



EMC TEST REPORT

Applicant : MIWA LOCK CO., LTD.
3-1-12, Shiba, Minato-ku, Tokyo, Japan, 105-8510

Type of Equipment : ALV2 ENTRANCE READER

Model Number : ALV2DCU・DP

FCC ID : VBU-ALV2DCU

Standard : 47 CFR Part 15 Subpart C Section 15.225

Receipt Date of Sample : 2014-07-28

Date Tested : 2014-08-01, 2014-08-04, and 2014-08-05

Date Report Issued : 2014-08-28

Report Number : EMC14141

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.

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1 GENERAL INFORMATION

1.1 Product Description

The Equipment Under Test (EUT) Model: ALV2DCU•DP 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 simultaneously.

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, 98 mA
- Weight : 400 g
- Dimensions : W 120 mm × D 58.8 mm × H 162 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 DOOR CONTROL UNIT		☒

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), (d), and Sec. 15.209 Radiated Emission	9 kHz to 30 MHz	Pass
Sec. 15.225 (d) and Sec. 15.209 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	ALV2 ENTRANCE READER	MIWA LOCK CO., LTD.	ALV2DCU•DP	14G000558T	FCC ID: VBU-ALV2DCU

Peripherals

Equipment		Manufacturer	Model No.	Serial No.	FCC ID and Note
ID	Name				
B	DOOR CONTROL UNIT	MIWA LOCK CO., LTD.	CMHL-001	08G000001T	

Interface Cables

Cable		Equipment Connected (IDs) (From - To)	Length	Shield	Bundle	FCC ID and Note
ID	Name					
a	AC Cable	B - AC Power Supply	2.3 m	No	No	EUT, AC120 V/60 Hz
b	DC Cable	A - B	2.6 m	No	No	EUT, DC3.0 V
c	Signal Cable	A - B	2.6 m	No	No	EUT
d	Earth Cable	A - Ground	2.3 m	No	No	EUT

Note: Bundle No: The cable is not bundled.

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 DOOR CONTROL UNIT.
 - 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

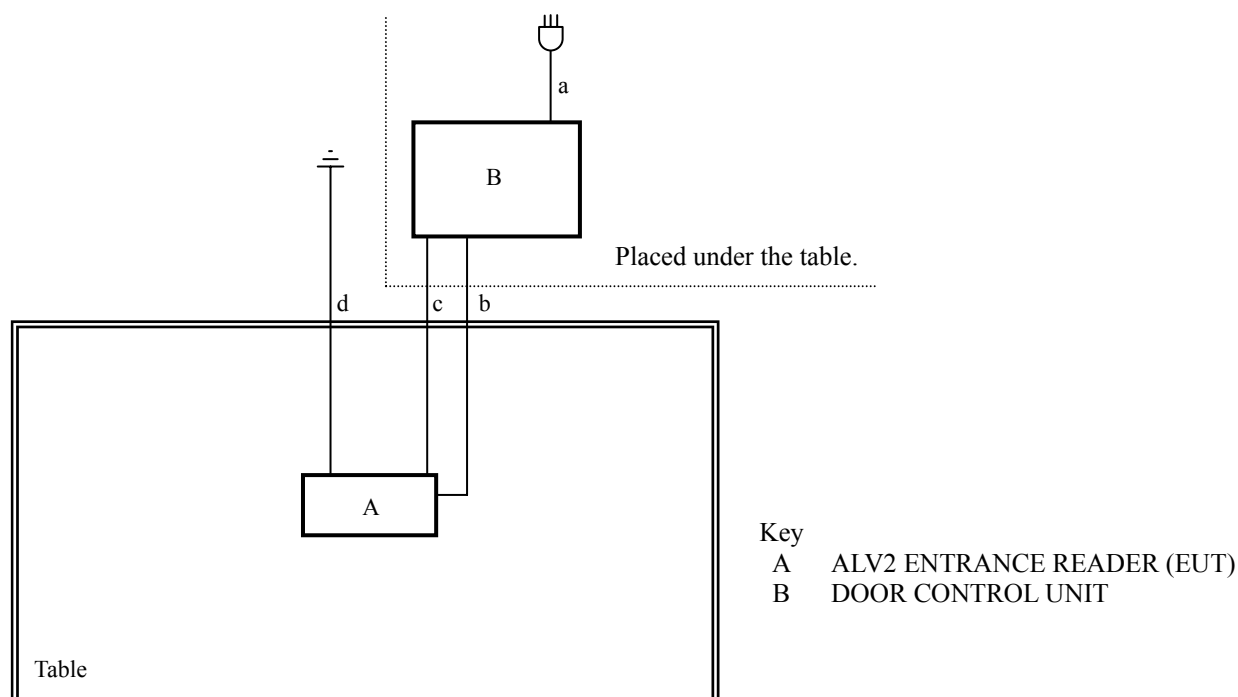
The condition at the time of return of EUT : Good

Limited conditions : None

No modification has been carried out by the test laboratory.

2.5 Configuration of Tested System

Figure



Note: 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 center of EUT was aligned to 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 0.6 m 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	N9020A	MY49100247	2014-06-18	2015-06-30	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:

$$c. f. = AF + CL - AG$$

$$FS = RA + c.f.$$

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 dB μ V 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 dB μ V/m.

The 32.0 dB μ V/m value was mathematically converted to its corresponding level in μ V/m.

$$FS = 52.5 \text{ dB}\mu\text{V} + 7.4 \text{ dB/m} + 1.1 \text{ dB} - 29.0 \text{ dB} = 32.0 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm} [(32.0 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

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: 2014-08-01

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, 26.0 dB(μ V/m) Quasi-Peak Value
and it has 43.5 dB margin from the limit(69.5 dB(μ V/m)).

14.010 MHz, 26.0 dB(μ V/m) Quasi-Peak Value
and it has 43.5 dB margin from the limit(69.5 dB(μ V/m)).

Test configuration photo: Refer to Section 8.2.1

4.5 Test Details (Continued)

Test Details for Pattern 2

Test Date: 2014-08-01

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, 26.0 dB(μ V/m) Quasi-Peak Value
and it has 43.5 dB margin from the limit(69.5 dB(μ V/m)).

14.010 MHz, 26.0 dB(μ V/m) Quasi-Peak Value
and it has 43.5 dB margin from the limit(69.5 dB(μ V/m)).

Test configuration photo: Refer to Section 8.2.1

Test Details for Pattern 3

Test Date: 2014-08-01

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):

14.010 MHz, 26.1 dB(μ V/m) Quasi-Peak Value
and it has 43.4 dB margin from the limit(69.5 dB(μ V/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: 2014-08-01

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: 2014-08-01

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

4.5 Test Details (Continued)

Test Details for Pattern 3

Test Date: 2014-08-01

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 center of EUT was aligned to 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	3 m	No. 2	2014-01-11	2015-01-31	
EMI Test Receiver	Rohde & Schwarz	ESIB40	100208	2013-08-29	2014-08-31	1), 2)
Biconical Antenna	Schwarzbeck	BBA9106	1586	2013-11-14	2014-11-30	3)
Log.-Periodic Antenna	Schwarzbeck	UHALP9108-A	0942	2013-11-14	2014-11-30	4)
Cable System	IPS Corporation	RE (32)	N/A	2014-02-24	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)

<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)

5.3.1 Exploratory Test (Continued)

<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:

$$c. f. = AF + CL - AG$$

$$FS = RA + c.f.$$

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 dB μ V 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 dB μ V/m.

The 32.0 dB μ V/m value was mathematically converted to its corresponding level in μ V/m.

$$FS = 52.5 \text{ dB}\mu\text{V} + 7.4 \text{ dB/m} + 1.1 \text{ dB} - 29.0 \text{ dB} = 32.0 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm} [(32.0 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

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: 2014-08-04

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):

Vertical Polarization, 45.146 MHz, 34.9 dB(μ V/m) Quasi-Peak Value
and it has 5.1 dB margin from the limit(40.0 dB(μ V/m)).

Test configuration photo: Refer to Section 8.2.2

Test Details for Pattern 2

Test Date: 2014-08-04

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):

Vertical Polarization, 45.383 MHz, 33.4 dB(μ V/m) Quasi-Peak Value
and it has 6.6 dB margin from the limit(40.0 dB(μ V/m)).

Test configuration photo: Refer to Section 8.2.2

5.5 Test Details (Continued)

Test Details for Pattern 3

Test Date: 2014-08-04

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):

Vertical Polarization, 44.788 MHz, 35.0 dB(μ V/m) Quasi-Peak Value
and it has 5.0 dB margin from the limit(40.0 dB(μ V/m)).

Test configuration photo: Refer to Section 8.2.2

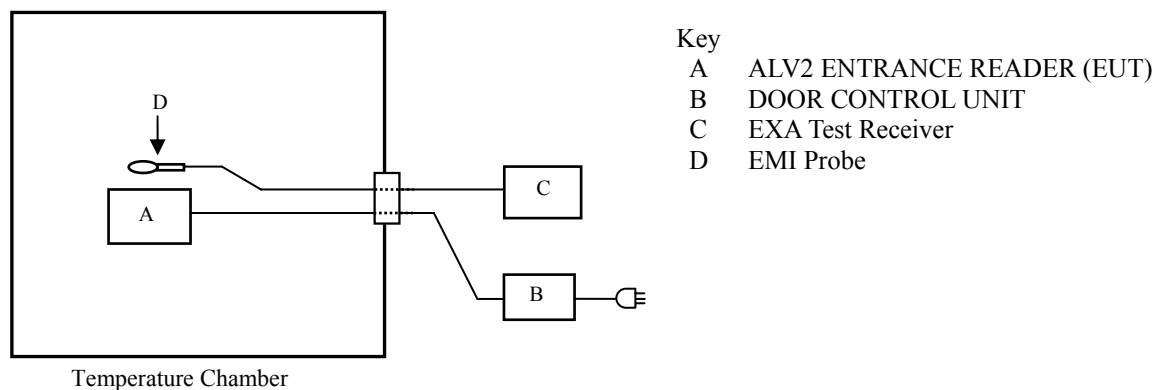
Note: See clause 8.1 for the axial direction of EUT (Pattern 1, Pattern 2, and Pattern 3).

