ETSI EN 301 489-1 V1.9.2
ETSI EN 301 489-17 V2.2.1

TEST REPORT

For

Next Thing Company

1940 Union St #32,
Oakland, CA 94607, USA

Model: HELLA 1337

Report Type: Original Report	**Product Type:** C.H.I.P. Computer
Prepared By	Kevin Wang Test Engineer
Report Number	R15101413-12
Report Date	2015-12-29
Reviewed By	Elijah Garcia EMC supervisor
	Bay Area Compliance Laboratories Corp. 1274 Anvilwood Ave. Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732-9164

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R15101413-12	Original Report	2015-12-29

1 General Information

1.1 General Statements

Bay area Compliance Laboratory Corp. [BACL] hereby makes the following Statements:

- The Unit(s) described in this Test Report were received at BACL's facilities on 16 October 2015. Testing was performed on the Unit(s) described in this Test Report during the period 02 through 09 November 2015.
- The Test Results reported herein apply only to the Unit(s) actually tested, and to substantially identical Units.
- This Test Report must not be used to claim product endorsement by A2LA, or any agency of the U.S. Government, or by any other foreign government.
- This Test Report is the property of BACL, and shall not be reproduced, except in full, without prior written approval of BACL.

1.2 Purpose

The purpose of this Test Report is to document the compliance of the *Next Thing Co*, product *C.H.I.P Computer*, model: *HELLA1337* to the requirements stated in ETSI EN 301 489-1 V1.9.2 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements" and, to the requirements stated in ETSI EN 301 489-17 V2.2.1 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment; Part 9: Specific conditions for wireless microphones, similar Radio Frequency (RF) audio link equipment, cordless audio and in-ear monitoring devices.

This Test Report references the applicable Electromagnetic Emissions and Immunity requirements.

THE DATA CONTAINED IN THIS TEST REPORT WAS COLLECTED AND COMPILED BY:

Kevin Wang
Test Engineer

1.3 Agent for the Responsible Party

None

1.4 Responsible Party

Company Name:	Next thing Co
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1.5 Product Description of the Equipment under Test (EUT)

The "EUT" (Equipment under Test) was a computer, contains 2.4GHz 802.11b/g/n and Bluetooth 4.0 dual modes.

1.6 Mechanical Description of the EUT

Dimensions: approximately 60 mm (L) x 41 mm (W) x 10 mm (H)
Weight: approximately 23.5 g.
Serial Number: None.
EUT Photos: See Exhibit C of this Test Report.

1.7 Related Submittal(s)/Grant(s)

None

1.8 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Appendix B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

1.9 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2005 by A2LA (Test Laboratory Accreditation Certificate Number 3279.02),*** in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2005 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report..

BACL's ISO/IEC 17025:2005 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3279.03)*** to certify

- For the USA (Federal Communications Commission):
  - 1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
  - 2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
  - 3- All Telephone Terminal Equipment within FCC Scope C.
- For the Canada (Industry Canada):
  - 1- All Scope 1-Licence-Exempt Radio Frequency Devices;
  - 2- All Scope 2-Licensed Personal Mobile Radio Services;
  - 3- All Scope 3-Licensed General Mobile & Fixed Radio Services;
  - 4- All Scope 4-Licensed Maritime & Aviation Radio Services;
  - 5- All Scope 5-Licensed Fixed Microwave Radio Services
  - 6- All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.
- For Singapore (Info-Communications Development Authority (IDA)):
  - 1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
  - 2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2
- For the Hong Kong Special Administrative Region:
  - 1 All Radio Equipment, per KHCA 10XX-series Specifications;
  - 2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
  - 3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.
- For Japan:
  - 1 MIC Telecommunication Business Law (Terminal Equipment):
    - All Scope A1 - Terminal Equipment for the Purpose of Calls;
    - All Scope A2 - Other Terminal Equipment
  - 2 Radio Law (Radio Equipment):
    - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
    - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
    - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3279.01)*** to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

1 Electronics and Office Equipment:
- for Telephony (ver. 3.0)
- for Audio/Video (ver. 3.0)
- for Battery Charging Systems (ver. 1.1)
- for Set-top Boxes & Cable Boxes (ver. 4.1)
- for Televisions (ver. 6.1)
- for Computers (ver. 6.0)
- for Displays (ver. 6.0)
- for Imaging Equipment (ver. 2.0)
- for Computer Servers (ver. 2.0)

2 Commercial Food Service Equipment
- for Commercial Dishwashers (ver. 2.0)
- for Commercial Ice Machines (ver. 2.0)
- for Commercial Ovens (ver. 2.1)
- for Commercial Refrigerators and Freezers

3 Lighting Products
- For Decorative Light Strings (ver. 1.5)
- For Luminaires (including sub-components) and Lamps (ver. 1.2)
- For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
- For Integral LED Lamps (ver. 1.4)

4 Heating, Ventilation, and AC Products
- for Residential Ceiling Fans (ver. 3.0)
- for Residential Ventilating Fans (ver. 3.2)

5 Other
- For Water Coolers (ver. 3.0)

D- ***A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:***

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Industry Canada - IC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
  - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
  - EMC Directive 2004/108/EC US-EU EMC & Telecom MRA CAB
  - Radio & Teleterminal Equipment (R&TTE) Directive 1995/5/EC US -EU EMC & Telecom MRA CAB
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Development Authority - IDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
  - ENERGY STAR Recognized Test Laboratory – US EPA
  - Telecommunications Certification Body (TCB) – US FCC;
- Vietnam: APEC Tel MRA -Phase I;

1.10 Measurement Uncertainties

All measurements involve uncertainties. In the case of EMC Emissions tests, the influence quantities (factors) that make a significant contribution to the measurement uncertainties are detailed in the latest version of CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Measurement instrumentation uncertainty" (i.e., CISPR 16-4-2:2011-06 + C1:2013-04 +A1:2014-02).

Based on the uncertainty models given in the latest version of CISPR 16-4-2, and, based on the calibration uncertainties of the specific instruments and facilities used at BACL to perform the measurements documented in this Test Report, the following estimates have been made of BACL's Measurement Uncertainties for the measurements documented in this Test Report.

Type of Measurement	**BACL Typical U_{LAB} Value** **(for a k=2 Coverage Factor, equivalent to ~ 95% level of confidence)**	**U_{CISPR} Value** **worst-allowable values, per Table 1 of the latest version of CISPR 16-4-2 (for a k=2 Coverage Factor, equivalent to ~ 95% level of confidence)**
Conducted Disturbance (Mains Port) 150 kHz to 30 MHz (i.e., AC/DC Line Conducted Emissions measurements made with an LISN)	3.3 dB	3.4 dB
Radiated Disturbance on an OATS 30 MHz – 1000 MHz (i.e., Radiated Emissions measured in a SAC at 10 metres distance)	5.8 dB	6.3 dB
Radiated Disturbance on an OATS 1 GHz – 6 GHz (i.e., Radiated Emissions measured in a FAR at 3 metres distance)	5.1 dB	5.2 dB

2 System Test Configuration

2.1 Justification

The system was configured for testing according to ETSI EN 301 489-1

2.2 EUT Exercise Software

The test utility used is *UART Terminal (RS-232)* provided by *Next Thing, Co.*

2.3 Equipment Modifications

A SMA port was attached to the output signal before the antenna of the EUT to perform conducted measurements.

2.4 Special Equipment

N/A

2.5 Local Support Equipment

Manufacturer	Description	Model No.
Acer	Laptop	ZHK

2.6 EUT Internal Configuration Details

Manufacturer	Description	Model
Realtek Semiconductor Corp.	WIFI/BT Module	RTL8723BS
Allwinner Technology	Soc	R8

2.7 Support Equipment

Manufacturer	Description	Model
Apple	USB Power Adapter	A1357
Asian Power Devices, Inc	AC Adapter	WB-10E05FU

2.8 Interface Ports and Cabling

Cable Description	Length (m)	To	From
USB Cable	<1M	Laptop	EUT
RF Cable	<1M	EUT	PSA

3 Emissions Testing Requirements

3.1 EMC Emissions Test Requirements as a function of type of use

Clause 7.1.1 of ETSI EN 301 489-17 V2.2.1 states that EN 301 489-1 contains the applicability of EMC emission measurements to the relevant ports of radio and/or associated ancillary equipment. Table 1 of ETSI EN 301 489-1 V1.9.1 is reproduced below for the convenience of the reader.

Table 1: EMC emission measurements for radio and associated ancillary equipment specified in the present document, overview

Phenomenon	Application	Equipment test requirement			Reference clause in the present document
		Radio and ancillary equipment for fixed use (e.g. base station equipment)	Radio and ancillary equipment for vehicular use (e.g. mobile equipment)	Radio and ancillary equipment for portable use (portable equipment)	
radiated emission	enclosure of ancillary equipment	applicable for stand alone testing	applicable for stand alone testing	applicable for stand alone testing	8.2
conducted emission	DC power input/output port	applicable	applicable	not applicable	8.3
conducted emission	AC mains input/output port	applicable	not applicable	not applicable	8.4
harmonic current emissions	AC mains input port	applicable	not applicable	not applicable	8.5
voltage fluctuations and flicker	AC mains input port	applicable	not applicable	not applicable	8.6
conducted emission	telecommunication port	applicable	not applicable	not applicable	8.7

3.2 Special Conditions for EMC Emissions Measurements

Clause 7.1.2 of ETSI EN 301 489-17 V2.2.1 states that no special conditions shall apply for Emissions testing of radio equipment.

