



EMI TEST REPORT

Test report no. : ERI-FCC-0119

Type of equipment : Wireless Earset

Model no. : MTW-9000

Applicant. : Mazeltelecom, Co. Ltd.

Test standards : FCC Part15 Subpart B /Subpart C(Class B)

Test procedure and items

- AC Power line Conducted Emissions Measurement : ANSI C63.4-1992
- Radiated Emissions Measurement : ANSI C63.4-1992

Test result : PASS

This equipment has been tested to comply with the requirements of FCC Rules and Regulations Part 15 Subpart B/C intentional Radiators.

The results in this report apply only to the sample tested.

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Date of test: 2002. 5. 28

Issued date: 2002. 6. 5

Tested by :

SE-JIN, O

approved by:

SANG-KYU, LEE

This laboratory is registered by KOLAS, KOREA.

This test report have been performed in accordance with Its terms of registration.

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Conducted emission, Radiated emission
EUT(front, rear, inner, main board)

1. Client information

Applicant : MazelTelecom Co., Ltd.
Address : Yusung Hanjin Resort Officetel 320 535-5 Bongmyong-Dong, Yusung-Gu, Daejeon, Korea.
Telephone Number : 82-42-822-2055
Facsimile Number : 82-42-822-2053

Manufacturer : MazelTelecom Co., Ltd.
Address : Yusung Hanjin Resort Officetel 320 535-5 Bongmyong-Dong, Yusung-Gu, Daejeon, Korea.
Telephone Number : 82-42-822-2055
Facsimile Number : 82-42-822-2053