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



6.2 Testing System

Instruments

Equipment	Manufacturer	Model	S/N	Calibration		Note
				Date	Due	
Temperature Chamber	ESPEC	MC-811P	1120008892	2013-10-31	2014-10-31	
EMI Probe	Anritsu	MA2601C	MA-01	2014-01-20	2015-01-31	
EMI Test Receiver	Agilent Technologies	N9038A	MY52260179	2014-05-21	2015-05-31	

6.3 Test Details

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

Product Name: ALV2P ENTRANCE READER
S/N: 14G000558T

Date: 2014-08-05

Operator: M.Horigane

Test location: Testing Room (EMC Center)

Model: ALV2DCU·DP

Reference Condition: Temp / Humi: 25.4 °C / 40 %

Temperature: -20 °C		Voltage: DC3.0 V				
Time	Start Up	2 min.	5 min.	10 min.	Diviation	
Frequency (MHz)	13.559937509	13.559937280	13.559937056	13.559936722	-0.000063	MHz
					-0.000467	%

Temperature: 20 °C		Voltage: DC3.0 V				
Time	Start Up	2 min.	5 min.	10 min.	Diviation	
Frequency (MHz)	13.560007614	13.560007533	13.560007458	13.560007335	0.000008	MHz
					0.000056	%

Temperature: 50 °C		Voltage: DC3.0 V				
Time	Start Up	2 min.	5 min.	10 min.	Diviation	
Frequency (MHz)	13.559992508	13.559992858	13.559993192	13.559993668	-0.000007	MHz
					-0.000047	%

Test configuration photo: Refer to Section 8.3

7 TEST DATA

- Radiated Emission Test Data

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

Pattern 1 Page 18

Pattern 2 Page 19

Pattern 3 Page 20

9 kHz to 30 MHz (as required by Sec. 15.225 (d) and Sec. 15.209)

Pattern 1 (Spectrum chart) Page 21

Pattern 2 (Spectrum chart) Page 22

Pattern 3 (Spectrum chart) Page 23

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

Pattern 1 Page 24

Pattern 2 Page 25

Pattern 3 Page 26

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

***** IPS Corporation *****
 <<Radiated Emission>> 1 August, 2014
 1E14202003. dat

Standard : FCC 15C 13.56MHz 3m
 Model : ALV2DCU-DP
 S/N : 14G000558T
 Product Name : ALV2 ENTRANCE READER
 File No : 003
 Power Source : DC3V from DOOR CONTROL UNIT
 Temp/Humi : 23.6°C / 44%
 Test Mode :
 Remarks : Pattern 1 , Distance = 3m
 Operator : M.Horigane

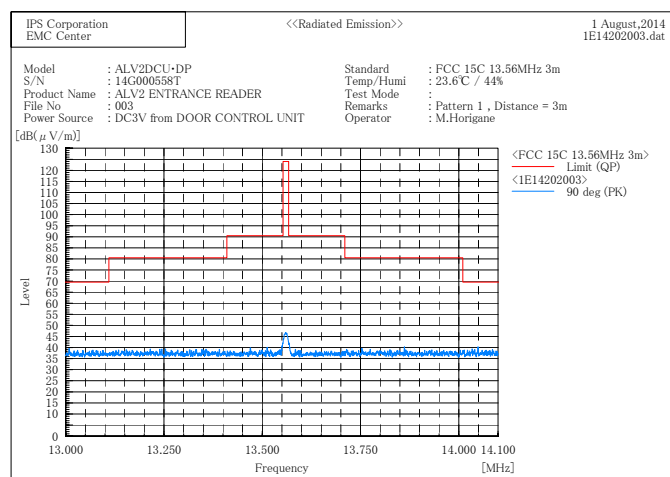
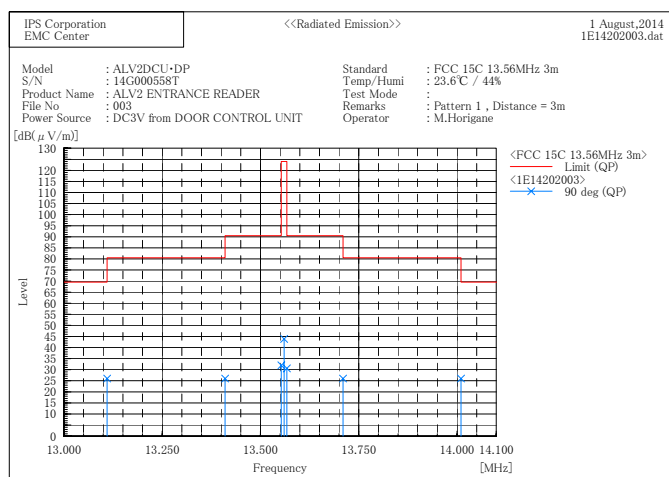
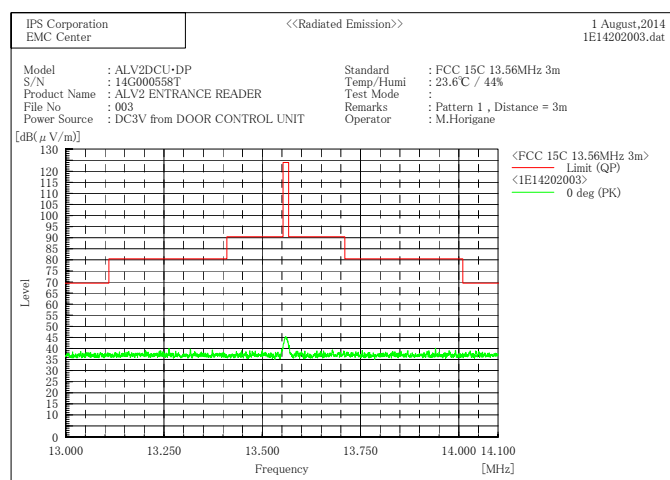
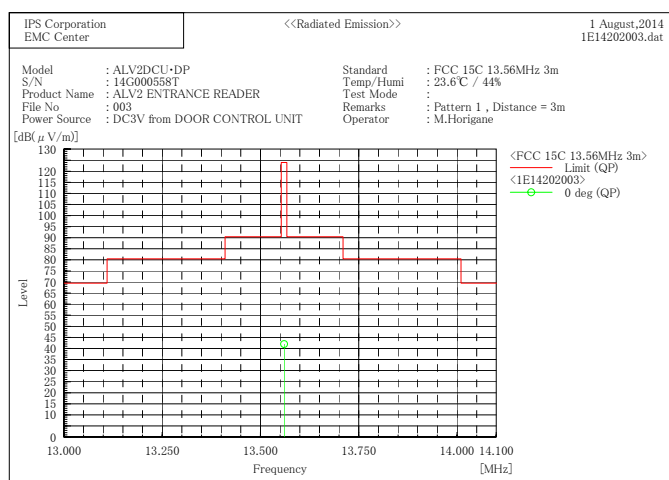
 Final Result

--- 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	13.560	19.8	22.2	42.0	124.0	82.0	100.0	18.0

--- 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	13.110	3.9	22.1	26.0	69.5	43.5	100.0	122.0
2	13.410	3.9	22.1	26.0	80.5	54.5	100.0	122.0
3	13.553	9.9	22.1	32.0	90.5	58.5	100.0	122.0
4	13.560	21.7	22.2	43.9	124.0	80.1	100.0	122.0
5	13.567	8.4	22.2	30.6	90.5	59.9	100.0	122.0
6	13.710	3.8	22.2	26.0	80.5	54.5	100.0	122.0
7	14.010	3.8	22.2	26.0	69.5	43.5	100.0	122.0



***** IPS Corporation *****
 <<Radiated Emission>>
 1 August, 2014
 IE14202005. dat

Standard : FCC 15C 13.56MHz 3m
 Model : ALV2DCU-DP
 S/N : 14G000558T
 Product Name : ALV2 ENTRANCE READER
 File No : 005
 Power Source : DC3V from DOOR CONTROL UNIT
 Temp/Humi : 23.7°C / 44%
 Test Mode :
 Remarks : Pattern 2 , Distance = 3m
 Operator : M.Horigane

