



## TEST REPORT

REGULATION :

FCC Part 2, 22, 74, 90, 90.210

| Applicant                                                                                                                                  | Testing Laboratory                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Kenwood Corporation<br>1-16-2, Hakusan, Midori-ku, Yokohama-shi<br>Kanagawa, 226-8525 Japan<br>Tel.: +81 45 939 6254 Fax.: +81 45 939 7093 | ETL SEMKO Japan K. K. Kashima No.1 Test site<br>FCC File Number : 100290-0<br>3-2, Sunayama, Kamisu-shi, Ibaraki-ken<br>314-0255 Japan<br>Tel.: +81 479 40 1097 Fax.: +81 479 46 1788<br>URL: www.japan.intertek-etlsemko.com |

|                            |                     |
|----------------------------|---------------------|
| Equipment type             | UHF P25 TRANSCEIVER |
| Trademark                  | KENWOOD             |
| Model(s)                   | TK-5810H-K          |
| Serial No.                 | None                |
| FCC ID                     | K4439923210         |
| Measurement Method         | ANSI/TIA-603-C-2004 |
| Deviation from standard(s) | No deviation        |
| Test Result                | Complied            |
| Report Number              | ESJ-107062          |
| Report issue date          | April 26, 2007      |

This equipment has been shown to be capable of compliance with the applicable standard(s) as indicated in the test report.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

This test report shall not be reproduced partially, or in full, without the prior written approval of ETL SEMKO Japan K. K. The results and statements contained in this report pertain only to the equipment evaluated.

Approved by

Kazuo Gokita

[Assistant Manager]

Tested by

Naoki Ikeda

## TABLE OF CONTENTS

---

|                                                                    | Page |
|--------------------------------------------------------------------|------|
| SECTION 1. GENERAL INFORMATION                                     | 3    |
| SECTION 2. TEST AND MEASUREMENT DATA                               | 5    |
| SECTION 3. INFORMATION ABOUT EUT                                   | 6    |
| SECTION 4. MEASUREMENT RESULT                                      | 8    |
| SECTION 5. TEST DATA                                               |      |
| 5.1 Carrier Output Power (Conducted)                               | 9    |
| 5.2 Unwanted Emissions (Transmitter Conducted)                     | 11   |
| 5.3 Field Strength of Spurious Radiation                           | 14   |
| 5.4 Emission Masks (Occupied Bandwidth)                            | 18   |
| 5.5 Transient Frequency Behavior                                   | 26   |
| 5.6 Audio Frequency Response / Audio Low Pass Filter (Voice Input) | 30   |
| 5.7 Modulation Limiting                                            | 33   |
| 5.8 Frequency Stability (Temperature Variation)                    | 37   |
| 5.9 Frequency Stability (Voltage Variation)                        | 40   |
| 5.10 Necessary Bandwidth and Emission Bandwidth                    | 42   |
| SECTION 6. VALIDITY OF TEST REPORT                                 | 44   |
| SECTION 7. DESCRIPTION OF TEST SITE                                | 44   |
| APPENDIX PHOTOGRAPHS                                               |      |

---

## SECTION 1. GENERAL INFORMATION

| Description of Test Item |                       |
|--------------------------|-----------------------|
| Kind of EUT              | : UHF P25 TRANSCEIVER |
| Condition of EUT         | : Prototype           |
| Type                     | : Mobile type         |
| Trademark                | : KENWOOD             |

| Test Performed |                      |
|----------------|----------------------|
| EUT Received   | : March 09, 2007     |
| Test started   | : March 19, 2007     |
| Test completed | : April 18, 2007     |
| Temperature    | : 20 to 28 degree C  |
| Humidity       | : 45 to 66 %         |
| Atmospheric    | : 100.8 to 102.8 kPa |
| Voltage        | : DC 13.4 V          |
| Current        | : 28A Maximum        |
| Frequency      | : None               |

| Test Tracability                                                                                                                          |  |
|-------------------------------------------------------------------------------------------------------------------------------------------|--|
| Tracability to national standards of test result is achieved by means of calibration tractability to national or international standards. |  |

| Abbreviations                               |                                    |
|---------------------------------------------|------------------------------------|
| EUT = Equipment Under Test                  | Cal Exp. = Calibration Expire      |
| D.R.G. Antenna = Double Rigid Guide Antenna | ACC = External accessory connector |

**In Accordance with FCC Rules and Regulations, Volume II, Part 2 and 90**

**Sub-part 2.1033**

|                                                     |                                                                                                                                              |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>(c)(1) Applicant and Manufacture Information</b> |                                                                                                                                              |
| APPLICANT                                           |                                                                                                                                              |
| Company                                             | : Kenwood Corporation                                                                                                                        |
| Address                                             | : 1-16-2, Hakusan, Midori-ku, Yokohama-shi<br>Kanagawa, 226-8525 Japan                                                                       |
| Contact Person                                      | : Tamaki Shimamura<br>Manager, Communications Equipment Division                                                                             |
| MANUFACTURER                                        |                                                                                                                                              |
| Company                                             | : Kenwood Corporation                                                                                                                        |
| Address                                             | : 1-16-2, Hakusan, Midori-ku, Yokohama-shi, Kanagawa,<br>226-8525 Japan                                                                      |
| <b>(c)(2) FCC ID</b>                                |                                                                                                                                              |
| FCC ID                                              | : K4439923210                                                                                                                                |
| Model number                                        | : TK-5810H-K                                                                                                                                 |
| Serial number                                       | : None                                                                                                                                       |
| <b>(c)(3) Instruction Manual(S)</b>                 |                                                                                                                                              |
| Instruction manual(s)                               | : Please refer to attached Exhibits F                                                                                                        |
| <b>(c)(4) Type of Emission</b>                      |                                                                                                                                              |
| Emission Designation                                | : 16K0F3E(Wide) / 11K0F3E(Narrow)<br>20K0F7D(Wide) / 11K2F7D(Narrow)<br>14K4F1D(Wide) / 7K20F1D(Narrow)<br>8K10F1E(Narrow) / 8K10F1D(Narrow) |
| <b>(c)(5) Frequency range</b>                       |                                                                                                                                              |
| Frequency Range                                     | : 450 to 520 MHz                                                                                                                             |
| <b>(c)(6) Power Rating</b>                          |                                                                                                                                              |
| Output Power                                        | : 50 to 100 W                                                                                                                                |
| Type                                                | : Continuously Variable                                                                                                                      |
| <b>(c)(7) Maximum Power Rating</b>                  |                                                                                                                                              |
| Output Power                                        | : 100 W (450-512 MHz:100 W, 512-520 MHz:90 W)                                                                                                |
| <b>Other Information</b>                            |                                                                                                                                              |
| Number of Channel                                   | : 512                                                                                                                                        |
| Channel Spacing                                     | : 25 kHz / 12.5 kHz                                                                                                                          |
| Maximum Deviation                                   | : 5 kHz / 2.5 kHz                                                                                                                            |
| Frequency Stability                                 | : 2.0 ppm (Specification)                                                                                                                    |
| Antenna Impedance                                   | : 50 $\Omega$ Nominal                                                                                                                        |
| <b>Note</b>                                         |                                                                                                                                              |
|                                                     |                                                                                                                                              |

## SECTION 2. TEST AND MEASUREMENT DATA

All test and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J and Industry Canada as the following individual parts:

| FCC Rule       | Test Item                                                                       | Tested     |
|----------------|---------------------------------------------------------------------------------|------------|
| Part 21        | Domestic Public Fixed radio Services                                            | N.A.       |
| <b>Part 22</b> | <b>Non Cellular</b>                                                             | <b>YES</b> |
| Part 22        | Public Mobile Services                                                          | N.A.       |
| Part 22        | Subpart H - Cellular Radiotelephone Service                                     | N.A.       |
| Part 22        | Alternative technologies and auxiliary service                                  | N.A.       |
| Part 23        | International Fixed Public Radiocommunication service                           | N.A.       |
| Part 24        | Personal Communications Services                                                | N.A.       |
| <b>Part 74</b> | <b>Subpart H - Low Power Auxiliary Stations</b>                                 | <b>YES</b> |
| Part 80        | Stations in the Maritime Services                                               | N.A.       |
| Part 80        | Subpart E - general Technical Standards                                         | N.A.       |
| Part 80        | Subpart F - Equipment Authorization for Compulsory Ships                        | N.A.       |
| Part 80        | Subpart K - Private Coast Stations and Marine Utility Stations                  | N.A.       |
| Part 80        | Subpart S - Compulsory radiotelephone Installations for Small Passenger Boats   | N.A.       |
| Part 80        | Subpart T - Radiotelephone Installation Required for Vessels on the Great Lakes | N.A.       |
| Part 80        | Subpart U - Radiotelephone Installations Required by the Bridge-to-Bridge Act   | N.A.       |
| Part 80        | Subpart V - Emergency Position Indicating Radiobeacons (EPIRB'S)                | N.A.       |
| Part 80        | Subpart W - Global Maritime Distress and Safety System (GMDSS)                  | N.A.       |
| Part 80        | Subpart X - Voluntary Radio Installations                                       | N.A.       |
| Part 87        | Aviation Services                                                               | N.A.       |
| <b>Part 90</b> | <b>Private Land Mobile radio Services</b>                                       | <b>YES</b> |
| Part 94        | Private Operational - Fixed Microwave Service                                   | N.A.       |
| Part 95        | Subpart A - General Mobile radio Service                                        | N.A.       |
| Part 95        | Subpart C - Radio Control (R/C) radio Service                                   | N.A.       |
| Part 95        | Subpart D - Citizens Band (CB) Radio Service                                    | N.A.       |
| Part 95        | Subpart E -Family radio Service                                                 | N.A.       |
| Part 95        | Subpart F -Interactive Video and Data Service (IVDS)                            | N.A.       |
| Part 97        | Amateur Radio Service                                                           | N.A.       |
| Part 101       | Fixed Microwave Service                                                         | N.A.       |

| IC Rule | Test Item                                                                                  | Tested |
|---------|--------------------------------------------------------------------------------------------|--------|
| RSS-119 | Land Mobile and Fixed Radio Transmitters and Receivers                                     | N.A.   |
| RSS-Gen | General Requirements and Information for the Certification of Radiocommunication Equipment | N.A.   |

### SECTION 3. INFORMATION ABOUT EUT

#### List of System Configuration

| Symbol | Item                    | Model No.  | Serial No. | Manufacture         | Notes  |
|--------|-------------------------|------------|------------|---------------------|--------|
| A1     | UHF P25 TRANSCEIVER     | TK-5810H-K | None       | Kenwood Corporation | EUT    |
| A2     | Front Panel Kit         | KCH-15     | None       | Kenwood Corporation | Option |
| A3     | Control Head Remote Kit | KRK-5      | None       | Kenwood Corporation | Option |
| A4     | External Speaker        | KES-5      | None       | Kenwood Corporation | Option |
| A5     | Keypad Microphone       | KMC-28     | None       | Kenwood Corporation | Option |
| A6     | Remote Control Cable    | KCT22      | None       | Kenwood Corporation | Option |
| A7     | Ignition Sense Cable    | KCT18      | None       | Kenwood Corporation | Option |

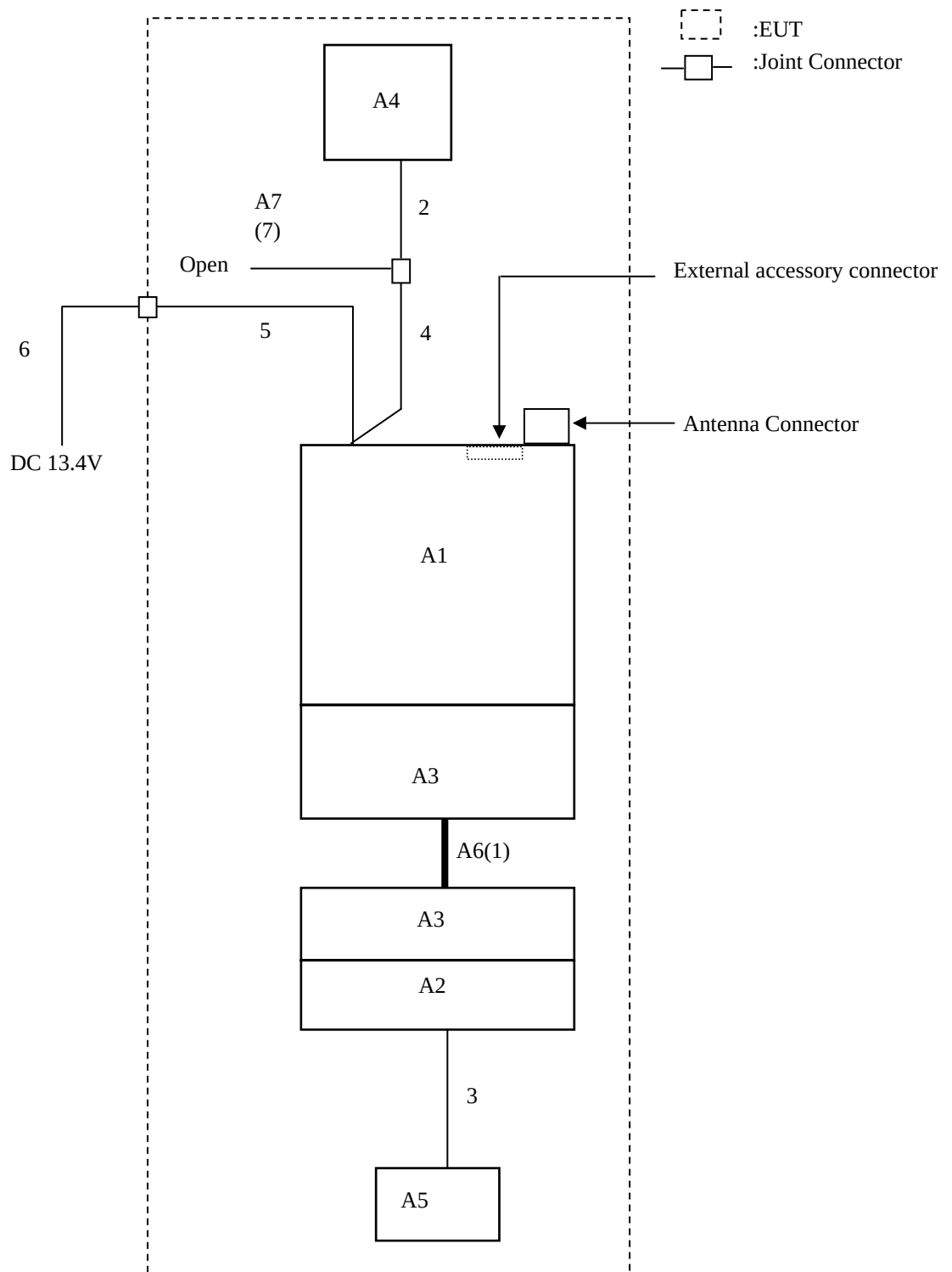
#### Port(s)/Connector(s)

| Port Name  | Connector Type   | Connector Pin | Notes |
|------------|------------------|---------------|-------|
| Antenna    | M                | 2 pin         |       |
| ACC        | D-sub            | 25 pin        |       |
| ACC        | None             | 9 pin         |       |
| Microphone | Kenwood Original | 12 pin        |       |

#### Used Cable(s)

| No. | Name                             | Length (m) | Shield  | Notes |
|-----|----------------------------------|------------|---------|-------|
| 1   | Remote Control Cable             | 7.20       | Plastic |       |
| 2   | Speaker Cable                    | 2.80       | Plastic |       |
| 3   | Mic. Cable                       | 0.60       | Plastic |       |
| 4   | Cable                            | 0.20       | Plastic |       |
| 5   | Power Cable for A1 (DC)          | 0.27       |         |       |
| 6   | Power External Cable for A1 (DC) | 3.00       |         |       |
| 7   | Ignition Sense Cable             | 3.30       | Plastic |       |

### Details of Configuration and Connection



## SECTION 4. MEASUREMENT RESULT

| FCC<br>Part2      | Part22                 | Part74         | Part90            | TEST ITEM                                   | RESULTS |
|-------------------|------------------------|----------------|-------------------|---------------------------------------------|---------|
| 2.1046<br>(a)     | -                      | -              | -                 | Carrier Output Power (Conducted)            | PASS    |
| 2.1051            | -                      | -              | 90.210            | Unwanted Emissions (Transmitter Conducted)  | PASS    |
| 2.1053<br>(a)     | -                      | -              | 90.210            | Field Strength of Spurious Radiation        | PASS    |
| 2.1049<br>(c) (1) | 22.359, 357<br>(a) (1) | 74.1236        | 90.210            | Emission Masks (Occupied Bandwidth)         | PASS    |
| -                 | -                      | -              | 90.214            | Transient Frequency Behavior                | PASS    |
| 2.1047<br>(a)     | -                      | -              | 90.242<br>(b) (8) | Audio Low Pass Filter (Voice Input)         | PASS    |
| 2.1047<br>(a)     | -                      | -              | -                 | Audio Frequency Response                    | PASS    |
| 2.1047<br>(b)     | -                      | -              | -                 | Modulation Limiting                         | PASS    |
| 2.1055<br>(a) (1) | 22.355                 | 74.1261<br>(b) | 90.213<br>(a)     | Frequency Stability (Temperature Variation) | PASS    |
| 2.1055<br>(d) (1) | 22.355                 | 74.1261<br>(b) | 90.213<br>(a)     | Frequency Stability (Voltage Variation)     | PASS    |

### Limitation on Results

The test result of this report is effective equipment under test itself and under the test configuration described on the report.

