

FCC PART 15.247

TEST REPORT

For

Circus World Displays Ltd.

4080 Montrose Rd, Niagara Falls, Ontario L2H 1J9 Canada

FCC ID: SMH22303

Report Type: Original Report	Product Type: 2.4GHz Wireless Security Camera with Dual Channel Receiver (Camera unit)
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Report Number: RSZ130925006-00	
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Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Circus World Displays Ltd.*'s product, model number: 22302 (FCC ID: SMH22303) or the "EUT" in this report was a *Camera unit of 2.4GHz Wireless Security Camera with Dual Channel Receiver*, which was measured approximately: 21.5 cm (L) x 8.5 cm (W) x 16.5 cm (H), rated input voltage: DC 6V from Adapter.

Adapter Information: AC ADAPTER

Model: 5E-AD060080-U

Input: 100-240V~50/60Hz, 0.15A

Output: DC 6V, 0.8A

Note: The series product, models 22300, 22301, 22302, 22303, 12300, 12301, 12302, 12303, SC1428GMR2T1R-USA-BK00, SC1428GMR4T2R-USA-BK00, SC1428GMR1T1R-USA-BK00, SC1428GMR1T-USA-BK00, SC1428GMR2T1R-USA-BK01, SC1428GMR4T2R-USA-BK01, SC1428GMR1T1R-USA-BK01 and SC1428GMR1T-USA-BK01, they share the same product only named differently due to different combination. Model 22302 was selected for testing, the detailed information can be referred to the attached declaration letter that stated and guaranteed by the applicant.

**All measurement and test data in this report was gathered from production sample serial number: 1309078 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2013-09-25.*

Objective

This report is prepared on behalf of *Circus World Displays Ltd.* in accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine the compliance of EUT with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

Submitted with the monitor unit of a system with FCC ID: SMH22302

Test Methodology

All measurements contained in this report were conducted with 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.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with radiated emission is 5.91 dB for 30MHz-1GHz and 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode which was selected by manufacturer.

EUT Exercise Software

No exercise software was used.

Equipment Modifications

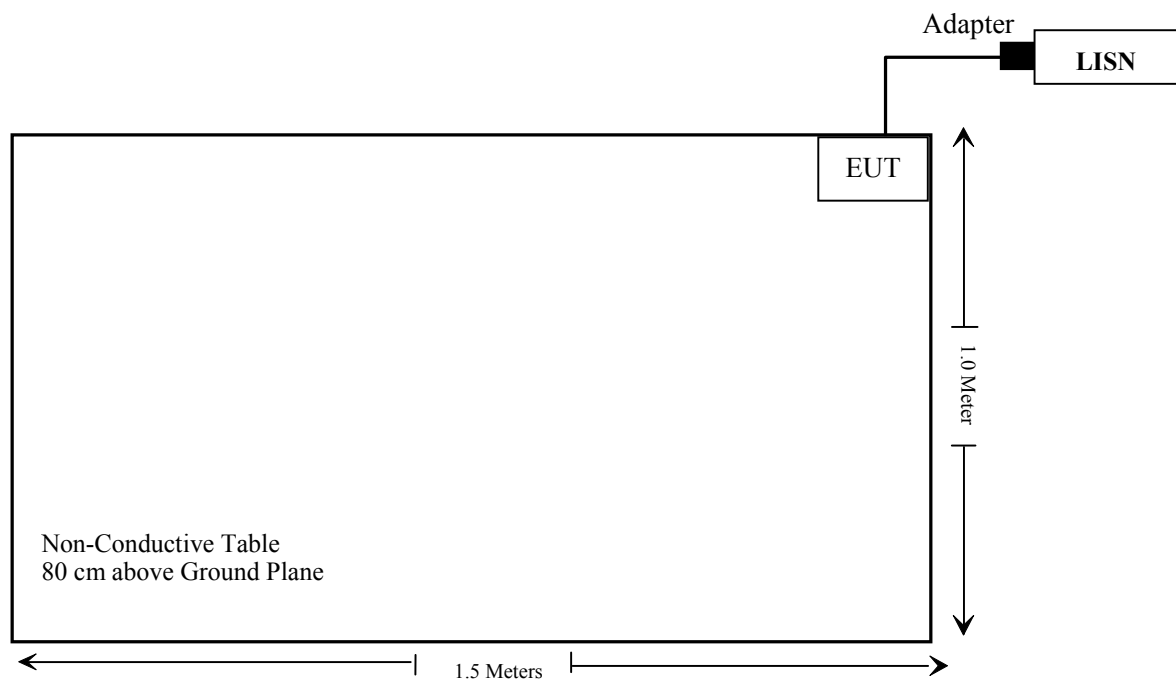
No modification was made to the EUT tested.

External I/O Cable

Cable Description	Length (m)	From/Port	To
DC Power Cable	3.00	EUT	Adapter

Block Diagram of Test Setup

For Conducted Emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b)(1), §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Emissions	Compliance
§15.247 (a)(1)	20 dB Bandwidth	Compliance
§15.247(a)(1)	Channel Separation	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(a)(1)(iii)	Quantity of hopping channel	Compliance
§15.247(b)(1)	Peak Output Power Measurement	Compliance
§15.247(d)	Band Edges	Compliance

FCC §15.247 (i) & §1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (Minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

MPE Calculation

Predication of MPE limit at a given distance

$$S = PG/4\pi R^2$$

Where:

S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
2436	2.2	1.66	11.85	15.31	20	0.005059	1.0

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliance

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 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.

Antenna Connector Construction

The EUT use one external omni-directional antenna (with reversed SMA-J connector) arrangement and the maximum gain is 2.2 dBi, fulfill the requirement of this section. Please refer to the internal photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207

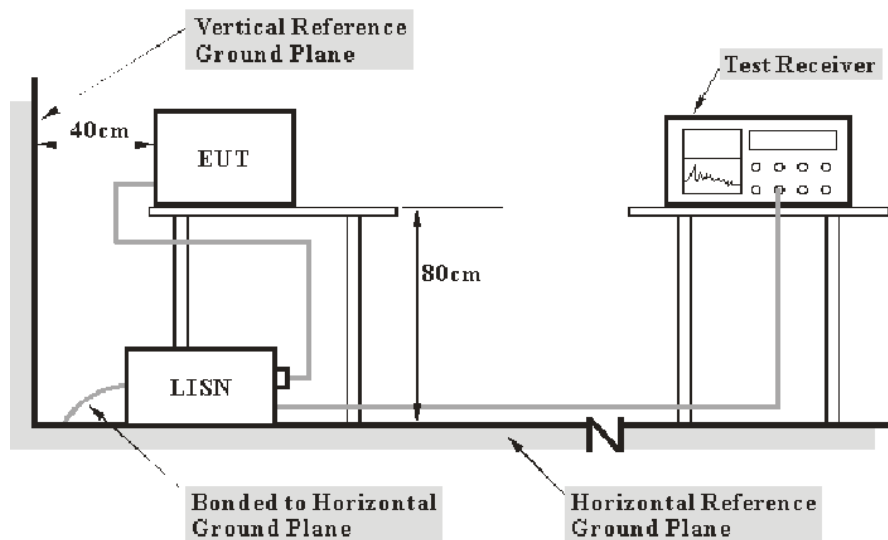
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements may be receiver reading, attenuation of the connection between AMN/ISN and receiver, AMN/ISN voltage division factor, AMN/ISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expanded combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report

