

Date: 2016-07-19 Page 1 of 24

No.: DM124230

Applicant: Radiance Instruments Ltd.

Flat 2002, 20/F, CEO Tower, 77 Wing Hong Street Lai Chi

Kok, Kowloon, Hong Kong, China

Manufacturer: Radiance Instruments Ltd.

Da Jing Village, Si Jiao Lou, Luo Yang Town, Hui Zhou

City, China

Description of Sample(s): Submitted sample(s) said to be

Product: Wireless Thermometer

Brand Name: N/A

Model Number: TMW017

FCC ID: 2AI67-TX1300CH

Date Sample(s) Received: 2016-06-28

Date Tested: 2016-07-04 to 2016-07-18

Investigation Requested: Perform ElectroMagnetic Interference measurement in

accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2015 and ANSI C63.10: 2013 for FCC Certification.

Conclusion(s): 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.

Remark(s):



Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
STC (Dongguan) Company Limited



Date:	2016-07-19	Page 2 of 24
No.: I	DM124230	
CON	TENT:	
	Cover Content	Page 1 of 24 Page 2 of 24
<u>1.0</u>	General Details	
1.1	Equipment Under Test [EUT]	Page 3 of 24
1.2	Description of EUT Operation	Page 3 of 24
1.3	Date of Order	Page 3 of 24
1.4	Submitted Sample	Page 3 of 24
1.5	Test Duration	Page 3 of 24
1.6	Country of Origin	Page 3 of 24
<u>2.0</u>	Technical Details	
2.1	Investigations Requested	Page 4 of 24
2.2	Test Standards and Results Summary	Page 4 of 24
<u>3.0</u>	Test Results	
3.1	Emission	Page 5-14 of 24
3.2	Bandwidth Measurement	Page 15-19 of 24
	Appendix A	
	List of Measurement Equipment	Page 20 of 24
	Appendix B	

Photographs

Page 21-24 of 24



Date: 2016-07-19 Page 3 of 24

No.: DM124230

1.0 General Details

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

Product: Wireless Thermometer
Manufacturer: Radiance Instruments Ltd.

Da Jing Village, Si Jiao Lou, Luo Yang Town, Hui Zhou City,

China

Brand Name: N/A Model Number: TMW017

Rating: 3.0Vd.c. ("AA" battery*2)

1.2 Description of EUT Operation

The Equipment Under Test (EUT) is a Wireless Thermometer. It is a transceiver operating at 2410MHz~2470MHz and the RF signal was modulated by IC.

1.3 Date of Order

2016-06-28

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2016-07-04 to 2016-07-18

1.6 Country of Origin

China



Date: 2016-07-19 Page 4 of 24

No.: DM124230

2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2015 Regulations and ANSI C63.10: 2013 for FCC Certification.

2.2 Test Standards and Results Summary Tables

	EMISSION Results Summary								
Test Condition	Test Requirement	Test Method	Class /	Te	est Resu	ılt			
			Severity	Pass	Fail	N/A			
Field Strength of Fundamental & Harmonics Emissions	FCC 47CFR 15.249	ANSI C63.10: 2013	N/A						
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10: 2013	N/A	\boxtimes					

Note: N/A - Not Applicable

Date: 2016-07-19 Page 5 of 24

No.: DM124230

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

Test Requirement: FCC 47CFR 15.249 & FCC 47CFR 15.209

Test Method: ANSI C63.10: 2013

Test Date: 2016-07-18 Mode of Operation: TX mode

Test Method:

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. For emission measurements above 1 GHz, the sample was placed 1.5m 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, 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 STC (Dongguan) Company Ltd. 68 Fumin Nan Road, Dalang, Dongguan, Guangdong, PRC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 629686.