This test report does not assure that whether the test result taken in other testing laboratory is compatible or reproducible to the test result on this report or not.



## SECTION 5. TEST DATA

### 5.1 Carrier Output Power (Conducted)

|                   |                                  |
|-------------------|----------------------------------|
| REGULATIONS       | : 47 CFR 2.1046 (a)              |
| TEST METHOD/GUIDE | : ANSI/TIA-603-C Section 2.2.1.2 |

#### Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 The EUT was conducted to a resistive coaxial attenuator of normal load impedance.  

$$\text{RF Power (dBm)} = \text{Power Meter reading (dBm)} + \text{Attenuator Loss (dB)} + \text{Cable Loss (dB)}$$

$$\text{RF Power (W)} = 10^{(\text{RF Power (dBm)}/10)}/1000$$

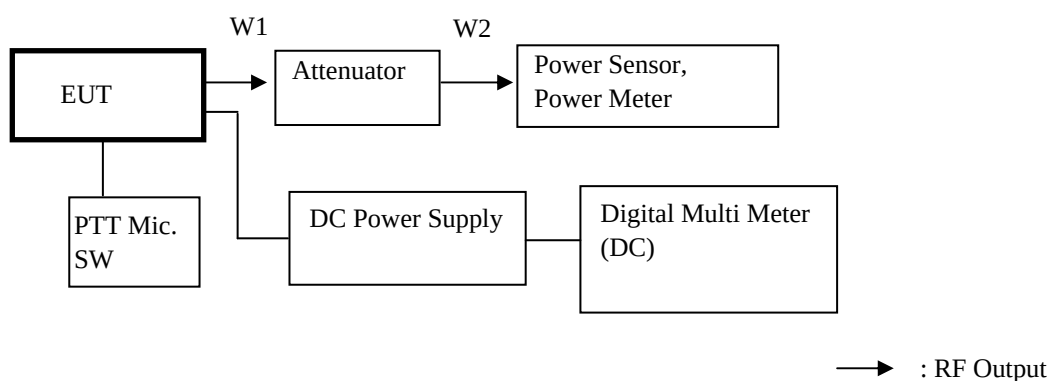
#### Measuring Equipments

| No. | Equipment           | Manufacture     | Model No.   | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------------|-----------------|-------------|------------|-------------|-------------|
| 1   | Power Meter         | Hewlett Packard | E4418B      | GB38410404 | Feb. 02, 07 | Feb. 29, 08 |
| 2   | Power Sensor        | Hewlett Packard | 8482A       | US37292242 | May. 26, 06 | May. 31, 07 |
| 3   | Attenuator (20dB)   | Weinschel       | 40-20-34    | AA5761     | Jun. 15, 06 | Jun. 30, 07 |
| 4   | Attenuator (30dB)   | Weinschel       | WA-29-30-34 | 8923       | Jun. 15, 06 | Jun. 30, 07 |
| 5   | DC Power Supply     | Daiwa           | PS-3020     | None       | None        | None        |
| 6   | Digital Multi Meter | Sanwa           | CD721       | 3215593    | May 15, 06  | May 31, 07  |

#### Measuring Cables

| No. | Cable         | Manufacturer   | Model No.   | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------|----------------|-------------|------------|-------------|-------------|
| W1  | Coaxial Cable | Suhner         | SUCOFLEX102 | KSR00046   | Aug. 01, 06 | Aug. 31, 07 |
| W2  | Coaxial Cable | Pacific custom | RG-58 C/U   | AM90C02    | Aug. 01, 06 | Aug. 31, 07 |

#### Measuring Equipment Configuration



#### Uncertainty

Measurement uncertainty is +/- 0.5dB (k = 2)

## Test Results

Measured for the worst case

| No. | Frequency<br>(MHz) | Band   | Setting    | RF Power<br>(W) |
|-----|--------------------|--------|------------|-----------------|
| 1   | 450.05             | Low    | High Power | 100             |
| 2   | 485.05             | Middle | High Power | 100             |
| 3   | 519.95             | High   | High Power | 90              |
| 4   | 450.05             | Low    | Low Power  | 50              |
| 5   | 485.05             | Middle | Low Power  | 50              |
| 6   | 519.95             | High   | Low Power  | 50              |

## 5.2 Unwanted Emissions (Transmitter Conducted)

|                   |                                   |
|-------------------|-----------------------------------|
| REGULATIONS       | : 47 CFR 2.1051, 90.210           |
| TEST METHOD/GUIDE | : ANSI/TIA-603-C Section 2.2.13.2 |

### Test Procedure

- The EUT and test equipment were set up as shown on the following page.
- Modulate the transmitter with a 2.5 kHz sine wave at an input Level of 16 dB greater than that necessary to produce 50 % of rated system deviation.
- Adjust the spectrum analyzer for the following setting:
  - Resolution Bandwidth : 10 kHz (< 1 GHz), 1 MHz (> 1 GHz).
  - Video Bandwidth : 30 kHz (< 1 GHz), 3 MHz (> 1 GHz).
  - Sweep Speed : 50 msec.
  - Detector mode : Average
- The emissions were measured for the worst case as follows:
  - : within a band of frequencies defined by the carrier frequency plus and minus one channel.
  - : from the lowest frequency generated in the EUT and to at least the 10th harmonic of the carrier frequency, or 40 GHz, whichever is lower.

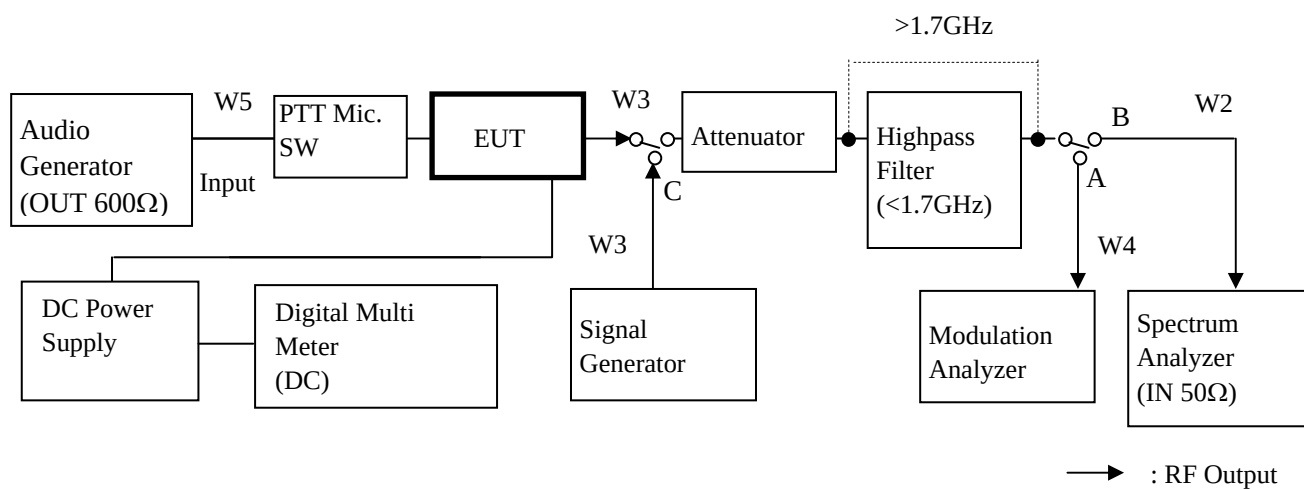
### Measuring Equipments

| No. | Equipment           | Manufacture     | Model No.   | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------------|-----------------|-------------|------------|-------------|-------------|
| 1   | Audio Generator     | Anritsu         | MG443B      | M70150     | Aug. 25, 06 | Aug. 31, 07 |
| 2   | Attenuator (20dB)   | Weinschel       | 40-20-34    | AA5761     | Jun. 15, 06 | Jun. 30, 07 |
| 3   | Attenuator (30dB)   | Weinschel       | WA-29-30-34 | 8923       | Jun. 15, 06 | Jun. 30, 07 |
| 4   | Modulation Analyzer | Hewlett Packard | 8901B       | 3403A04852 | Apr. 12, 06 | Apr. 30, 07 |
| 5   | Spectrum Analyzer   | Agilent         | E4407B      | MY45102460 | Oct. 03, 06 | Oct. 31, 07 |
| 6   | Signal Generator    | Rohde&Schwarz   | SMT06       | 100684     | Oct. 24, 06 | Oct. 31, 07 |
| 7   | Highpass Filter     | Anritsu         | MP526D      | 6200220657 | Aug. 01, 06 | Aug. 31, 07 |
| 8   | DC Power Supply     | Daiwa           | PS-3020     | None       | None        | None        |
| 9   | Digital Multi Meter | Sanwa           | CD721       | 3215593    | May 15, 06  | May. 31, 07 |

### Measuring Cables

| No. | Cable         | Manufacturer   | Model No.   | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------|----------------|-------------|------------|-------------|-------------|
| W2  | Coaxial Cable | Pacific custom | RG-58 C/U   | AM90C02    | Aug. 01, 06 | Aug. 31, 07 |
| W3  | Coaxial Cable | Suhner         | SUCOFLEX100 | KSR00091   | Oct. 01, 06 | Oct. 31, 07 |
| W4  | Coaxial Cable | Pacific custom | RG-58 C/U   | AM90C03    | Aug. 01, 06 | Aug. 31, 07 |
| W5  | Balance Cable | Nicoon         | 3D-2V       | KSR00092   | Oct. 01, 06 | Oct. 31, 07 |

## Measuring Equipment Configuration



## Uncertainty

Measurement uncertainty is +/- 1.5 dB (k = 2)

## Test Results

Measured for the worst case

State : High Power / 12.5 kHz channel bandwidth

| No.                                                           | Band   | Frequency<br>(MHz) | Correct<br>Level<br>(dBm) | Emission<br>Level<br>(dBc) | Limit<br>(dBc) | Margin<br>(dB) |
|---------------------------------------------------------------|--------|--------------------|---------------------------|----------------------------|----------------|----------------|
| 1                                                             | Low    | 900.10             | -43.64                    | -93.64                     | -70.0          | 23.6           |
| 2                                                             | Middle | 1455.15            | -42.62                    | -92.62                     | -70.0          | 22.6           |
| 3                                                             | High   | 1559.85            | -40.84                    | -90.84                     | -69.5          | 20.8           |
| There is the margin of 20dB over except for the above points. |        |                    |                           |                            |                |                |

State : Low Power / 12.5 kHz channel bandwidth

| No.                                                           | Band   | Frequency<br>(MHz) | Correct<br>Level<br>(dBm) | Emission<br>Level<br>(dBc) | Limit<br>(dBc) | Margin<br>(dB) |
|---------------------------------------------------------------|--------|--------------------|---------------------------|----------------------------|----------------|----------------|
| 1                                                             | Low    | 1624.60            | -47.82                    | -94.81                     | -67.0          | 27.8           |
| 2                                                             | Middle | 1314.15            | -48.16                    | -95.15                     | -67.0          | 28.2           |
| 3                                                             | High   | 1409.85            | -47.81                    | -94.80                     | -67.0          | 27.8           |
| There is the margin of 20dB over except for the above points. |        |                    |                           |                            |                |                |

Mask D Limit (dBc) =  $-(50+10\log(P))$

Correct Level (dBm) = Substitute SG Level (dBm)

Emission Level (dBc) = Correct Level (dBm) -  $10\log(P*1000)$

P = Carrier Level (W)

" - " = Measurement Limit

### 5.3 Field Strength of Spurious Radiation

REGULATIONS : 47 CFR 2.1053 (a), 90.210

TEST METHOD/GUIDE : ANSI/TIA-603-C Section 2.2.12.2

#### Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 Adjust the spectrum analyzer for the following setting:
  - a) Resolution Bandwidth : 10 kHz (< 1 GHz), 1 MHz (> 1 GHz).
  - b) Video Bandwidth : 300 kHz (< 1 GHz), 3 MHz (> 1 GHz).
  - c) Sweep Speed : 50ms.
  - d) Detector mode : Positive Peak
- 3 The transmitter was placed on a wooden turntable, and it was transmitting into non-radiating load which was also placed on the turntable.
- 4 The measurement antenna was placed at a distance of 3 meters from the EUT.  
During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.  
The test was performed by placing the EUT on 3-orthogonal axis.
- 5 The frequency range up to tenth harmonic of the fundamental frequency was investigated.
- 6 Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable.  
The absolute levels of the spurious emissions were measured by the substitution.
- 7 Spurious emissions in dB = 10 Log (TX power in Watts/0.001) – the absolute level
- 8 Spurious attenuation Wide Band Modulation limit in dB = 43 + 10 Log10 (power out in Watts)
- 9 Spurious attenuation Narrow Band Modulation limit in dB = 50 + 10 Log10 (power out in Watts)

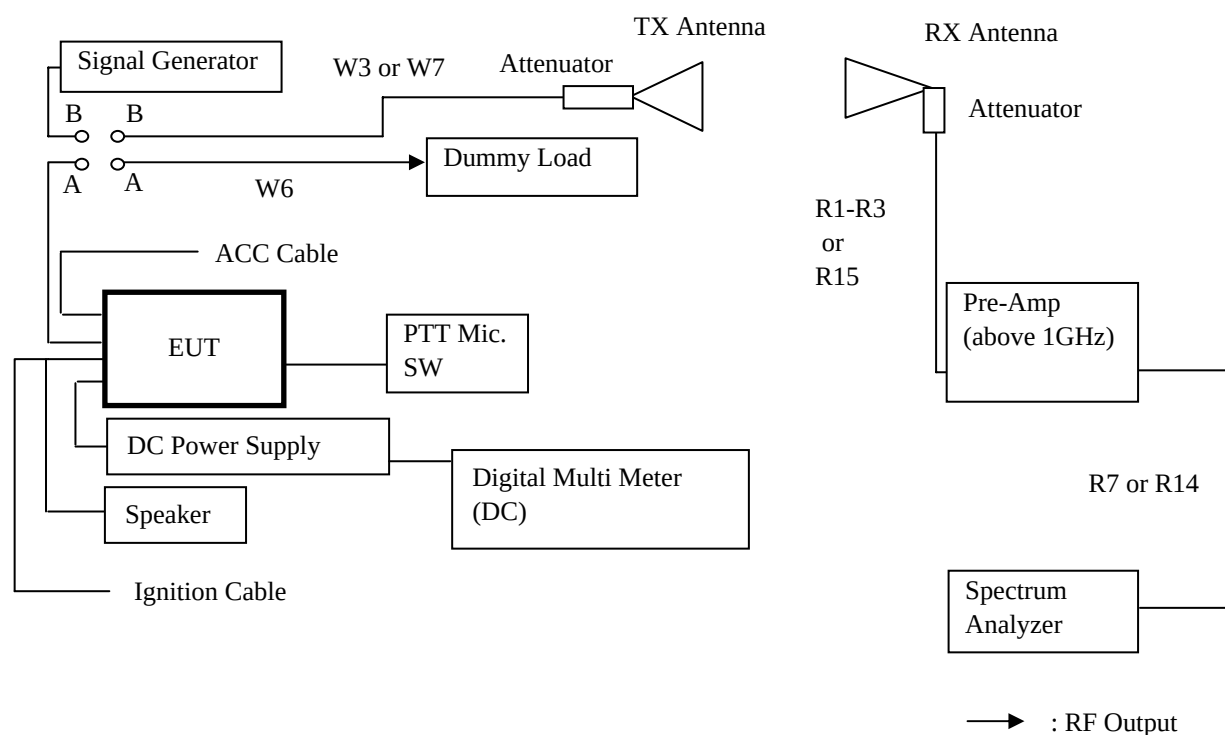
#### Measuring Equipments

| No. | Equipment           | Manufacture     | Model No. | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------------|-----------------|-----------|------------|-------------|-------------|
| 1   | Dipole Antenna(TX)  | Schwarzbeck     | UHA9105   | None       | Apr. 26, 06 | Apr. 30, 07 |
| 2   | D.R.G Antenna(TX)   | Schwarzbeck     | 3115      | 5045       | Jun. 08, 06 | Jun. 30, 07 |
| 3   | Tri-log Antenna(RX) | Schwarzbeck     | VULB9168  | 106        | Aug. 29, 06 | Aug. 31, 07 |
| 4   | D.R.G Antenna(RX)   | Schwarzbeck     | 3115      | 5044       | Jun. 08, 06 | Jun. 30, 07 |
| 5   | Pre-Amplifier       | Hewlett Packard | 83051A    | 3332A00329 | Sep. 27, 06 | Sep. 30, 07 |
| 6   | Step Attenuator     | Hewlett Packard | 8494B     | 2726A14513 | Jan. 15, 07 | Jan. 31, 08 |
| 7   | Attenuator(6dB)     | Anritsu         | MP721B    | M57593     | Jan. 15, 07 | Jan. 31, 08 |
| 8   | Attenuator(3dB)     | Narda           | 4768-3    | 79         | Sep. 27, 06 | Sep. 30, 07 |
| 9   | Attenuator(10dB)    | HUBER+SUHNER    | 6810.17B  | KSR0044    | Aug. 01, 06 | Aug. 31, 07 |
| 10  | Spectrum Analyzer   | Advantest       | R3182     | 111100429  | Mar. 29, 07 | Mar. 31, 08 |
| 11  | Signal Generator    | Rohde&Schwarz   | SMT06     | 100684     | Oct. 24, 06 | Oct. 31, 07 |
| 12  | Dummy Load          | TME             | CT-150NP  | 1138693    | Aug. 01, 06 | Aug. 31, 07 |
| 13  | DC Power Supply     | Daiwa           | PS-3020   | None       | None        | None        |
| 14  | Digital Multi Meter | Sanwa           | CD721     | 3215593    | May. 15, 06 | May 31, 07  |