Port	Measurement uncertainty
AC Mains	3.26 dB (k=2, 95% level of confidence)
CAT 3	3.70 dB (k=2, 95% level of confidence)
CAT 5	3.86 dB (k=2, 95% level of confidence)
CAT 6	4.64 dB (k=2, 95% level of confidence)

EUT Setup



Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2009 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2013-06-17	2014-06-17
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2013-05-07	2014-05-07
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2013-08-09	2014-08-09
Rohde & Schwarz	CE Test software	EMC 32	V8.53	-	-

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN/ISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the recorded data in following table, with the worst margin reading of:

14.7 dB at 0.338000 MHz in the Line conducted mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

in BACL., $U_{(Lm)}$ is less than U_{cispr} , if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

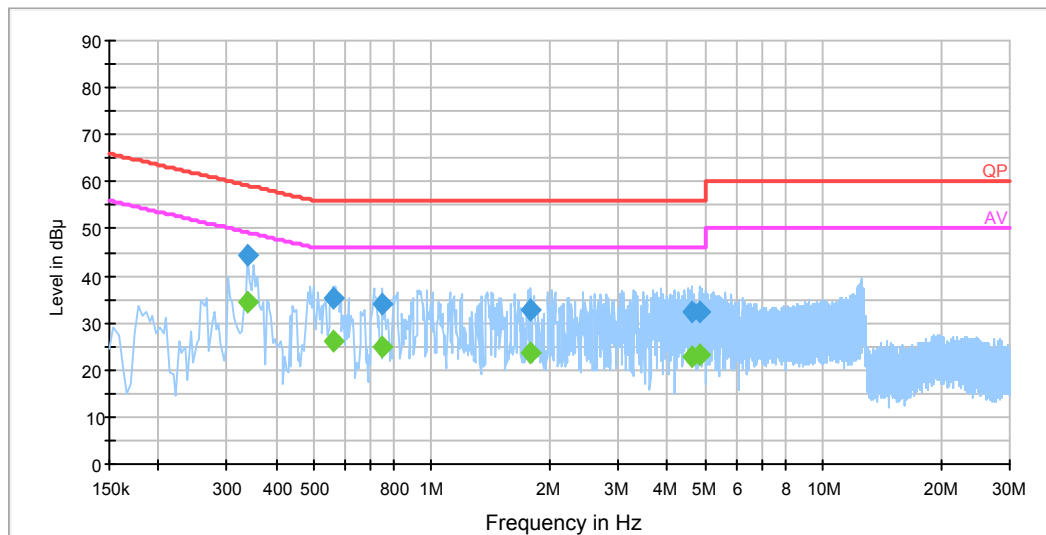
Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Simon Wang on 2013-10-27.

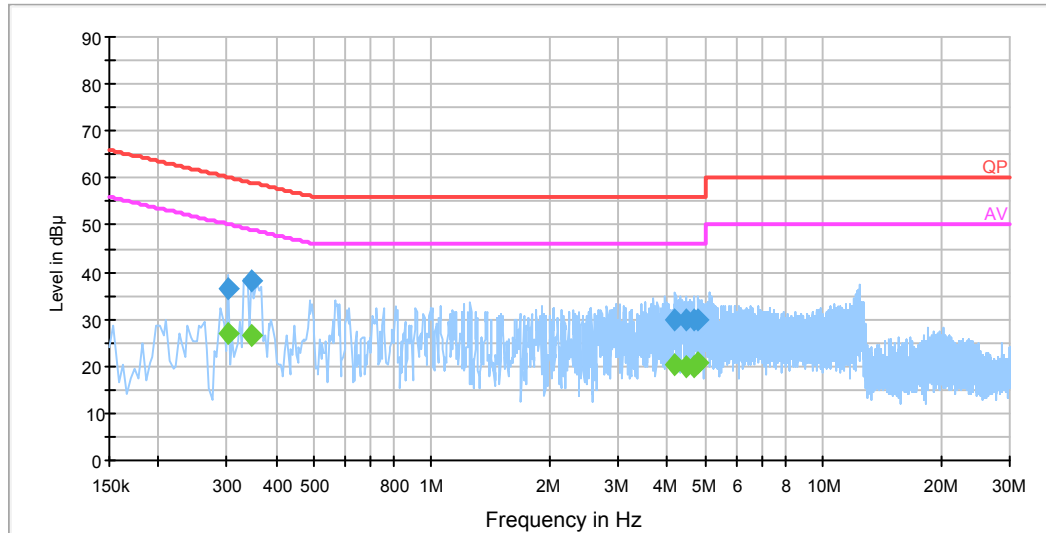
Test Mode: Transmitting

AC 120 V, 60 Hz, Line:

EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dBμV)	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Remark (PK/QP/Ave)
0.338000	44.6	19.5	59.3	14.7	QP
0.338000	34.4	19.5	49.3	14.9	Ave.
0.562000	35.4	19.5	56.0	20.6	QP
0.562000	26.2	19.5	46.0	19.8	Ave.
0.750000	34.1	19.5	56.0	21.9	QP
0.750000	24.9	19.5	46.0	21.1	Ave.
1.782000	32.7	19.5	56.0	23.3	QP
1.782000	23.8	19.5	46.0	22.2	Ave.
4.614000	32.3	19.6	56.0	23.7	QP
4.614000	22.9	19.6	46.0	23.1	Ave.
4.830000	32.2	19.6	56.0	23.8	QP
4.830000	23.1	19.6	46.0	22.9	Ave.

AC 120V, 60 Hz, Neutral:**EMI Auto Test N**

Frequency (MHz)	Corrected Amplitude (dBμV)	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Remark (PK/QP/Ave)
0.302000	36.4	19.5	60.2	23.8	QP
0.302000	27.0	19.5	50.2	23.2	Ave.
0.346000	38.1	19.5	59.1	21.0	QP
0.346000	26.4	19.5	49.1	22.6	Ave.
4.194000	29.9	19.7	56.0	26.1	QP
4.194000	20.2	19.7	46.0	25.8	Ave.
4.446000	29.7	19.7	56.0	26.3	QP
4.446000	19.9	19.7	46.0	26.1	Ave.
4.666000	29.7	19.7	56.0	26.3	QP
4.666000	19.7	19.7	46.0	26.3	Ave.
4.806000	29.8	19.7	56.0	26.2	QP
4.806000	20.9	19.7	46.0	25.1	Ave.

