FCC TEST REPORT

Test report No.:	EMC- FCC- R0171
FCC ID:	2ACQW-PFS-200
Type of equipment:	FACESTAMP
Model Name:	PFS-200
Variant Model Name:	DW-FACESTMP
Applicant:	Pravis Systems Co., Ltd.
FCC Rule Part(s):	FCC Part 15 Subpart C 15.225
Frequency Range:	13.533 ㎒ ~ 13.567 ㎒
Test result:	Complied

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.
The results of testing in this report apply to the product/system which was tested only.
Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of receipt: 2014. 05. 29

Date of test: 2014. 06. 24 ~ 06. 26

Issued date: 2014. 07. 09

Tested by: Beak

BAEK, DONG HUN

Approved by:

YU, SANG HOON

[Contents]

1. Client information

Applicant:	Pravis Systems Co., Ltd.
Address:	10, Baumoe-ro 21-gil Seocho-gu, Seoul, Korea
Telephone number:	+82-2-576-2205
Facsimile number:	+82-2-576-2204
Contact person:	Ji-mann Kim / kjimann@pravis.co.kr

Manufacturer:	Pravis Systems Co., Ltd.
Address:	10, Baumoe-ro 21-gil Seocho-gu, Seoul, Korea

2. Laboratory information

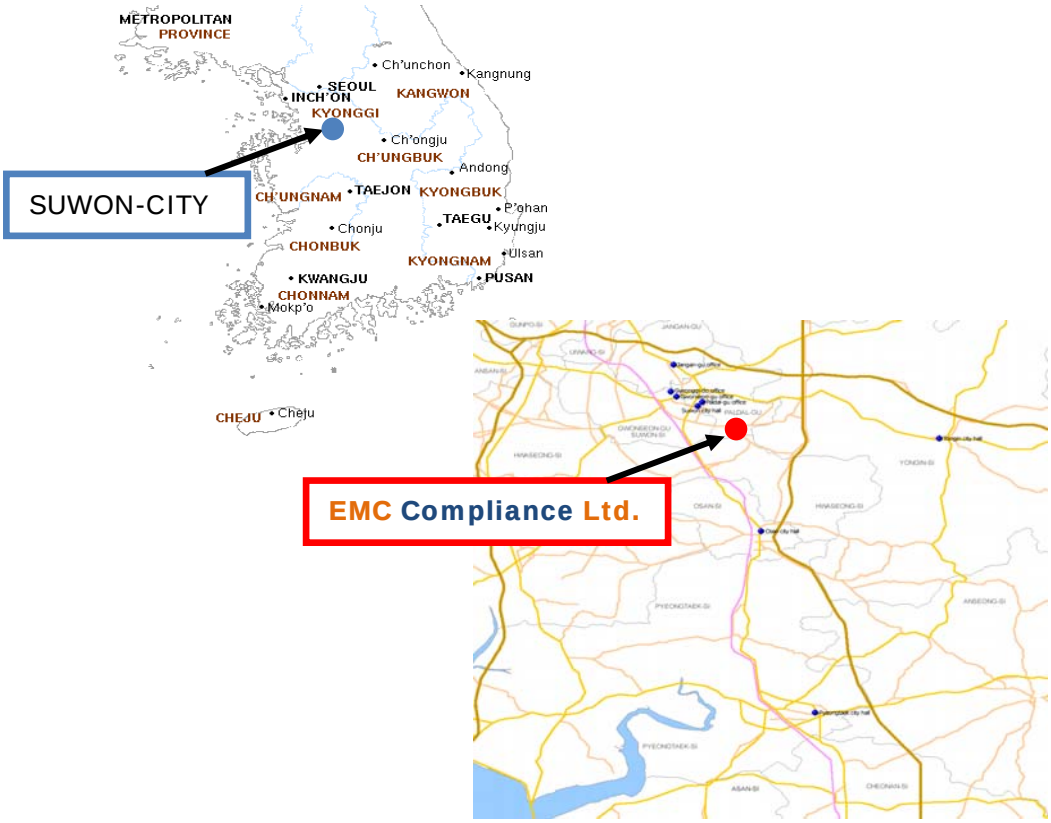
Address

EMC compliance Ltd.
65, Sinwon-ro, Yeongtong-gu, Suwon- si, Gyeonggi-do, 443-390, Korea
Telephone Number: 82-31-336-9919 Facsimile Number: 82-505-299-8311

