EMC TEST REPORT

Applicant	: MIWA LOCK CO., LTD. 3-1-12,Shiba, Minato-ku, Tokyo, Japan, 105-8510
Type of Equipment	: ALV2P
Model Number	: ALV2(P)
FCC ID	: VBU-ALV2P
Standard	: 47 CFR Part 15 Subpart C Section 15.225
Receipt Date of Sample	: 2014-05-15
Date Tested	: 2014-05-16, 2014-05-19, and 2014-05-20
Date Report Issued	: 2014-07-02
Report Number	: EMC14092

The measurements and tests covered by this document have been performed in accordance with the requirements of ISO/IEC 17025 and are traceable to national or international standards of measurement.

This report summarizes the result of a single investigation performed on the described test object and test results relate only to tested sample. The report shall not be reproduced except in full without the written approval of IPS Corporation.

APPROVED by:

Tetsushi Yamaguchi / Director

TESTS SUPERVISED by:

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1 GENERAL INFORMATION

1.1 Product Description

The Equipment Under Test (EUT) Model: ALV2(P) is a low power transmitter for hotel card lock and its fundamental frequency is 13.56 MHz. It has two 13.56 MHz transmitters. One is for detection of the approach of RFID card, the other is for communication with RFID card. They do not work simultaneity. This product was tested according to the standards below.

Condition of EUT

☐ : Mass-production ☑ : Pre-production ☐ : Engineering prototype

1.2 Product Specification

- Power Supply Rating : DC3 V
- Weight : 2.4 kg
- Dimensions : W 97 mm × D 187 mm × H 260 mm
- Highest frequency used : 20 MHz
- Transmitting Frequency : 13.56 MHz

Power source

AC/DC	Phases and Wires, or Volt		EUT
AC	Single Phase	: Without PE	☐
		: With PE	☐
	Three Phases	: Three wires with PE	☐
		: Four wires with PE	☐
DC	3 V from Dry Battery		☑

1.3 Summary of Test Result

Standard		Measurement Frequency Range	Result
Code of Federal Regulation 47 Part 15 Subpart C			
Sec. 15.207	Conducted Emission	150 kHz to 30 MHz	Not performed
Sec. 15.225 (a), (b), (c), and (d)			
	Radiated Emission	9 kHz to 30 MHz	Pass
Sec. 15.225 (d)	Radiated Emission	30 MHz to 1 GHz	Pass
Sec. 15.225 (e)	Frequency Stability		Pass

1.4 Measurement Uncertainty

Emission Test

Conducted Emission Test	AMN	Frequency range	Polarization	U (dB)	
				No 3, 10 m Semi-Anechoic Chamber	No 2, 3 m Semi-Anechoic Chamber
Main port	LISN (ESH2-Z5, KNW-407, KNW-411)	9 kHz to 30 MHz	-	1.7	1.7
Telecommunication port	ISN (ISN T8, ISN ST08)	150 kHz to 30 MHz	-	1.1	1.1
	Probe (CVP 2200A, F-35A)	150 kHz to 30 MHz	-	1.2	1.2

Radiated Emission Test	Antenna, Clamp		Frequency range	Polarization	U (dB)			
					No 3, 10 m Semi-Anechoic Chamber		No 2, 3 m Semi-Anechoic Chamber	
					10 m	3 m	10 m	3 m
Radiated Emission	Biconical (BBA9106)		30 MHz to 300 MHz	Horizontal	3.9	3.9	-	4.0
				Vertical	4.0	4.0	-	4.1
	Log.-Periodic (UHALP9108-A)		300 MHz to 1 GHz	Horizontal	4.1	4.1	-	4.1
				Vertical	4.1	4.1	-	4.1
	Dipole (VHA9103)		30 MHz to 300 MHz	Horizontal	3.8	3.8	-	3.8
				Vertical	4.0	4.0	-	4.0
	Dipole (UHA9105)		300 MHz to 1 GHz	Horizontal	3.8	3.8	-	3.8
				Vertical	4.0	4.0	-	4.0
	Bilog (CBL6111, CBL6112B)		30 MHz to 1 GHz	Horizontal	4.2	-	-	-
				Vertical	4.2	-	-	-
	Guide Horn	(EMCO3115, 3117)	1 GHz to 18 GHz	Horizontal & Vertical	-	2.6	-	2.6
		* (EMCO3116)	18 GHz to 40 GHz					
Magnetic Field Emission	Loop (HLA6120)		9 kHz to 30 MHz	-	-	2.6	-	2.6
	Large loop (MLA2000-L)		9 kHz to 30 MHz	-	2.9		-	
Disturbance Power	Absorbing (KT-10)		30 MHz to 300 MHz	-	3.5		3.5	

Note : Coverage factor k=2

: * Applied for Code of Federal Regulation 47 Part 15

1.5 Tested Systems Details

EUT, PERIPHERALS, AND CABLES USED

EUT

Equipment		Manufacturer	Model No.	Serial No.	FCC ID and Note
ID	Name				
A	ALV2P	MIWA LOCK CO., LTD.	ALV2(P)	Sample 2	FCC ID: VBU-ALV2P

Peripherals

None

Interface Cables

None

1.6 Test Facility

The test facility is located in following places of IPS Corporation.

- Nagano EMC Center
  1878-1, Ono, Tatsuno-machi, Kamiina-gun, Nagano-ken, 399-0601 Japan

The test site is registered to FCC pursuant to title 47 CFR §2.948 (e)(1)

- MRA; US-Japan MRA
- Test Firm Registration Number (MRA); 171180
- Designation Number; JP5085
- FCC Registration Number (FRN); 0006-2272-27

2 SYSTEM TEST CONFIGURATION

2.1 Justification

- All tests were performed without any deviation from the ANSI C63.4:2009.
- The system was configured for testing a typical fashion (as a customer would normally use it). The test data of the Radiated emission is presented for the "worst case" measurements, that test program as clause 2.2 should be working and the cable routing was attempted to maximize the emission.
- EUT was tested in three orthogonal orientations for Radiated emission in order to present "the worst case".
- EUT was set to transmit continuously during test by using RF circuit.
- Tests were performed in the following one mode with DC3 V from Dry Battery.
  - Detection mode
    Detecting the approach of RFID card.

2.2 EUT Exercise Software

The EUT exercise program used during all testing was designed to exercise the various system components in manner similar to a typical use.

2.3 Special Accessories

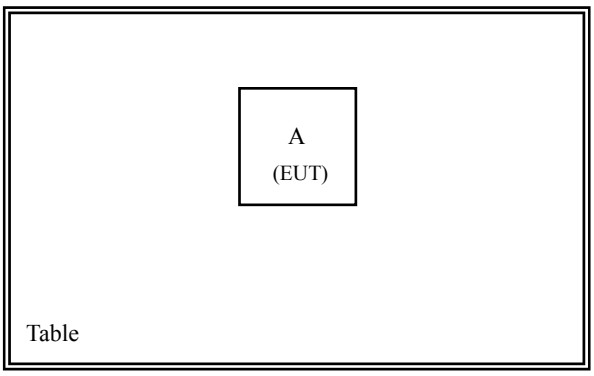
None.

2.4 Equipment Conditions

The condition at the time of receipt of EUT : Good
The condition at the time of return of EUT : Good
Limited conditions : None
No modification has been carried out by the test laboratory.

2.5 Configuration of Tested System

Figure



Key
A ALV2P

Note: This figure shows Radiated Emission Test as a representative figure.
Refer to the figure/photos of each test for the actual test arrangement.

3 CONDUCTED EMISSION TEST

- No test was performed, as the EUT was DC power operated equipment.

4 RADIATED EMISSION TEST (9 kHz to 30 MHz)

4.1 Test Setup

The test setup was made according to ANSI C63.4:2009.

The measurement distance was 3 m.

- The test was performed with frequency range 9 kHz to 30 MHz.
- The EUT is a stand-alone unit, it was placed in the center of a non-conductive table.
- The table size was 0.8 m high × 2.0 m wide × 1.0 m deep.
- The dimension of Loop Antenna can be completely enclosed by a square having sides of 60 cm in length.
- The antenna was located at 3 m of distance horizontally from the boundary of the EUT. The antenna height was 1 m.

4.2 Testing System

Instruments

Equipment	Manufacturer	Model	S/N	Calibration		Note
				Date	Due	
Semi-Anechoic Chamber	Otsuka Science	10 m	No. 3	2014-01-11	2015-01-31	
EMI Test Receiver	Rohde & Schwarz	ESCS30	836858/002	2014-04-08	2015-04-30	1)
EXA Signal Analyzer	Agilent Technologies	N9010A	MY52221120	2013-05-27	2014-05-31	2)
Loop Antenna	Chase	HLA6120	1131	2014-03-11	2015-03-31	
Cable System	IPS Corporation	RE (31)	N/A	2014-02-10	2015-02-28	

Note: 1) System Bandwidth=9 kHz, Detector Mode= Quasi-Peak
2) Detector Mode=Peak

Software:

Toyo Corporation, EP5/RE, Version 5.5.10

4.3 Description of Measurement Procedure

4.3.1 Exploratory Test

EUT is tested in all operating modes.

<Step1>

EUT and system are set up according to “IPS measurement procedures” and “ANSI C63.10:2009”.

<Step2>

The operator selects an antenna from among the following depending on the measurement frequency.

- Loop Antenna

4.3.1 Exploratory Test (Continued)

<Step3>
The Spectrum analyzer is controlled by PC EMI software as follows:

- Set to Peak Detector mode and Max-Hold mode.
- Sweep measurement frequency range.

Following parameters are also controlled by PC EMI software:

- Turntable (rotate 0° to 360°)
- Antenna polarization (vertical: 0° and 90°, horizontal: not rotated)
- Antenna height (1 m)

<Step4>
The operator performs following operations.

- Prints out the Spectrum chart from PC EMI software.
- Records frequency (ies) with minimum margin(s).
- Determines the operating mode where maximum emission is detected.

4.3.2 Final Test

<Step1>
EUT system is operated in the operation mode determined by Exploratory Test.

<Step2>
The operator selects an antenna from among the following depending on the measurement frequency.

- Loop Antenna

<Step3>
Following operation is performed by the operator:
EMC Test Receiver is set to the system bandwidth and detection mode specified by the test standard.

<Step4>
The operator controls turntable, antenna polarization and rotate to determine the combination where maximum emission was detected.

- Loop Antenna
  The center of the loop antenna was 1 m above the ground.
  Loop antenna was positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT.
  Also, loop antenna was positioned with its plane horizontal at the specified distance from EUT.

<Step5>
The operator arranges the apparatus and the cables to determine the configuration where maximum emission was detected.

<Step6>
The operator enters the values displayed on EMC Test Receiver into PC EMI software.
The measurement result is calculated by PC EMI software.
The same operation is repeated for all modes that should be measured.

4.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

c. f. = AF + CL - AG

F S = RA + c.f.