Note:

- 1) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
The corrected factor has been input into the transducer of the test software.
- 2) Corrected Amplitude = Reading + Correction Factor
- 3) Margin = Limit – Corrected Amplitude

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

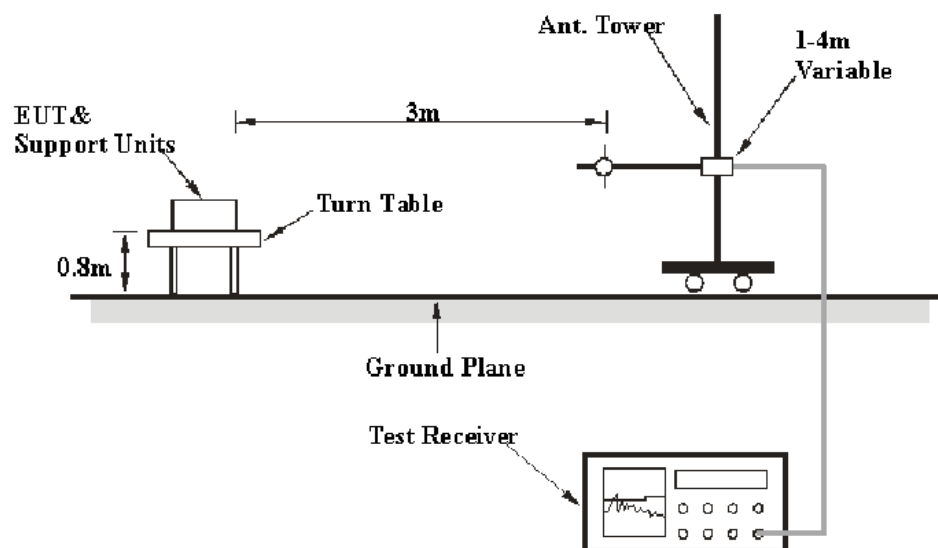
FCC §15.247 (d); §15.209; §15.205;

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expanded combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is 5.91 dB for 30MHz-1GHz and 4.92 dB for above 1GHz. And the uncertainty will not be taken into consideration for the test data recorded in the report

EUT Setup



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209 and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1 MHz	10 Hz	/	Ave.

Test Procedure

For the radiated emissions test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz to 1GHz and peak and Average detection modes for frequencies above 1GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2013-09-30	2014-09-30
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-09-17	2014-09-17
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2013-04-03	2014-04-03
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2014-11-30
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23
the electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2013-10-14	2016-10-13
R&S	Auto test Software	EMC32	V8.53	-	-

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the recorded data in following table, with the worst margin reading of:

3.43 dB at 2483.9 MHz in the Horizontal polarization

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(L_m)} \leq L_{lim} + U_{cispr}$$

in BACL., $U_{(L_m)}$ is less than $+ U_{cispr}$, if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Simon Wang on 2013-10-27.

EUT operation mode: Transmitting

30 MHz -25 GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2408 MHz)									
836.7	42.81	QP	273	1.2	H	-1.3	41.51	46	4.49
2408	103.74	PK	56	1.1	H	6.13	109.87	/	/
2408	98.06	Ave.	56	1.1	H	6.13	104.19	/	/
2408	103.86	PK	127	1.8	V	6.13	109.99	/	/
2408	97.52	Ave.	127	1.8	V	6.13	103.65	/	/
4816	36.57	PK	268	1.1	H	12.40	48.97	74	25.03
4816	20.30	Ave.	268	1.1	H	12.40	32.70	54	21.30
7224	32.38	PK	157	1.3	H	16.62	49.00	74	25.00
7224	17.63	Ave.	157	1.3	H	16.62	34.25	54	19.75
9632	32.97	PK	284	1.3	V	19.28	52.25	74	21.75
9632	17.98	Ave.	284	1.3	V	19.28	37.26	54	16.74
2384.5	43.59	PK	166	1.1	V	6.13	49.72	74	24.28
2384.5	30.68	Ave.	166	1.1	V	6.13	36.81	54	17.19
2382.2	47.82	PK	31	1.1	H	6.13	53.95	74	20.05
2382.2	37.11	Ave.	31	1.1	H	6.13	43.24	54	10.76
2486.5	36.22	PK	231	1.8	V	7.21	43.43	74	30.57
2486.5	22.33	Ave.	231	1.8	V	7.21	29.54	54	24.46
Middle Channel (2436 MHz)									
836.7	42.66	QP	145	1.2	H	-1.3	41.36	46	4.64
2436	103.28	PK	191	2.1	H	7.21	110.49	/	/
2436	97.47	Ave.	191	2.1	H	7.21	104.68	/	/
2436	103.22	PK	275	1.4	V	7.21	110.43	/	/
2436	97.15	Ave.	275	1.4	V	7.21	104.36	/	/
4872	41.54	PK	207	1.6	V	12.46	54.00	74	20.00
4872	31.48	Ave.	207	1.6	V	12.46	43.94	54	10.06
7308	33.20	PK	323	1.0	H	16.49	49.69	74	24.31
7308	20.03	Ave.	323	1.0	H	16.49	36.52	54	17.48
9744	32.32	PK	79	1.2	H	19.40	51.72	74	22.28
9744	17.33	Ave.	79	1.2	H	19.40	36.73	54	17.27
2356.5	35.57	PK	137	1.4	V	5.48	41.05	74	32.95
2356.5	21.32	Ave.	137	1.4	V	5.48	26.80	54	27.20
2374.9	35.86	PK	84	1.6	V	6.13	41.99	74	32.01
2374.9	21.51	Ave.	84	1.6	V	6.13	27.64	54	26.36
2499.5	34.86	PK	125	1.4	H	7.59	42.45	74	31.55
2499.5	20.74	Ave.	125	1.4	H	7.59	28.33	54	25.67

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2468 MHz)									
836.7	42.54	QP	136	1.2	H	-1.3	41.24	46	4.76
2468	103.09	PK	70	2.1	H	7.21	110.30	/	/
2468	97.64	Ave.	70	2.1	H	7.21	104.85	/	/
2468	103.36	PK	186	1.1	V	7.21	110.57	/	/
2468	96.88	Ave.	186	1.1	V	7.21	104.09	/	/
4936	35.81	PK	333	1.5	V	12.50	48.31	74	25.69
4936	23.43	Ave.	333	1.5	V	12.50	35.93	54	18.07
7404	32.14	PK	38	1.8	V	15.91	48.05	74	25.95
7404	17.43	Ave.	38	1.8	V	15.91	33.34	54	20.66
9872	32.12	PK	148	1.9	V	19.39	51.51	74	22.49
9872	17.35	Ave.	148	1.9	V	19.39	36.74	54	17.26
2387.1	37.36	PK	280	1.8	H	6.13	43.49	74	30.51
2387.1	22.84	Ave.	280	1.8	H	6.13	28.97	54	25.03
2483.9	51.90	PK	88	1.4	H	7.21	59.11	74	14.89
2483.9	43.36	Ave.	88	1.4	H	7.21	50.57	54	3.43
2484.7	50.26	PK	328	1.9	V	7.21	57.47	74	16.53
2484.7	39.97	Ave.	328	1.9	V	7.21	47.18	54	6.82

Note:

- 1) Corrected Factor=Antenna factor (RX) + cable loss – amplifier factor
- 2) Corrected Amplitude = Corrected Factor + Reading
- 3) Margin = Limit - Corrected Amplitude

FCC §15.247(a) (1)-CHANNEL SEPARATION**Applicable Standard**

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

Test Procedure

1. Set the EUT in Operating mode, RBW was set at 100 kHz, VBW $\geq$ 3RBW maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another trace
3. Measure the channel separation.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	100.1 kPa

* The testing was performed by Simon Wang on 2013-10-24.

Test Result: Compliance.

