

Date : 2016-08-12 No. : HM170348		Pa	age 1 of 50
Applicant:	Venture Global Limited Room 1102, 11/F., Fabrico Industrial Building, 78-84 Kwai Cheong Road, Kwai Chung, N.T., Hong Kong		4 Kwai Cheong
Manufacturer:	Venture Global Limited Room 1102, 11/F., Fabrico Industrial Building, 78-84 Kwai Cheong Road, Kwai Chung, N.T., Hong Kong		4 Kwai Cheong
Description of Sample(s):	Product: Brand Name: Model Number: FCC ID:	Wireless Multi-Alert Receiver Guardman MA-K100 YAHMAKRK1	
Date Sample(s) Received:	2016-07-20		
Date Tested:	2016-08-04 to 2016-08-05		
Investigation Requested:	Perform ElectroMagnetic Interference measurement in accordance with FCC 47 CFR [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):			

CHEUNG Chi, Kenneth Authorized Signatory ElectroMagnetic Compatibility Department For and on behalf of The Hong Kong Standards and Testing Centre Ltd.



Page 2 of 50

CONT	TENT:	
	Cover Content	Page 1 of 50 Page 2 of 50
<u>1.0</u>	<u>General Details</u>	
1.1	Test Laboratory	Page 3 of 50
1.2	Equipment Under Test [EUT] Description of EUT operation	Page 3 of 50
1.3	Date of Order	Page 3 of 50
1.4	Submitted Sample	Page 3 of 50
1.5	Test Duration	Page 3 of 50
1.6	Country of Origin	Page 3 of 50
1.7	RF Module Details	Page 4 of 50
1.8	Antenna Details	Page 4 of 50
<u>2.0</u>	Technical Details	
2.1	Investigations Requested	Page 5 of 50
2.2	Test Standards and Results Summary	Page 5 of 50
2.3	Table for Test Modes	Page 6 of 50
<u>3.0</u>	Test Results	
3.1	Emission	Page 7 - 44 of 50
	<u>Appendix A</u>	
	List of Measurement Equipment	Page 45 of 50
	<u>Appendix B</u>	
	Photographs	Page 46 - 50 of 50

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited. For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



Date : 2016-08-12

No. : HM170348

<u>1.0</u> General Details

1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd. EMC Laboratory 10 Dai Wang Street, Taipo Industrial Estate

Telephone:(852) 26661888Fax:(852) 26644353

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

Product:	Wireless Multi-Alert Receiver	
Manufacturer:	Venture Global Limited	
	Room 1102, 11/F., Fabrico Industrial Building, 78-84 Kwai	
	Cheong Road, Kwai Chung, N.T., Hong Kong	
Brand Name:	Guardman	
Model Number:	MA-K100	
Rating:	6Vd.c. ("AAA" size battery x 4) &	
	12Vd.c. 500mA (powered by adaptor)	
The AC/DC Adaptor used for the tests was a "Winstar" adaptor: Two pins (Live / Neutral)		

The AC/DC Adaptor used for the tests was a "Winstar" adaptor: Two pins (Live / Neutral) only adaptor, Model Number: NA-12, Input: 100-120/220-240Va.c., Output: 3-15Vd.c. 1200mA max.

1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Wireless Multi-Alert Receiver. The R.F. signal was modulated by IC, the type of modulation is FSK modulation and the spread spectrum technique used is Frequency hopping spread spectrum modulation.

1.3 Date of Order

2016-07-20

1.4 Submitted Sample(s):

2 Sample(s)

1.5 Test Duration

2016-08-04 to 2016-08-05

1.6 Country of Origin

China

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.

For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.

Page 3 of 50



Page 4 of 50

1.7 **RF Module Details**

Module Model Number:	Si4432
Modulation:	GFSK
Frequency Range:	902-928MHz
Carrier Frequencies:	902.25MHz - 926.75MHz

Module Specification (specification provided by manufacturer)

1.8 Antenna Details

Antenna Model: Antenna Type: Antenna Length: Antenna Gain: N/A Omnidirectional antenna 25.5mm 0dBi



Date : 2016-08-12

No. : HM170348

Page 5 of 50

<u>2.0</u> 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 Test Method for FCC Certification.

2.2 Test Standards and Results Summary Tables

EMISSION (RFID) Results Summary						
Test Condition	Test Requirement	Test Method	Class /		Fest Resul	÷
			Severity	Pass	Fail	N/A
Maximum Peak Conducted Output Power	FCC 47CFR 15.247(b)(2)	ANSI C63.10-2013	N/A	\boxtimes		
Radiated Spurious Emissions	FCC 47CFR 15.209	ANSI C63.10-2013	N/A	\boxtimes		
AC Mains Conducted Emissions	FCC 47CFR 15.207	ANSI C63.10-2013	N/A	\boxtimes		
Number of Hopping	FCC 47CFR	ANSI C63.10-2013	N/A	\boxtimes		
Frequency	15.247(a)(1)					
20dB Bandwidth	FCC 47CFR 15.247(a)(1)	ANSI C63.10-2013	N/A	\boxtimes		
Hopping Channel Separation	FCC 47CFR 15.247(a)(1)	ANSI C63.10-2013	N/A	\boxtimes		
Band-edge measurement (Radiated)	FCC 47CFR 15.247(d)	ANSI C63.10-2013	N/A	\boxtimes		
Pseudorandom Hopping Algorithm	FCC 47CFR 15.247(a)(1)	N/A	N/A	\boxtimes		
Time of Occupancy (Dwell Time)	FCC 47CFR 15.247(a)(1)	ANSI C63.10-2013	N/A	\boxtimes		
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	\boxtimes		
RF Exposure	FCC 47CFR 15.247(i)	N/A	N/A	\boxtimes		

