

Date : 2009-03-04 Page 1 of 20

No. : HM162944

**Applicant (HAO004):** Harvest One Limited.

9D On Shing Industrial Building, 2-16 Wo Liu Hang Road,

Fo Tan, N.T., Hong Kong.

**Manufacturer:** Harvest One Limited.

9D On Shing Industrial Building, 2-16 Wo Liu Hang Road,

Fo Tan, N.T., Hong Kong.

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

Product: Cactus Wireless Flash Trigger

Brand Name: CACTUS

Model Number: V4

FCC ID: VAAWFTV4

**Date Sample(s) Received:** 2008-12-30, 2009-02-05

**Date Tested:** 2009-01-09 to 2009-02-28

**Investigation Requested:** Perform ElectroMagnetic Interference measurement in

accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2008 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.



Date: 2009-03-04 Page 2 of 20

No. : HM162944

# **CONTENT:**

	Cover Content	Page 1 of 20 Page 2-3 of 20
1.0	General Details	
1.1	Test Laboratory	Page 4 of 20
1.2	Applicant Details Applicant Manufacturer	Page 4 of 20
1.3	Equipment Under Test [EUT] Description of EUT operation	Page 5 of 20
1.4	Date of Order	Page 5 of 20
1.5	Submitted Samples	Page 5 of 20
1.6	Test Duration	Page 5 of 20
1.7	Country of Origin	Page 5 of 20
<u>2.0</u>	Technical Details	
2.1	Investigations Requested	Page 6 of 20
2.2	Test Standards and Results Summary	Page 6 of 20
<u>3.0</u>	<u>Test Results</u>	
3.1	Emission	Page 7-11 of 20
3.2	Bandwidth Measurement	Page 12-13 of 20



Date: 2009-03-04 Page 3 of 20

: HM162944 No.

Appendix A

Page 14 of 20 List of Measurement Equipment

Appendix B

Page 15-17 of 20 Duty Cycle Correction During 100 msec

Appendix C

Page 18 of 20 Periodic Operation

Appendix D

Page 19-20 of 20 Photographs



Date: 2009-03-04 Page 4 of 20

No.: HM162944

# 1.0 General Details

## 1.1 Test Laboratory

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

Telephone: 852 2666 1888 Fax: 852 2664 4353

# 1.2 Applicant Details Applicant

Harvest One Limited.

9D On Shing Industrial Building, 2-16 Wo Liu Hang Road, Fo Tan, N.T., Hong Kong.

## Manufacturer

Harvest One Limited.

9D On Shing Industrial Building, 2-16 Wo Liu Hang Road, Fo Tan, N.T., Hong Kong.



Date: 2009-03-04 Page 5 of 20

No. : HM162944

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

Submitted Sample(s) said to be

Product: Cactus Wireless Flash Trigger

Manufacturer: Harvest One Limited.

Brand Name: CACTUS Model Number: V4

Rating: 12Vd.c. ("23A" size battery x 1)

## 1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Harvest One Limited.., Cactus Wireless Flash Trigger. The EUT is a one button transmitter. It is button transmitter, modulation by IC; and type is pulse modulation.

#### 1.4 Date of Order

2008-12-30, 2009-02-05

# 1.5 Submitted Sample(s):

1 Sample

## 1.6 Test Duration

2009-01-09 to 2009-02-28

## 1.7 Country of Origin

China



Date : 2009-03-04 Page 6 of 20

No.: HM162944

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

## 2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 2008 and ANSI C63.4:2003 for FCC Certification.

# 2.2 Test Standards and Results Summary Tables

EMISSION								
Test Condition	Test Condition Test Requirement Test Method Class / Test Result							
	1		Severity	Pass	Failed	N/A		
Field Strength of Fundamental Emissions & Spurious Emissions	FCC 47CFR 15.231a	ANSI C63.4:2003	N/A	$\boxtimes$				
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:2003	N/A	$\boxtimes$				

Note: N/A - Not Applicable



Date: 2009-03-04 Page 7 of 20

No. : HM162944

# 3.0 Test Results

#### 3.1 Emission

## 3.1.1 Radiated Emissions (30 – 1000MHz)

Test Requirement: FCC 47CFR 15.231a
Test Method: ANSI C63.4:2003
Test Detail

Test Date: 2009-02-28

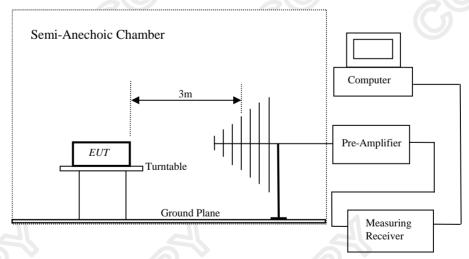
Mode of Operation: Transmitter on mode

#### **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, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

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

# **Test Setup:**





Date : 2009-03-04 Page 8 of 20

No. : HM162944

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

Frequency Range of	Field Strength of	Field Strength of	
Fundamental	Fundamental Emission	Spurious Emission	
	[Average]	[Average]	
[MHz]	$[\mu V/m]$	$[\mu V/m]$	
40.66-40.70	2,250	225	
70-130	1,250	125	
130-174	1,250 to 3,750 *	125 to 375 *	
174-260	3,750	375	
260-470	3,750 to 12,500 *	375 to 1,250 *	
Above 470	12,500	1,250	

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,  $\mu$ V/m at 3 meters=56.81818(F)-6136.3636; for the band 260-470 MHz,  $\mu$ V/m at 3 meters =41.6667(F)-7083.3333. The maximum permissible unwanted emission level is 20dB below the maximum permitted fundamental level.