3.3 Declaration of Type of Use

Based upon the technical characteristics of the product, for the purposes of EMC Emissions testing, the EUT was determined to be an item of “radio equipment for fixed use”.

4 Immunity Testing Requirements

4.1 EMC Immunity Test Requirements as a function of type of use

Clause 7.2.1 of ETSI EN 301 489-17 V2.2.1states that EN 301 489-1 contains the applicability of EMC immunity measurements to the relevant ports of radio and/or associated ancillary equipment. Table 2 of ETSI EN 301 489-1 V1.9.1 is reproduced below for the convenience of the reader.

Table 2: Immunity tests for radio and associated ancillary equipment specified in the present document, overview

Phenomenon	Application	Equipment test requirement			Reference clause in the present document
		Radio and ancillary equipment for fixed use (e.g. base station equipment)	Radio and ancillary equipment for vehicular use (e.g. mobile equipment)	Radio and ancillary equipment for portable use (portable equipment)	
RF electromagnetic field (80 MHz to 1 000 MHz and 1 400 MHz to 2 700 MHz)	enclosure	applicable	applicable	applicable	9.2
electrostatic discharge	enclosure	applicable	not applicable	applicable	9.3
fast transients common mode	signal, telecommunication and control ports, DC and AC power ports	applicable	not applicable	not applicable	9.4
RF common mode 0,15 MHz to 80 MHz	signal, telecommunication and control ports, DC and AC power ports	applicable	applicable	not applicable	9.5
transients and surges	DC power input ports	not applicable	applicable	not applicable	9.6
voltage dips and interruptions	AC mains power input ports	applicable	not applicable	not applicable	9.7
surges, line to line and line to ground	AC mains power input ports, telecommunication ports	applicable	not applicable	not applicable	9.8

4.2 Special Conditions for EMC Immunity Measurements

Clause 7.2.2 of ETSI EN 301 489-17 V2.2.1 states that no special conditions shall apply for Immunity testing for products covered in the present document.

4.3 Declaration of Type of Use

Based upon the technical characteristics of the product, for the purposes of EMC Immunity testing, the EUT was determined to be an item of “radio equipment for fixed use”.

4.4 Relevant Performance Criteria

4.4.1 General Performance Criteria (*per* ETSI EN 301 489-17 V2.2.1 Clause 6.1)

The performance criteria are:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following clauses.

Table 1: Performance criteria

Criteria	During test	After test
A	Shall operate as intended. May show degradation of performance (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 2). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 1). No unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2).
NOTE 1:	Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.	
NOTE 2:	No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.	

4.4.3 Specific Performance Criteria for Continuous Phenomena applied to Transmitters (CT) (*per* ETSI EN 301 489-17 V2.2.1 Clause 6.3)

The performance criteria A shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

4.4.4 Specific Performance Criteria for Transient phenomena applied to Transmitters (TT) (*per* ETSI EN 301 489-17 V2.2.1 Clause 6.4)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

4.4.5 Specific Performance Criteria for Continuous phenomena applied to Receivers (CR) (*per* ETSI EN 301 489-17 V2.2.1 Clause 6.5)

The performance criteria A shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

4.4.6 Specific Performance Criteria for Transient phenomena applied to Receivers (TR) (*per* ETSI EN 301 489-17 V2.2.1 Clause 6.6)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

4.5 RF exclusion band of radio communications equipment

4.5.1 RF exclusion band requirements per Clause 4.3 of ETSI EN 301 489-17 V2.2.1

Clause 4.3 of ETSI EN 301 489-17 V2.2.1, which is quoted below for the convenience of the reader, states that: The frequencies on which the transmitter part of the EUT is intended to operate shall be excluded from radiated emission measurements when performed in transmit mode of operation.

There shall be no frequency exclusion band applied to emission measurements of the receiver part of transceivers or the stand alone receiver under test, and/or associated ancillary equipment.

The exclusion band for immunity testing shall be calculated as follows:
• lower limit of exclusion band = lowest allocated band edge frequency -5 %;
• upper limit of exclusion band = highest allocated band edge frequency +5 %. Using the 2,450 MHz band as an example:
• lower limit of exclusion band = 2 400 - 120 = 2 280 MHz;
• upper limit of exclusion band = 2 483,5 + 124,175 = 2 607,675 MHz;
• thus the exclusion band for 2,45 GHZ equipment falling within the scope of the present document extends from 2 280 MHz to 2 607,675 MHz.

5 Summary of Test Results

Rule	Description of Test	Result
ETSI EN 301 489-1 Clause 7.1 EMC Emissions	Radiated Emissions (per ETSI EN 301 489-1 V1.9.1 Clause 8.2)	*N/A
	Conducted Emissions, DC Ports (per ETSI EN 301 489-1 V1.9.1 Clause 8.3)	*N/A
	Conducted Emissions, AC Mains (per ETSI EN 301 489-1 V1.9.1 Clause 8.4)	*N/A
	Harmonic Current Emissions (EN 61000-3-2 Test Method) (per ETSI EN 301 489-1 V1.9.1 Clause 8.5)	*N/A
	Voltage Fluctuations and Flicker (EN 61000-3-3 Test Method) (per ETSI EN 301 489-1 V1.9.1 Clause 8.6)	*N/A
	Conducted Emissions, Telecom Ports (per ETSI EN 301 489-1 V1.9.1 Clause 8.7)	*N/A
ETSI EN 301 489-1 Clause 7.2 Immunity	RF Electromagnetic Fields Immunity (EN 61000-4-3 Test Method) (per ETSI EN 301 489-1 V1.9.1 Clause 9.2)	Compliant
	ESD Immunity (EN 61000-4-2 Test Method) (per ETSI EN 301 489-1 V1.9.1 Clause 9.3)	Compliant
	EFT/Burst Immunity (EN 61000-4-4 Test Method) (per ETSI EN 301 489-1 V1.9.1 Clause 9.4)	*N/A
	RF Common Mode (EN 61000-4-6 Test Method) (per ETSI EN 301 489-1 V1.9.1 Clause 9.5)	*N/A
	Transients and Surges (ISO 7637-1, -2 Test Methods) (per ETSI EN 301 489-1 V1.9.1 Clause 9.6)	*N/A
	IEC 61000-4-8 Magnetic Field	Compliant
	Voltage Dips and Interruptions IEC 61000-4-11 Test Method) (per ETSI EN 301 489-1 V1.9.1 Clause 9.7)	*N/A
	Surges, Line to Line, Line to Ground (EN 61000-4-5 Test Method) (per ETSI EN 301 489-1 V1.9.1 Clause 9.8)	*N/A

Note: *N/A- Not applicable.

6 ETSI EN 301 489-1 V1.9.2 Clause 9.2 – Radio Frequency Electromagnetic Field (80 MHz to 1000 MHz and 1400 MHz to 2700 MHz) Immunity Test

6.1 Applicable Test Requirements *per* ETSI EN 301 489-1 V1.9.2 Clause 9.2.2

The test method shall be in accordance with EN 61000-4-3.

The following requirements and evaluation of test results shall apply:

- the test level shall be 3 V/m (measured unmodulated). The test signal shall be amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1 000 Hz. If the wanted signal is modulated at 1 000 Hz, then an audio signal of 400 Hz shall be used;
- the test shall be performed over the frequency range 80 MHz to 1 000 MHz and 1 400 MHz to 2 700 MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers (see clause 4), as appropriate;
- for receivers and transmitters the stepped frequency increments shall be 1 % frequency increment of the momentary used frequency, unless specified otherwise in the part of EN 301 489 series [i.13] dealing with the relevant type of radio equipment;
- further product related spot frequency tests may be specified in the relevant part of EN 301 489 series [i.13] dealing with the particular type of radio equipment;
- responses on receivers occurring at discrete frequencies, which are narrow band responses, shall be disregarded from the test (see clause 4);
- the frequencies selected and used during the test shall be recorded in the test report.

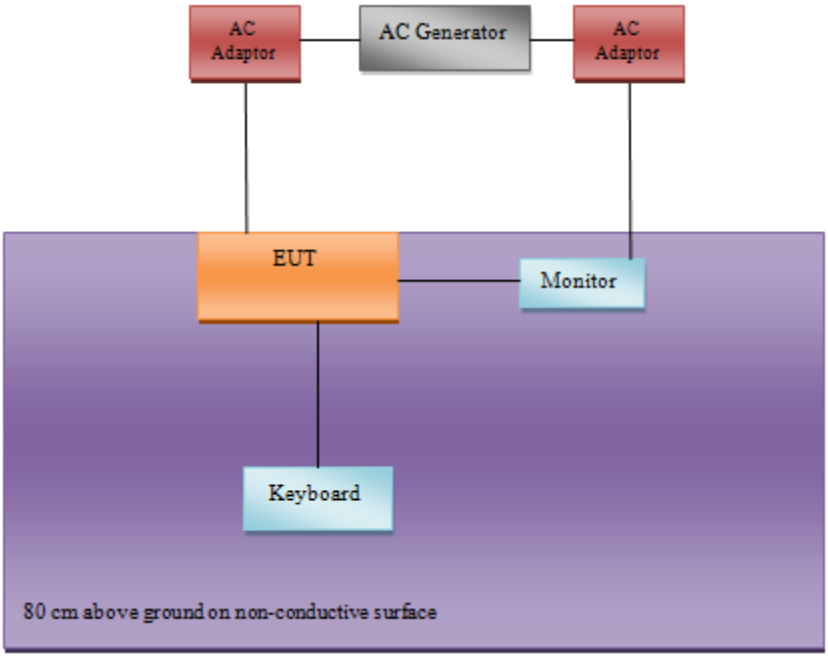
6.2 Application of the Electromagnetic Field

The EUT was setup and tested according to EN 61000-4-3.

