Electromagnetic Emission

FCC MEASUREMENT REPORT

CERTIFICATION OF COMPLIANCE

FCC Part 15 Certification Measurement

PRODUCT	:	Polaroid Mini Printer
MODEL/Serial No.	:	POLMP01W / Proto type
MULTIPLE MODEL	:	POLMP01B, POLMP01BL, POLMP01R
FCC ID	:	2ADOC-POLMP01W
BRAND NAME	:	Polaroid
APPLICANT	:	C&A Licensing LLC 2 Bergen Turnpike, Ridgefield Park, New Jersey, 07660, USA Attn.: Shlomo Engel / Director
MANUFACTURER	:	DSGLOBAL.CO,.LTD (Gasan-dong) 107, Gasan digital 2-ro, Geumcheon-gu, Seoul, KOREA
FACTORY 1	:	DSGLOBAL.CO,.LTD (Gasan-dong) 107, Gasan digital 2-ro, Geumcheon-gu, Seoul, KOREA
FACTORY 2		DSGLOBAL VINA CO.,LTD Lot XN3-1E, Dai An Expansion Industrial Zone, Lai Cach Town, Cam Giang District, Hai Duong Province, Vietnam
EQUIPMENT CLASSIFICATION	:	DTS (Part 15 Digital Transmission System)
TYPE OF MODULATION	:	FHSS(GFSK)
FREQUENCY CHANNEL	:	2 402 MHz to 2 480 MHz and Channel Spacing 2 MHz (40 Ch, BT 4.0 LE)
AIR DATE RATE	:	GFSK (1 Mbps)
ANTENNA TYPE	:	Chip Antenna (Integral)
ANTENNA GAIN	:	2.10 dBi max
RF POWER	:	0.774 mW
RULE PART(S)	:	FCC Part 15 Subpart C
FCC PROCEDURE	:	ANSI C63.10-2013
TEST REPORT No.	:	ETLT171019.0127
DATES OF TEST	:	October 18, 2017 to October 22, 2017
REPORT ISSUE DATE	:	October 25, 2017
TEST LABORATORY	:	ETL Inc. (FCC Designation Number : KR0022)

The Polaroid Mini Printer, Model POLMP01W has been tested in accordance with the measurement procedures specified in ANSI C63.10-2013 at the ETL Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part15 Subpart C section 15.247.
I attest to the accuracy of data. All measurement herein was performed by me or was made under my supervision and is correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.
The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Prepared by:
Seok Lyong, Choi (Test Engineer)
October 25, 2017

Reviewed by:
Kug Kyoung, Yoon (Chief Engineer)
October 25, 2017

ETL Inc.
Head office: #371-51, Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea
Open site: #499-1, Sagot-ri, Seosin-myeon, Hwaseong-si, Gyeonggi-do, 445-882, Korea
Tel: 82-2-858-0786 Fax: 82-2-858-0788

The test report merely corresponds to the test sample(s).
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Open site: #499-1, Sagot-ri, Seosin-myeon, Hwaseong-si, Gyeonggi-do, 445-882, Korea

FCC MEASUREMENT REPORT

Scope – *Measurement and determination of electromagnetic emission (EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)*

General Information

Applicant Name	**: C&A Licensing LLC**
Address	**: 2 Bergen Turnpike, Ridgefield Park,**
	New Jersey, 07660, USA
Attention	**: Shlomo Engel / Director**

- **EUT Type** : Polaroid Mini Printer
- **Model Number** : POLMP01W
- **S/N** : Proto type
- **Modulation Technique** : FHSS(GFSK)
- **Frequency Channel** : 2 402 MHz to 2 480 MHz and Channel Spacing 2 MHz (40 Ch, BT 4.0 LE)
- **Air Data Rate** : GFSK (1 Mbps)
- **Antenna Type** : Chip Antenna (Integral)
- **Antenna Gain** : 2.10 dBi max
- **RF Power** : 0.774 mW
- **Environmental of Tests** : Temperature: (22.9 ± 7.4) °C
  Humidity: (53 ± 12) % R.H.
  Atmospheric Pressure: (100.7 ± 1.7) kPa
- **FCC Rule Part(s)** : FCC Part 15 Subpart C
- **Test Procedure** : ANSI C63.10-2013
- **EQUIPMENT CLASS** : DTS (Part 15 Digital Transmission System)
- **Place of Tests** : ETL Inc. Testing Lab. (FCC Designation Number : KR0022)

  Radiated Emission test 1;
  #499-1, Sagot-ri, Seosin-myeon, Hwaseong-si,
  Gyeonggi-do, 445-882, Korea

  Radiated Emission test 2 and Conducted Emission test;
  #371-51, Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea

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1. INTRODUCTION

The measurement test for radiated and conducted emission test was conducted at the ETL Inc. The site is constructed in conformance with the requirements of the ANSI C63.10-2013 and CISPR Publication 16. The ETL has site descriptions on file with the FCC for 3 m and 10 m site configurations. Detailed description of test facility was found to be in compliance with FCC Rules according to the ANSI C63.10-2013 and registered to the Federal Communications Commission (FCC Designation Number : KR0022).