## **Result of Transmitter on mode: PASS**

Field Strength of Fundamental Emissions									
	Peak Value								
Frequency	Measured	Correction	Field	Field	Limit	E-Field			
	Level @3m	Factor	Strength	Strength	@3m	Polarity			
MHz	dΒμV	dB/m	_dBµV/m_	μV/m	μV/m_				
433.7	61.5	18.5	80.0	10000.0	109,875.1	Vertical			

	Field Strength of Fundamental Emissions								
	Average Value								
	Frequency	Measured	Correction	Field	Field	Limit	E-Field		
		Level @3m	Factor	Strength	Strength	@3m	Polarity		
	MHz	$dB\mu V$	dB/m	_dBµV/m_	μV/m	μV/m_			
ĺ	* 433.7	48.1	18.5	66.6	2138.0	10,987.5	Vertical		



Date: 2009-03-04 Page 9 of 20

No.: HM162944

1	Field Strength of Spurious Emissions Ouasi-Peak							
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Field Strength µV/m	Limit @3m µV/m	E-Field Polarity		
867.4 + 1300.9	32.7 19.9	26.0 27.6	58.7 47.5	861.0 237.1	1,098.5 500.0	Vertical Vertical		
1734.6 2168.3	13.7	28.5	42.2	128.8	1,098.5 1.098.5	Vertical Vertical		
2601.9 3035.6	< 1.0 < 1.0 < 1.0	17.4 17.2	< 18.4 < 18.2	< 8.3 < 8.1	1,098.5 1,098.5	Vertical  Vertical		
3469.2 + 3902.9	< 1.0 < 1.0 < 1.0	17.2 18.8 19.7	< 19.8 < 20.7	< 9.8 < 10.8	1,098.5	Vertical  Vertical		
+ 4336.5	< 1.0	20.6	< 21.6	< 12.0	500.0	Vertical		

#### Remarks:

\*: Adjusted by Duty Cycle = -13.4dB

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

FCC Limit for Average Measurement =  $41.6667(433.65MHz)-7083.333=10,987.5\mu V/m$ 

+: 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.

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB



Date : 2009-03-04 Page 10 of 20

No. : HM162944

## 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 on mode: PASS**

Emissions detected are more than 20 dB below the limit line(s).

#### Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz. Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty: 30MHz to 1GHz 5.1dB



Date: 2009-03-04 Page 11 of 20

No. : HM162944

## 3.2 20dB Bandwidth of Fundamental Emission

Test Requirement: FCC 47 CFR 15.231a

Test Method: ANSI C63.4:2003 (Section 13.1.7)

Test Date: 2009-02-28 Mode of Operation: On 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: 2009-03-04 Page 12 of 20

No. : HM162944

## Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range	20dB Bandwidth	FCC Limits *
[MHz]	[kHz]	[kHz]
433.65	78.2	1084.45

\*: FCC Limit for Bandwidth measurement = (0.25%)(Center Frequency) =(0.0025)(433.65) = 1084.125kHz

#### 20dB Bandwidth of Fundamental Emission Marker 1 [T1 ndB] RBW 10 kHz RF Att 0 dB Ref Lvl ndB 20.00 dB VBW 10 kHz 92 dB**æ**V 78.15631263 kHz 25 ms BW SWT Unit dBæV [T1] 52.03 dBæ\ 433.65100200 MHz 80 BW 8.15631263 kHz $\nabla_{\mathrm{T}}$ 31.97 dBæ\ [T1] 70 3.61092184 MHz $\nabla_{\mathrm{T}} \not \downarrow$ [T1] 32.35 dBæ IN1 68907816 MHz 1VIEW 1 MA 3 ( 20 1( Center 433.658016 MHz 100 kHz/ Span 1 MHz

The Hong Kong Standards and Testing Centre Ltd.

