

***EMC* EMISSION - TEST REPORT**

JQA APPLICATION No. : KL80020020S

Name of Product : Telematics Communication System

Model / Type No. : NN0200

FCC ID : LXC-NN0200

Applicant : DENSO CORPORATION

Address : 1-1, Showa-cho, Kariya-shi, Aichi-ken, 448-8661 Japan

Manufacturer : DENSO WIRELESS SYSTEMS AMERICA, INC

Address : 3250 Business Park Drive Vista, Ca 92083 USA

Receive date of EUT : April 5, 2002

Final Judgement : passed

TEST RESULTS IN THIS REPORT are obtained in use of equipment that is traceable to National Institute of Advanced Industrial Science and Technology(AIST) under METI Japan and Communications Research Lab.(CRL) under MPHPT Japan.

THE TEST RESULTS only responds to the test sample. This test report shall not be reproduced except in full.

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TEST REGULATION

FCC Rules and Regulations Parts 22 and 24 (October 1, 2001)

a) 800 MHz systems(Part 22) : Cellular Radiotelephone

b) 1900 MHz systems(Part 24)

○ - Narrowband PCS

● - Broadband PCS

Test procedure:

The tests were performed according to FCC Rules and Regulations Part 2 (October 1, 2001), and ANSI C63.4 (1992).

GENERAL INFORMATION

Test facility:

- 1) Test Facility located at Kita-Kansai : 1st and 2nd Open Sites (3 m Site)
Test Facility located at Kameoka : 1st Open Site (3, 10 and 30 m, on common plane)
: 2nd Open Site (3 and 10 m, on common plane)
Test Facility located at Tsuru : Anechoic Chamber (3 and 10 m, on common plane)
FCC filing No. : 31040/SIT 1300F2
- 2) KITA-KANSAI TESTING CENTER is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance established in Title 15, Part 285 Code of Federal Regulations.
NVLAP Lab Code: 200191-0

Definitions for symbols used in this test report:

- - Black box indicates that the listed condition, standard or equipment is applicable for this Report.
- - Blank box indicates that the listed condition, standard or equipment is not applicable for this Report.

Description of the Equipment Under Test (EUT):

- | | |
|-----------------------------|--|
| 1) Name | : Telematics Communication System |
| 2) Model / Type No. | : NN0200 |
| 3) Product Type | : Pre-Production(Serial No. : 10100057) |
| 4) Category | : Cellular Radiotelephone / Broadband PCS |
| 5) EUT Authorization | : ○ - Verification ● - Certification ○ - D.o.C. |
| 6) Transmitting Frequency | : 824.040 MHz (991 ch) - 848.970 MHz (799 ch)(AMPS)
: 824.700 MHz (1013 ch) - 848.310 MHz (777 ch)(CDMA)
: 1851.250 MHz (25 ch) - 1908.750 MHz (1175 ch)(CDMA) |
| 7) Receiving Frequency | : 869.040 MHz (991 ch) - 893.970 MHz (799 ch)(AMPS)
: 869.700 MHz (1013 ch) - 893.310 MHz (777 ch)(CDMA)
: 1931.250 MHz (25 ch) - 1988.750 MHz (1175 ch)(CDMA) |
| 8) Integrated Antenna | : Glass Printed Mono-pole Antenna |
| 9) Emission Designations | : 40K0F8W/40K0F1D,1M25F9W |
| 10) Maximum RF Output Power | : 660.7mW(ERP,800MHz,AMPS)
: 776.2mW(ERP,800MHz,CDMA)
: 278.6mW(EIRP,1900MHz,CDMA) |
| 11) Power Rating | : 13.8VDC |

Channel Numbers and Frequencies for 800MHz Systems(AMPS)

Band	Bandwidth (MHz)	Number of Channels	Boundary Channel Numbers	Transmitter Center Frequency (MHz)
Not Used		1	(990)	824.010
A"	1	33	991-1023	824.040-825.000
A	10	333	1-333	825.030-834.990
B	10	333	334-666	835.020-844.980
A'	1.5	50	667-716	845.010-846.480
B'	2.5	83	717-799	846.510-848.970

Channel Numbers and Frequencies for 800MHz Systems(CDMA)

Block Designator	CDMA Channel Validity	CDMA Channel Number	Transmitter Center Frequency (MHz)
A" (1MHz)	Not Valid Valid	991-1012 1013-1023	824.040-824.670 824.700-825.000
A (10MHz)	Valid Not Valid	1-311 312-333	825.030-834.330 834.360-834.990
B (10MHz)	Not Valid Valid Not Valid	334-355 356-644 645-666	835.020-835.650 835.680-844.320 844.350-844.980
A' (1.5MHz)	Not Valid Valid Not Valid	667-688 689-694 695-716	845.010-845.640 845.670-845.820 845.850-846.480
B' (2.5MHz)	Not Valid Valid Not Valid	717-738 739-777 778-799	846.510-847.140 847.170-848.310 848.340-848.970

Channel Numbers and Frequencies for 1900MHz Systems(CDMA)

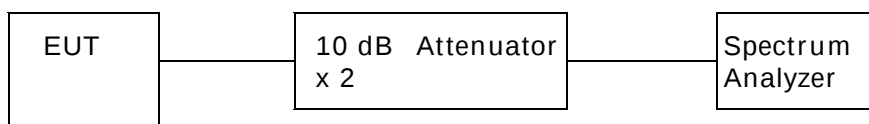
Block Designator	CDMA Channel Validity	CDMA Channael Number	Transmitter Center Frequency (MHz)
A (15MHz)	Not Valid	0-24	1850.000-1851.200
	Valid	25-275	1851.250-1863.750
	Cond. Valid	276-299	1863.800-1864.950
D (5MHz)	Cond. Valid	300-324	1865.000-1866.200
	Valid	325-375	1866.250-1868.750
	Cond. Valid	376-399	1868.800-1869.950
B (5MHz)	Cond. Valid	400-424	1870.000-1871.200
	Valid	425-675	1871.250-1883.750
	Cond. Valid	676-699	1883.800-1884.950
E (5MHz)	Cond. Valid	700-724	1885.000-1886.200
	Valid	725-775	1886.250-1888.750
	Cond. Valid	776-799	1888.800-1889.950
F (5MHz)	Cond. Valid	800-824	1890.000-1891.200
	Valid	825-875	1891.250-1893.750
	Cond. Valid	876-899	1893.800-1894.950
C (15MHz)	Cond. Valid	900-924	1895.000-1896.200
	Valid	925-1175	1896.250-1908.750
	Not Valid	1176-1199	1908.800-1909.950

TEST CONDITIONS

Transmitter Power(TP) Measurement (§2.1046(a))

Test Procedure :

The Transmitter Power was measured with a spectrum analyzer, two 10 dB attenuators and a short, low loss cable.



Test location :

KITA-KANSAI Testing Center

7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan

○ - Shielded room

KAMEOKA EMC Branch

9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan

○ - Shielded room

TSURU EMC Branch

2096 Ohata, Tsuru-shi, Yamanashi-ken 402-0035, Japan

● - Anechoic Chamber

Used test instruments and sites :

Model No.	Device ID	Last Cal. Date	Cal. Interval
○ - 432B/8478B	B - 24/B-43		
○ - ML2437A/ML2444A	B - 10/B-11		
○ - 6-20	D - 27		
○ - 4T-10	D - 74		
○ - 4T-10	D - 73		
● - 2-10	D - 79	September, 2001	1 Year
● - 2-10	D - 80	September, 2001	1 Year
● - 8566B	A - 13	January, 2002	1 Year
○ - 8593A	A - 15		

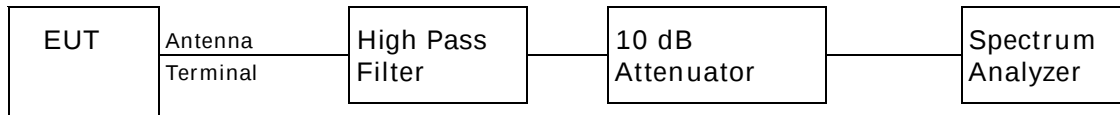
Environmental conditions :

Temperature: 18 °C Humidity: 24 %

Antenna Conducted Spurious Emission Measurement (§2.1051,§22.917, §24.238))

Test Procedure :

The Antenna Conducted Emission was measured with a spectrum analyzer, one 10 dB attenuator, a high pass filter and a short, low loss cable.



Test location :

KITA-KANSAI Testing Center

7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan

● - Shielded room

KAMEOKA EMC Branch

9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan

○ - Shielded room

Used test instruments:

Model No.	Device ID	Last Cal. Date	Cal. Interval
● - MP721C	D - 66	May, 2002	1 Year
○ - 4T-10	D - 74		
○ - 4T-10	D - 73		
○ - 2-10	D - 79		
○ - 2-10	D - 80		
● - UHP-127	D - 42	May, 2002	1 Year
● - UHP-128	D - 43	May, 2002	1 Year
● - 8566B	A - 13	January, 2002	1 Year
○ - 8593A	A - 15		

Environmental conditions:

Temperature: 24 °C Humidity: 52 %

Determination of the measurement distance on the radiated emission test

The Fig.1 is the maximum radiated position of the fundamental frequency. The test system is too big. Therefore the measurement distance is determined to 4.2m. The test was performed at the measurement distance between the rear window(including the glass printed antenna) and the receiving antenna.

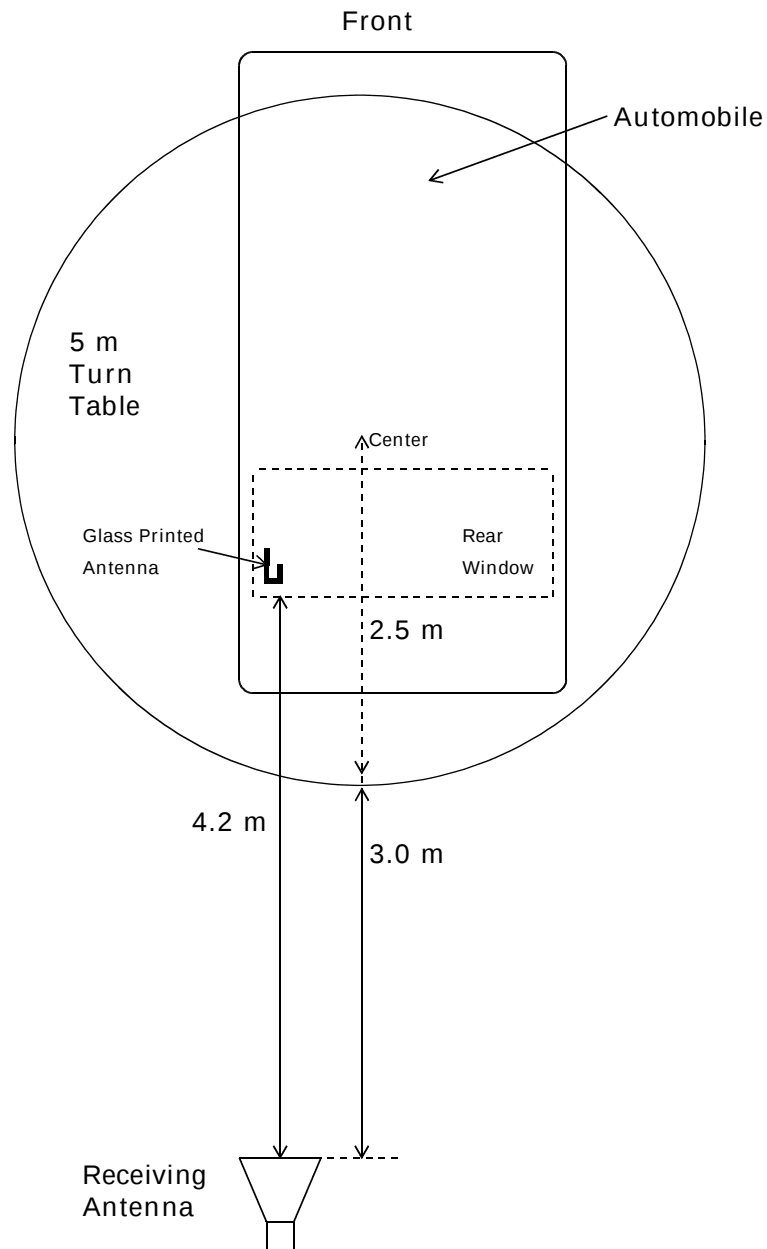


Fig.1 Determination of the measurement distance

Transmitter Power(ERP) Measurement (§22.913)

- 800 MHz Systems -

The measurement was performed shown as follows.

Step 1) The test was set-up shown as Fig.2(a). In order to obtain the maximum emission, the EUT is placed on the ground plane, at the distance 4.2m from the receiving antenna(Resonant Tune Dipole Antenna) and rotated around 360 degrees. The receiving antenna height was varied from 1m to 4 m. The EUT on the ground plane was placed to obtain maximum emission against the receiving antenna polarization (Vertical and Horizontal). Then the meter reading of the test receiver at the maximum emission was A dB(μ V).

Step 2) The test was set-up shown as Fig.2(b). The EUT was replaced to half-wave dipole antenna at the same polarization under the same condition as step 1. The RF power was fed to the transmitting Antenna(half-wave Dipole Antenna) from the signal generator. In order to obtain the maximum emission level, the height of the receiving antenna is varied from 1m to 4 m. The level of the signal generator was adjusted so that the meter reading of the test receiver at the maximum emission was A dB(μ V) ,same as the recorded level in Step1. Then the RF power into the substitution half-wave dipole antenna was P(dBm).

The ERP is calculated in the following equation.

$$\text{ERP[dBm]} = P(\text{dBm}) - (\text{Balun Loss of the half-wave Dipole Ant. (dB)}) + \text{Cable Loss(dB)}$$

Test location:

KITA-KANSAI Testing Center

7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan

○ - 1st open test site (3 meters)

○ - 2nd open test site (3 meters)

KAMEOKA EMC Branch

9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan

○ - 1st open test site ○ - 3 m ○ - 10 m ○ - 30 m

○ - 2nd open test site ○ - 3 m ○ - 10 m

TSURU EMC Branch

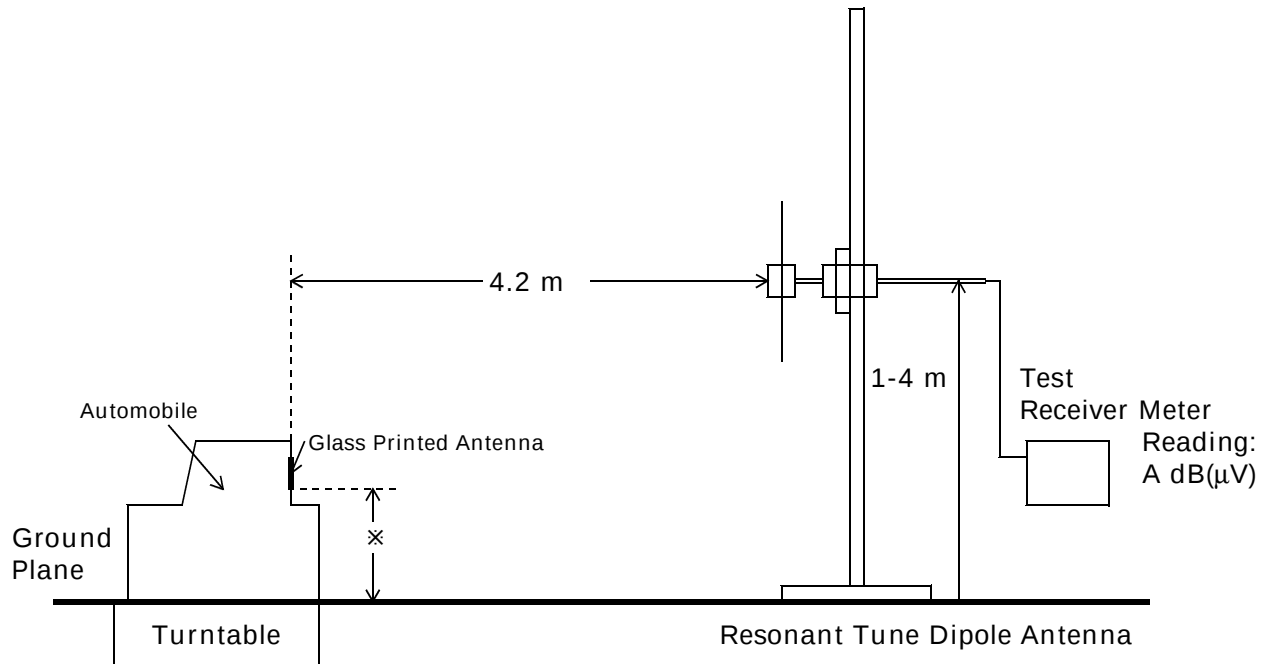
2096 Ohata, Tsuru-shi, Yamanashi-ken 402-0035, Japan

● - Anechoic Chamber(Measurement distance : 4.2 m)

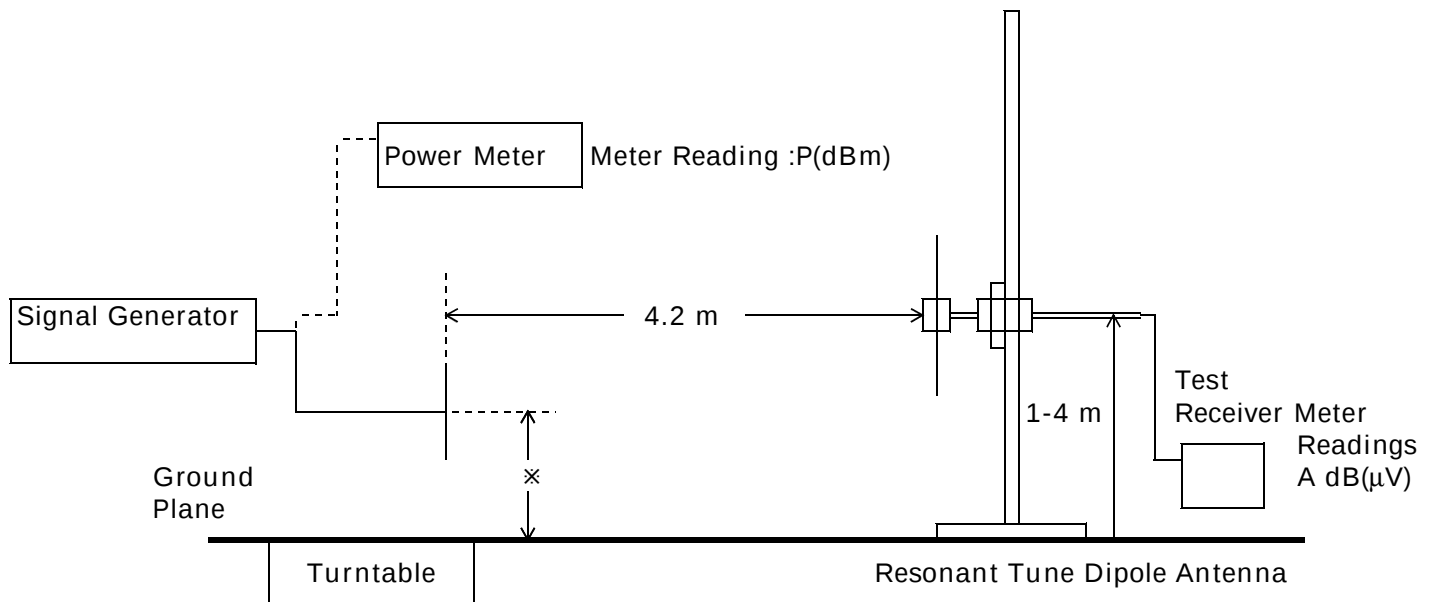
Used test instruments:

Model No.	Device ID	Last Cal. Date	Cal. Interval
● - ESCS 30	A - 1	August, 2001	1 Year
○ - ESCS 30	A - 9		
○ - ESV/ESV-Z3	A - 7 / A - 17		
○ - ESV/ESV-Z3	A - 6 / A - 18		
○ - ESV/ESV-Z3	A - 4 / A - 20		
○ - ESV/ESV-Z3	A - 8 / A - 19		
○ - ESVS 10	A - 5		
○ - KBA-511A	C - 13		
● - KBA-611	C - 18	November, 2001	1 Year
● - KBA-611	C - 20	November, 2001	1 Year
○ - VHA9103/BBA9106	C - 43		
○ - UHALP9107	C - 42		
○ - VHA9103/FBAB9177	C - 25		
○ - UHALP9108-A1	C - 28		
● - Cable	H - 6	November, 2001	1 Year
○ - 432B/8478B	B - 24/B-43		
● - ML2437A/ML2444A	B - 10/B-11	January, 2002	1 Year
○ - 8673D	B - 2		
● - MG3681A	B - 3	January, 2002	1 Year

Temperature: 18 °C Humidity: 24 %



(a) EUT



(b) Half-wave Dipole Antenna

Note) ※: The same height(1.2 m)

Fig.2 Maximum Transmitter Power(ERP) Measurement(800 MHz system)

Transmitter Power(EIRP) Measurement (§24.232) **- 1900 MHz Systems -**

The measurement was performed shown as follows.

Step 1) The test was set-up shown as Fig.3(a). In order to obtain the maximum emission, the EUT is placed on the ground plane, at the distance 4.2m from the receiving antenna(Horn Antenna) and rotated around 360 degrees. The receiving antenna height was varied from 1m to 4 m. The EUT on the table was placed to obtain maximum emission against the receiving antenna polarization (Vertical and Horizontal). Then the meter reading of the spectrum analyzer at the maximum emission was A dB(μ V).

Step 2) The test was set-up shown as Fig.3(b). The EUT was replaced to Horn antenna at the same polarization under the same condition as step 1. The RF power was fed to the transmitting Antenna(horn Antenna) from the signal generator. In order to obtain the maximum emission level, the height of the receiving antenna is varied from 1m to 4 m. The level of the signal generator was adjusted so that the meter reading of the spectrum analyzer at the maximum emission was A dB(μ V) ,same as the recorded level in Step1. Then the RF power into the substitution horn antenna was P(dBm).

The EIRP is calculated in the following equation.

$$\text{EIRP(dBm)} = P(\text{dBm}) + G_h(\text{dBi})$$

Where, $G_h(\text{dBi})$: Gain of the substitution horn antenna

Test location:

KITA-KANSAI Testing Center

7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan

○ - 1st open test site (3 meters)

○ - 2nd open test site (3 meters)

KAMEOKA EMC Branch

9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan

○ - 1st open test site ○ - 3 m ○ - 10 m ○ - 30 m

○ - 2nd open test site ○ - 3 m ○ - 10 m

TSURU EMC Branch

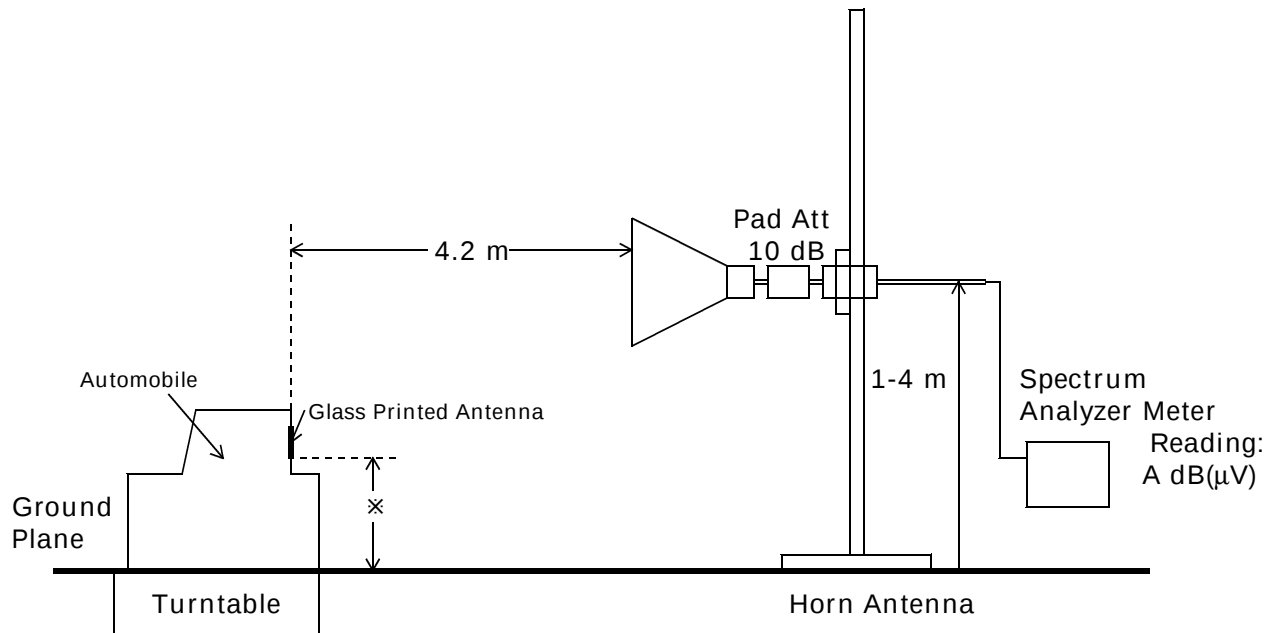
2096 Ohata, Tsuru-shi, Yamanashi-ken 402-0035, Japan

● - Anechoic Chamber(Measurement distance : 4.2 m)

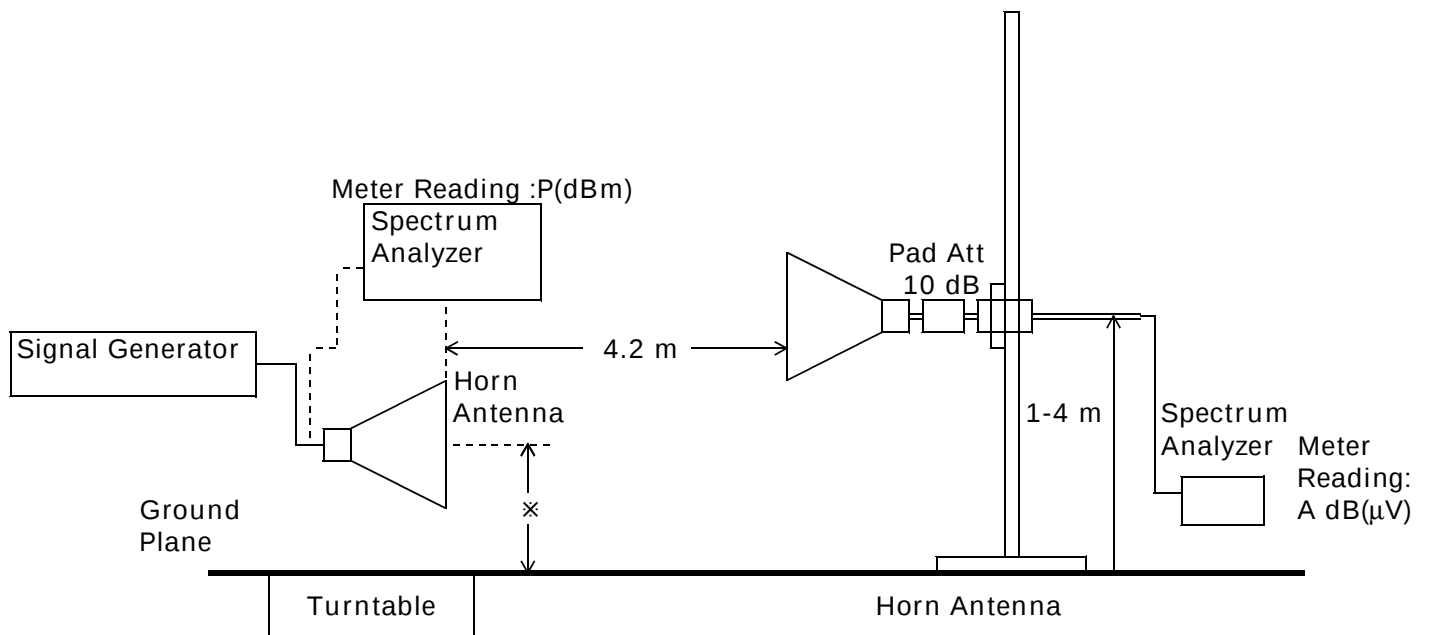
Used test instruments:

Model No.	Device ID	Last Cal. Date	Cal. Interval
○ - ESCS 30	A - 1		
○ - ESCS 30	A - 9		
● - 8566B	A - 13	January, 2002	1 Year
○ - 8593A	A - 15		
○ - ESV	A - 6		
● - 4T-10	D - 73	May, 2001	1 Year
○ - 4T-10	D - 74		
○ - WJ-6611-513	A - 23		
○ - WJ-6882-824	A - 21		
○ - DBL-0618N515	A - 33		
● - 91888-2	C - 40 - 1	May, 2001	1 Year
● - 91888-2	C - 41 - 1	May, 2001	1 Year
○ - 91889-2	C - 41 - 2		
○ - 94613-1	C - 41 - 3		
○ - 91891-2	C - 41 - 4		
○ - 94614-1	C - 41 - 5		
○ - 3160-09	C - 48		
○ - 355C	D - 22		
○ - 355D	D - 23		
○ - MZ5010C	D - 81		
● - Cable	C - 40 - 11	May, 2001	1 Year
○ - Cable	C - 40 - 12		
○ - 432B/8478B	B - 24/B-43		
● - ML2437A/ML2444A	B - 10/B-11	January, 2002	1 Year
○ - 8673D	B - 2		
● - MG3681A	B - 3	January, 2002	1 Year

Temperature: 18 °C Humidity: 24 %



(a) EUT



(b) Substitution Horn Antenna

Note) ⊗: The same height(1.2m)

Fig.3 Maximum Transmitter Power (EIRP) Measurement(1900 MHz systems)

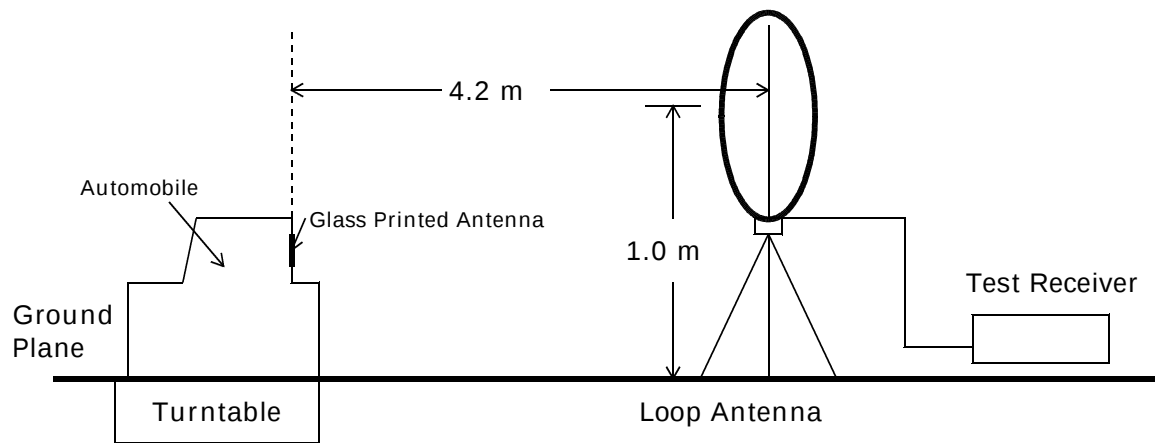
Unwanted Radiation Measurement (§2.1053, §22.917, 24.238)

- Radiated Field Strength at 4.2m -

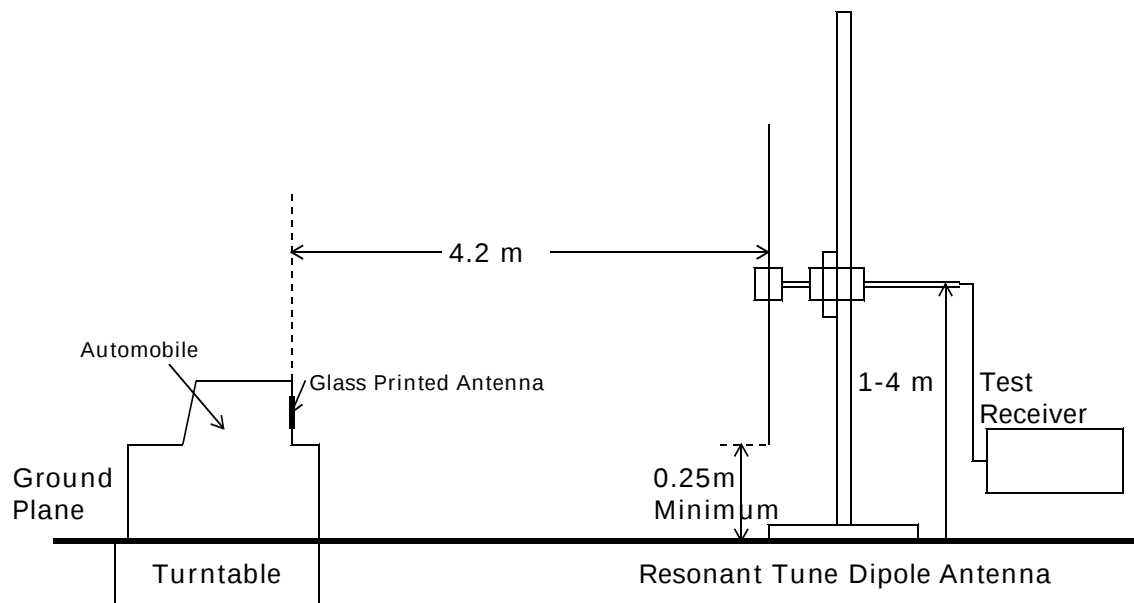
The spurious radiation for Equipment was measured at the distance 4.2 m away from the EUT which was placed on the ground plane. The receiving antenna was oriented for vertical polarization and varied from 1 m to 4 m until the maximum emission level was detected on the measuring instrument. The EUT was rotated 360 degrees until the maximum emission was received. The measurement was also repeated with the receiving antenna in the horizontal polarization.

This test was carried out using the loop antenna for up to 30MHz, using the half-wave dipole antenna for up to 1GHz and using the horn antenna for above 1GHz.

The respective measuring emission level of the spurious and harmonics were compared with the radiated emission level of fundamental frequency by specified attenuation limits, $43+10\log_{10}$ (EIRP in watt)[dB], $EIRP = EIRP$ of fundamental emission.

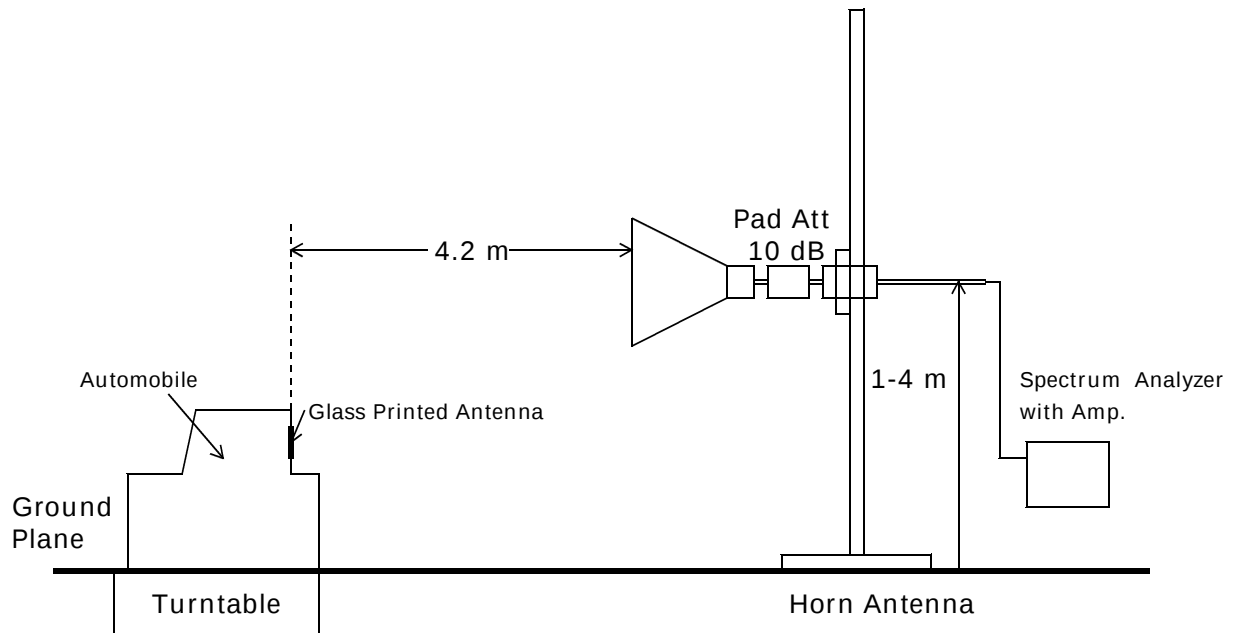


(a) Measurement set up for up to 30 MHz



(b) Measurement set up for up to 1 GHz

Fig.4 Unwanted Radiation Measurement(Field Strength at 4.2 m)



(c) Measurement set up for above 1GHz

Fig.4 Unwanted Radiation Measurement(Field Strength at 4.2 m)

Test location:

KITA-KANSAI Testing Center

7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan

- - 1st open test site (3 meters)
- - 2nd open test site (3 meters)

KAMEOKA EMC Branch

9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan

- - 1st open test site ○ - 3 m ○ - 10 m ○ - 30 m
- - 2nd open test site ○ - 3 m ○ - 10 m

TSURU EMC Branch

2096 Ohata, Tsuru-shi, Yamanashi-ken 402-0035, Japan

- - Anechoic Chamber(Measurement distance : 4.2 m)

Validation of Site Attenuation:

- 1) Last Confirmed Date : May 11, 2001
- 2) Interval : 1 Year

Used test instruments :

Model No.	Device ID	Last Cal. Date	Cal. Interval
● - ESCS 30	A - 1	August, 2001	1 Year
○ - ESCS 30	A - 9		
○ - ESH 2	A - 2		
○ - ESH 2	A - 3		
● - HFH2-Z2	C - 2	July, 2001	1 Year
○ - HFH2-Z2	C - 3		
○ - ESV/ESV-Z3	A - 7 / A - 17		
○ - ESV/ESV-Z3	A - 6 / A - 18		
○ - ESV/ESV-Z3	A - 4 / A - 20	November, 2001	1 Year
○ - ESV/ESV-Z3	A - 8 / A - 19		
○ - ESVS 10	A - 5		
● - KBA-511A	C - 16		
● - KBA-611	C - 18	November, 2001	1 Year
○ - VHA9103/BBA9106	C - 43	November, 2001	1 Year
○ - UHALP9107	C - 42		
○ - VHA9103/FBAB9177	C - 27		
○ - UHALP9108-A1	C - 26		
● - Cable	H - 6	November, 2001	1 Year

- continue -

Used test instruments :

Model No.	Device ID	Last Cal. Date	Cal. Interval
● - 8566B	A - 13	January, 2002	1 Year
○ - 8593A	A - 15		
● - 4T-10	D - 73	May, 2001	1 Year
○ - 4T-10	D - 74		
● - WJ-6611-513	A - 23	May, 2001	1 Year
● - WJ-6882-824	A - 21	May, 2001	1 Year
● - DBL-0618N515	A - 33	May, 2001	1 Year
● - 91888-2	C - 41 - 1	May, 2001	1 Year
● - 91889-2	C - 41 - 2	May, 2001	1 Year
○ - 94613-1	C - 41 - 3		
○ - 91891-2	C - 41 - 4		
○ - 94614-1	C - 41 - 5		
● - 3160-04	C - 55	May, 2001	1 Year
● - 3160-05	C - 56	May, 2001	1 Year
● - 3160-06	C - 57	May, 2001	1 Year
● - 3160-07	C - 58	May, 2001	1 Year
● - 3160-08	C - 59	May, 2001	1 Year
● - 3160-09	C - 48	November, 2001	1 Year
○ - 355C	D - 22		
○ - 355D	D - 23		
● - MZ5010C	D - 81	November, 2001	1 Year
○ - 8673D	B - 2		
● - Cable	C - 40 - 11	May, 2001	1 Year
● - Cable	C - 40 - 12	May, 2001	1 Year
● - MG3681A	B - 3	January, 2002	1 Year
● - UHP-127	D - 42	May, 2002	1 Year
● - UHP-128	D - 43	May, 2002	1 Year

Environmental conditions :

Temperature: 18 °C Humidity: 24 %

Occupied Bandwidth Measurement (§2.1049, §22.917, §24.238)

Test Procedure :

The measurement test-setup is shown in Fig.5.

The setting of the spectrum analyzer are shown as follows :

1) Modulation : AMPS

Res. Bandwidth : 300 Hz
Video Bandwidth : 1 kHz
Span : 100 kHz
Sweep Time : AUTO
Trace : Maxhold

2) Modulation : CDMA

Res. Bandwidth : 30 kHz
Video Bandwidth : 100 kHz
Span : 3 MHz
Sweep Time : AUTO
Trace : Maxhold

Test location :

KITA-KANSAI Testing Center

7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan

● - Shielded room

KAMEOKA EMC Branch

9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan

○ - Shielded room

Used test instruments:

Model No.	Device ID	Last Cal. Date	Cal. Interval
○ - 4T-10	D - 74		
○ - 4T-10	D - 73		
● - 2-10	D - 79	September, 2001	1 Year
○ - 2-10	D - 80		
● - 8566B	A - 13	January, 2002	1 Year
○ - 8593A	A - 15		

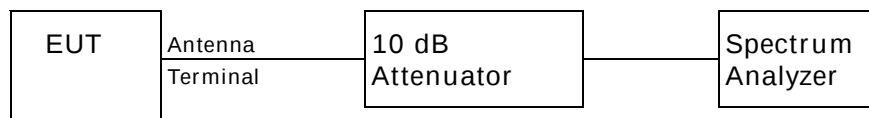


Fig.5 Occupied Bandwidth Measurement

Environmental conditions:

Temperature: 23 °C Humidity: 54 %

Band-Edge Emission Measurement(\$22.917,\$24.238)

Test Procedure :

The measurement test-setup is shown in Fig.6.

The setting of the spectrum analyzer are shown as follows :

1) Modulation : AMPS

TX Frequency : 824.040 MHz / 848.970 MHz
Band-edge Frequency : 824.000 MHz / 849.000 MHz
Res. Bandwidth : 1 kHz
Video Bandwidth : 3 kHz
Span : 1 MHz
Sweep Time : AUTO
Trace : Maxhold

2) Modulation : CDMA

TX Frequency : 824.700 MHz / 848.310 MHz / 1851.250 MHz / 1908.750 MHz
Band-edge Frequency : 1850.000 MHz / 1910.000 MHz
Res. Bandwidth : 100 kHz
Video Bandwidth : 300 kHz
Span : 5 MHz
Sweep Time : AUTO
Trace : Maxhold

Test location :

KITA-KANSAI Testing Center

7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan

● - Shielded room

KAMEOKA EMC Branch

9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan

○ - Shielded room

Used test instruments:

Model No.	Device ID	Last Cal. Date	Cal. Interval
○ - 4T-10	D - 74		
○ - 4T-10	D - 73		
● - 2-10	D - 79	September, 2001	1 Year
○ - 2-10	D - 80		
● - 8566B	A - 13	January, 2002	1 Year
○ - 8593A	A - 15		

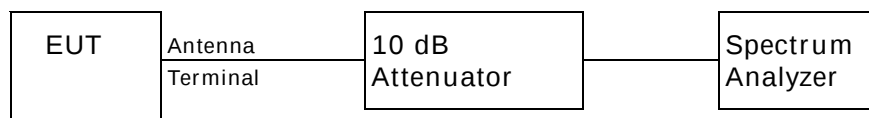


Fig.6 Band-Edge Emission Measurement

Environmental conditions:

Temperature: 24 °C Humidity: 60 %

Audio Frequency Response & Modulation Characteristics Measurement (§2.1047, §22.915)

Test Procedure :

1) Audio Frequency Response Measurement

The measurement test-setup is shown in Fig.7. The frequency response over the frequency range 100Hz - 5000Hz is measured. The audio signal generator is connected to the audio input circuit of the EUT. The audio signal input level over the frequency range are adjusted to obtain frequency deviation 4kHz. The reference level at 1kHz is -35.5 dBV.

2) Modulation Characteristics Measurement

The measurement test-setup is shown in Fig.5. The audio signal generator is connected to the audio input circuit of the EUT. The audio signal input level at the maximum response frequency at 2.7kHz are changed and the frequency deviation at the level is measured.

In addition, the audio signal generator is connected to the audio input circuit of the EUT. The audio signal input level at the maximum response frequency at 300Hz, 1000Hz, 2500Hz and 3000Hz are changed and the frequency deviation at the level is measured.

Test location :

KITA-KANSAI Testing Center

7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan

● - Shielded room

KAMEOKA EMC Branch

9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan

○ - Shielded room

Used test instruments:

Model No.	Device ID	Last Cal. Date	Cal. Interval
○ - 4T-10	D - 74		
○ - 4T-10	D - 73		
● - 2-10	D - 79	September, 2001	1 Year
○ - 2-10	D - 80		
● - 8566B	A - 13	January, 2002	1 Year
○ - 8593A	A - 15		
● - MS61A	B - 40	April, 2002	1 Year
● - VP-7212A	B - 41	April, 2002	1 Year

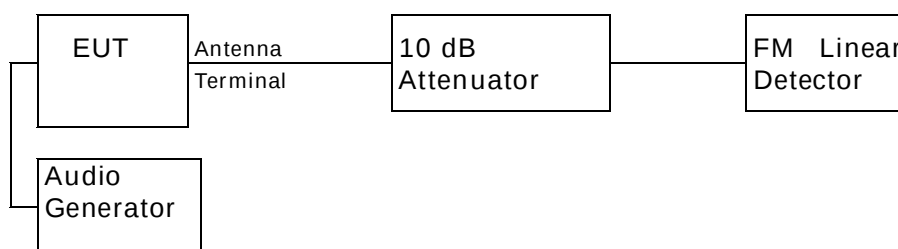


Fig.7 Audio Frequency Response and Modulation Characteristics Measurement

Environmental conditions:

Temperature: 23 °C Humidity: 54 %

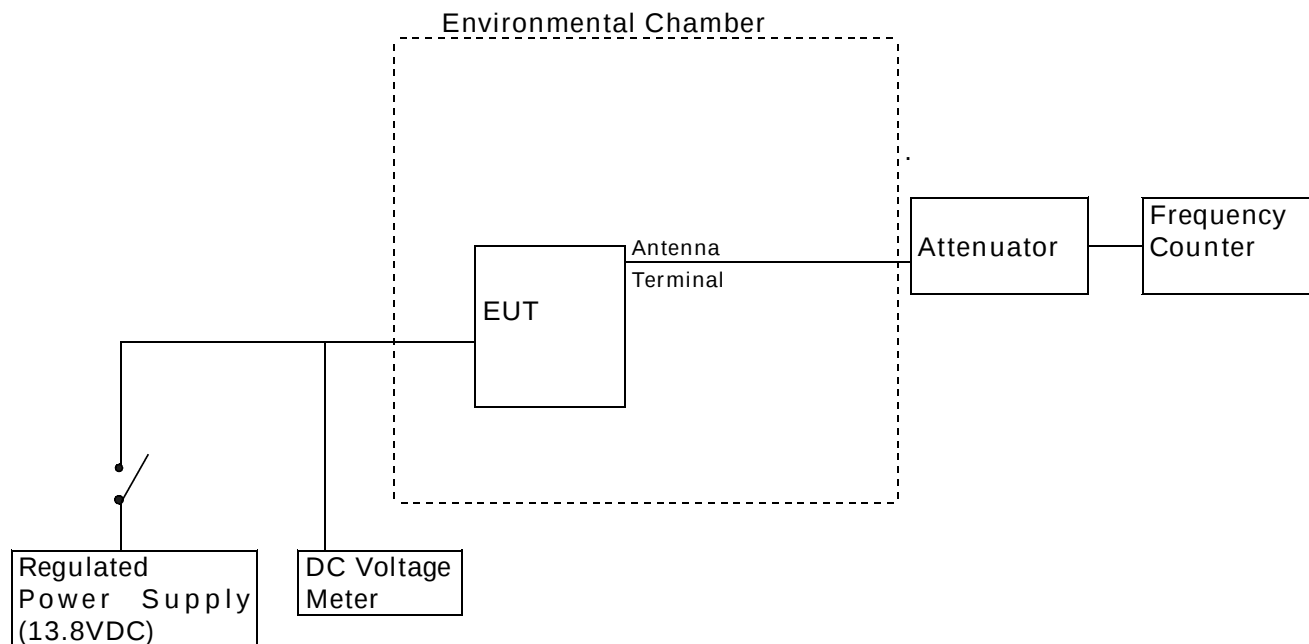
Frequency Stability Measurement (§2.1055, §22.355, §24.235)

a) Frequency Stability Measurement versus Temperature

The EUT was placed in an environmental chamber and was tested in the range from -30 to +50 degrees Celsius. The EUT was stabilized at each temperature. The power (13.8VDC) supplied was applied to the transmitter and allowed to stabilize for 10 minutes. The transmitting frequency was measured at startup and 2 minutes, 5 minutes and 10 minutes after startup. This procedure was repeated from -30 to +50 degrees Celsius at the interval of 10 degrees.

b) Frequency Stability Measurement versus Power Supply Voltage

The EUT was placed in an environmental chamber and was tested at the temperature of +20 degrees Celsius. The EUT was stabilized at the temperature. The power (13.8VDC) which is set to 85% and at 115% was applied to the transmitter and allowed to stabilize for 10 minutes. The transmitting frequency was measured at startup and 2 minutes, 5 minutes and 10 minutes after startup.



Test location:

KITA-KANSAI Testing Center

7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan

○ - Shielded room

● - Environment Testing Room

KAMEOKA EMC Branch

9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan

○ - Shielded room

Used test instruments and sites :

Model No.	Device ID	Last Cal. Date	Cal. Interval
● - PL-3G	02304009	July, 2001	1 Year
● - EL100-06T4	14201089	July, 2001	1 Year
● - 2011-39	B - 33	April, 2002	1 Year
● - 6032A	F - 5	April, 2002	1 Year
● - TR5212	B - 30	March, 2002	1 Year

CONFIGURATION OF EUT

The Equipment Under Test (EUT) consists of :

Description	Applicant (Manufacturer)	Model No. (Serial No.)	FCC ID
Telematics Communication System	DENSO CORPORATION (DENSO WIRELESS SYSTEMS AMERICA, INC)	NN0200 (10100057)	LXC-NN0200

The measurement was carried out with the following equipment connected :

Description	Grantee/Distributor	Model No. (Serial No.)	FCC ID
GLASS-BACK WDW (Glass Printd Antenna)	CENTRAL GLASS CO., LTD.	79712 AR210 (---)	N/A
ANT ASSY-GPS, IVC (GPS Antenna)	DENSO CORPORATION	25975 AS500 (---)	N/A
SW-ASSY V.COMM (4 button & Mic)	Matsushita Electric Co., Ltd.	253B0 AR210 (--)	N/A
DC Power Supply	TAKASAGO Electric Works	NL035-10 (35883293)	N/A

Test Configuration:

Operation - mode of the EUT:

The tests were carried out under 3 modulation types(2 types on 800MHz systems and 1 type on 1900 MHz systems) shown as follows :

- 1) 800 MHz systems
 - a) F3E : Continuous Wave
 - b) CDMA
- 2) 1900 MHz systems
 - CDMA

Test system:

The EUT is 2 communicating systems as one 800 MHz systems(Cellular Radiotelephone) and one 1900MHz systems(Broadband PCS).

The EUT has 4 ports shown as follows :

- 1) C1 port : connected to 4 button & Mic and DC Power Supply
- 2) Cellular port : connected to the glass printed antenna
- 3) GPS port : connected to the GPS antenna
- 4) J1850 port : not connected

The test systems under test consists of 4 units(one telematics communication system(RF unit/Control unit), one glass printed antenna, one GPS antenna and one 4 buttons & Mic.

The test system was set up in the actual automobile(INIFINITI Q45, NE manufactured by NISSAN MOTOR CO., LTD.)

The telematics communication system is installed in the trunk.

The glass printed antenna is installed in the rear window(Cable length between RF unit/Control unit and the glass printed antenna : 1087 mm).

The characteristics of the glass printed antenna differ by automobile model and were unique for each one .

The GPS antenna was on the rear dash, under the rear window.

The 4 button and Mic is installed above the rear view mirror, on the inside roof.

The equipments setting and the cable configuration are unique for the set up automobile.

The radiated emission test were conducted in the actual automobile.

(Refer to test configuration sketch and set-up photos)

Special accessories:

None

A) 800 MHz Systems:

Detailed Equipment portion:

- 1) Modulation Type : AMPS
Transmitting frequency : 824.040 MHz(991ch) - 848.970 MHz(799ch)
- 2) Modulation Type : CDMA : 824.700 MHz(1013ch) - 848.310 MHz(777ch)
Transmitting frequency

Detailed Receiver portion:

- 1) Modulation Type : AMPS
Receiving frequency : 869.040 MHz(991ch) - 893.970 MHz(799ch)
1st Local frequency : 1052.640 MHz(991ch) - 1077.570 MHz(799ch)
1st Intermediate frequency : 183.60 MHz
2nd Local frequency : 183.60 MHz
- 2) Modulation Type : CDMA
Receiving frequency : 869.700 MHz(1013ch) - 893.310 MHz(777ch)
1st Local frequency : 1053.300 MHz(1013ch) - 1076.910 MHz(777ch)
1st Intermediate frequency : 183.60 MHz
2nd Local frequency : 183.60 MHz

B) 1900 MHz Systems:

Detailed Equipment portion:

- Transmitting frequency : 1851.250 MHz(25ch) - 1908.750 MHz(1175ch)

Detailed Receiver portion:

- Receiving frequency : 1931.250 MHz(25ch) - 1988.750 MHz(1175ch)
1st Local frequency : 2114.850 MHz(25ch) - 2172.350 MHz(1175ch)
1st Intermediate frequency : 183.60 MHz
2nd Local frequency : 183.60 MHz

C) GPS Systems:

Detailed Receiver portion:

- Receiving frequency : 1575.420 MHz
1st Local frequency : 1554.985 MHz
1st Intermediate frequency : 20.435 MHz

JQA Application No.: KL80020020S
Model No. : NN0200
FCC ID : LXC-NN0200

Regulation : CFR 47 FCC Rules Parts 22 and 24
Issue Date : May 23, 2002

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Other Clock Frequency:

WTM : 16.368 kHz, 32.768 kHz, 48 kHz, 12.288 MHz, 19.2 MHz
VIOC : 4 MHz, 16 MHz, 19.2 MHz

EUT Modification

- - No modifications were conducted by JQA to achieve compliance to applied levels.
- - To achieve compliance to applied levels, the following change(s) were made by JQA during the compliance test.

— The modification(s) will be implemented in all production models of this equipment. —

Applicant	: N/A	Date	: N/A
Typed Name	: N/A	Position	: N/A

Responsible Party

— Responsible Party of Test Item(Product) —

Responsible party :

Contact Person :

Signatory

Deviation from Standard

- - No deviations from the standard described in page 3.
- - The following deviations were employed from the standard described in page 3.