Where	c.f.	= Correction Factor
	FS	= Field Strength (Emission Level - Result)
	RA	= Receiver Amplitude (Reading Level)
	AF	= Antenna Factor
	CL	= Cable Loss
	AG	= Amplifier Gain

Assume a receiver reading of 52.5 dBμV is obtained. The Antenna Factor of 7.4 dB/m and a Cable Loss of 1.1 dB is added. The Amplifier Gain of 29.0 dB is subtracted, giving a field strength of 32.0 dBμV/m. The 32.0 dBμV/m value was mathematically converted to its corresponding level in μV/m.

FS = 52.5 dBμV + 7.4 dB/m + 1.1 dB - 29.0 dB = 32.0 dBμV/m

Level in μV/m = Common Antilogarithm [(32.0 dBμV/m)/20] = 39.8 μV/m

4.5 Test Details

13.110 MHz to 14.010 MHz (as required by Sec. 15.225 (a), (b), and (c))

Test Details for Pattern 1

Test Date: 2014-05-19

Test data: Refer to Section 7 of this report for test data and spectrum chart.
(Spectrum chart is presented)

Summary of the measurement data (Worst measurement):
13.110 MHz, 26.5 dB(μV/m) Peak Value
and it has 43.0 dB margin from the limit(69.5 dB(μV/m)).
14.010 MHz, 26.5 dB(μV/m) Peak Value
and it has 43.0 dB margin from the limit(69.5 dB(μV/m)).

Test configuration photo: Refer to Section 8.2.1

Test Details for Pattern 2

Test Date: 2014-05-19

Test data: Refer to Section 7 of this report for spectrum chart.
(Spectrum chart is presented)

Summary of the measurement data (Worst measurement):
13.110 MHz, 26.5 dB(μV/m) Peak Value
and it has 43.0 dB margin from the limit(69.5 dB(μV/m)).

Test configuration photo: Refer to Section 8.2.1

4.5 Test Details (Continued)

Test Details for Pattern 3
Test Date: 2014-05-19

Test data: Refer to Section 7 of this report for spectrum chart.
(Spectrum chart is presented)

Summary of the measurement data (Worst measurement):
13.110 MHz, 26.5 dB(μV/m) Peak Value
and it has 43.0 dB margin from the limit(69.5 dB(μV/m)).

Test configuration photo: Refer to Section 8.2.1

9 kHz to 30 MHz (as required by Sec. 15.225 (d) and Sec. 15.209)
Test Details for Pattern 1
Test Date: 2014-05-20

Test data: Refer to Section 7 of this report for spectrum chart.
(Spectrum chart is presented)

Test configuration photo: Refer to Section 8.2.1

Test Details for Pattern 2
Test Date: 2014-05-20

Test data: Refer to Section 7 of this report for spectrum chart.
(Spectrum chart is presented)

Test configuration photo: Refer to Section 8.2.1

Test Details for Pattern 3
Test Date: 2014-05-20

Test data: Refer to Section 7 of this report for spectrum chart.
(Spectrum chart is presented)

Test configuration photo: Refer to Section 8.2.1

Note: See clause 8.1 for the axial direction of EUT (Pattern 1, Pattern 2, and Pattern 3).

5 RADIATED EMISSION TEST (30 MHz to 1 GHz)

5.1 Test Setup

The test setup was made according to ANSI C63.4:2009.

The measurement distance was 3 m

- The test was performed with frequency range 30 MHz to 1 GHz.
- The EUT is a stand-alone unit, it was placed in the center of a non-conductive table.
- The table size was 0.8 m high × 2.0 m wide × 1.0 m deep.
- Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna was scanned in height from 1 m to 4 m.

5.2 Testing System

Instruments

Equipment	Manufacturer	Model	S/N	Calibration		Note
				Date	Due	
Semi-Anechoic Chamber	Otsuka Science	10 m	No. 3	2014-01-11	2015-01-31	
EMI Test Receiver	Rohde & Schwarz	ESCS30	836858/002	2014-04-08	2015-04-30	1)
EXA Signal Analyzer	Agilent Technologies	N9010A	MY52221120	2013-05-27	2014-05-31	2)
Biconical Antenna	Schwarzbeck	BBA9106	1513	2013-11-14	2014-11-30	3)
Log-Periodic Antenna	Schwarzbeck	UHALP9108-A	0715	2013-11-14	2014-11-30	4)
Cable System	IPS Corporation	RE (28)	N/A	2014-02-10	2015-02-28	

Note: 1) System Bandwidth=120 kHz, Detector Mode=Quasi-Peak.
2) Detector Mode=Peak
3) For 30 MHz to 300 MHz
4) For 300 MHz to 1 GHz

Software:

Toyo Corporation, EP5/RE, Version 5.5.10

5.3 Description of Measurement Procedure

5.3.1 Exploratory Test

EUT is tested in all operating modes.

<Step1>

EUT and system are set up according to “IPS measurement procedures” and “ANSI C63.10:2009”.

<Step2>

The operator selects an antenna from among the following depending on the measurement frequency.

- Broadband Antenna (This Antenna is used for 30 MHz to 1 GHz)
- Double Rigid Guide Antenna (This Antenna is used for over 1 GHz)

5.3.1 Exploratory Test (Continued)

<Step3>
The Spectrum analyzer is controlled by PC EMI software as follows:

- Set to Peak Detector mode and Max-Hold mode.
- Sweep measurement frequency range.

Following parameters are also controlled by PC EMI software:

- Turntable (rotate 0° to 360°)
- Antenna polarization (horizontal and vertical)
- Antenna height (1 m to 4 m)

<Step4>
The operator performs following operations.

- Prints out the Spectrum chart from PC EMI software.
- Records frequency (ies) with minimum margin(s).
- Determines the operating mode where maximum emission is detected.

5.3.2 Final Test

<Step1>
EUT system is operated in the operation mode determined by Exploratory Test.

<Step2>
The operator selects an antenna from among the following depending on the measurement frequency.

- Broadband Antenna (This Antenna is used for 30 MHz to 1 GHz)
- Double Rigid Guide Antenna (This Antenna is used for over 1 GHz)

<Step3>
Following operation is performed by the operator:
EMC Test Receiver is set to the system bandwidth and detection mode specified by the test standard.

<Step4>
For 30 MHz to 1 GHz, the operator controls the turntable and antenna height and polarization to reproduce the combination where maximum emission was detected during the Exploratory Test.
For over 1 GHz, the operator controls the turntable and antenna height, polarization, azimuth and elevation to reproduce the combination where maximum emission was detected during the Exploratory Test.

<Step5>
The operator arranges the apparatus and the cables to reproduce the configuration where maximum emission was detected during the Exploratory Test.

<Step6>
The operator enters the values displayed on EMC Test Receiver into PC EMI software.
The measurement result is calculated by PC EMI software.
The same operation is repeated for all modes that should be measured.

5.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

c. f. = AF + CL - AG

F S = RA + c.f.

Where c.f. = Correction Factor
FS = Field Strength (Emission Level - Result)
RA = Receiver Amplitude (Reading Level)
AF = Antenna Factor
CL = Cable Loss
AG = Amplifier Gain

Assume a receiver reading of 52.5 dBμV is obtained. The Antenna Factor of 7.4 dB/m and a Cable Loss of 1.1 dB is added. The Amplifier Gain of 29.0 dB is subtracted, giving a field strength of 32.0 dBμV/m. The 32.0 dBμV/m value was mathematically converted to its corresponding level in μV/m.

FS = 52.5 dBμV + 7.4 dB/m + 1.1 dB - 29.0 dB = 32.0 dBμV/m

Level in μV/m = Common Antilogarithm [(32.0 dBμV/m)/20] = 39.8 μV/m

5.5 Test Details

30 MHz to 1 GHz (as required by Sec. 15.225 (d) and Sec. 15.209)

Test Details for Pattern 1

Test Date: 2014-05-19

Test data: Refer to Section 7 of this report for spectrum chart.
(Spectrum chart is presented)

Test configuration photo: Refer to Section 8.2.2

Test Details for Pattern 2

Test Date: 2014-05-19

Test data: Refer to Section 7 of this report for test data and spectrum chart.
(Spectrum chart is presented)

Summary of the measurement data (Worst measurement):
Horizontal Polarization, 759.372 MHz, 31.9 dB(μV/m) Peak Value
and it has 14.1 dB margin from the limit(46.0 dB(μV/m)).

Test configuration photo: Refer to Section 8.2.2

5.5 Test Details (Continued)

Test Details for Pattern 3
Test Date: 2014-05-19

Test data: Refer to Section 7 of this report for spectrum chart.
(Spectrum chart is presented)

Test configuration photo: Refer to Section 8.2.2

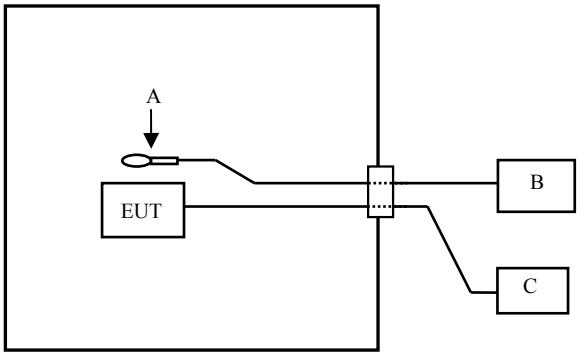
Note: See clause 8.1 for the axial direction of EUT (Pattern 1, Pattern 2, and Pattern 3).

6 FREQUENCY STABILITY TEST

6.1 Test Setup

- The test setup was made according to ANSI C63.4: 2009.
- The EUT was placed in a temperature and humidity chamber.
- The near field magnetic sensor was placed near the EUT inside the chamber.

Figure



Temperature Chamber

Key
A EMI Probe
B EXA Signal Analyzer
C DC Power Supply
* For details, refer to clause 6.2.

6.2 Testing System

Instruments

Equipment	Manufacturer	Model	S/N	Calibration Date	Calibration Due	Note
Temperature Chamber	ESPEC	MC-811P	1120008892	2013-10-31	2014-10-31	
EMI Probe	Anritsu	MA2601C	MA-01	2014-01-20	2015-01-31	
EXA Signal Analyzer	Agilent Technologies	N9010A	MY52221120	2013-05-27	2014-05-31	
DC Power Supply	KIKUSUI	PAN35-5A	LA002428	Non Calibration		

6.3 Test Details

The table below shows the test details as required by Sec.15.225(e).

