



STC Test Report

Date : 2010-09-15
No. : HM165655

Page 1 of 22

Applicant (KOI004): Kolf Industries (H.K.) Ltd.
No. 1 2/F., Sing Win Ind. Bldg., 15-17 Shing Yip Street,
Kwun Tong, Kowloon

Manufacturer: Kolfdal Electronic (Shenzhen) Ltd.
6/F, Block 1, Sheung Yuen Ind. Bldg., North Honggang Road
Luohu, Shenzhen, China

Description of Sample(s): Submitted sample(s) said to be
Product: Wireless Alarm
Brand Name: Malem
Model Number: MO15
FCC ID: U9FMO15

Date Sample(s) Received: 2010-08-23

Date Tested: 2010-08-31 to 2010-09-13

Investigation Requested: Perform ElectroMagnetic Interference measurement in
accordance with FCC 47CFR [Codes of Federal Regulations]
Part 15: 2009 and ANSI C63.4:2003 for FCC Certification.

Conclusion(s): The submitted product COMPLIED 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): ---



Dr. LEE Kam Chuen
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
The Hong Kong Standards and Testing Centre Ltd.



STC Test Report

Date : 2010-09-15

Page 2 of 22

No. : HM165655

CONTENT:

Cover	Page 1 of 22	
Content	Page 2-3 of 22	
1.0	<u>General Details</u>	
1.1	Equipment Under Test [EUT]	Page 4 of 22
1.2	Description of EUT operation	
1.3	Date of Order	Page 4 of 22
1.4	Submitted Sample(s)	Page 4 of 22
1.5	Test Duration	Page 4 of 22
1.6	Country of Origin	Page 4 of 22
2.0	<u>Technical Details</u>	
2.1	Investigations Requested	Page 5 of 22
2.2	Test Standards and Results Summary	Page 5 of 22
3.0	<u>Test Results</u>	
3.1	Emission	Page 6-9 of 22
3.2	Bandwidth Measurement	Page 10-11 of 22

The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage



STC Test Report

Date : 2010-09-15

Page 3 of 22

No. : HM165655

Appendix A

List of Measurement Equipment

Page 12 of 22

Appendix B

Duty Cycle Correction During 100 msec

Page 13-19 of 22

Appendix C

Periodic Operation

Page 20 of 22

Appendix D

Photographs

Page 21-22 of 22

The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage



STC Test Report

Date : 2010-09-15

Page 4 of 22

No. : HM165655

1.0 General Details

1.1 Equipment Under Test [EUT]

Description of Sample

Submitted sample(s) said to be

Product: Wireless Alarm

Manufacturer: Kolfda Electronic (Shenzhen) Ltd.

Brand Name: Malem

Model Number: MO15

Rating: 12Vd.c. ("EL12" size battery x 1)

1.2 Description of EUT Operation

The Equipment Under Test (EUT) is a Kolf Industries (H.K.) Ltd., Wireless Alarm. When the EUT achieves wet detection, the transmitter will periodically send a signal to the receiver unit [§15.231(e) – periodic operation]. The transmission signal modulation by IC; and the type is ASK modulation.

1.3 Date of Order

2010-08-23

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2010-08-31 to 2010-09-13

1.6 Country of Origin

China

The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org



STC Test Report

Date : 2010-09-15

Page 5 of 22

No. : HM165655

2.0 Technical Details

2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 2009 and ANSI C63.4:2003 for FCC Certification.

2.2 Test Standards and Results Summary Tables

EMISSION Results Summary						
Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Failed	N/A
Field Strength of Fundamental Emissions & Spurious Emissions	FCC 47CFR 15.231e	ANSI C63.4:2003	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:2003	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: N/A - Not Applicable

The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage



STC Test Report

Date : 2010-09-15

Page 6 of 22

No. : HM165655

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions (30 – 1000MHz)

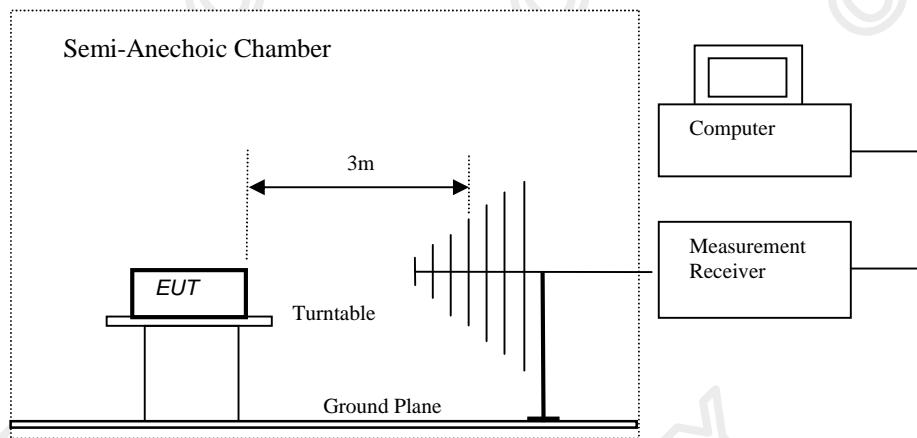
Test Requirement: FCC 47CFR 15.231e
Test Method: ANSI C63.4:2003
Test Date: 2010-09-13
Mode of Operation: Tx on mode

Test Method:

The sample was placed 0.8m above the ground plane of OATS*. 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.

