Measurement of RF Emissions from a Mobile Repeater, Model No. B8001900

For : RES Limited
Elgin, IL

P.O. No. : 780-0000001989
Date Received : August 30, 2004
Dates Tested : August 30 through September 7, 2004
Test Personnel : Daniel E. Crowder, EMC Engineer
Specification : FCC "Code of Federal Regulations" Title 47 Parts 22 and 24

Test Report By :

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Witnessed by :

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Measurement of RF Emissions from a Mobile Repeater, Model No. B8001900

1.0 INTRODUCTION:

1.1 DESCRIPTION OF TEST ITEM: During the period of August 30, 2004 through September 7, 2004, a series of radio interference measurements were performed on a RES Limited Mobile Repeater, model B8001900, serial number 31, (hereinafter referred to as the test item). The tests were performed for RES Limited of Elgin, IL.

The test item is a single channel Mobile Repeater that operates in the 800MHz Cellular bands, 824MHz to 849MHz and 869MHz to 894MHz or PCS blocks A through F, 1930 through 1990 and 1850 through 1910. The test item has a rated gain of 50dB.

1.2 PURPOSE: The test series was performed to determine if the test item meets the technical requirements of FCC Part 22 for 800MHz cellular radio and FCC Part 24 for broadband PCS,**.**

1.3 DEVIATIONS, ADDITIONS AND EXCLUSIONS: There were no deviations, additions to, or exclusions from the test specification during this test series.

1.4 APPLICABLE DOCUMENTS: The following documents of the exact issue designated form part of this document to the extent specified herein:

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 22, dated 1 October 2003

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 24, dated 1 October 2003

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 2, dated 1 October 2003

- ANSI C63.4-2001, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"

1.5 SUBCONTRACTOR IDENTIFICATION: This series of tests was performed by Elite Electronic Engineering Incorporated, of Downers Grove, Illinois. The laboratory is accredited by the National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP Lab Code: 100278-0.

1.6 LABORATORY CONDITIONS: The temperature at the time of the test was 22°C and the relative humidity was 21%.

2.0 TEST ITEM SETUP AND OPERATION:

2.1 POWER INPUT: The test item obtained 13.7VDC through two 1.8 meter long, unshielded power leads.

2.2 GROUNDING: The test item was ungrounded during the tests.

2.3 PERIPHERAL EQUIPMENT: The following peripheral equipment was submitted with the test item:

ITEM	DESCRIPTION
HP Signal Generator	M/N E4432B, S/N VS39440973

The output of the signal generator was connected to the test item through a 0.2 meter long coaxial cable.

2.4 MODULATION: For occupied bandwidth, band edge compliance and antenna conducted emissions data, the test signals were modulated with four different representative types of modulations: (1) Amps (FM) 30kHz modulation, (2) Digital modulation - CDMA 1.23 MHz, (3) Digital modulation - GSM 300 kHz and (4) Digital modulation - TDMA 30 kHz. The modulated input signals were supplied from an HP M/N E4432B Signal Generator.

For radiated emissions data, the test signal was unmodulated.

2.5 FREQUENCY SELECTION: For part 22 testing, one test frequency was used for each frequency band. For the uplink frequency band all tests were performed at 824MHz, 836.5MHz and 849MHz. For the downlink frequency band all tests were performed at 869MHz, 881.5MHz and 894MHz.

For the part 24 testing, the radiated spurious emissions test, three test frequencies for both uplink and downlink, one at the low edge of Block A, one in the middle of the low edge and the high edge, one at the high edge of Block C, were selected. The frequencies were one channel spacing from the low or high edge of the frequency range edge.

The specified channel spacing used for each modulation type is shown below:

Modulation	Channel Spacing
AMPS	30kHz
CDMA	1.23MHz
GSM	300kHz
TDMA	30kHz

The specific test frequencies are designated as follows:

Modulation Type	Low Edge Frequency MHz	High Edge Frequency MHz	Low Frequency MHz	Middle Frequency MHz	High Frequency MHz
Downlink RF Power Output test, Occupied Bandwidth test, Spurious Emissions at Antenna Terminal test					
AMPS				881.5	
CDMA				881.5	
GSM				881.5	
TDMA				881.5	
Downlink, Field Strength of Spurious Emissions test					
AMPS			869	881.5	894
CDMA			869	881.5	894
GSM			869	881.5	894
TDMA			869	881.5	894
Uplink RF Power Output test, Occupied Bandwidth test, Spurious Emissions at Antenna Terminal test					
AMPS				836.5	
CDMA				836.5	
GSM				836.5	
TDMA				836.5	
Uplink, Field Strength of Spurious Emissions test					
AMPS			824	836.5	849
CDMA			824	836.5	849
GSM			824	836.5	849
TDMA			824	836.5	849
Downlink RF Power Output test, Occupied Bandwidth test, Spurious Emissions at Antenna Terminal test					
AMPS	1930.03	1989.97			
CDMA	1931.23	1988.77			
GSM	1930.3	1989.7			
TDMA	1930.03	1989.97			
Downlink, Field Strength of Spurious Emissions test					
AMPS			1935	1955	1985
CDMA			1935	1955	1985
GSM			1935	1955	1985
TDMA			1935	1955	1985
Uplink RF Power Output test, Occupied Bandwidth test, Spurious Emissions at Antenna Terminal test					
AMPS	1850.03	1909.97			
CDMA	1851.23	1908.77			
GSM	1850.3	1909.7			
TDMA	1850.03	1909.97			
Uplink, Field Strength of Spurious Emissions test					
AMPS			1855	1875	1905
CDMA			1855	1875	1905
GSM			1855	1875	1905
TDMA			1855	1875	1905

2.6 RF POWER OUTPUT: The input levels were adjusted to reach the rated output levels shown below:

Modulation	Rated Power dBm		Rated Power Watts	
	Uplink	Downlink	Uplink	Downlink
Part 22 AMPS	25	15	0.32	0.03
Part 22 CDMA	20	15	0.1	0.03
Part 22 GSM	25	15	0.32	0.03
Part 22 TDMA	25	15	0.32	0.03
Part 24 AMPS	25	15	0.32	0.03
Part 24 CDMA	25	15	0.32	0.03
Part 24 GSM	25	15	0.32	0.03
Part 24 TDMA	25	15	0.32	0.03

3.0 TEST EQUIPMENT:

3.1 TEST EQUIPMENT LIST: A list of the test equipment used can be found on Table I. All equipment was calibrated per the instruction manuals supplied by the manufacturer.

3.2 CALIBRATION TRACEABILITY: Test equipment is maintained and calibrated on a regular basis. All calibrations are traceable to the National Institute of Standards and Technology (NIST).

4.0 REQUIREMENTS, PROCEDURES AND RESULTS:

4.1 RF POWER OUTPUT MEASUREMENTS:

4.1.1 REQUIREMENTS: In accordance with paragraph 22.913, the effective radiated power (ERP) level is allowed up to 7 watts for mobile transmitters.

In accordance with paragraph 24.323, mobile/portable stations are limited to 2 Watts e.i.r.p. peak power and the equipment must employ means to limit the power of the minimum necessary for successful communications.

4.1.2 PROCEDURES: The test item was adjusted for the rated gain. The test item was configured to measure the output for the downlink path.

(a) The input signal was set to 824MHz.

(b) The input signal was not modulated.

(c) The spectrum analyzer was connected to the output of the test item through 50 dB of attenuation and the output of the test item was monitored.

(d) The amplitude of the input signal was adjusted until the rated output level was achieved. The output power level was measured and recorded. The input signal level was also recorded.

(e) Steps (b) through (d) were repeated separately for each frequency listed in paragraph 2.5 above.

4.1.3 RESULTS: The output power measurements are presented on pages 14 through 16.

The remainder of the tests series was performed at these power levels. The power output complies with the FCC requirements.

The EIRP limit does not apply to the power output alone, but the combination of the power output and the antenna. Compliance to the power output will be based on the system configuration. Therefore, the EIRP requirement cannot be directly applied to the test item.

4.2 OCCUPIED BANDWIDTH MEASUREMENTS:

4.2.1 REQUIREMENTS:

For AMPS and TDMA modulations, paragraph 22.917(d) states that the mean power of any emission shall be attenuated below the unmodulated carrier power (P) in accordance with the following schedule:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45kHz: at least 26 dB.
(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90kHz: at least 45 dB.
(3) On any frequency removed from the carrier frequency by more than 90 kHz; up to the first multiple of the carrier frequency: at least 60 dB or 43 + 10 log P dB, whichever is the lesser attenuation.

For CDMA modulation, in accordance with paragraph 10.5.1.3 of the TIA/EIA/IS-98-A specification, the mean power of any emission shall be attenuated below the unmodulated carrier power (P) in accordance with the following schedule:

(1) For offset frequencies greater than 900kHz from the CDMA Channel center frequency: At least 42dB
(2) For offset frequencies greater than 1.98MHz from the CDMA Channel center frequency: At least 54dB

For GSM modulation, there is no specific emission mask. To determine compliance the output signal must represent the input signal.

In accordance with Paragraph 24.238(a), on any frequency outside the authorized frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P)dB. For a rated power level of 0.32 watts uplink and 0.03 watts downlink, the emissions outside of the emission bandwidth shall be attenuated at least 38dB uplink and 28dB downlink below the transmitter power.

In the 1MHz bands immediately outside and adjacent to the frequency range a resolution of at least one percent of the emission bandwidth shall be used. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency where the emissions are 38dB down for uplink frequencies and 28dB down for downlink frequencies.

4.2.2 PROCEDURES: The test was performed using each of the modulation types listed in paragraph 2.5 (AMPS, CDMA, GSM, TDMA).

(a) The input signal was set separately to each of the frequencies listed in Para 2.5. The input signal level was adjusted to provide the rated level at the test item output. The reference level was recorded.
(b) The input signal was AMPS modulated.
(c) A spectrum analyzer was connected to the output of the test item. With a bandwidth of the spectrum analyzer set to 300 Hz, the output of the test item was measured and recorded.
(d) The input signal from the signal generator was measured with the spectrum analyzer and recorded over the same frequency range.
(e) The modulation was changed to CDMA and steps (c) and (d) were repeated separately with the input signal set to each of the frequencies listed in Para 2.5. The bandwidth of the spectrum analyzer was set to 30kHz.
(f) The modulation was changed to GSM and steps (c) and (d) were repeated separately with the input signal set to each of the frequencies listed in Para 2.5. The bandwidth of the spectrum analyzer was set to 30kHz.
(g) The modulation was changed to TDMA and steps (c) and (d) were repeated separately with the input signal set to each of the frequencies listed in Para 2.5. The bandwidth of the spectrum analyzer was set to 300Hz.

4.2.3 RESULTS: The plots of the occupied bandwidth measured with all modulations listed above in paragraph 2.4 are presented on pages 17 through 88. The limits, shown on the plots, are referenced to the power measured from the unmodulated carrier.

As can be seen from the data, the test item output met the occupied bandwidth requirements with the AMPS, CDMA, GSM and TDMA modulations of the carrier. The sideband emissions measured at the test item output were similar to the sideband emissions measured from the input signals.

4.3 SPURIOUS EMISSIONS AT ANTENNA TERMINAL:

4.3.1 REQUIREMENTS: This test determines whether the test item produces excessive spurious emissions.

In accordance with paragraph 22.917(e), on any frequency twice or more than twice the fundamental frequency, the spurious emissions shall be attenuated below the unmodulated carrier power (P) by at least 43 + 10 log (P) dB. This requirement translates to a field strength limit of -13dBm. The peak power of the emissions shall be measured from 30MHz up to the 10th harmonic of the fundamental frequency.

In accordance with Paragraph FCC 24.238, the spurious emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB. FCC requirements apply only to frequencies outside the authorized frequency block. For the uplink frequencies 0.32W, the spurious emissions shall be attenuated by a minimum of 38dB. This requirement translates to a limit of -13dBm. For the downlink frequencies 0.03W, the spurious emissions shall be attenuated by a minimum of 28dB. This requirement translates to a limit of -13dBm. The peak power of the emissions shall be measured at the antenna terminal from 30MHz up to the 10th harmonic of the fundamental frequency.

4.3.2 PROCEDURES: In general, this test will measure spurious emissions at the antenna

terminals. The test was performed using each of the modulation types listed in paragraph 2.4 (AMPS, CDMA, GSM, and TDMA).

(a) The input signal was set to each of the frequencies listed in Para 2.5. The input signal level was adjusted to provide the rated level at the test item output.
(b) The input signal was AMPS modulated.
(c) A spectrum analyzer was connected to the output of the test item. The frequency span was adjusted to cover 30MHz up to 1GHz. With a bandwidth of the spectrum analyzer set to 100 kHz, the output of the test item was measured and recorded.
(d) The frequency span was adjusted to cover 1GHz up to 20GHz. With a bandwidth of the spectrum analyzer set to 1MHz, the output of the test item was measured and recorded. This range covers up through the 10th harmonic.
(e) Steps (c) and (d) were repeated with the input signals modulation set to CDMA.
(f) Steps (c) and (d) were repeated with the input signals modulation set to GSM.
(g) Steps (c) and (d) were repeated with the input signals modulation set to TDMA.