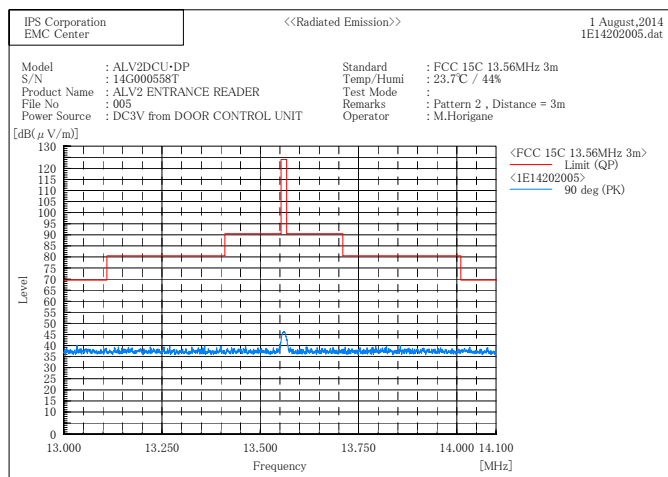
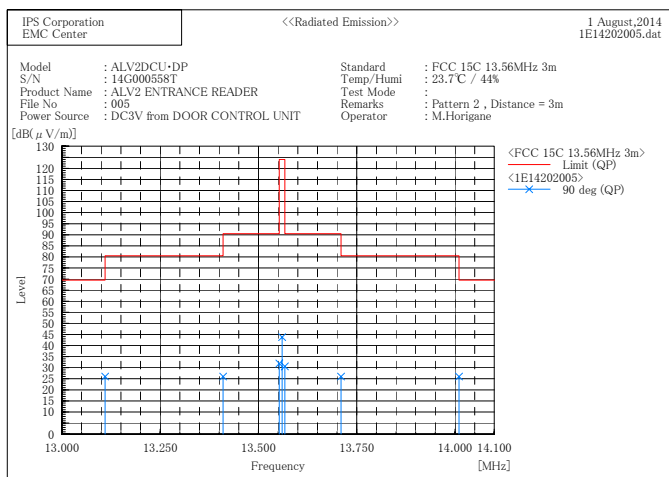
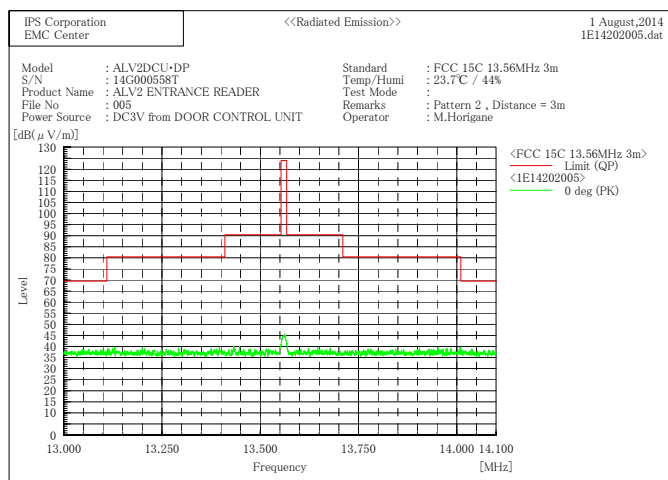
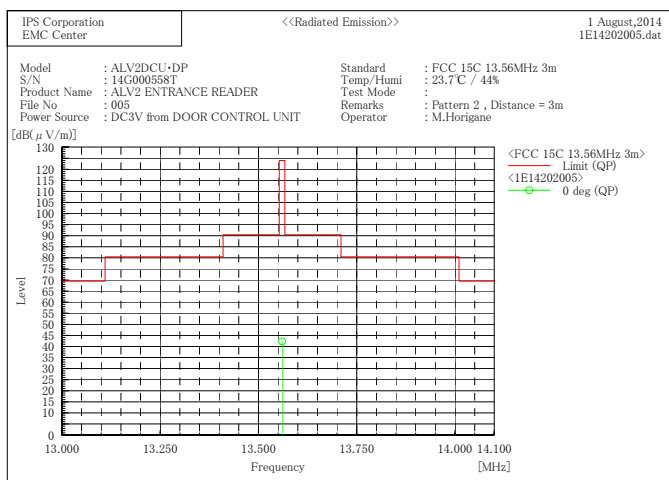
 Final Result

--- 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	13.560	20.1	22.2	42.3	124.0	81.7	100.0	11.0

--- 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	13.110	3.9	22.1	26.0	69.5	43.5	100.0	97.0
2	13.410	3.9	22.1	26.0	80.5	54.5	100.0	97.0
3	13.553	9.8	22.1	31.9	90.5	58.6	100.0	97.0
4	13.560	21.6	22.2	43.8	124.0	80.2	100.0	97.0
5	13.567	8.4	22.2	30.6	90.5	59.9	100.0	97.0
6	13.710	3.8	22.2	26.0	80.5	54.5	100.0	97.0
7	14.010	3.8	22.2	26.0	69.5	43.5	100.0	97.0



***** IPS Corporation *****
 <<Radiated Emission>> 1 August, 2014
 1E14202007.dat

Standard : FCC 15C 13.56MHz 3m
 Model : ALV2DCU-DP
 S/N : 14G000558T
 Product Name : ALV2 ENTRANCE READER
 File No : 007
 Power Source : DC3V from DOOR CONTROL UNIT
 Temp/Humi : 23.7°C / 44%
 Test Mode :
 Remarks : Pattern 3 , Distance = 3m
 Operator : M.Horigane

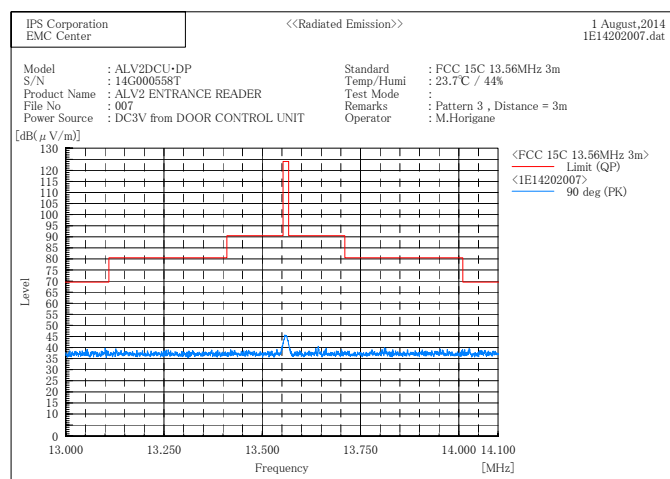
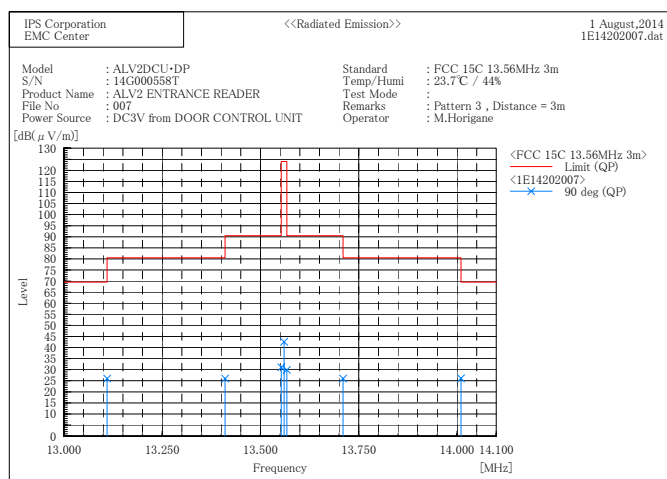
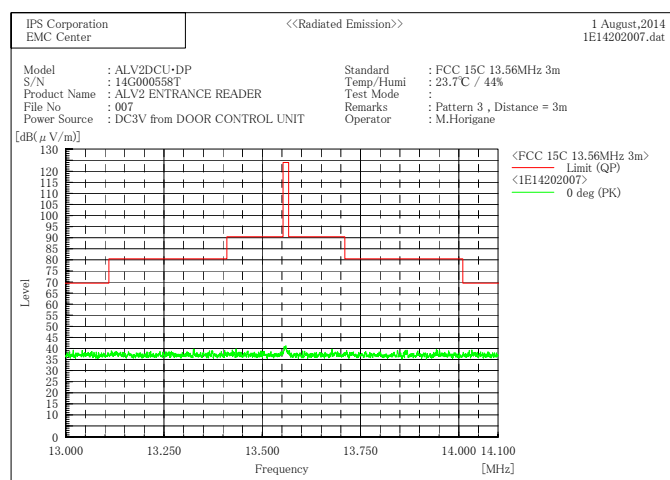
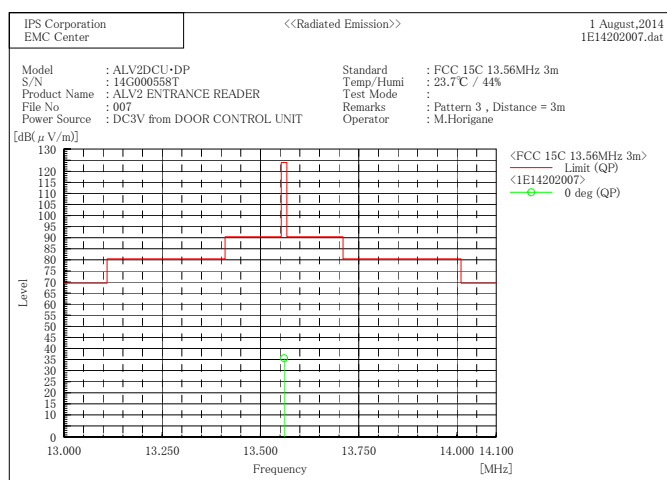
 Final Result