The electromagnetic field was established at the front edge of the EUT. Except for the applicable Exclusion Bands (as defined in ETSI EN 301 489-17 V2.2.1), the frequency range was swept from 80 to 1000 MHz and from 1400 to 2700 MHz using a power level necessary to obtain the required 3 volt/meter, 1 kHz AM sine wave modulated at 80% depth, field directed at the EUT. The test was performed successively in both Horizontal and Vertical Polarizations, with each of the four sides (i.e., front, left, rear, and right) of the EUT aligned to the calibration plane.

See Section 4.5 of this Test Report for details regarding the application of Exclusion Band(s) during the RF Radiated Fields Immunity Testing of the EUT.

6.3 Test Setup Block Diagram



6.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
ETS	Antenna, Biconi-Log	3140	1019	Cal. Not Required	Cal. Not Required
HP	Power Sensor	8481A	2702A72334	2015-05-19	1 year
Amplifier Research	Coupler	DC6180A	320286	Cal. Not Required	Cal. Not Required
Amplifier Research	Power Meter	PM2002	307653	Cal. Not required	Cal. Not required
HP	Generator, Signal	8648C	3847M00143	2014-12-03	1 year
IFI	Amplifier	CMX5001	2194-1296	Cal. Not Required	Cal. Not Required
PST	Amplifier, Solid State	AR Series	-	Cal. Not Required	Cal. Not Required
Hughes	Amplifier, Traveling Wave Tube	8010H01F000	174	Cal. Not Required	Cal. Not Required
RF/Microwave Instrument	Dual Directional Coupler	DC7420	342372	Cal. Not Required	Cal. Not Required
A.R.A.	Antenna, Horn	DRG-118/A	1132	2015-02-19	2 year
Narda Safety Test Solutions	Field Meter	NBM 520	D0887	2015-03-31	2 year
Narda Safety Test Solutions	E Field Probe	EF 1891	D-0375	2015-03-31	2 year

[1] *the test setup, including the couplers, was verified each time by monitoring the field strength level on the field meter.*

Statement of Traceability: BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 14 May 2015) "A2LA Policy on Metrological Traceability".

6.5 Test Environmental Conditions

Temperature:	21 º C
Relative Humidity:	43 %
ATM Pressure:	101.7 kPa

The testing was performed by Kevin Wang on 2015-11-09 in 5m chamber 2.

6.6 EN 61000-4-3 Radiated RF-Electromagnetic Field Immunity Test Results

Frequency Range (MHz)	V/m	Front Side		Rear Side		Left Side		Right Side	
		Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
80-200	3	A	A	A	A	A	A	A	A
200-1000	3	A	A	A	A	A	A	A	A

Note: A ----- Performance Criteria A
B ----- Performance Criteria B
C ----- Performance Criteria C
- ---- Not Applicable

The EUT was subjected to a 3 volt/meter, 80% Amplitude modulated, 1 kHz sine wave field. The EUT was subjected to continuous radiated disturbance required by EN 301 489-1/-17. During testing a 3 second dwell time with 1% step from 80 MHz to 1000 MHz was used. The distance from the antenna to the EUT is 3 meters.

Frequency Range (MHz)	V/m	Front Side		Rear Side		Left Side		Right Side	
		Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
1400-2700	3	A	A	A	A	A	A	A	A

Note: A ----- Performance Criteria A
B ----- Performance Criteria B
C ----- Performance Criteria C
- ---- Not Applicable

The EUT was subjected to a 3 volt/meter, 80% Amplitude modulated, 1 kHz sine wave. The EUT was subjected to continuous radiated disturbance required by EN 301 489-1/-17. During testing a 3 second dwell time with 1% step from 1400 MHz to 2700 MHz was used. The distance from the antenna to the EUT is 1 meter.

7 ETSI EN 301 489-1 Clause 9.3 – Electrostatic Discharge Immunity Test

7.1 Applicable Test Requirements *per* ETSI EN 301 489-1 V1.9.2 Clause 9.3.2

The test shall be as per EN 61000-4-2.

The test method shall be in accordance with EN 61000-4-2 [2].

For radio equipment and ancillary equipment the following requirements and evaluation of test results shall apply.

The test severity level for contact discharge shall be 4 kV and for air discharge 8 kV. All other details, including intermediate test levels, are contained within EN 61000-4-2 [2].

Electrostatic discharges shall be applied to all exposed surfaces of the EUT except where the user documentation specifically indicates a requirement for appropriate protective measures (see EN 61000-4-2 [2]).

Note: per EN 61000-4-2, testing shall also be satisfied at the lower levels given in table 1

Table 1 – Test levels

1a- Contact Discharge		1b – Air Discharge	
Level	**Test Voltage (kV)**	**Level**	**Test Voltage (kV)**
1	2	1	2
2	4	2	4
3	6	3	8
4	8	4	15
x[1)]	Special	x[1)]	Special
[1)] "x" is an open level. The level has to be specified in the dedicate equipment. If higher voltages than those shown are specified, special test equipment may be need.			

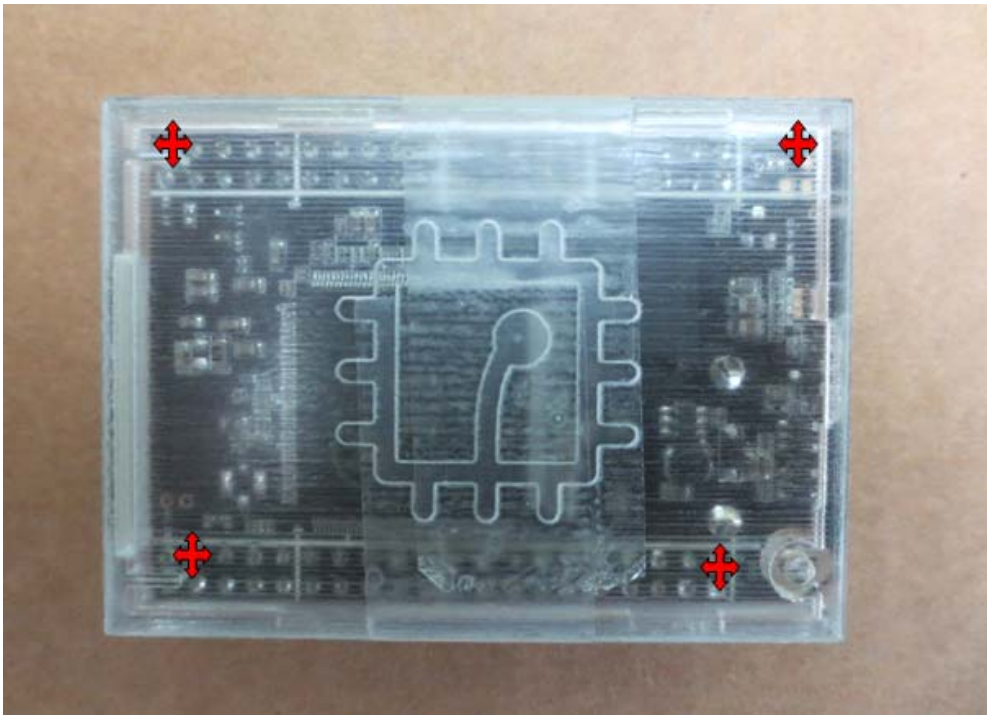
7.2 Application of Electrostatic Discharges

The ESD Immunity Tests were conducted in the following Discharge Mode order: Air Discharge, Direct Contact Discharge, Indirect Contact Discharge to the Horizontal Coupling Plane, and Indirect Contact Discharge to the Vertical Coupling Plane. The ESD test levels were set and discharges for the different discharge modes were applied at the appropriate locations.