Date: 2016-07-19 Page 6 of 24

No.: DM124230

Spectrum Analyzer Setting:

9KHz – 30MHz (Pk & Av) RBW: 10kHz

VBW: 30kHz Sweep: Auto

Span: Fully capture the emissions being measured

Trace: Max. hold

30MHz – 1GHz (QP) RBW: 120kHz

VBW: 120kHz Sweep: Auto

Span: Fully capture the emissions being measured

Trace: Max. hold

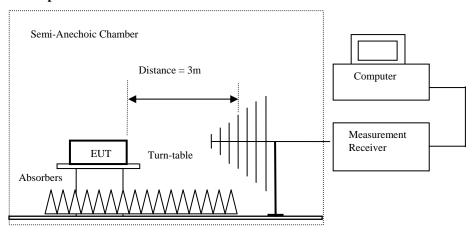
Above 1GHz (Pk & Av) RBW: 1MHz

VBW: 1MHz Sweep: Auto

Span: Fully capture the emissions being measured

Trace: Max. hold

Test Setup:



Ground Plane

- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30 MHz to 1000 MHz made with Bi-log antennas, above 1000 MHz horn antennas are used, 9 kHz to 30 MHz loop antennas are used.



Date: 2016-07-19 Page 7 of 24

No.: DM124230

Limits for Field Strength of Fundamental & Harmonics Emissions [FCC 47CFR 15.249]:

Frequency Range of Fundamental	Field Strength of Fundamental Emission	Field Strength of Harmonics Emission
[MHz]	[microvolts/meter]	[microvolts/meter]
902-928	50,000 [Quasi-Peak]	500 [Average]
2400-2483.5	50,000 [Average]	500 [Average]

Results of Tx mode (Lowest Frequency Channel-2410 MHz): Pass

	Field Strength of Fundamental Emissions								
			Peak Value						
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field			
	Level @3m	Factor	Strength	Strength		Polarity			
MHz	dBμV/m	dBμV/m	dBμV/m	μV/m	μV/m				
2410.00	64.1	36.8	100.9	110,917.5	500,000	Vertical			

	Field Strength of Fundamental Emissions								
	Average Value								
Frequency	Frequency Measured Correction Field Field Limit @3m E-Field								
	Level @3m	Factor	Strength	Strength		Polarity			
MHz	dBμV/m	dBμV/m	dBμV/m	μV/m	μV/m				
2410.00	44.9	36.8	81.7	12,161.9	50,000	Vertical			

	Field Strength of Harmonics Emission Peak Value								
Frequency									
1	Level @3m	Factor	Strength	Strength		Polarity			
MHz	dBμV/m	$dB\mu V/m$	dBμV/m	μV/m	μV/m	·			
4820.0	21.2	41.5	62.7	1,364.6	5,000	Vertical			
7230.0	12.9	47.5	60.4	1,047.1	5,000	Vertical			
9640.0	6.1	49.7	55.8	616.6	5,000	Vertical			
12050.0	4.5	51.8	56.3	653.1	5,000	Vertical			



Date: 2016-07-19 Page 8 of 24

No.: DM124230

Field Strength of Harmonics Emission Average Value								
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field		
	Level @3m	Factor	Strength	Strength		Polarity		
MHz	dBμV/m	dBμV/m	dBμV/m	μV/m	μV/m			
4820.0	1.4	41.5	42.9	139.6	500	Vertical		
7230.0	-7.2	47.5	40.3	103.5	500	Vertical		
9640.0	-14.1	49.7	35.6	60.3	500	Vertical		
12050.0	-15.3	51.8	36.5	66.8	500	Vertical		

Results of Tx mode (Middle Frequency Channel- 2440MHz): Pass

	Field Strength of Fundamental Emissions								
	Peak Value								
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field			
	Level @ 3m	Factor	Strength	Strength		Polarity			
MHz	MHz $dB\mu V/m$ $dB\mu V/m$ $dB\mu V/m$ $\mu V/m$ $\mu V/m$								
2440.00	63.6	36.9	100.5	105,925.4	500,000	Vertical			

Field Strength of Fundamental Emissions								
		A	Average Valu	e				
Frequency	Frequency Measured Correction Field Field Limit @3m E-Field							
	Level @3m	Factor	Strength	Strength		Polarity		
MHz	dBμV/m	dBμV/m	dBμV/m	μV/m	μV/m			
2440.00	44.3	36.9	81.2	11,481.5	50,000	Vertical		