*: OATS [Open Area Test Site] located at the roof of Hong Kong Standards & Testing Centre with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 568301.

Test Setup:



The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org



STC Test Report

Date : 2010-09-15

Page 7 of 22

No. : HM165655

Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.231e]:

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Average] [μ V/m]	Field Strength of Spurious Emission [Average] [μ V/m]
40.66-40.70	1,000	100
70-130	500	50
130-174	500 to 1,500 **	50 to 150 **
174-260	1,500	150
260-470	1,500 to 5,000 **	150 to 500 **
Above 470	5,000	500

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, μ V/m at 3 meters = $22.72727(F) - 2454.545$; for the band 260-470 MHz, μ V/m at 3 meters = $16.6667(F) - 2833.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

Results of Tx on mode (achieves wet detection): PASS

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
433.9	63.4	18.5	81.9	12,445.1	43,983.5	Horizontal
867.8	35.7	25.7	61.4	1,174.9	4,398.3	Horizontal
+	1301.7	26.8	55.0	562.3	5,000.0	Horizontal
	1735.6	21.3	31.4	52.7	431.5	4,398.3
	2169.5	20.0	32.9	52.9	441.6	4,398.3
	2603.4	23.4	32.9	56.3	653.1	4,398.3
	3037.3	< 1.0	5.8	< 6.8	< 2.2	4,398.3
	3471.2	< 1.0	34.9	< 35.9	< 62.4	4,398.3
+	3905.1	< 1.0	26.5	< 27.5	< 23.7	5,000.0
+	4339.00	< 1.0	26.5	< 27.5	< 23.7	5,000.0

Remarks:

FCC Limit for Fundamental Average Measurement = $16.6667(433.9) - 2833.3333 = 4,398.35 \mu$ V/m

+: Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 were not adjusted for averaging and the limits of FCC Rules Part 15 Section 15.209 were applied.

*: Adjusted by Duty Cycle = -9.6dB

Duty Cycle Correction = -20dB, if the calculation duty cycle correction >-20dB

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org



STC Test Report

Date : 2010-09-15

Page 8 of 22

No. : HM165655

Results of Tx on mode (achieves wet detection): PASS

Field Strength of Fundamental Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
433.9	53.8	18.5	72.3	4,121.0	4,398.3	Horizontal
867.8	26.1	25.7	51.8	389.0	439.8	Horizontal
+	1301.7	17.2	28.2	45.4	186.2	500.0
	1735.6	11.7	31.4	43.1	142.9	Horizontal
	2169.5	10.4	32.9	43.3	146.2	Horizontal
	2603.4	13.8	32.9	46.7	216.3	439.8
	3037.3	< 1.0	5.8	< 6.8	< 2.2	439.8
	3471.2	< 1.0	34.9	< 35.9	< 62.4	439.8
+	3905.1	< 1.0	26.5	< 27.5	< 23.7	500.0
+	4339.00	< 1.0	26.5	< 27.5	< 23.7	500.0

Remarks:

FCC Limit for Fundamental Average Measurement = $16.6667(433.9)-2833.3333=4,398.35\mu$ V/m

+: Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 were not adjusted for averaging and the limits of FCC Rules Part 15 Section 15.209 were applied.

*: Adjusted by Duty Cycle = -9.6dB

Duty Cycle Correction = -20dB, if the calculation duty cycle correction >-20dB

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org



STC Test Report

Date : 2010-09-15

Page 9 of 22

No. : HM165655

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

Frequency Range [MHz]	Quasi-Peak Limits [μ V/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.

Result of Tx on mode (9kHz – 30MHz): PASS

Emissions detected are more than 20 dB below the FCC Limits

Result of Tx on mode (30MHz – 5GHz): PASS

Emissions detected are more than 20 dB below the FCC Limits

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30MHz

Calculated measurement uncertainty : 30MHz to 1GHz 5.2dB
1GHz to 18GHz 5.1dB

The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org



STC Test Report

Date : 2010-09-15

Page 10 of 22

No. : HM165655

3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.231e
Test Method:	ANSI C63.4:2003 (Section 13.1.7)
Test Date:	2010-09-13
Mode of Operation:	Tx on mode (achieves wet detection)

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.