Date : 2014-05-16 Operator: S.Nema

Product Name : ALV2P Test location : Testing Room (EMC Center)

S/N : Sample 2 Model : ALV2(P)

Reference Condition : Temp/Humi : 24.0 °C /32 %

Temperature : -20 °C Voltage : DC3 V

Time	Start Up	2 min.	5 min.	10 min.	Diviation	
Frequency (MHz)	13.559995113	13.559995119	13.559994992	13.559994857	-0.000005	MHz
					-0.000038	%

Temperature : 20 °C Voltage : DC3 V

Time	Start Up	2 min.	5 min.	10 min.	Diviation	
Frequency (MHz)	13.560043526	13.560043457	13.560043359	13.560043165	0.000044	MHz
					0.000321	%

Temperature : 50 °C Voltage : DC3 V

Time	Start Up	2 min.	5 min.	10 min.	Diviation	
Frequency (MHz)	13.560003891	13.560004045	13.560004276	13.560004632	0.000005	MHz
					0.000034	%

Test configuration photo: Refer to Section 8.3

7 TEST DATA

- Radiated Emission Test Data

Note: See clause 8.1 for the axial direction of EUT (Pattern 1, Pattern 2, and Pattern 3).

********** IPS Corporation **********
<<Radiated Emission>>
19 May, 2014
1E14144006.dat

Standard : FCC 15C 13.56MHz 3m
Model : ALV2(P)
S/N : Sample 2
Product Name : ALV2P
File No : 006
Power Source : DC3V from Dry Battery
Temp/Humi : 24.3℃ / 30%
Test Mode : Detection
Remarks : Pattern 1 , Distance = 3m
Operator : M.Horigane

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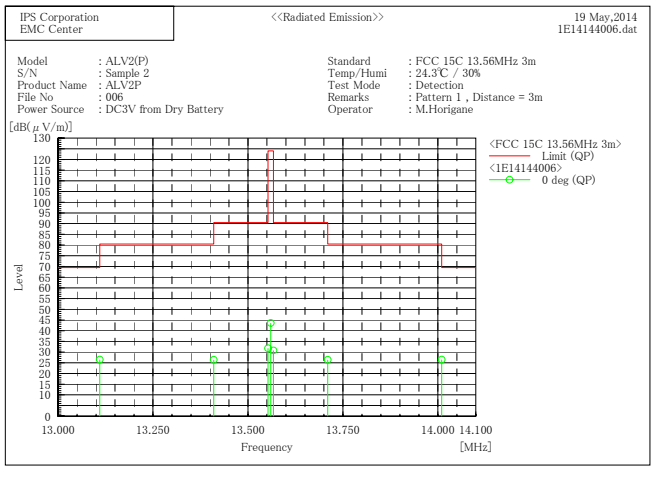
Final Result

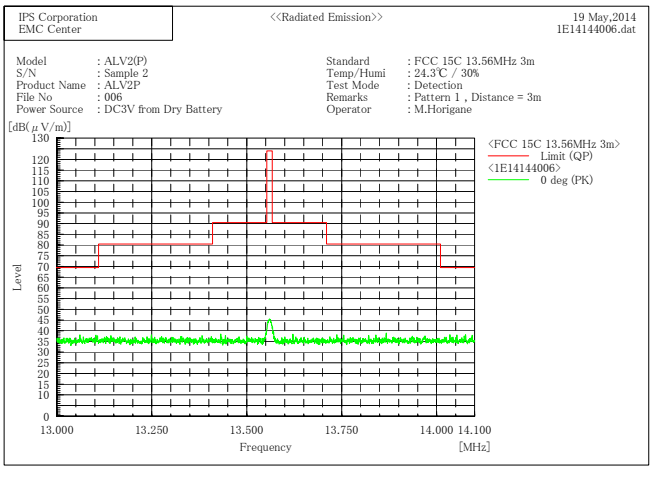
--- 0 deg (QP)---

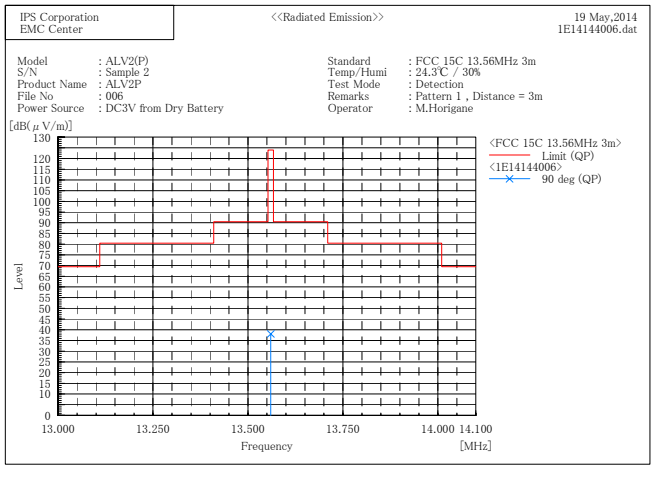
No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	13.110	4.4	22.1	26.5	69.5	43.0	100.0	12.0
2	13.410	4.3	22.1	26.4	80.5	54.1	100.0	12.0
3	13.553	9.7	22.1	31.8	90.5	58.7	100.0	12.0
4	13.560	21.4	22.2	43.6	124.0	80.4	100.0	12.0
5	13.567	8.6	22.2	30.8	90.5	59.7	100.0	12.0
6	13.710	4.2	22.2	26.4	80.5	54.1	100.0	12.0
7	14.010	4.3	22.2	26.5	69.5	43.0	100.0	12.0

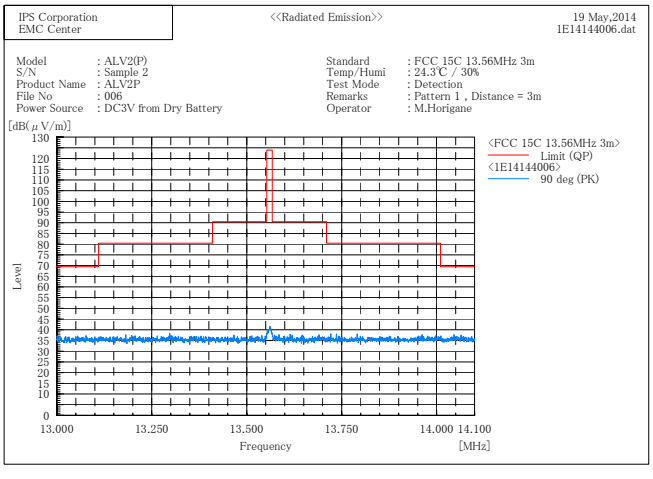
--- 90 deg (QP)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	13.560	15.9	22.2	38.1	124.0	85.9	100.0	93.0









********** IPS Corporation **********
<<Radiated Emission>>
19 May, 2014
1E14144005.dat

Standard : FCC 15C 13.56MHz 3m
Model : ALV2(P)
S/N : Sample 2
Product Name : ALV2P
File No : 005
Power Source : DC3V from Dry Battery
Temp/Humi : 24.1℃ / 30%
Test Mode : Detection
Remarks : Pattern 2 , Distance = 3m
Operator : M.Horigane

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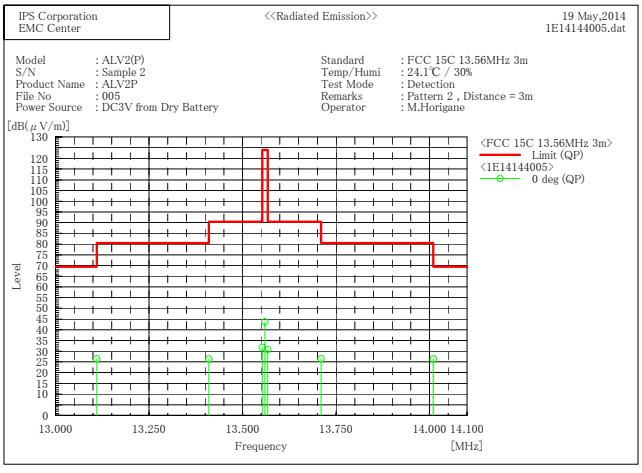
Final Result

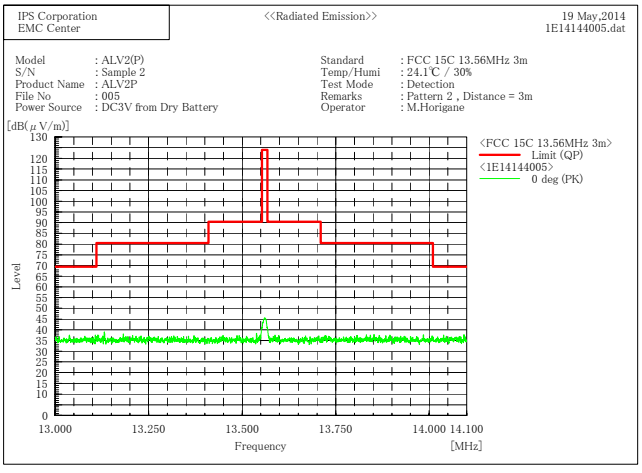
--- 0 deg (QP)---

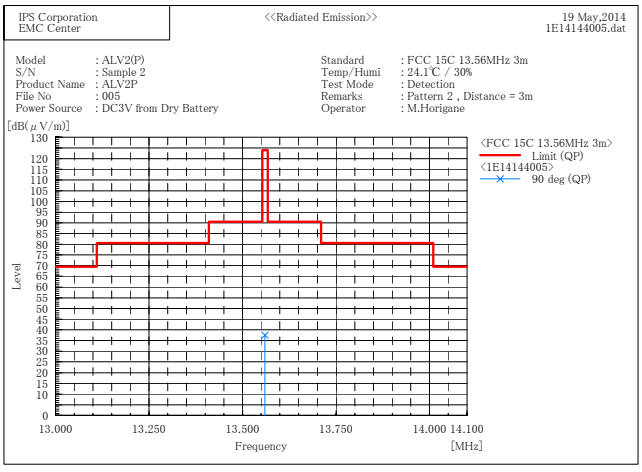
No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	13.110	4.4	22.1	26.5	69.5	43.0	100.0	10.0
2	13.410	4.3	22.1	26.4	80.5	54.1	100.0	10.0
3	13.553	9.7	22.1	31.8	90.5	58.7	100.0	10.0
4	13.560	21.5	22.2	43.7	124.0	80.3	100.0	10.0
5	13.567	8.6	22.2	30.8	90.5	59.7	100.0	10.0
6	13.710	4.3	22.2	26.5	80.5	54.0	100.0	10.0
7	14.010	4.2	22.2	26.4	69.5	43.1	100.0	10.0

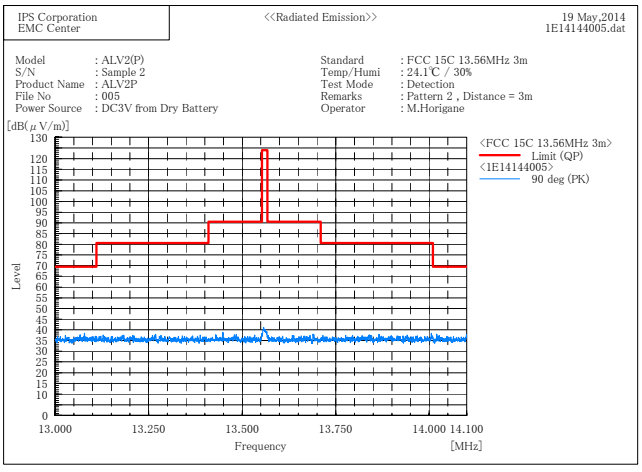
--- 90 deg (QP)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	13.560	15.4	22.2	37.6	124.0	86.4	100.0	80.0









