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# **Certificate of Compliance**

for the FCC Declaration of Conformity Procedure from the

# **Conformity Assessment Body**

**Hong Kong Standards and Testing Centre Designation Number: HK0001** 

on the basis of Asia-Pacific Economic Cooperation (APEC) economies' Mutual Recognition Arrangement for Conformity Assessment of Telecommunications Equipment (APEC Tel MRA) scheme sanctioned by the Federal Communications Commission of the United States Government.

Certificate Number:

FCC002277

The Hong Kong Standards and Testing Centre Ltd. Test Laboratory: MH189528 / 11 December 2013. Test Report / Issued date: Dragino Technology Co., Limited Applicant: Manufacturer: Dragino Technology Co., Limited Type of Equipment: Wireless Sensor Node **Brand Name:** Dragino Flukso Model Number: **MS14** Additional Model Number(s): FLM03B, MS14-P, MS14-S, MS14-MLC

## **Rules and Regulations**

United States CFR 47 FCC Part 15 Subpart B (Unintentional Radiators).

## Standards

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 9kHz to 40GHz.

### Remark

This certificate shall be used in conjunction with the above mentioned test report,



ElectroMagnetic Compatibility Department

For and on behalf of

Date: 2013-12-11

The Hong Kong Standards and Testing Centre Ltd.

(Conformity Assessment Body CAB under the APEC Tel MRA)

http://www.hkstc.org 10 Dai Wang St., Tai Po Industrial Estate, N.T., Hong Kong Tel.: (852)26661888 Fax: (852)26644353



Date: 2013-12-11

Page 1 of 17

38

No.: MH189528

 Applicant(KAW001): Dragino Technology Co., Limited Room 2073, Zi'An Commercial Building, Qian Jin 1 Road, Xin'An 6th District, Bao'an District, Shenzhen 518101, China
 Manufacturer: Dragino Technology Co., Limited Room 2073, Zi'An Commercial Building, Qian Jin 1 Road, Xin'An 6th District, Bao'an District, Shenzhen 518101,

China

Submitted sample(s) said to beProduct:Wireless Sensor NodeBrand Name:Dragino FluksoModel Number:MS14
2013-11-24
2013-11-24
FCC Part 15 Subpart B
The submitted product <u>COMPLIED</u> with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.
The EUT operating frequency provided by manufacturer is 25MHz (RF function excluded). For additional model(s) details, see page 3





Date:	Date: 2013-12-11				
No.: N	IH189528				
CONT	ENT:				
	Cover Content	Page 1 of 17 Page 2 of 17			
<u>1.0</u>	<u>General Details</u>				
1.1	Equipment Under Test [EUT] Description of sample(s)	Page 3 of 17			
1.2	Description of EUT operation	Page 3 of 17			
1.3	Date of Order	Page 3 of 17			
1.4	Submitted Sample(s)	Page 3 of 17			
1.5	Test Duration	Page 3 of 17			
1.6	Country of Origin	Page 3 of 17			
<u>2.0</u>	Technical Details				
2.1	Investigations Requested	Page 4 of 17			
2.2	Test Standards and Results Summary	Page 4 of 17			
<u>3.0</u>	Test Results				
3.1	Emission	Page 5-12 of 17			
	Appendix A				
	List of Measurement Equipment	Page 13 of 17			
	Appendix B				
	Ancillary Equipment	Page 14 of 17			
	<u>Appendix C</u>				
	Photographs	Page 15-17 of 17			

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#### Date: 2013-12-11

Page 3 of 17

#### No.: MH189528

#### **<u>1.0</u>** General Details

#### 1.1 Equipment Under Test [EUT] Description of Sample(s)

Submitted sample(s) said to be Product:	Wireless Sensor Node
Manufacturer:	Dragino Technology Co., Limited Room 2073, Zi'An Commercial Building, Qian Jin 1 Road. Xin'An 6th District, Bao'an District ; Shenzhen 518101,China
Brand Name:	Dragino
Model Number:	MS14
Additional Model Number(s):	FLM03B, MS14-P, MS14-S, MS14-MLC
Rating:	12Vd.c. with Jack
	by the applicant with following details: 7-120050-AU; Input: 100-240Va.c. 50/60Hz 0.3A Max ;

#### **1.2 Description of EUT Operation**

The Equipment Under Test (EUT) is a Wireless Sensor Node of Dragino Technology Co., Limited. Test was conducted in On mode (connected to PC and ping with internet) to simulate the normal operating condition.