The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage



STC Test Report

Date : 2010-09-15

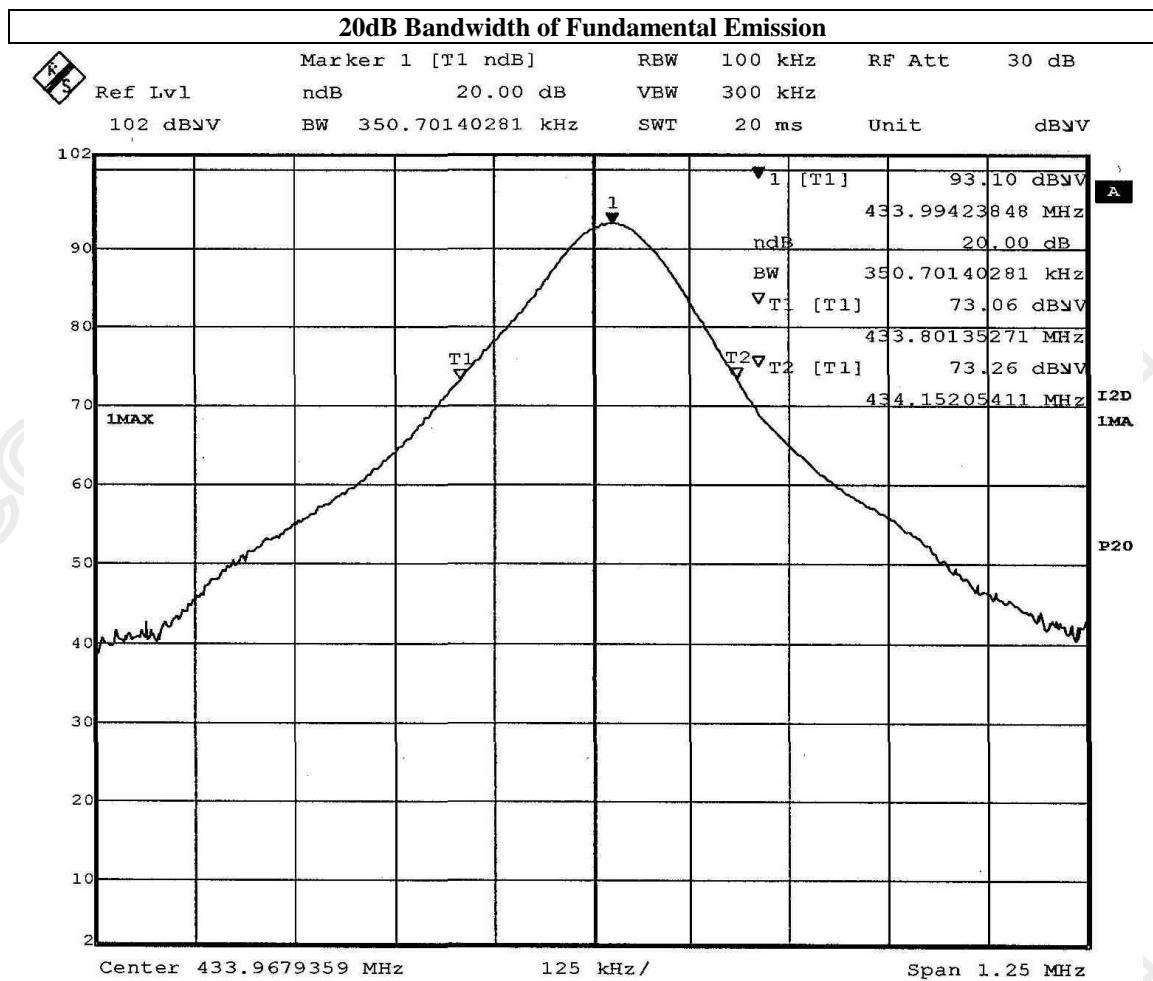
Page 11 of 22

No. : HM165655

Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits * [kHz]
433.9	350.701	1084.75

*: FCC Limit for Bandwidth measurement
= (0.25%)(Center Frequency)
= (0.0025)(433.9)
= 1084.75kHz



The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Tai Po Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage



STC Test Report

Date : 2010-09-15

Page 12 of 22

No. : HM165655

Appendix A

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM020	HORN ANTENNA	EMCO	3117	0075933	2008/11/06	2010/11/06
EM215	MULTIDEVICE CONTROLER	EMCO	2090	00024676	N/A	N/A
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A	N/A
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-Linggren	FACT-3	--	2009/05/02	2012/05/02
EM174	BICONILOG ANTENNA	EMCO	3142B	00029071	2010/01/24	2012/01/24
EM229	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB40	100248	2010/09/27	2011/09/27
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2009/07/26	2011/07/26

Remarks:-

CM Corrective Maintenance

N/A Not Applicable

TBD To Be Determined

The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage



STC Test Report

Date : 2010-09-15

Page 13 of 22

No. : HM165655

Appendix B

Duty Cycle Correction During 100msec [FCC 47CFR 15.231(e)]

The transmitter periodically sends a different series of characters, but each packet period (100msec) never exceeds a series of 28 long (751.503μsec) and 52 short (230.461μsec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered $(28 \times 751.503\mu\text{sec}) + (52 \times 230.461\mu\text{sec})$ per 100msec=33.026% duty cycle. Figure A through F show the characteristics of the pulses train for one of these functions.

Remarks:

Duty Cycle Correction = $20\log(0.33026) = -9.6\text{dB}$

The following figures [Figure A to Figure F] showed the characteristics of the pulse train for one of these functions.

