

# THRU Lab & Engineering.

477-6, Hager-Ri, Yoju-Up, Yoju-Gun

Kyunggi-Do, 469-803, Korea

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## Test Report

Product Name: Wireless PEN MOUSE

FCC ID: PE3D0YAK11-T

**Applicant:**

**ISV Co., Ltd.**

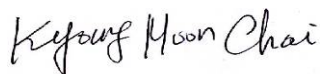
102-705 Bucheon Techno park 364  
Samjung-Dong, O-jung-Gu,  
Bucheon, korea

**Date Receipt: 07/25/2008**

**Date Tested: 07/28/2008**

**Date Issued: 08/11/2008**

**Tested by Kyoung M. Choi**



**Approved by K.T. Kang**



APPLICANT: ISV Co., Ltd.

FCC ID: PE3D0YAK11-T

REPORT #: THRU-808002

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**APPLICANT:** ISV Co., Ltd.

**FCC ID:** PE3DOYAK11-T

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## TEST PROCEDURE

**BANDWIDTH 20 dB:** The measurements were made with the spectrum analyzer's resolution bandwidth and the span set as shown on plot.

**POWER OUTPUT:** The RF power output was measured conducted.

**ANTENNA CONDUCTED EMISSIONS:** The RBW = 100 kHz, VBW = 300 kHz and the span set to 10MHz and the spectrum was scanned from 30 MHz to the 10<sup>th</sup> Harmonic of the fundamental. Above 1GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

**RADIATION INTERFERENCE:** The test procedure used was ANSI STANDARD C63.4-2003 using an Agilent spectrum receiver with pre-selector. The bandwidth (RBW) of the spectrum receiver was 100kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

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APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

NAME OF TEST: RADIATION INTERFERENCE(Below 1G)

Rules Part No.: 15.209

REQUIREMENTS: 30 to 88 MHz: 40.0 dBuV/M @ 3 METERS  
88 to 216 MHz: 43.5 dBuV/M  
216 to 960 MHz: 46.0 dBuV/M  
ABOVE 960 MHz: 54.0 dBuV/M

TEST RESULTS: A search was made of the spectrum from 30 to 1000 MHz and the measurements indicate that the unit DOES meet the FCC requirements.

## TEST DATA:

\* Tuning Frequency : 2402MHz

| No | Emission Frequency (MHz) | Meter Reading dBuV/m | Ant. Polaritry | Correction Factor dB | Cable Loss dB | Field Strength (dBuV/m) | Margin (dBuV) | Limit (dBuV/m) |
|----|--------------------------|----------------------|----------------|----------------------|---------------|-------------------------|---------------|----------------|
| 1  | 37.13                    | 13.2                 | H              | 12.9                 | 0.8           | 26.8                    | -13.2         | 40.0           |
| 2  | 62.07                    | 14.0                 | V              | 7.0                  | 1.1           | 22.1                    | -17.9         | 40.0           |
| 3  | 120.10                   | 7.0                  | V              | 10.8                 | 1.8           | 19.7                    | -23.8         | 43.5           |
| 4  | 212.80                   | 6.5                  | H              | 10.8                 | 2.7           | 19.9                    | -23.6         | 43.5           |
| 5  | 342.00                   | 7.9                  | H              | 15.5                 | 3.8           | 27.2                    | -18.8         | 46.0           |
| 6  | 378.00                   | 5.2                  | V              | 15.0                 | 4.0           | 24.3                    | -21.7         | 46.0           |
| 7  | 414.00                   | 8.2                  | H              | 15.6                 | 4.3           | 28.1                    | -17.9         | 46.0           |
| 8  | 475.00                   | 9.0                  | H              | 19.6                 | 4.7           | 33.4                    | -12.6         | 46.0           |
| 9  | 615.00                   | 7.2                  | H              | 20.1                 | 5.7           | 32.9                    | -13.1         | 46.0           |
| 10 | 853.00                   | 5.0                  | V              | 23.1                 | 7.1           | 35.2                    | -10.8         | 46.0           |

SAMPLE CALCULATION:  $FSdBuV/m = MR(dBuV) + ACFdB$ .

TEST PROCEDURE: ANSI STANDARD C63.4-2003 using a Hewlett Packard Model 8566B spectrum analyzer, a Hewlett Packard Model 85685A Pre-selector, a Hewlett Packard Model 85650A Quasi-Peak adapter, and an appropriate antenna - see the test equipment list. The bandwidth of spectrum analyzer was 100 kHz with an appropriate sweep speed. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported.

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NAME OF TEST: RADIATION INTERFERENCE(Below 1G)

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REQUIREMENTS: 30 to 88 MHz: 40.0 dBuV/M @ 3 METERS  
88 to 216 MHz: 43.5 dBuV/M  
216 to 960 MHz: 46.0 dBuV/M  
ABOVE 960 MHz: 54.0 dBuV/M

TEST RESULTS: A search was made of the spectrum from 30 to 1000 MHz and the measurements indicate that the unit DOES meet the FCC requirements.

## TEST DATA:

\* Tuning Frequency : 2441MHz

| No | Emission Frequency (MHz) | Meter Reading dBuV/m | Ant. Polarity | Correction Factor dB | Cable Loss dB | Field Strength (dBuV/m) | Margin (dBuV) | Limit (dBuV/m) |
|----|--------------------------|----------------------|---------------|----------------------|---------------|-------------------------|---------------|----------------|
| 1  | 53.95                    | 10.2                 | V             | 9.5                  | 1.1           | 20.8                    | -19.2         | 40.0           |
| 2  | 68.23                    | 5.6                  | H             | 5.8                  | 1.2           | 12.6                    | -27.4         | 40.0           |
| 3  | 147.50                   | 11.4                 | H             | 16.3                 | 2.1           | 29.8                    | -13.7         | 43.5           |
| 4  | 172.00                   | 9.0                  | V             | 15.8                 | 2.3           | 27.1                    | -16.4         | 43.5           |
| 5  | 194.40                   | 10.2                 | V             | 14.7                 | 2.5           | 27.4                    | -16.1         | 43.5           |
| 6  | 287.10                   | 8.7                  | V             | 17.6                 | 3.3           | 29.7                    | -16.3         | 46.0           |
| 7  | 446.00                   | 5.2                  | H             | 16.3                 | 4.5           | 26.1                    | -19.9         | 46.0           |
| 8  | 592.00                   | 7.4                  | H             | 18.8                 | 5.5           | 31.7                    | -14.3         | 46.0           |
| 9  | 720.00                   | 6.4                  | H             | 21.3                 | 6.3           | 34.0                    | -12.0         | 46.0           |
| 10 | 877.00                   | 5.4                  | H             | 23.6                 | 7.2           | 36.2                    | -9.8          | 46.0           |

SAMPLE CALCULATION:  $FSdBuV/m = MR(dBuV) + ACFdB$ .

TEST PROCEDURE: ANSI STANDARD C63.4-2003 using a Hewlett Packard Model 8566B spectrum analyzer, a Hewlett Packard Model 85685A Pre-selector, a Hewlett Packard Model 85650A Quasi-Peak adapter, and an appropriate antenna - see the test equipment list. The bandwidth of spectrum analyzer was 100 kHz with an appropriate sweep speed. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported.

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216 to 960 MHz: 46.0 dBuV/M  
ABOVE 960 MHz: 54.0 dBuV/M

TEST RESULTS: A search was made of the spectrum from 30 to 1000 MHz and the measurements indicate that the unit DOES meet the FCC requirements.