TEST RESULTS
- 800 MHz Systems -

Transmitter Power(TP)

The transmitter power is 758.58 mW at 824.700 MHz
Uncertainty of measurement results +0.6 dB(2σ) -0.6 dB(2σ)

Remarks: _____

Antenna Conducted Spurious Emission

The requirements are **● - Passed** **○ - Not Passed**
Min. limit margin 25.2 dB at 3393.240 MHz
Max. limit exceeding _____ dB at _____ MHz
Uncertainty of measurement results +2.4 dB(2σ) -2.4 dB(2σ)

Remarks: _____

Transmitter Power(ERP)

The requirements are **● - Passed** **○ - Not Passed**
The Maximum ERP is 776.2 mW at 836.490 MHz
Min. limit margin 9.6 dB at 836.490 MHz
Max. limit exceeding _____ dB at _____ MHz
Uncertainty of measurement results +1.4 dB(2σ) -1.3 dB(2σ)

Remarks: _____

Occupied Bandwidth

The requirements are

● - Passed

○ - Not Passed

The results(Occupied Bandwidth)

Refer to page 50 - 65

The results(Band-edge Emission)

Refer to pages 66 - 70

Uncertainty of measurement results at Frequency

±0.05 ppm(2σ)

Uncertainty of measurement results at Amplitude

±0.6 dB(2σ)

Remarks:

Unwanted Radiation (9 kHz - 10 GHz)

The requirements are

● - Passed

○ - Not Passed

Min. limit margin

16.7 dB at 2544.930 MHz

Max. limit exceeding

_____ dB at _____ MHz

Uncertainty of measurement results

9 kHz - 30 MHz

+2.5 dB(2σ)

-2.5 dB(2σ)

30 MHz - 1 GHz

+4.1 dB(2σ)

-4.2 dB(2σ)

1 GHz - 10 GHz

+3.1 dB(2σ)

-3.2 dB(2σ)

Remarks:

Frequency Stability

Frequency Stability :

+0.33 ppm at 836.490 MHz

Uncertainty of measurement results

±0.05 ppm

Remarks:

TEST RESULTS
- 1900 MHz Systems -

Transmitter Power(TP)

The transmitter power is 610.94 mW at 1880.000 MHz
Uncertainty of measurement results +0.6 dB(2σ) -0.6 dB(2σ)

Remarks: _____

Antenna Conducted Spurious Emission

The requirements are **● - Passed** **○ - Not Passed**
Min. limit margin More than 32.0 dB at 11452.500 MHz
Max. limit exceeding _____ dB at _____ MHz
Uncertainty of measurement results +2.4 dB(2σ) -2.4 dB(2σ)

Remarks: _____

Transmitter Power(EIRP)

The requirements are **● - Passed** **○ - Not Passed**
The Maximum ERP is 278.6 mW at 1908.750 MHz
Min. limit margin 8.6 dB at 1908.750 MHz
Max. limit exceeding _____ dB at _____ MHz
Uncertainty of measurement results +1.3 dB(2σ) -1.3 dB(2σ)

Remarks: _____

Occupied Bandwidth

The requirements are

● - Passed

○ - Not Passed

The results(Occupied Bandwidth)

Refer to page 88 - 91

The results(Band-edge Emission)

Refer to pages 92 - 94

Uncertainty of measurement results at Frequency

±0.05 ppm(2σ)

Uncertainty of measurement results at Amplitude

±0.6 dB(2σ)

Remarks:

Unwanted Radiation (9 kHz - 20 GHz)

The requirements are

● - Passed

○ - Not Passed

Min. limit margin

22.8 dB at 3817.500 MHz

Max. limit exceeding

_____ dB at _____ MHz

Uncertainty of measurement results

9 kHz - 30 MHz

+2.5 dB(2σ)

-2.5 dB(2σ)

30 MHz - 1 GHz

+4.1 dB(2σ)

-4.2 dB(2σ)

1 GHz - 20 GHz

+3.1 dB(2σ)

-3.2 dB(2σ)

Remarks:

Frequency Stability

Frequency Stability :

+0.44 ppm at 1880.000 MHz

Uncertainty of measurement results

±0.05 ppm

Remarks:

SUMMARY

GENERAL REMARKS :

The EUT was tested according to the requirements of FCC Rules and Regulations Parts 22 and 24 (October 1, 2001) under the test configuration, as shown in page 37.

The conclusion for the test items of which are required by the applied regulation is indicated under the final judgement.

FINAL JUDGEMENT :

The "as received" sample;

- - fulfill the test requirements of the regulation mentioned on page 3.
- - fulfill the test requirements of the regulation mentioned on page 3, but with certain qualifications.
- - doesn't fulfill the test regulation mentioned on page 3.

Begin of testing : April 6, 2002

End of testing : May 16, 2002

- JAPAN QUALITY ASSURANCE ORGANIZATION -

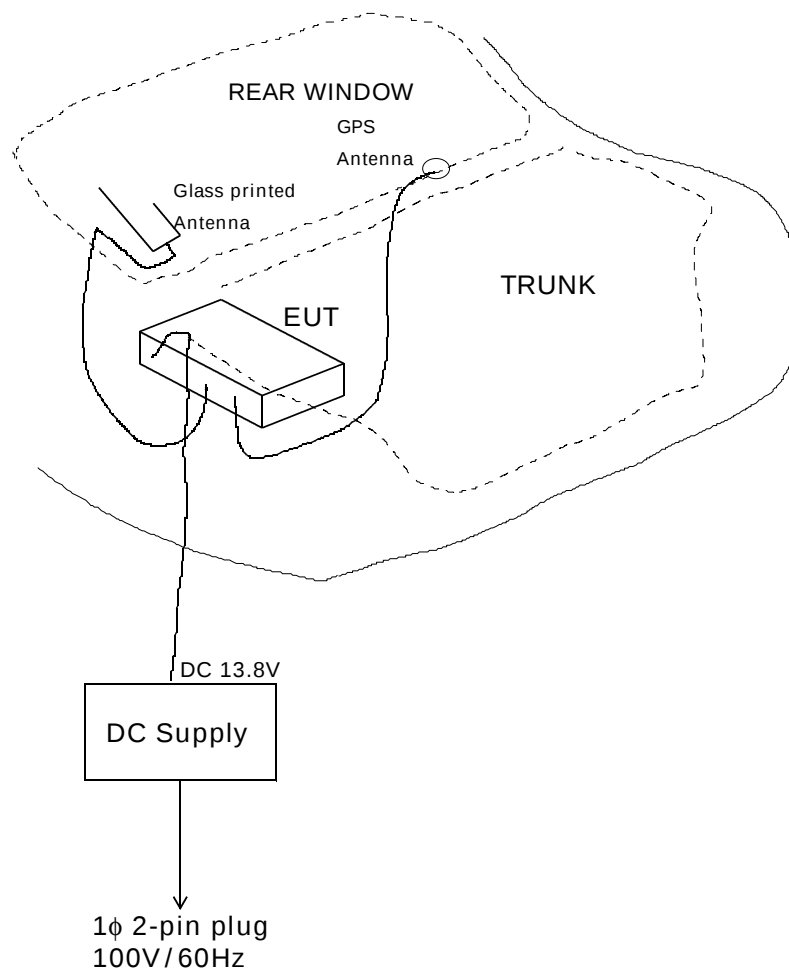
Approved by :

Issued by :



Akio Hosoda
Manager
EMC Div.
JQA KITA-KANSAI Testing Center

Shigeru Kinoshita
Deputy Manager
EMC Div.
JQA KITA-KANSAI Testing Center



Test-Setup (Photographs) at worst case



Front View



Side View



DC Power Supply

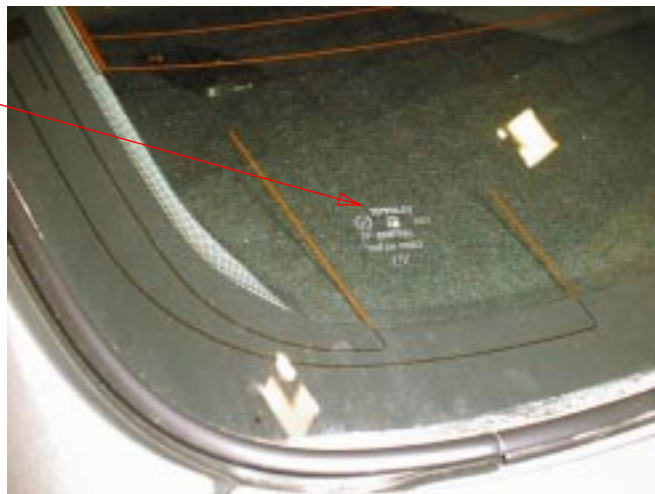
Rear View

RF Unit / Control Unit



Telematics Communication System
(RF Unit / Control Unit)

Glass Printed Antenna



Glass Printed Antenna

4 button & Mic



4 button & Mic

Transmitter Power(TP) Measurement - 800 MHz Systems -

Test Date: April 6, 2002
 Temp.: 18 °C; Humi.: 24 %

a) Modulation Type : AMPS

CH	Frequency [MHz]	Correction Factor [dB]	Meter Readings [dBm]	Results		Remarks (Note 2)
				[dBm]	[mW]	
991	824.040	20.00	7.21	27.21	526.02	A
383	836.490	20.00	7.46	27.46	557.19	A
799	848.970	20.00	6.63	26.63	460.26	A

b) Modulation Type : CDMA

CH	Frequency [MHz]	Correction Factor [dB]	Meter Readings [dBm]	Results		Remarks (Note 2)
				[dBm]	[mW]	
1013	824.700	20.00	8.80	28.80	758.58	A
383	836.490	20.00	8.30	28.30	676.08	A
777	848.310	20.00	8.16	28.16	654.64	A

Sample of calculated result at 824.700 MHz, as the Maximum Level Point:

Correction Factor = 20.00 dB
 +) Meter Reading = 8.80 dBm
 Result = 28.80 dBm : $10^{(28.80/10)} = 758.58(\text{mW})$

The point shown on "___" is the Maximum Level Point.

Note : 1. The correction factor includes the attenuator loss and the cable loss.

Remarks:

Note 2	Detector Function	RES. B.W	V.B.W	Sweep T	Span	Corr. Factor *
A	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	CL+P20
B	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	CL+P20+HPF
C	Peak (ESV)	120 kHz	--	--	--	CL+P20

*)CL: Cable Loss + DC-Cutter Loss/ P20: 20dB Att. / HPF: High Pass Filter Loss

Tester : Hiroshi Fujimoto

Antenna Conducted Spurious Emission Measurement - 800 MHz Systems -

Test Date: May 6, 2002
Temp.: 24 °C ; Humi.: 52 %

Measurement Results:

Transmitting Frequency :824.040MHz (991ch)
Modulation Type : AMPS

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
1648.080	10.5	< -60.0	-13.0	< -49.5	> +36.5	B
2472.120	10.7	< -60.0	-13.0	< -49.3	> +36.3	B
3296.160	11.1	-58.8	-13.0	-47.7	+34.7	B
4120.200	11.0	< -60.0	-13.0	< -49.0	> +36.0	C
4944.240	11.0	< -60.0	-13.0	< -49.0	> +36.0	C
5768.280	11.2	< -60.0	-13.0	< -48.8	> +35.8	C
6592.320	12.4	< -60.0	-13.0	< -47.6	> +34.6	C
7416.360	11.7	< -60.0	-13.0	< -48.3	> +35.3	C
8240.400	11.4	< -60.0	-13.0	< -48.6	> +35.6	C

Transmitting Frequency :836.490MHz (383ch)
Modulation Type : AMPS

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
1672.980	10.5	< -60.0	-13.0	< -49.5	> +36.5	B
2509.470	10.7	< -60.0	-13.0	< -49.3	> +36.3	B
3345.960	11.1	-57.4	-13.0	-46.3	+33.3	B
4182.450	11.0	< -60.0	-13.0	< -49.0	> +36.0	C
5018.940	11.0	< -60.0	-13.0	< -49.0	> +36.0	C
5855.430	11.6	< -60.0	-13.0	< -48.4	> +35.4	C
6691.920	12.0	< -60.0	-13.0	< -48.0	> +35.0	C
7528.410	11.5	< -60.0	-13.0	< -48.5	> +35.5	C
8364.900	11.9	< -60.0	-13.0	< -48.1	> +35.1	C

Transmitting Frequency :848.970MHz (799ch)
Modulation Type : AMPS

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
1697.940	10.5	< -60.0	-13.0	< -49.5	> +36.5	B
2546.910	10.7	< -60.0	-13.0	< -49.3	> +36.3	B
3395.880	11.2	< -60.0	-13.0	< -48.8	> +35.8	B
4244.850	11.0	< -60.0	-13.0	< -49.0	> +36.0	C
5093.820	11.0	< -60.0	-13.0	< -49.0	> +36.0	C
5942.790	11.5	< -60.0	-13.0	< -48.5	> +35.5	C
6791.760	12.1	< -60.0	-13.0	< -47.9	> +34.9	C
7640.730	11.5	< -60.0	-13.0	< -48.5	> +35.5	C
8489.700	12.2	< -60.0	-13.0	< -47.8	> +34.8	C

Transmitting Frequency :824.700MHz (1013ch)
Modulation Type : CDMA

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
1649.400	10.5	-59.5	-13.0	-49.0	+36.0	B
2474.100	10.7	-54.0	-13.0	-43.3	+30.3	B
3298.800	11.1	-50.5	-13.0	-39.4	+26.4	B
4123.500	11.0	< -60.0	-13.0	< -49.0	> +36.0	C
4948.200	11.0	< -60.0	-13.0	< -49.0	> +36.0	C
5772.900	11.2	< -60.0	-13.0	< -48.8	> +35.8	C
6597.600	12.4	< -60.0	-13.0	< -47.6	> +34.6	C
7422.300	11.7	< -60.0	-13.0	< -48.3	> +35.3	C
8247.000	11.4	< -60.0	-13.0	< -48.6	> +35.6	C

Transmitting Frequency :836.490MHz (383ch)
Modulation Type : CDMA

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
1672.980	10.5	< -60.0	-13.0	< -49.5	> +36.5	B
2509.470	10.7	-58.3	-13.0	-47.6	+34.6	B
3345.960	11.1	-58.3	-13.0	-47.2	+34.2	B
4182.450	11.0	< -60.0	-13.0	< -49.0	> +36.0	C
5018.940	11.0	< -60.0	-13.0	< -49.0	> +36.0	C
5855.430	11.6	< -60.0	-13.0	< -48.4	> +35.4	C
6691.920	12.0	< -60.0	-13.0	< -48.0	> +35.0	C
7528.410	11.5	< -60.0	-13.0	< -48.5	> +35.5	C
8364.900	11.9	< -60.0	-13.0	< -48.1	> +35.1	C

Transmitting Frequency :848.310MHz (777ch)
Modulation Type : CDMA

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
1696.620	10.5	< -60.0	-13.0	< -49.5	> +36.5	B
2544.930	10.7	< -60.0	-13.0	< -49.3	> +36.3	B
3393.240	11.2	-49.4	-13.0	-38.2	+25.2	B
4241.550	11.0	< -60.0	-13.0	< -49.0	> +36.0	C
5089.860	11.0	< -60.0	-13.0	< -49.0	> +36.0	C
5938.170	11.5	< -60.0	-13.0	< -48.5	> +35.5	C
6786.480	12.1	< -60.0	-13.0	< -47.9	> +34.9	C
7634.790	11.5	< -60.0	-13.0	< -48.5	> +35.5	C
8483.100	12.2	< -60.0	-13.0	< -47.8	> +34.8	C

Sample of calculated result at 3393.240MHz, as the Minimum Margin point:

$$\begin{array}{rcl} \text{Correction Factor} & = & 11.2 \text{ dB} \\ +) \text{ Meter Reading} & = & -49.4 \text{ dBm} \\ \hline \text{Result} & = & -38.2 \text{ dBm} \end{array}$$

Minimum Margin : $-13.0 - (-38.2) = 25.2(\text{dB})$

The point shown on "___" is the Minimum Margin Point.

Applied limits :

$$\begin{aligned} \text{Applied limits} &= 10\log[\text{TP(mW)}] - [43 + 10\log[\text{tp(W)}]] = 10\log[\text{TP(mW)}] - [43 + (10\log[\text{TP(mW)}] - 30)] \\ &= -13 [\text{dBm}] \end{aligned}$$

Where $\text{tp(W)} = \text{TP(mW)} / 1000$: Transmitter Power at antenna terminal

$$10\log[\text{tp(W)}] = 10\log[\text{TP(mW)}] - 30$$

Note : 1. The spectrum was checked from 9 kHz up to 10 GHz.

2. All emissions not listed were found to be more than 20dB below the limit.

Remarks:

Note 3	Detector Function	RES. B.W	V.B.W	Sweep T	Span	Corr. Factor *
A	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	CL+P10
B	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	CL+P10+HPF(D-43)
C	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	CL+P10+HPF(D-42)
D	Peak (ESV)	120 kHz	--	--	--	CL+P10

*)CL: Cable Loss + DC-Cutter Loss/ P10: 10dB Att. / HPF: High Pass Filter Loss

Tester : Akio Hosoda

Transmitter Power(ERP) Measurement - 800 MHz Systems -

Test Date: April 6, 2002
Temp.: 18 °C; Humi.: 24 %

Measurement Results:

a) Modulation Type : AMPS

CH	Frequency [MHz]	Maximum Transmitter Power ERP[mW]	EIRP[mW]	Limits ERP [W]	Margin [dB]
991	824.040	660.7	1083.9	7.0	+10.3
383	836.490	550.8	903.6	7.0	+11.0
799	848.970	415.9	682.3	7.0	+12.3

b) Modulation Type : CDMA

CH	Frequency [MHz]	Maximum Transmitter Power ERP[mW]	EIRP[mW]	Limits ERP [W]	Margin [dB]
1013	824.700	660.7	1083.9	7.0	+10.3
383	836.490	776.2	1273.5	7.0	+ 9.6
777	848.310	487.5	799.8	7.0	+11.6

Minimum Margin : $10\log(7.0/(776.2/1000)) = 9.6(\text{dB})$
The point shown on "___" is the Minimum Margin Point.

Tester : Hiroshi Fujimoto

Unwanted Radiation Measurement - 800 MHz Systems -

Test Date: April 6, 2002

Temp.: 18 °C; Humi.: 24 %

Measurement Results:

Transmitting Frequency :824.040MHz (991ch)
 Modulation Type : AMPS

Frequency [MHz]	Antenna Factor [dB(1/m)]	Correction Factor [dB]	Meter Readings at 4.2m [dB(μV)]		Limits* [dB(μV/m)]	Results at 4.2m [dB(μV/m)]		Margin [dB]	Remarks (Note 3)
			Hori.	Vert.		Hori.	Vert.		
824.040	28.1	2.9	86.5	92.5	---	117.5	123.5	---	F
1648.080	20.9	-27.1	58.5	60.7	80.2	52.3	54.5	+25.7	E
2472.120	21.3	-21.7	58.2	60.2	80.2	57.8	59.8	+20.4	B
3296.160	21.9	-21.0	46.2	48.5	80.2	47.1	49.4	+30.8	B
4120.200	27.2	-20.7	45.7	48.2	80.2	52.2	54.7	+25.5	B
4944.240	27.3	-21.3	< 30.0	< 30.0	80.2	< 36.0	< 36.0	> +44.2	B
5768.280	27.4	-20.5	< 30.0	< 30.0	80.2	< 36.9	< 36.9	> +43.3	B
6592.320	29.9	-19.9	< 30.0	< 30.0	80.2	< 40.0	< 40.0	> +40.2	B
7416.360	30.0	-19.2	< 30.0	< 30.0	80.2	< 40.8	< 40.8	> +39.4	B
8240.400	33.4	-27.5	< 30.0	< 30.0	80.2	< 35.9	< 35.9	> +44.3	C

*: Limit = 123.5(Maximum at 824.040 MHz) - [43 + 10log(1.0839)] = 80.2 [dB(μV/m)]

Transmitting Frequency :836.490MHz (383ch)
 Modulation Type : AMPS

Frequency [MHz]	Antenna Factor [dB(1/m)]	Correction Factor [dB]	Meter Readings at 4.2m [dB(μV)]		Limits* [dB(μV/m)]	Results at 4.2m [dB(μV/m)]		Margin [dB]	Remarks (Note 3)
			Hori.	Vert.		Hori.	Vert.		
836.490	28.2	2.9	87.0	92.0	---	118.1	123.1	---	F
1672.980	20.9	-27.1	58.6	59.8	80.5	52.4	53.6	+26.9	E
2509.470	21.3	-21.7	58.6	61.3	80.5	58.2	60.9	+19.6	B
3345.960	22.0	-21.0	47.4	50.9	80.5	48.4	51.9	+28.6	B
4182.450	27.2	-20.7	41.1	43.8	80.5	47.6	50.3	+30.2	B
5018.940	27.3	-21.3	< 30.0	< 30.0	80.5	< 36.0	< 36.0	> +44.5	B
5855.430	29.8	-20.3	< 30.0	< 30.0	80.5	< 39.5	< 39.5	> +41.0	B
6691.920	29.9	-19.9	< 30.0	< 30.0	80.5	< 40.0	< 40.0	> +40.5	B
7528.410	30.0	-19.1	< 30.0	< 30.0	80.5	< 40.9	< 40.9	> +39.6	B
8364.900	33.4	-27.6	< 30.0	< 30.0	80.5	< 35.8	< 35.8	> +44.7	C

*: Limit = 123.1(Maximum at 836.490 MHz) - [43 + 10log(0.9036)] = 80.5 [dB(μV/m)]

Transmitting Frequency :848.970MHz (799ch)
Modulation Type : AMPS

Frequency [MHz]	Antenna Factor [dB(1/m)]	Correction Factor [dB]	Meter Readings at 4.2m [dB(μV)]		Limits* [dB(μV/m)]	Results at 4.2m [dB(μV/m)]		Margin [dB]	Remarks (Note 3)
			Hori.	Vert.		Hori.	Vert.		
848.970	28.3	2.9	86.5	90.5	- - -	117.7	121.7	- - -	F
1697.940	21.1	-27.7	60.2	60.9	80.4	53.6	54.3	+26.1	E
2546.910	21.3	-21.7	59.1	61.2	80.4	58.7	60.8	+19.6	B
3395.880	22.0	-20.9	48.9	52.3	80.4	50.0	53.4	+27.0	B
4244.850	27.2	-20.8	37.5	38.9	80.4	43.9	45.3	+35.1	B
5093.820	27.3	-21.2	< 30.0	< 30.0	80.4	< 36.1	< 36.1	> +44.3	B
5942.790	29.9	-20.1	< 30.0	< 30.0	80.4	< 39.8	< 39.8	> +40.6	B
6791.760	29.9	-19.8	< 30.0	< 30.0	80.4	< 40.1	< 40.1	> +40.3	B
7640.730	30.0	-19.3	< 30.0	< 30.0	80.4	< 40.7	< 40.7	> +39.7	B
8489.700	33.4	-27.6	< 30.0	< 30.0	80.4	< 35.8	< 35.8	> +44.6	C

*: Limit = 121.7(Maximum at 848.970 MHz) - [43 + 10log(0.6823)] = 80.4 [dB(μV/m)]

Transmitting Frequency :824.700MHz (1013ch)
Modulation Type : CDMA

Frequency [MHz]	Antenna Factor [dB(1/m)]	Correction Factor [dB]	Meter Readings at 4.2m [dB(μV)]		Limits* [dB(μV/m)]	Results at 4.2m [dB(μV/m)]		Margin [dB]	Remarks (Note 3)
			Hori.	Vert.		Hori.	Vert.		
824.700	28.1	2.9	86.0	92.5	---	117.0	123.5	---	F
1649.400	20.9	-27.1	58.7	58.8	80.2	52.5	52.6	+27.6	E
2474.100	21.3	-21.7	61.0	62.1	80.2	60.6	61.7	+18.5	B
3298.800	21.9	-21.0	45.4	48.3	80.2	46.3	49.2	+31.0	B
4123.500	27.2	-20.7	42.6	45.5	80.2	49.1	52.0	+28.2	B
4948.200	27.3	-21.3	< 30.0	< 30.0	80.2	< 36.0	< 36.0	> +44.2	B
5772.900	27.4	-20.5	< 30.0	< 30.0	80.2	< 36.9	< 36.9	> +43.3	B
6597.600	29.9	-19.9	< 30.0	< 30.0	80.2	< 40.0	< 40.0	> +40.2	B
7422.300	30.0	-19.2	< 30.0	< 30.0	80.2	< 40.8	< 40.8	> +39.4	B
8247.000	33.4	-27.5	< 30.0	< 30.0	80.2	< 35.9	< 35.9	> +44.3	C

*: Limit = 123.5(Maximum at 824.700 MHz) - [43 + 10log(1.0839)] = 80.2 [dB(μV/m)]

Transmitting Frequency :836.490MHz (383ch)
Modulation Type : CDMA

Frequency [MHz]	Antenna Factor [dB(1/m)]	Correction Factor [dB]	Meter Readings at 4.2m [dB(μV)]		Limits* [dB(μV/m)]	Results at 4.2m [dB(μV/m)]		Margin [dB]	Remarks (Note 3)
			Hori.	Vert.		Hori.	Vert.		
836.490	28.2	2.9	87.0	93.0	---	118.1	124.1	---	F
1672.980	20.9	-27.1	58.0	58.7	80.1	51.8	52.5	+27.6	E
2509.470	21.3	-21.7	58.9	63.0	80.1	58.5	62.6	+17.5	B
3345.960	22.0	-21.0	49.5	52.2	80.1	50.5	53.2	+26.9	B
4182.450	27.2	-20.7	43.0	45.4	80.1	49.5	51.9	+28.2	B
5018.940	27.3	-21.3	< 30.0	< 30.0	80.1	< 36.0	< 36.0	> +44.1	B
5855.430	29.8	-20.3	< 30.0	< 30.0	80.1	< 39.5	< 39.5	> +40.6	B
6691.920	29.9	-19.9	< 30.0	< 30.0	80.1	< 40.0	< 40.0	> +40.1	B
7528.410	30.0	-19.1	< 30.0	< 30.0	80.1	< 40.9	< 40.9	> +39.2	B
8364.900	33.4	-27.6	< 30.0	< 30.0	80.1	< 35.8	< 35.8	> +44.3	C

*: Limit = 124.1(Maximum at 836.490 MHz) - [43 + 10log(1.2735)] = 80.1 [dB(μV/m)]

Transmitting Frequency :848.310MHz (777ch)
 Modulation Type : CDMA

Frequency [MHz]	Antenna Factor [dB(1/m)]	Correction Factor [dB]	Meter Readings at 4.2m [dB(μV)]		Limits* [dB(μV/m)]	Results at 4.2m [dB(μV/m)]		Margin [dB]	Remarks (Note 3)
			Hori.	Vert.		Hori.	Vert.		
848.310	28.3	2.9	87.5	91.5	- - -	118.7	122.7	- - -	F
1696.620	21.1	-27.7	59.1	59.6	80.7	52.5	53.0	+27.7	E
2544.930	21.3	-21.7	61.9	64.4	80.7	61.5	64.0	+16.7	B
3393.240	22.0	-20.9	50.5	53.5	80.7	51.6	54.6	+26.1	B
4241.550	27.2	-20.8	44.6	47.5	80.7	51.0	53.9	+26.8	B
5089.860	27.3	-21.2	< 30.0	< 30.0	80.7	< 36.1	< 36.1	> +44.6	B
5938.170	29.9	-20.1	< 30.0	< 30.0	80.7	< 39.8	< 39.8	> +40.9	B
6786.480	29.9	-19.8	< 30.0	< 30.0	80.7	< 40.1	< 40.1	> +40.6	B
7634.790	30.0	-19.3	< 30.0	< 30.0	80.7	< 40.7	< 40.7	> +40.0	B
8483.100	33.4	-27.6	< 30.0	< 30.0	80.7	< 35.8	< 35.8	> +44.9	C

*: Limit = 122.7(Maximum at 848.310 MHz) - [43 + 10log(0.7998)] = 80.7 [dB(μV/m)]

Sample of calculated result at 2544.930 MHz, as the Minimum Margin point:

Antenna Factor = 21.3 dB
Correction Factor = -21.7 dB
+) Meter Reading = 64.4 dB(μ V)
Result = 64.0 dB(μ V/m)

Minimum Margin : 80.7 - 64.0 = 16.7(dB)

The point shown on "___" is the Minimum Margin Point.