## Measuring Cables

| No. | Cable         | Manufacturer   | Model No.             | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------|----------------|-----------------------|------------|-------------|-------------|
| W3  | Coaxial Cable | Suhner         | SUCOFLEX100           | KSR00046   | Aug. 01, 06 | Aug. 31, 07 |
| W6  | Coaxial Cable | Suhner         | SUCOFLEX102           | KSR00091   | Oct. 01, 06 | Oct. 31, 07 |
| W7  | Coaxial Cable | Radiall        | R286401332            | KSR00048   | Aug. 01, 06 | Aug. 31, 07 |
| R1  | Coaxial Cable | ETL SEMKO      | 5D-2W                 | None       | Jan. 15, 07 | Jan. 31, 08 |
| R2  | Coaxial Cable | ETL SEMKO      | 10D-2W                | None       | Jan. 15, 07 | Jan. 31, 08 |
| R3  | Coaxial Cable | ETL SEMKO      | 5D-2W                 | None       | Jan. 15, 07 | Jan. 31, 08 |
| R7  | Coaxial Cable | ETL SEMKO      | 5D-2W                 | None       | Jan. 15, 07 | Jan. 31, 08 |
| R14 | Coaxial Cable | Suhner         | SUCOFLEX102           | 712/2      | Sep. 27, 06 | Sep. 30, 07 |
| R15 | Coaxial Cable | Insulated Wire | KSP-1501-1969-<br>KPS | 03292003   | Sep. 27, 06 | Sep. 30, 07 |

## Measuring Equipment Configuration



## Uncertainty

Measurement uncertainty is +/- 4.8dB (k = 2)

## Test Results

Measured for the worst case

State : High Power / 12.5 kHz channel bandwidth / 450.05 MHz

| No | Frequency<br>(MHz) | Pol  | Reading<br>Level<br>(dBm) | SG Out<br>Level<br>(dBm) | Loss<br>(dB) | Antenna<br>Gain<br>(dBi) | Correct<br>Level<br>(dBm) | Emission<br>Level<br>(dBc) | Limit<br>Level<br>(dBc) | Margin<br>(dB) |
|----|--------------------|------|---------------------------|--------------------------|--------------|--------------------------|---------------------------|----------------------------|-------------------------|----------------|
| 1  | 900.10             | Hor. | -76.00                    | -23.90                   | 12.67        | 2.15                     | -34.4                     | -84.4                      | -70.0                   | 14.4           |
|    |                    | Ver. | -70.15                    | -13.35                   | 12.67        | 2.15                     | -23.9                     | -73.9                      | -70.0                   | 3.9            |
| 2  | 1350.15            | Hor. | -42.60                    | -27.30                   | 12.23        | 7.62                     | -31.9                     | -81.9                      | -70.0                   | 11.9           |
|    |                    | Ver. | -45.30                    | -30.20                   | 12.23        | 7.62                     | -34.8                     | -84.8                      | -70.0                   | 14.8           |
| 3  | 1800.20            | Hor. | -49.10                    | -31.30                   | 12.71        | 8.61                     | -35.4                     | -85.4                      | -70.0                   | 15.4           |
|    |                    | Ver. | -50.70                    | -34.00                   | 12.71        | 8.61                     | -38.1                     | -88.1                      | -70.0                   | 18.1           |
| 4  | 2250.25            | Hor. | -57.50                    | -39.20                   | 13.14        | 9.65                     | -42.7                     | -92.7                      | -70.0                   | 22.7           |
|    |                    | Ver. | -57.20                    | -35.80                   | 13.14        | 9.65                     | -39.3                     | -89.3                      | -70.0                   | 19.3           |
| 5  | 2700.30            | Hor. | -60.68                    | -40.00                   | 13.53        | 9.74                     | -43.8                     | -93.8                      | -70.0                   | 23.8           |
|    |                    | Ver. | -65.60                    | -44.60                   | 13.53        | 9.74                     | -48.4                     | -98.4                      | -70.0                   | 28.4           |
| 6  | 3150.35            | Hor. | -67.10                    | -43.30                   | 13.87        | 9.48                     | -47.7                     | -97.7                      | -70.0                   | 27.7           |
|    |                    | Ver. | -70.00                    | -44.00                   | 13.87        | 9.48                     | -48.4                     | -98.4                      | -70.0                   | 28.4           |
| 7  | 3600.40            | Hor. | -59.10                    | -32.50                   | 14.11        | 10.13                    | -36.5                     | -86.5                      | -70.0                   | 16.5           |
|    |                    | Ver. | -58.21                    | -30.70                   | 14.11        | 10.13                    | -34.7                     | -84.7                      | -70.0                   | 14.7           |
| 8  | 4050.45            | Hor. | -67.22                    | -39.50                   | 14.36        | 10.16                    | -43.7                     | -93.7                      | -70.0                   | 23.7           |
|    |                    | Ver. | -70.20                    | -42.10                   | 14.36        | 10.16                    | -46.3                     | -96.3                      | -70.0                   | 26.3           |
| 9  | 4500.50            | Hor. | -68.40                    | -39.60                   | 14.61        | 11.07                    | -43.1                     | -93.1                      | -70.0                   | 23.1           |
|    |                    | Ver. | -67.00                    | -36.50                   | 14.61        | 11.07                    | -40.0                     | -90.0                      | -70.0                   | 20.0           |

There is the margin of 20dB over except for the above points.

Mask D Limit (dBc) =  $-(50+10\log(P))$

Correct Level (dBm) = Substitute SG Level (dBm) + ANT Gain (dBi) - Loss (Cable, Attenuator) (dB)

Emission Level (dBc) = Correct Level (dBm) -  $10\log(P*1000)$

P = Carrier Level (W)

" - " = Measurement Limit



State : Low Power / 12.5 kHz channel bandwidth / 450.05 MHz

| No                                                            | Frequency<br>(MHz) | Pol  | Reading<br>Level<br>(dBm) | SG Out<br>Level<br>(dBm) | Loss<br>(dB) | Antenna<br>Gain<br>(dBi) | Correct<br>Level<br>(dBm) | Emission<br>Level<br>(dBc) | Limit<br>Level<br>(dBc) | Margin<br>(dB) |
|---------------------------------------------------------------|--------------------|------|---------------------------|--------------------------|--------------|--------------------------|---------------------------|----------------------------|-------------------------|----------------|
| 1                                                             | 900.10             | Hor. | -70.70                    | -20.30                   | 12.67        | 2.15                     | -30.8                     | -77.8                      | -67.0                   | 10.8           |
|                                                               |                    | Ver. | -72.20                    | -15.90                   | 12.67        | 2.15                     | -26.4                     | -73.4                      | -67.0                   | 6.4            |
| 2                                                             | 1350.15            | Hor. | -50.90                    | -35.30                   | 12.23        | 7.62                     | -39.9                     | -86.9                      | -67.0                   | 19.9           |
|                                                               |                    | Ver. | -60.00                    | -45.20                   | 12.23        | 7.62                     | -49.8                     | -96.8                      | -67.0                   | 29.8           |
| 3                                                             | 1800.20            | Hor. | -60.18                    | -43.00                   | 12.71        | 8.61                     | -47.1                     | -94.1                      | -67.0                   | 27.1           |
|                                                               |                    | Ver. | -54.60                    | -38.00                   | 12.71        | 8.61                     | -42.1                     | -89.1                      | -67.0                   | 22.1           |
| 4                                                             | 2250.25            | Hor. | -                         | -                        | 13.14        | 9.65                     | -                         | -                          | -                       | -              |
|                                                               |                    | Ver. | -67.40                    | -46.30                   | 13.14        | 9.65                     | -49.8                     | -96.8                      | -67.0                   | 29.8           |
| 5                                                             | 2700.30            | Hor. | -61.54                    | -41.30                   | 13.53        | 9.74                     | -45.1                     | -92.1                      | -67.0                   | 25.1           |
|                                                               |                    | Ver. | -60.50                    | -39.70                   | 13.53        | 9.74                     | -43.5                     | -90.5                      | -67.0                   | 23.5           |
| 6                                                             | 3150.35            | Hor. | -                         | -                        | 13.87        | 9.48                     | -                         | -                          | -                       | -              |
|                                                               |                    | Ver. | -                         | -                        | 13.87        | 9.48                     | -                         | -                          | -                       | -              |
| 7                                                             | 3600.40            | Hor. | -70.30                    | -44.00                   | 14.11        | 10.13                    | -48.0                     | -95.0                      | -67.0                   | 28.0           |
|                                                               |                    | Ver. | -70.00                    | -42.60                   | 14.11        | 10.13                    | -46.6                     | -93.6                      | -67.0                   | 26.6           |
| 8                                                             | 4050.45            | Hor. | -74.00                    | -47.60                   | 14.36        | 10.16                    | -51.8                     | -98.8                      | -67.0                   | 31.8           |
|                                                               |                    | Ver. | -                         | -                        | 14.36        | 10.16                    | -                         | -                          | -                       | -              |
| 9                                                             | 4500.50            | Hor. | -68.20                    | -39.50                   | 14.61        | 11.07                    | -43.0                     | -90.0                      | -67.0                   | 23.0           |
|                                                               |                    | Ver. | -68.20                    | -36.50                   | 14.61        | 11.07                    | -40.0                     | -87.0                      | -67.0                   | 20.0           |
| There is the margin of 20dB over except for the above points. |                    |      |                           |                          |              |                          |                           |                            |                         |                |

Mask D Limit (dBc) =  $-(50+10\log(P))$

Correct Level (dBm) = Substitute SG Level (dBm) + ANT Gain (dBi) - Loss (Cable, Attenuator) (dB)

Emission Level (dBc) = Correct Level (dBm) -  $10\log(P*1000)$

P = Carrier Level (W)

" - " = Measurement Limit

#### 5.4 Emission Masks (Occupied Bandwidth)

REGULATIONS : 47 CFR 2.1049 (c) (1), 22.359, 357 (a) (1) , 74.1236 , 90.210

TEST METHOD/GUIDE : ANSI/TIA-603-C Section 2.2.11.2

#### Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 For EUT supporting audio modulation, the audio signal generator was adjusted to the frequency of maximum response and with output level set for +/- 2.5 kHz or +/- 1.25 kHz deviation (or 50 % modulation).
- 3 With level constant, the signal level was increased 16 dB.  
For EUT supporting digital modulation, the digital modulation mode was operated to its maximum extent.
- 4 Adjust the spectrum analyzer for the following setting:
  - a) Resolution Bandwidth : 100 Hz (Nonmodulation and Narrow modulation), 300 Hz (Wide modulation).
  - b) Video Bandwidth : 30 kHz (Nonmodulation), 100 Hz (Narrow band modulation), 3kHz (Wide band modulation).
  - c) Sweep Speed : 8 sec.
  - d) Sampling Time : 10 times
- 5 The occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.

#### Measuring Equipments

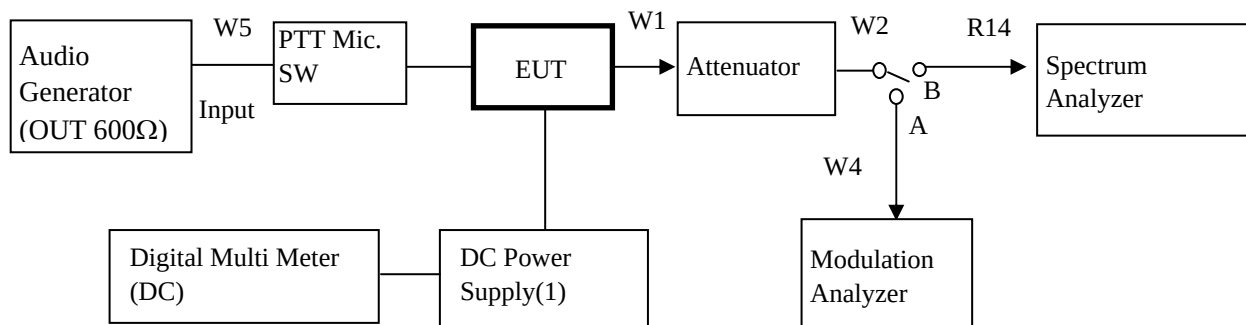
| No. | Equipment            | Manufacture            | Model No.    | Serial No. | Cal Date    | Cal Exp.    |
|-----|----------------------|------------------------|--------------|------------|-------------|-------------|
| 1   | Audio Generator      | Anritsu                | MG443B       | M70150     | Aug. 25, 06 | Aug. 31, 07 |
| 2   | Attenuator (20dB)    | Weinschel              | 40-20-34     | AA5761     | Jun. 15, 06 | Jun. 30, 07 |
| 3   | Attenuator (30dB)    | Weinschel              | WA-29-30-34  | 8923       | Jun. 15, 06 | Jun. 30, 07 |
| 4   | Attenuator (10dB)    | TME                    | CFA-05NPJ-10 | 262843     | Aug. 01, 06 | Aug. 31, 07 |
| 5   | Modulation Analyzer  | HP                     | 8901B        | 3403A04852 | Apr. 12, 06 | Apr. 30, 07 |
| 6   | Spectrum Analyzer    | Agilent                | E4407B       | MY45102460 | Oct. 03, 06 | Oct. 31, 07 |
| 7   | Modem Evaluation Kit | Consumer Microcircuits | EV9000       | None       | None        | None        |
| 8   | DC Power Supply(1)   | Daiwa                  | PS-3020      | None       | None        | None        |
| 9   | DC Power Supply(2)   | Kenwood                | PW18-1.8Q    | None       | None        | None        |
| 10  | Digital Multi Meter  | Sanwa                  | CD721        | 3215593    | May 15, 06  | May 31, 07  |

#### Measuring Cables

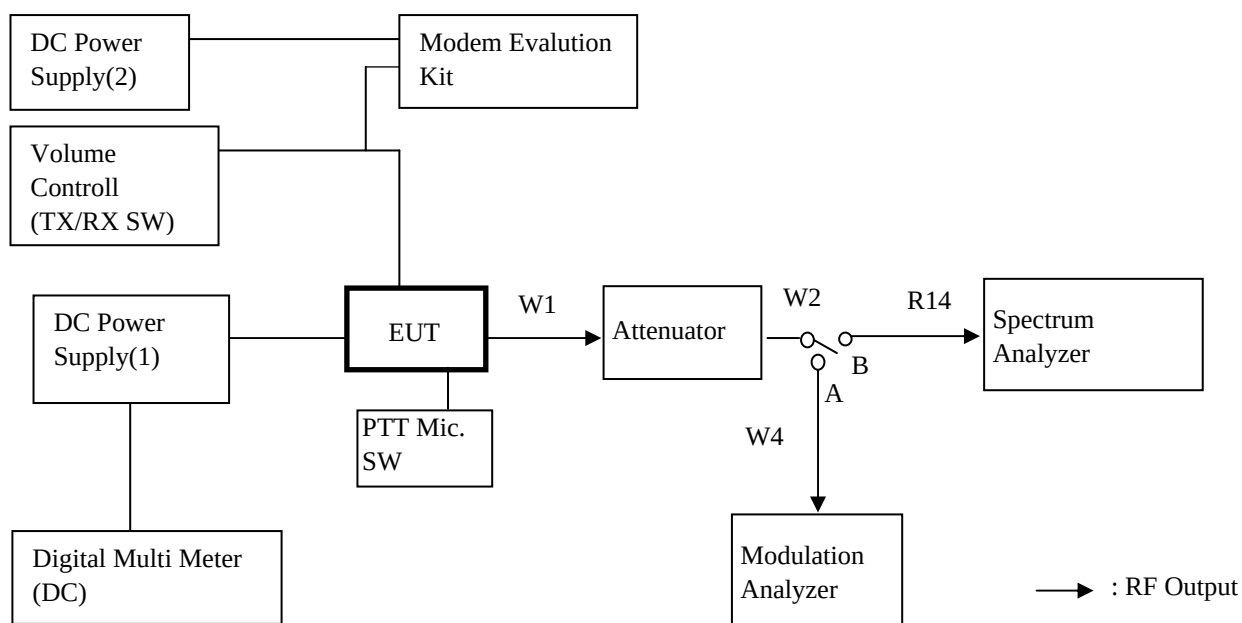
| No. | Cable         | Manufacture    | Model No.   | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------|----------------|-------------|------------|-------------|-------------|
| W1  | Coaxial Cable | Suhner         | SUCOFLEX102 | KSR00046   | Aug. 01, 06 | Aug. 31, 07 |
| W2  | Coaxial Cable | Pacific custom | RG-58 C/U   | AM90C02    | Aug. 01, 06 | Aug. 31, 07 |
| W4  | Coaxial Cable | Pacific custom | RG-58 C/U   | AM90C03    | Aug. 01, 06 | Aug. 01, 06 |
| W5  | Balance Cable | Nicoon         | 3D-2V       | KSR00092   | Oct. 01, 06 | Aug. 02, 06 |
| R14 | Coaxial Cable | Suhner         | SUCOFLEX102 | 712/2      | Sep. 27, 05 | Sep. 30, 06 |