2. Laboratory information

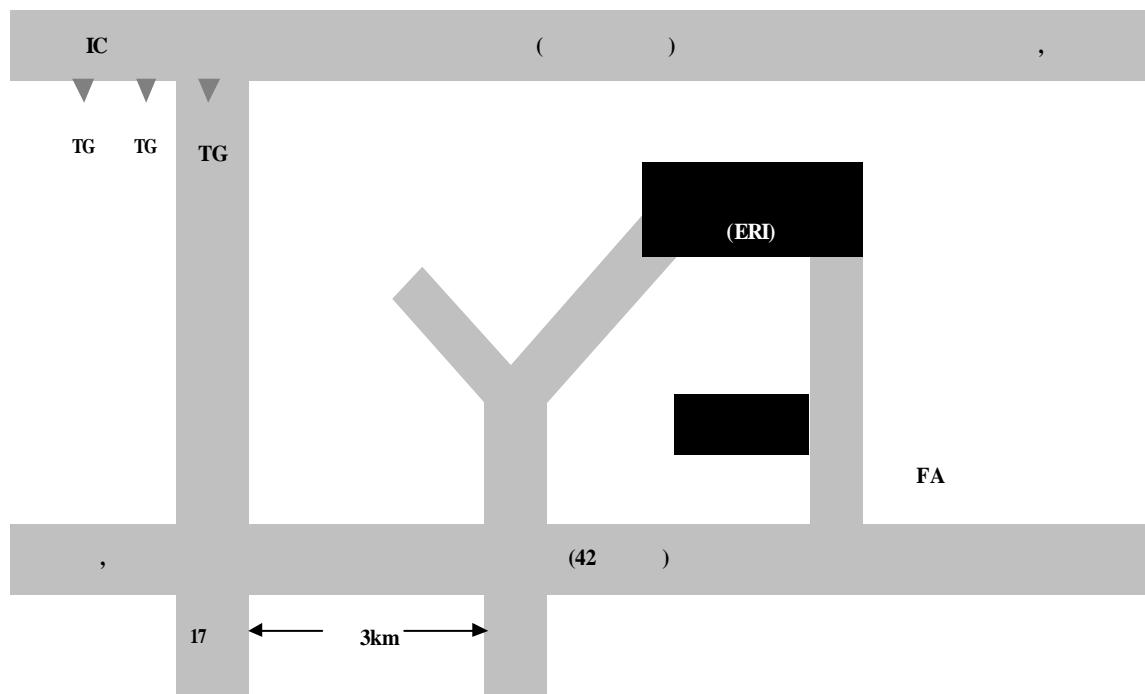
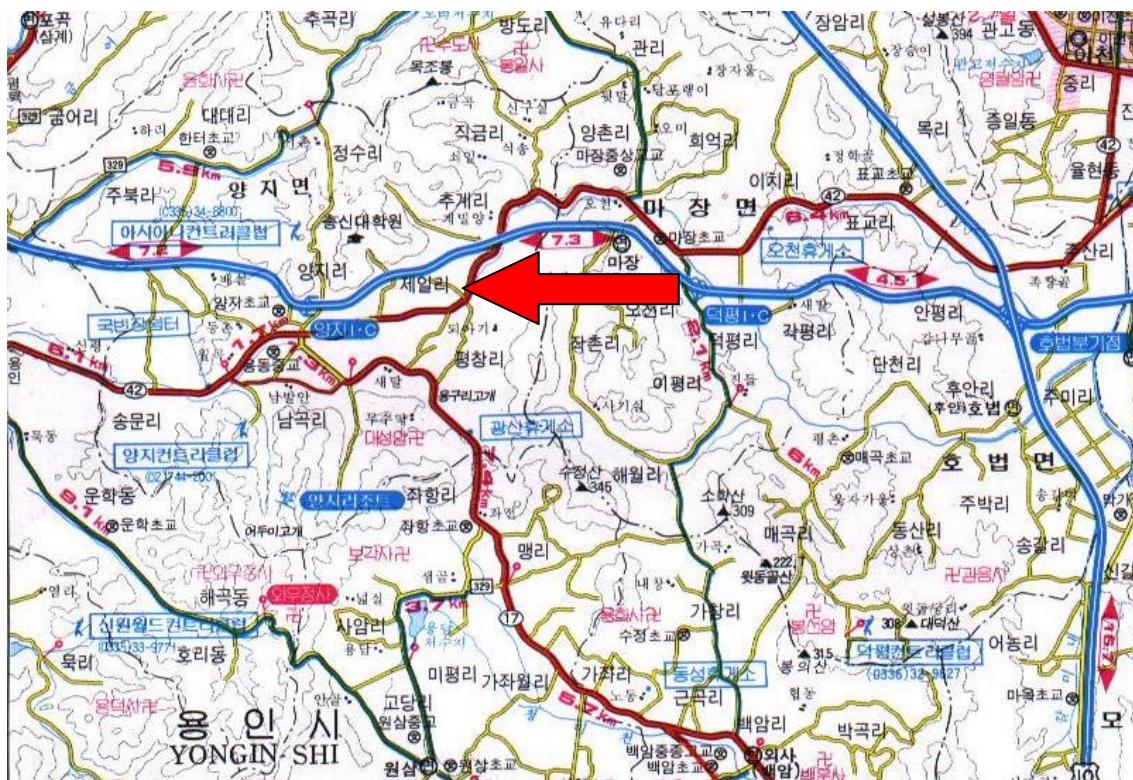
Address

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All of the test facilities of ERI were accredited by KOLAS(ATS) / MIC of Korea, FCC.

KOLAS No. : 111
EK : J
MIC : KR0030
FCC Filing No. : 302567

MAP

3. TEST SYSTEM CONFIGURATION

3.1 Operation Environment

| | Temperature | Humidity | Pressure |
|-----------------|-------------|----------|----------|
| 10m chamber : | 19 °C | 48 % | 990hPa |
| Shielded room : | 22.8 °C | 58 % | 990hPa |

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, specially in field of EMC.

The factors contributing to uncertainties are test receiver, Cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna Frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability.

Based on NIS 80,81, The measurement uncertainty level with a 95% confidence level were applied.

3.3 Sample calculation

Radiated emission

The field strength is calculated by adding the antenna Factor, cable loss and, Antenna pad subtracting the amplifier gain from the measured reading.

