



## **STC Test Report**

Date : 2010-09-15

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No. : HM165655

**Applicant (KOI004):**

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

**Manufacturer:**

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

**Description of Sample(s):**

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

**Date Sample(s) Received:**

2010-08-23

**Date Tested:**

2010-08-31 to 2010-09-13

**Investigation Requested:**

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

**Conclusion(s):**

The submitted product COMPLIED with the requirements of  
Federal Communications Commission [FCC] Rules and  
Regulations Part 15. The tests were performed in accordance  
with the standards described above and on Section 2.2 in this  
Test Report.

**Remark(s):**

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

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

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### **1.0 General Details**

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

Submitted sample(s) said to be

Product: Wireless Alarm  
Manufacturer: Kolfda Electronic (Shenzhen) Ltd.  
Brand Name: Malem  
Model Number: MO15  
Rating: 12Vd.c. ("EL12" size battery x 1)

#### **1.2 Description of EUT Operation**

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

#### **1.3 Date of Order**

2010-08-23

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

1 Sample

#### **1.5 Test Duration**

2010-08-31 to 2010-09-13

#### **1.6 Country of Origin**

China

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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 2009 and ANSI C63.4:2003 for FCC Certification.

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

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

Note: N/A - Not Applicable

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### **3.0 Test Results**

#### **3.1 Emission**

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

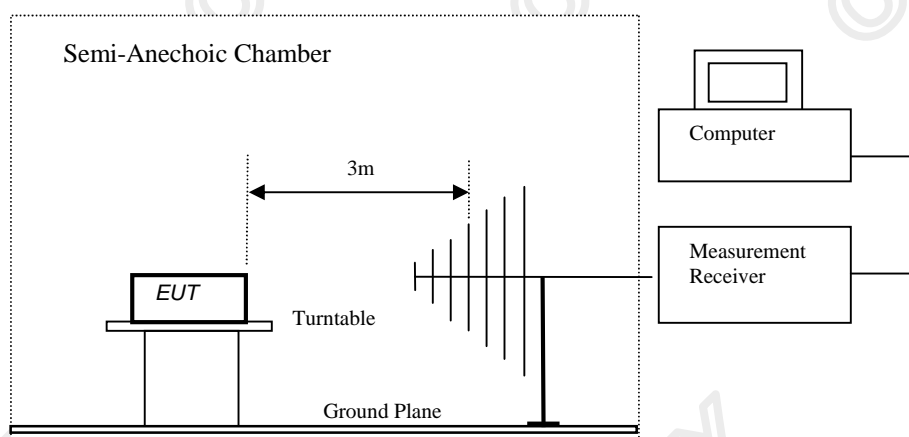
Test Requirement:	FCC 47CFR 15.231e
Test Method:	ANSI C63.4:2003
Test Date:	2010-09-13
Mode of Operation:	Tx on mode

#### **Test Method:**

The sample was placed 0.8m above the ground plane of OATS\*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

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

#### **Test Setup:**



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

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

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

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

Field Strength of Fundamental Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
433.9	63.4	18.5	81.9	12,445.1	43,983.5	Horizontal
867.8	35.7	25.7	61.4	1,174.9	4,398.3	Horizontal
+ 1301.7	26.8	28.2	55.0	562.3	5,000.0	Horizontal
1735.6	21.3	31.4	52.7	431.5	4,398.3	Horizontal
2169.5	20.0	32.9	52.9	441.6	4,398.3	Horizontal
2603.4	23.4	32.9	56.3	653.1	4,398.3	Horizontal
3037.3	< 1.0	5.8	< 6.8	< 2.2	4,398.3	Horizontal
3471.2	< 1.0	34.9	< 35.9	< 62.4	4,398.3	Horizontal
+ 3905.1	< 1.0	26.5	< 27.5	< 23.7	5,000.0	Horizontal
+ 4339.00	< 1.0	26.5	< 27.5	< 23.7	5,000.0	Horizontal

Remarks:

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

+: Denotes restricted band of operation.

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

\*: Adjusted by Duty Cycle = -9.6dB

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

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

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

Field Strength of Fundamental Emissions						
Average Value						
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
433.9	53.8	18.5	72.3	4,121.0	4,398.3	Horizontal
867.8	26.1	25.7	51.8	389.0	439.8	Horizontal
+ 1301.7	17.2	28.2	45.4	186.2	500.0	Horizontal
1735.6	11.7	31.4	43.1	142.9	439.8	Horizontal
2169.5	10.4	32.9	43.3	146.2	439.8	Horizontal
2603.4	13.8	32.9	46.7	216.3	439.8	Horizontal
3037.3	< 1.0	5.8	< 6.8	< 2.2	439.8	Horizontal
3471.2	< 1.0	34.9	< 35.9	< 62.4	439.8	Horizontal
+ 3905.1	< 1.0	26.5	< 27.5	< 23.7	500.0	Horizontal
+ 4339.00	< 1.0	26.5	< 27.5	< 23.7	500.0	Horizontal

**Remarks:**

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

+: Denotes restricted band of operation.