********** IPS Corporation **********
<<Radiated Emission>>
19 May, 2014
1E14144007.dat

Standard : FCC 15C 13.56MHz 3m
Model : ALV2(P)
S/N : Sample 2
Product Name : ALV2P
File No : 007
Power Source : DC3V from Dry Battery
Temp/Humi : 24.3℃ / 30%
Test Mode : Detection
Remarks : Pattern 3 , Distance = 3m
Operator : M.Horigane

****

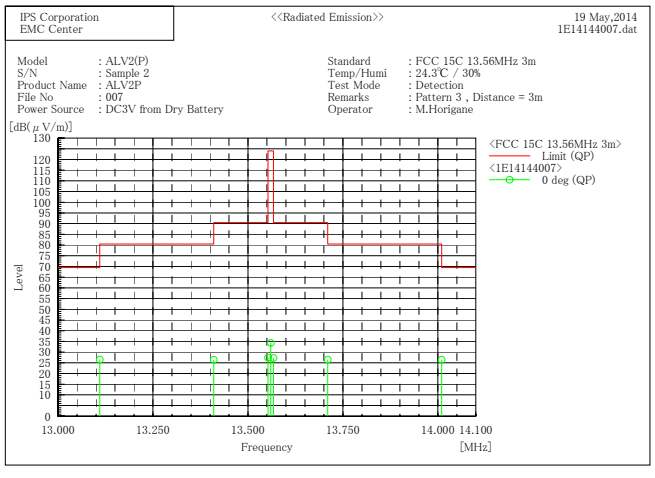
Final Result

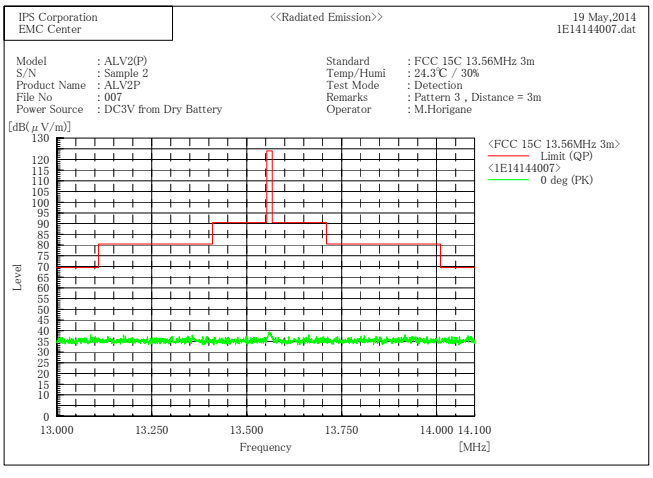
--- 0 deg (QP)---

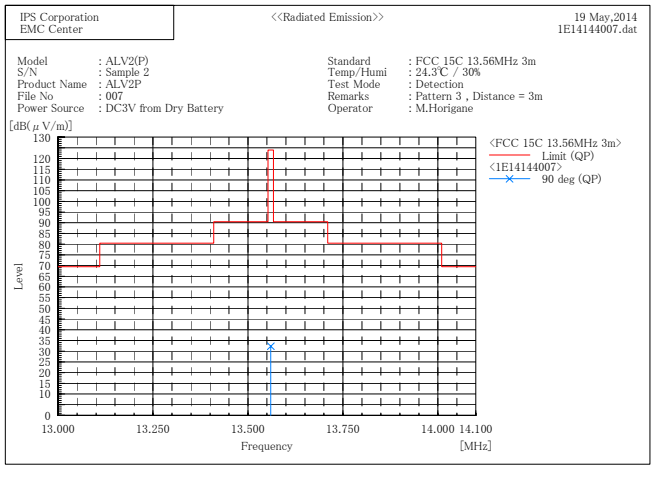
No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	13.110	4.4	22.1	26.5	69.5	43.0	100.0	216.0
2	13.410	4.3	22.1	26.4	80.5	54.1	100.0	216.0
3	13.553	5.3	22.1	27.4	90.5	63.1	100.0	216.0
4	13.560	12.1	22.2	34.3	124.0	89.7	100.0	216.0
5	13.567	5.0	22.2	27.2	90.5	63.3	100.0	216.0
6	13.710	4.3	22.2	26.5	80.5	54.0	100.0	216.0
7	14.010	4.2	22.2	26.4	69.5	43.1	100.0	216.0

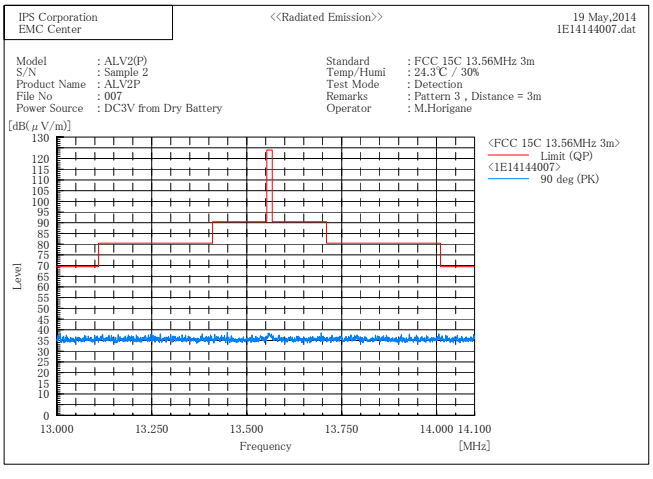
--- 90 deg (QP)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	13.560	10.1	22.2	32.3	124.0	91.7	100.0	48.0









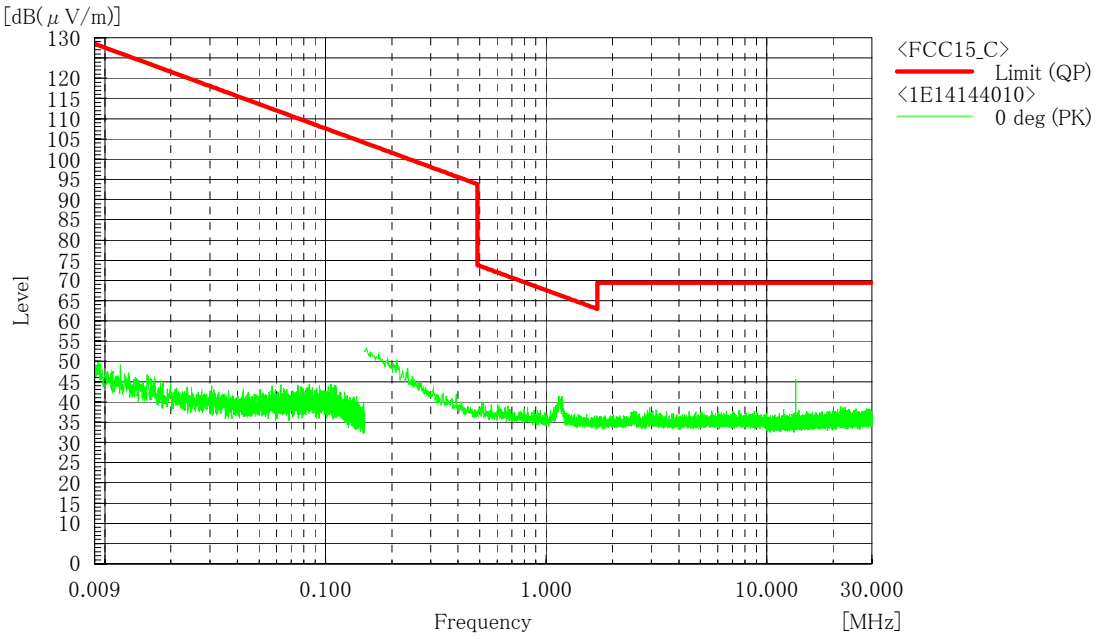
IPS Corporation
EMC Center

<<Radiated Emission>>

20 May,2014
1E14144010.dat

Model : ALV2(P)
S/N : Sample 2
Product Name : ALV2P
File No : 010
Power Source : DC3V from Dry Battery

Standard : FCC Part15 SubpartC
Temp/Humi : 22.9℃ / 33%
Test Mode : Detection
Remarks : Pattern 1 , Distance = 3m
Operator : M.Horigane



