Engineering and Testing for EMC and Safety Compliance

TYPE CERTIFICATION REPORT

Ericsson, Inc.
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Research Triangle Park, NC 27709
919-472-1697 (Pierre Chery)

MODEL: DM-15

FCC ID: AXATR-420-A2

November 7, 2001

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 1999	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 1999	§15.109: RADIATED EMISSIONS LIMITS
PART 22: 1998	PUBLIC MOBILES SERVICES
ANSI C63.4-1992	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
ANSI/TIA/EIA603- 1992	LAND MOBILE FM OR PM COMMUNICATIONS EQUIPMENT MEASUREMENT AND PERFORMANCE STANDARDS
ANSI/TIA/EIA 603-1-1998	ADDENDUM TO ANSI/TIA/EIA 603-1992

FCC Rules Parts	Frequency Range	Output Power (W)	Freq. Tolerance	Emission Designator
22.901(d)	824-849 MHz	0.4	0.1	29K3DXW
22.901(d)	824-849 MHz	0.6, 2.0, 3.4	0.1	40K0F1D, 40K0F8W

REPORT PREPARED BY:

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Document Number: 2001295 / QRTL01-331

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1 GENERAL INFORMATION

The following Report of a Type Certification is prepared on behalf of ***Ericsson, Inc.*** in accordance with the Federal Communications Commissions. The Equipment Under Test (EUT) was the ***DM-15 UNIT; FCC ID: AXATR-420-A2***. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47 and ANSI/TIA/EIA603-1992 /-1-1998 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

1.1 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

1.2 RELATED SUBMITTAL(S)/GRANT(S)

This is an original application for Certification

2 CONFORMANCE STATEMENT

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 1999	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 1999	§15.109: RADIATED EMISSIONS LIMITS
PART 22: 1998	PUBLIC MOBILES SERVICES
ANSI C63.4-1992	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
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ANSI/TIA/EIA 603-1-1998	ADDENDUM TO ANSI/TIA/EIA 603-1992

FCC Rules Parts	Frequency Range	Output Power (W)	Freq. Tolerance	Emission Designator
22.901(d)	824-849 MHz	0.4	N/A	29K3DXW
22.901(d)	824-849 MHz	0.6, 2.0, 3.4	N/A	40K0F1D, 40K0F8W

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the FCC Part 2, FCC Part 15.109, FCC Part 22.901(d) certification methodology.

Signature: _____ Date: November 7, 2001

Typed/Printed Name: Bruno Clavier Position: Vice President of Operations (NVLAP Signatory)

Signature: _____ Date: November 7, 2001

Typed/Printed Name: Daniel W. Baltzell Position: EMC Test Engineer

NVLAP *Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 200061-0.*

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

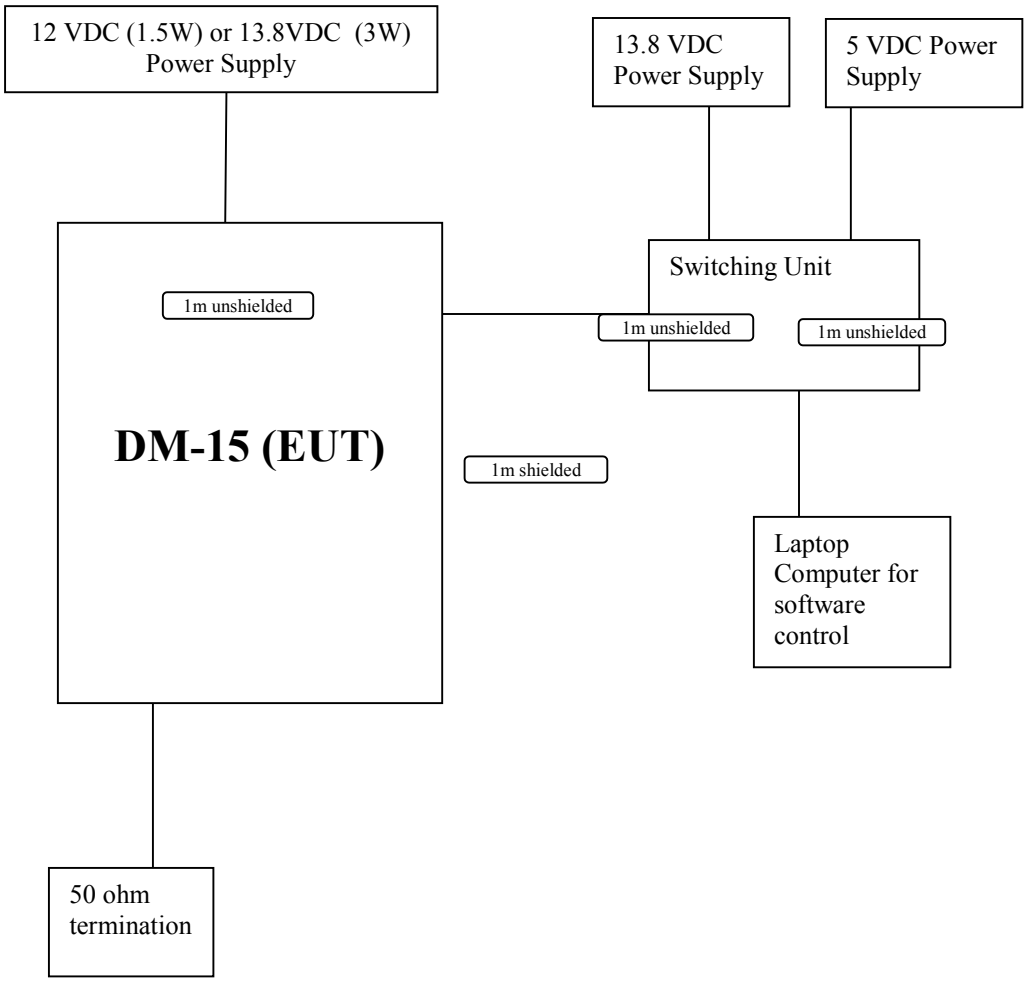
3 TESTED SYSTEM DETAILS

Listed below is the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

3.1 COMPONENTS

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION
EUT	ERICSSON, INC.	DM-15	TE60011HJL	PROTOTYPE EP2	UNSHIELDED

3.2 CONFIGURATION OF TESTED SYSTEM



4 FCC PART 2 §2.1046 (A): RF POWER OUTPUT: CONDUCTED

4.1 TEST DATA

The following channel (in MHz) were tested: 824.04, 836.49, 848.97
The worst-case Output Power (highest) levels are shown.
*Measurement accuracy: +/- 3%

Frequency (MHz)	High Power (dBm)	Low Power (dBm)	Burst (dBm)	TDMA (dBm)
824.04	33.05	27.76	35.32	33.10
836.49	32.30	26.70	35.03	33.20
848.97	31.76	26.80	34.53	31.80

4.2 TEST EQUIPMENT

Power Meter	HP437B	s/n 2949A02966
	HP 8901A	s/n 2545A04102 (power mode)
Power Sensor	HP8481B	s/n 2702A05059
Frequency Counter	HP8901A	s/n 2545A04102 (Frequency mode)

5 FCC PART 15 §15.107 (A) - AC LINES CONDUCTED EMISSIONS

5.1 TEST PROCEDURE

The EUT is operated with a DC power supply so no AC line emission test is required.

6 FCC PART 15 §15.109 (A) RADIATED EMISSIONS

6.1 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FI(dBuV/m) = SAR(dBuV) + SCF(dB/m)
FI = Field Intensity
SAR = Spectrum Analyzer Reading
SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

SCF(dB/m) = - PG(dB) + AF(dB/m) + CL(dB)

SCF = Site Correction Factor
PG = Pre-amplifier Gain
AF = Antenna Factor
CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(uV/m) = 10^{FI(dBuV/m)/20}$$

For example, assume a signal at a frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is -11.5 dB/m. The actual radiated field strength is calculated as follows:

49.3 dBuV - 11.5 dB/m = 37.8 dBuV/m

$$10^{37.8/20} = 10^{1.89} = 77.6 \text{ uV/m}$$

6.2 TEST PROCEDURE

The EUT was scanned at a three-meter open-field range in order to determine its emissions spectrum signature. The physical arrangement of the test system was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency.

Final radiated emissions measurements were made on the three-meter, open-field test site. The EUT was placed on a nonconductive turntable 1.0 meter above the ground plane.

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.

Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.

6.3 TEST DATA

Table 6-1: Radiated Emissions (Receiver-Digital Data) Temperature: 59°F, Humidity: 62%

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
38.871	Qp	V	1	1.0	36.6	-17.2	19.4	40.0	-20.6
77.760	Qp	V	0	1.0	37.0	-22.8	14.2	40.0	-25.8
194.401	Qp	V	0	1.0	36.9	-18.0	18.9	43.5	-24.6
233.275	Qp	V	0	1.0	41.6	-16.4	25.2	46.0	-20.8
272.165	Qp	V	1	1.0	33.9	-14.7	19.2	46.0	-26.8
311.037	Qp	V	1	1.0	35.8	-13.4	22.4	46.0	-23.6
979.548	Qp	V	1	1.0	33.9	-2.9	31.0	54.0	-23.0
991.998	Qp	V	0	1.0	30.4	-2.8	27.6	54.0	-26.4
1004.478	Av	V	1	1.0	38.8	-4.3	34.5	54.0	-19.5
1959.096	Av	V	1	1.0	13.9	33.2	47.1	54.0	-6.9
1983.996	Av	V	1	1.0	35.8	-6.9	28.9	54.0	-25.1
2008.955	Av	V	1	1.0	35.6	-1.5	34.1	54.0	-19.9
2938.644	Av	V	1	1.0	25.9	4.0	29.9	54.0	-24.1
2975.994	Av	V	0	1.0	26.1	3.9	30.0	54.0	-24.0
3013.433	Av	V	1	1.0	35.6	3.8	39.4	54.0	-14.6
3918.192	Av	V	1	1.0	25.9	6.6	32.5	54.0	-21.5
3967.991	Av	V	0	1.0	26.1	7.2	33.3	54.0	-20.7
4017.910	Av	V	1	1.0	25.9	14.3	40.2	54.0	-13.8

6.4 TEST EQUIPMENT

Antenna:	CHASE CBL6112B	s/n 2648
Amplifier:	HP8449B	s/n 3008A00505
Spectrum analyzer:	HP8566B	s/n 3138A07771
RF Signal Generator	HP8648C	s/n 3537A01741
Synthesized Sweeper	HP83752A	s/n 3610A00846

7 FCC PART 2 §2.1053 (A): FIELD STRENGTH OF SPURIOUS RADIATION

7.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.12

The transmitter is terminated with a 50 Ω load and is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1000 Hz, and for digital mode the transmitter is set in continuous transmitting mode and modulated with pseudo random data using internal software.

7.2 TEST DATA

The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded. No spurious emissions were found for Burst, High power, Low power, or TDMA modes for the low, mid, and high channels.

(824.04 MHz) – 33.05 dBm; High power AMPS; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1648.08	<100	46.1	<-53.9
2472.12	<100	46.1	<-53.9
3296.16	<100	46.1	<-53.9
4120.20	<100	46.1	<-53.9
4944.24	<100	46.1	<-53.9
5768.28	<100	46.1	<-53.9
6592.32	<100	46.1	<-53.9
7416.36	<100	46.1	<-53.9
8240.40	<100	46.1	<-53.9

(836.49 MHz) – 32.3 dBm; High power AMPS; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1672.98	<100	45.3	<-54.7
2509.47	<100	45.3	<-54.7
3345.96	<100	45.3	<-54.7
4182.45	<100	45.3	<-54.7
5018.94	<100	45.3	<-54.7
5855.43	<100	45.3	<-54.7
6691.92	<100	45.3	<-54.7
7528.41	<100	45.3	<-54.7
8364.90	<100	45.3	<-54.7

(848.97 MHz) – 31.76 dBm; High power AMPS; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1697.94	<100	44.8	<-55.2
2546.91	<100	44.8	<-55.2
3395.88	<100	44.8	<-55.2
4244.85	<100	44.8	<-55.2
5093.82	<100	44.8	<-55.2
5942.79	<100	44.8	<-55.2
6791.76	<100	44.8	<-55.2
7640.73	<100	44.8	<-55.2
8489.70	<100	44.8	<-55.2

(824.04 MHz) – 27.76 dBm; Low power AMPS; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1648.08	<100	40.8	<-59.2
2472.12	<100	40.8	<-59.2
3296.16	<100	40.8	<-59.2
4120.20	<100	40.8	<-59.2
4944.24	<100	40.8	<-59.2
5768.28	<100	40.8	<-59.2
6592.32	<100	40.8	<-59.2
7416.36	<100	40.8	<-59.2
8240.40	<100	40.8	<-59.2

(836.49 MHz) – 26.7 dBm; Low power AMPS; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1672.98	<100	39.7	<-60.3
2509.47	<100	39.7	<-60.3
3345.96	<100	39.7	<-60.3
4182.45	<100	39.7	<-60.3
5018.94	<100	39.7	<-60.3
5855.43	<100	39.7	<-60.3
6691.92	<100	39.7	<-60.3
7528.41	<100	39.7	<-60.3
8364.90	<100	39.7	<-60.3

(848.97 MHz) – 26.8 dBm; Low power AMPS; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1697.94	<100	39.8	<-60.2
2546.91	<100	39.8	<-60.2
3395.88	<100	39.8	<-60.2
4244.85	<100	39.8	<-60.2
5093.82	<100	39.8	<-60.2
5942.79	<100	39.8	<-60.2
6791.76	<100	39.8	<-60.2
7640.73	<100	39.8	<-60.2
8489.70	<100	39.8	<-60.2

(824.04 MHz) – 36.02 dBm; Burst mode; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1648.08	<100	48.3	<-51.7
2472.12	<100	48.3	<-51.7
3296.16	<100	48.3	<-51.7
4120.20	<100	48.3	<-51.7
4944.24	<100	48.3	<-51.7
5768.28	<100	48.3	<-51.7
6592.32	<100	48.3	<-51.7
7416.36	<100	48.3	<-51.7
8240.40	<100	48.3	<-51.7

(836.49 MHz) – 35.3 dBm; Burst mode; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1672.98	<100	48.0	<-52.0
2509.47	<100	48.0	<-52.0
3345.96	<100	48.0	<-52.0
4182.45	<100	48.0	<-52.0
5018.94	<100	48.0	<-52.0
5855.43	<100	48.0	<-52.0
6691.92	<100	48.0	<-52.0
7528.41	<100	48.0	<-52.0
8364.90	<100	48.0	<-52.0

(848.97 MHz) – 34.93 dBm; Burst mode; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1697.94	<100	47.5	<-52.5
2546.91	<100	47.5	<-52.5
3395.88	<100	47.5	<-52.5
4244.85	<100	47.5	<-52.5
5093.82	<100	47.5	<-52.5
5942.79	<100	47.5	<-52.5
6791.76	<100	47.5	<-52.5
7640.73	<100	47.5	<-52.5
8489.70	<100	47.5	<-52.5

(824.04 MHz) – 33.1 dBm; TDMA; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1648.08	<100	46.1	<-53.9
2472.12	<100	46.1	<-53.9
3296.16	<100	46.1	<-53.9
4120.20	<100	46.1	<-53.9
4944.24	<100	46.1	<-53.9
5768.28	<100	46.1	<-53.9
6592.32	<100	46.1	<-53.9
7416.36	<100	46.1	<-53.9
8240.40	<100	46.1	<-53.9