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 6 of 50

2.3 Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate in the table below is the worst case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode
Maximum Peak Conducted Output Power	GFSK
Hopping Channel Separation	GFSK
Number of Hopping Frequency	GFSK
Time of Occupancy(Dwell Time)	GFSK
Radiated Spurious Emissions	GFSK
Band-edge compliance of Conducted Emission	GFSK



Date : 2016-08-12

No. : HM170348

Page 7 of 50

- <u>3.0</u> <u>Test Results</u>
- 3.1 Emission

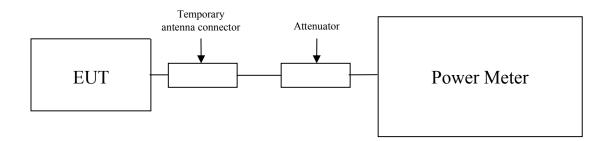
3.1.1 Maximum Peak Conducted Output Power

Test Requirement:	FCC 47CFR 15.247(b)(2)
Test Method:	ANSI C63.10-2013
Test Date:	2016-08-05
Mode of Operation:	Tx mode

Test Method:

The RF output of the EUT was connected to the Power Meter. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in dBm.

Test Setup:





Page 8 of 50

Limits for Maximum Peak Conducted Output Power [FCC 47CFR 15.247]:

902–928 MHz band:

For frequency hopping systems employing at least 50 hopping channels: 1Watt For frequency hopping systems employing less than 50 hopping: 0.25 Watts

Results of RFID mode (Fundamental Power): Pass

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
902.25	0.0723
Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
914.75	0.0913
·	
Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
926.75	0.0891

Calculated measurement uncertainty	:	30MHz to 1GHz	1.7dB
		1GHz to 18GHz	1.7dB

Remark:

1. All test data for each data rate were verified, but only the worst case was reported.

2. The EUT is programmed to transmit signals continuously for all testing.

The Hong Kong Standards and Testing Centre Limited 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited. For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



Page 9 of 50

3.1.2 Radiated Spurious Emissions

Test Requirement:	FCC 47CFR 15.209
Test Method:	ANSI C63.10-2013
Test Date:	2016-08-05
Mode of Operation:	Tx mode

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, 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.

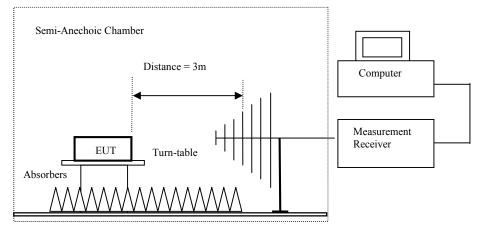


Page 10 of 50

Spectrum Analyzer Setting:

9KHz – 30MHz (Pk & Av)	RBW: VBW: Sweep: Span: Trace:	10kHz 30kHz Auto Fully capture the emissions being measured Max. hold
30MHz – 1GHz (QP)	RBW: VBW: Sweep: Span: Trace:	120kHz 120kHz Auto Fully capture the emissions being measured Max. hold
Above 1GHz (Pk & Av)	RBW: VBW: Sweep: Span: Trace:	1MHz 3MHz Auto Fully capture the emissions being measured Max. hold

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, 9kHz to 30MHz loop antennas are used.

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 11 of 50

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

Frequency Range	Quasi-Peak Limits
[MHz]	$[\mu V/m]$
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 Rx mode (9kHz - 30MHz): Pass

	Field Strength of Spurious Emissions								
Peak Value									
Frequency	Measured	Correction	Field	Field	Limit	E-Field			
	Level	Factor	Strength	Strength		Polarity			
MHz	MHz $dB\mu V$ dB/m $dB\mu V/m$ $\mu V/m$ $\mu V/m$								
	Emissions detected are more than 20 dB below the FCC Limits								

Radiated Emissions Average Value							
Frequency	Measured	Correction	Field	Limit	Margin	E-Field	
	Level @3m	Factor	Strength	@3m	_	Polarity	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dBuV/m		
	Emissions de	etected are m	ore than 20 o	iB below the F	CC Limits		

Result of Rx mode (30MHz - 1GHz): Pass

	Radiated Emissions								
	Quasi-Peak Value								
Frequency	Measured	Correction	Field	Limit	Margin	E-Field			
	Level @3m	Factor	Strength	@3m		Polarity			
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dBuV/m				
32.9	3.0	14.5	17.5	40.0	22.5	Vertical			
149.4	0.4	9.7	10.1	43.5	33.4	Vertical			
420.0	9.3	17.3	26.6	46.0	19.4	Horizontal			
440.0	8.7	17.6	26.3	46.0	19.7	Horizontal			
720.0	6.9	22.4	29.3	46.0	16.7	Horizontal			
830.0	6.6	23.9	30.5	46.0	15.5	Horizontal			

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Result of Rx mode (Above 1GHz): Pass

Field Strength of Spurious Emissions									
Peak Value									
Frequency	Measured	Correction	Field	Field	Limit	E-Field			
	Level	Factor	Strength	Strength		Polarity			
MHz	MHz $dB\mu V$ dB/m $dB\mu V/m$ $\mu V/m$								
	Emissions	detected are	more than 20	dB below the	FCC Limits				

	Radiated Emissions								
Average Value									
Frequency	Measured	Correction	Field	Limit	Margin	E-Field			
	Level @3m	Factor	Strength	@3m		Polarity			
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dBuV/m				
	Emissions d	etected are m	ore than 20 o	iB below the F	CC Limits				

