Licensed Non-Broadcasting Transceiver

RF MEASUREMENT REPORT

VERIFICATION OF COMPLIANCE

PRODUCT	:	**Mobile Subscription Radio Telecommunication Repeater**
MODEL/TYPE NO	:	**MBR801A**
FCC ID	:	**Q4AMBR801A**
TRADE NAME	:	**Jung Ang System DWTT-MBR801A**
APPLICANT	:	**Jung Ang System Co.,Ltd. 504-29, JAS B/D, Younnam-Dong, Mapo-Gu, Seoul, Korea**
FCC RULE PART(S)	:	**FCC Part 2 & Part 22 Cellular Radiotelephone Service**
FCC PROCEDURE	:	**Certification**
FCC CLASSIFICATION	:	**Amplifier (AMP)**
EMISSION DESIGNATOR	:	**F9W (CDMA)**
FREQUENCY RANGE	:	**Downlink 870 MHz ~ 880 MHz (CDMA) Uplink 825 MHz~ 835 MHz (CDMA)**
RF OUTPUT POWER	:	**Downlink 10 Watts (40dBm) Uplink 2.5 Watts (34dBm)**
DATES OF TEST	:	**April 08, 2003**
DATES OF ISSUE	:	**April 11, 2003**
TEST REPORT No.	:	**BWS-03-RF-012**
TEST LAB.		**BWS Tech., Inc. (Registration No. : 553281)**

This RF Reapter Model MBR801A has been tested in accordance with the measurement procedures specified in CFR 47 Part 2.947 and ANSI C63.4-2000 at the BWS TECH/RF Test Laboratory and has been shown to be complied with the FCC Technical Specification described above.

I attest to the accuracy of data. All measurement 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. The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Kayoung Kim

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Chief of Laboratory Division
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This report only responds to the tested sample and may not be reproduced, except in full, without written approval of the BWS TECH,Inc.

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RF TEST REPORT

Scope – *Measurement and determination of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of relevant international standard*

1. GENERAL INFORMATION

Applicant

Applicant Name : Jung Ang System Co., Ltd

Applicant Address : 504-29, JAS B/D, Younnam-Dong, Mapo-Gu, Seoul, Korea

Phone/Fax : Phone : +82 2 330 5863 Fax : +82 2 330 5879

Other Information

- **EUT Type :** RF Broad Band Repeater
- **Model Name :** MBR801A
- **FCC Identifier :** Q4AMBR801A
- **Brand Name :** Jung Ang System
- **S/N :** Prototype
- **Freq. Range :** Downlink : 870 MHz ~ 880 MHz (CDMA)
  Uplink : 825 MHz~ 835 MHz (CDMA)
- **Max. Power Output :** Downlink (CDMA) : 10 Watts (40dBm)
  Uplink (CDMA) : 2.5 Watts (34dBm)
- **Emission Designator :** F9W
- **FCC Classification** Amplifier (AMP)
- **Rule Part(s) :** FCC Part 22 & Part 2
- **Test Procedure :** Certification
- **Dates of Tests :** March 10, 2003
- **Place of Tests :** BWS TECH Inc.
  294-9, Jungdae-Dong, Kwangju-Si, Kyunggi-Do
  464-080, Korea
  EMC Testing Laboratory
  (FCC Registration Number : 553281)

  TEL: +82 31 762 0124 FAX: +82 31 762 0126
- **Test Report No. :** BWS-03-RF-012

2. DESCRIPTION OF ATTACHMENTS

Appendix 1. FCC ID Label and Location
-. Sample FCC ID Label and location information is shown

Appendix 2. Test Setup Photos
-. Radiated Emission Test setup photos are shown

Appendix 3. External Photos
-. External photos are shown

Appendix 4. Internal Photos
-. Internal photos are shown

Appendix 5. Block Diagram
-. The block diagram is shown

Appendix 6. Schematics
-. The circuit diagrams are shown

Appendix 7. Operational Instruction
-. Explanation of operational instruction for circuit is shown.

Appendix 8. Part List
-. The part lists are shown.

Appendix 9. Tune up Procedure
-. The alignment procedure are shown.

Appendix 10. RF Exposure statement
-. The user operating manual is shown.

Appendix 11. User Manual

3. INTRODUCTION

The measurement tests were conducted at the open area test site of BWS TECH Inc. facility located at 294-9, Jungdae-Dong, Kwangju-Si, Kyunggi-Do, Korea. The measurement facilities were constructed in conformance with the requirements of the ANSI C63.4-2000 and CISPR Publication 16. The ETL has site descriptions on file with the FCC for 3 and 10 meter site configurations. Detailed description of test facility was found to be in compliance with the requirements of Section 2.948 FCC Rules according to the ANSI C63.4-2000 and registered to the Federal Communications Commission(Registration Number : 553281).

All measurements contained in this application were conducted in accordance with FCC Rules and regulations CFR 47and American National Standard Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C.63.4-2000).

Measurement Procedure

The radiated and spurious measurements were made outdoors at a 3-meter test range (see Figure2).
The equipment under testing was placed on a wooden turntable, 3-meters from the receive antenna. The receive antenna height and turntable rotations was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This level was recorded.
For readings above 1 GHZ, the above procedure would be repeated using horn antennas and the difference between the gain of the horn and an isotropic antenna are taken into consideration.

4. PRODUCT INFORMATION

4.1 Equipment Description

This RF Broad Band repeater is a device to cover signal blind, which are generated in the wave shadow area where the signal reception is not clear, as amplifying and emitting the frequency of radio waves received from the nearby station. This repeater is located on the path between CDMA Base station and a mobile terminal. It amplifies the signal between a station and a terminal, and provides the radio channel.

4.2 Technical Specification

- Chassis Type	Metal enclosure
- Frequency Range	Downlink : 870 MHz ~ 880 MHz (CDMA) Uplink : 825 MHz~ 835 MHz (CDMA)
- Channel Spacing	1.23 MHz
- RF Output Power	Forward : 10 Watts (40 dBm) /Total Reverse : 2.5 Watts (34 dBm) /Total
-.Input Power Range	Downlink : -60 ~ -40dBm Uplink : -120 ~ -60dBm
- ALC	Downlink : < 42dBm or Auto Shut Down Uplink : < 36dBm or Auto Shut Down
- Communication	Tx/Rx
- Gain Adjustment Range	30 dB/1dB Step
-.Operating Temperature	-25℃ ~ +55℃
-. Dimension	478(W) x 660(H) x 307(D)
- Power Supply	AC 110V/60Hz

4.3 Variations covered by this report

Model Difference : N/A

Technical Deviation : N/A

4.4 Additional information related to Testing

☑ **Note.**

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☑ **Note.**

Please refer to the duties and responsibilities of the Responsible Party attached.

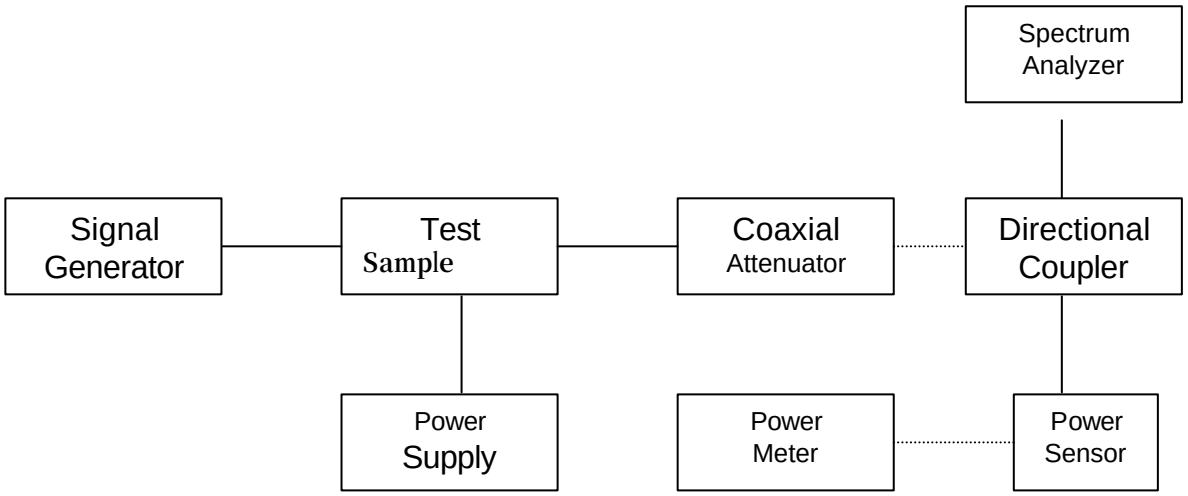
5. DESCRIPTION OF TESTS

5.1 RF Power Output - Conducted Power Output - §2.1046

Test Procedure : ANSI/TIA/EIA-603-1992, section 2.2.1

The EUT was connected to a resistive coaxial attenuator having a 50 ohm load impedance, and the unmodulated RF output power(carrier) was measured by means of an R. F. Spectrum Analyzer.

The EUT was aligned for transmitter operation on three frequencies(Fo) at full rated power per the tune-up procedure outlined in the Product Specification. This represents frequencies at the low, middle and high end of the EUT operating frequency band.



5.2 RF Power Output – ERP Measurement by Substitution Method - §2.1046

The EUT was setup at an antenna to EUT distance of 3 meters on an open area test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane.
The physical arrangement of the EUT and associated cabling was varied in order to determine the effect on the EUT' s emissions in amplitude, direction and frequency. At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations.
The worst-case, maximum radiated emission was recorded and used as reference for the ERP measurement. The EUT was then replaced by an ½ wave dipole antenna and polarized in accordance with the EUT' s antenna polarization. The ½ wave dipole antenna was connected to a RF signal generator with a coaxial cable.
The search antenna height, and search antenna polarity was set to levels that produced the maximum reading obtained above. The signal generator was adjusted to a level that produced the radiated emission level obtained in the above.
The signal generator level was recorded and corrected by the power loss in the cable between the generator and the antenna and further corrected for the gain of the substitution antenna used relative to an ideal ½ wave dipole antenna. The signal generator corrected level is the ERP level

5. DESCRIPTION OF TESTS

5.3 Transmitter Audio Frequency Response - §2.1047(a)

Test Procedure : ANSI/TIA/EIA-603-1992, section 2.2.6

The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.The frequency response of the audio modulating circuit over the frequency range 100 - 5000 Hz is measured. The audio signal generator is connected to the audio input circuit/microphone of the EUT. The audio signal input is adjusted to obtain 20% modulation at 1kHz and this point is taken as the 0dB reference level. With the input held constant and below the limit at all frequencies, the audio signal generator is varied from 100 Hz to 50 kHz. The deviation in kHz was recorded using a modulation analyzer. The response in dB relative to 1 kHz was calculated as follows:

Audio Frequency Response = 20 LOG (DEV_{freq}/DEV_{ref})

5.4 Audio Low Pass Filter Frequency Response - §2.1047(a)

Test Procedure : ANSI/TIA/EIA-603-1992, Section 2.2.15

The Audio Low Pass Filter Response is the frequency response of the post limiter low pass filter circuit above 3000 Hz. The response in dB relative to 1kHz is measured using the HP8901 Modulation Analyzer. For the frequency response of the audio low-pass filter, The EUT and test equipment were set up such that the audio input is connected at the input to the modulation limiter and the modulated stage. The audio output is connected at the output of the modulated stage.

5.5 Modulation Limiting - §2.1047(b) & §22.915(b)

Test Procedure : ANSI/TIA/EIA-603-1992, section 2.2.3

The audio signal generator is connected to the audio input circuit/microphone of the EUT.

The transmitter is adjusted its full rating. The modulation response is measured for each of the three modulating frequencies, one of them is the frequency of maximum response(300Hz, 1000 Hz, and 3000Hz), and the input signal voltage is varied from 30% modulation to at least 20dB higher than the saturation point. The system maximum deviation was recorded at each test condition.

Measurements of modulation and test plots are attached. Measurements were performed for both negative and positive modulation and respective results were recorded.

5. DESCRIPTION OF TESTS

5.6 Occupied Bandwidth : §2.1049 & §22.913

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

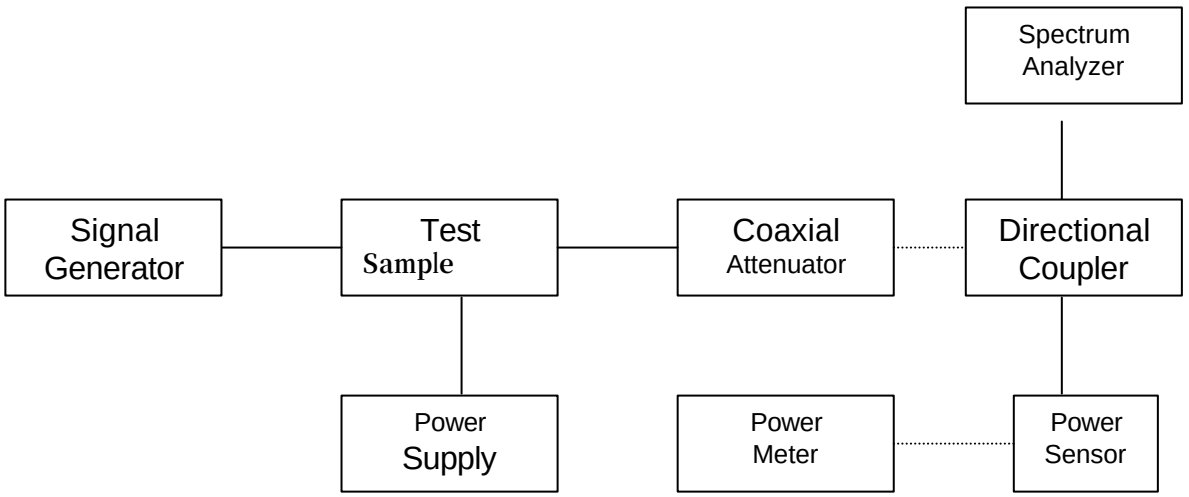
The antenna output terminal of the EUT was connected to the input of a 50ohm spectrum analyzer through a matched 30dB attenuator. The radio transmitter was modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. The input level shall be established at the frequency of maximum response of the audio modulating circuit. The occupied bandwidth data is obtained for 25kHz and 12.5 kHz channel bandwidth. The results are shown on the attached graphs.
.