(836.49 MHz) – 33.2 dBm; TDMA; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1672.98	<100	46.2	<-53.8
2509.47	<100	46.2	<-53.8
3345.96	<100	46.2	<-53.8
4182.45	<100	46.2	<-53.8
5018.94	<100	46.2	<-53.8
5855.43	<100	46.2	<-53.8
6691.92	<100	46.2	<-53.8
7528.41	<100	46.2	<-53.8
8364.90	<100	46.2	<-53.8

(848.97 MHz) – 31..8 dBm; TDMA; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1697.94	<100	44.8	<-55.2
2546.91	<100	44.8	<-55.2
3395.88	<100	44.8	<-55.2
4244.85	<100	44.8	<-55.2
5093.82	<100	44.8	<-55.2
5942.79	<100	44.8	<-55.2
6791.76	<100	44.8	<-55.2
7640.73	<100	44.8	<-55.2
8489.70	<100	44.8	<-55.2

7.3 TEST EQUIPMENT

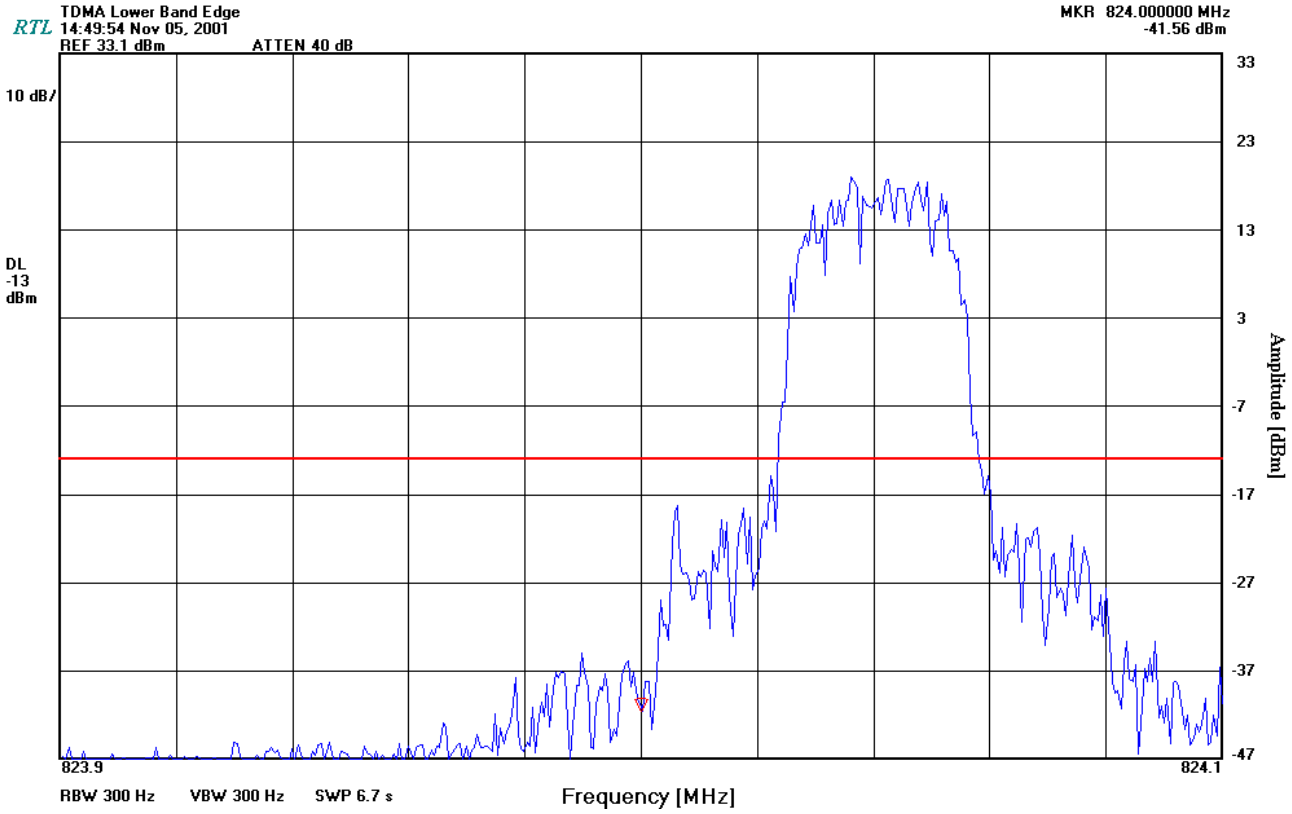
Antenna:	CHASE CBL6112	s/n 2099
Amplifier:	HP8449B	s/n 3008A00505
Spectrum analyzer:	HP8564E	s/n 3943A01719
RF Signal Generator	HP8648C	s/n 3537A01741
Synthesized Sweeper	HP83752A	s/n 3610A00846

8 FCC PART 22.901(D) - BAND-EDGE COMPLIANCE

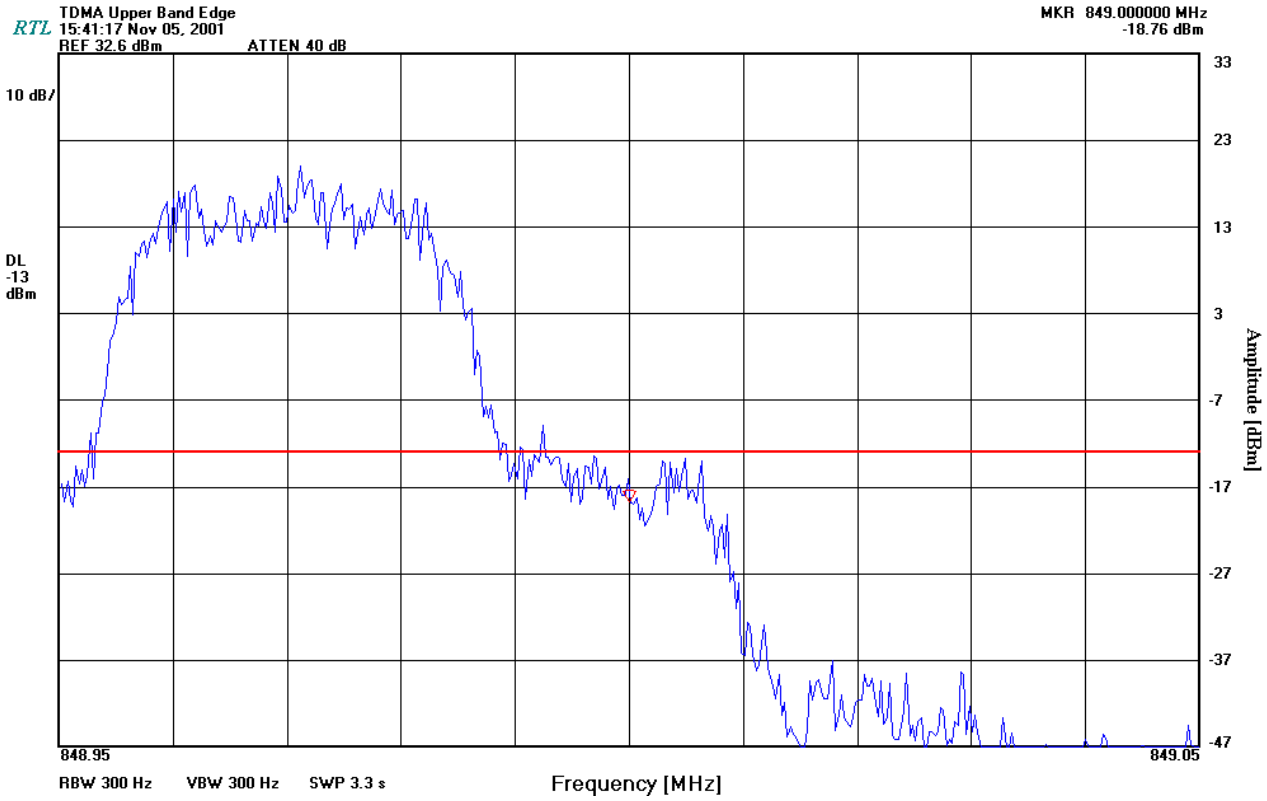
8.1 TEST DATA

The following plots were made using radiated measurements.