Result of Tx mode (9kHz - 30MHz): Pass

	Field Strength of Spurious Emissions								
Peak Value									
Frequency	Measured	Correction	Field	Field	Limit	E-Field			
	Level	Factor	Strength	Strength		Polarity			
MHz	dBµV	dB/m	dBµV/m	μV/m	μV/m				
	Emissions detected are more than 20 dB below the FCC Limits								

Radiated Emissions Average Value							
Frequency	Measured	Correction	Field	Limit	Margin	E-Field	
	Level @3m	Factor	Strength	@3m		Polarity	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dBuV/m		
	Emissions d	etected are m	ore than 20 o	iB below the F	CC Limits		

Result of Tx mode (30MHz - 1GHz): Pass

	Radiated Emissions								
Quasi-Peak Value									
Frequency	Measured	Correction	Field	Limit	Margin	E-Field			
	Level @3m	Factor	Strength	@3m		Polarity			
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dBuV/m				
	Emissions detected are more than 20 dB below the FCC Limits								

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 13 of 50

Result of Tx mode (Lower Channel 902.25MHz) (Above 1GHz): Pass

	Field Strength of Spurious Emissions								
	Peak Value								
Frequency	Measured	Correction	Field	Limit	Margin	E-Field			
	Level @3m	Factor	Strength	@3m		Polarity			
MHz	dBµV	dB/m	dBµV/m	$dB\mu V/m$	dBµV/m				
902.25	89.40	23.90	113.30	N/A	N/A	Vertical			
1804.70	42.10	26.30	68.40	93.30	24.90	Vertical			
2706.10	31.40	28.90	60.30	74.00	13.70	Vertical			

Result of Tx mode (Lower Channel 902.25MHz) (Above 1GHz): Pass

	Field Strength of Spurious Emissions								
	Average Value								
Frequency	Measured	Correction	Field	Limit	Margin	E-Field			
	Level @3m	Factor	Strength	@3m		Polarity			
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dBµV/m				
902.25	88.80	23.90	112.70	N/A	N/A	Vertical			
1804.70	33.80	26.30	60.10	92.70	32.60	Vertical			
2706.10	21.50	28.90	50.40	54.00	3.60	Vertical			

Result of Tx mode (Middle Channel 914.75MHz) (Above 1GHz): Pass

	Field Strength of Spurious Emissions							
	Peak Value							
Frequency	Measured	Correction	Field	Limit	Margin	E-Field		
	Level @3m	Factor	Strength	@3m		Polarity		
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dBµV/m			
914.75	91.20	23.90	115.10	N/A	N/A	Vertical		
1829.50	41.70	26.40	68.10	95.10	27.00	Vertical		
2744.25	32.40	28.90	61.30	74.00	12.70	Vertical		

Result of Tx mode (Middle Channel 914.75MHz) (Above 1GHz): Pass

	Field Strength of Spurious Emissions							
	Average Value							
Frequency	Measured	Correction	Field	Limit	Margin	E-Field		
	Level @3m	Factor	Strength	@3m		Polarity		
MHz	dBµV	dB/m	$dB\mu V/m$	dBµV/m	dBµV/m			
914.75	90.60	23.90	114.50	N/A	N/A	Vertical		
1829.50	32.80	26.40	59.20	94.50	35.30	Vertical		
2744.25	22.70	28.90	51.60	54.00	2.40	Vertical		

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 14 of 50

Result of Tx mode (Highest Channel 926.75MHz) (Above 1GHz): Pass

	Field Strength of Spurious Emissions									
Peak Value										
Frequency	Measured	Correction	Field	Limit	Margin	E-Field				
	Level @3m	Factor	Strength	@3m		Polarity				
MHz	dBµV	dB/m	$dB\mu V/m$	dBµV/m	dBµV/m					
926.75	92.40	23.90	116.30	N/A	N/A	Vertical				
1853.50	41.20	26.40	67.60	96.30	28.70	Vertical				
2780.25	31.30	29.10	60.40	74.00	13.60	Vertical				

Result of Tx mode (Highest Channel 926.75MHz) (Above 1GHz): Pass

	Field Strength of Spurious Emissions										
Average Value											
Frequency	Measured	Correction	Field	Limit	Margin	E-Field					
	Level @3m	Factor	Strength	@3m		Polarity					
MHz	dBµV	dB/m	$dB\mu V/m$	dBµV/m	dBµV/m						
926.75	91.90	23.90	115.80	N/A	N/A	Vertical					
1853.50	29.90	26.40	56.30	95.80	39.50	Vertical					
2780.25	21.00	29.10	50.10	54.00	3.90	Vertical					

Remarks:

* Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

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.

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 15 of 50

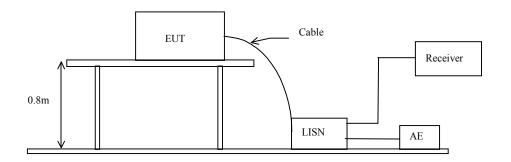
3.1.3 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.10-2013
Test Date:	2016-08-04
Mode of Operation:	On mode
Test Voltage:	120Va.c., 60Hz

Test Method:

The test was performed in accordance with ANSI C63.10-2013, 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:





Page 16 of 50

Limit for Conducted Emissions (FCC 47 CFR 15.207):

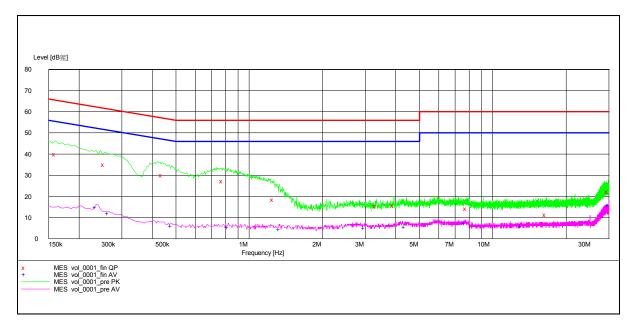
Frequency Range	Quasi-Peak Limits	Average
[MHz]	[dBµV]	[dBµV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* 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: Pass

Please refer to the following diagram for individual results.



