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No. : HM158831

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

1101 David House, 8-20 Nanking Street,

Kowloon, Hong Kong.

**Manufacturer:** Harvest One Limited.

1101 David House, 8-20 Nanking Street,

Kowloon, Hong Kong.

**Description of Samples:** Model Name: Cactus Wireless Flash Trigger

Brand Name: CACTUS<sup>TM</sup>
Model Number: PT-04
FCC ID: VAAWFT

**Date Samples Received:** 2007-05-17

**Date Tested:** 2007-06-05

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

accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2006 and ANSI C63.4:2003 for FCC Certification.

**Conclusions:** 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.

Remarks: ----

LEE Kam Chuen,
ElectroMagnetic Compatibility Department
For and on behalf of

The Hong Kong Standards and Testing Centre Ltd.



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#### <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 New Territories, Hong Kong

Telephone: 852 2666 1888 Fax: 852 2664 4353

#### 1.2 **Applicant Details Applicant**

Harvest One Limited. 1101 David House, 8-20 Nanking Street, Kowloon, Hong Kong.

#### **HKSTC Code Number for Applicant**

#### Manufacturer

Harvest One Limited. 1101 David House, 8-20 Nanking Street, Kowloon, Hong Kong.



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# 1.3 Equipment Under Test [EUT] Description of Sample

Product: Cactus Wireless Flash Trigger

Manufacturer: Harvest One Limited.

Brand Name: CACTUS<sup>TM</sup>
Model Number: PT-04

Rating: 12Vd.c ("L1028" size battery x 1)

#### 1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Harvest One Limited., 433MHz Wireless Control Flash Trigger. The transmitter is a button transmitter. The EUT continues to transmit while button is being pressed. It is button transmitter, Modulation by IC; and the type is pulse modulation.

#### 1.4 Date of Order

2007-05-17

#### 1.5 Submitted Sample(s):

1 Sample

#### 1.6 Test Duration

2007-06-05

#### 1.7 Country of Origin

China

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#### 2.0 **Technical Details**

#### 2.1 **Investigations Requested**

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 2006 and ANSI C63.4:2003 for FCC Certification.

#### **Test Standards and Results Summary Tables**

EMISSION Results Summary							
Test Condition	Test Requirement	Test Method	Class /	7	Test Resu	lt	
			Severity	Pass	Failed	N/A	
Field Strength of Fundamental Emissions & Spurious Emissions	FCC 47CFR 15.231a	ANSI C63.4:2003	N/A				
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:2003	N/A				
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.207	ANSI C63.4:2003	N/A				

Note: N/A - Not Applicable



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#### 3.0 Test Results

#### 3.1 Emission

#### 3.1.1 Radiated Emissions (30 – 1000MHz)

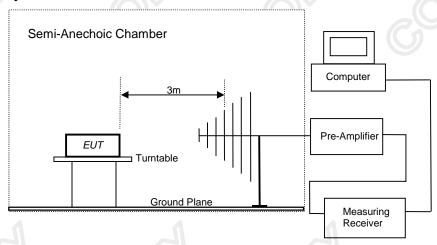
Test Requirement: FCC 47CFR 15.231a
Test Method: ANSI C63.4:2003
Test Date: 2007-06-05
Mode of Operation: Tx mode

#### **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, 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 HKSTC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

#### **Test Setup:**



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

#### **Results:**

	Field Strength of Fundamental Emissions					
	Peak Value					
Frequency	Measured	Correction	Field	Field	Limit	E-Field
	Level @3m	Factor	Strength	Strength	@3m	Polarity
MHz	$dB\mu V_{\perp}$	dB/m	$dB\mu V/m$	μV/m	μV/m	
433.90	52.8	18.6	71.4	3715.4	109,958.5	Horizontal

Field Strength of Spurious Emissions							
Peak Value							
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field	
	Level @3m	Factor	Strength	Strength		Polarity	
MHz	$dB\mu V$	dB/m	dBμV/m	$\mu V/m$	$\mu V/m$		
867.80	< 1.0	29.1	< 30.1	< 32.0	10,995.8	Vertical	
+ 1301.70	< 1.0	26.7	< 27.7	< 24.3	5,000.0	Vertical	
1735.60	< 1.0	32.2	< 33.2	< 45.7	10,995.8	Vertical	
2169.50	< 1.0	38.8	< 39.8	< 97.7	10,995.8	Vertical	
2603.40	< 1.0	17.4	< 18.4	< 8.3	10,995.8	Vertical	
3037.30	< 1.0	17.2	< 18.2	< 8.1	10,995.8	Vertical	
3471.20	< 1.0	18.8	< 19.8	< 9.8	10,995.8	Vertical	
+ 3905.10	< 1.0	19.7	< 20.7	< 10.8	5,000.0	Vertical	
+ 4339.00	< 1.0	20.6	< 21.6	< 12.0	5,000.0	Vertical	