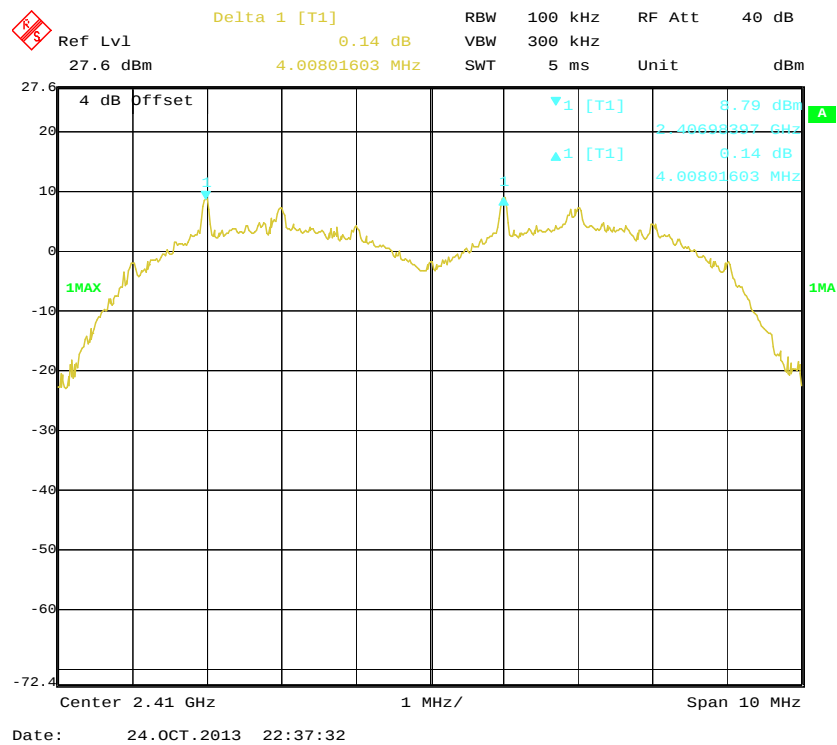
Please refer to following tables and plots

Test Mode: Transmitting

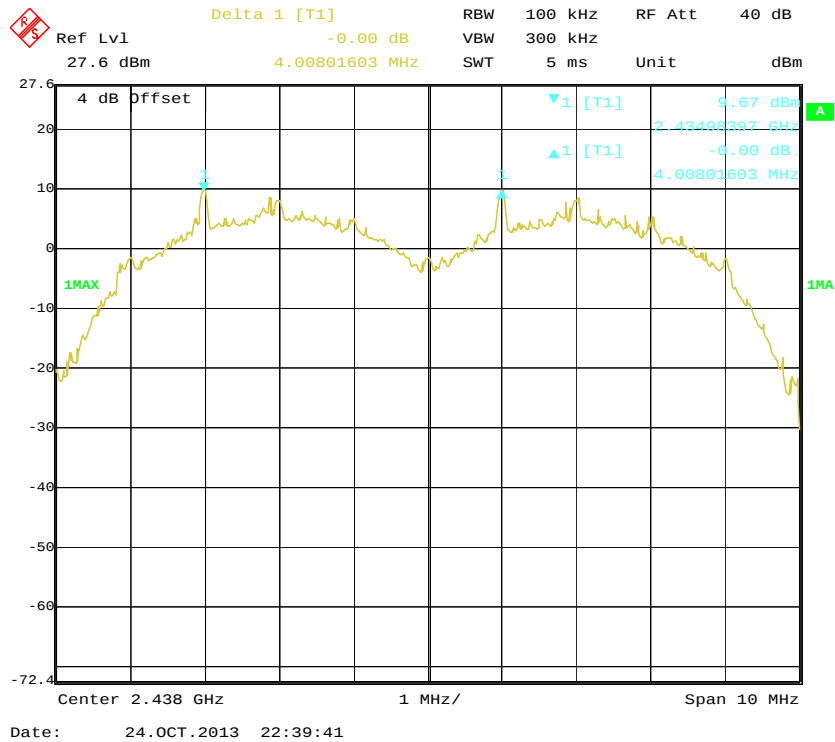
Channel	Channel Frequency (MHz)	Channel Separation (MHz)	>Limit (MHz)	Result
Channel 1	2408	4.008	3.249	Pass
Channel 2	2412			
Channel 9	2436	4.008	3.249	
Channel 10	2440			
Channel 18	2464	4.008	3.249	
Channel 19	2468			

Note: the limit = 2/3 of 20 dB bandwidth

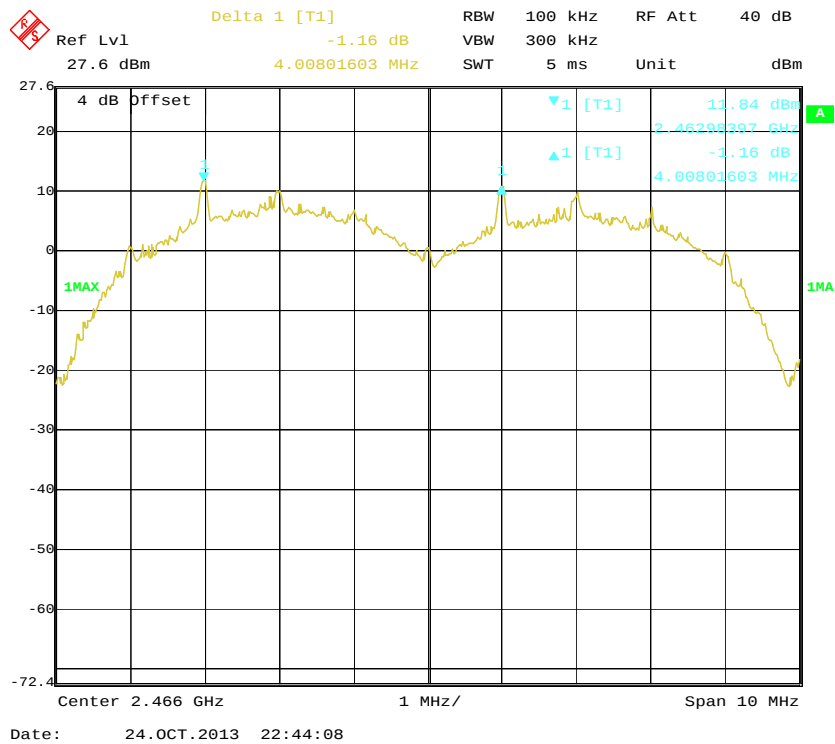
Low Channel



Middle Channel



High Channel



FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH**Applicable Standard**

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	100.1 kPa

* The testing was performed by Simon Wang on 2013-10-24.