The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 17 of 50

Results of On Mode- Live: Pass

		Quasi	i-peak	Average				
Conductor	Frequency	Level	Limit	Level	Limit			
Live or Neutral	MHz	dBµV	dBµV	dBµV	dBµV			
Live	0.160	40.0	66.0	_*_	-*-			
Live	0.235	_*_	_*_	14.6	52.0			
Live	0.265	_*_	_*_	11.8	51.0			
Live	1.260	18.5	56.0	_*_	_*_			
Live	1.335	_*_	_*_	4.3	46.0			
Live	2.985	_*_	_*_	4.9	46.0			
Live	3.320	15.4	56.0	_*_	-*-			
Live	3.930	15.5	56.0	_*_	-*-			
Live	4.360	_*_	_*_	5.5	46.0			
Live	7.695	_*_	_*_	7.2	50.0			
Live	29.830	22.1	60.0	_*_	-*-			
Live	30.000	_*_	_*_	15.9	50.0			
Neutral	0.255	34.9	62.0	_*_	_*_			
Neutral	0.440	30.0	57.0	_*_	_*_			
Neutral	0.480	_*_	_*_	6.0	46.0			
Neutral	0.780	27.0	56.0	_*_	-*-			
Neutral	0.820	_*_	_*_	5.1	46.0			
Neutral	7.835	14.2	60.0	_*_	_*_			
Neutral	13.135	_*_	_*_	5.9	50.0			
Neutral	16.555	11.4	60.0	-*-	_*-			

Remarks:

Calculated measurement uncertainty (0.15MHz – 30MHz): 3.2dB -*- Emission(s) that is far below the corresponding limit line.

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 18 of 50

3.1.3 Number of Hopping Frequency

Limit of Number of Hopping Frequency

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

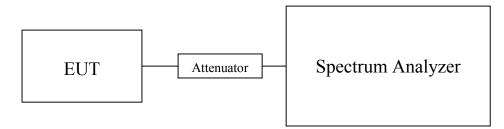
Frequency hopping systems in the 902–928 MHz band shall use at least 25 channels

The RF output of the EUT was connected to the spectrum analyzer by a low loss cable.

Spectrum Analyzer Setting:

RBW = 1MHz, $VBW \ge RBW$, Sweep = Auto, Span = the frequency band of operation Detector = Peak, Trace = Max. hold

Test Setup:





Page 19 of 50

Measurement Data:

ïde	o BW 3	00 kl	Ηz				PN IFG	IO: F iain:] ast Low	Ģ	Þ			Free n: 10						Á	∖vg vgi	Ty∣ Hol	pe: ld:>	Log 100	g-P1)/10(wr D					1	RAC TYF DE	E 1 2 E M W T P N	2345 WWWA INNN
0 dB	Vdiv R	ef 0.0	0 dE	Зm																												Τ		
10.0																			_															
20.0																																		
30.0	<u> </u>	በሰ		1/1/	η Λ	11	ſ	Λſ		Â	1		Λ	$\left \right $]	ĥ	ή	A				Λ					Î						
0.0											Ì	۲í			ľ			İ							Ĭ									
0.0			ļļ	ľľ							ļ	ľ			Ĭ	ĺ			ļ	ļ									ſ	Ì		ļ		
0.0											ſ	ľ										I		ľ	,	ĺ	[ļ	ļ			ſ		
0.0 -	1						 -		•																									L.
0.0																																		
	902.00 BW 10									#VE	210			LU															-	St	op	923	8.00) MH 1 pt

[50 out of total 50 channel used in a hopping sequence]

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 20 of 50

3.1.4 20dB Bandwidth

Test Requirement:	
Test Method:	
Test Date:	
Mode of Operation:	

FCC 47CFR 15.247(a)(1) ANSI C63.10-2013 2016-08-05 Tx mode

Remark:

The result has been done on all the possible configurations for searching the worst cases.

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 3.1.3 in this test report.



Page 21 of 50

Fundamental Frequency	20dB Bandwidth	FCC Limits
[MHz]	[kHz]	[MHz]
902.25	87.2	<0.5

(Lowest Operating Frequency)

enter Freq 902.250000 N	1Hz #IFGain:Low	Center Freq: 902.25000 Trig: Free Run #Atten: 10 dB	00 MH2 Avg Hold:≻10/10	Radio Std: None Radio Device: BTS
dB/div Ref -30.00 dBn	1			
9 g 1.0				
0				
0				
.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		Myrow and a set	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
	-			· m ······
0				
0				
20				
enter 902.3 MHz tes BW 10 kHz		#VBW 30 kH	z	Span 500 kł Sweep 6.2 n
Occupied Bandwidth	<u>າ</u>	Total Power	-31.9 dBm	
	3.425 kHz			
Transmit Freq Error	-3.564 kHz	OBW Power	99.00 %	
x dB Bandwidth	87.16 kHz	x dB	-20.00 d B	

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 22 of 50

Fundamental Frequency	20dB Bandwidth	FCC Limits
[MHz]	[kHz]	[MHz]
914.75	87.7	<0.5