#### 1.3 Date of Order

2013-11-24

#### **1.4** Submitted Sample(s):

1 Sample

#### 1.5 Test Duration

2013-11-24

#### **1.6** Country of Origin

China

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Date: 2013-12-11

No.: MH189528

#### 2.0 <u>Technical Details</u>

#### 2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2012 and ANSI C63.4: 2009 for FCC DoC.

#### 2.2 Test Standards and Results Summary Tables

EMISSION Results Summary							
Test Condition	Test Condition Test Requirement Test Method Class / Test Result						
Severity Pass Fa							
Radiated Emissions	FCC 47CFR 15.109	ANSI C63.4:2009	Class B	$\boxtimes$			
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.107	ANSI C63.4:2009	Class B	$\boxtimes$			

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Page 4 of 17



#### Date: 2013-12-11

Page 5 of 17

#### No.: MH189528

3.0 Test Results

#### 3.1 Emission

#### 3.1.1 Radiated Emissions

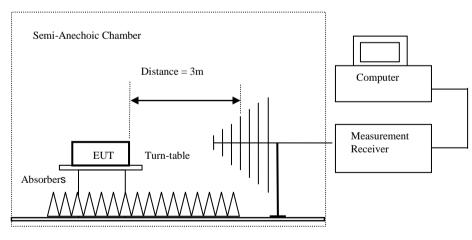
Test Requirement:	FCC 47CFR 15.109
Test Method:	ANSI C63.4:2009
Test Date:	2013-11-24
Mode of Operation:	On mode (connected to PC and ping with internet)

#### **Test Method:**

The sample was placed 0.8m above the ground plane of Semi-Anechoic chamber\*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

\*: Semi-Anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd. with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

#### **Test Setup:**



Ground Plane

- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.

- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used.

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#### Date: 2013-12-11

Page 6 of 17

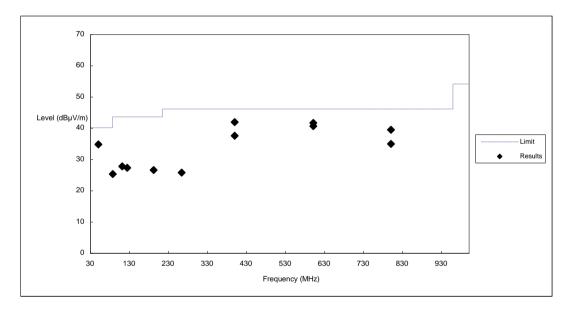
#### No.: MH189528

#### Limits for Radiated Emissions [FCC 47 CFR 15.109 Class B]:

Frequency Range	Quasi-Peak Limits
[MHz]	[µV/m]
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

#### Results of On mode (connected to PC and ping with internet) : PASS



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Date: 2013-12-11

#### No.: MH189528

#### **Results of On mode (connected to PC and ping with internet) : PASS**

Radiated Emissions						
Quasi-Peak						
Emission	Emission E-Field Level Limit Level Limit					
Frequency	Polarity	@3m	@3m	@3m	@3m	
MHz		dBµV/m	dBµV/m	μV/m	μV/m	
88.2	Horizontal	25.2	43.5	18.2	150	
125.1	Horizontal	27.2	43.5	22.9	150	
193.0	Horizontal	26.5	43.5	21.1	150	
400.5	Horizontal	41.8	46.0	123.0	200	
602.3	Horizontal	40.5	46.0	105.9	200	
801.2	Horizontal	39.3	46.0	92.3	200	
51.3	Vertical	34.7	40.0	54.3	100	
112.5	Vertical	27.6	43.5	24.0	150	
264.7	Vertical	25.6	46.0	19.1	200	
400.5	Vertical	37.4	46.0	74.1	200	
602.3	Vertical	41.6	46.0	120.2	200	
801.2	Vertical	34.8	46.0	55.0	200	