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

\*: Adjusted by Duty Cycle = -9.6dB

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

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

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

Frequency Range [MHz]	Quasi-Peak Limits [μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

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

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

Emissions detected are more than 20 dB below the FCC Limits

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

Emissions detected are more than 20 dB below the FCC Limits

#### **Remarks:**

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

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

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### **3.2 20dB Bandwidth of Fundamental Emission**

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

#### **Test Method:**

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

#### **Test Setup:**

As Test Setup of clause 3.1.1 in this test report.

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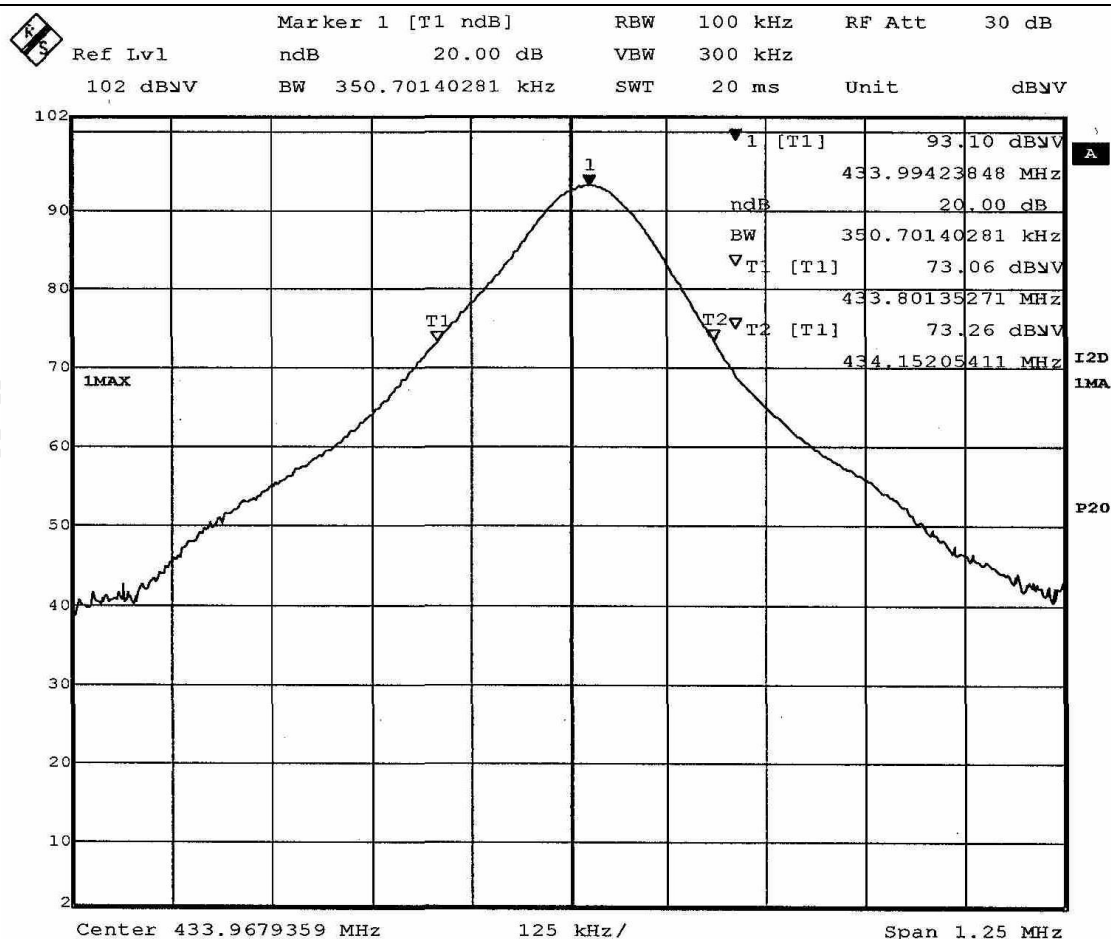
No. : HM165655

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

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

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

### 20dB Bandwidth of Fundamental Emission



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### **Appendix A**

#### **List of Measurement Equipment**

##### **Radiated Emission**

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

#### **Remarks:-**

CM      Corrective Maintenance

N/A     Not Applicable

TBD     To Be Determined

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### **Appendix B**

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

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

Remarks:

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

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

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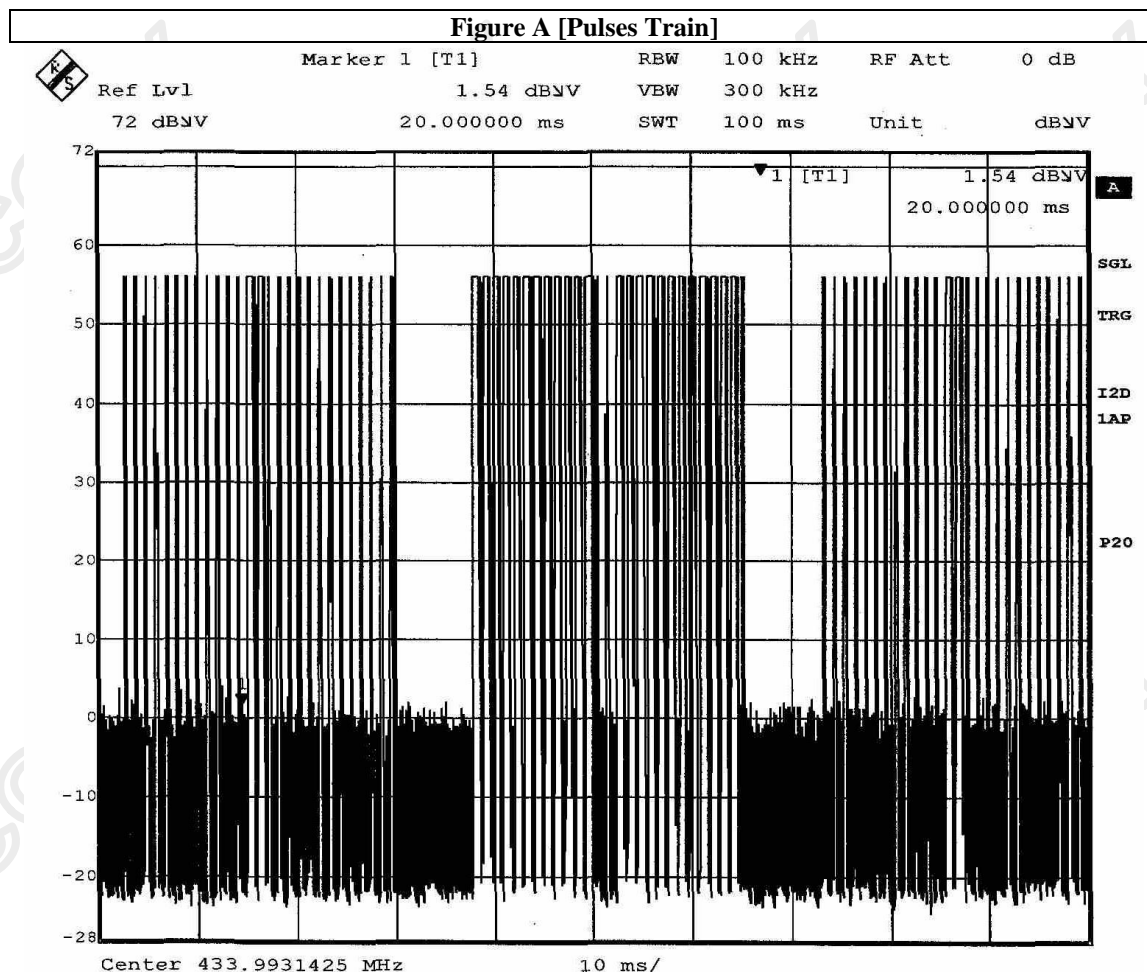
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Figure A [Pulses Train]