4.3.3 RESULTS: The plots of the antenna conducted output measurements are presented on pages 88 through 184. As can be seen from the data, the test item did not produce spurious emissions in excess of the -13dBm limit.

4.4 FIELD STRENGTH OF SPURIOUS EMISSIONS:

4.4.1 PRELIMINARY RADIATED MEASUREMENTS:

4.4.1.1 REQUIREMENTS: Because emission levels in the open field may be masked by interference from sources other than the test item, preliminary radiated measurements are first performed in the low ambient environment of a shielded enclosure. The radiated emissions from the test item were first measured using peak detection. This data was then automatically plotted

4.4.1.2 PROCEDURES: All preliminary tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. The walls and ceiling of the shielded chamber are lined with ferrite tiles. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4 2001 for site attenuation.

The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All powerlines and signal lines entering the enclosure pass through filters on the enclosure wall. The powerline filters prevent extraneous signals from entering the enclosure on these leads.

The test was performed using each of the modulation types listed in paragraph 2.5.

(a) The preliminary measurements were performed with the test item operating separately with the input signal set to each of the frequencies listed in Para 2.5 with the input signal unmodulated. The broadband measuring antennas were positioned at a 3 meter distance from the test item. The frequency range from 30MHz to 18GHz was investigated. The readings were taken with a peak detector function and recorded.

4.4.1.3 RESULTS: The preliminary plots are presented on pages 185 through 208.

Factors for the antennas and cables were added to the data before it was plotted.

This data is only presented for a reference, and is not used as official data. All significant radiated emissions were subsequently measured at an open field test site.

4.4.2 FINAL RADIATED EMISSIONS:

4.4.2.1 REQUIREMENTS: In accordance with paragraph 24.238, on any frequency twice or more than twice the fundamental frequency, the emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB. This requirement translates to a minimum attenuation of 38dB for the uplink frequencies and 28dB for the downlink frequencies. The peak power of the emissions shall be measured from 30MHz up to the 10th harmonic of the fundamental frequency.

4.4.2.2 PROCEDURES: Final open field measurements were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. The walls and ceiling of the shielded chamber are lined with ferrite tiles. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4 2001 for site attenuation.
The final open field emission test procedure is as follows:

a) The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
b) The antenna output of the test item was terminated in 50 ohms for the tests.
c) A double ridged waveguide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
d) Detected emissions were maximized at each frequency by rotating the test item and adjusting the receive antenna height and polarization.
e) The maximum meter reading was recorded. Measurement BW was 1 MHz and Video of 3MHz. Peak readings were recorded. No averaging methods or corrections were applied.
f) Measurements were performed with the input signal unmodulated.
g) Measurements were performed separately at each frequency used during the preliminary measurements.

The equivalent power into a dipole antenna was determined from the field intensity levels measured at 3 meters using the substitution method. To determine the emission power another tuned dipole antenna or double ridged waveguide antenna was set in place of the test item and connected to a calibrated signal generator. The output of the signal generator was adjusted to match the received level at the spectrum analyzer. The signal level was recorded. The reading was corrected to compensate for cable loss, as required, and when the ridged waveguide antenna was used increased by the difference in gain between the dipole and the waveguide antenna.

4.4.2.3 RESULTS OF OPEN FIELD RADIATED TEST: The final open field radiated levels are presented on pages 209 through 220. The radiated emissions were measured through the 10th harmonic. All emissions measured from the test item were within the specification limits.

5.0 CONCLUSION:

It was found that the RES Limited Mobile Repeater, model B8001900, Serial No. 31, complies with the RF Power Output, the Occupied Bandwidth, the Spurious Emissions at Antenna Terminal, and the Field Strength of Spurious Emissions requirements of the 800MHz Cellular band of FCC Part 22 and the Broadband PCS band of FCC Part 24.

6.0 CERTIFICATION:

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the test specification.

The data presented in this test report pertains only to the test item at the test date as operated by RES Limited personnel. Any electrical or mechanical modification made to the test item subsequent to the specified test date will serve to invalidate the data and void this certification.

7.0 ENDORSEMENT DISCLAIMER:

This report must not be used to claim product endorsement by NVLAP or any agency of the US Government.

TABLE I: TEST EQUIPMENT LIST

ELITE ELECTRONIC ENG. INC. Page: 1

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Cal Inv	Due Date
Equipment Type: ACCESSORIES, MISCELLANEOUS								
XZG3	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	2421A03059	---		N/A	
Equipment Type: AMPLIFIERS								
APK3	PREAMPLIFIER	AGILENT TECHNOL	8449B	3008A01593	1-26.5GHZ	05/10/04	12	05/10/05
Equipment Type: ANTENNAS								
NTA0	BILOG ANTENNA	CHASE EMC LTD.	BILOG CBL611	2057	0.03-2GHZ	07/12/04	12	07/12/05
NWF0	RIDGED WAVE GUIDE	EMCO	3105	2035	1-12.4GHZ	01/05/04	12	01/05/05
NWH0	RIDGED WAVE GUIDE	TENSOR	4105	2081	1-12.4GHZ	09/05/04	12	09/05/05
NWI0	RIDGED WAVE GUIDE	AEL	H1498	153	2-18GHZ	09/05/04	12	09/05/05
NWI1	RIDGED WAVE GUIDE	AEL	H1498	154	2-18GHZ	09/05/04	12	09/05/05
Equipment Type: CONTROLLERS								
CDD2	COMPUTER	HEWLETT PACKARD	D4171A#ABA	US61654645	---		N/A	
CMA0	MULTI-DEVICE CONTROLLER	EMCO	2090	9701-1213	---		N/A	
Equipment Type: PRINTERS AND PLOTTERS								
HRE1	LASER JET 5P	HEWLETT PACKARD	C3150A	USHB061052	---		N/A	
Equipment Type: RECEIVERS								
RBA0	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB26	100145	20HZ-26.5GHZ	03/14/03	18	09/14/04
RAC2	SPECTRUM ANALYZER	HEWLETT PACKARD	85660B	3638A08770	100HZ-22GHZ	02/10/04	12	02/10/05
RACD	RF PRESELECTOR	HEWLETT PACKARD	85685A	3010A01205	20HZ-2GHZ	02/11/04	12	02/11/05
RAF4	QUASIPEAK ADAPTER	HEWLETT PACKARD	85650A	2043A00320	0.01-1000MHZ	02/11/04	12	02/11/05
Equipment Type: SIGNAL GENERATORS								
GBX1	SYNTHESIZED SWEEPER	HEWLETT PACKARD	83630A	3420A00857	10MHZ-26.5GHZ		NOTE 1	

Cal. Interval: Listed in Months I/O: Initial Only N/A: Not Applicable

Note 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

MANUFACTURER : RES Ltd.
MODEL : B8001900 Mobile Repeater
S/N : 31
SPECIFICATION : FCC- 22 RF Power Output
DATE : August 30, 2004
NOTES : All modulations
:

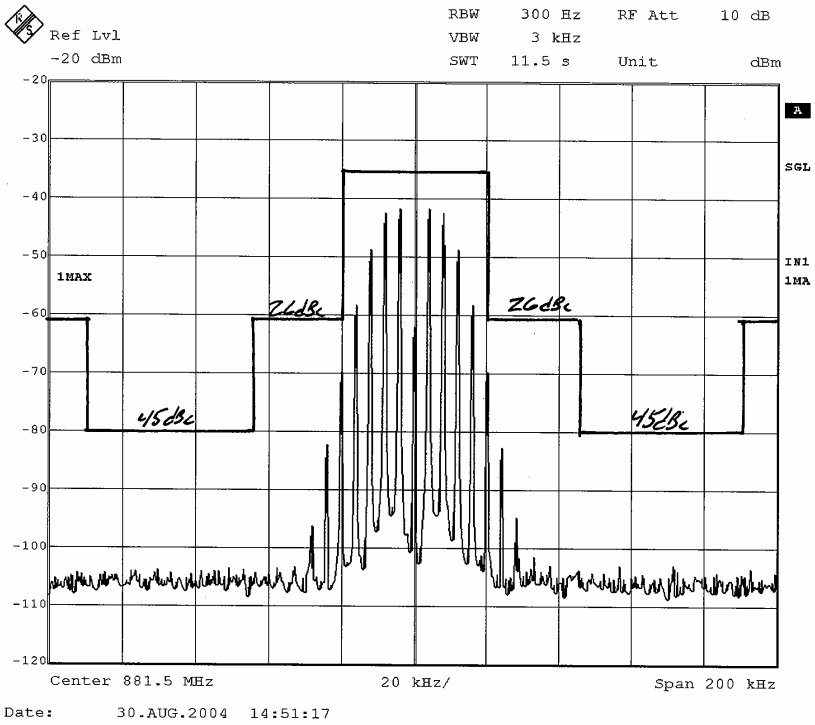
Frequency MHz	Modulation	Rated Power dBm	Rated Power Watts
836.5	AMPS	25	0.32
836.5	CDMA	20	0.1
836.5	GSM	25	0.32
836.5	TDMA	25	0.32
881.5	AMPS	15	0.03
881.5	CDMA	15	0.03
881.5	GSM	15	0.03
881.5	TDMA	15	0.03

MANUFACTURER : RES Limited
MODEL : B8001900
S/N : 31
SPECIFICATION : FCC- 24 RF Power Output
DATE : September 3, 2004
NOTES : AMPS (FM) & CDMA Modulation
:

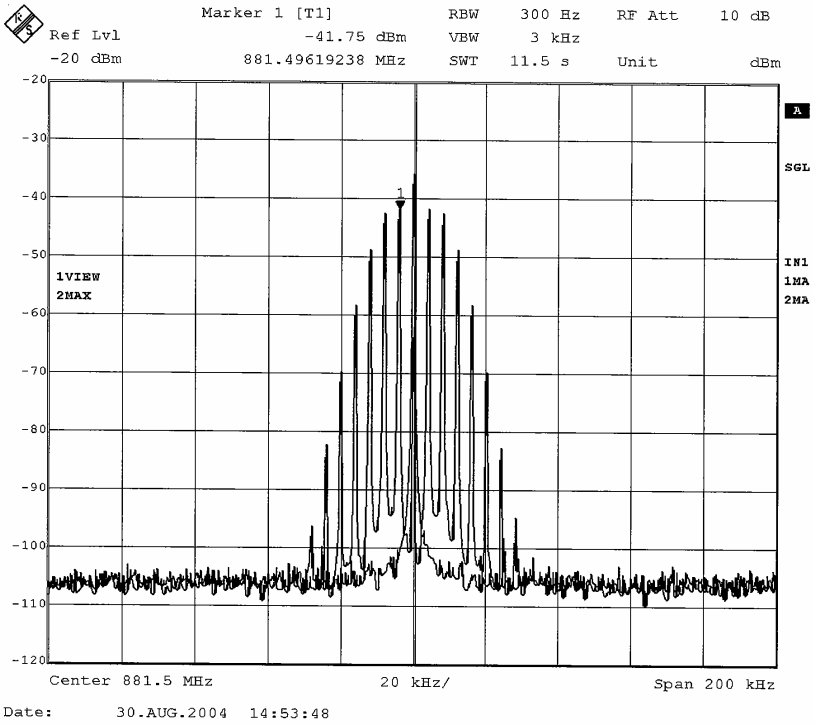
Frequency		Modulation	Rated Power dBm		Rated Power Watts	
Block Edges	Low, Middle, High		Uplink	Downlink	Uplink	Downlink
1850.03	---	AMPS	25	---	0.3	---
1909.97	---	AMPS	25	---	0.3	---
---	1855.00	AMPS	25	---	0.3	---
---	1875.00	AMPS	25	---	0.3	---
---	1905.00	AMPS	25	---	0.3	---
1930.03	---	AMPS	---	15	---	0.03
1989.97	---	AMPS	---	15	---	0.03
---	1935.00	AMPS	---	15	---	0.03
---	1955.00	AMPS	---	15	---	0.03
---	1985.00	AMPS	---	15	---	0.03
1851.23	---	CDMA	25	---	0.3	---
1908.77	---	CDMA	25	---	0.3	---
---	1855.00	CDMA	25	---	0.3	---
---	1875.00	CDMA	25	---	0.3	---
---	1905.00	CDMA	25	---	0.3	---
1931.23	---	CDMA	---	15	---	0.03
1988.77	---	CDMA	---	15	---	0.03
---	1935.00	CDMA	---	15	---	0.03
---	1955.00	CDMA	---	15	---	0.03
---	1985.00	CDMA	---	15	---	0.03

MANUFACTURER : RES Limited
MODEL : B8001900
S/N : 31
SPECIFICATION : FCC- 24 RF Power Output
DATE : September 3, 2004
NOTES : GSM & TDMA Modulations
:

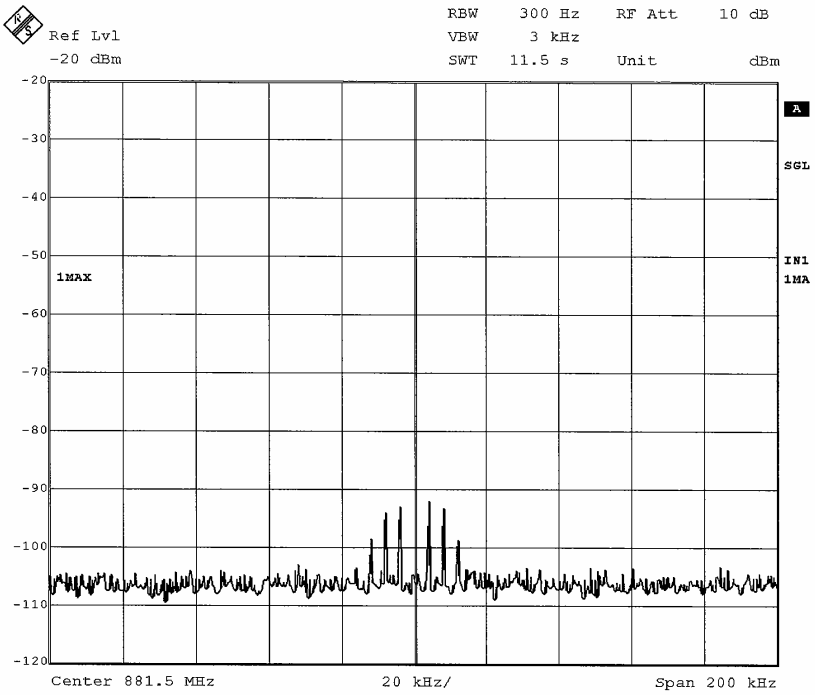
Frequency		Modulation	Rated Power dBm		Rated Power Watts	
Block Edges	Low, Middle, High		Uplink	Downlink	Uplink	Downlink
1850.30	---	GSM	25	---	0.3	---
1909.70	---	GSM	25	---	0.3	---
---	1855.00	GSM	25	---	0.3	---
---	1875.00	GSM	25	---	0.3	---
---	1905.00	GSM	25	---	0.3	---
1930.30	---	GSM	---	15	---	0.03
1989.70	---	GSM	---	15	---	0.03
---	1935.00	GSM	---	15	---	0.03
---	1955.00	GSM	---	15	---	0.03
---	1985.00	GSM	---	15	---	0.03
1850.03	---	TDMA	25	---	0.3	---
1909.97	---	TDMA	25	---	0.3	---
---	1855.00	TDMA	25	---	0.3	---
---	1875.00	TDMA	25	---	0.3	---
---	1905.00	TDMA	25	---	0.3	---
1930.03	---	TDMA	---	15	---	0.03
1989.97	---	TDMA	---	15	---	0.03
---	1935.00	TDMA	---	15	---	0.03
---	1955.00	TDMA	---	15	---	0.03
---	1985.00	TDMA	---	15	---	0.03



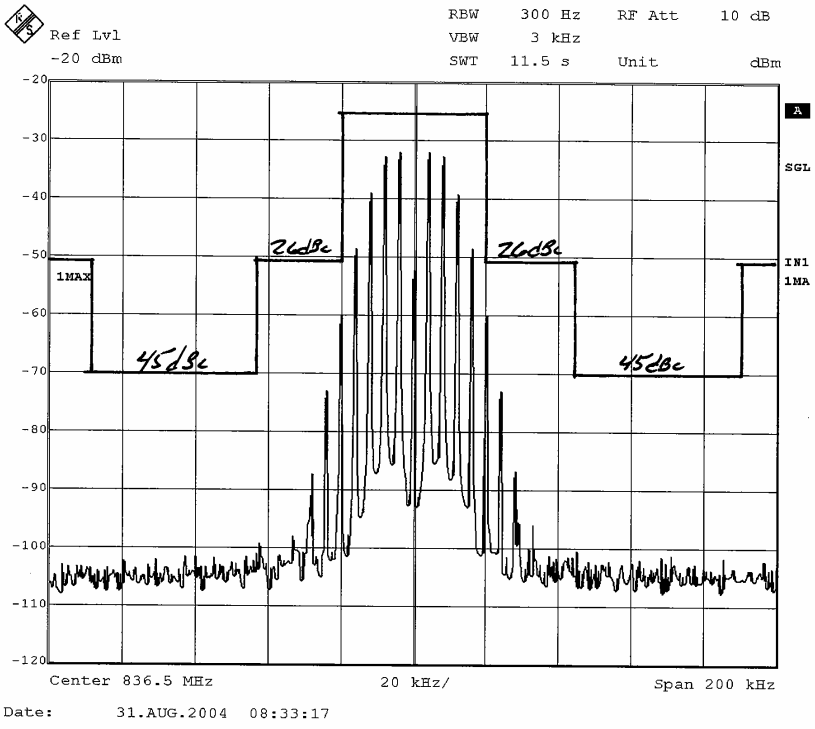
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 881.5MHz AMPS
Date	:	August 30, 2004
Notes	:	Output (50dB External Pads)



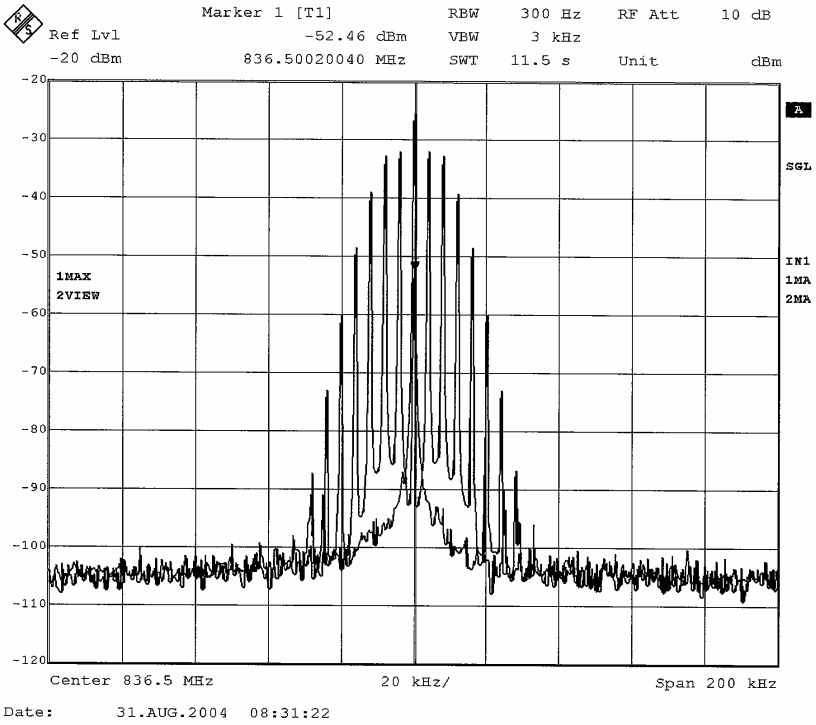
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 881.5MHz AMPS
Date	:	August 30, 2004
Notes	:	Output CW vs. Mod (50dB External Pads)



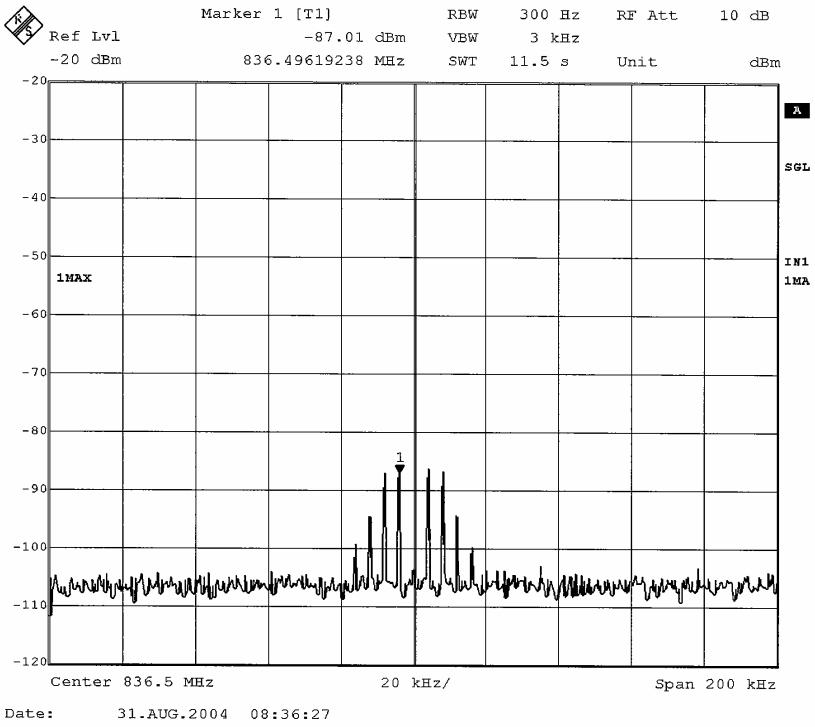
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 881.5MHz AMPS
Date	:	August 30, 2004
Notes	:	Input (50dB External Pads)



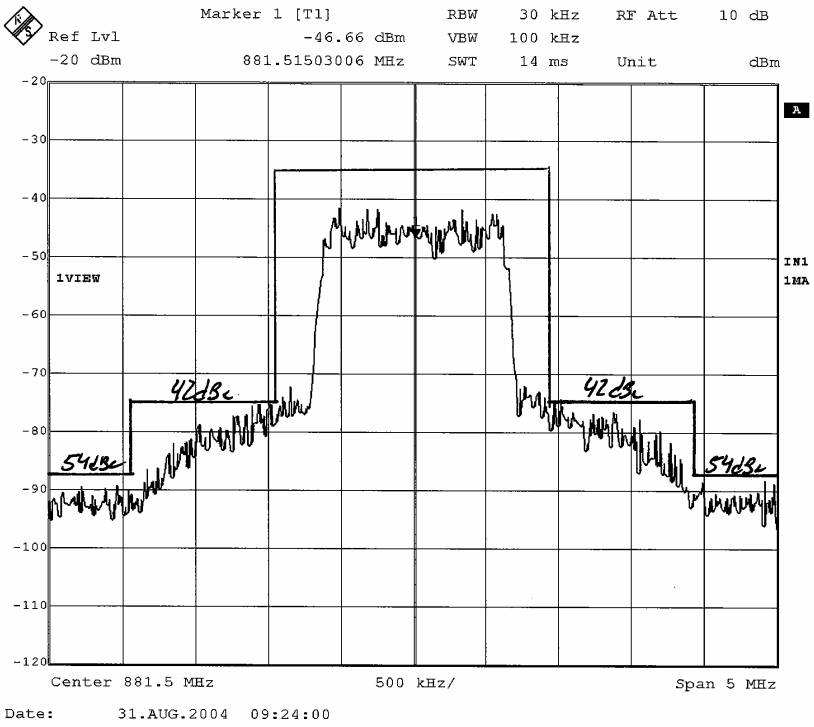
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 836.5MHz AMPS
Date	:	August 31, 2004
Notes	:	Output (50dB External Pads)



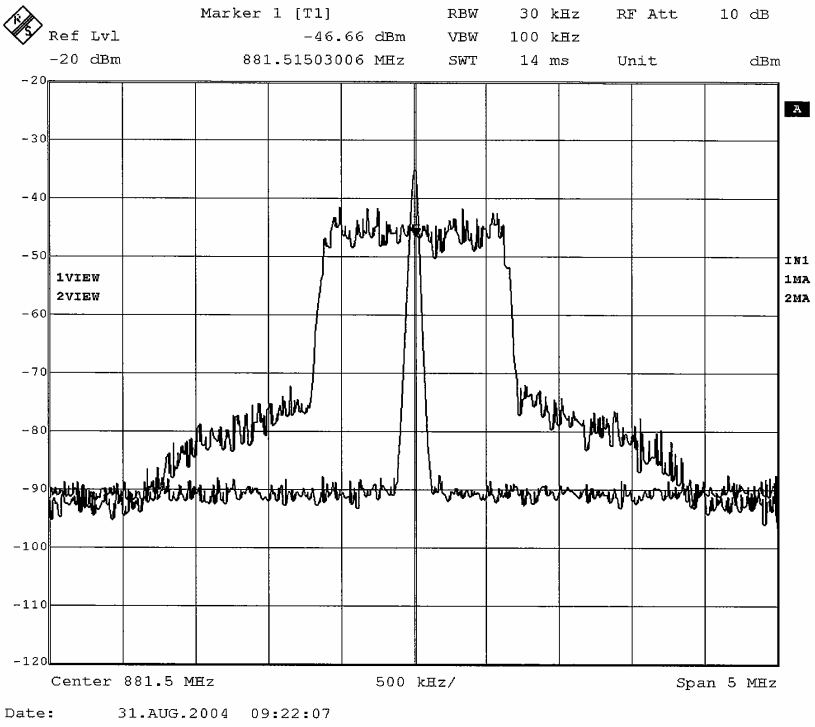
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 836.5MHz AMPS
Date	:	August 31, 2004
Notes	:	Output CW vs. Mod (50dB External Pads)