	Field Strength of Harmonics Emission								
	Peak Value								
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field			
	Level @3m	Factor	Strength	Strength		Polarity			
MHz	dBμV/m	dBμV/m	dBμV/m	μV/m	μV/m				
4880.0	20.1	41.5	61.6	1,202.3	5,000	Vertical			
7320.0	11.8	47.6	59.4	933.3	5,000	Vertical			
9760.0	5.4	49.7	55.1	568.9	5,000	Vertical			
12200.0	4.1	51.8	55.9	623.7	5,000	Vertical			

Field Strength of Harmonics Emission								
		A	Avarage Valu	e				
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field		
	Level @3m	Factor	Strength	Strength		Polarity		
MHz	dBμV/m	dBμV/m	dBμV/m	μV/m	μV/m			
4880.0	-0.2	41.5	41.3	116.1	500	Vertical		
7320.0	-8.4	47.6	39.2	91.2	500	Vertical		
9760.0	-15.0	49.7	34.7	54.3	500	Vertical		
12200.0	-15.6	51.8	36.2	64.6	500	Vertical		

STC (Dongguan) Company Limited



Date: 2016-07-19 Page 9 of 24

No.: DM124230

Results of Tx mode (Highest Frequency Channel – 2470MHz): Pass

ı	Results of 1x mode (Highest Frequency Channel – 24/0MHz): Pass									
ſ	Field Strength of Fundamental Emissions									
				Peak Value						
ſ	Frequency Measured Correction Field Field Limit @3m E-Field									
		Level @3m	Factor	Strength	Strength		Polarity			
	MHz $dB\mu V/m$ $dB\mu V/m$ $dB\mu V/m$ $\mu V/m$ $\mu V/m$									
ſ	2470.00	63.4	36.9	100.3	103,514.2	500,000	Vertical			

Field Strength of Fundamental Emissions							
Average Value							
Frequency	Frequency Measured Correction Field Field Limit @3m E-Field						
	Level @3m Factor Strength Strength Polarity						
MHz	MHz $dB\mu V/m$ $dB\mu V/m$ $dB\mu V/m$ $\mu V/m$ $\mu V/m$						
2470.00	43.7	36.9	80.6	10,715.2	50,000	Vertical	

Field Strength of Harmonics Emission							
Peak Value							
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field	
	Level @3m	Factor	Strength	Strength		Polarity	
MHz	dBμV/m	dBμV/m	dBμV/m	μV/m	μV/m		
4940.0	20.6	41.6	62.2	1,288.2	5,000	Vertical	
7410.0	12.8	47.8	60.6	1,071.5	5,000	Vertical	
9880.0	6.6	49.8	56.4	660.7	5,000	Vertical	
12350.0	5.2	51.9	57.1	716.1	5,000	Vertical	

Field Strength of Harmonics Emission							
Avarage Value							
Frequency Measured Correction Field Field Limit @3m E-Field							
Level @ 3m Factor Strength Strength Polarity							
MHz	dBμV/m	dBμV/m	$dB\mu V/m$ $dB\mu V/m$ $\mu V/m$ $\mu V/m$				
4940.0	0.3	41.6	41.9	124.5	500	Vertical	
7410.0	-7.7	47.8	40.1	101.2	500	Vertical	
9880.0	-14.0	49.8	35.8	61.7	500	Vertical	
12350.0	-15.3	51.9	36.6	67.6	500	Vertical	

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz Calculated measurement uncertainty (9kHz - 30MHz): 3.3dB

(30MHz – 1GHz): 4.6dB (1GHz - 26GHz): 4.4dB

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



Date: 2016-07-19 Page 10 of 24

No.: DM124230

Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

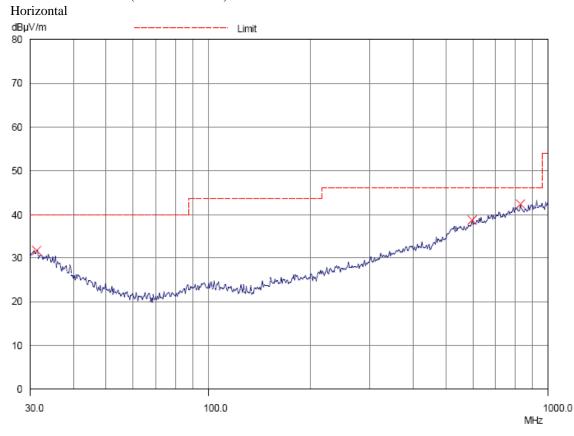
Frequency Range [MHz]	Quasi-Peak Limits [μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