The sample calculation is as follows :

$$FS = MR + AF + CL + AT - AG$$

MR = Meter Reading

AF = Antenna Factor

CL = Cable Loss

AT = Antenna Pad

AG=Amplifier Gain

If MR is 30dB, AF 12dB, CL 5dB, AP 10dB, AG 35dB

The result (MR) is

$$30 + 12 + 5 + 10 - 35 = 22 \text{dBuV/m}$$

4. Description of e.u.t.

4.1 Product Description

| | |
|-----------------------|--|
| Type of product : | WIRELESS EARSET |
| Model No. : | MTW-9000 |
| Serial Number : | N/A |
| Electric rating : | DC 1.55V |
| General Description : | This EUT(Equipment Under Test) is the WIRELESS EARSET. |

4.2 Peripherals

4.3 Used cables

| Cable Type | Shield | Length (meters) | Ferrite | Connector | Connection Point 1 | Connection Point 2 |
|---------------|--------|-----------------|---------|-----------|--------------------|--------------------|
| Earphone plug | - | 0.15 | - | - | - | - |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

4.4 Operating condition

Operating : Running Mode

5. TEST RESULTS

5.1 Conducted emission

5.1.1 Measurement procedure

Mains

The measurements were performed in a shielded room.

EUT was placed on a non-metallic table height of 0.8m above the reference ground plane.

The rear of tabletop was located 0.4m to the vertical conducted plane.

All other surfaces of tabletop was at least 0.8m from any other grounded conducting surface.

I/O cables and AC cables that were connected to the peripherals were bundled in center.

They were folded back and forth forming a bundle 0.3m to 0.4m long and were hanged at a 0.4m height to the ground plane.

Each EUT power lead, except ground (safety) lead, were individually connected through a LISN to input power source.

Both lines of power cord, hot and neutral, were measured.

5.1.2 Used equipment

| Equipment | Model | Serial No. | Makers | Next Cal.Date | Used |
|---------------|----------------|------------|---------------------------|---------------|------|
| Test receiver | ESS | 848588/006 | R&S | 2002. 6. 08 | |
| | ESCS30 | 100022 | R&S | 2003. 3. 25 | |
| L.I.S.N. | ESH3-Z5 | 827246/008 | R&S | 2003. 3. 12 | |
| | ESH3-Z5 | 831887/018 | R&S | 2003. 3. 12 | |
| Shield room | 8 × 6 × 3.3m/H | - | Daehan shield Engineering | - | |

5.1.3 Measurement uncertainty

Conducted Emission measurement : ± 2.4 (K=2)

5.1.4 Test data

| Frequency | Tested | LISN | Meter | Total | Results | Margin | Limits |
|-----------|--------|------|------------|-------|---------|---------------|--------|
| Range | Freq. | Pol. | Reading[A] | Loss | QP | | |
| | | | QP | [B] | [A]+[B] | [C]- [A+B] | [C] |
| [MHz] | [MHz] | | [dBuV] | [dB] | [dBuV] | [dBuV] | [dBuV] |
| 0.45-30 | 0.461 | N | 10.3 | 0.18 | 10.48 | 37.52 | 48 |
| | 0.526 | N | 12.5 | 0.18 | 12.68 | 35.32 | 48 |
| | 0.671 | H | 13.1 | 0.18 | 13.28 | 34.72 | 48 |
| | 0.756 | H | 15.6 | 0.18 | 15.78 | 32.22 | 48 |
| | 0.846 | N | 11.5 | 0.18 | 11.68 | 36.32 | 48 |
| | 29.2 | H | 2.1 | 1.48 | 3.58 | 44.42 | 48 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