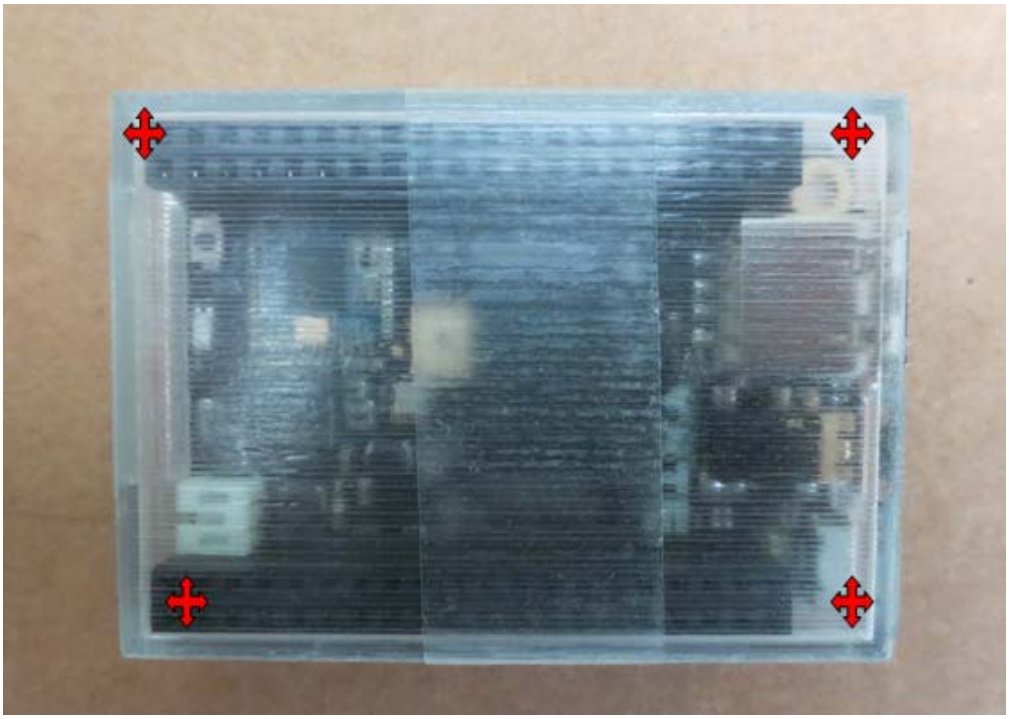
The locations of the ESD Discharges (i.e., the Test Points) are shown in the photographs on the next two pages of this Test Report.

