



FCC Part 22 Report

for

Telian Corporation

on the

Cellular Phone

Model Number: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

Test Report: 30360052

Date of Report: December 26, 2002

Revised: February 19, 2003

Job #: 3036005

Date of Test: December 16 to 19, 2002 and February 18, 2003



Warnock Hersey



emc

A2LA Certificate Number: 1755-01

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Review Date:	02/19/03	

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1.0 Introduction

1.1 Test Summary

FCC RULE	DESCRIPTION OF TEST	RESULT	SECTION
2.1046	RF Power Output	Complies	2.0
22.913, 24.232	ERP	Complies	3.0
2.1047	Modulation Requirements	Complies	4.0
22.915(d)(1)	Audio Filter Characteristics	Complies	5.0
2.1049 22.917(b)(d)	Emission Limitation, Occupied Bandwidth	Complies	6.0
2.1051, 22.917(e) 22.917(f), 24.238(a)	Out of Band Emissions at Antenna Terminals Mobile Emissions In Base Frequency Range	Complies	7.0
2.1053	Field Strength of Spurious Radiation	Complies	8.0
15.207	Line Conducted Emissions	Complies	9.0
2.1055	Frequency Stability vs. Temperature	Complies	10.0
2.1055	Frequency Stability vs. Voltage	Complies	11.0
2.1093	Specific Absorption Rate	Complies	A separate report is issued

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1.2 Product Description

The Telian Corporation Models MTD – 3500/ MTD – 3510 are a dual mode, TDMA and AMPS cellular radiotelephone operating in a cellular band 824 – 849 MHz. The difference between models is only keypad layout and shape of the plastic face plate. The electronics of both phones are identical.

For more information, please refer to the attached product description.

Use of Product	Portable Cellular Phone
Whether quantity (>1) production is planned	[X] Yes, [] No
Cellular Phone modes	AMPS TDMA
Type(s) of Emission	40K0F8W, 40K0F1D, 30K0G7D
Allowed Deviation	12± 10% (AMPS mode)
RF Output Power	26.4 dBm - AMPS 26.6 dBm - TDMA
Frequency Range	824 - 849 MHz
Antenna (e) & Gain	Monopole, -2 dBd
Detachable antenna?	[] Yes [X] No
Receiver L.O. frequency	988.65 – 1013.61 MHz
External input	[X] Audio [] Digital Data
DC power into final RF stage	3.5 V, 120 mA quiescent current

1.3 Related Submittal(s) Grants

None

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2.0 RF Power Output, FCC 2.1046

2.1 Test Procedure

The transmitter output was connected to a calibrated coaxial attenuator, the other end of which was connected to a spectrum analyzer. Transmitter output was read off the spectrum analyzer in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the spectrum analyzer reading. An HP power meter was also used to measure the RF power.

Tests were performed at three frequencies (low, middle, and high channels) and on all power levels, which can be setup on the transmitters.

2.2 Test Equipment

Hewlett Packard 8481A Power Sensor, 435B Power Meter

Hewlett Packard HP8566B Spectrum Analyzer, 100 Hz - 22 GHz

2.3 Test Results

Frequency (MHz)	Mode	Maximum measured Conducted Power (dBm)	Plot
824.04	AMPS	26.4	2.1
	TDMA	26.0	22
836.55	AMPS	26.4	23
	TDMA	26.1	2.4
848.97	AMPS	26.1	2.5
	TDMA	26.6	2.6

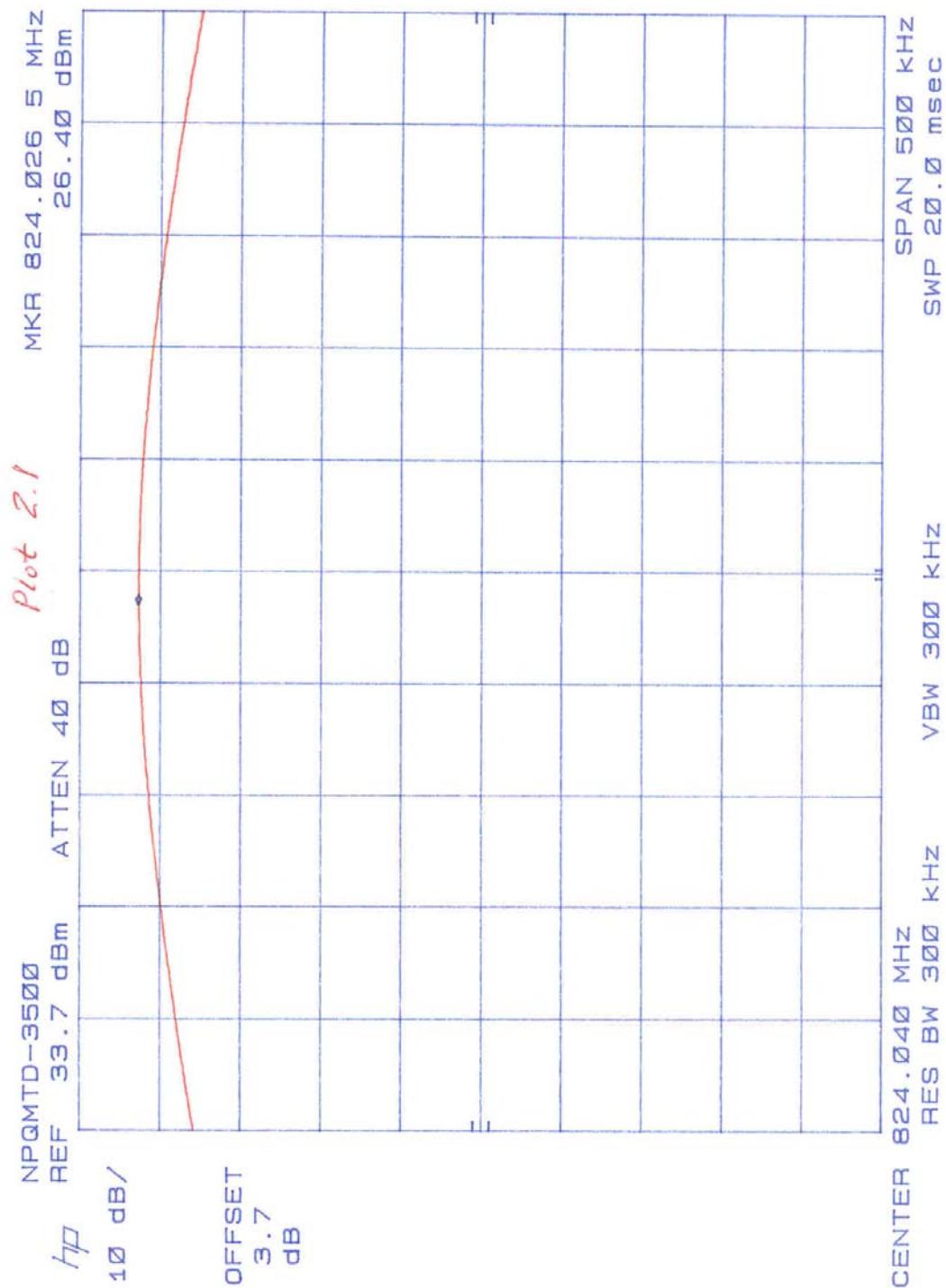
Frequency (MHz)	Mode	Level	Measured Conducted Power (dBm)
836.55	AMPS	0, 1, 2	26.4
836.55	AMPS	3	22.5
836.55	AMPS	4	18.5
836.55	AMPS	5	14.5
836.55	AMPS	6	10.5
836.55	AMPS	7	6.5

See plot 2.3

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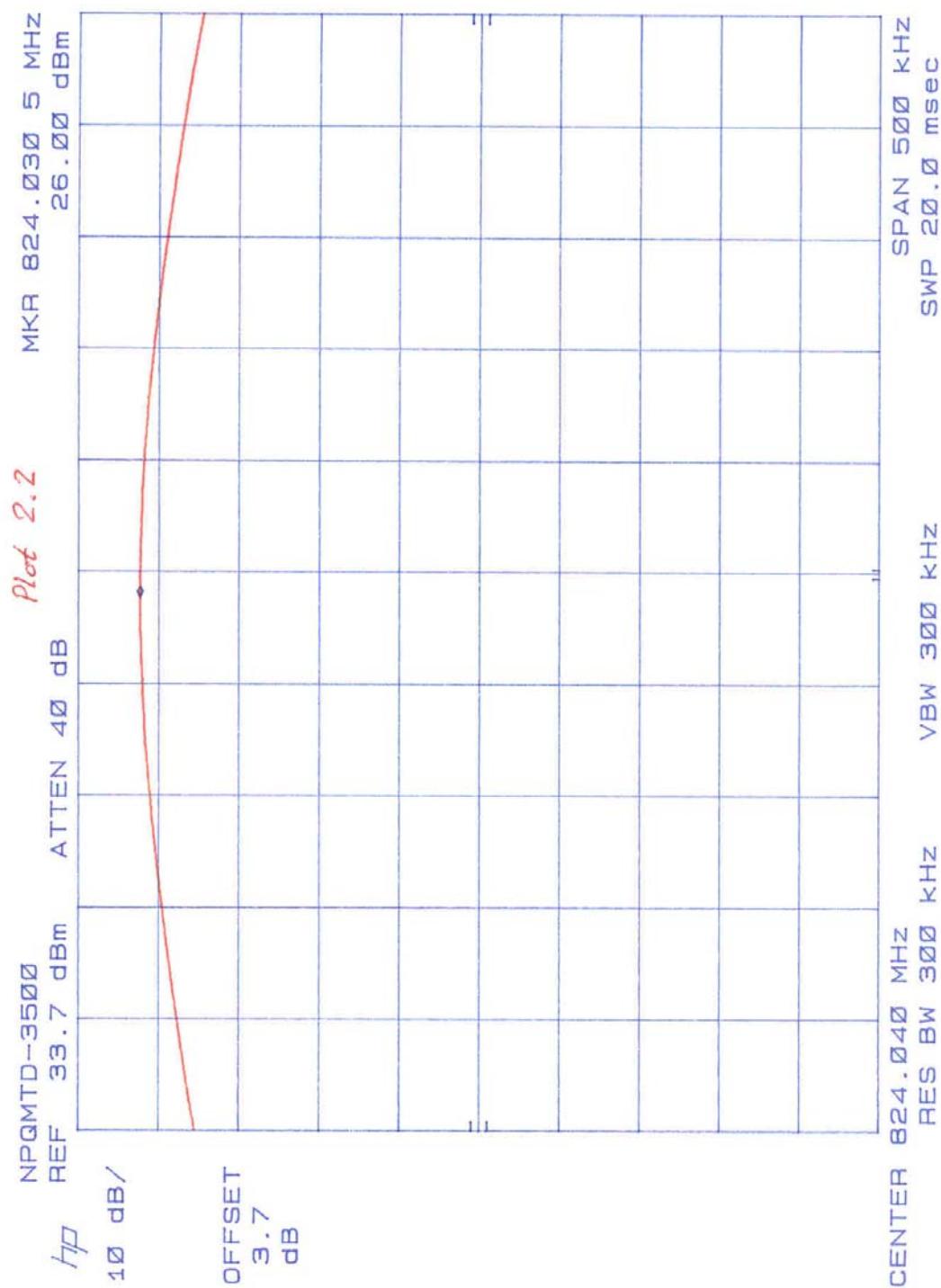
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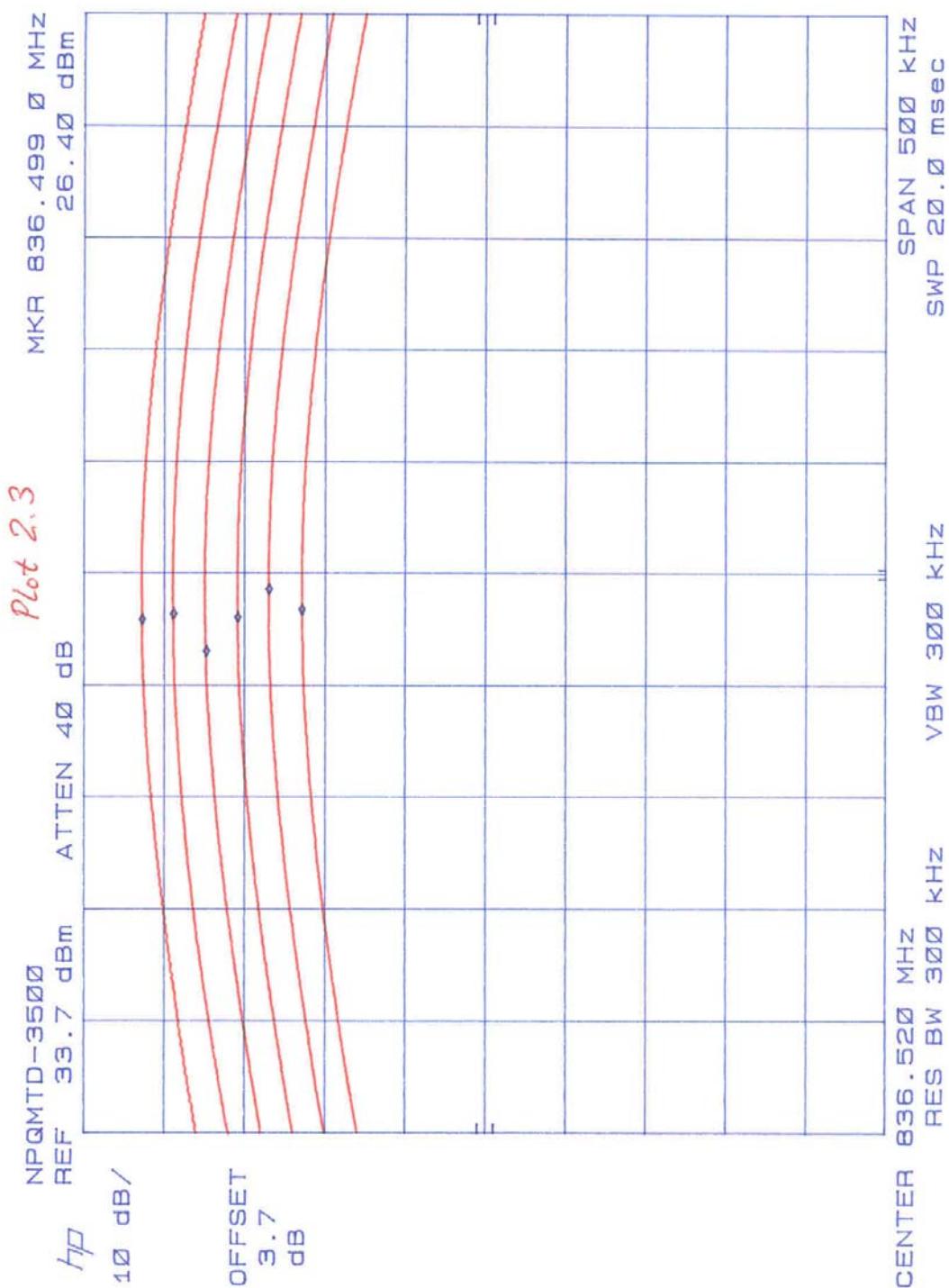
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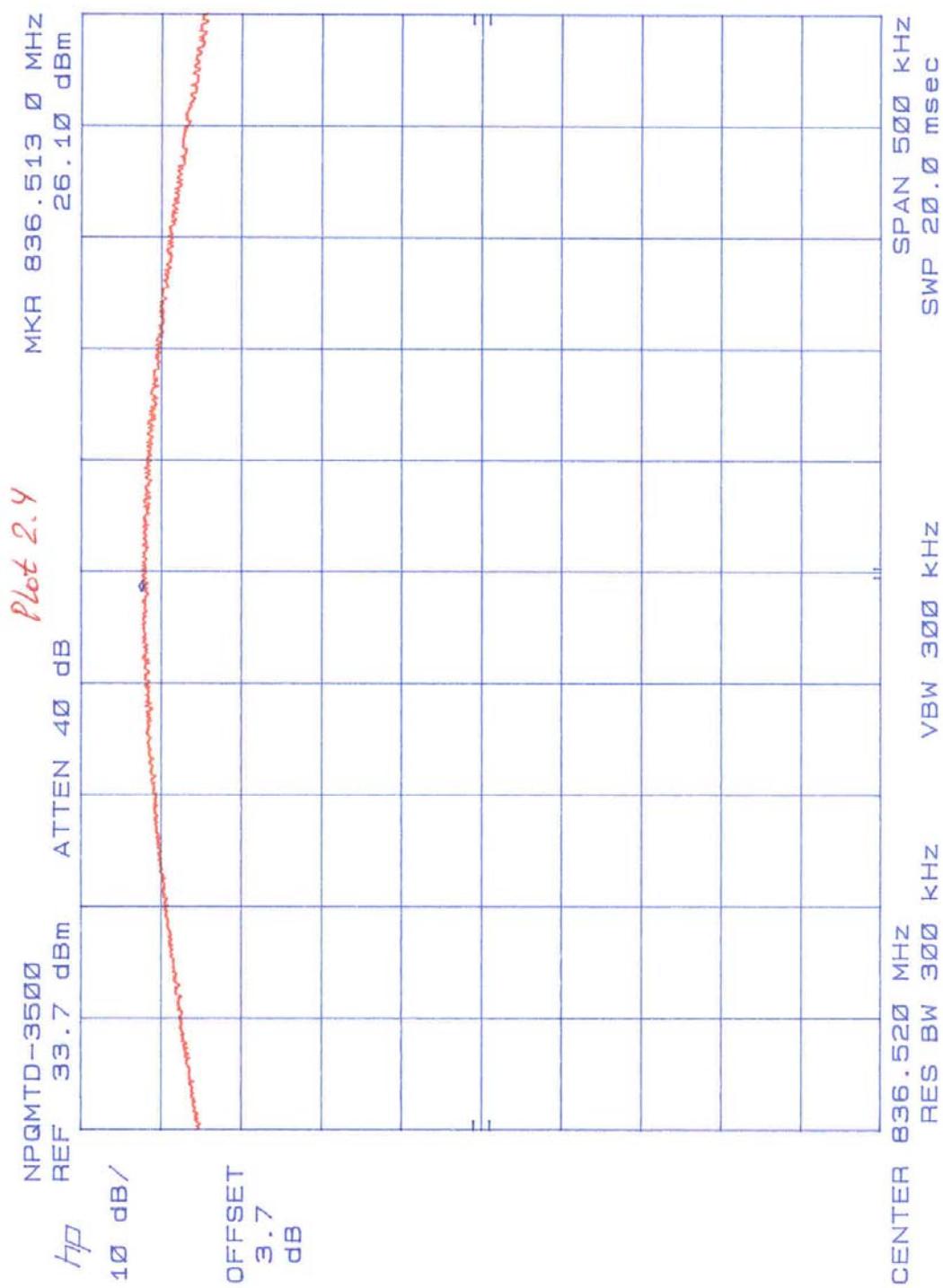
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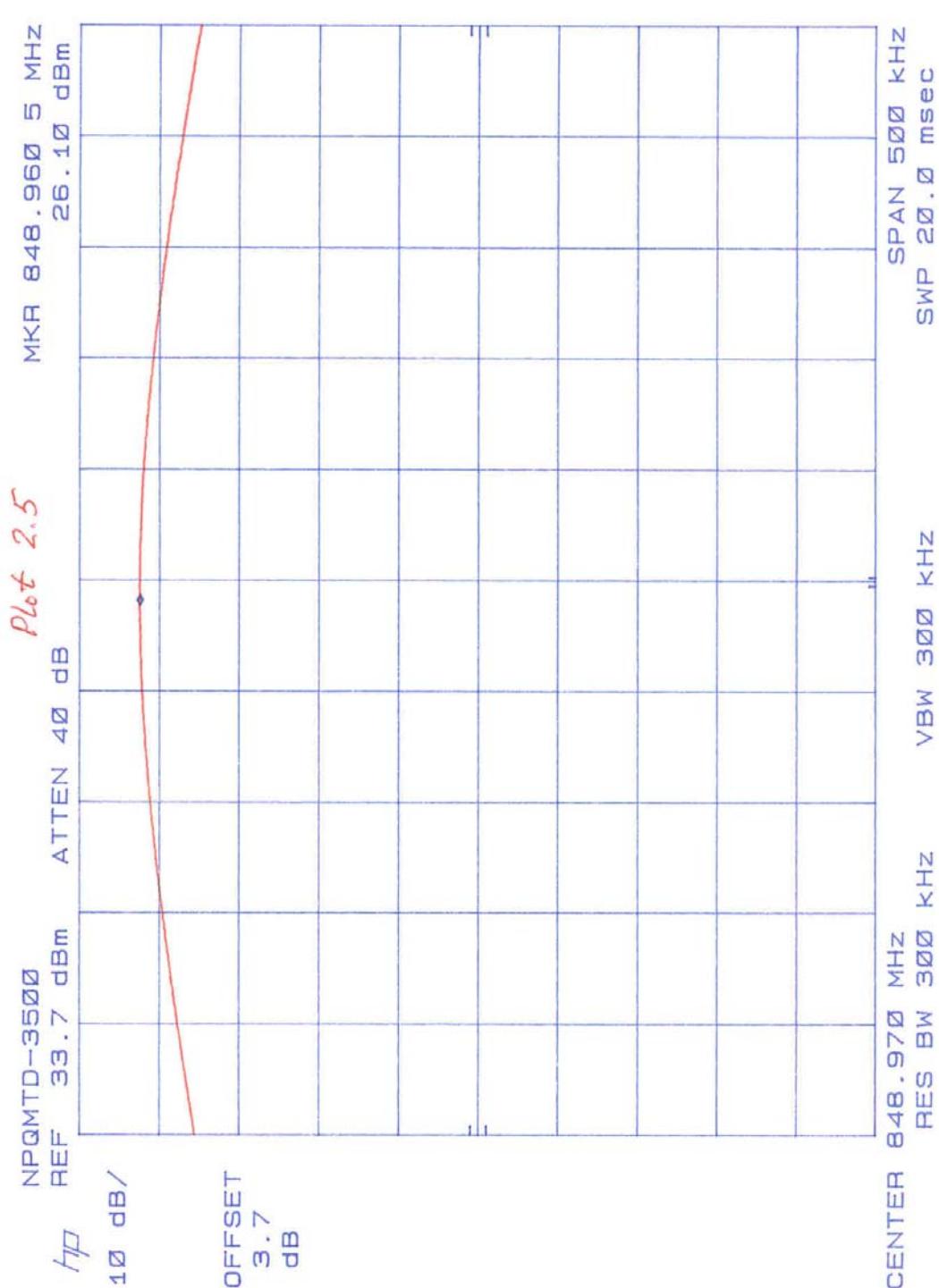
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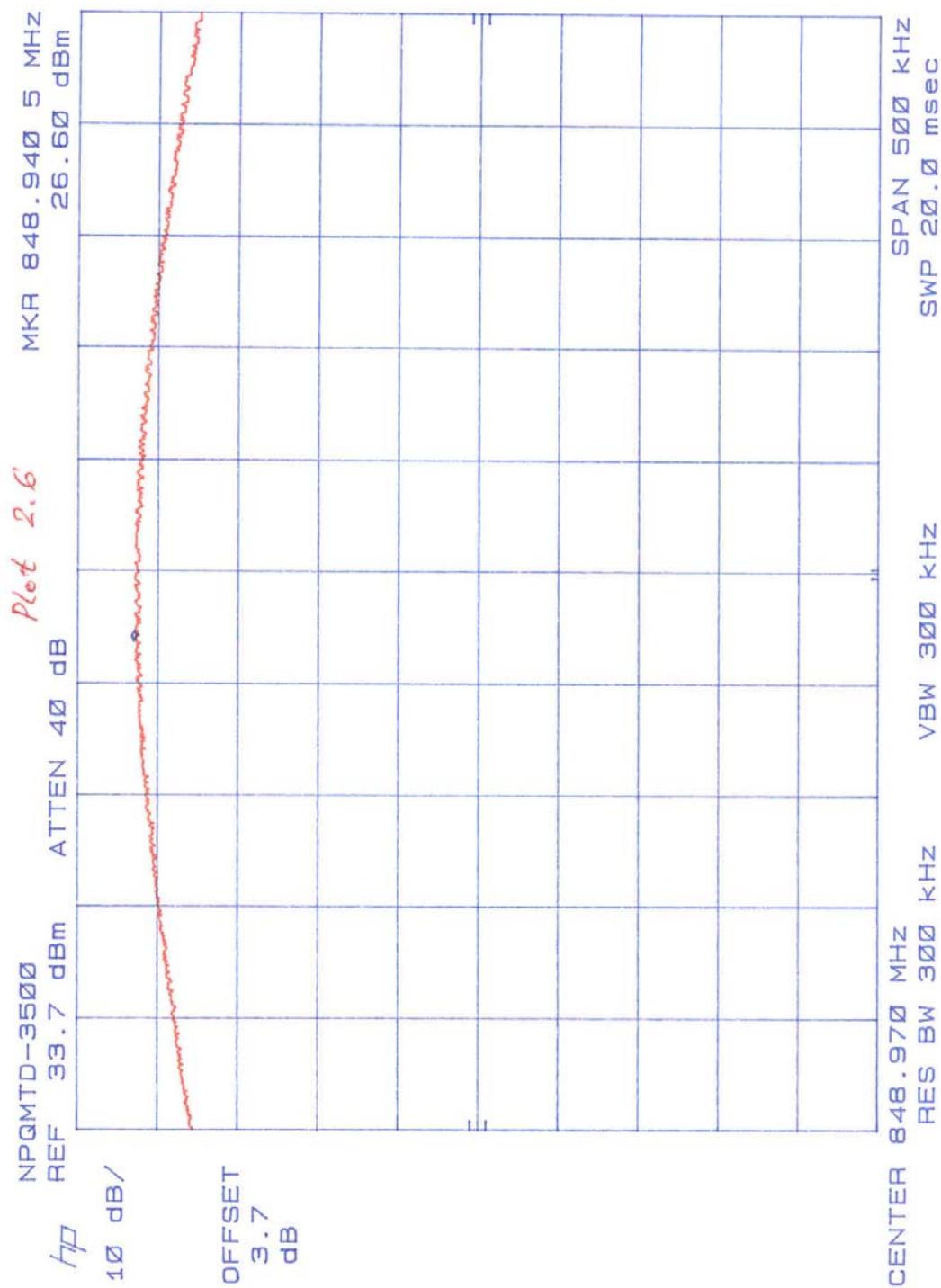
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3.0 Radiated Power
FCC 22.913

The Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

3.1 Test Procedure

The EUT was positioned on a non-conductive turntable, 0.8m above the ground plane in a 10m semi-anechoic chamber.

The radiated emission at the fundamental frequency was measured at 3m distance with a test antenna and spectrum analyzer. During the measurement, the resolution and video bandwidths of the spectrum analyzer were set to 100 kHz.

Worst-case emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna. The spectrum analyzer reading in dB(μ V) was recorded.

ERP was measured using a substitution method. The EUT was replaced by half-wave dipole connected to a signal generator. The spectrum analyzer reading was recorded and ERP was calculated as follows:

$$\text{ERP} = V_1 - V_2 + V_g,$$

Where V_1 & V_2 are spectrum analyzer readings in dB(μ V) when measured field strength from EUT & generator accordingly; V_g is the generator output in dBm.

3.2 Test Equipment

Hewlett Packard HP8546A Spectrum Analyzer
EMCO 3148 Log Periodic Antenna
CDI Robert's Antenna
Hewlett Packard HP83732A Signal Generator

3.3 Test Results

Complies	Refer to the attached data sheets.
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**Effective Radiated Power
(Measured by Substitution Method)**

Frequency MHz	Antenna Polariz.	SA Reading (EUT) dB(µV)	SA Reading (Sig. Gen. +Tuned Dipole) dB(µV)	Signal Generator Output dBm	ERP dBm
AMPS Mode					
824.04	V	95.3	41.1	-30.0	24.2
836.55	V	93.9	40.0	-30.0	23.9
848.97	V	92.8	41.8	-30.0	21.0
TDMA Mode					
824.04	V	92.7	41.1	-30.0	21.6
836.55	V	95.3	40.0	-30.0	24.2
848.97	V	92.1	41.8	-30.0	20.3

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4.0 Modulation Deviation Limiting

FCC 2.1047, 22.915(b)(c)

4.1 Test Procedure

The RF output of the transceiver was connected to the input of an FM deviation meter through sufficient attenuation so as not to overload the meter or distort the readings. An audio signal generator with a variable attenuator on the output was coupled into the external microphone jack of the transceiver, or alternatively, the microphone element was removed and the generator output was connected to the microphone wires by clip leads.

At three different modulating frequencies, the output level of the audio generator was varied and the FM deviation level was recorded (Table 4.1a).

4.2 Test Equipment

Marconi 2955A/2957 Radio Communication Test Set

4.3 Test Results

The deviation did not exceed 13.2 kHz.

The EUT passed the test.

See test data in table 4.

Table 4 Modulation Deviation Limiting

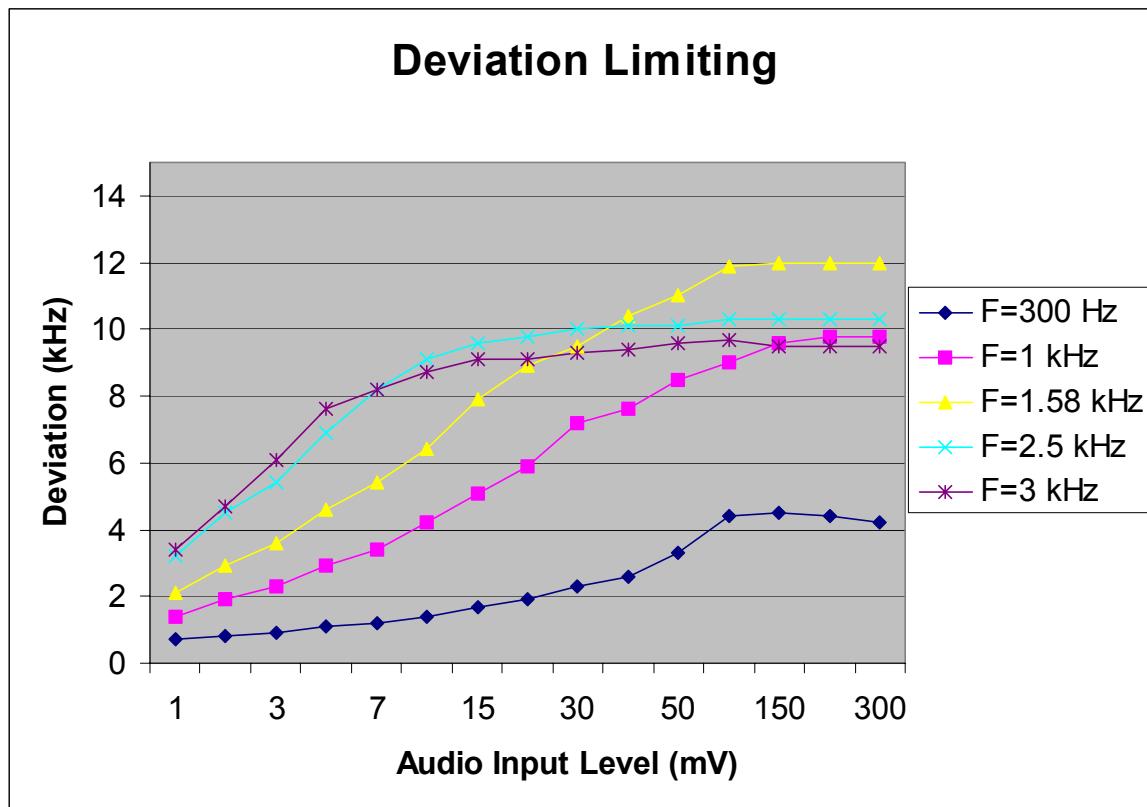
Input Level (mV)	FM Deviation in kHz at Indicated Modulating Frequency				
	300 Hz	1 kHz	1.58 kHz	2.5 kHz	3 kHz
1	0.7	1.4	2.1	3.2	3.4
2	0.8	1.9	3.0	4.5	4.7
3	0.9	2.3	3.5	5.4	5.8
5	1.1	2.9	4.6	6.9	7.6
7	1.2	3.4	5.4	8.2	8.2
10	1.4	4.2	6.4	9.1	8.7
15	1.7	5.1	7.9	9.6	9.1
20	1.9	5.9	8.9	9.8	9.1
30	2.3	7.2	9.5	10.0	9.3
40	2.6	7.6	10.4	10.1	9.4
50	2.9	8.5	11.0	10.1	9.6
100	4.4	9.0	11.9	10.3	9.7
150	4.5	9.6	12.0	10.3	9.5
200	4.4	9.8	12.0	10.3	9.5
300	4.2	9.8	12.0	10.3	9.5

Middle Channel: 836.52 MHz

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5.0 Audio Filter Characteristics

FCC 22.915(d)

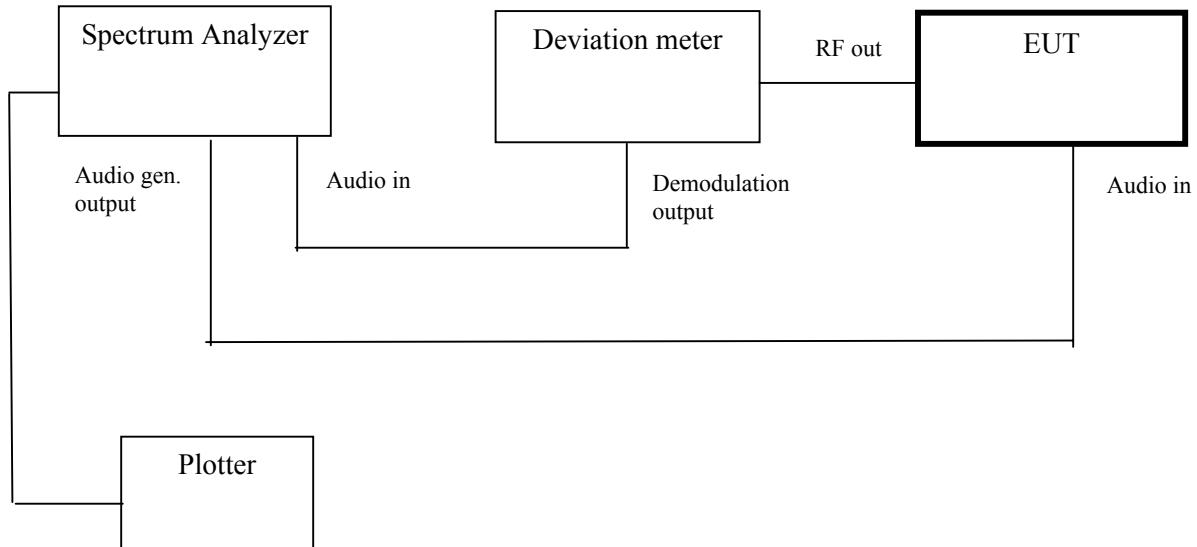
For mobile stations, these signals must be attenuated, relative to the level at 1 kHz, as follows:

- (i) In the frequency ranges of 3.0 to 5.9 kHz and 6.1 to 15.0 kHz, signals must be attenuated by at least $40 \log(f/3)$ dB, where f is the frequency of the signal in kHz.
- (ii) In the frequency range of 5.9 to 6.1 kHz, signals must be attenuated at least 35 dB.
- (iii) In the frequency range above 15 kHz, signals must be attenuated at least 28 dB.

5.1 Test Procedure

The RF output of the transceiver was connected to the input of an FM deviation meter through sufficient attenuation so as not to overload the meter or distort the readings. An audio signal generator was coupled into the external microphone jack of the transceiver, or alternatively, the microphone element was removed and the generator output was connected to the microphone wires by clip leads.

The test was performed according to the block diagram shown below.



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On that block diagram, the HP 3885A spectrum analyzer having the tracing generator, and the Marconi 2955A Radio Communication Test Set having an output of a demodulator, are used. After the calibration was made (the -20 dBm reading of the spectrum analyzer corresponds to the 9 kHz deviation) the spectrum analyzer was set to scan the frequency from 300 Hz to 30 kHz, with the same audio input level as described above, and with compressor OFF and expander OFF.

The audio filter response was plotted directly from the spectrum analyzer (Refer to Plots 5.1 and 5.2). Using the level measured at 1 kHz as a reference (0 dB), the audio filter response was calculated (See Table 5).

5.2 Test Equipment

Marconi Instruments 2955/2957 Radio Communications Test Set

HP 3588A Spectrum Analyzer

HP 7470A Plotter

5.3 Test Results

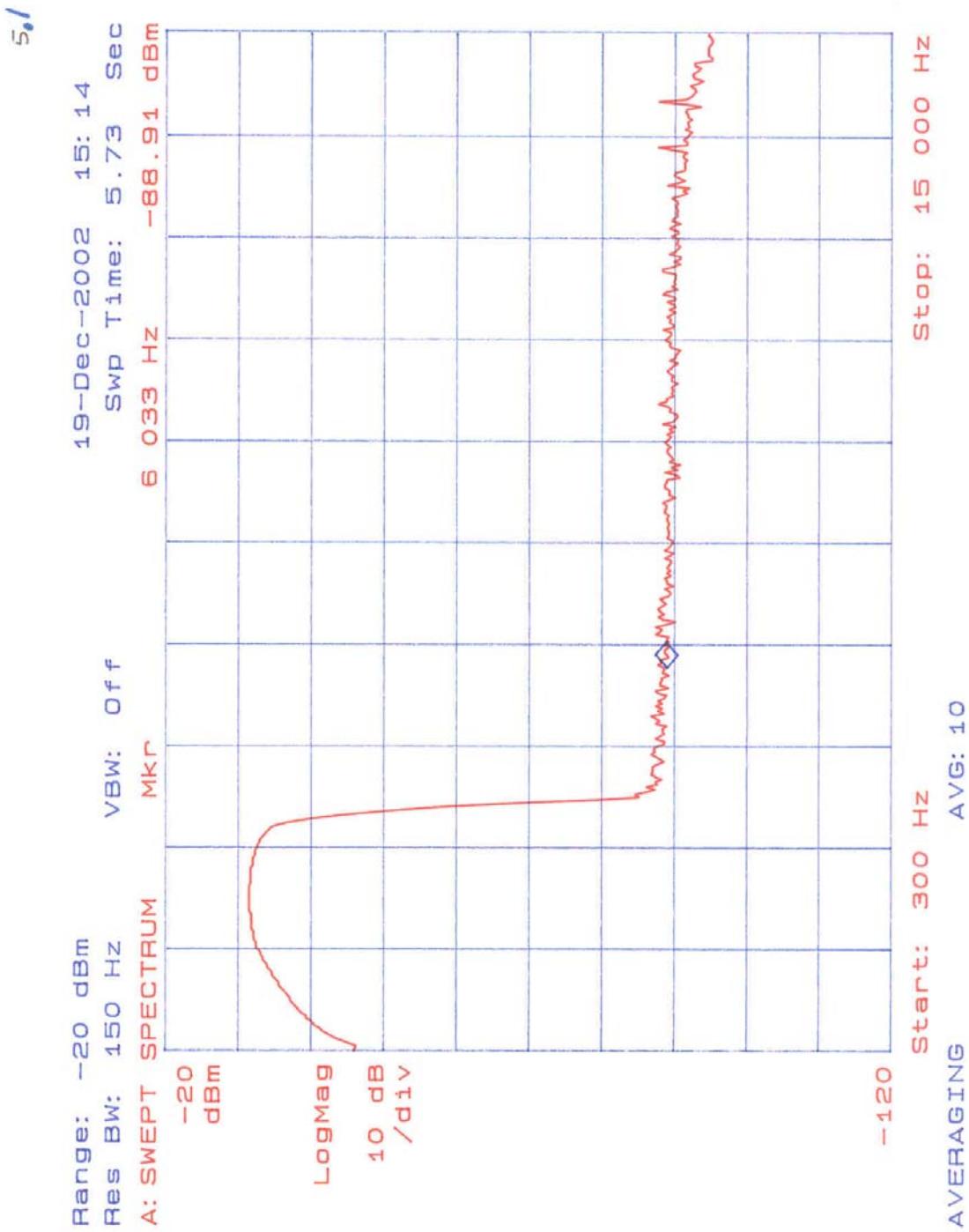
Complies, refer to the attached plots and data table.

Audio Filter Characteristics	
Plot Number	Description
5.1	300 Hz to 15 kHz
5.2	15 kHz to 30 kHz

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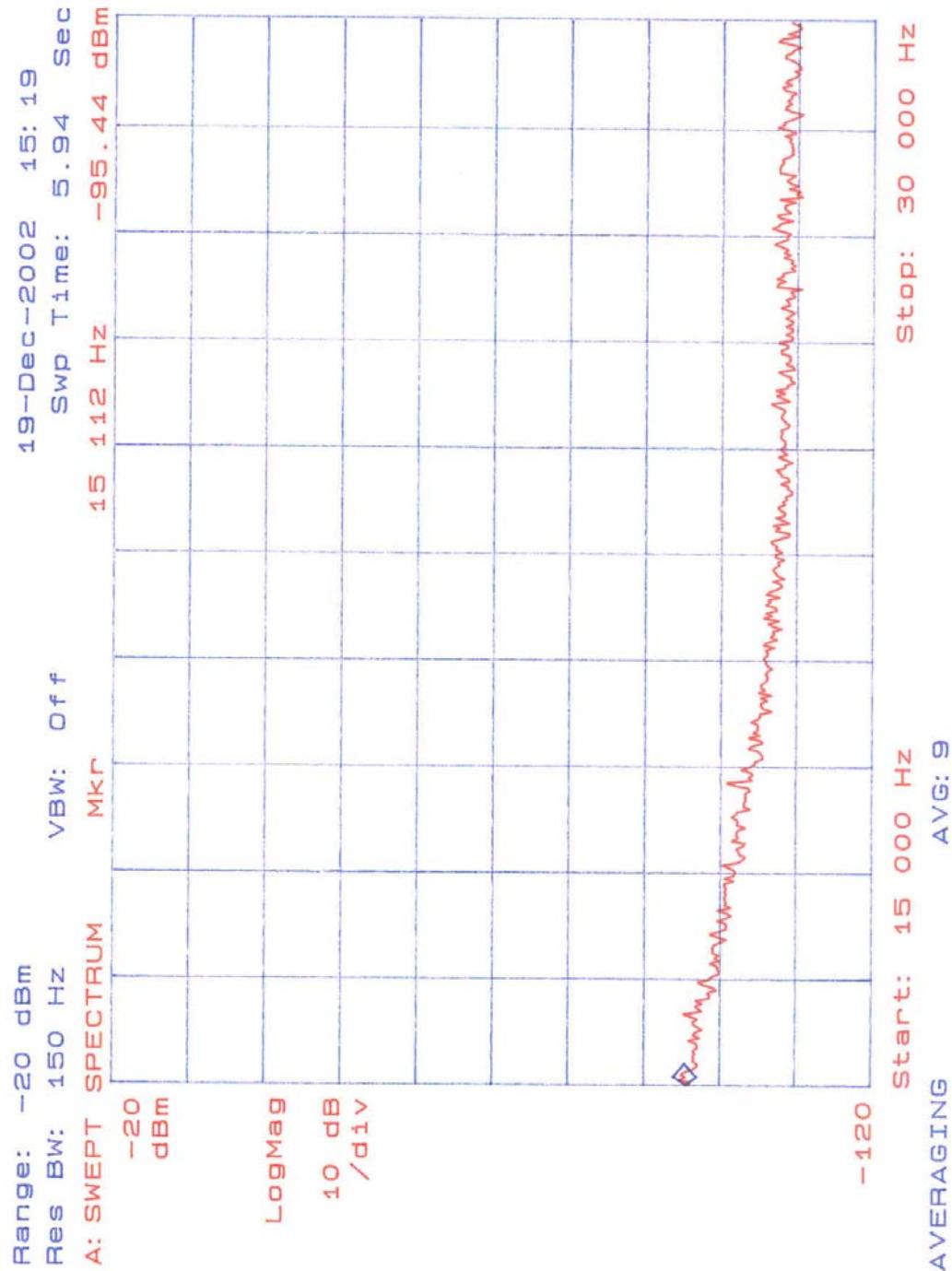


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5.2





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Table 5
Audio Filter Characteristics

Modulation Frequency kHz	Relative Level dBm	Attenuation
0.3	-43.2	10.3
0.6	-39.9	7.0
1.0	-32.9	0
1.5	-31.2	-1.7
2.0	-30.8	-2.1
2.5	-30.8	-2.1
3.0	-31.4	-1.5
3.5	-33.5	0.6
3.8	-56.9	24.0
3.9	-77.1	44.2
4.0	-88.3	55.4
6.0	-89.7	56.8
6.0 – 15.0	< - 88	> 55
15 – 30	< - 90	> 57

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6.0 Emission Limitations, Occupied Bandwidth

FCC 2.1049, 22.917(b)(d)

For F3E/F3D emission mask uses with audio filter, the mean power of emissions must be attenuated below the mean power of the unmodulated carrier wave (P) as follows:

- (1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz: at least 26 dB;
- (2) On any frequency removed from the carrier frequency by more than 45 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 F1D emission mask, the mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) as follows:

- (1) On any frequency removed from the carrier frequency by more than 20 kHz but no more than 45 kHz: at least 26 dB;
- (2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz: at least 45 dB;
- (2) 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.

6.1 Test Procedure

The RF output of the transceiver was connected to the input of the spectrum analyzer through sufficient attenuation. The audio generator was connected to the audio input of the transceiver.

The spectrum with no modulation was recorded. The audio input signal was adjusted to obtain the frequencies deviation equal 6 kHz at the audio frequency of maximum response which was determined measuring deviation versus frequency from 300 Hz to 3.5 kHz and was found 1.58 kHz. The audio input level was increased by 16 dB. The audio frequency was set to the frequency 2.5 kHz.

The resolution bandwidth of the spectrum analyzer was set at 300 Hz and the spectrum was recorded in the frequency band 50 kHz and 100 kHz from the carrier frequency. The same plots have been done for wideband emissions, SAT, ST, DTMF9, Voice, some of the combinations of these modulating signals and in TDMA mode. In addition, the emissions were recorded for low power (voice plus SAT only).