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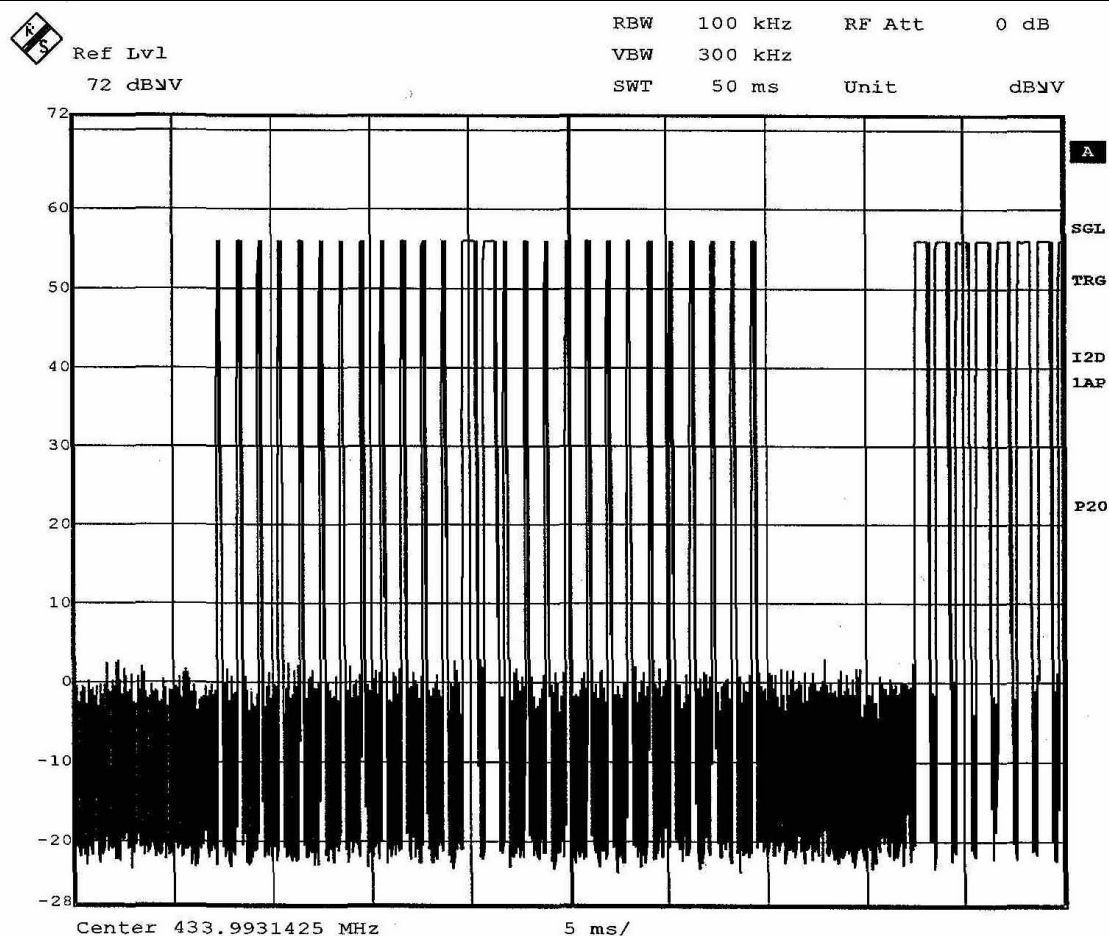
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Figure B [Closer Look on pulse train]



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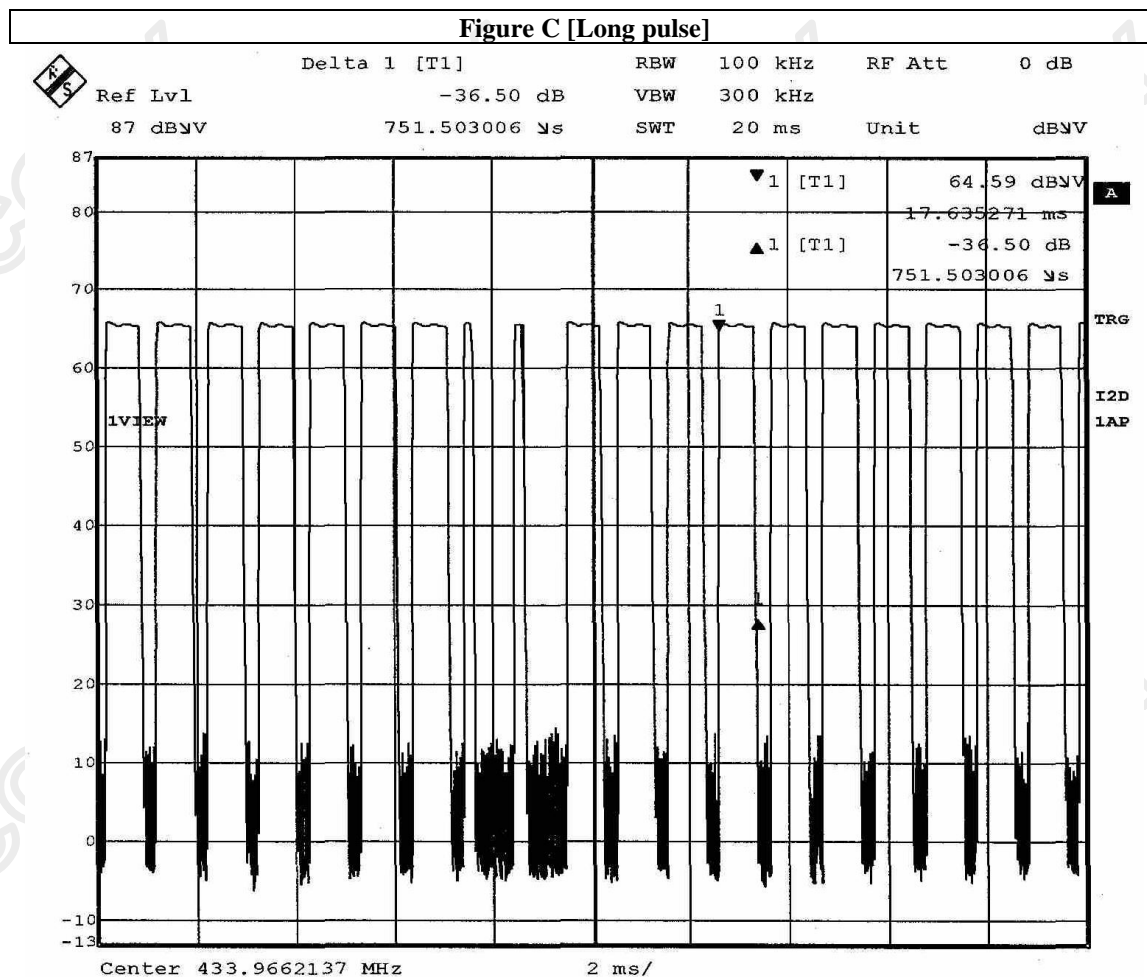
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Figure C [Long pulse]