Specified Limits:
(a) On any frequency removed from the assigned carrier frequency by more than 20kHz, up to and including 45kHz, the sideband is at least 26dB below the carrier.
(b) On any frequency removed from the assigned carrier frequency by more than 45kHz, up to and including 90kHz, the sideband is at least 45dB below the carrier.
(c) On any frequency removed from the assigned carrier frequency by more than 90kHz, up to the first multiple of the carrier frequency, the sideband is at least 60dB below the carrier of 40 + log10 (mean power output in Watts) dB, whichever is the smaller attenuation.

5.7 Spurious and Harmonic Emissions at Antenna Terminal : §2.1051

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to 10 GHz. The transmitter is modulated with a 2500Hz tone at a level of 16dB greater than that required to provide 50% modulation of the rated system deviation at 1000 Hz.

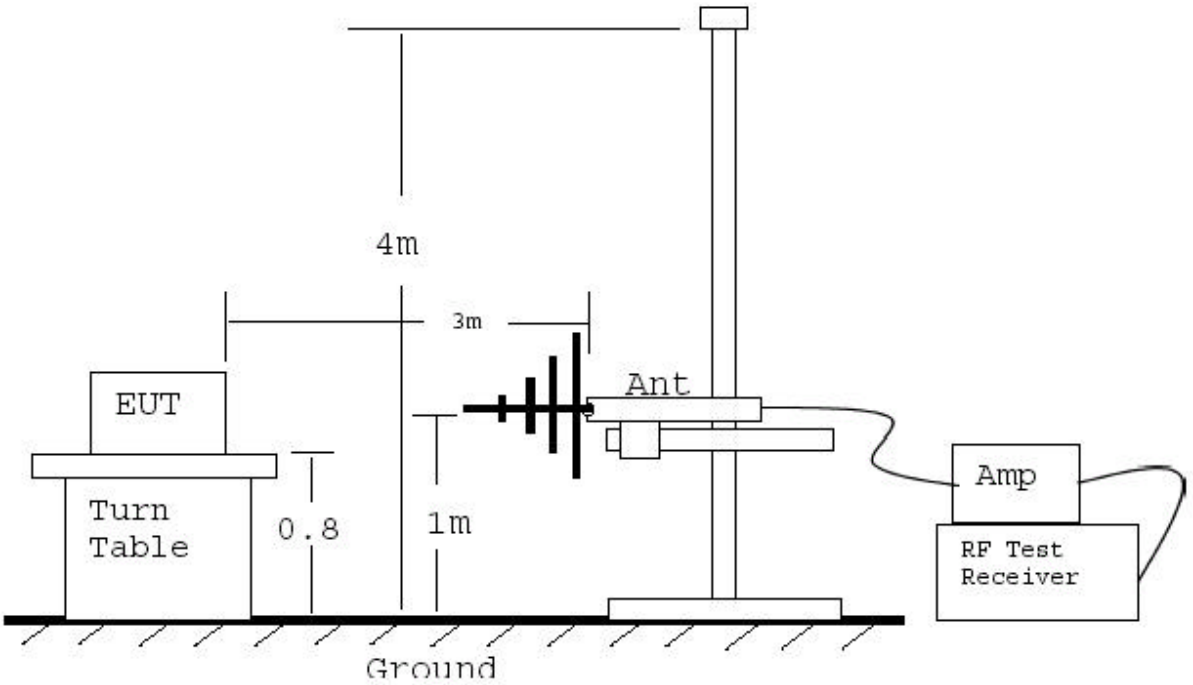
The antenna output terminal of the EUT was connected to the input of 50 ohm spectrum analyzer through a matched 30dB RF attenuator and coaxial cable.The transmitter was operating at maximum power with modulation.



5. DESCRIPTION OF TESTS

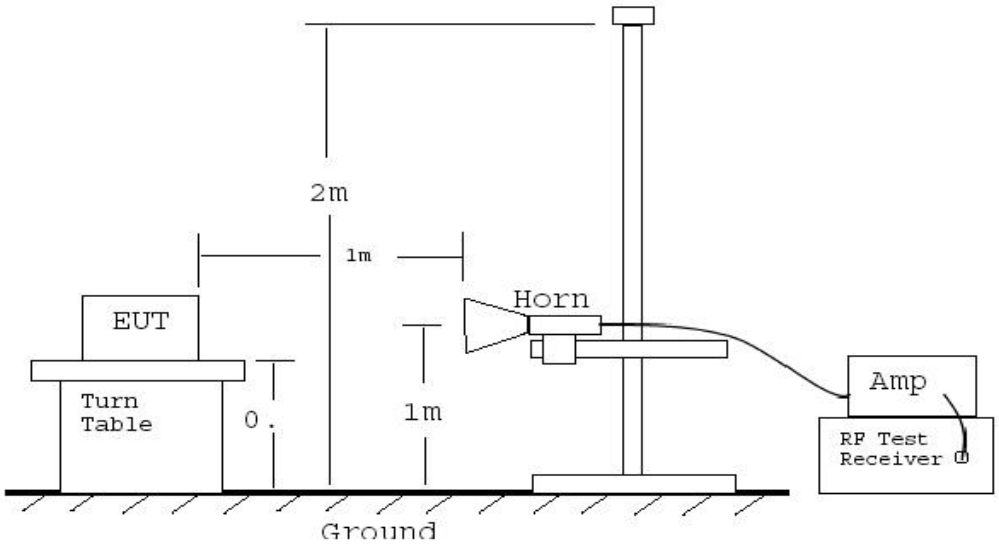
5.8 Radiated Spurious and Harmonic Emissions : §2.1053

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or inter-mediate circuit elements under normal conditions of installation and operation.
Radiation and harmonic emissions above 1 GHz is measured outdoors at our 3-meter test range. The equipment under test is placed on a wooden turn-table 3-meters from the receive antenna. The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer reading. This level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic antenna are taken into consideration.

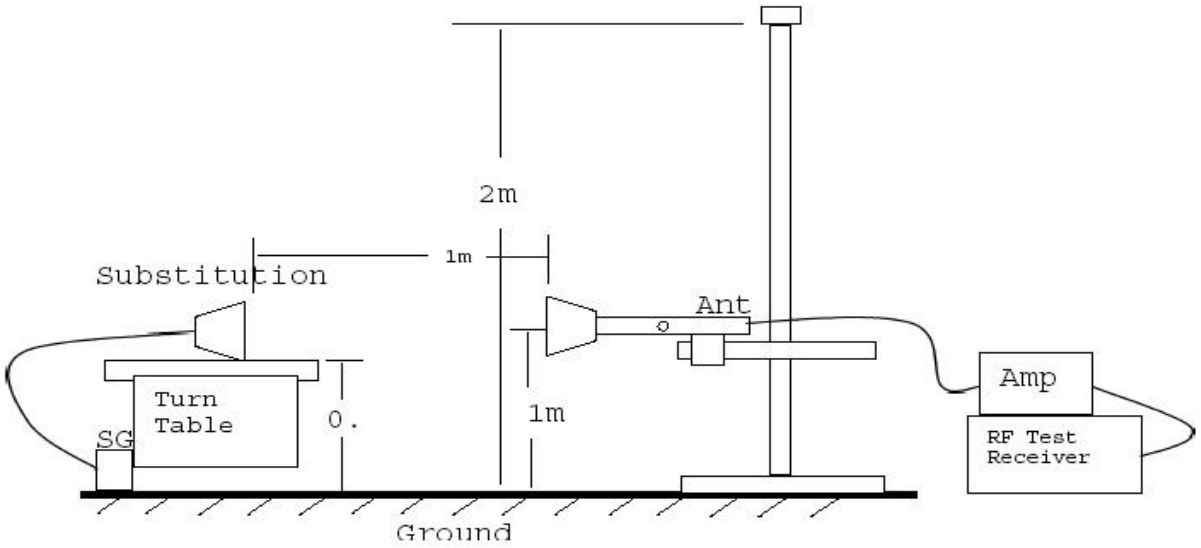


Radiated Emission Test 30 – 1000 MHz (Bilog)

5. DESCRIPTION OF TESTS



Radiated Emission Test 1 – 9 GHz (Horn)



Substitution Method above1 GHz

5. DESCRIPTION OF TESTS

5.9 Frequency Stability / Temperature Variation - §2.1055(b) & §22.335

Test Procedure : ANSI/TIA/EIA-603-1992, section 2.2.2

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

The frequency stability of the transmitter is measured by:
a) **Temperature:** The temperature is varied from -3?C to +50°C using an environmental chamber.
b) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification – The minimum frequency stability shall be +/- 1.5ppm for base station or Fixed station at any time during normal operation.

Time Period and Procedure:
1. The carrier frequency of the transmitter and the individual oscillators is measured at room temperature (25°C to 27°C to provide a reference).
2. The equipment is subjected to an overnight "soak" at -30?C without any power applied.
3. After the overnight "soak" at -30?C (usually 14-16 hours), the equipment is turned on in a "standby" condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter and the individual oscillators is made within a three minute interval after applying power to the transmitter.
4. Frequency measurements is made at 1?C interval up to room temperature. At least a period of one and one half hour is provided to allow stabilization of the equipment at each temperature level.
5. Again the transmitter carrier frequency and the individual oscillators is measured at room temperature to begin measurement of the upper temperature levels.
6. Frequency were made at 10 intervals starting at -30?C up to +50?C allowing at least two hours at each temperature for stabilization. In all measurements the frequency is measured within three minutes after applying power to the transmitter.
7. The artificial load is mounted external to the temperature chamber.

Note: The EUT is tested down to the battery endpoint for battery operated equipment.

6. TEST RESULTS

6.1 Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

FCC Rules Section	Test Item	Result
Part 2.1046 / Part 22.913	RF Power Output	Passed
Part 2.1049 / Part 22.917	Occupied Bandwidth	Passed
Part 2.1051 / Part 22.917	Spurious Emission at Antenna Terminal	Passed
Part 2.1053 / Part 22.917	Field Strength of Spurious Emission	Passed
Part 2.1055 / Part 22.335	Frequency Stability	Passed

The data collected shows that the **Jung Ang System Co. Ltd. RF Repeater MBR801A** complies with technical requirements of the FCC Rule Part 2.947 and Part 22 related technical specification.

6.2 Modification to EUT

The device tested is not modified anything, mechanical or circuits to improve EMI status during a measurement. No EMI suppression device(s) was added and/or modified during testing.

7. TEST DATA

7.1 RF Power Output Measurement

Test Standard :	FCC Part 22.913 & 2.1046
Operating Frequency :	Downlink 870 - 880 MHz Uplink 825 - 835 MHz
Channel :	Low / Mid/ High
RF Power Output :	Downlink 10 Watts (40 dBm) Uplink 2.5 Watt (34dBm)

Down Link(Forward)

Test Conditon	Measured Output Power (Watts)		
	Low	Mid	High
Rated voltage	8.262	9.940	8.640

Up Link(Reverse)

Test Conditon	Measured Output Power (Watts)		
	Low	Mid	High
Rated voltage	2.036	2.361	2.088

Note :

1. *The input to the amplifier is tuned such that the output power is set to its maximum rated power*
2. *The RF output ports were properly attenuated by the RF attenuator and were connected to the RF Power Meter.*
3. *The measurements were performed at the shielded room.with environmental conditions of 21℃, 43%RH*
4. *Downlink(Forward) channel frequency Low : 871.11MHz, Mid : 874.80MHz, High : 878.49MHz*
   Uplink(Reverse) channel frequency Low : 826.11MHz, Mid : 829.80MHz, High : 833.49MHz

7. TEST DATA

7.2 Occupied Bandwidth

Test Standard :	FCC Part 22.913 & 2.1049(i)
Operating Frequency :	Downlink 870 - 880 MHz Uplink 825 - 835 MHz
Channel :	Low / Mid/ High
RF Power Output :	Downlink 10 Watts (40 dBm) Uplink 2.5 Watt (34dBm)

Down Link (Forward)

Test Conditon	Limit (MHz)	Measured Bandwidth (MHz)		
		Low	Mid	High
Rated Supply voltage	<1.32	1.275	1.275	1.258
Input Signal	<1.32	1.275	1.275	1.267

Up Link (Reverse)

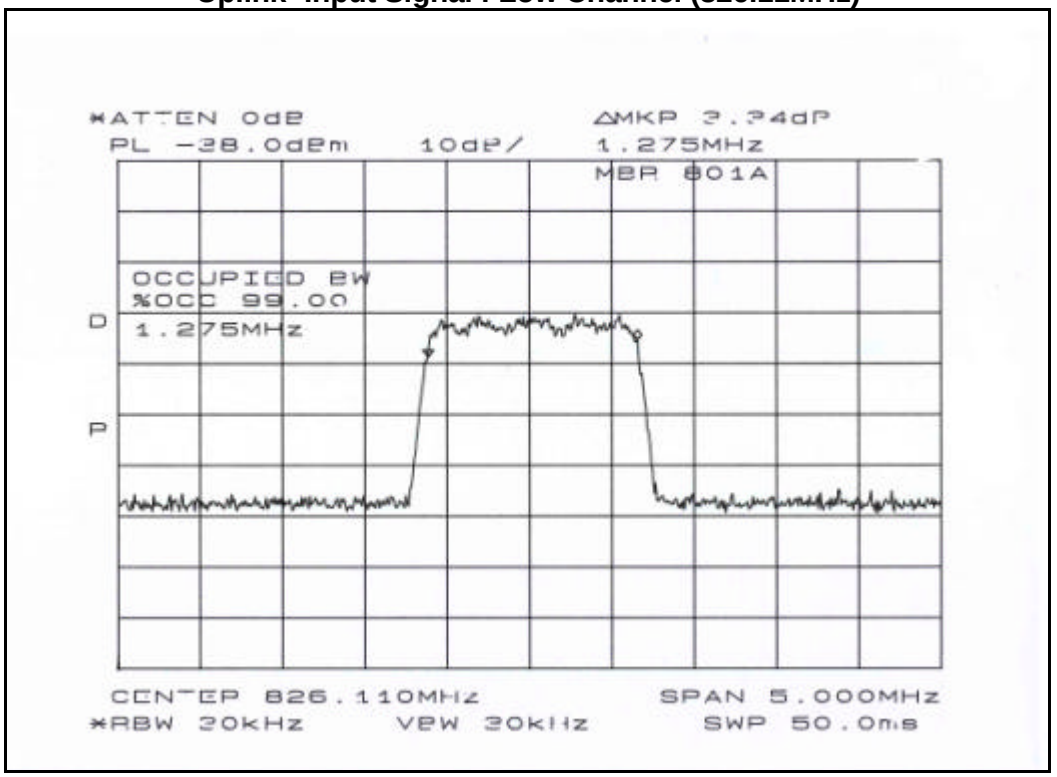
Test Conditon	Limit (MHz)	Measured Data (MHz)		
		Low	Mid	High
Rated supply voltage	<1.32	1.275	1.275	1.275
Input Signal	<1.32	1.275	1.275	1.275