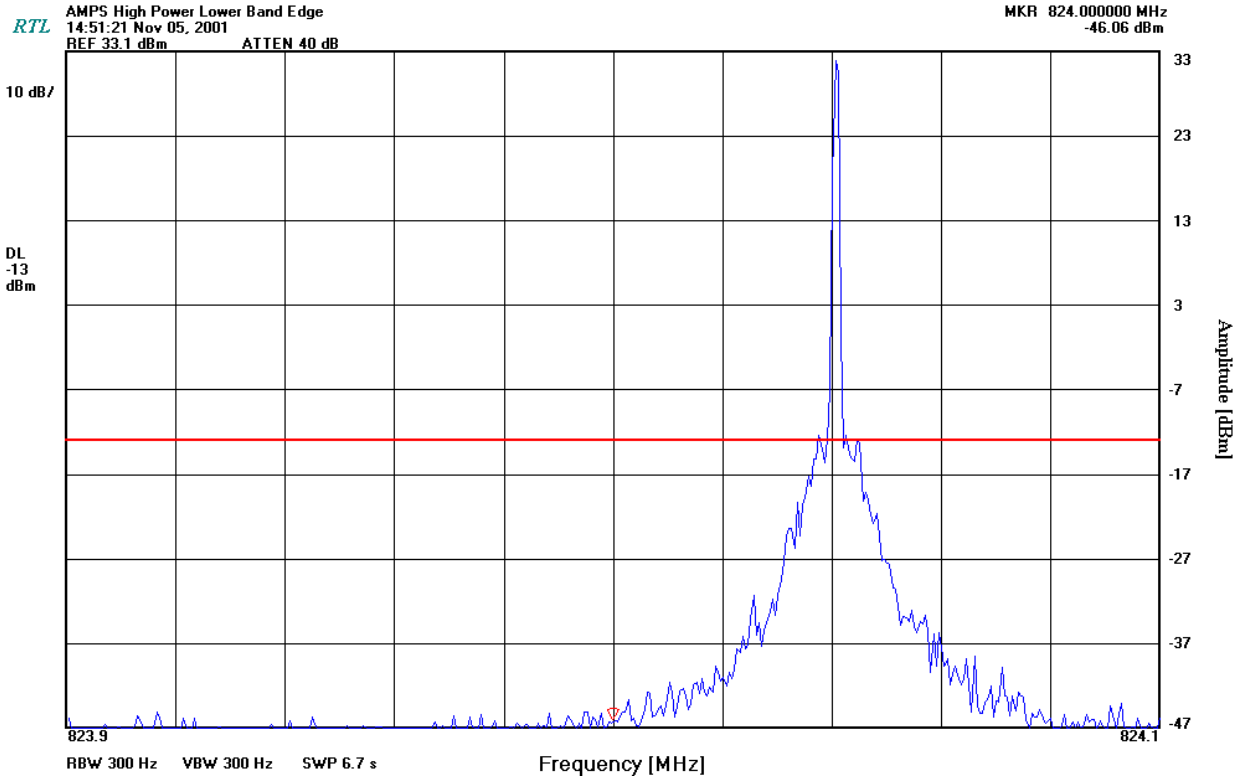
TDMA Lower Band Edge



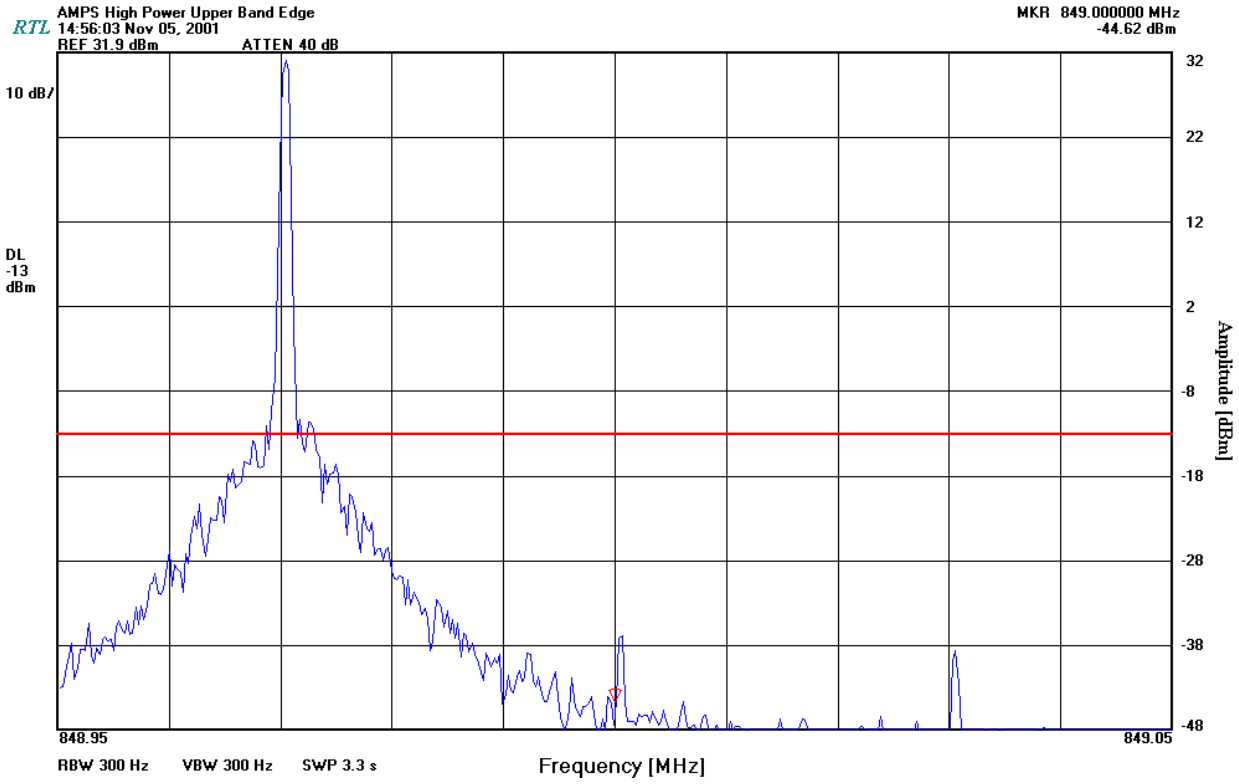
TDMA Upper Band Edge



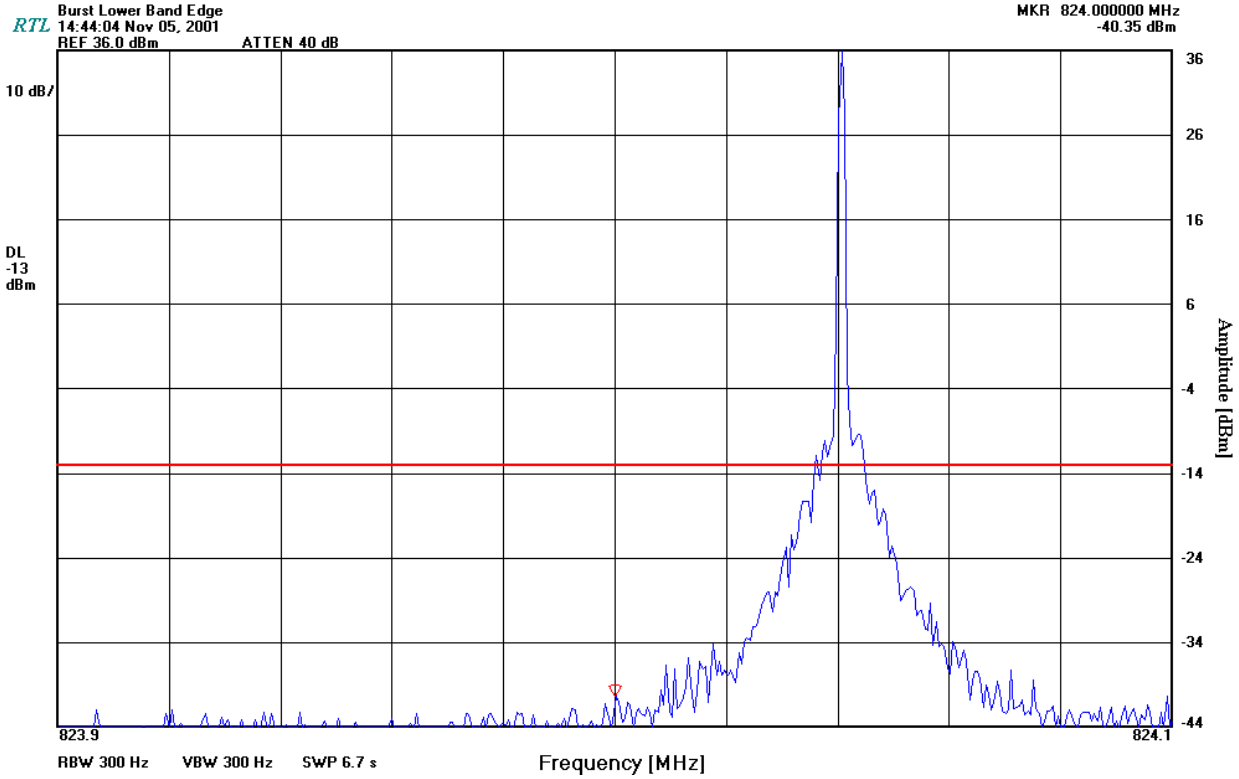
AMPS Lower Band Edge (high power)



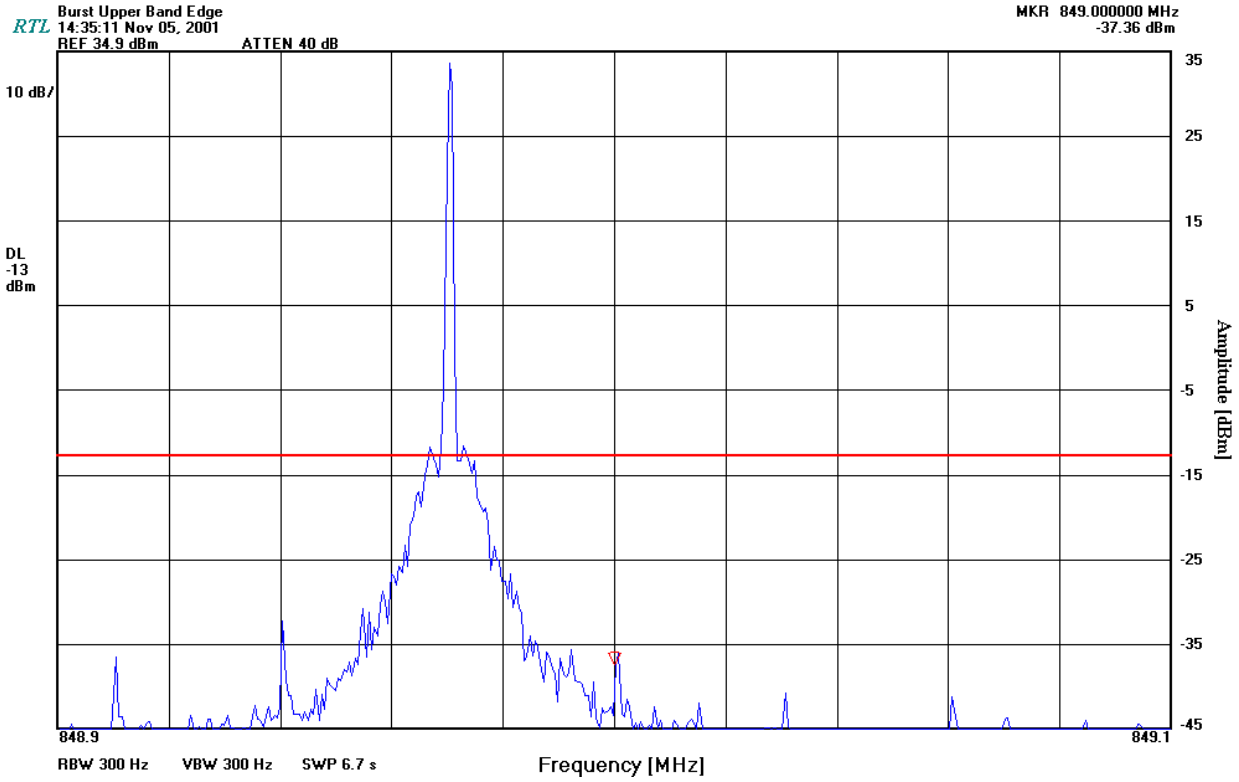
AMPS Upper Band Edge (high power)



Burst Lower Band Edge



Burst Upper Band Edge



8.2 TEST EQUIPMENT

Spectrum Analyzer HP8566B
Antenna BiLog Chase 6112L

9 FCC PART 2 §2.1051: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

9.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, Section 2.2.13

The transmitter is terminated with a 50 Ω load and interfaced with a spectrum analyzer.
The transmitter is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1000 Hz, and for digital mode the transmitter is set in continuous transmitting mode and modulated with pseudo random data using internal software

9.2 TEST DATA

CFR Part 22.917(b) Requirements

Frequency range of measurement per Part 2.1057: 9kHz to 10 x Fc

Limits: Mask (dBm): P (dBm) – (43+10xLOG P(W))

The following channel (in MHz) were investigated: 824.04; 836.49; 848.97
The following modes were investigated: high power AMPS, low power AMPS, Burst, and TDMA

9.3 TEST EQUIPMENT

Audio Generator:

Synthesized Level Generator	HP3336B	s/n 2127A00559
Audio Signal Analyzer	Tektronix ASG 100	s/n B032374
Spectrum Analyzer	HP8564E	s/n 3943A01719
	HP8546A	s/n 3525A00159

(824.04 MHz) – 33.05 dBm; High power AMPS; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1648.08	88.5	46.1	-42.4
2472.12	63.2	46.1	-17.1
3296.16	51.2	46.1	-5.1
4120.20	79.9	46.1	-33.8
4944.24	89.4	46.1	-43.3
5768.28	100.2	46.1	-54.1
6592.32	105.5	46.1	-59.4
7416.36	109.8	46.1	-63.7
8240.40	<110		

(836.49 MHz) – 32.3 dBm; High power AMPS; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1672.98	79.3	45.3	-34.0
2509.47	63.6	45.3	-18.3
3345.96	54.1	45.3	-8.8
4182.45	77.5	45.3	-32.2
5018.94	90.6	45.3	-45.3
5855.43	104.9	45.3	-59.6
6691.92	100.6	45.3	-55.3
7528.41	109.0	45.3	-63.7
8364.90	111.5	45.3	-66.2

(848.97 MHz) – 31.76 dBm; High power AMPS; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1697.94	81.6	44.8	-36.8
2546.91	59.9	44.8	-15.1
3395.88	56.1	44.8	-11.3
4244.85	79.8	44.8	-35.0
5093.82	91.6	44.8	-46.8
5942.79	102.4	44.8	-57.6
6791.76	<110		
7640.73	108.0	44.8	-63.2
8489.70	<110		

(824.04 MHz) – 27.76 dBm; Low power AMPS; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1648.08	62.7	40.8	-21.9
2472.12	71.6	40.8	-30.8
3296.16	90.1	40.8	-49.3
4120.20	86.8	40.8	-46.0
4944.24	96.5	40.8	-55.7
5768.28	93.8	40.8	-53.0
6592.32	104.5	40.8	-63.7
7416.36	104.5	40.8	-63.7
8240.40	97.2	40.8	-56.4

(836.49 MHz) – 26.7 dBm; Low power AMPS; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1672.98	63.9	39.7	-24.2
2509.47	66.7	39.7	-27.0
3345.96	81.3	39.7	-41.6
4182.45	88.1	39.7	-48.4
5018.94	103.2	39.7	-63.5
5855.43	108.0	39.7	-68.3
6691.92	95.2	39.7	-55.5
7528.41	106.6	39.7	-66.9
8364.90	97.9	39.7	-58.2

(848.97 MHz) – 26.8 dBm; Low power AMPS; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1697.94	54.9	39.8	-15.1
2546.91	59.0	39.8	-19.2
3395.88	75.5	39.8	-35.7
4244.85	81.9	39.8	-42.1
5093.82	88.9	39.8	-49.1
5942.79	87.0	39.8	-47.2
6791.76	105.2	39.8	-65.4
7640.73	84.8	39.8	-45.0
8489.70	83.7	39.8	-43.9

(824.04 MHz) – 36.02 dBm; Burst mode; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1648.08	88.8	48.3	-40.5
2472.12	64.4	48.3	-16.1
3296.16	50.2	48.3	-1.9
4120.20	78.8	48.3	-30.5
4944.24	87.1	48.3	-38.8
5768.28	99.7	48.3	-51.4
6592.32	106.6	48.3	-58.3
7416.36	110.3	48.3	-62.0
8240.40	112.1	48.3	-63.8

(836.49 MHz) – 35.3 dBm; Burst mode; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1672.98	80.2	48.0	-32.2
2509.47	63.7	48.0	-15.7
3345.96	52.9	48.0	-4.9
4182.45	77.1	48.0	-29.1
5018.94	88.6	48.0	-40.6
5855.43	101.3	48.0	-53.3
6691.92	113.4	48.0	-65.4
7528.41	109.3	48.0	-61.3
8364.90	<110		

(848.97 MHz) – 34.93 dBm; Burst mode; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1697.94	63.0	47.5	-15.5
2546.91	58.2	47.5	-10.7
3395.88	54.9	47.5	-7.4
4244.85	82.5	47.5	-35.0
5093.82	89.1	47.5	-41.6
5942.79	94.0	47.5	-46.5
6791.76	112.3	47.5	-64.8
7640.73	107.2	47.5	-59.7
8489.70	111.7	47.5	-64.2

(824.04 MHz) – 33.1 dBm; TDMA; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1648.08	96.3	46.1	-50.2
2472.12	82.3	46.1	-36.2
3296.16	85.6	46.1	-39.5
4120.20	98.1	46.1	-52.0
4944.24	101.0	46.1	-54.9
5768.28	<110		
6592.32	<110		
7416.36	<110		
8240.40	<110		

(836.49 MHz) – 33.2 dBm; TDMA; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1672.98	95.1	46.2	-48.9
2509.47	84.8	46.2	-38.6
3345.96	86.8	46.2	-40.6
4182.45	97.0	46.2	-50.8
5018.94	100.1	46.2	-53.9
5855.43	<110		
6691.92	<110		
7528.41	<110		
8364.90	<110		

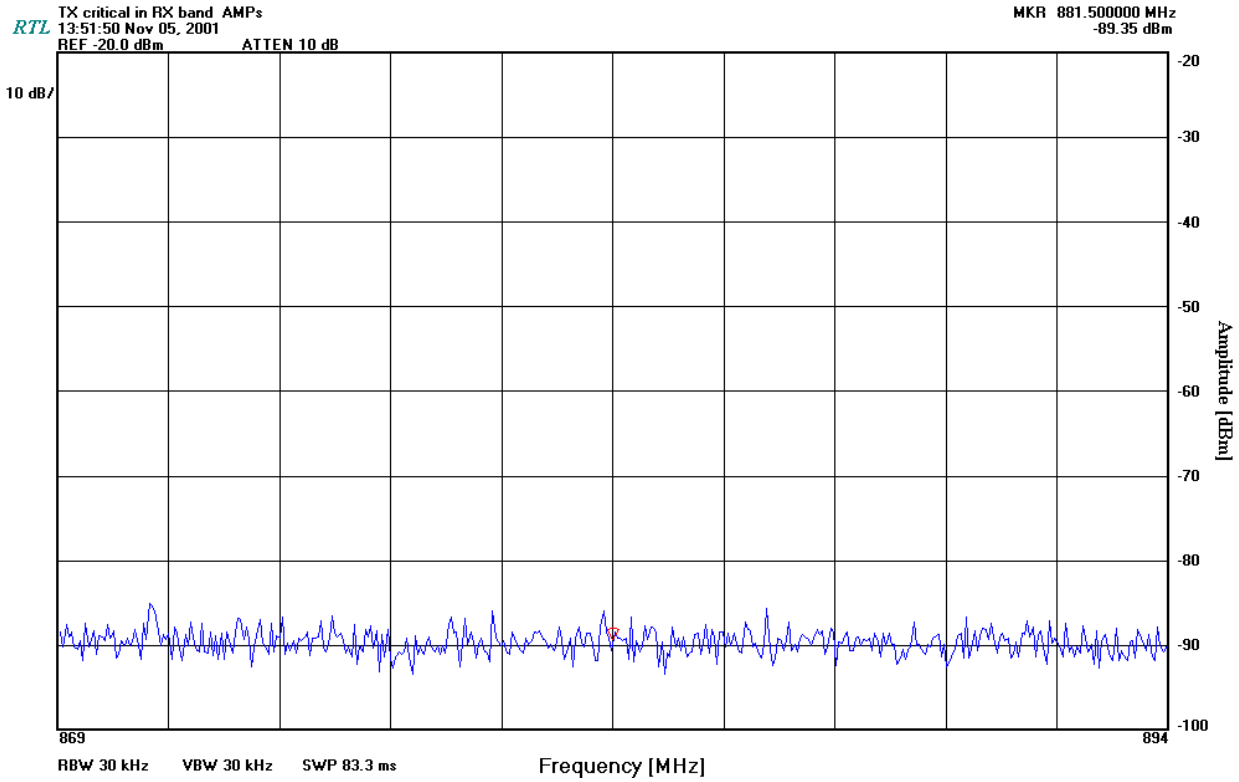
(848.97 MHz) – 31..8 dBm; TDMA; 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBc)	Limit (dBc)	Margin (dB)
1697.94	94.5	44.8	-49.7
2546.91	80.2	44.8	-35.4
3395.88	87.8	44.8	-43.0
4244.85	97.1	44.8	-52.3
5093.82	98.8	44.8	-54.0
5942.79	<110		
6791.76	<110		
7640.73	<110		
8489.70	<110		