## TEST DATA:

\* Tuning Frequency : 2480MHz

| No | Emission Frequency (MHz) | Meter Reading dBuV/m | Ant. Polarity | Correction Factor dB | Cable Loss dB | Field Strength (dBuV/m) | Margin (dBuV) | Limit (dBuV/m) |
|----|--------------------------|----------------------|---------------|----------------------|---------------|-------------------------|---------------|----------------|
| 1  | 41.93                    | 10.2                 | V             | 12.4                 | 0.9           | 23.5                    | -16.5         | 40.0           |
| 2  | 61.40                    | 12.5                 | V             | 7.1                  | 1.1           | 20.8                    | -19.2         | 40.0           |
| 3  | 108.80                   | 8.2                  | V             | 11.0                 | 1.7           | 20.9                    | -22.6         | 43.5           |
| 4  | 129.10                   | 6.5                  | H             | 12.5                 | 1.9           | 20.9                    | -22.6         | 43.5           |
| 5  | 269.60                   | 9.4                  | H             | 14.1                 | 3.2           | 26.7                    | -19.3         | 46.0           |
| 6  | 327.40                   | 8.2                  | H             | 16.4                 | 3.6           | 28.2                    | -17.8         | 46.0           |
| 7  | 515.00                   | 8.2                  | V             | 17.9                 | 5.0           | 31.1                    | -14.9         | 46.0           |
| 8  | 579.00                   | 7.4                  | H             | 18.6                 | 5.4           | 31.4                    | -14.6         | 46.0           |
| 9  | 629.00                   | 6.5                  | V             | 20.6                 | 5.7           | 32.9                    | -13.1         | 46.0           |
| 10 | 852.00                   | 7.0                  | V             | 23.1                 | 7.0           | 37.1                    | -8.9          | 46.0           |

SAMPLE CALCULATION: FSdBuV/m = MR(dBuV) + ACFdB.

TEST PROCEDURE: ANSI STANDARD C63.4-2003 using a Hewlett Packard Model 8566B spectrum analyzer, a Hewlett Packard Model 85685A Pre-selector, a Hewlett Packard Model 85650A Quasi-Peak adapter, and an appropriate antenna - see the test equipment list. The bandwidth of spectrum analyzer was 100 kHz with an appropriate sweep speed. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported.

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APPLICANT: ISV CO., LTD.

FCC ID: PE3DOYAK11-T

NAME OF TEST: RADIATION INTERFERENCE(Receiver Mode)

Rules Part No.: 15.109

REQUIREMENTS: 30 to 88 MHz: 40.0 dBuV/M @ 3 METERS  
88 to 216 MHz: 43.5 dBuV/M  
216 to 960 MHz: 46.0 dBuV/M  
ABOVE 960 MHz: 54.0 dBuV/M

TEST RESULTS: A search was made of the spectrum from 30 to 1000 MHz and the measurements indicate that the unit DOES meet the FCC requirements.

## TEST DATA:

\* Tuning Frequency : 2402MHz

| No | Emission Frequency (MHz) | Meter Reading dBuV/m | Ant. Polaritry | Correction Factor dB | Cable Loss dB | Field Strength (dBuV/m) | Margin (dBuV) | Limit (dBuV/m) |
|----|--------------------------|----------------------|----------------|----------------------|---------------|-------------------------|---------------|----------------|
| 1  | 45.83                    | 14.9                 | H              | 11.7                 | 1.0           | 27.5                    | -12.5         | 40.0           |
| 2  | 83.61                    | 10.2                 | H              | 8.9                  | 1.4           | 20.5                    | -19.5         | 40.0           |
| 3  | 126.70                   | 10.8                 | V              | 12.1                 | 1.9           | 24.8                    | -18.7         | 43.5           |
| 4  | 194.40                   | 9.5                  | H              | 14.7                 | 2.5           | 26.7                    | -16.8         | 43.5           |
| 5  | 212.00                   | 7.4                  | V              | 10.8                 | 2.7           | 20.8                    | -22.7         | 43.5           |
| 6  | 335.00                   | 9.5                  | H              | 16.2                 | 3.7           | 29.4                    | -16.6         | 46.0           |
| 7  | 407.00                   | 8.5                  | V              | 15.5                 | 4.3           | 28.3                    | -17.7         | 46.0           |
| 8  | 586.00                   | 6.2                  | V              | 18.7                 | 5.5           | 30.4                    | -15.6         | 46.0           |
| 9  | 689.00                   | 9.0                  | V              | 21.3                 | 6.1           | 36.4                    | -9.6          | 46.0           |
| 10 | 743.00                   | 5.5                  | H              | 21.0                 | 6.4           | 33.0                    | -13.0         | 46.0           |
| 11 | 878.00                   | 4.7                  | H              | 23.6                 | 7.2           | 35.5                    | -10.5         | 46.0           |

SAMPLE CALCULATION:  $FSdBuV/m = MR(dBuV) + ACFdB$ .

TEST PROCEDURE: ANSI STANDARD C63.4-2003 using a Hewlett Packard Model 8566B spectrum analyzer, a Hewlett Packard Model 85685A Pre-selector, a Hewlett Packard Model 85650A Quasi-Peak adapter, and an appropriate antenna - see the test equipment list. The bandwidth of spectrum analyzer was 100 kHz with an appropriate sweep speed. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported.

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NAME OF TEST: RADIATION INTERFERENCE(Receiver Mode)

Rules Part No.: 15.109

REQUIREMENTS: 30 to 88 MHz: 40.0 dBuV/M @ 3 METERS  
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216 to 960 MHz: 46.0 dBuV/M  
ABOVE 960 MHz: 54.0 dBuV/M

TEST RESULTS: A search was made of the spectrum from 30 to 1000 MHz and the measurements indicate that the unit DOES meet the FCC requirements.

## TEST DATA:

\* Tuning Frequency : 2441MHz

| No | Emission Frequency (MHz) | Meter Reading dBuV/m | Ant. Polaritry | Correction Factor dB | Cable Loss dB | Field Strength (dBuv/m) | Margin (dBuv) | Limit (dBuv/m) |
|----|--------------------------|----------------------|----------------|----------------------|---------------|-------------------------|---------------|----------------|
| 1  | 48.23                    | 13.4                 | H              | 11.2                 | 1.0           | 25.6                    | -14.4         | 40.0           |
| 2  | 66.54                    | 16.5                 | V              | 6.1                  | 1.2           | 23.8                    | -16.2         | 40.0           |
| 3  | 83.61                    | 10.2                 | H              | 8.9                  | 1.4           | 20.5                    | -19.5         | 40.0           |
| 4  | 198.80                   | 14.2                 | V              | 15.9                 | 2.5           | 32.5                    | -11.0         | 43.5           |
| 5  | 283.30                   | 16.0                 | V              | 17.5                 | 3.3           | 36.8                    | -9.2          | 46.0           |
| 6  | 327.00                   | 9.5                  | H              | 16.4                 | 3.6           | 29.5                    | -16.5         | 46.0           |
| 7  | 515.00                   | 12.4                 | V              | 17.9                 | 5.0           | 35.3                    | -10.7         | 46.0           |
| 8  | 629.00                   | 6.5                  | V              | 20.6                 | 5.7           | 32.9                    | -13.1         | 46.0           |
| 9  | 635.00                   | 8.4                  | H              | 20.5                 | 5.8           | 34.7                    | -11.3         | 46.0           |
| 10 | 744.00                   | 9.0                  | H              | 21.0                 | 6.4           | 36.5                    | -9.5          | 46.0           |
| 11 | 840.00                   | 5.2                  | V              | 22.8                 | 7.0           | 34.9                    | -11.1         | 46.0           |

SAMPLE CALCULATION:  $FSdBuV/m = MR(dBuV) + ACFdB$ .

TEST PROCEDURE: ANSI STANDARD C63.4-2003 using a Hewlett Packard Model 8566B spectrum analyzer, a Hewlett Packard Model 85685A Pre-selector, a Hewlett Packard Model 85650A Quasi-Peak adapter, and an appropriate antenna - see the test equipment list. The bandwidth of spectrum analyzer was 100 kHz with an appropriate sweep speed. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported.

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216 to 960 MHz: 46.0 dBuV/M  
ABOVE 960 MHz: 54.0 dBuV/M

TEST RESULTS: A search was made of the spectrum from 30 to 1000 MHz and the measurements indicate that the unit DOES meet the FCC requirements.