Applied limits :

Radiated Field Strength at 4.2 m

Applied limits [dB(μ V/m)] = Field Strength [dB(μ V/m)] at Maximum Fundamental Frequency - [43+10log[EIRP(W)]]

Where EIRP(W) : Fundamental Transmitter Power(EIRP)

Note : 1. The spectrum was checked from 9 kHz up to 10 GHz.

2. All emissions not listed were found to be more than 20dB below the limit.

Remarks:

Note 3	Detector Function	RES. B.W	V.B.W	Sweep T	Span	Corr. Factor *
A	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	CL+P10
B	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	CL+P20-Amp.
C	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	CL+P10-Amp.
D	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	P10-Amp.+Mix.
E	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	CL+HPF+P10-Amp.
F	Peak (ESV)	120 kHz	--	--	--	CL

*)CL: Cable Loss/ P20: 20dB Att. / P10: 10dB Att. / Amp.: Amplifier Gain/ Mix.: Mixer Conversion Loss/
HPF : High Pass Filter loss

Tester : Hiroshi Fujimoto

Occupied Bandwidth Measurement - 800 MHz Systems -

Test Date: May 6, 2002
Temp.: 24 °C; Humi.: 60 %

- a) Modulation Type : AMPS
Input Signal : Audio Input (-30dBV(50% Modulation) + 16 dB = -14 dBV)

CH No.	Transmitting Frequency(MHz)	Data Page
991	824.040	Page 51
383	836.490	Page 52
799	848.970	Page 53

- b) Modulation Type : AMPS
Input Signal : SAT(Supervisory Audio Tone)

CH No.	Transmitting Frequency(MHz)	Data Page
991	824.040	Page 54
383	836.490	Page 55
799	848.970	Page 56

- c) Modulation Type : AMPS
Input Signal : ST(Signal Tone)

CH No.	Transmitting Frequency(MHz)	Data Page
991	824.040	Page 57
383	836.490	Page 58
799	848.970	Page 59

- d) Modulation Type : AMPS
Input Signal : Wideband Data

CH No.	Transmitting Frequency(MHz)	Data Page
991	824.040	Page 60
383	836.490	Page 61
799	848.970	Page 62

- e) Modulation Type : CDMA

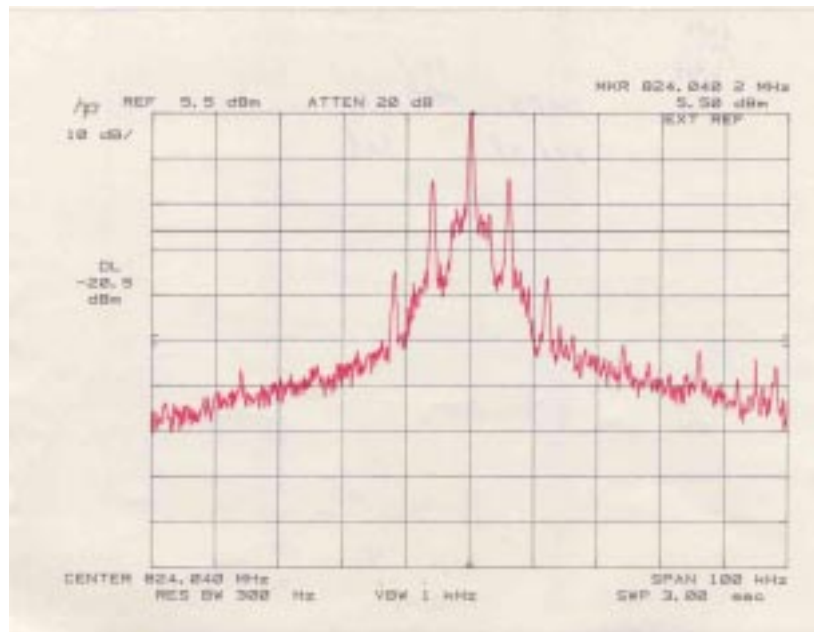
CH No.	Transmitting Frequency(MHz)	Data Page
1013	824.700	Page 63
383	836.490	Page 64
777	848.310	Page 65

Occupied Bandwidth Measurement

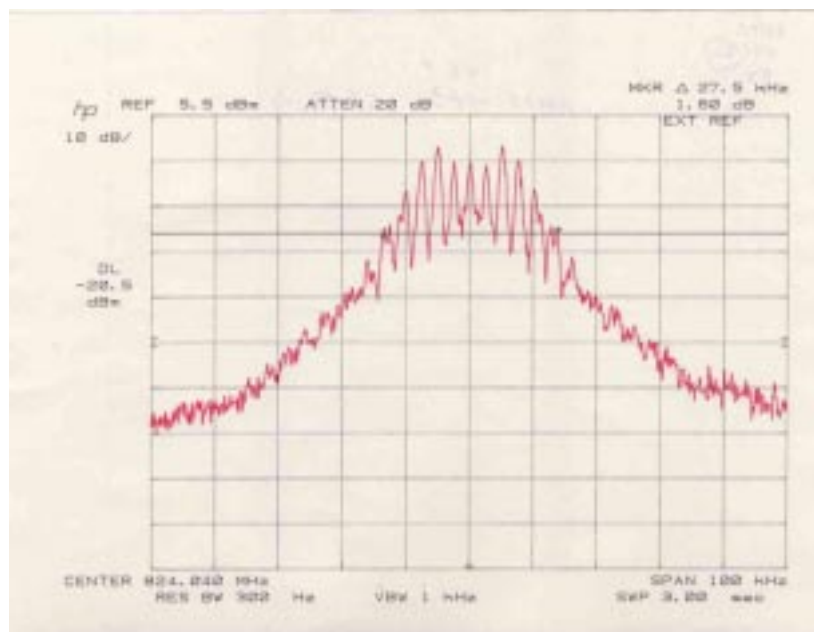
Transmitting Frequency : 824.040 MHz (991 ch)

Modulation Type : AMPS

Input Signal : Audio Input(-14 dBV at 2.5 kHz)



(a) Reference Level



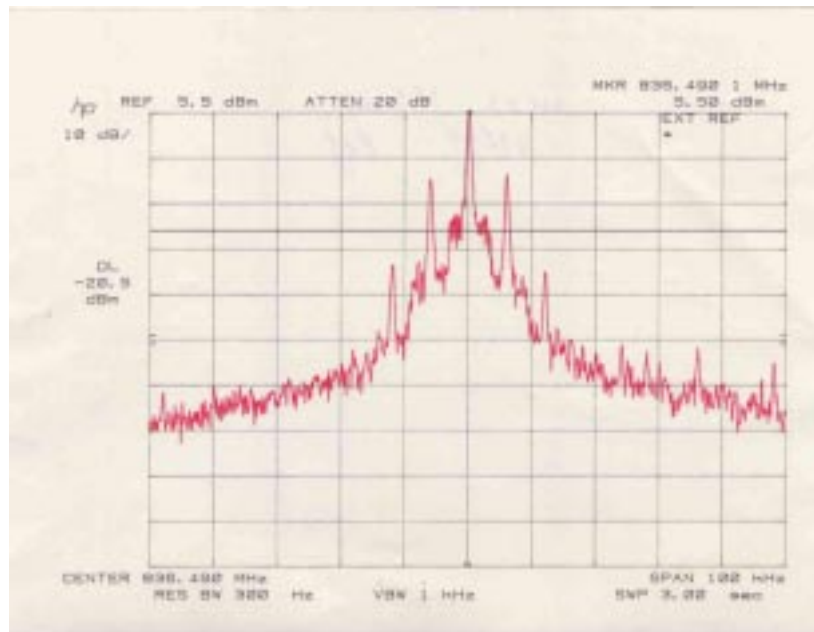
(b) Occupied Bandwidth

Occupied Bandwidth Measurement

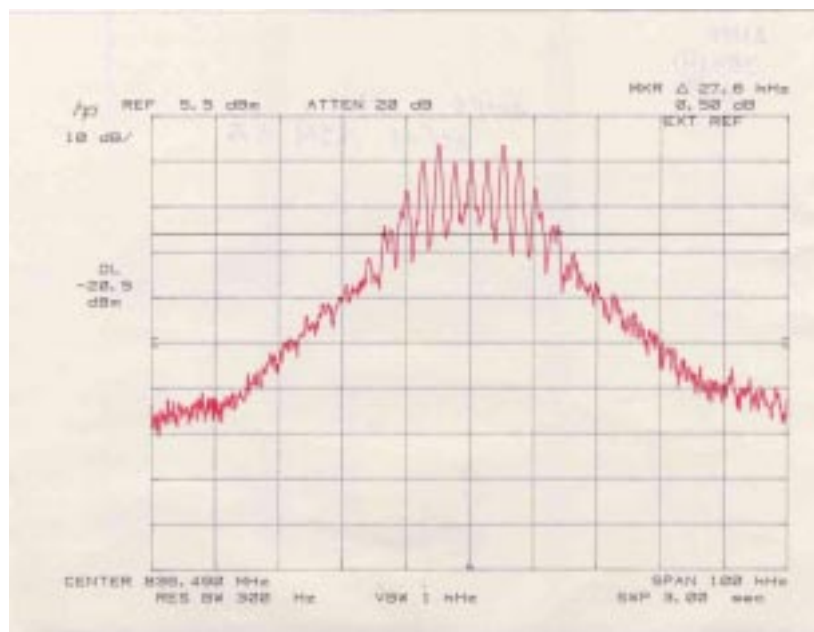
Transmitting Frequency : 836.490 MHz (383 ch)

Modulation Type : AMPS

Input Signal : Audio Input(-14 dBV at 2.5 kHz)



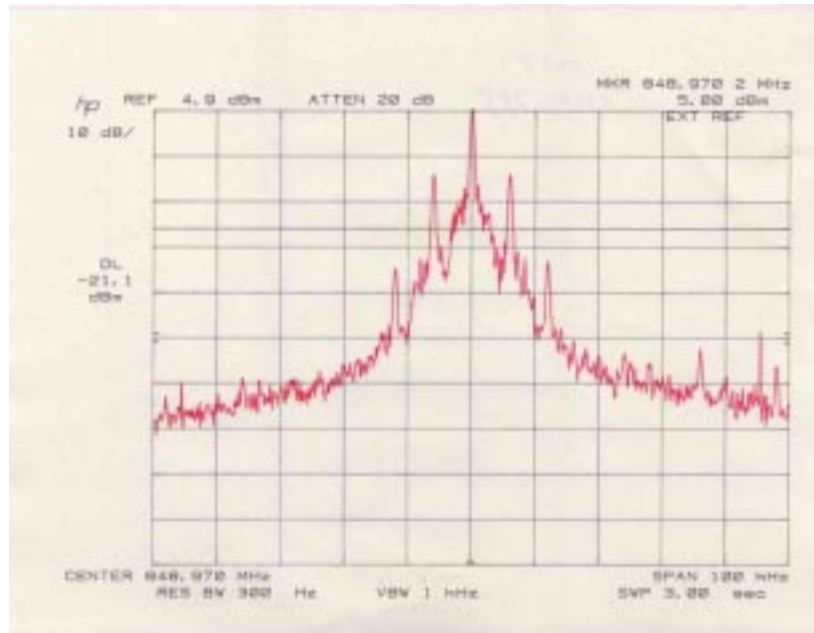
(a) Reference Level



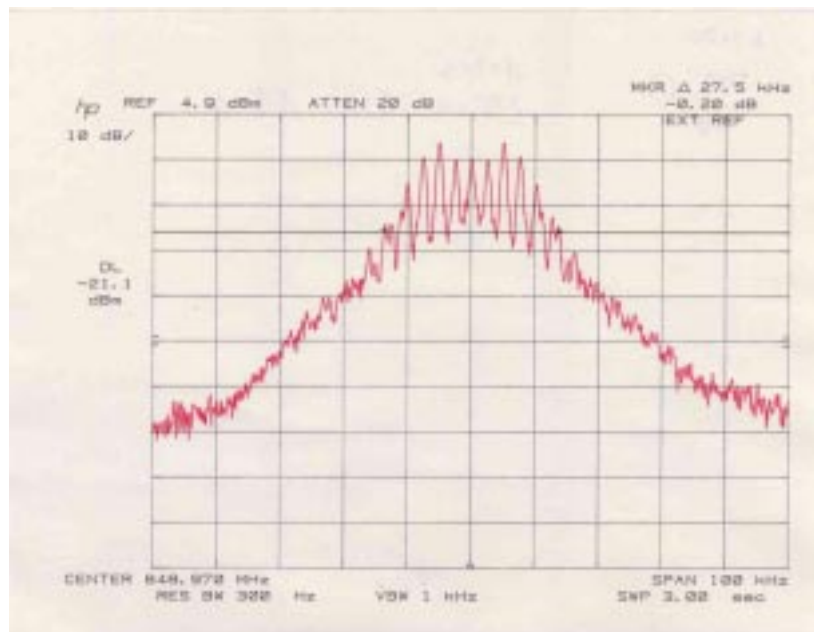
(b) Occupied Bandwidth

Occupied Bandwidth Measurement

Transmitting Frequency : 848.970 MHz (799 ch)
Modulation Type : AMPS
Input Signal : Audio Input(-14 dBV at 2.5 kHz)



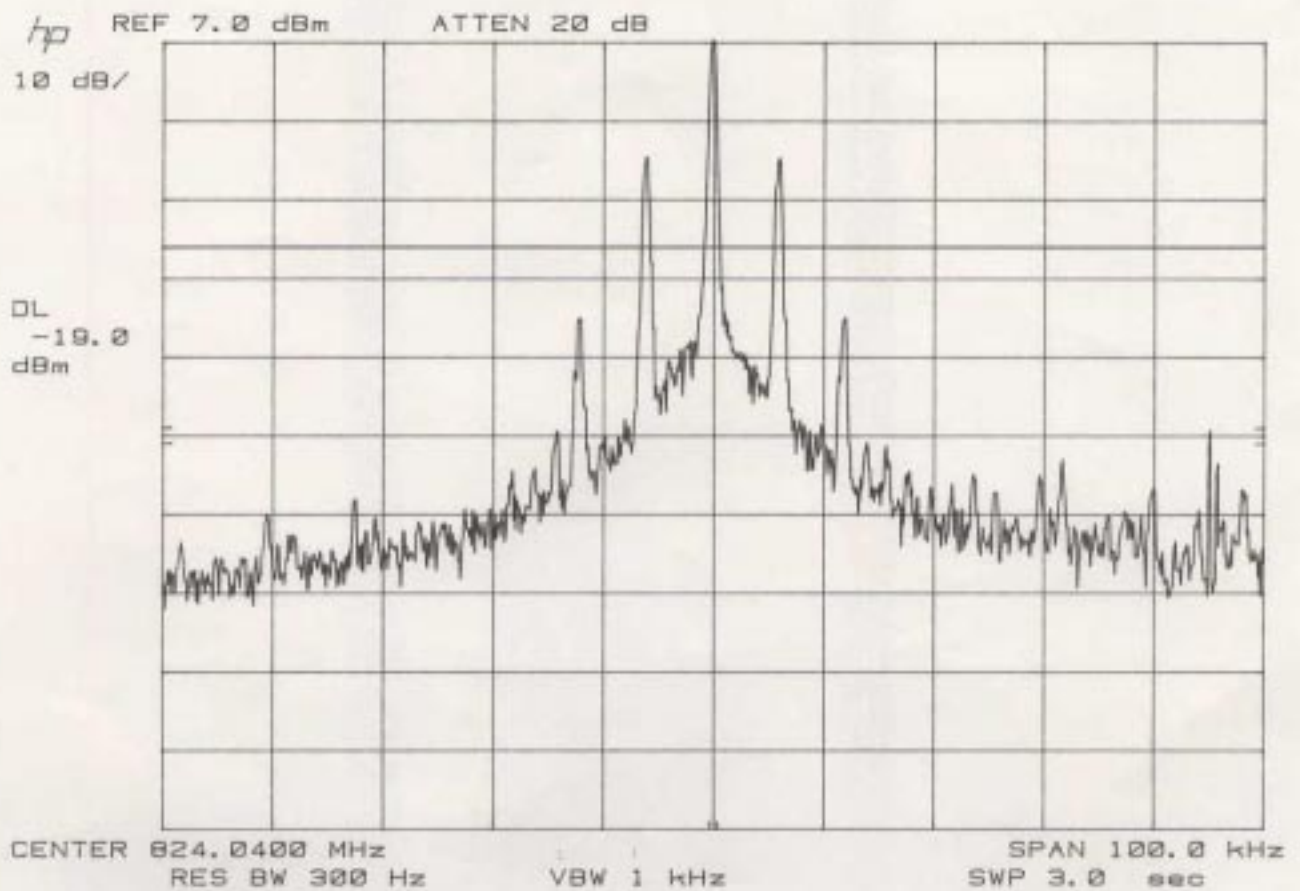
(a) Reference Level



(b) Occupied Bandwidth

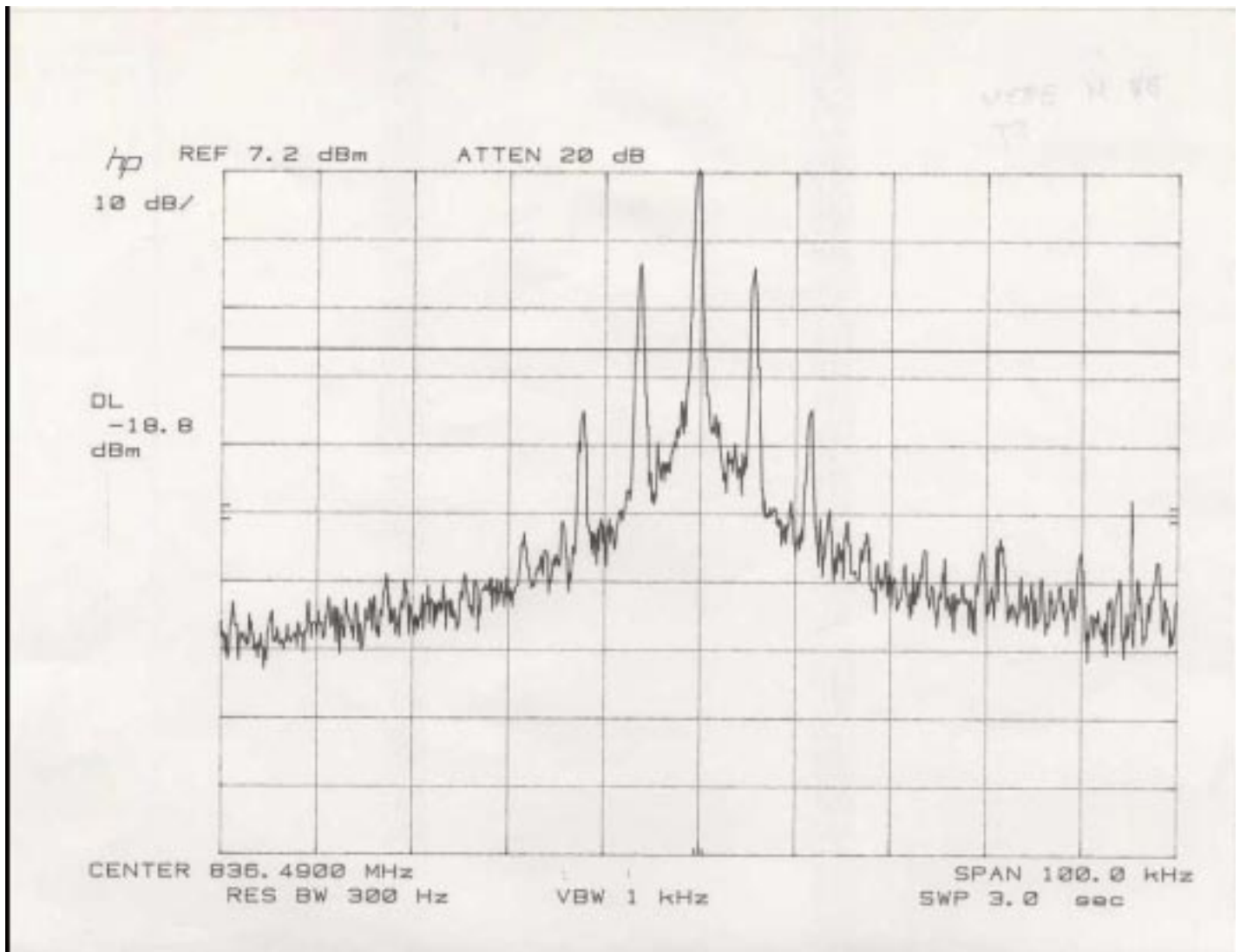
Occupied Bandwidth Measurement

Transmitting Frequency : 824.040 MHz (991 ch)
Modulation Type : AMPS
Input Signal : SAT(Supervisory Audio Tone)



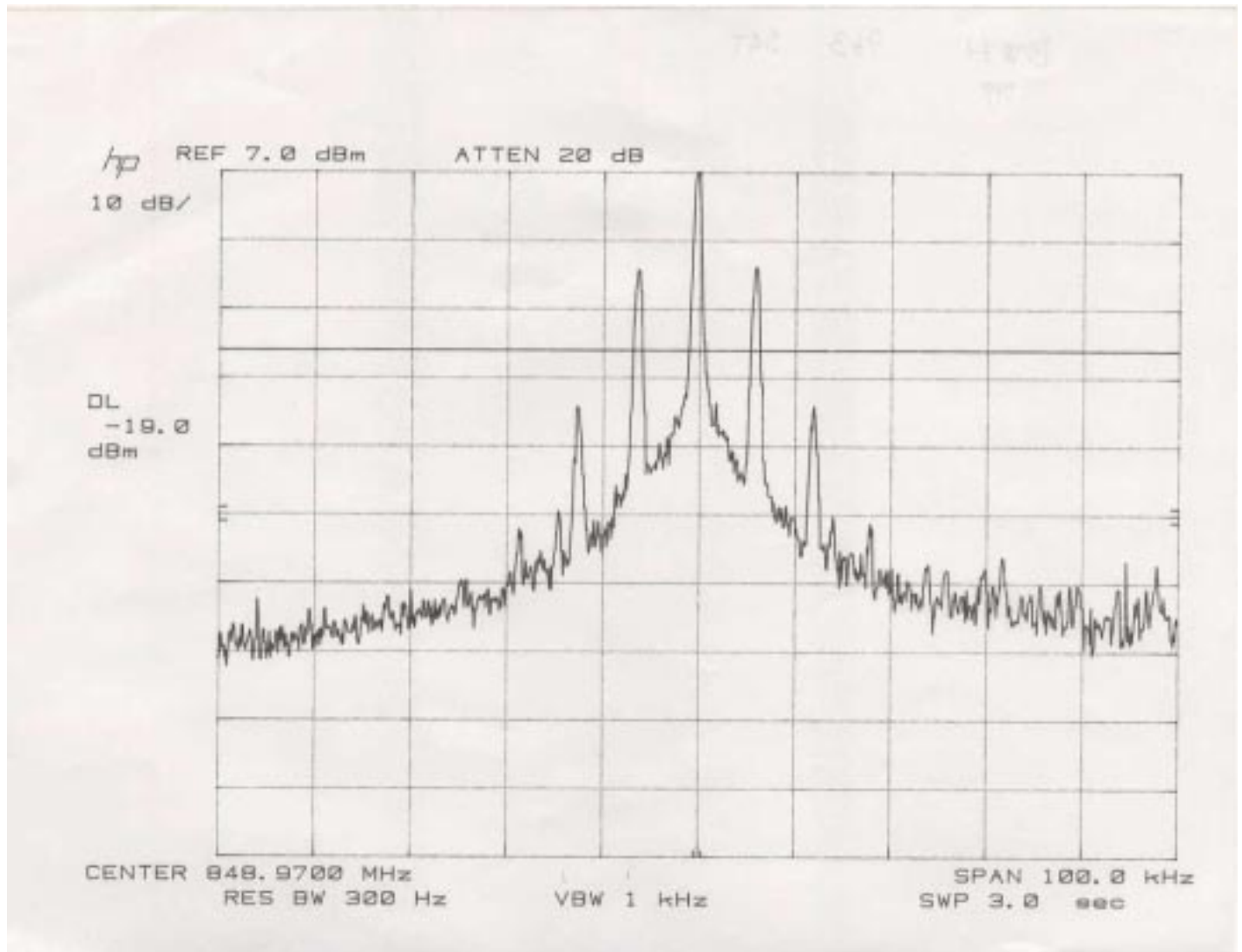
Occupied Bandwidth Measurement

Transmitting Frequency : 836.490 MHz (383 ch)
Modulation Type : AMPS
Input Signal : SAT(Supervisory Audio Tone)



Occupied Bandwidth Measurement

Transmitting Frequency : 848.970 MHz (799 ch)
Modulation Type : AMPS
Input Signal : SAT(Supervisory Audio Tone)

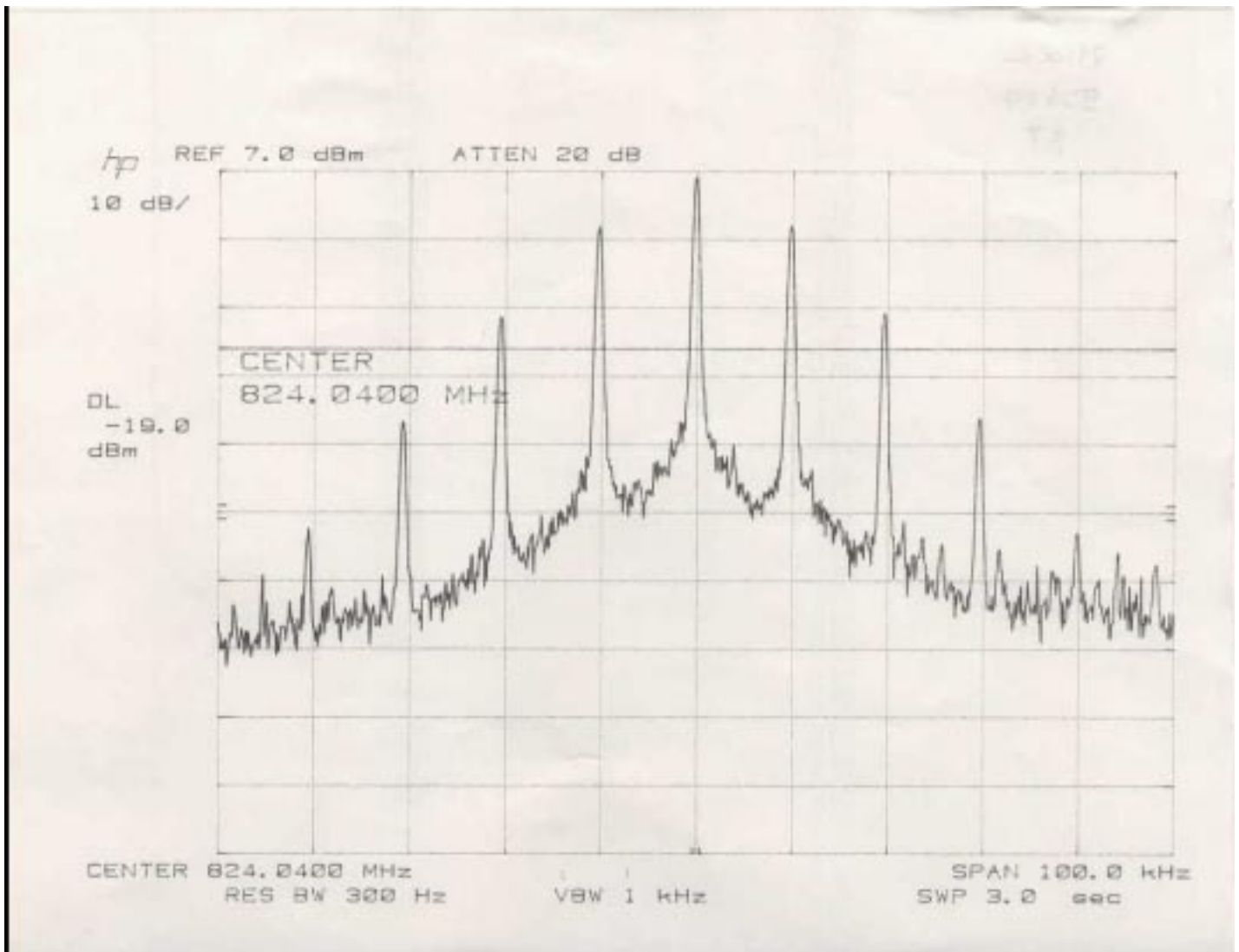


Occupied Bandwidth Measurement

Transmitting Frequency : 824.040 MHz (991 ch)

