ENGINEERING TEST REPORT

DET02 Wireless Timer
Model: 99-DET02
FCC ID: 2AFBLDET02

Applicant:

Airia Brands Inc.
511 McCormick Blvd.
London, Ontario
Canada N5W 4C8

Tested in Accordance With

FCC Part 15, Subpart C, Section 15.249
Low Power Transmitters Operating in the Frequency Band 2400-2483.5 MHz

UltraTech's File No.: 15FET056_FCC15C249

This Test report is Issued under the Authority of Tri M. Luu Vice President of Engineering UltraTech Group of Labs Date: October 28, 2015	
Report Prepared by: Dan Huynh Issued Date: October 28, 2015	Tested by: Wei Wu Test Dates: June 25 - 26, 2015

- *The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.*
- *This report must not be used by the client to claim product endorsement by NVLAP or any agency of the US Government.*

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91038	1309	46390-2049	NVLAP LAB CODE 200093-0	AT-1945	SL2-IN-E-1119R	Korea KCC-RRA CA2049	TL363_B	TPTDP DA1300

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 15, Subpart C, Section 15.249
Title:	Code of Federal Regulations (CFR), Title 47 – Telecommunication, Part 15 – Radio Frequency Devices
Purpose of Test:	Equipment Certification for Low Power Licensed-Exempt Transmitters operating in the Frequency Band 2400-2483.5 MHz.
Test Procedures:	▪ ANSI C63.4 ▪ ANSI C63.10
Environmental Classification:	Residential

1.2. RELATED SUBMITTAL(S)/GRANT(S)

Publication	Year	Title
FCC 47 CFR 15	2015	Code of Federal Regulations, Title 47 -Telecommunication
ANSI C63.4	2009	American National Standard for 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	2009	American National Standard for Testing Unlicensed Wireless Devices
CISPR 22 EN 55022	2008-09, Edition 6.0 2006	Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurement
CISPR 16-1-1 +A1 +A2	2006 2006 2007	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus
CISPR 16-1-2 +A1 +A2	2003 2004 2006	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-2: Conducted disturbances

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

Applicant	
Name:	Airia Brands Inc.
Address:	511 McCormick Blvd. London, Ontario Canada N5W 4C8
Contact Person:	Peter Grinbergs Phone #: 519-457-1904 Fax #: 519-457-1676 Email Address: pgrinbergs@airiabrands.com

Manufacturer	
Name:	Jeckson Electric Co. Ltd.
Address:	18/F., China Aerospace Centre, 143 Hoi Bun Road Kwun Tong Kowloon Hong Kong
Contact Person:	Karen Cheung Phone #: 852 2389-7337 Fax #: 852 2343-0391 Email Address: karencheung@casil-jeckson.com

2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

Brand Name:	Airia Brands Inc.
Product Name:	DET02 Wireless Timer
Model Name or Number:	99-DET02
Serial Number:	Test sample
Type of Equipment:	Low Power Communication Device Transmitter
Input Power Supply Type:	3V Lithium Battery CR2540
Primary User Functions of EUT:	To remotely control the HRV to run at high speed for a certain period of time

2.3. EUT'S TECHNICAL SPECIFICATIONS

Transmitter	
Equipment Type:	Mobile
Intended Operating Environment:	[ ] Commercial, industrial or business environment [x] Residential environment
Power Supply Requirement:	3V Lithium Battery CR2540
RF Output Power Rating:	90.44 dBµV/m at 3m distance
Operating Frequency Range:	2466 MHz
RF Output Impedance:	50 Ω
20 dB Bandwidth:	1.59 MHz
Modulation Type:	GFSK
Antenna Connector Type:	Integral

2.4. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Cable Type (Shielded/Non-shielded)
None				

2.5. ANCILLARY EQUIPMENT

None.

EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21°C
Humidity:	51%
Pressure:	102 kPa
Power input source:	3V Lithium Battery CR2540

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operating Modes:	EUT was configured to transmit continuously for emissions measurements.
Special Test Software:	None
Special Hardware Used:	None
Transmitter Test Antenna:	The EUT is tested with the antenna fitted in a manner typical of normal intended use as integral antenna equipment.