The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.10-2013) was used in determining radiated and conducted emissions from the C&A Licensing LLC Model: POLMP01W

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2. PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the Polaroid Mini Printer (model: POLMP01W).

The model POLMP01W is basic model that was tested.

The multiple models POLMP01B, POLMP01BL and POLMP01R are identical to basic model, except for model designation and color.

Model name	Color
POLMP01W (Basic model)	White
POLMP01B	Black
POLMP01BL	Blue
POLMP01R	Red

Will be added the other Main Board and Battery.
(Add Test report ETLT171019.0127 issued on October 25, 2017 to previously published test report ETLE141105.1589 on December 01, 2014.)

	Before (Original)	Addition	After *
Main Board model name	S2_CI V0.1	ZIP1.1 V1.0	S2_CI V0.1
			ZIP1.1 V1.0
Battery model name	432948	P0562-LF	432948
			P0562-LF

* It's may be used the one of two type selected by manufacturer.

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2.2 General Specification

Item	Specification
Paper size	50 mm x 76 mm
Type of supported image file/size	PNG (2 550 x 3 300), JPEG (baseline) Within a maximum of 10 M Byte Progressive JPEG not supported
Paper used	ZINK Paper (for Pomini only)
Paper storage conditions	Temperature: (22.5 ± 2.5) °C
	Humidity: (47.5 ± 7.5) % R.H.
Product operating conditions	Temperature: (22.5 ± 17.5) °C
	Humidity: Less than 70 % R.H. (35 °C)
Optimal print conditions	Temperature: (23.5 ± 8.5) °C
	Humidity: Less than 70 % (32 °C)
LED display	Power on/Standby/Communication/Charge/Error/Print/Update
Communication	Bluetooth 4.0
External connection terminal	Micro USB port (charging only)
USB power supply	Rated DC 5 V / 1.0 A adapter (optional)
Built-in battery	500 mAh Lithium polymer (rechargeable)
Proper image resolution	More than 1 280 x 2 448 pixel
Weight	186 g
Support App version	Android: 4.0 or higher iOS: 5.1 or higher (Support may not be provided depending on the user's Smart phone version and environment.)
High Internal Frequency	Bluetooth Module → 26.000 MHz

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3. DESCRIPTION OF TESTS

The tests documented in this report were performed in accordance with ANSI C63.10-2013 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

3.1 Radiated Emission Measurement

Radiated emission measurements were made in accordance with § 13 in ANSI C63.10-2013 "Measurement of Intentional radiators" The measurements were performed over the frequency range of 30 MHz to 40 GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak, Quasi-peak, Average" within a bandwidth of 120 kHz and above 1 GHz is 1 MHz.

Preliminary measurements were made at 3 m using broadband antennas, and spectrum analyzer to determine the frequency producing the maximum emission in shielded room. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 MHz to 1 000 MHz using Log-Bicon antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used. Final measurements were made open site or SVSWR chamber at 3 m. The test equipment was placed on a styrofoam table. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a table height for below 1GHz is 0.8 m, and for above 1GHz is 1.5 m. nonmetallic 1.0 m x 1.5 m table. The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 m to 4 m and stopped at the azimuth or height producing the maximum emission.

Varying the mode of operating frequencies of the EUT maximized each emission. The system was tested in all the three orthogonal planes and changing the polarity of the antenna. The worst-case emissions are recorded in the data tables. If necessary, the radiated emission measurement could be performed at a closer distance to ensure higher accuracy and the results were extrapolated to the specified distance using an inverse linear distance extrapolation factor (20 dB/decade) as per section 15.31(f).

Photographs of the worst-case emission can be seen in Photographs of the worst-case emission test setup can be seen in Appendix B.

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3.2 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with section § 13 in ANSI C63.10-2013 "measurement of intentional radiators" The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω/50 μH LISN as the input transducer to a Spectrum Analyzer or a Test Receiver. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 9 kHz or for "quasi-peak" within a bandwidth of 9 kHz.

The line-conducted emission test is conducted inside a shielded anechoic chamber room with 1 m x 1.5 m x 0.8 m wooden table which is placed 0.4 m away from the vertical wall and 1.5 m away from the side wall of the chamber room. Two LISN are bonded to the shielded room. The EUT is powered from the LISN and the support equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2 cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and these supply lines will be connected to the LISN. Non-inductive bundling to a 1 m length shortened all interconnecting cables more than 1 m. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the EMI Test Receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was reexamined using to set Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0.15 MHz to 30 MHz. The bandwidth of the spectrum analyzer was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission.

Photographs of the worst-case emission can be seen in Photographs of the worst-case emission test setup can be seen in Appendix B.