The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage



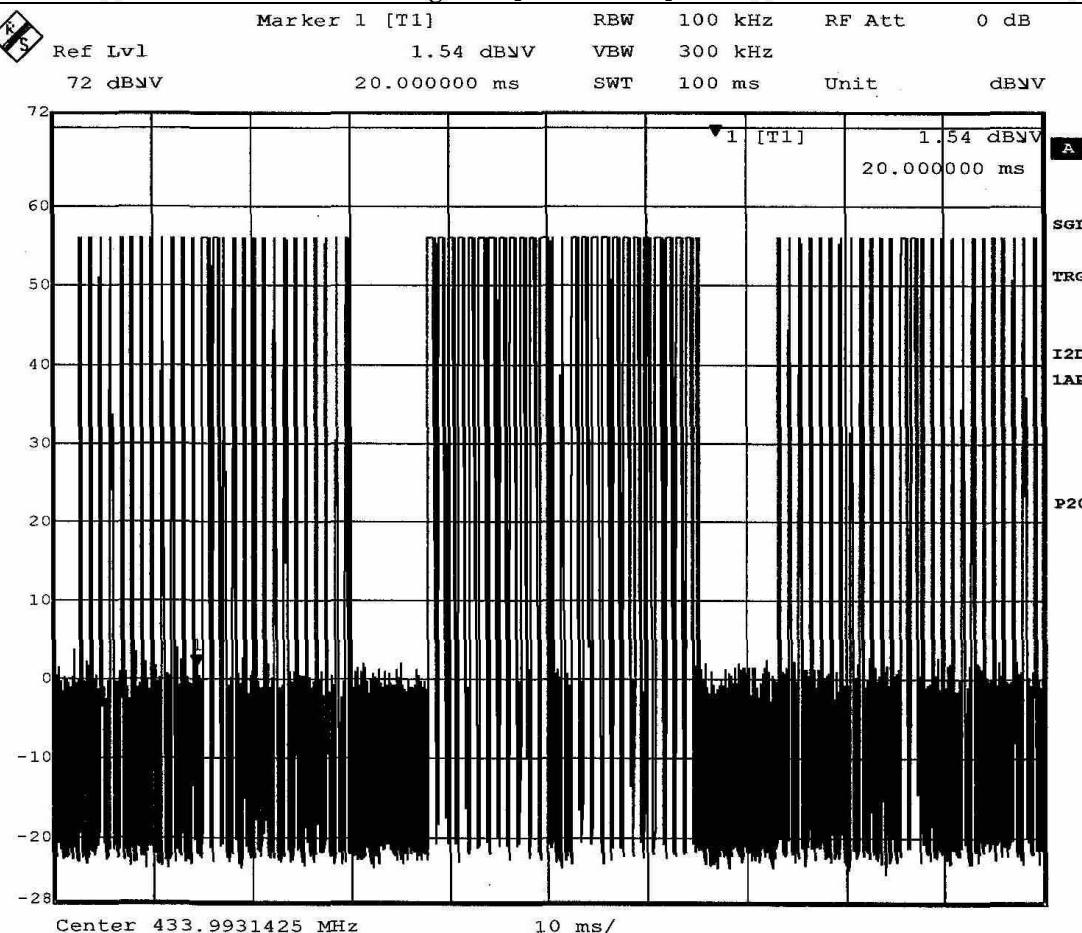
STC Test Report

Date : 2010-09-15

Page 14 of 22

No. : HM165655

Figure A [Pulses Train]