(Middle Operating Frequency)

nter Freq 914.750000 I	MHz #IFGain:Low	Center Freq: 914.7500 ⊃ Trig: Free Run #Atten: 10 dB	100 MHz AvgjHold:>10/10	Radio Std: None Radio Device: BTS
B/div Ref -30.00 dBi	m	······		
)	N		harmon -	
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			
, ,				
nter 914.8 MHz es BW 10 kHz		#VBW 30 kH	łz	Span 500 k Sweep 6.2 r
Occupied Bandwidt	h	Total Power	-31.5 dBm	
8	0.516 kHz			
fransmit Freq Error	-2.947 kHz	OBW Power	99.00 %	
dB Bandwidth	87.71 kHz	x dB	-20.00 dB	

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 23 of 50

Fundamental Frequency	20dB Bandwidth	FCC Limits
[MHz]	[kHz]	[MHz]
926.75	86.6	<0.5

### (Highest Operating Frequency)

0 dB/div Ref -30.00 dBn				
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			
0.0				
20				
enter 926.8 MHz Res BW 10 kHz		#VBW 30 kH	Iz	Span 500 kł Sweep 6.2 n
Occupied Bandwidth	1	Total Power	-30.0 dBm	
1 [,]	15.88 kHz			
Transmit Freq Error	12.883 kHz	OBW Power	99.00 %	
x dB Bandwidth	87.57 kHz	x dB	-20.00 dB	

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 24 of 50

3.1.5 Hopping Channel Separation

Requirements:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater or the 20 dB bandwidth of the hopping channel, whichever is greater.

Limit:

The measured maximum bandwidth = 87.7 kHz

The Hong Kong Standards and Testing Centre Limited 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited. For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



Page 25 of 50

Channel separation = 500kHz Channel 0 – Channel 1, Pass

Marker	1Δ-500.0000	Р	NO: Wide 🖵	Trig: Free l Atten: 10 d		Avg Type: Avg Hold:>1	Log-Pwr 100/100	TF	ACE 1 2 3 4 5 6 TYPE M MAMMAN DET P N N N N N
10 dB/div Log	/ Ref 0.00 dB	m						∆Mkr1	-500 kHz 0.087 dB
-10.0									
-20.0									
-30.0		1 ∆2							
							~~ % 2~~		
-40.0									
-60.0	/		4	Υß	ſ	Í		,	l,
-70.0	read				ار مر				Long and the second sec
-80.0	hư"			WWWW	-WV				"Wh
-90.0									
	902.5000 MHz W 100 kHz		 #VB	W 300 kHz			Sweej	Span 0 1.000 ms	1.000 MHz (1001 pts)

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 26 of 50

Channel separation = 504kHz Channel 24 – Channel 25, Pass

Marke	er 1 ∆ -5(04.000000	Р	NO: Wide 🖵 Gain:Low	Trig: Free l Atten: 10 d		Avg Type: I Avg Hold:>1	_og-Pwr 100/100	TR	ACE 123456 TYPE MWWWWW DET PNNNNN
10 dB/c	div Ref	0.00 dBm							∆Mkr1	-504 kHz 0.099 dB
10.0 —										
-20.0			▲1∆2							
-30.0 —								~~ <u>%</u> 2~		
-40.0							,			
50.0					4	کسم	,		μ. N	1
-70.0 —						N^				
-80.0	ſŊŸ				γ_{γ}	urvr ^{ur}				γ, τ. μ. τ. γ
90.0 —										
	r 914.500 BW 100 k			#VB	W 300 kHz			Swee	Span p 1.000 ms	1.000 MHz (1001 pts)

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 27 of 50

Channel separation = 500kHz Channel 49 – Channel 50, Pass

Marker 1	Δ 500.000000	P	'NO: Wide 🕞	Trig: Free Atten: 10 c	Run IB	Avg Type: l Avg Hold:>1	_og-Pwr 100/100	TF	ACE 1 2 3 4 5 TYPE MWWWWW DET PINNNN
10 dB/div	Ref 0.00 dBm		Sumeon		_			∆Mkr1	500 kH: 0.080 dE
-10.0									
20.0		<u> </u>					¹ ∆2		
30.0		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						<u></u>	
40.0	War		- Vy					- Vy	
50.0	. Mark		,	ή Λ	م	, 		Y	\n
50.0	W				, N				T.
70.0 [* \}} √				U					ال ار الر
80.0									
90.0								<u> </u>	
	26.5000 MHz 100 kHz	1	#VB	W 300 kHz			Sweep	Span 0 1.000 ms	1.000 MH ; (1001 pt:

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 28 of 50

3.1.6 Band-edge Compliance of RF Conducted Emissions Measurement:

Limit :

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

The Hong Kong Standards and Testing Centre Limited 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited. For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



Page 29 of 50

Band-edge Compliance of RF Conducted Emissions Measurement:

Fixed Frequency:

Frequency Range [MHz]	Conducted Emission Attenuated below the Fundamental [dB]
902 - Lowest Fundamental (902.25)	36.8

Marker 1 Δ -270.00000			ns (Lowest frequency Avg Type: Log-Pwr Avg Hold: 100/100	TRACE 1 2 3 4 5 6 TYPE MWWWW DET PNNNN
10 dB/div Ref 0.00 dBm				ΔMkr1 -270 kHz -36.765 dE
-10.0				
-20.0				
-30.0				
-40.0				
-50.0			1Δ2 1Δ2	
60.0				
-70.0		and another and a second and a second a	allen and a start	mmmmmhhhh
-90.0				
Start 890.000 MHz #Res BW 100 kHz	#VI	300 kHz	Swee	Stop 908.000 MHz p 1.733 ms (1001 pts
MKR MODE TRO SCL $1 \Delta 2 1 f (\Delta)$		765 dB	UNCTION WIDTH	FUNCTION VALUE
2 F 1 f 3 4	902.258 MHz -21.35	2 dBm		