## TEST DATA:

\* Tuning Frequency : 2480MHz

| No | Emission Frequency (MHz) | Meter Reading dBuV/m | Ant. Polaritry | Correction Factor dB | Cable Loss dB | Field Strength (dBuV/m) | Margin (dBuV) | Limit (dBuV/m) |
|----|--------------------------|----------------------|----------------|----------------------|---------------|-------------------------|---------------|----------------|
| 1  | 39.11                    | 15.4                 | H              | 12.8                 | 0.8           | 29.0                    | -11.0         | 40.0           |
| 2  | 53.70                    | 9.2                  | V              | 9.6                  | 1.1           | 19.9                    | -20.1         | 40.0           |
| 3  | 81.12                    | 10.9                 | V              | 8.3                  | 1.4           | 20.6                    | -19.4         | 40.0           |
| 4  | 129.40                   | 10.5                 | H              | 12.6                 | 1.9           | 25.0                    | -18.5         | 43.5           |
| 5  | 182.30                   | 8.9                  | H              | 14.4                 | 2.4           | 25.6                    | -17.9         | 43.5           |
| 6  | 194.40                   | 10.5                 | V              | 14.7                 | 2.5           | 27.7                    | -15.8         | 43.5           |
| 7  | 280.00                   | 8.2                  | V              | 17.3                 | 3.3           | 28.8                    | -17.2         | 46.0           |
| 8  | 548.00                   | 5.9                  | H              | 18.2                 | 5.2           | 29.3                    | -16.7         | 46.0           |
| 9  | 633.00                   | 5.0                  | V              | 20.6                 | 5.8           | 31.4                    | -14.6         | 46.0           |
| 10 | 826.00                   | 7.0                  | H              | 22.4                 | 6.9           | 36.3                    | -9.7          | 46.0           |
| 11 | 853.00                   | 7.4                  | V              | 23.1                 | 7.1           | 37.6                    | -8.4          | 46.0           |

SAMPLE CALCULATION:  $FSdBuV/m = MR(dBuV) + ACFdB$ .

TEST PROCEDURE: ANSI STANDARD C63.4-2003 using a Hewlett Packard Model 8566B spectrum analyzer, a Hewlett Packard Model 85685A Pre-selector, a Hewlett Packard Model 85650A Quasi-Peak adapter, and an appropriate antenna - see the test equipment list. The bandwidth of spectrum analyzer was 100 kHz with an appropriate sweep speed. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported.

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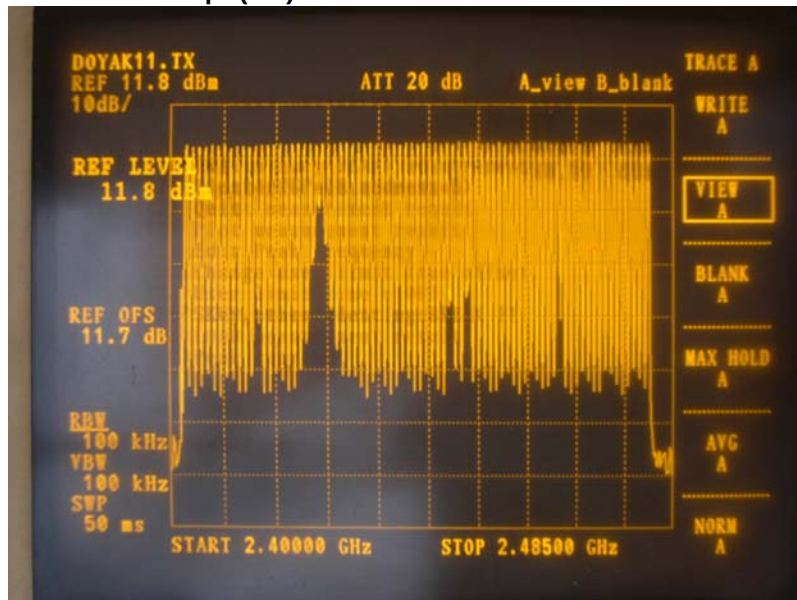
NAME OF TEST: NUMBER OF HOPPING CHANNELS

Rules Part No.: 15.247(a)(1)

## Requirements:

|                 |                                                                                                     |
|-----------------|-----------------------------------------------------------------------------------------------------|
| 902-928 MHz     | If the 20 dB bandwidth is less than 250 kHz, the system shall use at least 50 hopping frequencies.  |
|                 | If the 20 dB bandwidth is 250 kHz or greater, the system shall use at least 25 hopping frequencies. |
| 2400-2483.5 MHz | At least 15 channels                                                                                |
| 5725-5850 MHz   | At least 75 channels                                                                                |

Test Data: The number of hops(79)



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APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

NAME OF TEST: DWELL TIME OF A HOPPING CHANNEL

Rules Part No.: 15.247(a)(1)(i)

## Requirements:

|                 |                                                                                             |
|-----------------|---------------------------------------------------------------------------------------------|
| 902-928 MHz     | If 20 dB bandwidth is less than 250 kHz, Dwell time < = 0.4 seconds in a 20 second period.  |
|                 | If 20 dB bandwidth is 250 kHz or greater, Dwell time < = 0.4 seconds in a 10 second period. |
| 2400-2483.5 MHz | < = 0.4 seconds in a 0.4 seconds multiplied the number of hopping channels employed.        |
| 5725-5850 MHz   | < = 0.4 seconds in a 30 second period.                                                      |

## Test Data:

OCCUPANCY Time of Frequency Hopping System

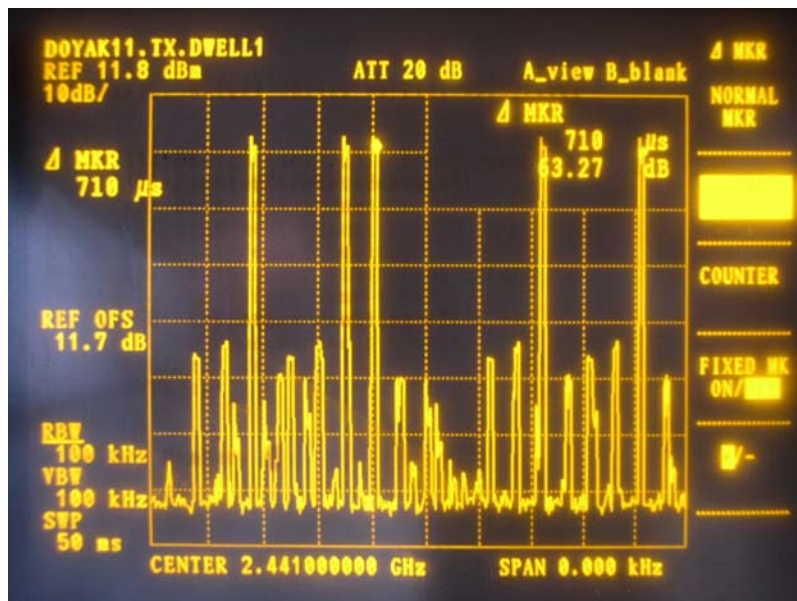
Test time Period :  $0.4 \times 79 = 30.4\text{Sec}$ ,

Hopping Time which in 1sec :  $11 / 10\text{sec} = 1.1/\text{sec}$

=> The Maximum OCCUPANCY Time within 30.4Sec :

$(710\mu\text{s} \times 1100) / (79 \times 30.4) = 325.199\text{msec}$

Test Result : The Average Occupancy Time is Less Than 0.4sec.



APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

REPORT #: THRU-808002

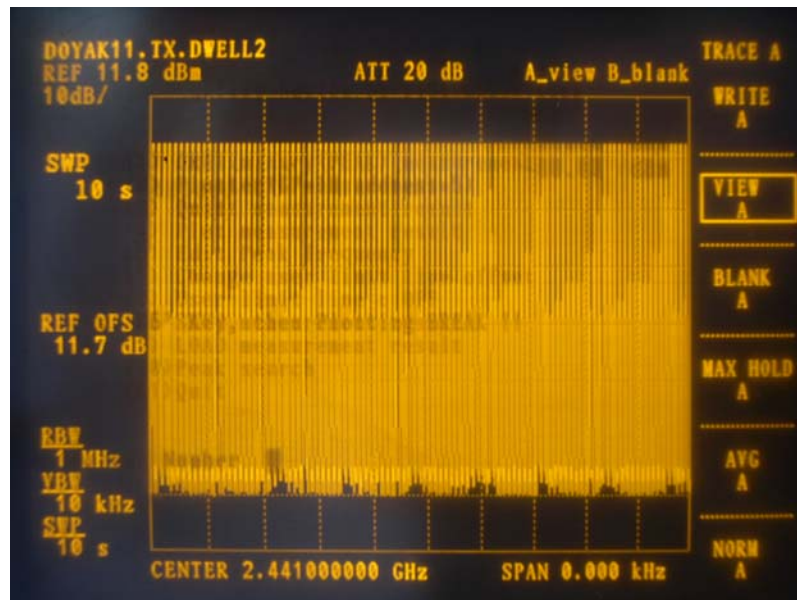
# THRU Lab & Engineering.