Modulation Type : AMPS

Input Signal : ST(Signaling Tone)

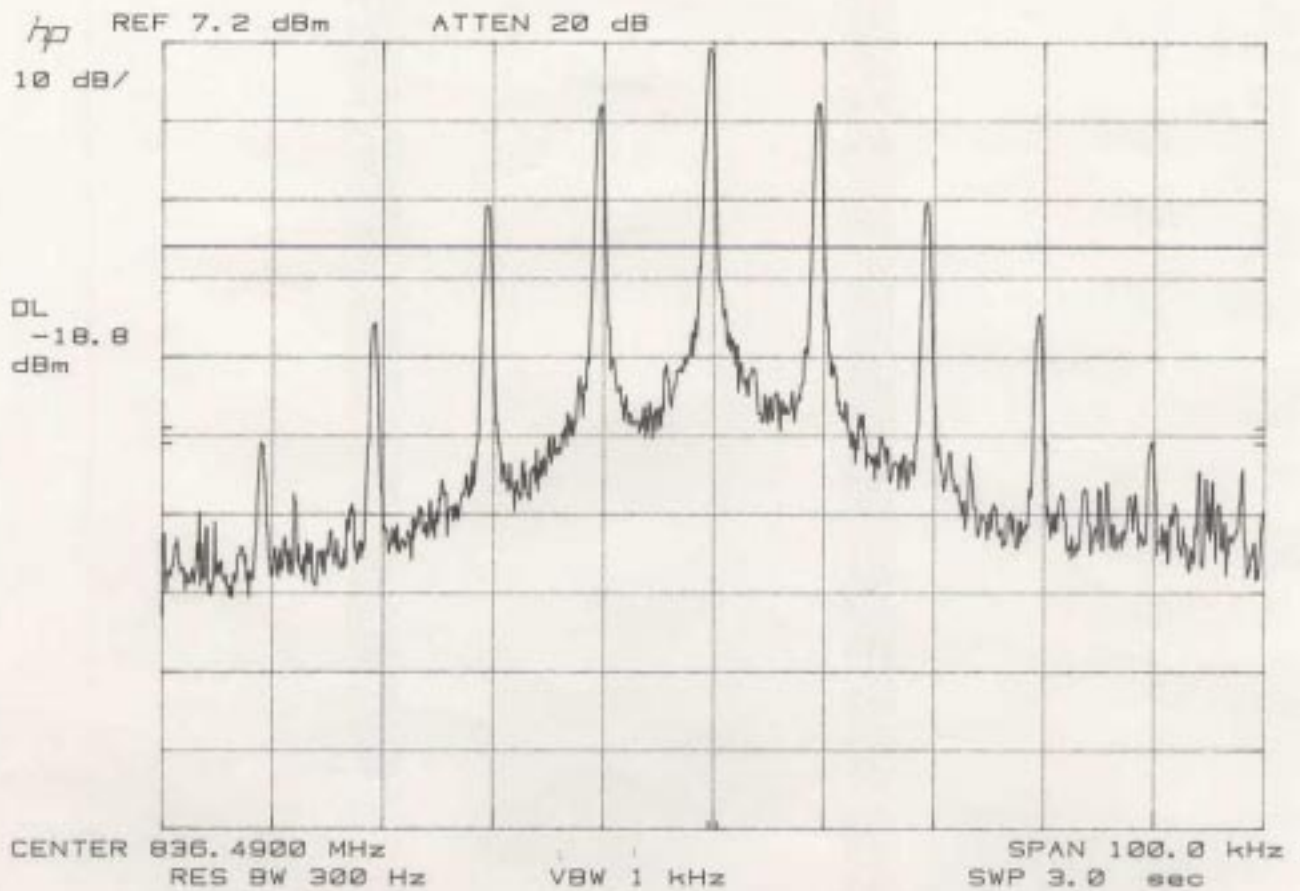


Occupied Bandwidth Measurement

Transmitting Frequency : 836.490 MHz (383 ch)

Modulation Type : AMPS

Input Signal : ST(Signaling Tone)

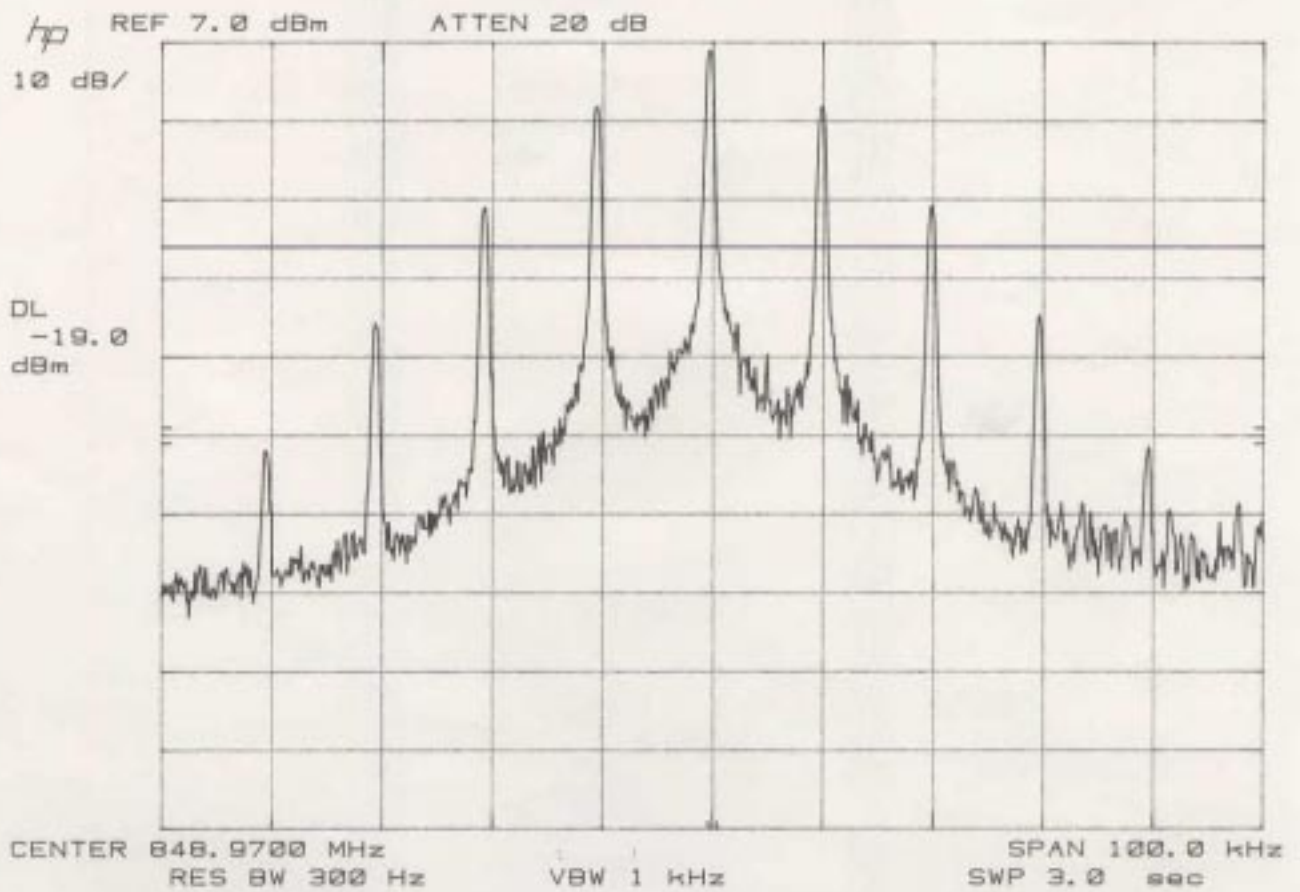


Occupied Bandwidth Measurement

Transmitting Frequency : 848.970 MHz (799 ch)

Modulation Type : AMPS

Input Signal : ST(Signaling Tone)

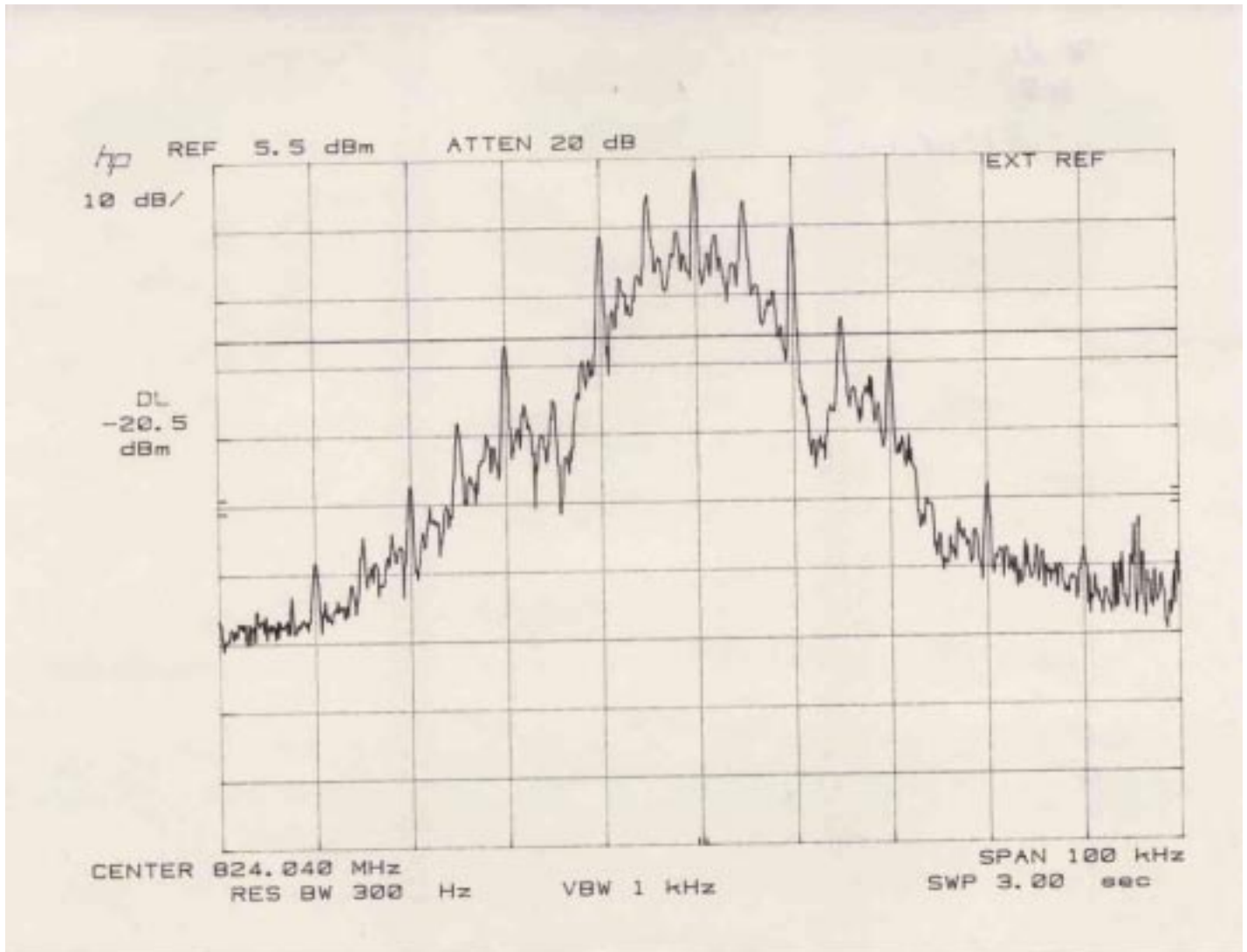


Occupied Bandwidth Measurement

Transmitting Frequency : 824.040 MHz (991 ch)

Modulation Type : AMPS

Input Signal : Wideband Data

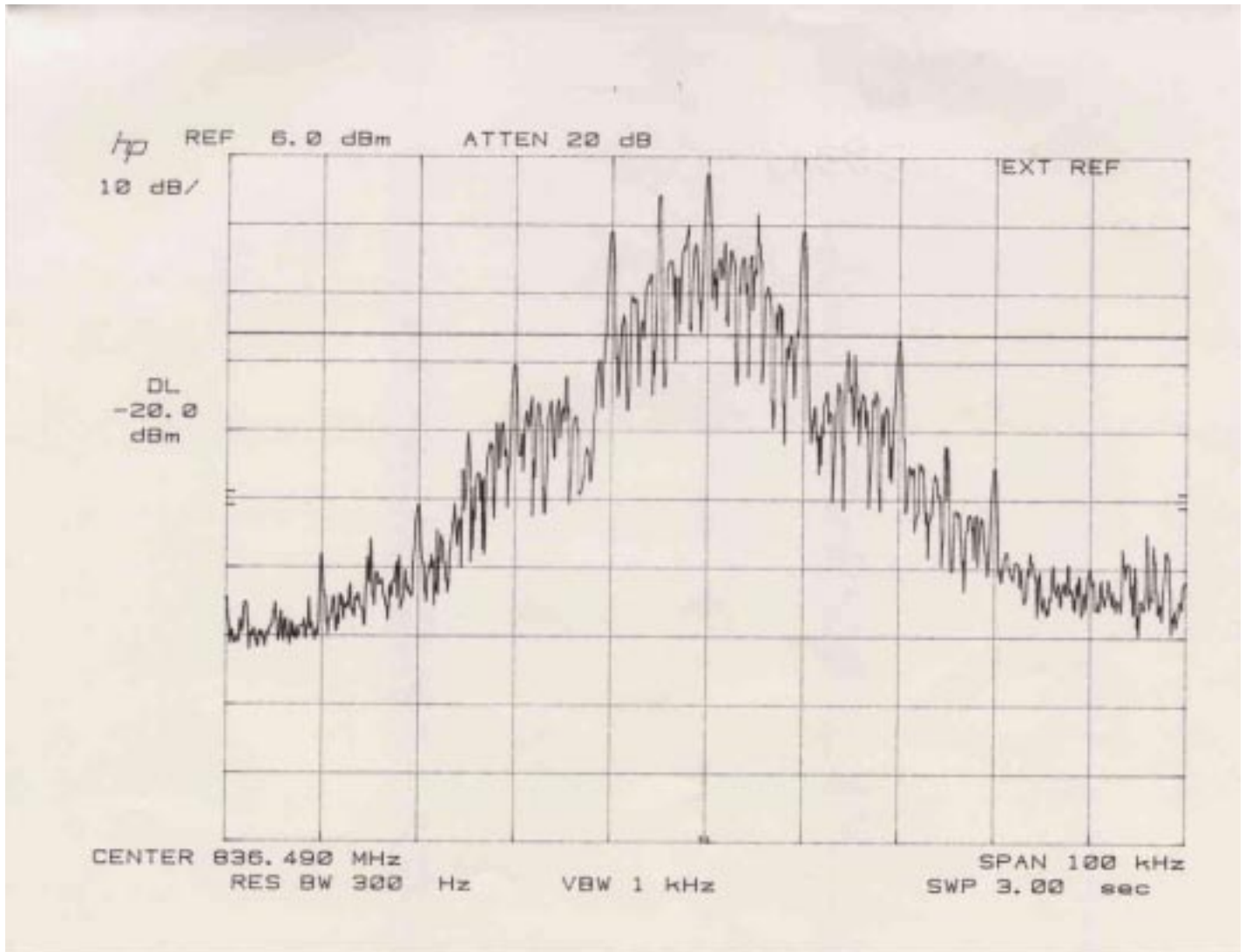


Occupied Bandwidth Measurement

Transmitting Frequency : 836.490 MHz (383 ch)

Modulation Type : AMPS

Input Signal : Wideband Data

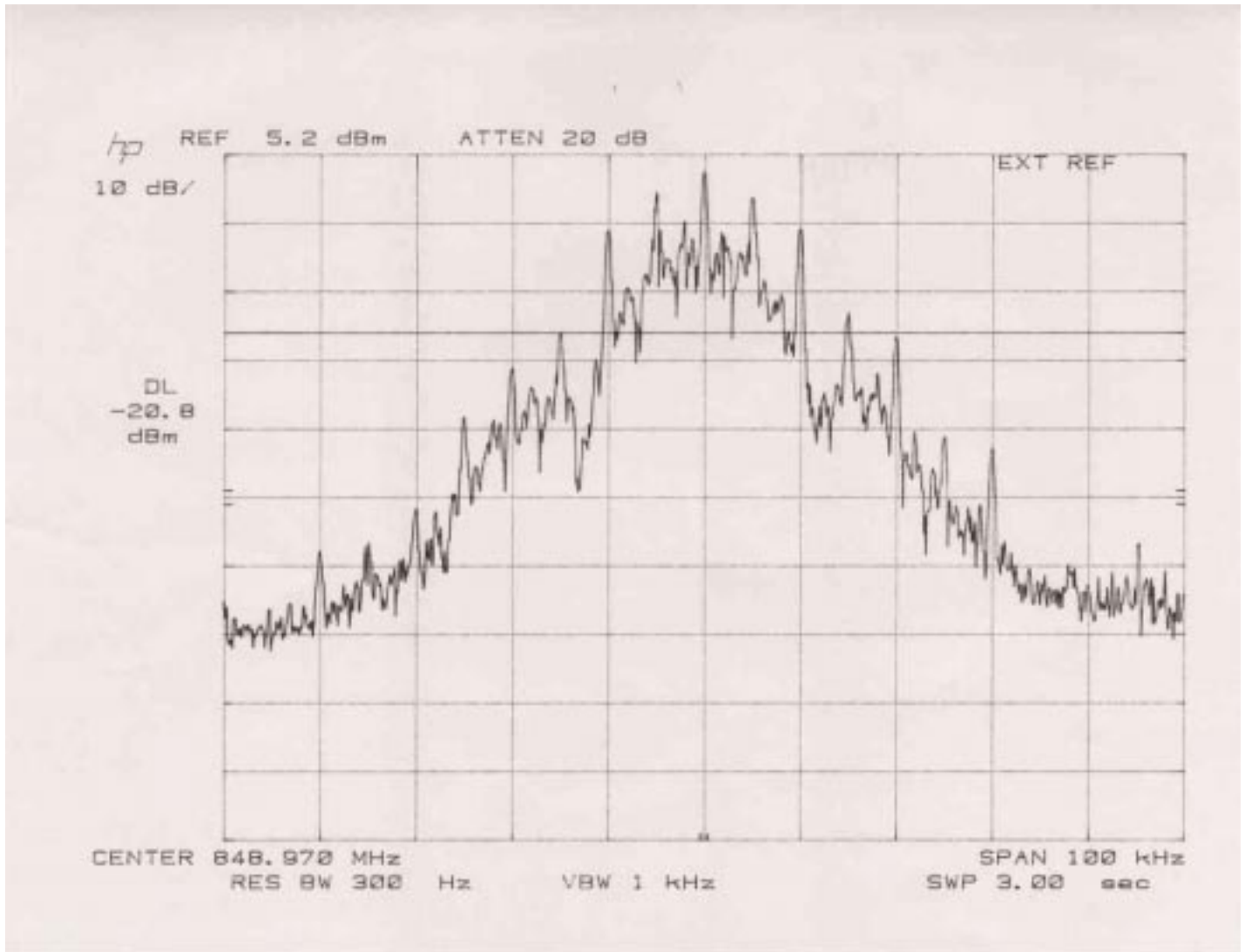


Occupied Bandwidth Measurement

Transmitting Frequency : 848.970 MHz (799 ch)

Modulation Type : AMPS

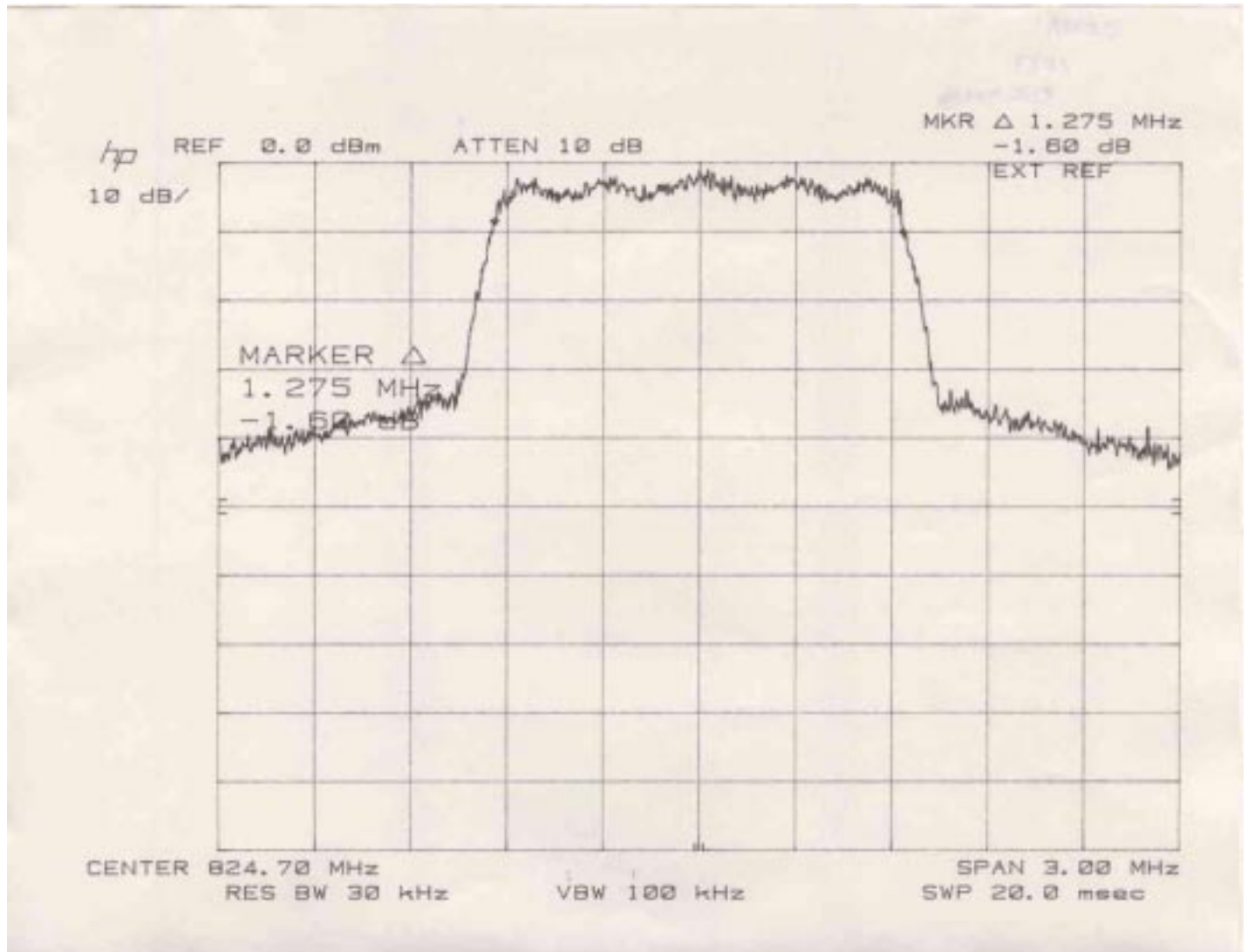
Input Signal : Wideband Data



Occupied Bandwidth Measurement

Transmitting Frequency : 824.700 MHz (1013 ch)

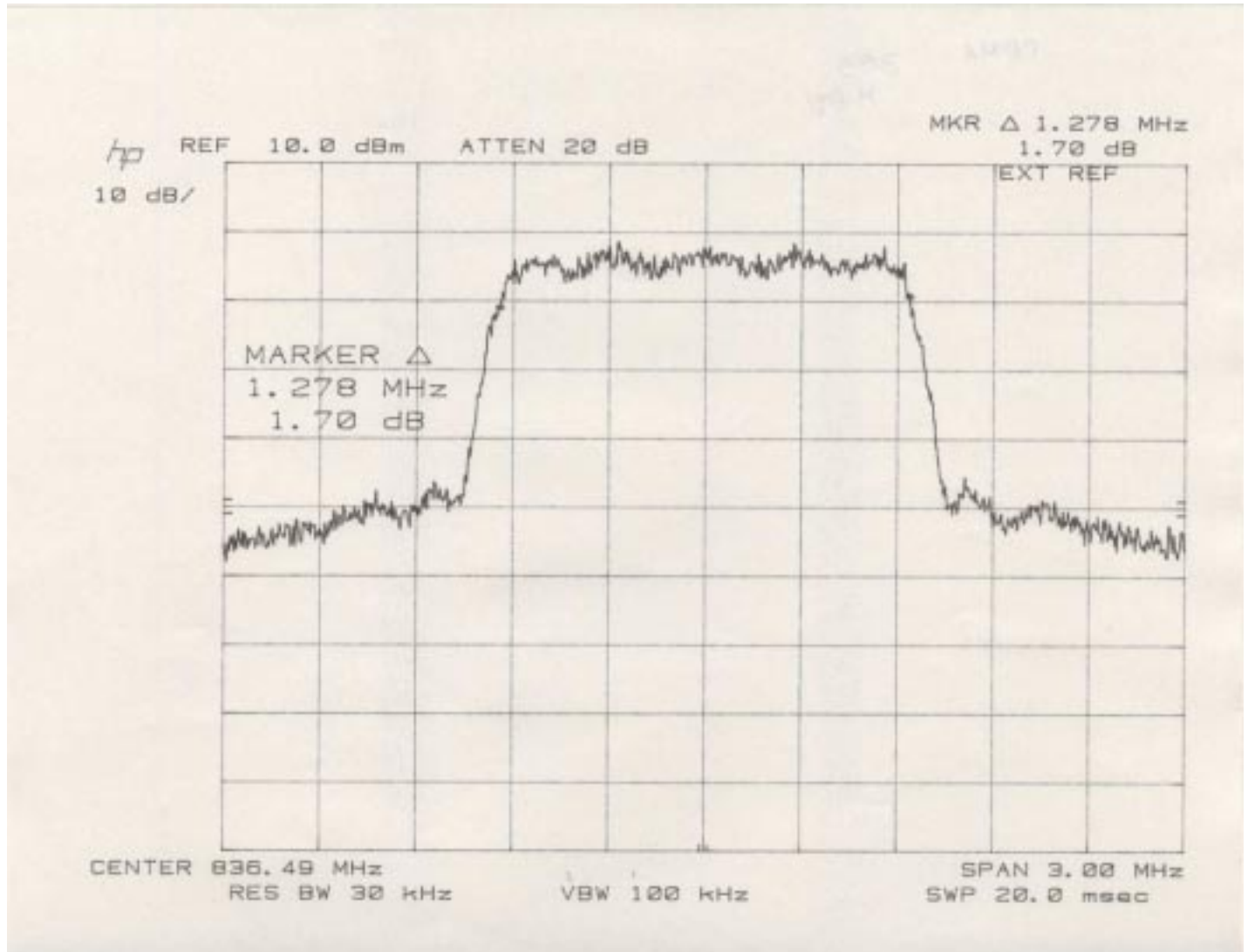
Modulation Type : CDMA



Occupied Bandwidth Measurement

Transmitting Frequency : 836.490 MHz (383 ch)