Note :

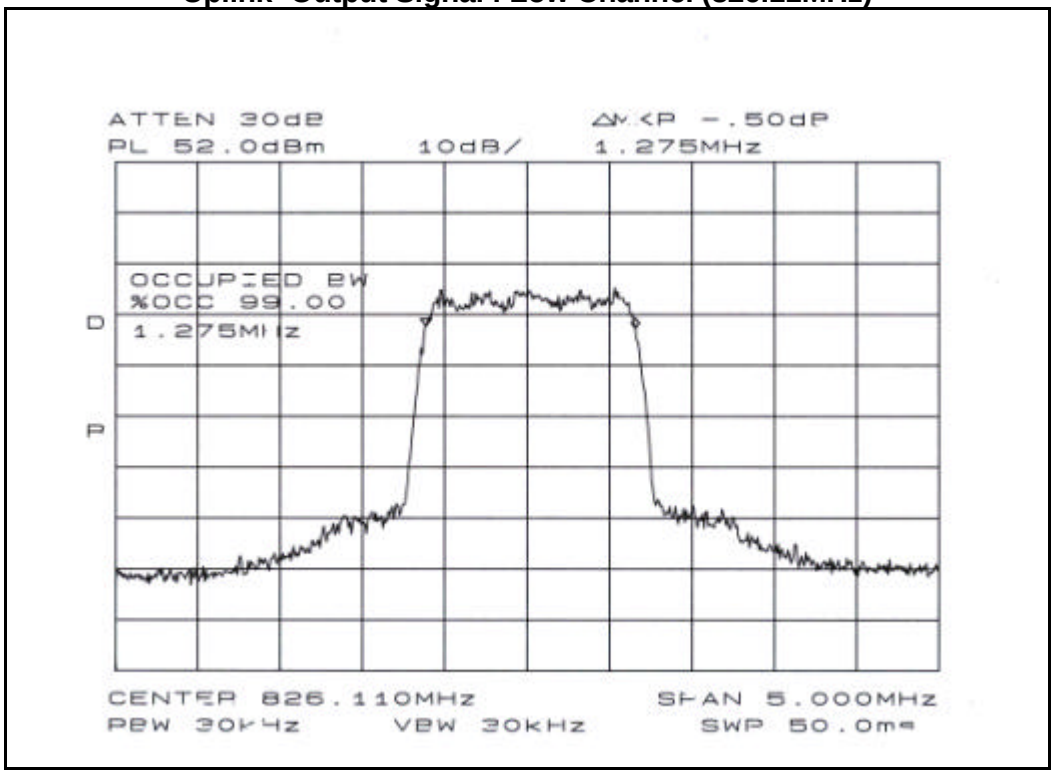
1. *The input to the amplifier is tuned such that the output power is set to its maximum rated power*
2. *The spectrum analyzer for this measurement was set with RBW : 30kHz, VBW : 30kHz, as recorded in the plots.*
3. *The frequency band measurements were performed at the rated supply voltage and ±10% of the rated supply voltage.*
4. *The measurements were performed at the shielded room.with environmental conditions of 21℃, 43%RH*
5. *Forward channel frequency Low : 871.11MHz, Mid : 874.80MHz, High : 878.49MHz*
   Reverse channel frequency Low : 826.11MHz, Mid : 829.80MHz, High : 833.49MHz
6. *According to the Section 1049(i), the transmitters designed for other types of modulation, plots of the input signal were shown to verify any degradation to the output signal.*

Plots of Occupied Bandwidth - CDMA

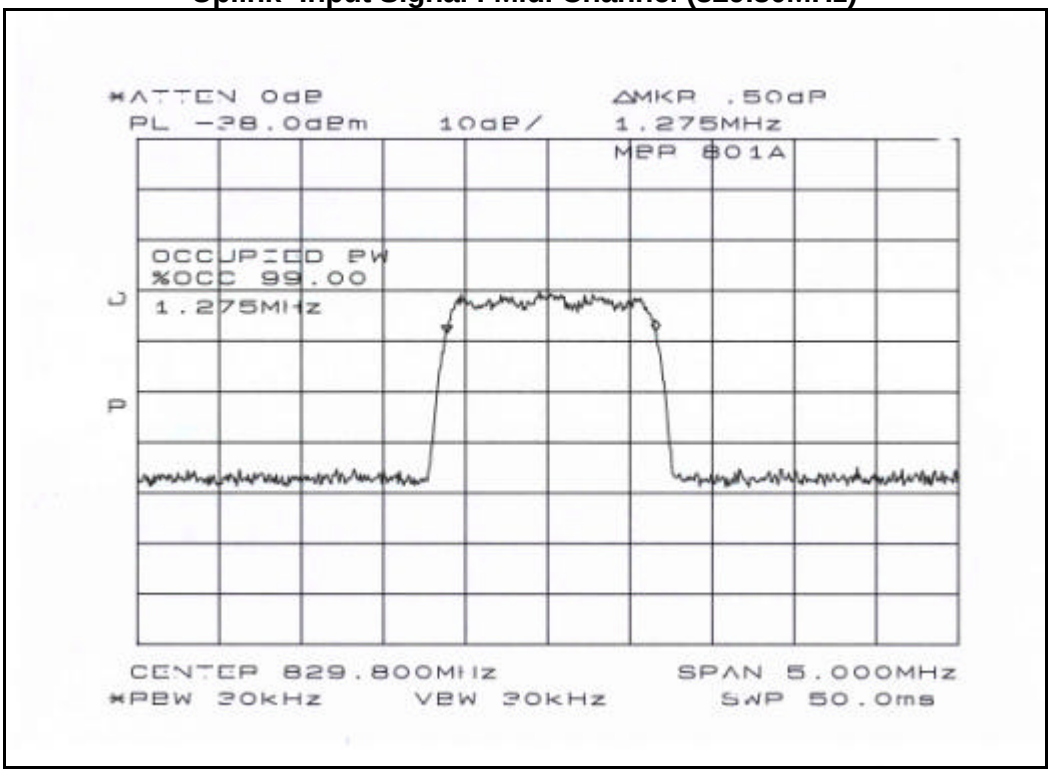
Uplink- Input Signal : Low Channel (826.11MHz)



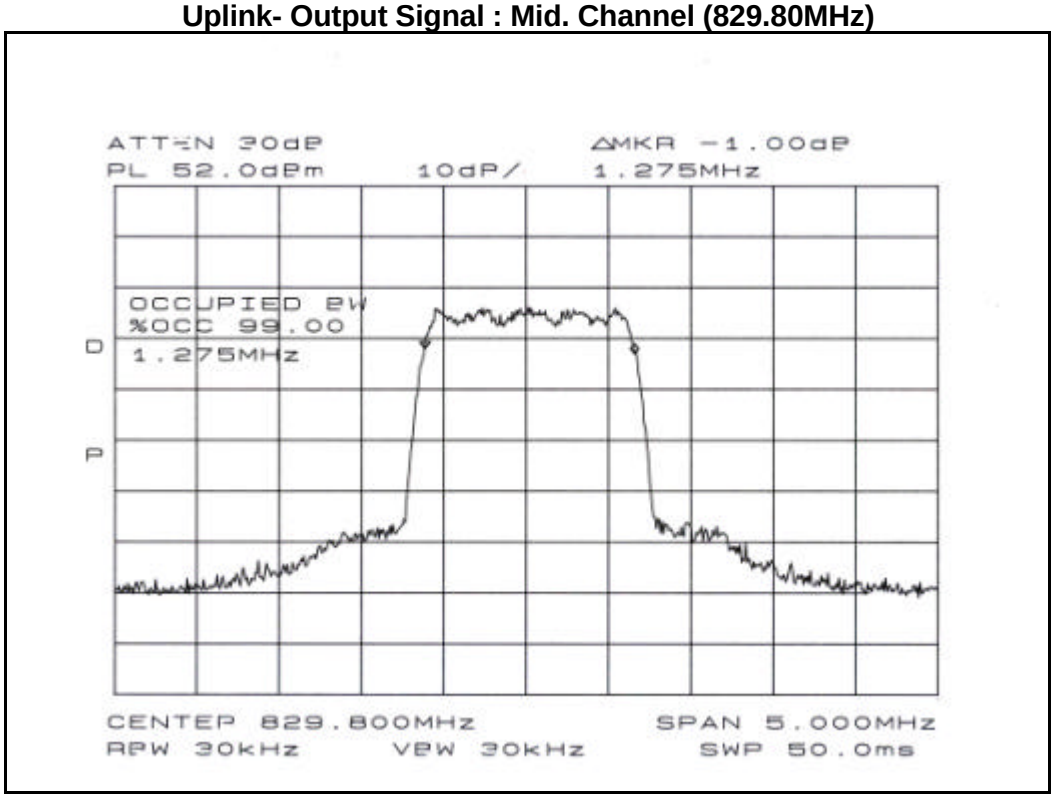
Uplink- Output Signal : Low Channel (826.11MHz)



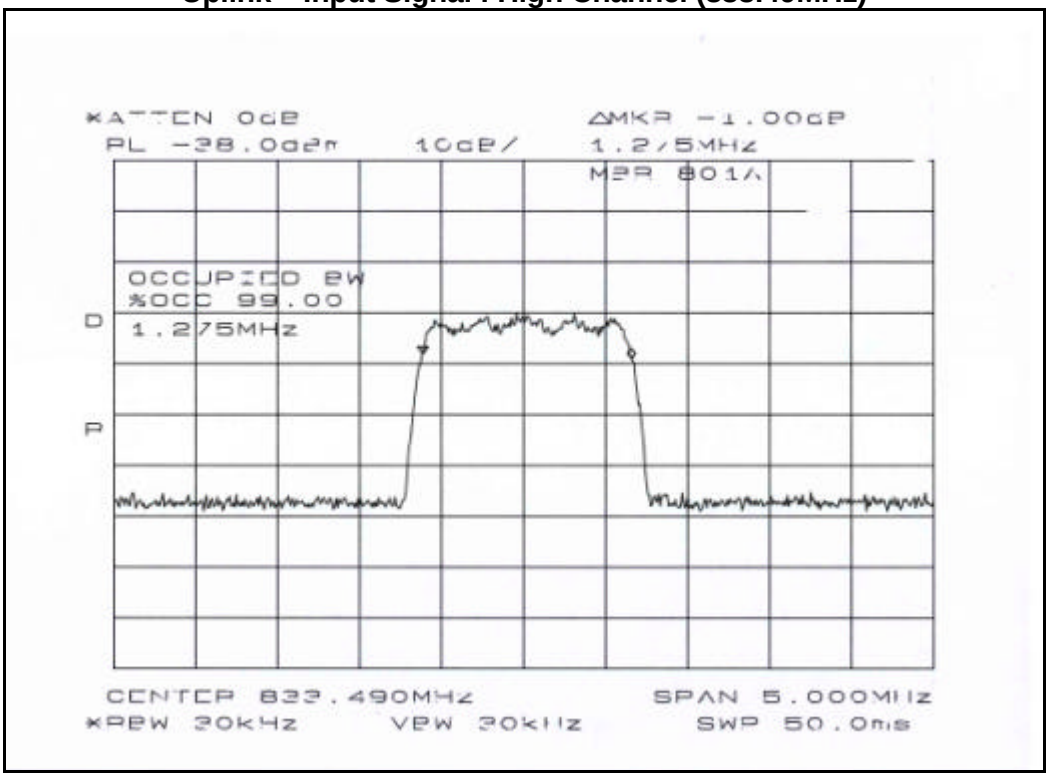
Uplink- Input Signal : Mid. Channel (829.80MHz)



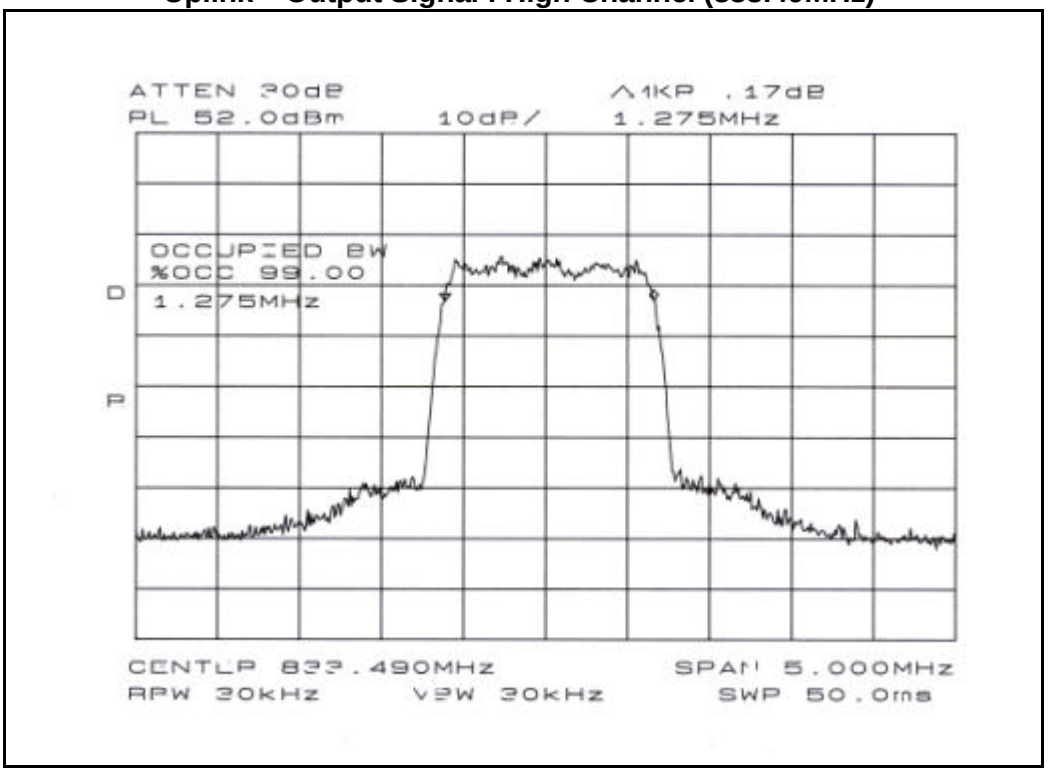
Uplink- Output Signal : Mid. Channel (829.80MHz)