Remarks:

Calculated measurement uncertainty (30MHz - 1GHz): 4.9dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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Page 7 of 17



#### Date: 2013-12-11

Page 8 of 17

#### No.: MH189528

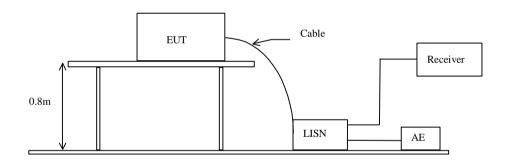
#### 3.1.2 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.107
Test Method:	ANSI C63.4:2009
Test Date:	2013-11-24
Mode of Operation:	On mode (connected to PC and ping with internet)

#### **Test Method:**

The test was performed in accordance with ANSI C63.4: 2009, with the following: an initial measurement was performed in peak and average detection mode on the live line, any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

#### **Test Setup:**



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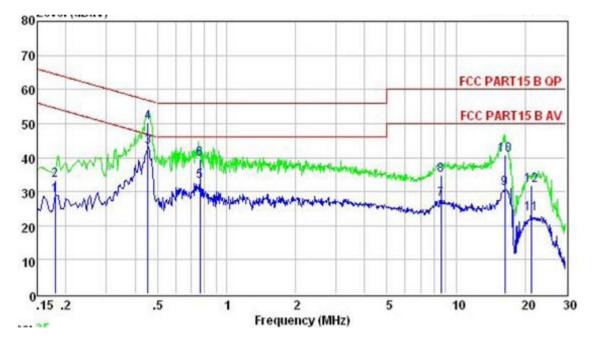
#### No.: MH189528

#### Limit for Conducted Emissions (FCC 47 CFR 15.107):

Frequency Range	Quasi-Peak Limits	Average
[MHz]	[dBµV]	[dBµV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

\* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.



Results of On mode (	connected to P	C and ning with	internet FUT	mains) (I) · PASS
Results of OII mode (	connected to F	C and ping with	miernei, EUI	(L): FASS

		Quasi-peak		Ave	rage
Conductor	Frequency	Level	Limit	Level	Limit
Live or Neutral	MHz	dBμV	dBμV	dBμV	dBμV
Live	0.180	33.2	64.5	28.9	54.5
Live	0.454	50.2	56.8	43.2	46.8
Live	0.767	39.5	56.0	33.0	46.0
Live	8.592	34.7	60.0	27.8	50.0
Live	16.312	40.7	60.0	31.1	50.0
Live	21.147	31.9	60.0	23.5	50.0

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#### No.: MH189528

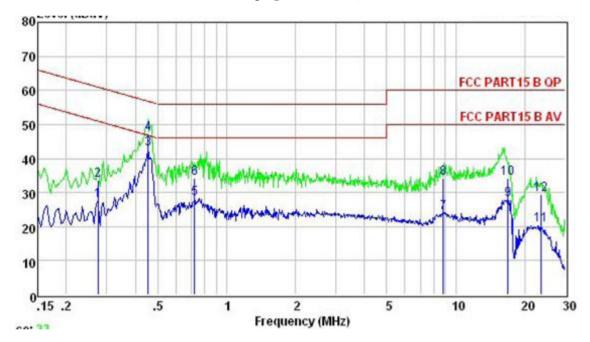
\*

#### Limit for Conducted Emissions (FCC 47 CFR 15.107):

Frequency Range	Quasi-Peak Limits	Average
[MHz]	[MHz] [dBµV] [	
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.