7.3 Electrostatic Discharge Immunity Test Points - RED is Air Discharge and BLUE is Direct Contact

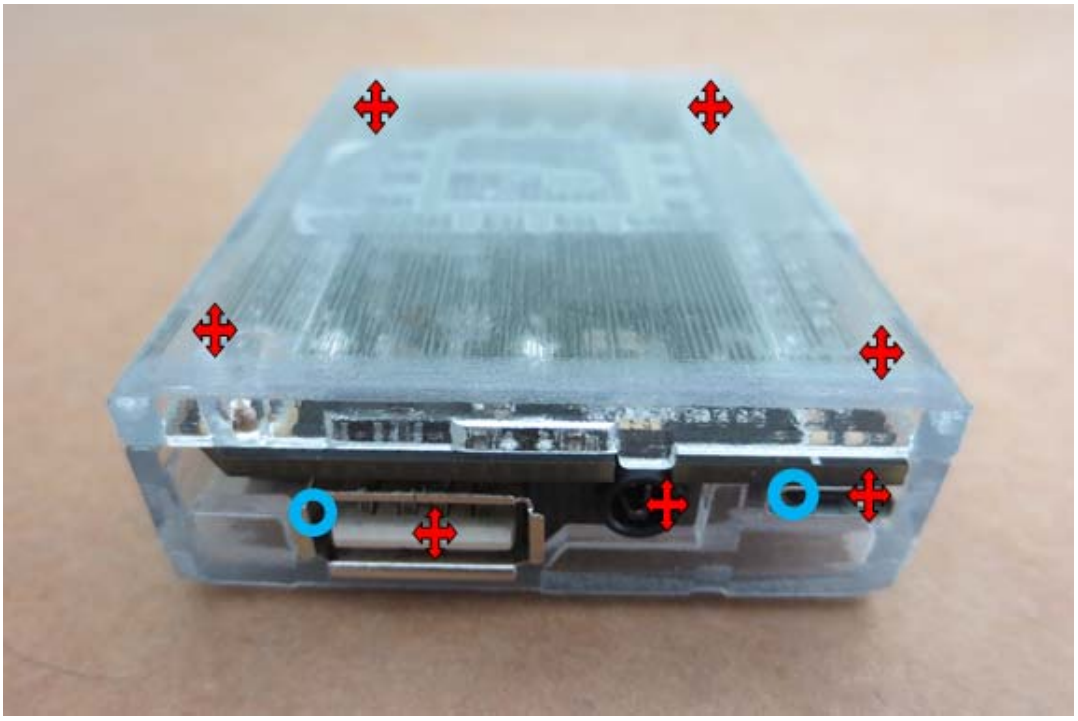
Top View



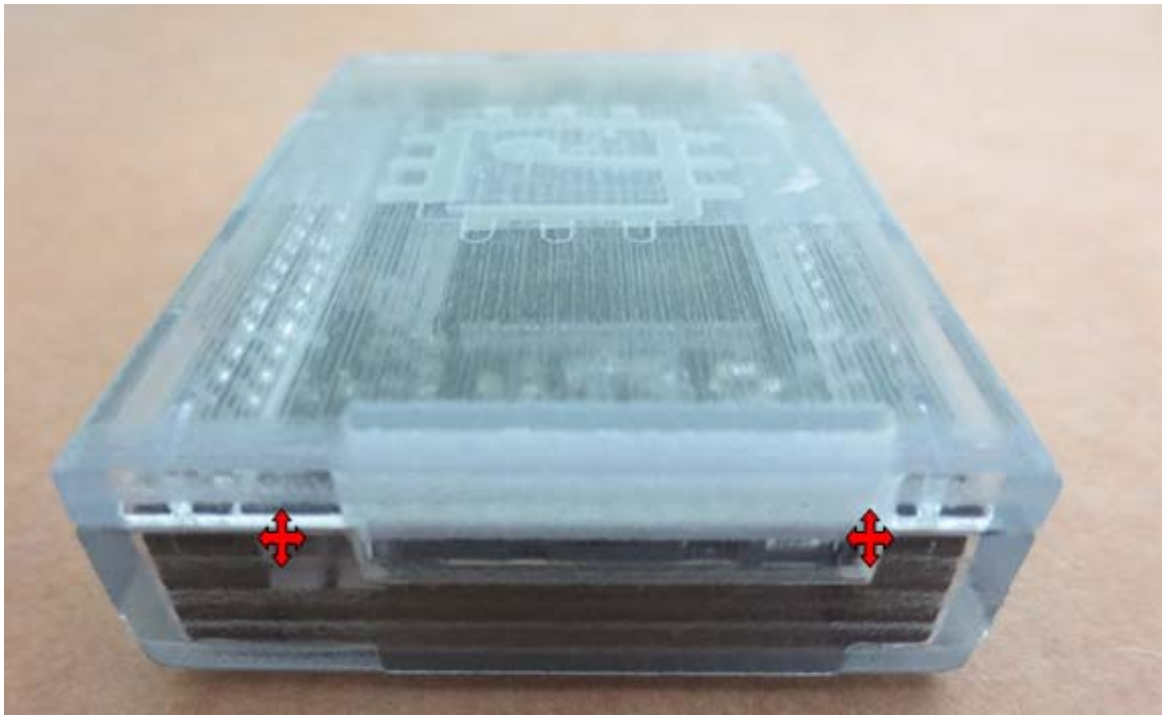
Bottom View



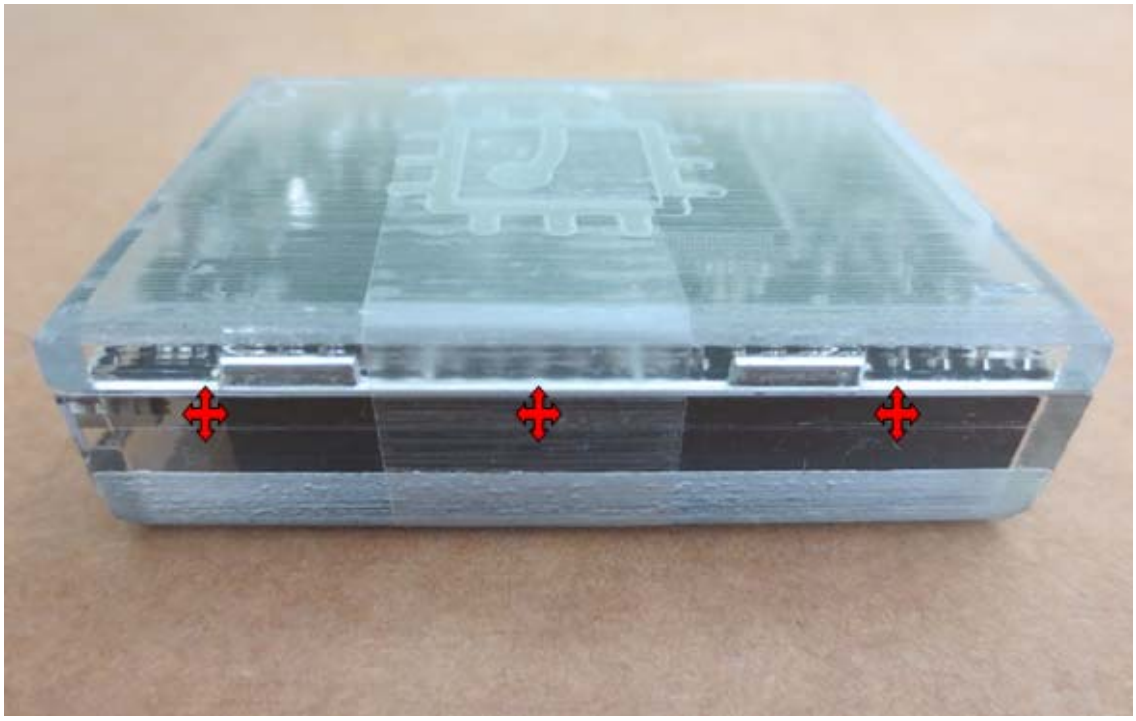
Front View



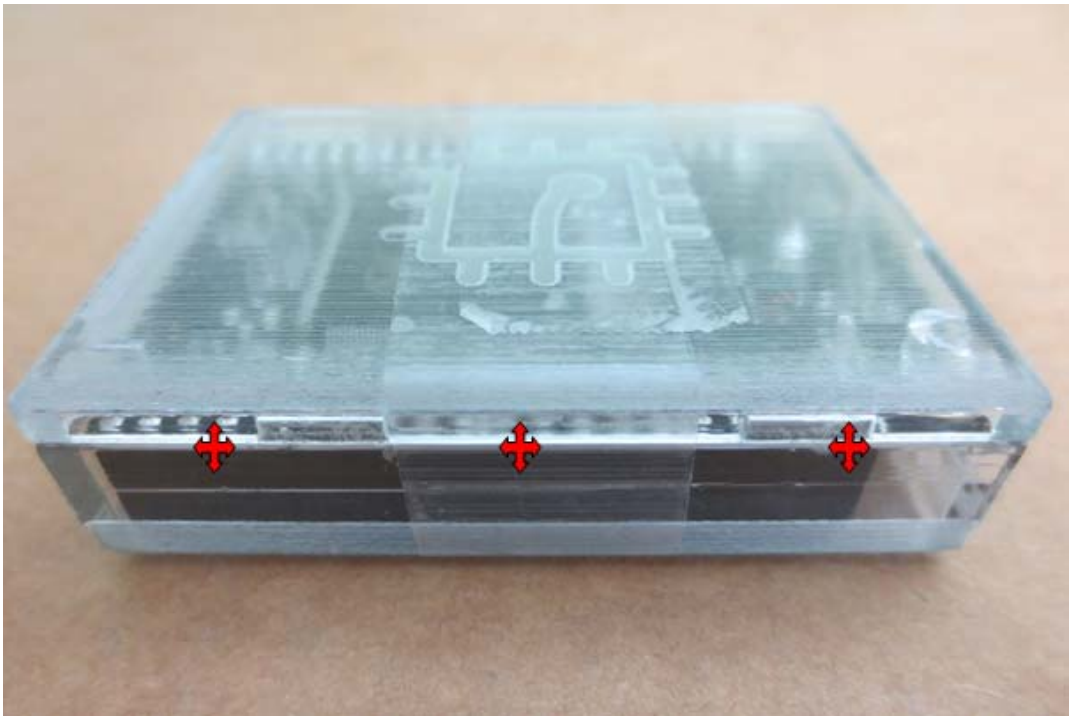
Rear View



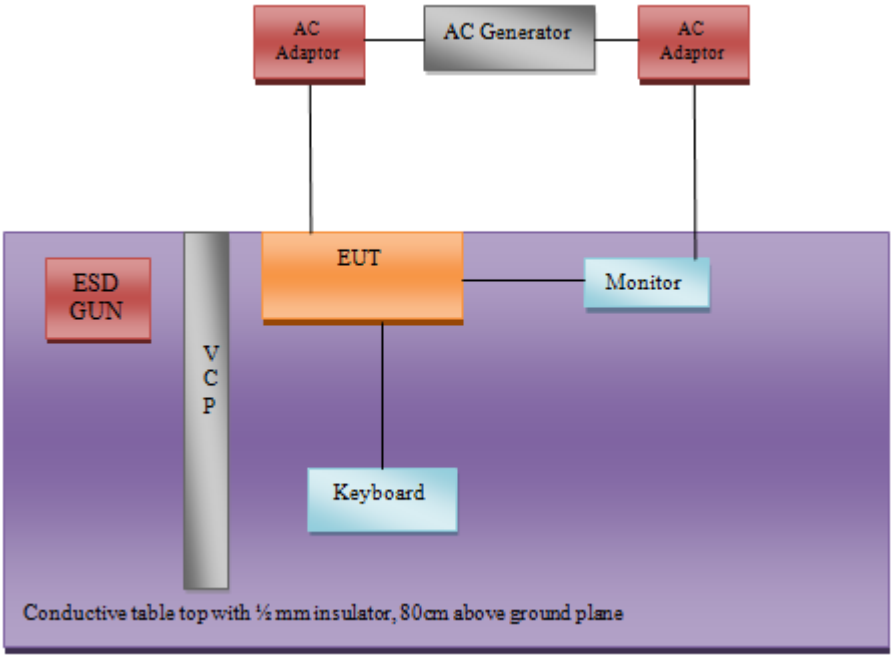
Left Side View



Right Side View



7.4 Test Setup Block Diagram



7.5 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
TESEQ AG	ESD Generator	NSG 438	1282	2014-10-02	1 year

[1] *the output level was verified each time before testing.*

Statement of Traceability: BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 14 May 2015) "A2LA Policy on Metrological Traceability".

7.6 Test Environmental Conditions

Temperature:	24º C
Relative Humidity:	48%
ATM Pressure:	101.4 kPa

The testing was performed by Kevin Wang on 11/02/2015 at Outside Room 1B

7.7 ESD Immunity Test Results

Table 1: Electrostatic Discharge (Air Discharge)

IEC 61000-4-2 Test Point	Test Level (kV)											
	-2	+2	-4	+4	-6	+6	-8	+8	-15	+15	-20	+20
Front Side	A	A	A	A	-	-	A	A	-	-	-	-
USB Port	A	A	A	A	-	-	A	A	-	-	-	-
Micro USB Port	A	A	A	A	-	-	A	A	-	-	-	-
Video Port	A	A	A	A	-	-	A	A	-	-	-	-
Rear Side	A	A	A	A	-	-	A	A	-	-	-	-
Right Side	A	A	A	A	-	-	A	A	-	-	-	-
Left Side	A	A	A	A	-	-	A	A	-	-	-	-

Table 2: Electrostatic Discharge (Direct Contact)

IEC 61000-4-2 Test Point	Test Level (kV)											
	-2	+2	-4	+4	-6	+6	-8	+8	-15	+15	-20	+20
USB Port	A	A	A	A	-	-	-	-	-	-	-	-
Micro USB Port	A	A	A	A	-	-	-	-	-	-	-	-

Table 3: Electrostatic Discharge (Indirect Contact HCP)

IEC 61000-4-2 Test Point	Test Level (kV)											
	-2	+2	-4	+4	-6	+6	-8	+8	-15	+15	-20	+20
Front Side	A	A	A	A	-	-	-	-	-	-	-	-
Rear Side	A	A	A	A	-	-	-	-	-	-	-	-
Left Side	A	A	A	A	-	-	-	-	-	-	-	-
Right Side	A	A	A	A	-	-	-	-	-	-	-	-

Table 4: Electrostatic Discharge (Indirect Contact VCP)

IEC 61000-4-2 Test Point	Test Level (kV)											
	-2	+2	-4	+4	-6	+6	-8	+8	-15	+15	-20	+20
Front Side	A	A	A	A	-	-	-	-	-	-	-	-
Rear Side	A	A	A	A	-	-	-	-	-	-	-	-
Left Side	A	A	A	A	-	-	-	-	-	-	-	-
Right Side	A	A	A	A	-	-	-	-	-	-	-	-

Note: A ----- Performance Criteria A
B ----- Performance Criteria B
C ----- Performance Criteria C
- ----- Not Applicable

The EUT was subjected to ESD Immunity Tests as required by Clause 9.3 of EN 301 489-1 V1.9.2. The ESD Discharges were applied at the levels specified therein. During and after the test, the EUT operated as intended, with no loss function and no degradation of performance.

8 IEC 61000-4-8 - Power Frequency Magnetic Fields

8.1 Applicable Standard

As per EN 61000-4-8: Test Levels

The preferential range of test levels, respectively for continuous and short duration application of the magnetic field, applicable to distribution networks at 50 Hz and 60 Hz, is given in Table 1 and Table 2. The magnetic field strength is expressed in A/m; 1 A/m corresponds to a free space induction of 1, 26 uT.

Table 1-Test levels for continuous field

Level	Magnetic field strength A/m
1	1
2	3
3	10
4	30
5	100
x[a]	special
[a] "x" is an open level. This level can be given in the product specification.	

Table 2-Test levels for short duration; 1 s to 3 s

Level	Magnetic field strength A/m
1	n.a.[b]
2	n.a.[b]
3	n.a.[b]
4	300
5	1000
x[a]	special
a "x" is an open level. This level, as well the duration of the test, can be given in the product specification. b "n.a."= not applicable	

8.2 Power Frequency Magnetic Field Test

The test level as described in EN 61000-4-8 titled "Table 1 – Test Levels for continuous field" was chosen. A single turn induction coil of 1m x 1m in size was used to generate the magnetic field.