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3.3 FCC Part 15.205 Restricted Bands of Operations

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 - 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 - 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 - 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 - 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 - 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 - 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 - 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 - 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 25	2 483.5 - 2 500	17.7 - 21.4
8.376 25 - 8.386 75	156.7 - 156.9	2 690 - 2 900	22.01 - 23.12
8.414 25 - 8.414 75	162.012 5 - 167.17	3 260 - 3 267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3 332 - 3 339	31.2 - 31.8
12.519 75 - 12.520 25	240 - 285	3 345.8 - 3 358	36.43 - 36.5
12.576 75 - 12.577 25	322 - 335.4	3 600 - 4 400	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490 MHz - 0.510 MHz.
[2] Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1 000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

3.4 Antenna connection requirement

(1) According to §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

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4. TEST CONDITION

4.1 Test Configuration

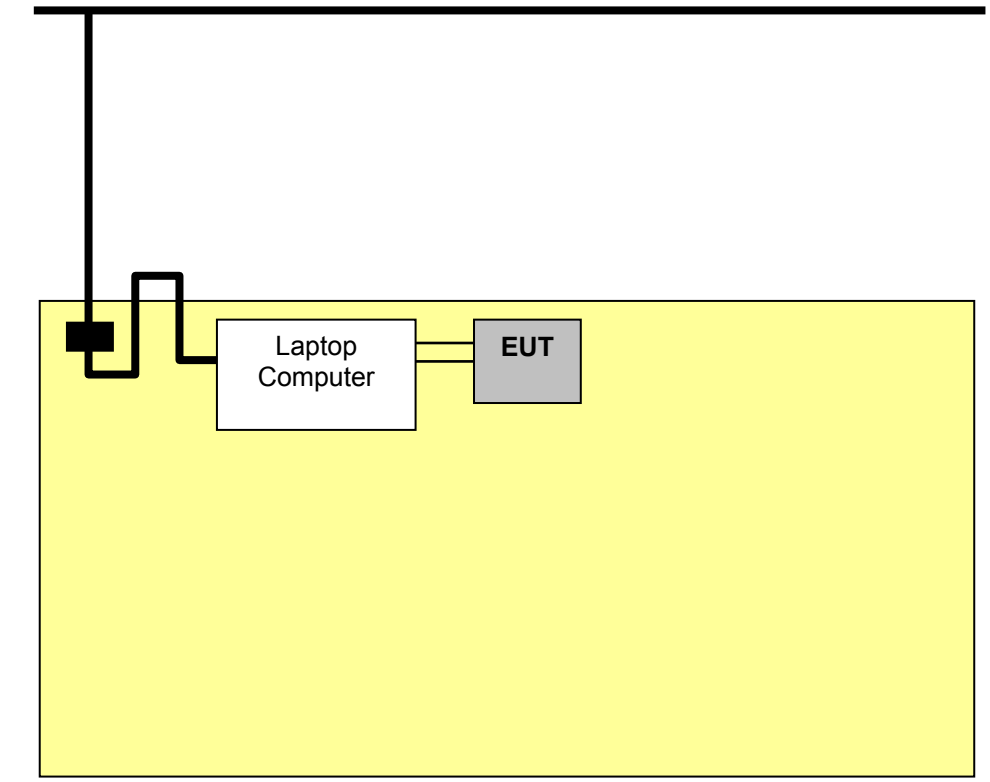
The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the following conditions and configurations were used.

* This test was applied to X, Y, Z. and the worst result were investigated and reported.

4.2 Description of Test modes

Polaroid Mini Printer that has the control software.

4.3 The setup drawing(s)



: Signal line

: AC Power line

: Adapter

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5. TEST RESULTS

5.1 Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

47 CFR Part 15, Subpart C	Measurement Required	Result
15.209(a)	Spurious Emissions	**Pass**
15.203	Antenna connection requirement	Integral antenna which is permanently attached and cannot be replaced.
1.1307(b)(1)	RF Exposure	**Pass**

The data collected shows that the **C&A Licensing LLC / Polaroid Mini Printer / POLMP01W** complied with technical requirements of above rules part 15.207, 209 and 15.247 Limits.

The equipment is not modified anything, mechanical or circuits to improve EMI status during a measurement. No EMI suppression device(s) was added and/or modified during testing.

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5.2 Spurious Emissions

EUT	Polaroid Mini Printer / POLMP01W
Limit apply to	FCC Part 15.209
Operating Condition	Low CH, Middle CH, High CH Transmission
Result	Passed

Limit

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequencies [MHz]	Field Strength [μV/m]	Measurement Distance [m]
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/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

* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 MHz - 72 MHz, 76 MHz - 88 MHz, 174 MHz - 216 MHz or 470 MHz - 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

Test Results

- Refer to see the measured plot in next page.