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 TX mode (9kHz - 30MHz): PASS

Emissions detected are more than 20 dB below the FCC Limits

Results of TX mode (30MHz - 1GHz): PASS





Date: 2016-07-19 Page 11 of 24

No.: DM124230

Results of TX mode (30MHz - 1GHz): PASS

Radiated Emissions Quasi-Peak								
Emission	Emission E-Field Level Limit Level Limit							
Frequency	Polarity @3m @3m @3m @3m							
MHz	MHz $dB\mu V/m$ $dB\mu V/m$ $\mu V/m$ $\mu V/m$							
31.3	31.3 Horizontal 31.7 40.0 38.5 100							
594.1	Horizontal	38.6	46.0	85.1	200			
823.8	Horizontal	40.2	46.0	102.3	200			



Date: 2016-07-19 Page 12 of 24

No.: DM124230

Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

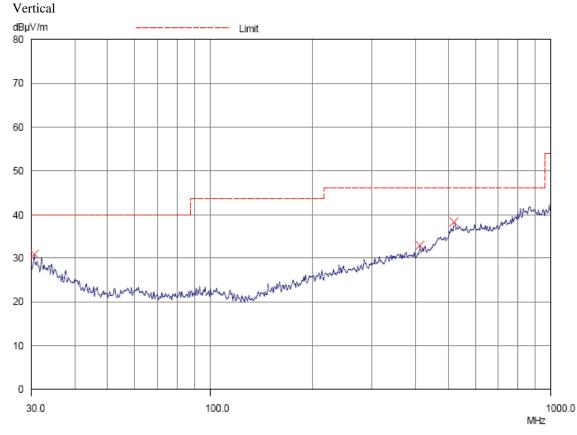
Frequency Range [MHz]	Quasi-Peak Limits [μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

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 TX mode (9kHz - 30MHz): PASS

Emissions detected are more than 20 dB below the FCC Limits

Results of TX mode (30MHz - 1GHz): PASS





Date: 2016-07-19 Page 13 of 24

No.: DM124230

Results of TX mode (30MHz - 1GHz): PASS

Radiated Emissions Quasi-Peak								
Emission E-Field Level Limit Level Limit								
Frequency	Polarity @3m @3m @3m @3m							
MHz	MHz $dB\mu V/m$ $dB\mu V/m$ $\mu V/m$ $\mu V/m$							
30.5	30.5 Vertical 30.8 40.0 34.7 100							
411.3	Vertical	32.8	46.0	43.7	200			
516.5	Vertical	38.2	46.0	81.3	200			

Remarks:

Calculated measurement uncertainty (9kHz - 30MHz): 3.3dB

(30MHz – 1GHz): 4.6dB (1GHz - 26GHz): 4.4dB

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



Date: 2016-07-19 Page 14 of 24

No.: DM124230

3.1.2 Antenna Requirement

Test Requirements: § 15.203

Test Specification:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Test Results:

This is PCB antenna. There is no external antenna, the antenna gain = 3dBi. User is unable to remove or changed the Antenna.



Date: 2016-07-19 Page 15 of 24

No.: DM124230

3.2 20dB Bandwidth of Fundamental Emission

Test Requirement: FCC 47 CFR 15.249 Test Method: ANSI C63.10: 2013

Test Date: 2016-07-02 Mode of Operation: Tx mode

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

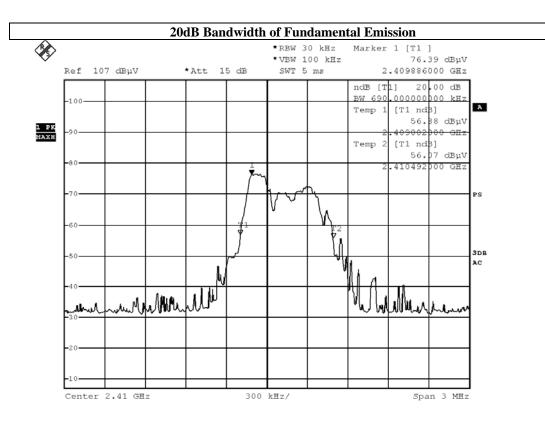


Date: 2016-07-19 Page 16 of 24

No.: DM124230

Limits for 20dB Bandwidth of Fundamental Emission (Low Frequency Channel):

