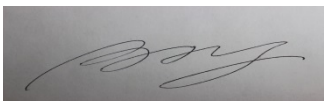
RF EXPOSURE REPORT

Report No.: CE_RF Exposure_ SL18040201-RIO-001
Supersede Report No.: NONE

Applicant	Resin.io
Host Product Name	Raspberry Compute Module 3 Lite
Model No.	Balena Fin
Test Standard	EU 1999/519/EC EN 62311: 2008
Test Method	EN 62311: 2008
Date of test	05/15/2018 – 06/29/2018
Issue Date	06/29/2018
Test Result	Pass Fail
Equipment complied with the specification	[x]
Equipment did not comply with the specification	[ ]

	
Benjamin Jing	Chen Ge
Test Engineer	Engineer Reviewer

Issued By:
SIEMIC Laboratories
775 Montague Expressway, Milpitas, 95035 CA

Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC , RF/Wireless , Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless , Telecom
Taiwan	BSMI , NCC , NIST	EMC, RF, Telecom , Safety
Hong Kong	OFTA , NIST	RF/Wireless ,Telecom
Australia	NATA, NIST	EMC, RF, Telecom , Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF , Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC , RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom , Safety
Israel	MOC, NIST	EMC, RF, Telecom, Safety

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC , RF , Telecom
Canada	IC FCB , NIST	EMC , RF , Telecom
Singapore	iDA, NIST	EMC , RF , Telecom
EU	NB	EMC & Radio Equipment Directive (RED)
Japan	MIC (RCB 208)	RF , Telecom
HongKong	OFTA (US002)	RF , Telecom

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1 Report Revision History

Report No.	Report Version	Description	Issue Date
CE_Exposure_SL18040201-RIO-001	Original	Original	06/29/2018

2 Executive Summary

The purpose of this test program was to demonstrate compliance of following product

Company:	Resin.io
Product:	Raspberry Compute Module 3 Lite
Model :	Balena Fin

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1st page.

3 Customer information

Applicant Name	Resin.io
Applicant Address	One London Wall 6th floor London EC2Y 5EB United Kingdom
Manufacturer Name	Resin.io
Manufacturer Address	One London Wall 6th floor London EC2Y 5EB United Kingdom

4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	881796
IC Test Site No.	4842D-2
VCCI Test Site No.	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Host Product Name	Raspberry Compute Module 3 Lite
Model No.	Balena Fin
Trade Name	Resin.io
Serial No.	N/A
Input Power	100-240VAC,50/60Hz
Power Adapter Manu/Model	VEL36US120-US-JA
Power Adapter SN	E317867
Product Hardware version	N/A
Product Software version	Dut Labtool
Radio Hardware version	N/A
Radio Software version	Dut Labtool
Date of EUT received	04/15/2018
Equipment Class/ Category	Wideband transmission systems
Port/Connectors	1 X RJ45, 2 X USB, 1 X mini USB, 1 X HDMI
Remark	NONE

6.2 Radio Description

Specs for Radio

Specs for BT

Radio Type	Bluetooth
Operating Frequency	2402MHz-2480MHz
Modulation	FHSS (BDR/EDR)
Channel Spacing	1MHz (BDR, EDR)
Antenna Type	External antenna : ¼ Dipole - Omni Embedded antenna : SMD
Antenna Gain	External antenna : 2 dBi ; Embedded antenna : 1 dBi
Antenna Connector Type	U.FL -

Specs for BLE

Radio Type	Bluetooth
Operating Frequency	2402MHz-2480MHz
Modulation	GFSK (LE)
Channel Spacing	2MHz (LE)
Antenna Type	External antenna : ¼ Dipole - Omni Embedded antenna : SMD
Antenna Gain	External antenna : 2 dBi ; Embedded antenna : 1 dBi
Antenna Connector Type	U.FL -

Specs for 2.4 GHz WLAN

Radio Type	802.11b	802.11g	802.11n-20M	802.11n-40M
Operating Frequency	2412-2462MHz	2412-2462MHz	2412-2462MHz	2422-2462MHz
Modulation	DSSS (CCK, DQPSK, BPSK)	OFDM-CCK (BPSK, QPSK, 16QAM,64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	5MHz	5MHz	5MHz(2.4GHz)	40MHz
Number of Channels	11	11	11(2.4GH)	7(2.4GH)
Antenna Type	External antenna : ¼ Dipole - Omni Embedded antenna : SMD			
Antenna Gain (Peak)	External antenna : 2 dBi ; Embedded antenna : 1 dBi			
Antenna Connector Type	U.FL -			
Remarks	2.4GHz and 5GHz Radio does not transmit simultaneously			