5.1.5 Result

PASS

5.2 Radiated Emission

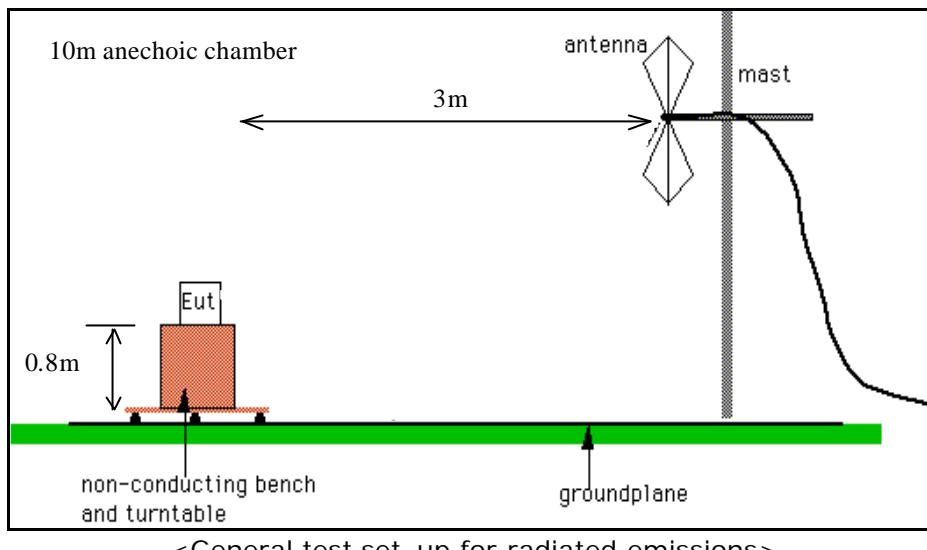
5.2.1 Measurement procedure

Mains

The frequency range investigated was 30 MHz to 1000 MHz and 30 MHz to 10 GHz. All readings are quasi-peak unless stated otherwise.

Judgment: Passed by ___ dBuV/m

The half-wave dipole antenna was tuned to the frequency found during Preliminary radiated measurements. The EUT, support equipment and Interconnecting cables were re-configured to the set-up to the producing the Maximum emission for the frequency and were placed on top of a 0.8 meter High non-metallic 1 X 1.5 meter table. The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. And this device(EUT) was tested in 3 orthogonal planes. The antenna measured both horizontal and vertical polarization.



5.2.2 Used equipment

| Equipment | Model | Makers | Serial No. | Next Cal.Date | Used |
|----------------------|--------------|-------------|------------|---------------|------|
| Test Receiver | ESMI | R&S | 826210/007 | 2003.03.08 | x |
| | ESCS30 | R&S | 830986/015 | 2003.03.18. | |
| Biconical Antenna | VHA9103 | Schwarzbeck | 1950 | 2003.04.17 | |
| Log-Periodic Antenna | UHALP9108-A1 | Schwarzbeck | 0393 | 2003.04.17 | |
| Horn Antenna | 3115 | EMCO | 9811-5606 | 2002.11.13 | x |
| Antenna Mast | MA240 | HD | N/A | - | |
| Turn Table | DT430S | HD | N/A | - | |

5.2.3 Measurement uncertainty

Radiated Emission measurement :
 30-300MHz +3.96dB / -4.04dB
 300-1000MHz +3.04dB / -3.00dB

5.2.4 Test data

| Tested Frequency (MHz) | Reading [A] (dBuV/m) | ANT | Total Loss [B] (dB) | Result [A+B] (dBuV/m) | Limit [D] (dBuV/m) | Margin [D]-[A+B] (dBuV/m) |
|------------------------|----------------------|------|---------------------|-----------------------|--------------------|---------------------------|
| | | Pol. | | | | |
| 59.70 | 3.50 | H | 11.17 | 14.67 | 40.0 | 25.33 |
| 181.90 | 4.60 | H | 18.82 | 23.42 | 43.5 | 20.08 |
| 227.80 | 5.10 | H | 19.60 | 24.70 | 46.0 | 21.30 |
| 839.00 | 3.20 | H | 26.94 | 30.14 | 46.0 | 15.86 |
| 865.30 | 3.10 | H | 27.61 | 30.71 | 46.0 | 15.29 |

5.2.5 Fundamental frequency

| Tested Frequency (MHz) | Reading [A] (dBuV/m) | ANT Pol. | Total Loss [B] (dB) | Result [A+B] (dBuV/m) | Limit [D] (dBuV/m) | Margin [D]-[A+B] (dBuV/m) |
|---------------------------|-------------------------|-------------|------------------------|--------------------------|-----------------------|------------------------------|
| 915 | 31 | V | 28.26 | 59.3 | 94 | 34.7 |
| 1830 | 2.1 | H | 35.8 | 37.9 | 54 | 13.0 |
| 2745 | <5 | - | - | - | 54 | - |
| 3660 | <5 | - | - | - | 54 | - |
| 4575 | <5 | - | - | - | 54 | - |
| 5490 | <5 | - | - | - | 54 | - |
| 6405 | <5 | - | - | - | 54 | - |
| 7320 | <5 | - | - | - | 54 | - |
| 8235 | <5 | - | - | - | 54 | - |
| 9150 | <5 | - | - | - | 54 | - |