## Measuring Equipment Configuration

### <FM Modulation Case>



### <GMSK and 4Level FSK Modulation Case>



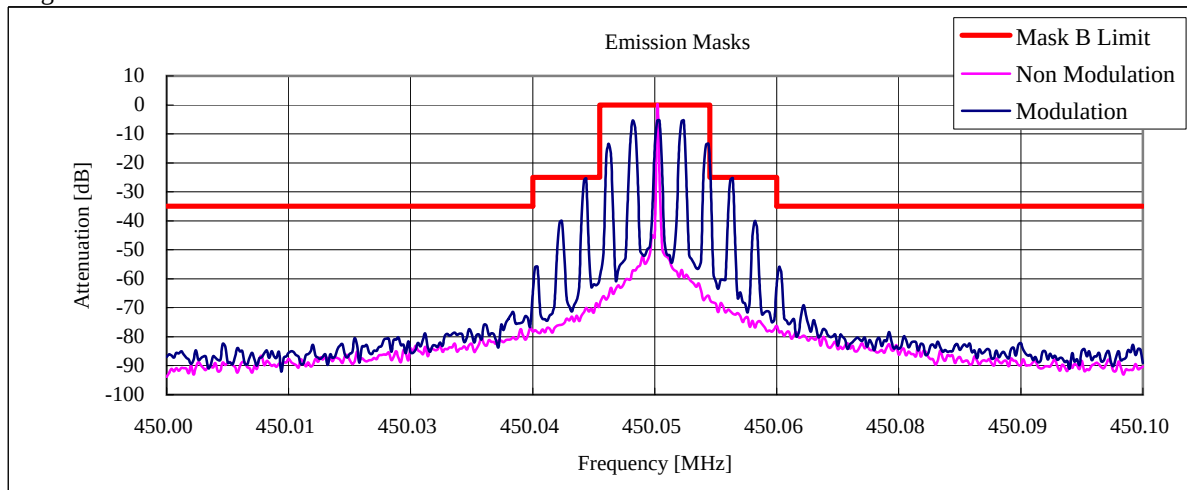
## Uncertainty

Measurement uncertainty is +/- 1.0dB (k = 2)

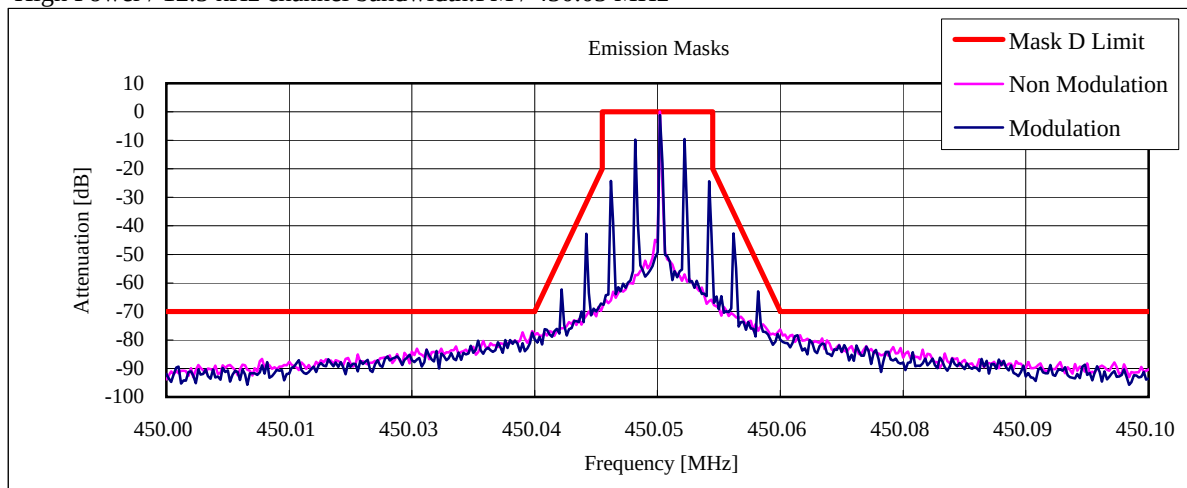
## Test Results

Measured for the worst case

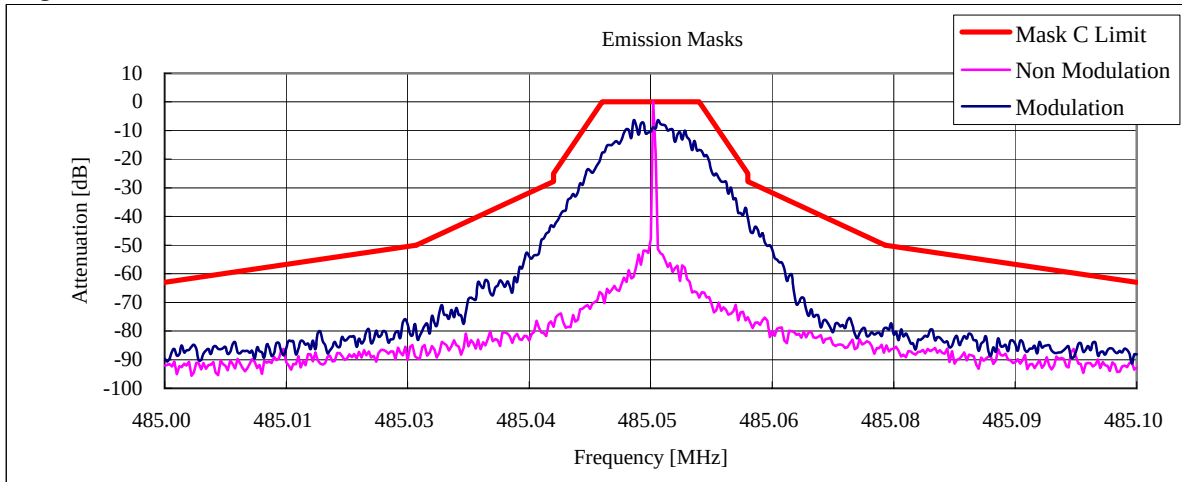
State : High Power / 25 kHz channel bandwidth:FM / 450.05 MHz



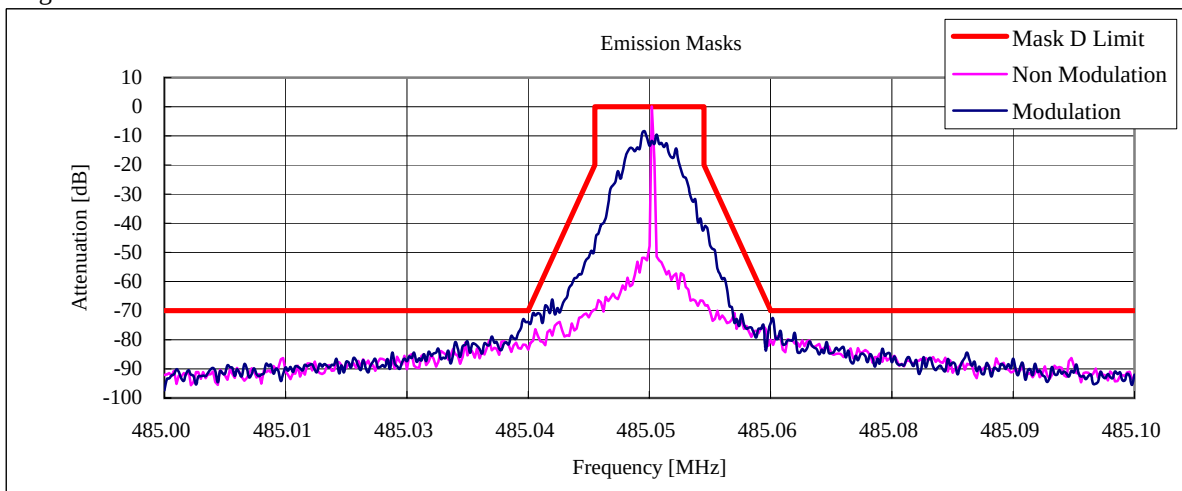
State : High Power / 12.5 kHz channel bandwidth:FM / 450.05 MHz



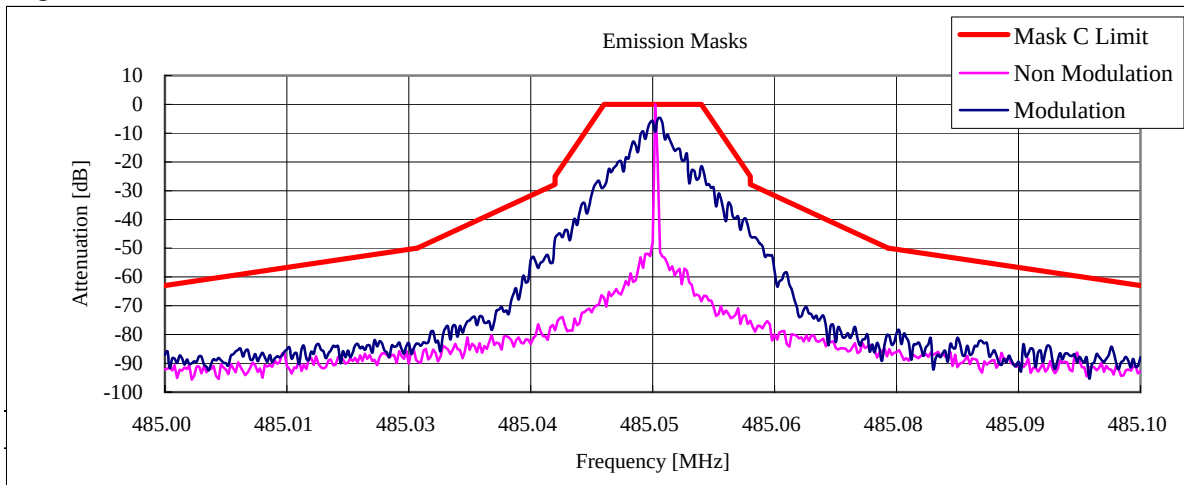
State : High Power / 25 kHz channel bandwidth:4 Level FSK / 485.05 MHz



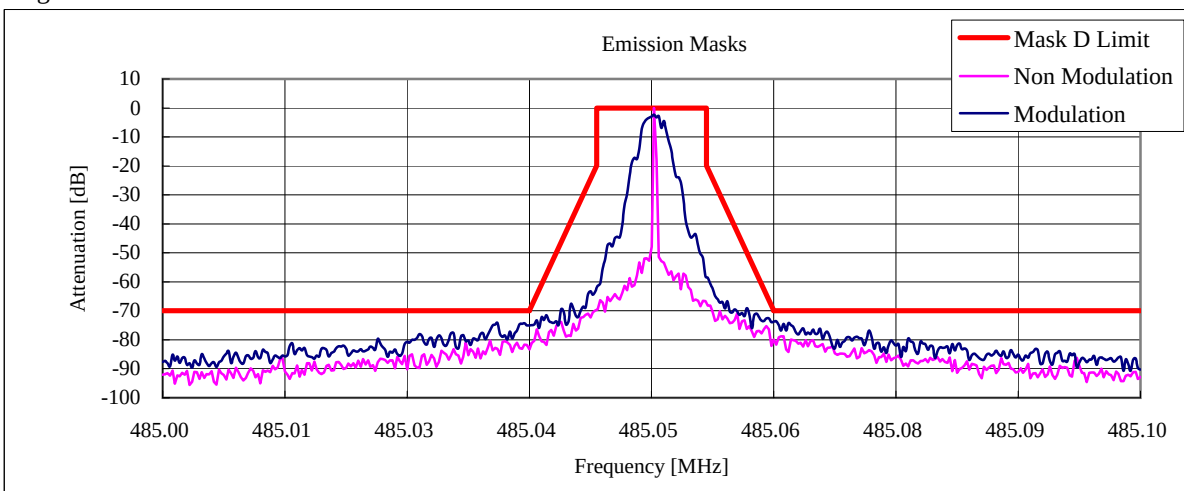
State : High Power / 12.5 kHz channel bandwidth:4Level FSK / 485.05 MHz



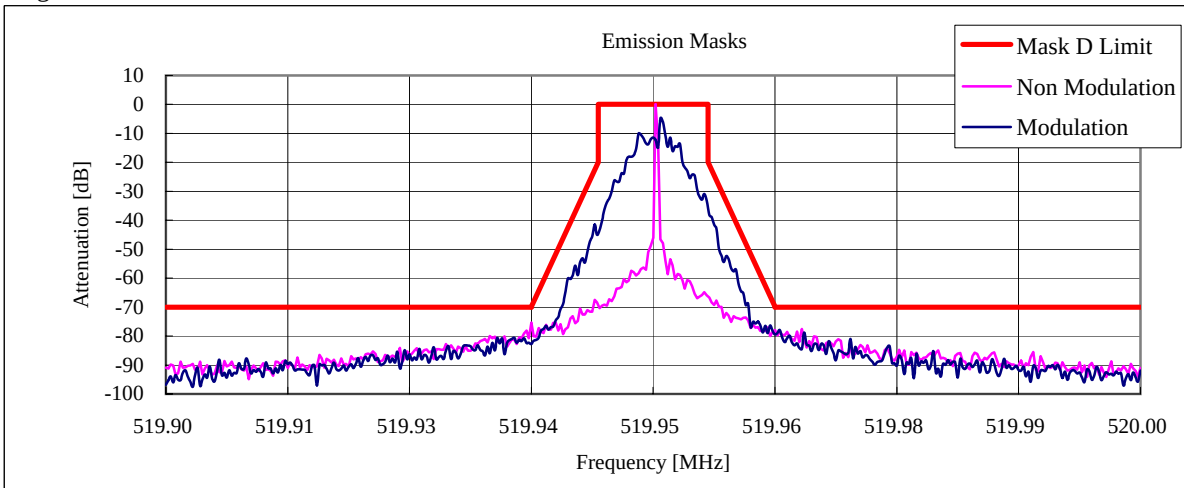
State : High Power / 25 kHz channel bandwidth:GMSK / 485.05 MHz



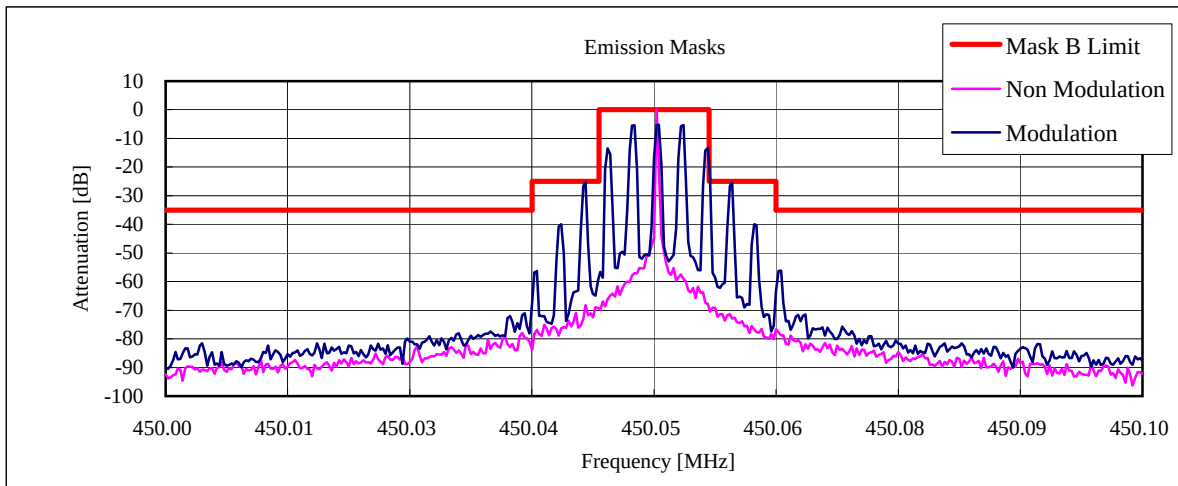
State : High Power / 12.5 kHz channel bandwidth:GMSK / 485.05 MHz



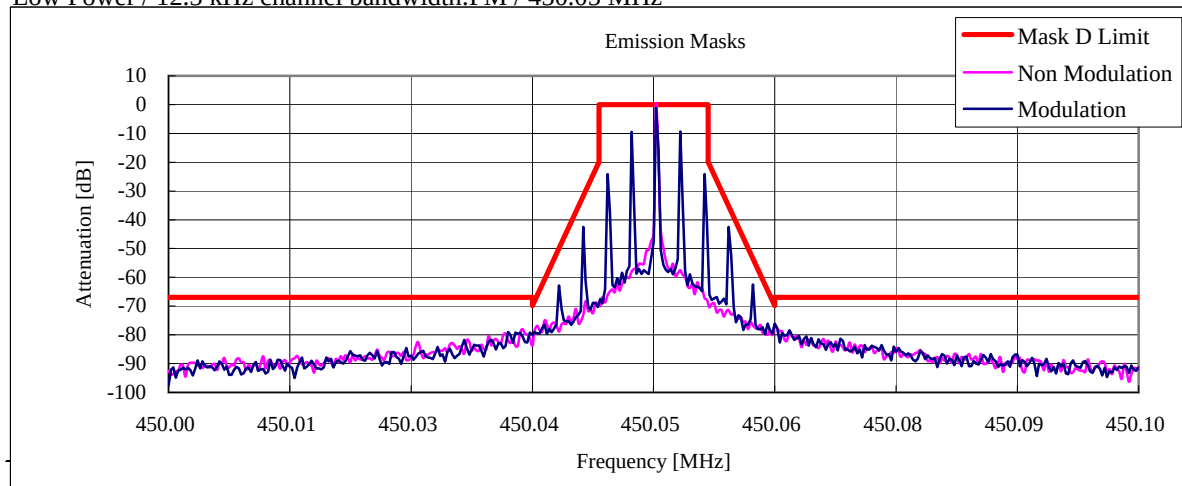
State : High Power / 12.5 kHz channel bandwidth:C4FM / 519.95 MHz