28.FEB.2009

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



Date: 2009-03-04 Page 13 of 20

No. : HM162944

# Appendix A

# List of Measurement Equipment

## **Radiated Emission**

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM020	HORN ANTENNA	EMCO	3115	4032	2006/07/11	2009/07/11
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-Lindgren	FACT-3		2006/05/02	2009/05/02
EM174	BICONILOG ANTENNA	EMCO	3142C	00029071	2008/01/24	2010/01/24
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB7	100072	2008/06/16	2009/06/16
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2006/07/26	2009/07/26

#### Remarks:-

CMCorrective Maintenance

N/A Not Applicable or Not Available

TBD To Be Determined



Date: 2009-03-04 Page 14 of 20

No. : HM162944

# Appendix B

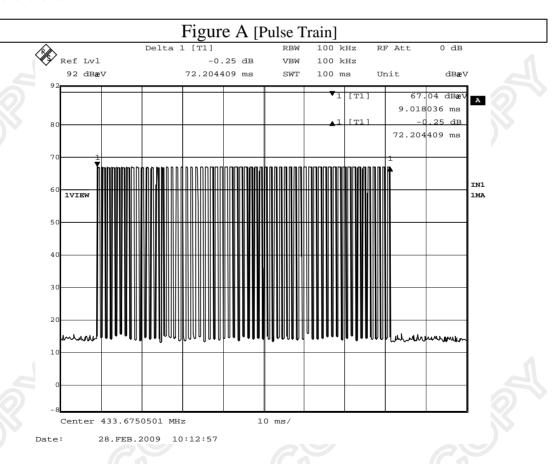
## **Duty Cycle Correction During 100msec**

Each function key sends a different series of characters, but each packet period (100msec) never exceeds a series of 360 pulses (59.3msec) pulses period. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered 360x0.059msec per 100msec=21.3% duty cycle. Figure A through D show the characteristics of the pulses train for one of these functions.

#### Remarks:

Duty Cycle Correction = 20Log(0.213) =-13.4dB

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





Date: 2009-03-04 Page 15 of 20

No. : HM162944

# Figure B [60 sets within 100ms period] Marker 1 [T1] RBW 100 kHz RF Att 0 dB Ref Lvl 62.16 dBæV VBW 100 kHz 92 dB**æ**V 3.559118 ms 10 ms IIn i t SWT dB#W 62.16 dBæV [T1] 3.559118 ms 0.09 dB 1.230461 ms IN1

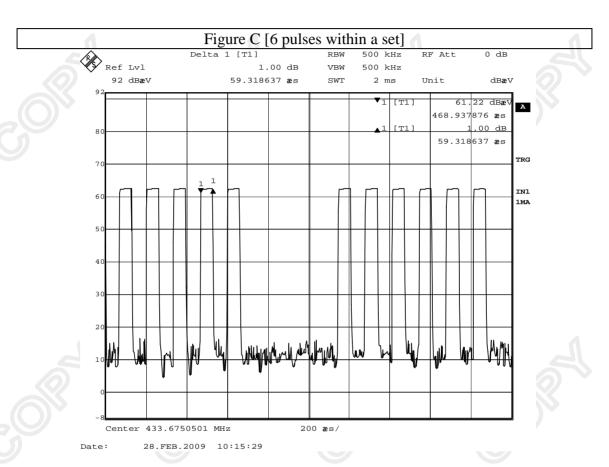
1 ms/

Center 433.6750501 MHz 28.FEB.2009 10:14:36 Date:



Date: 2009-03-04 Page 16 of 20

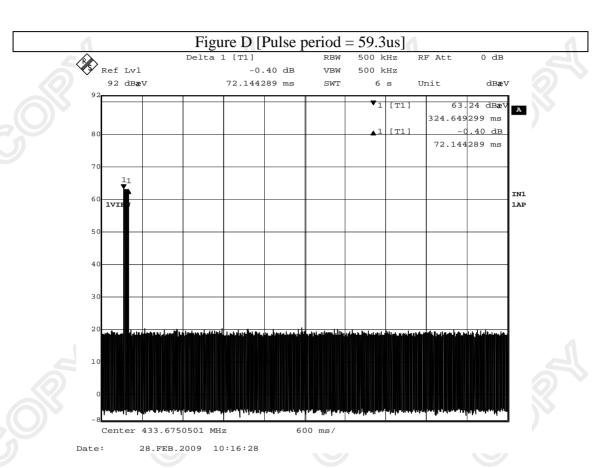
No. : HM162944





Date: 2009-03-04 Page 17 of 20

No.: HM162944





Date: 2009-03-04 Page 18 of 20

No. : HM162944

# Appendix C

# Periodic Operation [FCC 47CFR 15.231(a2)]

According to FCC 47CFR15.231 (a2). A transmitter automatically activated must automatically deactivate within not more than 5 seconds of being released. The EUT ceases transmission almost immediately upon being released and appears to finish the current packet being transmitted. Therefore the longest period of time the transmitter should take to deactivate is a packet length.



Date: 2009-03-04 Page 19 of 20

No.: HM162944

# Appendix D

## **Photographs of EUT**

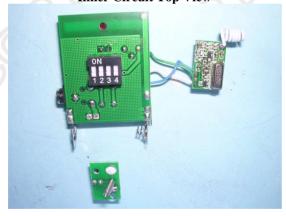
Front View of the product



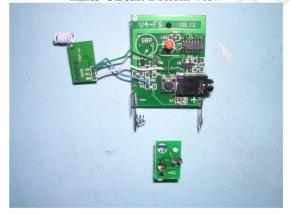
Rear View of the product



**Inner Circuit Top View** 



**Inner Circuit Bottom View** 





Date: 2009-03-04 Page 20 of 20

No. : HM162944

# **Photographs of EUT**



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

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