Specs for 5 GHz WLAN

Radio Type	802.11a	802.11n-20M	802.11n-40M	802.11ac-80M
Operating Frequency	5180-5240MHz 5260-5320MHz 5500-5700MHz 5745-5825MHz	5180-5240MHz 5260-5320MHz 5500-5700MHz 5745-5825MHz	5190-5230MHz 5270-5310MHz 5510-5670MHz 5755-5795MHz	5210MHz, 5290MHz 5530MHZ, 5610MHz, 5690MHz,5775MHz
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	20MHz	20MHz (5GHz)	40MHz	80MHz
Number of Channels	22	22 (5GHz)	10 (5GHz)	6 (5GHz)
Antenna Type	External antenna : ¼ Dipole - Omni Embedded antenna : SMD			
Antenna Gain	External antenna : 2 dBi Embedded antenna : 1 dBi			
Antenna Connector Type	U.FL -			
Remarks	2.4GHz and 5GHz Radio does not transmit simultaneously			

7 RF Exposure Evaluation

7.1 Human Exposure to The Electromagnetic Fields

Requirement(s):

<table>
<tr><th>Spec</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>EN 62311: 2008</td><td>According to EN 62311:2008, the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified 1999/519/EC.
Reference levels for electric, magnetic and electromagnetic fields
(0 Hz to 300 GHz, unperturbed rms values)
<table>
<tr><th>Frequency range</th><th>E-field strength (V/m)</th><th>H-field strength (A/m)</th><th>B-field (μT)</th><th>Equivalent plane wave power density S_{eq} (W/m²)</th></tr>
<tr><td>0-1 Hz</td><td>—</td><td>3,2 × 10⁴</td><td>4 × 10⁴</td><td>—</td></tr>
<tr><td>1-8 Hz</td><td>10 000</td><td>3,2 × 10⁴/f²</td><td>4 × 10⁴/f²</td><td>—</td></tr>
<tr><td>8-25 Hz</td><td>10 000</td><td>4 000/f</td><td>5 000/f</td><td>—</td></tr>
<tr><td>0,025-0,8 kHz</td><td>250/f</td><td>4/f</td><td>5/f</td><td>—</td></tr>
<tr><td>0,8-3 kHz</td><td>250/f</td><td>5</td><td>6,25</td><td>—</td></tr>
<tr><td>3-150 kHz</td><td>87</td><td>5</td><td>6,25</td><td>—</td></tr>
<tr><td>0,15-1 MHz</td><td>87</td><td>0,73/f</td><td>0,92/f</td><td>—</td></tr>
<tr><td>1-10 MHz</td><td>87/f^1/2</td><td>0,73/f</td><td>0,92/f</td><td>—</td></tr>
<tr><td>10-400 MHz</td><td>28</td><td>0,073</td><td>0,092</td><td>2</td></tr>
<tr><td>400-2 000 MHz</td><td>1,375 f^1/2</td><td>0,0037 f^1/2</td><td>0,0046 f^1/2</td><td>f/200</td></tr>
<tr><td>2-300 GHz</td><td>61</td><td>0,16</td><td>0,20</td><td>10</td></tr>
</table>
Notes:
1. f as indicated in the frequency range column.
2. For frequencies between 100 kHz and 10 GHz, Seq, E2, H2, and B2 are to be averaged over any six-minute period.
3. For frequencies exceeding 10 GHz, Seq, E2, H2, and B2 are to be averaged over any 68/f1.05 -minute period (f in GHz).
4. No E-field value is provided for frequencies < 1 Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 25 kV/m. Spark discharges causing stress or annoyance should be avoided.</td><td>☒</td></tr>
<tr><td>Classification of the assessment method</td><td>The antenna of the product, under normal use condition is at least 20 cm away from the body of the end user. Warning statement to the use for keeping at least 20 cm separation distance and the prohibition of operating to a person has been printed on the user's manual. So, this product under normal use is located on electromagnetic far field to the human body.
Far Filed Calculation Formula
$Given$
$E = \frac{\sqrt{30 \times G \times TP}}{D}$
$D = \frac{\sqrt{30 \times G \times TP}}{E}$
Where
G = Numerical Gain of antenna
TP = conducted power in W
D=separation distance in m</td><td></td></tr>
<tr><td>Remark</td><td>None</td><td></td></tr>
<tr><td>Result</td><td>☒ Pass ☐ Fail</td><td></td></tr>
</table>