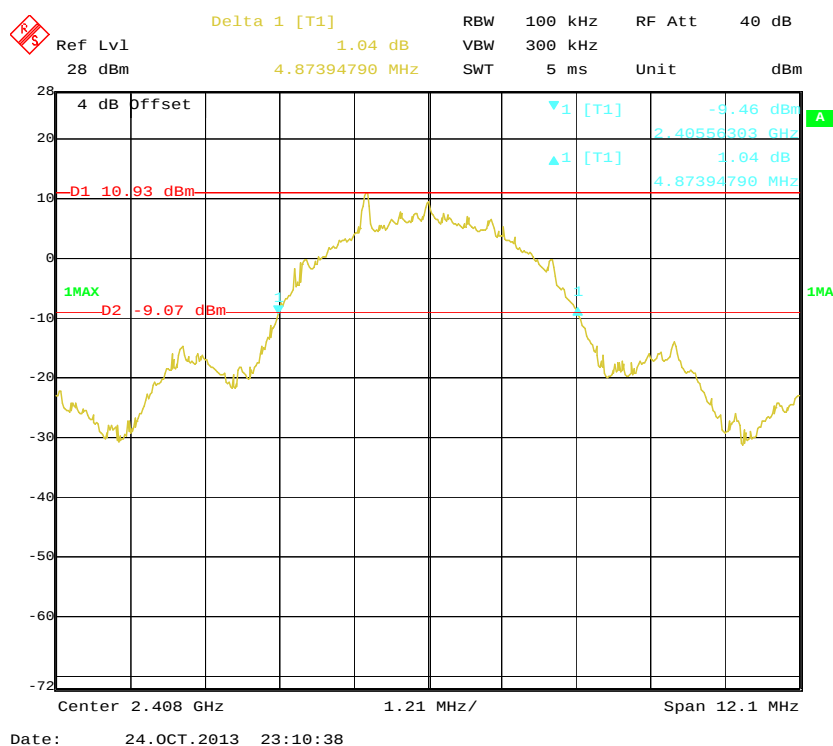
Test Result: Compliance.

Please refer to following tables and plots

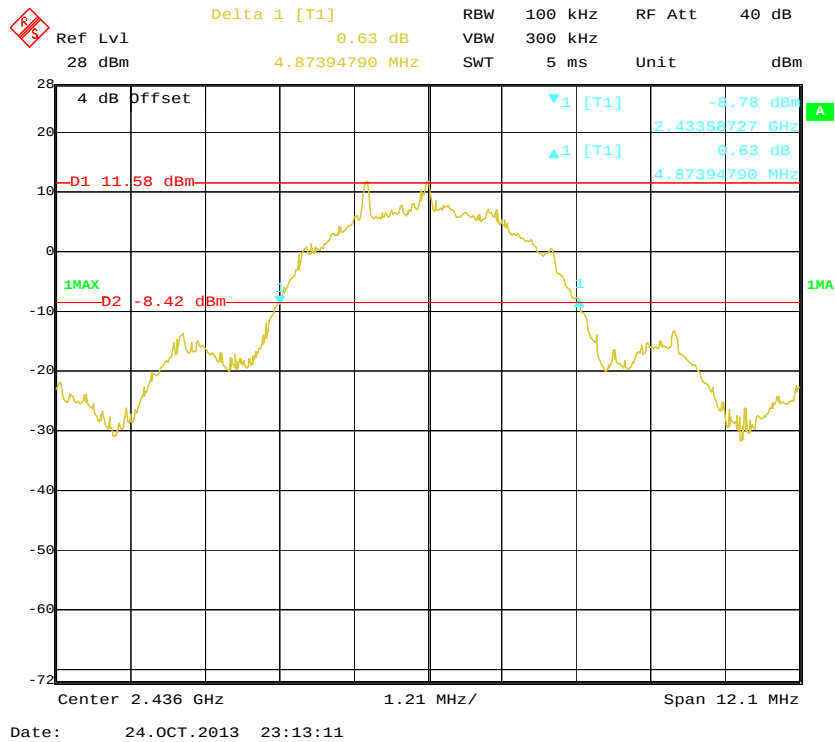
Test Mode: Transmitting

Channel	Frequency (MHz)	20 dB Emission Bandwidth (MHz)
Low	2408	4.874
Middle	2436	4.874
High	2468	4.874

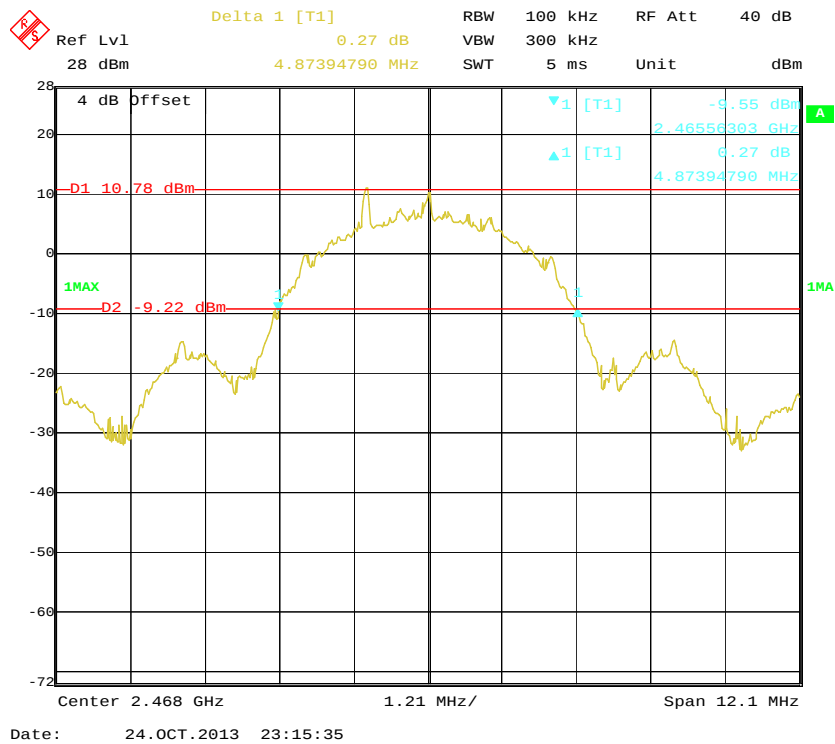
Low Channel



Middle Channel



High Channel



FCC §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL**Applicable Standard**

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Set the EUT in hopping mode from first channel to last.
3. By using the max-hold function record the quantity of the channel.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	100.1 kPa

The testing was performed by Simon Wang on 2013-10-24.

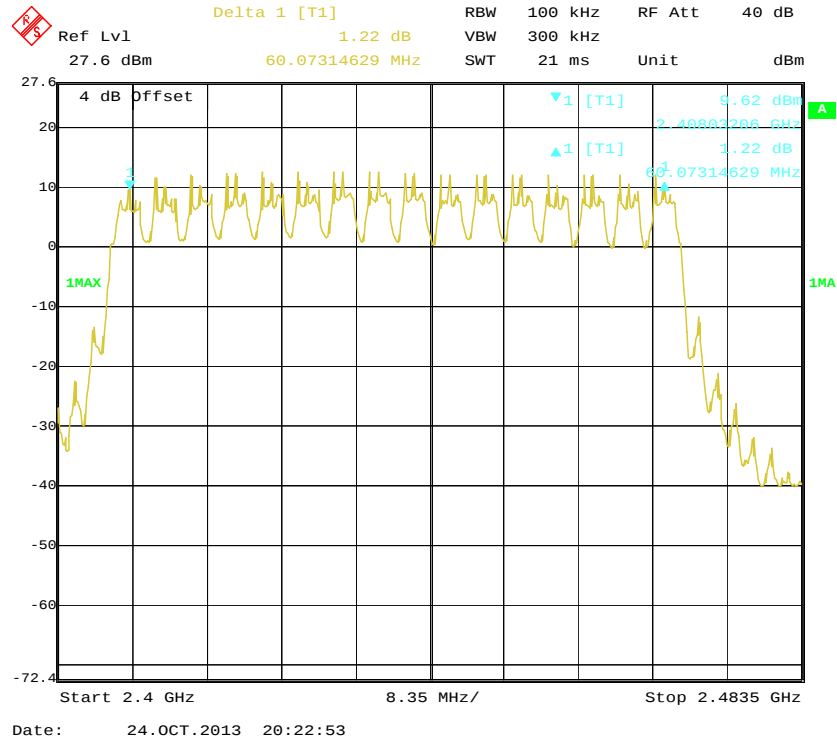
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.50	16	≥15