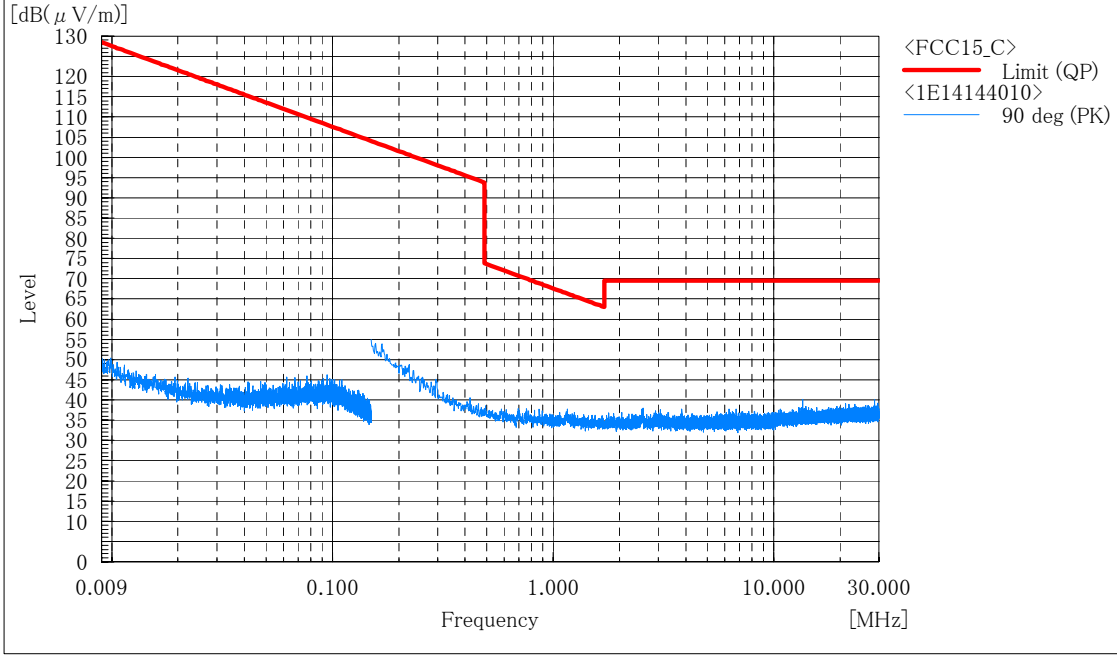
IPS Corporation
EMC Center

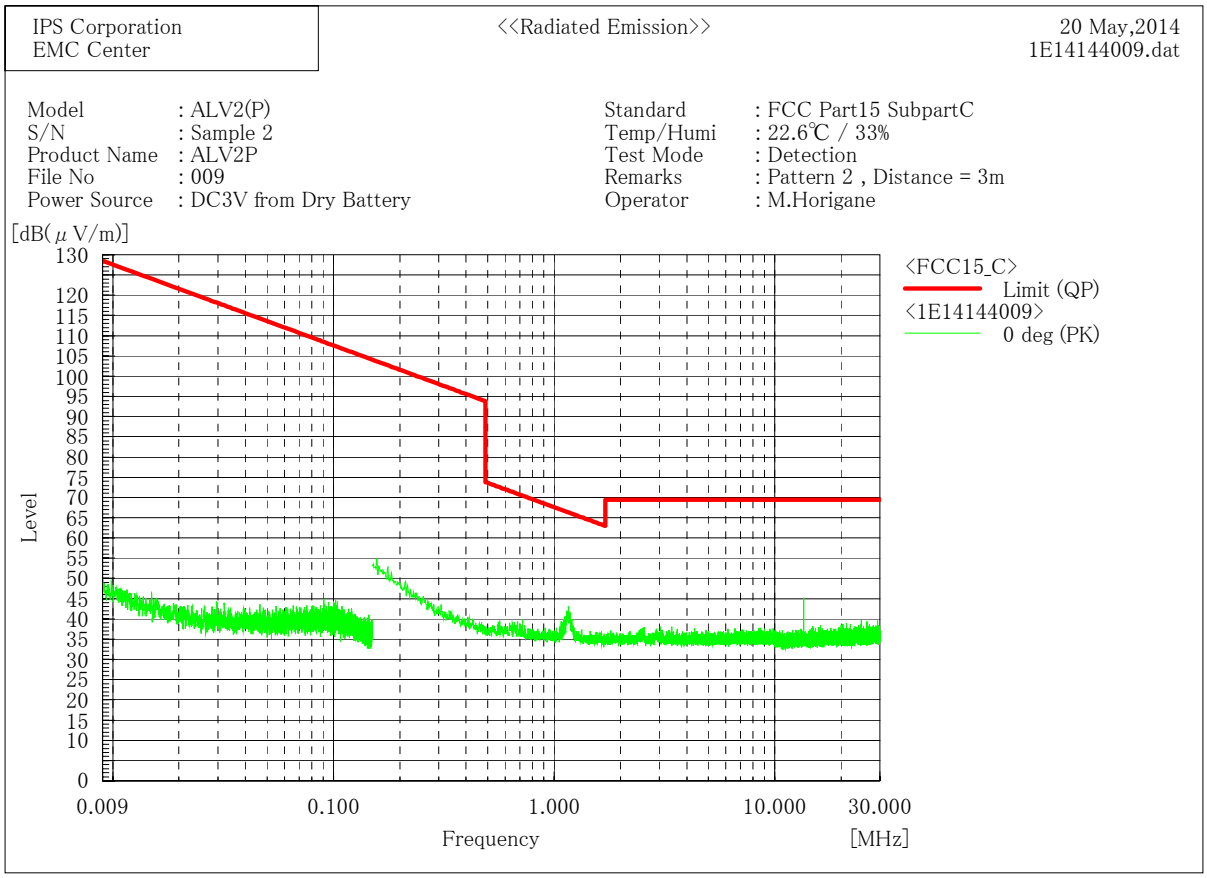
<<Radiated Emission>>

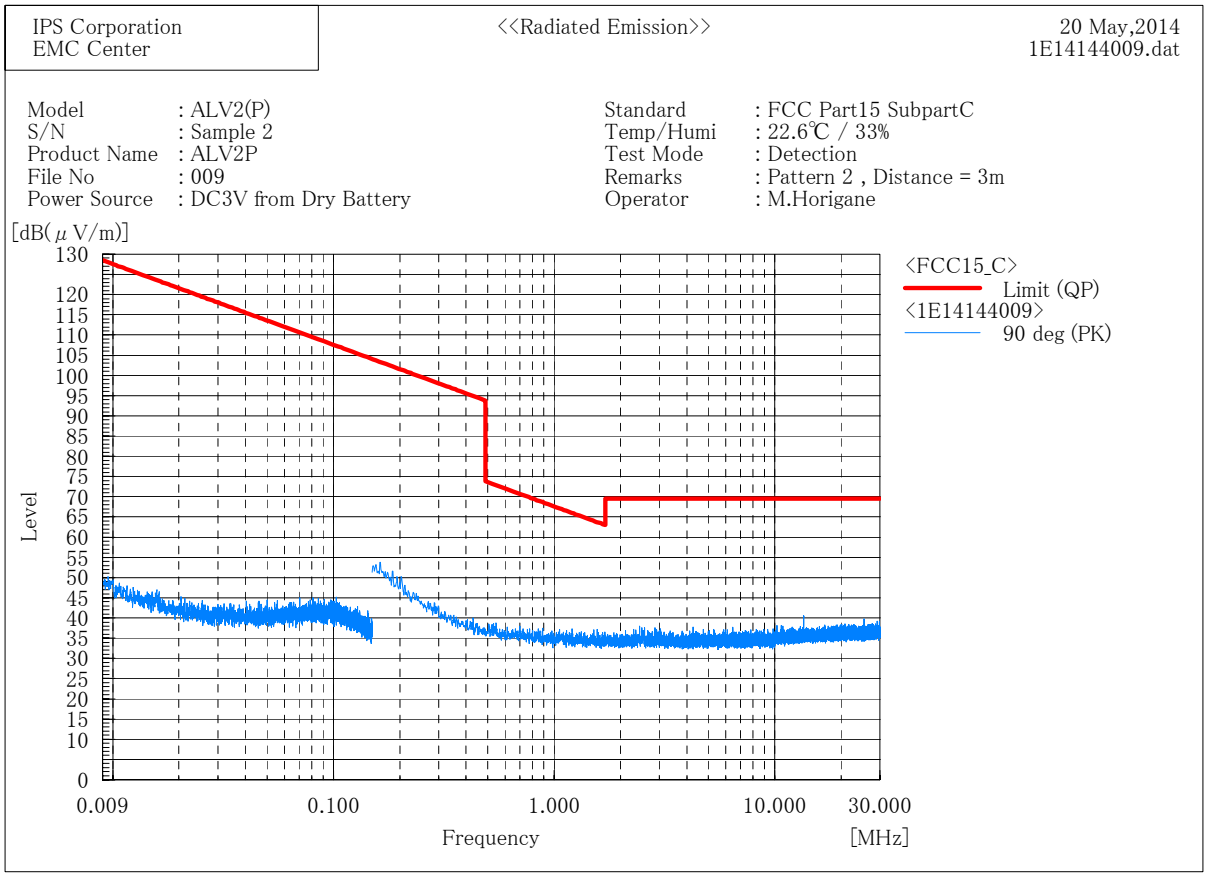
20 May,2014
1E14144010.dat

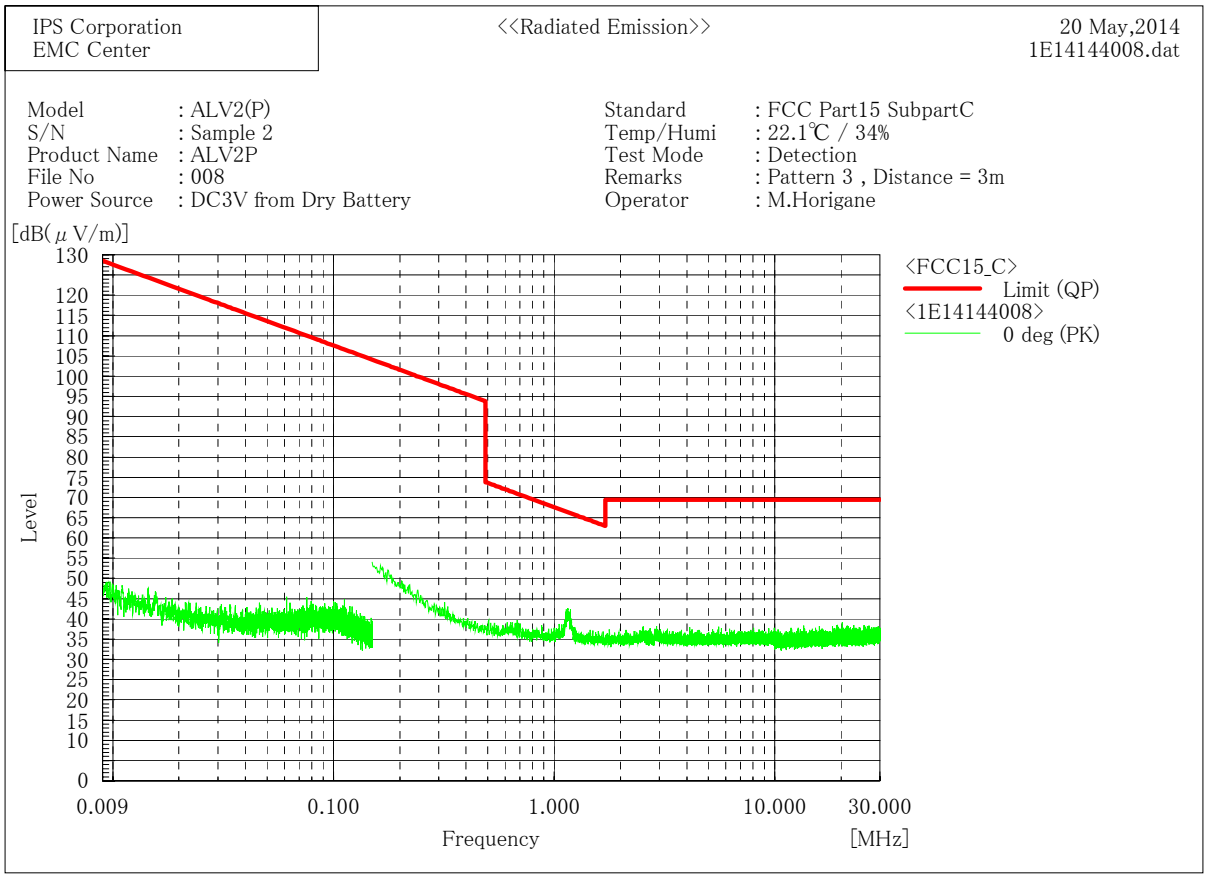
Model : ALV2(P)
S/N : Sample 2
Product Name : ALV2P
File No : 010
Power Source : DC3V from Dry Battery