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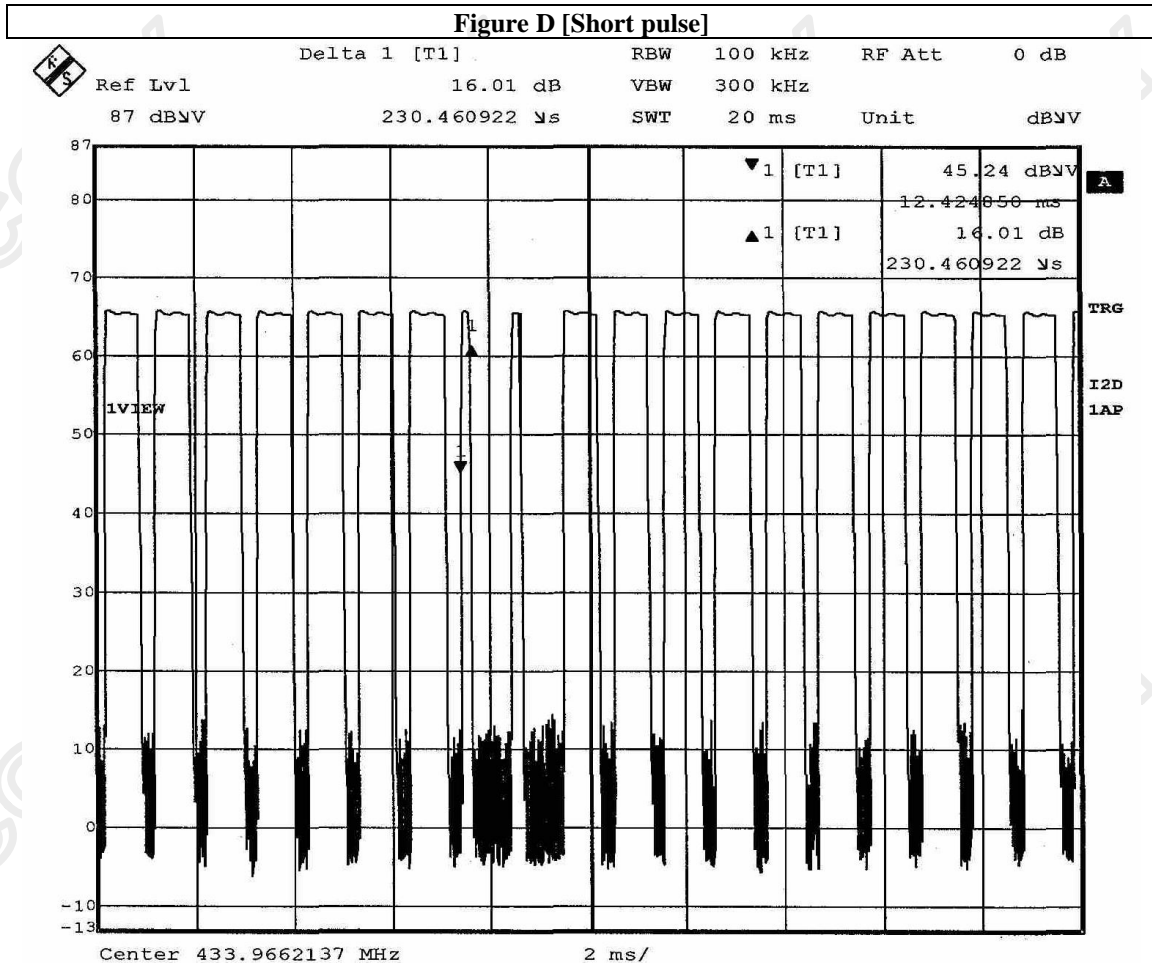
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Figure D [Short pulse]