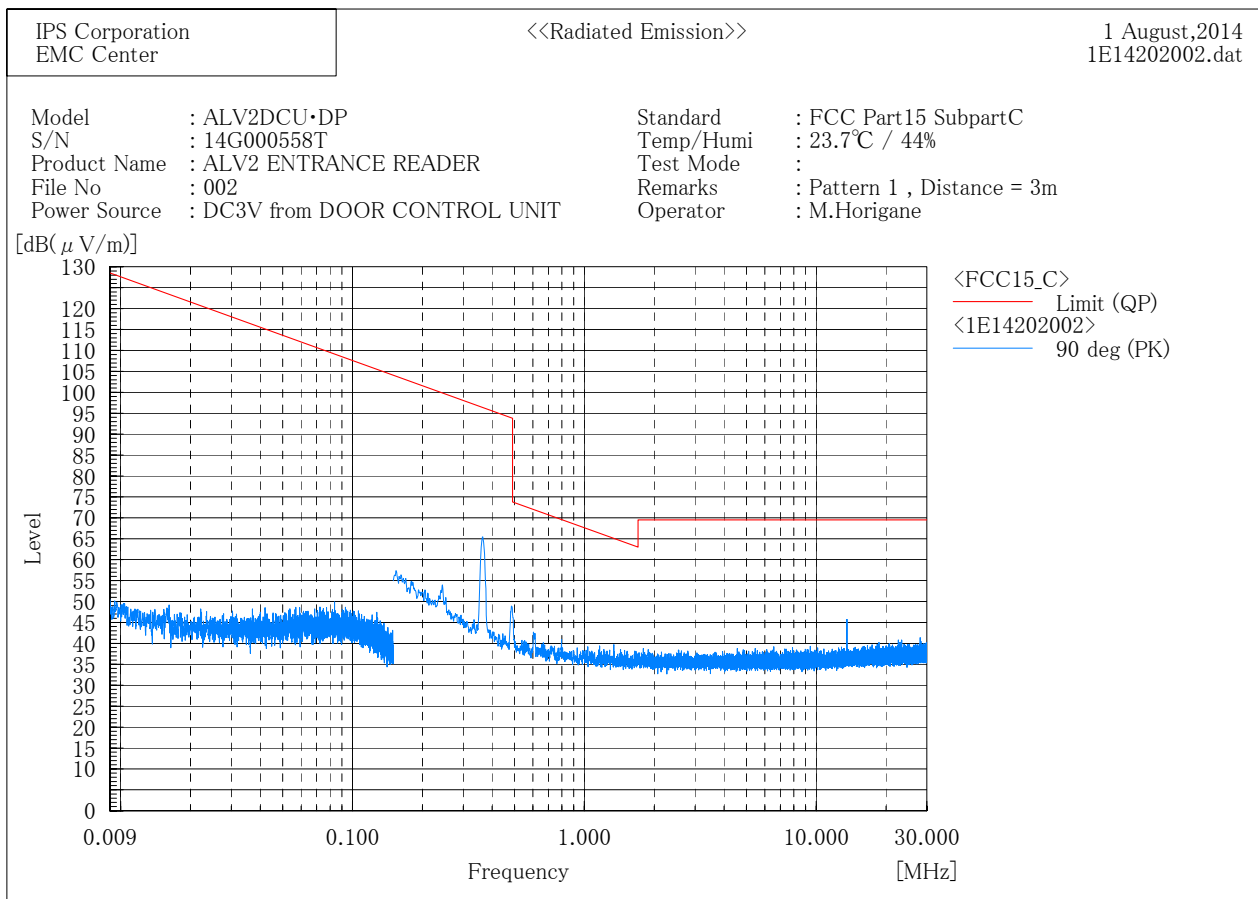
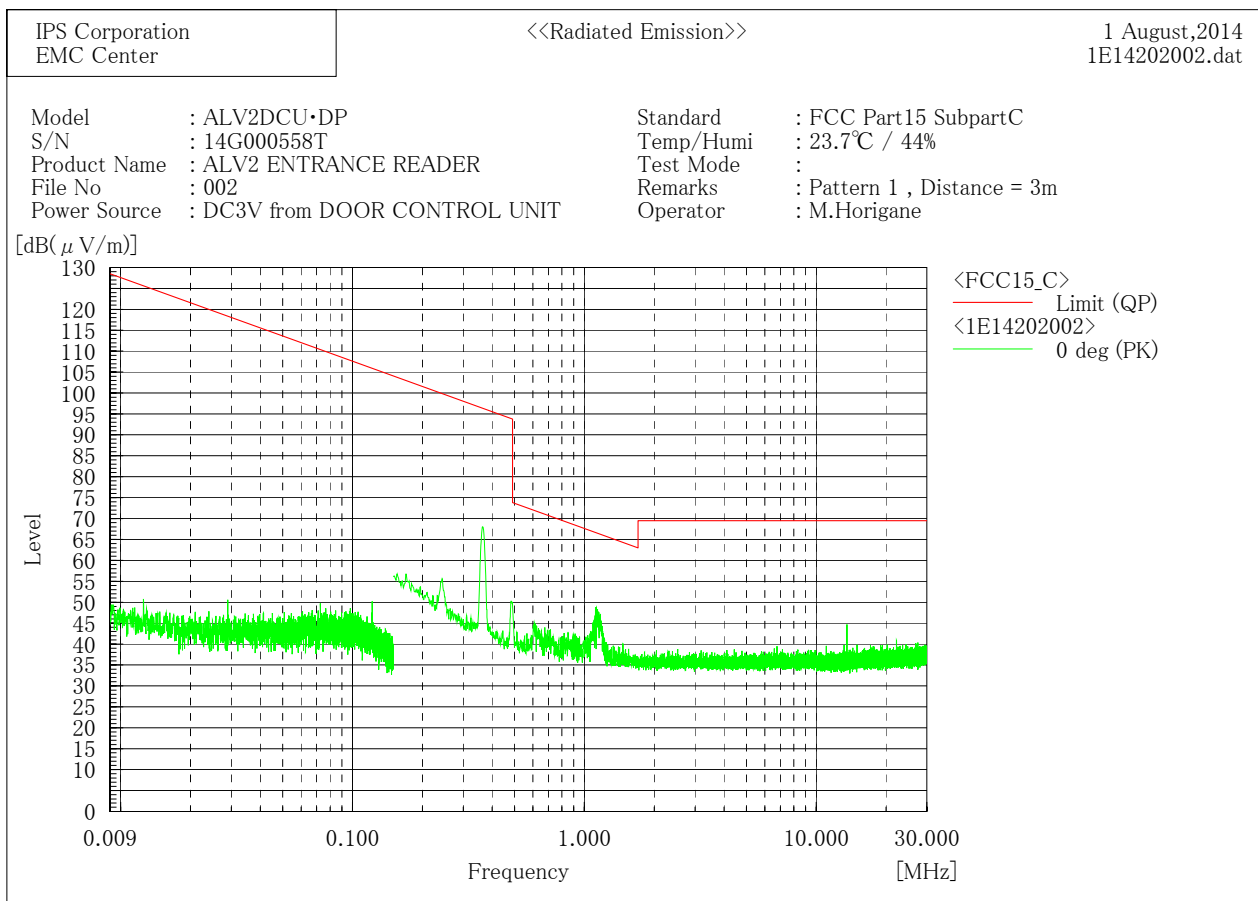
--- 0 deg (QP) ---

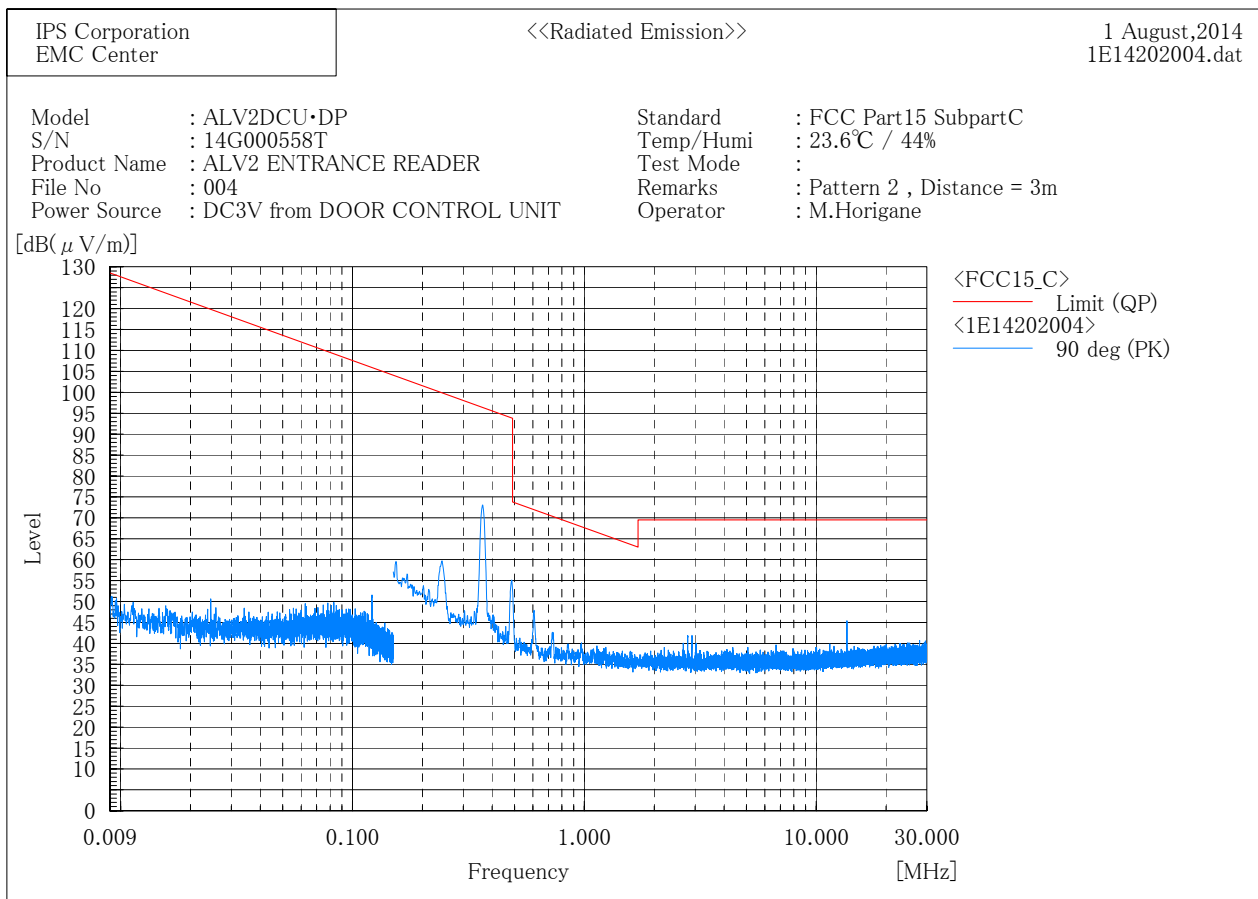
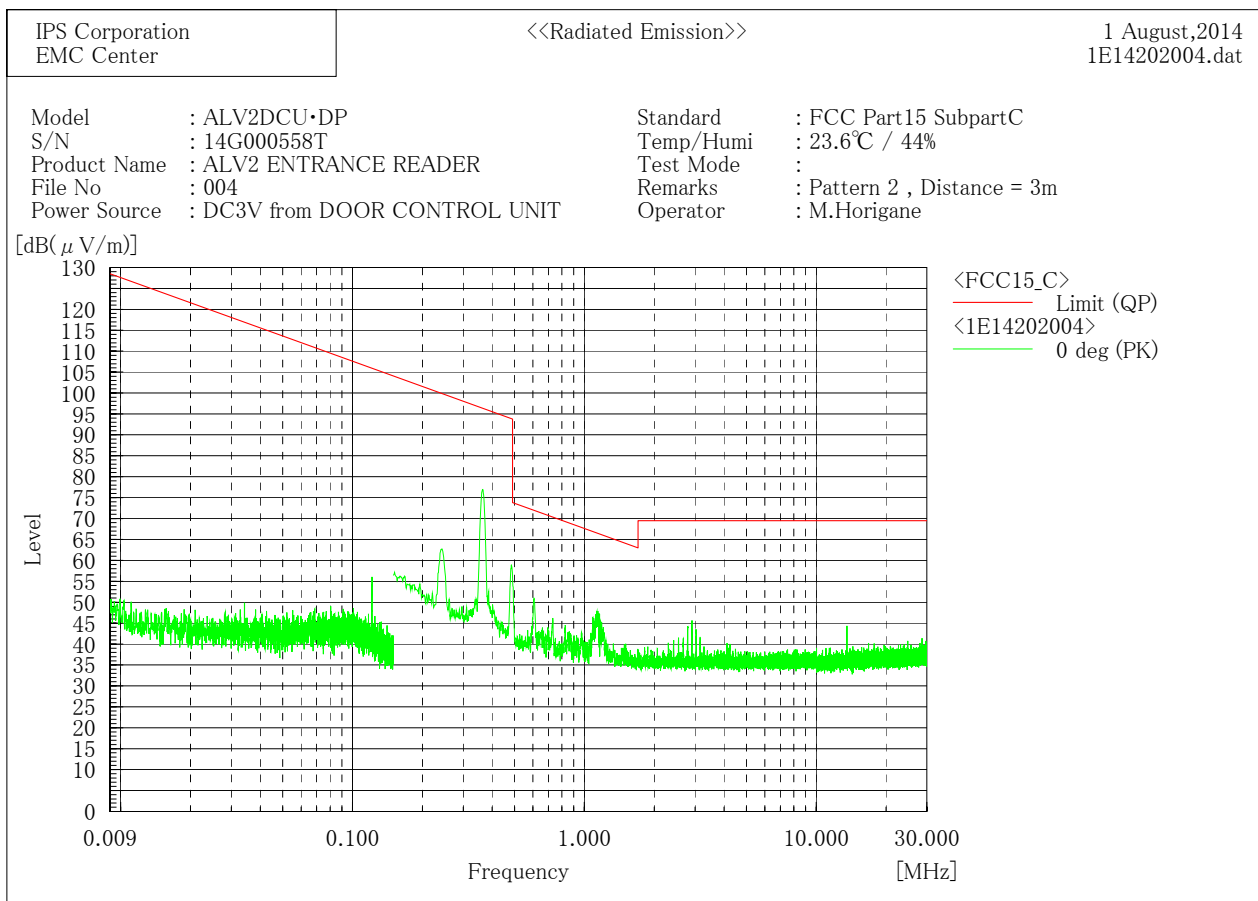
No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	13.560	13.4	22.2	35.6	124.0	88.4	100.0	238.0