Transmitter Test Signals:	
Frequency Band(s):	2466 MHz
Test Frequency(ies):	2466 MHz
Transmitter Wanted Output Test Signals:	
• RF Power Output (measured maximum output power):	90.44 dBµV/m at 3m distance
• Normal Test Modulation:	GFSK
• Modulating signal source:	Internal

EXHIBIT 4. SUMMARY OF TEST RESULTS

4.1. LOCATION OF TESTS

All of the measurements described in this report were performed at Ultratech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

- AC Power Line Conducted Emissions were performed in UltraTech's shielded room, 24'(L) by 16'(W) by 8'(H).

- Radiated Emissions were performed at the Ultratech's 3-10 TDK Semi-Anechoic Chamber situated in the Town of Oakville, province of Ontario. This test site been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville 3-10 TDK Semi-Anechoic Chamber has been filed with FCC office (FCC File No.: 91038) and Industry Canada office (Industry Canada File No.: 2049A-3). Expiry Date: 2017-04-02.

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC Section(s)	Test Requirements	Compliance (Yes/No)
15.107(a) & 15.207	Power Line Conducted Emissions	Yes
15.215(c)	20 dB Bandwidth	Yes
15.249(a), 15.209, 15.205	Transmitter Radiated Emissions, Harmonic Emissions	Yes

4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None.

EXHIBIT 5. TEST DATA

5.1. 20 dB BANDWIDTH [47 CFR 15.215(c)]

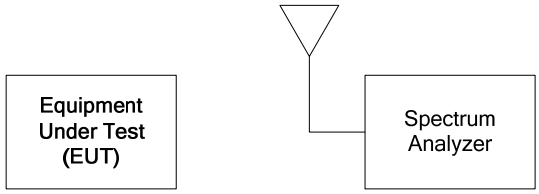
5.1.1. Limits

The 20 dB bandwidth must be contained within the frequency band designated in the rule.

5.1.2. Method of Measurements

The transmitter output was loosely coupled to the spectrum analyzer through a receiving antenna and the bandwidth of the fundamental frequency was measured with the spectrum analyzer with the resolution bandwidth of the spectrum analyzer set per ANSI 63.4