Frequency Range	20dB Bandwidth
[MHz]	[kHz]
2410	690



BMP

Date: 2.JUL.2016 16:13:06

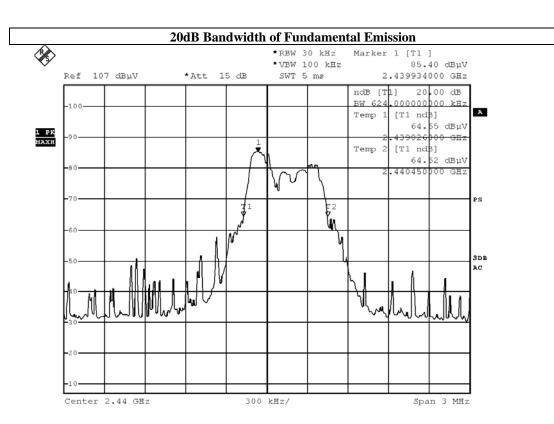


Date: 2016-07-19 Page 17 of 24

No.: DM124230

Limits for 20dB Bandwidth of Fundamental Emission (Middle Frequency Channel):

Frequency Range	20dB Bandwidth
[MHz]	[kHz]
2440	624



BMP

Date: 2.JUL.2016 16:17:46

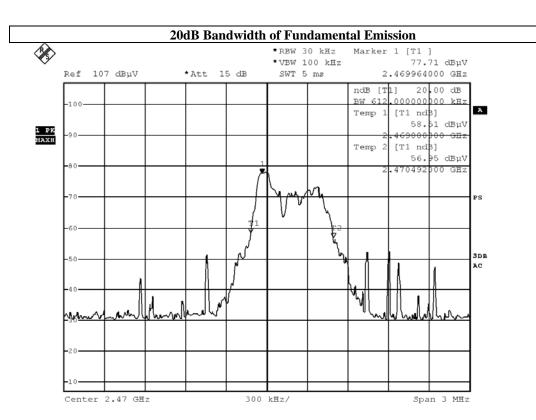


Date: 2016-07-19 Page 18 of 24

No.: DM124230

Limits for 20dB Bandwidth of Fundamental Emission (High Frequency Channel):

Frequency Range	20dB Bandwidth
[MHz]	[kHz]
2470	612



BMP

Date: 2.JUL.2016 16:19:31



Date: 2016-07-19 Page 19 of 24

No.: DM124230

RF Radiated Emissions Measurement:

Limit:

Emissions radiated outside of the specified frequency bands, except t for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Result: RF Radiated Emissions (1GHz-26GHz) (worse data) (Lowest)

Field Strength of Band-edge Compliance							
Peak Value							
Frequency Measured Correction Field Limit Margin E-Field							
	Level @3m Factor Strength @3m Polarity						
MHz $dB\mu V$ dB/m $dB\mu V/m$ $dB\mu V/m$ $dB\mu V/m$							
2400.0	15.5	36.8	52.3	74.0	21.7	Vertical	

Field Strength of Band-edge Compliance							
Average Value							
Frequency Measured Correction Field Limit Margin E-Field							
	Level @3m Factor Strength @3m Polarity						
MHz	dΒμV	dB/m	$dB\mu V/m$	$dB\muV/m$	$dB\mu V/m$		
2400.0	3.7	36.8	40.5	54.0	13.5	Vertical	

Result: RF Radiated Emissions (1GHz-26GHz) (worse data) (Highest)

Field Strength of Band-edge Compliance							
Peak Value							
Frequency	Measured	Correction	Field	Limit	Margin	E-Field	
	Level @3m	Factor	Strength	@3m		Polarity	
MHz	dΒμV	dB/m	$dB\mu V/m$	$dB\mu V/m$	$dB\mu V/m$		
2483.5	12.9	36.8	49.7	74.0	24.3	Vertical	