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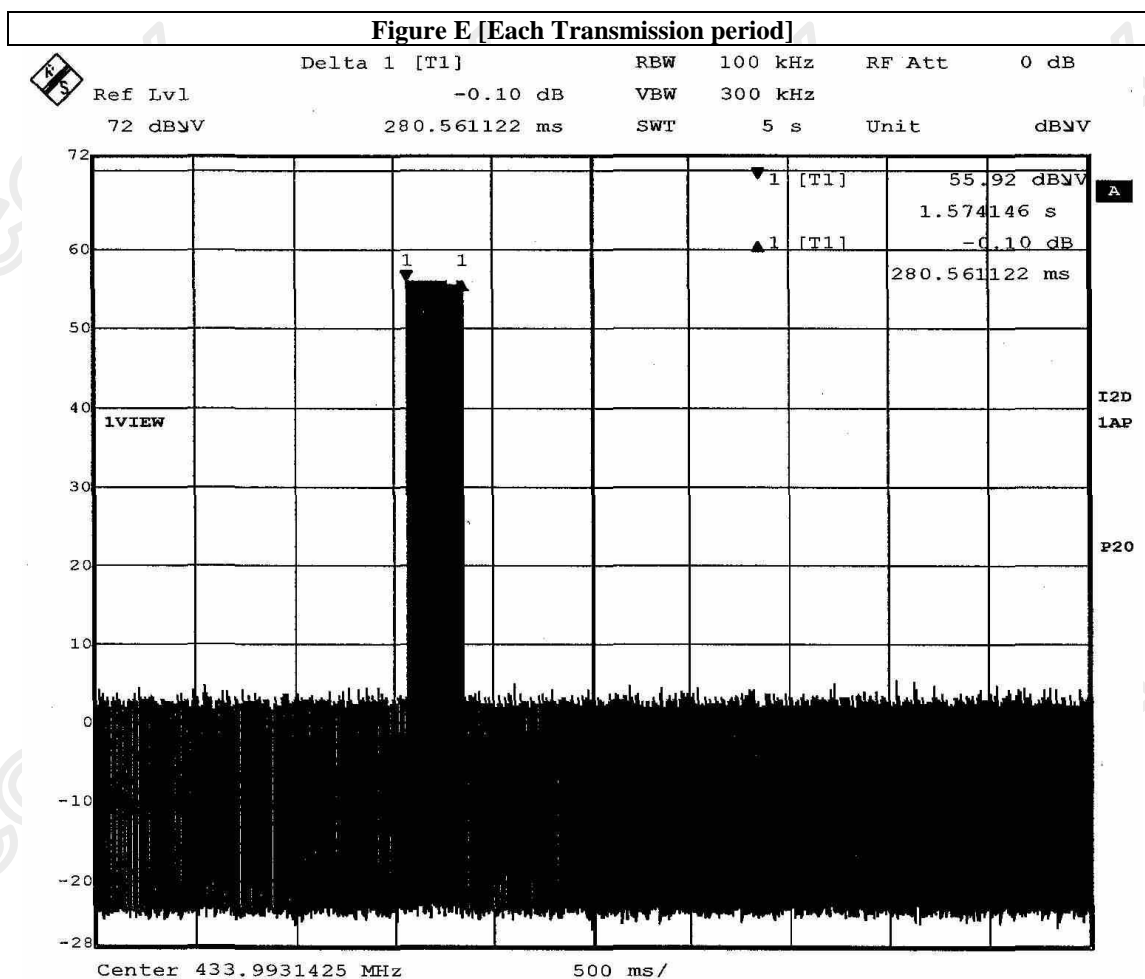
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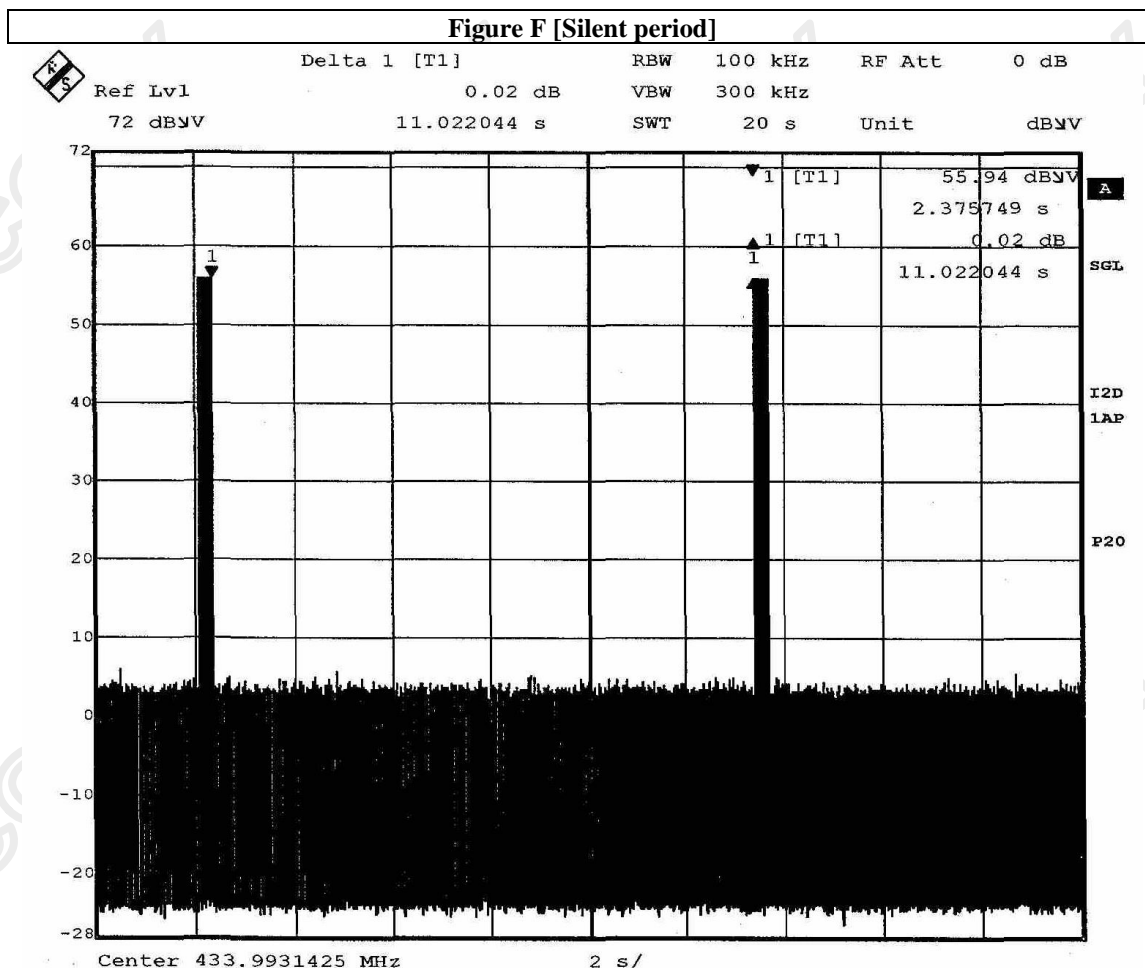
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Figure F [Silent period]