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The Dwell time(2)



APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

REPORT #: THRU-808002

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APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

NAME OF TEST: OCCUPIED BANDWIDTH

Rules Part No.: 15.247(a)(2)

Requirements: 20 dB bandwidth

Test Data: See the following plot

| Channel | Frequency(MHz) | Measurement Level(kHz) | Required Limit(kHz) | Result |
|---------|----------------|------------------------|---------------------|--------|
| 1       | 2402.000       | 606                    | >500                | PASS   |
| 40      | 2441.000       | 660                    | >500                | PASS   |
| 79      | 2480.000       | 657                    | >500                | PASS   |

APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

REPORT #: THRU-808002

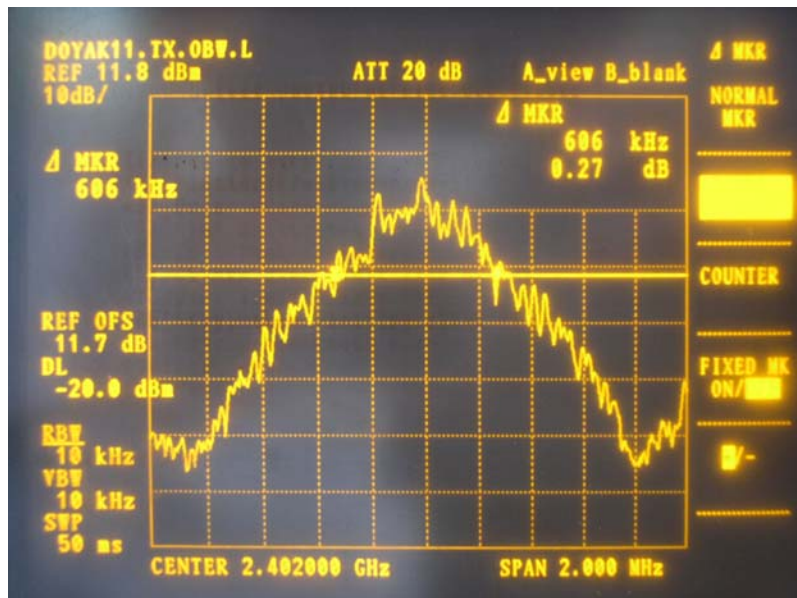
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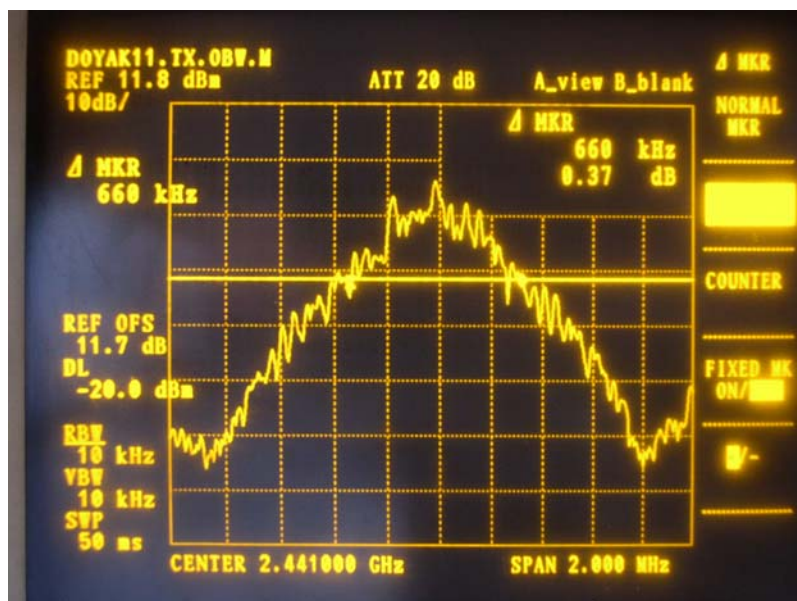
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Low channel



Mid channel



APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

REPORT #: THRU-808002

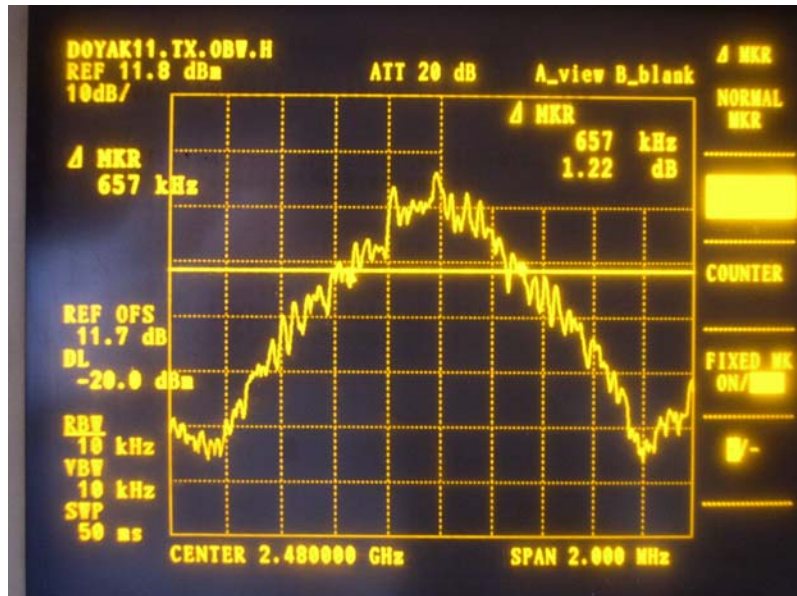
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High channel



APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

REPORT #: THRU-808002

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APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

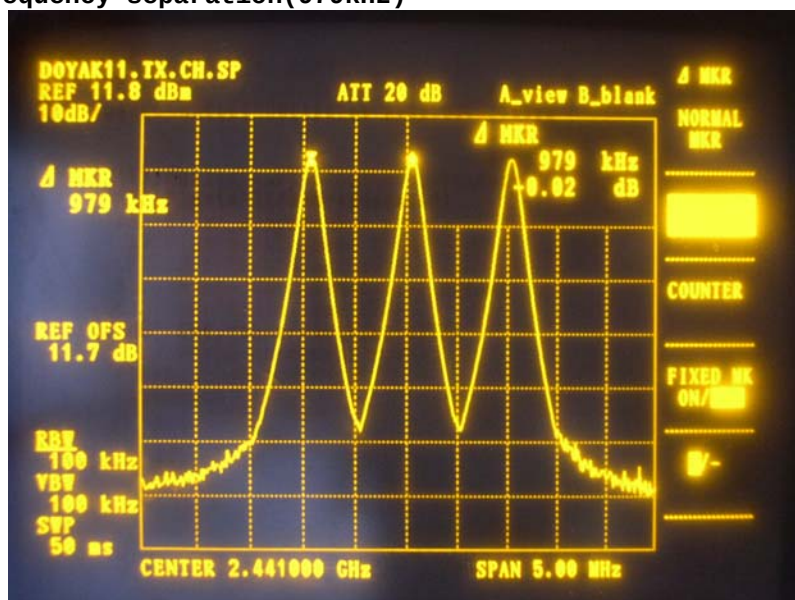
NAME OF TEST: CARRIER FREQUENCY SEPARATION

Rules Part No.: 15.247(a)(1)

Requirements: The hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Test Data:

The channel frequency separation(979kHz)



APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

REPORT #: THRU-808002

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APPLICANT: ISV Co., Ltd.