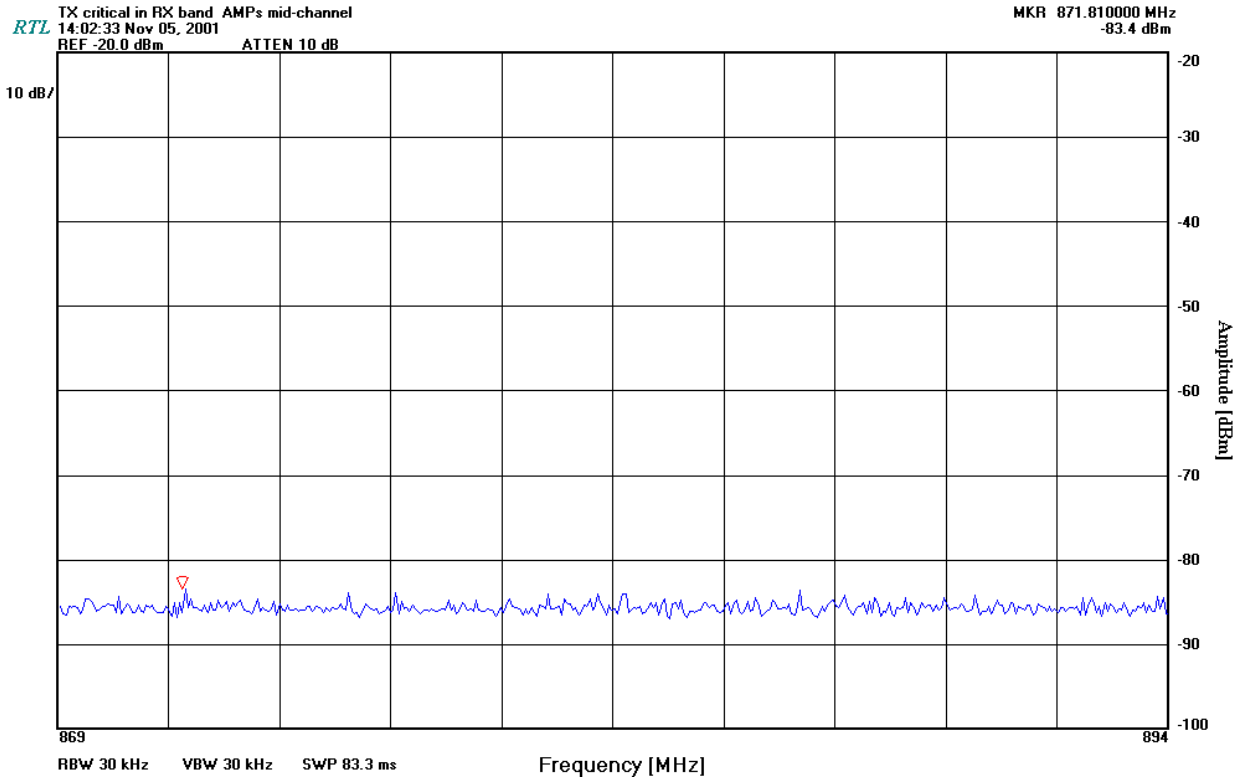
10 FCC PART 22.917 (F) EMISSIONS IN BASE STATION FREQUENCY BAND FROM MOBILES

10.1 TEST DATA

TX spurs in RX critical (824.04 MHz) High power AMPS



TX spurs in RX critical (836.49 MHz) High Power AMPS



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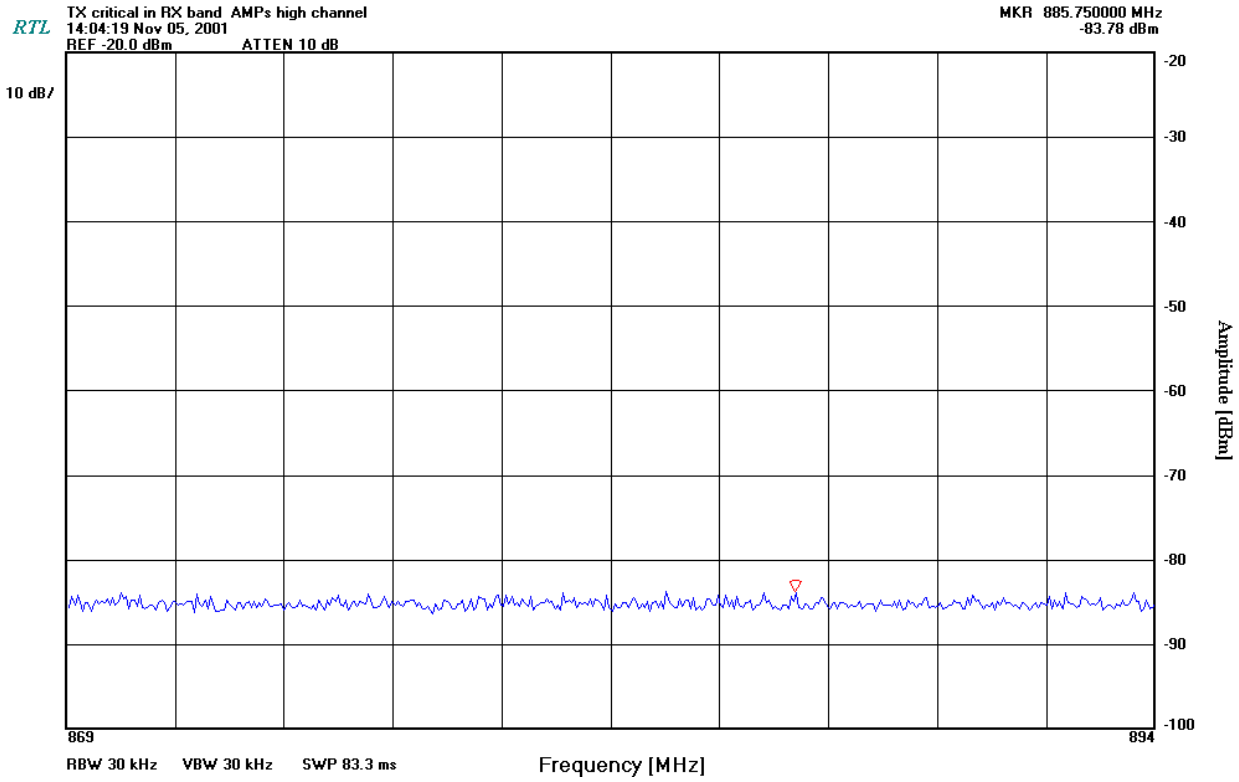
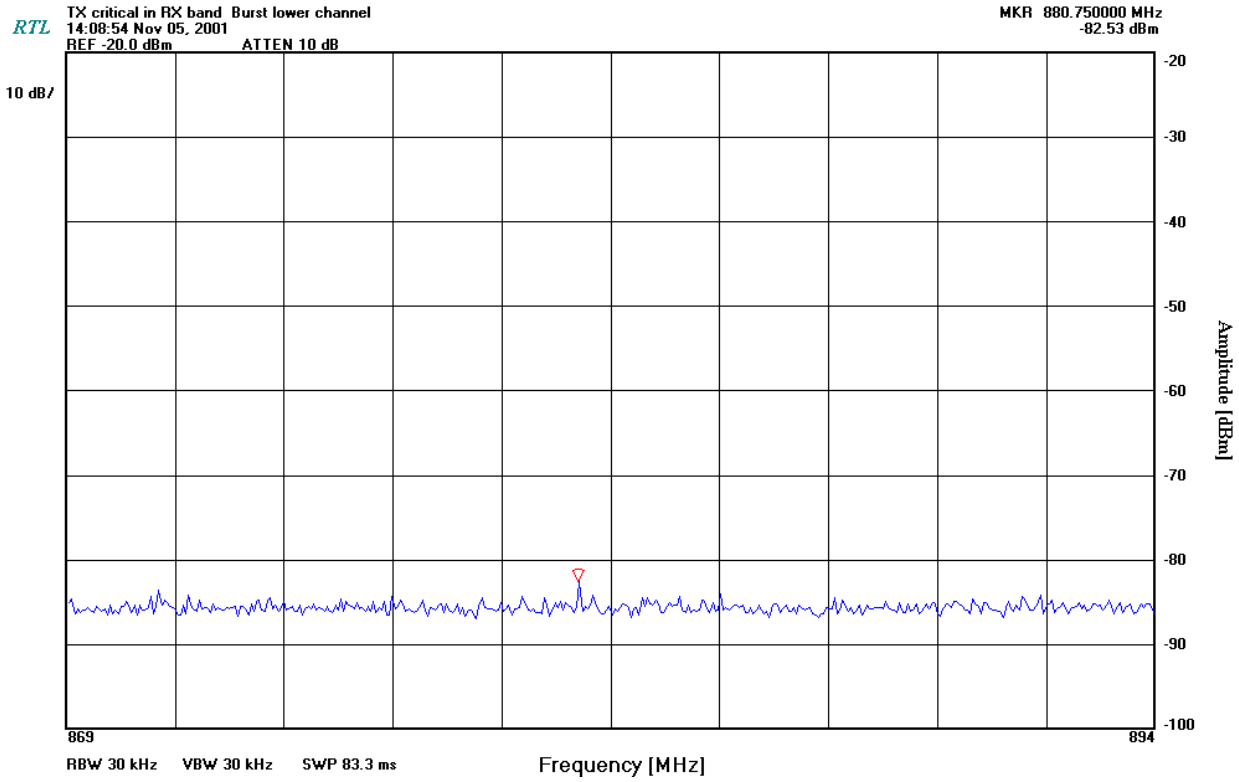
TX spurs in RX critical (848.97 MHz) High Power AMPS



TX spurs in RX critical (824.04 MHz) Burst



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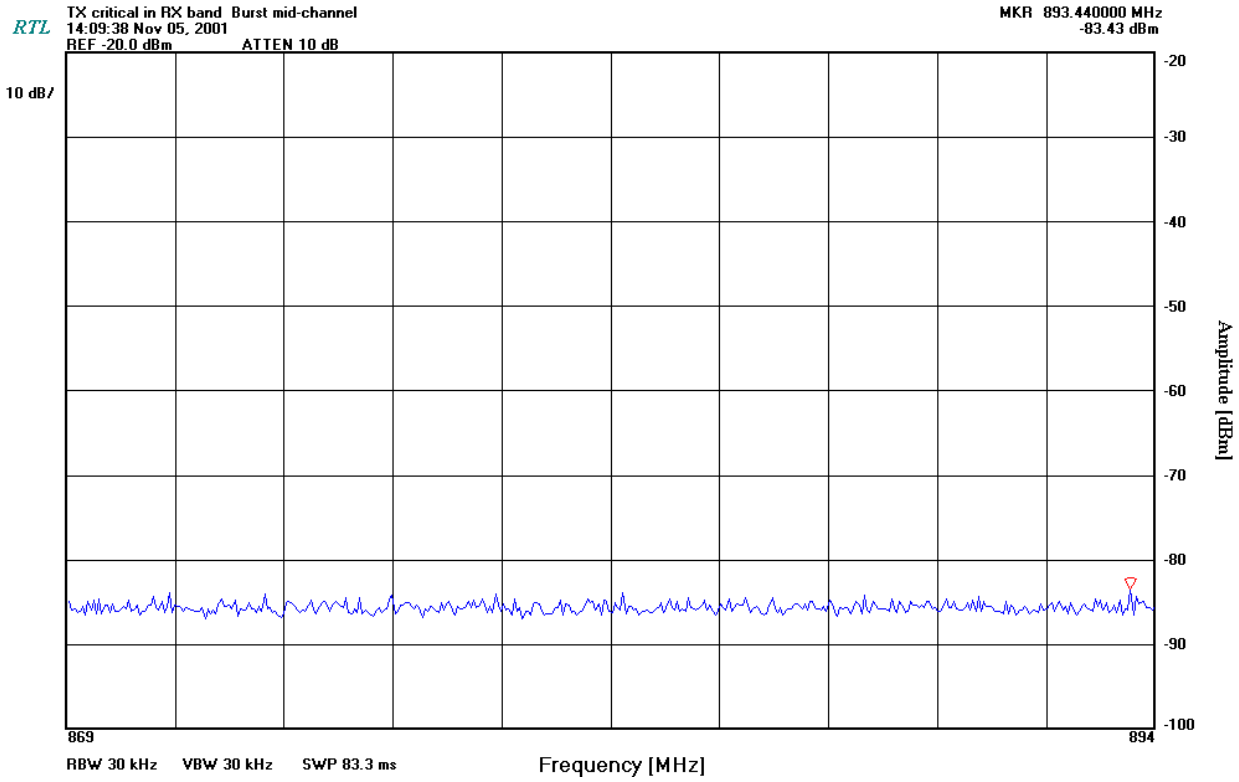
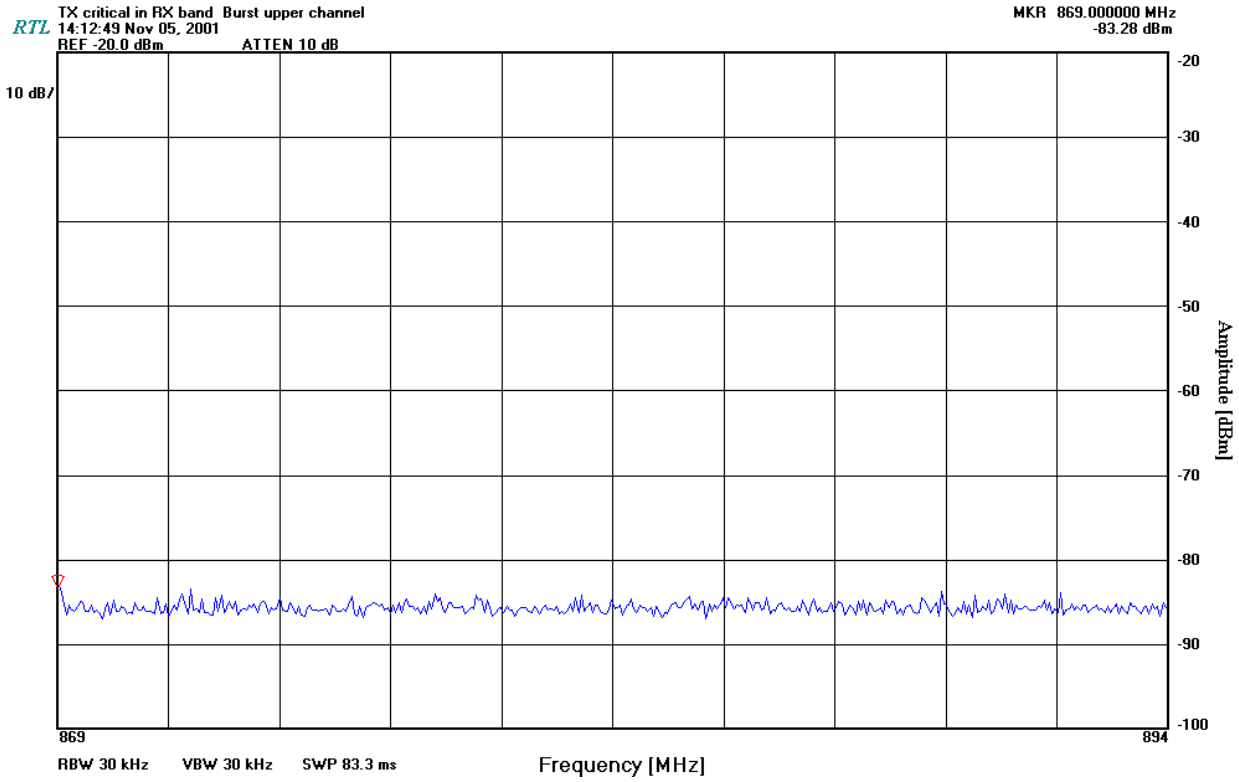
TX spurs in RX critical (836.49 MHz) Burst