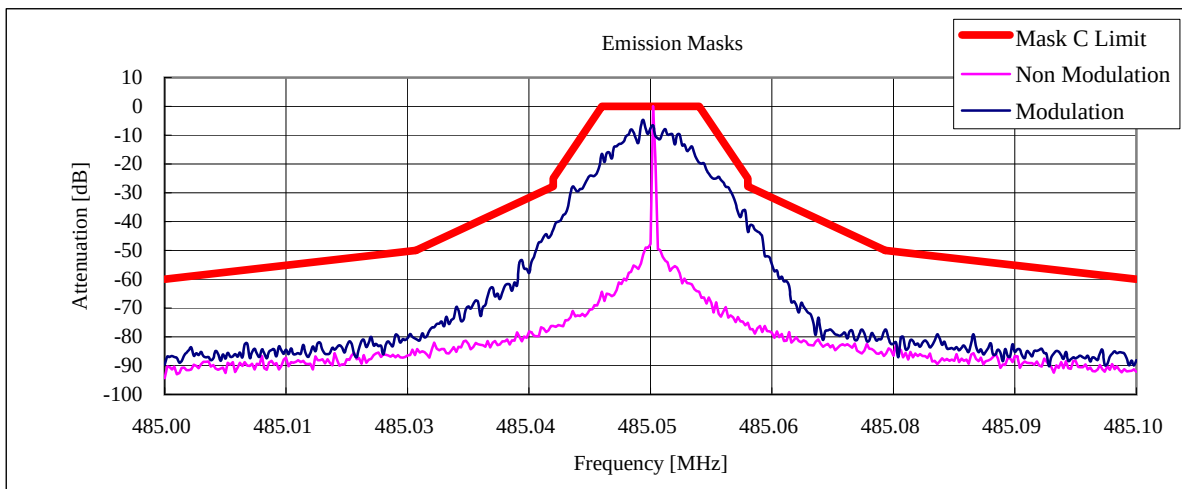
State : Low Power / 25 kHz channel bandwidth:FM / 450.05 MHz



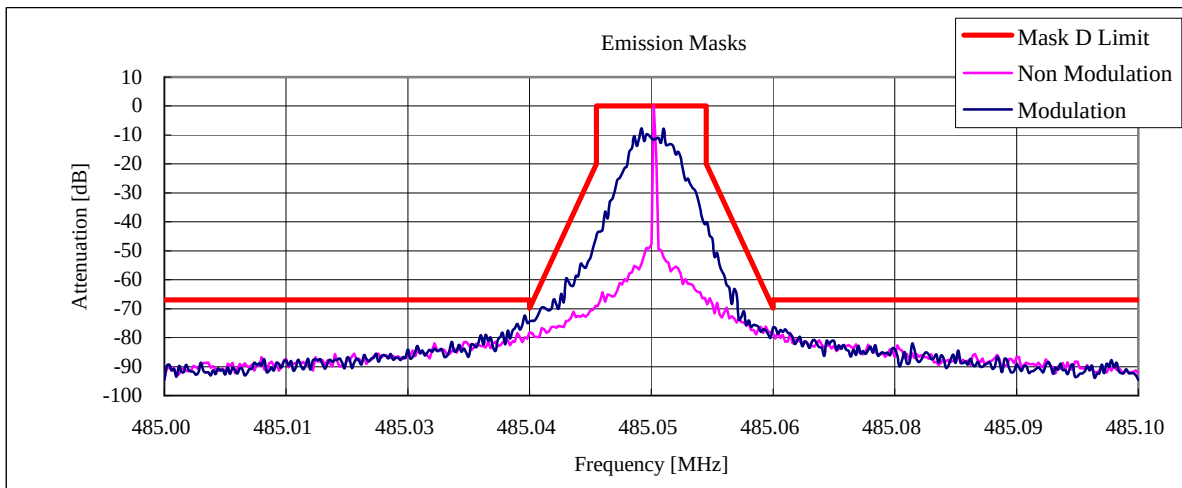
State : Low Power / 12.5 kHz channel bandwidth:FM / 450.05 MHz



State : Low Power / 25 kHz channel bandwidth:4 Level FSK / 485.05 MHz

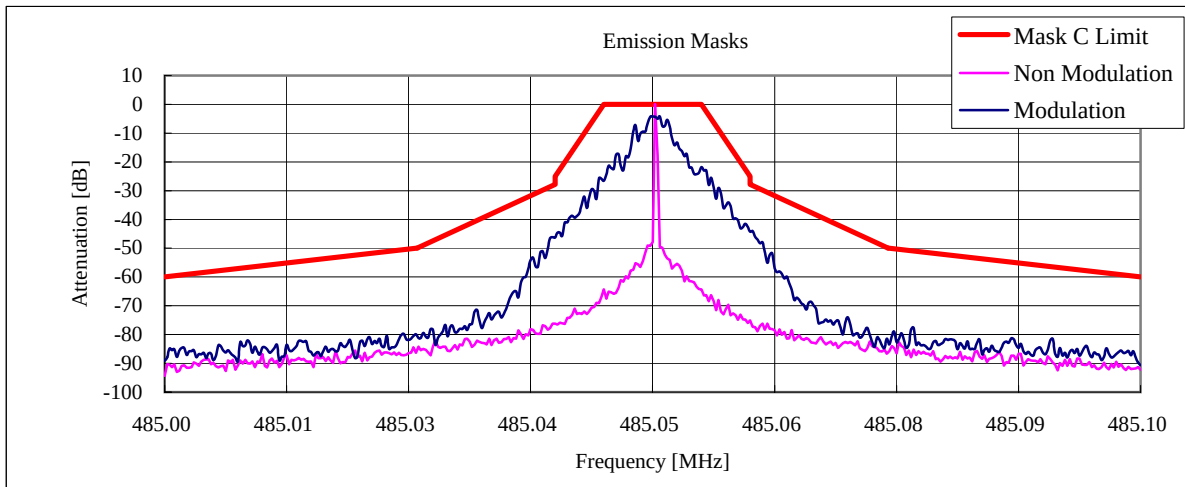


State : Low Power / 12.5 kHz channel bandwidth:4Level FSK / 485.05 MHz

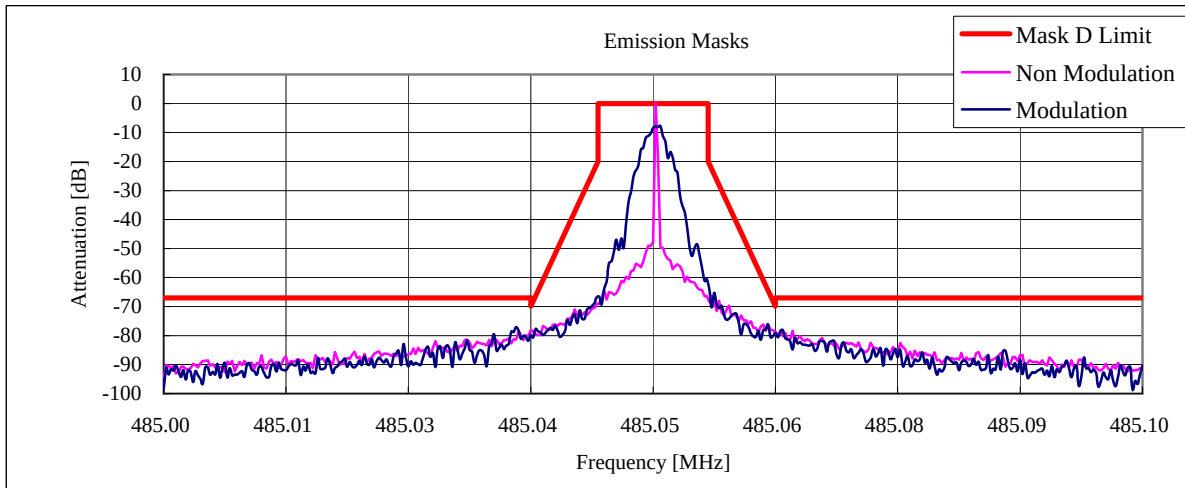




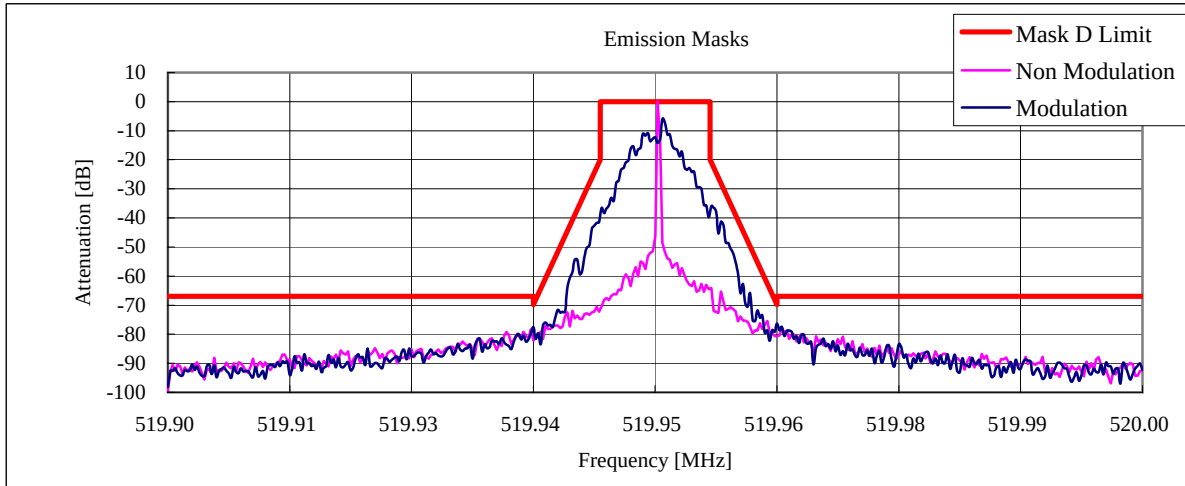
State : Low Power / 25 kHz channel bandwidth:GMSK / 485.05 MHz



State : Low Power / 12.5 kHz channel bandwidth:GMSK / 485.05 MHz



State : Low Power / 12.5 kHz channel bandwidth:C4FM / 519.95 MHz



## 5.5 Transient Frequency Behavior

|                   |                                    |
|-------------------|------------------------------------|
| REGULATIONS       | : 47 CFR 90.214                    |
| TEST METHOD/GUIDE | : ANSI/TIA-603-C, Section 2.2.19.3 |

### Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 The transmitter was turned on.
- 3 Sufficient attenuation was provided so that the transmitter carrier level measured at the output of the combiner was 40 dB below the maximum input level of the test receiver.  
This level was recorded as step f.
- 4 The transmitter was turned off.
- 5 An RF signal generator (1) modulated with a 1 kHz tone at either 25 kHz or 12.5 kHz deviation, and set to the same frequency as the assigned transmitter frequency, (2) was adjusted to a level -20 dB below the level recorded for step f, as measured at the output of the combiner.  
This level was then fixed for the remainder of the test and is recorded at step h.
- 6 The oscilloscope was setup using TIA-603C steps j and k as a guide, and to 10 msec./div.
- 7 The transmitter was turned on, and the level of the carrier at the output of the combiner was recorded as step l.
- 8 The carrier on-time as referenced in TIA-603-C steps m, n, and o was captured and plotted.
- 9 The carrier off-time as referenced in TIA-603-C steps p, q, r, and s was captured and plotted.

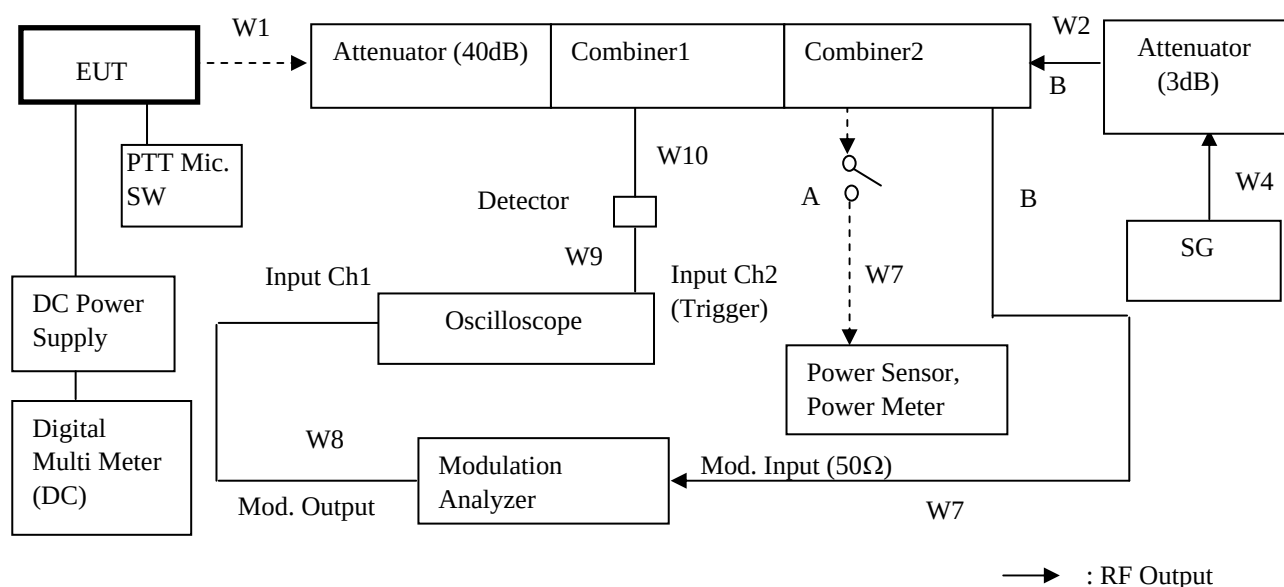
### Measuring Equipments

| No. | Equipment           | Manufacture     | Model No.    | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------------|-----------------|--------------|------------|-------------|-------------|
| 1   | Signal Generator    | Hewlett Packard | 8657B        | 3247U03266 | Dec. 25, 06 | Dec. 31, 07 |
| 2   | Oscilloscope        | Tektronix       | TDS 680B     | B010292    | Aug. 22, 06 | Aug. 31, 07 |
| 3   | Power Meter         | Hewlett Packard | E4418B       | GB38410404 | Feb. 02, 07 | Feb. 29, 08 |
| 4   | Power Sensor        | Hewlett Packard | 8482A        | US37292242 | May. 26, 06 | May. 31, 07 |
| 5   | Attenuator (20dB)   | Weinschel       | 40-20-34     | AA5761     | Jun. 15, 06 | Jun. 30, 07 |
| 6   | Attenuator (10dB)   | TME             | CFA-05NPJ-10 | 262856     | Aug. 01, 06 | Aug. 31, 07 |
| 7   | Attenuator (10dB)   | TME             | CFA-05NPJ-10 | 262843     | Aug. 01, 06 | Aug. 31, 07 |
| 8   | Modulation Analyzer | Hewlett Packard | 8901B        | 3403A04852 | Apr. 12, 06 | Apr. 30, 07 |
| 9   | Combiner(1)         | Anritsu         | Z-164A       | M89549     | Aug. 01, 06 | Aug. 31, 07 |
| 10  | Combiner(2)         | Anritsu         | Z-164A       | M89249     | Aug. 01, 06 | Aug. 31, 07 |
| 11  | Attenuator (3dB)    | TME             | CFA-20NPJ-3  | 679701     | Aug. 01, 06 | Aug. 31, 07 |
| 12  | DC Power Supply     | Daiwa           | PS-3020      | None       | None        | None        |
| 13  | Digital Multi Meter | Sanwa           | CD721        | 3040939    | May 15, 06  | May 31, 07  |

## Measuring Cables

| No. | Cable         | Manufacture    | Model No.   | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------|----------------|-------------|------------|-------------|-------------|
| W1  | Coaxial Cable | Suhner         | SUCOFLEX102 | KSR00046   | Aug. 01, 06 | Aug. 31, 07 |
| W2  | Coaxial Cable | Pacific custom | RG-58 C/U   | AM90C02    | Aug. 01, 06 | Aug. 31, 07 |
| W4  | Coaxial Cable | Pacific custom | RG-58 C/U   | AM90C03    | Aug. 01, 06 | Aug. 31, 07 |
| W7  | Coaxial Cable | Pacific custom | RG-58 C/U   | AM90C04    | Aug. 01, 06 | Aug. 31, 07 |
| W8  | Coaxial Cable | Pacific custom | RG-58 C/U   | KSR00094   | Oct. 01, 06 | Oct. 31, 07 |
| W9  | Coaxial Cable | Pacific custom | RG-58 C/U   | KSR00095   | Oct. 01, 06 | Oct. 31, 07 |
| W10 | Coaxial Cable | Pacific custom | RG-58 C/U   | KSR00096   | Oct. 01, 06 | Oct. 31, 07 |