The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage



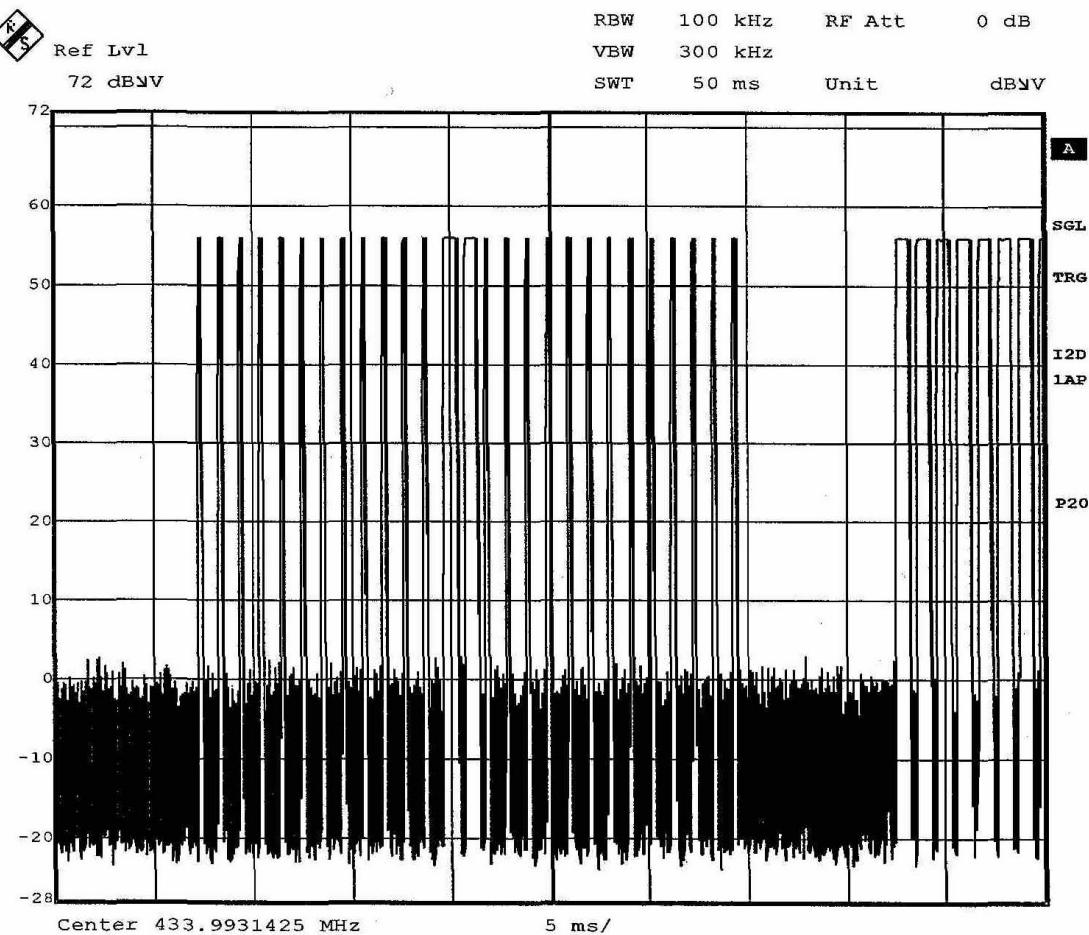
STC Test Report

Date : 2010-09-15

Page 15 of 22

No. : HM165655

Figure B [Closer Look on pulse train]



The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage



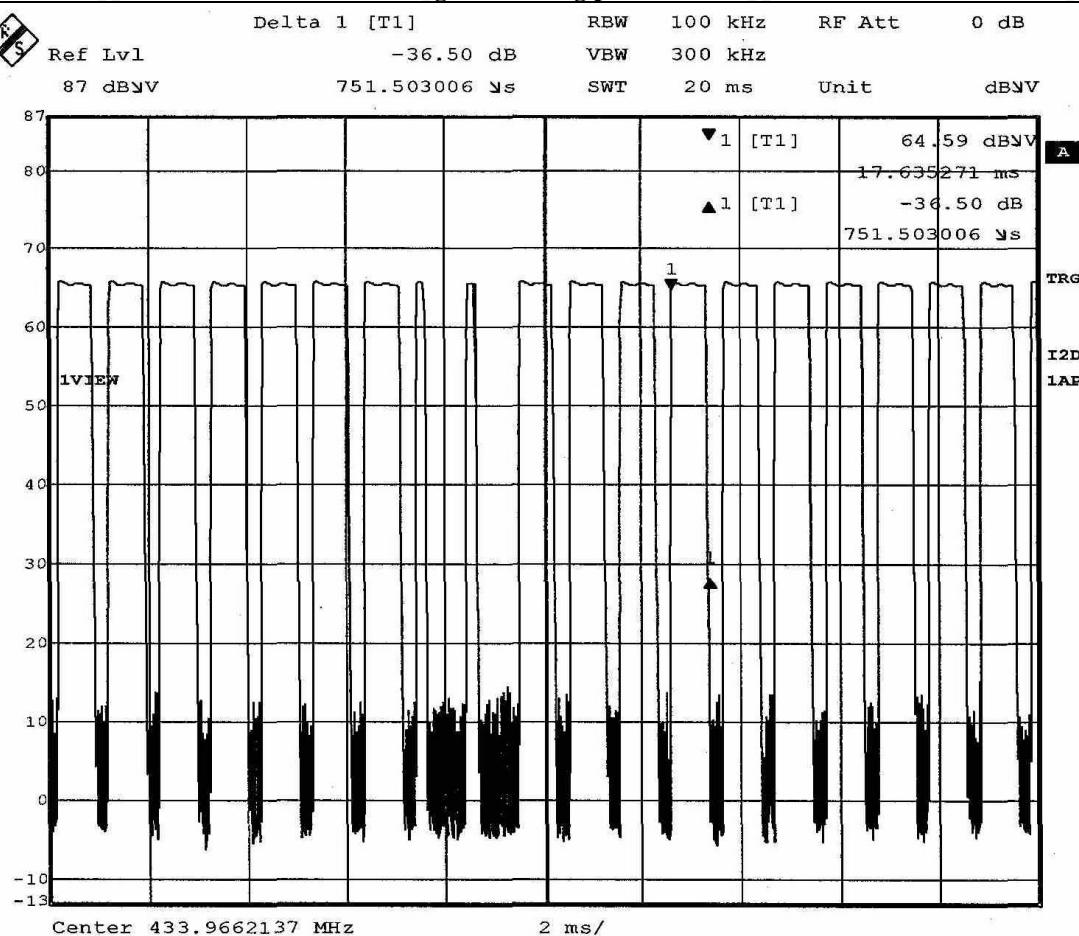
STC Test Report

Date : 2010-09-15

Page 16 of 22

No. : HM165655

Figure C [Long pulse]