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 30 of 50

Band-edge Compliance of RF Conducted Emissions Measurement:

Hopping Frequency:

Frequency Range [MHz]	Conducted Emission Attenuated below the Fundamental [dB]
902 - Lowest Fundamental (902.25)	46.3

Band-edge Co Marker 1 Δ -252.000000 kl	mpliance of RF Condu			CE 1 2 3 4 5 6
Marker 1 & -252.000000 ki	PNO: East +++ Trig	j: Free Run Avg Ho en: 16 dB	Id: 100/100 TY	ET P N N N N
10 dB/div Ref 0.00 dBm			∹ ∆Mkr1 46	252 kHz .292 dE
-10.0				
-20.0			X200000000	ΛΛΛ
-30.0			┥┶┺╶┶┍╌┶╴┿╖┙┥╘┙┶╵┥╢┪ ┥┪┛┥┙╎┙┥┥┙┙┙	
-50.0			/ 1) 1/ 1/ 1/ 1/ 1/ 1/ 1/ 1/ 1/ - 1 1/ 1/ 1/ 1/ 1/ 1/ 1/ 1/ 1/	
-60.0			,1∆2	∦
-80.0	www.horr.	mmmmmmmmM		
-90.0				
Start 890.000 MHz ≉Res BW 100 kHz	#VBW 30) kHz	Stop 908 Sweep 1.733 ms (
MKR MODE THE SCL \times	-252 kHz (Δ) -46.292 dB	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	
2 F 1 f 902 3	240 MHz -21.926 dBm			
4 5 6				
7 8				
9 10 14				
11				<u>></u>

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 31 of 50

Band-edge Compliance of RF Conducted Emissions Measurement:

Fixed Frequency:

Frequency Range [MHz]	Conducted Emission Attenuated below the Fundamental [dB]
Highest Fundamental (926.75) - 928	49.3

Band-edg Marker 1 ∆ 1.3496962			s (Highest frequency Avg Type: Log-Pwr Avg Hold: 100/100	Channel) TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P NNNN			
10 dB/div Ref 10.00 dB	m			∆Mkr1 1.350 MHz -49.271 dB			
0.00							
-10.0							
-20.0	2						
-30.0							
-50.0							
-60.0	140						
-70.0	102 martine martine martine	And a lage of the production of the	Mulance vale Mariland American	Winy Haller range Lyber marked			
-80.0							
Stop 950.00 MHz Stop 950.00 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.867 ms (1001 pts)							
$\begin{array}{c c} \text{MKR MODE TRC SCL} \\ \hline 1 & \Delta 2 & 1 & f & (\Delta) \\ \hline 2 & F & 1 & f \\ \hline 3 & & & \\ \hline \end{array}$		FUNCTION FU .271 dB 71 dBm		FUNCTION VALUE			

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 32 of 50

Band-edge Compliance of RF Conducted Emissions Measurement:

Hopping Frequency:

Frequency Range [MHz]	Conducted Emission Attenuated below the Fundamental [dB]
Highest Fundamental (926.75) - 928	41.6

Band-edge Com Marker 1 Δ 1.139743500 MH		DINDUCTED Emissi Trig: Free Run #Atten: 30 dB	ons (Highest free Avg Type: Log Avg Hold: 100	g-Pwr ™	RACE 123456 TYPE MWWWWW DET PINNNN
10 dB/div Ref 20.00 dBm					140 MHz 1.601 dB
10.0					
0.00					
-10.0					
-20.0 A A A A A A A A A A A A A A A A A A A					
-40.0					
			MMail Malazina da a a a	بالم راسات موسا که با بستان موسط الم	n mai hansara sas
-70.0			-1 -00		
Start 920.01 MHz #Res BW 100 kHz	#VBI	// 300 kHz		Stop 9 Sweep 2.867 ms	50.00 MHz (1001 pts)
	40 MHz (Δ) -41.60 25 MHz -19.379	1 dB	FUNCTION WIDTH	FUNCTION VALUE	×

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 33 of 50

3.1.7 Time of Occupancy (Dwell Time)

Requirements

For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

Dwell Time = Pulse Duration * hop rate

Observed duration: 20s

Measurement Data:

Channel Occupied: 50 of 50 Channel

Average Dwell time (at any 20s observation period) of Lowest Channel = 27 pulses x 3.63ms(pulse period) x2 (double time of graph) = 196.0ms = 0.196s Middle Channel = 28 pulses x 3.63ms(pulse period) x2 (double time of graph) = 203.3ms = 0.203s Highest Channel = 28 pulses x 3.63ms(pulse period) x2 (double time of graph) = 203.3ms = 0.203s

For hopping system, channel bandwidth <250kHz, at least 50 hopping should be used (PASS), dwell time < 0.4s at any 20s period (PASS).



Page 34 of 50

ideo BW 300 kHz	PNO: Fast 🍙 Trig: Free Ru IFGain:Low Atten: 10 dB	Avg Type: Log-Pwr n Avg Hold>100/100	TRACE 12345 TYPE M WWWWA DET P N N N N
odB/div Ref 0.00 dBm			
0.0			
0.0			
1) 1 1 1 1 1 1		7 (7 (
0.0			
art 902.00 MHz Res BW 100 kHz	#VBW 300 kHz	Sweel	Stop 928.00 MH 5 2.533 ms (1001 pt

Fig. A [50 out of total 50 channel used in a hopping sequence]