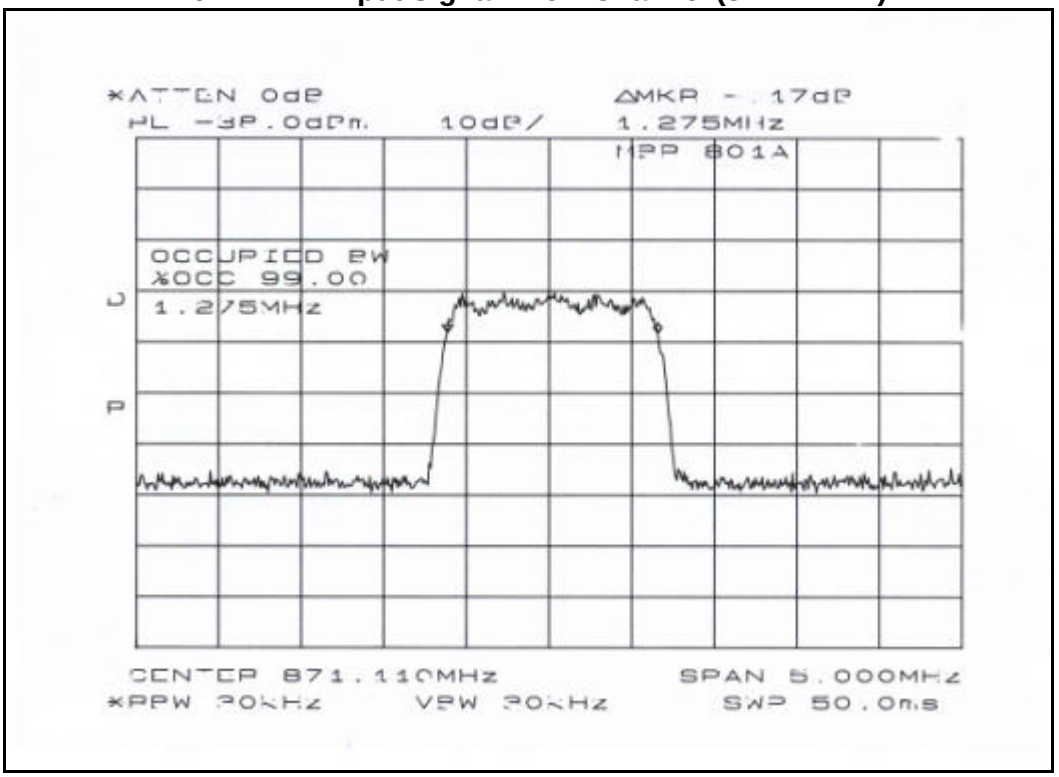
Uplink – Input Signal : High Channel (833.49MHz)



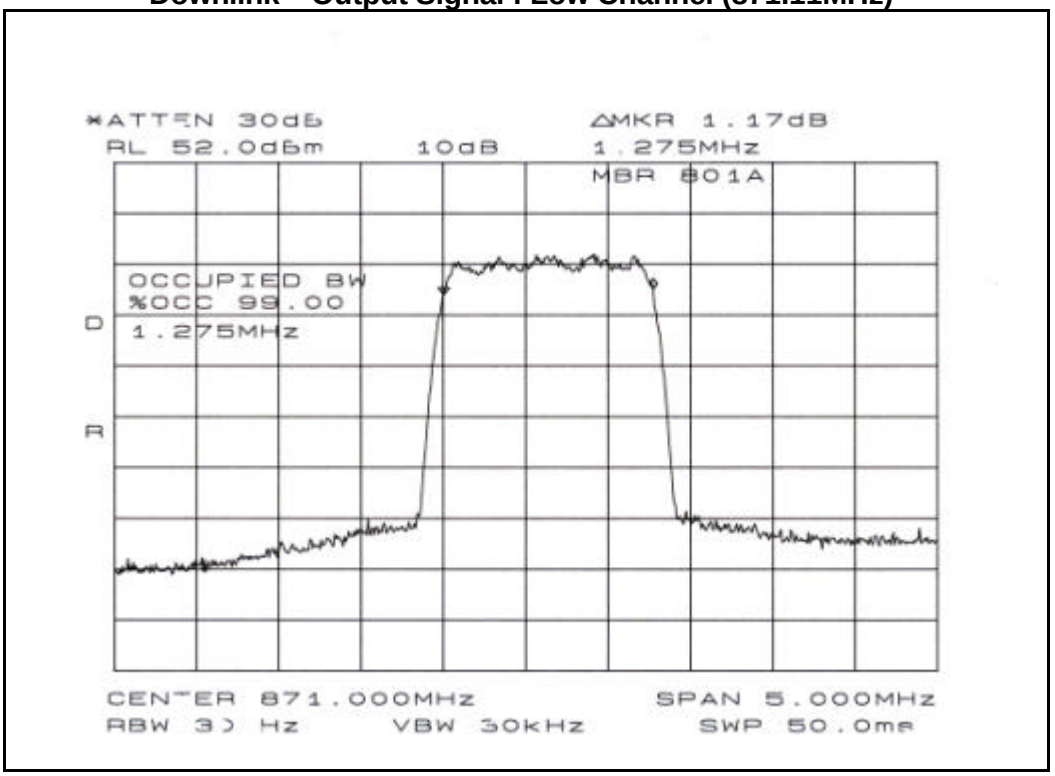
Uplink – Output Signal : High Channel (833.49MHz)



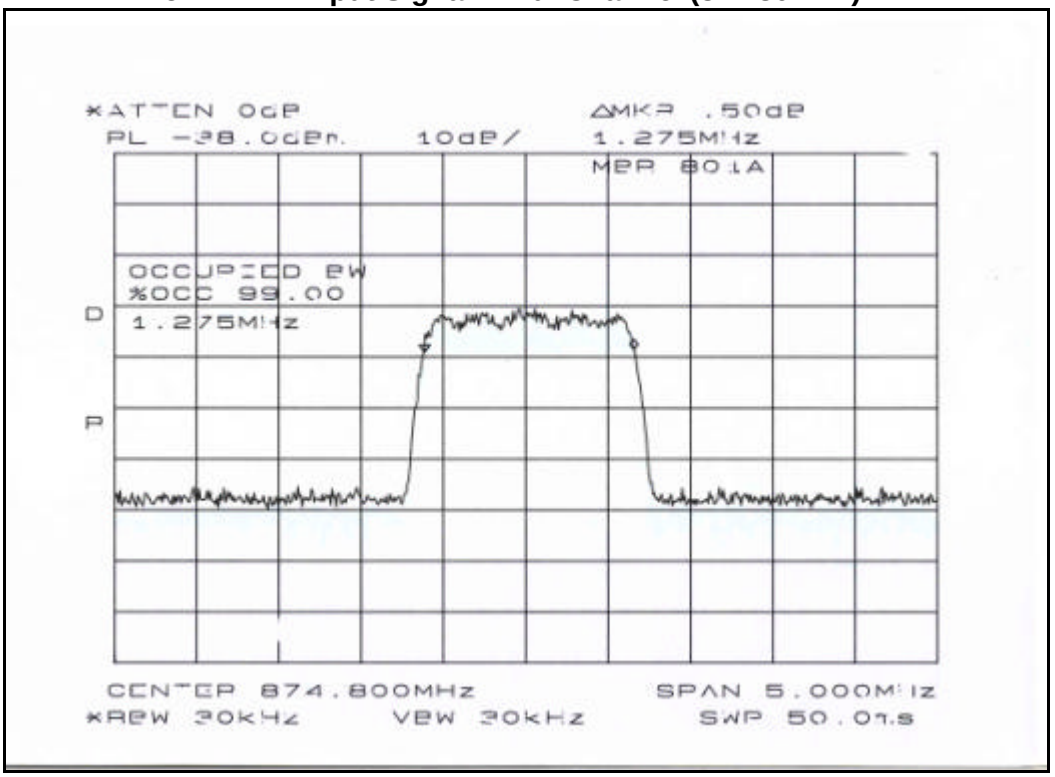
Downlink – Input Signal : Low Channel (871.11MHz)



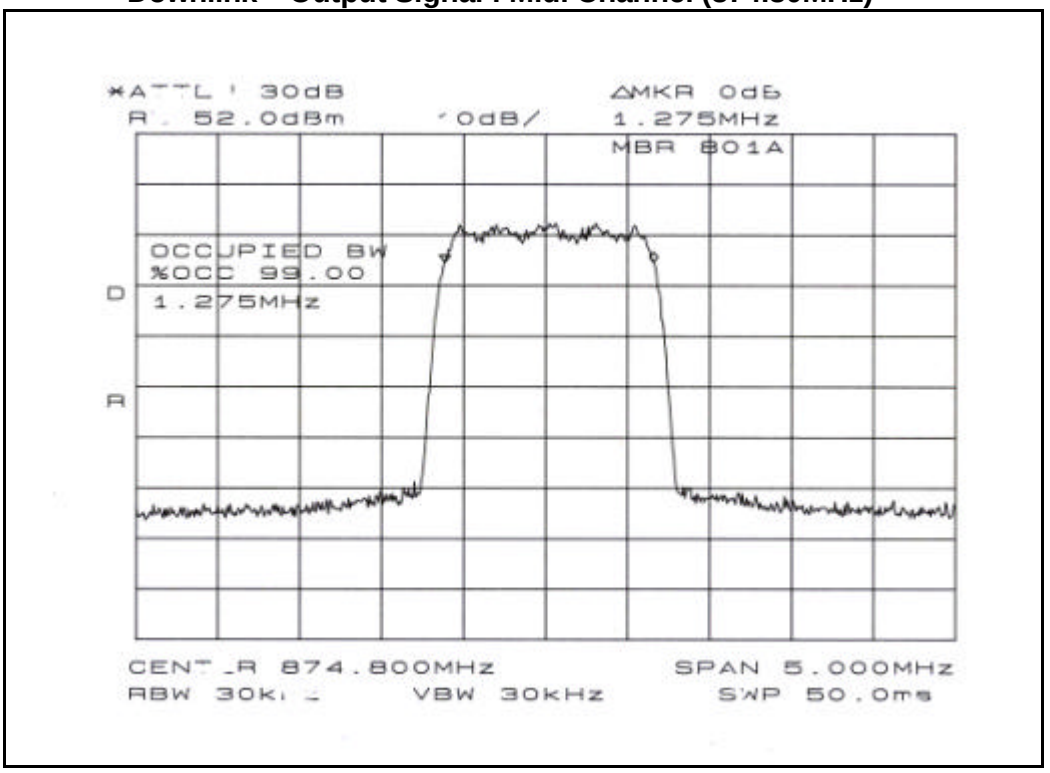
Downlink – Output Signal : Low Channel (871.11MHz)



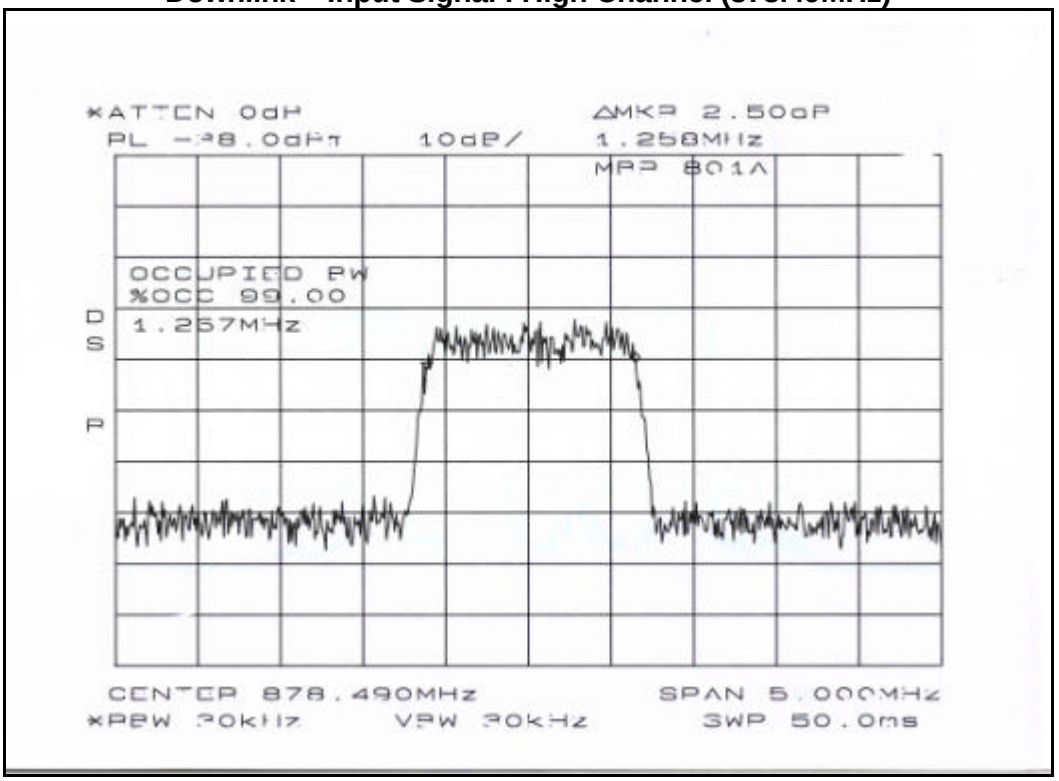
Downlink – Input Signal : Mid. Channel (874.80MHz)