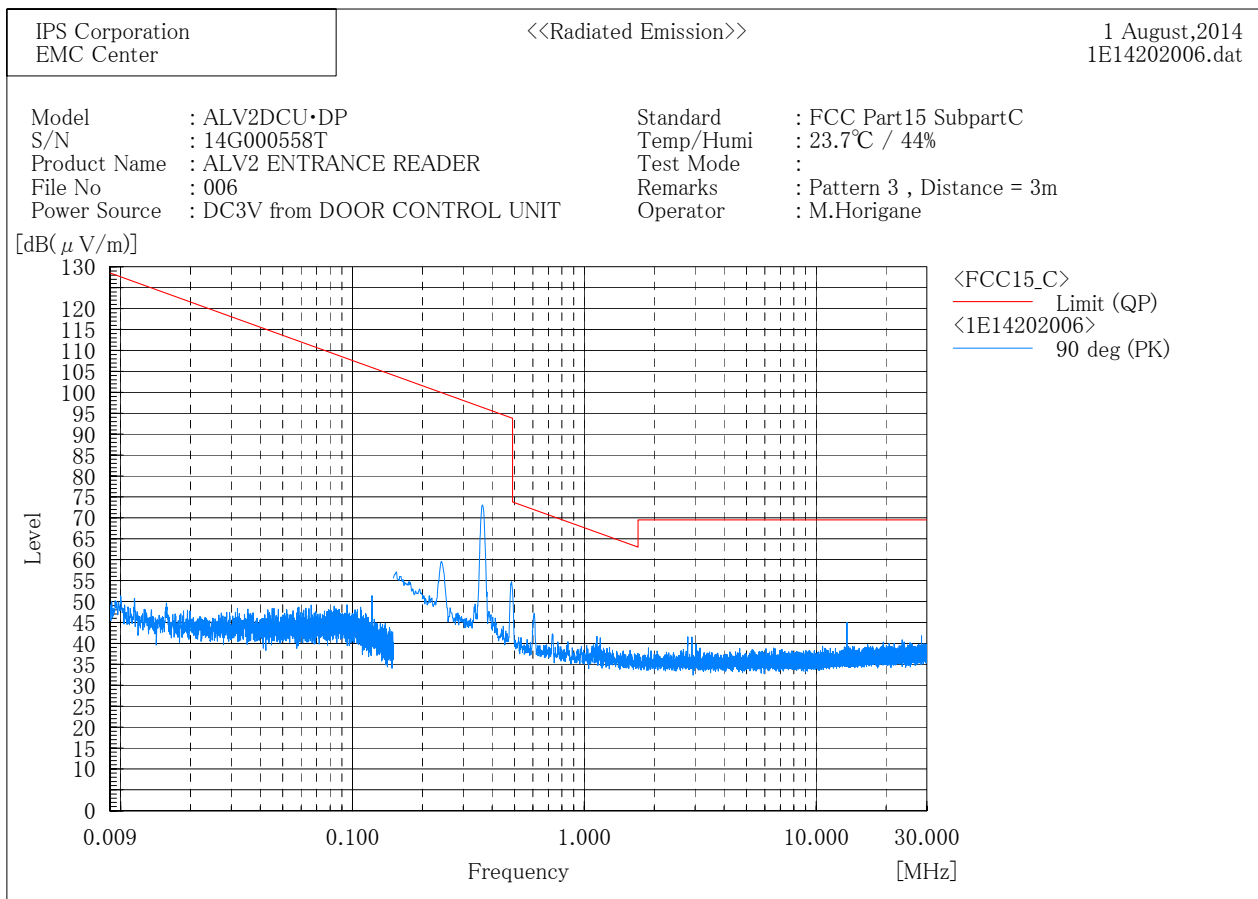
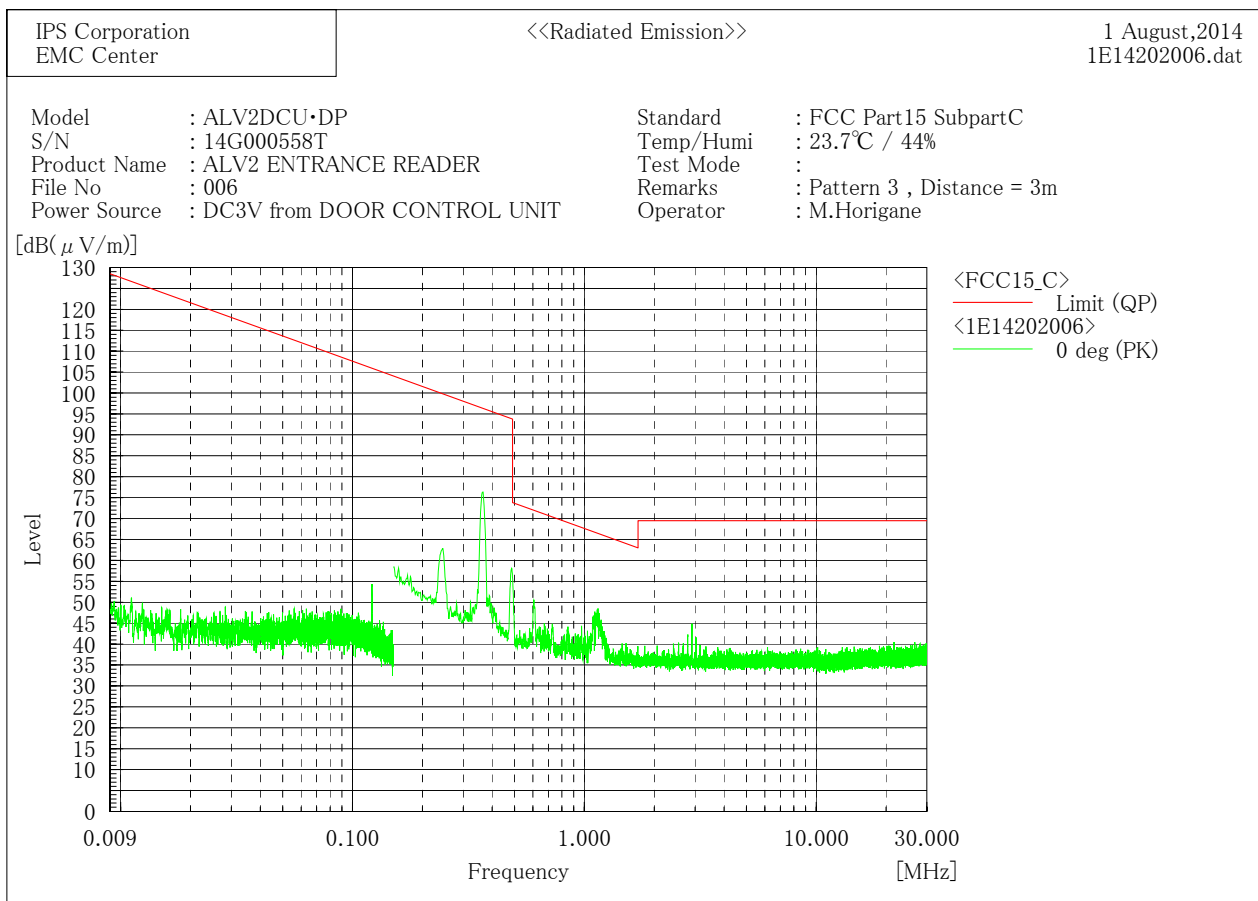
--- 90 deg (QP) ---