## Measuring Equipment Configuration



## Uncertainty

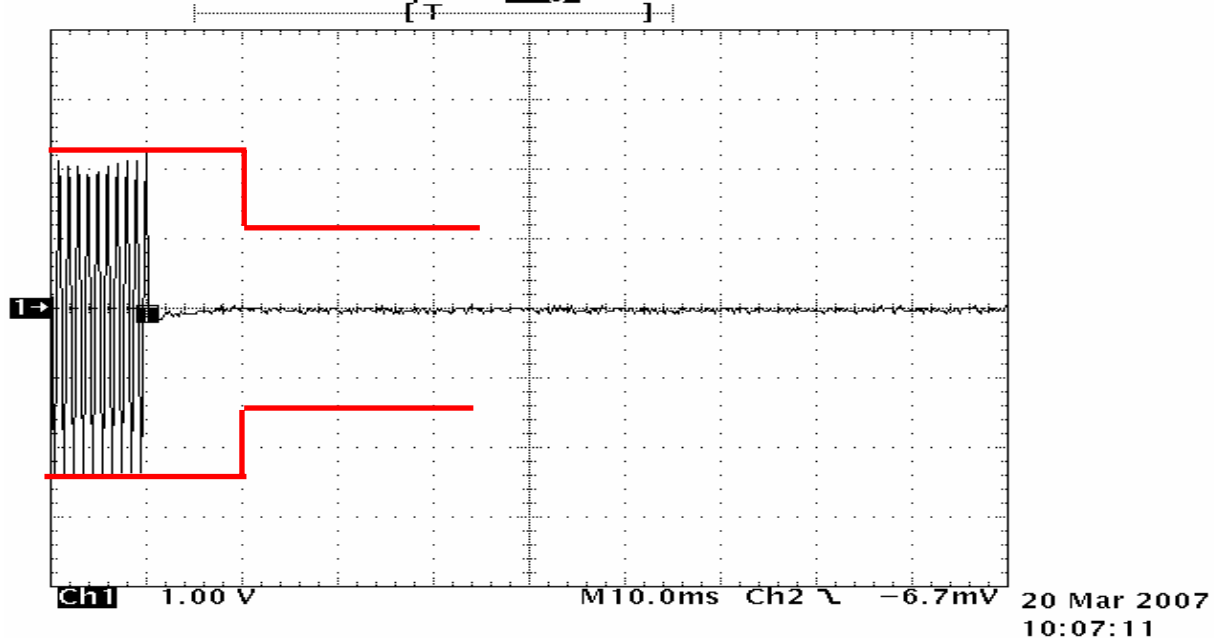
Measurement uncertainty is +/- 1.1dB (k = 2)

## Test Results

Measured for the worst case

State : High Power / 25 kHz channel bandwidth:FM / 485.05 MHz / PTT:OFF -ON

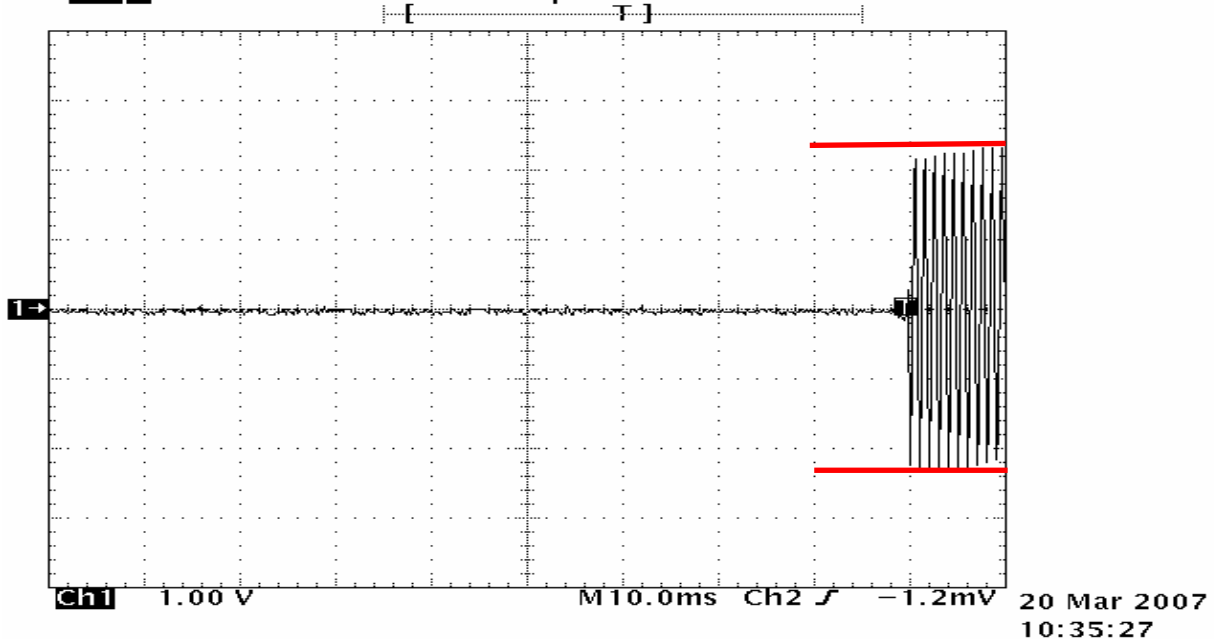
Tek Run: 5.00kS/s Sample 17192



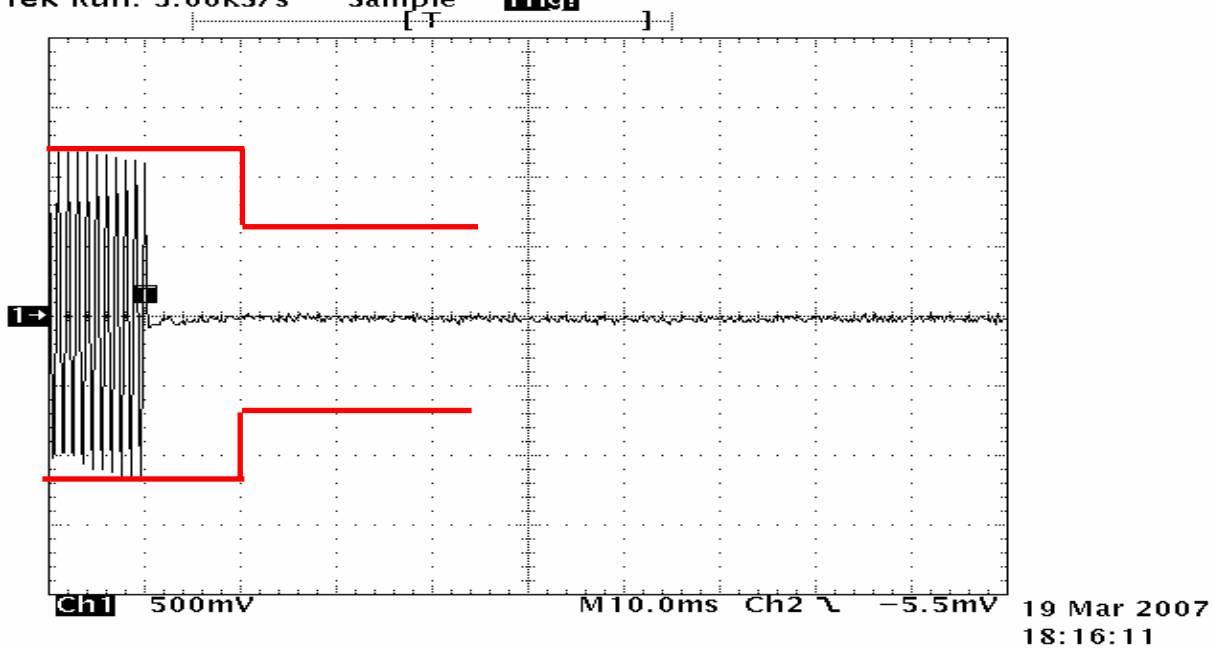
State : High Power / 25 kHz channel bandwidth:FM / 485.05 MHz / PTT:ON -OFF

Tek stop: 5.00kS/s

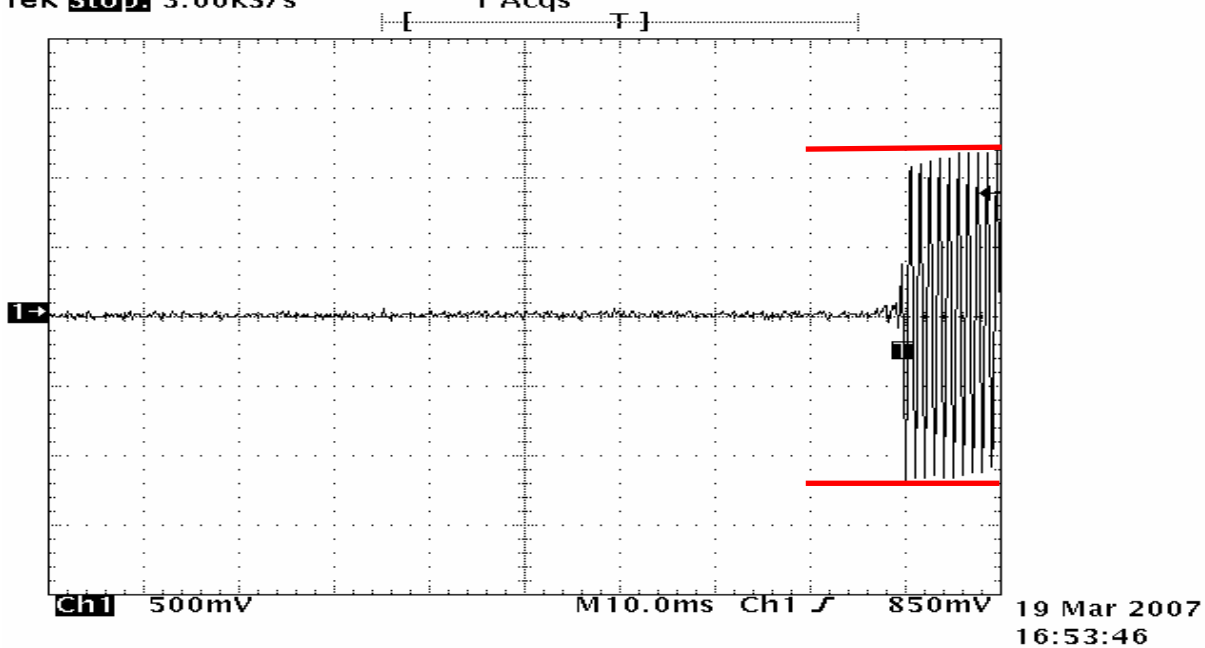
16 Acqs



State : High Power / 12.5 kHz channel bandwidth:FM / 485.05 MHz / PTT:OFF -ON  
Tek Run: 5.00kS/s Sample 17192



State : High Power / 12.5 kHz channel bandwidth:FM / 485.05 MHz / PTT:ON -OFF  
Tek Stop: 5.00kS/s 1 Acqs



## 5.6 Audio Frequency Response / Audio Low Pass Filter (Voice Input)

|                   |                                             |
|-------------------|---------------------------------------------|
| REGULATIONS       | : 47 CFR 2.1047 (a)                         |
| TEST METHOD/GUIDE | : ANSI/TIA-603-C Section 2.2.6.2.2, 3.2.6.2 |

### Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 Adjust the Modulation Analyzer for the following setting:
  - a) High-pass filter : 50 Hz
  - b) Low-pass filter : 15 kHz
  - c) Detector : positive peak
  - d) Function : FM
- 3 The audio signal input was adjusted to obtain 20 % modulation at 1 kHz, and this point was taken as the 0 dB reference level.
- 4 With input levels held constant and below limiting at all frequencies, the audio signal generator was varied from 300 Hz to 20kHz (12.5kHz channel bandwidth) or 30 kHz (25kHz channel bandwidth).
- 5 The response in dB relative to 1 kHz was then measured, using the Modulation Analyzer.

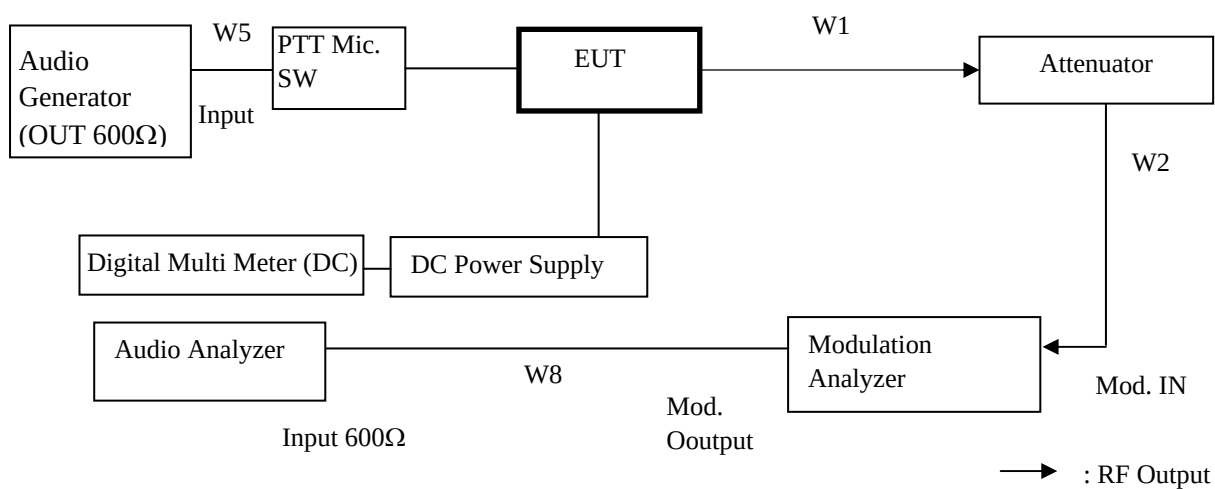
### Measuring Equipments

| No. | Equipment           | Manufacture | Model No.   | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------------|-------------|-------------|------------|-------------|-------------|
| 1   | Audio Generator     | Anritsu     | MG443B      | M70150     | Aug. 25, 06 | Aug. 31, 07 |
| 2   | Attenuator (20dB)   | Weinschel   | 40-20-34    | AA5761     | Jun. 15, 06 | Jun. 30, 07 |
| 3   | Attenuator (30dB)   | Weinschel   | WA-29-30-34 | 8923       | Jun. 15, 06 | Jun. 30, 07 |
| 4   | Modulation Analyzer | HP          | 8901B       | 3403A04852 | Apr. 12, 06 | Apr. 30, 07 |
| 5   | Audio Analyzer      | HP          | 8903B       | 2948A07326 | Apr. 18, 06 | Apr. 30, 07 |
| 6   | DC Power Supply     | Daiwa       | PS-3020     | None       | None        | None        |
| 7   | Digital Multi Meter | Sanwa       | CD721       | 3215593    | May. 15, 06 | May 31, 07  |

### Measuring Cables

| No. | Cable         | Manufacture    | Model No.   | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------|----------------|-------------|------------|-------------|-------------|
| W1  | Coaxial Cable | Suhner         | SUCOFLEX102 | KSR00046   | Aug. 01, 06 | Aug. 31, 07 |
| W2  | Coaxial Cable | Pacific custom | RG-58 C/U   | AM90C02    | Aug. 01, 06 | Aug. 31, 07 |
| W5  | Balance Cable | Nicoon         | 3D-2V       | KSR00092   | Oct. 01, 06 | Oct. 31, 07 |
| W8  | Coaxial Cable | Pacific custom | RG-58 C/U   | KSR00094   | Oct. 01, 06 | Oct. 31, 07 |

## Measuring Equipment Configuration



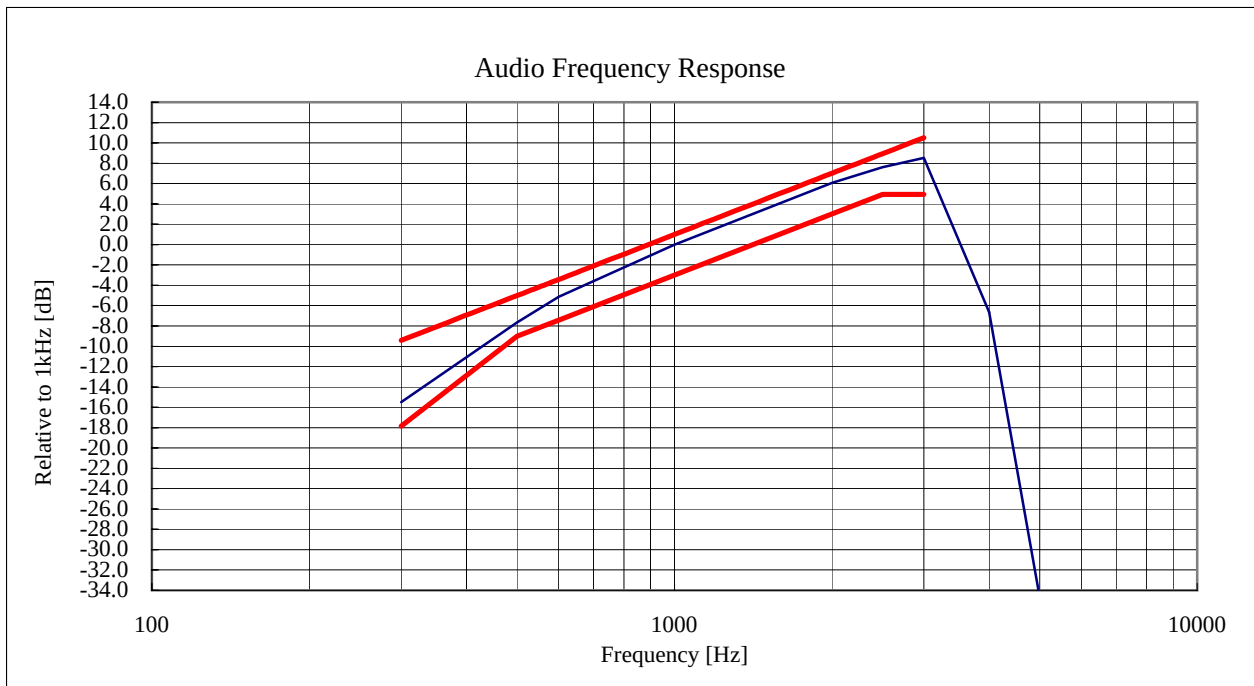
## Uncertainty

Measurement uncertainty is +/- 0.3dB (k = 2)

