



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AR0040285(8) Date : 29 Jul 2013

Application No. : LR006869(7)

Applicant : E Measuring Device Limited  
3/F, Fook Cheong Building,  
63 Hoi Yuen Road, Kwun Tong  
Hong Kong

Sample Description : One(1) item of submitted sample stated to be Digital Measuring Tape with USB  
RF Receiver of Model No. DT-138  
Sample registration No. : RR023627-001  
Radio Frequency : 2440MHz Transmitter  
Rating : 2 x 1.5V AAA size batteries  
No. of submitted sample : One (4) set (s)

Date Received : 23 Apr 2013

Test Period : 23 Apr 2013 to 08 Jul 2013.

Test Requested : FCC Part 15 Certification.

Test Method : 47 CFR Part 15 (10-1-12 Edition)  
ANSI C63.4 – 2009  
KDB Publication No. 558074


Test Engineer : Mr. LEUNG Shu-kan, Ken

Test Result : See attached sheet(s) from page 2 to 23.

Conclusion : The submitted sample was found to comply with requirement of FCC Part 15  
Subpart C.

For and on behalf of  
CMA Industrial Development Foundation Limited

Authorized Signature : \_\_\_\_\_

  
Mr. WONG Lap-pong, Andrew  
Assistant Manager  
Electrical Division

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FCC ID: 2AA07-DT138



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### 1 General Information

#### 1.1 General Description

The equipment under test (EUT) is a transmitter for DT-138 Digital measuring tape. The EUT is powered by 2 x 1.5V AAA size batteries. When the tape is pulled out, the length is measured and sent to MCU for calculation. Then the LCD displays the length. Once the transmit button is pressed, the data will be sent to receiver by RF signal.

The brief circuit description is listed as follows:

- D2, Q1, U3 and its associated circuit act as measuring circuit.
- U5 and its associated circuit act as MCU.
- U1 and its associated circuit act as RF power amplifier.
- C4, L1, C5, C22, L7, L8, C23, C24 and its associated circuit act as band pass filter.



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## 1.2 Location of the test site

FCC Registered Test Site Number: 552221

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.4 – 2009. A Semi-Anechoic Chamber Testing Site is set up for investigation and located at:

Ground Floor, Yan Hing Centre,  
9 – 13 Wong Chuk Yeung Street,  
Fo Tan, Shatin,  
New Territories,  
Hong Kong.

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.4 – 2009. A shielded room is located at :

Ground Floor, Yan Hing Centre,  
9 – 13 Wong Chuk Yeung Street,  
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## 1.3 List of measuring equipment

Equipment	Manufacturer	Model No.	Serial No.	Calibration Due Date
EMI Test Receiver	R&S	ESCS 30	100001	15 Aug 2013
Spectrum Analyzer	R&S	FSP30	100628	15 Aug 2013
Broadband Antenna	Schaffner	CBL6112B	2692	16 Jan 2014
Loop Antenna	EMCO	6502	00056620	15 Sep 2013
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	09 Oct 2014
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170442	16 May 2015
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	09 Oct 2014
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	16 May 2015
Coaxial Cable	Schaffner	RG 213/U	N/A	16 May 2015
Coaxial Cable	Suhner	RG 214/U	N/A	16 May 2015
Coaxial Cable	Suhner	Sucoflex_102	N/A	09 Oct 2014



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## 1.4 Measurement Uncertainty

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a level of confidence of approximately 95%.

### Radiated emissions

Frequency	Uncertainty ( $U_{lab}$ )
30MHz ~ 200MHz (Horizontal)	4.83dB
30MHz ~ 200MHz (Vertical)	4.84dB
200MHz ~1000MHz (Horizontal)	4.66dB
200MHz ~1000MHz (Vertical)	4.65dB

### Conducted emissions

Frequency	Uncertainty ( $U_{lab}$ )
150kHz~30MHz	3.02dB



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## 2 Description of the radiated emission test

### 2.1 Test Procedure

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.4 – 2009 and KDB Publication No. 558074.