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	13.110	3.9	22.1	26.0	69.5	43.5	100.0	176.0
2	13.410	3.9	22.1	26.0	80.5	54.5	100.0	176.0
3	13.553	9.0	22.1	31.1	90.5	59.4	100.0	176.0
4	13.560	20.4	22.2	42.6	124.0	81.4	100.0	176.0
5	13.567	7.7	22.2	29.9	90.5	60.6	100.0	176.0
6	13.710	3.8	22.2	26.0	80.5	54.5	100.0	176.0
7	14.010	3.9	22.2	26.1	69.5	43.4	100.0	176.0









***** IPS Corporation *****
 <<Radiated Emission>> 4 August, 2014
 1E14202008.dat

Standard : FCC Part15 SubpartC
 Model : ALV2DCU-DP
 S/N : 14G000558T
 Product Name : ALV2 ENTRANCE READER
 File No : 008
 Power Source : DC3V from DOOR CONTROL UNIT
 Temp /Humi : 22.3°C / 49%
 Test Mode :
 Remarks : Pattern 1
 Operator : M.Horigane

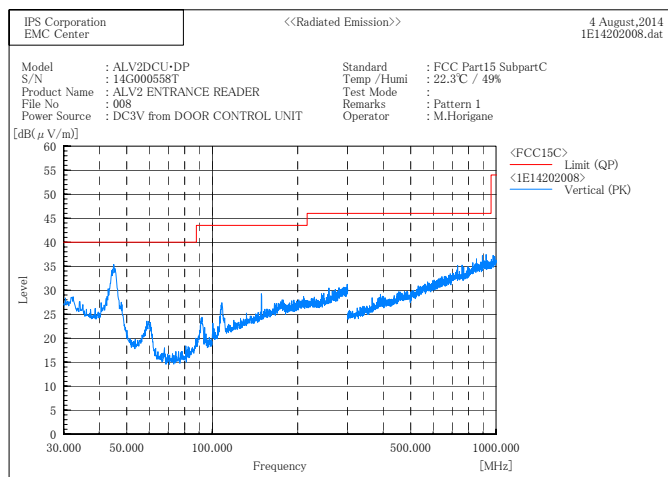
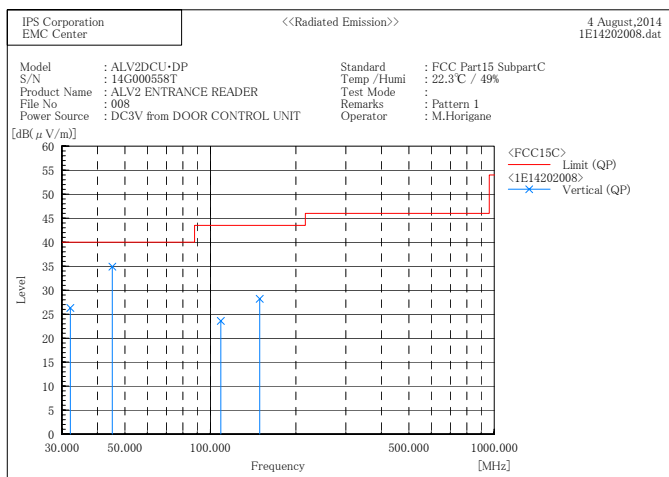
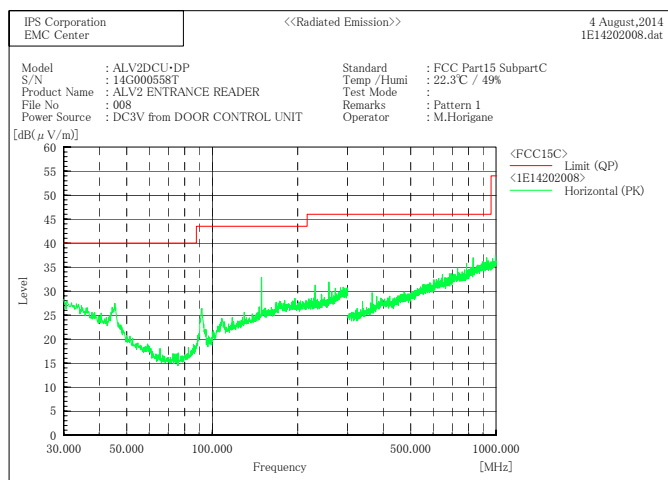
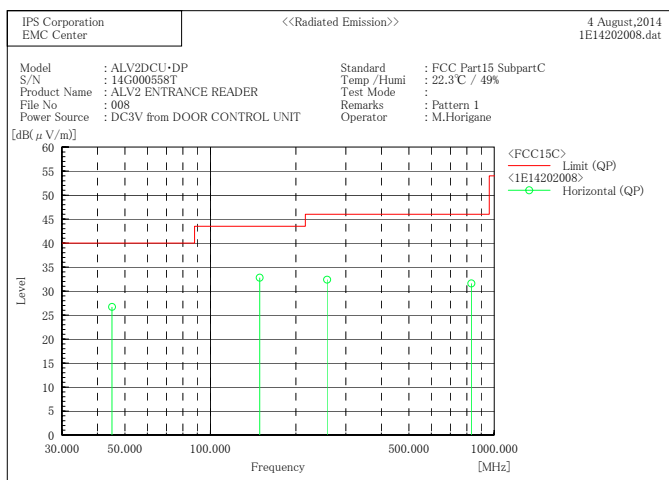
 Final Result

--- 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	45.022	39.7	-13.0	26.7	40.0	13.3	208.0	118.0
2	149.162	43.3	-10.5	32.8	43.5	10.7	200.3	267.0
3	257.642	39.9	-7.5	32.4	46.0	13.6	130.5	244.0
4	829.861	32.6	-1.0	31.6	46.0	14.4	300.3	10.0

--- 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	32.114	34.6	-8.3	26.3	40.0	13.7	100.0	336.0
2	45.146	48.0	-13.1	34.9	40.0	5.1	100.0	162.0
3	108.813	37.3	-13.7	23.6	43.5	19.9	100.0	273.0
4	149.161	38.7	-10.5	28.2	43.5	15.3	100.0	217.0



***** IPS Corporation *****
 <<Radiated Emission>> 4 August, 2014
 1E14202009.dat

Standard : FCC Part15 SubpartC
 Model : ALV2DCU-DP
 S/N : 14G000558T
 Product Name : ALV2 ENTRANCE READER
 File No : 009
 Power Source : DC3V from DOOR CONTROL UNIT
 Temp /Humi : 21.2°C / 47%
 Test Mode :
 Remarks : Pattern 2
 Operator : M.Horigane

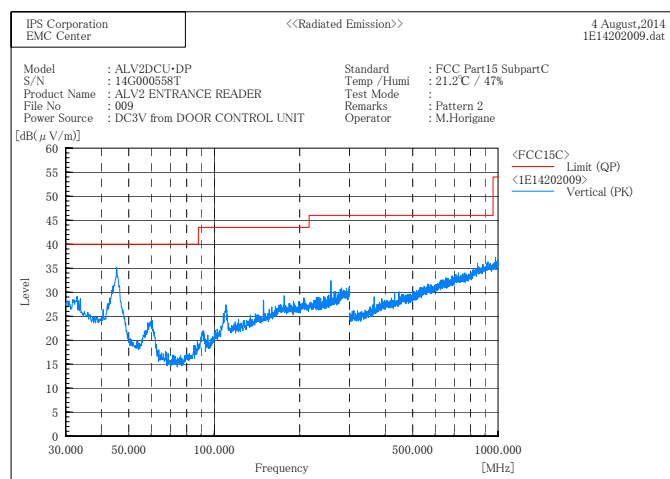
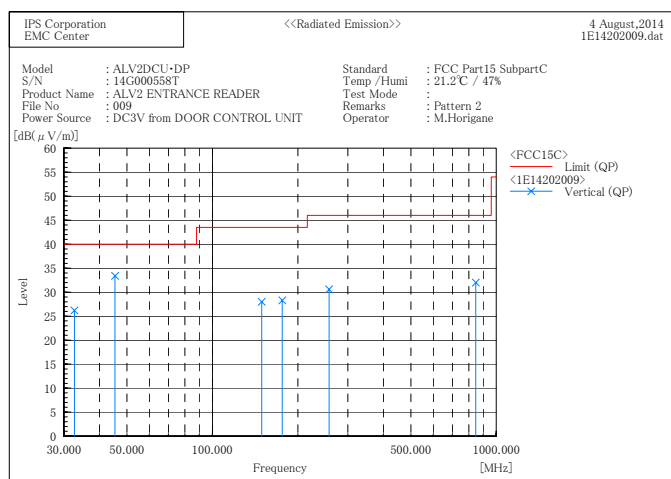
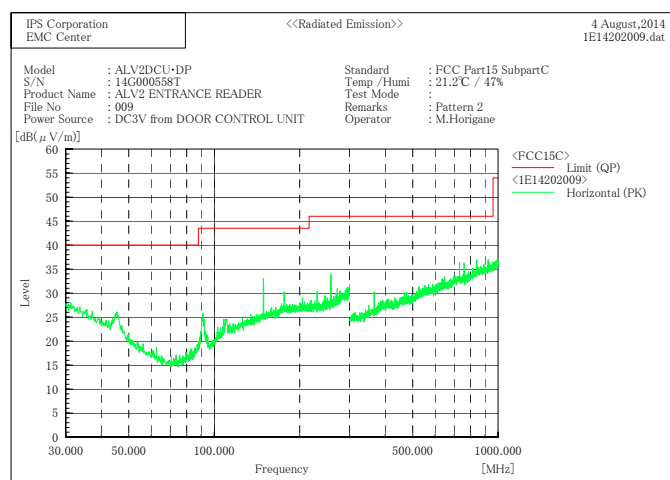
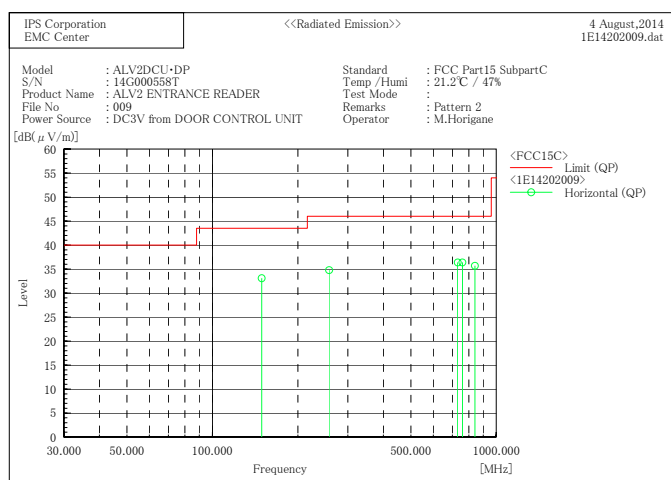
 Final Result