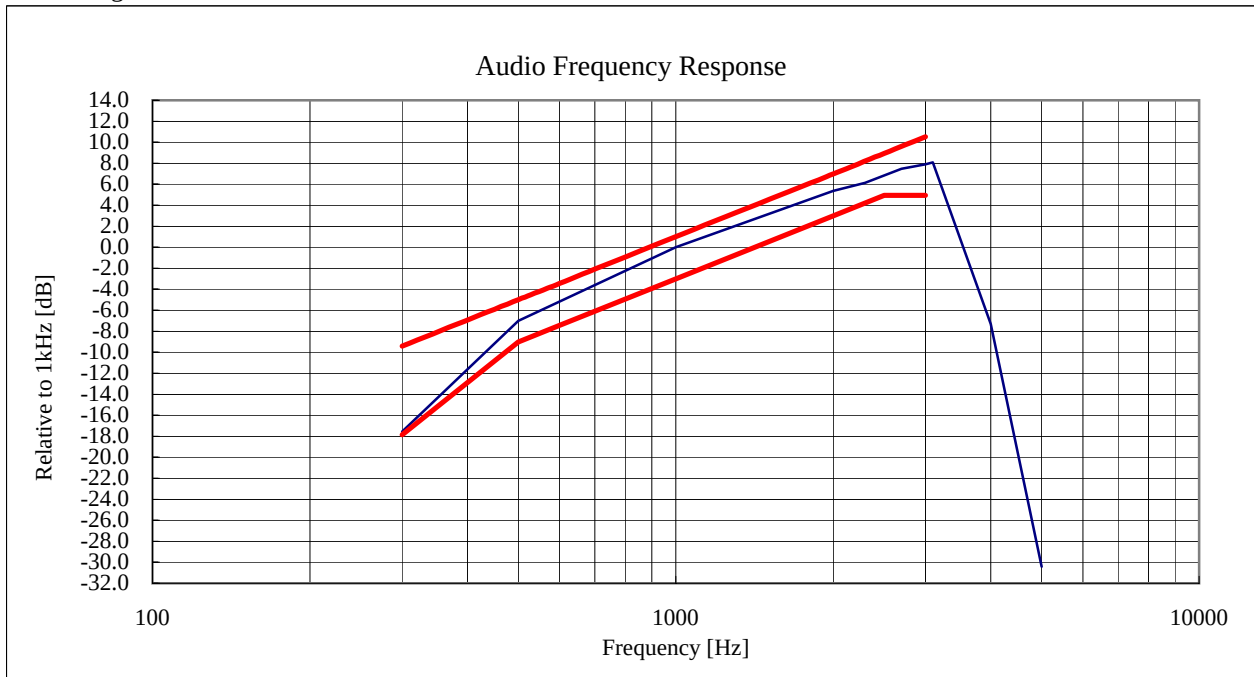
## Test Results

Measured for the worst case

State : High Power / 25 kHz channel bandwidth / 519.95 MHz



State : High Power / 12.5 kHz channel bandwidth / 519.95 MHz



Note:

Audio Filter of the above result is substituted with the same structure as Audio Frequency Resonse.

On the transmission condition below 3kHz, Transceiver shows pre-emphasis condition of transmission function.

On the transmission condition above 3kHz, Transceiver shows Audio Low Pass Filter.



## 5.7 Modulation Limiting

|                   |                                           |
|-------------------|-------------------------------------------|
| REGULATIONS       | : 47 CFR 2.1047 (b)                       |
| TEST METHOD/GUIDE | : ANSI/TIA-603-C Section 2.2.3.2, 1.3.4.4 |

### Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 Adjust the Modulation Analyzer for the following setting:
  - a) High-pass filter : off
  - b) Low-pass filter : 15 kHz
  - c) Detector : positive peak
  - d) Function : FM
- 3 Apply a 1kHz modulation signal to the transmitter from the audio generator, and adjust the level to obtain 60% of full rated system deviation.
- 4 Measure the modulation frequency that was showed on the Modulation Analyzer when the output levels of the Audio Generator were changed from -20 dB to +50 dB by 10 dB.
- 5 Set the output frequencies of the Audio Generator 300 Hz and 3 kHz, and repeat test procedure 4.
- 6 Set the the Detector of the Modulation Analyzer Negative Peak.
- 7 Repeat test procedure 4 and 5.

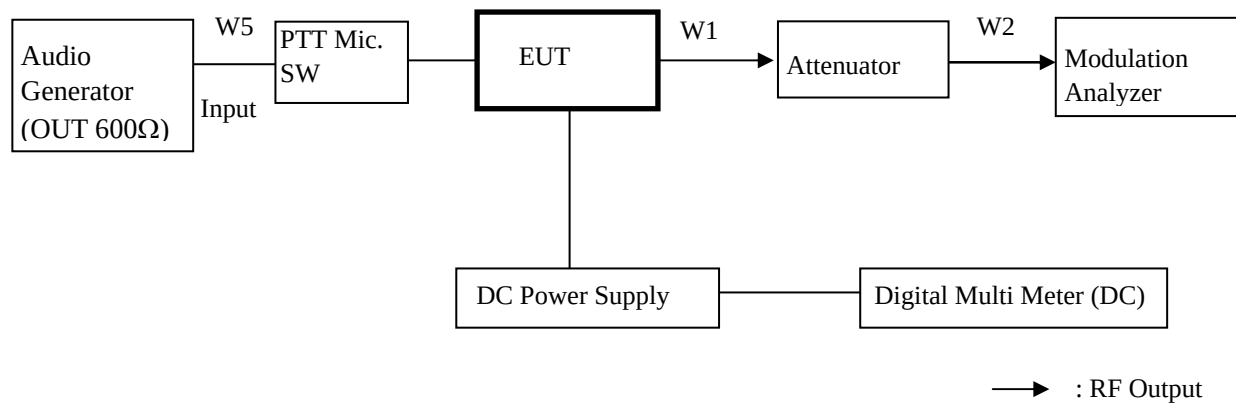
### Measuring Equipments

| No. | Equipment           | Manufacture | Model No.   | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------------|-------------|-------------|------------|-------------|-------------|
| 1   | Audio Generator     | Anritsu     | MG443B      | M70150     | Aug. 25, 06 | Aug. 31, 07 |
| 2   | Attenuator (20dB)   | Weinschel   | 40-20-34    | AA5761     | Jun. 15, 06 | Jun. 30, 07 |
| 3   | Attenuator (30dB)   | Weinschel   | WA-29-30-34 | 8923       | Jun. 15, 06 | Jun. 30, 07 |
| 4   | Modulation Analyzer | HP          | 8901B       | 3403A04852 | Apr. 12, 06 | Apr. 30, 07 |
| 5   | DC Power Supply     | Daiwa       | PS-3020     | None       | None        | None        |
| 6   | Digital Multi Meter | Sanwa       | CD721       | 3215593    | May 15, 06  | May 31, 07  |

### Measuring Cables

| No. | Cable         | Manufacture    | Model No.   | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------|----------------|-------------|------------|-------------|-------------|
| W1  | Coaxial Cable | Suhner         | SUCOFLEX102 | KSR00046   | Aug. 01, 06 | Aug. 31, 07 |
| W2  | Coaxial Cable | Pacific custom | RG-58 C/U   | AM90C02    | Aug. 01, 06 | Aug. 31, 07 |
| W5  | Balance Cable | Nicoon         | 3D-2V       | KSR00092   | Oct. 01, 06 | Oct. 31, 07 |

## Measuring Equipment Configuration



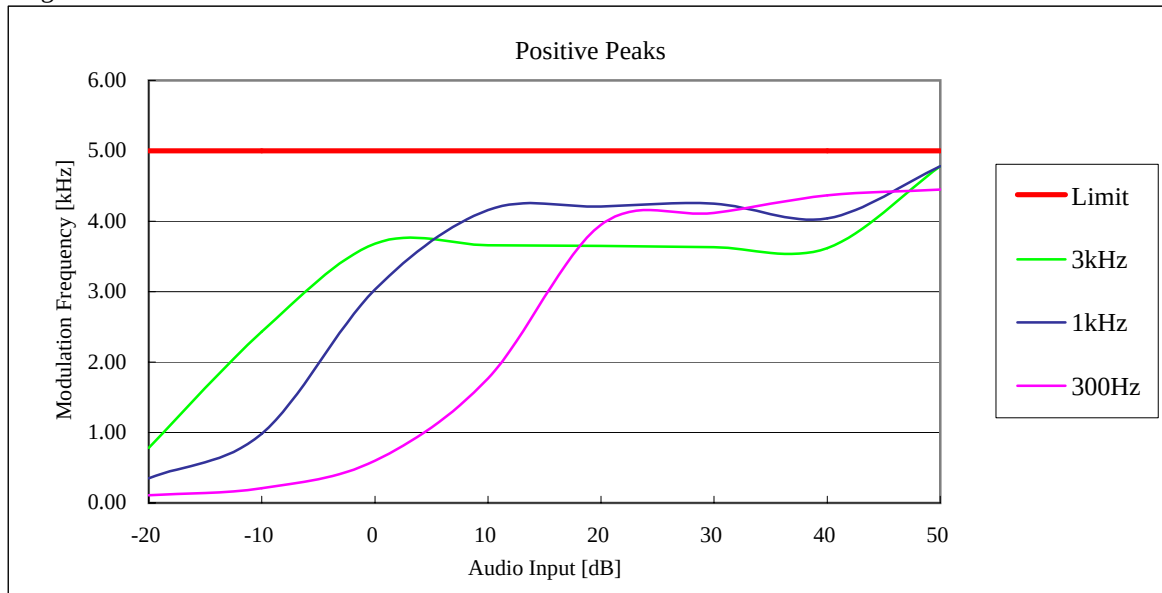
## Uncertainty

Measurement uncertainty is +/- 0.3dB (k = 2)

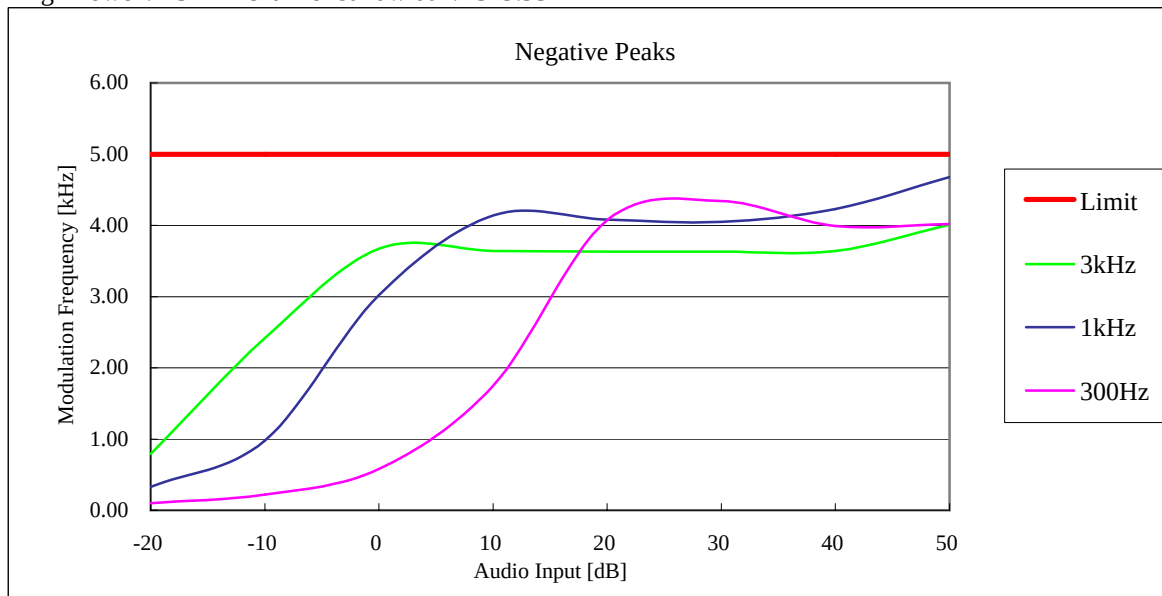
## Test Results

Measured for the worst case

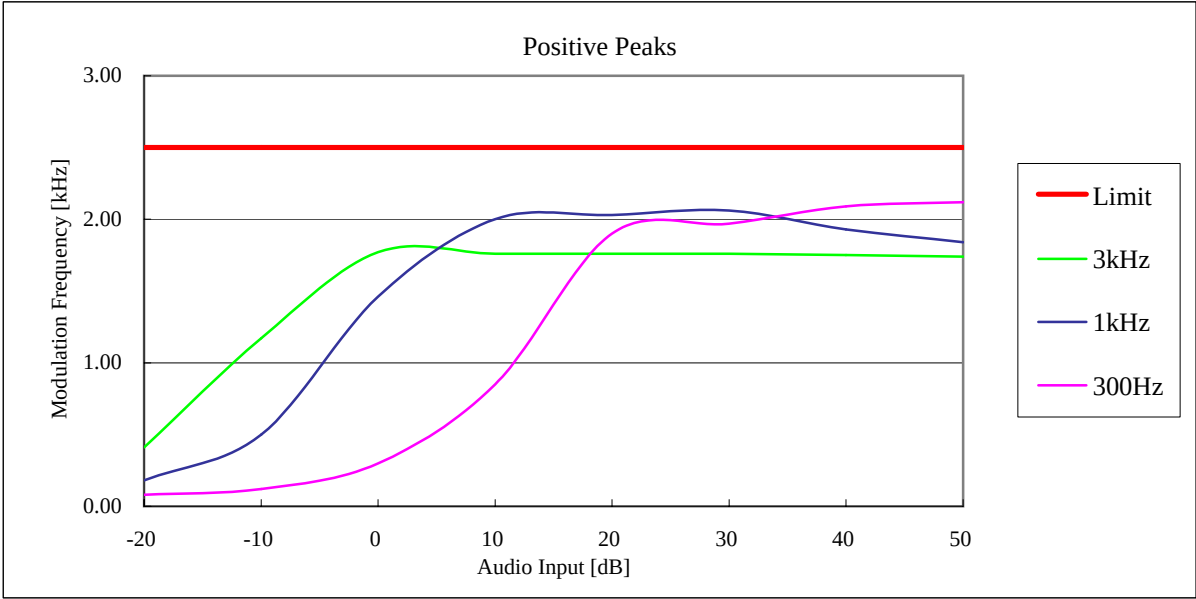
State : High Power / 25 kHz channel bandwidth / 519.95 MHz



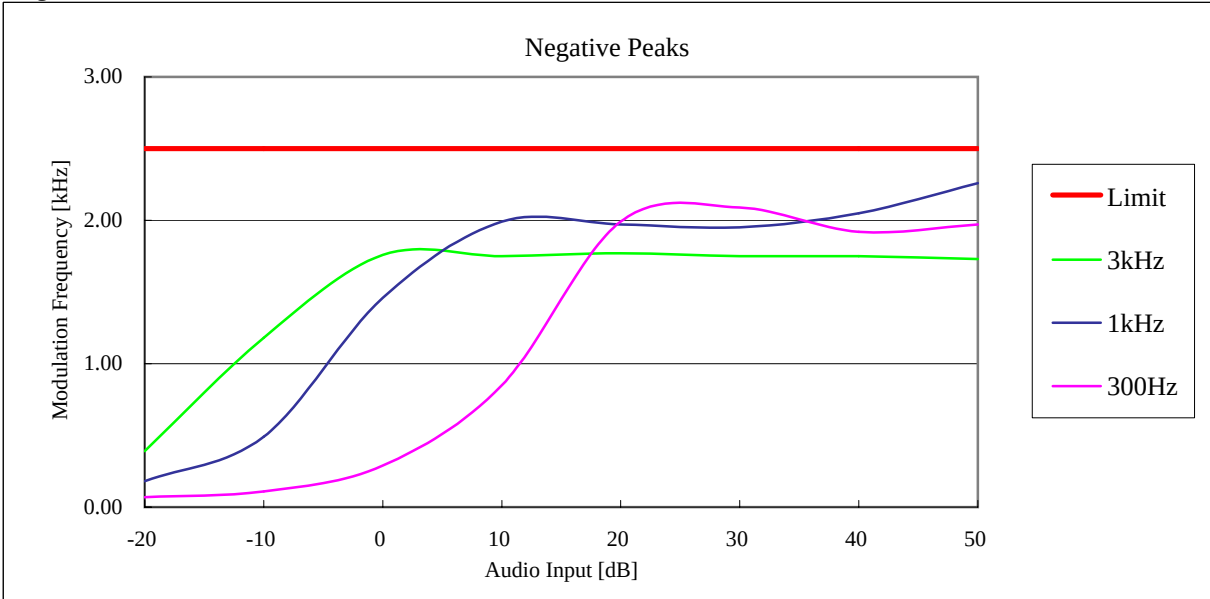
State : High Power / 25 kHz channel bandwidth / 519.95 MHz



State : High Power / 12.5 kHz channel bandwidth / 519.95 MHz



State : High Power / 12.5 kHz channel bandwidth / 519.95 MHz



## 5.8 Frequency Stability (Temperature Variation)

REGULATIONS : 47 CFR 2.1055 (a) (1), 22.355 , 74.1261 (b) , 90.213(a)

TEST METHOD/GUIDE : ANSI/TIA-603-C Section 2.2.2.2

### Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 Set the temperature -30 degrees C.
- 3 Leave the EUT for 1 hour after it became the temperature that was set up.
- 4 Make the EUT the transmitting state.  
Two minutes later, measure the output frequency.
- 5 Make the EUT the receiving state.
- 6 Set the temperature 50 degrees C by 10 degrees C.  
And repeat test procedure 3 to 5.