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6.2 Test Equipment

HP 8566B Spectrum Analyzer

Marconi 2955/2957 Radio Communication Test Set

HP 7470A Plotter

6.3 Test Results

Complies	Refer to the attached plots.
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Plot Number	Description
6.1	Wideband emissions (0, 1, 0, 1), scan 100 kHz
6.2	DTMF "9"
6.3	SAT (6 kHz, 2 kHz deviation)
6.4	ST (10 kHz, 8 kHz deviation), scan 100 kHz
6.5	ST & SAT (6 kHz & 10 kHz), scan 100 kHz
6.6	DTMF & SAT, scan 100 kHz
6.7	Voice (2.5 kHz), scan 100 kHz
6.8	Voice (2.5 kHz), scan 200 kHz
6.9	Voice (2.5 kHz) & SAT (6 kHz), scan 100 kHz
6.10	Voice (2.5 kHz) & SAT (6 kHz), scan 200 kHz
6.11	TDMA mode, scan 100 kHz
6.12	TDMA mode, scan 200 kHz
6.13	Voice (2.5 kHz) & SAT (6 kHz), low power

Calculation of the necessary bandwidth (Bn) using the Carson's Rule $Bn = 2(M+D)$:

a) Voice and SAT signals:

Voice (M=2.5 kHz, D=12 kHz)

SAT (M=6 kHz, D=2 kHz)

$$Bn = 2(6+12+2) = 40 \text{ kHz}$$

Emission Designator: 40K0F8W

b) Wideband data:

Data (M=10 kHz, D=8 kHz)

SAT (M=6 kHz, D=2 kHz)

$$Bn = 2(10+8+2) = 40 \text{ kHz}$$

Emission Designator: 40K0F1D

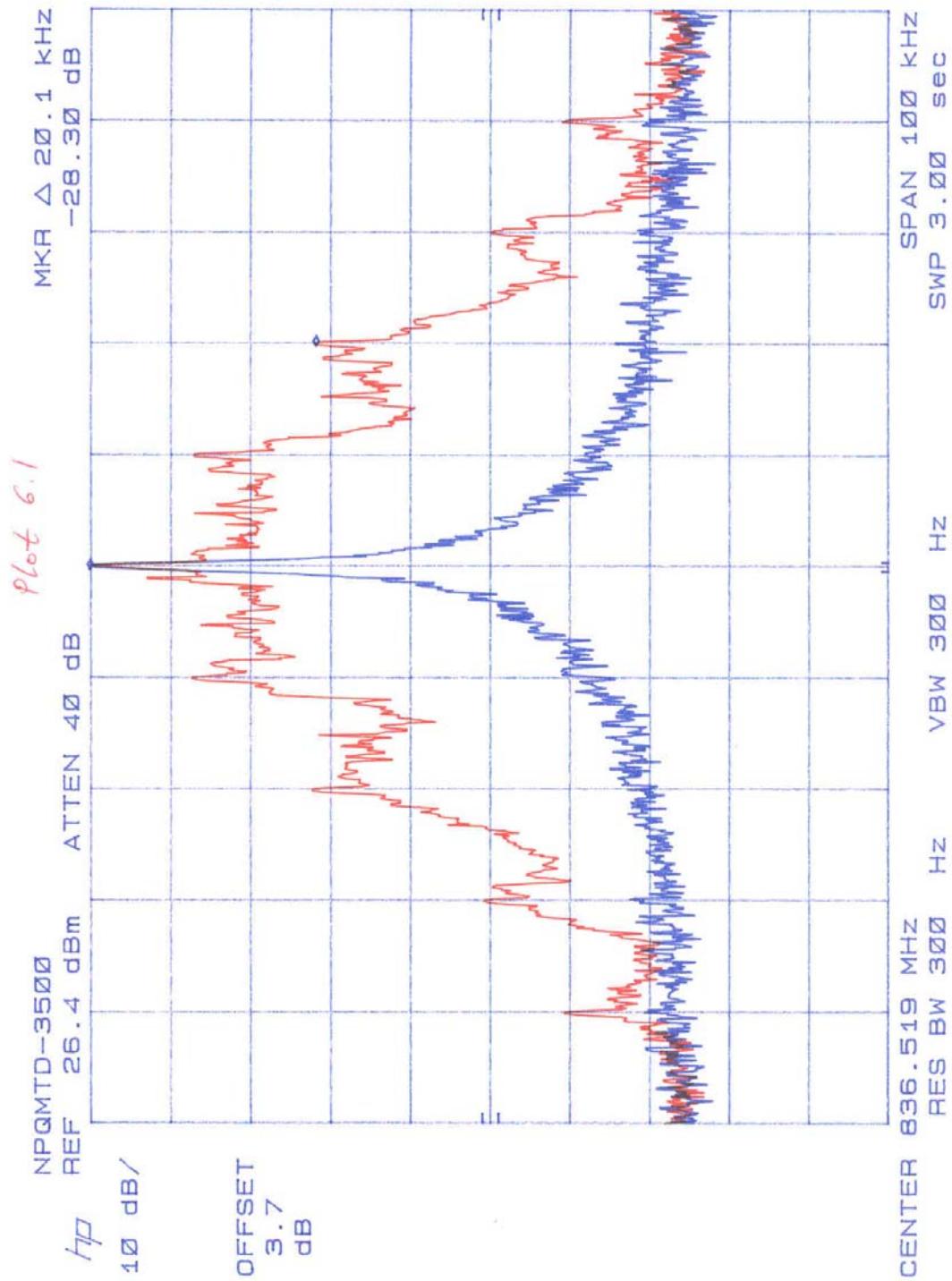
c) TDMA

Emission Designator: 30K0DXW

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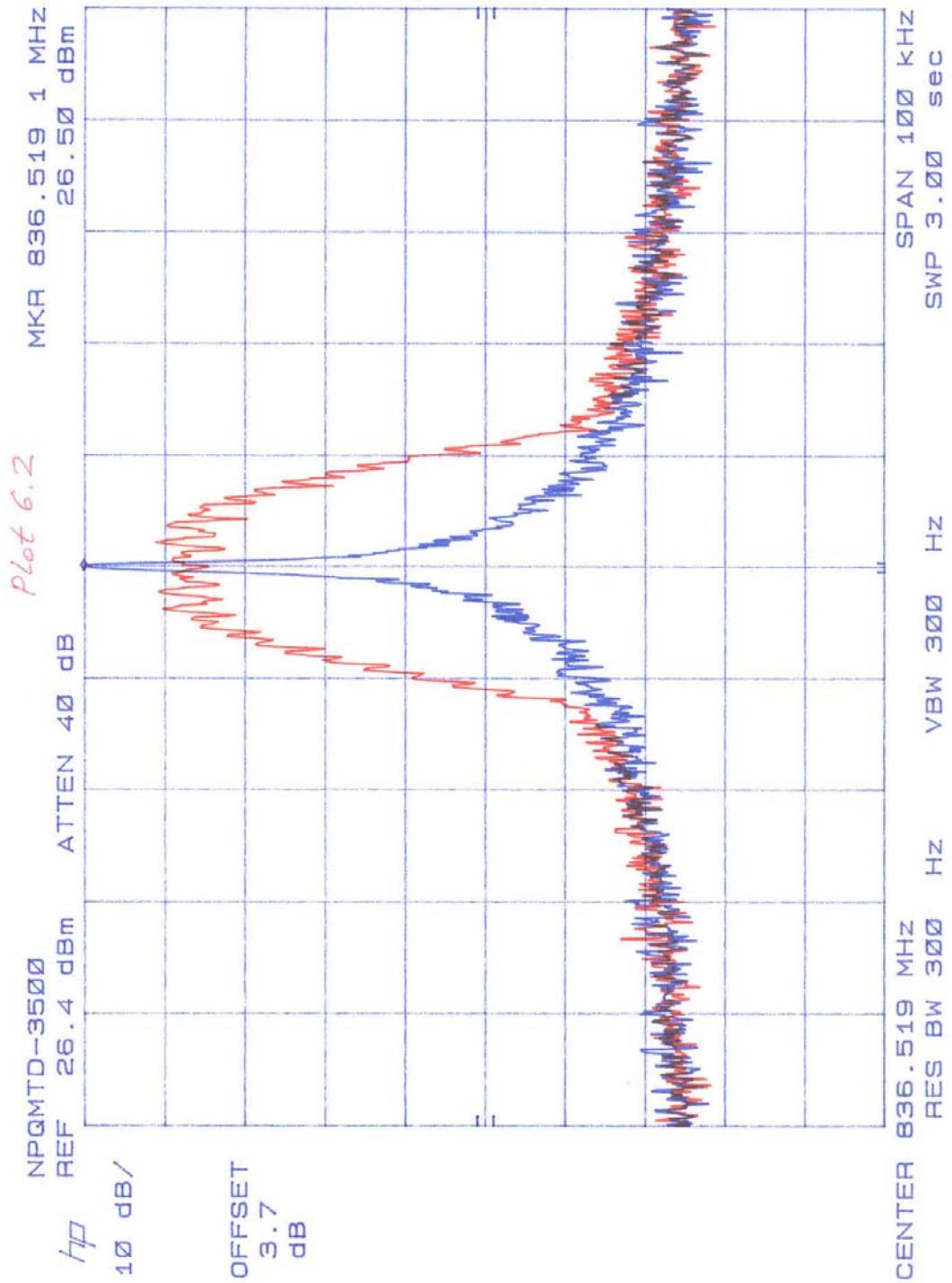
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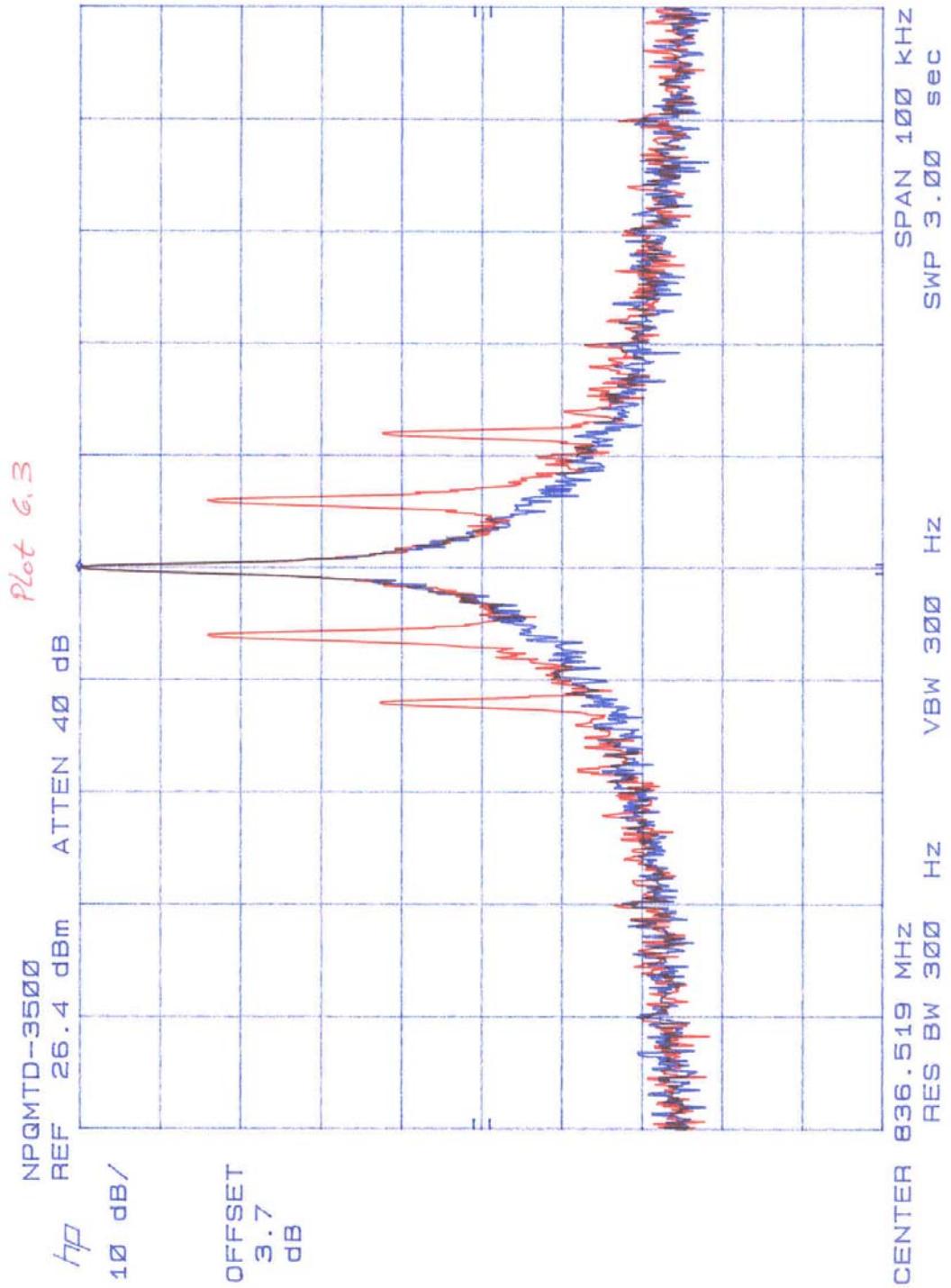
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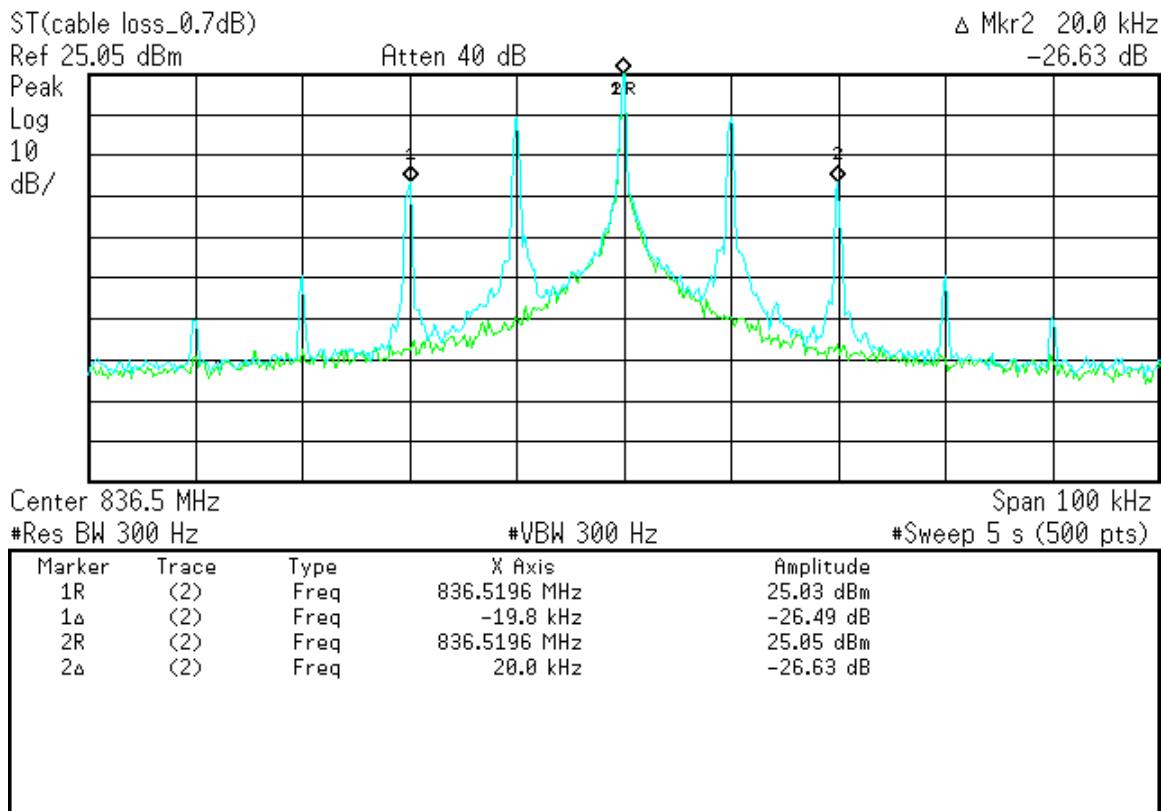


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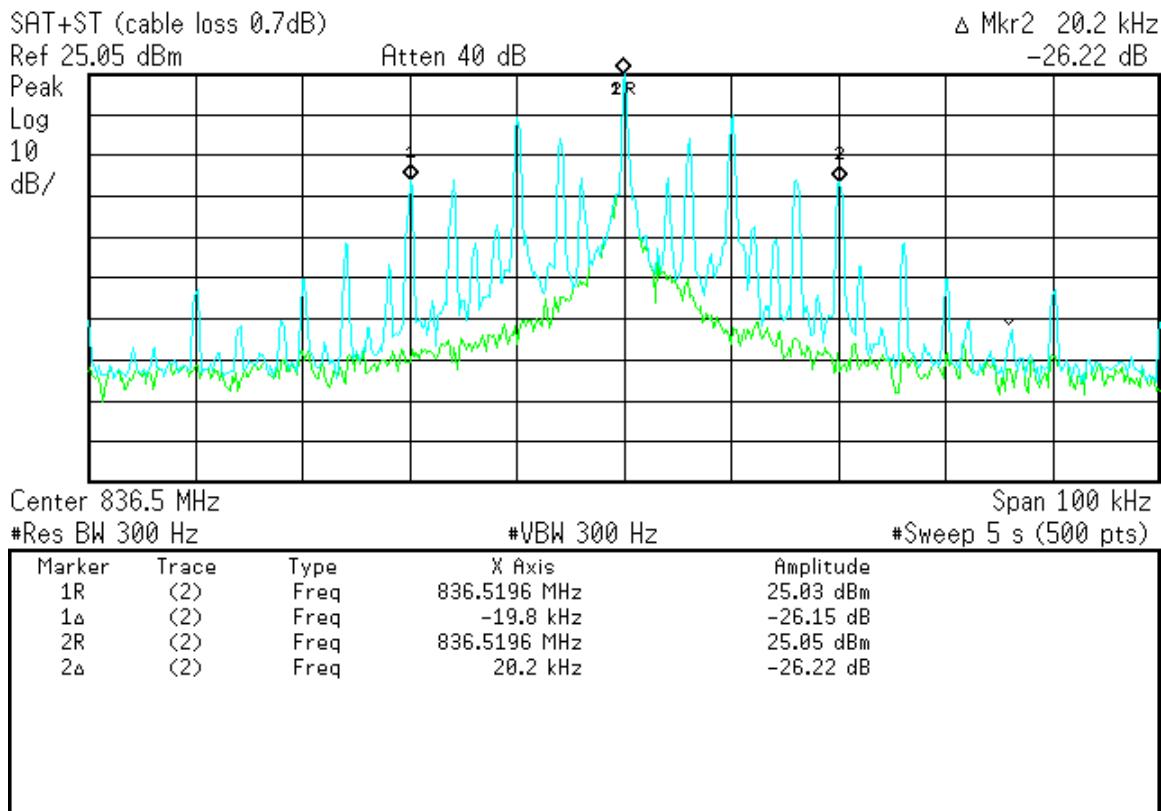