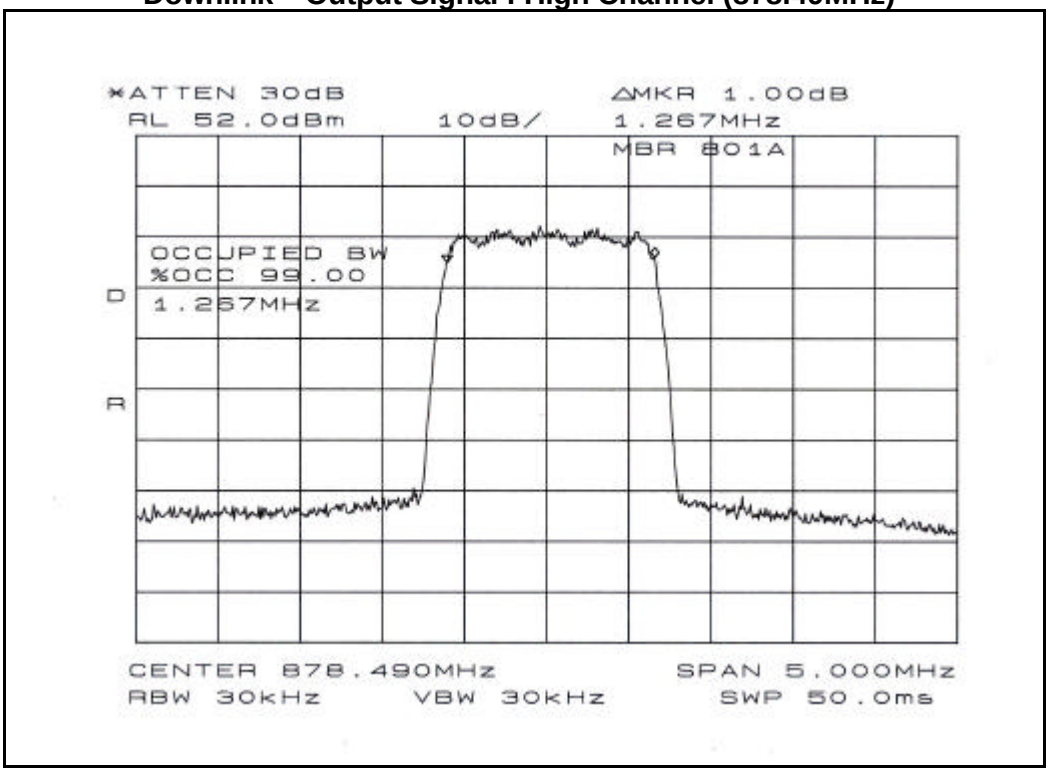
Downlink – Output Signal : Mid. Channel (874.80MHz)



Downlink – Input Signal : High Channel (878.49MHz)



Downlink – Output Signal : High Channel (878.49MHz)



7. TEST DATA

7.3 Spurious Emission at Antenna Termianal

Test Standard :	FCC Part 22.917(e) & 2.1051
Operating Frequency :	Downlink 870 - 880 MHz Uplink 825 - 835 MHz
Channel :	Low / Mid/ High
RF Power Output :	Downlink 10 Watts (40 dBm) Uplink 2.5 Watt (34dBm)

Downlink (Forward)

Frequency Range	Limit (dBm)	Measured Emission Level (dBm)		
		Low	Mid	High
30MHz < f_0 < 1GHz	< -13 dBm	-72.50	-72.50	-72.33
1GHz < f_0 < 12.5GHz	< -13 dBm	-41.50	-41.33	-42.33

Uplink (Reverse)

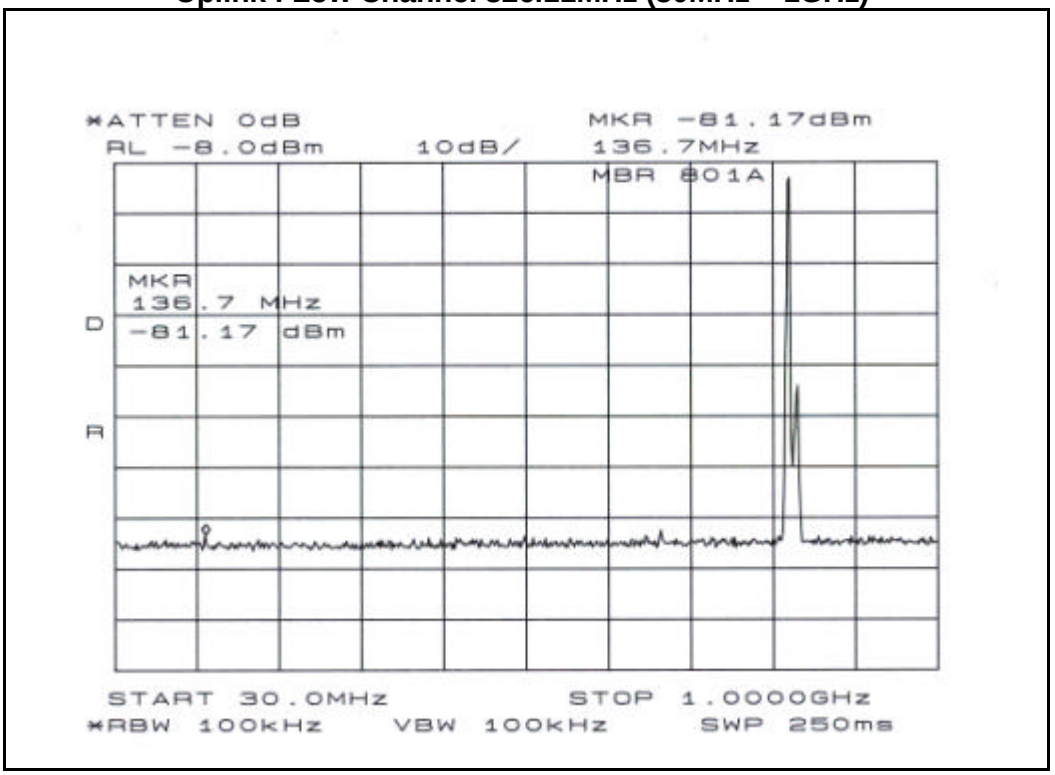
Frequency Range	Limit (dBm)	Measured Emission Level (dBm)		
		Low	Mid	High
30MHz < f_0 < 1GHz	< -13 dBm	-81.17	-86.83	-77.50
1GHz < f_0 < 12.5GHz	< -13 dBm	-58.67	-55.00	-58.17

Note :

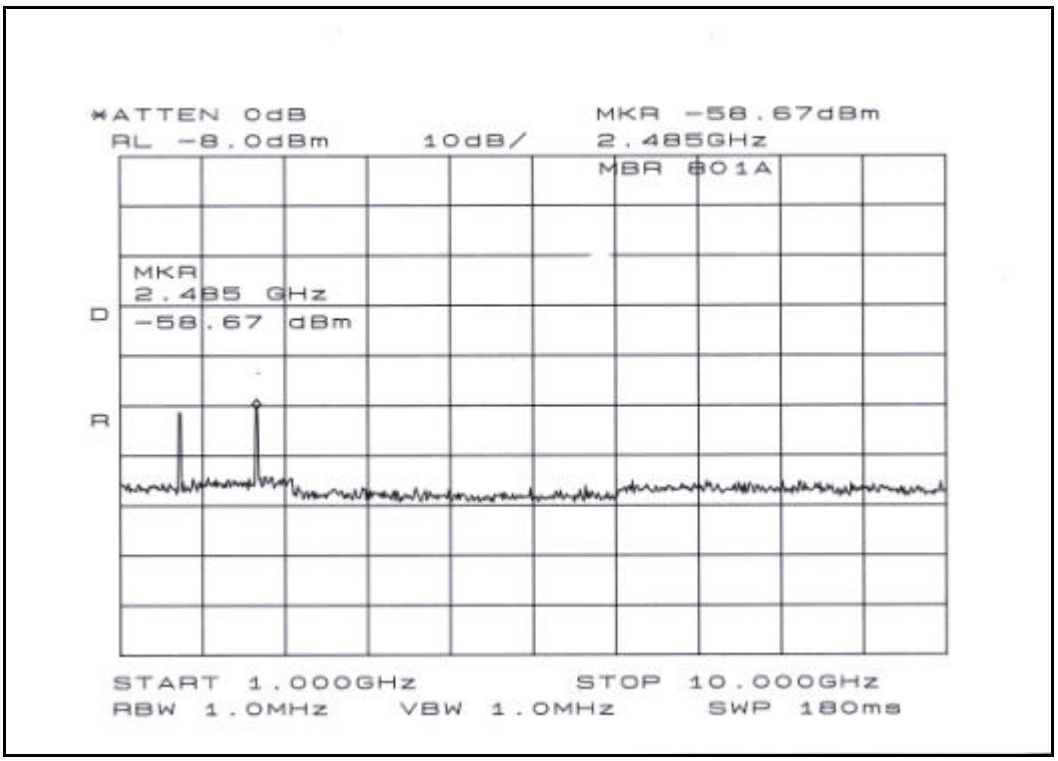
1. *The input to the amplifier is CDMA modulated signal tuned such that the output power is set to its maximum rated output power.*
2. *The RF output ports were properly terminated by the RF load and were connected to the RF Power Meter and Spectrum analyzer through the directional coupler.*
3. *The spectrum analyzer for this measurement was set with the RBW 100kHz in the range of 30MHz ~1GHz, and RBW 1MHz in the range of 1GHz~12.5GHz, as recorded in the plots. The VBW was set the same as RBW.*
4. *The measurements were performed at the shielded room.with environmental conditions of 21℃, 43%RH*
5. *Plots were taken with single input at low, mid, and high of the band. Plots were taken of the out-of-band emissions from 30MHz to the 10th harmonic of the carrier frequency.*
6. *For measuring emissions above 0.9 GHz, a high-pass filter was used to eliminate the fundamental transmit frequency to prevent possible saturation effects on the front end of the spectrum analyzer.*
7. *The emissions shall not be more than 43 + 10 log (P) dBc below the mean power output, which is equivalent to –13 dBm.*
8. *Downlink channel frequency Low : 871.11MHz, Mid : 874.80MHz, High : 878.49MHz*
   Uplink channel frequency Low : 826.11MHz, Mid : 829.80MHz, High : 833.49MHz

Spurious Emission Test Plot

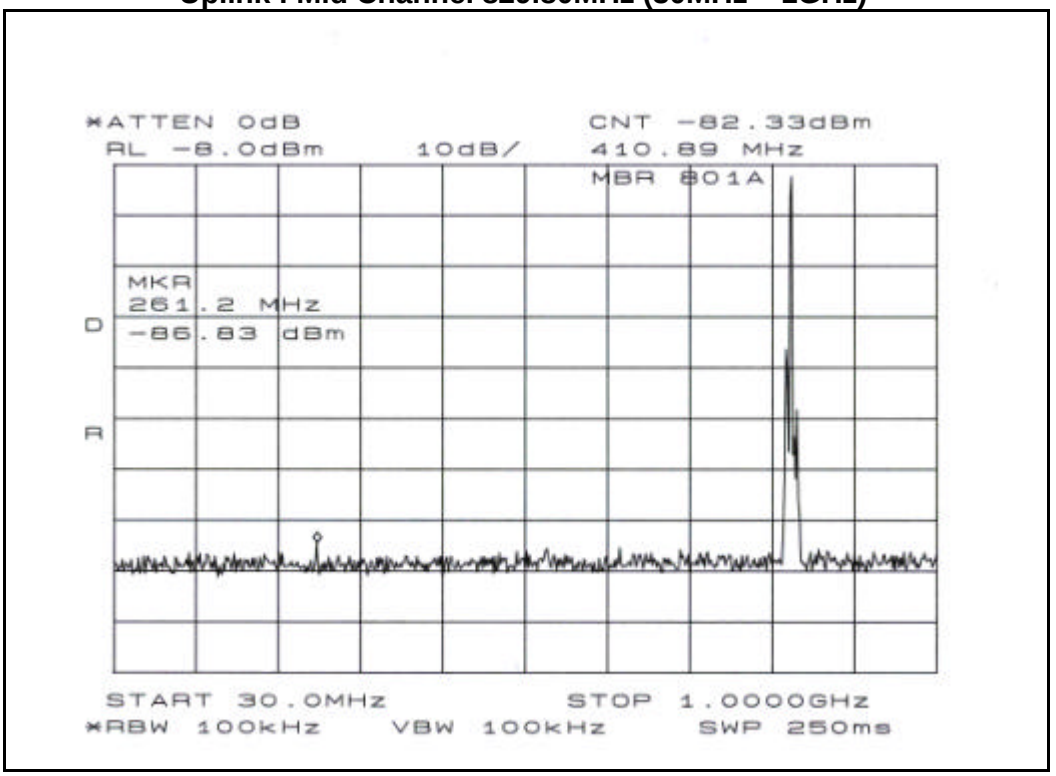
Uplink : Low Channel 826.11MHz (30MHz ~ 1GHz)



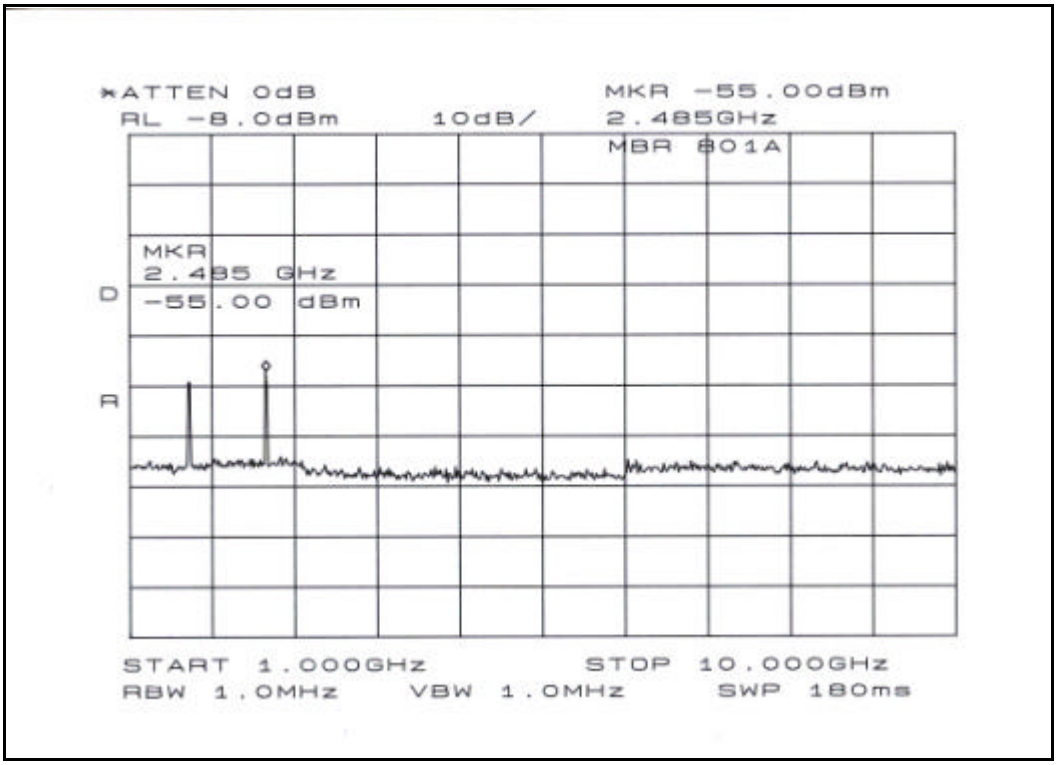
Uplink : Low Channel 826.11MHz (1GHz ~ 10GHz)



