

Advanced Compliance Laboratory

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# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

of

Mini-Receiver

**MODEL: CL-MR**

**FCC ID: OF7CLMR & IC: 3575A-CLMR**

May 24,2012

This report concerns (check one): Original grant <input checked="" type="checkbox"/> Class II change <input type="checkbox"/>	
Equipment type: <u>Low Power Intentional Radiator</u>	
Deferred grant requested per 47 CF 0.457(d)(1)(ii)?	yes <input type="checkbox"/> no <input checked="" type="checkbox"/>
If yes, defer until: _____ (date)	
Company agrees to notify the Commission by _____ (date)	
of the intended date of announcement of the product so that the grant can be issued on that date.	
Transition Rules Request per 15.37?	yes <input type="checkbox"/> no <input checked="" type="checkbox"/>
Test Specification: 47 CFR FCC Part 15C & Industry Canada RSS-210/RSS-Gen	
Report prepared for:	THE TORO COMPANY
Report prepared by:	Advanced Compliance Lab
Report number:	0048-120425-02



Lab Code: 200101

The test result in this report IS supported and covered by the NVLAP accreditation

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## 1. GENERAL INFORMATION

### 1.1 Verification of Compliance

EUT: MiniRECEIVER

Model: CL-MR

Applicant: THE TORO COMPANY

Test Type: FCC Part 15C CERTIFICATION  
IC RSS-210 (Issue 8) & RSS-Gen CERTIFICATION

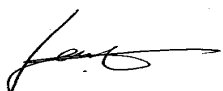
Result: PASS

Tested by: ADVANCED COMPLIANCE LABORATORY

Test Date: 04/25/2012 - 05/24/2012

Report Number: 0048-120425-02

The above equipment was tested by Compliance Laboratory, Advanced Technologies, Inc. for compliance with the requirement set forth in the FCC/IC rules and regulations Part 15 subpart C. This said equipment in the configuration described in the report, shows the maximum emission levels emanating from equipment are within the compliance requirements.



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Wei Li  
Lab Manager  
Advanced Compliance Lab

Date May 24, 2012

## **1.2 Equipment Modifications**

N/A

### 1.3 Product Information

#### System Configuration

ITEM	DESCRIPTION	FCC/IC ID	CABLE
Product	MINIRECEIVER <sup>(1)</sup>	FCC ID: OF7CLMR IC: 3575A-CLMR	
Housing	PLASTICS		
Power Supply	AC-DC adapter, I/P:120Vac, O/P:+9Vdc		
Operation Freq.	906MHz ~ 922MHz		
Receiver	CL-MR(RX)	Verification	

(1) EUT submitted for grant.

### 1.4 Test Methodology

Radiated tests were performed according to the procedures in ANSI C63.4-2003 at an antenna to EUT distance of 3 meters.

### 1.5 Test Facility

The open area test site and conducted measurement facility used to collect the radiated and conducted data are located at Hillsborough, New Jersey. This site has been accepted by FCC to perform measurements under Part 15 or 18 (Registration No. 886209) and designated by IC as “Site IC 3130A”. The NVLAP Lab code for accreditation of FCC EMC Test Method is: 200101-0.