Certificate

KOLAS No.: 231
FCC Site Registration No.: 687132
VCCI Site Registration No.: R-3327, G-198, C-3706, T-1849
IC Site Registration No.:8035A-2

SITE MAP



3. Description of E.U.T.

3.1 Basic description

Applicant :	Pravis Systems Co., Ltd.
Address of Applicant :	10, Baumoe-ro 21-gil Seocho-gu, Seoul, Korea
Manufacturer :	Pravis Systems Co., Ltd.
Address of Manufacturer :	10, Baumoe-ro 21-gil Seocho-gu, Seoul, Korea
Type of equipmen :	FACESTAMP
Basic Model :	PFS-200
Variant Model* :	DW-FACESTMP
Serial number :	Engineering Sample

* Variant model names are different only for the marketing area, and all model names are electrically identical in construction, radio characteristics, and features.

3.2 General description

Operating Frequency	13.564 ㎒
Freqyency Range	13.533 ㎒ ~ 13.567 ㎒
Type of Modulation	ASK
Number of Channels	1 channel
Type of Antenna	Integral Type
Power supply	DC 12 Ⅴ
Operating temperature	-20℃ ~ 50 ℃
Dimension	80 X 120 X 11.4 ㎜

3.3 Test frequency

frequency	**13.564 ㎒**

4. Summary of test results

4.1 Standards & results

Rule Reference	Parameter	Status
15.225 (a)	In-band Fundamental Emission	C
15.225 (b), (c)	In-band Spurious Emission	C
15.225 (d) 15.209	Out-of –band Emission	C
15.225 (e)	Frequency Stability Tolerance	C
15.207	Conducted Emissions	C

Note: C=complies
NC= Not complies
NT=Not tested
NA=Not Applicable

4.2 Uncertainty

Measurement Item	Expanded Uncertainty U = KUc (K = 2)	
Frequency stability Tolerance	± 6.11 ㎑	
Radiated Spurious Emissions	30 ㎒ ~ 300 ㎒:	+ 4.86 dB, - 4.88 dB
	300 ㎒ ~ 1 000 ㎒:	+ 4.98 dB, - 4.99 dB
Conducted Emissions	9 ㎑ ~ 150 ㎑:	± 3.82 dB
	150 ㎑ ~ 30 ㎒:	± 3.43 dB

480-5 Shin-dong, Yeongtong-gu, Suwon-city, Gyunggi-do, 443-390, Korea,
82 31 336 9919 (Main) 82 31 336 4767 (Fax)

5. Test results

5.1 In-band Fundamental Emission

5.1.1 Minimum Standard

15.225 (a) The field strength of any emission within the band 13.553-13.567 ㎒ shall not exceed 15,848 microvolts/meter at 30 meters.

5.1.2 Measurement Procedure

Test Procedure The Radiated Electric Field Strength intensity has been measured on semi anechoic chamber with a ground plane and at a distance of 3 m.

Frequency : From 9 ㎑ to 30 ㎒ at distance 3m The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

Frequency : From 30 ㎒ to 1 ㎓ at distance 3m The measuring antenna height varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.

Measurements were performed with a QP, PK, and AV detector. The radiated emission measurements were made with the following detector function of the test receiver (below 1 ㎓).

Freq'	9 - 90 ㎑	90 - 110 ㎑	150 - 490 ㎑	490 ㎑ - 30 ㎒	30 ㎒ -1 ㎓
Detecter type	PK/AV	QP	PK/AV	QP	QP
IF bandwidth	200 ㎐	200 ㎐	9 ㎑	9 ㎑	120 ㎑

* Part 15 Section 15.31 (f)(2) (9 ㎑ - 30 ㎒)

[Limit at 3m]=[Limit at 300m]-40 x log(3[m]/300[m])

[Limit at 3m]=[Limit at 30m]-40 x log (3[m]/30[m])

480-5 Shin-dong, Yeongtong-gu, Suwon-city, Gyunggi-do, 443-390, Korea,
82 31 336 9919 (Main) 82 31 336 4767 (Fax)

5.1.3 Test Result

- Complies

EUT	FACESTAMP		
Operating Frequency	13.564 ㎒	**Model Name**	DW-FACESTMP
Operating Mode	Transmitter Mode	**Modulation Technology**	ASK
Environmental Condition	21℃/46 %	**Test Channel**	1ch