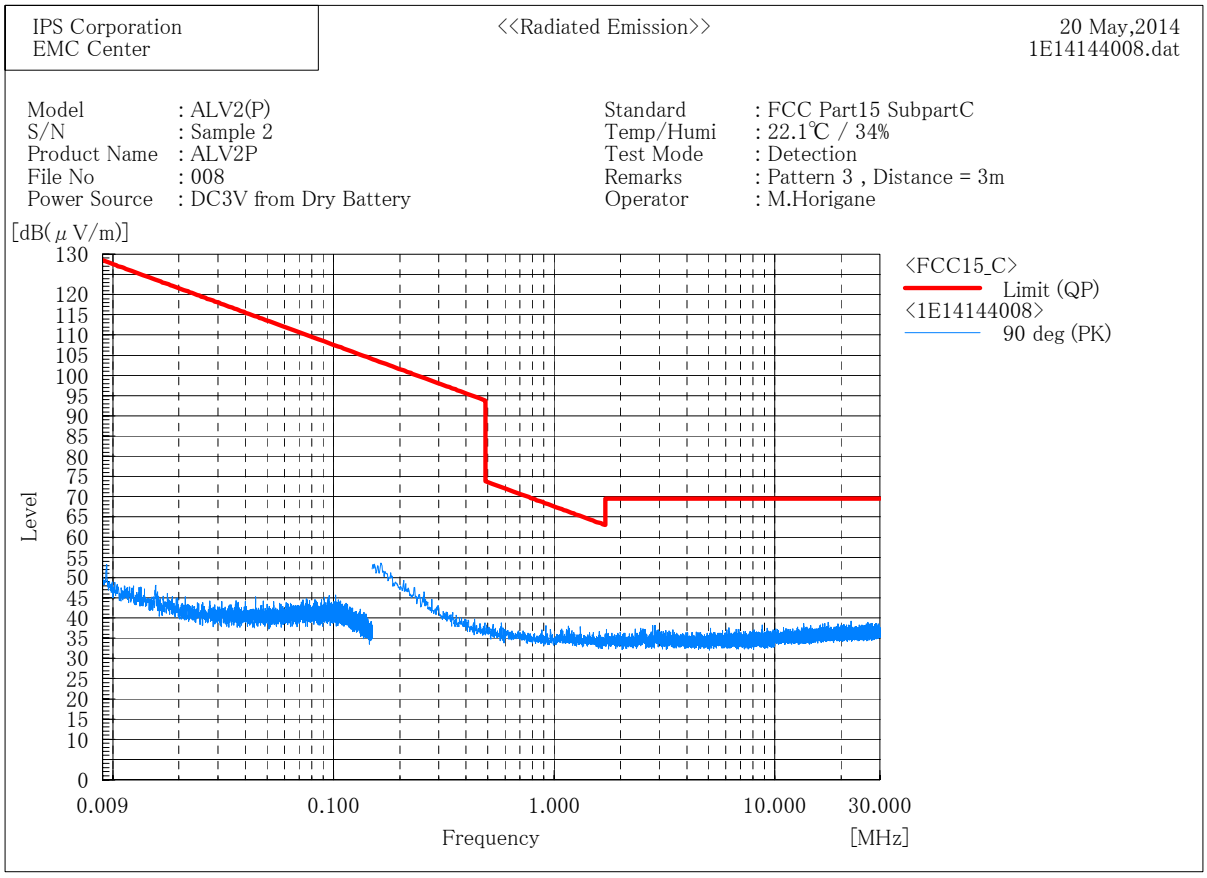
Standard : FCC Part15 SubpartC
Temp/Humi : 22.9℃ / 33%
Test Mode : Detection
Remarks : Pattern 1 , Distance = 3m
Operator : M.Horigane




IPS Corporation
EMC Center
<<Radiated Emission>>
20 May,2014
1E14144009.dat
Model : ALV2(P)
S/N : Sample 2
Product Name : ALV2P
File No : 009
Power Source : DC3V from Dry Battery
Standard : FCC Part15 SubpartC
Temp/Humi : 22.6℃ / 33%
Test Mode : Detection
Remarks : Pattern 2 , Distance = 3m
Operator : M.Horigane
[dB(μV/m)]
Level
Frequency
[MHz]
0.009
0.100
1.000
10.000
30.000
<FCC15_C>
Limit (QP)
<1E14144009>
0 deg (PK)


IPS Corporation
EMC Center
<<Radiated Emission>>
20 May,2014
1E14144009.dat
Model : ALV2(P)
S/N : Sample 2
Product Name : ALV2P
File No : 009
Power Source : DC3V from Dry Battery
Standard : FCC Part15 SubpartC
Temp/Humi : 22.6℃ / 33%
Test Mode : Detection
Remarks : Pattern 2 , Distance = 3m
Operator : M.Horigane
[dB(μV/m)]
Level
Frequency
[MHz]
0.009
0.100
1.000
10.000
30.000
<FCC15_C>
Limit (QP)
<1E14144009>
90 deg (PK)


IPS Corporation
EMC Center
<<Radiated Emission>>
20 May,2014
1E14144008.dat
Model : ALV2(P)
S/N : Sample 2
Product Name : ALV2P
File No : 008
Power Source : DC3V from Dry Battery
Standard : FCC Part15 SubpartC
Temp/Humi : 22.1℃ / 34%
Test Mode : Detection
Remarks : Pattern 3 , Distance = 3m
Operator : M.Horigane
[dB(μV/m)]
Level
Frequency
[MHz]
0.009
0.100
1.000
10.000
30.000
<FCC15_C>
Limit (QP)
<1E14144008>
0 deg (PK)


IPS Corporation
EMC Center
<<Radiated Emission>>
20 May,2014
1E14144008.dat
Model : ALV2(P)
S/N : Sample 2
Product Name : ALV2P
File No : 008
Power Source : DC3V from Dry Battery
Standard : FCC Part15 SubpartC
Temp/Humi : 22.1℃ / 34%
Test Mode : Detection
Remarks : Pattern 3 , Distance = 3m
Operator : M.Horigane
[dB(μV/m)]
Level
Frequency
[MHz]
0.009
0.100
1.000
10.000
30.000
<FCC15_C>
Limit (QP)
<1E14144008>
90 deg (PK)

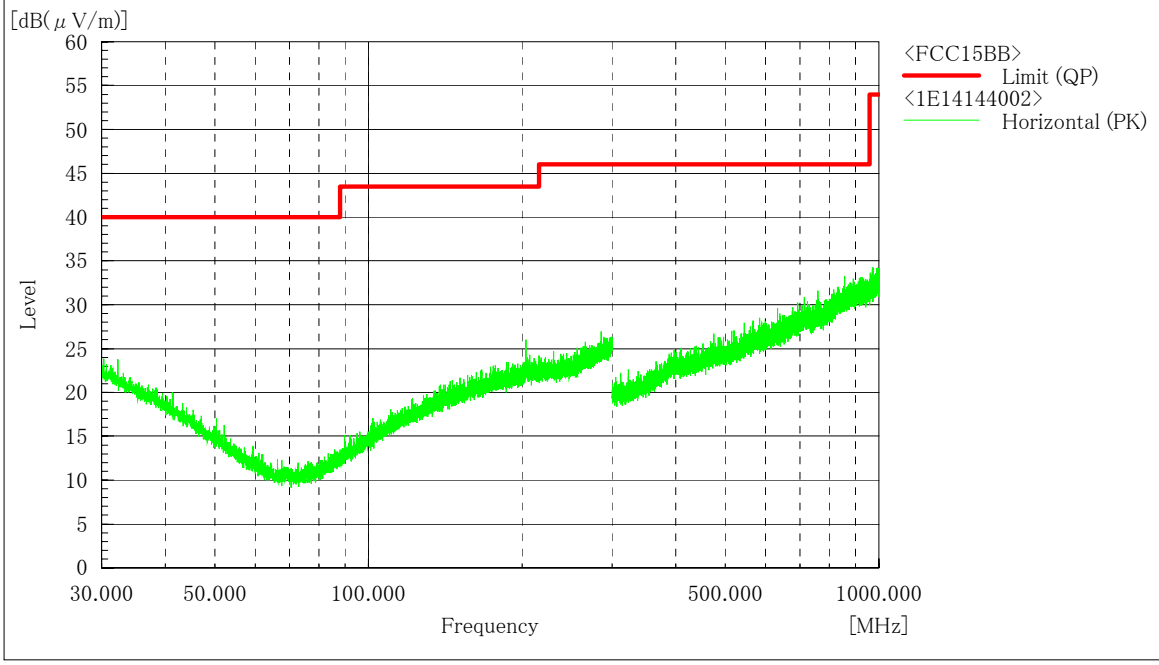
IPS Corporation
EMC Center

<<Radiated Emission>>

19 May,2014
1E14144002.dat

Model : ALV2(P)
S/N : Sample 2
Product Name : ALV2P
File No : 002
Power Source : DC3V from Dry Battery

Standard : FCC Part15 SubpartB ClassB
Temp/Humi : 21.8℃ / 35%
Test Mode : Detection
Remarks : Pattern 1
Operator : M.Horigane



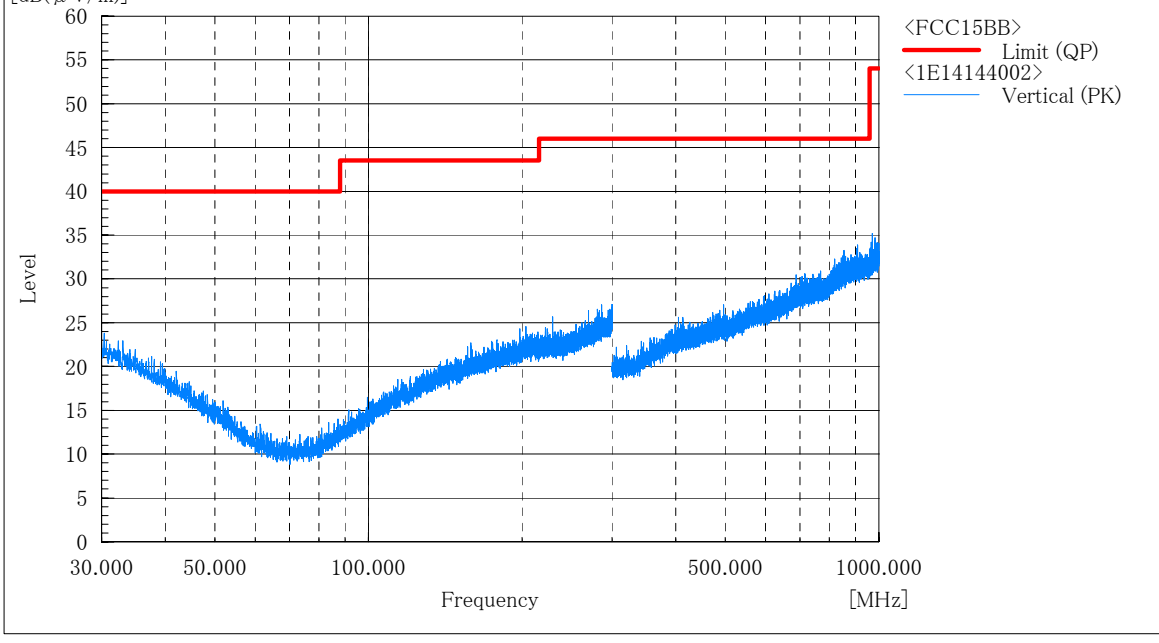
IPS Corporation
EMC Center

<<Radiated Emission>>

19 May,2014
1E14144002.dat

Model : ALV2(P)
S/N : Sample 2
Product Name : ALV2P
File No : 002
Power Source : DC3V from Dry Battery