* Receiving Antenna Mode : *Horizontal, Vertical*

* 3m chamber

* <5 : mean less than 5dB

5.2.5 Result

- PASS

6. TEST PHOTOGRAPHS

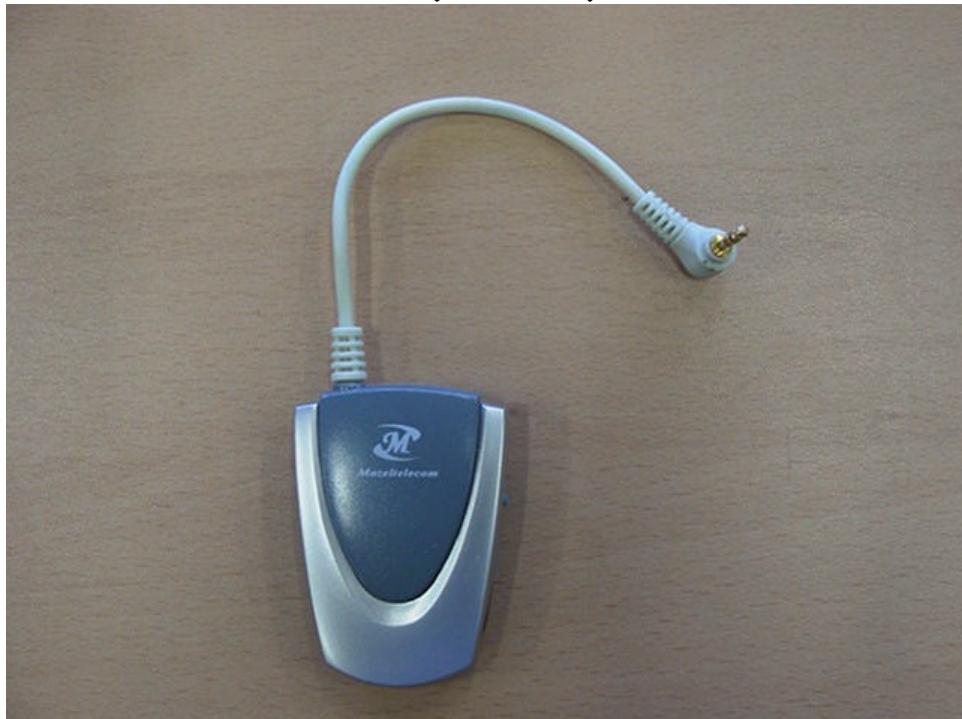