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Radiated Emissions Test data

- 9 kHz to 1 GHz

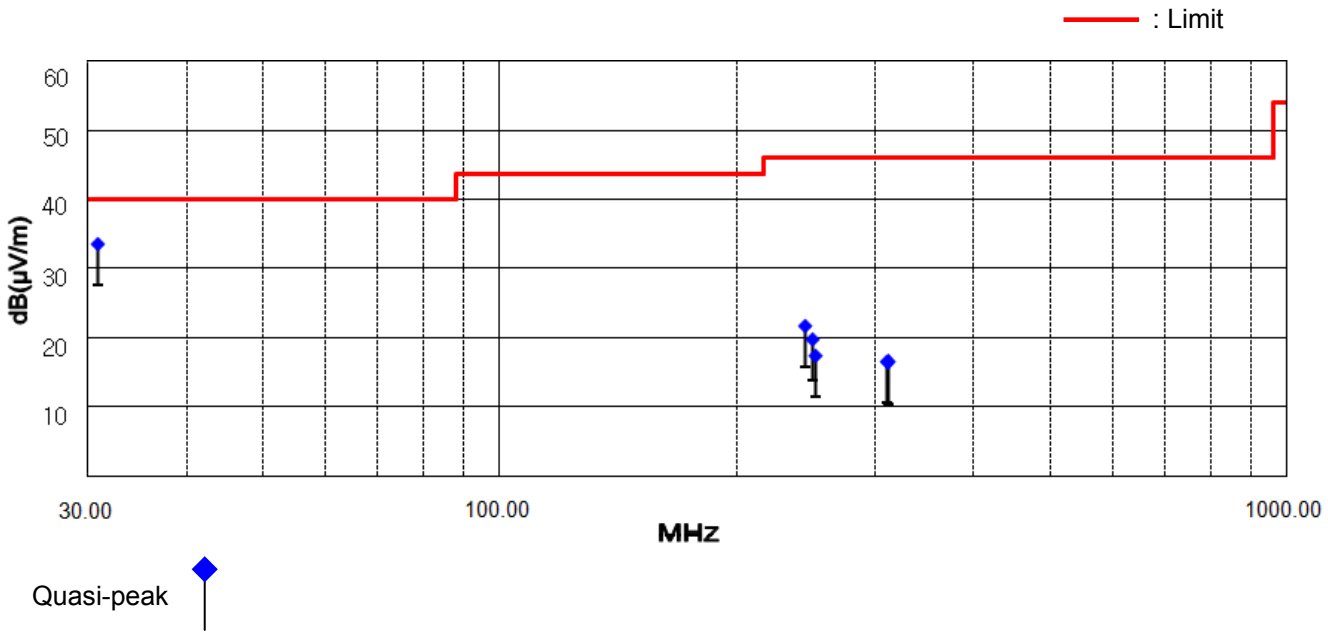
Test Date	October 22, 2017
Environmental of Test	(22.9 ± 7.4) °C, (48 ± 6) % R.H., (101.1 ± 0.1) kPa

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.
Detector mode: CISPR Quasi-Peak mode (100 Hz, 9 kHz) (6 dB Bandwidth: 120 kHz)

Frequency [MHz]	Reading [dB(μV)]	Polarization (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB(μV)]	Height [cm]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
30.82	54.42	V	10.22	-31.16	100	33.48	40.00	6.52
244.08	38.57	H	12.77	-29.61	357	21.73	46.00	24.27
248.99	36.44	H	12.90	-29.59	355	19.75	46.00	26.25
251.19	34.07	H	12.94	-29.57	355	17.44	46.00	28.56
309.76	31.95	H	13.92	-29.26	351	16.61	46.00	29.39
311.39	31.74	H	13.95	-29.26	350	16.43	46.00	29.57

NOTES:

1. * H : Horizontal polarization, ** V : Vertical polarization
2. The cable loss value was included the Amp. Gain.
3. Result = Reading + Antenna factor + Cable loss
4. Margin = Limit - Result
5. The measurement was performed for the frequency range above 9 kHz according to FCC Part 15.209.



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- Above 1 GHz (1 GHz to 25 GHz)

Test Date	October 22, 2017
Environmental of Test	(21.8 ± 5.0) °C, (54 ± 10) % R.H., (100.0 ± 1.0) kPa

1. Low CH (2 402 MHz)

Frequency [MHz]	Reading [dB(μV)]		Polarity (*H/**V)	Ant. Factor [dB/m]	Cable - AMP Loss [dB]	Height [cm]	Result [dB(μV/m)]		Limit [dB(μV/m)]		Margin [dB]	
	Peak	Average					Peak	Average	Peak	Average	Peak	Average
2 882.54	70.50	43.33	V	28.25	-44.64	150	54.11	26.94	73.97	53.97	19.86	27.03
5 885.84	50.83	36.90	H	32.34	-42.83	150	40.34	26.41	73.97	53.97	33.63	27.56
7 242.15	48.80	35.52	V	36.05	-41.27	150	43.58	30.30	73.97	53.97	30.39	23.67
10 328.54	46.58	33.46	V	39.69	-37.82	150	48.45	35.33	73.97	53.97	25.52	18.64
18 285.21	43.11	38.87	H	37.01	-31.40	150	48.72	44.48	73.97	53.97	25.25	9.49
21 447.35	42.97	35.13	V	37.66	-29.84	150	50.79	42.95	73.97	53.97	23.18	11.02