Frequency	Detecter type	Reading (dBuV)	Correction Factor	field strength dBuV/m at 3 m
13.564 ㎒	QP	81.6	-11.7	69.9
Maximum Level(dBμV/m)				18.4
Limit(dBμV/m) at 3m				124 dBμV/m
margin				54.1

Note: Field strength limit was calculated with 40 dB/dec

5.2 In-band Spurious Emission

5.2.1 Regulation

15.225 (b) With in the bands 13.410-13.553 ㎒ and 13.567-13.710 ㎒, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

15.225 (c) With in the bands 13.110-13.410 ㎒ and 13.710-14.010 ㎒, the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

5.2.2 Test Result

- Complied

DC 12V
Measurement Distance: 3 m

Frequency [㎒]	Receiver Bandwidth [㎑]	Reading [dB(㎶)]	Pol. [V/H]	Factor [dB]	Limit [dB(㎶/m)]	Result [dB(㎶/m)]	Margin [dB]
QP DATA							
13.142	9	48.8	H	-11.7	90.5	37.1	53.4
13.553	9	62.5	H	-11.7	80.5	50.8	29.7
13.568	9	78.5	V	-11.7	80.5	66.8	13.7
13.713	9	51.6	V	-11.7	90.5	39.9	50.6

Margin (dB) = Limit – Actual
[Resultl = Reading – Amp Gain + Attenuator + AF + CL]
1. H = Horizontal, V = Vertical Polarization
2. ATT = Attenuation (10 dB pad and/or Insertion Loss of HPF), AF/CL = Antenna Factor and Cable Loss

5.3 Out-of-band Emission

5.3.1 Regulation

15.225 (d) The Field Strength of any emissions appearing outside of the 13.110-14.010 ㎒ band shall not exceed the general radiated emission limits in 15.209

Frequency (㎒)	Field Strength (㎶/m)	Measurement distance (meters)
0.009-0.490	2400/F(㎑)	300
0.490-1.705	24000/F(㎑)	30
1.705-30.0	30(29.54 dB㎶/m)	30
30.0-88.0	100(40 dB㎶/m)	3
88-216	150(43.5 dB㎶/m)	3
216-960	200 (46 dB㎶/m)	3
Above 960	500 (53.98 dB㎶/m)	3

5.3.2 Measurement Procedure

The spurious emissions from the EUT will be measured on an 10 m Anechoic chamber in the frequency range of 9 ㎑ to 30 ㎒ using a tuned receiver and a shielded loop antenna.
The antenna was positioned 3, 10 or 30 meters horizontally from the EUT.
Measurements haver been made in all three orthogonal axes and the shielded loop antenna was rotated to locate the maximum of the emissions.
In the case where larger measuring distances are required the results will extrapolated based on the values measuring on the closer distances according to Section 15.31 (f) (2) [2].

The final measurement will be performed with an EMI Riceiver set to Quasi Peak detector except for the frequency bands 9 ㎑ to 90 ㎑ and 110 to 490 ㎑ where an average detector will be used according to Section 15.209 (d) [2].

The final lever, expressed in dB㎶/m, is arrived at by taking the reading from the EMI receiver (Level dB㎶) and adding the antenna correction factor and cable loss fator (Factor dB) to it. This result then has to be compared with the relevant FCC limit. The resolution bandwith during the measurement is as follows:
9 ㎑ – 150 ㎑: RBW: 200 ㎐
150 ㎑ – 30 ㎒: RBW: 9 ㎑

480-5 Shin-dong, Yeongtong-gu, Suwon-city, Gyunggi-do, 443-390, Korea,
82 31 336 9919 (Main) 82 31 336 4767 (Fax)

The preliminary radiated measurements were performed to determine the frequency producing the maximum emissions in an anechoic chamber at a distance of 3 meters.

The EUT was placed on the top of the 0.8 meter height, 1 x 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360°.

The antenna polarization was also changed from vertical to horizontal. The spectrum was canned from 30 to 1 000 ㎒ using the BILOG antenna.

To obain the final measurement data, the EUT was arranged on a turntable situated on a 10 m chamber. The EUT was tested at a distance 3 meters.

Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.