The equipment under test (EUT) was placed on a non-conductive turntable with dimensions of 1.5m x 1m and 0.8m high above the ground. 3m from the EUT, a broadband antenna mounting on the mast received the signal strength. The turntable was rotated to maximize the emission level. The antenna was then moving along the mast from 1m up to 4m until no more higher value was found. Both horizontal and vertical polarization of the antenna were placed and investigated.

For below 30MHz, a loop antenna with its vertical plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1 m above the ground.

For 30MHz to 2GHz, broadband antenna with its vertical and horizontal plane is placed 3m from the EUT and rotated about its vertical and horizontal axis for maximum response at each azimuth about the EUT. And the reference point of antenna shall be 1 m above the ground.

For above 2GHz, horn antenna with its vertical and horizontal plane is placed 3m from the EUT and rotated about its vertical and horizontal axis for maximum response at each azimuth about the EUT. Preamplifier and High Pass filter was used for measurements. The reference point of antenna shall be 1 m above the ground.

The device was rotated through three orthogonal axes to determine which attitude and configuration produce the highest emission during measurement for Radiated Emission measurement.

The antenna output terminal was connected to spectrum analyzer directly for conducted output power measurement.



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### 2.2 Test Result

#### Subpart C:

Peak Detector and Average Detector data were measured unless otherwise stated.

“#” means emissions appear within the restricted bands shall follow the requirement of section 15.205.

The harmonic emissions meet the requirement of section 15.209 are based on measurements employing the CISPR quasi-peak detector below 1000MHz and average detector for frequencies above 1000MHz.

It was found that the EUT meet the FCC requirement.





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## 2.3 Radiated Emission Measurement Data

### Conductive measurements

pursuant to

the requirement of FCC Part 15 subpart C

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	27	° C
Relative humidity:	70	%

Detector: Quasi-peak (outside operation band)

RBW: 120kHz

VBW: 300kHz

Frequency (MHz)	Polarity (H/V)	Reading at 3m (dBμV)	Antenna Factor and Cable Loss (dB/m)	Field Strength at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
150.107	H	7.6	14.5	22.1	43.5	- 21.4
190.287	H	12.2	11.2	23.4	43.5	- 20.1
227.993	V	11.4	11.9	23.3	46.0	- 22.7
239.993	V	12.3	11.9	24.2	46.0	- 21.8
251.992	V	9.9	15.0	24.9	46.0	- 21.1
263.992	V	10.5	15.0	25.5	46.0	- 20.5
275.992	V	11.4	15.0	26.4	46.0	- 19.6
287.991	V	11.1	15.0	26.1	46.0	- 19.9
299.991	V	10.6	15.0	25.6	46.0	- 20.4
311.911	V	10.0	15.9	25.9	46.0	- 20.1



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## 2.3 Radiated Emission Measurement Data

### Radiated emission

pursuant to

the requirement of FCC Part 15 subpart C

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	24	° C
Relative humidity:	71	%

Operation Mode: Transmission

Peak: Measurement

RBW: 1MHz

VBW: 3MHz

Frequency (MHz)	Polarity (H/V)	Reading at 3m (dBμV)	Transducer Factor (dB/m)	Field Strength at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
2439.958	V	64.3	- 6.3	58.0	114.0	- 56.0
# 4879.829	V	50.6	2.0	52.6	74.0	- 21.4
# 4879.858	H	51.2	2.0	53.2	74.0	- 19.8
# 7319.726	V	40.9	10.2	51.1	74.0	- 22.9

Remark: Peak measurement values are lower than average limit, therefore average measurement is not necessary.