FCC ID: PE3D0YAK11-T

NAME OF TEST: CONDUCTED POWER OUTPUT

Rules Part No.: 15.247(b)(1)

**Requirements:** The maximum peak output power shall not exceed 1 watt (30 dBm). If directional transmitting antennas with a gain of more than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

Both the base and handset have a maximum power output of less than +30 dBm. Power was measured by disconnecting the antennas and measuring across a 50 ohm load as recommended by the manufacturer using a HP spectrum analyzer Model 8566B. The antennas are non-directional and do not exceed 6dBi gain. The power output was measured at three places in the band highest is reported below.



## Test Data:

| Frequency                | dBm     | mW      |
|--------------------------|---------|---------|
| Low Channel<br>2402 MHz  | 3.87dBm | 2.437mW |
| Mid Channel<br>2441 MHz  | 4.32dBm | 2.703mW |
| High Channel<br>2482 MHz | 4.30dBm | 2.691mW |

Three places in the band were measured and the highest power presented above.

APPLICANT: ISV Co., Ltd.

FCC ID: PE3D0YAK11-T

REPORT #: THRU-808002

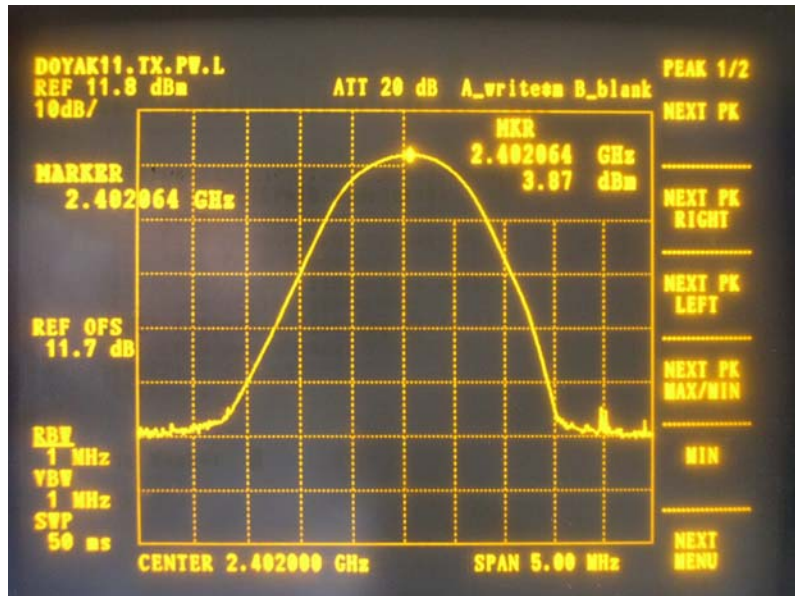
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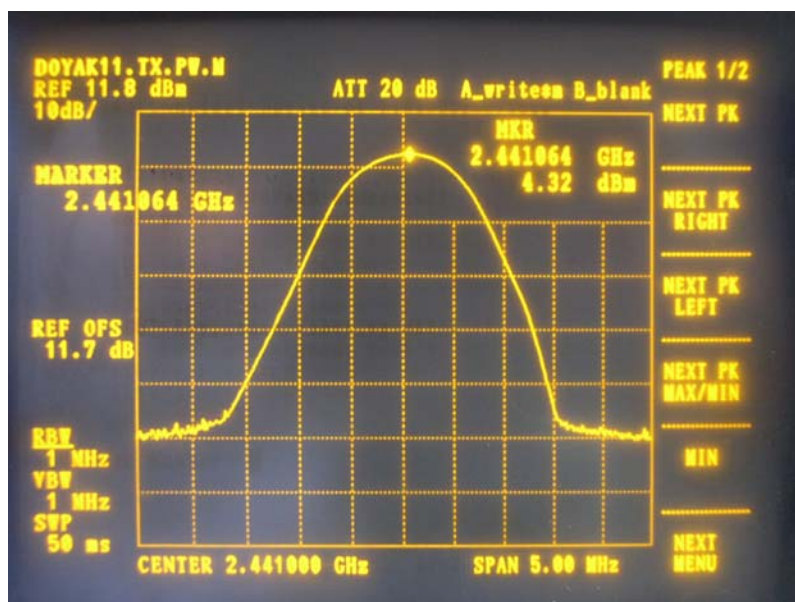
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Low channel



Mid channel



APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

REPORT #: THRU-808002

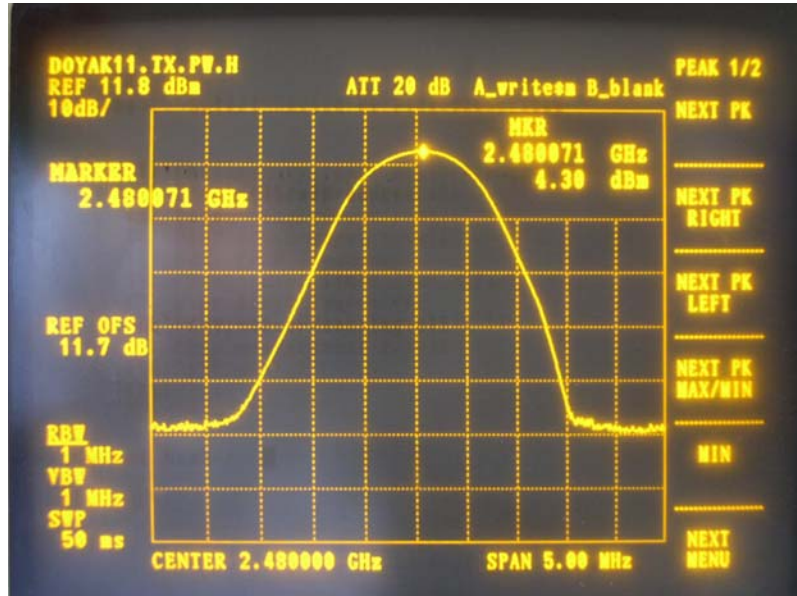
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High channel



APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

REPORT #: THRU-808002

# THRU Lab & Engineering.

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APPLICANT: ISV Co., Ltd.

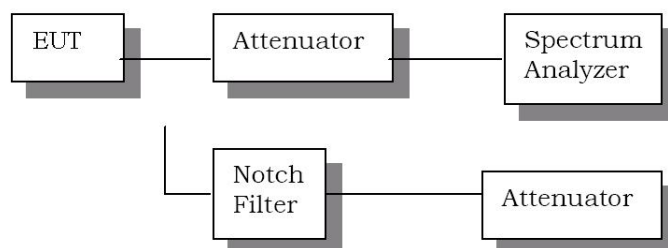
FCC ID: PE3D0YAK11-T

NAME OF TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Rules Part No.: 15.247(c)

Requirements: Emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

## Method of Measuring:



Note: The spectrum was scanned to the tenth harmonic.

## Test Data:

**"Not Applicable"**

APPLICANT: ISV Co., Ltd.

FCC ID: PE3D0YAK11-T

REPORT #: THRU-808002

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APPLICANT: ISV Co., Ltd.

FCC ID: PE3D0YAK11-T

NAME OF TEST: FIELD STRENGTH OF SPURIOUS EMISSIONS

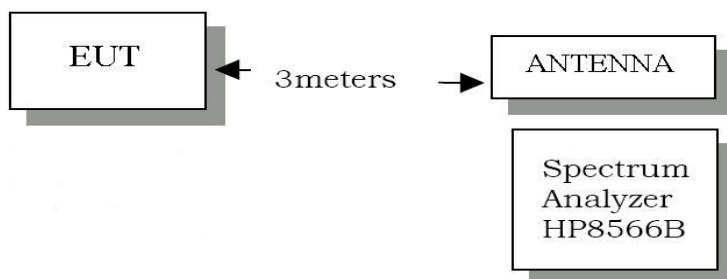
Rules Part No.: 15.247(c), 15.205 & 15.209(b)

## Requirements:

| (Fundamental) Frequency | (Field Strength) Limits |
|-------------------------|-------------------------|
| 902 - 928MHz            | 127.37dBuV/m            |
| 2.4 - 2.4835GHz         | 54 dBuV/m @ 3m          |
| 30 - 88 MHz             | 40 dBuV/m @3m           |
| 88 -216 MHz             | 43.5 dBuV/m @3m         |
| 216 -960 MHz            | 46 dBuV/m @3m           |
| ABOVE 960 MHz           | 54dBuV/m                |

Emissions that fall in the restricted bands (15.205) must be less than or equal to 500 uV/m (54dBuV/m). Spurious not in a restricted band must be 20 dBc.