2. Middle CH (2 440 MHz)

Frequency [MHz]	Reading [dB(μV)]		Polarity (*H/**V)	Ant. Factor [dB/m]	Cable - AMP Loss [dB]	Height [cm]	Result [dB(μV/m)]		Limit [dB(μV/m)]		Margin [dB]	
	Peak	Average					Peak	Average	Peak	Average	Peak	Average
2 884.15	70.85	43.67	H	28.25	-44.64	150	54.46	27.28	73.97	53.97	19.51	26.69
5 841.44	51.06	37.00	V	32.29	-42.90	150	40.45	26.39	73.97	53.97	33.52	27.58
7 248.68	48.94	35.57	V	36.07	-41.26	150	43.75	30.38	73.97	53.97	30.22	23.59
10 343.18	47.16	33.17	H	39.72	-37.80	150	49.08	35.09	73.97	53.97	24.89	18.88
18 294.48	43.35	39.18	H	36.95	-31.39	150	48.91	44.74	73.97	53.97	25.06	9.23
21 461.99	42.87	35.24	H	37.67	-29.83	150	50.71	43.08	73.97	53.97	23.26	10.89

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3. High CH (2 480 MHz)

Frequency [MHz]	Reading [dB(μV)]		Polarity (*H/**V)	Ant. Factor [dB/m]	Cable - AMP Loss [dB]	Height [cm]	Result [dB(μV/m)]		Limit [dB(μV/m)]		Margin [dB]	
	Peak	Average					Peak	Average	Peak	Average	Peak	Average
2 888.44	71.89	43.72	V	28.26	-44.64	150	55.51	27.34	73.97	53.97	18.46	26.63
5 837.55	50.95	37.10	V	32.28	-42.90	150	40.33	26.48	73.97	53.97	33.64	27.49
7 249.67	48.83	35.60	H	36.07	-41.26	150	43.64	30.41	73.97	53.97	30.33	23.56
10 351.19	47.00	33.64	V	39.73	-37.79	150	48.94	35.58	73.97	53.97	25.03	18.39
18 308.64	43.39	39.57	H	36.88	-31.39	150	48.88	45.06	73.97	53.97	25.09	8.91
21 451.83	43.02	35.29	V	37.66	-29.84	150	50.84	43.11	73.97	53.97	23.13	10.86

NOTES:

1. * H : Horizontal polarization, ** V : Vertical polarization
2. Factor = Antenna factor + Cable loss - Amp. Gain
3. Result = Reading + Factor
4. Margin value = Limit - Result
5. Measuring frequencies from 1 GHz to the 10^{th} harmonic of highest fundamental frequency.
6. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded(ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
7. Spectrum setting:
   a. Peak Setting 1 GHz to 10^{th} harmonics of fundamental, RBW = 1 MHz, VBW = 1 MHz, Sweep = Auto
   b. AV Setting 1 GHz to 10^{th} harmonics of fundamental, RBW = 1 MHz, VBW = 10 Hz, Sweep = Auto