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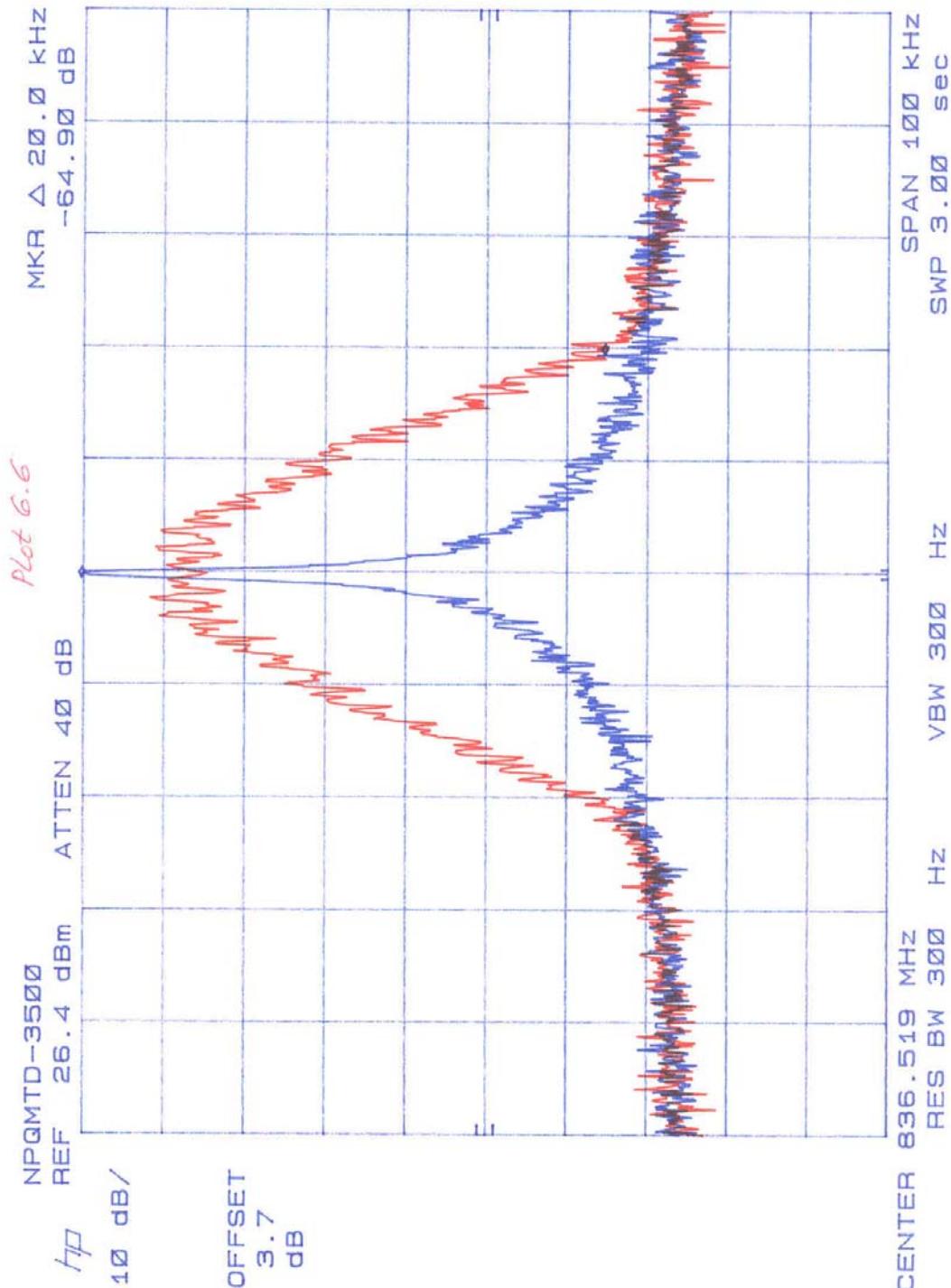
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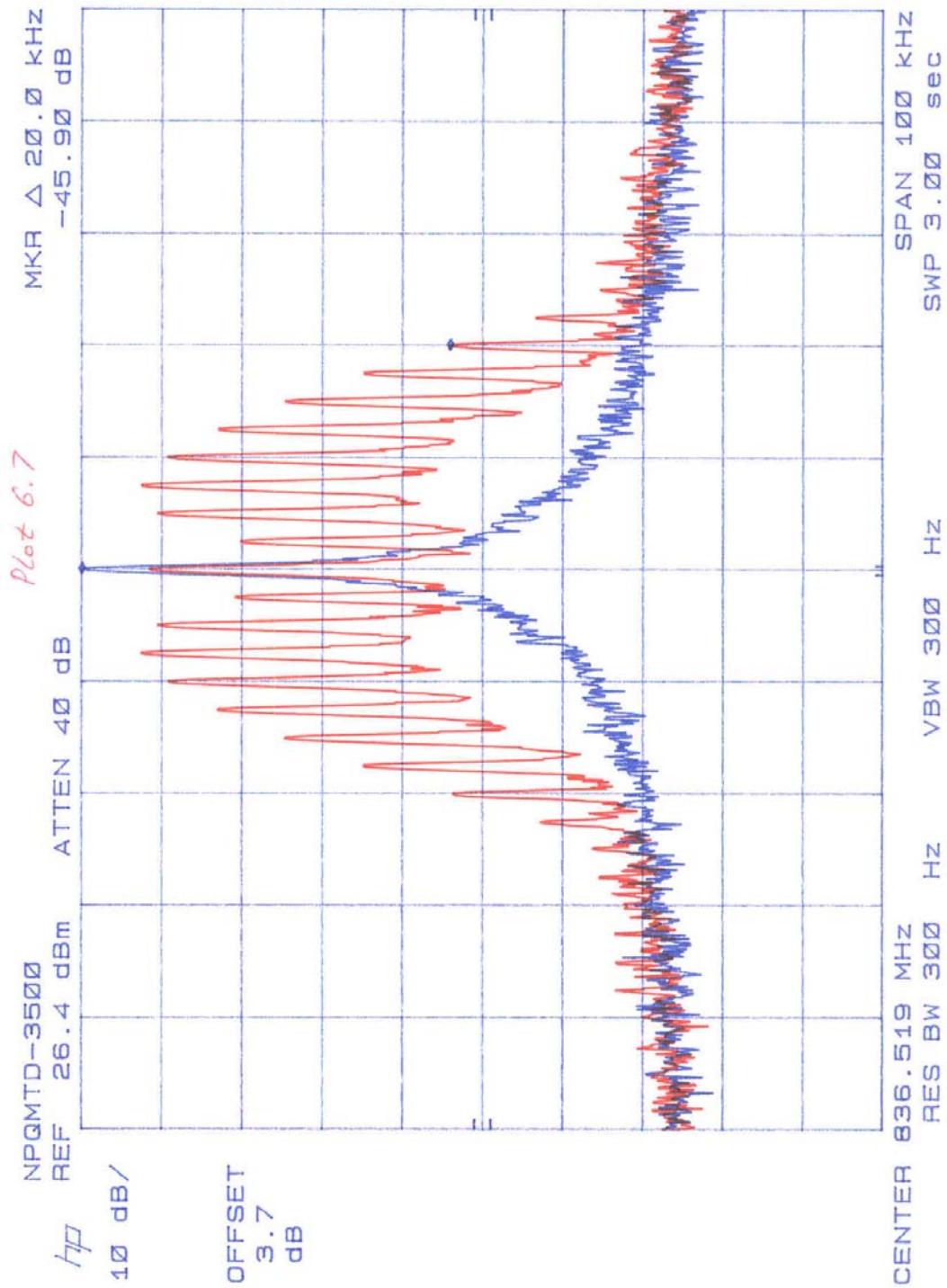
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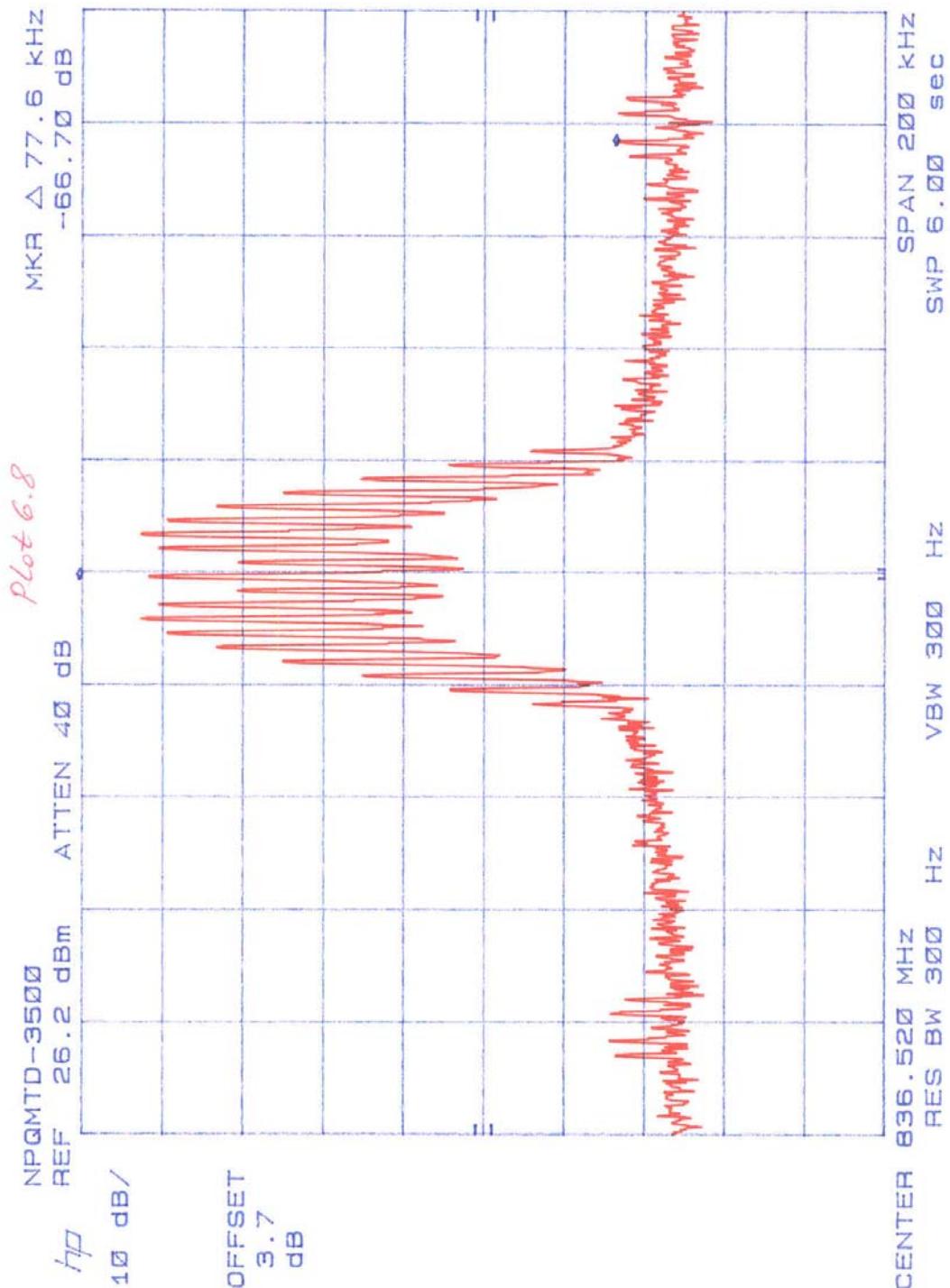
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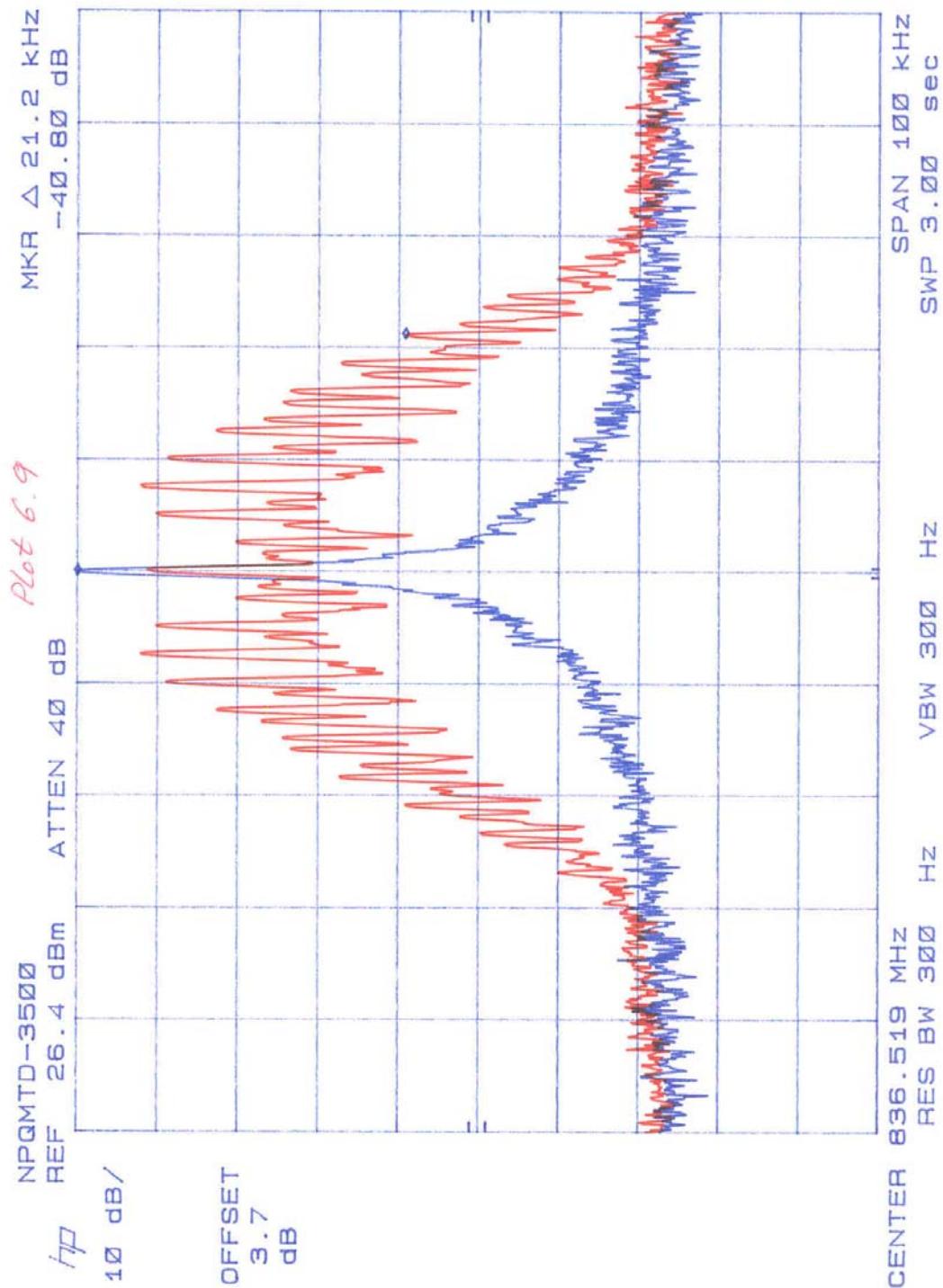
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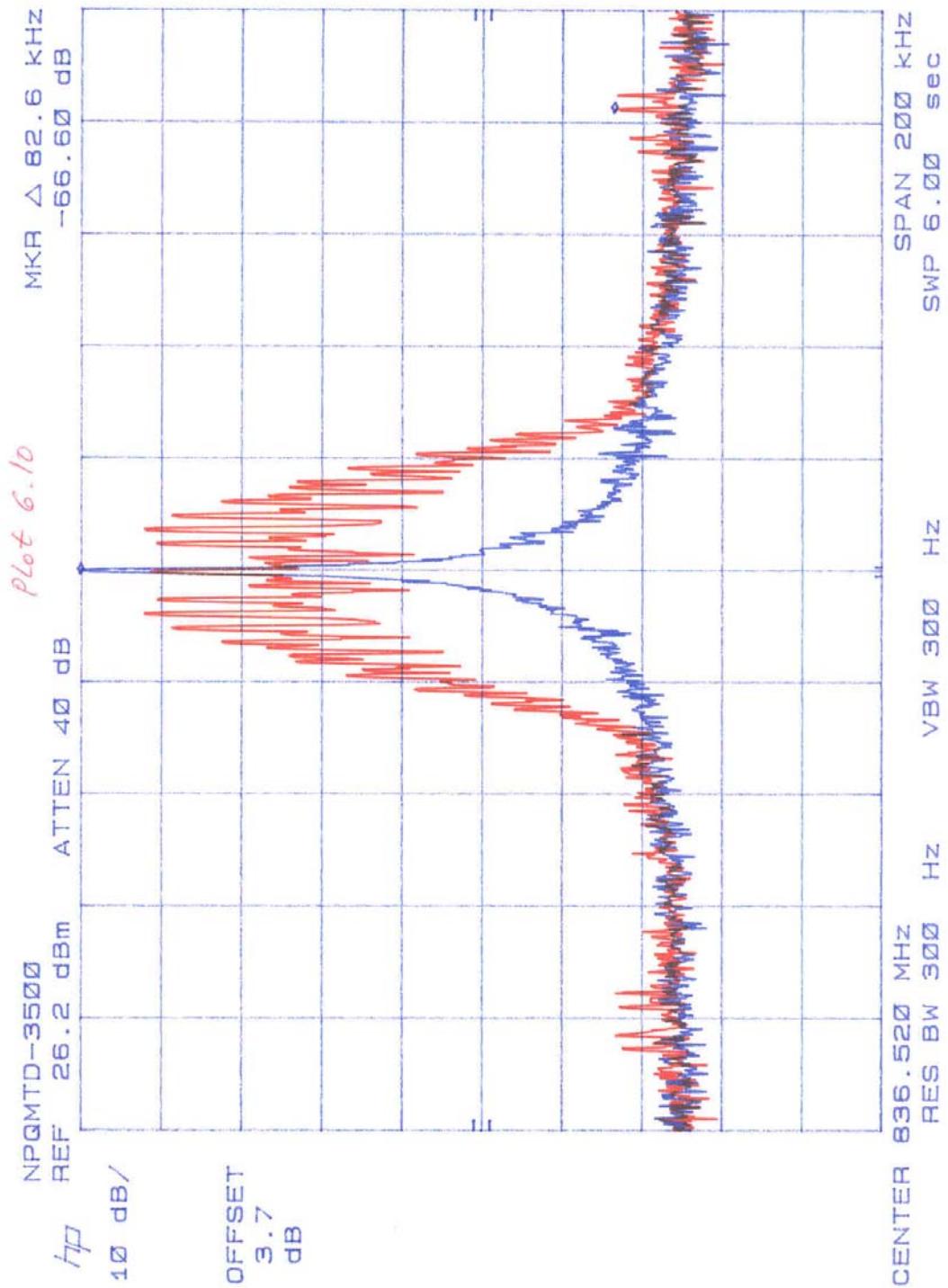
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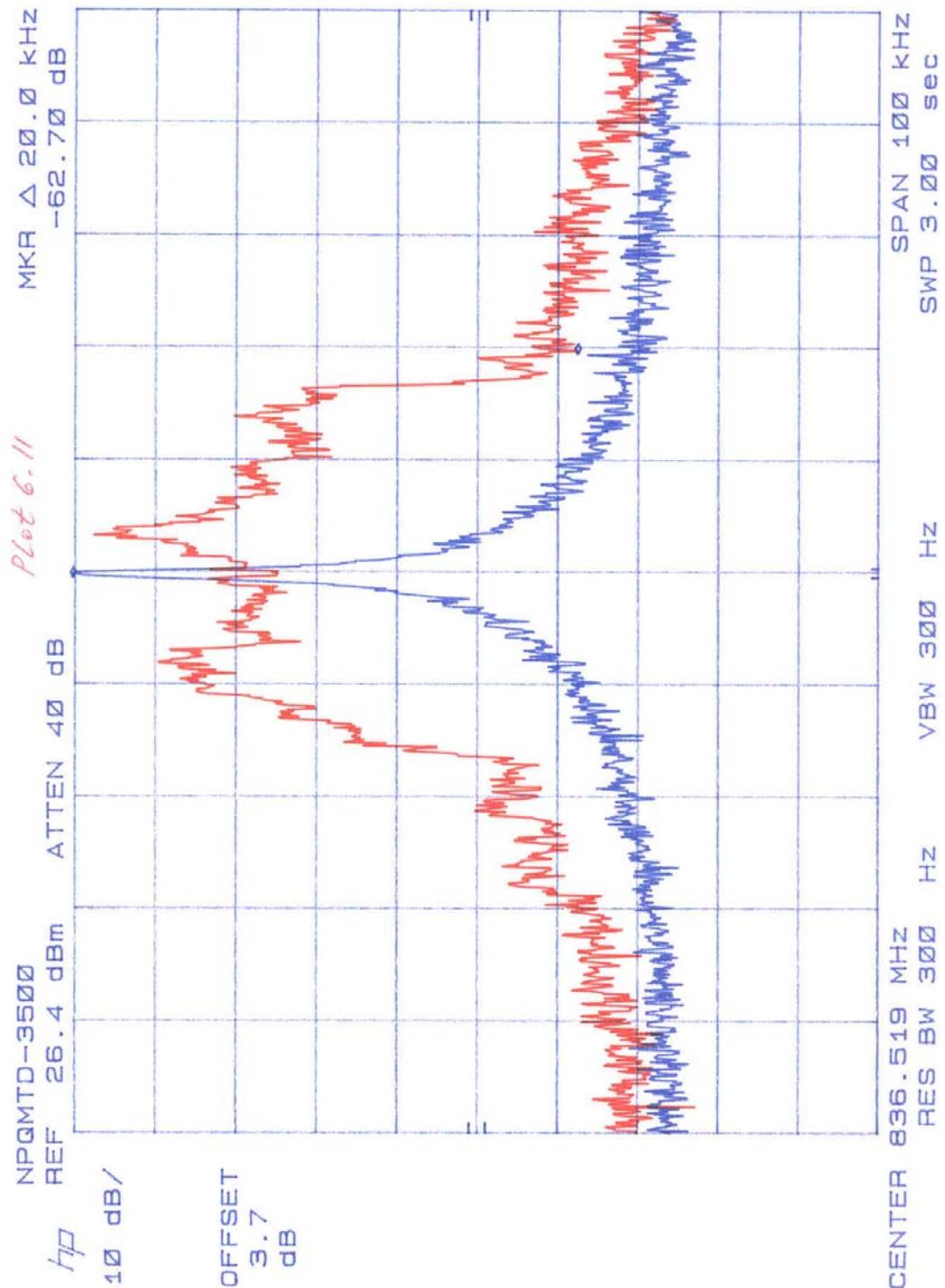
Date of Test: December 16 to 20, 2002 and February 18, 2003



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FCC ID: NPQMTD-3500

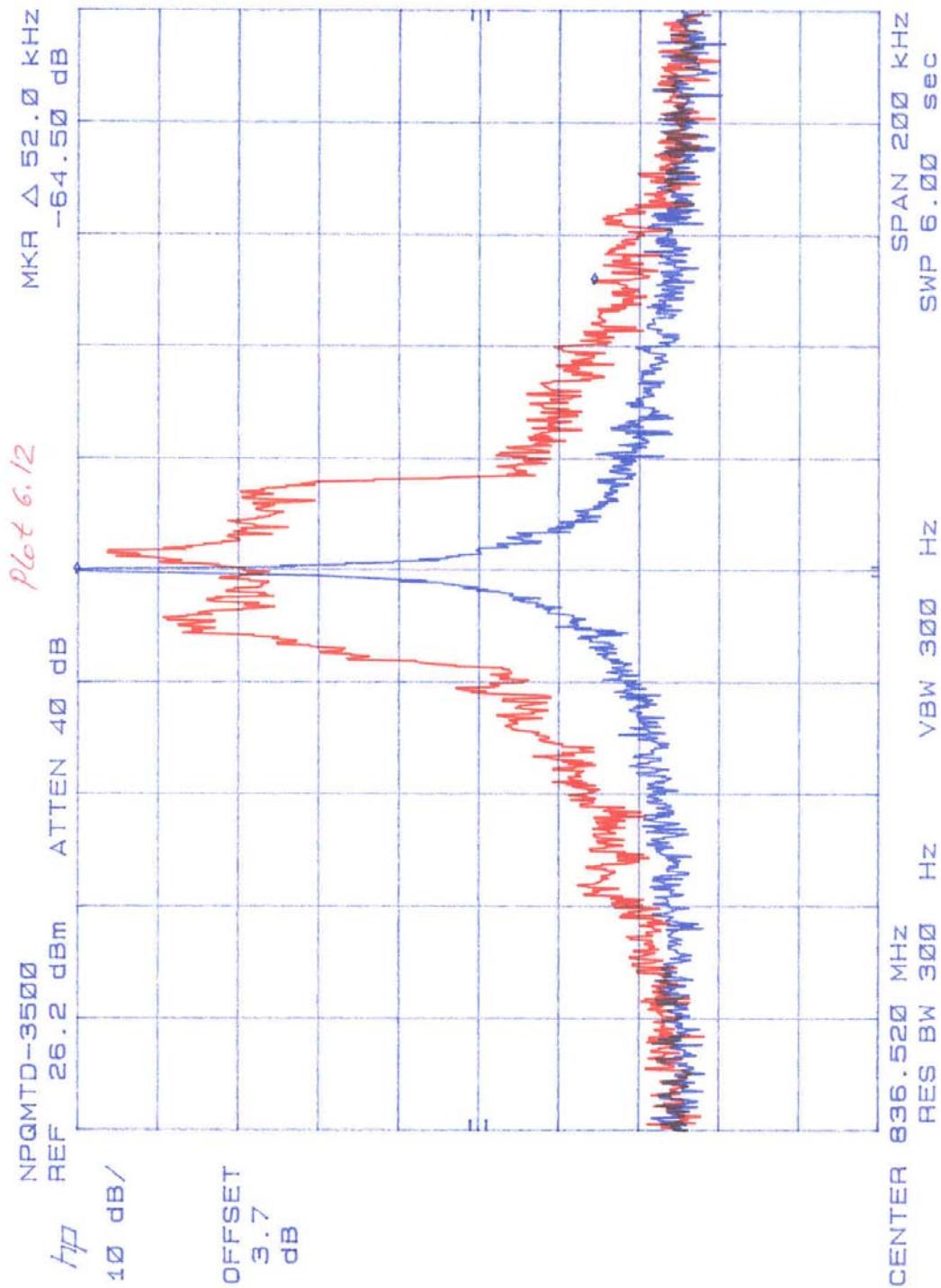
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