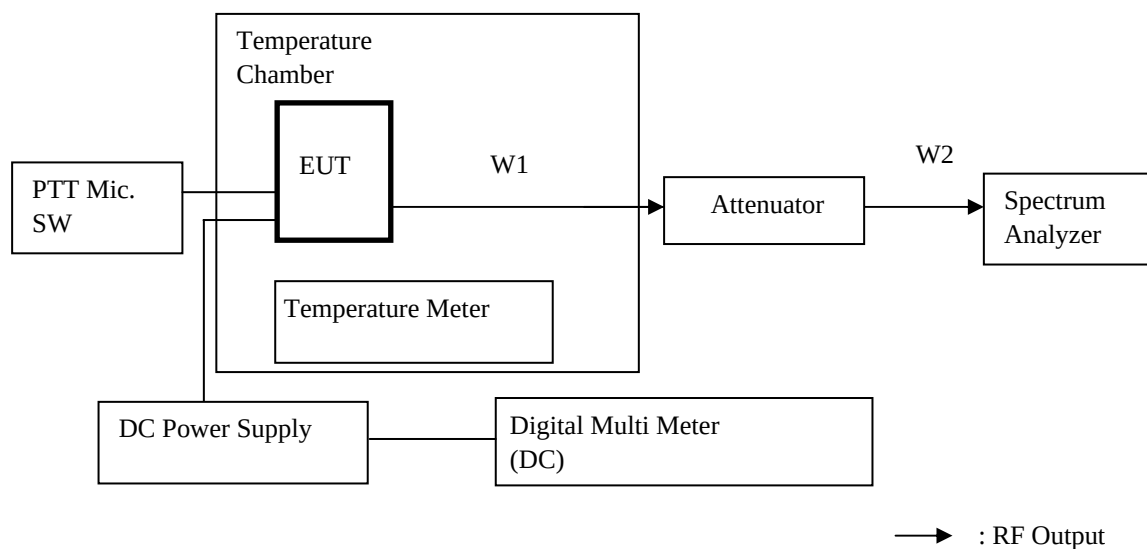
### Measuring Equipments

| No. | Equipment           | Manufacture | Model No.     | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------------|-------------|---------------|------------|-------------|-------------|
| 1   | Spectrum Analyzer   | Agilent     | E4407B        | MY45102460 | Oct. 03, 06 | Oct. 31, 07 |
| 2   | Attenuator (20dB)   | Weinschel   | 40-20-34      | AA5761     | Jun. 15, 06 | Jun. 30, 07 |
| 3   | Attenuator (30dB)   | Weinschel   | WA-29-30-34   | 8923       | Jun. 15, 06 | Jun. 30, 07 |
| 4   | DC Power Supply     | Daiwa       | PS-3020       | None       | None        | None        |
| 5   | Digital Multimeter  | Sanwa       | CD721         | 3215593    | May 15, 06  | May 31, 07  |
| 6   | Temperature Chamber | Tabai       | PL-3F         | 5103661    | None        | None        |
| 7   | Temperature Meter   | Sato        | PC-5000TRH-II | A11999972  | Mar. 22, 07 | Mar. 31, 08 |

### Measuring Cables

| No. | Cable         | Manufacture    | Model No.   | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------|----------------|-------------|------------|-------------|-------------|
| W1  | Coaxial Cable | Suhner         | SUCOFLEX102 | KSR00046   | Aug. 01, 06 | Aug. 31, 07 |
| W2  | Coaxial Cable | Pacific custom | RG-58 C/U   | AM90C02    | Aug. 01, 06 | Aug. 31, 07 |

## Measuring Equipment Configuration



## Uncertainty

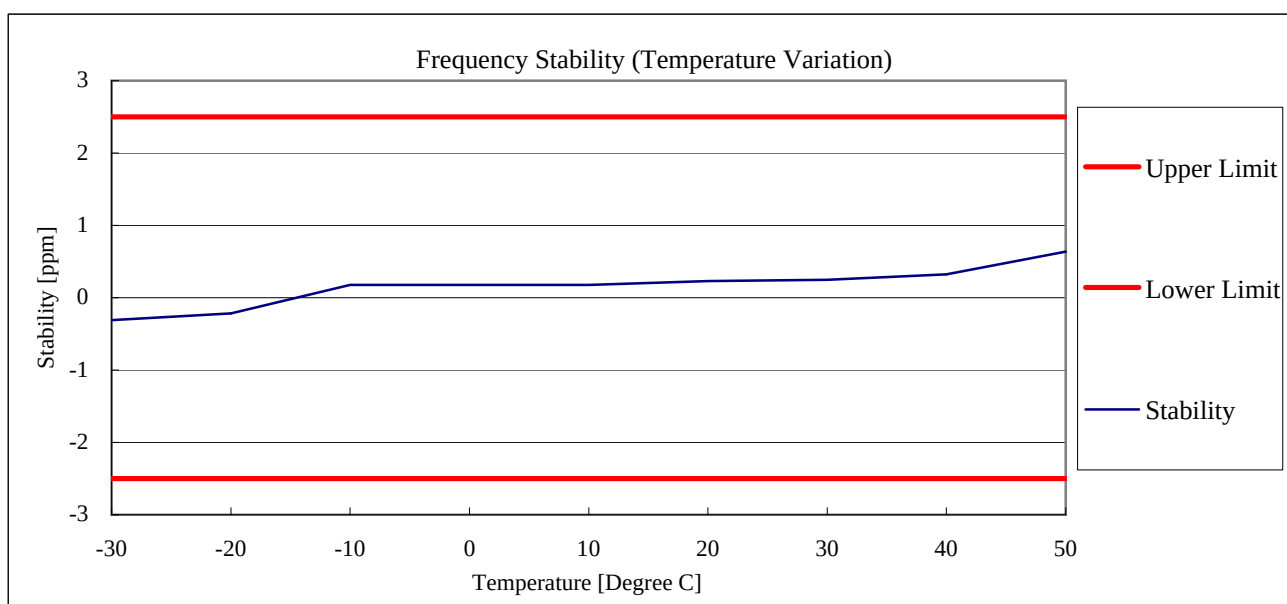
Measurement uncertainty is +/- 0.2ppm

## Test Results

Measured for the worst case

State : High Power / 12.5 kHz channel bandwidth / 519.95 MHz

| No. | Temperature<br>(Degree C) | Frequency<br>(MHz) | Stability<br>(ppm) | Limit<br>(ppm) |
|-----|---------------------------|--------------------|--------------------|----------------|
| 1   | -30                       | 519.949838         | -0.31              | 2.5            |
| 2   | -20                       | 519.949888         | -0.22              | 2.5            |
| 3   | -10                       | 519.950093         | 0.18               | 2.5            |
| 4   | 0                         | 519.950091         | 0.18               | 2.5            |
| 5   | 10                        | 519.950092         | 0.18               | 2.5            |
| 6   | 20                        | 519.950120         | 0.23               | 2.5            |
| 7   | 30                        | 519.950128         | 0.25               | 2.5            |
| 8   | 40                        | 519.950169         | 0.33               | 2.5            |
| 9   | 50                        | 519.950332         | 0.64               | 2.5            |



## 5.9 Frequency Stability (Voltage Variation)

REGULATIONS : 47 CFR 2.1055 (d) (1), 22.355 , 74.1261 (b) , 90.213(a)

TEST METHOD/GUIDE : ANSI/TIA-603-C Section 2.2.2.2

### Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 The power supply voltage to the EUT was varied from 85 % to 115 % of the nominal value measured at the input to the EUT.

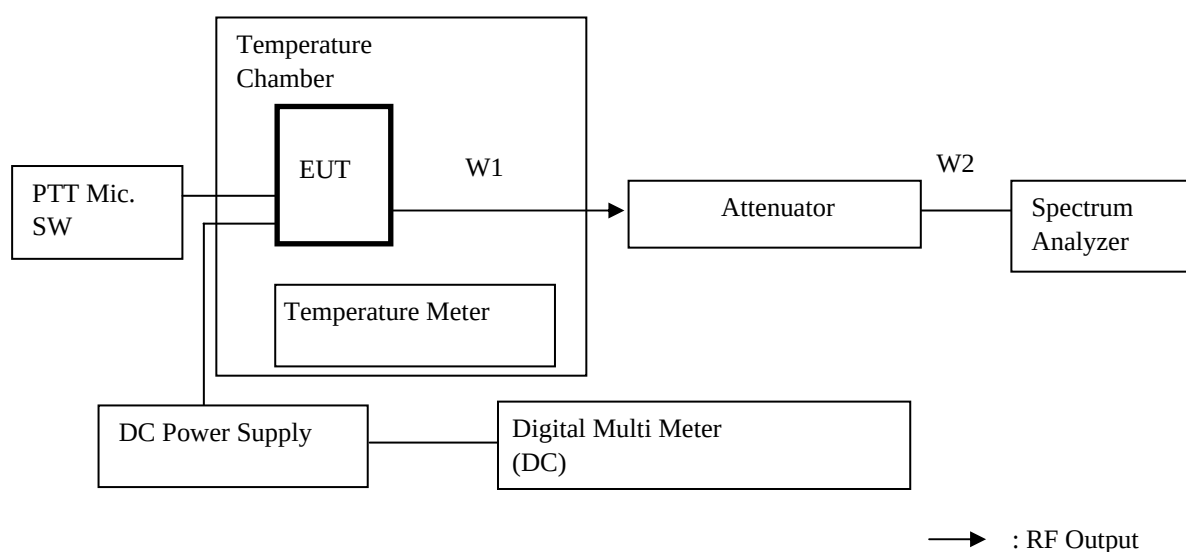
### Measuring Equipments

| No. | Equipment           | Manufacture | Model No.     | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------------|-------------|---------------|------------|-------------|-------------|
| 1   | Spectrum Analyzer   | Agilent     | E4407B        | MY45102460 | Oct. 03, 06 | Oct. 31, 07 |
| 2   | Attenuator (20dB)   | Weinschel   | 40-20-34      | AA5761     | Jun. 15, 06 | Jun. 30, 07 |
| 3   | Attenuator (30dB)   | Weinschel   | WA-29-30-34   | 8923       | Jun. 15, 06 | Jun. 30, 07 |
| 4   | DC Power Supply     | Daiwa       | PS-3020       | None       | None        | None        |
| 5   | Digital Multimeter  | Sanwa       | CD721         | 3215593    | May 15, 06  | May 31, 07  |
| 6   | Temperature Chamber | Tabai       | PL-3F         | 5103661    | None        | None        |
| 7   | Temperature Meter   | Sato        | PC-5000TRH-II | A11999972  | Mar. 22, 07 | Mar. 31, 08 |

### Measuring Cables

| No. | Cable         | Manufacture    | Model No.   | Serial No. | Cal Date    | Cal Exp.    |
|-----|---------------|----------------|-------------|------------|-------------|-------------|
| W1  | Coaxial Cable | Suhner         | SUCOFLEX102 | KSR00046   | Aug. 01, 06 | Aug. 31, 07 |
| W2  | Coaxial Cable | Pacific custom | RG-58 C/U   | AM90C02    | Aug. 01, 06 | Aug. 31, 07 |

### Measuring Equipment Configuration



### Uncertainty

Measurement uncertainty is +/- 0.2ppm



## Test Results

Measured for the worst case

State : High Power / 12.5 kHz channel bandwidth / 519.95 MHz

| No. | Diviation (%) | Voltage (V) | Frequency (MHz) | Stability (ppm) | Limit (ppm) |
|-----|---------------|-------------|-----------------|-----------------|-------------|
| 1   | 85            | 11.4        | 519.950120      | 0.23            | 2.5         |
| 2   | 100           | 13.4        | 519.950112      | 0.22            | 2.5         |
| 3   | 115           | 15.4        | 519.950112      | 0.22            | 2.5         |

### 5.10 Necessary Bandwidth and Emission Bandwidth

REGULATIONS : 47 CFR 2.202 (g) & Federal Register/ Vol.68, No236

#### Calculation Results

State : 16K0F3E(25kHz channel bandwidth)

| Item                | Mark |       |
|---------------------|------|-------|
| Maximum Modulation  | (M)  | 3kHz  |
| Maximum Deviation   | (D)  | 5kHz  |
| Constant Factor     | (K)  | 1     |
| Necessary Bandwidth | (Bn) | 16kHz |

$$B_n = (2 \times M) + (2 \times D \times K)$$

State : 11K0F3E(12.5kHz channel bandwidth)

| Item                | Mark |        |
|---------------------|------|--------|
| Maximum Modulation  | (M)  | 3kHz   |
| Maximum Deviation   | (D)  | 2.5kHz |
| Constant Factor     | (K)  | 1      |
| Necessary Bandwidth | (Bn) | 11kHz  |

$$B_n = (2 \times M) + (2 \times D \times K)$$

State : 20K0F7D(4Level FSK/19200bps, 25kHz channel bandwidth)

| Item                     | Mark |          |
|--------------------------|------|----------|
| Digital information rate | (R)  | 19200bps |
| Peak frequency deviation | (D)  | 5.2kHz   |
| Signaling states         | (S)  | 4        |
| Numerical factor         | (K)  | 1        |
| Necessary Bandwidth      | (Bn) | 20kHz    |

$$B_n = (R / \log_2 S) + 2 \times D \times K$$

State : 11K2F7D(4Level FSK/9600bps, 12.5kHz channel bandwidth)

| Item                     | Mark |         |
|--------------------------|------|---------|
| Digital information rate | (R)  | 9600bps |
| Peak frequency deviation | (D)  | 3.2kHz  |
| Signaling states         | (S)  | 4       |
| Numerical factor         | (K)  | 1       |
| Necessary Bandwidth      | (Bn) | 11.2kHz |

$$B_n = (R / \log_2 S) + 2 \times D \times K$$

State : 14K4F1D(GMSK/9600bps, 25kHz channel bandwidth)

| Item                     | Mark |         |
|--------------------------|------|---------|
| Digital information rate | (R)  | 9600bps |
| Peak frequency deviation | (D)  | 2.4kHz  |
| Signaling states         | (S)  | 2       |
| Constant Factor          | (K)  | 1       |
| Necessary Bandwidth      | (Bn) | 14.4kHz |

$$B_n = (R/\log_2 S) + 2 \times D \times K$$

State : 7K20F1D(GMSK/4800bps, 12.5kHz channel bandwidth)

| Item                     | Mark |         |
|--------------------------|------|---------|
| Digital information rate | (R)  | 4800bps |
| Peak frequency deviation | (D)  | 1.2kHz  |
| Signaling states         | (S)  | 2       |
| Constant Factor          | (K)  | 1       |
| Necessary Bandwidth      | (Bn) | 7.2kHz  |

$$B_n = (R/\log_2 S) + 2 \times D \times K$$

State : 8K10F1D/8K10F1E(C4FM/9600bps, 12.5kHz channel bandwidth)

| Item                     | Mark |         |                         |
|--------------------------|------|---------|-------------------------|
| Digital information rate | (R)  | 9600bps |                         |
| Peak frequency deviation | (D)  | 4.5kHz  |                         |
| Signaling states         | (S)  | 4       |                         |
| Numerical factor         | (K)  | 1       |                         |
| Necessary Bandwidth      | (Bn) | 8.1kHz  | Measurements were done* |

\*Measurements per Rule 47CFR Part 2.202(c)(4) were done because Part 2.202(g) Table III-A.1. formulation produces an excessive result using the value of K recommended in the Table. Therefore the 99% energy rule(title 47CFR 2.202(a)) was used for digital mode and is more accurate than Carson's rule. It basically states that 99% of the modulation energy falls within X kHz, in this case, 8.10kHz. Measurements were performed in accordance with TIA/EIA 102.CAAA-A Section 2.2.5.2. The emission mask was obtained from 47CFR 90.210(d).

## 6. VALIDITY OF TEST REPORT

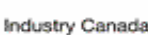
The test result of this report is effective for equipment under test itself and under the test configuration described on the report.

This test report does not assure that whether the test result taken in other testing laboratory is compatible or reproducible to the test result on this report or not.

Copying of this report without permission is prohibited.

## 7. DESCRIPTION OF TEST LABORATORY

| ACCREDITATION                                                                                          | SCOPE |           | LAB. CODE         |
|--------------------------------------------------------------------------------------------------------|-------|-----------|-------------------|
| <br>LAB CODE 100290-0 | NVLAP | USA       | EMC Testing       |
|                                                                                                        | NVLAP | USA       | Calibration       |
|                                                                                                        | NVLAP | USA       | Telecommunication |
|                                                                                                        | VLAC  | JAPAN     | EMC Testing       |
|                       | BSMI  | TAIWAN    | EMC Testing       |
|                      | NATA  | AUSTRALIA | Calibration       |
|                                                                                                        | NATA  | AUSTRALIA | Telecommunication |

| FILING                                                                              | SCOPE |              | LAB. CODE         |
|-------------------------------------------------------------------------------------|-------|--------------|-------------------|
|  | VCCI  | JAPAN        | EMC Testing       |
|  | FCC   | USA          | EMC Testing       |
|  | IC    | CANADA       | EMC Testing       |
|  | IC    | CANADA       | Telecommunication |
|  |       | SAUDI ARABIA | EMC Testing       |

Note 1 : NVLAP accreditation does not constitute any product endorsement by NVLAP or any agent of the U.S. Government.