## Test Setup



Equipment placed 80cm above ground on a rotatable platform.

APPLICANT: ISV Co., Ltd.

FCC ID: PE3D0YAK11-T

REPORT #: THRU-808002

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Test Data:

Low : 2402MHz

| No | Emission Frequency (MHz) | Meter Reading dBuV/m | Ant. Polarity | Correction Factor dB | Cable Loss dB | Field Strength (dBuV/m) | Margin (dBuV) | Limit (dBuV/m) | Mode |
|----|--------------------------|----------------------|---------------|----------------------|---------------|-------------------------|---------------|----------------|------|
| 1  | 4804.00                  | 6.8                  | H             | 33.7                 | 4.6           | 45.1                    | -8.9          | 54.0           | PK   |
| 2  | 7206.00                  | 8.2                  | H             | 36.1                 | 5.7           | 50.1                    | -3.9          | 54.0           | PK   |
| 3  | 9608.00                  | NOT DETECTABLE       |               |                      |               |                         |               | 54.0           | PK   |
| 4  | 12010.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 5  | 14412.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 6  | 16814.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 7  | 19216.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 8  | 21618.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 9  | 24020.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 10 | 4804.00                  | 5.9                  | V             | 33.7                 | 4.6           | 44.2                    | -9.8          | 54.0           | PK   |
| 11 | 7206.00                  | 9.0                  | V             | 36.1                 | 5.7           | 50.9                    | -3.1          | 54.0           | PK   |
| 12 | 9608.00                  | NOT DETECTABLE       |               |                      |               |                         |               | 54.0           | PK   |
| 13 | 12010.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 14 | 14412.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 15 | 16814.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 16 | 19216.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 17 | 21618.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 18 | 24020.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |

| No | Emission Frequency (MHz) | Meter Reading dBuV/m | Ant. Polarity | Correction Factor dB | Cable Loss dB | Field Strength (dBuV/m) | Margin (dBuV) | Limit (dBuV/m) | Mode |
|----|--------------------------|----------------------|---------------|----------------------|---------------|-------------------------|---------------|----------------|------|
| 1  | 7206.00                  | 7.4                  | H             | 36.1                 | 5.7           | 49.3                    | -4.7          | 54.0           | AV   |
| 2  | 7206.00                  | 8.4                  | V             | 36.1                 | 5.7           | 50.3                    | -3.7          | 54.0           | AV   |

APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

REPORT #: THRU-808002

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Mid : 2441MHz

| No | Emission Frequency (MHz) | Meter Reading dBuV/m | Ant. Polarity | Correction Factor dB | Cable Loss dB | Field Strength (dBuV/m) | Margin (dBuV) | Limit (dBuV/m) | Mode |
|----|--------------------------|----------------------|---------------|----------------------|---------------|-------------------------|---------------|----------------|------|
| 1  | 4882.00                  | 6.2                  | H             | 33.9                 | 4.6           | 44.8                    | -9.2          | 54.0           | PK   |
| 2  | 7323.00                  | 8.5                  | H             | 36.2                 | 5.8           | 50.5                    | -3.5          | 54.0           | PK   |
| 3  | 9764.00                  | NOT DETECTABLE       |               |                      |               |                         |               | 54.0           | PK   |
| 4  | 12205.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 5  | 14646.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 6  | 17087.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 7  | 19528.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 8  | 21969.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 9  | 24410.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 10 | 4882.00                  | 6.8                  | V             | 33.9                 | 4.6           | 45.4                    | -8.6          | 54.0           | PK   |
| 11 | 7323.00                  | 9.0                  | V             | 36.2                 | 5.8           | 51.0                    | -3.0          | 54.0           | PK   |
| 12 | 9764.00                  | NOT DETECTABLE       |               |                      |               |                         |               | 54.0           | PK   |
| 13 | 12205.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 14 | 14646.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 15 | 17087.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 16 | 19528.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 17 | 21969.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 18 | 24410.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |

| No | Emission Frequency (MHz) | Meter Reading dBuV/m | Ant. Polarity | Correction Factor dB | Cable Loss dB | Field Strength (dBuV/m) | Margin (dBuV) | Limit (dBuV/m) | Mode |
|----|--------------------------|----------------------|---------------|----------------------|---------------|-------------------------|---------------|----------------|------|
| 1  | 7326.00                  | 7.8                  | H             | 36.2                 | 5.8           | 49.8                    | -4.2          | 54.0           | AV   |
| 2  | 7326.00                  | 8.6                  | V             | 36.2                 | 5.8           | 50.6                    | -3.4          | 54.0           | AV   |

APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

REPORT #: THRU-808002

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High : 2480MHz

| No | Emission Frequency (MHz) | Meter Reading dBuV/m | Ant. Polarity | Correction Factor dB | Cable Loss dB | Field Strength (dBuV/m) | Margin (dBuV) | Limit (dBuV/m) | Mode |
|----|--------------------------|----------------------|---------------|----------------------|---------------|-------------------------|---------------|----------------|------|
| 1  | 4960.00                  | 6.5                  | H             | 34.2                 | 4.7           | 45.3                    | -8.7          | 54.0           | PK   |
| 2  | 7440.00                  | 7.9                  | H             | 36.3                 | 5.8           | 50.0                    | -4.0          | 54.0           | PK   |
| 3  | 9920.00                  | NOT DETECTABLE       |               |                      |               |                         |               | 54.0           | PK   |
| 4  | 12400.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 5  | 14880.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 6  | 17360.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 7  | 19840.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 8  | 22320.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 9  | 24800.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 10 | 4960.00                  | 6.7                  | V             | 34.2                 | 4.7           | 45.5                    | -8.5          | 54.0           | PK   |
| 11 | 7440.00                  | 8.4                  | V             | 36.3                 | 5.8           | 50.5                    | -3.5          | 54.0           | PK   |
| 12 | 9920.00                  | NOT DETECTABLE       |               |                      |               |                         |               | 54.0           | PK   |
| 13 | 12400.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 14 | 14880.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 15 | 17360.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 16 | 19840.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 17 | 22320.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |
| 18 | 24800.00                 |                      |               |                      |               |                         |               | 54.0           | PK   |

| No | Emission Frequency (MHz) | Meter Reading dBuV/m | Ant. Polarity | Correction Factor dB | Cable Loss dB | Field Strength (dBuV/m) | Margin (dBuV) | Limit (dBuV/m) | Mode |
|----|--------------------------|----------------------|---------------|----------------------|---------------|-------------------------|---------------|----------------|------|
| 1  | 7440.00                  | 7.0                  | H             | 36.3                 | 5.8           | 49.1                    | -4.9          | 54.0           | AV   |
| 2  | 7440.00                  | 7.8                  | V             | 36.3                 | 5.8           | 49.9                    | -4.1          | 54.0           | AV   |

APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

REPORT #: THRU-808002

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**APPLICANT:** ISV Co., Ltd.

**FCC ID:** PE3DOYAK11-T

**NAME OF TEST:** RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

**Rule Parts No.:** Part 15.205

**Requirements:** Emissions that fall in the restricted bands (15.205). These emissions must be less than or equal to 500 uV/m (54dBuV/m). Emissions not in the restricted band must be 20 dBc.