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**2.4 Conducted Emission Measurement Data**

**Conducted emission**

**pursuant to**

**the requirement of FCC Part 15 subpart C**

Operation Mode: Transmission

Frequency (MHz)	Reading (dBμV)	Reading (mW)	Limit (mW)	Margin (mW)
2440.087	67.1	0.0015	1000.0	- 999.9985



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### **3 Description of the Line-conducted Test**

#### **3.1 Test Procedure**

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.4 – 2009. The EUT was setup as described in the procedures, and both lines were measured.

#### **3.2 Test Result**

No measurement is required as the EUT is a battery-operated product.

#### **3.3 Graph and Table of Conducted Emission Measurement Data**

Not Applicable





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#### **4 Photograph**

##### **4.1 Photographs of the Test Setup for Radiated Emission and Conducted Emission**

For electronic filing, the photos are saved with filename TSup1.jpg to TSup2.jpg.

##### **4.2 Photographs of the External and Internal Configurations of the EUT**

For electronic filing, the photos are saved with filename ExPho1.jpg to ExPho2.jpg and InPho1.jpg to InPho4.jpg.



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## 5 Supplementary document

The following document were submitted by applicant, and for electronic filing, the document are saved with the following filenames:

Document	Filename
ID Label/Location	LabelSmp.jpg
Block Diagram	BlkDia.pdf
Schematic Diagram	Schem.pdf
Users Manual	UserMan.pdf
Operational Description	OpDes.pdf

### 5.1 Bandwidth

The plot saved in TestRpt2.pdf shows the band edge is fulfil 15.205 restricted band, and 15.247(d) requirement.

The plot saved in TestRpt3.pdf shows the 6dB bandwidth has minimum 500kHz for frequency channel 2440MHz. It fulfils the section 15.247(a) requirement.

### 5.2 Duty cycle

Not Applicable

### 5.3 Transmission time

Not Applicable

### 5.4 Power Spectral Density

The plot saved in TestRpt4.pdf shows the frequency channel 2440MHz were not excess 8dBm for 3kHz bandwidth. It fulfils 15.247 (e) requirement.



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## 6 Appendices

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A2	Photos of External Configurations	1	page
A3	Photos of Internal Configurations	2	pages
A4	ID Label/Location	1	page
A5	Band Edge Plot	1	page
A6	6dB Bandwidth Plot	1	page
A7	Power Spectral Density	1	page

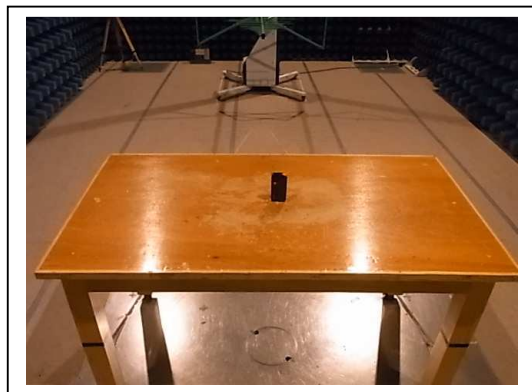


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**A1. Photos of the set-up of Radiated Emissions**



(Front view)



(Back view)

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Reviewed by:

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### A2. Photos of External Configurations



External Configuration 1



External Configuration 2

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Mr. WONG Lap-pong, Andrew



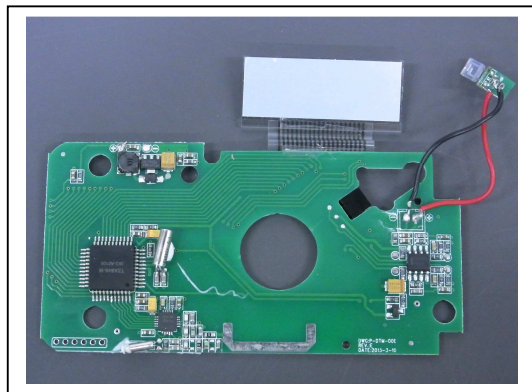
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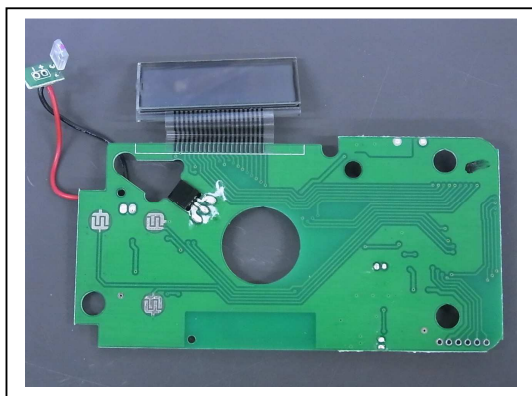
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## A3. Photos of Internal Configurations