The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage



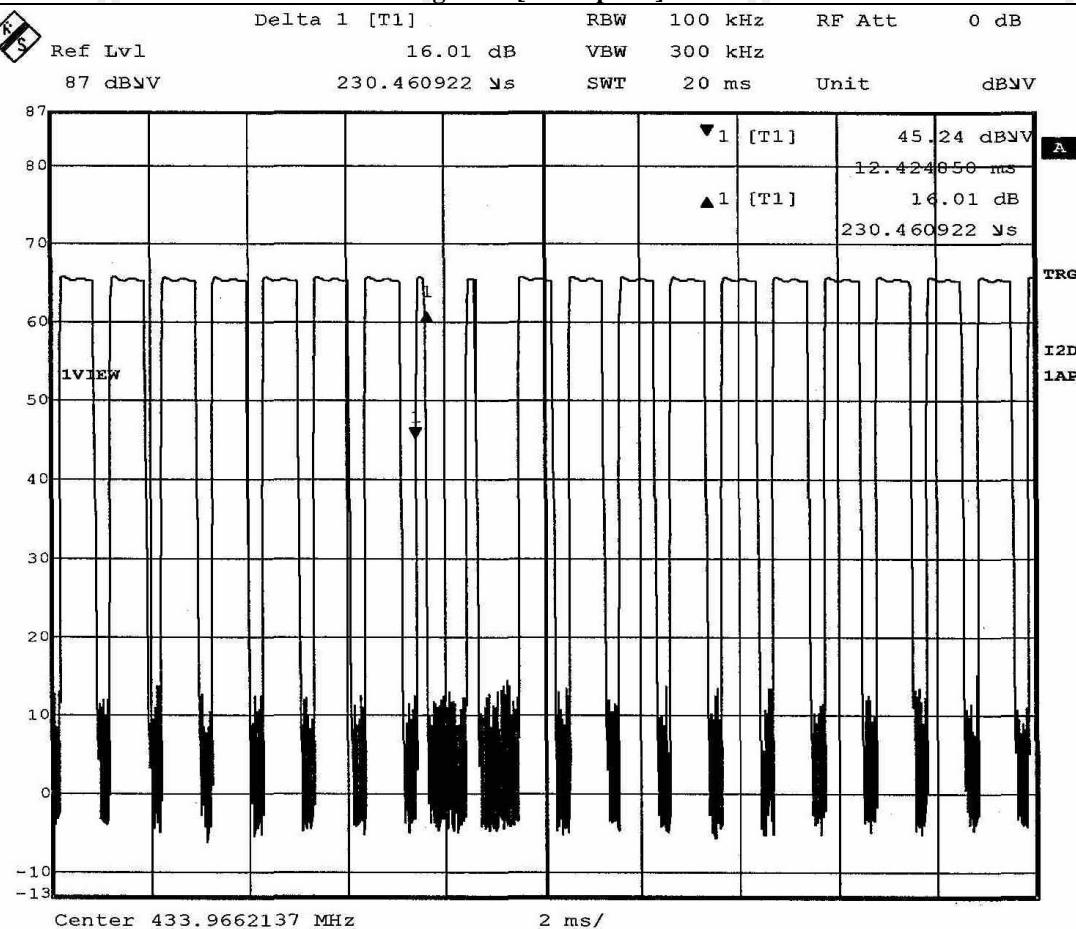
STC Test Report

Date : 2010-09-15

Page 17 of 22

No. : HM165655

Figure D [Short pulse]