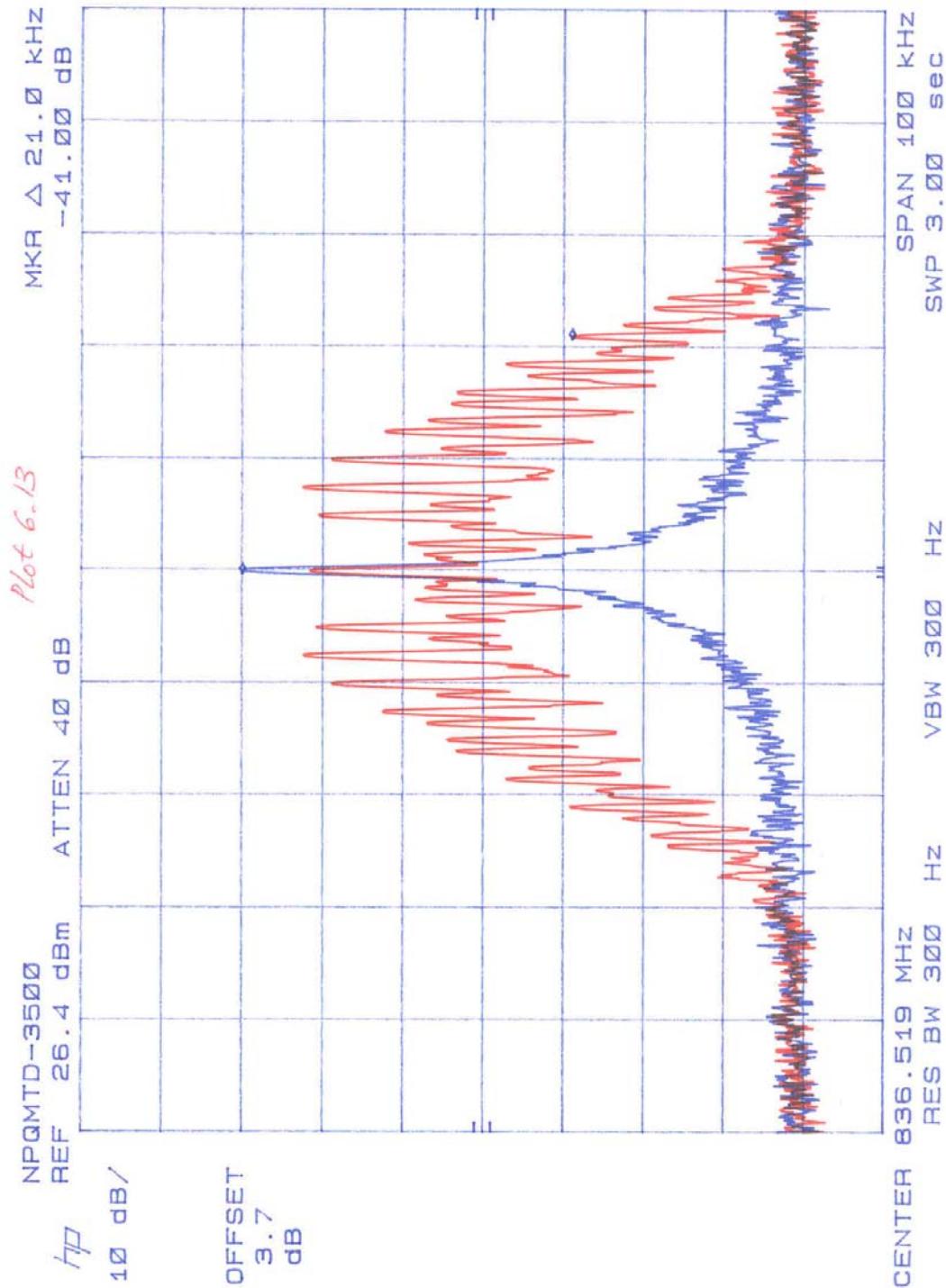
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002 and February 18, 2003

7.0 Out of Band Emissions at Antenna Terminals

FCC 22.917(e), 22.917(f)

Out of Band Emissions:

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at least $(43 + 10 \log P)$ dB.

Mobile Emissions in Base Frequency Range:

The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed -80 dBm at the transmit antenna connector.

7.1 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 30 kHz. The audio modulating signal was adjusted like it is described in Section 6.1 of this report. Sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

7.2 Test Equipment

HP 8566B Spectrum Analyzer

Marconi 2955/2957 Radio Communication Test Set

HP 7470A Plotter

Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002 and February 18, 2003

7.3 Test Results

Complies	Refer to the attached plots.
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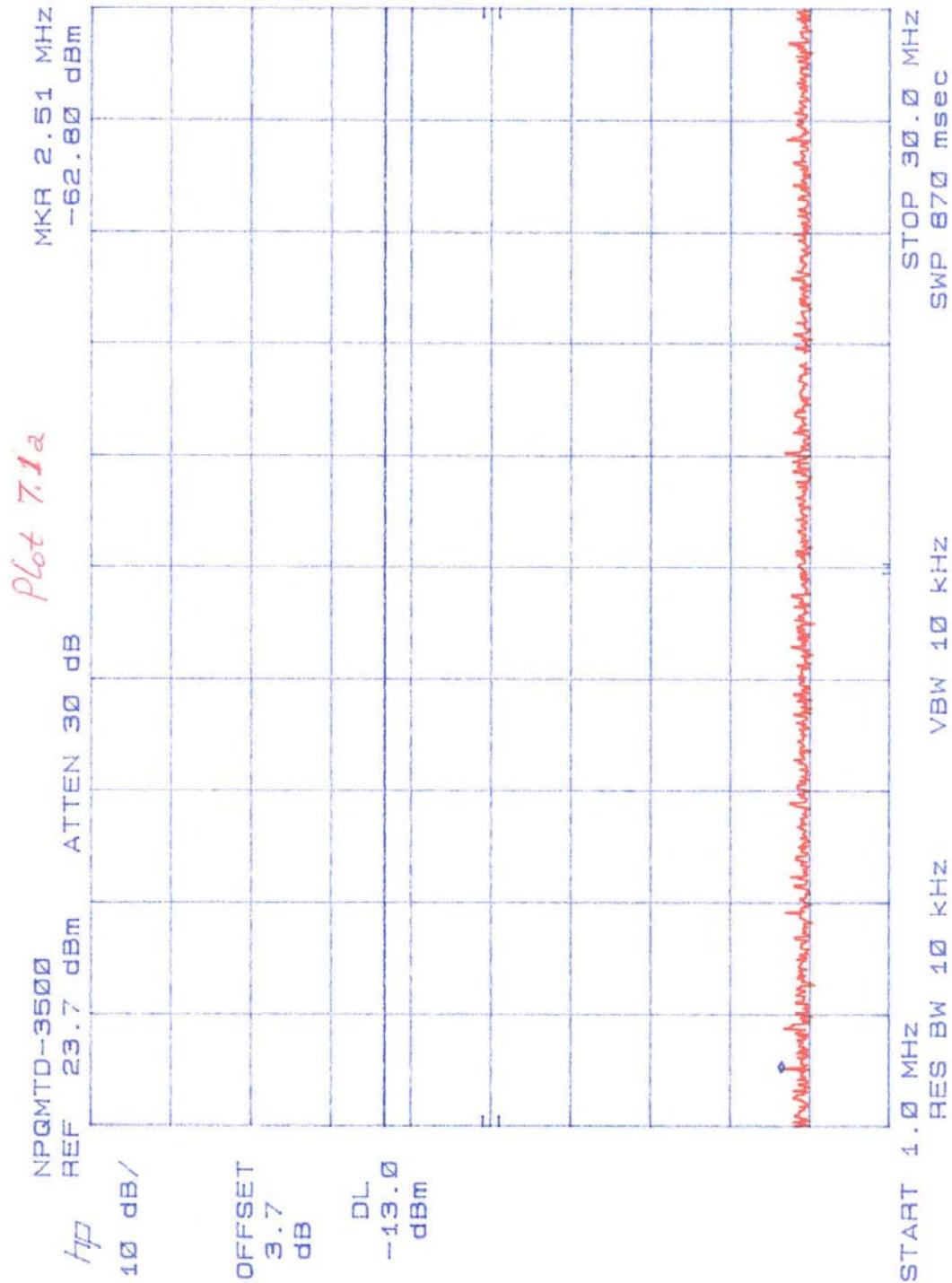
Plot Number	Description
7.1.a - 7.1.d	Low Channel, high power
7.2.a - 7.2.d	Middle Channel, high power
7.3.a - 7.3.d	High Channel, high power
7.5.a - 7.5.d	Middle Channel, low power (5 dBm)

Emissions in the receiving band	
Plot Number	Description
7.4.a	Low Channel
7.4.b	Middle Channel
7.4.c	High Channel

Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

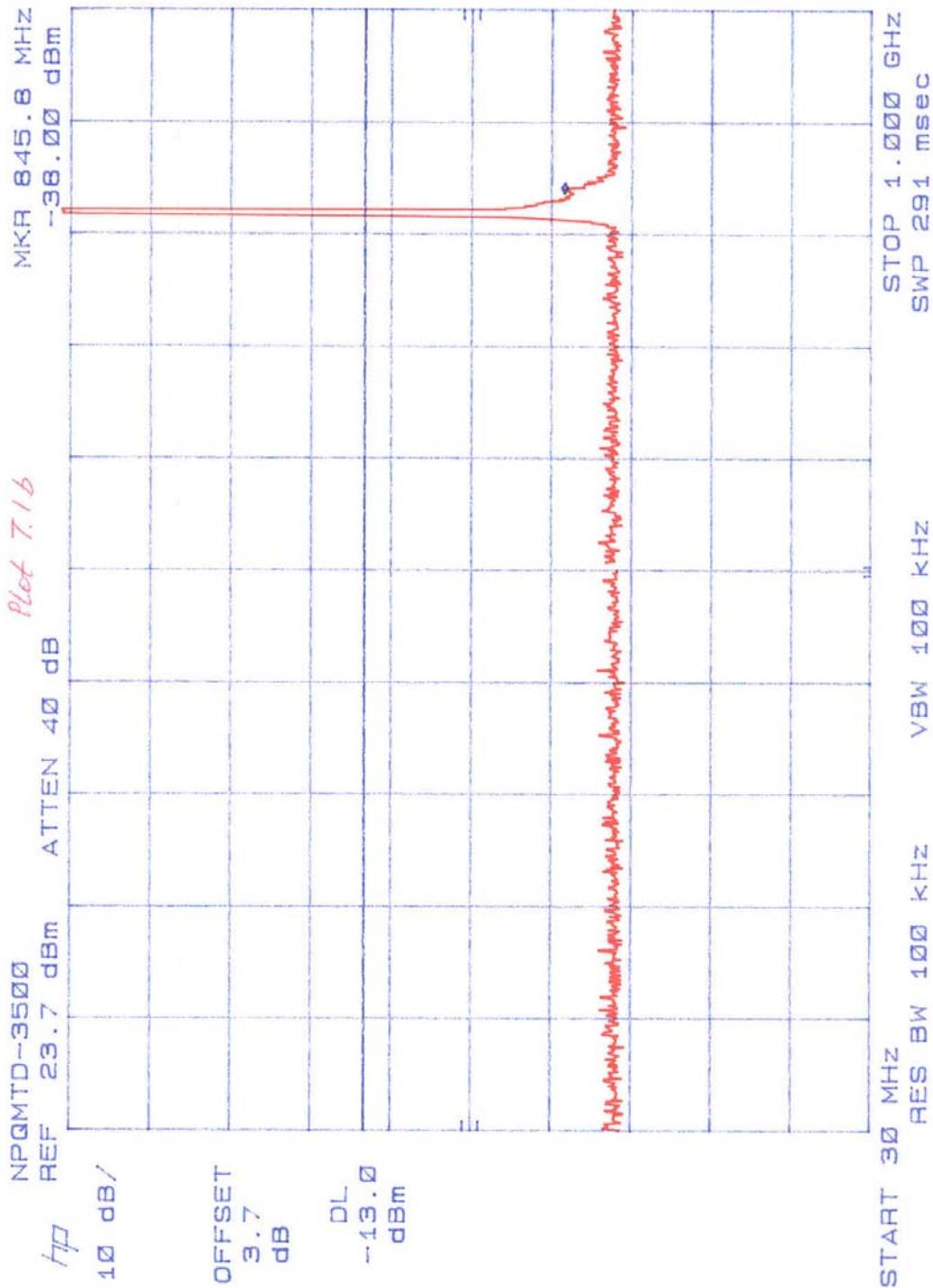
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

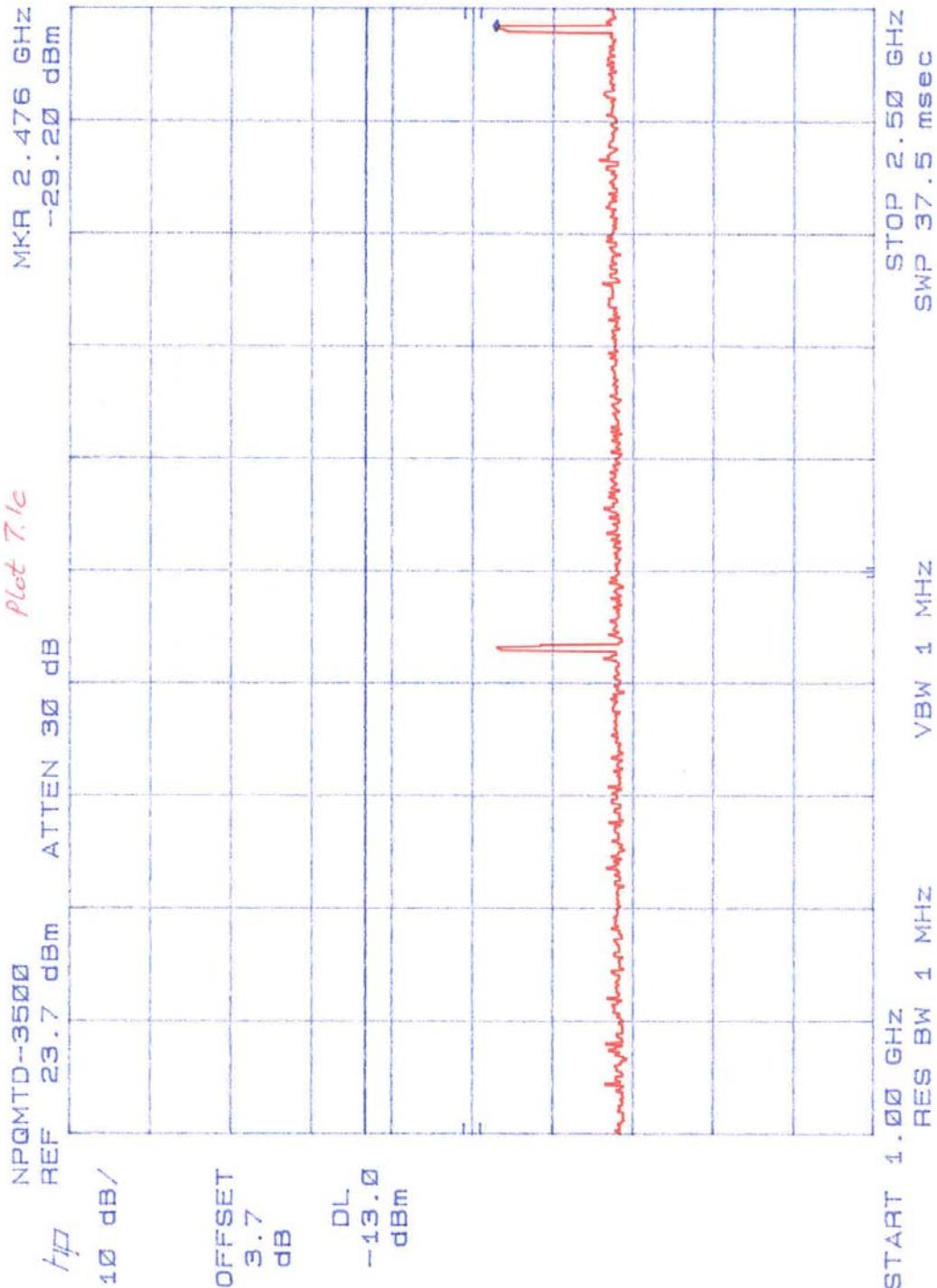
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Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

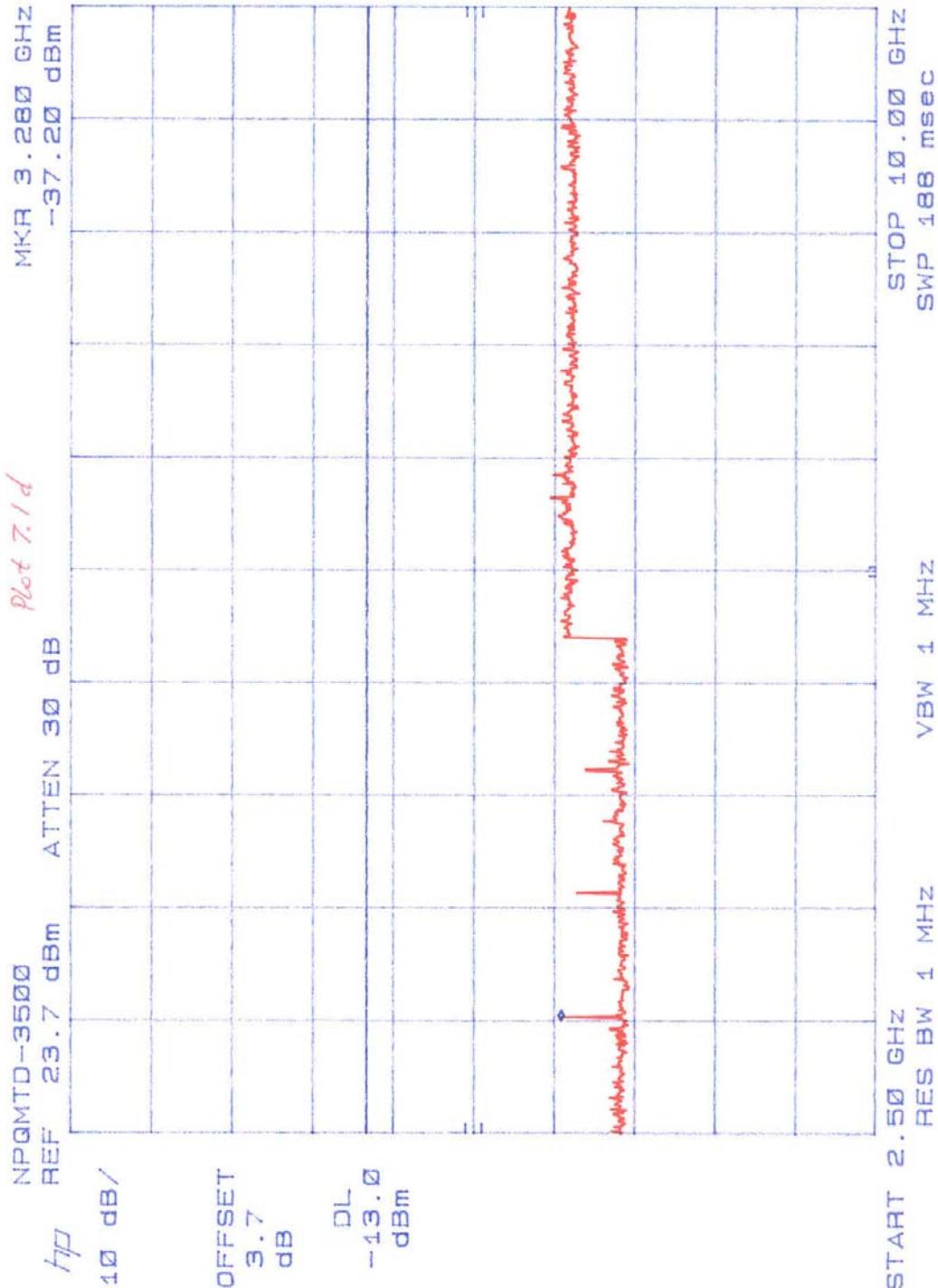
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

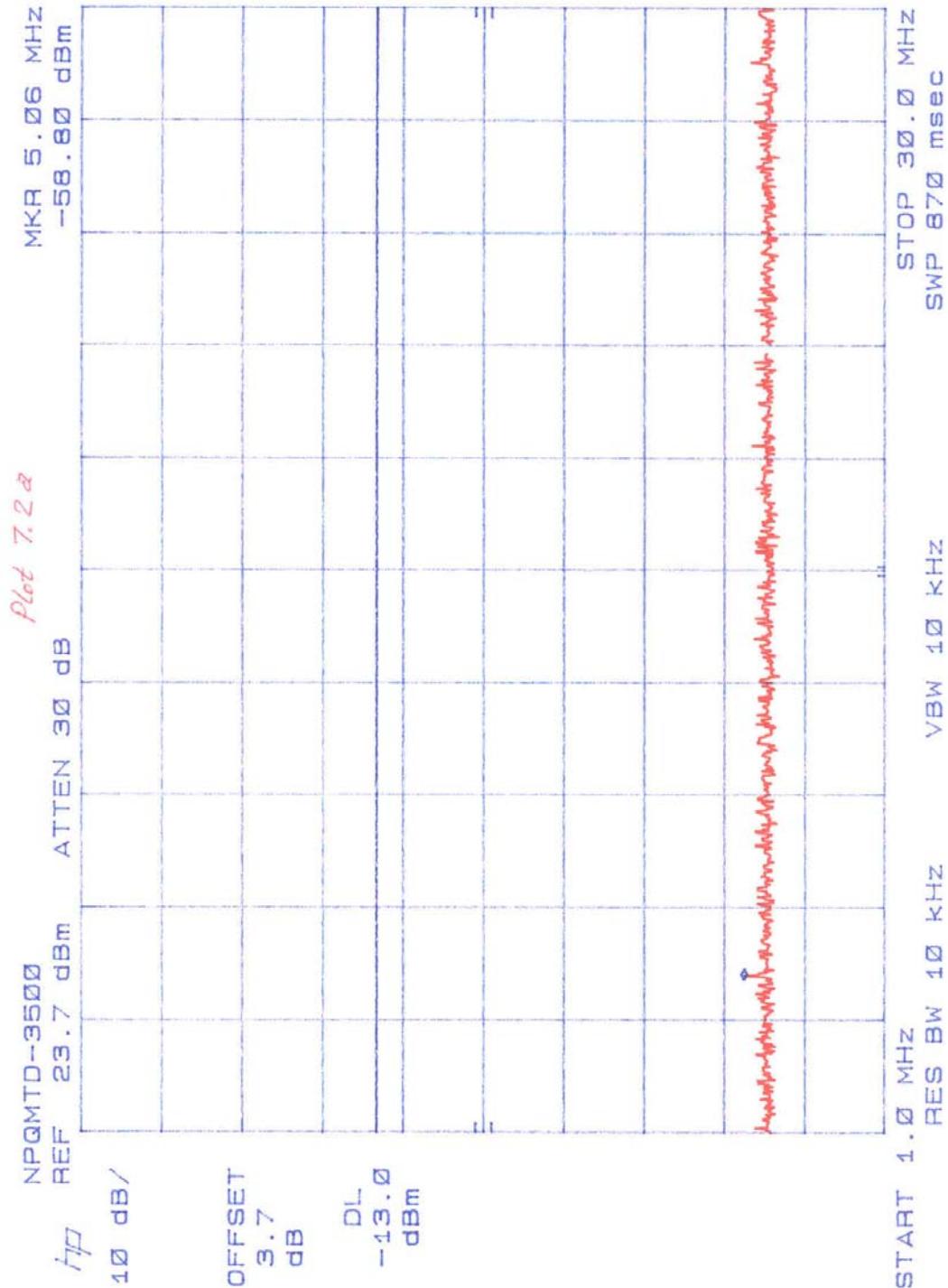
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