5.3.3 Test Result

-Complied

Measurement Distance: 3 m

DC 12 V

Frequency [㎒]	Receiver Bandwidth [㎑]	Reading [dB(㎶)]	Pol. [V/H]	Factor [dB]	Limit [dB(㎶/m)]	Result [dB(㎶/m)]	Margin [dB]
QP DATA.							
0.154	9	61.4	V	-12.7	118.1	48.7	69.4
0.501	9	49.3	V	-12.7	73.8	36.6	37.2
25.037	9	41.3	V	-10.4	69.5	30.9	38.6
40.670	120	34.4	V	-15.0	40.0	19.4	20.6
162.646	120	38.1	H	-13.5	43.5	24.6	18.9
705.241	120	44.5	H	-3.2	46.0	41.3	4.7
991.149	120	25.2	H	2.9	54.0	28.1	25.9

Margin (dB) = Limit – Actual
[Resultl = Reading – Amp Gain + Attenuator + AF + CL]
1. H = Horizontal, V = Vertical Polarization
2. ATT = Attenuation (10 dB pad and/or Insertion Loss of HPF), AF/CL = Antenna Factor and Cable Loss

* The spurious emission at the frequency does not fall in the restricted bands.
** The measured result is within the test standard limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95 % level of confidence. However, the result indicates that compliance is more probable than non-compliance.

NOTE: All emissions not reported were more than 20 dB below the specified limit or in the noise floor.

5.4 Frequency Stability tolerance

5.4.1 Regulation

15.225 (e) The frequency tolerance of the carrier signal shall be maintained within ±0.01 % of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85 % to 115 % of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

5.4.2 Test Result

- Complied

DC 12V

VOLTAGE (%)	POWER (V)	TEMP (℃)	FREQ (Hz)	FREQ.DEV (Hz)	Deviation (%)
100	12	20	135 616 76	-76	-0.000 56
		-20	135 617 23	-123	-0.000 91
		-10	135 617 28	-128	-0.000 94
		0	135 617 12	-112	-0.000 83
		10	135 616 77	-77	-0.000 57
		20	135 616 49	-49	-0.000 36
		25	135 616 44	-44	-0.000 32
		30	135 616 41	-41	-0.000 30
		40	135 616 37	-37	-0.000 27
		50	135 616 37	-37	-0.000 27
85	10.2	20	135 616 75	-75	-0.000 55
115	13.8	20	135 616 75	-75	-0.000 55

480-5 Shin-dong, Yeongtong-gu, Suwon-city, Gyunggi-do, 443-390, Korea,
82 31 336 9919 (Main) 82 31 336 4767 (Fax)

5.5 Conducted Emission

5.5.1 Regulation

According to §15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (㎒)	Conducted limit (㏈μV)	
	Qausi-peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50

* Decreases with the logarithm of the frequency.

According to §15.107(a), for unintentional device, except for Class A digital devices, line conducted emission limits are the same as the above table.