Conducted emission

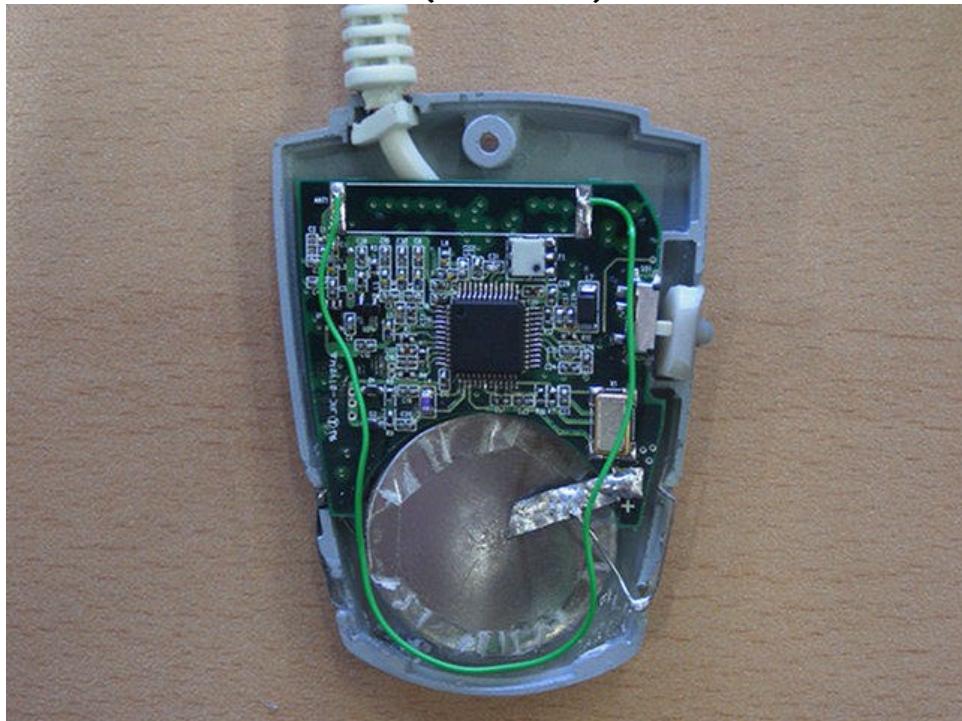


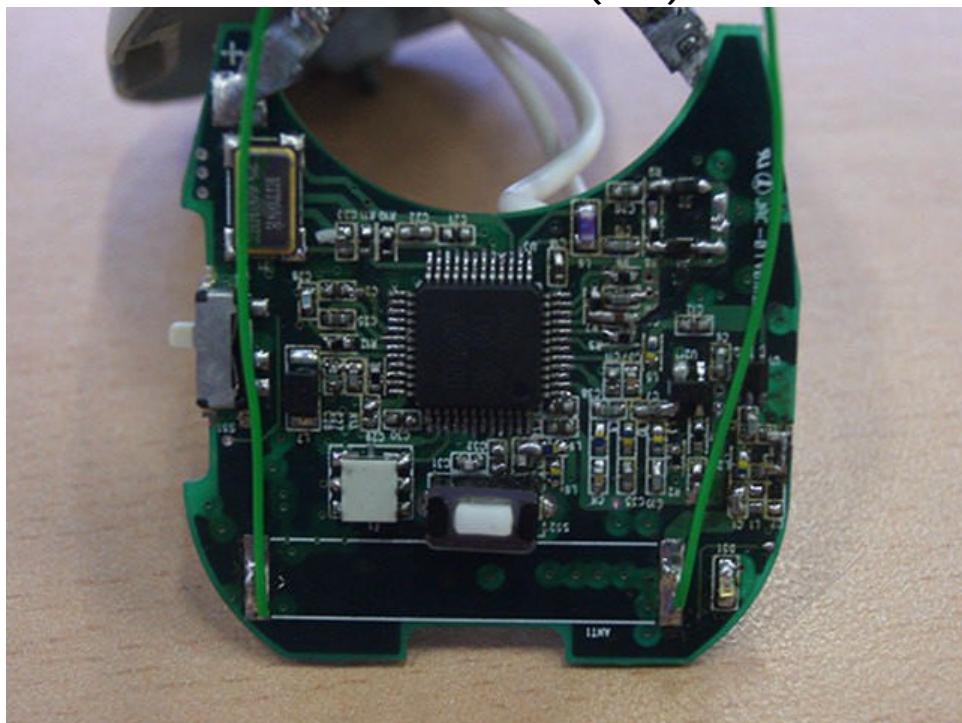
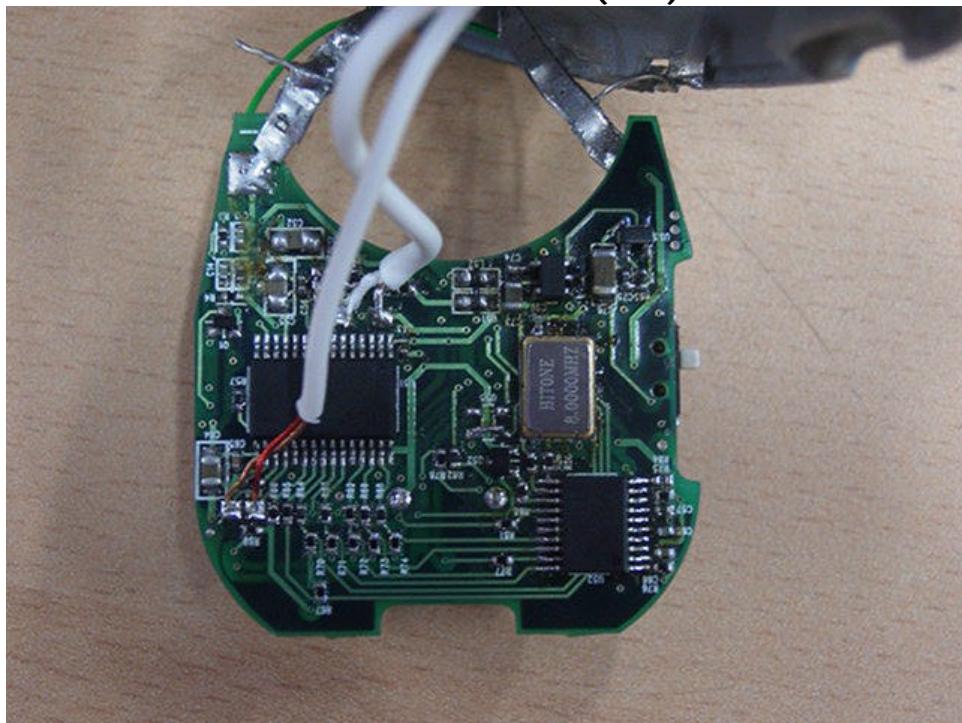
Radiated emission