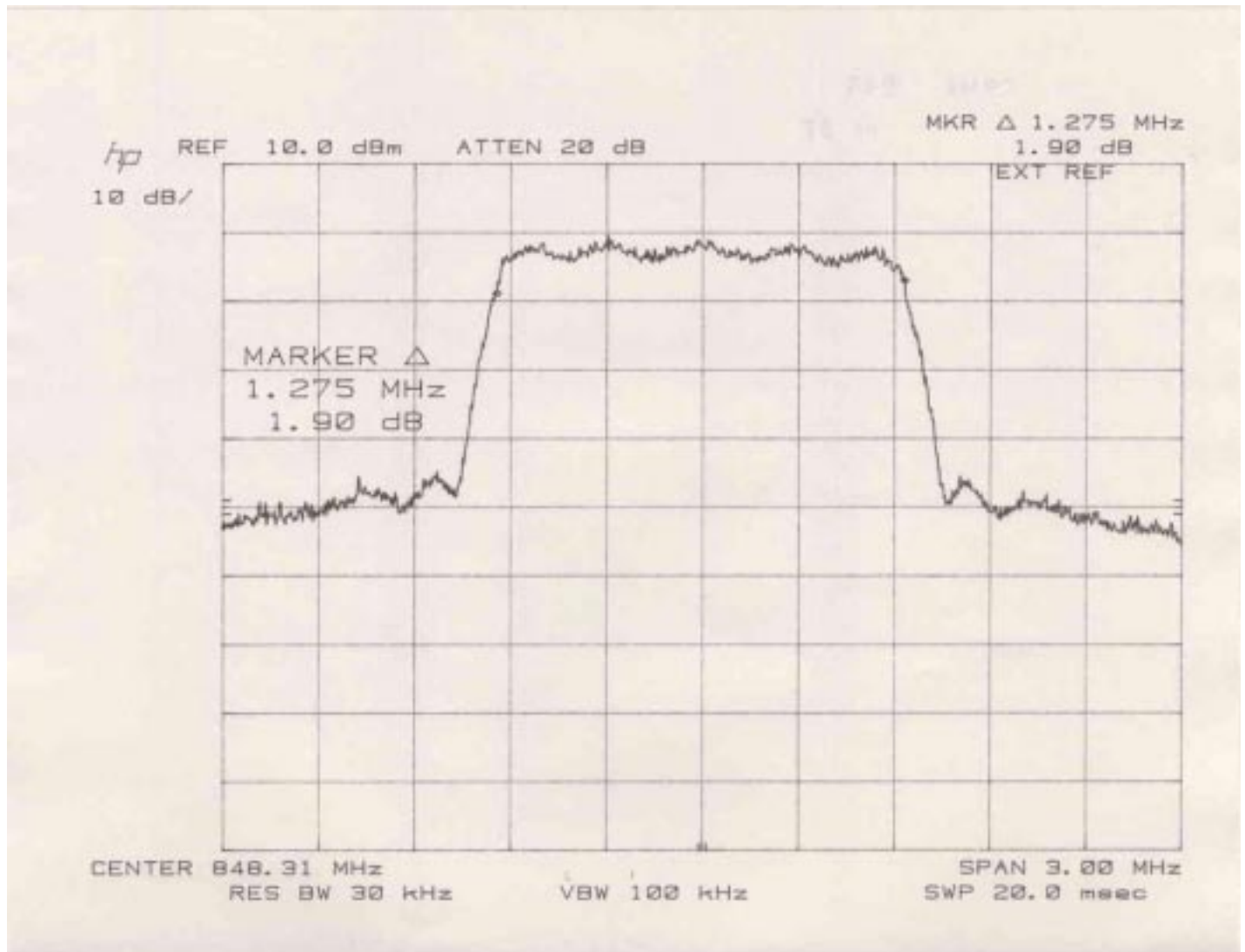
Modulation Type : CDMA



Occupied Bandwidth Measurement

Transmitting Frequency : 848.310 MHz (777 ch)

Modulation Type : CDMA



Band-Edge Emission Measurement - 800 MHz Systems -

Test Date: May 6, 2002
Temp.: 24 °C; Humi.: 60 %

Modulation Type : AMPS
Input Signal : Audio Input (-30dBV(50% Modulation) + 16 dB = -14 dBV)

CH No.	Transmitting Frequency(MHz)	Band-Edge Frequency(MHz)	Data Page
991	824.040	824.000	Page 67
799	848.970	849.000	Page 68

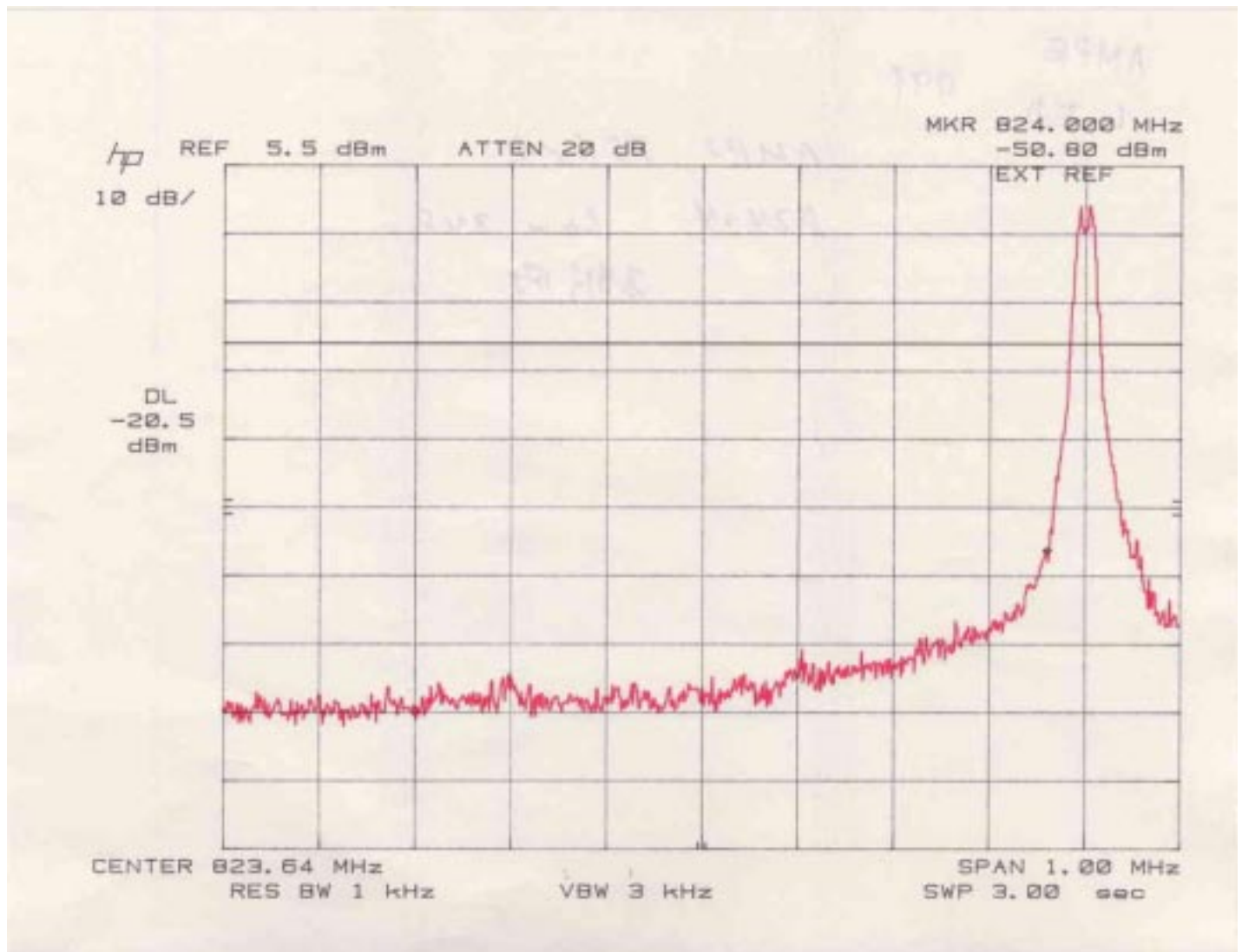
Modulation Type : CDMA

CH No.	Transmitting Frequency(MHz)	Band-Edge Frequency(MHz)	Data Page
991	824.700	824.000	Page 69
799	848.310	849.000	Page 70

Tester : Akio Hosoda

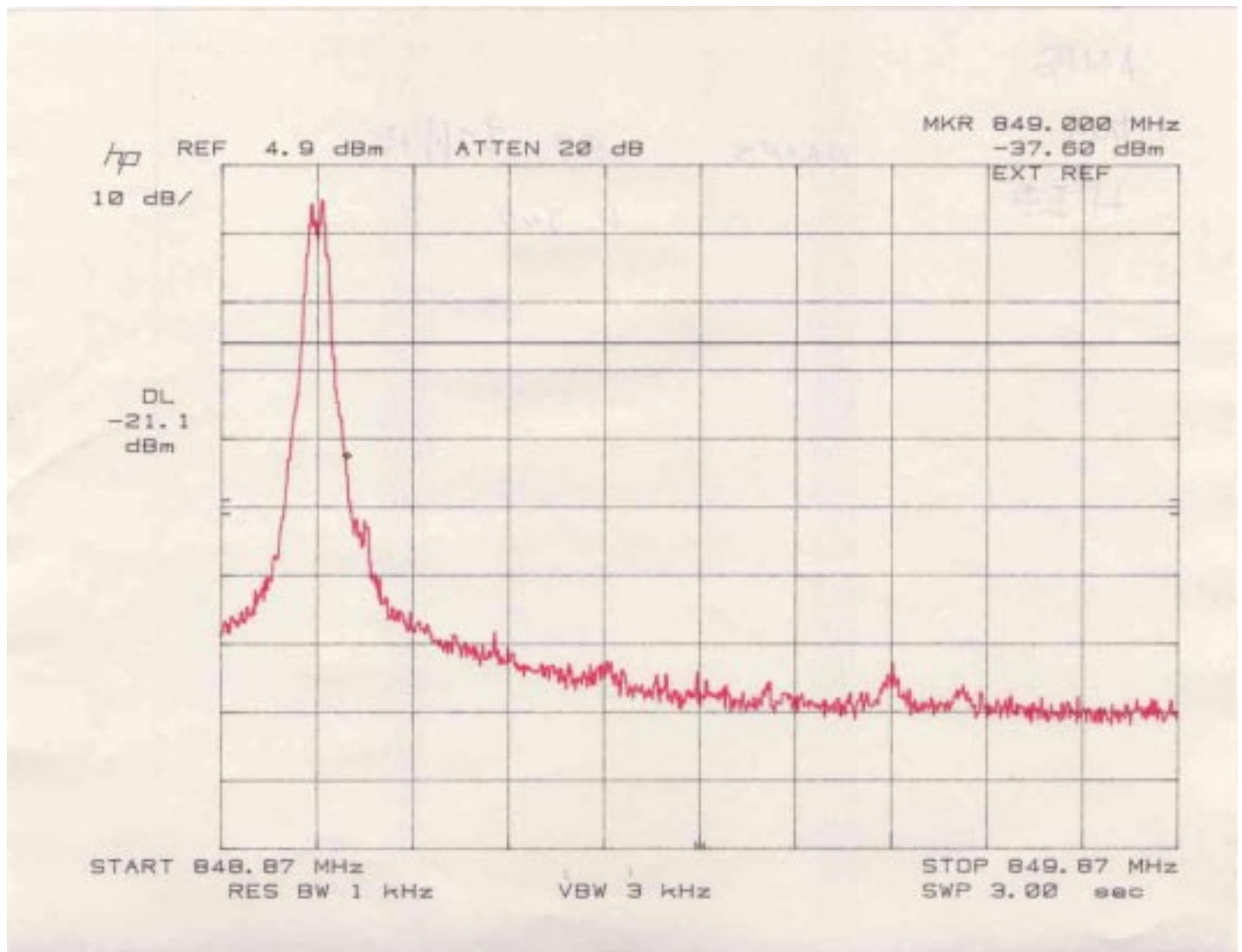
Band-Edge Emission Measurement

Transmitting Frequency : 824.040 MHz (991 ch)
Band-Edge Frequency : 824.000 MHz
Modulation Type : AMPS
Input Signal : Audio Input(-14dBV at 2.5 kHz)



Band-Edge Emission Measurement

Transmitting Frequency : 848.970 MHz (799 ch)
Band-Edge Frequency : 849.000 MHz
Modulation Type : AMPS
Input Signal : Audio Input(-14dBV at 2.5 kHz)

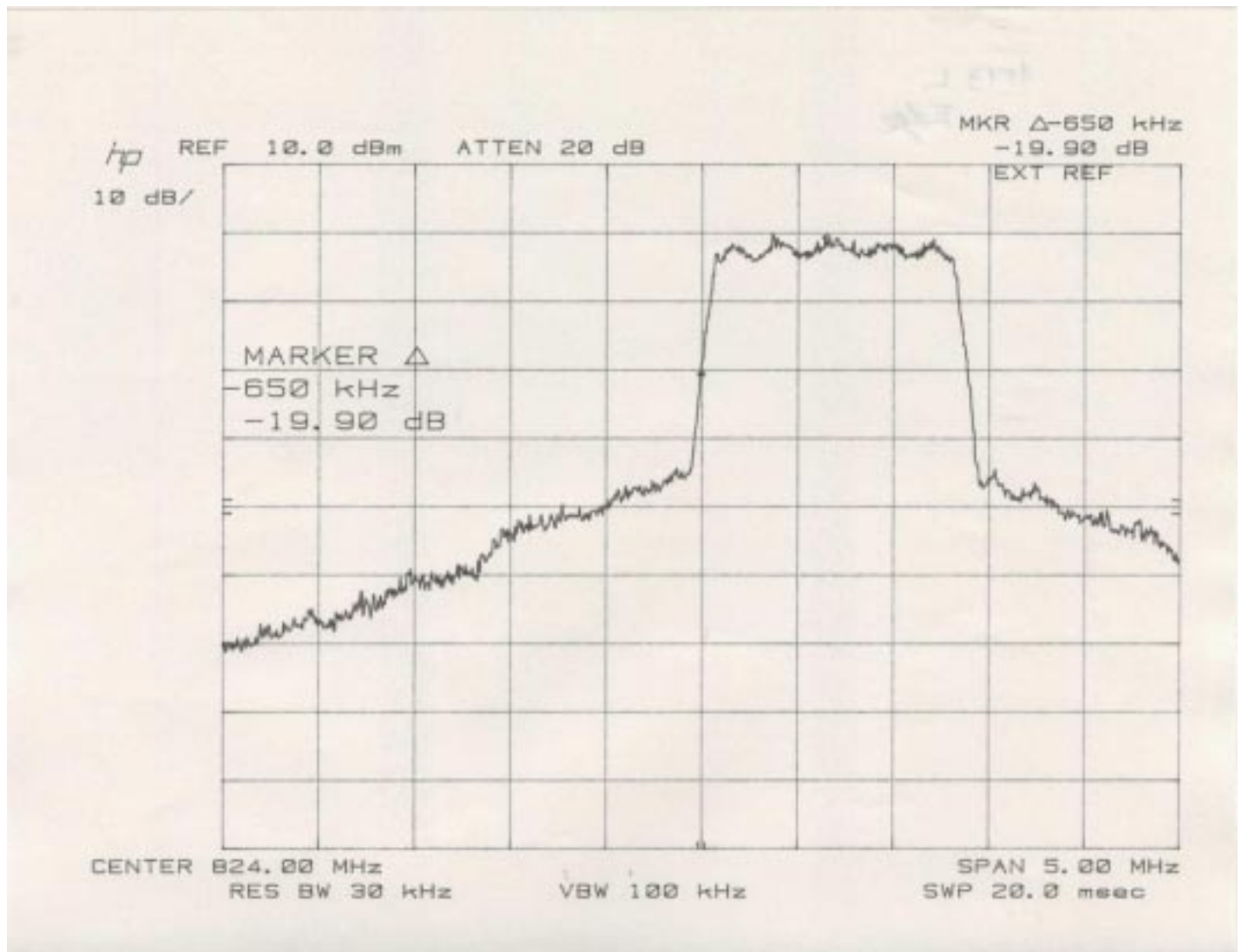


Band-Edge Emission Measurement

Transmitting Frequency : 824.700 MHz (1013 ch)

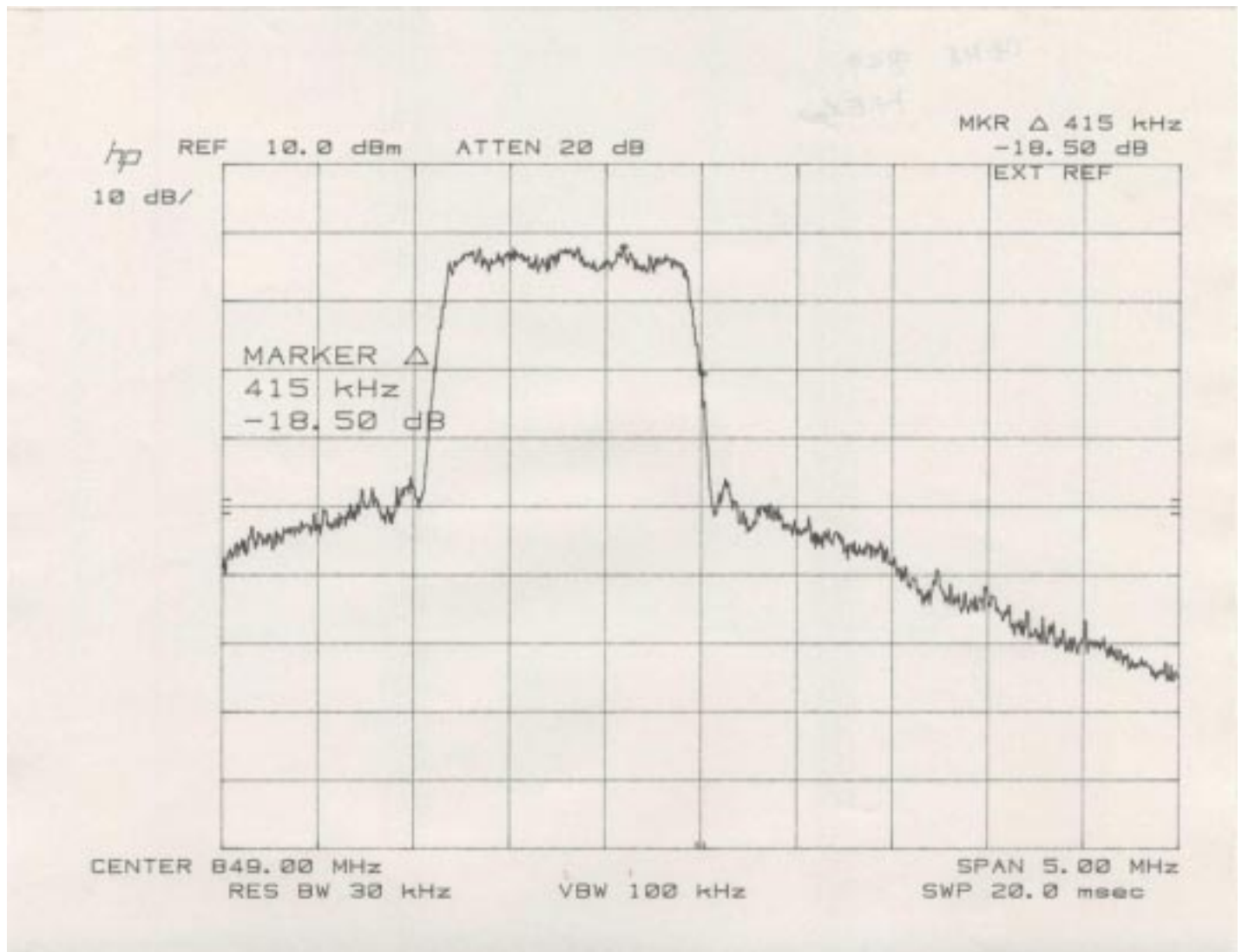
Band-Edge Frequency : 824.000 MHz

Modulation Type : CDMA



Band-Edge Emission Measurement

Transmitting Frequency : 848.310 MHz (777 ch)
Band-Edge Frequency : 849.000 MHz
Modulation Type : CDMA

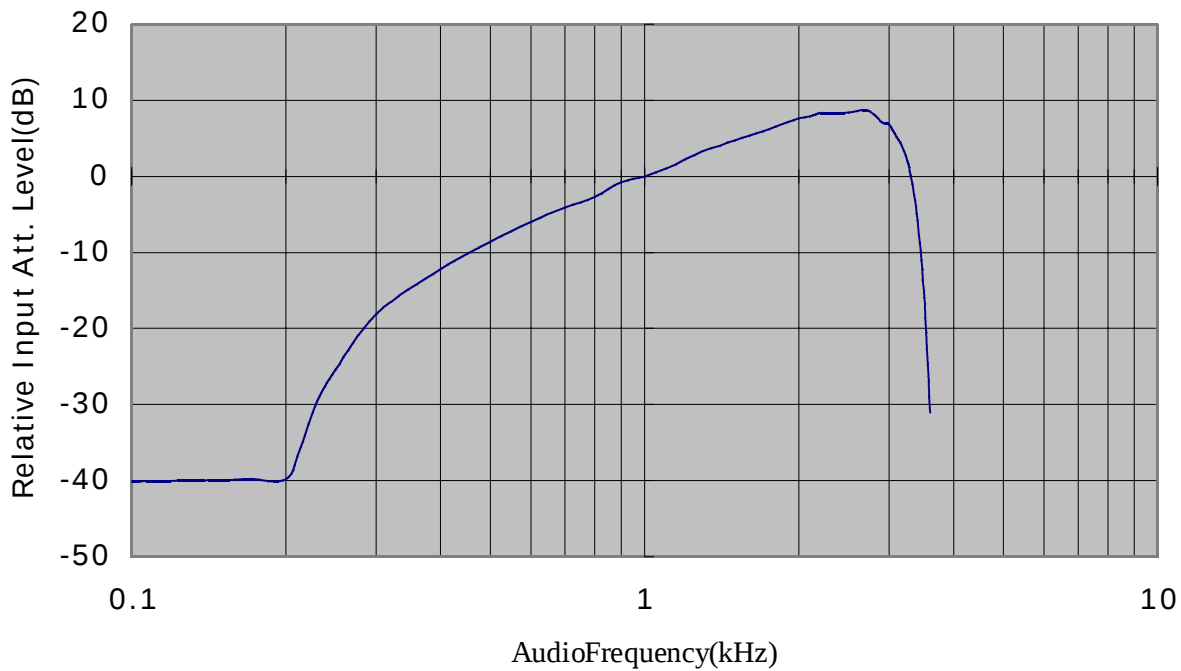


Audio Frequency Response Measurement - 800 MHz Systems -

Test Date: May 5, 2002

Temp.: 24 °C; Humi.: 60 %

Audio Frequency Response
Freq. Dev.=4.0kHz at 1kHz(0dB=-35.5dBV)



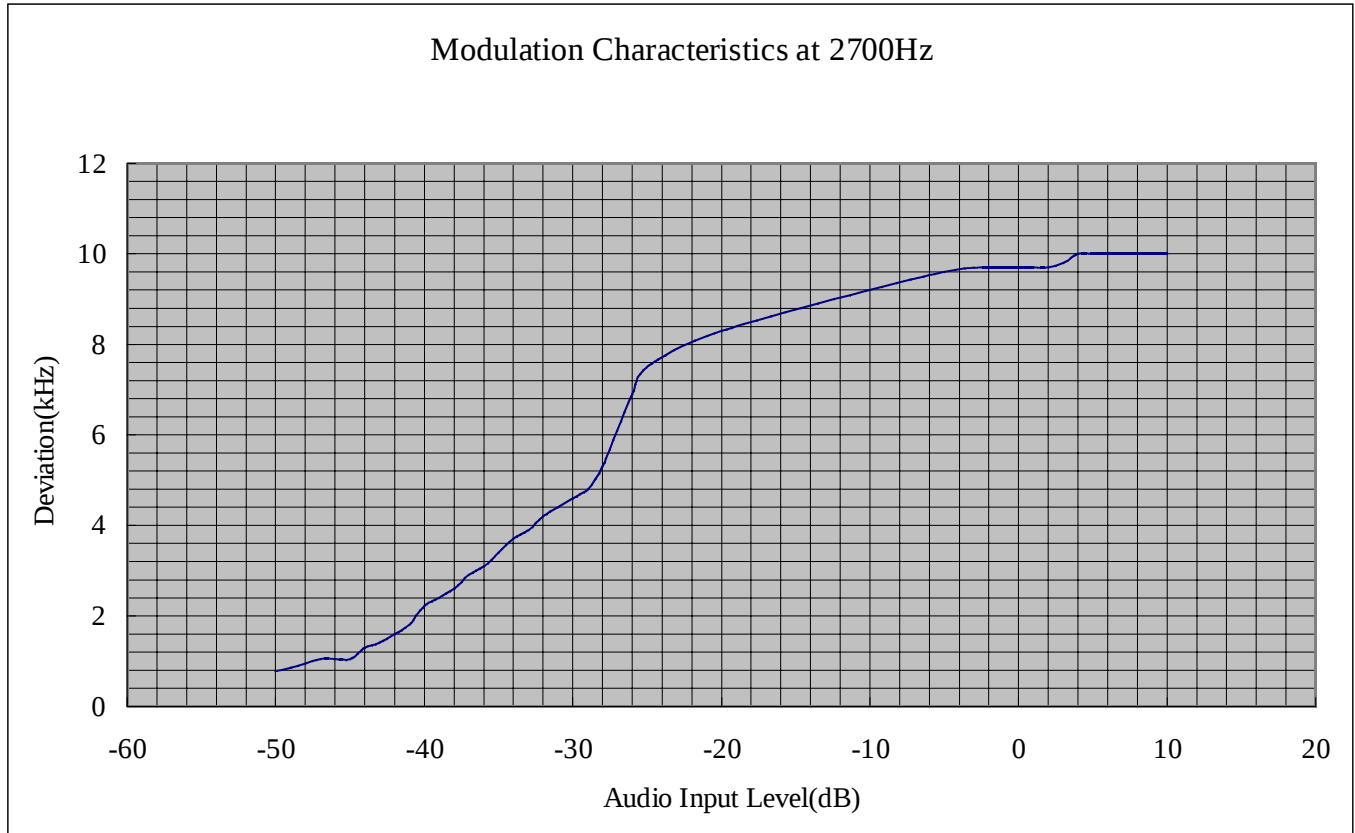
Results : Maximum Frequency Response : 2.7kHz