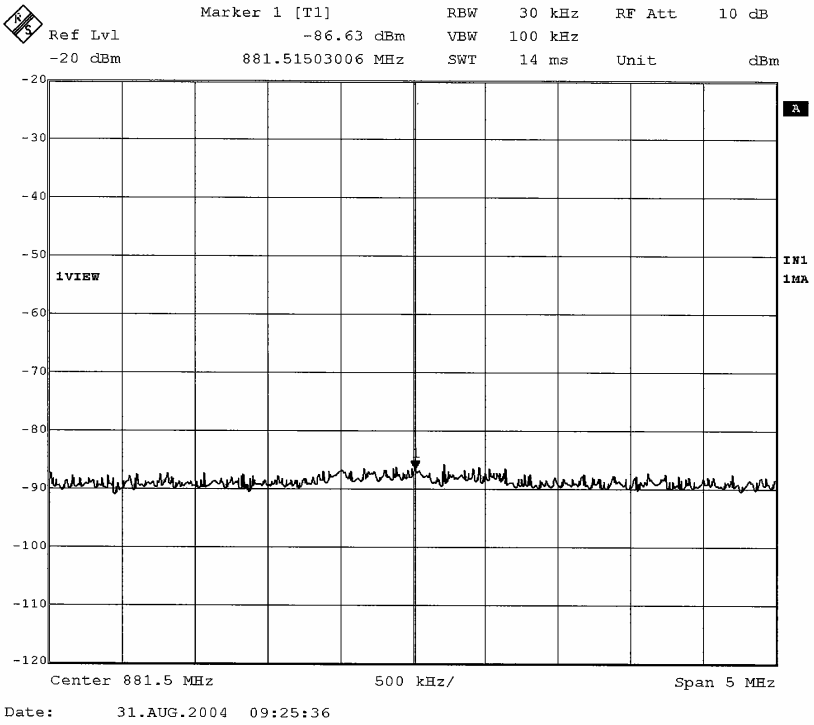
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 836.5MHz AMPS
Date	:	August 31, 2004
Notes	:	Input (50dB External Pads)



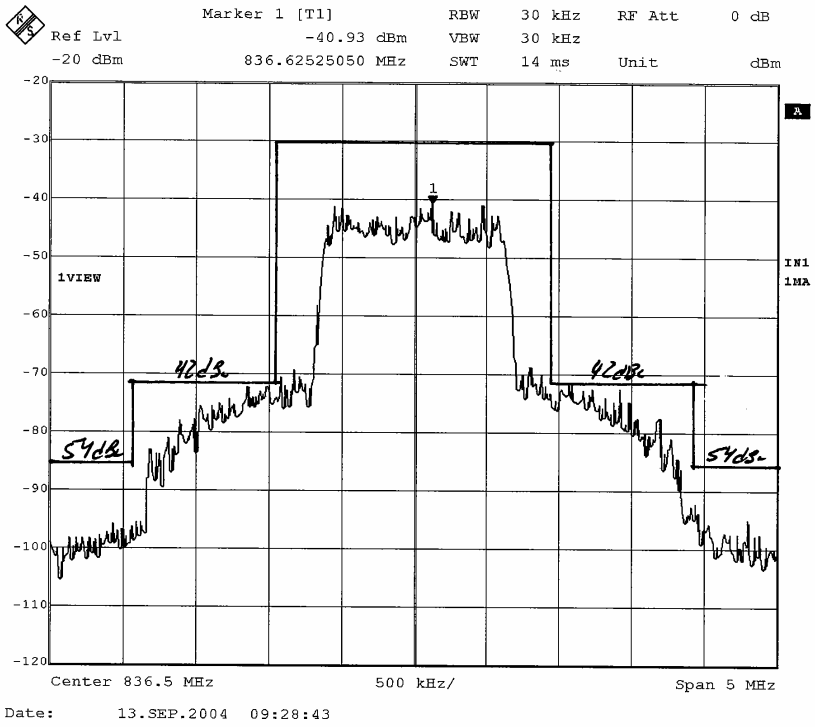
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 881.5MHz CDMA
Date	:	August 31, 2004
Notes	:	Output (50dB External Pads)



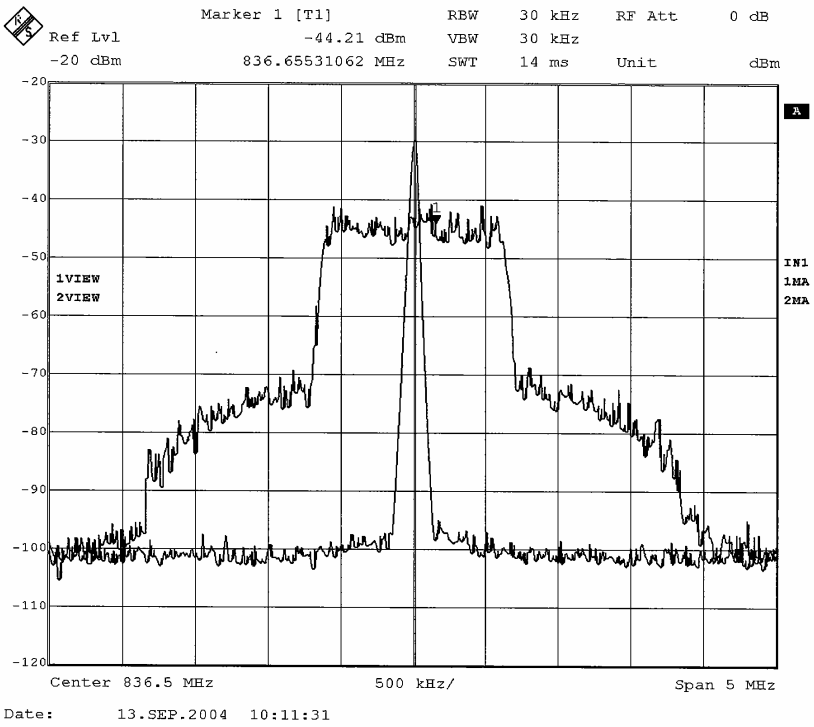
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 881.5MHz CDMA
Date	:	August 31, 2004
Notes	:	Output CW vs. Mod (50dB External Pads)



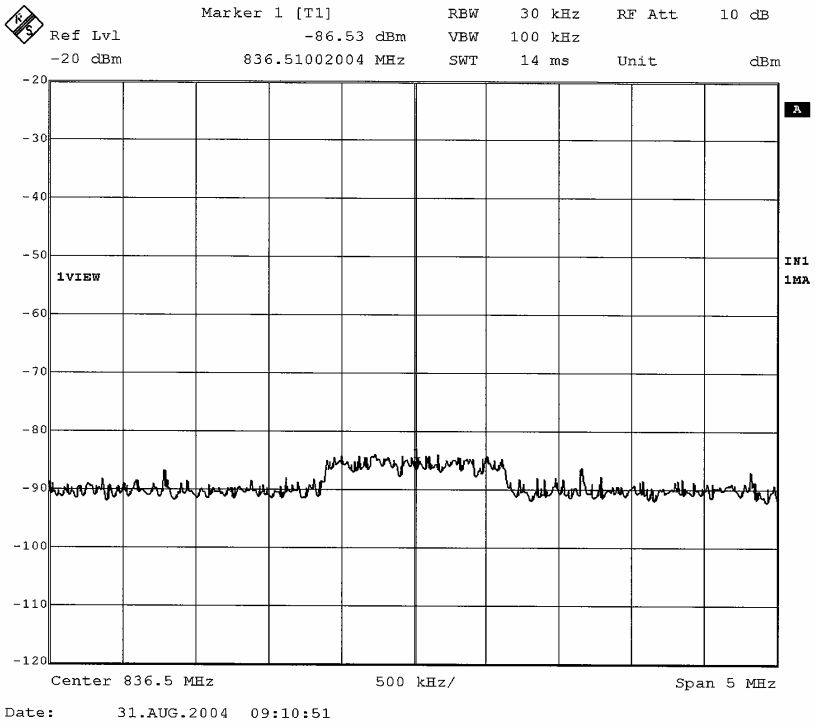
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 881.5MHz CDMA
Date	:	August 31, 2004
Notes	:	Input (50dB External Pads)



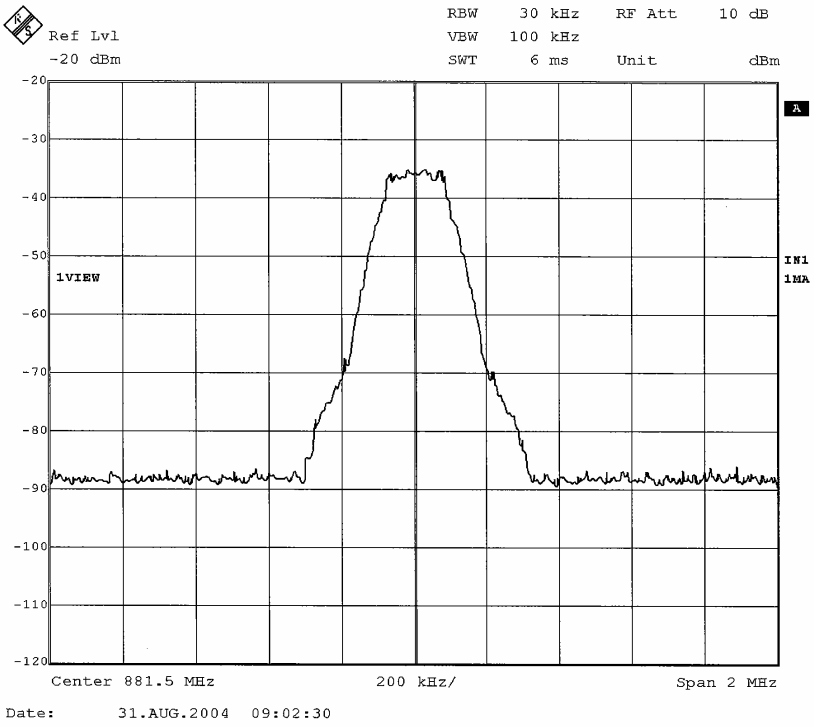
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 836.5MHz CDMA
Date	:	August 31, 2004
Notes	:	Output (50dB External Pads)



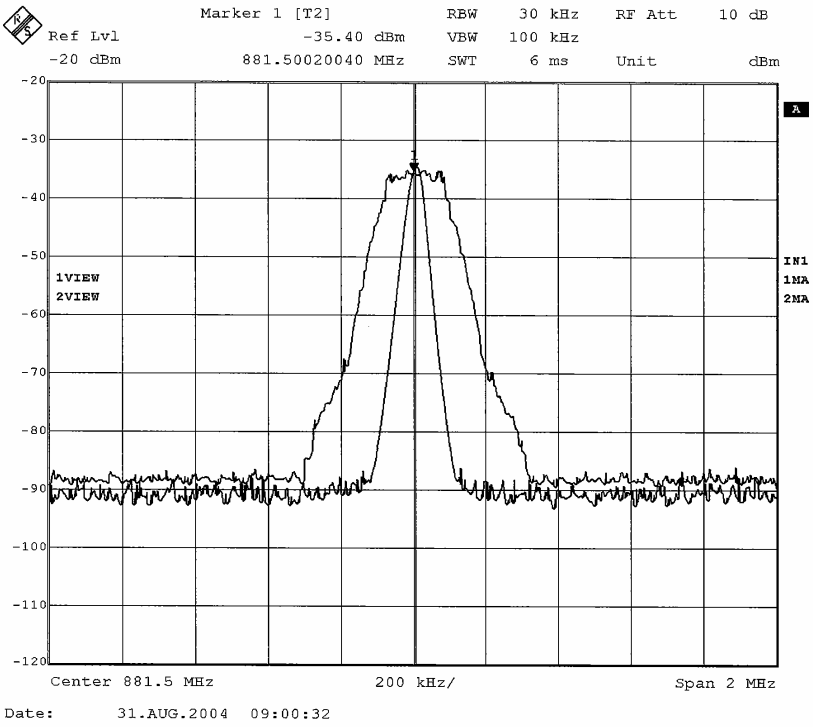
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 836.5MHz CDMA
Date	:	September 13, 2004
Notes	:	Output CW vs. Mod (50dB External Pads)