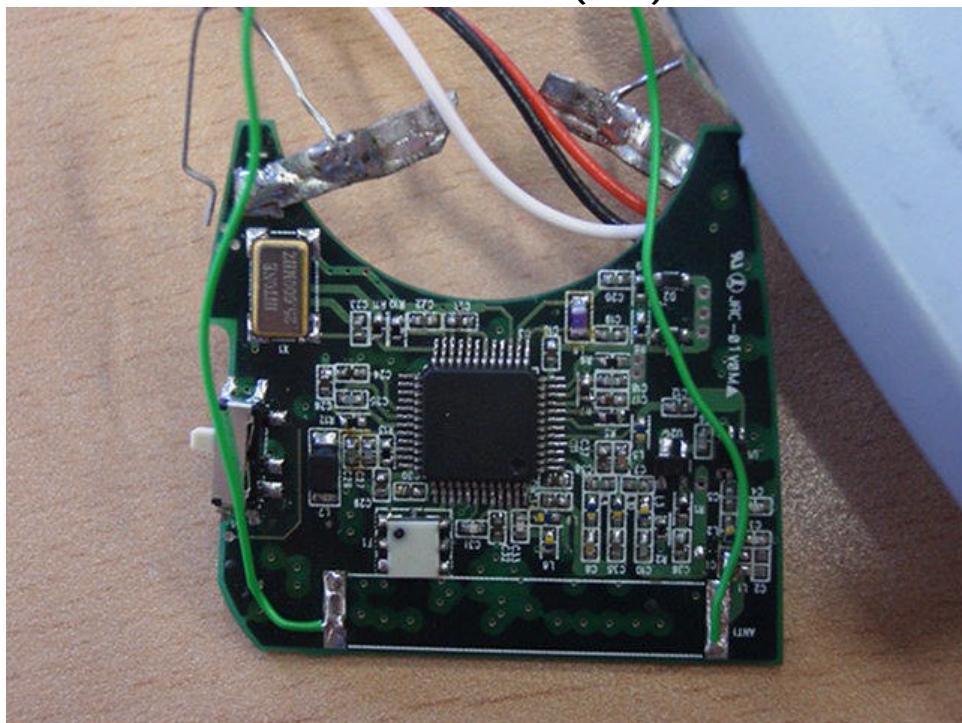


EUT (EARSET front)**EUT (EARSET rear)**

EUT (BASE front)**EUT (BASE rear)**

EUT (EARSET inner)**EUT (BASE inner)**

EARSET Main board (front)**EARSET Main board (rear)**

BASE Main board (front)**BASE Main board (rear)**