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Test Results:

Type	CH Freq (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Measurement distance (cm)	Calculated MPE (W/m2)	MPE Limit (W/m2)	Pass / Fail
BT	2441	0.31	2	20	0.003	10	Pass
BLE	2440	1.65	2	20	0.005	10	Pass
2.4GHz WiFi	2437	15.9	2	20	0.122	10	Pass
5GHz WiFi	5775	11.7	2	20	0.046	10	Pass

Annex A. SIEMIC Accreditation

Accreditations	Document	Scope / Remark
SO 17025 (A2LA)		lease see the documents for the detailed scope
SO Guide 65 (A2LA)		lease see the documents for the detailed scope
CB Designation		1, A2, A3, A4, B1, B2, B3, B4, C
CC DoC Accreditation		CC Declaration of Conformity Accreditation
CC Site Registration		meter site
CC Site Registration		0 meter site
C Site Registration		meter site
C Site Registration		0 meter site
U NB		adio & Telecommunications Terminal Equipment: EN45001 – EN ISO/IEC 17025
		lectromagnetic Compatibility: EN45001 – EN ISO/IEC 17025
ingapore iDA CB(Certification Body)		hase I, Phase II
ietnam MIC CAB Accreditation		lease see the document for the detailed scope
ongKong OFCA		Phase II) OFCA Foreign Certification Body for Radio and Telecom
		Phase I) Conformity Assessment Body for Radio and Telecom
ndustry Canada CAB		adio: Scope A – All Radio Standard Specification in Category I
		elecom: CS-03 Part I, II, V, VI, VII, VIII

apan Recognized Certification Body Designation		Radio : A1. Terminal equipment for purpose of calling Telecom : B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law
orea CAB Accreditation		EMI: KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMIEMS: KCC Notice 2008-38, RRL Notice 2008-4: CA Procedures for EMS KN24, KN61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8, -4-11: Test Method for EMS
		Radio: RRL Notice 2008-26, RRL Notice 2008-2, RRL Notice 2008-10, RRL Notice 2007-49, RRL Notice 2007-20, RRL Notice 2007-21, RRL Notice 2007-80 RRL Notice 2004-68
		Telecom: President Notice 20664, RRL Notice 2007-30, RRL Notice 2008-7 with attachments 1, 3, 5, 6; President Notice 20664, RRL Notice 2008-7 with attachment 4
aiwan NCC CAB Recognition		P0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08
aiwan BSMI CAB Recognition		CNS 13438
apan VCCI		R-3083: Radiation 3 meter site C-3421: Main Ports Conducted Interference Measurement T-1597: Telecommunication Ports Conducted Interference Measuremet
ustralia CAB recognition		EMC: AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4
		Radiocommunications: AS/NZS 4281, AS/NZS 4268, AS/NZS 4280.1, AS/NZS 4280.2, AS/NZS 4295, AS/NZS 4582, AS/NZS 4583, AS/NZS 4769.1, AS/NZS 4769.2, AS/NZS 4770, AS/NZS 4771
		Telecommunications: AS/ACIF S002:05, AS/ACIF S003:06, AS/ACIF S004:06 AS/ACIF S006:01, AS/ACIF S016:01, AS/ACIF S031:01, AS/ACIF S038:01, AS/ACIF S040:01, AS/ACIF S041:05, AS/ACIF S043.2:06, AS/ACIF S60950.1
ustralia NATA Recognition		S/ACIF S002, AS/ACIF S003, AS/ACIF S004, AS/ACIF S006, AS/ACIF S016,AS/ACIF S031, AS/ACIF S038, AS/ACIF S040, AS/ACIF S041, AS/ACIF S043.2