--- 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	149.164	43.6	-10.5	33.1	43.5	10.4	216.6	260.0
2	257.644	42.3	-7.5	34.8	46.0	11.2	131.7	263.0
3	731.244	38.6	-2.2	36.4	46.0	9.6	100.0	102.0
4	759.363	38.6	-2.2	36.4	46.0	9.6	106.7	332.0
5	840.726	36.5	-0.8	35.7	46.0	10.3	100.0	0.0

--- 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	32.646	34.6	-8.4	26.2	40.0	13.8	100.0	47.0
2	45.383	46.5	-13.1	33.4	40.0	6.6	100.0	147.0
3	149.162	38.5	-10.5	28.0	43.5	15.5	100.0	221.0
4	176.285	37.6	-9.3	28.3	43.5	15.2	100.0	286.0
5	257.644	38.1	-7.5	30.6	46.0	15.4	100.0	29.0
6	846.693	32.6	-0.6	32.0	46.0	14.0	199.5	5.0



***** IPS Corporation *****
 <<Radiated Emission>> 4 August, 2014
 1E14202010.dat

Standard : FCC Part15 SubpartC
 Model : ALV2DCU-DP
 S/N : 14G000558T
 Product Name : ALV2 ENTRANCE READER
 File No : 010
 Power Source : DC3V from DOOR CONTROL UNIT
 Temp /Humi : 22.0°C / 46%
 Test Mode :
 Remarks : Pattern 3
 Operator : M.Horigane

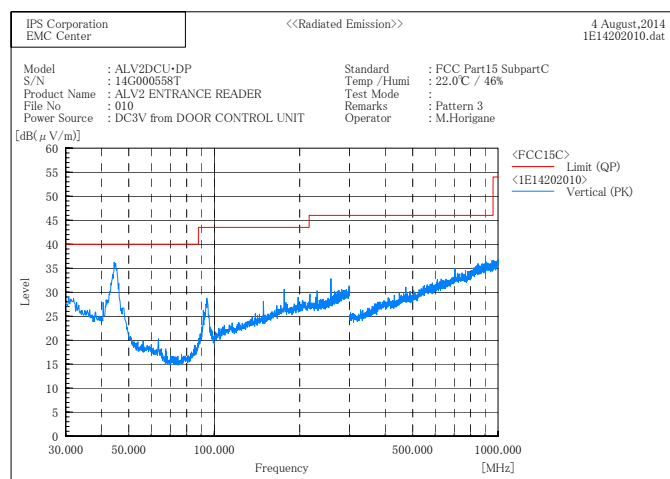
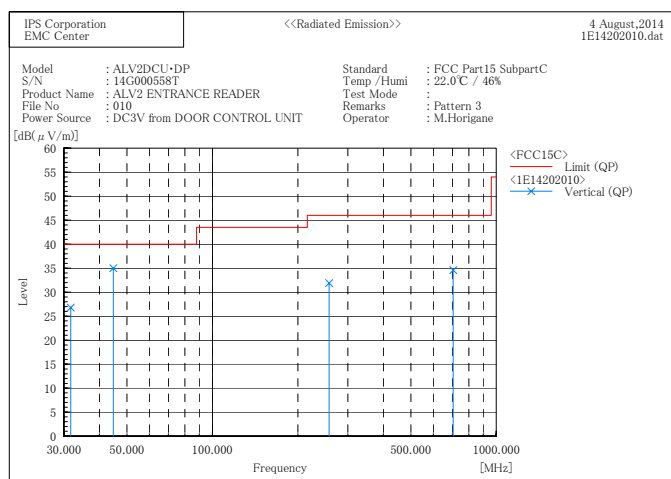
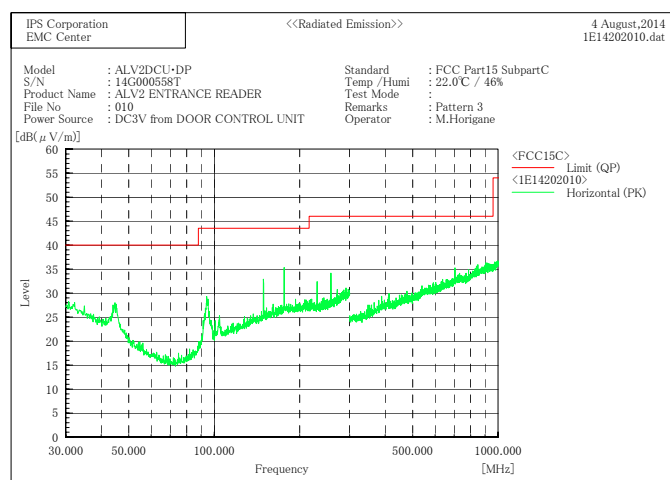
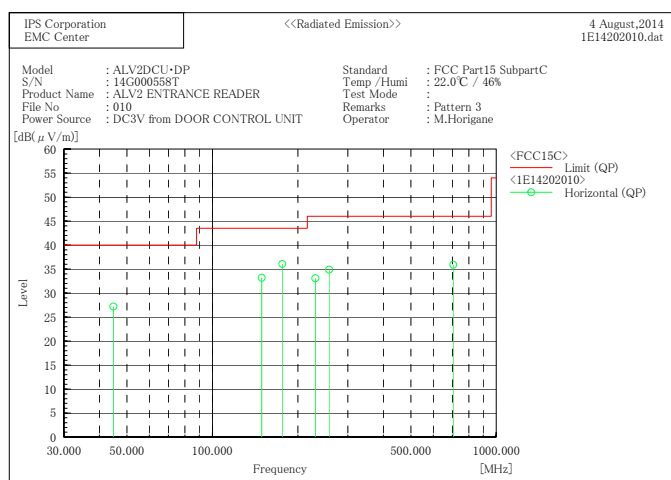
 Final Result

--- 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	44.784	40.1	-12.9	27.2	40.0	12.8	209.7	98.0
2	149.162	43.7	-10.5	33.2	43.5	10.3	210.8	96.0
3	176.281	45.4	-9.3	36.1	43.5	7.4	182.7	109.0
4	230.522	41.3	-8.2	33.1	46.0	12.9	143.3	109.0
5	257.643	42.4	-7.5	34.9	46.0	11.1	124.2	115.0
6	705.121	38.0	-2.1	35.9	46.0	10.1	121.2	209.0

--- Vertical Polarization (QP)---

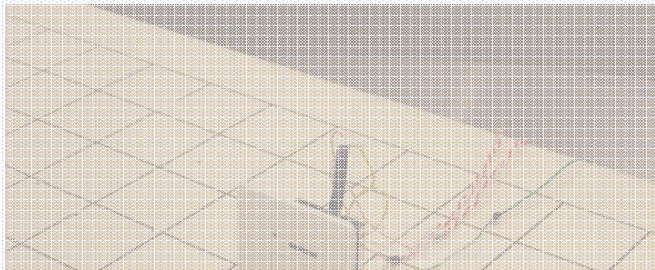
No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	31.693	34.9	-8.1	26.8	40.0	13.2	100.0	277.0
2	44.788	47.9	-12.9	35.0	40.0	5.0	100.0	149.0
3	257.644	39.4	-7.5	31.9	46.0	14.1	100.0	88.0
4	705.121	36.7	-2.1	34.6	46.0	11.4	100.0	226.0



8 TEST CONFIGURATION PHOTO

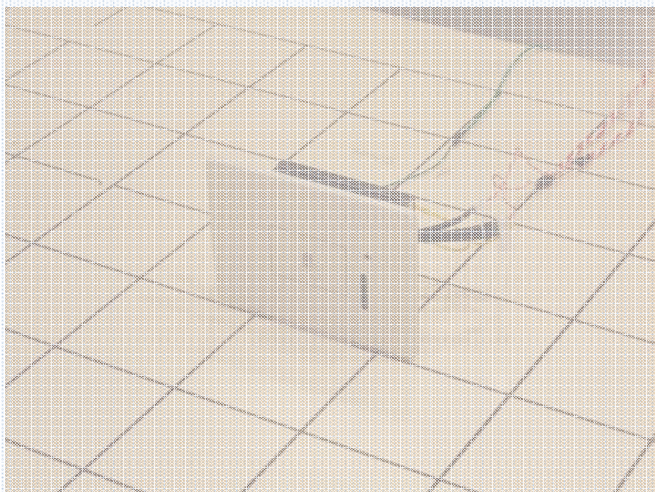
8.1 Radiated Emission Test (Axial Direction of EUT)

Pattern 1



TEST CONFIGURATION PHOTOS
were separated from this report.