Standard : FCC Part15 SubpartB ClassB
Temp/Humi : 21.8℃ / 35%
Test Mode : Detection
Remarks : Pattern 1
Operator : M.Horigane



********** IPS Corporation **********
<<Radiated Emission>>
19 May, 2014
1E14144003.dat

Standard : FCC Part15 SubpartB ClassB
Model : ALV2(P)
S/N : Sample 2
Product Name : ALV2P
File No : 003
Power Source : DC3V from Dry Battery
Temp/Humi : 22.7℃ / 34%
Test Mode : Detection
Remarks : Pattern 2
Operator : M.Horigane

****

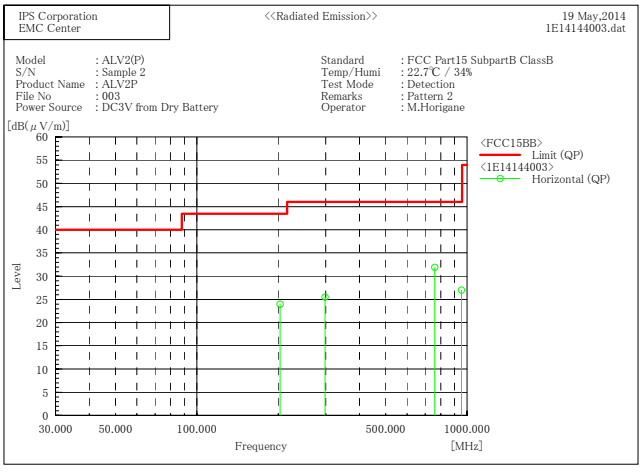
Final Result

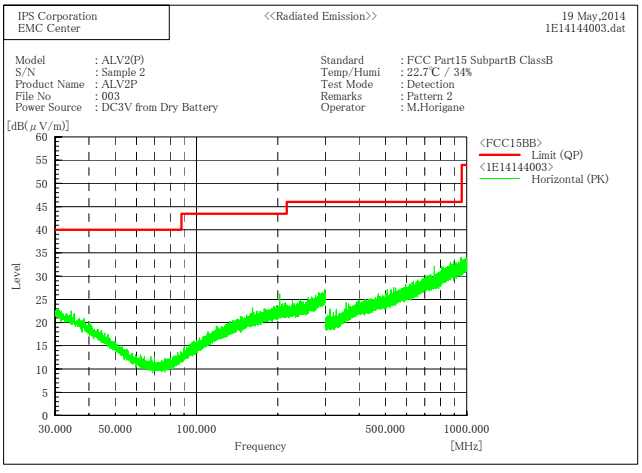
--- Horizontal Polarization (QP)---

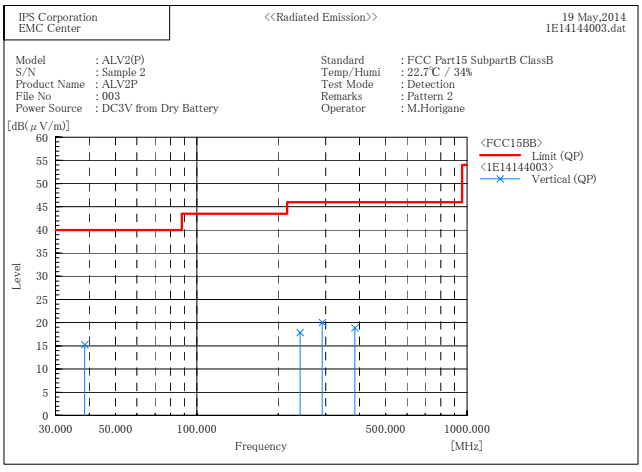
No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	203.410	26.1	-2.1	24.0	43.5	19.5	156.1	268.0
2	298.331	24.4	1.1	25.5	46.0	20.5	112.5	107.0
3	759.372	28.8	3.1	31.9	46.0	14.1	105.3	223.0
4	954.220	20.8	6.2	27.0	46.0	19.0	100.0	33.0

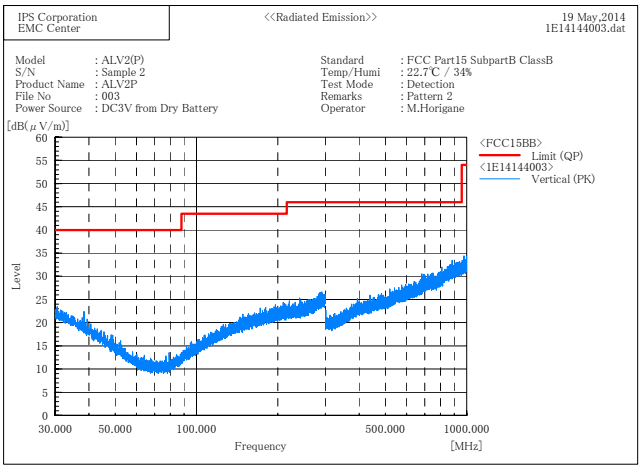
--- Vertical Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	38.405	20.8	-5.5	15.3	40.0	24.7	100.0	285.0
2	241.317	19.4	-1.5	17.9	46.0	28.1	100.0	7.0
3	291.144	19.4	0.7	20.1	46.0	25.9	100.0	120.0
4	384.430	20.8	-1.9	18.9	46.0	27.1	293.0	21.0









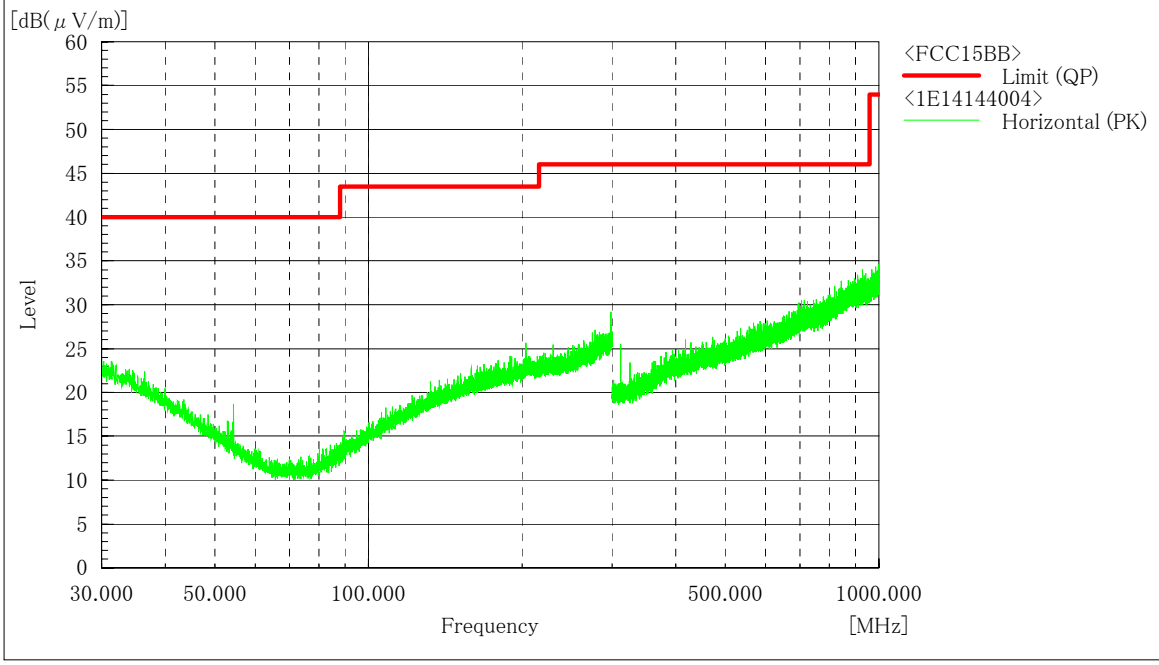
IPS Corporation
EMC Center

<<Radiated Emission>>

19 May,2014
1E14144004.dat

Model : ALV2(P)
S/N : Sample 2
Product Name : ALV2P
File No : 004
Power Source : DC3V from Dry Battery

Standard : FCC Part15 SubpartB ClassB
Temp/Humi : 23.0℃ / 33%
Test Mode : Detection
Remarks : Pattern 3
Operator : M.Horigane



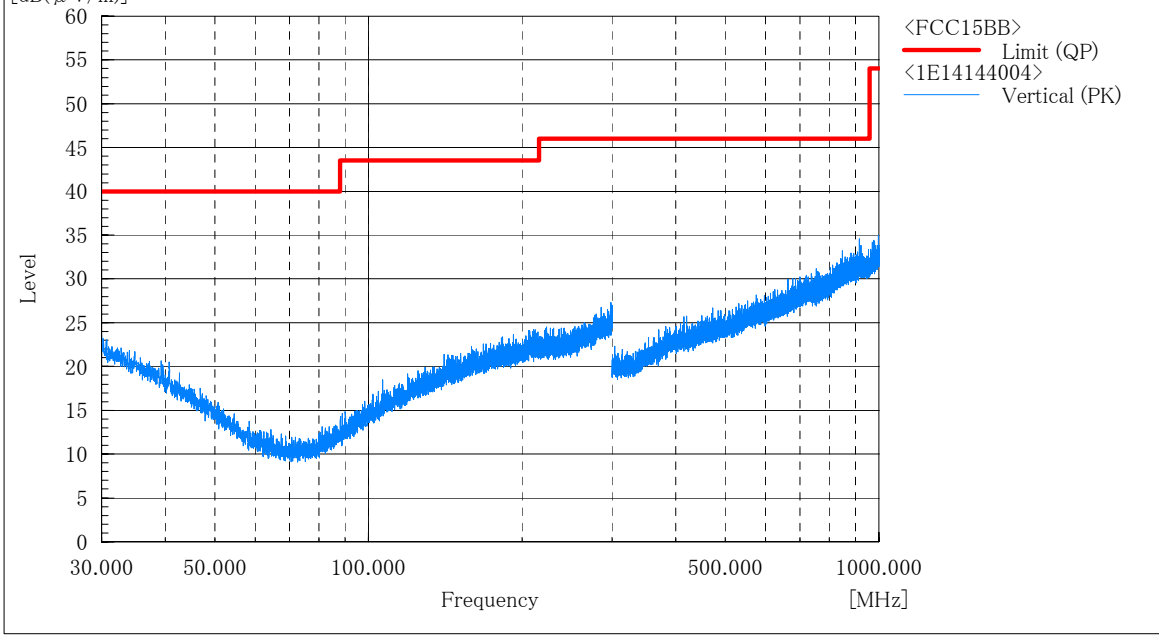
IPS Corporation
EMC Center

<<Radiated Emission>>

19 May,2014
1E14144004.dat

Model : ALV2(P)
S/N : Sample 2
Product Name : ALV2P
File No : 004
Power Source : DC3V from Dry Battery