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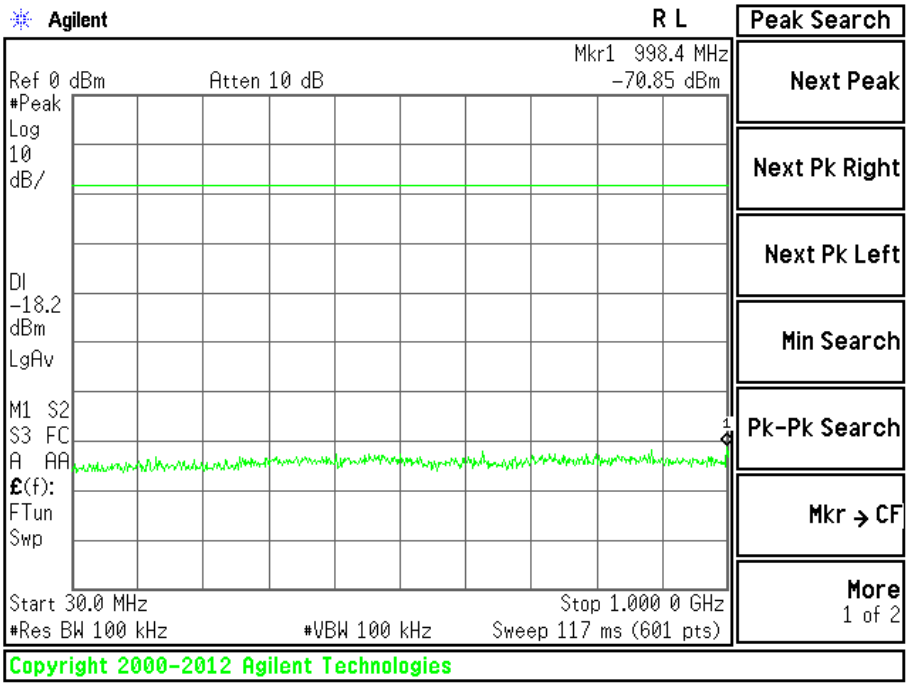
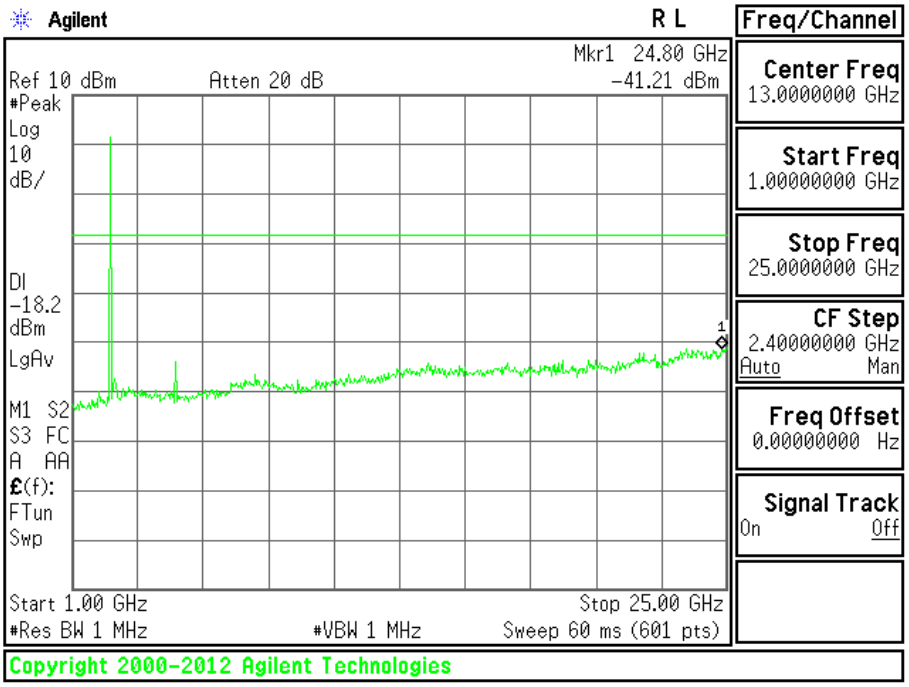
Plots of Spurious Emissions (Conducted Measurement)

Test Date	October 18, 2017
Environmental of Test	(22.9 ± 0.2) °C, (42 ± 1) % R.H., (102.3 ± 0.0) kPa

[CH Low]





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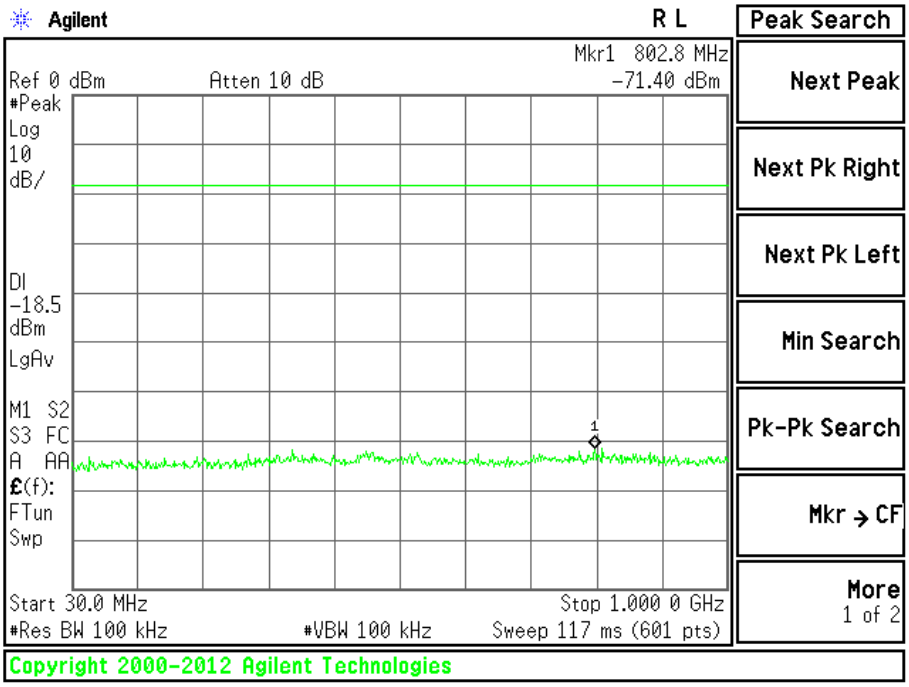
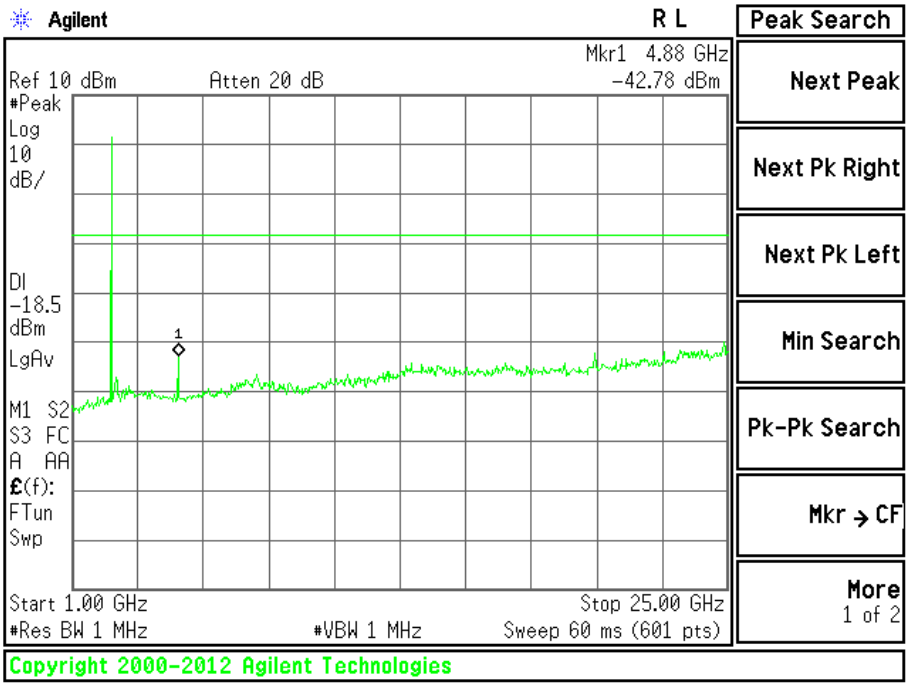
[CH Mid]