Field Strength of Band-edge Compliance Average Value							
Frequency	Measured	Correction	Field	Limit	Margin	E-Field	
	Level @3m	Factor	Strength	@3m		Polarity	
MHz	dΒμV	dB/m	dBμV/m	$dB\muV/m$	$dB\mu V/m$	·	
2483.5	0.4	36.8	37.2	54.0	16.8	Vertical	



Date: 2016-07-19 Page 20 of 24

No.: DM124230

Appendix A

List of Measurement Equipment

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EMD004	LISN	ROHDE & SCHWARZ	ESH3-Z5	100102	2016.03.29	2017.03.29
EMD022	EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	100314	2016.03.29	2017.03.29
EMD035	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	100441	2016.03.29	2017.03.29
EMD036	EMI Test Receiver	ROHDE & SCHWARZ	ESIB 26	100388	2016.03.29	2017.03.29
EMD041	TWO-LINE V- NETWORK	ROHDE & SCHWARZ	ENV216	100261	2016.03.29	2017.03.29
EMD061	Biconilog Antenna	ETS.LINDGREN	3142C	00060439	2014.11.29	2016.11.29
EMD062	Double-Ridged Waveguide (1GHz – 18GHz)	ETS.LINDGREN	3117	00075933	2014.11.15	2016.11.15
EMD084	MULTI-DVICE CONTROLLER	ETS.LINDGREN	2090	00060107	N/A	N/A
EMD088	Video Contol Unit	ETS.LINDGREN	Y21953A	2601073	N/A	N/A
EMD093	Monitor	ViewSonic	VA9036	Q8X064201876	N/A	N/A
EMD102	Intelligent Frequency	Ainuo Instrument Co., Ltd	AN97005SS	79707454	N/A	N/A
EMD103	Intelligent Frequency	Ainuo Instrument Co., Ltd	AN97005SS	79707455	N/A	N/A
EMD105	FACT-3 EMC Chamber	ETS.LINDGREN	FACT-3	3803	N/A	N/A
EMD106	Shielding Room #1	ETS.LINDGREN	RFD-100	3802	N/A	N/A
	100V Insertion Unit	ROHDE & SCHWARZ	URV5-Z4	100464	2016.03.29	2017.03.29
EMD113	Pre-Amplifier	ROHDE & SCHWARZ	N/A	1129588	2016.03.29	2017.03.29
EMD124	Loop Antenna	ETS-Lindgren	6502	00104905	2016.05.23	2017.05.23
EMD131	Standard Gain Horn Antenna (18GHz – 26.5GHz)	Chengdu AINFO Inc.	JXTXLB-42- 15-C-KF	J2021100721001	2015.06.27	2017.06.27

Remarks:-

N/A Not Applicable or Not Available



Date: 2016-07-19 Page 21 of 24

No.: DM124230

Appendix B

Photographs of EUT

Front View of the product



Inside View of the product



Inner Circuit Bottom View



Rear View of the product



Inner Circuit Top View



Inner Circuit Top View



STC (Dongguan) Company Limited

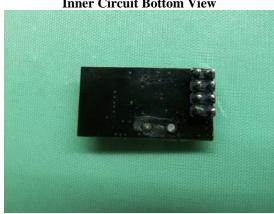


Date: 2016-07-19 Page 22 of 24

No.: DM124230

Photographs of EUT

Inner Circuit Bottom View

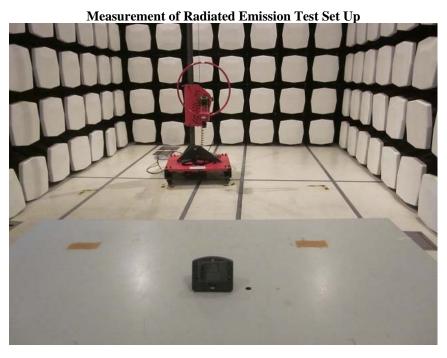




Date: 2016-07-19 Page 23 of 24

No.: DM124230

Photographs of EUT





STC (Dongguan) Company Limited



Date: 2016-07-19 Page 24 of 24

No.: DM124230

Photographs of EUT



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