### 1.6 Test Equipment

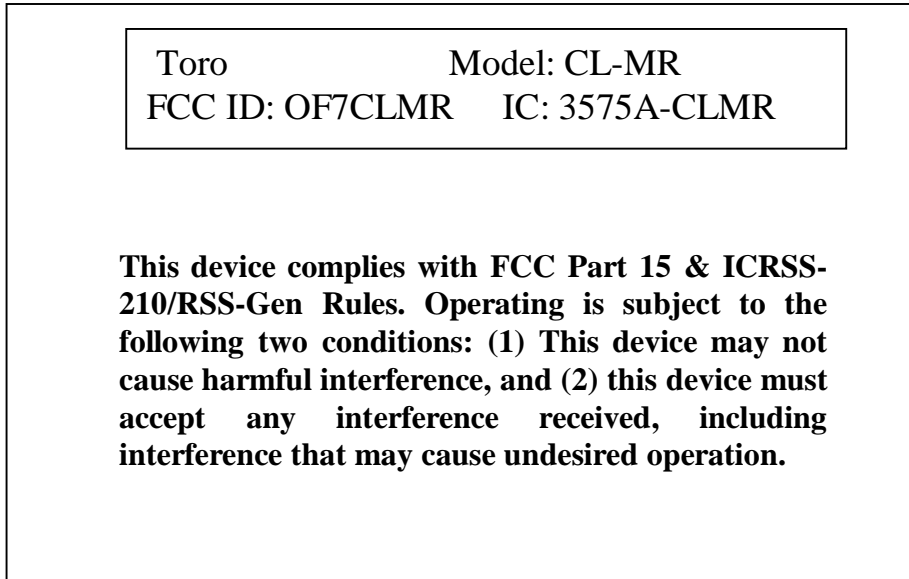
Manufacture	Model	Serial No.	Description	Cal Due dd/mm/yy
Hewlett-Packard	HP8546A	3448A00290	EMI Receiver	15/10/12
Agilent	E4440A	US40420700	3Hz-26.5GHz Spectrum Analyzer	25/8/12
EMCO	3104C	9307-4396	20-300MHz Biconical Antenna	15/01/13
EMCO	3146	9008-2860	200-1000MHz Log-Periodic Antenna	15/01/13
EMCO	3115	4945	Double Ridge Guide Horn Antenna	22/01/13
Electro-Meterics	ALR-25M/30	289	10KHz-30MHz Active Loop Antenna	5/28/12
Fischer Custom	LISN-1	900-4-0008	Line Impedance Stabilization Networks	18/03/13
Fischer Custom	LISN-2	900-4-0009	Line Impedance Stabilization Networks	24/03/13

All Test Equipment Used are Calibrated Traceable to NIST Standards.

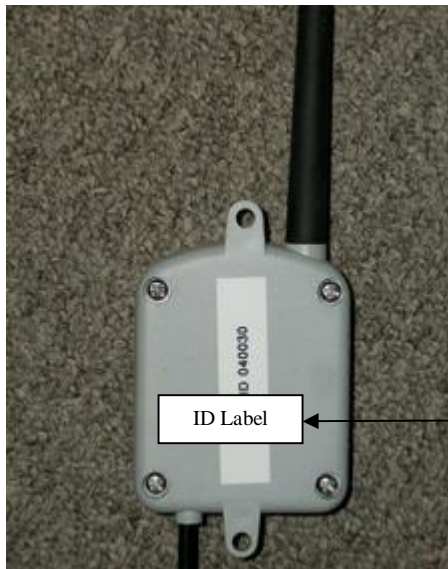
**1.7 Statement for the Document Use**

This report shall not be reproduced except in full, without the written approval of the laboratory. And this report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. / Canada Government.

## 2. PRODUCT LABELING



**Figure 2.1 ID Label  
(Only ID shown on EUT)**



**Figure 2.2 Location of ID Label on EUT**



### **3. SYSTEM TEST CONFIGURATION**

#### **3.1 Justification**

The system was configured for testing in a typical fashion (as a customer would normally use it). And its antenna was permanently attached to the EUT with max length, 3.2". Testing was performed as EUT was continuously operated at the following frequency channels:

**Low=906MHz, Middle= 914MHz, High=922MHz.**

If applicable, fresh external battery shall be used for extended operating time.

#### **3.2 Special Accessories**

N/A

#### **3.3 Configuration of Tested System**

Figure 3.1 illustrate this system, which is tested standing along.



**Figure 3.1 Radiated Test Setup**



**Figure 3.2 Conducted Setup- Front**



**Figure 3.3 Conducted Setup- Rear**

## **4. SYSTEM SCHEMATICS**

**See Attachment.**

**Figure 4.1 System Schematics**

## 5. CONDUCTED EMISSION DATA

### 5.1 Test Methods and Conditions

The EUT was under normal operational mode during the conducted emission test. EMI Receiver was scanned from 150KHz to 30MHz with maximum hold mode for maximum emission. Recorded data was sent to the plotter to generate output in linear format. At the input of the spectrum analyzer, a HP transient limiter is inserted for protective purpose. This limiter has a 10 dB attenuation in the range of 150KHz to 30MHz. That factor was automatically compensated by the receiver, so the readings are the corrected readings. The reference of the plot is the CISPR 22 Class B limit in Figure 5.1 through Figure 5.2.