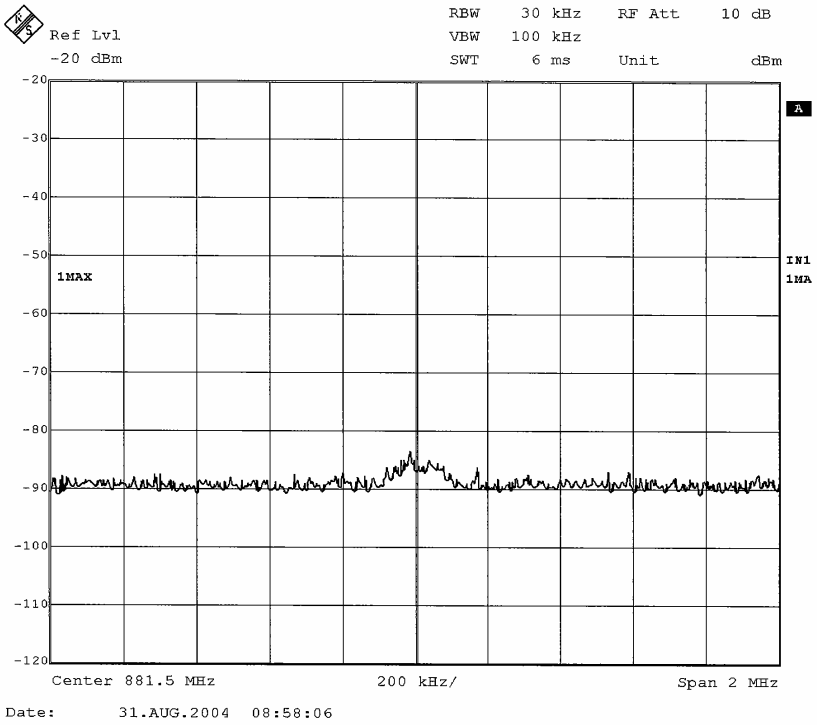
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 836.5MHz CDMA
Date	:	August 31, 2004
Notes	:	Input (50dB External Pads)



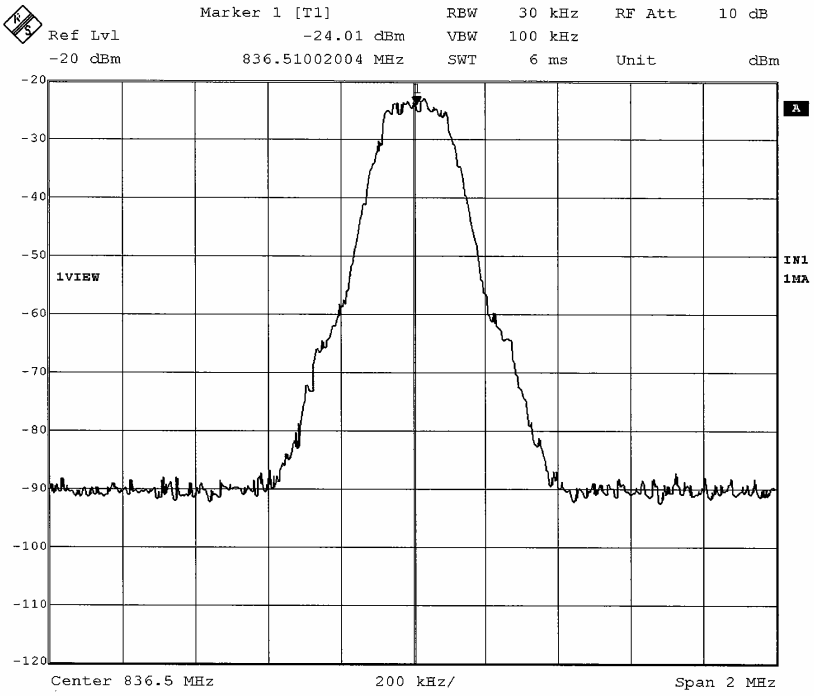
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 881.5MHz GSM
Date	:	August 31, 2004
Notes	:	Output (50dB External Pads)



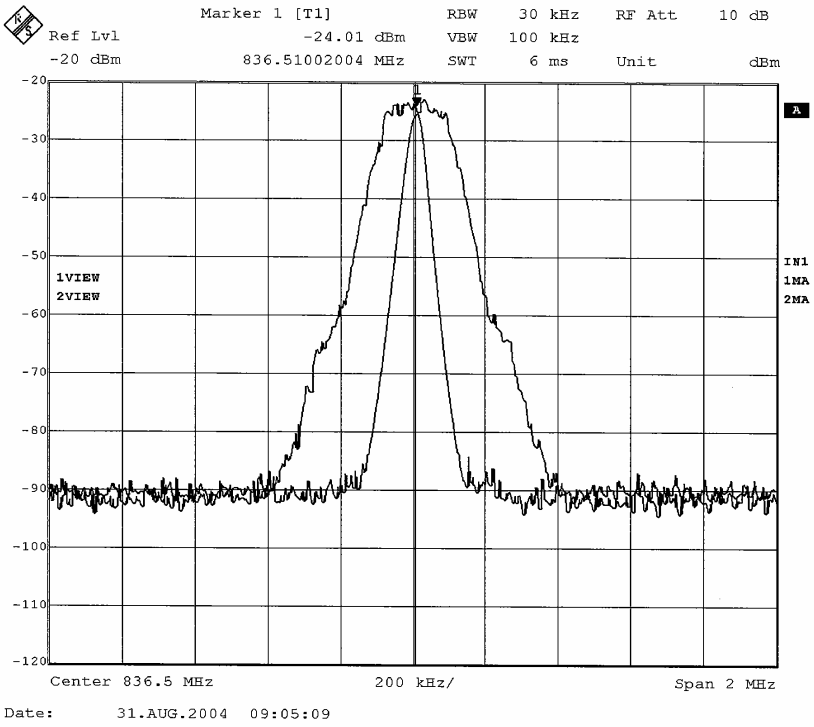
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 881.5MHz GSM
Date	:	August 31, 2004
Notes	:	Output CW vs. Mod (50dB External Pads)



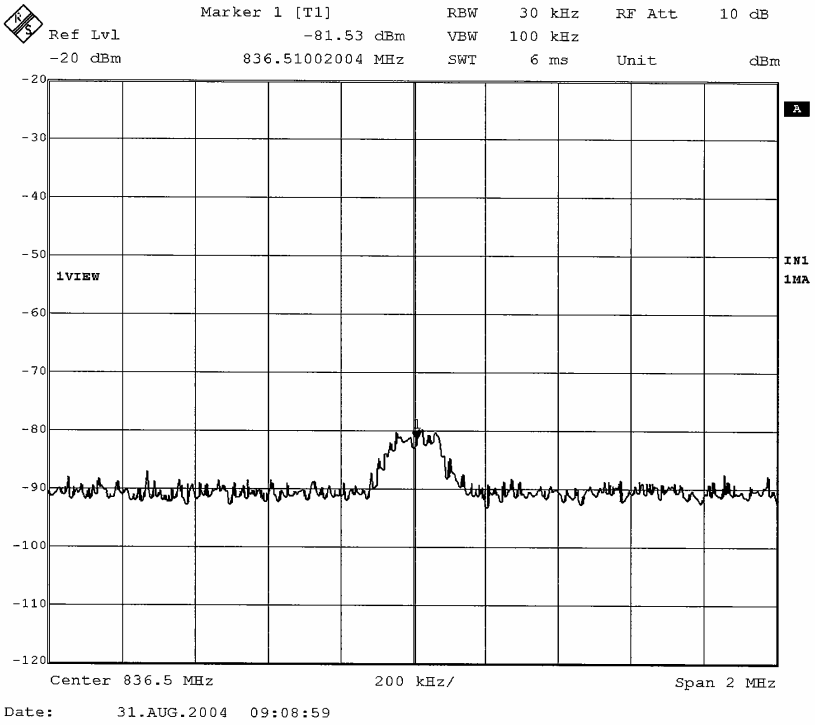
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 881.5MHz GSM
Date	:	August 31, 2004
Notes	:	Input (50dB External Pads)



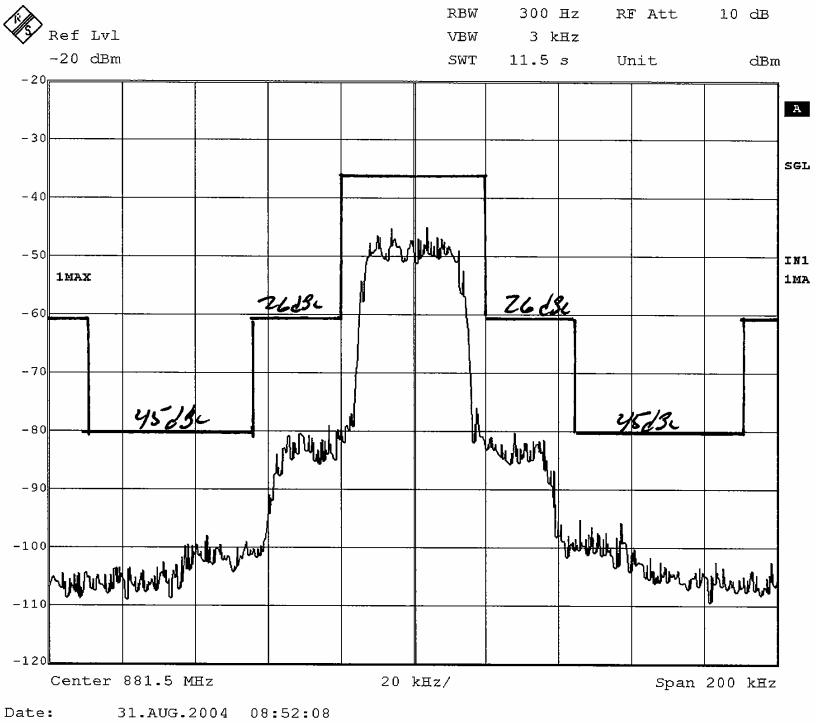
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 836.5MHz GSM
Date	:	August 31, 2004
Notes	:	Output (50dB External Pads)



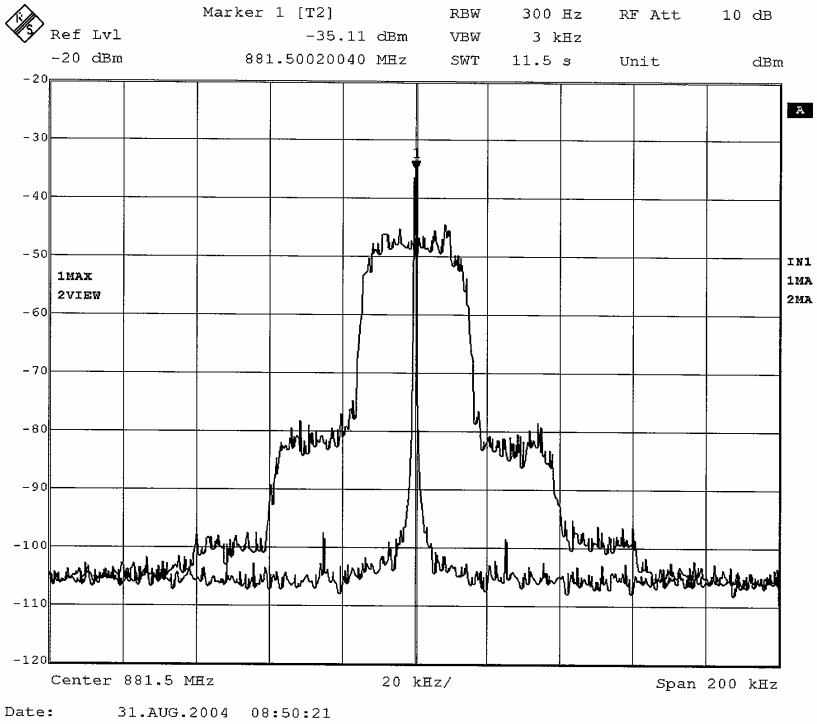
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 836.5MHz GSM
Date	:	August 31, 2004
Notes	:	Output CW vs. Mod (50dB External Pads)



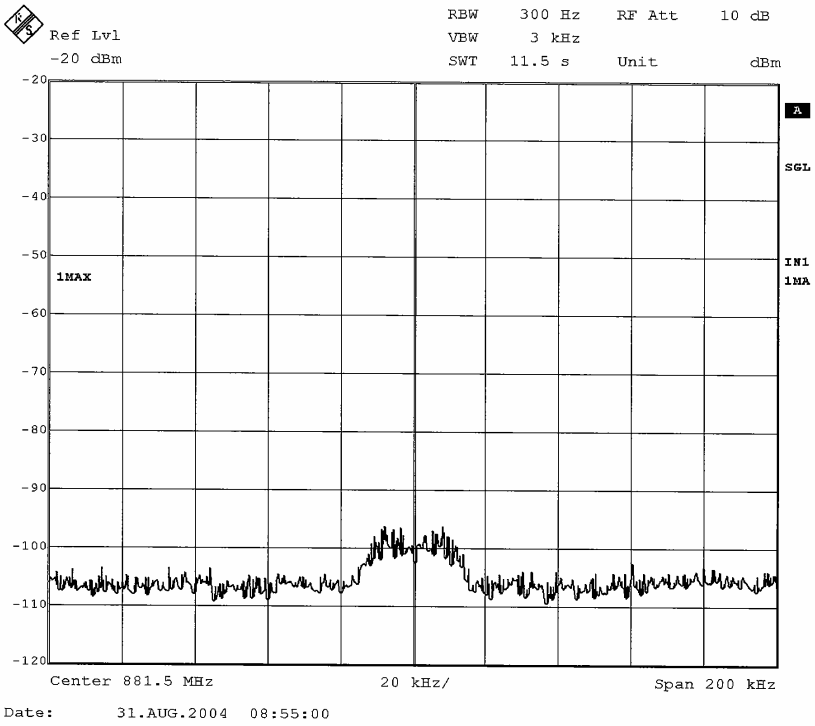
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 836.5MHz GSM
Date	:	August 31, 2004
Notes	:	Input (50dB External Pads)