The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage



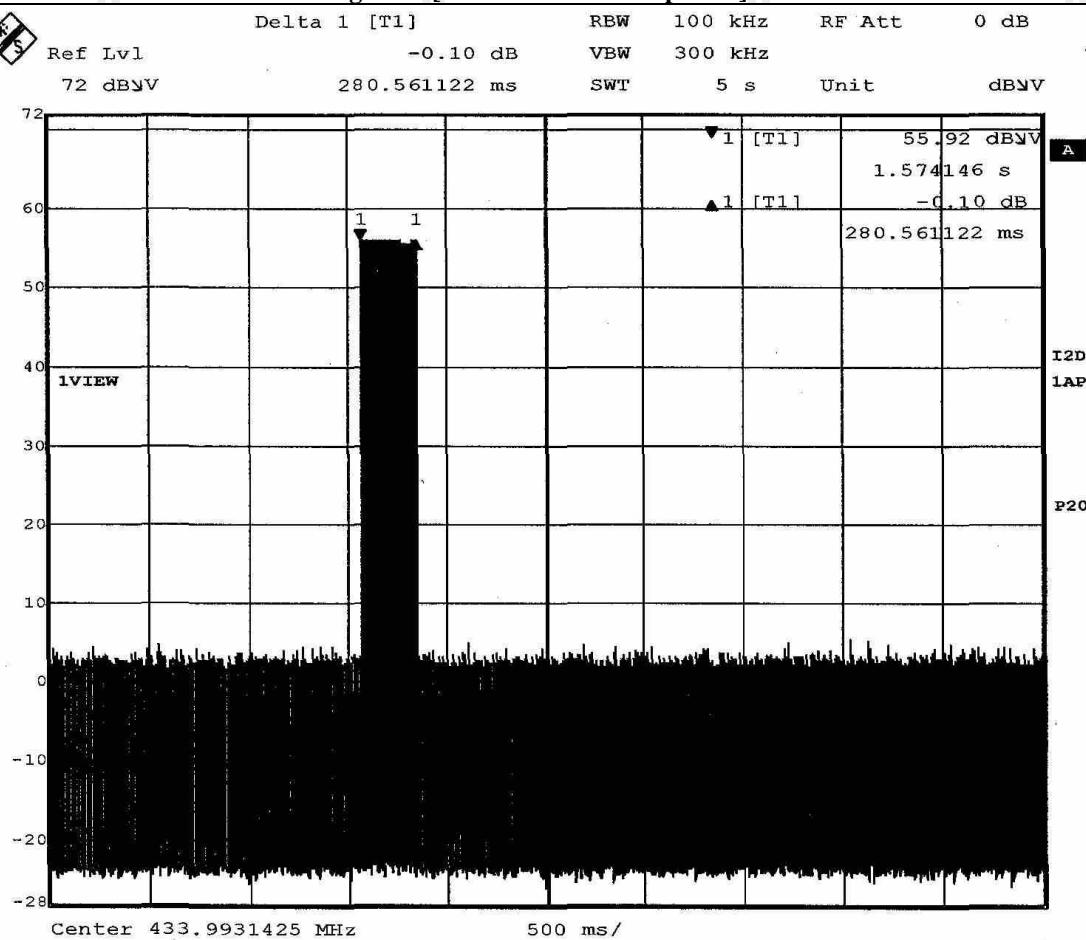
STC Test Report

Date : 2010-09-15

Page 18 of 22

No. : HM165655

Figure E [Each Transmission period]



The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage



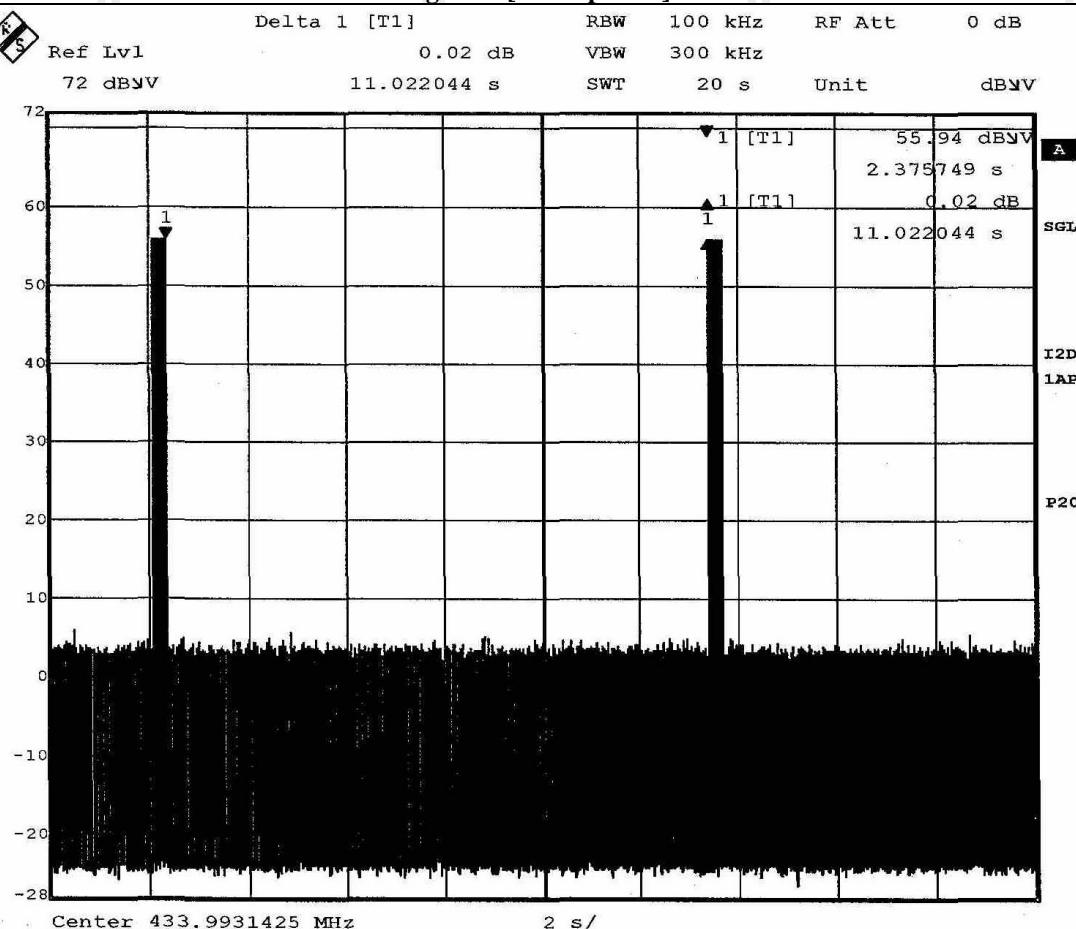
STC Test Report

Date : 2010-09-15

Page 19 of 22

No. : HM165655

Figure F [Silent period]



The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage



STC Test Report

Date : 2010-09-15

Page 20 of 22

No. : HM165655

Appendix C

Periodic Operation [FCC 47CFR 15.231(e)]