Conducted Emission Technical Requirements				
Frequency Range	Class A		Class B	
	Quasi-Peak dBuV	Average dBuV	Quasi-Peak DBuV	Average dBuV
150kHz -0.5MHz	79 (8912uV)	66 (1995uV)	66-56	56-46
0.5MHz-30MHz	73 (4467uV)	60 (1000uV)	---	---
0.5MHz- 5MHz	---	---	56	46 (250uV)
5MHz-30MHz	---	---	60	50

Emissions that have peak values close to the specification limit (if any) are also measured in the quasi-peak/average mode to determine compliance.

### 5.2 Test Data

Figure 5.1-5.2 show the neutral and line conducted emissions for the standard operation.

Highest Data for AC Line Conducted Emissions						
Frequency (MHz)	0.41	0.54	0.61	0.69	1.72	1.92
Peak Reading (dBuV)	45.9	43.3	45.1	38.1	42.6	42.0
Average Reading (dBuV*)			38.2			

\* no need to show the average reading if the peak value is under average limit.

Test Personnel:



Tester Signature: \_\_\_\_\_

Typed/Printed Name: Edward Lee

Date: May 24,2012

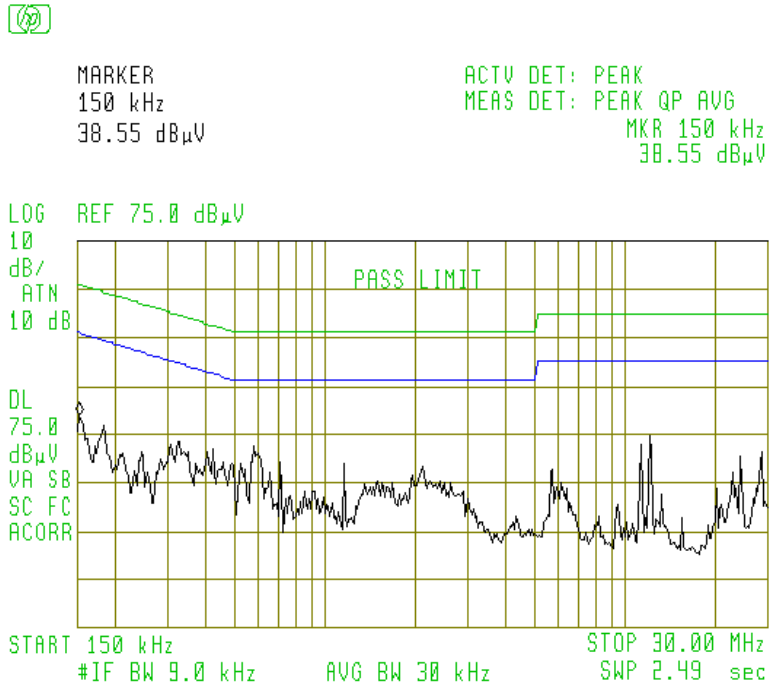


Fig. 5.1 Conducted Emission-Line

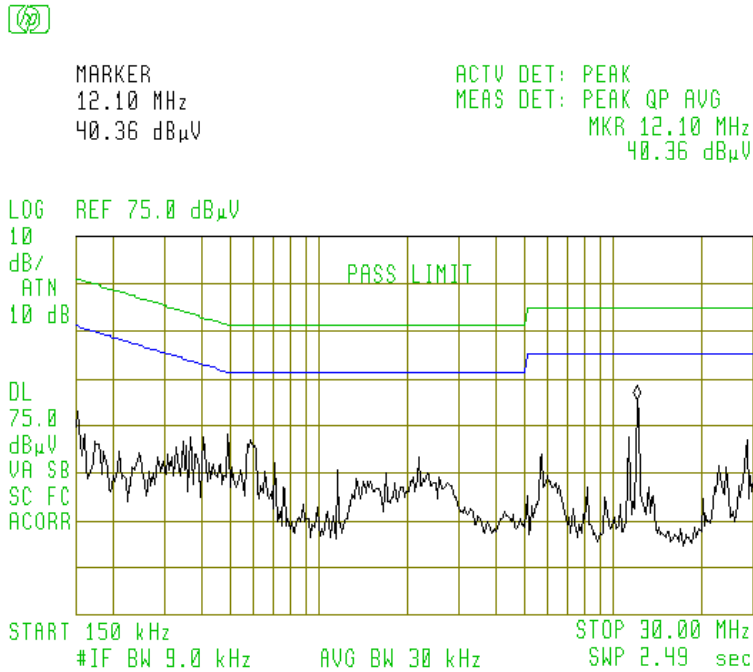


Fig. 5.2 Conducted Emission- Neutral

## 6. RADIATED EMISSION DATA

### 6.1 Field Strength Calculation

The corrected field strength is automatically calculated by EMI Receiver using following:

$$FS = RA + AF + CF + AG$$

where FS: Corrected Field Strength in dB $\mu$ V/m

RA: Amplitude of EMI Receiver before correction in dB $\mu$ V

AF: Antenna Factor in dB/m

CF: Cable Attenuation Factor in dB

AG: Built-in Preamplifier Gain in dB (Stored in receiver as part of the calibration data)

THE "DUTY CYCLE CORRECTION FACTOR" FOR SPURIOUS RADIATED EMISSIONS IS;  
 $20 \log * (12 \times 2 \text{ ms} / 100 \text{ ms}) = -12.4 \text{ dB}$ , WHICH WAS USED TO CORRECT THE AVERAGE  
 RADIATED EMISSION READINGS.

### 6.2 Test Methods and Conditions

The initial step in collecting radiated data is a EMI Receiver scan of the measurement range below 30MHz using peak detector and 9KHz IF bandwidth / 30KHz video bandwidth. For the range 30MHz - 1GHz, 100KHz IF bandwidth / 100KHz video bandwidth are used. Both bandwidths are 1MHz for above 1GHz measurement. Up to 10<sup>th</sup> harmonics were investigated.

### 6.3 Test Data

The following data lists the significant emission frequencies, polarity and position, peak reading of the EMI Receiver, the FCC/IC limit, and the difference between the peak reading and the limit. Explanation of the correction and calculation are given in section 5.1.

Test Personnel: \_\_\_\_\_



Typed/Printed Name: Edward Lee

Date: May 24, 2012

**Radiated Test Data (CH-906MHz/914MHz/922MHz)**

Frequency (MHz)	Polarity (V,H) Position (X,Y,Z)	Antenna Height (m)	Azimuth (Degree)	Peak/QP Reading at 3m (2) (dBuV/m)	Reading After Correction (dBuV/m)	FCC/IC 3m Limit (1) (dBuV/m)	Difference (dBuV/m)
906	V	1.2	080	82.8*		94	-11.2
1812	V	1.1	080	59.8	47.4	54	-6.6
2718	V	1.1	015	55.1	42.7	54	-11.3
906	H	1.1	180	84.3*		94	-9.7
1812	H	1.0	180	59.5	47.1	54	-6.9
2718	H	1.0	185	56.9	44.5	54	-9.5
914	V	1.2	270	88.3*		94	-5.7
1828	V	1.1	250	63.5	51.1	54	-2.9
2712	V	1.1	160	56.2	43.8	54	-10.2
914	H	1.1	100	83.7*		94	-10.3
1828	H	1.0	255	58.3	45.9	54	-8.1
2742	H	1.0	160	56.1	43.7	54	-10.3
922	V	1.2	090	90.5*		94	-3.5
1844	V	1.1	090	64.4	52.0	54	-2.0
2766	V	1.1	205	57.0	44.6	54	-9.4
922	H	1.1	270	84.7*		94	-9.3
1844	H	1.0	260	59.5	47.1	54	-6.9
2766	H	1.0	230	53.6	41.2	54	-12.8

\* All fundamentals are QP reading.

(1) The limit for emissions within the 902-928MHz band is 50mV(94dB) per FCC Part 15 Sec. 15.249 and IC RSS-210 Annex 2.9. The limit for its harmonics is 500uV (54dB). Other spurious emissions shall be lower than either its fundamental by 50dB or the limit defined in FCC Part 15 Sec. 15.209 and IC RSS-210 Annex 7, whichever is higher.