Number of Hopping Channels



FCC §15.247(a) (1) (iii) -TIME OF OCCUPANCY (DWELL TIME)**Applicable Standard**

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

The EUT was worked in channel hopping; spectrum span was set as 0. Sweep was set as 0.4 X channel no. (s), the quantity of pulse was get from single sweep. In addition, the time of single pulses was tested.

Dwell Time= Pulse time (ms) * hope rate/ number of hopping channels * hopping No.*0.4 s

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	100.1 kPa

The testing was performed by Simon Wang on 2013-10-25.

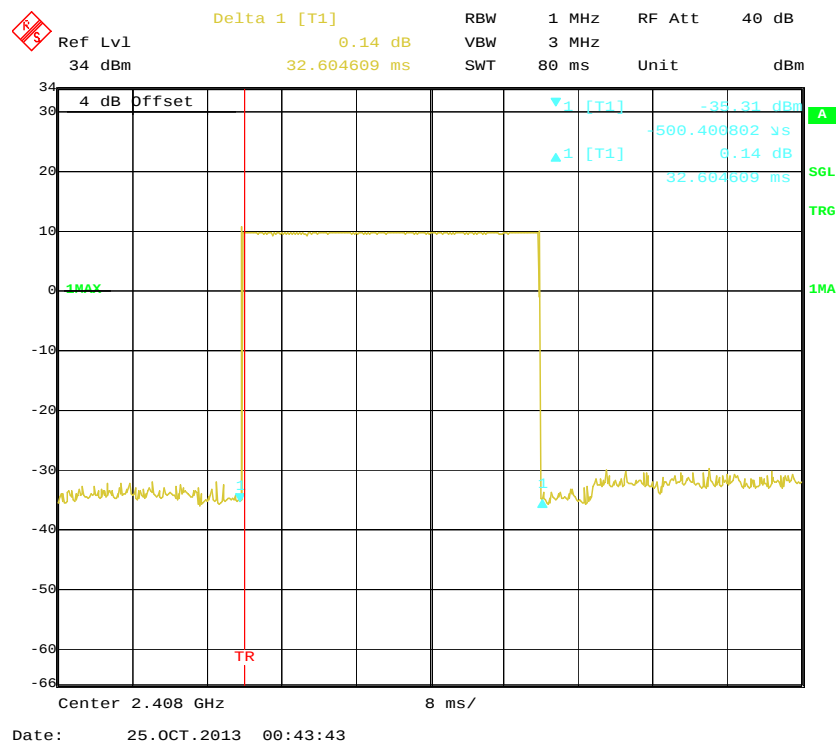
Test Result: Compliance.

Please refer to following tables and plots

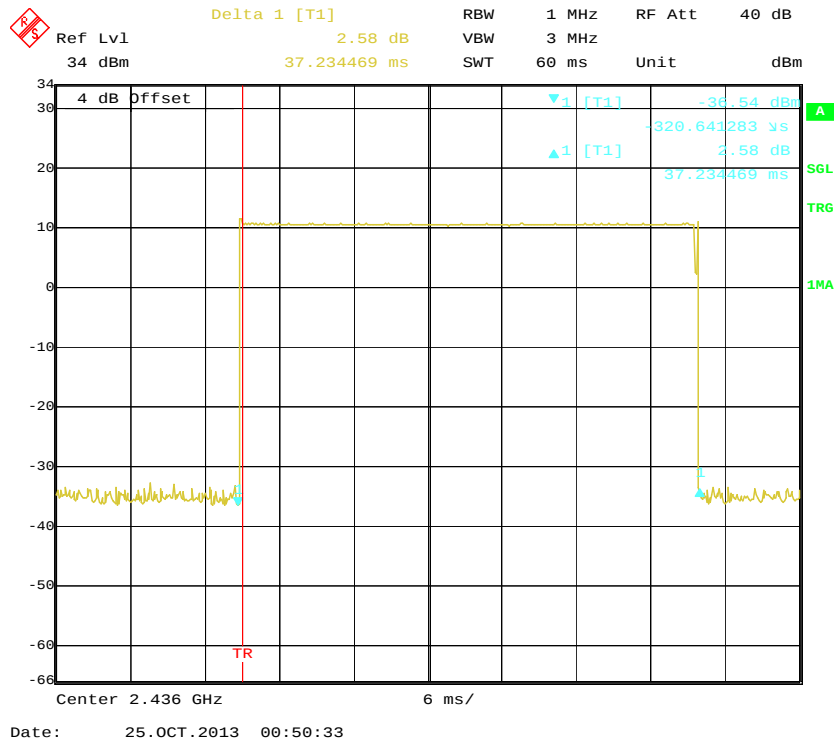
Test Mode: Transmitting

Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
Low	32.605	0.260	0.4	Pass
Middle	37.234	0.298	0.4	Pass
High	29.599	0.236	0.4	Pass
Note: Dwell time= Pulse time*(20/16)*0.4*16				

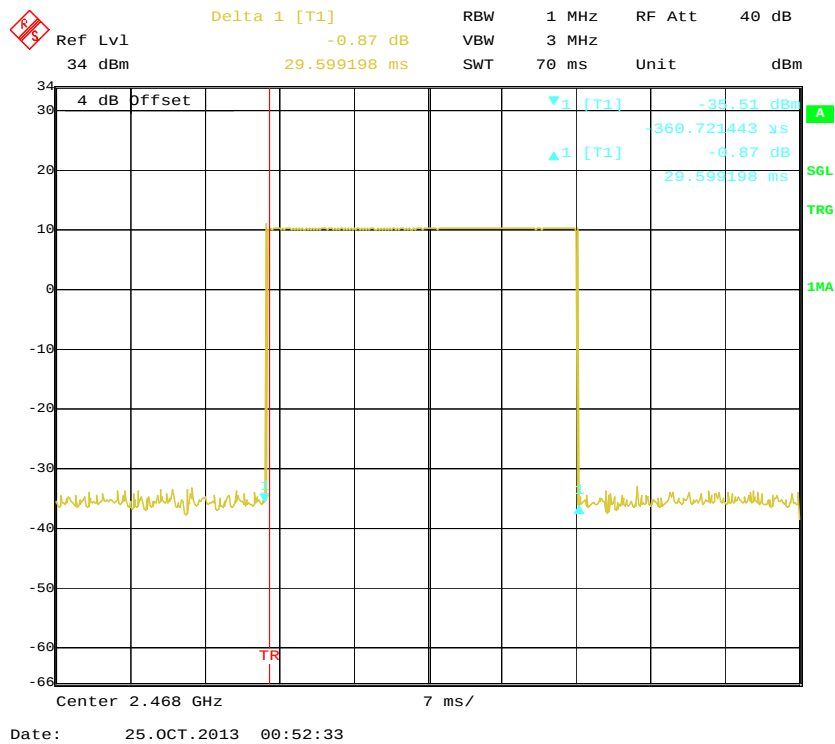
Low Channel



Middle Channel



High Channel

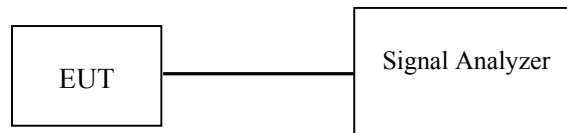


FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT**Applicable Standard**

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to an EMI Test Receiver.
3. Add a correction factor to the display.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	100.1 kPa

* The testing was performed by Simon Wang on 2013-10-24.

