cellular:</b> From modular grant [Watts]:<ul style="list-style-type: none"><li>▪ LTE Band 2: 0.316</li><li>▪ LTE Band 4: 0.316</li><li>▪ LTE Band 12: 0.316</li></ul></li><li>❖ <b>Bluetooth LE:</b> Measured [Watts]: 0.0071</li></ul>

#### 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 (MHz) /1500	30
1500 – 100.000	1.0	30

IC

300 – 6000	0.02619 x f (MHz) <sup>0.6834</sup>	6
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##### 4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.109(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);  
 operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm (EIRP: 36.9);

IC

300MHz <= operating frequency < 6 GHz: excluded if EIRP < 0.0131 x f (MHz)<sup>0.6834</sup> 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 RF Exposure evaluation for Stand Alone Operation

- 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.
- Cellular cannot transmit simultaneously

Band	Lowest frequency [MHz]	ERP/EIRP [dBm]	FCC EIRP limit [dBm]	EIRP [W]	ISED EIRP limit [W]	Actual [W/m2]	FCC [W/m2]	ISED [W/m2]	Verdict
LTE 2	1850	27.917	36.90	0.619	2.24	1.231	10.0	4.476	Complies
<b>LTE 4</b>	1710	<b>28.047</b>	36.90	<b>0.638</b>	2.12	<b>1.269</b>	10.0	4.242	Complies
LTE 12	699	22.637	33.90	0.301	1.15	0.599	4.66	2.302	Complies
<b>BT-LE</b>	<b>2402</b>	<b>9.79</b>	<b>36.90</b>	<b>0.01</b>	<b>2.68</b>	<b>0.019</b>	<b>10.0</b>	<b>5.351</b>	Complies

The single radios meet RF Exposure limits at distances of 20 CM.





## 6 Revision History

Date	Report Name	Changes to report	Report prepared by
03/13/2019	EMC_COMPO_012_18001_FCC_ISED_MPE	Initial Release	Issa Ghanma
03/21/2019	EMC_COMPO_012_18001_FCC_ISED_MPE_rev1	FCC ID correction	Issa Ghanma
03/26/2019	EMC_COMPO_012_18001_FCC_ISED_MPE_rev2	Correction: Section 3.1 <ul style="list-style-type: none"> <li>• Replace Module name with <b>Chipset manufacturer number</b>.</li> </ul> Replace BLUENRG-2323 with <b>BLUENRG-232</b>	Issa Ghanma
05/20/2019	EMC_COMPO_012_18001_FCC_ISED_MPE_rev3	<ul style="list-style-type: none"> <li>• Wording correction in</li> <li>• EIRP Correction for BLE, by not using a rounded power, but exact power.</li> </ul> Changes made to section 5.1 of this document	Issa Ghanma