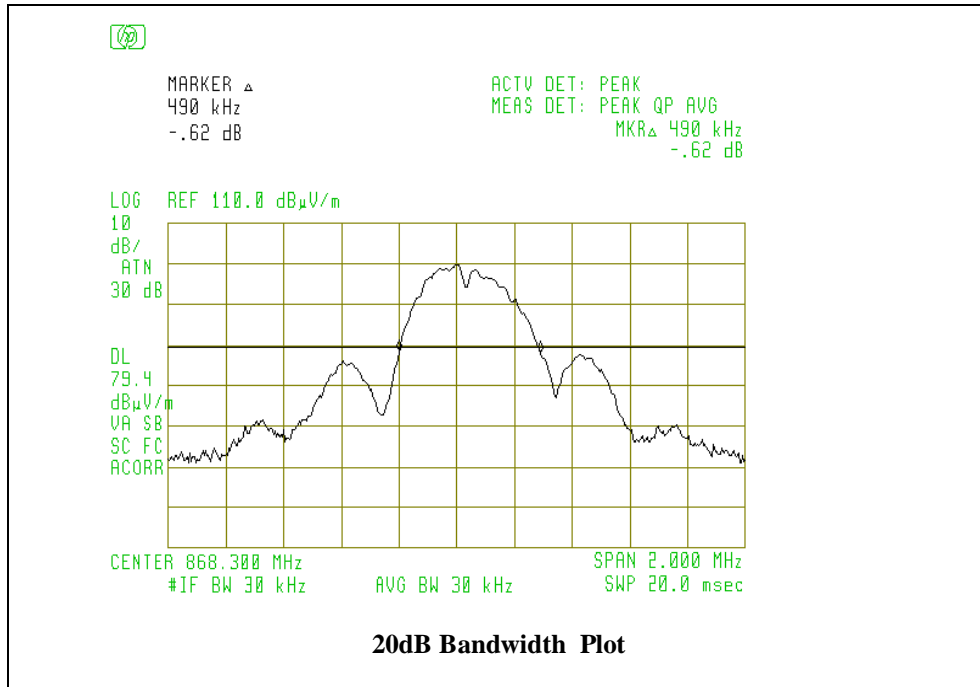
(2) If each peak reading is less than the FCC/IC average limit, it'll be not necessary to show the measured/ calculated average reading.

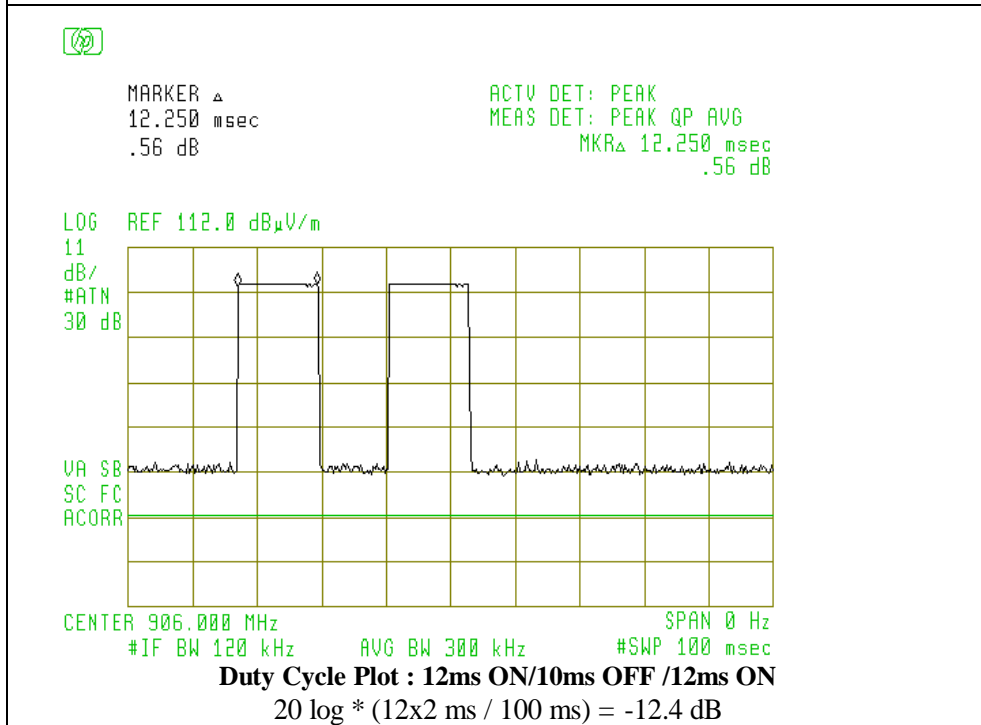
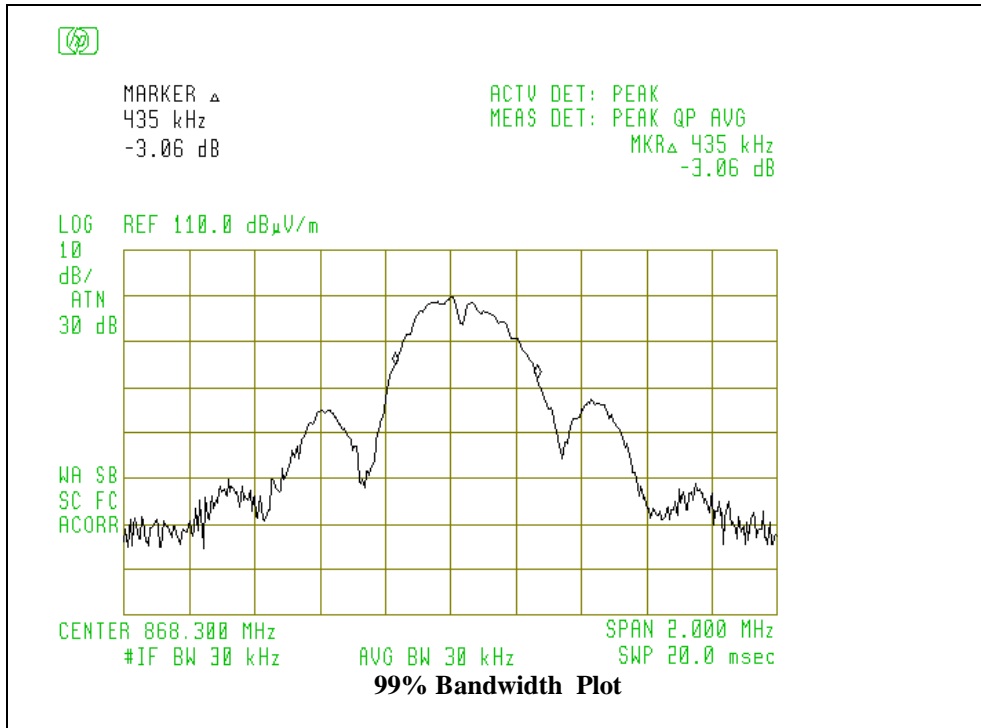