TX spurs in RX critical (848.97 MHz) Burst



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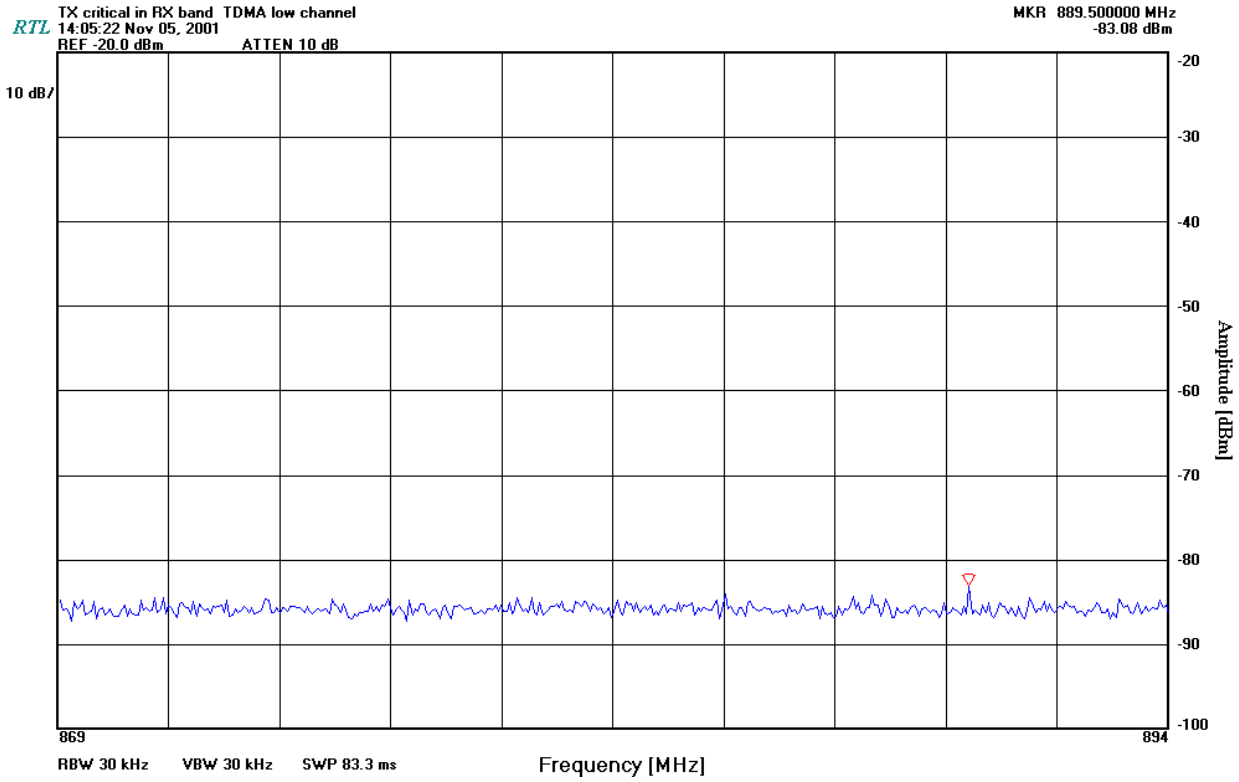
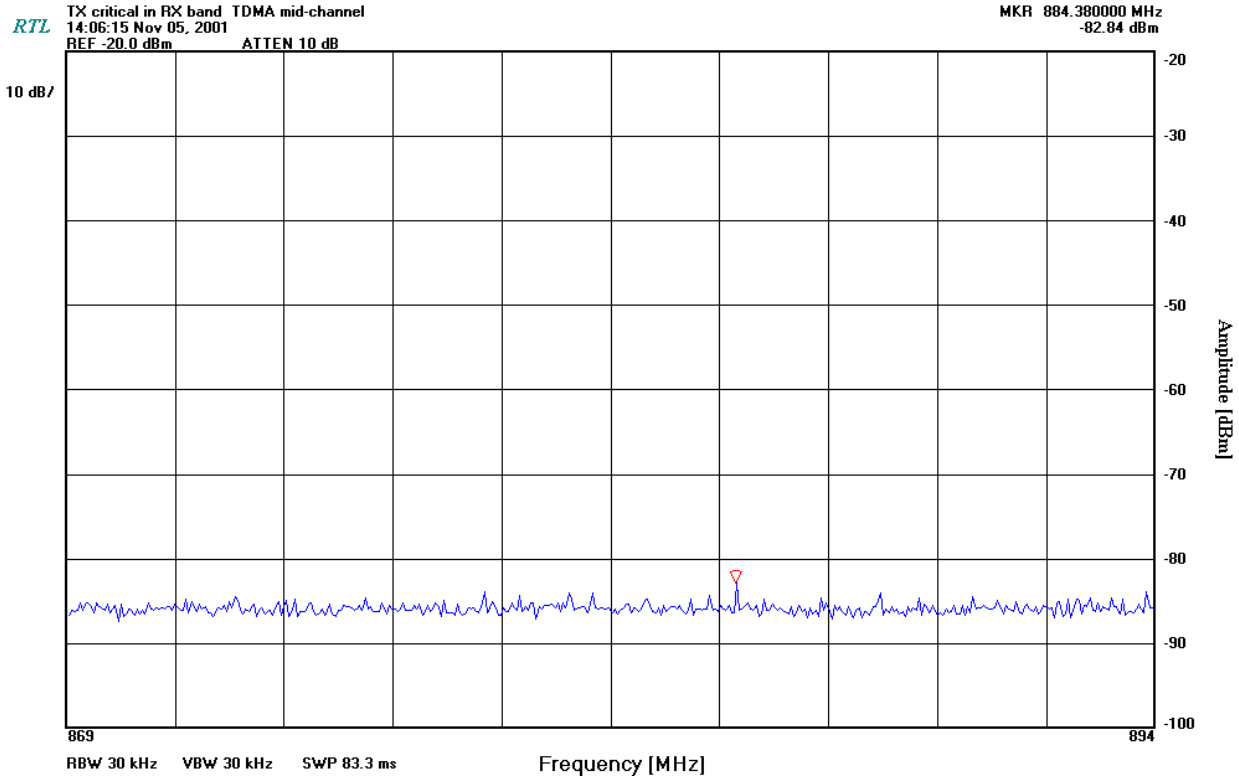
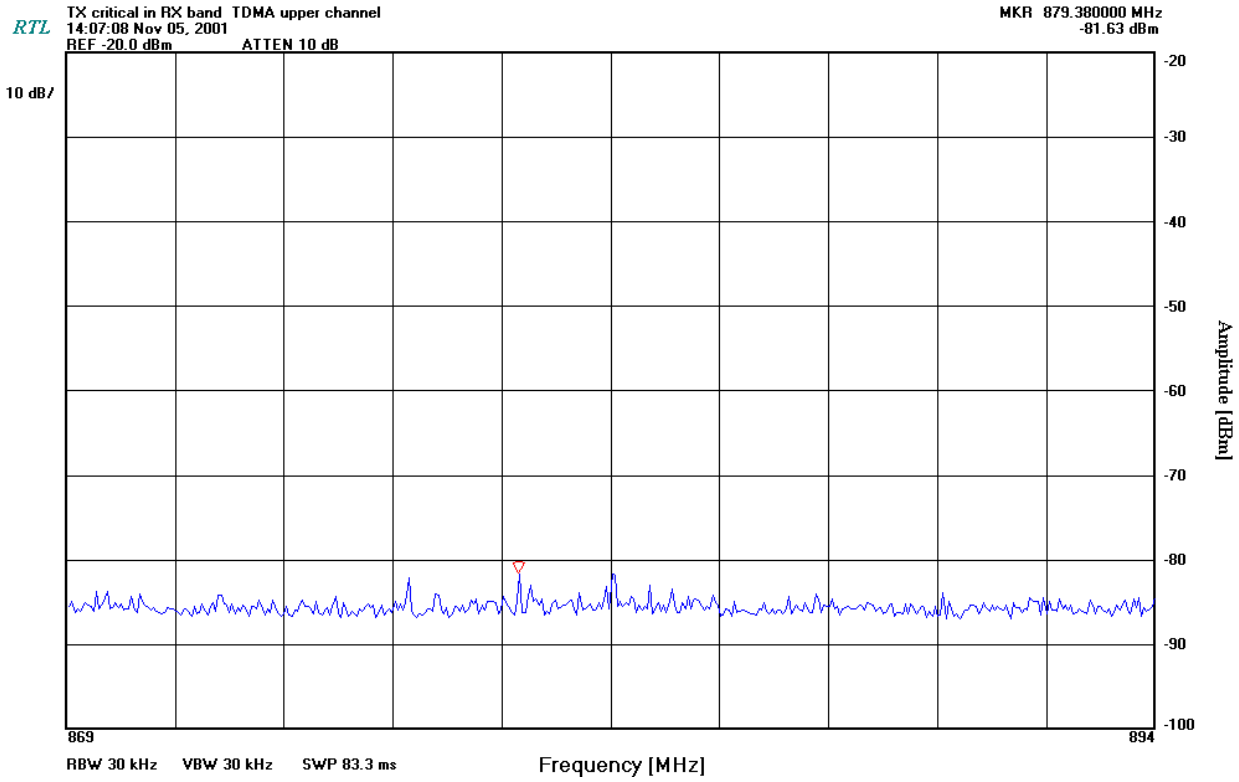
TX spurs in RX critical (824.04 MHz) TDMA



TX spurs in RX critical (836.49 MHz) TDMA



TX spurs in RX critical (848.97 MHz) TDMA



10.2 TEST EQUIPMENT

Spectrum Analyzer HP8564E s/n 3943A01719

11 FCC PART 2 §2.1049 (C) (1): OCCUPIED BANDWIDTH

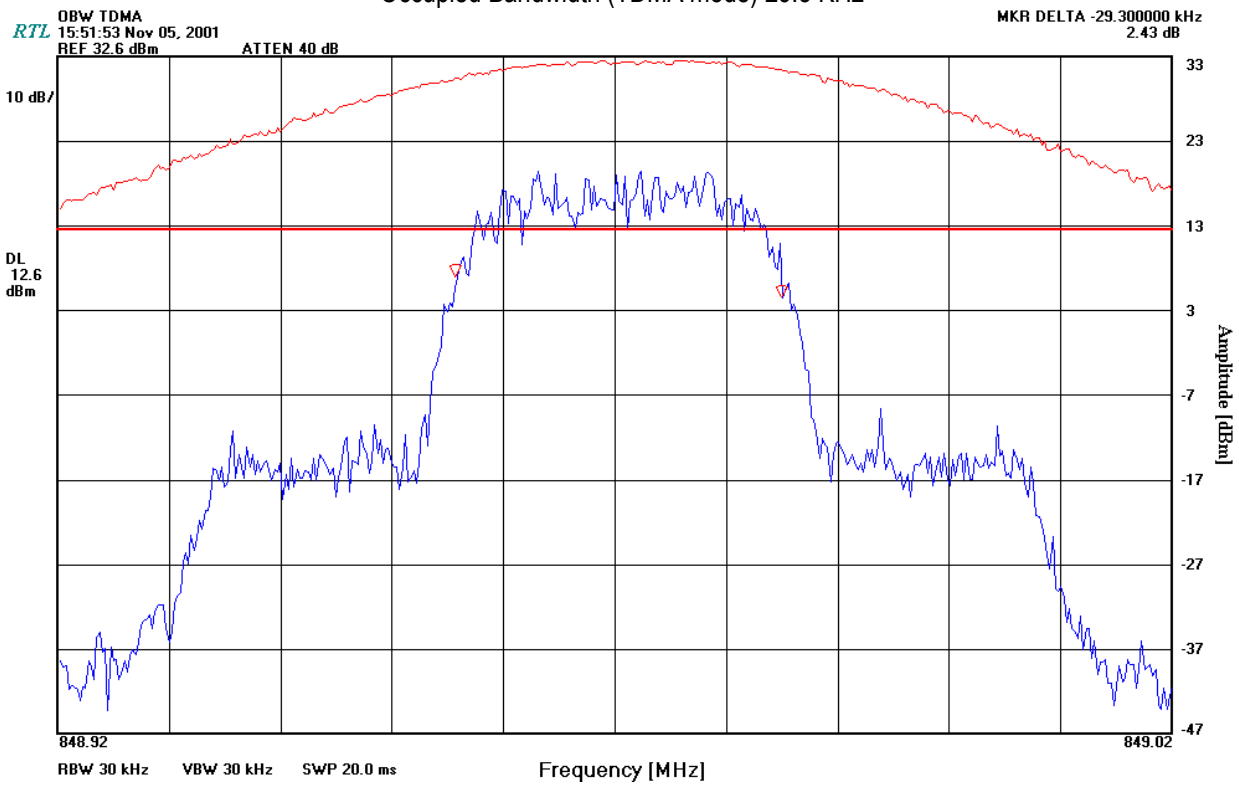
OCCUPIED BANDWIDTH - COMPLIANCE WITH THE EMISSION MASKS

11.1 TEST PROCEDURE

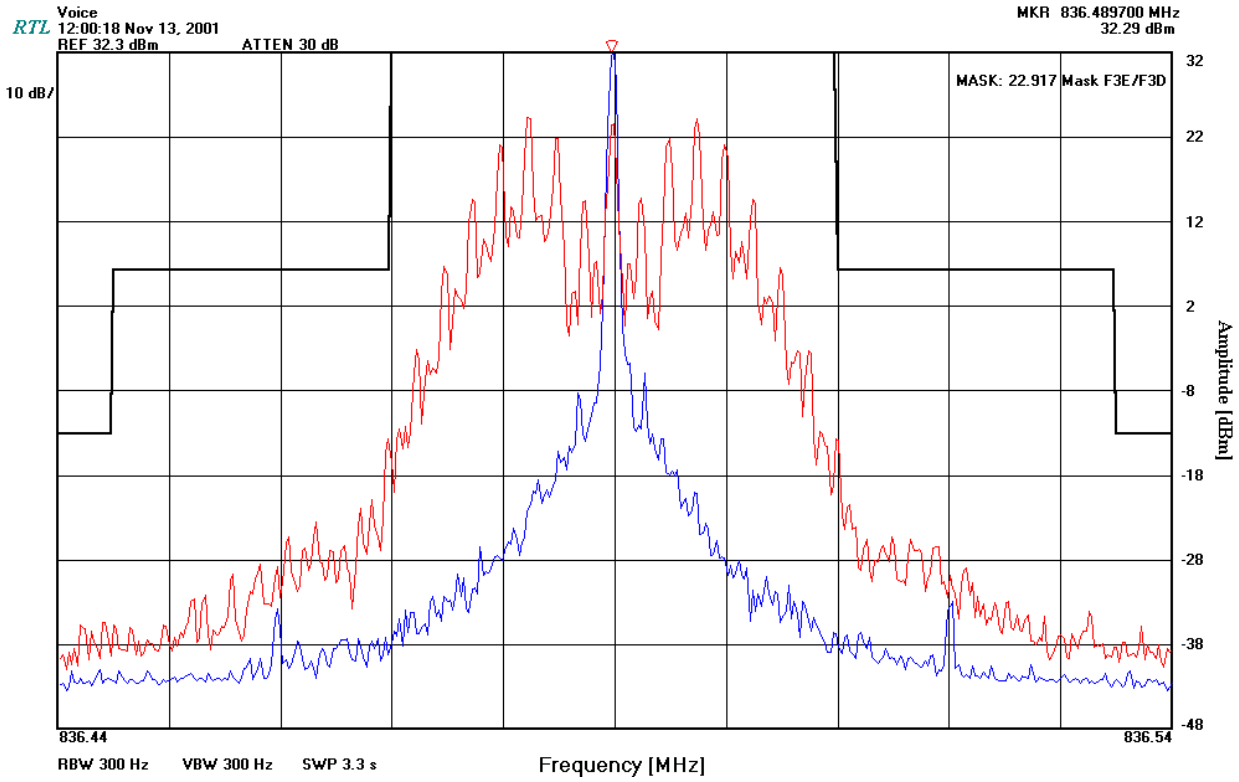
ANSI/TIA/EIA-603-1992, section 2.2.11
Part 22.917(b)