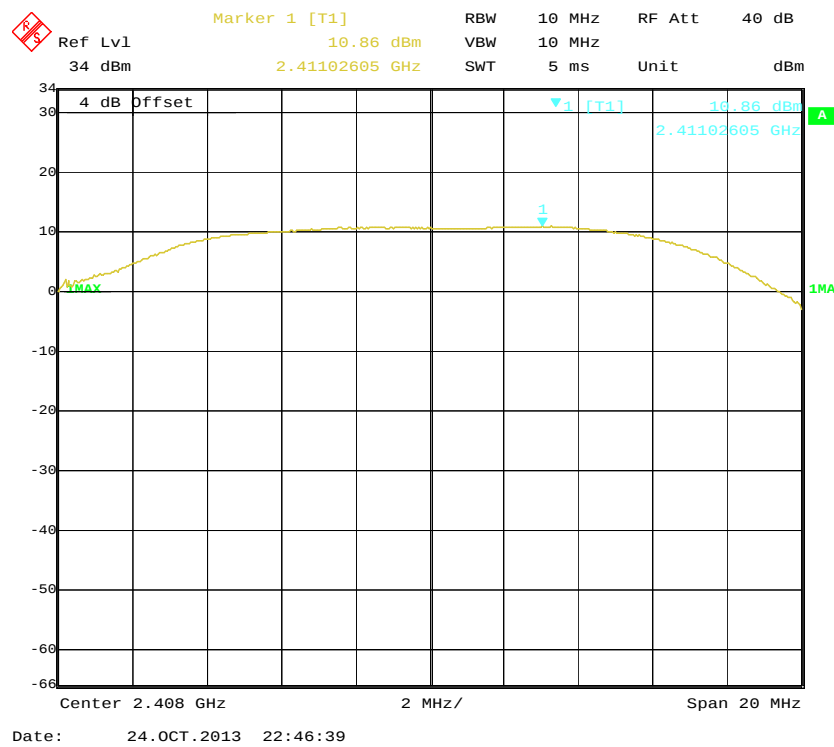
Test Result: Compliance.

Test Mode: Transmitting

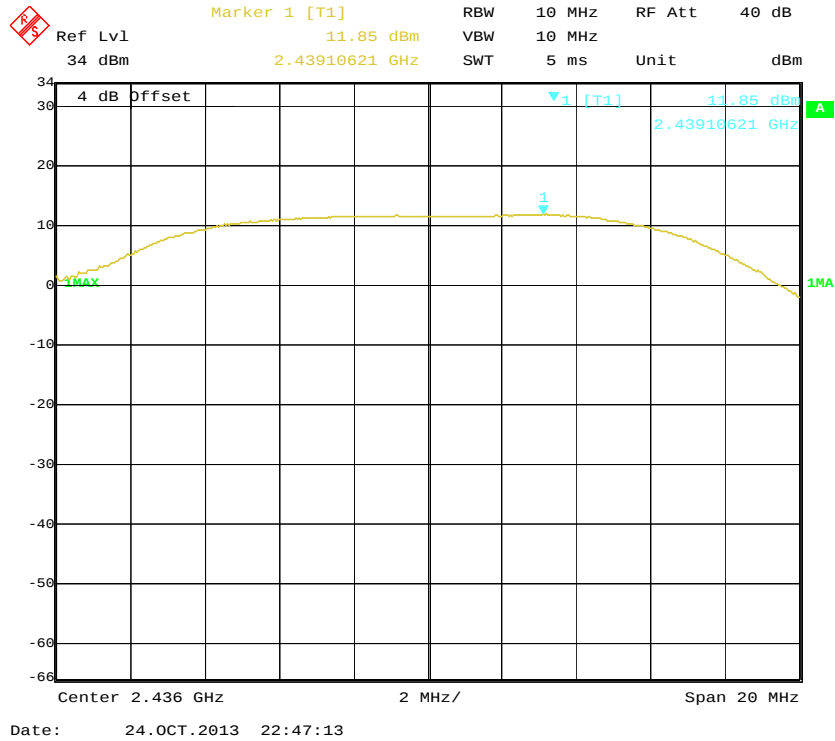
Please refer to following tables and plots

Channel	Channel frequency (MHz)	Conducted Peak output power (dBm)	Conducted Power output (mW)	Limit (mW)
Low	2408	10.86	12.19	125
Middle	2436	11.85	15.31	125
High	2468	11.85	15.31	125

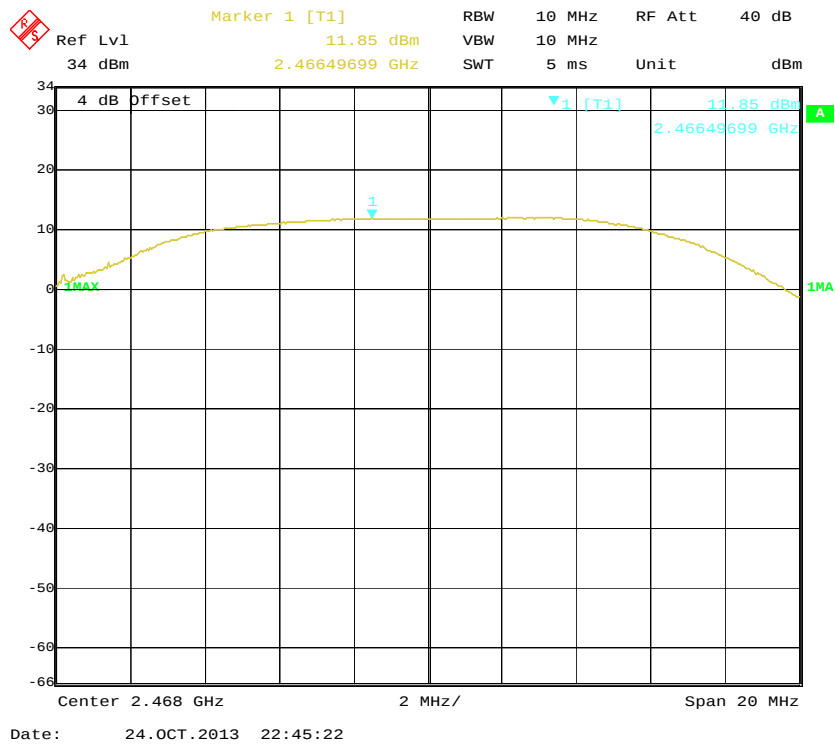
Low Channel



Middle Channel



High Channel



FCC §15.247(d) - BAND EDGES

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Put it on the rotated table and turn on the EUT and make it operate in operating mode. Then set it to low channel and high channel within its operating range, and make sure the instrument is operated in its linear range.
3. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
4. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	100.1 kPa