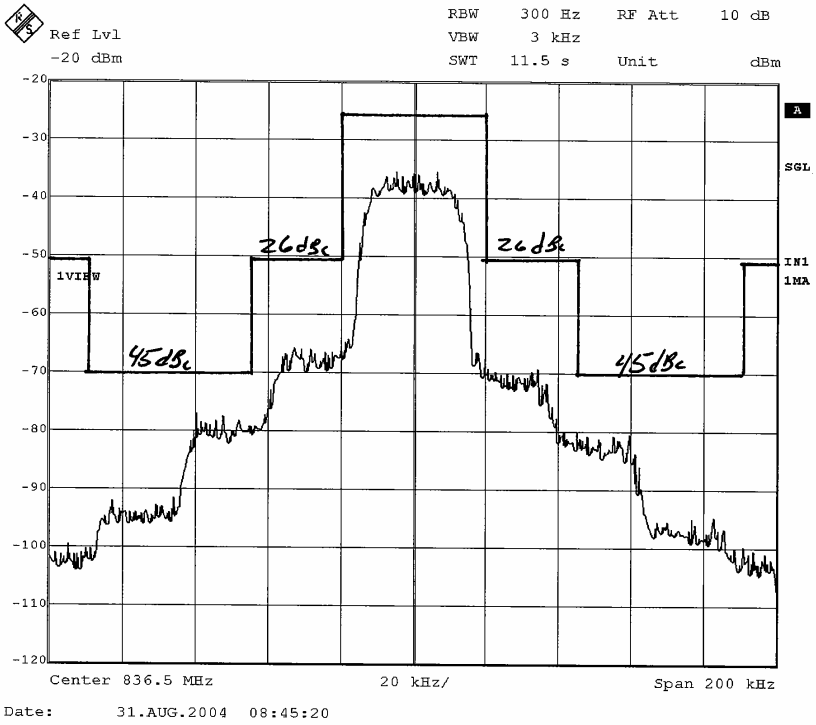
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 881.5MHz TDMA
Date	:	August 31, 2004
Notes	:	Output (50dB External Pads)



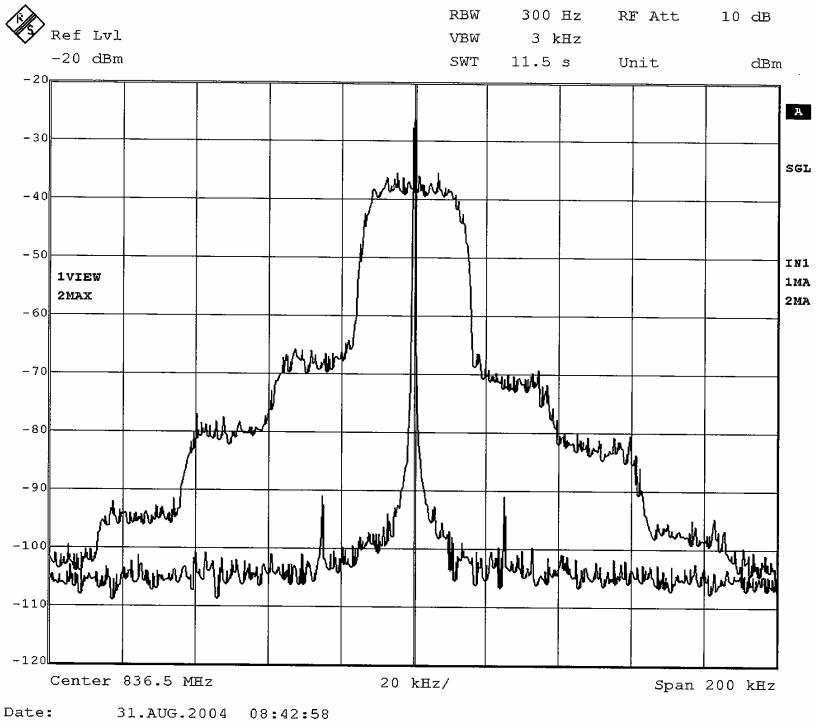
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 881.5MHz TDMA
Date	:	August 31, 2004
Notes	:	Output CW vs. Mod (50dB External Pads)



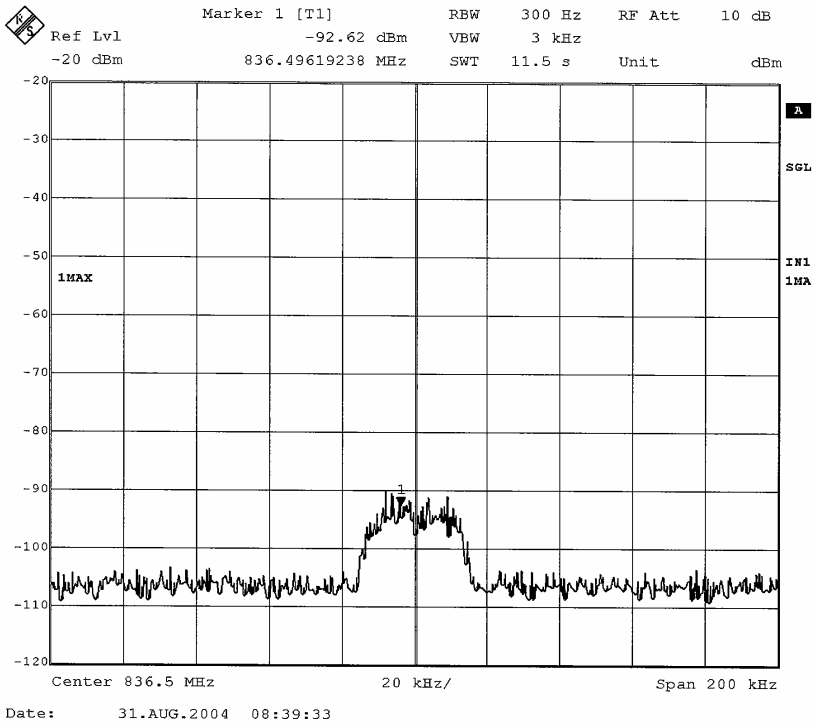
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 881.5MHz TDMA
Date	:	August 31, 2004
Notes	:	Input (50dB External Pads)



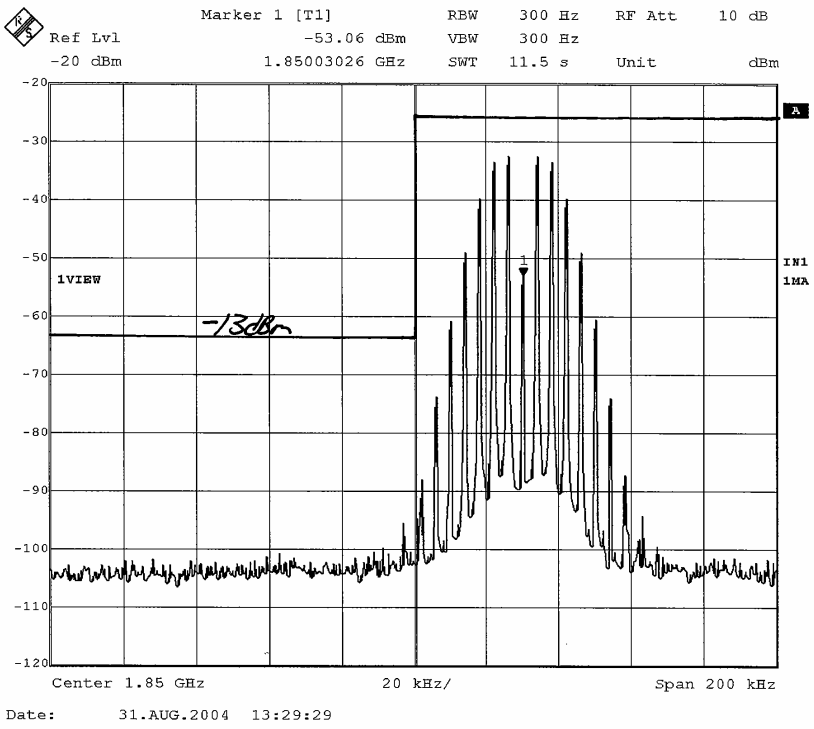
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 836.5MHz TDMA
Date	:	August 31, 2004
Notes	:	Output (50dB External Pads)



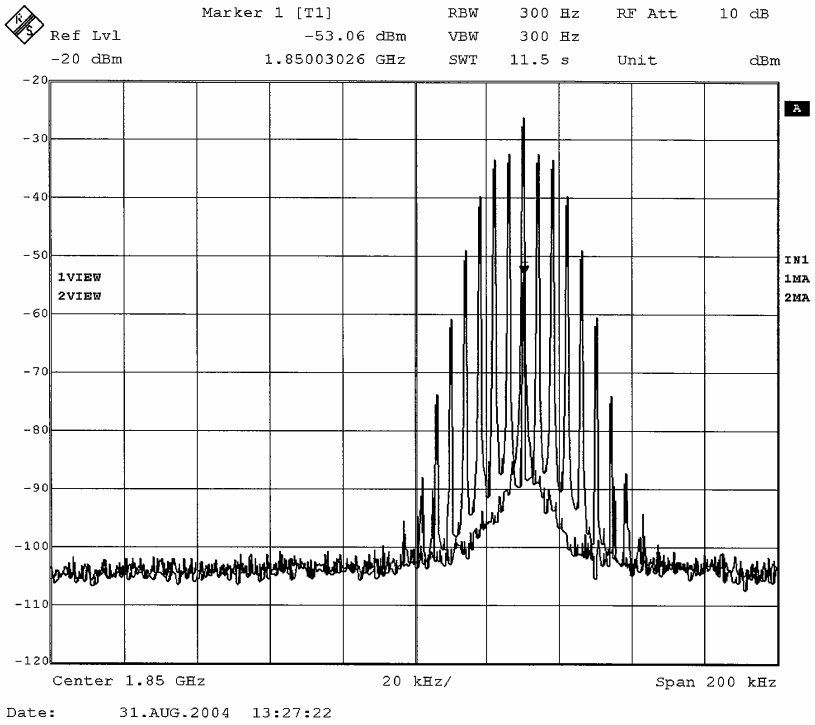
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 836.5MHz TDMA
Date	:	August 31, 2004
Notes	:	Output CW vs. Mod (50dB External Pads)



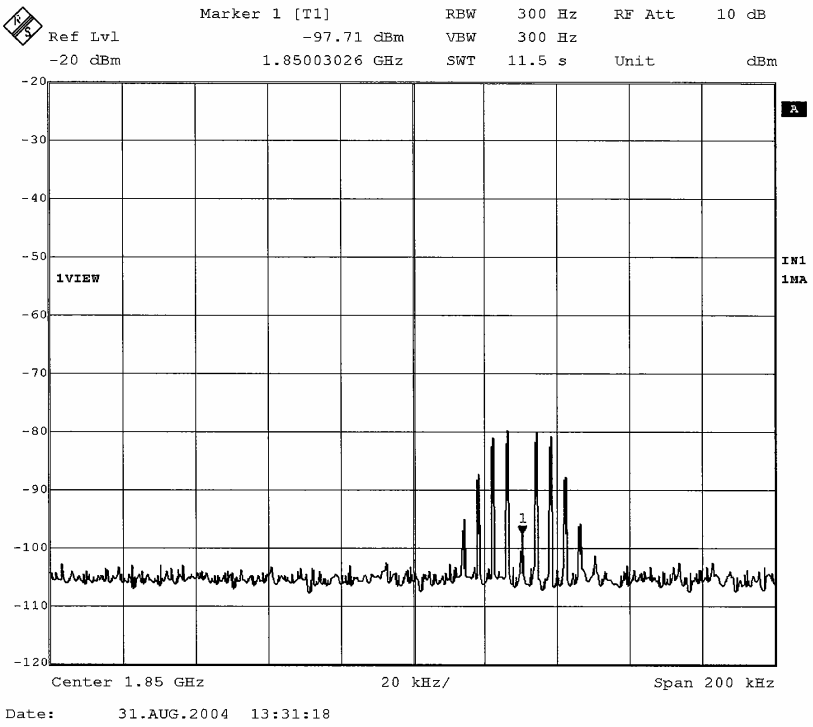
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 22 Occupied Bandwidth
Test Mode	:	Tx @ 836.5MHz TDMA
Date	:	August 31, 2004
Notes	:	Input (50dB External Pads)