11.2 TEST DATA

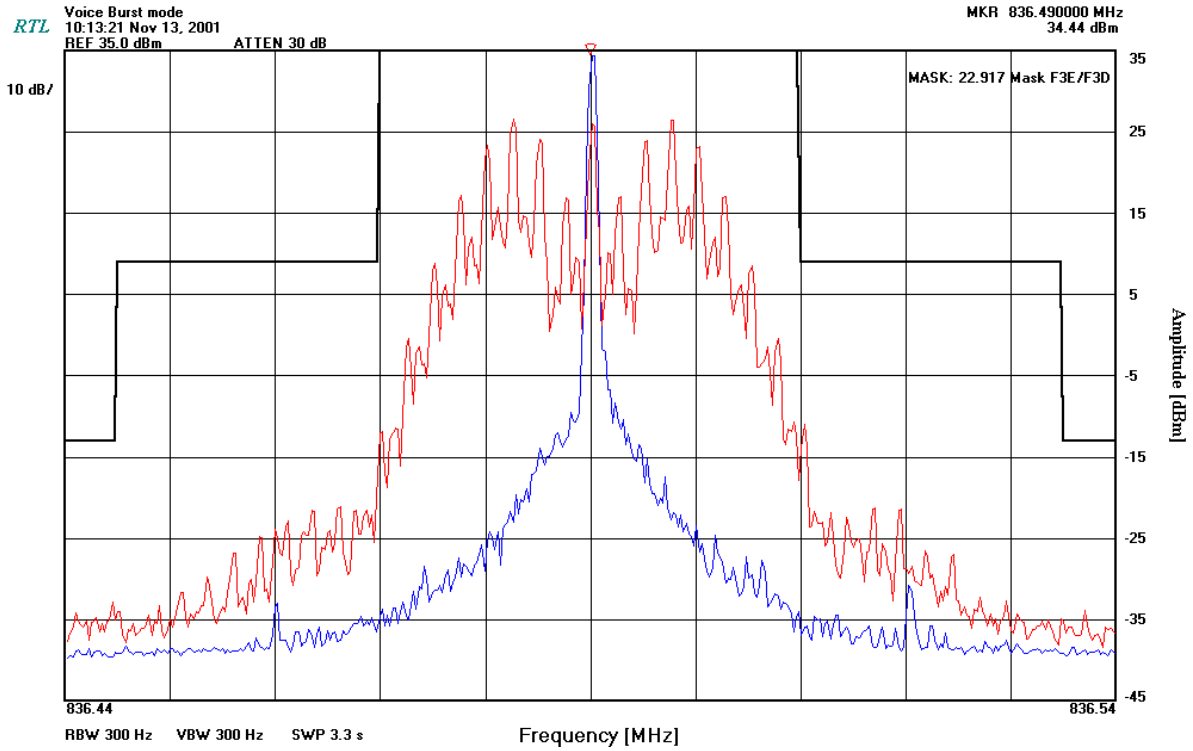
Occupied Bandwidth (TDMA mode) 29.3 KHz



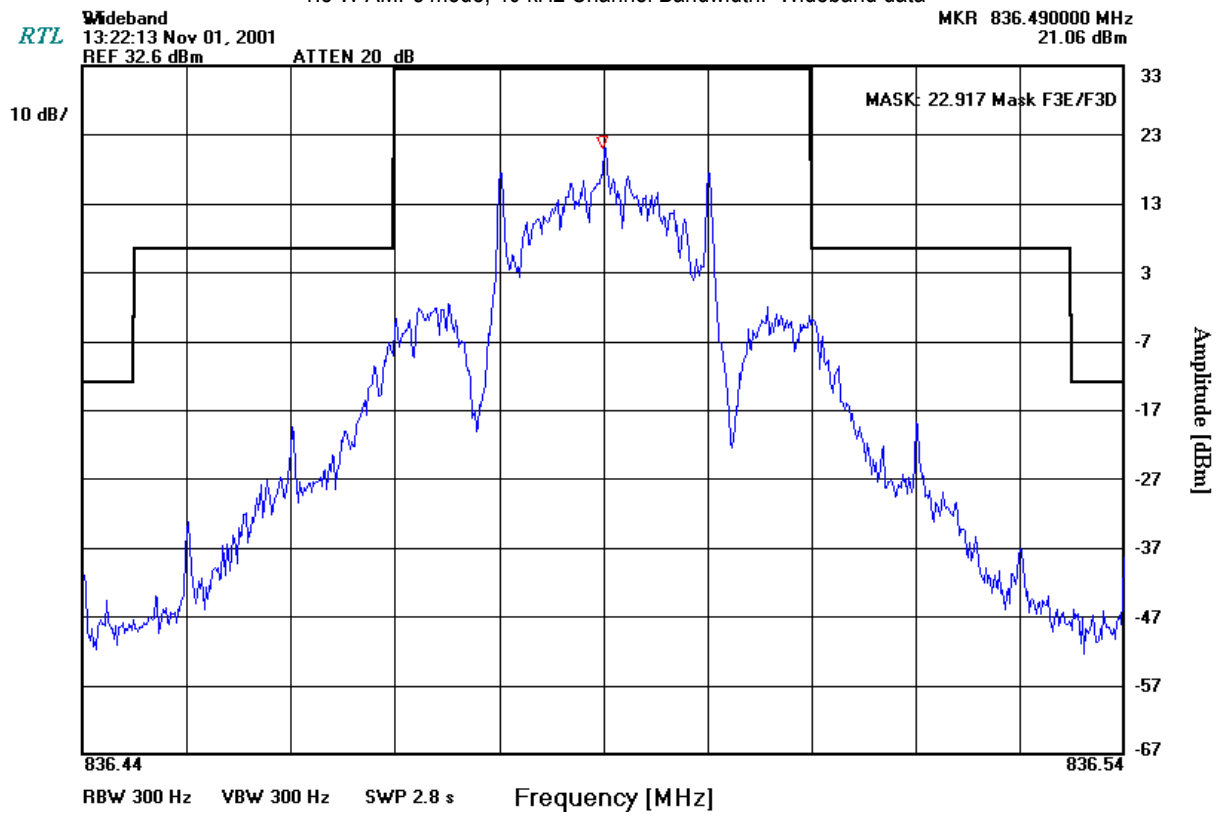
1.5 W AMPs mode; 40 kHz Channel Bandwidth: (Audio Modulation: 2,500 Hz) Voice



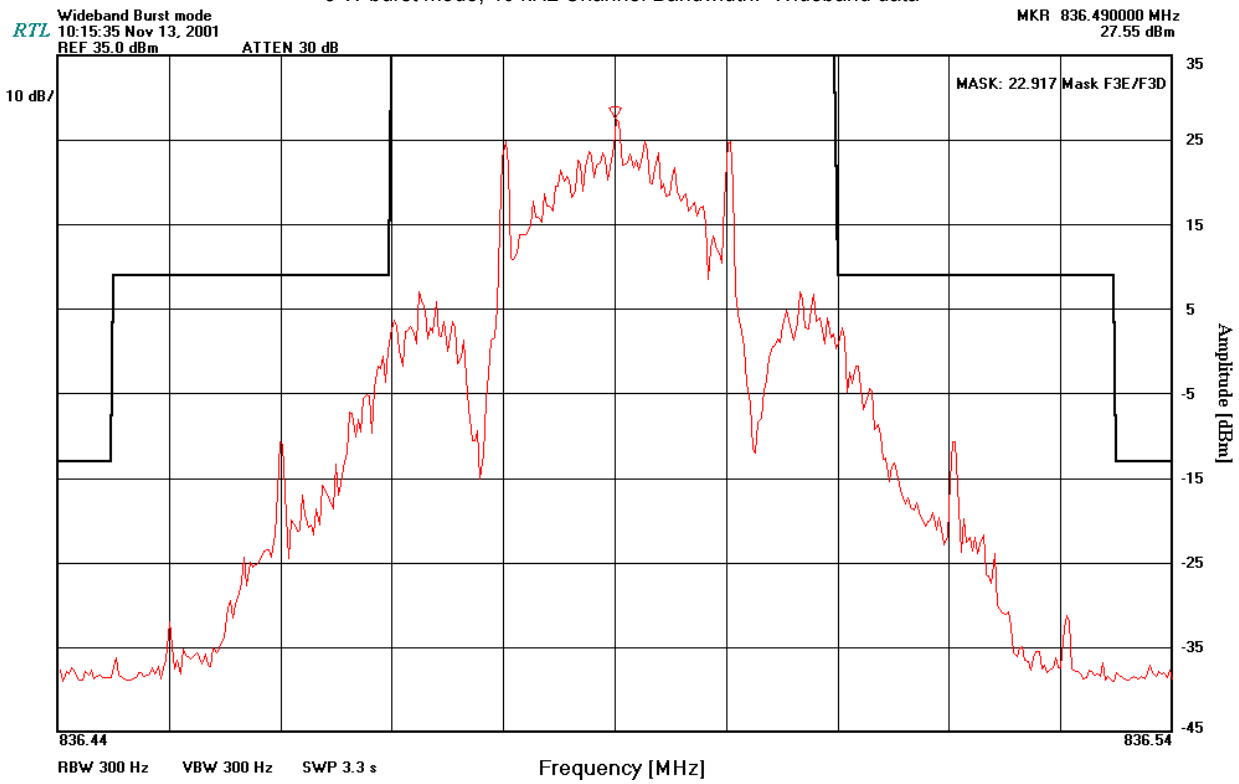
3W burst mode 40 kHz Channel Bandwidth: (Audio Modulation: 2,500 Hz) Voice



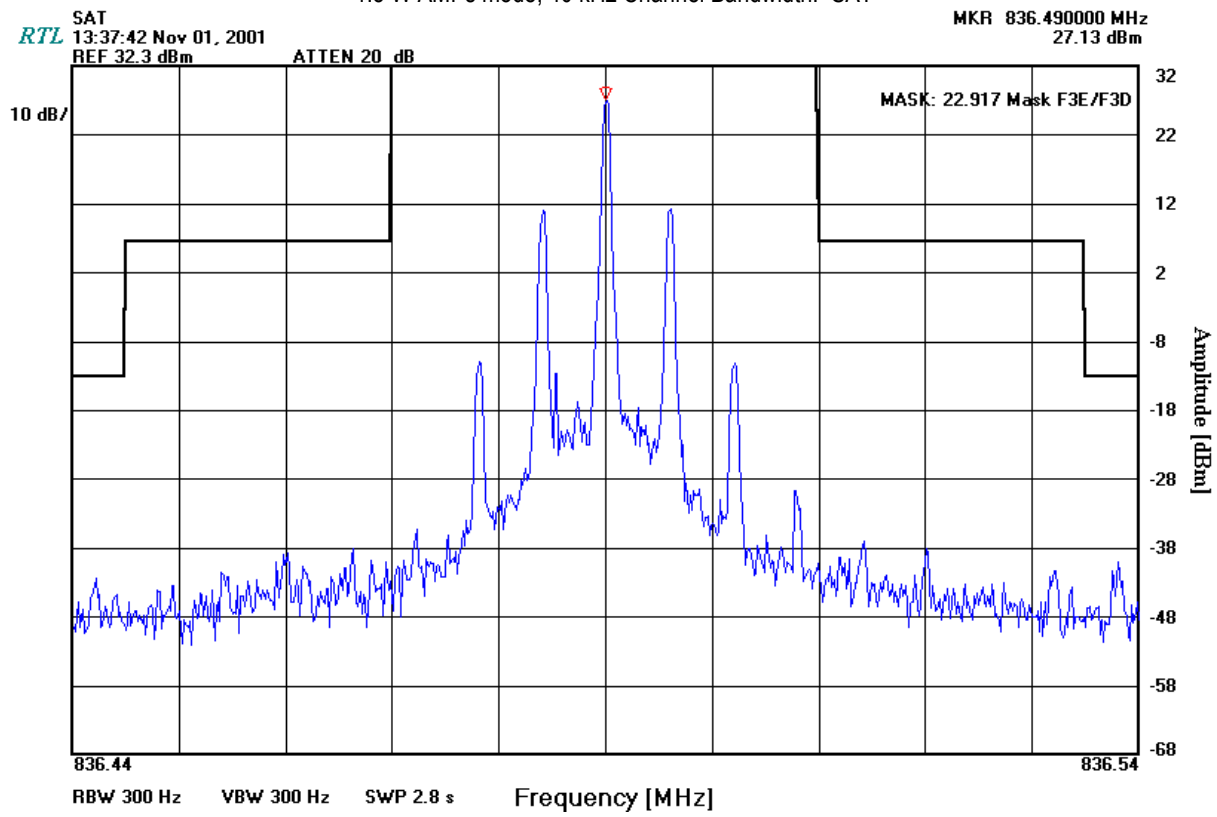
1.5 W AMPs mode; 40 kHz Channel Bandwidth: Wideband data