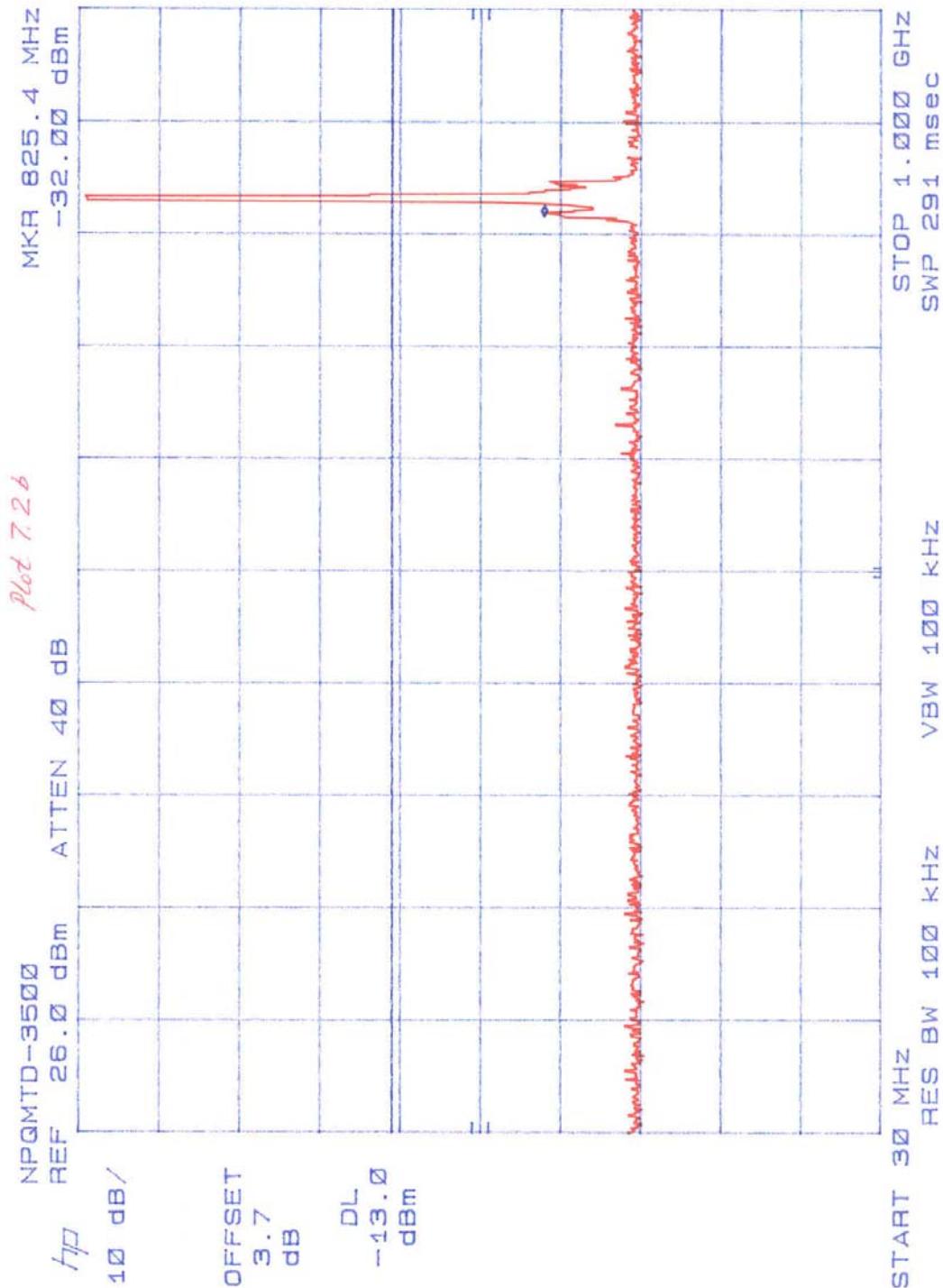
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

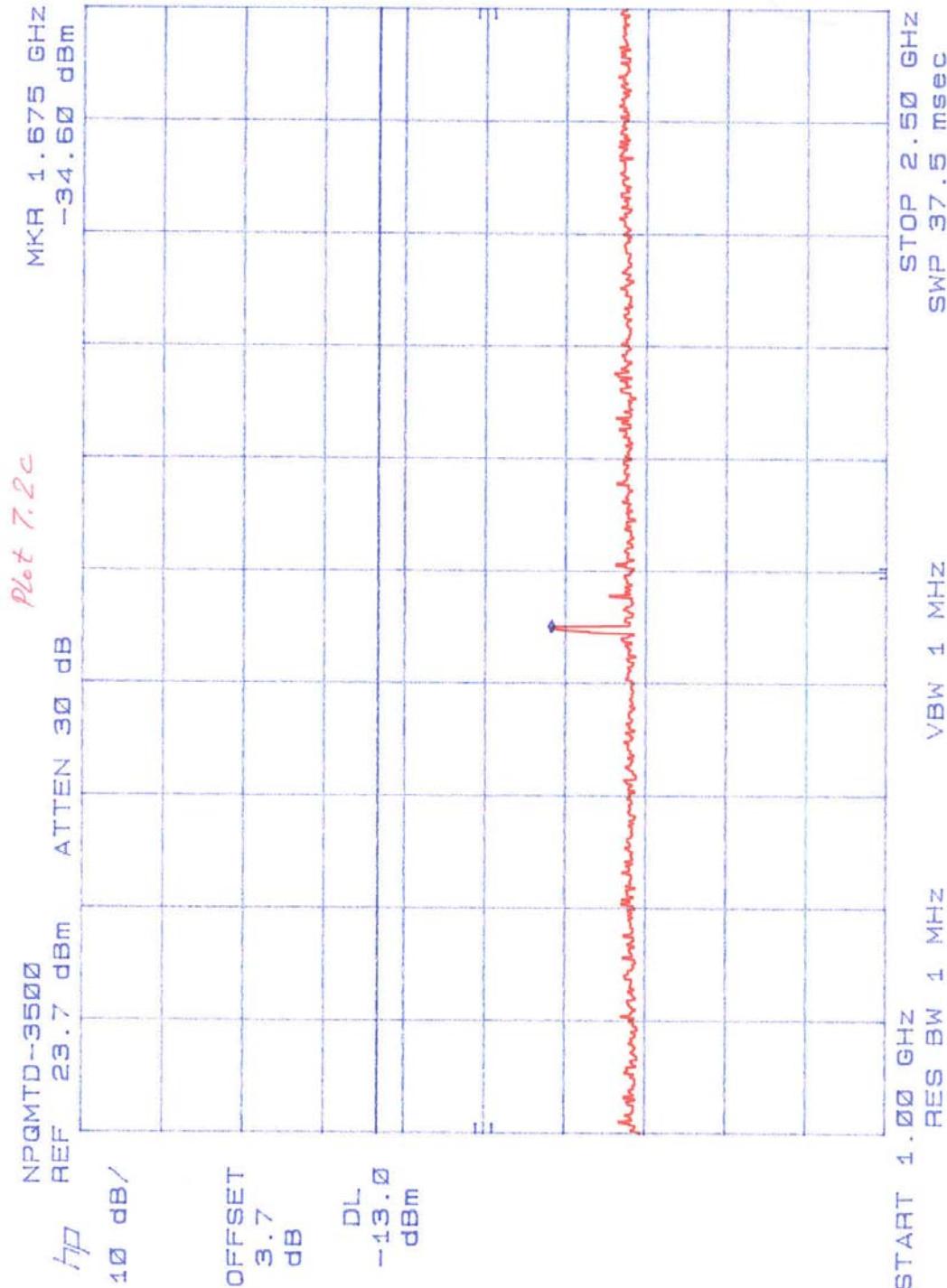
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

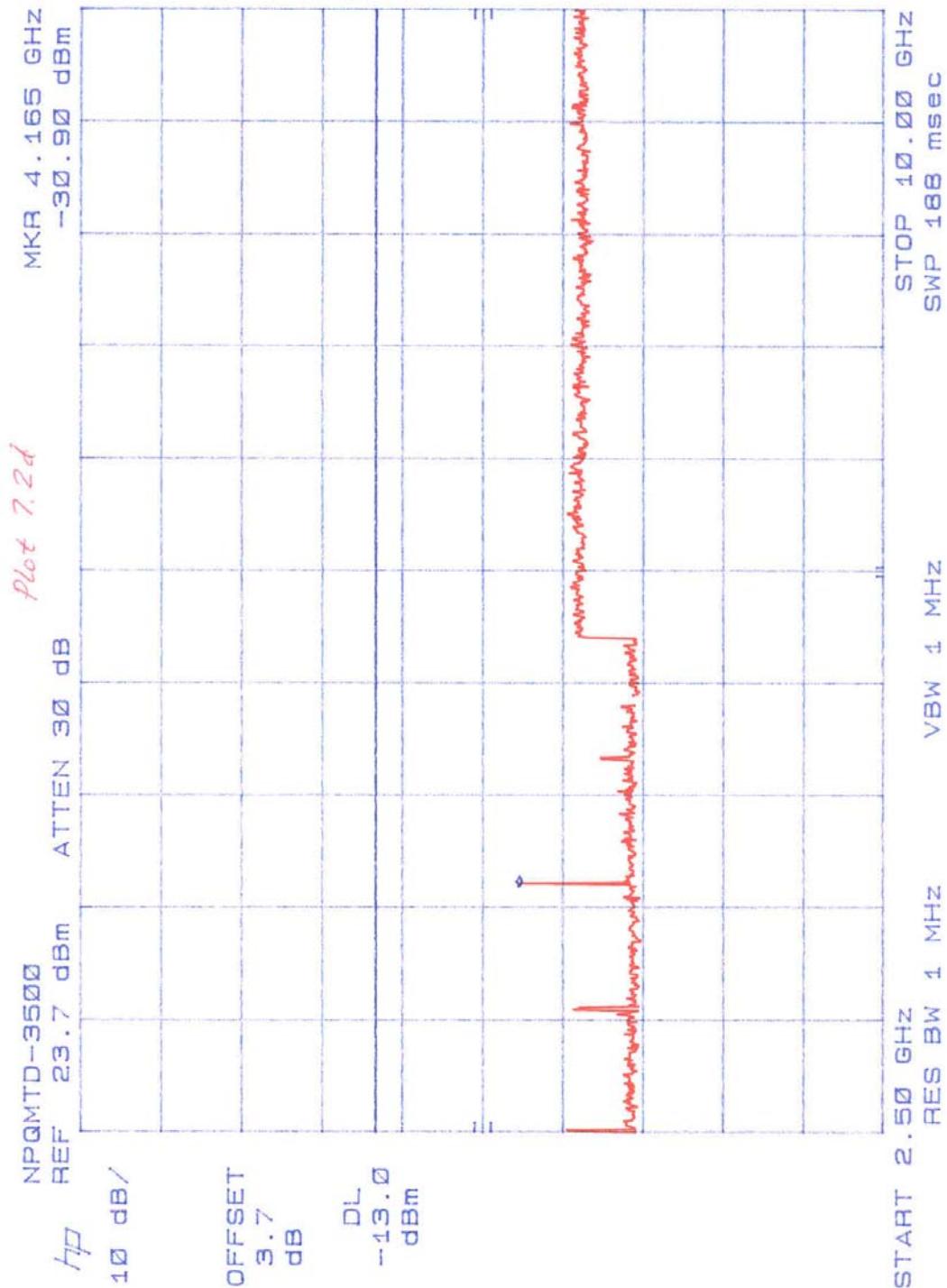
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

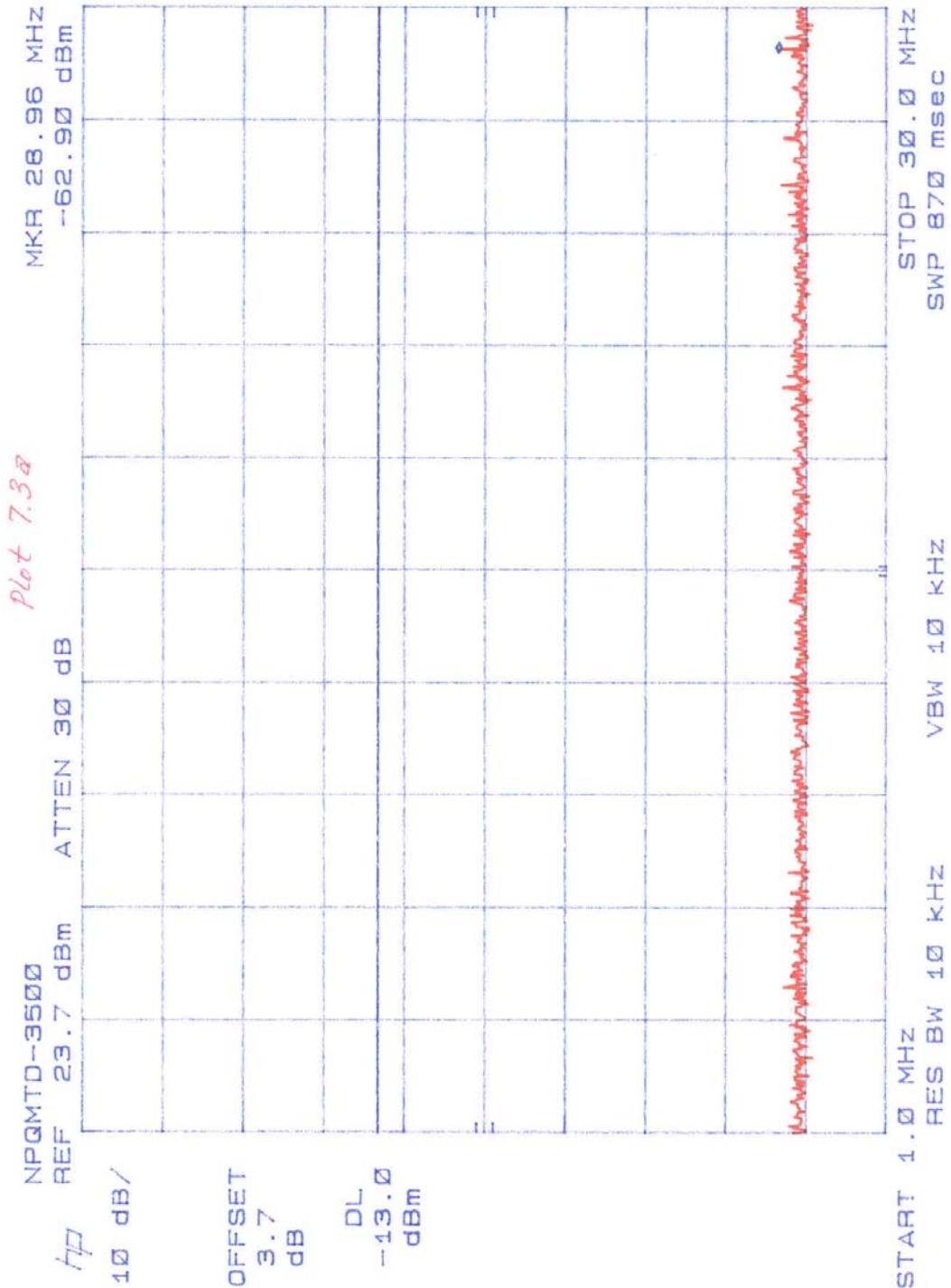
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

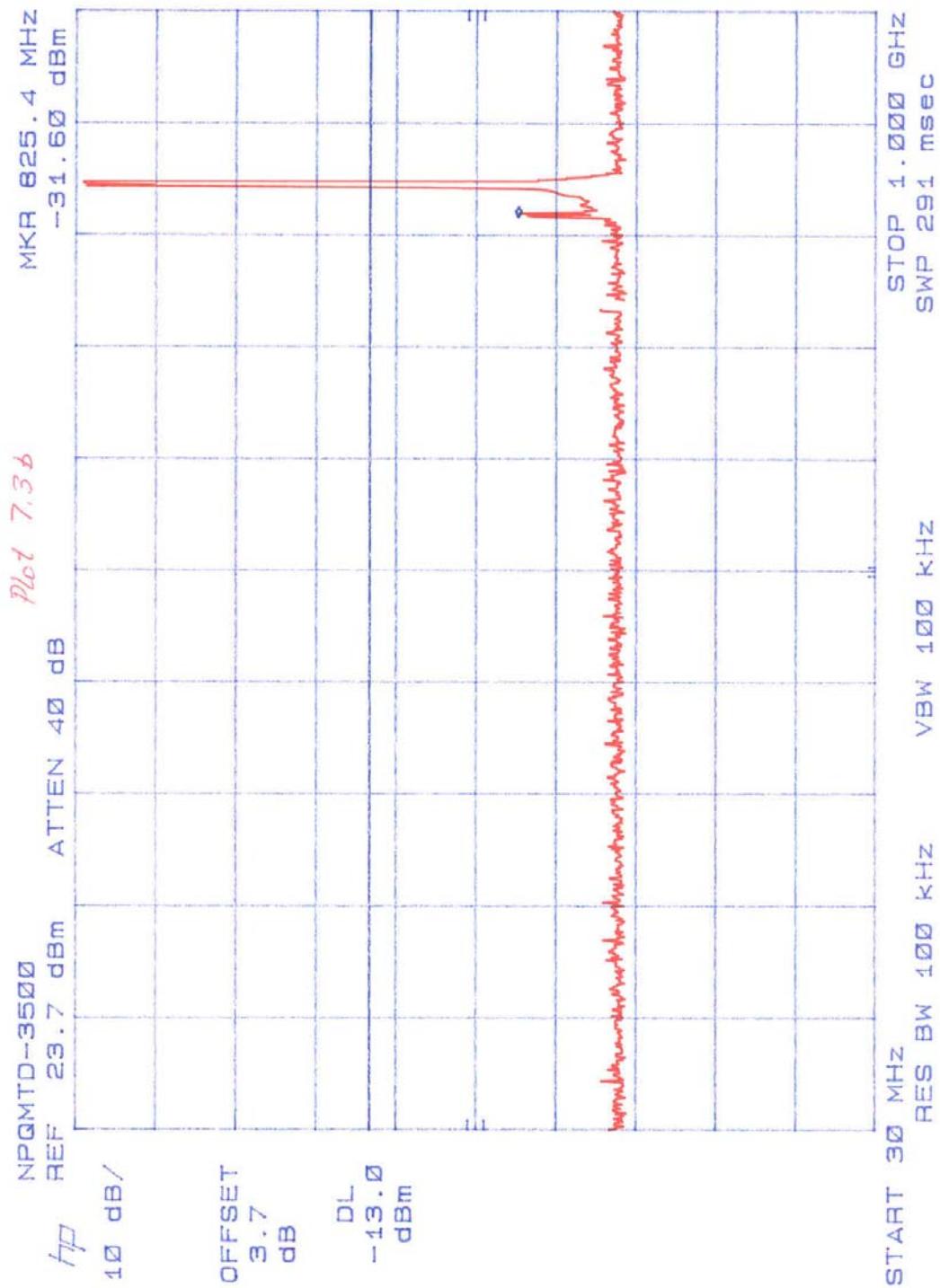
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

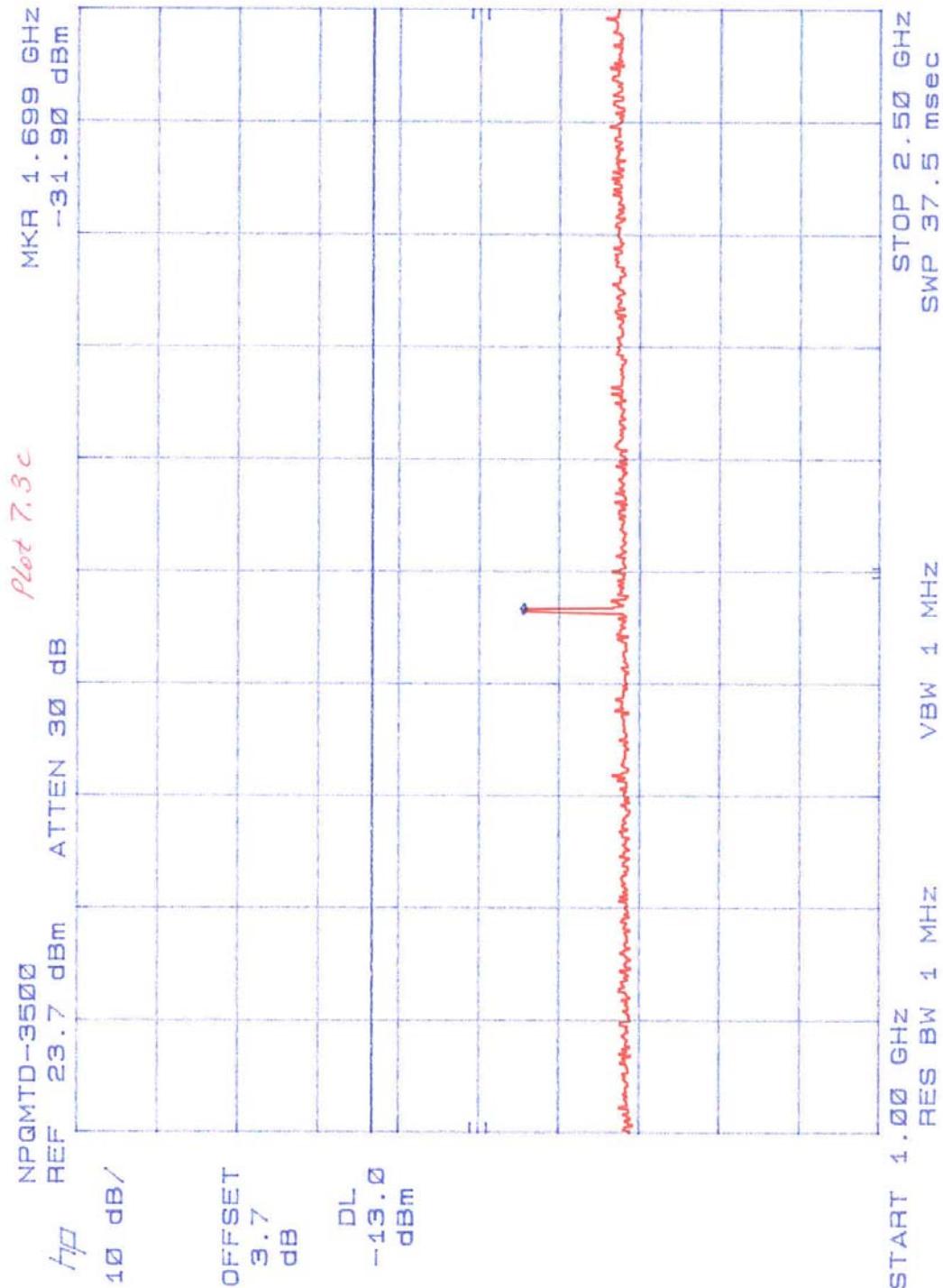
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