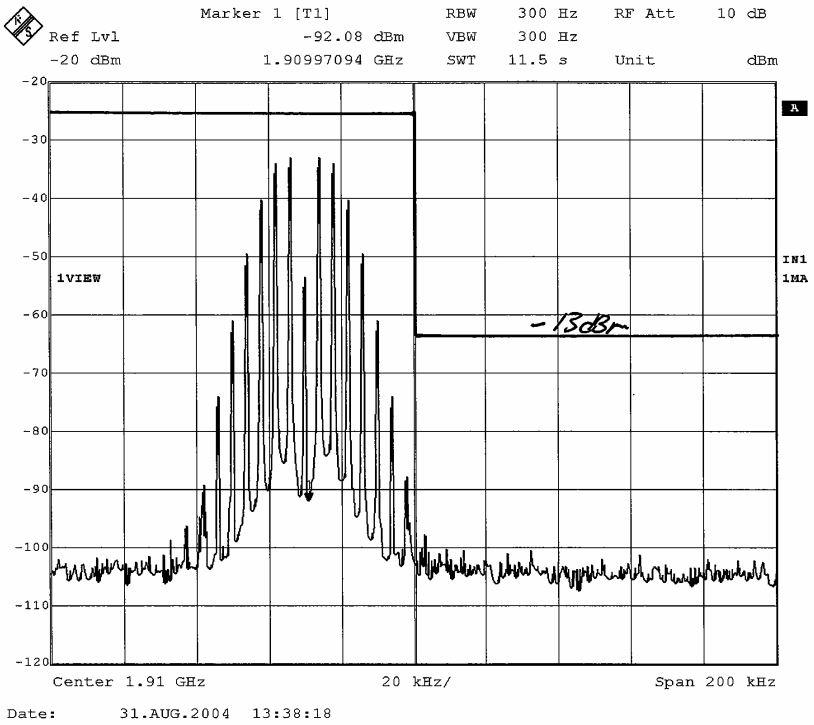
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 24 Bandedge Compliance
Test Mode	:	Tx @ 1850.03MHz AMPS
Date	:	August 31, 2004
Notes	:	Output (50dB External Pads)



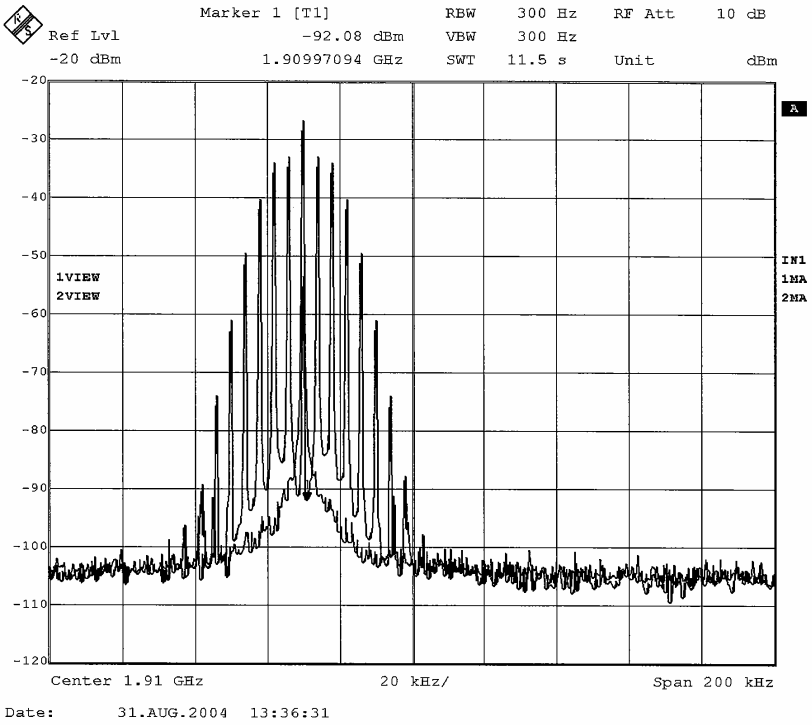
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 24 Bandedge Compliance
Test Mode	:	Tx @ 1850.03MHz AMPS
Date	:	August 31, 2004
Notes	:	Output CW vs. Mod (50dB External Pads)



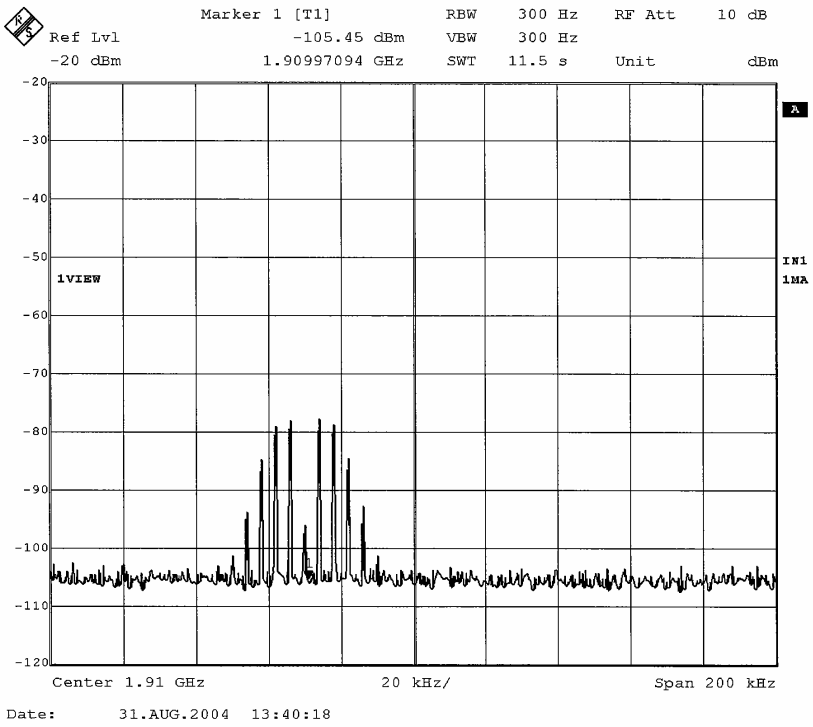
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 24 Bandedge Compliance
Test Mode	:	Tx @ 1850.03MHz AMPS
Date	:	August 31, 2004
Notes	:	Input (50dB External Pads)



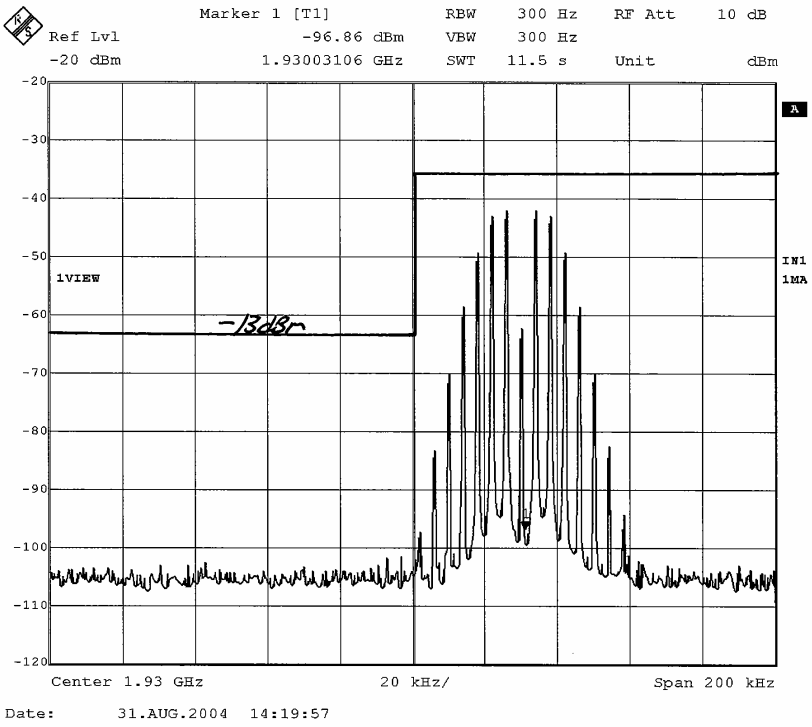
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 24 Bandedge Compliance
Test Mode	:	Tx @ 1909.97MHz AMPS
Date	:	August 31, 2004
Notes	:	Output (50dB External Pads)



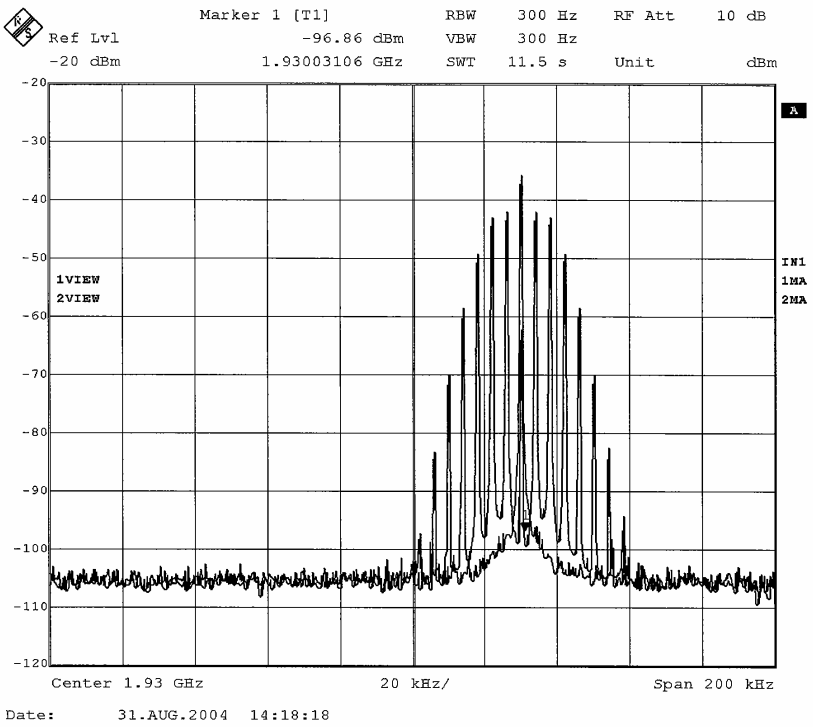
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 24 Bandedge Compliance
Test Mode	:	Tx @ 1909.97MHz AMPS
Date	:	August 31, 2004
Notes	:	Output CW vs. Mod (50dB External Pads)



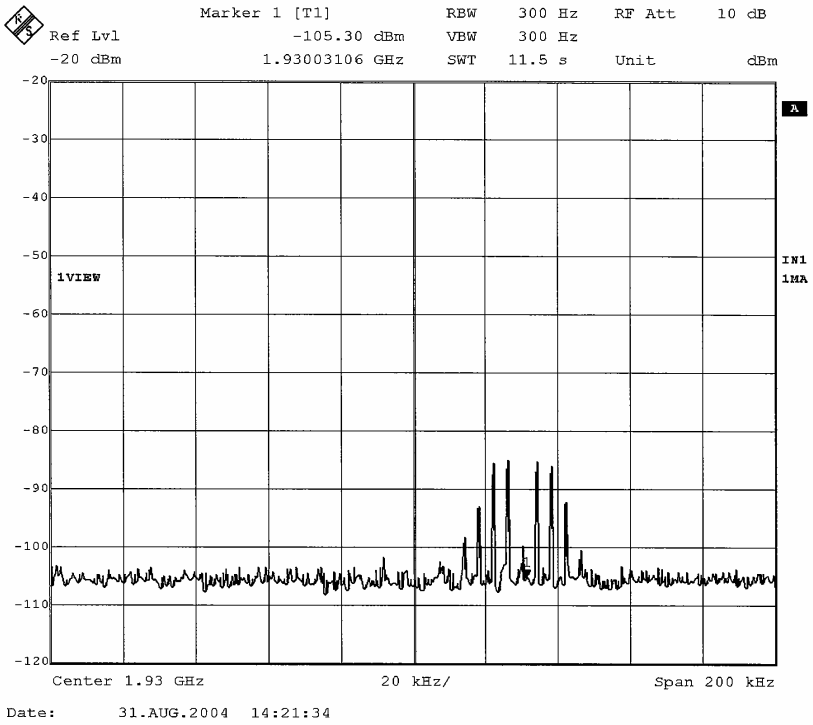
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 24 Bandedge Compliance
Test Mode	:	Tx @ 1909.97MHz AMPS
Date	:	August 31, 2004
Notes	:	Input (50dB External Pads)