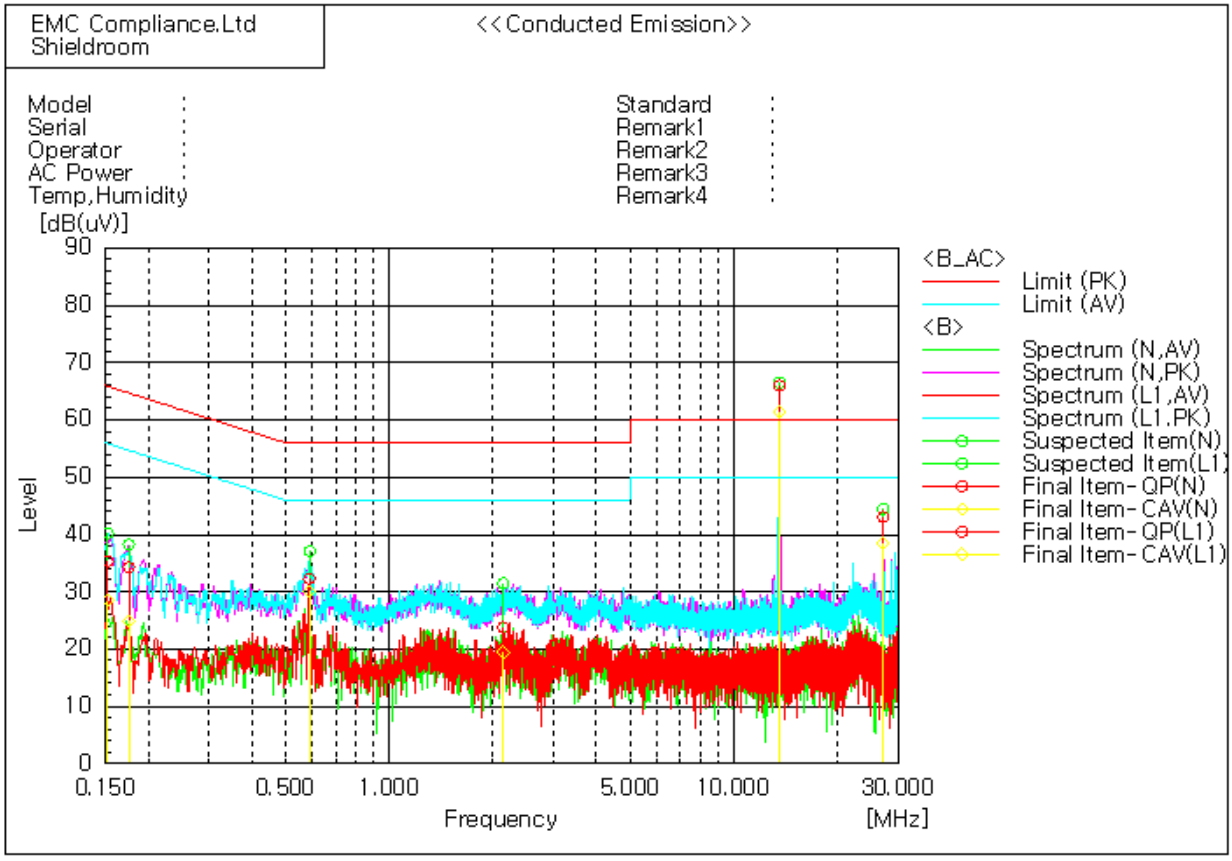
5.5.2 Measurement Procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 ㎝ in which is located 40 ㎝ away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω /50μ H LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 ㎒ to 30 ㎒.
5. The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 ㎑ or to QUASI-PEAK and AVERAGE within a bandwidth of 9 ㎑. The EUT was in transmitting mode during the measurements.

480-5 Shin-dong, Yeongtong-gu, Suwon-city, Gyunggi-do, 443-390, Korea,
82 31 336 9919 (Main) 82 31 336 4767 (Fax)

5.5.3 Test Result

- Complied



Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	o.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.17595	24.3	14.9	10.0	34.3	24.9	64.7	54.7	30.4	29.8
2	0.58725	22.3	20.1	10.0	32.3	30.1	56.0	46.0	23.7	15.9
3	13.5615	56.1	51.6	9.9	66.0	61.5	60.0	50.0	-6.0	-11.5

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	o.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.15255	25.4	18.4	10.0	35.4	28.4	65.9	55.9	30.5	27.5
2	2.14668	13.9	9.7	9.8	23.7	19.5	56.0	46.0	32.3	26.5
3	27.12262	33.1	28.6	9.9	43.0	38.5	60.0	50.0	17.0	11.5

* Fundamental Frequency: 13.5615 MHz

6. Test equipment used for test

	Description	Manufacture	Model No.	Serial No.	Next Cal Date.
■	Temp & Humidity Chamber	ESPEC CORP.	SH-661	92004048	15.03.10
■	Spectrum Analyzer	R&S	FSP40	100209	14.10.21
■	DC Power Supply	Tektronix	PS2520G	TW50517	14.10.21
■	Signal Generator	R&S	SMR40	100007	15.06.10
■	Loop Antenna	R&S	HFH2-Z2	100355	15.06.19
■	Bi-Log Antenna	Schwarzbeck	VULB9163	552	14.07.18
■	Attenuator	HP	8491A	16861	15.07.01
■	Antenna Mast	Innco Systems	MA4000-EP	303	-
■	Turn Table	Innco Systems	DT2000S-1t	79	-
■	EMI Test Receiver	R&S	ESCI	100710	14.10.28
■	LISN	R&S	ENV216	101358	14.10.01

480-5 Shin-dong, Yeongtong-gu, Suwon-city, Gyunggi-do, 443-390, Korea,
82 31 336 9919 (Main) 82 31 336 4767 (Fax)