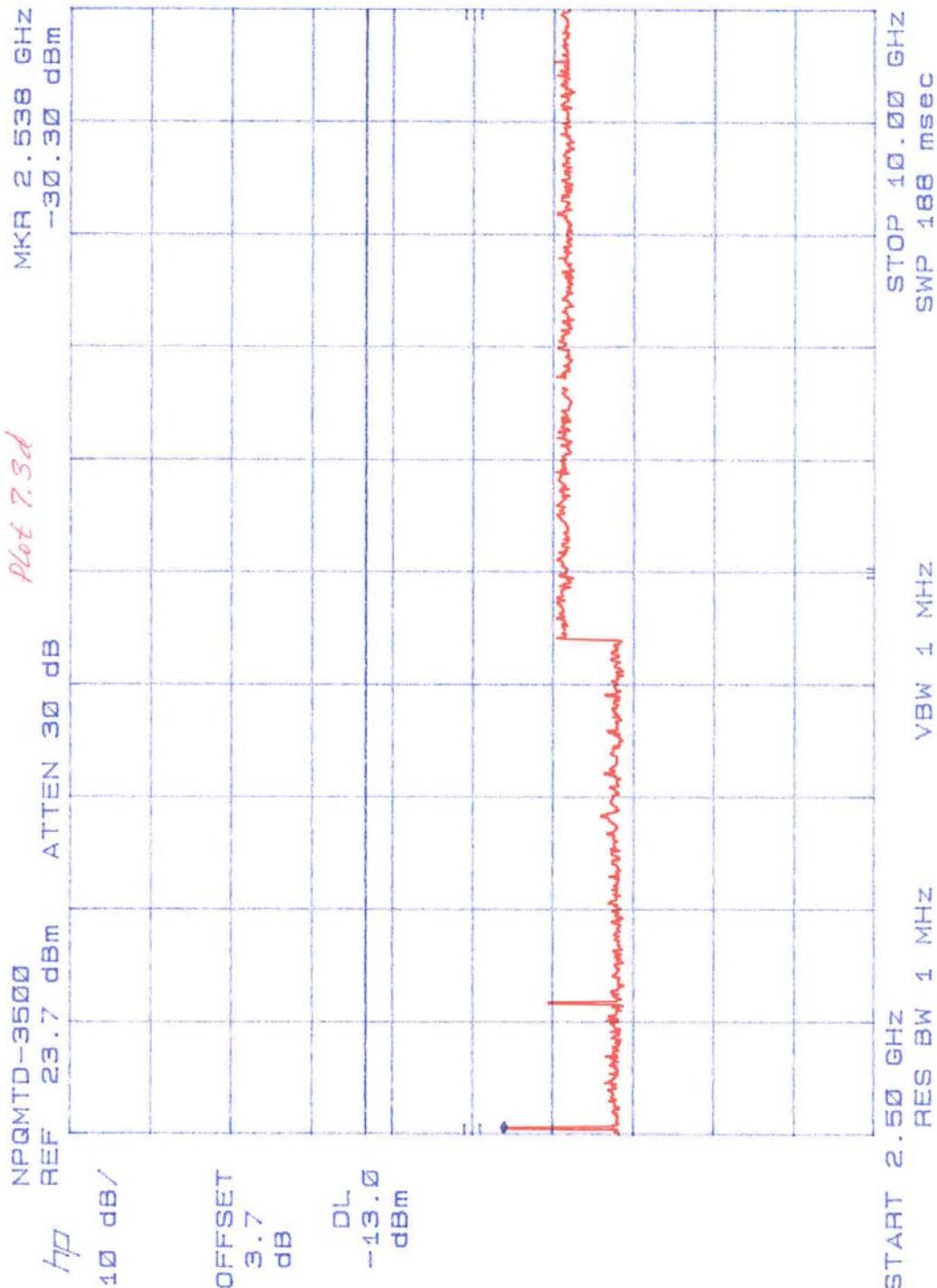
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

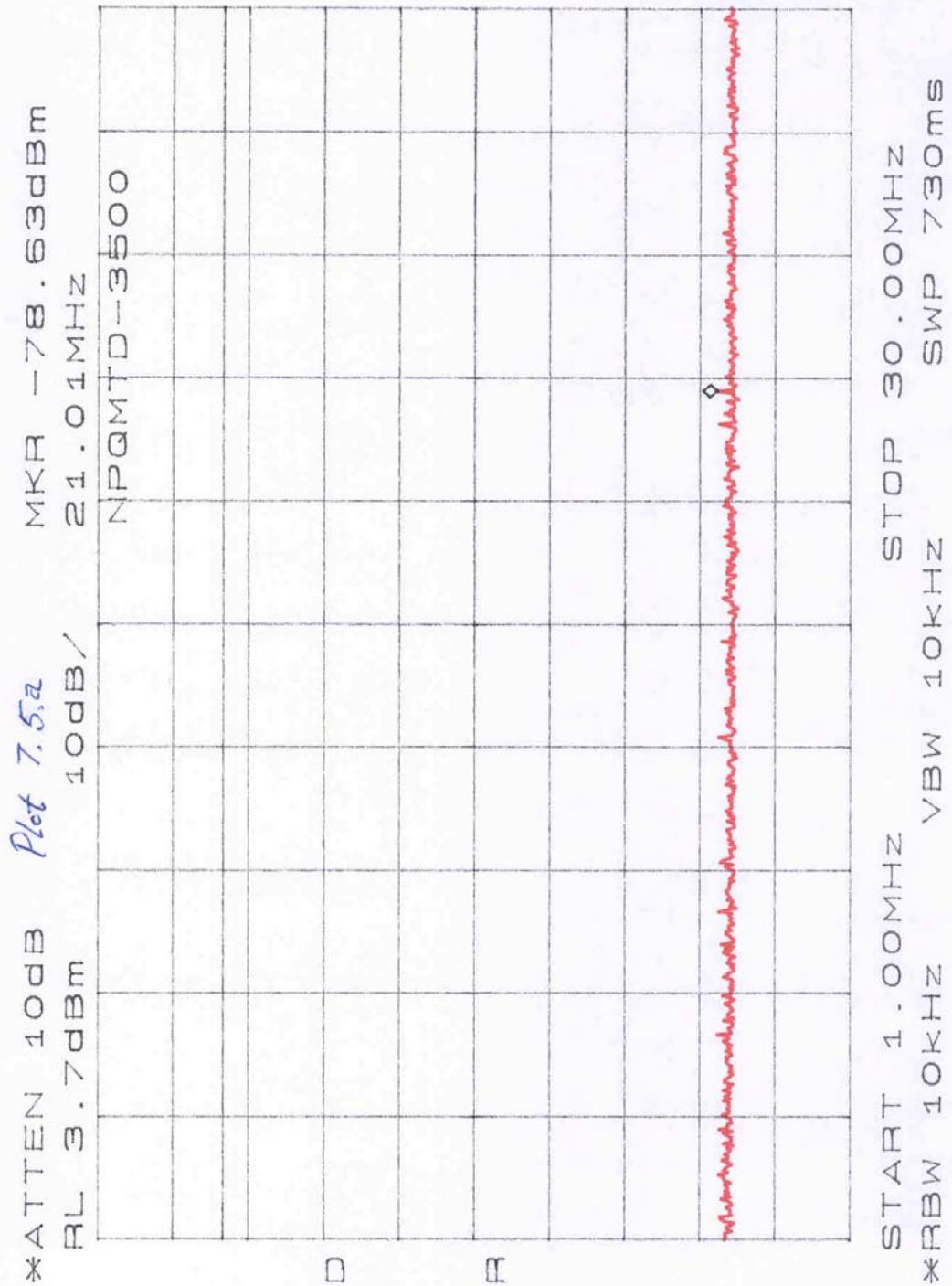
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

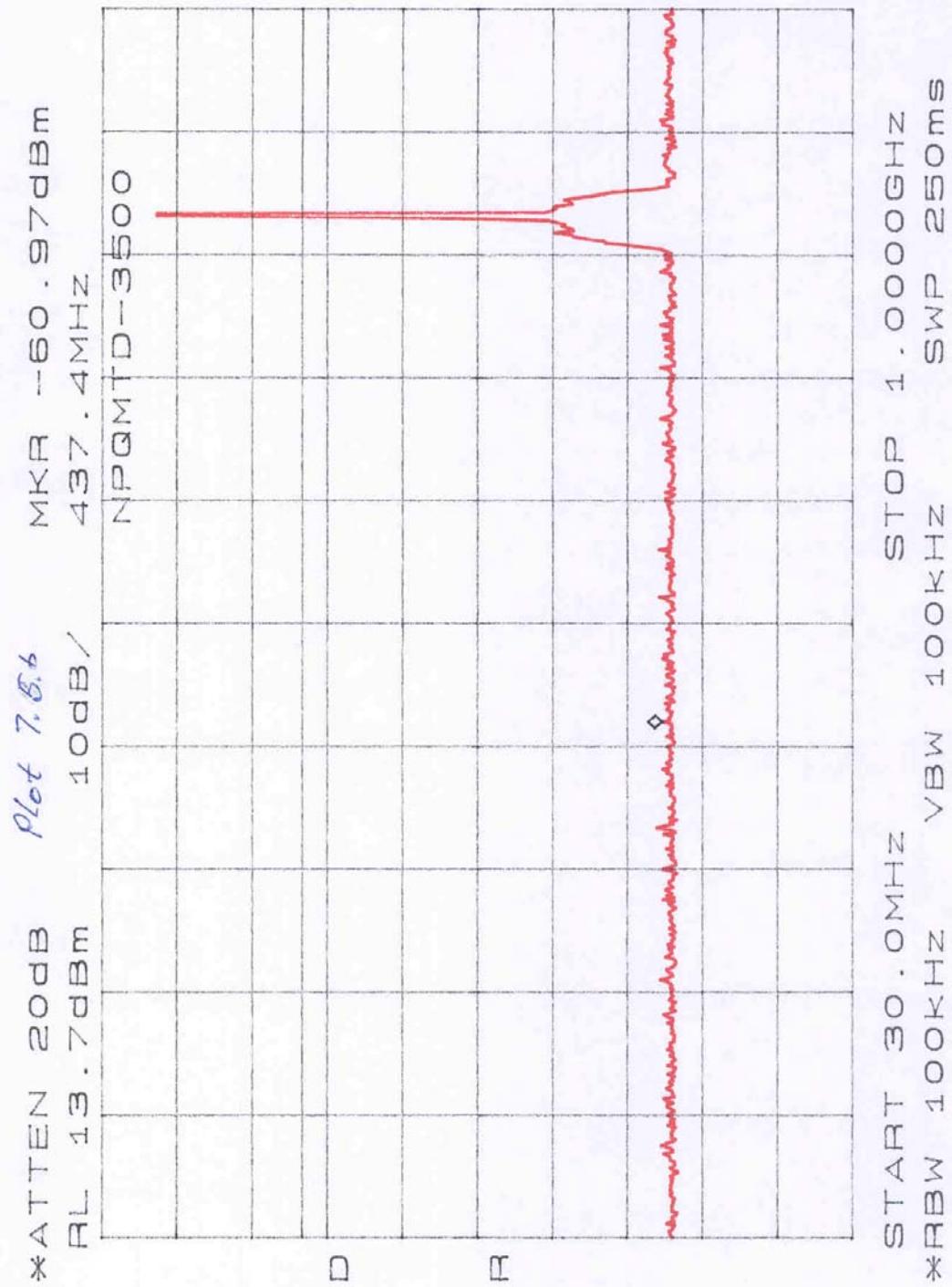
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

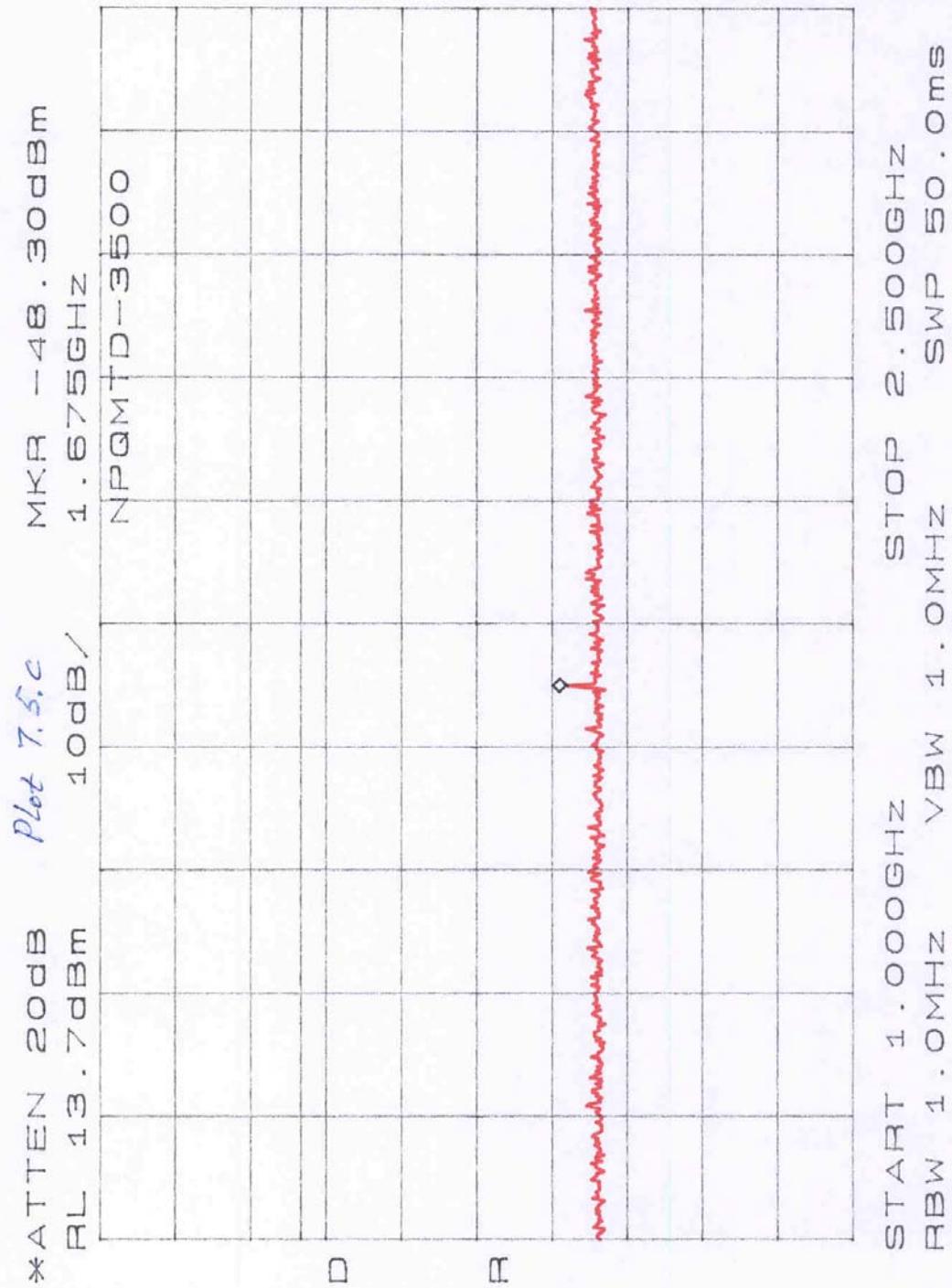
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

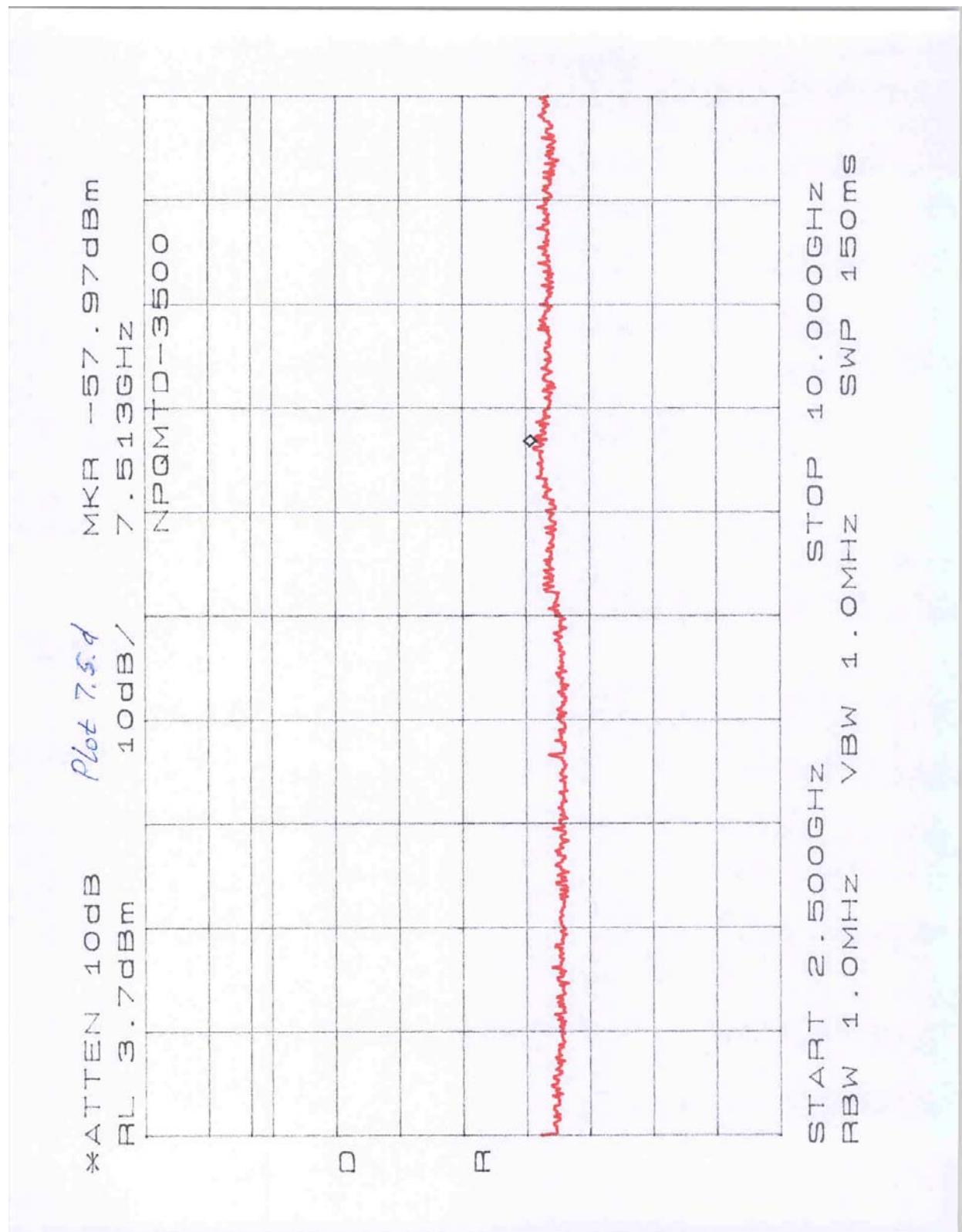
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

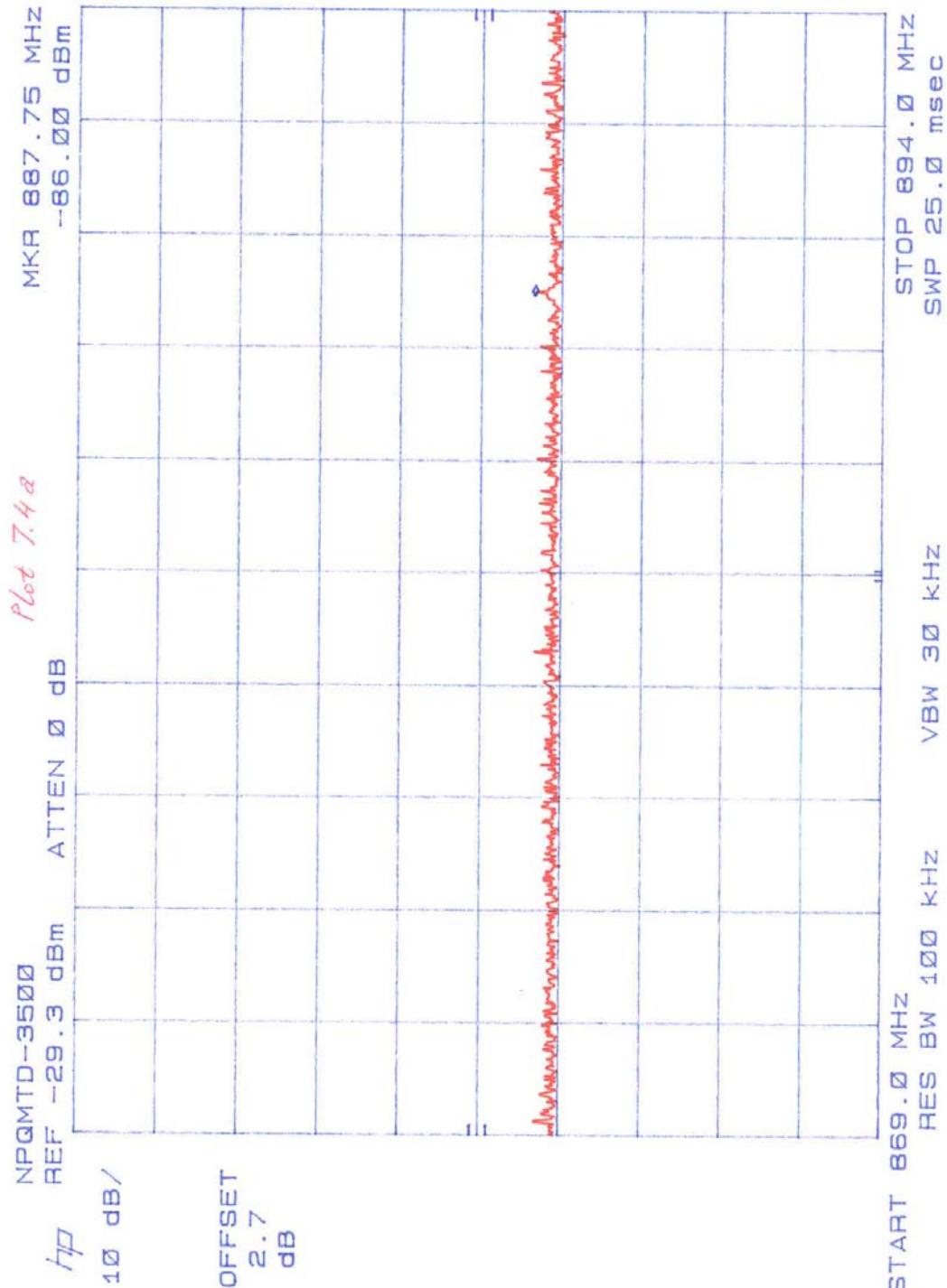
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