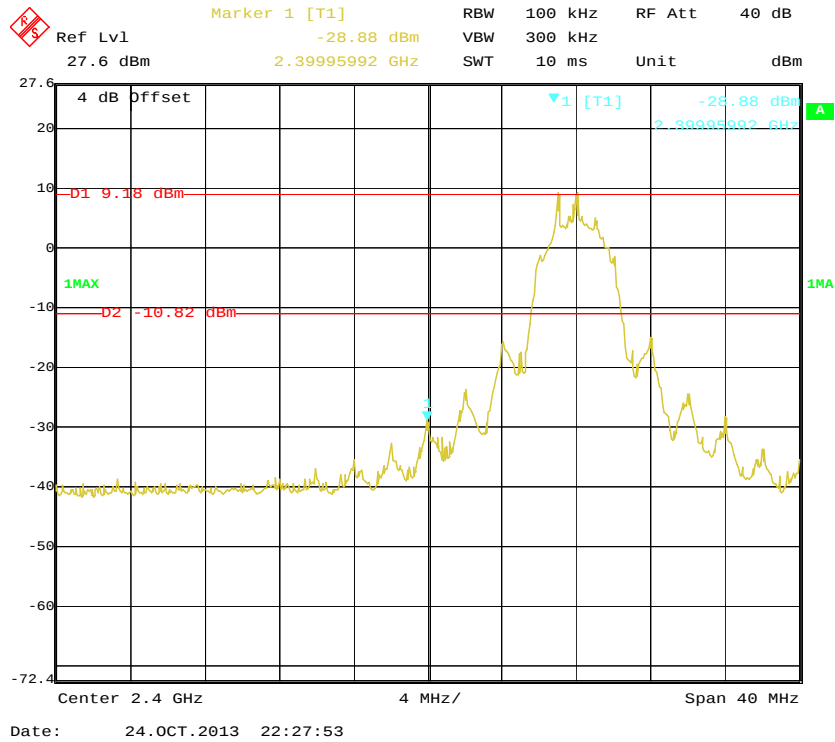
*The testing was performed by Simon Wang on 2013-10-24.

Test Result: Compliance.

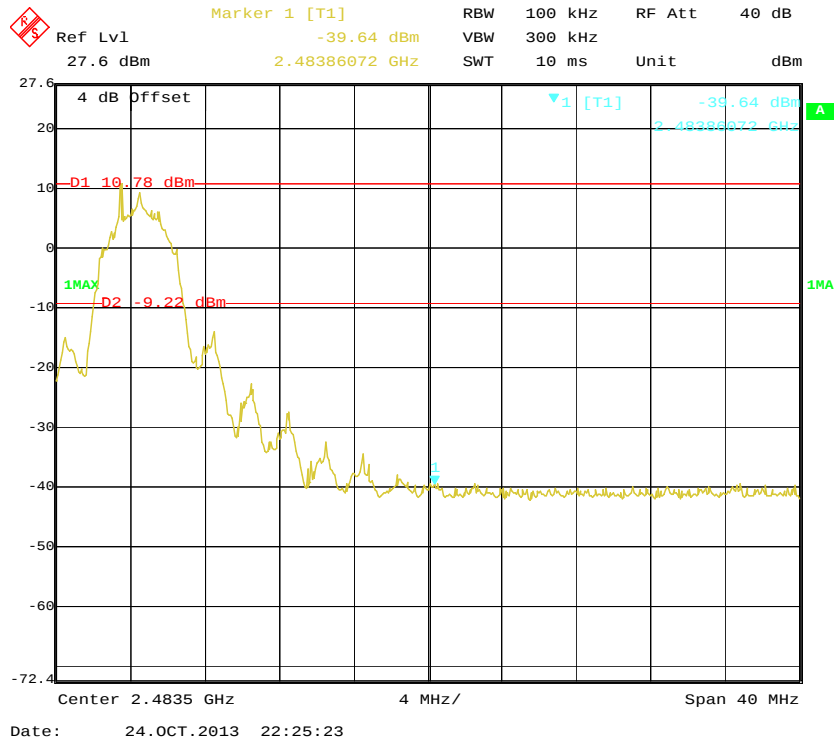
Test Mode: Transmitting

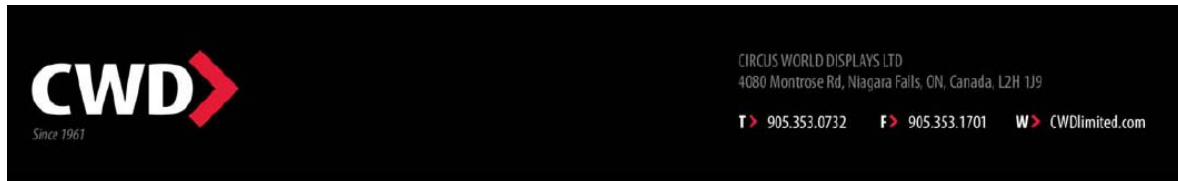
Please refer to follow plots:

Band Edge: Left Side



Band Edge: Right Side



PRODUCT SIMILARITY DECLARATION LETTER

Date: 2015-4-14

Product Similarity Declaration

To Whom It May Concern,

We, CIRCUS WORLD DISPLAYS LTD., hereby declare that we have a product named as 2.4GHz Wireless Security Camera with Dual Channel Receiver (Camera unit), Model :22302 was tested by BACL, meanwhile, for our marketing purpose, we would like to list a series models as below on reports and certificate, all the models are identical schematics. Only named differently due to different combination:

model number	description
22300, 12300 SC1428GMR2T1R-USA-BK00, SC1428GMR2T1R-USA-BK01	2 x DW Security Camera, 1 x DW Security Receiver 3 x cUL Power Adaptor, 2 x Mounting Hardware 1 x Quick Start Guide (8.5x11 Colour)
22301, 12301 SC1428GMR4T2R-USA-BK00 SC1428GMR4T2R-USA-BK01	4 x DW Security Camera, 2 x DW Security Receiver 6 x cUL Power Adaptor, 4 x Mounting Hardware 1 x Quick Start Guide (8.5x11 Colour)
22302, 12302 SC1428GMR1T1R-USA-BK00, SC1428GMR1T1R-USA-BK01	1 x DW Security Camera, 1 x DW Security Receiver 2 x cUL Power Adaptor, 1 x Mounting Hardware 1 x Quick Start Guide (8.5x11 Colour)
22303, 12303 SC1428GMR1T-USA-BK00, SC1428GMR1T-USA-BK01	1 x DW Security Camera, 1 x cUL Power Adaptor, 1 x Mounting Hardware 1 x Quick Start Guide (8.5x11 Colour)

No other changes are made to them.

We confirm that all information above is true, and we'll be responsible for all the consequences. Please contact me if you have any question.

Sincerely,

Signature:

Raj Jain
President

******* END OF REPORT *******