## Test Data

Result :

1. Reading dBuV + Step Atten Value(10dB) - PAM-0118 Preamplifier Gain(46.4dB)

2. 1 + ANT Factor + Cable Loss

Low

PK :  $56.40 + 10 - 46.4 = 20.0\text{dBuV}$

AV :  $42.60 + 10 - 46.4 = 6.2\text{dBuV}$

High

PK :  $54.40 + 10 - 46.40 = 18.0\text{dBuV}$

AV :  $42.50 + 10 - 46.40 = 6.1\text{dBuV}$

| No | Emission Frequency (MHz) | Meter Reading dBuV/m | Ant. Polarity | Correction Factor dB | Cable Loss dB | Field Strength (dBuV/m) | Margin (dBuV) | Limit (dBuV/m) |
|----|--------------------------|----------------------|---------------|----------------------|---------------|-------------------------|---------------|----------------|
|    | Low                      |                      |               |                      |               |                         |               |                |
| PK | 2395.35                  | 20.0                 | V             | 27.8                 | 3.3           | 51.1                    | -2.9          | 54.0           |
| AV | 2395.35                  | 6.2                  | V             | 27.8                 | 3.3           | 37.3                    | -16.7         | 54.0           |
|    | HIGH                     |                      |               |                      |               |                         |               |                |
| PK | 2484.76                  | 18.0                 | V             | 27.9                 | 3.3           | 49.2                    | -4.8          | 54.0           |
| AV | 2484.76                  | 6.1                  | V             | 27.9                 | 3.3           | 37.3                    | -16.7         | 54.0           |

APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

REPORT #: THRU-808002

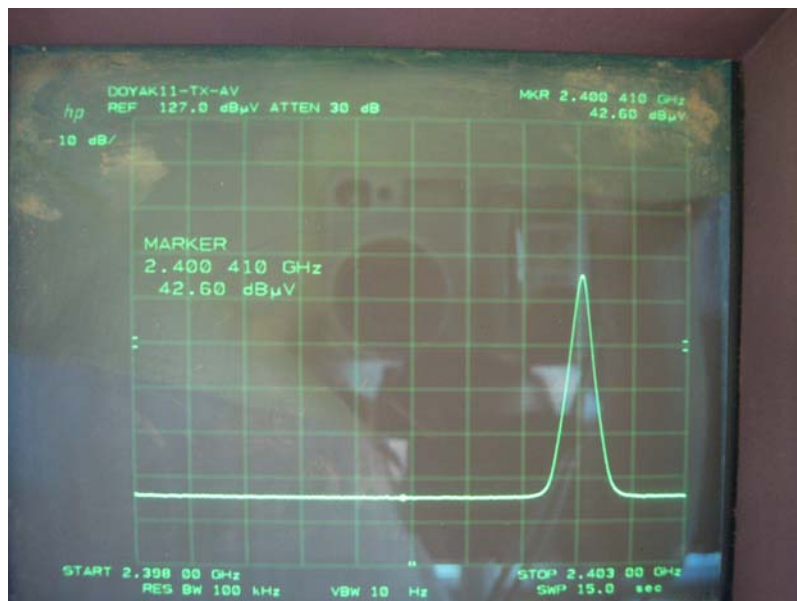
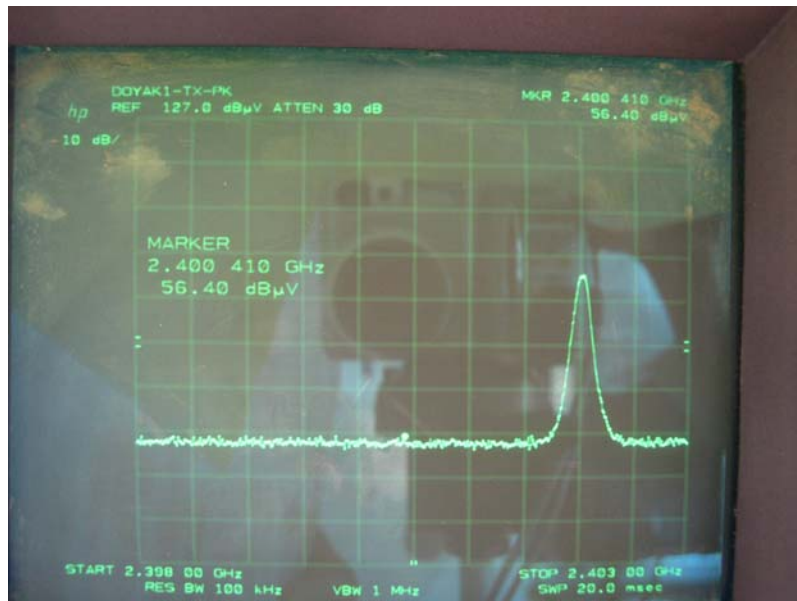
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Low channel



APPLICANT: ISV Co., Ltd.

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REPORT #: THRU-808002

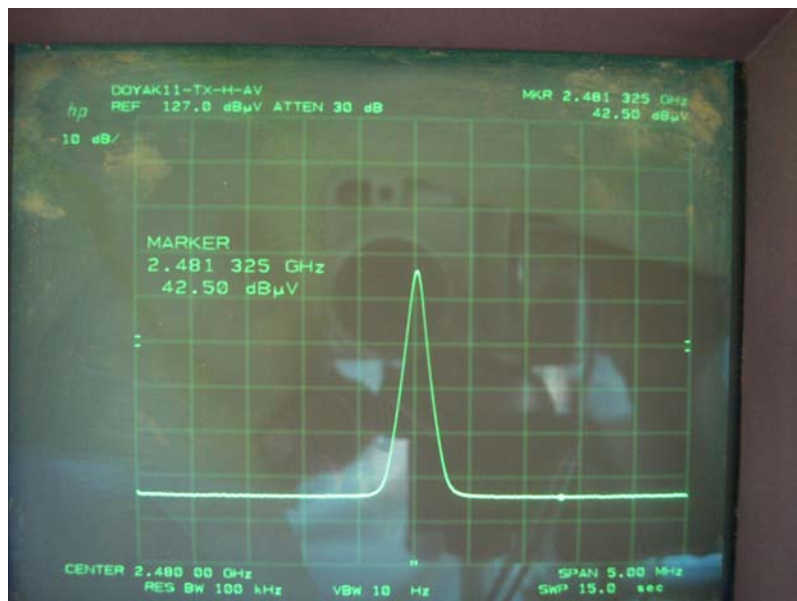
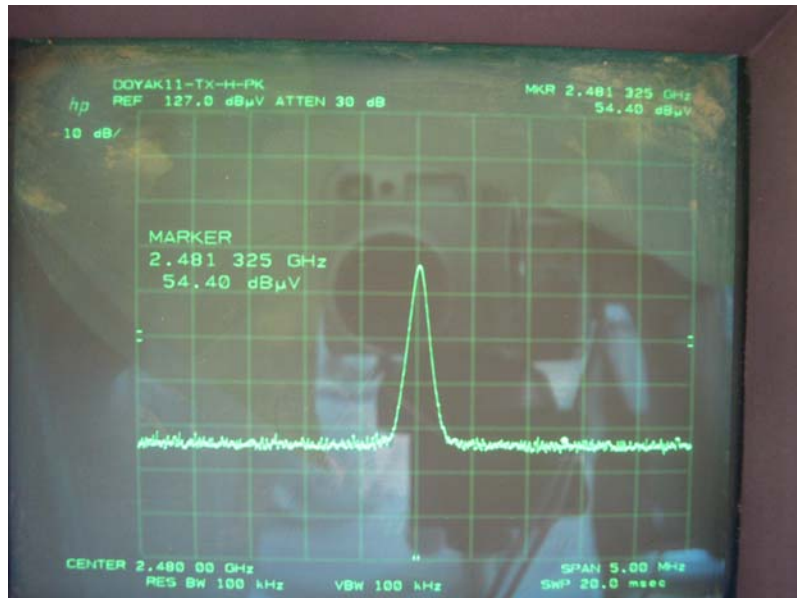
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High channel



APPLICANT: ISV Co., Ltd.

FCC ID: PE3DOYAK11-T

REPORT #: THRU-808002

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APPLICANT: ISV Co., Ltd.

FCC ID: PE3D0YAK11-T

NAME OF TEST: POWER LINE CONDUCTED INTERFERENCE

RULES PART NO.: 15.207

## REQUIREMENTS:

|               | QUASI - PEAK | AVERAGE    |
|---------------|--------------|------------|
| .15 - 0.5 MHz | 66-56 dBuV   | 56-46 dBuV |
| 0.5 - 5.0     | 56           | 46         |
| 5.0 - 30.     | 60           | 50         |

TEST PROCEDURE: ANSI STANDARD C63.4-2003. The spectrum was scanned from .15 to 30 MHz.

The highest emission read for Line 1 was

The highest emission read for Line 2 was

THE GRAPHS ON THE FOLLOWING PAGES REPRESENT THE EMISSIONS READ FOR POWER LINE CONDUCTED FOR THIS DEVICE.