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 35 of 50

	PNO: Wide ↔ IFGain:Low	⊥ Trig: Video #Atten: 18 dB	Avg Type: Log-Pwr	TRACE 12345 TYPE W WWWWW DET N N N N N
10 dB/div Ref 8.00 dBm				
-2.00				
-12.0				
-22.0				
-32.0				
52.0				
62.0				
72.0				
⁷²⁰ <mark>рановала во Горији (</mark> 82.0	in de proprior (na ballana de producer de la composition de la composition de la composition de la composition	allen ei fal de for it we helpe det. Is it	the formation of the first of t	ad and a difference of a second s
Center 902.250000 MHz Res BW 100 kHz	#VE	3W 300 kHz	Swe	Span 0 Hz ep 10.01 s (1001 pts

Fig. B [27 pulses within 10s period]

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 36 of 50

Marker 1	Δ -3.63000 ms	PNO: Widd IFGain:Loo	,	Trig Delays.910 ms Trig: Video #Atten: 18 dB	Avg type:t	og-Pwr	lh	ACE 1 2 3 4 5 6 TYPE WWWWWWW DET N N N N N N
10 dB/div	Ref 8.00 dBm	IFGain:Lo	¥	whitelit. To did			∆Mkr1 -	3.630 ms 0.36 dB
-2.00								
-12.0								
-22.0		• !	∆2 			×2		
-32.0								TRIG LVL
-42.0								
-52.0								
-62.0								
-72.0								
-82.0 11111								
Center 90 Res BW 1	2.250000 MHz 00 kHz		#VBV	V 300 kHz		Swee	o 10.00 ms	Span 0 Hz ; (1001 pts)

Fig. C [Each pulse period = 3.630ms]

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 37 of 50

Center F	req 9	14.7	550	00	MHz			Wide n:Low			ig: Vi tten:					,	Avg T	уре:	Log-F	^o wr				TR	YPE V	234 ////////////////////////////////////	unu,
10 dB/div	Ref	8.00	dBr	n																							
2.00																											
12.0																											
22.0								1	1	1																	
32.0													+													TRIG	Ľ
12.0	_												+	_	+								+	╞		_	
52.0	_												+	_									-		_		
52.0 .									_				╀	+			1	1					╁	╁	+		
							 	الل, بر ا لر	ار رو ار او رو		الى الى				101												t
82.0																											
enter 91 les BW 1			MHz	2				1	žVR	W 31	10 k	47									2010	on	10.0	0.9	Spa (10	in 0 01 n	H

Fig. D [28 pulses within 10s period]

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 38 of 50

Marker 1 ∆ -3.63000 ms	PNO: Wide ↔ IFGain:Low	Trig Delay3.910 ms Trig: Video #Atten: 18 dB	Avg Type: Log-Pwr	TRACE 123456 TYPE WAWWWW DET N N N N N
10 dB/div Ref 8.00 dBm				ΔMkr1 -3.630 ms 0.10 dB
-2.00				
-12.0	1∆2			
-22.0	• 1222		ma na 1	
-32.0				TRIG LVI
-42.0				
-52.0				
-62.0				
Center 914.750000 MHz Res BW 100 kHz	#VBI	W 300 kHz	Swee	Span 0 Hz ep 10.00 ms (1001 pts

Fig. E [Each pulse period = 3.630ms]

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 39 of 50

								PNO: 1 IFGair	Wide n:Low			ig:Vi tten:		в		Avg 1	ype:	Log	-Pwr				TR. T	ACE 1 YPE W DET N	234 WWWM NNN	5 6 MN N N
10 dB/ Log	/div	F	tef t	8.00	dBr	n															1					
-2.00 -							 																			
-12.0 -																										
-22.0 -																									TRIG L	
-42.0 -																										
-52.0 -														-	-	-								$\left \right $		╞
-62.0 -				$\left \right $																						╞
-72.0 -																11 (1.14)	hiller		un lu					لر للس	6 y L I &	
Cente Res E					MH2	-			\$	¢VΒ	W 30)0 ki	Hz							Swe	ep	10.0)0 s	Spai (100	n 0 I)1 pt	lz (s)

Fig. F [28 pulses within 10s period]

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 40 of 50

Marker 1	Δ -3.63000 ms	PN	10: W Gain:I	ide ↔►→ .ow	Trig Delay Trig: Video #Atten: 18)	Avg Type: I	Log-Pwr	TR ·	ACE 123456 Inype www.www Det NNNNN
10 dB/div Log	Ref 8.00 dBm								ΔMkr1 -	3.630 ms -0.47 dB
-2.00										
-12.0										
-22.0			-	142	₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m.n	% 2		
-32.0										TRIG LVL
-42.0										
-52.0										
-72.0										
-82.0										
Center 92 Res BW 1	26.750000 MHz 00 kHz			#VB۱	N 300 kHz	I		Sweep) 10.00 ms	Span 0 Hz (1001 pts)

Fig. G [Each pulse period = 3.630ms]

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 41 of 50

3.1.8 Channel Centre Frequency

Requirements:

Frequency hopping system in the 902-928MHz band shall use at least 50 (Channel 0 to 49) non-overlapping channels.

The EUT operates in according with the within the 902.25 – 926.75 MHz frequency band. RF channels for the EUT are spaced 0.25 MHz and are ordered in channel number k. In order to comply with out-of-band regulations, a lower frequency guard band of 0.25 MHz and a higher frequency guard band of 0.25 MHz is used.

The operating frequencies of each channel are as follows:

First RF channel start from 902MHz + 0.25MHz guard band = 902.25MHz Frequency of RF Channel = 902.25+k MHz, k = 0,...,50 (Channel separation = 0.50MHz)



Page 42 of 50

3.1.9 Pseudorandom Hopping Algorithm

Requirements:

The channel frequencies shall be selected from a pseudorandom ordered list of hopping frequencies. Each frequency must be used equally by the transmitter.

EUT Pseudorandom Hopping Algorithm

Refer to the R.F. module specification.