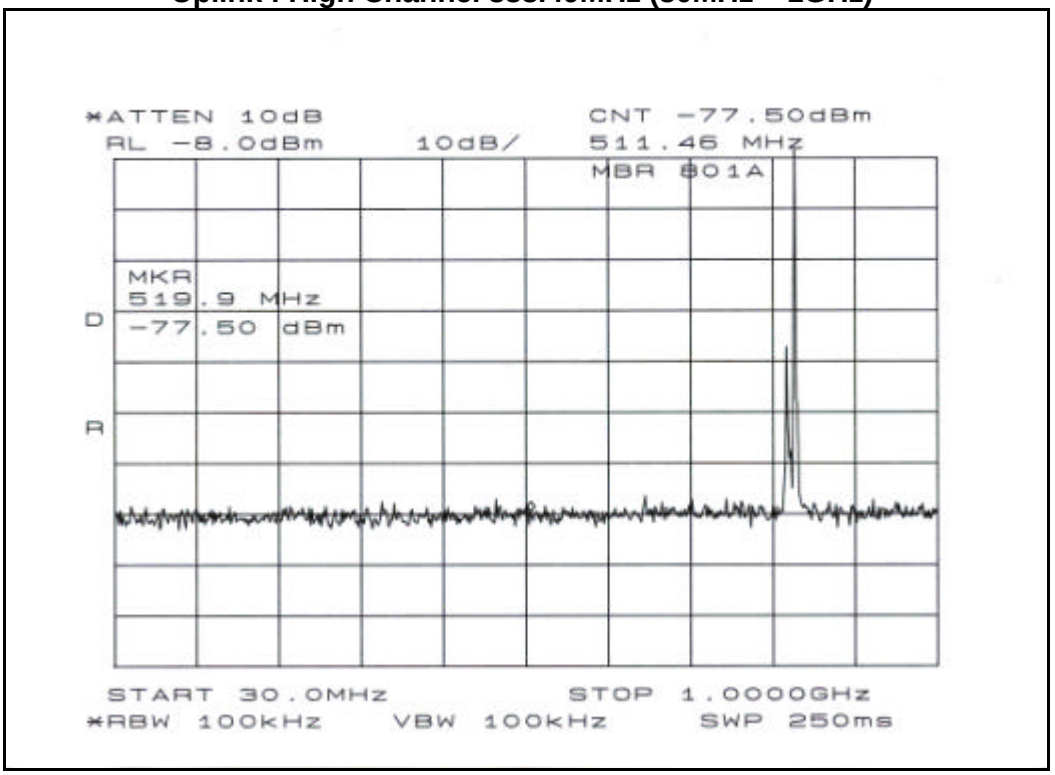
Uplink : Mid Channel 829.80MHz (30MHz ~ 1GHz)



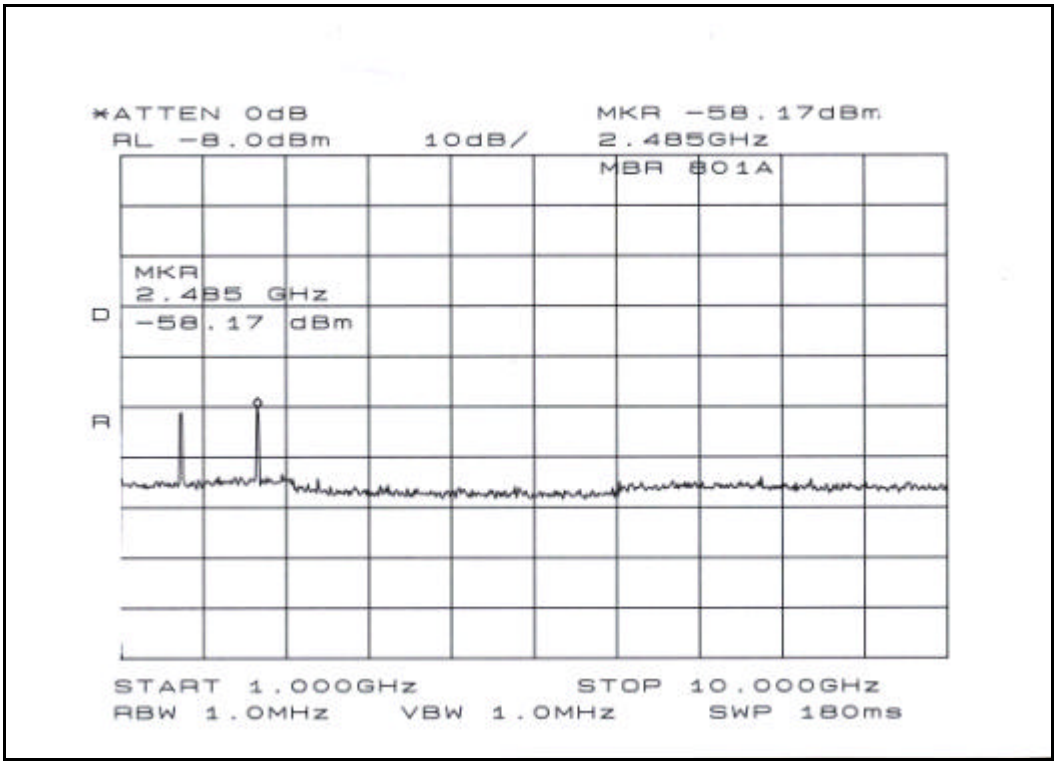
Uplink : Mid Channel 829.80MHz (1GHz ~ 10GHz)



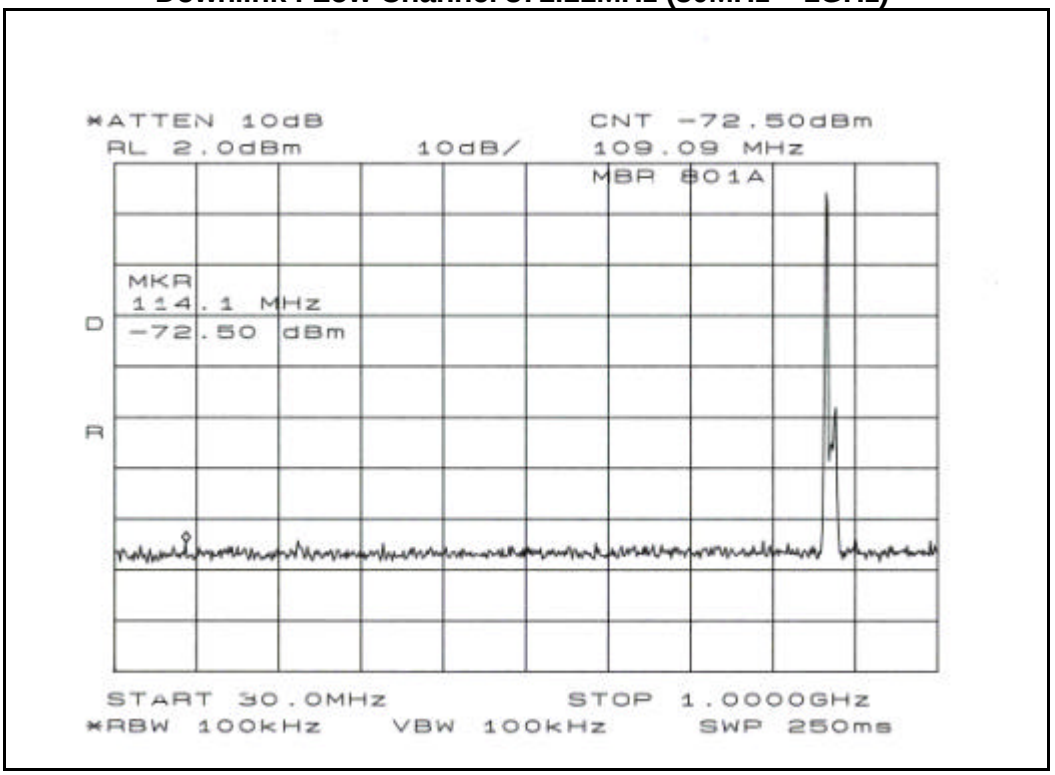
Uplink : High Channel 833.49MHz (30MHz ~ 1GHz)



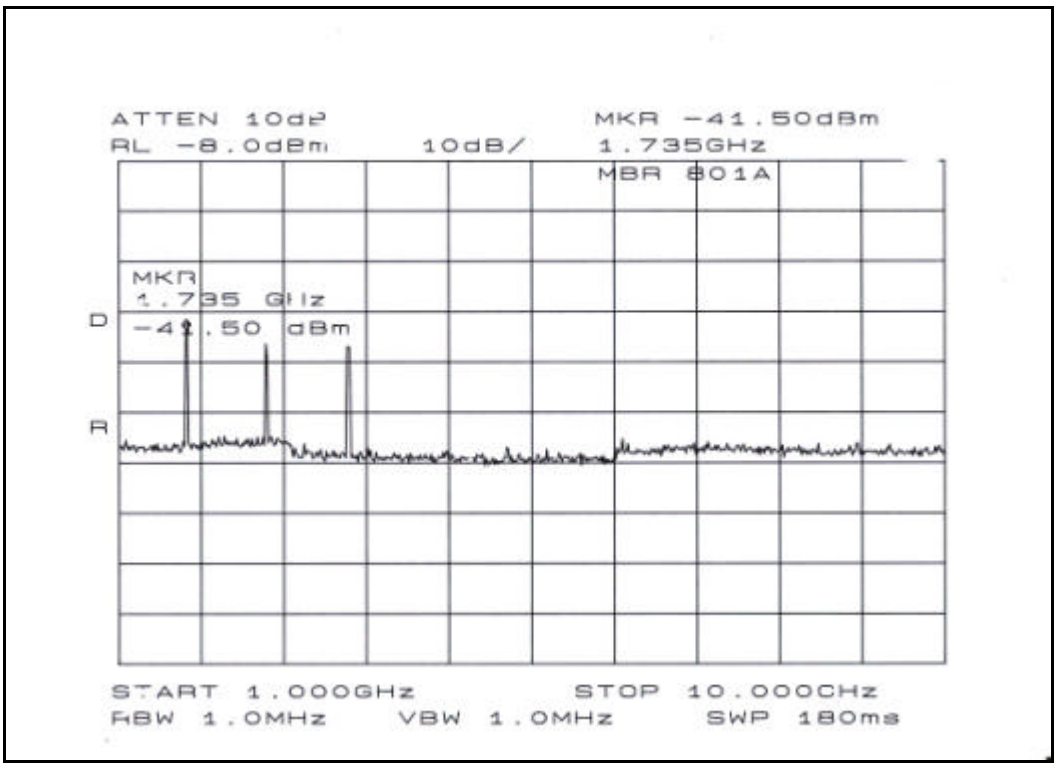
Uplink : Low Channel 833.49MHz (1GHz ~ 10GHz)



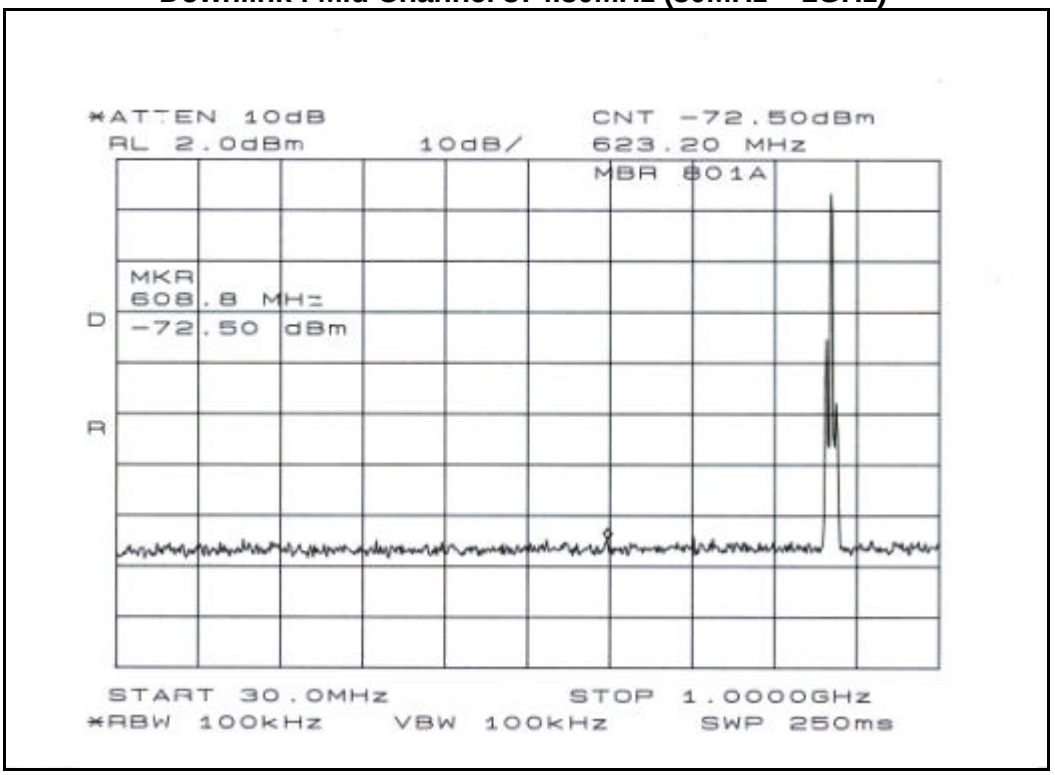
Downlink : Low Channel 871.11MHz (30MHz ~ 1GHz)