Pattern 2



Pattern 3



8 TEST CONFIGURATION PHOTO

8.2.1 Radiated Emission Test

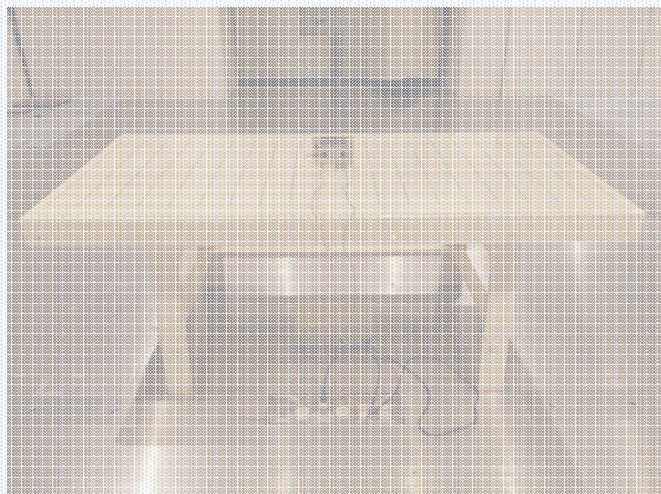
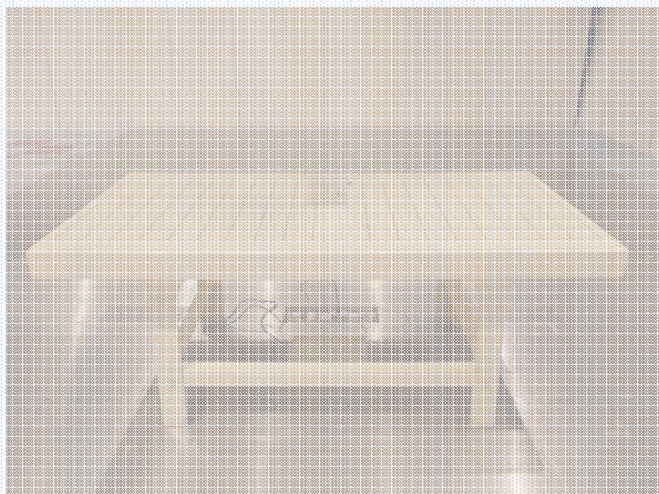
9 kHz to 30 MHz

Pattern 1

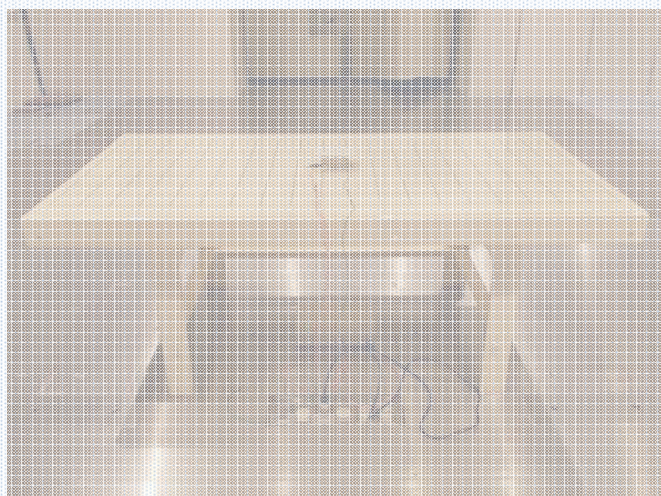
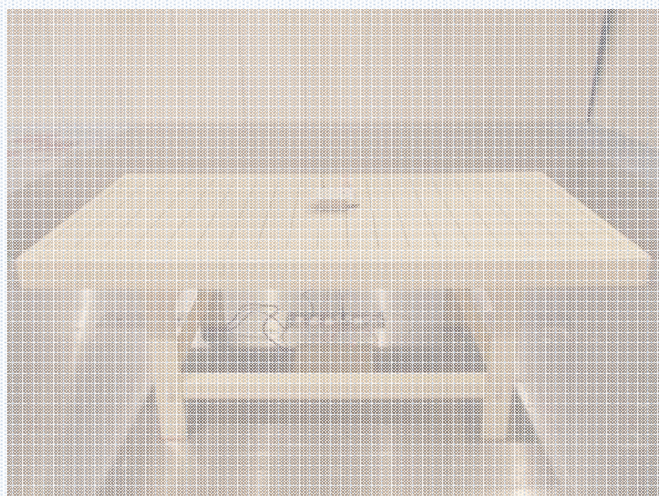


**TEST CONFIGURATION PHOTOS
were separated from this report.**

Pattern 2



Pattern 3



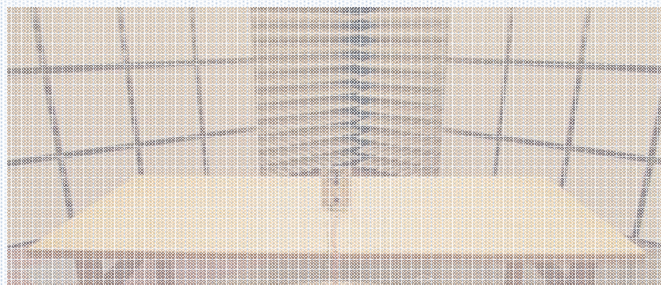
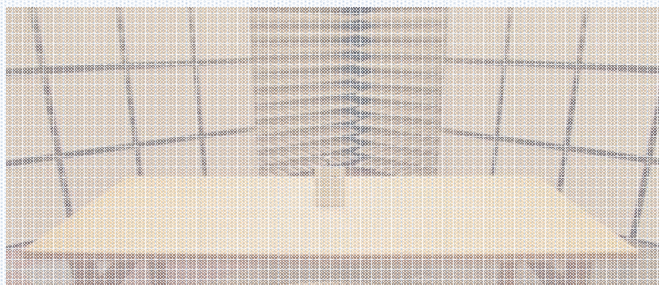
This cable routing was attempted to maximize the radiated emission.

8 TEST CONFIGURATION PHOTO

8.2.2 Radiated Emission Test

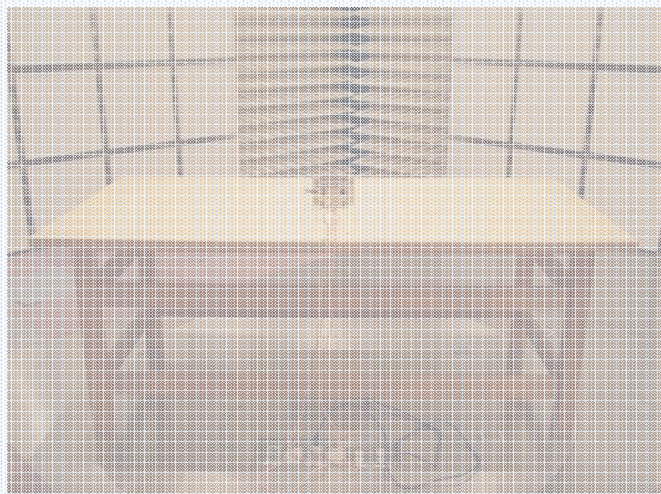
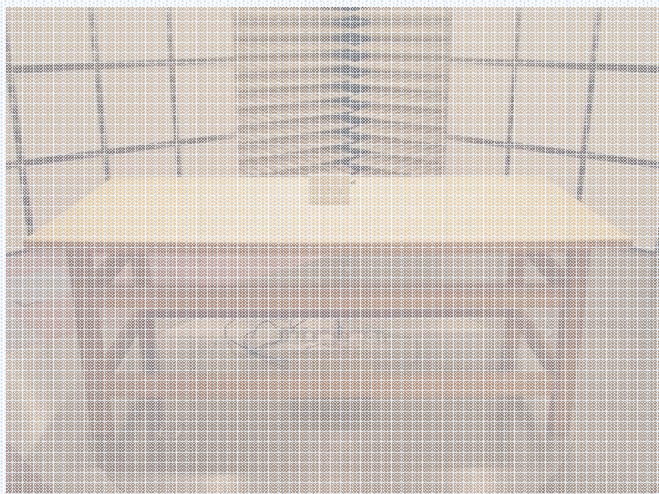
30 MHz to 1 GHz

Pattern 1

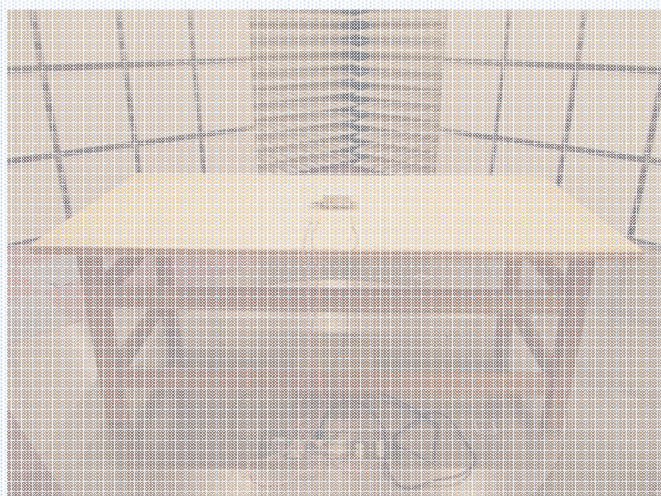
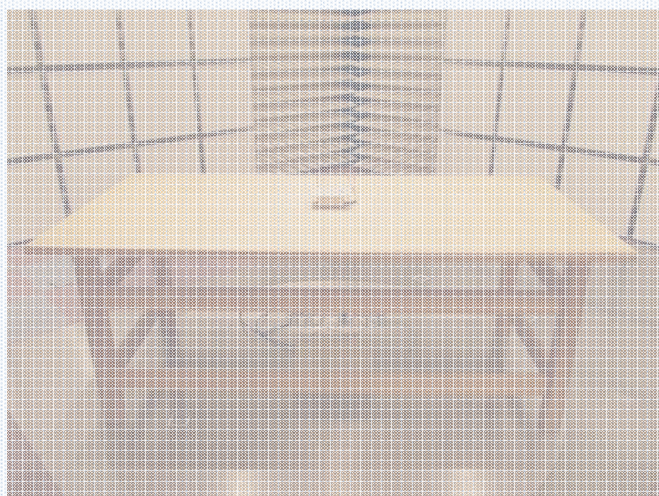


TEST CONFIGURATION PHOTOS
were separated from this report.

Pattern 2



Pattern 3



This cable routing was attempted to maximize the radiated emission.

8 TEST CONFIGURATION PHOTO

8.3 Frequency Stability Test