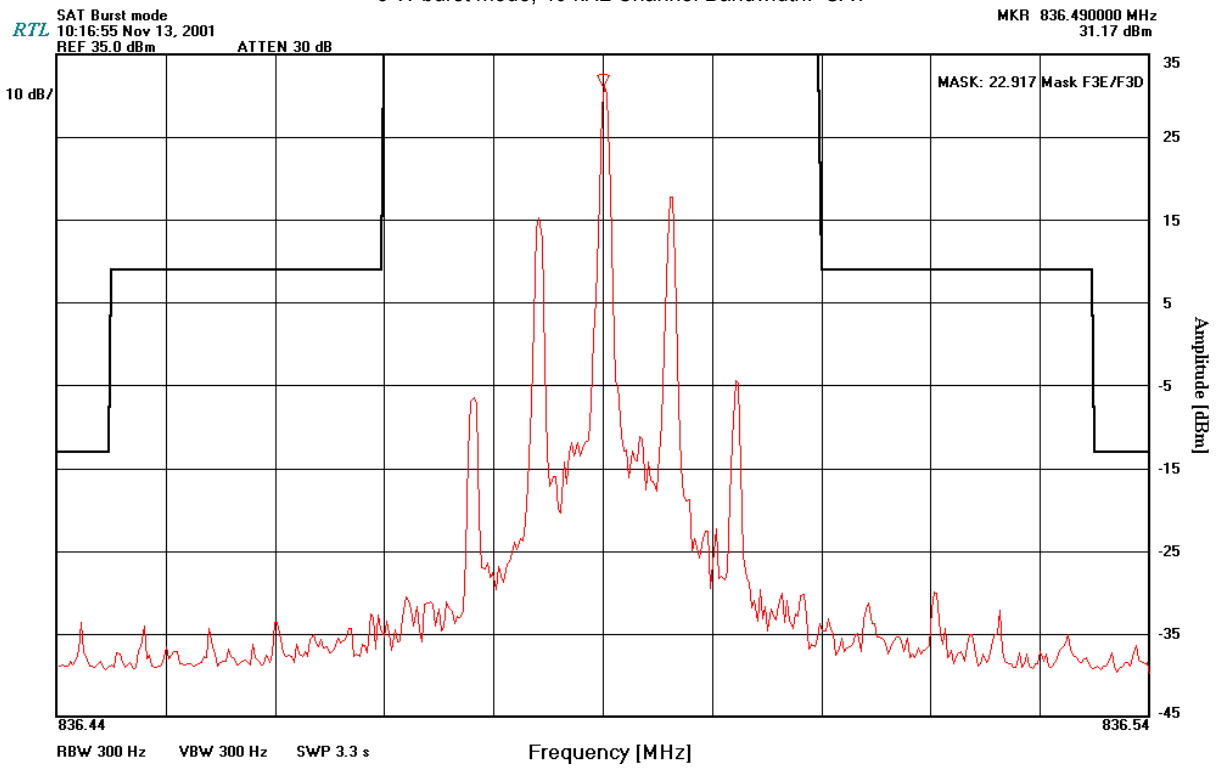
3 W burst mode; 40 kHz Channel Bandwidth: Wideband data



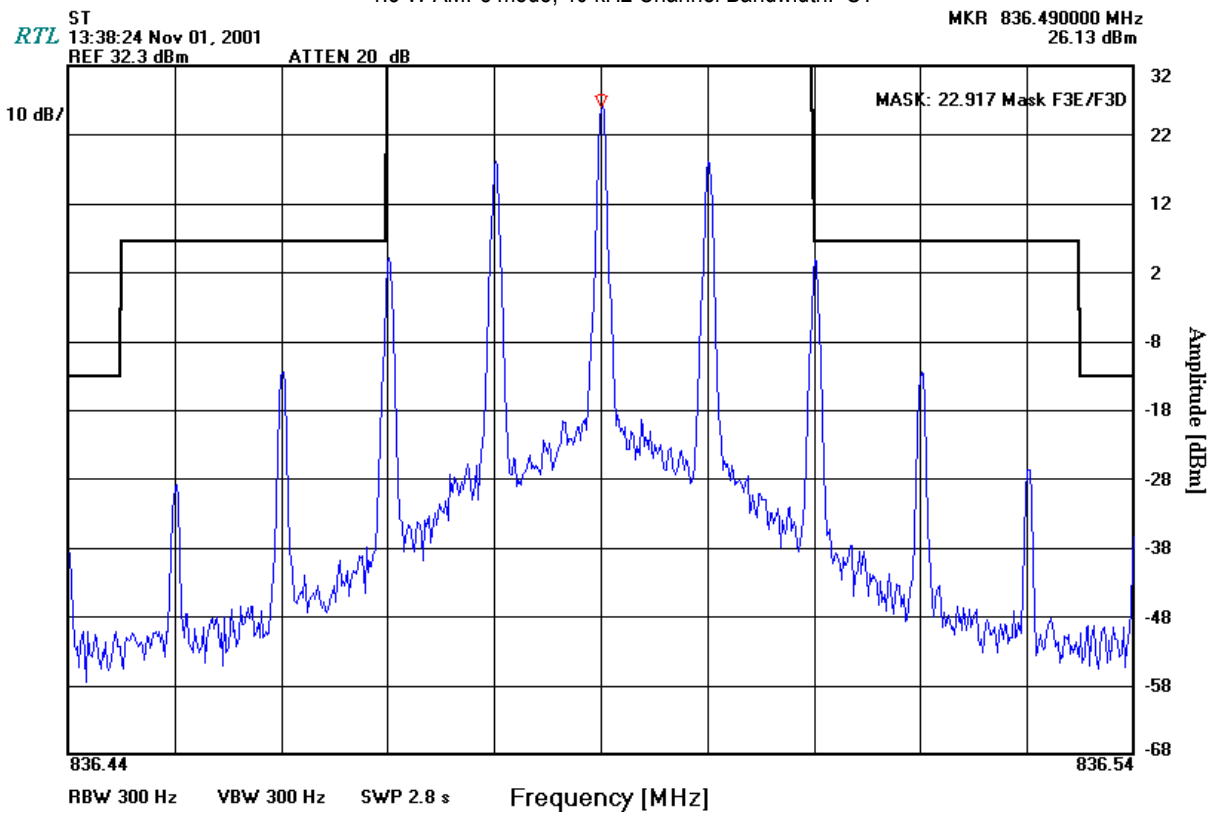
1.5 W AMPs mode; 40 kHz Channel Bandwidth: SAT



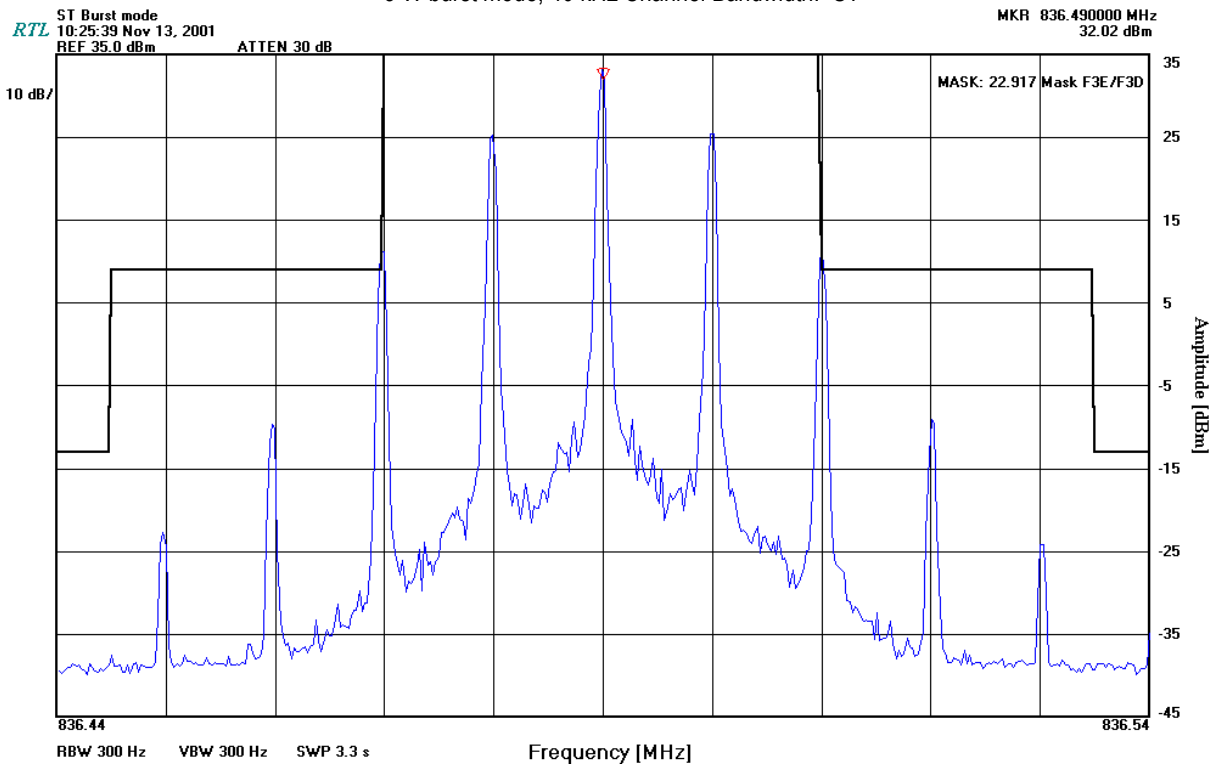
3 W burst mode; 40 kHz Channel Bandwidth: SAT



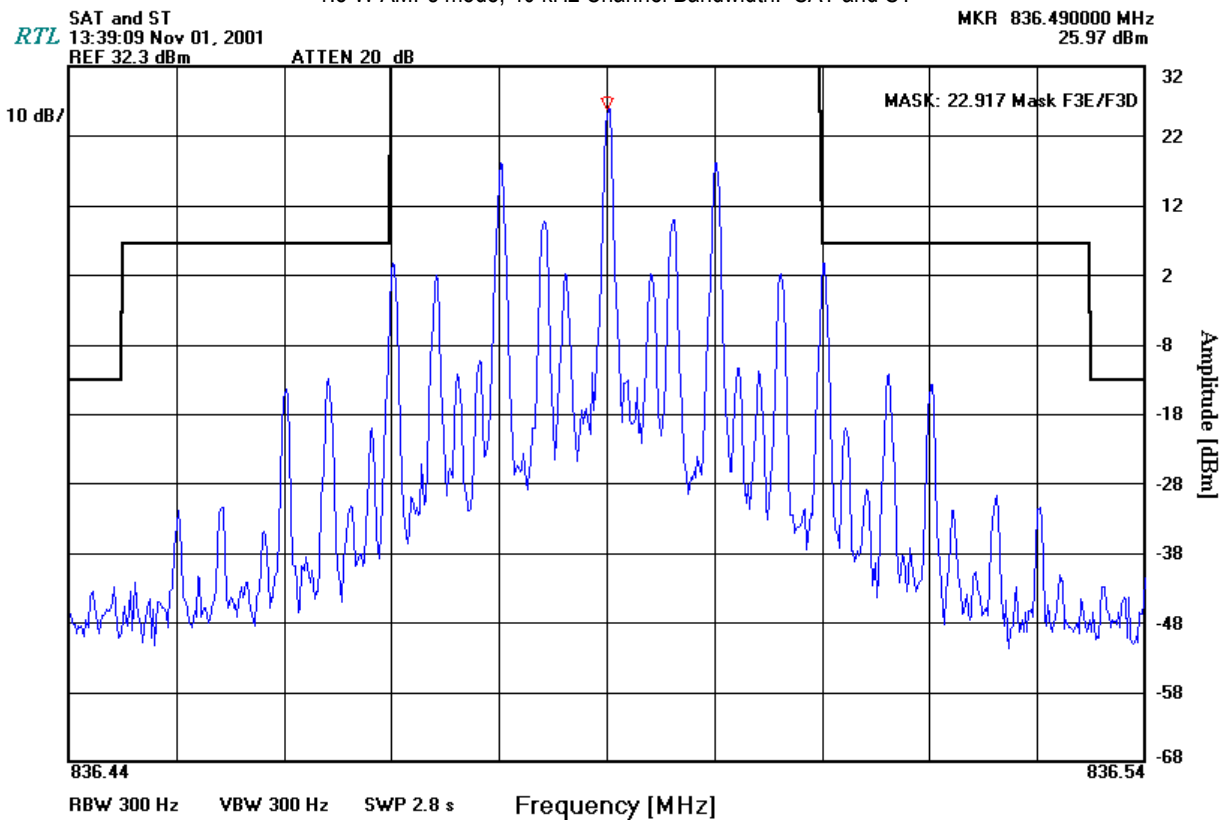
1.5 W AMPs mode; 40 kHz Channel Bandwidth: ST



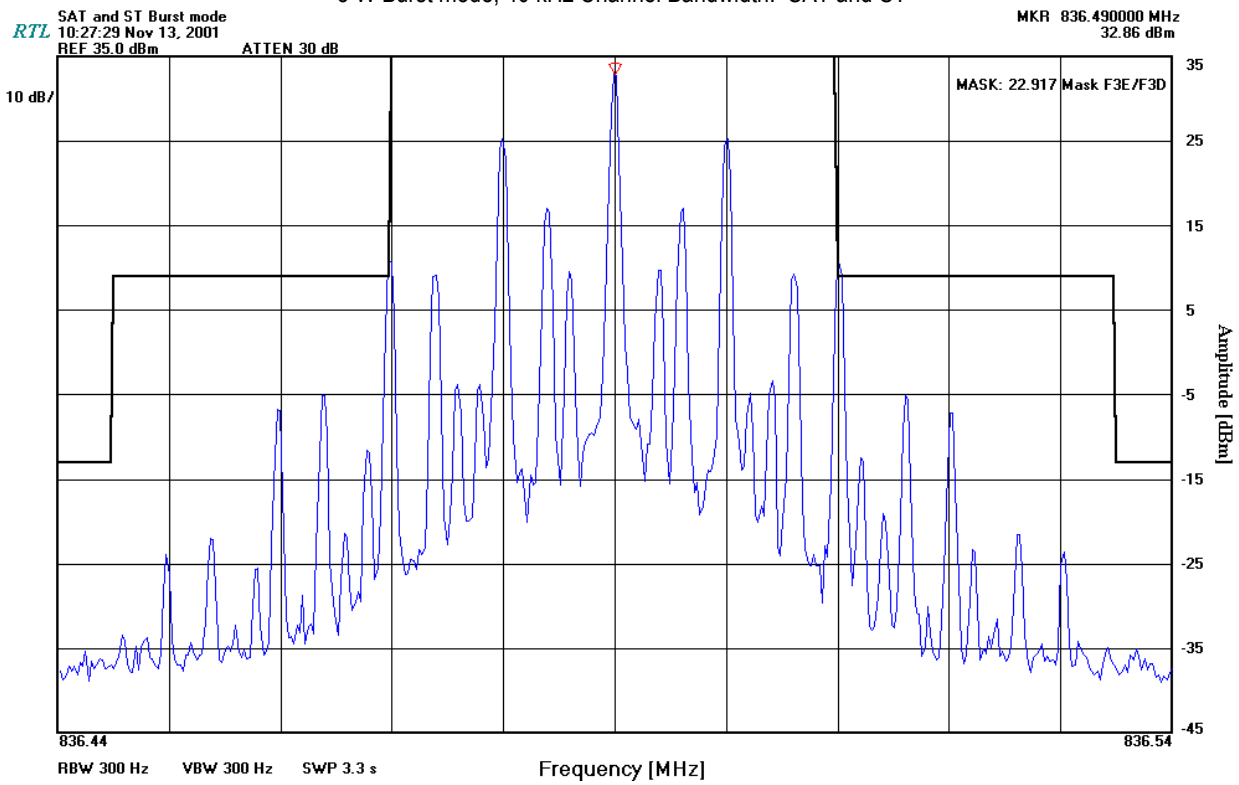
3 W burst mode; 40 kHz Channel Bandwidth: ST