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### **Appendix C**

#### **Periodic Operation [FCC 47CFR 15.231(e)]**

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

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

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## **STC Test Report**

Date : 2010-09-15

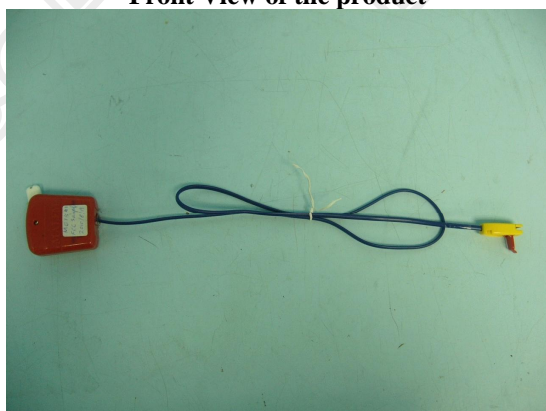
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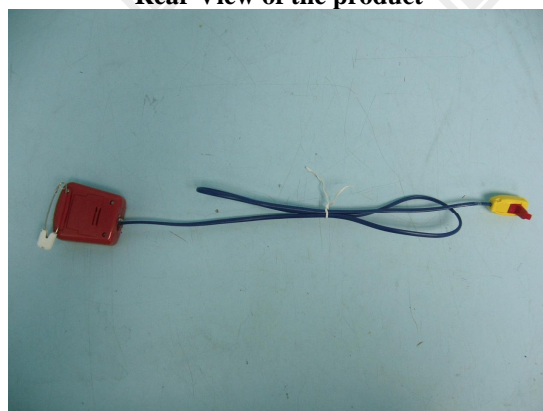
### **Appendix D**