According to FCC 47CFR15.231 (e). A periodic transmitter shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage



STC Test Report

Date : 2010-09-15

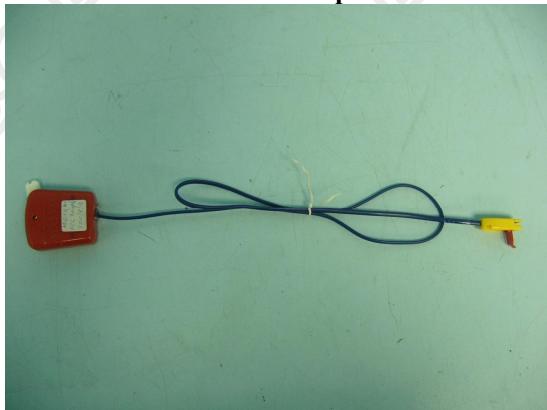
Page 21 of 22

No. : HM165655

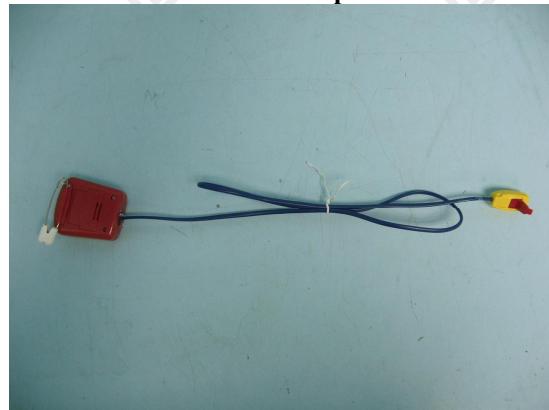
Appendix D

Photographs of EUT

Front View of the product



Rear View of the product



Inner Circuit Top View



Inner Circuit Bottom View



The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage



STC Test Report

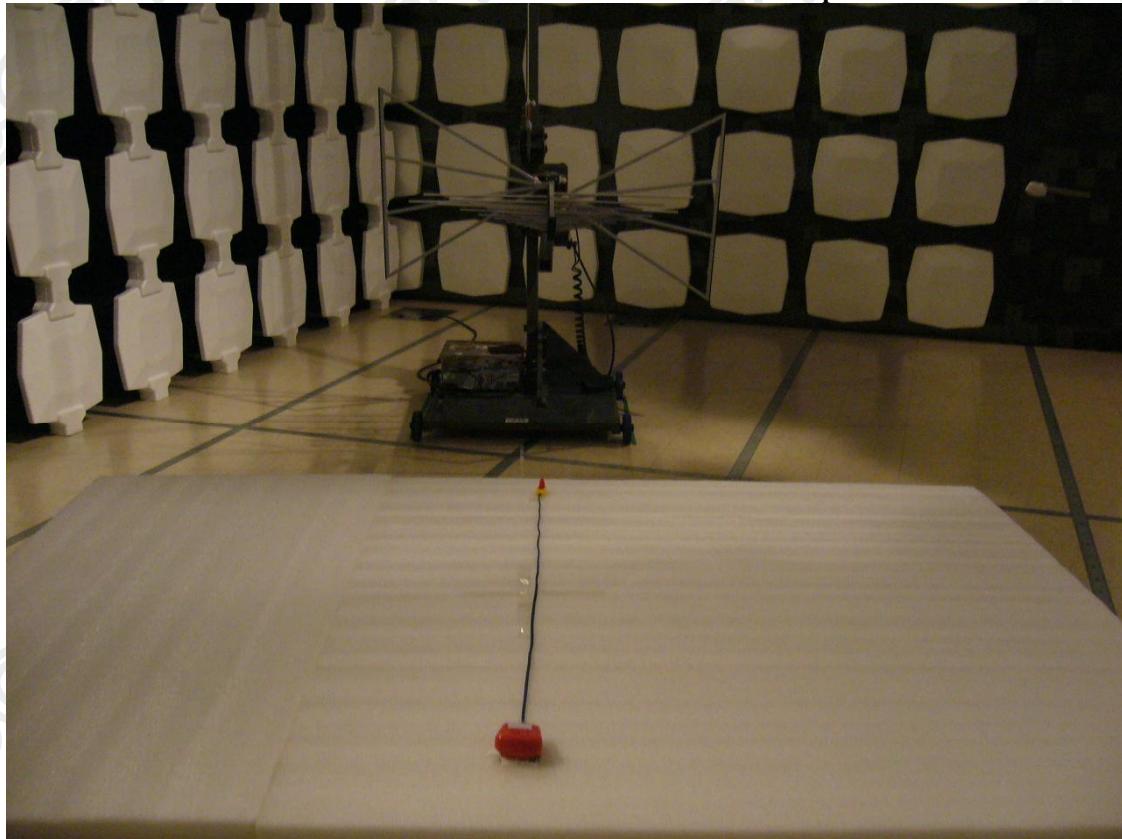
Date : 2010-09-15

Page 22 of 22

No. : HM165655

Photographs of EUT

Measurement of Radiated Emission Test Set Up



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

The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Ltd.
For Conditions of Issuance of this test report, please refer to the overleaf or Homepage