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#### **Results:**

	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		
433.90	51.1	18.6	69.7	3054.9	10,995.8	Horizontal	

	Field Strength of Spurious Emissions							
		A	Average Value	e				
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field		
	Level @3m	Factor	Strength	Strength		Polarity		
MHz	$dB\mu V$	dB/m	dBμV/m	$\mu V/m$	$\mu V/m$			
867.80	< 1.0	29.1	< 30.1	< 32.0	1,099.6	Vertical		
+ 1301.70	< 1.0	26.7	< 27.7	< 24.3	500.0	Vertical		
1735.60	< 1.0	32.2	< 33.2	< 45.7	1,099.6	Vertical		
2169.50	< 1.0	38.8	< 39.8	< 97.7	1,099.6	Vertical		
2603.40	< 1.0	17.4	< 18.4	< 8.3	1,099.6	Vertical		
3037.30	< 1.0	17.2	< 18.2	< 8.1	1,099.6	Vertical		
3471.20	< 1.0	18.8	< 19.8	< 9.8	1,099.6	Vertical		
+ 3905.10	< 1.0	19.7	< 20.7	< 10.8	500.0	Vertical		
+ 4339.00	< 1.0	20.6	< 21.6	< 12.0	500.0	Vertical		

#### Remarks:

Adjusted by Duty Cycle = -1.7dB

FCC Limit for Average Measurement =  $41.6667(433.9MHz)-7083.3333=10,995.847\mu V/m$ 

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 ±5.2dB

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#### Limits for Radiated Emissions [FCC 47 CFR 15.209]:

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

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

#### **Results:**

Radiated Emissions Ouasi-Peak							
Frequency							
	Level @3m	Factor	Strength	Strength		Polarity	
MHz	$dB\mu V$	dB/m	dBuV/m	μV/m	μV/m		
Emissions detected are more than 20 dB below the FCC Limits							

Remarks:

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty 30MHz to 1GHz ±5.2dB



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

Test Requirement: FCC 47CFR 15.207 Test Method: ANSI C63.4:2003

Test Date: N/A Mode of Operation: N/A

Results: N/A

The EUT is operated by a single source of internal battery power [located in the battery compartment], therefore power line conducted emission was deemed unnecessary.



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#### 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: 2007-06-05 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.

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#### Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range	20dB Bandwidth	FCC Limits *
[MHz]	[KHz]	[KHz]
433.853	145	1084.6

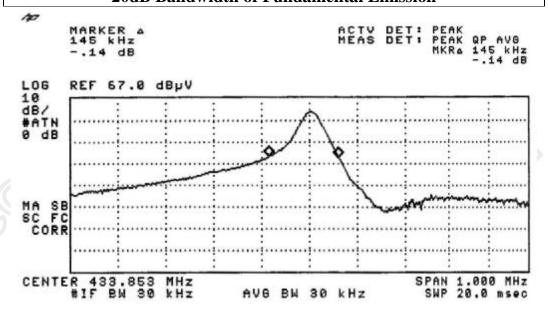
FCC Limit for Bandwidth measurement

= (0.25%)(Center Frequency)

=(0.0025)(433.853)

= 1084.6 KHz

# 20dB Bandwidth of Fundamental Emission





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#### Appendix A

### List of Measurement Equipment

#### **Radiated Emission**

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.
EM007	SPECTRUM ANALYZER	HEWLETT PACKARD	HP85660B	3144A21192
EM008	SPECTRUM ANALYZER DISPLAY	HEWLETT PACKARD	HP85662A	3144A20514
EM009	QUASI PEAK ADAPTOR	HEWLETT PACKARD	HP85650A	3303A01702
EM010	RF PRESELECTOR	HEWLETT PACKARD	HP85685A	3221A01410
EM011	ATTENUATOR/SWITCH	HEWLETT PACKARD	HP11713A	2508A10595
EM012	PRE-AMPLIFIER	HEWLETT PACKARD	HP8449B	3008A00262
EM020	HORN ANTENNA	ETS-Linggren	3115	4032
EM022	LOOP ANTENNA	ETS-Linggren	6502	1189-2424
EM072	SIGNAL GENERATOR	HEWLETT PACKARD	8640B	1948A11892
EM083	OPEN AREA TEST SITE	HKSTC	N/A	N/A
EM131	EMC ANALYZER	HEWLETT PACKARD	8595EM	3710A00155
EM145	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCS 30	830245/021
EM195	ANTENNA POSITIONING MAST	ETS-Linggren	2075	2368
EM196	MULTI-DEVICE CONTROLLER	ETS-Linggren	2090	1662
EM215	MULTIDEVICE CONTROLER	ETS-Linggren	2090	00024676
EM216	MINI MAST SYSTEM	ETS-Linggren	2075	00026842
EM217	ELECTRIC POWERED TURNTABLE	ETS-Linggren	2088	00029144
EM218	ANECHOIC CHAMBER	ETS-Linggren	FACT-3	
EM219	BICONILOG ANTENNA	ETS-Linggren	3142C	00029071
EM229	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB40	100248