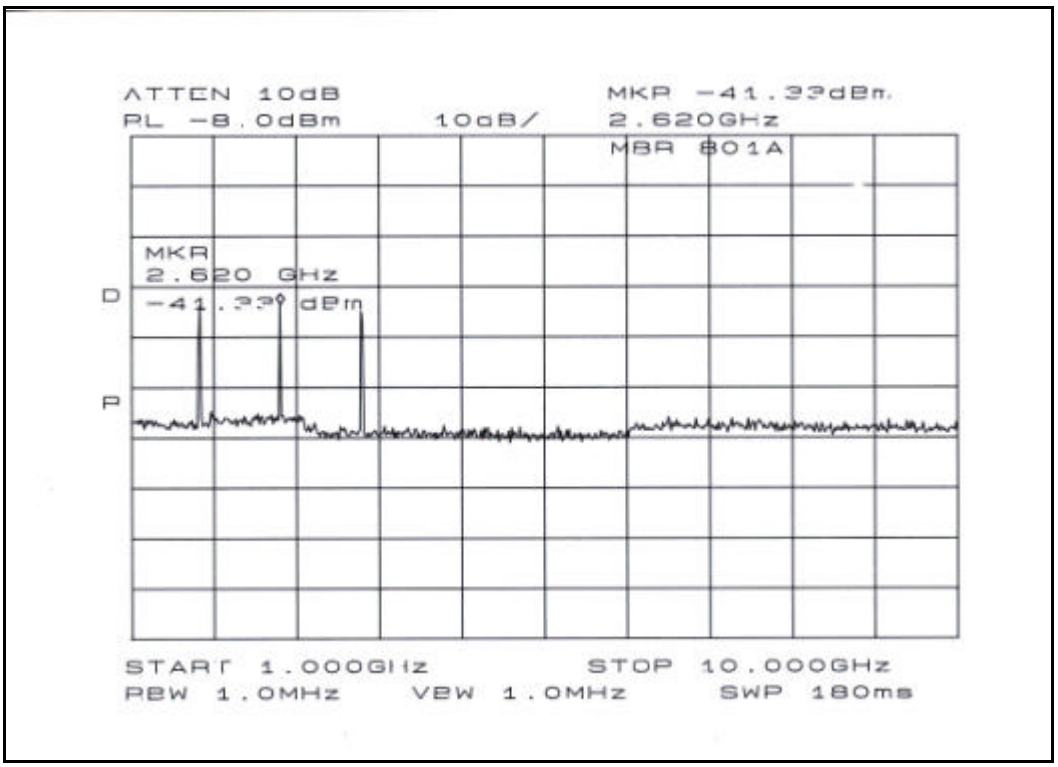
Downlink : Low Channel 871.11MHz (1GHz ~ 10GHz)



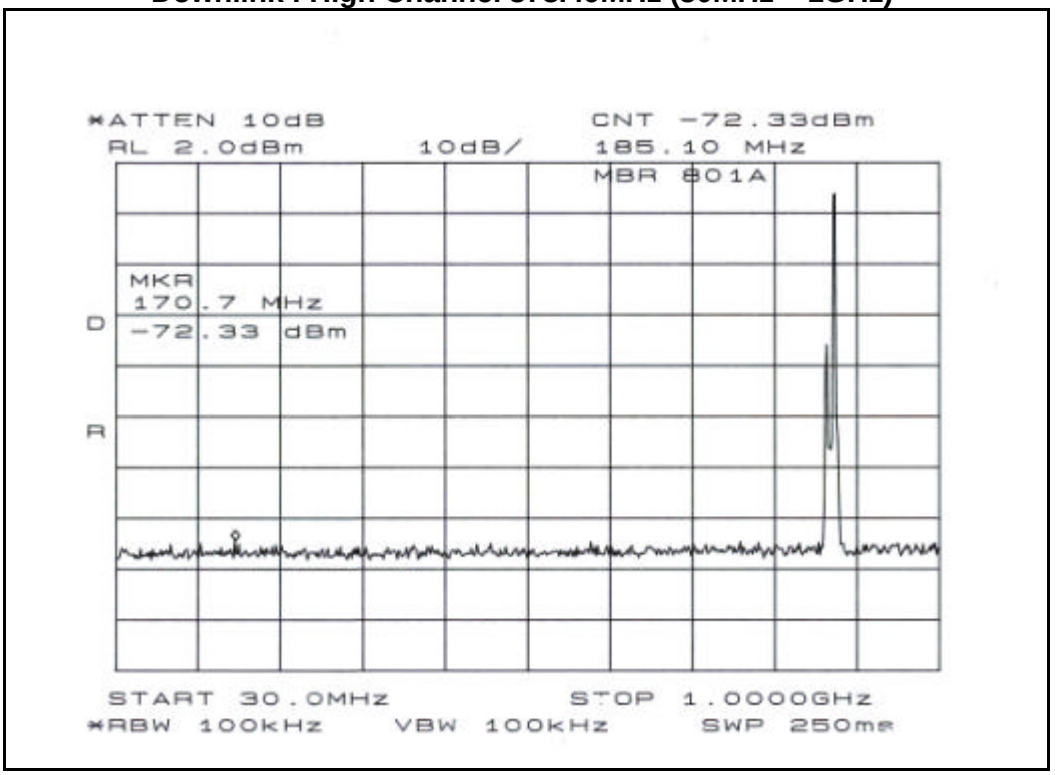
Downlink : Mid Channel 874.80MHz (30MHz ~ 1GHz)



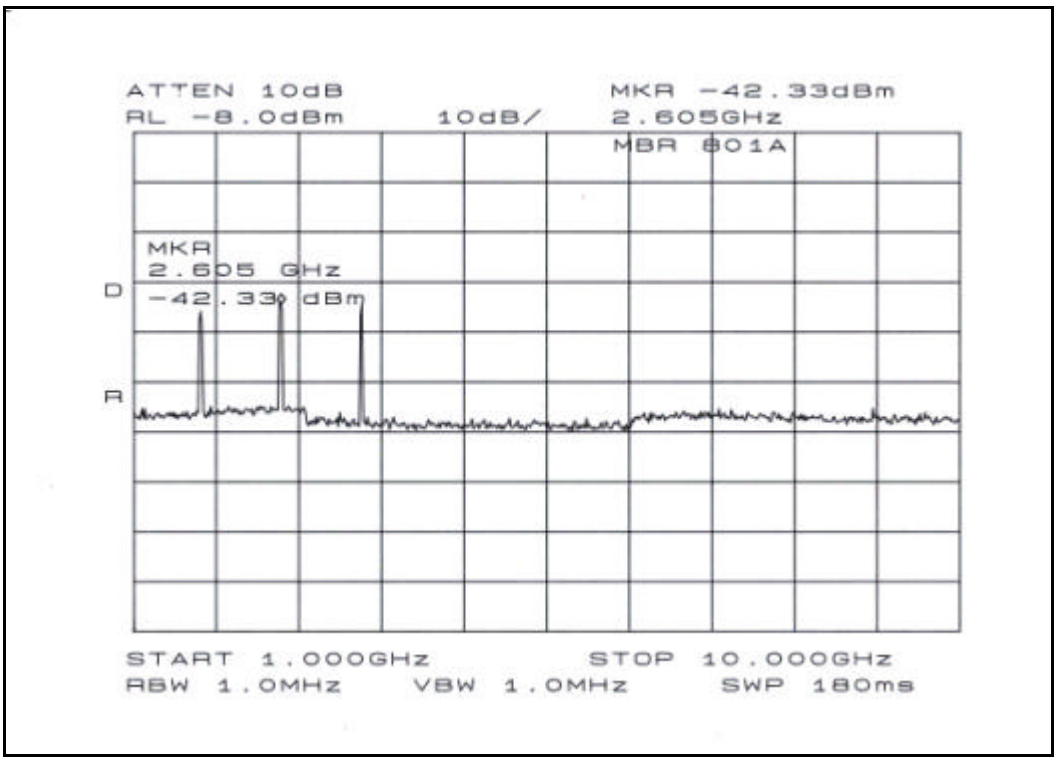
Downlink : Mid Channel 874.80MHz (1GHz ~ 10MHz)



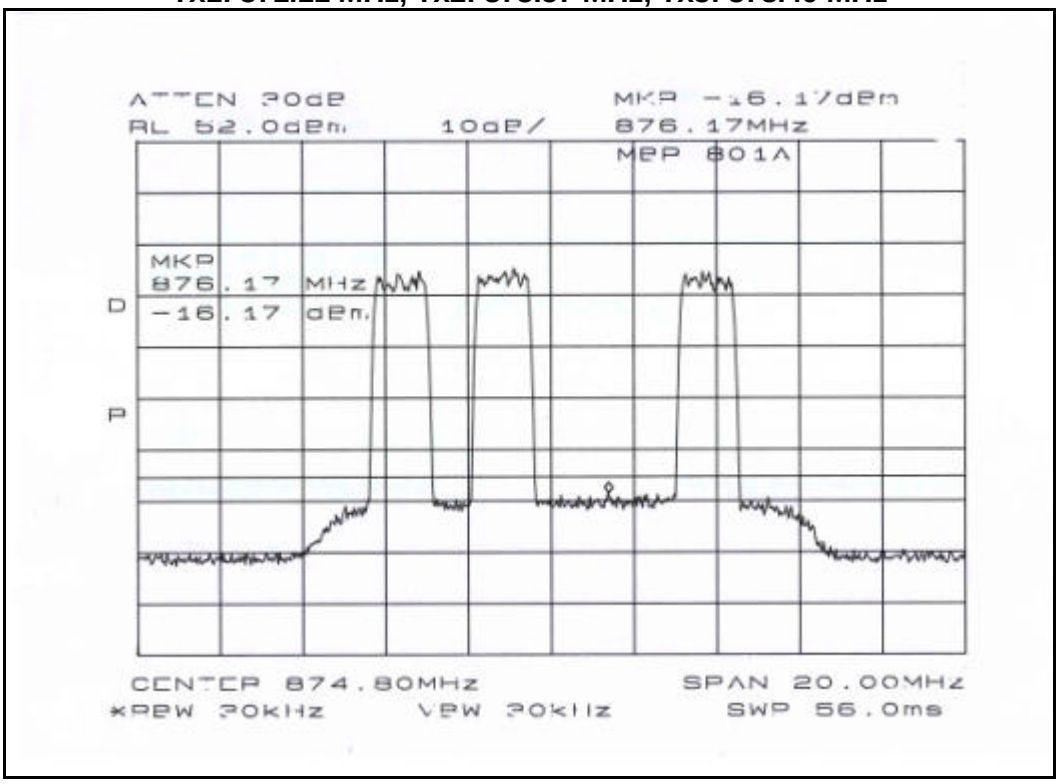
Downlink : High Channel 878.49MHz (30MHz ~ 1GHz)



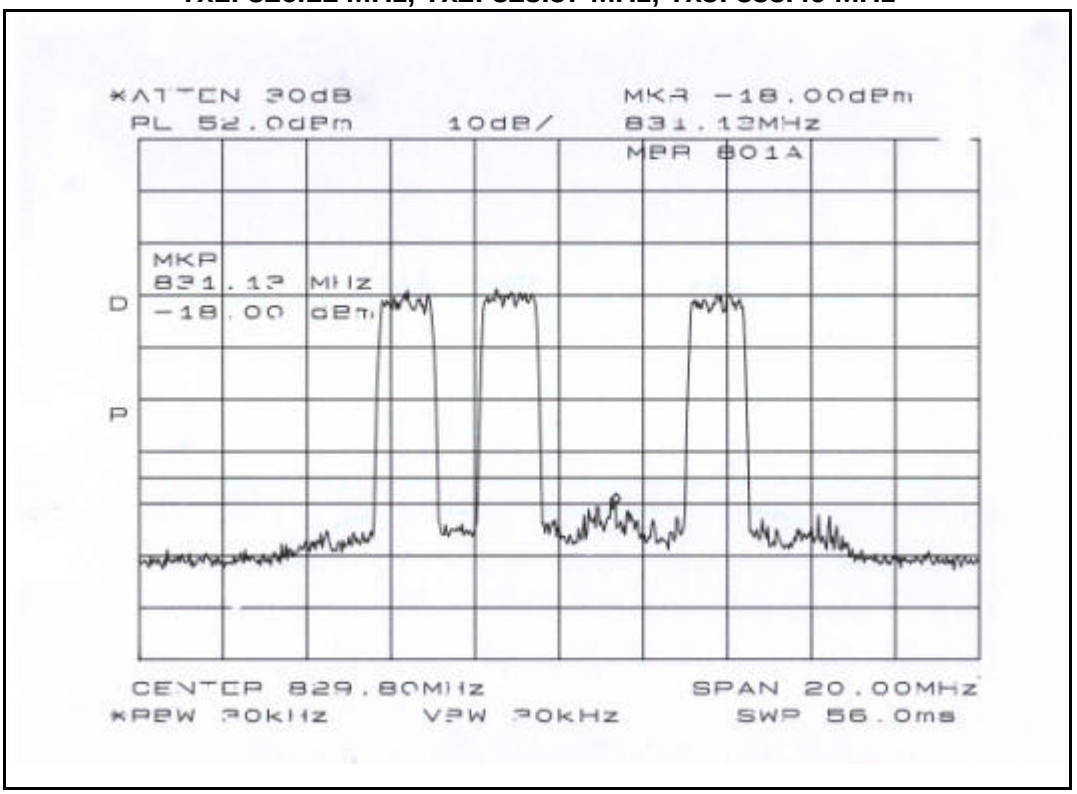
Downlink : High Channel 878.49MHz (1MGz ~ 10GHz)



Downlink : CDMA Intermodulation
Tx1: 871.11 MHz, Tx2: 873.57 MHz, Tx3: 878.49 MHz



Uplink : CDMA Intermodulation
Tx1: 826.11 MHz, Tx2: 828.57 MHz, Tx3: 833.49 MHz



7. TEST DATA

7.4 Field Strength of Spurious Radiation

FCC Rules :	FCC Part 22.917(e) & 2.1051
Operating Frequency :	Downlink 870 - 880 MHz
Channel :	Low / Mid / High
Rated Output Power :	Downlink 10 Watts (40 dBm)
RF Input Signal :	CDMA modulated signal
Distance :	3 meters

Frequency Tuned (MHz)	Antenna Polarization (V/H)	Signal GEN. Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
1742.2	H	-47.7	7.9	-39.8	-13.0	-26.8
1749.6	H	-50.9	7.9	-43.0	-13.0	-30.0
1757.0	H	-49.5	7.9	-41.6	-13.0	-28.6
2613.3	H	-48.8	8.6	-40.2	-13.0	-27.2
2624.4	V	-45.8	8.6	-37.2	-13.0	-24.2
2635.5	H	-51.2	8.6	-42.6	-13.0	-29.6
3484.4	V	-50.2	10.5	-39.7	-13.0	-26.7
3499.2	V	-52.8	10.4	-42.4	-13.0	-29.4
3513.9	V	-54.9	10.4	-44.5	-13.0	-31.5

Note :

1. *The spectrum bandwidth was set to RBW 100 kHz (freq. up to 1GHz) and RBW 1 MHz(freq above 1GHz).*
2. *Transmitter was set to the rated power output(10 watts) condition.*
3. *The spectrum was checked from 30 MHz up to the 10th harmonic of the carrier frequency.*
4. *All emission not reported were found to be more than 30dB below the limit.*
5. *The EUT was positioned through 3 orthogonal axis and worst-case are reported.*
6. *ERP measurements were performed using the rated supply voltage condition(AC 110V).*
7. *The limit was applied according to the 43 +10log(P)dBc.*
8. *Downlink channel frequency Low : 871.11MHz, Mid : 874.80MHz, High : 878.49MHz*