Results of On mode	(connected to PC and	ping with internet, EU	$\Gamma$ mains) (N) · $PASS$
Results of OII mode	connected to r C and	ping with internet, EU	$\mathbf{L}$ mains) ( $\mathbf{N}$ ) : <b>FASS</b>

		Quasi-peak		Ave	rage
Conductor	Frequency	Level	Limit	Level	Limit
Live or Neutral	MHz	dBμV	dBμV	dBμV	dBµV
Neutral	0.274	33.6	61.0	27.5	51.0
Neutral	0.454	47.3	56.8	42.8	46.8
Neutral	0.724	34.1	56.0	28.3	46.0
Neutral	8.822	34.1	60.0	24.2	50.0
Neutral	16.839	34.2	60.0	27.9	50.0
Neutral	23.511	29.6	60.0	20.5	50.0

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#### Page 10 of 17



Date: 2013-12-11

#### No.: MH189528

\*

#### Limit for Conducted Emissions (FCC 47 CFR 15.107):

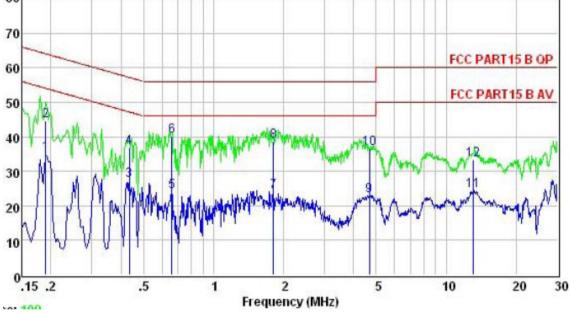
Frequency Range	Quasi-Peak Limits	Average
[MHz]	[dBµV]	[dBµV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.



Results of On mode (connected to PC and ping with internet, PC mains) (L) : PASS



		Quasi-peak		Ave	rage
Conductor	Frequency	Level	Limit	Level	Limit
Live or Neutral	MHz	dBµV	dBµV	dBµV	dBµV
Live	0.190	44.6	64.0	35.0	54.0
Live	0.435	36.9	57.2	27.5	47.2
Live	0.661	40.0	56.0	24.1	46.0
Live	1.810	38.6	56.0	24.0	46.0
Live	4.672	36.6	56.0	22.9	46.0
Live	12.988	33.4	60.0	24.3	50.0

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#### Page 11 of 17



Date: 2013-12-11

#### No.: MH189528

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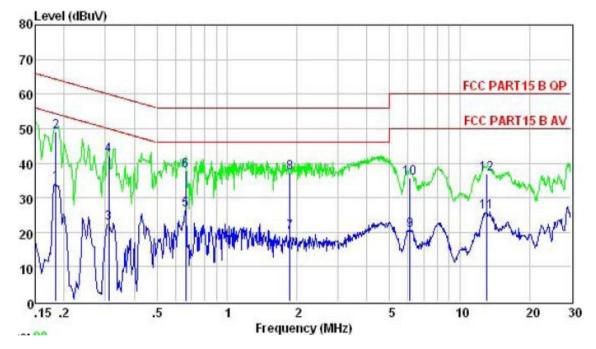
#### Limit for Conducted Emissions (FCC 47 CFR 15.107):

Frequency Range	Quasi-Peak Limits	Average
[MHz]	[dBµV]	[dBµV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

#### Results of On mode (connected to PC and ping with internet, PC mains) (N) : PASS



		Quasi-peak		Ave	rage
Conductor	Frequency	Level	Limit	Level	Limit
Live or Neutral	MHz	dBμV	dBμV	dBμV	dBµV
Neutral	0.184	49.0	64.3	34.1	54.3
Neutral	0.310	42.3	60.0	22.7	50.0
Neutral	0.665	37.8	56.0	26.3	46.0
Neutral	1.868	37.2	56.0	20.0	46.0
Neutral	6.121	35.6	60.0	20.6	50.0
Neutral	12.988	36.8	60.0	25.8	50.0

#### Remarks:

Calculated measurem The theory after 93 Standards and Testing Centre Ltd.