#### **Photographs of EUT**

**Front View of the product**



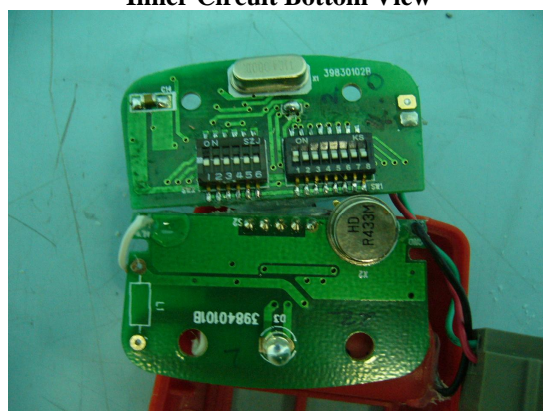
**Rear View of the product**



**Inner Circuit Top View**



**Inner Circuit Bottom View**



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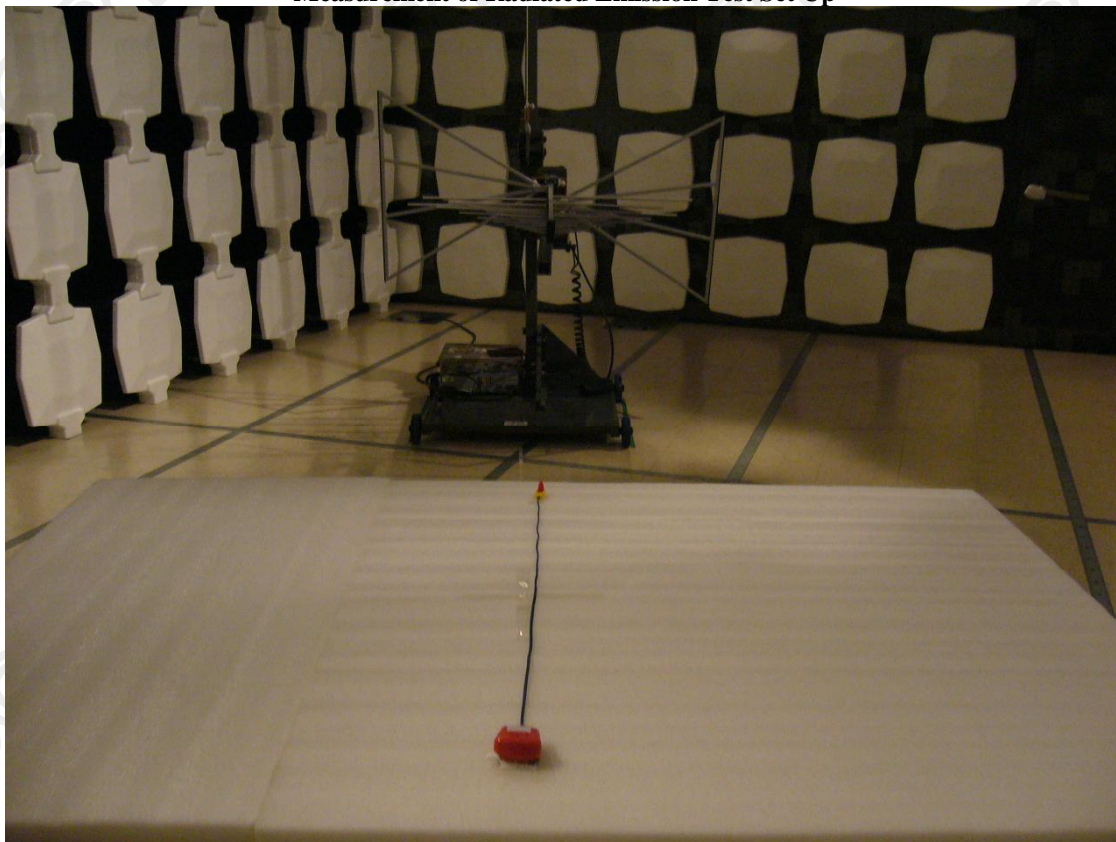
Date : 2010-09-15

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### **Photographs of EUT**

**Measurement of Radiated Emission Test Set Up**



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

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