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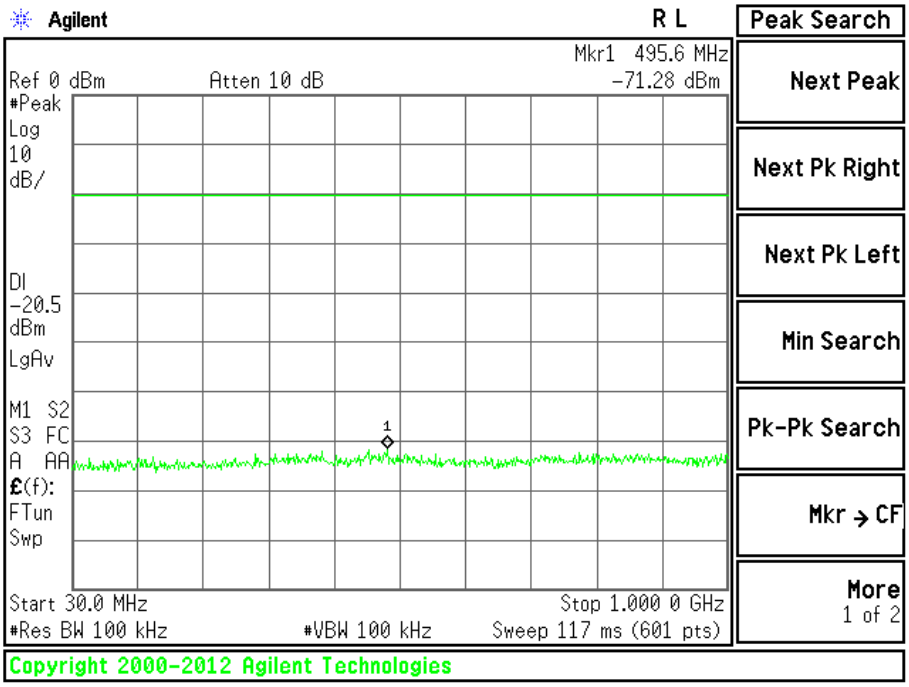
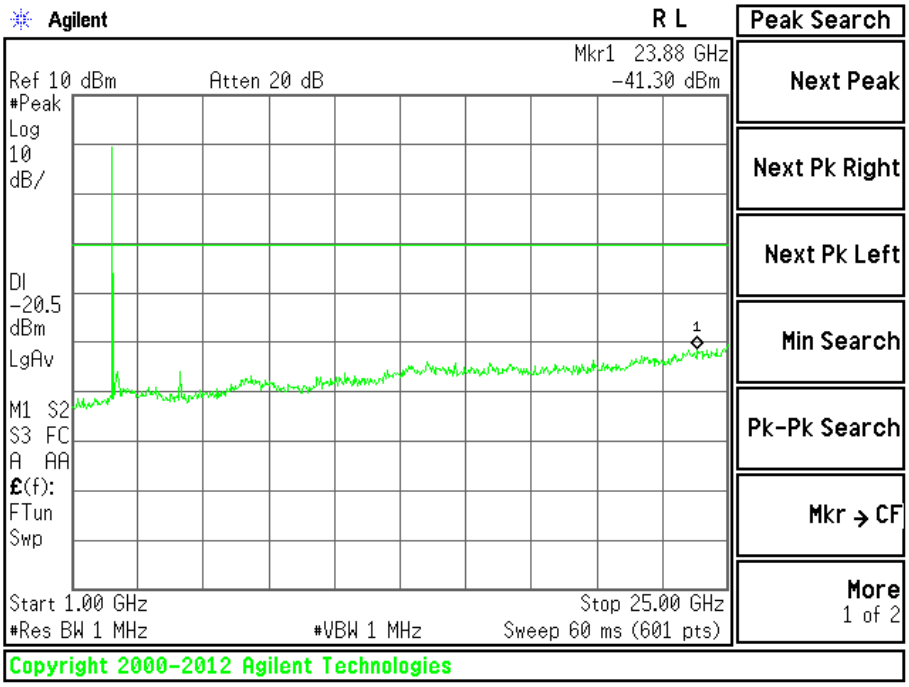
[CH High]