### **Line Conducted**

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.
EM078	VARIAC	SHANGHAI VOLTAGE	TDGC-3/0.5	N/A
EM081	SMALL SCREENED ROOM	MIKO INST HK	N/A	N/A
EM119	LISN	ROHDE & SCHWARZ	ESH3-Z5	0831.5518.52
EM127	ISOLATION TRANSFORMER 220 TO 300V	WING SUN	N/A	N/A
EM233	PULSE LIMITER	ROHDE & SCHWARZ	ESH3-Z2	100314
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB7	100072
EM154	SHIELDING ROOM	SIEMENA MATSUSHITA COMPONENTS	N/A	803-740-057-99A
EM197	LISN	ETS-Linggren	4825/2	1193

### Remarks:-

CMCorrective Maintenance

N/A Not Applicable or Not Available

**TBD** To Be Determined





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#### Appendix B

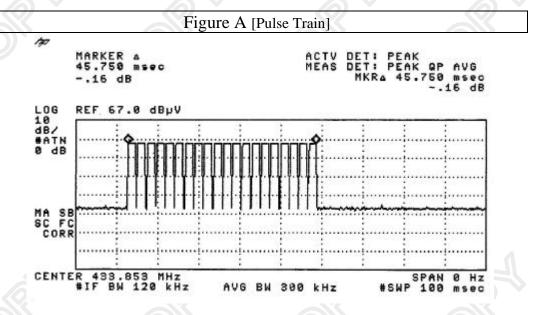
#### **Duty Cycle Correction During 100msec**

Each function key sends a different series of characters, but each packet period (45.75msec) never exceeds a series of 20 long (1.875μsec) or 20 short (1.687μsec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered 20x1.875msec per 45.75msec=81.9% duty cycle. Figure A through C show the characteristics of the pulses train for one of these functions.

#### Remarks:

Duty Cycle Correction = 20Log(0.8.19) = -1.7dB

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



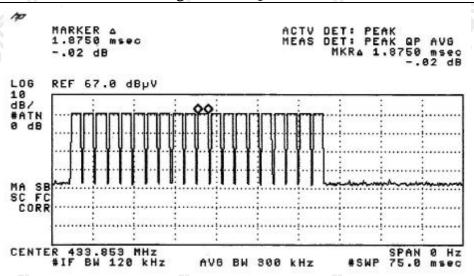
### The Hong Kong Standards and Testing Centre Ltd.



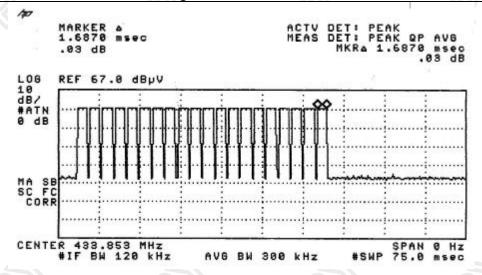
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# Figure B [Long Pulse]



# Figure C [Short Pulse]





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### 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.

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# Appendix D

# Photographs of EUT



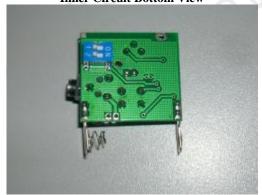
Rear View of the product



**Inner Circuit Top View** 



**Inner Circuit Bottom View** 

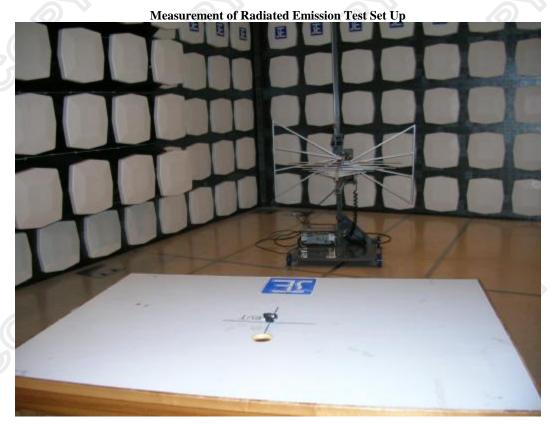




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### **Photographs of EUT**



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