Tester : Akio Hosoda

Modulation Characteristics Response Measurement - 800 MHz Systems -

Test Date: May 5, 2002

Temp.: 24 °C; Humi.: 60 %

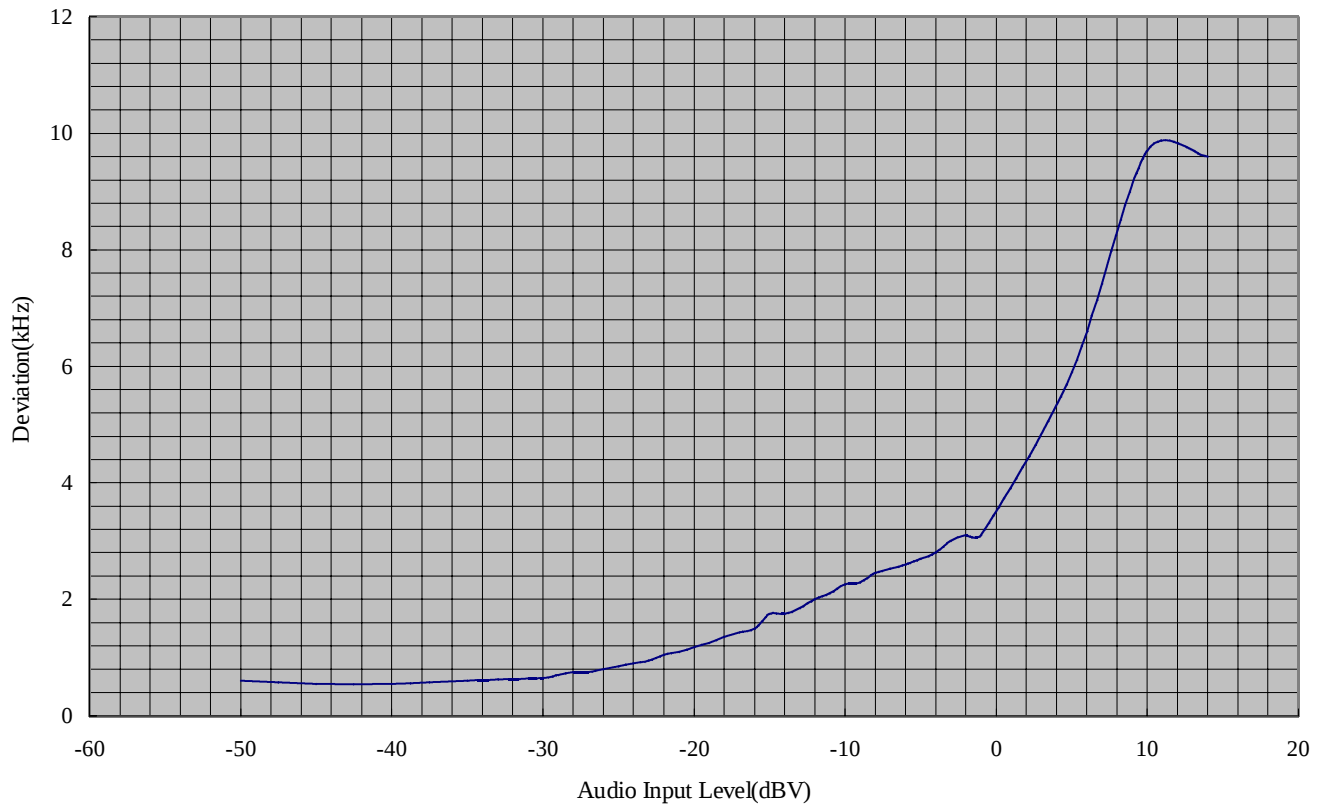


Results : Audio Input level correspond to 50% Modulation : -30 dBV

Tester : Akio Hosoda

Test Date: May 16, 2002
Temp.: 24 °C; Humi.: 60 %

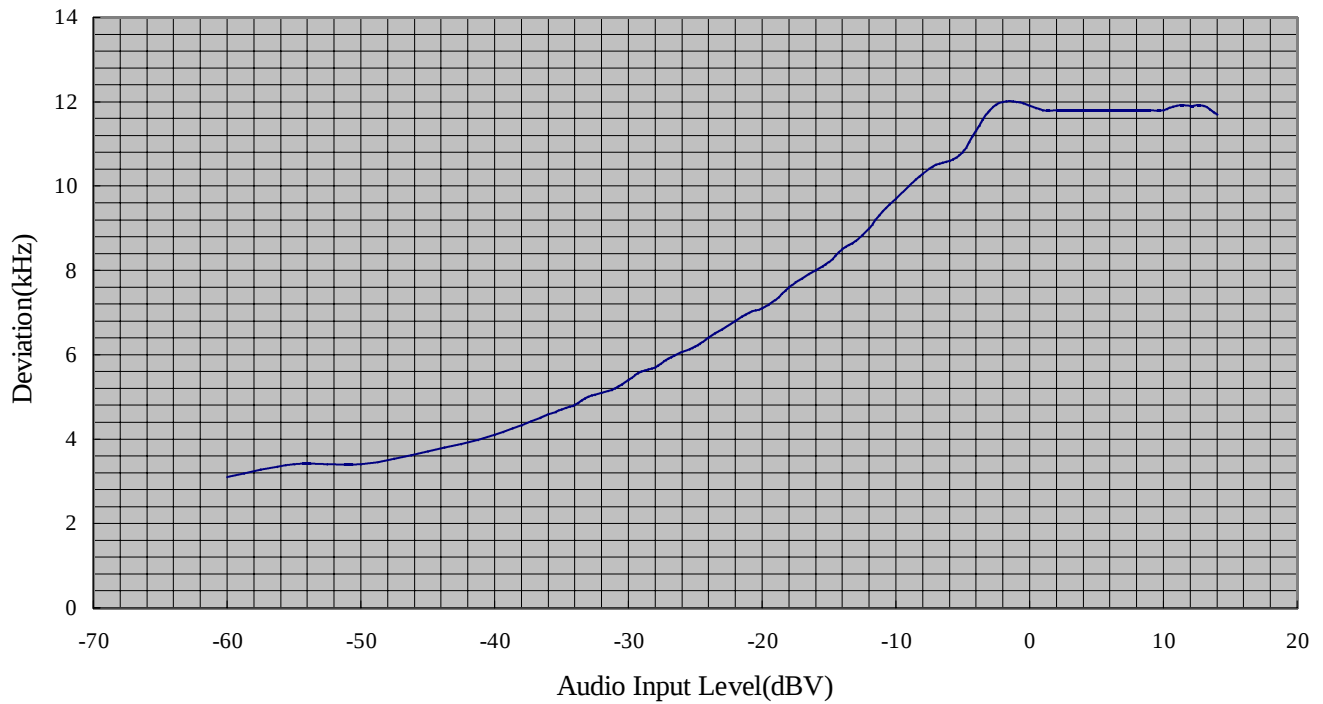
Modulation Deviation at 300Hz



Tester : Akio Hosoda

Test Date: May 16, 2002
Temp.: 24 °C; Humi.: 60 %

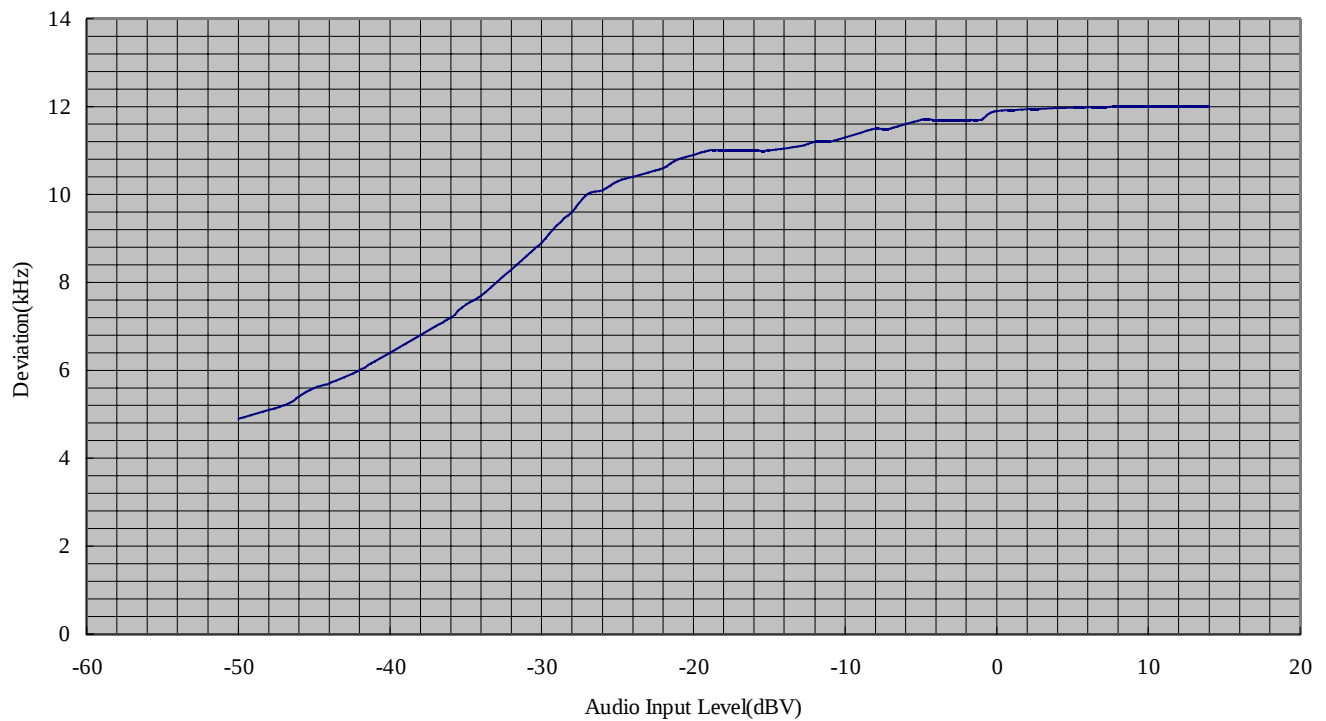
Modulation Characteristics at 1000Hz



Tester : Akio Hosoda

Test Date: May 16, 2002
Temp.: 24 °C; Humi.: 60 %

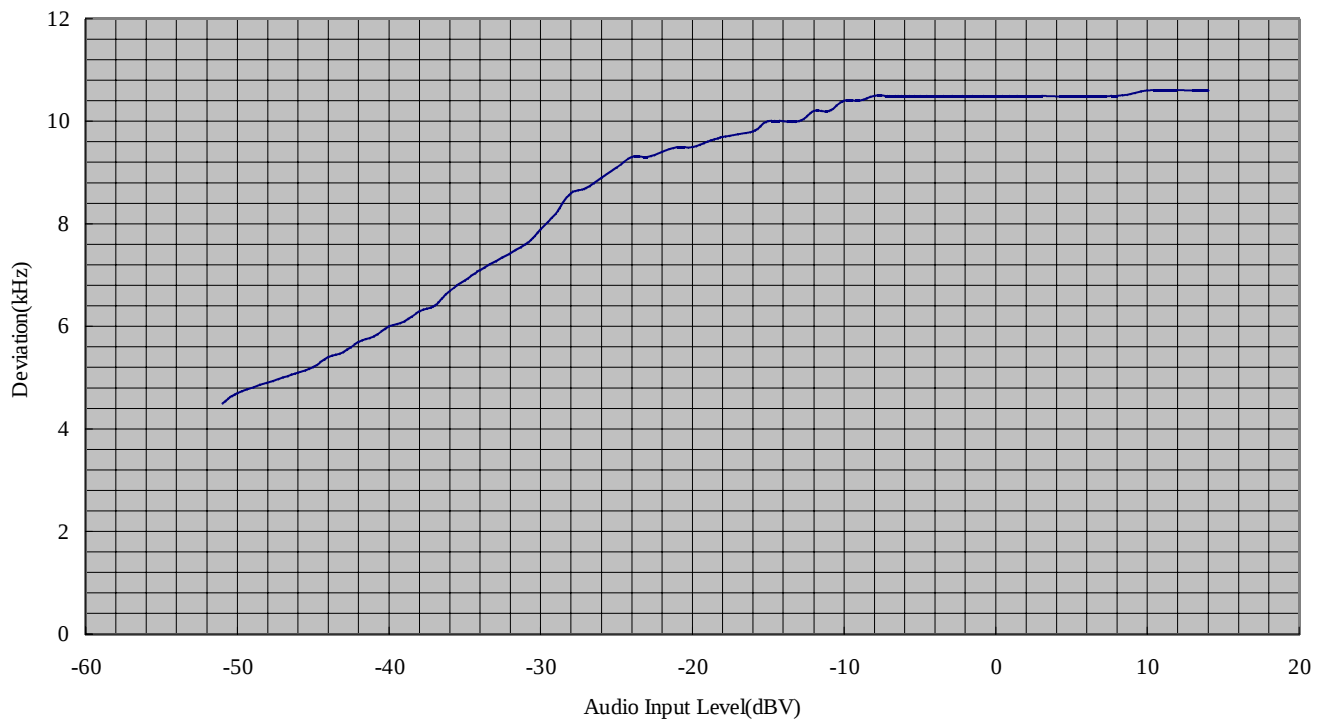
Modulation Characteristics at 2500Hz



Tester : Akio Hosoda

Test Date: May 16, 2002
Temp.: 24 °C; Humi.: 60 %

Modulation Characteristics at 3000Hz



Result except Voice

Input Siganl	Frequency Deviation	Limits
SAT(Supervisory Audio Tone)	2.0 kHz	2kHz+/-10%
ST(Signaling Tone)	8.7 kHz	8kHz+/-10%
Wideband Data	7.6 kHz	8kHz+/-10%

Tester : Akio Hosoda

Frequency Stability Measurement - 800 MHz Systems -

Measurement Results:

Test Date: April 21, 2002

a) Frequency Stability Measurement versus Temperature

a-1)Reference Frequency:		824.040 MHz		(991ch)	
Modulation Type: AMPS					
DC Supply Voltage : 13.8VDC					
Ambient		Deviation(ppm)			
Temperature	Startup	2 minutes	5 minutites	10 minutites	
(°C)					
-30	+ 0.01	+ 0.08	+ 0.05	- 0.13	
-20	+ 0.04	+ 0.00	- 0.05	- 0.01	
-10	+ 0.13	+ 0.12	+ 0.09	+ 0.05	
0	+ 0.01	- 0.03	- 0.04	- 0.03	
10	+ 0.03	+ 0.04	+ 0.05	+ 0.06	
20	+ 0.03	+ 0.03	+ 0.03	+ 0.02	
30	- 0.04	- 0.06	- 0.07	- 0.08	
40	- 0.07	- 0.08	- 0.08	- 0.08	
50	+ 0.10	+ 0.10	+ 0.11	+ 0.11	

a-2)Reference Frequency:		836.490 MHz		(383ch)	
Modulation Type: AMPS					
DC Supply Voltage : 13.8VDC					
Ambient		Deviation(ppm)			
Temperature	Startup	2 minutes	5 minutites	10 minutites	
(°C)					
-30	+ 0.50	+ 0.36	+ 0.25	+ 0.13	
-20	- 0.32	- 0.31	- 0.38	- 0.40	
-10	+ 0.33	+ 0.25	+ 0.19	+ 0.17	
0	+ 0.07	- 0.03	- 0.04	- 0.03	
10	+ 0.01	- 0.04	- 0.02	+ 0.00	
20	+ 0.03	+ 0.03	+ 0.03	+ 0.02	
30	- 0.03	- 0.05	- 0.07	- 0.08	
40	+ 0.22	+ 0.01	+ 0.00	+ 0.00	
50	+ 0.07	+ 0.07	+ 0.07	+ 0.08	

a-3)Reference Frequency:		848.970 MHz		(799ch)	
Modulation Type: AMPS					
DC Supply Voltage : 13.8VDC					
Ambient		Deviation(ppm)			
Temperature	Startup	2 minutes	5 minutites	10 minutites	
(°C)					
-30	+ 0.51	+ 0.36	+ 0.28	+ 0.14	
-20	+ 0.50	+ 0.33	+ 0.19	+ 0.05	
-10	+ 0.24	+ 0.21	+ 0.14	+ 0.07	
0	+ 0.01	+ 0.00	- 0.00	+ 0.00	
10	- 0.00	+ 0.00	+ 0.02	+ 0.02	
20	+ 0.03	+ 0.03	+ 0.03	+ 0.03	
30	- 0.03	- 0.05	- 0.08	- 0.36	
40	- 0.04	- 0.05	- 0.06	- 0.06	
50	+ 0.01	+ 0.00	+ 0.01	+ 0.03	

b) Frequency Stability Measurement versus Power Supply Voltage

b-1)Reference Frequency:		824.040 MHz		(991ch)
Ambient Temperature :		20 °C		
Modulation Type: AMPS				
DC Supply		Deviation(ppm)		
Voltage	Startup	2 minutes	5 minutites	10 minutites
(VDC)				
11.73 (85%)	+ 0.04	+ 0.03	+ 0.03	+ 0.02
13.80 (100%)	+ 0.03	+ 0.03	+ 0.03	+ 0.02
15.87 (115%)	+ 0.03	+ 0.03	+ 0.03	+ 0.02

b-2)Reference Frequency:		836.490 MHz		(383ch)
Ambient Temperature :		20 °C		
Modulation Type: AMPS				
DC Supply		Deviation(ppm)		
Voltage	Startup	2 minutes	5 minutites	10 minutites
(VDC)				
11.73 (85%)	+ 0.03	+ 0.03	+ 0.03	+ 0.02
13.80 (100%)	+ 0.03	+ 0.03	+ 0.03	+ 0.02
15.87 (115%)	+ 0.03	+ 0.03	+ 0.03	+ 0.02

b-3)Reference Frequency:		848.970 MHz		(799ch)
Ambient Temperature :		20 °C		
Modulation Type: AMPS				
DC Supply		Deviation(ppm)		
Voltage	Startup	2 minutes	5 minutites	10 minutites
(VDC)				
11.73 (85%)	+ 0.04	+ 0.03	+ 0.04	+ 0.00
13.80 (100%)	+ 0.03	+ 0.03	+ 0.03	+ 0.03
15.87 (115%)	+ 0.03	+ 0.04	+ 0.04	+ 0.03

Note : The measurement were made after all of components of the oscillator sufficiently stabilized at each temperature.

Sample Caluculation at 836.490 MHz ,-10°C Startup 13.8VDC) :
$$((836.4902780 - 836.4900000)/836.4900000) \times 10^6 = +0.33 \text{ (ppm)}$$

Tester : Akio Hosoda

Maximum Permissible Exposure(MPE) :
- 800 MHz Systems -

The separation distance between the printed glass antenna to the passenger setting on the rear seat is 0.483 m (Refer to planeview in Schematics).

The limit for Maximum Permissible Exposure(MPE) at frequency of 848 MHz is 0.60 mW/cm^2 .
($f[\text{MHz}]/1500 \text{ mW/cm}^2$ for General Population/Uncontrolled environment in §1.1310.)

The conversion from power to power density uses the following equation :

$$PD = (TPG)/4\pi r^2 = EIRP/4\pi r^2$$

Where : PD : Power Density at the passenger setting on the rear seat(W/m^2)

TP : Transmitted Power (W)

G : Numeric gain of the antenna

EIRP: Equivalent Isotropically Radiated Power

r : Separation distance(in m) = 0.483 m

The conversion from W/m^2 to mW/cm^2 is: $\text{mW/cm}^2 = \text{W/m}^2 / 10$

Maximum EIRP^{*1} : 1273.5 mW

Note) ^{*1}: Measured Value

Minimum distance for MPE calculation

Items	Value
EIRP (W)	1.2735
r (m)	0.483
PD (W/m^2)	0.435
PD (mW/cm^2)	0.0435

MPE evaluation :

The Power density at the passenger setting on the rear seat (0.0435 mW/cm^2) is less than the MPE (0.60 mW/cm^2).

Transmitter Power(TP) Measurement - 1900 MHz Systems -

Test Date: April 6, 2002
 Temp.: 18 °C; Humi.: 24 %

Modulation Type : CDMA

CH	Frequency [MHz]	Correction Factor [dB]	Meter Readings [dBm]	Results [dBm]	Results [mW]	Remarks (Note 2)
25	1851.250	20.50	7.28	27.78	599.79	A
600	1880.000	20.50	7.36	27.86	610.94	A
1175	1908.750	20.50	5.42	25.92	390.84	A

Sample of calculated result at 1880.000 MHz, as the Maximum Level Point:

Correction Factor = 20.50 dB
 +) Meter Reading = 7.36 dBm
 Result = 27.86 dBm : $10^{(27.86/10)} = 610.94(\text{mW})$

The point shown on "___" is the Maximum Level Point.

Note : 1. The correction factor includes the attenuator loss and the cable loss.

Remarks:

Note 2	Detector Function	RES. B.W	V.B.W	Sweep T	Span	Corr. Factor *
A	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	CL+P20
B	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	CL+P20+HPF
C	Peak (ESV)	120 kHz	--	--	--	CL+P20

*)CL: Cable Loss + DC-Cutter Loss/ P20: 20dB Att. / HPF: High Pass Filter Loss

Tester : Hiroshi Fujimoto

Antenna Conducted Spurious Emission Measurement - 1900 MHz Systems -

Test Date: May 6, 2002
 Temp.: 24 °C ; Humi.: 52 %

Measurement Results:

Transmitting Frequency :1851.250MHz (25ch)
Modulation Type : CDMA

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
3702.500	11.3	< -60.0	-13.0	< -48.7	> +35.7	C
5553.750	11.4	< -60.0	-13.0	< -48.6	> +35.6	C
7405.000	11.7	< -60.0	-13.0	< -48.3	> +35.3	C
9256.250	13.2	< -60.0	-13.0	< -46.8	> +33.8	C
11107.500	12.2	< -60.0	-13.0	< -47.8	> +34.8	C
12958.750	12.6	< -60.0	-13.0	< -47.4	> +34.4	C
14810.000	11.8	< -60.0	-13.0	< -48.2	> +35.2	C
16661.250	13.3	< -60.0	-13.0	< -46.7	> +33.7	C

Transmitting Frequency :1880.000MHz (600ch)
Modulation Type : CDMA

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
3760.000	10.9	< -60.0	-13.0	< -49.1	> +36.1	C
5640.000	11.6	< -60.0	-13.0	< -48.5	> +35.5	C
7520.000	11.4	< -60.0	-13.0	< -48.6	> +35.6	C
9400.000	12.6	< -60.0	-13.0	< -47.4	> +34.4	C
11280.000	14.1	< -60.0	-13.0	< -46.0	> +33.0	C
13160.000	11.8	< -60.0	-13.0	< -48.2	> +35.2	C
15040.000	11.8	< -60.0	-13.0	< -48.2	> +35.2	C
16920.000	13.0	< -60.0	-13.0	< -47.0	> +34.0	C

Transmitting Frequency :1908.750MHz (1175ch)
Modulation Type : CDMA

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
3817.500	11.2	< -60.0	-13.0	< -48.8	> +35.8	C
5726.250	11.3	< -60.0	-13.0	< -48.7	> +35.7	C
7635.000	11.4	< -60.0	-13.0	< -48.6	> +35.6	C
9543.750	12.0	< -60.0	-13.0	< -48.0	> +35.0	C
11452.500	15.0	< -60.0	-13.0	< -45.0	> +32.0	C
13361.250	13.1	< -60.0	-13.0	< -46.9	> +33.9	C
15270.000	11.3	< -60.0	-13.0	< -48.7	> +35.7	C
17178.750	12.5	< -60.0	-13.0	< -47.5	> +34.5	C

Sample of calculated result at 11452.500 MHz, as the Minimum Margin point:

$$\begin{array}{rcl} \text{Correction Factor} & = & 15.0 \text{ dB} \\ +) \text{ Meter Reading} & = & <-60.0 \text{ dBm} \\ \hline \text{Result} & = & <-45.0 \text{ dBm} \end{array}$$

Minimum Margin : $-13.0 - (<-45.0) = >32.0(\text{dB})$

The point shown on "___" is the Minimum Margin Point.

Applied limits :

$$\begin{aligned} \text{Applied limits} &= 10\log[\text{TP(mW)}] - [43 + 10\log[\text{tp(W)}]] = 10\log[\text{TP(mW)}] - [43 + (10\log[\text{TP(mW)}] - 30)] \\ &= -13 \text{ [dBm]} \end{aligned}$$

Where $\text{tp(W)} = \text{TP(mW)} / 1000$: Transmitter Power at antenna terminal

$$10\log[\text{tp(W)}] = 10\log[\text{TP(mW)}] - 30$$

Note : 1. The spectrum was checked from 9 kHz up to 20 GHz.

2. All emissions not listed were found to be more than 20dB below the limit.

Remarks:

Note 3	Detector Function	RES. B.W	V.B.W	Sweep T	Span	Corr. Factor *
A	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	CL+P10
B	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	CL+P10+HPF(D-43)
C	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	CL+P10+HPF(D-42)
D	Peak (ESV)	120 kHz	--	--	--	CL+P10

*)CL: Cable Loss + DC-Cutter Loss/ P10: 10dB Att. / HPF: High Pass Filter Loss

Tester : Akio Hosoda

Transmitter Power(EIRP) Measurement - 1900 MHz Systems -

Test Date: April 6, 2002

Temp.: 18 °C; Humi.: 24 %

Measurement Results:

Modulation Type : CDMA

CH	Frequency [MHz]	Maixmum Transmitter Power ERP[mW]	EIRP[mW]	Limits EIRP [W]	Margin [dB]
25	1851.250	103.3	169.4	2.0	+10.7
600	1880.000	144.2	236.6	2.0	+ 9.3
1175	1908.750	169.8	278.6	2.0	+ 8.6

Minimum Margin : $10\log(2.0/(278.6/1000)) = 8.6(\text{dB})$
The point shown on "___" is the Minimum Margin Point.

Tester : Hiroshi Fujimoto

Unwanted Radiation Measurement - 1900 MHz Systems -

Test Date: April 6, 2002
 Temp.: 18 °C; Humi.: 24 %

Measurement Results:

Transmitting Frequency :1851.25MHz (25ch)
 Modulation Type : CDMA

Frequency [MHz]	Antenna Factor [dB(1/m)]	Correction Factor [dB]	Meter Readings at 4.2m [dB(μV)]		Limits* [dB(μV/m)]	Results at 4.2m [dB(μV/m)]		Margin [dB]	Remarks (Note 3)
			Hori.	Vert.		Hori.	Vert.		
1851.250	21.7	10.5	81.3	84.6	---	113.5	116.8	---	A
3702.500	23.8	-20.8	42.7	43.2	81.5	45.7	46.2	+35.3	E
5553.750	27.4	-20.8	44.7	43.5	81.5	51.3	50.1	+30.2	B
7405.000	30.0	-19.2	< 30.0	< 30.0	81.5	< 40.8	< 40.8	> +40.7	B
9256.250	33.4	-27.6	< 30.0	< 30.0	81.5	< 35.8	< 35.8	> +45.7	C
11107.500	33.5	-27.7	< 30.0	< 30.0	81.5	< 35.8	< 35.8	> +45.7	C
12958.750	37.1	-26.5	< 30.0	< 30.0	81.5	< 40.6	< 40.6	> +40.9	C
14810.000	37.1	-26.5	< 30.0	< 30.0	81.5	< 40.6	< 40.6	> +40.9	C
16661.250	37.2	-27.0	< 30.0	< 30.0	81.5	< 40.2	< 40.2	> +41.3	C
18512.500	40.2	-18.2	< 30.0	< 30.0	81.5	< 52.0	< 52.0	> +29.5	D

*: Limit = 116.8(Maximum at 1851.250 MHz) - [43 + 10log(0.1694)] = 81.5 [dB(μV/m)]

Transmitting Frequency :1880.00MHz (600ch)
 Modulation Type : CDMA

Frequency [MHz]	Antenna Factor [dB(1/m)]	Correction Factor [dB]	Meter Readings at 4.2m [dB(μV)]		Limits* [dB(μV/m)]	Results at 4.2m [dB(μV/m)]		Margin [dB]	Remarks (Note 3)
			Hori.	Vert.		Hori.	Vert.		
1880.000	21.7	10.5	82.7	85.9	---	114.9	118.1	---	A
3760.000	23.8	-20.7	43.8	52.3	81.4	46.9	55.4	+26.0	E
5640.000	27.4	-20.6	40.8	42.0	81.4	47.6	48.8	+32.6	B
7520.000	30.0	-19.1	< 30.0	< 30.0	81.4	< 40.9	< 40.9	> +40.5	B
9400.000	33.4	-27.5	< 30.0	< 30.0	81.4	< 35.9	< 35.9	> +45.5	C
11280.000	33.5	-27.5	< 30.0	< 30.0	81.4	< 36.0	< 36.0	> +45.4	C
13160.000	37.1	-26.4	< 30.0	< 30.0	81.4	< 40.7	< 40.7	> +40.7	C
15040.000	37.1	-26.6	< 30.0	< 30.0	81.4	< 40.5	< 40.5	> +40.9	C
16920.000	37.2	-27.0	< 30.0	< 30.0	81.4	< 40.2	< 40.2	> +41.2	C
18800.000	40.2	-18.1	< 30.0	< 30.0	81.4	< 52.1	< 52.1	> +29.3	D

*: Limit = 118.1(Maximum at 1880.000 MHz) - [43 + 10log(0.2366)] = 81.4 [dB(μV/m)]

Transmitting Frequency :1908.75MHz (1175ch)
Modulation Type : CDMA

Frequency [MHz]	Antenna Factor [dB(1/m)]	Correction Factor [dB]	Meter Readings at 4.2m [dB(μV)]		Limits* [dB(μV/m)]	Results at 4.2m [dB(μV/m)]		Margin [dB]	Remarks (Note 3)
			Hori.	Vert.		Hori.	Vert.		
1908.750	21.7	10.5	83.6	86.7	- - -	115.8	118.9	- - -	A
3817.500	23.8	-20.7	49.2	55.6	81.5	52.3	58.7	+22.8	E
5726.250	27.4	-20.5	40.1	42.6	81.5	47.0	49.5	+32.0	B
7635.000	30.0	-19.1	< 30.0	< 30.0	81.5	< 40.9	< 40.9	> +40.6	B
9543.750	33.4	-27.5	< 30.0	< 30.0	81.5	< 35.9	< 35.9	> +45.6	C
11452.500	33.5	-27.3	< 30.0	< 30.0	81.5	< 36.2	< 36.2	> +45.3	C
13361.250	37.1	-26.3	< 30.0	< 30.0	81.5	< 40.8	< 40.8	> +40.7	C
15270.000	37.2	-26.6	< 30.0	< 30.0	81.5	< 40.6	< 40.6	> +40.9	C
17178.750	37.2	-27.0	< 30.0	< 30.0	81.5	< 40.2	< 40.2	> +41.3	C
19087.500	40.2	-18.1	< 30.0	< 30.0	81.5	< 52.1	< 52.1	> +29.4	D

*: Limit = 118.9(Maximum at 1908.750 MHz) - [43 + 10log(0.2796)] = 81.4 [dB(μV/m)]

Sample of calculated result at 3817.500 MHz, as the Minimum Margin point:

Antenna Factor = 23.8 dB
 Correction Factor = -20.7 dB
 +) Meter Reading = 55.6 dB(μ V)
 Result = 58.7 dB(μ V/m)

Minimum Margin : 81.5 - 58.7 = 22.8(dB)

The point shown on "___" is the Minimum Margin Point.