Page 43 of 50

3.1.10 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 Omnidirectional antenna. There is no external antenna, the antenna gain = 0dBi. User is unable to remove or change the Antenna.



Page 44 of 50

3.1.11 RF Exposure -

Test Requirement: Test Date: Mode of Operation: FCC 47CFR 15.247(i) 2016-08-05 Tx mode

Test Method:

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

Test Results:

The EUT complied with the requirement(s) of this section. EUT meets the requirements of these sections as proven through MPE calculation The MPE calculation for EUT @ 20cm Based on the highest P = 91.3 mW (@ 914.8MHz)

Pd = PG/ 4pi*R² = (91.3 x1)/12.566* (20)² = (91.3)/12.566x 400= 91.3 /5026.4 = 0.01816mW/cm²

where:

*Pd = power density in mW/cm2

* G = Antenna numeric gain (1); Log G = g/10 (g = 0dBi).

- * P = Conducted RF power to antenna (91.3 mW).
- * R = Minimum allowable distance.(20 cm)
- *The power density $Pd = 0.01816 \text{ mW/cm}^2$ is less than 1 mW/cm² (listed MPE limit)

*The SAR evaluation is not needed (this is a desk top device, R > 20 cm)

* The EUT(antenna) must be 0.2 meters away from the General Population.

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 45 of 50

Appendix A

List of Measurement Equipment

LIST OF MEASUREMENT EQUIPMENT

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM299	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS-LINDGREN	3115	00114120	2016/04/27	2018/04/27
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	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3		2016/04/24	2017/04/24
EM355	BICONILOG ANTENNA	ETS-LINDGREN	3143B	00094856	2016/03/03	2018/03/03
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2016/06/01	2017/06/01
EM299	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS-LINDGREN	3115	00114120	2016/04/27	2018/04/27
EM302	PRECISION OMNIDIRECTIONAL DIPOLE (1 – 6GHZ)	SEIBERSDORF LABORATORIES	POD 16	161806/L	2016/05/11	2018/05/11
EM303	PRECISION OMNIDIRECTIONAL DIPOLE (6 – 18GHZ)	SEIBERSDORF LABORATORIES	POD 618	6181908/L	2016/05/11	2018/05/11
EM011	ATTENNUATOR/SWITCH	НР	HP11713A	2508A10595	2015/11/16	2017/11/16
EM012	PRE-AMPLIFIER	H P	HP8449B	3008A00262	2015/11/16	2017/11/16
EM525	CABLE FOR ETS CHAMBER	SUHNER	N/A	N/A	2016/01/11	2017/01/11
EM529	MICROWAVE FREQUENCY CABLE	SUHNER	SUCOFLEX 104	238296	2016/07/22	2018/07/22

Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL								
EM119	LISN	R & S	ESH3-Z5	0831.5518.5 2	2015/10/22	2016/10/22								
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB7	100072	2016/06/01	2017/06/01								
EM179	IMPULSE LIMITER	ROHDE & SCHWARZ	ESH3-Z2	357- 8810.52/54	2016/01/11	2017/01/11								
EM154	SHIELDING ROOM	SIEMENS MATSUSHITA COMPONENTS	N/A	803-740- 057-99A	2012/02/03	2017/02/03								
N/A	MEASUREMENT AND EVALUATION SOFTWARE	ROHDE & SCHWARZ	ESIB-K1	V1.20	N/A	N/A								

Remarks:-

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

The Hong Kong Standards and Testing Centre Limited

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

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@hkstc.org Website: www.stc-group.org

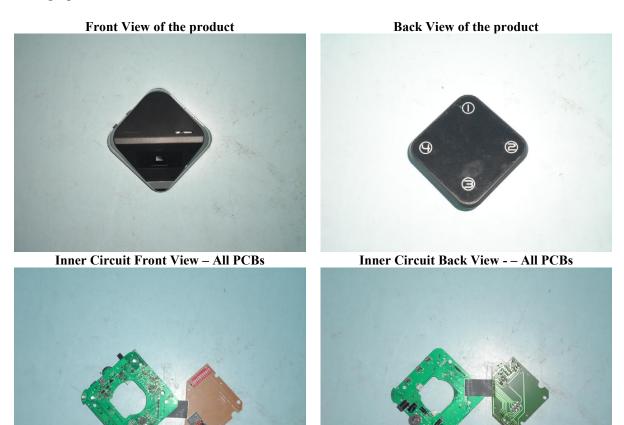
This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 46 of 50

Appendix B

Photographs of EUT





Page 47 of 50

Photographs of EUT





Page 48 of 50

Photographs of EUT





Page 49 of 50

Photographs of EUT





Page 50 of 50

Photographs of EUT

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



Conditions of Issuance of Test Reports

- 1. All samples and goods are accepted by The Hong Kong Standards & Testing Centre Limited (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The Company provides its services on the basis that such terms and conditions constitute express agreement between the Company and any person, firm or company requesting its services (the "Clients").
- 2. Any report issued by the Company as a result of this application for testing service (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to his customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
- 3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
- 4. The Report refers only to the sample tested and does not apply to the bulk, unless the sampling has been carried out by the Company and is stated as such in the Report.
- 5. In the event of the improper use the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
- 6. Sample submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
- 7. The Company will not be liable for or accept responsibility for any loss or damage howsoever arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
- 8. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
- 9. Subject to the variable length of retention time for test data and report stored hereinto as to otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of this test report for a period of three years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after the retention period. Under no circumstances shall we be liable for damages of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.
- 10. Issuance records of the Report are available on the internet at www.stc-group.org. Further enquiry of validity or verification of the Reports should be addressed to the Company.