Internal Configuration 1



Internal Configuration 2

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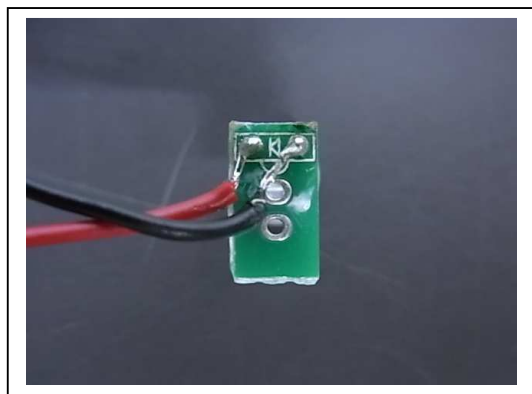
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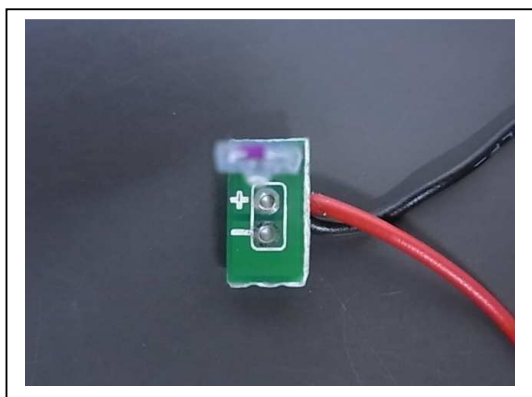
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### A3. Photos of Internal Configurations



Internal Configuration 3



Internal Configuration 4

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**A4. ID Label / Location**



ID Label 1

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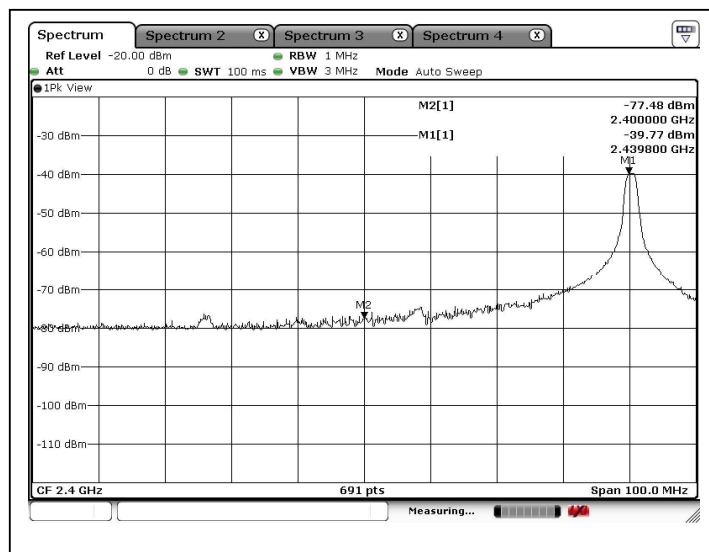
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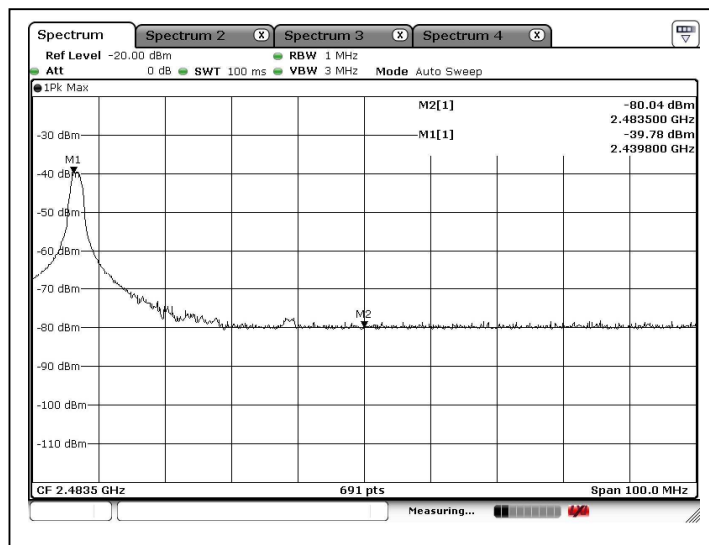
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### A5. Band edge Plot