Other Spurious outside of the band 902-928MHz  
 (the worst case of investigated L, M, H channel operation modes)

Frequency (MHz)	Polarity (V,H) Position X	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m (2) (dBuV/m)	Peak Reading After Correction (dBuV/m)	FCC/IC 3m Limit (1) (dBuV/m)	Difference (dBuV/m)
892	V		210	42.2		46.5	-4.3
924	H		200	43.0		46.5	-3.5
892	H		260	42.0		46.5	-4.5
924	H		270	40.4		46.5	-6.1

Comparing to the limit defined in FCC Part 15 Sec. 15.209 and IC RSS-210, no other significant emissions were found.





## 6.4 EUT RECEIVING MODE VERIFICATION

### Radiated Test Data for Receiving Mode

(the worst case of investigated L, M, H channel operation modes)

Frequency (MHz)	Polarity (V,H) Position X	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m (2) (dBuV/m)	Peak Reading After Correction (dBuV/m)	FCC/IC 3m Limit (1) (dBuV/m)	Difference (dBuV/m)
43.0	V	1.1		29.2		40.0	-10.8
123.1	V	1.1		29.6		43.5	-13.9
151.1	V	1.1		34.9		43.5	-8.6
334	V	1.1		32.0		46.5	-14.5
534	V	1.1		35.5		46.5	-11.0
690	V	1.0		37.6		46.5	-8.9
38.5	H	1.4		28.6		40.0	-11.4
51.3	H	1.4		27.8		40.0	-12.2
52.8	H	1.4		33.8		40.0	-6.2
302	H	1.1		31.3		46.5	-15.2
510	H	1.0		34.4		46.5	-12.1
718	H	1.0		37.5		46.5	-9.0

(1) Receiving mode spurious emissions shall be lower than the limit defined in FCC Part 15 Sec. 15.209 and IC RSS-Gen.

(2) If each peak reading is less than the FCC/IC average limit, it'll be not necessary to show the measured/ calculated average reading.

## **7. PHOTOS OF TESTED EUT**

The following photos show the inside details of the EUT.