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5.3 Radio Frequency Exposure

Standard Applicable:

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Portable device with its physical nature to be used nearby, the distance between radiating structure and human is less than 20 cm.

As per KDB 447498 D01, The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] *
[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

f (GHz) is the RF channel transmit frequency in GHz
Power and distance are rounded to the nearest mW and mm before calculation
The result is rounded to one decimal place for comparison

Measurement Result:

This is a portable device and the Max peak output power is (**0.79 mW**) lower than the threshold given and derived as above, where

= 0.79 (mW) / 5 (mm) * √2.480 (GHz) = 0.25 < 3.00

As the result of calculation result indicates, the RF exposure generating from given transmitter (transmitter employed digital modulation) can be excluded from SAR measurement, and is deemed compliant with RF exposure as per FCC.

Frequency [MHz]	Output Power [dBm]	Target power W/ tolerance [dBm]	Max tune up power [dBm]	Max tune up power [mW]	Separation distance [mm]	RF exposure	Limit
2 402	-1.11	-5 ~ -1	-1	0.79	5	0.24	3.00
2 441	-2.54	-5 ~ -1	-1	0.79	5	0.25	3.00
2 480	**-4.29**	**-5 ~ -1**	**-1**	**0.79**	**5**	**0.25**	**3.00**

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6. SAMPLE CALCULATION

Sample Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.
The basic equation with a sample calculation is as follows:

FS = RA + AF + CF

Where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor - Preamplifier Factor

$dB(\mu V) = 20 \log_{10} (\mu V)$: Equation
dB(μV) = dBm + 107

Example : @ 30.82 MHz

Limit = 40.00 dB(μV/m)

Reading = 54.42 dB(μV)

Antenna Factor + (Cable Loss - Amp Gain) = 10.22 + (-31.16) = -20.94 dB(μV/m)

Total = 33.48 dB(μV/m)

Margin = 40.00 – 33.48 = 6.52 dB

= 6.52 dB below Limit

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7. List of test equipments used for measurements

Test Equipment		Model	Mfg.	Serial No.	Cal. Date	Cal. Due Date
☒	EMI Test Receiver	ESCI7	R&S	100851	17.08.31	18.08.31
☒	Spectrum Analyzer	E4440A	Agilent	US40420382	17.09.01	18.09.01
☒	Attenuator	BW-S10-2W263+	Mini-Circuits	-	17.03.15	18.03.15
☒	Bi-Log Antenna	VULB9163	Schwarzbeck	01069	17.02.17	19.02.17
☒	Loop Antenna	6502	EMCO	00033743	16.09.05	18.09.05
☒	Horn Antenna	BBHA 9120D	Schwarzbeck	826	16.03.23	18.03.23
☒	Horn Antenna	BBHA 9170	Schwarzbeck	766	17.07.28	19.07.28
☒	Amplifier	TK-PA18	TESTEK	120020	17.09.01	18.09.01
☒	Amplifier	310N	SONOMA INSTRUMENT	284750	17.08.31	18.08.31
☒	Amplifier	JS44-18004000-45-8P	MITEQ Inc.	1568695	17.09.05	18.09.05
☒	AMPLIFIER	TK-PA18H	TESTEK	170010-L	17.06.07	18.06.07
☒	Highpass Filter	WHKX3.0 /18G-6SS	Wainwright Instrument	15	17.03.14	18.03.14
☒	Highpass Filter	WHNX6-4740-6000 -26500-40CC	WAINWRIGHT INSTRUMENT GmbH	1	17.09.04	18.09.04
☒	Band Reject Filter	WRCGV 2402/2480-2382/2500-52/10SS	Wainwright Instrument	2R	17.08.31	18.08.31
☒	TURN-TABLE	TT 1.35 SI	SES	-	N/A	N/A
☒	ANTENNA MASTER	AM 4.5	SES	-	N/A	N/A
☒	TURN-TABLE	DS1200-S	Innco Systems Gmbh	2740311	N/A	N/A
☒	Antenna Master	MA4000	AUDIX	N/A	N/A	N/A
☒	Controller	HD 2000	HD GmbH	C/125	N/A	N/A

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