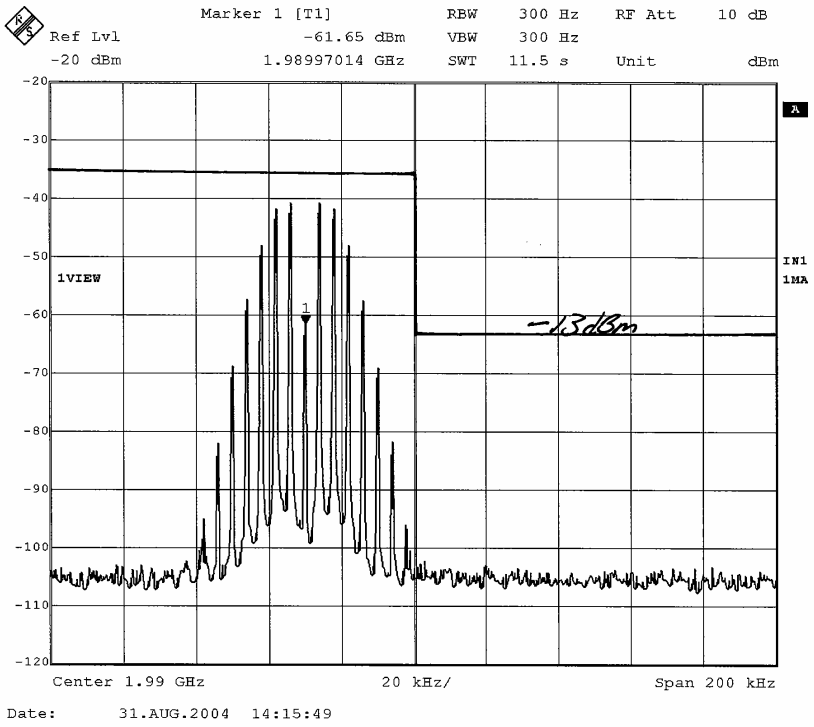
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 24 Bandedge Compliance
Test Mode	:	Tx @ 1930.03MHz AMPS
Date	:	August 31, 2004
Notes	:	Output (50dB External Pads)



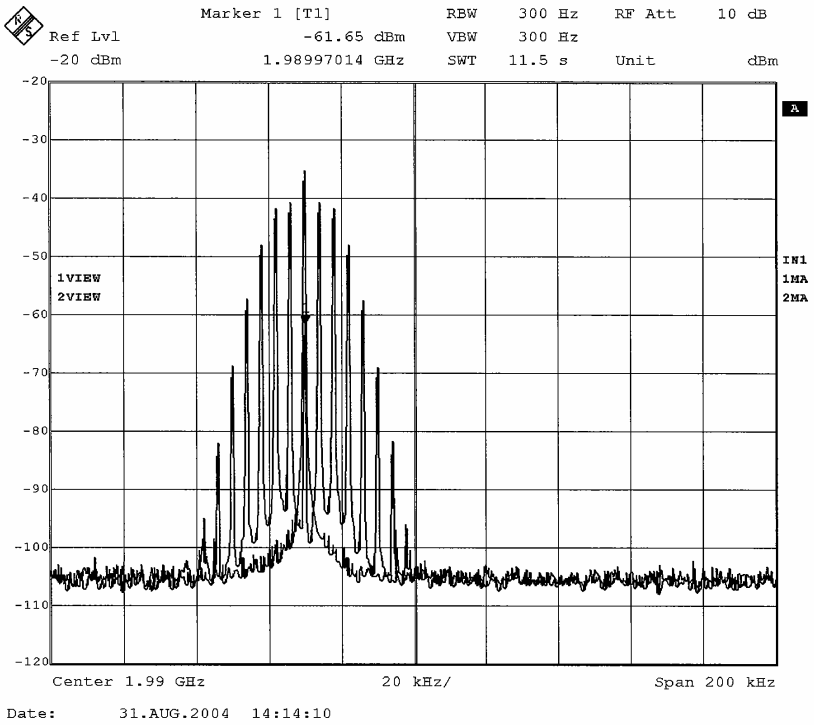
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 24 Bandedge Compliance
Test Mode	:	Tx @ 1930.03MHz AMPS
Date	:	August 31, 2004
Notes	:	Output CW vs. Mod (50dB External Pads)



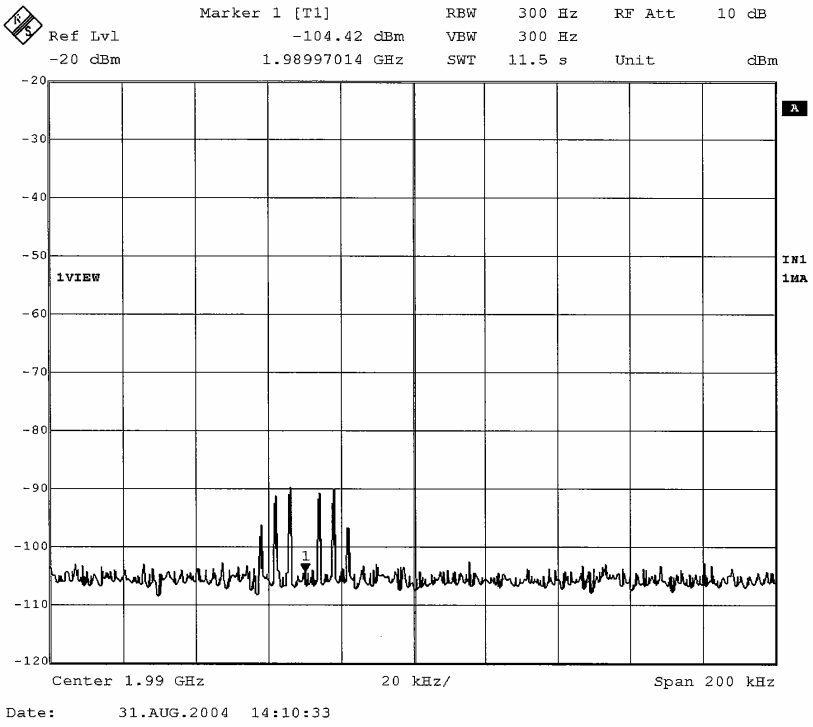
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 24 Bandedge Compliance
Test Mode	:	Tx @ 1930.03MHz AMPS
Date	:	August 31, 2004
Notes	:	Input (50dB External Pads)



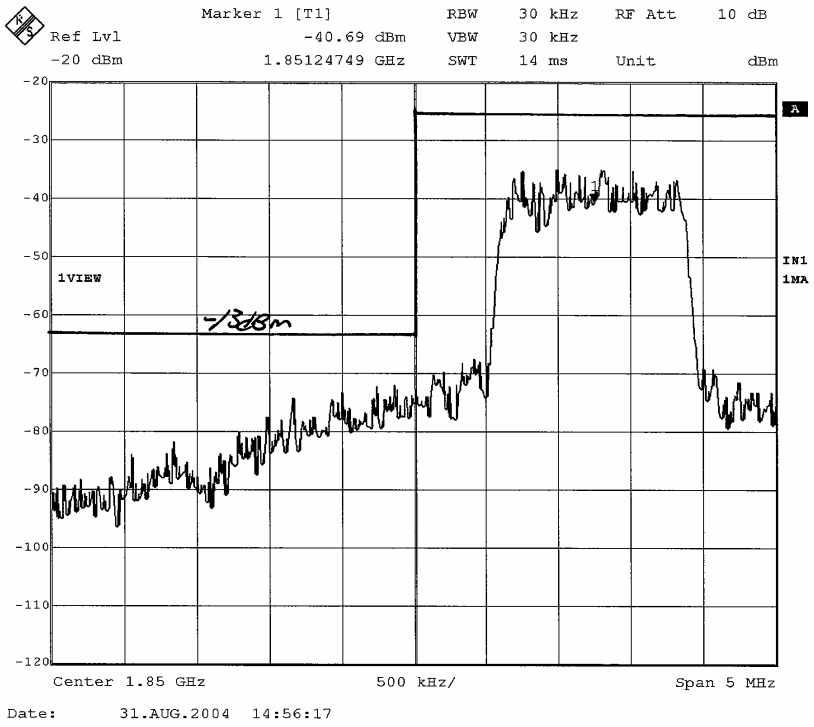
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 24 Bandedge Compliance
Test Mode	:	Tx @ 1989.97MHz AMPS
Date	:	August 31, 2004
Notes	:	Output (50dB External Pads)



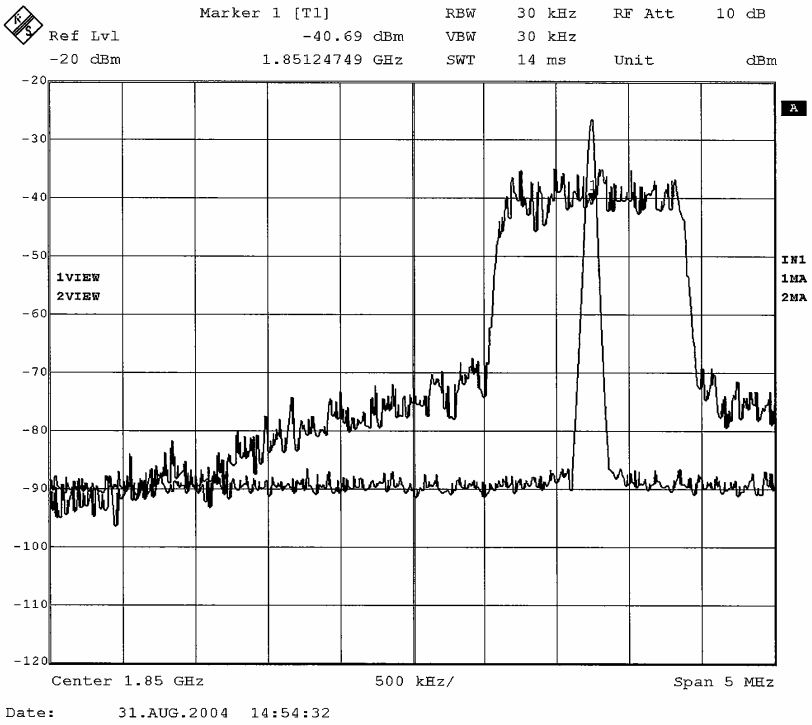
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 24 Bandedge Compliance
Test Mode	:	Tx @ 1989.97MHz AMPS
Date	:	August 31, 2004
Notes	:	Output CW vs. Mod (50dB External Pads)



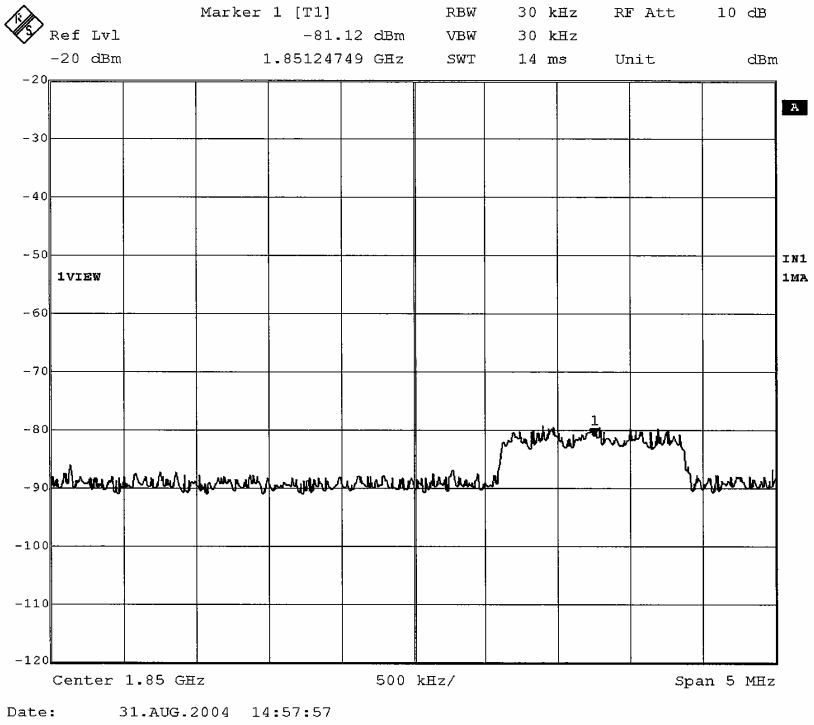
Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 24 Bandedge Compliance
Test Mode	:	Tx @ 1989.97MHz AMPS
Date	:	August 31, 2004
Notes	:	Input (50dB External Pads)



Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 24 Bandedge Compliance
Test Mode	:	Tx @ 1851.23MHz CDMA
Date	:	August 31, 2004
Notes	:	Output (50dB External Pads)



Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 24 Bandedge Compliance
Test Mode	:	Tx @ 1851.23MHz CDMA
Date	:	August 31, 2004
Notes	:	Output CW vs. Mod (50dB External Pads)



Manufacturer	:	RES Ltd.
Model No.	:	B8001900 Mobile Repeater
Serial No.	:	31
Test	:	FCC 24 Bandedge Compliance
Test Mode	:	Tx @ 1851.23MHz CDMA
Date	:	August 31, 2004
Notes	:	Input (50dB External Pads)