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**Applicant (LET009):** Education Insights 18730 S. Wilmington Avenue Ste. 100, Rancho Dominguez, CA 90220 USA **Manufacturer:** Castlespring Ent. Ltd. 1027 Ocean Centre, Canton Road TST Hong Kong Product: Wireless Eggspert **Description of Samples:** Brand Name: Eggspert Model Number: EI-7881 FCC ID: MJO-EI-7881A **Date Samples Received:** 2009-03-09 **Date Tested:** 2009-03-19 **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. The submitted product **COMPLIED** with the requirements of **Conclusions:** 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:** 

N.

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



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No. : HM163199

# 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 1888Fax:852 2664 4353

### 1.2 Applicant Details Applicant

Education Insights 18730 S. Wilmington Avenue Ste. 100, Rancho Dominguez, CA 90220 USA

# Manufacturer

Castlespring Ent. Ltd. 1027 Ocean Centre, Canton Road TST Hong Kong



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### Equipment Under Test [EUT] Description of Sample

Product: Manufacturer: Brand Name: Model Number: Rating:

Wireless Eggspert Castlespring Ent. Ltd. Eggspert EI-7881 3Vd.c. ("AAA" size battery x 2)

# 1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is an Education Insights., Wireless Eggspert. The EUT is a one button transmitter. It is button transmitter, modulation by IC; and type is pulse modulation.

## 1.4 Date of Order

2009-03-09

# **1.5** Submitted Sample(s):

1 Sample

**Test Duration** 

2009-03-19

Country of Origin

China



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<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 Results Summary								
Test Condition	Test Requirement	Test Method	Class /	Test l	Result			
			Severity	Pass	Fail			
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					



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<u>3.0</u>	<u>Test Results</u>		
3.1	Emission		
3.1.1	Radiated Emissions (30	) – 1000MHz)	
	Test Requirement:	FCC 47CFR 15.231a	
	Test Method:	ANSI C63.4:2003	
	Test Date:	2009-03-19	
	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 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.



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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]	[µV/m]	[µV/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.

Results of Tx 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	dBμV	dB/m	dBuV/m	μV/m	μV/m	
433.95	59.0	18.5	77.5	7498.9	109,979.3	Horizontal

Field Strength of Fundamental Emissions								
	Average Value							
Frequency	Frequency Measured Correction Field Field Limit E-Field							
Level @3m		Factor	Strength	Strength	@3m	Polarity		
MHz	dBµV	dB/m	dBµV/m	μV/m	μV/m			
433.95	47.1	18.5	65.6	1905.5	10,997.9	Horizontal		



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A	Field Strength of Spurious Emissions Quasi-Peak								
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field			
	Level @3m	Factor	Strength	Strength		Polarity			
MHz	dBμV	dB/m	dBµV/m	µV/m	μV/m				
867.90	14.3	25.9	40.2	102.3	1,099.8	Horizontal			
+ 1301.85	11.1	25.2	36.3	65.3	500.0	Horizontal			
1735.80	< 1.0	32.2	< 33.2	< 45.7	1,099.8	Vertical			
2169.75	< 1.0	38.8	< 39.8	< 97.7	1,099.8	Vertical			
2603.70	< 1.0	17.4	< 18.4	< 8.3	1,099.8	Vertical			
3037.65	< 1.0	17.2	< 18.2	< 8.1	1,099.8	Vertical			
3471.60	< 1.0	18.8	< 19.8	< 9.8	1,099.8	Vertical			
+ 3905.55	< 1.0	19.7	< 20.7	< 10.8	500.0	Vertical			
+ 4339.50	< 1.0	20.6	< 21.6	< 12.0	500.0	Vertical			

Remarks:

+:

\*: Adjusted by Duty Cycle = -11.9dB

FCC Limit for Average Measurement = 41.6667(433.95MHz)-7083.3333=10,997.9 $\mu$ 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 1GHz5.2dB



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

Frequency Range	Quasi-Peak Limits
[MHz]	[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 of On mode:**

Radiated Emissions								
Quasi-Peak								
Frequency	Frequency Measured Correction Field Field Limit @3m E-Field							
	Level @3m 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								

Remarks:

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

Correction Factor includes Antenna Factor and Cable Attenuation.Calculated measurement uncertainty: 30MHz to 1GHz5.2dB



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# 3.2 20dB Bandwidth of Fundamental Emission

Test Requirement: Test Method: Test Date: Mode of Operation: FCC 47 CFR 15.231a ANSI C63.4:2003 (Section 13.1.7) 2009-03-19 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:



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## 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	ЕМСО	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:-**

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



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## **Appendix B**

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

The function key sends a different series of characters, but each packet period (100msec) never exceeds a series of 2 long pulse (3.8msec), 3 medium pulse (1.87msec) and 14 short pulses (0.873msec) 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 (14x0.873msec)+(3x1.87mesc)+(2x3.8msec) per 100msec=25.4% duty cycle. Figure A through C show the characteristics of the pulses train for one of these functions.

Remarks:

Duty Cycle Correction = 20Log(0.254) =-11.9dB

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



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



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