TEST RESULTS: Both lines were observed. The measurements indicate that the unit DOES appear to meet the FCC requirements for this class of equipment.

## "Not Applicable"

APPLICANT: ISV Co., Ltd.

FCC ID: PE3D0YAK11-T

REPORT #: THRU-808002

# THRU Lab & Engineering.

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Kyunggi-Do, 469-803, Korea

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## TEST Equipment List

| No | Description          | Manufacturer    | Model No.           | Serial No. | Due Cal.   | Used                                |
|----|----------------------|-----------------|---------------------|------------|------------|-------------------------------------|
| 1  | Test Receiver        | Rohde & Schwarz | ESHS 10             | 862970/018 | 2009.05.13 | <input type="checkbox"/>            |
| 2  | Test Receiver        | Rohde & Schwarz | ESVS 10             | 826008/014 | 2009.06.20 | <input checked="" type="checkbox"/> |
| 3  | Spectrum Analyzer    | Hewlett Packard | 8566B               | 2311A02394 | 2009.06.10 | <input checked="" type="checkbox"/> |
| 4  | Spectrum Analyzer    | Advantest Corp. | R3261C              | 61720208   | 2009.06.10 | <input checked="" type="checkbox"/> |
| 5  | Modulation Analyzer  | Hewlett Packard | 8901B               | 3438A05094 | 2009.05.29 | <input type="checkbox"/>            |
| 6  | Audio analyzer       | Hewlett Packard | 8903B               | 3011A12915 | 2009.05.29 | <input checked="" type="checkbox"/> |
| 7  | Preamplifier         | Hewlett Packard | 8447F               | 2805A02570 | 2009.05.26 | <input type="checkbox"/>            |
| 8  | Preamplifier         | A.H. Systems    | PAM-0118            | 164        | 2009.04.27 | <input checked="" type="checkbox"/> |
| 9  | Signal Generator     | Hewlett Packard | 8673D               | 2708A00448 | 2009.06.10 | <input type="checkbox"/>            |
| 10 | Power Meter          | Hewlett Packard | 437B                | 312U24787  | 2009.04.29 | <input type="checkbox"/>            |
| 11 | Power Sensor         | Hewlett Packard | 8482B               | 3318A06943 | 2009.06.29 | <input type="checkbox"/>            |
| 12 | Loop Antenna         | Rohde & Schwarz | HFH2-Z2.335.4711.52 | 826532/006 | 2009.01.31 | <input type="checkbox"/>            |
| 13 | Dipole Antenna       | Rohde & Schwarz | VHAP                | 574        | 2010.07.07 | <input type="checkbox"/>            |
| 14 | Dipole Antenna       | Rohde & Schwarz | VHAP                | 575        | 2010.07.17 | <input type="checkbox"/>            |
| 15 | Dipole Antenna       | Rohde & Schwarz | UHAP                | 546        | 2010.07.07 | <input type="checkbox"/>            |
| 16 | Dipole Antenna       | Rohde & Schwarz | UHAP                | 547        | 2010.07.07 | <input type="checkbox"/>            |
| 17 | Biconical Antenna    | Eaton Corp.     | 94455-1             | 0977       | 2010.07.03 | <input type="checkbox"/>            |
| 18 | Biconical Antenna    | EMCO            | 3104C               | 9111-2468  | 2010.07.03 | <input checked="" type="checkbox"/> |
| 19 | Log Periodic Antenna | EMCO            | 3146                | 2051       | 2010.06.05 | <input checked="" type="checkbox"/> |
| 20 | Log Periodic Antenna | EMCO            | 3146                | 8901-2320  | 2010.07.03 | <input type="checkbox"/>            |
| 21 | Horn Antenna         | A.H. Systems    | SAS-571             | 414        | 2009.03.17 | <input checked="" type="checkbox"/> |
| 22 | LISN                 | EMCO            | 3825/2              | 9111-1912  | 2008.12.12 | <input type="checkbox"/>            |
| 23 | LISN                 | Kyoritsu        | KNW-242             | 8-923-2    | 2009.05.23 | <input type="checkbox"/>            |
| 24 | Waveform Generator   | Hewlett Packard | 33120A              | US34001190 | 2009.05.29 | <input type="checkbox"/>            |
| 25 | Digital Oscilloscope | Tektronix       | TDS 340A            | B012287    | 2009.06.10 | <input type="checkbox"/>            |

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|    |            |                  |      |       |            |                          |
|----|------------|------------------|------|-------|------------|--------------------------|
| 26 | Dummy Load | Bird Electronics | 8251 | 11511 | 2009.02.02 | <input type="checkbox"/> |
|----|------------|------------------|------|-------|------------|--------------------------|

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NAME OF TEST: RF EXPOSURE REQUIREMENT

| §15.247 (e), §1.1307 (b)(2), §1.1310, & §2.1093              |                                     |
|--------------------------------------------------------------|-------------------------------------|
| Frequency Range (MHz)                                        | Power Density (mW/cm <sup>2</sup> ) |
| Limits for Occupational/Controlled Exposures                 |                                     |
| 0.3 - 3.0                                                    | *(100)                              |
| 3.0 - 30                                                     | *(900/f <sub>2</sub> )              |
| 30 - 300                                                     | 1.0                                 |
| 300 - 1500                                                   | f/300                               |
| 1500 - 100,000                                               | 5.0                                 |
| Limits for General Population/Uncontrolled Exposure          |                                     |
| 0.3 - 3.0                                                    | *(100)                              |
| 3.0 - 30                                                     | *(180/f <sub>2</sub> )              |
| 30 - 300                                                     | 0.2                                 |
| 300 - 1500                                                   | f/1500                              |
| 1500 - 100,000                                               | 1.0                                 |
| f = frequency in MHz * = Plane-wave equivalent power density |                                     |

## MPE Calculation

The calculations on the next page are based on the following:

An output power of 2.703mW

A gain of 0 dBi

A value for the general population exposure limit of 1 mW/cm<sup>2</sup> which in the formula is designated as S=1 or as calculated from 1500/1500=1

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Po :=2.703 mWatts

dBi :=0 antenna gain

f :=1500 Frequency in MHz

G :=dBd + 2.15 gain in dBi

G = 2.15

$$G_n := 10^{\frac{G}{10}} \quad \text{gain numeric}$$

$$S := \frac{f}{1500}$$

300 for controlled  
1500 for uncontrolled

Gn = 1.641

S = 1

$$R := \sqrt{\frac{(P_o \cdot G_n)}{(4 \pi \cdot S)}}$$

R :=0.594 distance in centimeters  
Required for compliance

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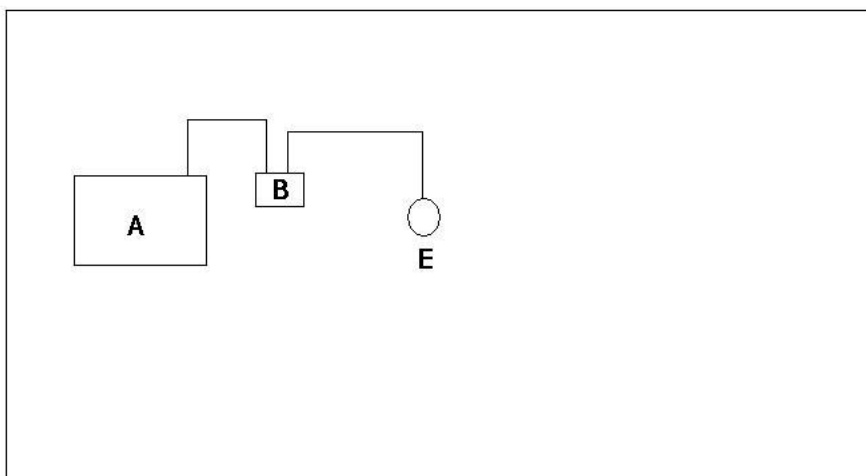
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## Test Setup Block Diagram

### 1) Radiated Test Diagram

Test Setup Block Diagram



Turn Table (150\*100cm)

#### Test Equipment

A : Samsung Notebook S820(FCCID : A3LS820 Feb 11, 1999)

B : EUT Test JIG(EUT Control)

E : EUT