7. TEST DATA

7.4 Field Strength of Spurious Radiation(Continued)

FCC Rules :	FCC Part 22.917(e) & 2.1051
Operating Frequency :	Uplink 825 - 835 MHz
Channel :	Low / Mid / High
Rated Output Power :	Uplink 2.5 Watts (34 dBm)
RF Input Signal :	CDMA modulated signal
Distance :	3 meters

Frequency Tuned (MHz)	Antenna Polarization (V/H)	Signal GEN. Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
1652.2	H	-63.2	7.6	-55.6	-13.0	-42.6
1659.6	H	-61.4	7.6	-53.8	-13.0	-40.8
2478.3	H	-60.7	8.3	-52.4	-13.0	-39.4
2489.4	V	-55.8	8.3	-47.5	-13.0	-34.5
3304.4	V	-61.2	10.6	-50.6	-13.0	-37.6
3319.2	V	-60.0	10.6	-49.4	-13.0	-36.4

Note :

1. *The spectrum bandwidth was set to RBW 100 kHz (freq. up to 1GHz) and RBW 1 MHz(freq above 1GHz).*
2. *Transmitter was set to the rated power output(2.5 watts) condition.*
3. *The spectrum was checked from 30 MHz up to the 10th harmonic of the carrier frequency.*
4. *All emission not reported were found to be more than 40dB below the limit.*
5. *The EUT was positioned through 3 orthogonal axis and worst-case are reported.*
6. *ERP measurements were performed using the rated supply voltage condition(AC 110V).*
7. *The limit was applied according to the 43 +10log(P)dBc.*
8. *Uplink channel frequency Low : 826.11MHz, Mid : 829.80MHz, High : 833.49MHz*

7. TEST DATA

7.5 Frequency Stability

Test Specification :	FCC Part 22.355
Operating Frequency :	Downlink : 870 - 880 MHz
Channel :	Mid (874.80MHz)
Reference Voltage :	110 VAC
Power Output :	Downlink 10 Watts (40 dBm)

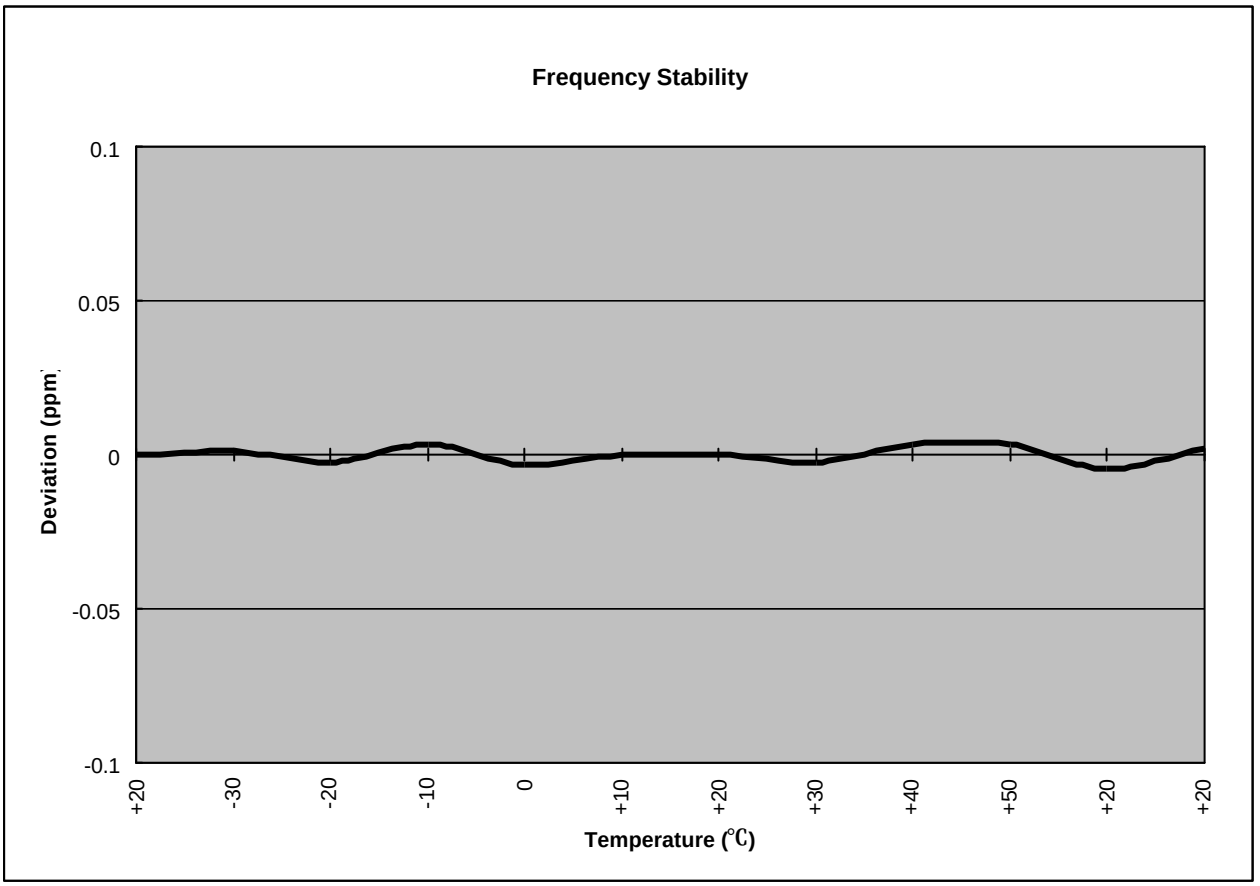
Downlink (874.80MHz)

Voltage (%)	Power Supply (VDC)	Temperature (°C)	Frequency (Hz)	Deviation (ppm)
100 %	7.20	+20(Ref)	874,800,015	0
100 %		- 30	874,800,016	0.0011
100 %		- 20	874,800,013	-0.0023
100 %		- 10	874,800,018	0.0034
100 %		0	874,800,012	-0.0034
100 %		+ 10	874,800,015	0
100 %		+ 20	874,800,015	0
100 %		+ 30	874,800,013	-0.0023
100 %		+40	874,800,018	0.0034
100 %		+50	874,800,018	0.0034
85 %	6.12	+ 20	874,800,011	-0.0046
115 %	8.28	+ 20	874,800,017	0.0022

Note :
1. *The worst-case temperature deviation was recorded.*

7. TEST DATA

7.5 Frequency Stability (Continued)



7. TEST DATA

7.5 Frequency Stability (Continued)

Test Specification :	FCC Part 22.355
Operating Frequency :	Uplink : 870 - 880 MHz
Channel :	Mid (829.8MHz)
Reference Voltage :	110 VAC
Power Output :	Uplink 2.5 Watts (34 dBm)

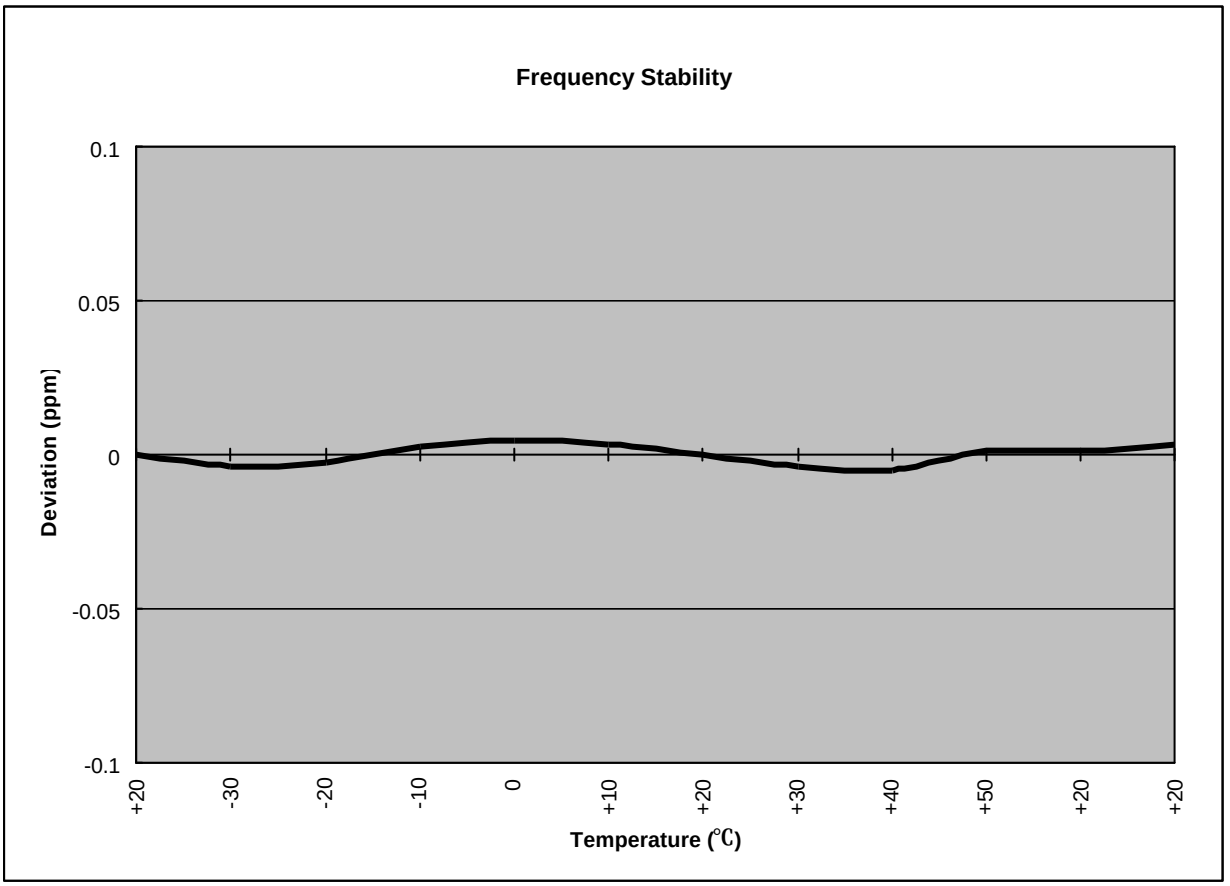
Uplink (829.80MHz)

Voltage (%)	Power Supply (VDC)	Temperature (°C)	Frequency (Hz)	Deviation (ppm)
100 %	7.20	+20(Ref)	829,800,016	0
100 %		- 30	829,800,013	-0.0036
100 %		- 20	829,800,014	-0.0024
100 %		- 10	829,800,018	0.0024
100 %		0	829,800,020	0.0048
100 %		+ 10	829,800,019	0.0036
100 %		+ 20	829,800,016	0
100 %		+ 30	829,800,013	-0.0036
100 %		+40	829,800,012	-0.0048
100 %		+50	829,800,017	0.0012
85 %	6.12	+ 20	829,800,017	0.0012
115 %	8.28	+ 20	829,800,019	0.0036

Note :
1. The worst-case temperature deviation was recorded.

7. TEST DATA

7.5 Frequency Stability (Continued)



8. TEST EQUIPMENT LIST

List of Test Equipments Used for Measurements

Test Equipment	Model	Mfg.	Serial No.	Cal. Due Date
Spectrum Analyzer	8563E	H.P.	3611A05046	03-05-15
Spectrum Analyzer	8594E	H.P.	3911A08040	03-05-15
Spectrum Analyzer	E7403A	ADVANTEST	61720002	03-08-22
Receiver	ESH3	R & S	892580/014	03-05-21
Signal Generator	E4432B	H.P.	US40053157	03-05-15
Signal Generator	SGT9000	GIGATRONICS	9604010	03-05-15
Power Meter	E4418A	H.P.	GB38272621	03-05-15
Power Sensor	8481A	H.P.	3318A92101	03-05-15
Audio Analyzer	8903B	H.P.	3011A09344	03-05-27
Modulation Analyzer	8901B	H.P.	3028A03124	03-05-30
Synthesized Function Generator	SG-4111	IWATSU	35559	03-05-09
Broadband Power Amplifier	100W 10000M 11	Amplifier Research	18649	03-03-19
Broadband Power Amplifier	75A220	Amplifier Research	15326	03-12-16
Preamplifier	8447E	H.P.	2945A02712	03-08-19
Preamplifier	HP 8347A	HP	2834A00544	03-05-23
Band Reject Filter	CCF811-874.8/8.61-20A	MICROWAVE TECH	-	03-07-18
Band Reject Filter	CCF811-829.8/8.61-20A	MICROWAVE TECH	-	03-07-18
Horn Antenna	BBHA 9120 D	Schwarz Beck	234	03-06-20
Horn Antenna	BBHA 9170	Schwarz Beck	157	03-06-20
Horn Antenna	3115	EMCO	9809-2334	03-09-20
Dipole Antenna	VDA6106A	Schaffner-chase	1277	03-09-13
Dipole Antenna	UHA9105	Schaffner-chase	91052168	03-09-13
Dipole Antenna	VHAP	Schwarz Beck	964	03-05-03
Dipole Antenna	UHAP	Schwarz Beck	949	03-05-03
Biconical Antenna	VHA9103	Schwarzbeck	-	03-09-12
Log Periodic Antenna	UPA6109	SCHAFFNER	1076	03-09-12
TriLog Antenna	VULB9160	Schwarz Beck	3122	03-05-08
Bilog	CBL6140A	Chase	1144	03-08-26
Attenuator	8325	BIRD	4572	03-06-27
Attenuator	RFA500NMF30	RFA500NMF30	9522	03-01-28
Termination	8173	BIRD	2501	
Dual directional coupler	772D	H.P.	2839A00395	03-01-28
Dual directional coupler	778D	H.P.	1144A08477	03-10-28
CDMA-Coupler	DJDC-C30-NS	DONGJIN	-	03-07-18
LISN	L3-25	PMM	1110KT0403	03-10-02
LISN	KNW-242C	PMM	8-920-20	03-08-31
Digital Oscilloscope	TDS3032	Tektronix	B081558	03-06-18
Turn-Table	JAC-2	JAEMC	-	
Antenna Master	JAC-1	Daeil EMC	-	
Plotter	7550A	H.P	2725A 75529	
EMC Anechoic Chamber	-	SEMITECH	000815	
Temp/Humidity Chamber	-	Seo jin	-	03-09-05
Thermo Hygrograph	PC-5000TRH-II	SATO	-	03-10-27
BaroMeter	KEIRYOKI	SATO	564021	03-07-18
Slidacs	DeaKyong Slidacs	DeaKyong	-	-