Band edge 1



Band edge 2

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Reviewed by:

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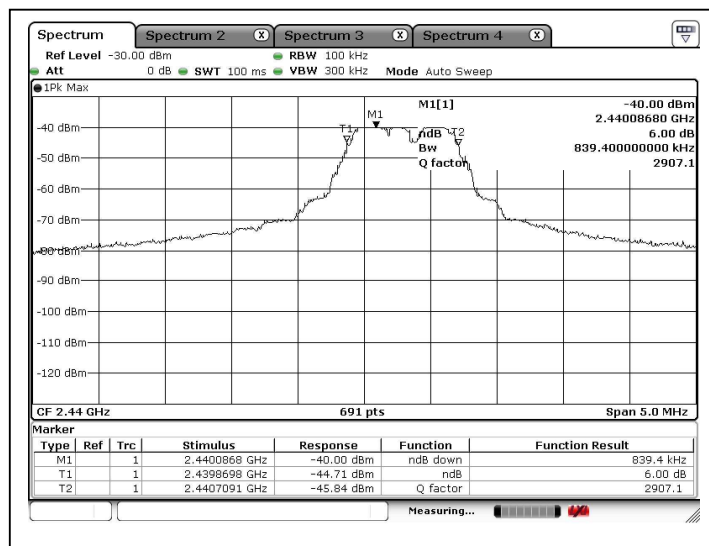
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## A6. 6dB Bandwidth Plot



Bandwidth 1

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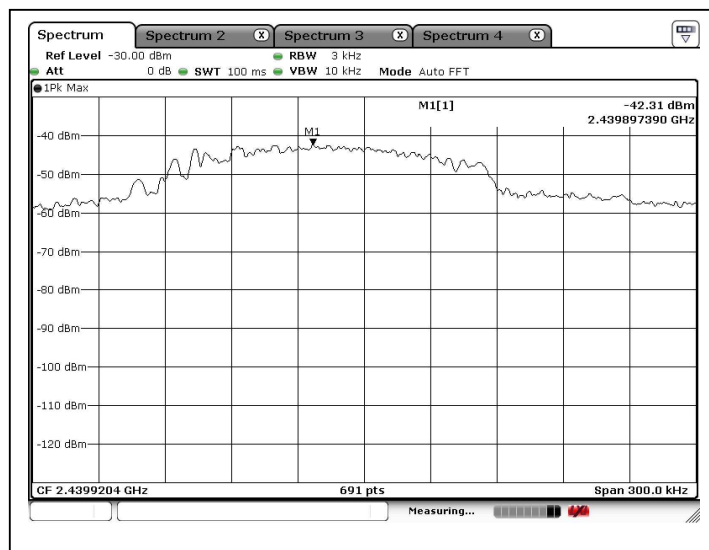
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## A7. Power Spectral Density



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

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