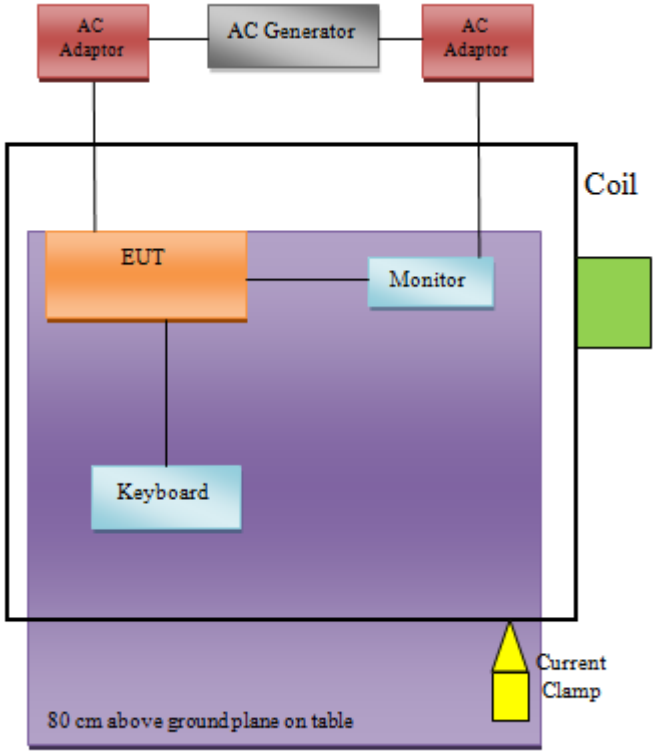
8.3 Power Frequency Magnetic Field Test Measurement Uncertainty

The measurement uncertainty with a 95 % confidence factor has determined that the applied field has an expanded uncertainty value of 1.97. The applied magnetic field is determined to be within 5% of stated value.

8.4 Application of Magnetic Field

The EUT was setup according to the EN 61000-4-8 and the test shall be done as the procedure described in the standard.

8.5 Test Setup Block Diagram



8.6 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	AC Power Source/Analyzer	6812B	US38390366	Cal. Not. Required	Cal. Not. Required
Agilent	AC Power Source/Analyzer	6812B	US38390366	Cal. Not. Required	Cal. Not. Required
Amplifier Research	Coil	BV113-97	25085	Cal. Not Required	Cal. Not Required
Amplifier Research	Transformer	RFTVS	25089	Cal. Not Required	Cal. Not Required
Fluke Corp	Multi meter, Digital	233	23840029	2015-06-25	1 year
Fluke	Meter, Clamp True RMS	33	776155326	2015-09-21	1 year

Statement of Traceability: BACL Corp. attests that all calibrations or verifications have been performed per the A2LA requirements, traceable to the NIST.

8.7 Environmental Conditions

Temperature:	21 °C
Relative Humidity:	43 %
ATM Pressure:	101.4 kPa

The testing was performed by Kevin Wang on 2015-11-09 in Immunity Test Area 1B.

8.8 Power Frequency Magnetic Field Test (EN 61000-4-8)

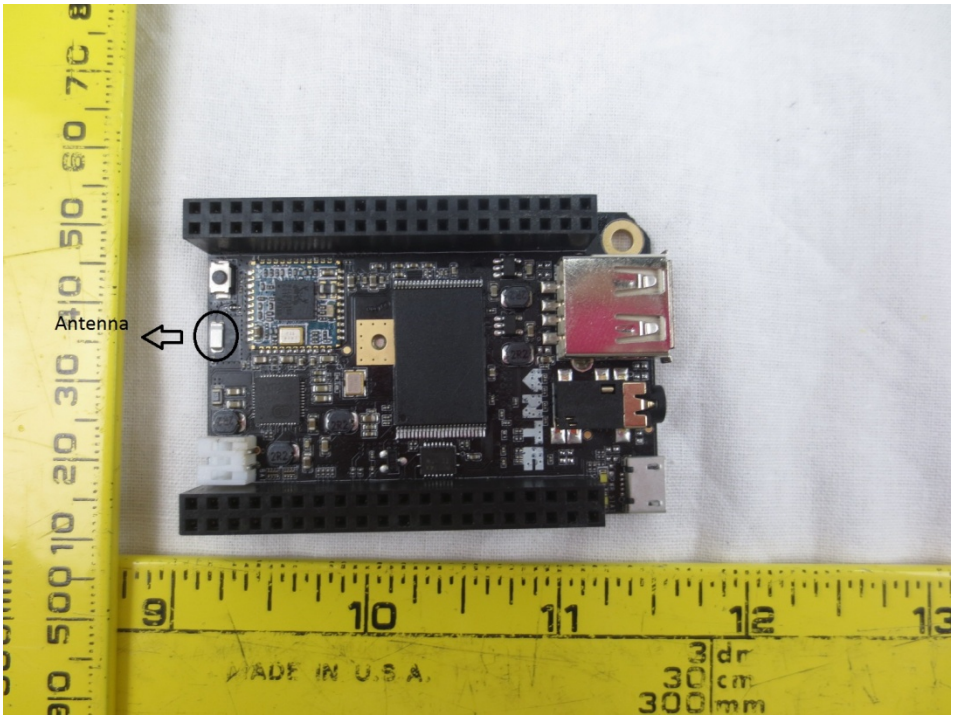
Frequency Range (Hz)	**A/m**	**X**	**Y**	**Z**
50	3	A	A	A
60	3	A	A	A

Note: A ----- Performance Criteria A
B ----- Performance Criteria B
C ----- Performance Criteria C
- ----- Not Applicable

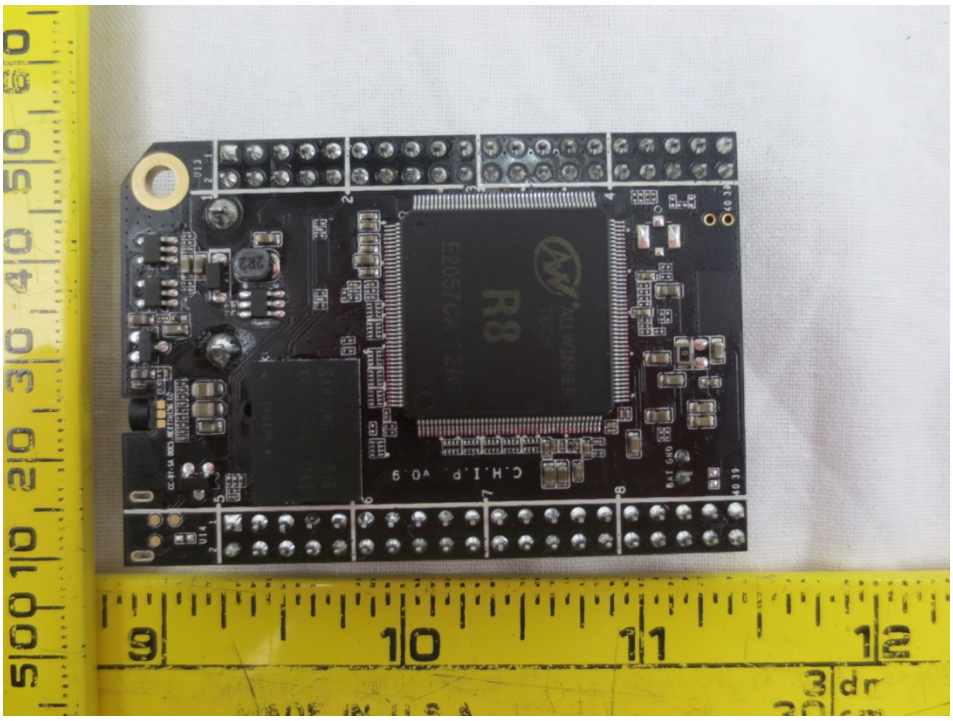
The EUT was subjected to the Power Frequency Magnetic Field Test specified in EN 61000-4-8. During testing a minimum 2 minutes dwell time was used for each orientation.