Applied limits :

Radiated Field Strength at 4.2 m

Applied limits [dB(μ V/m)] = Field Strength [dB(μ V/m)] at Maximum Fundamental Frequency - [43+10log[EIRP(W)]]

Where EIRP(W) : Fundamental Transmitter Power(EIRP)

Note : 1. The spectrum was checked from 9 kHz up to 20 GHz.

2. All emissions not listed were found to be more than 20dB below the limit.

Remarks:

Note 3	Detector Function	RES. B.W	V.B.W	Sweep T	Span	Corr. Factor *
A	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	CL+P10
B	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	CL+P20-Amp.
C	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	CL+P10-Amp.
D	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	P10-Amp.+Mix.
E	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz	CL+HPF+P10-Amp.
F	Peak (ESV)	120 kHz	--	--	--	CL

*)CL: Cable Loss/ P20: 20dB Att. / P10: 10dB Att. / Amp.: Amplifier Gain/ Mix.: Mixer Conversion Loss/
 HPF : High Pass Filter loss

Tester : Hiroshi Fujimoto

JQA Application No.: KL80020020S
Model No. : NN0200
FCC ID : LXC-NN0200

Regulation : CFR 47 FCC Rules Parts 22 and 24
Issue Date : May 23, 2002

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Occupied Bandwidth Measurement - 1900 MHz Systems -

Test Date: May 6, 2002
Temp.: 24 °C; Humi.: 60 %

Modulation Type : CDMA

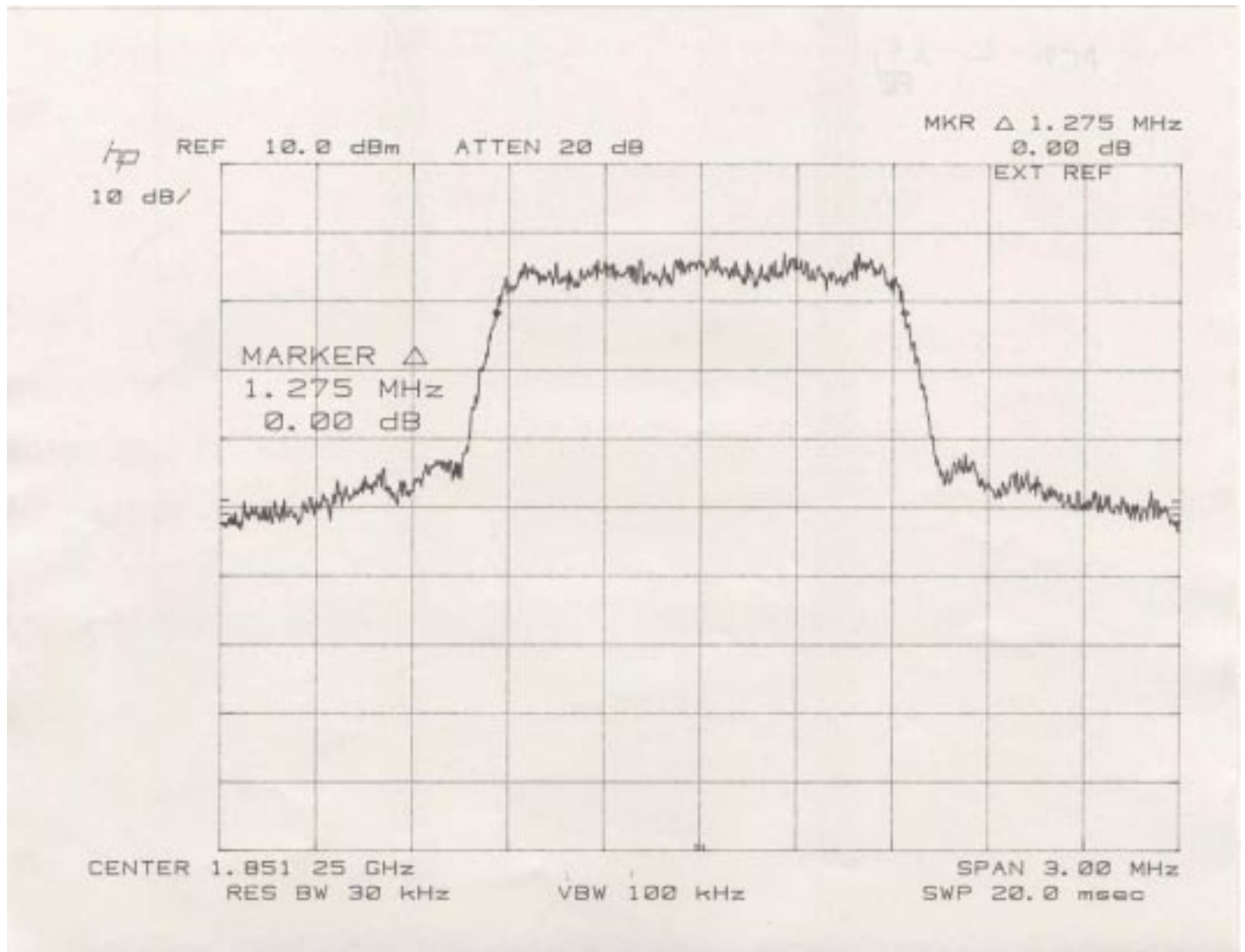
CH No.	Transmitting Frequency(MHz)	Data Page
25	1851.250	Page 89
600	1880.000	Page 90
1175	1908.750	Page 91

Tester : Akio Hosoda

Occupied Bandwidth Measurement

Transmitting Frequency : 1851.250 MHz (25 ch)

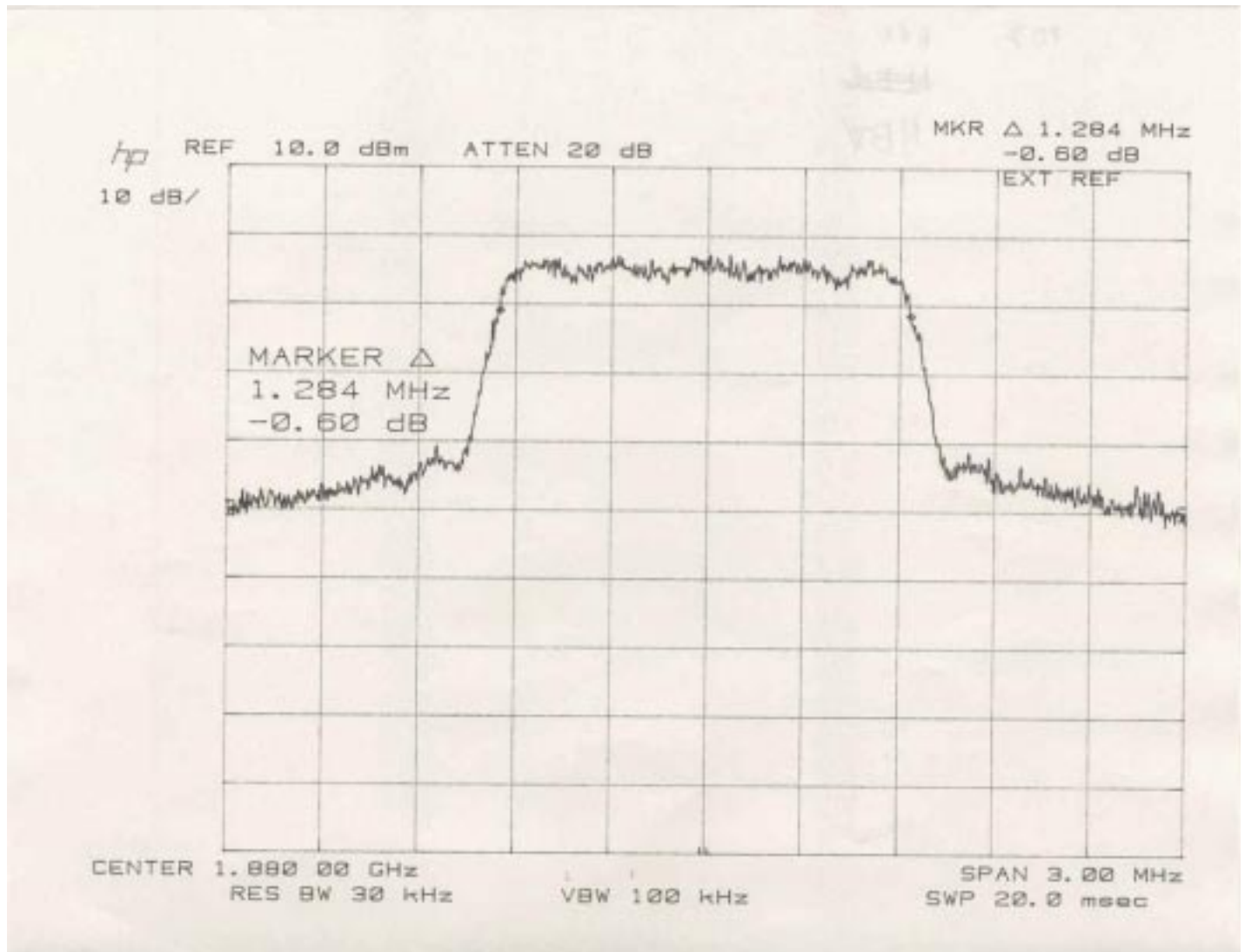
Modulation Type : CDMA



Occupied Bandwidth Measurement

Transmitting Frequency : 1880.000 MHz (600 ch)

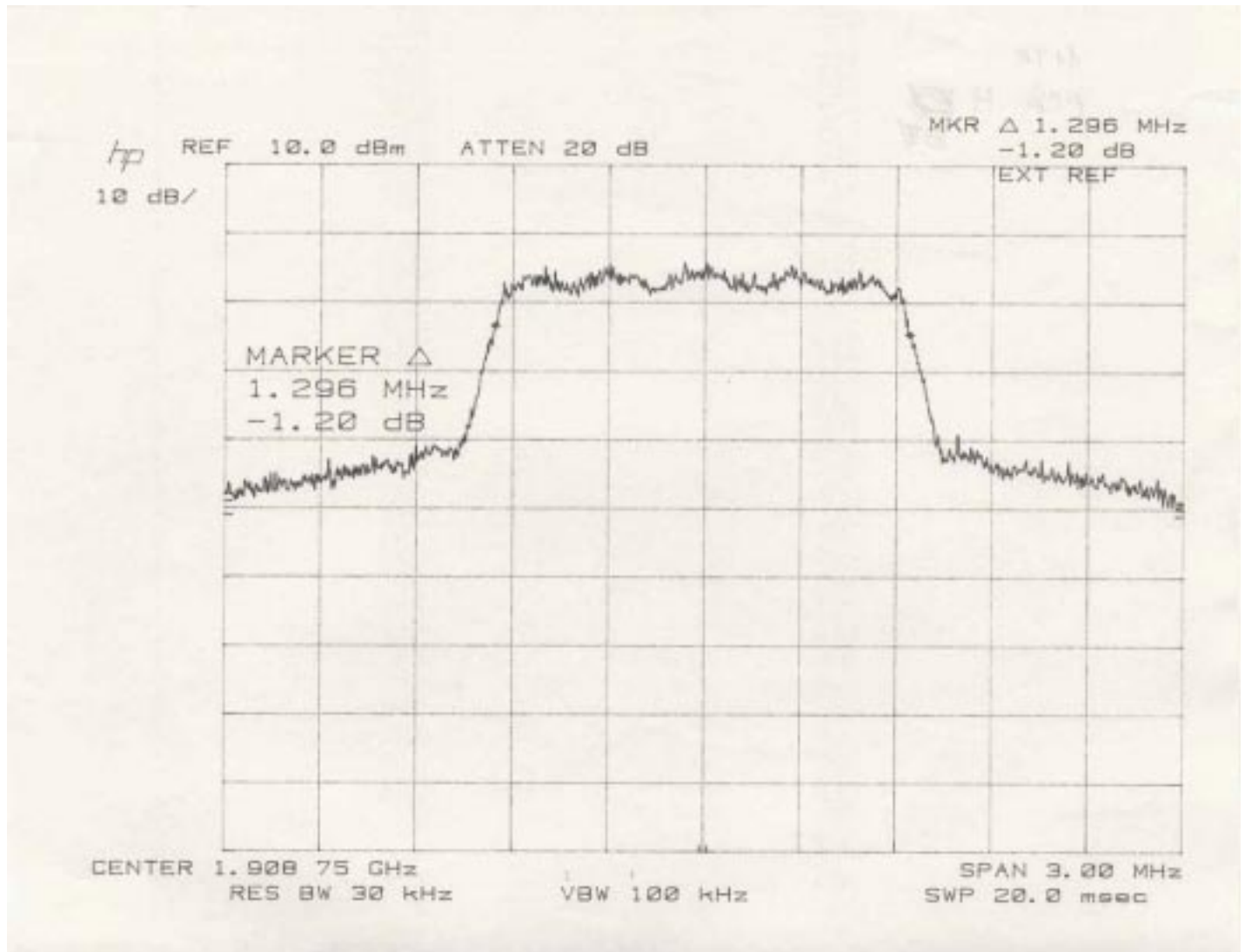
Modulation Type : CDMA



Occupied Bandwidth Measurement

Transmitting Frequency : 1908.750 MHz (1175 ch)

Modulation Type : CDMA



JQA Application No.: KL80020020S
Model No. : NN0200
FCC ID : LXC-NN0200

Regulation : CFR 47 FCC Rules Parts 22 and 24
Issue Date : May 23, 2002

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Band-Edge Emission Measurement - 1900 MHz Systems -

Test Date: May 6, 2002
Temp.: 24 °C; Humi.: 60 %

Modulation Type : CDMA

CH No.	Transmitting Frequency(MHz)	Band-Edge Frequency(MHz)	Data Page
25	1851.250	1850.000	Page 93
1175	1908.750	1910.000	Page 94

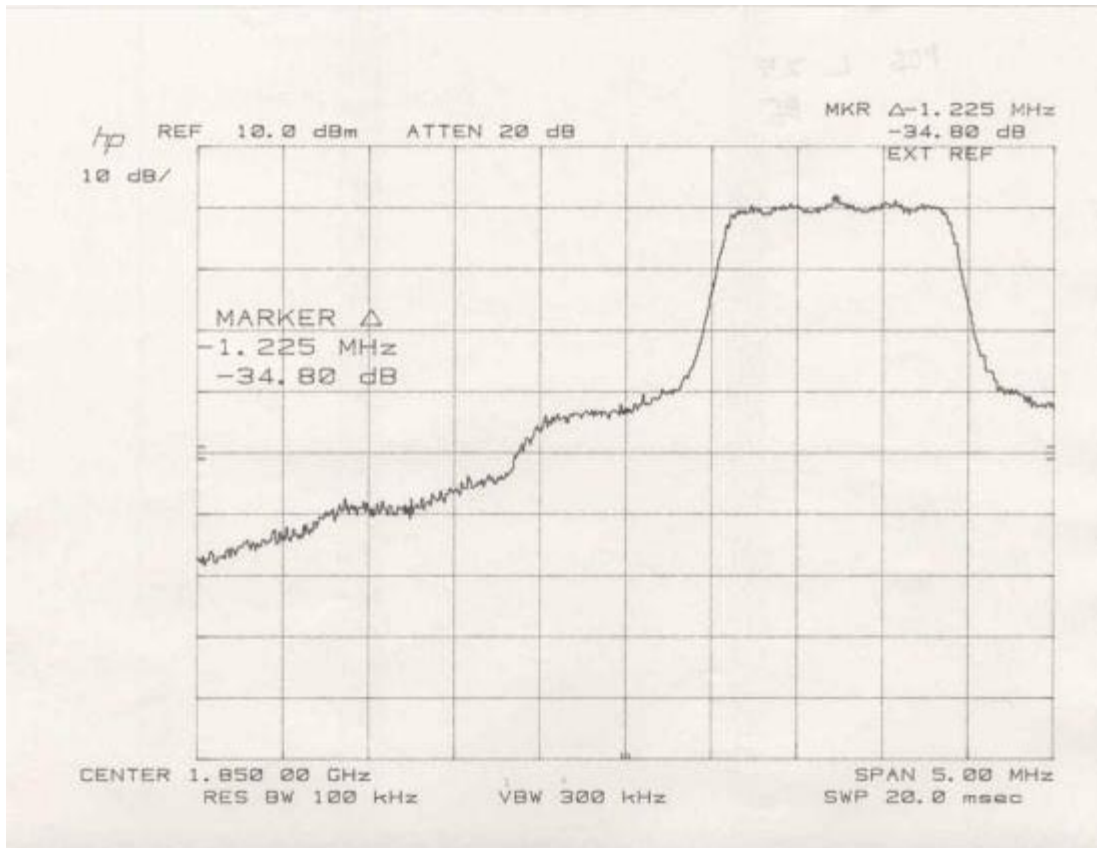
Tester : Akio Hosoda

Band-Edge Emission Measurement

Transmitting Frequency : 1851.250 MHz (25 ch)

Band-Edge Frequency : 1850.000 MHz

Modulation Type : CDMA

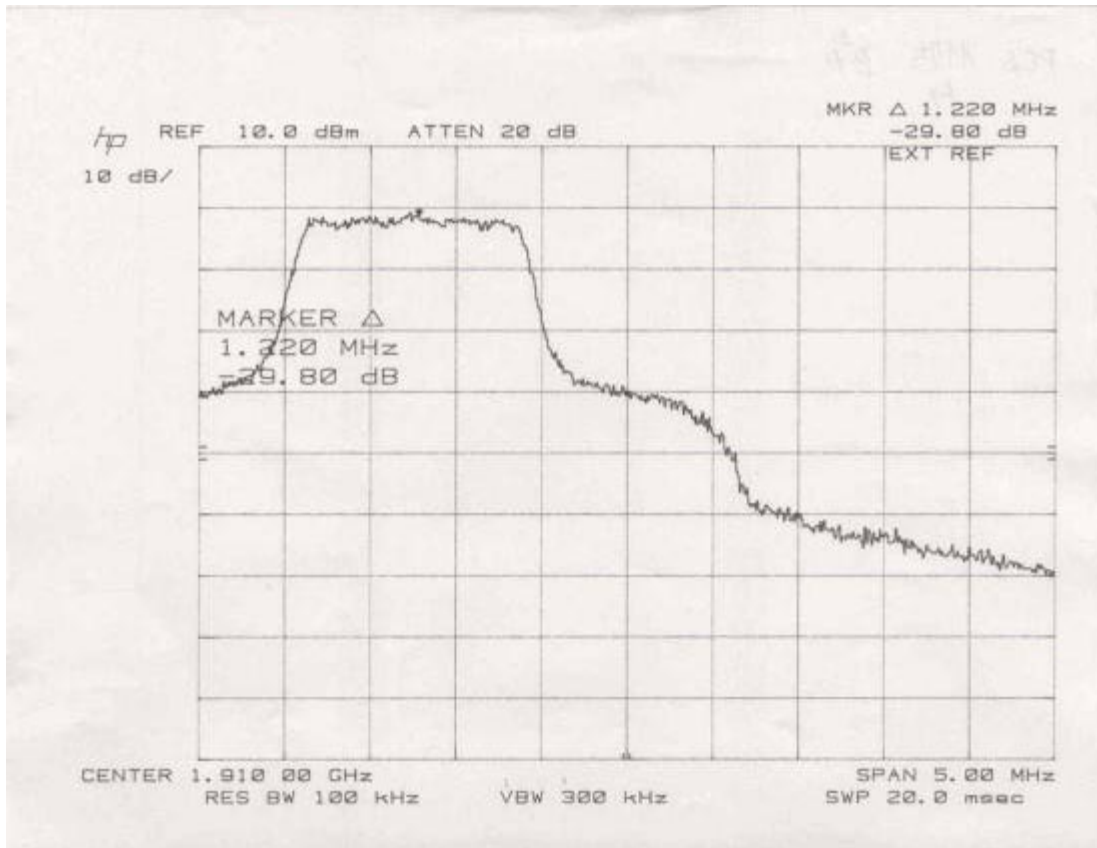


Band-Edge Emission Measurement

Transmitting Frequency : 1908.750 MHz (1175 ch)

Band-Edge Frequency : 1910.000 MHz

Modulation Type : CDMA



Frequency Stability Measurement - 1900 MHz Systems -

Measurement Results:

Test Date: April 22, 2002

a) Frequency Stability Measurement versus Temperature

a-1)Reference Frequency: 1851.250 MHz (25ch)

Modulation Type: CDMA

DC Supply Voltage : 13.8VDC

Ambient Temperature (°C)	Startup	Deviation(ppm)		
		2 minutes	5 minutites	10 minutites
-30	- 0.01	+ 0.08	- 0.02	+ 0.01
-20	- 0.05	- 0.03	- 0.21	- 0.35
-10	+ 0.10	+ 0.09	+ 0.10	+ 0.19
0	+ 0.18	+ 0.00	+ 0.07	+ 0.09
10	+ 0.13	+ 0.14	+ 0.06	+ 0.11
20	+ 0.18	+ 0.17	+ 0.10	+ 0.10
30	+ 0.06	+ 0.06	- 0.08	- 0.13
40	+ 0.12	+ 0.04	+ 0.05	+ 0.02
50	+ 0.00	+ 0.11	+ 0.02	+ 0.06

a-2)Reference Frequency: 1880.000 MHz (600ch)

Modulation Type: CDMA

DC Supply Voltage : 13.8VDC

Ambient Temperature (°C)	Startup	Deviation(ppm)		
		2 minutes	5 minutites	10 minutites
-30	+ 0.44	+ 0.27	+ 0.18	+ 0.12
-20	- 0.03	- 0.34	- 0.31	- 0.41
-10	+ 0.19	- 0.00	+ 0.02	- 0.03
0	+ 0.29	+ 0.17	+ 0.17	+ 0.25
10	+ 0.09	+ 0.07	- 0.02	+ 0.06
20	+ 0.08	+ 0.11	+ 0.07	+ 0.05
30	+ 0.05	- 0.07	- 0.10	- 0.09
40	+ 0.06	+ 0.02	+ 0.03	+ 0.05
50	+ 0.05	+ 0.03	+ 0.04	+ 0.04

a-3)Reference Frequency: 1908.750 MHz (1175ch)

Modulation Type: CDMA

DC Supply Voltage : 13.8VDC

Temperature (°C)	Startup	2 minutes	5 minutites	10 minutites
-30	+ 0.00	- 0.01	- 0.06	- 0.14
-20	- 0.08	- 0.08	- 0.11	- 0.12
-10	+ 0.05	+ 0.03	+ 0.03	+ 0.03
0	+ 0.16	+ 0.08	+ 0.04	+ 0.14
10	+ 0.10	+ 0.07	+ 0.10	+ 0.09
20	+ 0.05	+ 0.02	+ 0.00	+ 0.05
30	- 0.01	- 0.05	- 0.04	- 0.02
40	+ 0.17	+ 0.08	+ 0.05	+ 0.03
50	- 0.03	- 0.02	- 0.02	+ 0.06

a) Frequency Stability Measurement versus Temperature

b-1)Reference Frequency:		1851.250 MHz		(25ch)	
Ambient Temperature :		20 °C			
Modulation Type: CDMA					
DC Supply		Deviation(ppm)			
Voltage	Startup	2 minutes	5 minutites	10 minutites	
(VDC)					
11.73(85%)	+ 0.17	+ 0.12	+ 0.04	+ 0.06	
13.80(100%)	+ 0.18	+ 0.17	+ 0.10	+ 0.10	
15.87(115%)	+ 0.09	+ 0.10	+ 0.01	+ 0.07	

b-2)Reference Frequency:		1880.000 MHz		(600ch)	
Ambient Temperature :		20 °C			
Modulation Type: CDMA					
DC Supply		Deviation(ppm)			
Voltage	Startup	2 minutes	5 minutites	10 minutites	
(VDC)					
11.73(85%)	+ 0.09	+ 0.03	+ 0.02	+ 0.06	
13.80(100%)	+ 0.08	+ 0.11	+ 0.07	+ 0.05	
15.87(115%)	+ 0.00	- 0.01	+ 0.01	+ 0.02	

b-3)Reference Frequency:		1908.750 MHz		(1175ch)	
Ambient Temperature :		20 °C			
Modulation Type: CDMA					
DC Supply		Deviation(ppm)			
Voltage	Startup	2 minutes	5 minutites	10 minutites	
(VDC)					
11.73(85%)	+ 0.06	+ 0.06	+ 0.09	+ 0.06	
13.80(100%)	+ 0.05	+ 0.02	+ 0.00	+ 0.05	
15.87(115%)	+ 0.07	+ 0.10	+ 0.01	+ 0.05	

JQA Application No.: KL80020020S
Model No. : NN0200
FCC ID : LXC-NN0200

Regulation : CFR 47 FCC Rules Parts 22 and 24
Issue Date : May 23, 2002

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Note : The measurement were made after all of components of the oscillator sufficiently stabilized at each temperature.

Sample Caluculation at 1880.000 MHz ,-30°C Startup 13.8VDC) :
$$((1880.0008250 - 1880.0000000)/1880.0000000) \times 10^6 = +0.44 \text{ (ppm)}$$

Tester : Akio Hosoda

Maximum Permissible Exposure(MPE) :
- 1900 MHz Systems -

The separation distance between the printed glass antenna to the passenger setting on the rear seat is 0.483 m (Refer to plan view in Schematics).

The limit for Maximum Permissible Exposure(MPE) at frequency of 1.91 GHz is 1.00 mW/cm². (1.00 mW/cm² for General Population/Uncotrolled environment in §1.1310.)

The conversion from power to power density uses the following equation :

$$PD = (TPG) / 4\pi r^2 = EIRP / 4\pi r^2$$

Where : PD : Power Density at the passenger setting on the rear seat(W/m²)

TP : Transmitted Power (W)

G : Numeric gain of the antenna

EIRP: Equivalent Isotropically Radiated Power

r : Separation distance(in m) = 0.483 m

The conversion from W/m² to mW/cm² is: mW/cm² = W/m² / 10

Maximum EIRP*¹ : 280.0 mW

Note) *¹ : Measured Value

Minimum distance for MPE calculation

Items	Value
EIRP (W)	0.280
r (m)	0.483
PD (W/m ²)	0.096
PD (mW/cm ²)	0.0096

MPE evaluation :

The Power density at the passenger setting on the rear seat (0.0096mW/cm²) is less than the MPE (1.00 mW/cm²).