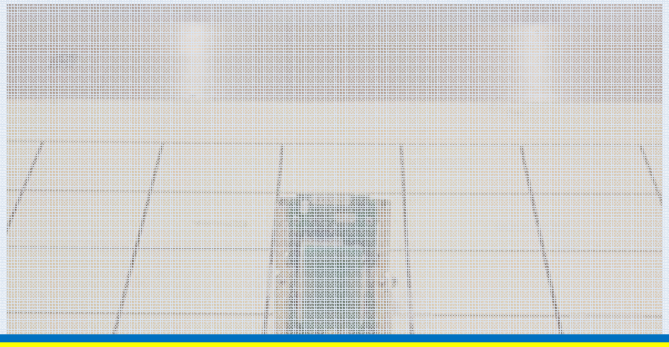
Standard : FCC Part15 SubpartB ClassB
Temp/Humi : 23.0℃ / 33%
Test Mode : Detection
Remarks : Pattern 3
Operator : M.Horigane



8 TEST CONFIGURATION PHOTO

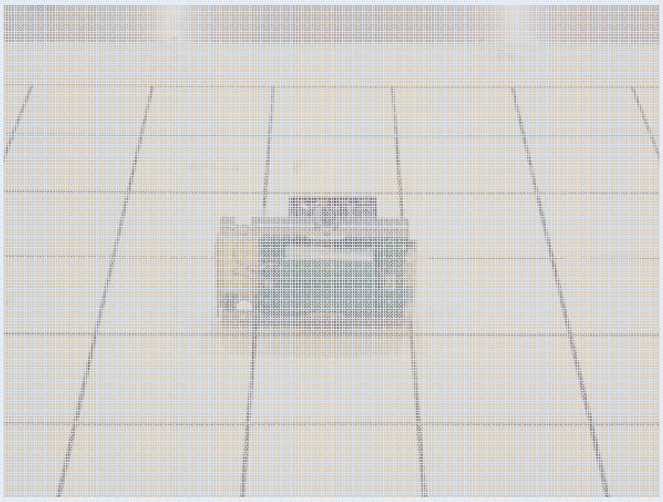
8.1 Radiated Emission Test (Axial Direction of EUT)

Pattern 1

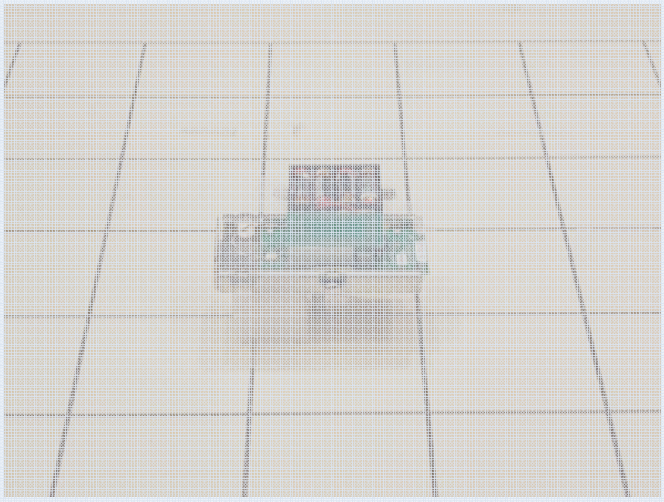


TEST CONFIGURATION PHOTOS were separated from this report.

Pattern 2



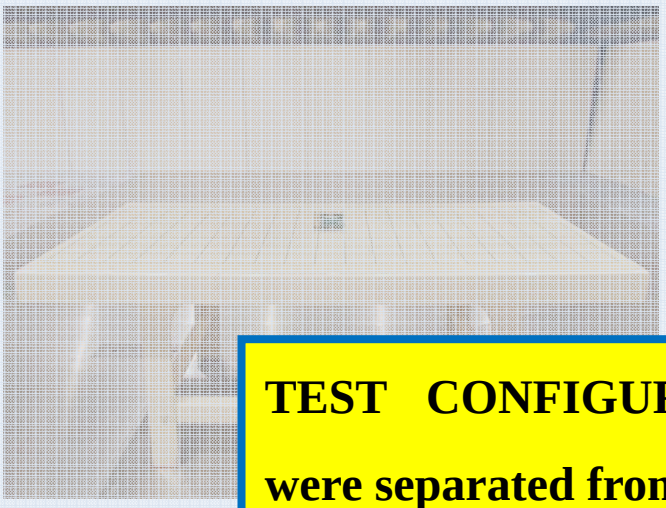
Pattern 3



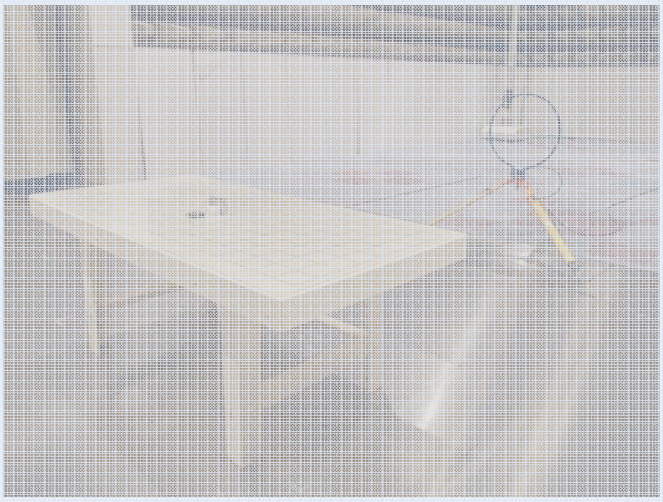
8 TEST CONFIGURATION PHOTO

8.2.1 Radiated Emission Test

9 kHz to 30 MHz



TEST CONFIGURATION PHOTOS were separated from this report.



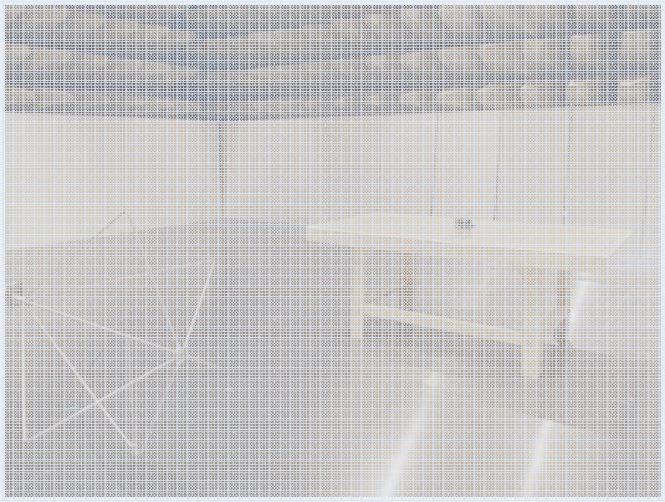
This cable routing was attempted to maximize the radiated emission.

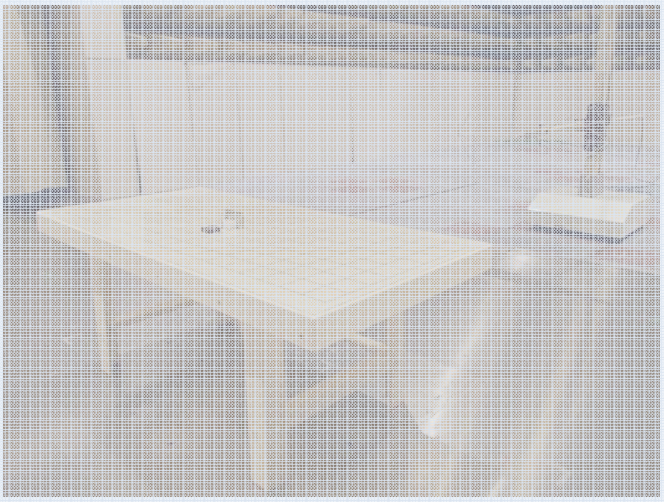
8 TEST CONFIGURATION PHOTO

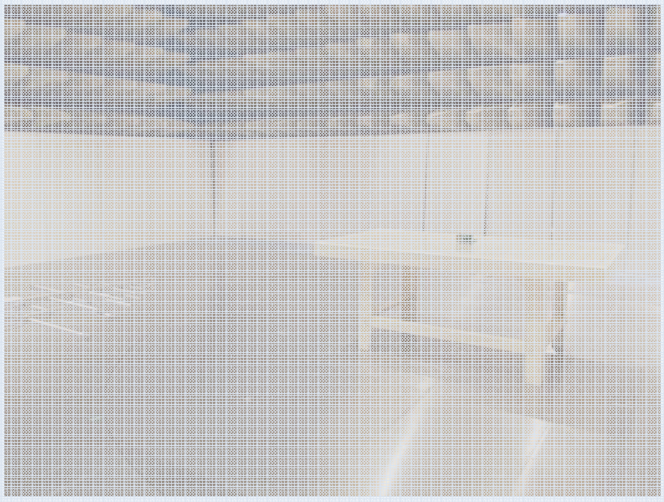
8.2.2 Radiated Emission Test

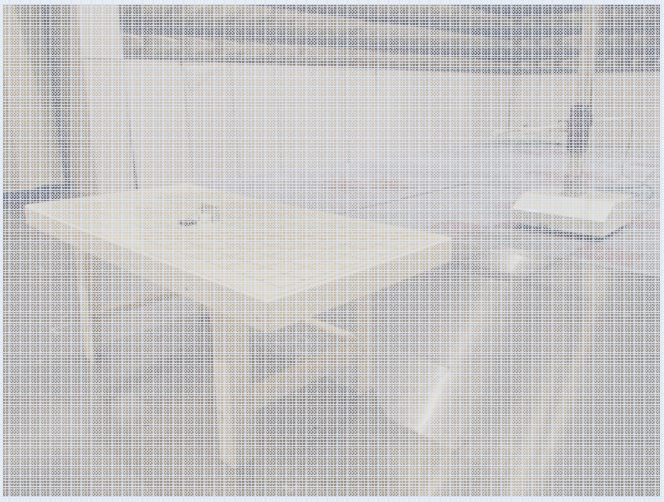
30 MHz to 1 GHz

TEST CONFIGURATION PHOTOS were separated from this report.









This cable routing was attempted to maximize the radiated emission.

8 TEST CONFIGURATION PHOTO

8.3 Frequency Stability Test