9 Appendix A – EUT Photographs

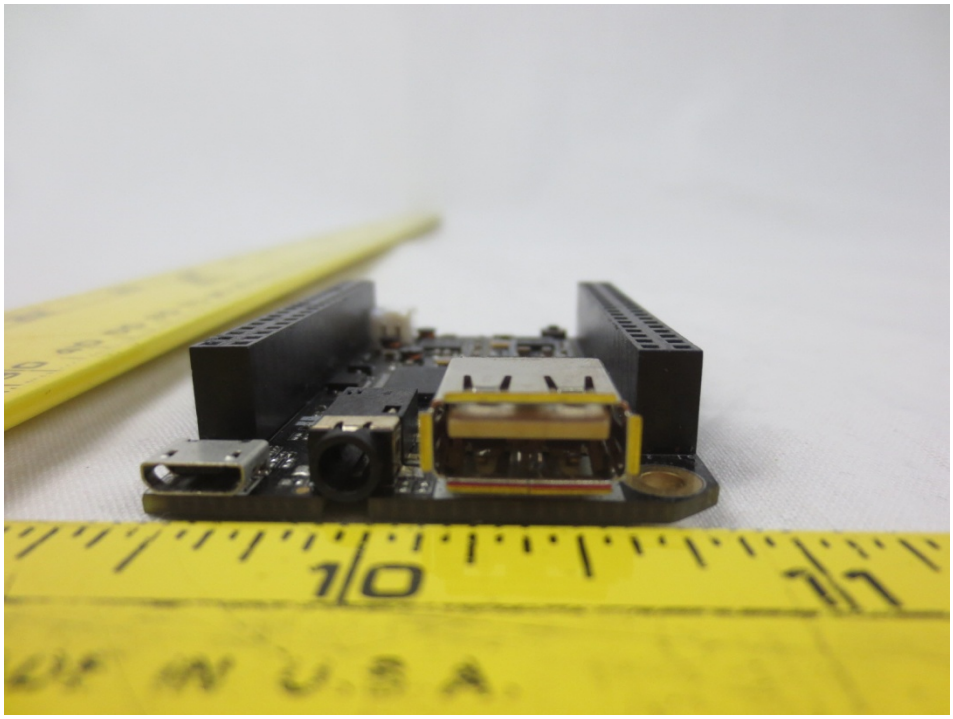
9.1 EUT Photo – Top View



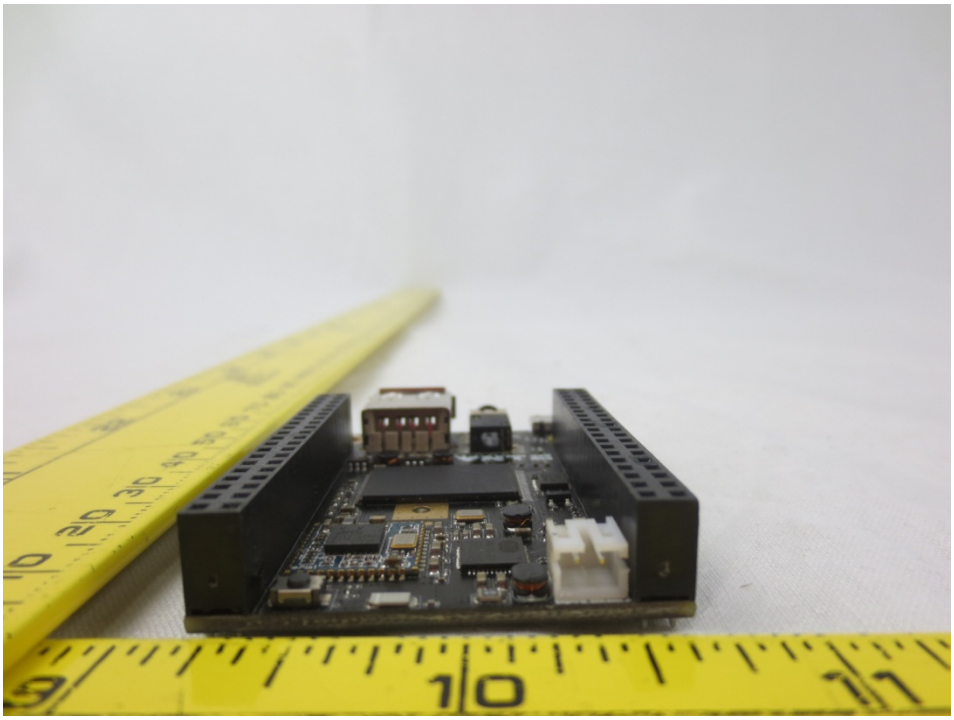
9.2 EUT Photo – Bottom View



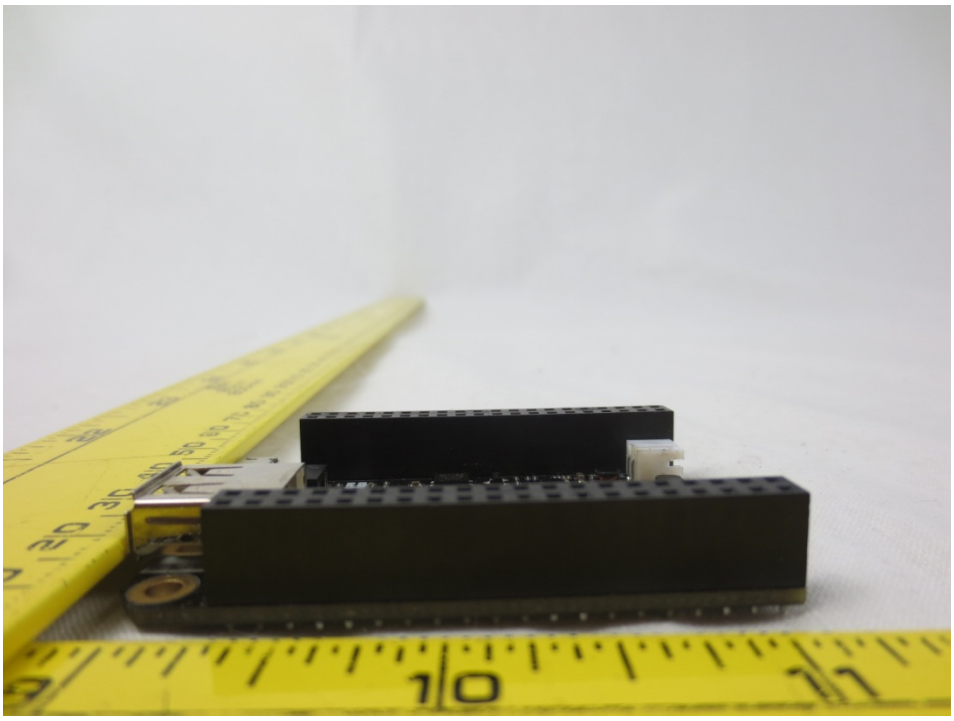
9.3 EUT Photo – Front View



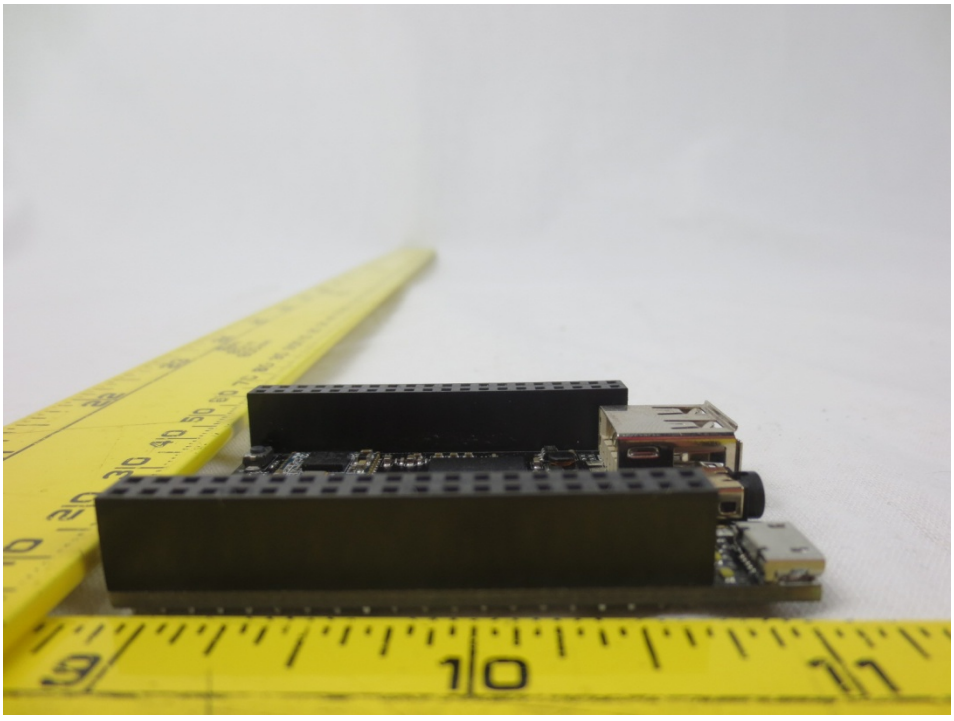
9.4 EUT Photo – Back View



9.5 EUT Photo – Right Side View



9.6 EUT Photo – Left Side View



9.7 AC/DC Power Adapter

10 Appendix B – "CE MARK" Product Labeling

10.1 Label Information

1. The CE conformity marking must consist of the initials 'CE' taking the form below. If the CE marking is reduced or enlarged the proportions must be respected.

2. The CE marking must have a height of at least 5 mm except where this is not possible on account of the nature of the apparatus.

   The EMC Directive recognizes that there are circumstances where it is "not possible or warranted on account of the nature of the product" to have the marking affixed to the apparatus or to its data plate. In such cases it is allowed to have the CE marking' affixed on the packaging, refer to the Blue Guide when such exemptions are allowed.

3. The CE marking must be affixed to the product or to its data plate. Additionally it must be affixed to the packaging, if any, and to the accompanying documents, where the directive concerned provides for such documents.