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Page 12 of 17



#### Date: 2013-12-11

No.: MH189528

Appendix A

#### List of Measurement Equipment

	Radiated Emission						
EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL	
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A	
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A	N/A	
EM217	ELECTRIC POWERED TURNTABLE	ЕМСО	2088	00029144	N/A	N/A	
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3		2013/09/30	2014/09/30	
EM174	BICONILOG ANTENNA	EMCO	3142B	1671	2012/05/31	2014/05/31	
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2013/05/07	2014/05/07	
EM299	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS-LINDGREN	3115	00114120	2012/01/25	2014/01/25	

#### Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM232	LISN	SCHAFFNER	NNB41	04/100082	2013/04/15	2014/04/15
EM145	EMI TEST RECEIVER	R & S	ESCS 30	830245/021	2013/05/07	2014/05/07
EM179	IMPULSE LIMITER	ROHDE & SCHWARZ	ESH3-Z2	357-8810.52/54	2013/01/27	2014/01/27
EM154	SHIELDING ROOM	SIEMENS MATSUSHITA COMPONENTS	N/A	803-740-057- 99A	2012/02/03	2017/02/03

#### **Remarks:-**

- CM Corrective Maintenance
- N/A Not Applicable or Not Available
- TBD To Be Determined

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Page 13 of 17



#### Date: 2013-12-11

Page 14 of 17

No.: MH189528

Appendix B

#### **Ancillary Equipment**

ITEM NO.	DESCRIPTION	MODEL NO.	FCC ID	REMARK
1	DELL COMPUTER	DMC	N/A	N/A
2	DELL MONITOR	E177FPB	ARSCM356N	RESOLUTION 1024*768 (DURING TESTING) 1.0M UNSHIEDED POWER VORD CONNECTED TO THE COMPUTER 1.5M SHIELDED CABLE CONNECTED TO THE COMPUTER
3	DELL KEYBOARD	SK-8110	N/A	1.8M SHIELDED COILED CABLE CONNECTED TO THE COMPUTER
4	DELL MOUSE	N/A	N/A	2.4M UNSHIELDED CABLE CONNECTED TO THE COMPUTER
5	LASER PRINTER	HP LASERJET 1020 PLUS	N/A	1.8M UNSHIELDED POWER CORD 2.8M SHIELDED CABLE (BUNDLED TO 1M) CONNECTED TO THE COMPUTER

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No.: MH189528

Appendix C

Photographs of EUT



**Front View of the Product** 

**Rear View of the Product** 









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Page 15 of 17



Date: 2013-12-11

No.: MH189528

**Photographs of EUT** 

N

# Side View of the Product 16

**Inner Circuit Top View** 

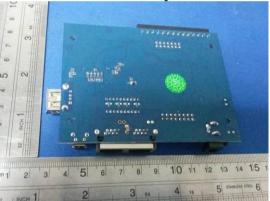
ms14d25015

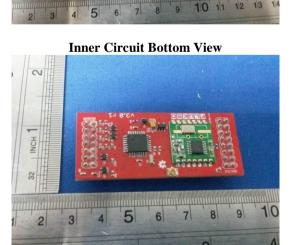
**Inner Circuit Top View** 

Page 16 of 17

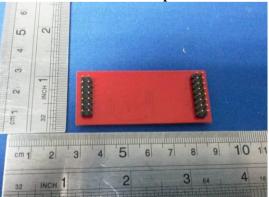


**Inner Circuit Top View** 





**Inner Circuit Top View** 



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Date: 2013-12-11

No.: MH189528

**Photographs of EUT** 

# Measurement of Radiated Emission Test Set Up

Measurement of Conducted Emission Test Set Up



\*\*\*\*\* End of Test Report \*\*\*\*\*

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Page 17 of 17