5.1.3. Test Arrangement

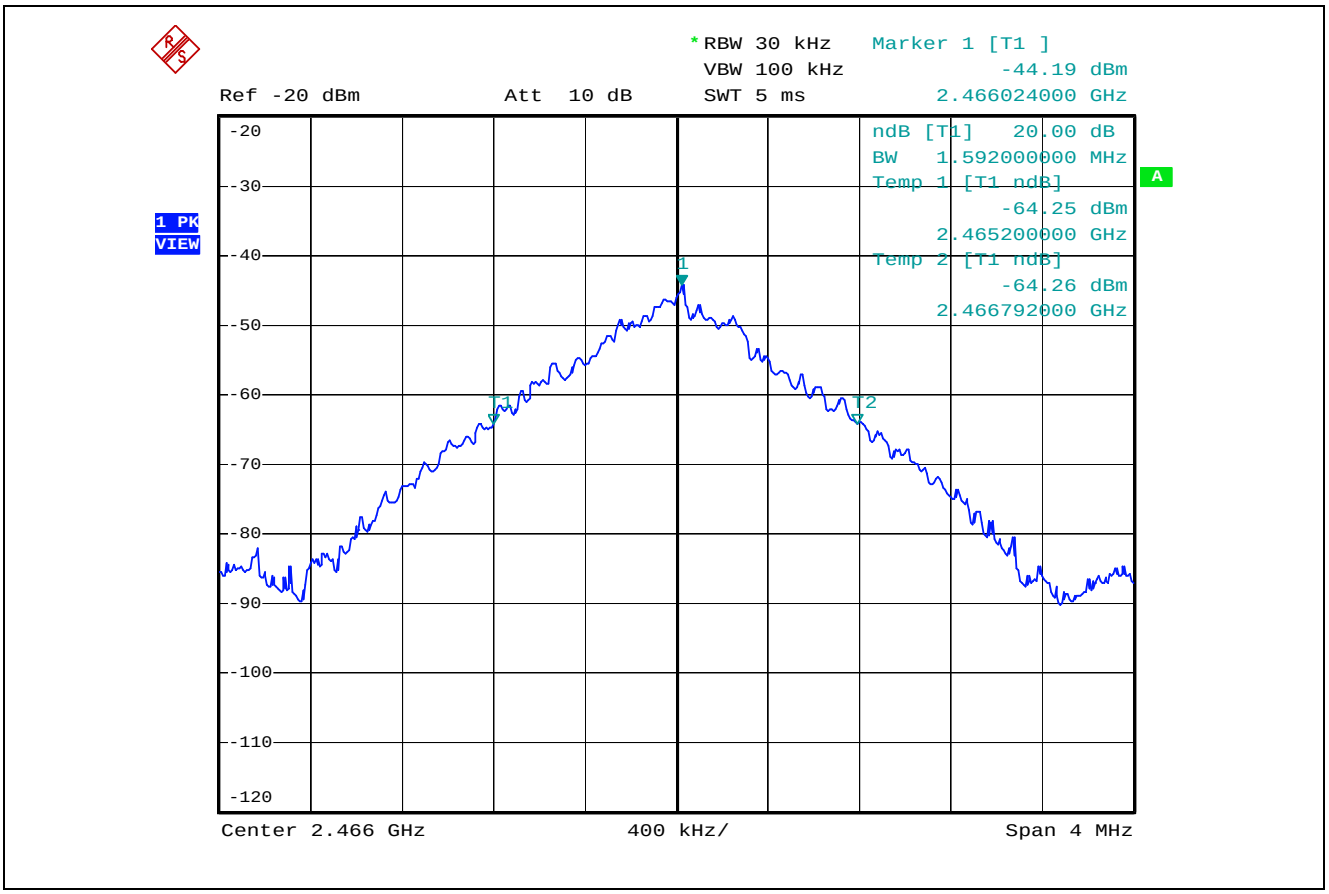


5.1.4. Test Data

Frequency (MHz)	20 dB Bandwidth (MHz)
2466	1.59

See the following plot for details.

Plot 5.1.4.1. 20 dB Bandwidth, 2466 MHz



5.2. FUNDAMENTAL FIELD STRENGTH AND HARMONIC EMISSIONS (RADIATED @ 3m) [47 CFR 15.249(a), 15.209 & 15.205]

5.2.1. Limits

(a) The Field Strength of emissions from intentional radiators operated within 2400–2483.5 MHz band shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (mV/m)	Field Strength of Harmonics (μV/m)
2400-2483.5 MHz	50	500

(c) Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

(e) As shown in § 15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

§15.209 Radiated emission limits; general requirements

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

The fundamental frequency shall not fall within any restricted frequency band specified in 15.205. All rf other emissions that fall in the restricted bands shall not exceed the general radiated emission limits specified in @ 15.209(a).

§15.205 Restricted bands of operation

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

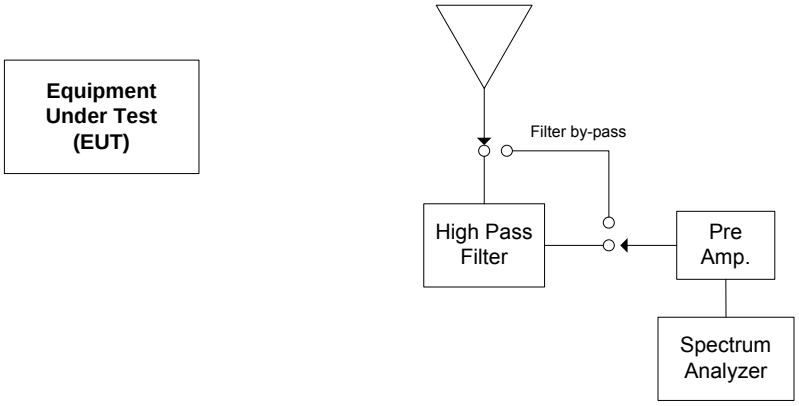
[1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2]Above 38.6

5.2.2. Method of Measurements

Refer to ANSI C63.4 for measurement methods.