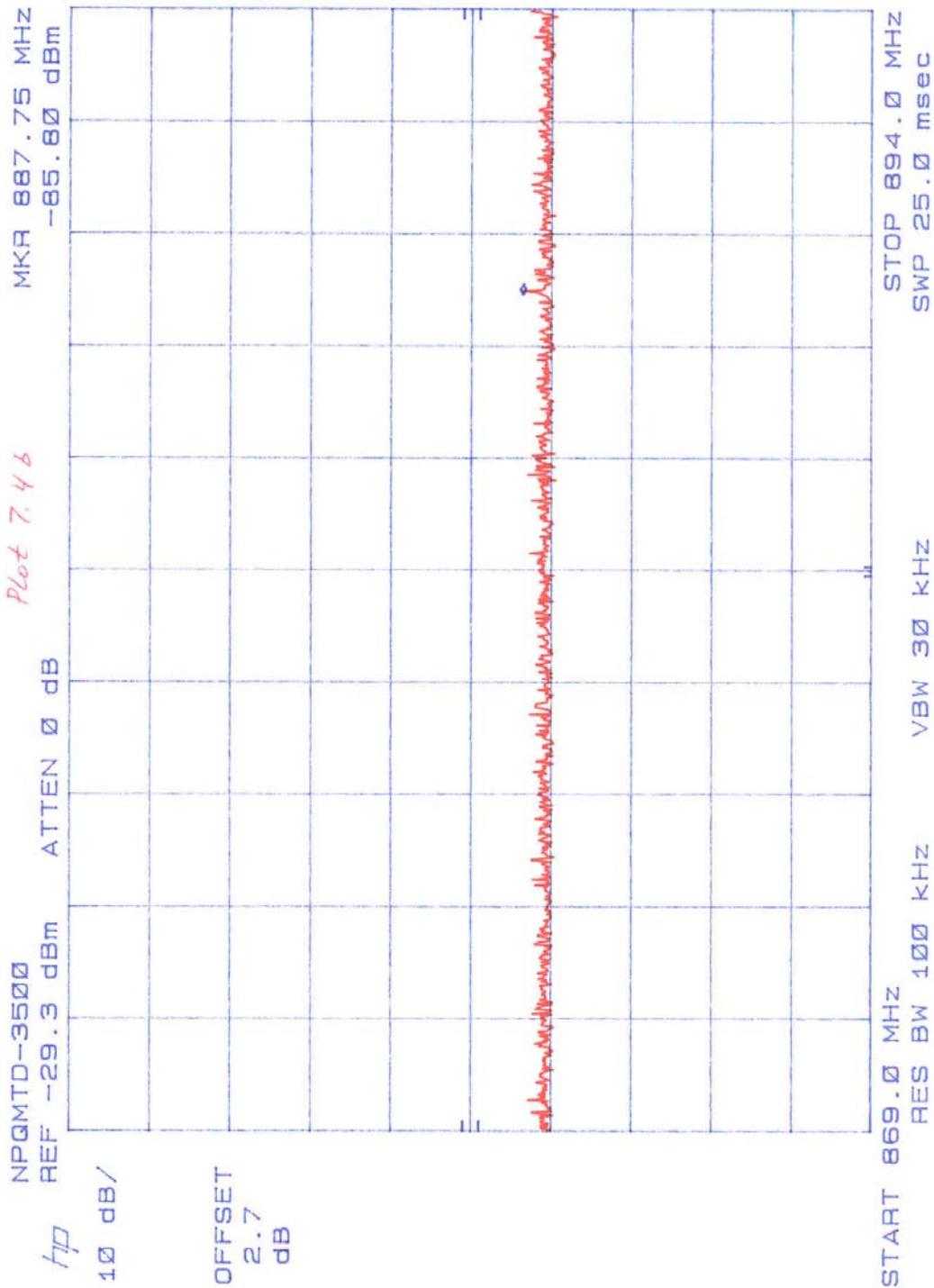
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

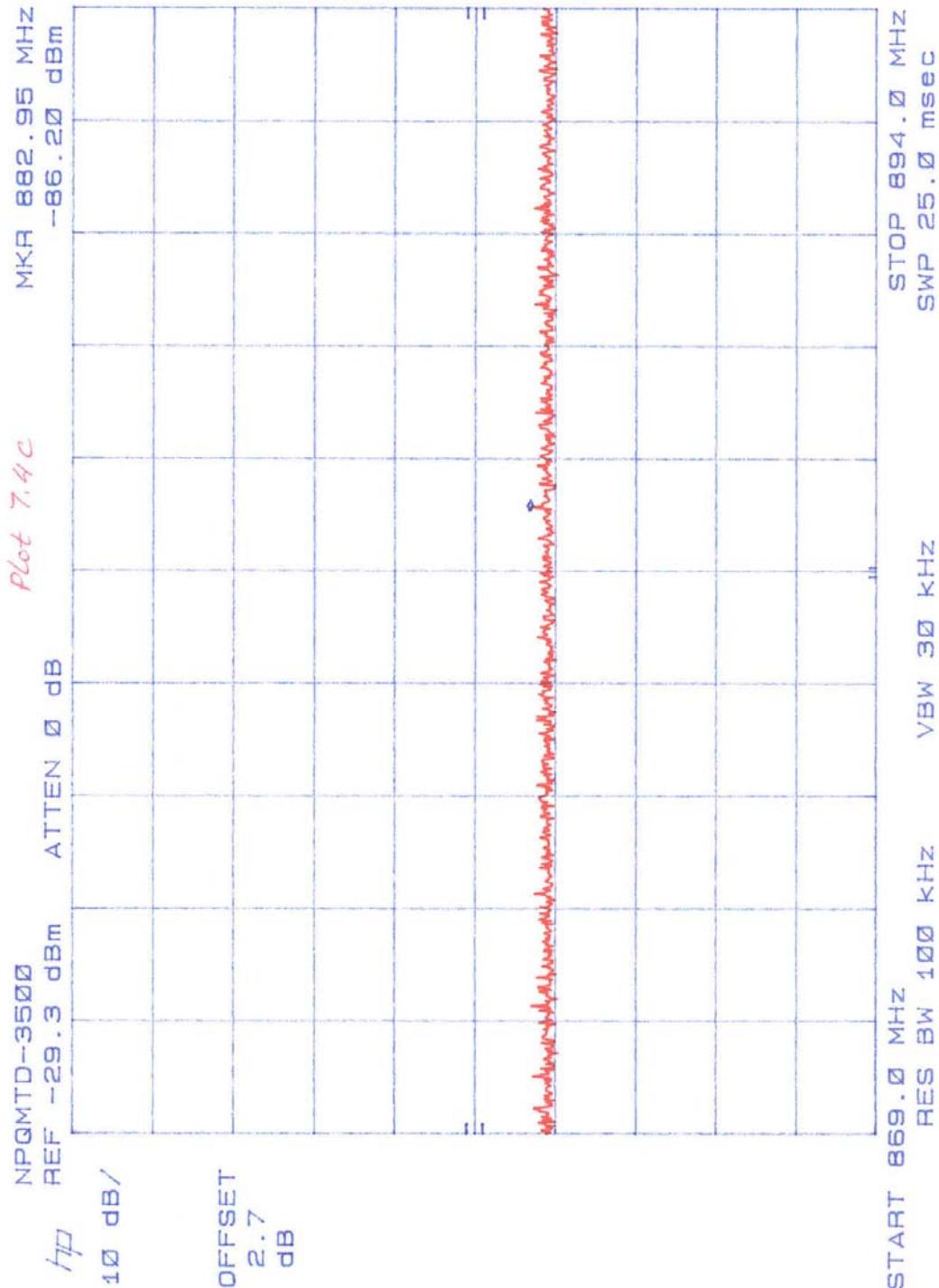
Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002 and February 18, 2003

8.0 Field Strength of Spurious Radiation
FCC 2.1053

8.1 Test Procedure

The EUT was setup to transmit a maximum power. The accessory headset was connected to the EUT.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to tenth harmonic of each of the three fundamental frequency (low, middle, and high channels) was investigated. The tests were performed with the EUT placed on three orthogonal axis; the worst case of emissions was reported.

For spurious emissions attenuation, the substitution method was used. On each frequency where the Field Strength was found above 63.4 dB(μ V/m) (which corresponds to ERP = -33 dBm), the EUT was substituted by a reference antenna (half-wave dipole - below 1 GHz, or Horn antenna - above 1GHz), connected to a signal generator. The signal generator output was adjusted to obtain the same reading as from EUT. The ERP at the spurious emissions frequency was calculated as in section 3. The spurious emissions attenuation was calculated as the difference between ERP at the fundamental frequency (see section 3) and at the spurious emissions frequency.

The emissions from the digital part and receiver of the EUT were measured as well.

8.2 Test Equipment

EMCO 3115 Horn Antenna
Hewlett Packard HP8546A Spectrum Analyzer
Tektronix 2784 Spectrum Analyzer
Hewlett Packard HP 83732A Signal Generator
Low Pass Filter
Preamplifier

8.3 Test Results

The data of the Field Strength of spurious emissions is presented in Appendix A. The measurements by the substitution method were performed only on the frequencies where the Field Strength exceeds 63 dB(μ V/m) for the mode with the highest emission level.



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002 and February 18, 2003

**Effective Radiated Power
(Measured by Substitution Method)**

Frequency	Antenna Polariz.	SA Reading (EUT)	Mode	Signal Generator Output required to have the same SA Reading as from EUT	ERP *	Spurious Attenuat.
MHz		dB(μV)		V _g dBm	dBm	dB
Channel 824.04 MHz						
1648.1	V	28.7	AMPS	-42.1	-37.1	63.5
3296.2	V	58.6	AMPS	-41.9	-35.9	62.3
Channel 836.52 MHz						
1673.0	V	29.5	TDMA	-40.5	-35.8	66.6
2509.6	V	65.3	TDMA	-38.4	-32.9	64.5
4182.3	H	61.2	AMPS	-39.0	-32.6	65.4
Channel 848.97 MHz						
1697.9	V	31.4	AMPS	-38.4	-34.4	64.5
2546.9	H	65.2	AMPS	-39.0	-33.5	65.1
3395.9	H	59.3	TDMA	-42.9	-36.7	69.5
4244.9	H	65.3	TDMA	-34.0	-28.5	60.6
5093.8	H	58.6	TDMA	-36.9	-30.1	63.5

* ERP is calculated as: $ERP_{(dBm)} = V_{g(dBm)} + G_{(dBd)}$

The Limit for Spurious Attenuation is 40 dB

Test Result:	Complies by more than 20 dB for Part 22 and more than 10 dB for Part 15 Class B.
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Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002 and February 18, 2003

9.0 Line Conducted Emissions,

FCC 15.207

9.1 Test Procedure

Test procedure described in the ANSI C63.4 Standard was employed.

The EUT was connected to the charger, that was connected to the AC line through the LISNs.

Both HOT and NEUTRAL leads were tested.

9.2 Test Results

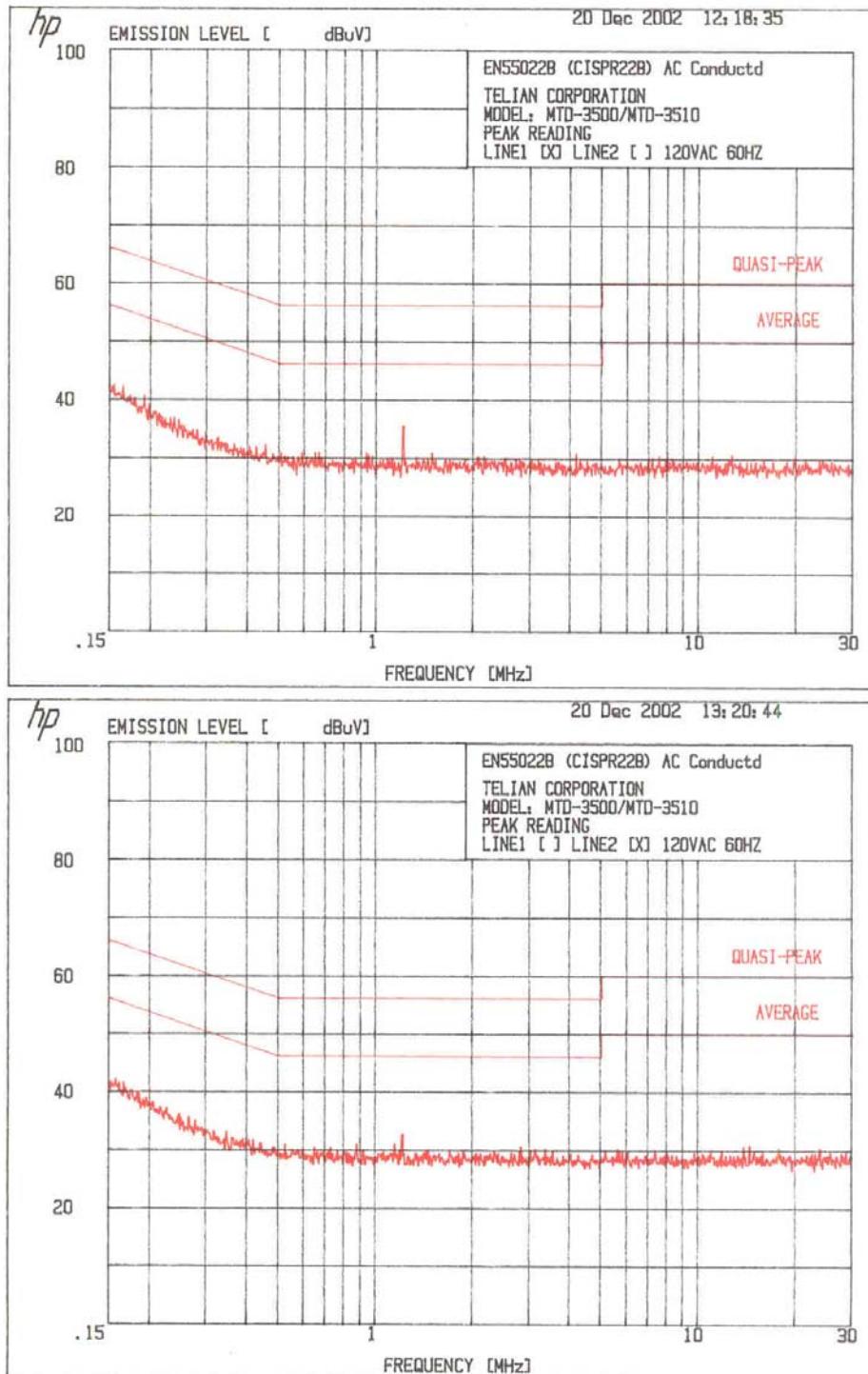
See the attached plots.

The EUT passed by 11 dB.

Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002 and February 18, 2003



Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002 and February 18, 2003

10.0 Frequency Stability vs Temperature

FCC 2.1055, 22.355

Frequency Tolerance: 2.5 ppm

10.1 Test Procedure

The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber. The DC leads, RF output cable, and external PTT cable exited the chamber through an opening made for that purpose.

After the temperature stabilized for approximately 20 minutes, the external PTT switch was activated, and the frequency output was recorded from the counter.

10.2 Test Equipment

Temperature Chamber, -30°C to $+70^{\circ}\text{C}$

Hewlett Packard 5383A Frequency Counter

DC Power Supply

10.3 Test Results

Test Result: Complies

Tx Frequency: 836.520000 MHz
Tolerance: +/- 2091.3 Hz

Temperature ($^{\circ}\text{C}$)	Frequency (MHz)	Difference (Hz)
50	836.520150	150
40	836.519820	-180
30	836.519770	-230
20	836.520150	150
10	836.519860	-140
0	836.520120	120
-10	836.520340	340
-20	836.520360	360
-30	836.520360	360

Maximum variation is 0.43 ppm

Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002 and February 18, 2003

11.0 Frequency Stability vs Voltage

FCC 2.1055, 22.355

Frequency Tolerance: 2.5 ppm

11.1 Test Procedure

An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminates; i.e., the battery end point. The output frequency was recorded for each battery voltage.

11.2 Test Equipment

Hewlett Packard 5383A Frequency Counter
DC Power Supply

11.3 Test Results.

Test Result: Complies

Tx Frequency: 836.52 MHz
Tolerance: +/- 2091.3 Hz

Supply (Battery) Volts	Frequency (MHz)	Difference (Hz)
3.43	836.520000	836.520136
3.70	836.520000	836.520149
4.26	836.520000	836.520155

Maximum variation is 0.43 ppm

Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002 and February 18, 2003

12.0 Test Equipment

Measurement equipment used for compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
Bi-Log Antenna	EMCO	3143	9509-1160	12	9/19/03
Pre-Amplifier	Sonoma Inst.	310	185634	12	01/10/03
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	7/16/03
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	7/16/03
Spectrum Analyzer	Tektronix	2784	B3020108	12	8/08/03
Signal Generator	Hewlett Packard	83732A	322A00119	12	03/04/03
Double-ridged Horn Antenna	EMCO	3115	9170-3712	12	6/02/03
Double-ridged Horn Antenna	EMCO	3115	8812-3049	12	4/03/03
Pre-Amplifier	Miteq	AMF-4D-001180-24-10P	799159	12	04/05/03
Radio Communication Test Set	Marconi	2955/2957	N/A	12	12/13/03

Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002 and February 18, 2003

13.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 /3036005	DC	January 7, 2003	Original document

Telian Corporation., Model No: MTD-3500 & MTD-3510

FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002

Appendix A

FCC Part 22 Spurious Radiated Emission test data

17 December 2002

Test Mode: Tx @ 824.04 MHz

Temperature: 21.0 C

Humidity: 51.0 %

Company: Telian Corporation

Model: MTD - 3500/3510

Frequency MHz.	Polarity	Mode	SA Reading dB(μ V)	Cable Loss dB	Pre Amplif. dB	Ant. factor dB(1/m)	Ext. Atten. dB	FS Level dB(μ V/m)
1648.08	V	AMPS	28.7	4.2	—	27.4	3	63.3
		TDMA	28.4	4.2	—	27.4	3	63.0
2472.12	V	AMPS	58.3	5.1	36.5	30.6	3	60.5
		TDMA	57.5	5.1	36.5	30.6	3	59.7
3296.16	V	AMPS	58.6	6.0	36.4	32.3	3	63.5
		TDMA	53.8	6.0	36.4	32.3	3	58.7
4120.20	V	AMPS	54.1	6.8	36.3	34.1	3	61.7
		TDMA	51.8	6.8	36.3	34.1	3	59.4
4944.24	H	AMPS	48.7	9.5	35.8	35.2	3	60.6
		TDMA	49.3	9.5	35.8	35.2	3	61.2
5768.28	H	AMPS	39.4	8.3	35.3	36.4	3	51.8
		TDMA	46.1	8.3	35.3	36.4	3	58.5
6592.32	H / V	AMPS	32.3*	12.6	35.3	35.9	3	48.5
		TDMA	32.3*	12.6	35.3	35.9	3	48.5
7416.36	H / V	AMPS	32.3*	12.6	35.3	38.0	3	50.6
		TDMA	32.3*	12.6	35.3	38.0	3	50.6
8240.4	H / V	AMPS	32.3*	12.6	35.4	37.8	3	50.3
		TDMA	32.3*	12.6	35.4	37.8	3	50.3

Telian Corporation., Model No: MTD-3500 & MTD-3510
FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002

FCC Part 22 Spurious Radiated Emission test data

17 December 2002

Test Mode: Tx @ 836.52 MHz

Temperature: 21.0 C

Humidity: 51.0 %

Company: Telian Corporation

Model: MTD – 3500/3510

Frequency MHz.	Polarity	Mode	SA Reading dB(µV)	Cable Loss dB	Pre Amplif. dB	Ant. factor dB(1/m)	Ext. Atten. dB	FS Level dB(µV/m)
1673.04	V	AMPS	26.3	4.2	—	27.4	3	60.9
		TDMA	29.5	4.2	—	27.4	3	64.1
2509.56	V	AMPS	60.7	5.1	36.5	30.6	3	62.9
		TDMA	65.3	5.1	36.5	30.6	3	67.5
3346.08	V	AMPS	56.6	6.0	36.4	32.3	3	61.5
		TDMA	57.0	6.0	36.4	32.3	3	61.9
4182.26	H	AMPS	61.2	6.8	36.3	34.1	3	68.8
		TDMA	60.4	6.8	36.3	34.1	3	68.0
5019.12	H	AMPS	48.1	9.5	35.8	35.2	3	60.0
		TDMA	49.9	9.5	35.8	35.2	3	61.8
5855.64	H	AMPS	40.1	8.3	35.3	36.4	3	52.5
		TDMA	39.4	8.3	35.3	36.4	3	51.8
6692.16	H / V	AMPS	33.2*	11.5	35.3	36.5	3	48.9
		TDMA	33.2*	11.5	35.3	36.5	3	48.9
7528.68	H / V	AMPS	33.2*	10.2	35.4	35.4	3	49.0
		TDMA	33.2*	10.2	35.4	35.4	3	49.0
8365.20	H / V	AMPS	33.2*	10.1	35.4	37.9	3	48.8
		TDMA	33.2*	10.1	35.4	37.9	3	48.8

Telian Corporation., Model No: MTD-3500 & MTD-3510
FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002

FCC Part 22 Spurious Radiated Emission test data

17 December 2002

Test Mode: Tx @ 848.97 MHz

Temperature: 21.0 C

Humidity: 51.0 %

Company: Telian Corporation

Model: MTD - 3500/3510

Frequency MHz.	Polarity	Mode	SA Reading dB(µV)	Cable Loss dB	Pre Amplif. dB	Ant. factor dB(1/m)	Ext. Atten. dB	FS Level dB(µV/m)
1697.94	V	AMPS	31.4	4.2	—	27.4	3	66.0
		TDMA	28.0	4.2	—	27.4	3	62.6
2546.91	H	AMPS	65.2	5.1	36.5	30.6	3	67.4
		TDMA	60.2	5.1	36.5	30.6	3	62.4
3395.88	H	AMPS	58.2	6.0	36.4	32.3	3	63.1
		TDMA	59.3	6.0	36.4	32.3	3	64.2
4244.85	H	AMPS	61.8	6.8	36.3	34.1	3	69.4
		TDMA	65.3	6.8	36.3	34.1	3	72.9
5093.82	H	AMPS	53.8	9.5	35.8	35.2	3	65.7
		TDMA	58.6	9.5	35.8	35.2	3	70.5
5942.79	H / V	AMPS	33.2*	8.3	35.3	36.4	3	45.6
		TDMA	33.2*	8.3	35.3	36.4	3	45.6
6791.79	H / V	AMPS	33.2*	10.5	35.3	36.7	3	48.1
		TDMA	33.2*	10.5	35.3	36.7	3	48.1
7640.73	H / V	AMPS	33.2*	10.4	35.4	37.9	3	49.1
		TDMA	33.2*	10.4	35.4	37.9	3	49.1
8489.70	H / V	AMPS	33.2*	10.4	35.4	37.9	3	49.1

Notes:

- Test was performed at 3m.
- Detector used – Peak.
- * Noise floor.

Telian Corporation., Model No: MTD-3500 & MTD-3510
FCC ID: NPQMTD-3500

Date of Test: December 16 to 20, 2002

FCC Part 15 Test Data