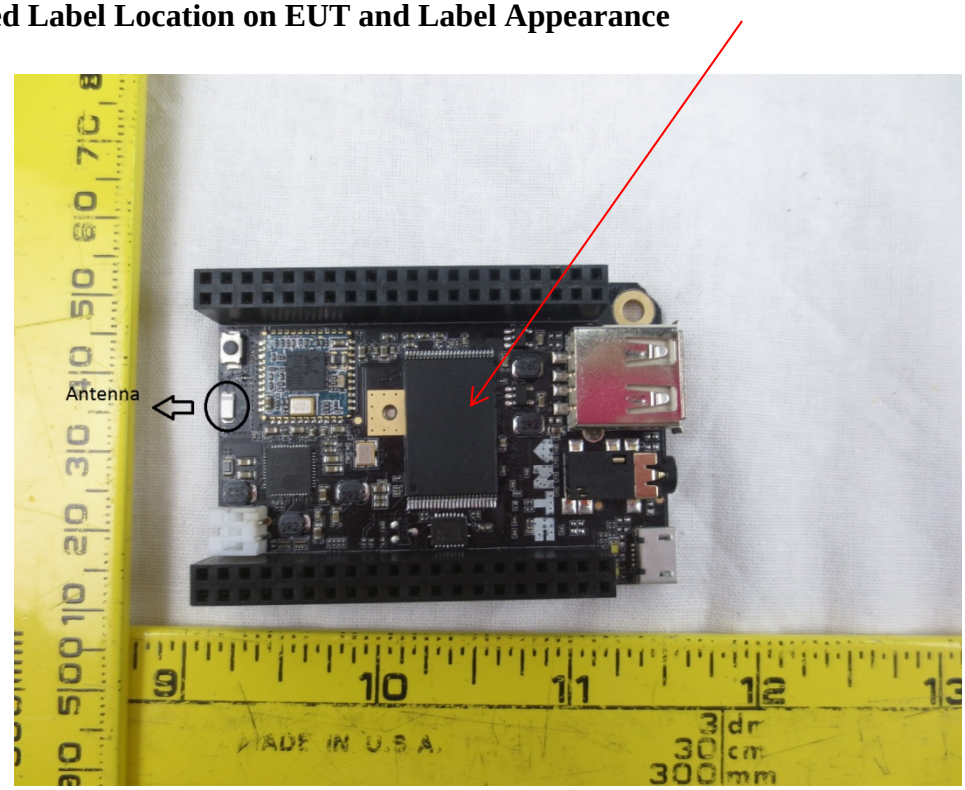
4. The CE marking must be affixed visibly, legibly, and indelibly.

5. Other labeling requirements maybe required if the product(s) is/are subject to several directives.

Specifications: Text is black or white in color and is left justified. Labels are printed in indelible ink on permanent adhesive backing or silk-screened and shall be affixed at a conspicuous location on the EUT. The label cannot be positioned on a removable portion of the EUT (e.g. battery cover).

11 Appendix C – Product Label

11.1 Suggested Label Location on EUT and Label Appearance

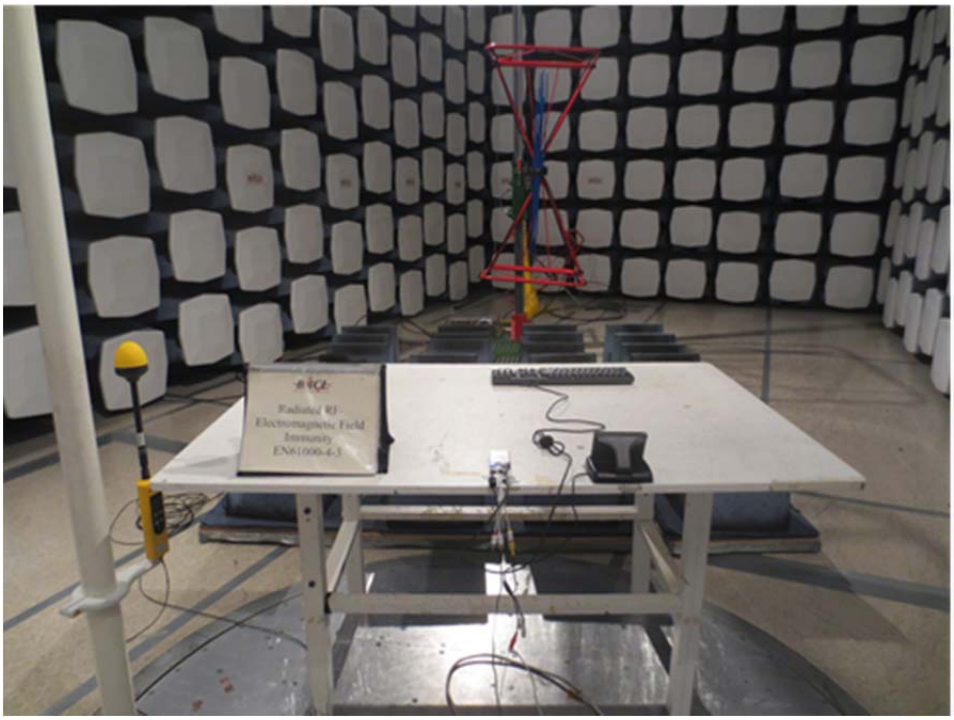


12 Appendix D – Test Setup Photographs

12.1 Electromagnetic Field Immunity (EN 61000-4-3)

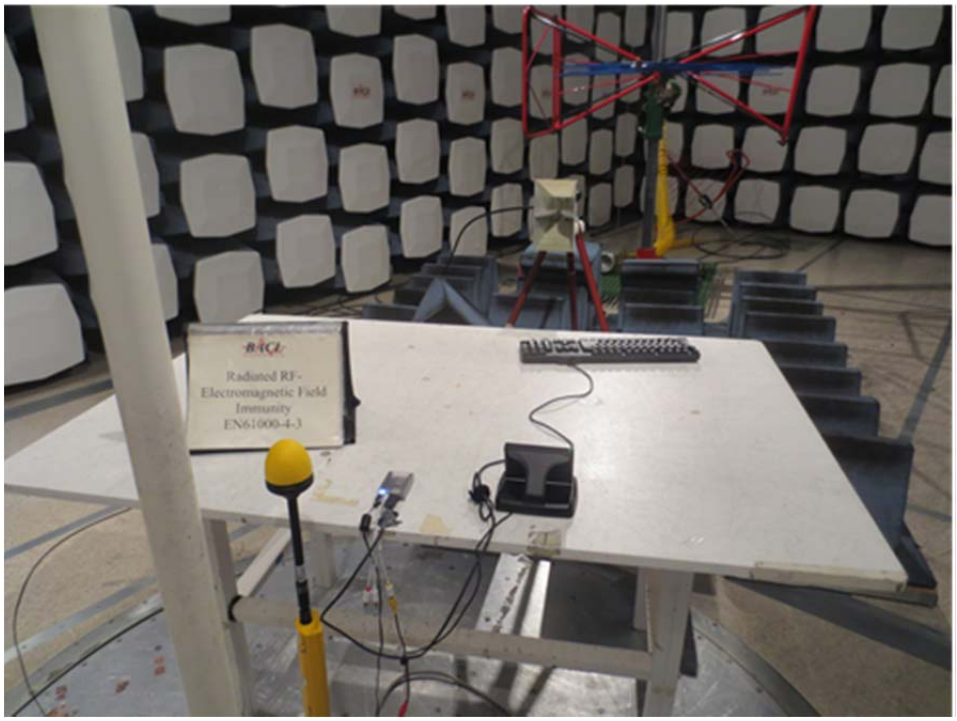
80 MHz to 1000 MHz Front View

80 MHz to 1000 MHz Rear View



1400 MHz to 2700 MHz Front View

1400 MHz to 2700 MHz Rear View



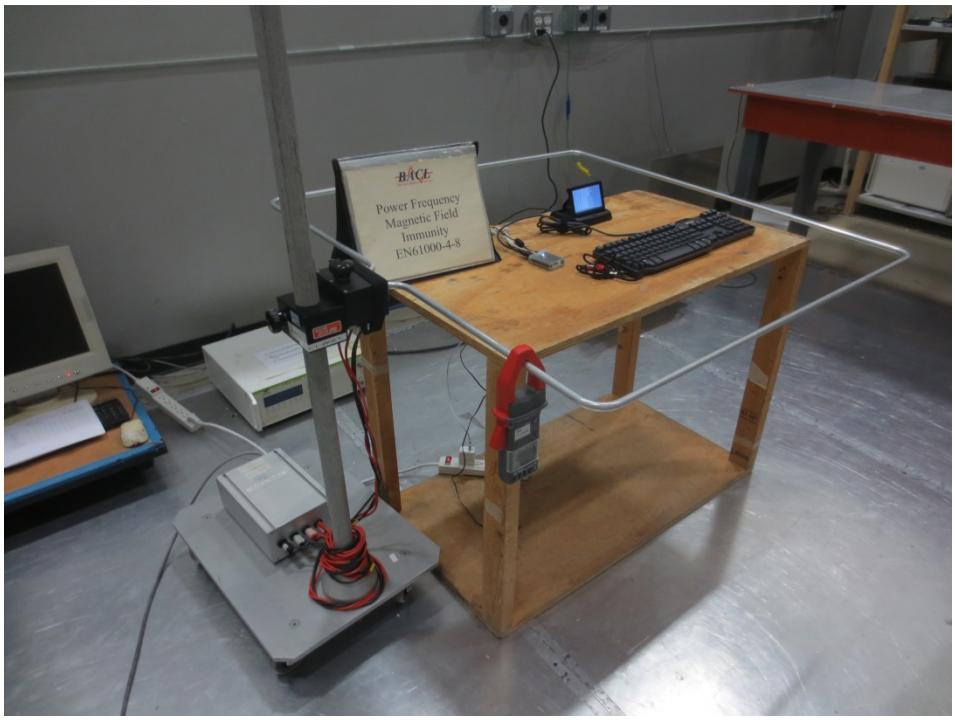
12.2 Electrostatic Discharge Immunity (EN 61000-4-2)

Front View

Rear View

12.3 Power Frequency Magnetic Field (EN 61000-4-2)

Front View



Rear View

---END OF REPORT---