5.2.3. Test Arrangement



5.2.4. Test Data

The emissions were scanned from 30 MHz to 10th harmonic of the highest fundamental frequency and all significant emissions were recorded.

Frequency (MHz)	Peak E-Field @3m (dBµV/m)	*QP/Average E-Field @3m (dBµV/m)	Antenna Plane (H/V)	Field Strength Limit of Fundamental/Harmonic (dBµV/m)	Field Strength Limit of § 15.209 (dBµV/m)	Margin (dB))
2466	95.12	90.44	V	94.0	--	-3.6
2466	94.56	90.24	H	94.0	--	-3.8
4932	58.54	52.25	V	54.0	54.0	-1.8
4932	58.14	51.69	H	54.0	54.0	-2.3
7398	60.70	47.20	V	54.0	54.0	-6.8
7398	62.40	49.54	H	54.0	54.0	-4.5
9864	60.42	48.37	V	54.0	54.0	-5.6
9864	64.34	51.00	H	54.0	54.0	-3.0

*QP for frequencies below or equal to 1000 MHz; Average for frequencies above 1000 MHz.

EXHIBIT 6. TEST EQUIPMENT LIST

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Cal. Due Date
Antenna	ETS	3160-09	118385	18GHz-26.5GHz	4 Aug 2016
Biconilog Antenna	EMCO	3142C	00026873	26 MHz – 3000 MHz	14 Apr 2016
EMI Receiver	Rohde & Schwarz	ESU40	100037	20 Hz – 40 GHz	8 May 2017
Attenuator	Pasternack	PE7024-10	--	DC-18GHz	Cal on use
Horn antenna	EMCO	3115	9911-5955	1-18GHz	12 Dec 2015
Preamplifier	Com-power	PAM-118A	551016	500MHz-18GHz	6 Jan 2016
Preamplifier	SpacekLabs	SLKKa-30-6	161243	18GHz-26.5GHz	4 Aug 2016
High Pass Filter	K & L	11SH10-4000/T12000	4	Cut off 4000 MHz	Cal on use

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

EXHIBIT 7. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of CISPR 16-4-2 @ IEC:2003 and JCGM 100:2008 (GUM 1995) – Guide to the Expression of Uncertainty in Measurement.

7.1. RADIATED EMISSION MEASUREMENT UNCERTAINTY

	Radiated Emission Measurement Uncertainty @ 3m, Horizontal (30-1000 MHz):	**Measured (dB)**	**Limit (dB)**
u_c	**Combined standard uncertainty:** $u_c(y) = \sqrt{\sum_{i=1}^{m} u_i^2(y)}$	**± 2.39**	**± 2.6**
U	**Expanded uncertainty U:** $U = 2u_c(y)$	**± 4.79**	**± 5.2**

	Radiated Emission Measurement Uncertainty @ 3m, Vertical (30-1000 MHz):	**Measured (dB)**	**Limit (dB)**
u_c	**Combined standard uncertainty:** $u_c(y) = \sqrt{\sum_{i=1}^{m} u_i^2(y)}$	**± 2.39**	**± 2.6**
U	**Expanded uncertainty U:** $U = 2u_c(y)$	**± 4.78**	**± 5.2**

	Radiated Emission Measurement Uncertainty @ 3 m, Horizontal & Vertical (1 – 18 GHz):	**Measured (dB)**	**Limit (dB)**
u_c	**Combined standard uncertainty:** $u_c(y) = \sqrt{\sum_{i=1}^{m} u_i^2(y)}$	**± 1.87**	**Under consideration**
U	**Expanded uncertainty U:** $U = 2u_c(y)$	**± 3.75**	**Under consideration**