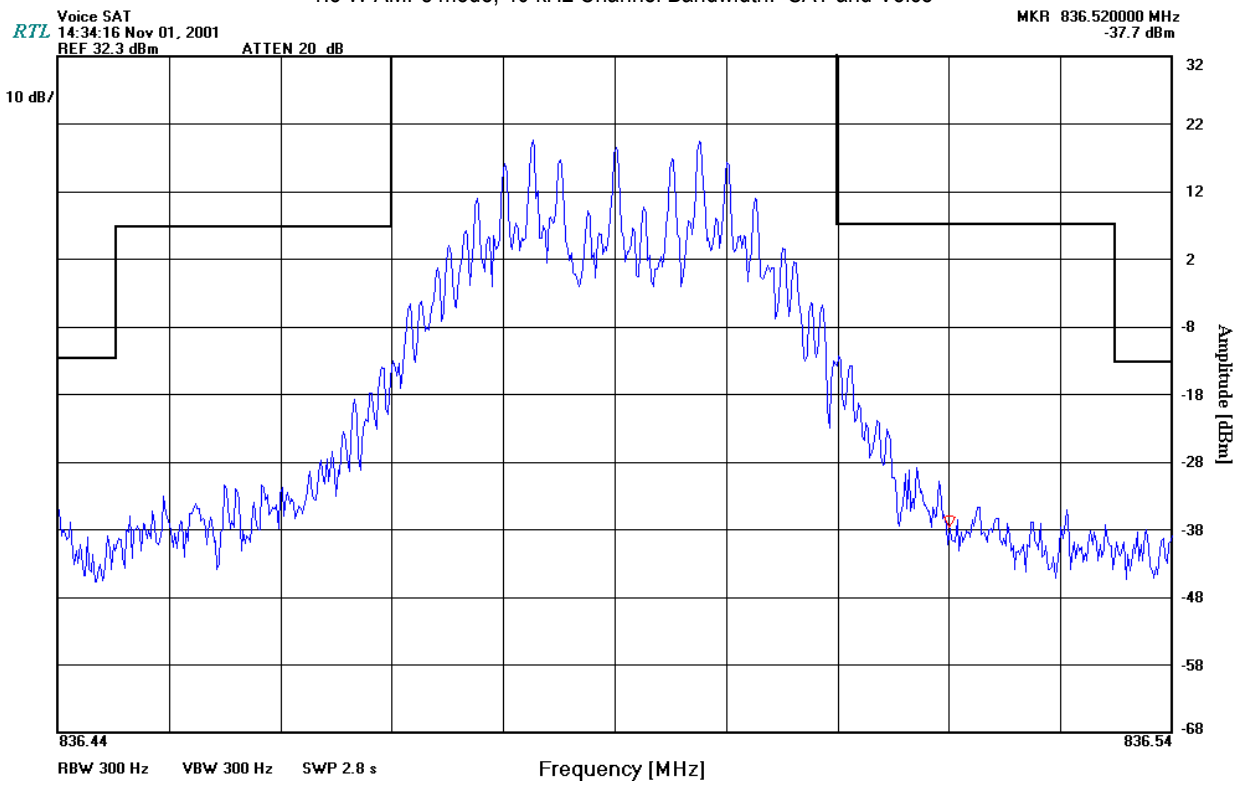
1.5 W AMPs mode; 40 kHz Channel Bandwidth: SAT and ST



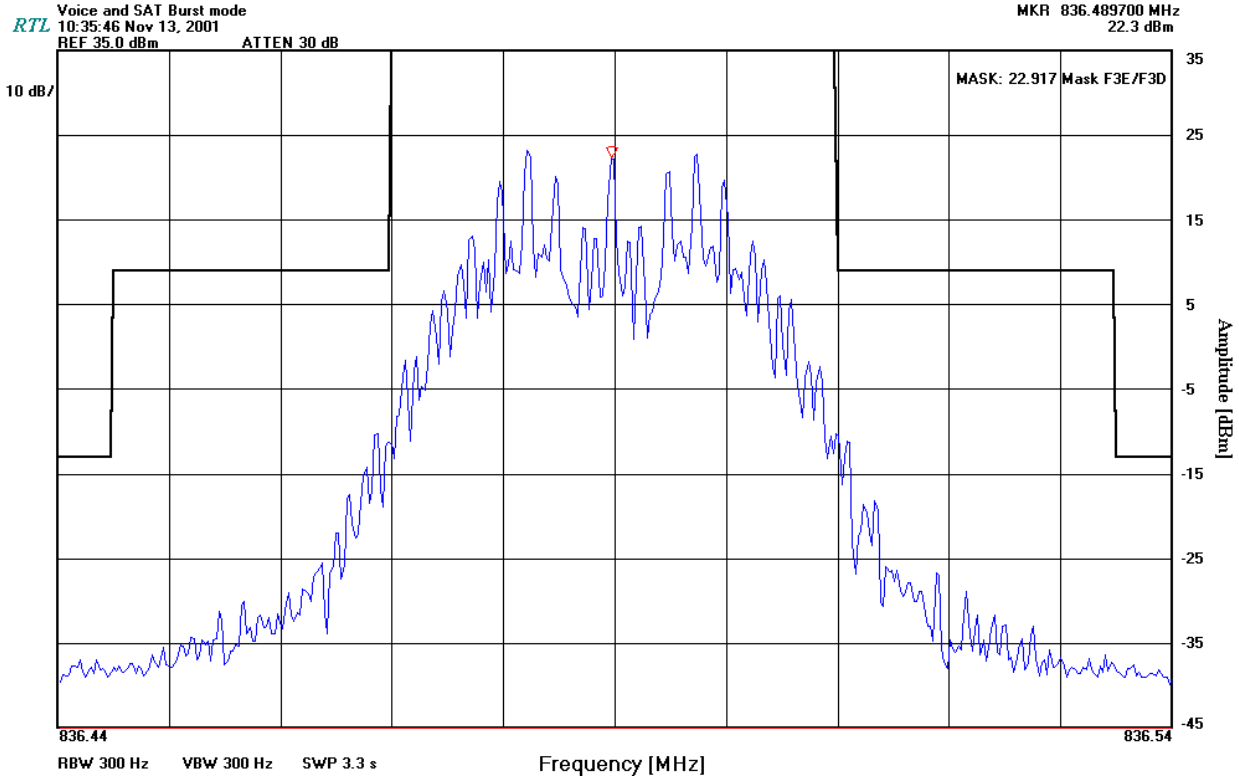
3 W Burst mode; 40 kHz Channel Bandwidth: SAT and ST



1.5 W AMPs mode; 40 kHz Channel Bandwidth: SAT and Voice



3 W burst mode; 40 kHz Channel Bandwidth: SAT and Voice



11.3 TEST EQUIPMENT

Spectrum Analyzer HP8564E s/n 3943A01719

12 FCC PART 2 §2.1055: FREQUENCY STABILITY

12.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.2, EIA/TIA-136 part 270, and FCC part 22.355

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

The EUT was evaluated over the temperature range -30°C to +50°C.

The temperature was initially set to -30°C and a 2-hour period was observed for stabilization of the EUT.
The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10 degrees centigrade through the range. A ½ an hour period was observed to stabilize the EUT at each measurement step and the frequency stability was measured within one minute after application of primary power to the transmitter.
Additionally, the power supply voltage of the EUT was varied from 85% to 115% of the nominal voltage.

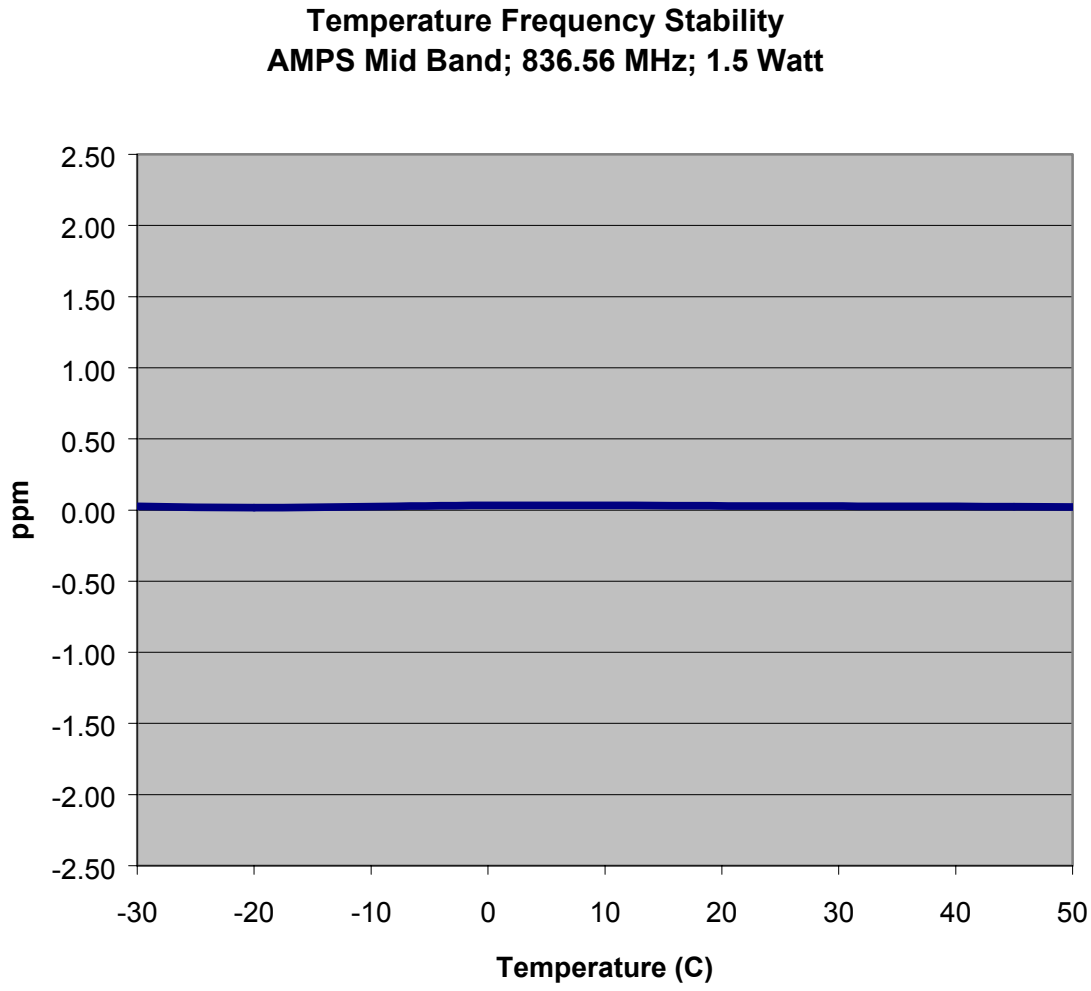
The worst-case test data are shown.

12.2 TEST DATA

12.2.1 FREQUENCY STABILITY/TEMPERATURE VARIATION

Temperature Frequency Stability
AMPS Mid Band; 836.56 MHz; 1.5W

Temperature (°C)	Power (dBm)	Freq. Error (Hz)	Frequency Measured (MHz)	ppm
-40	32.64	35	836.520035	0.04
-20	32.57	14	836.520014	0.02
0	31.2	27	836.520027	0.03
25	31	23	836.520023	0.03
45	29.3	19	836.520019	0.02
65	28.9	13	836.520013	0.02
85	28.3	5	836.520005	0.01



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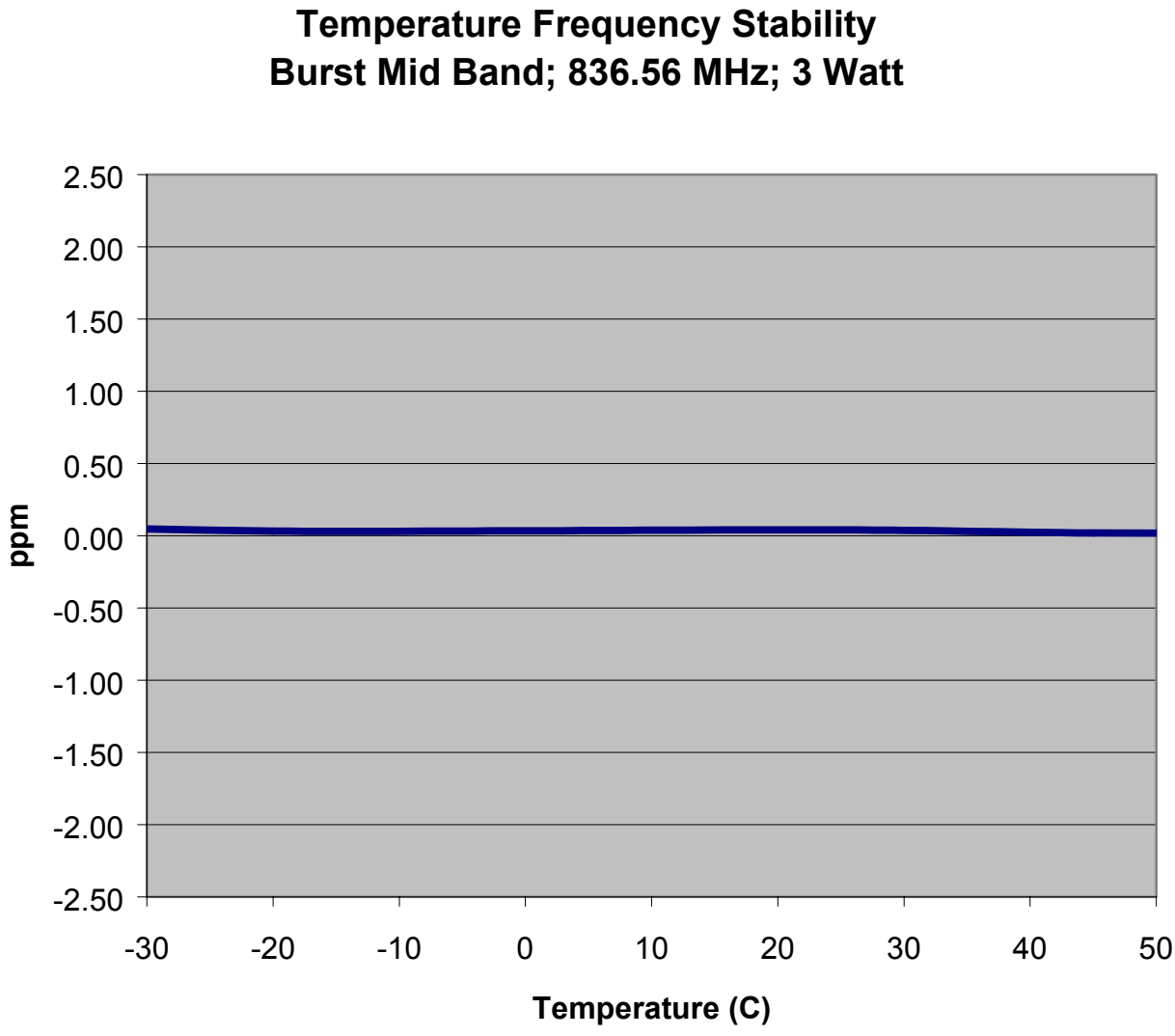
Temperature Frequency Stability
Burst Mid Band; 836.56 MHz; 3 Watt

Temperature (°C)	Power (dBm)	Freq. Error (Hz)	Frequency Measured (MHz)	ppm
-40	36.1	57.0	836.520057	0.07
-20	34.7	27.0	836.520027	0.03
0	35.1	27.8	836.520028	0.03
25	34.7	34.1	836.520034	0.04
45	34.2	16.0	836.520016	0.02
65	33.7	16.1	836.520016	0.02
85	31.8	41.4	836.520041	0.05



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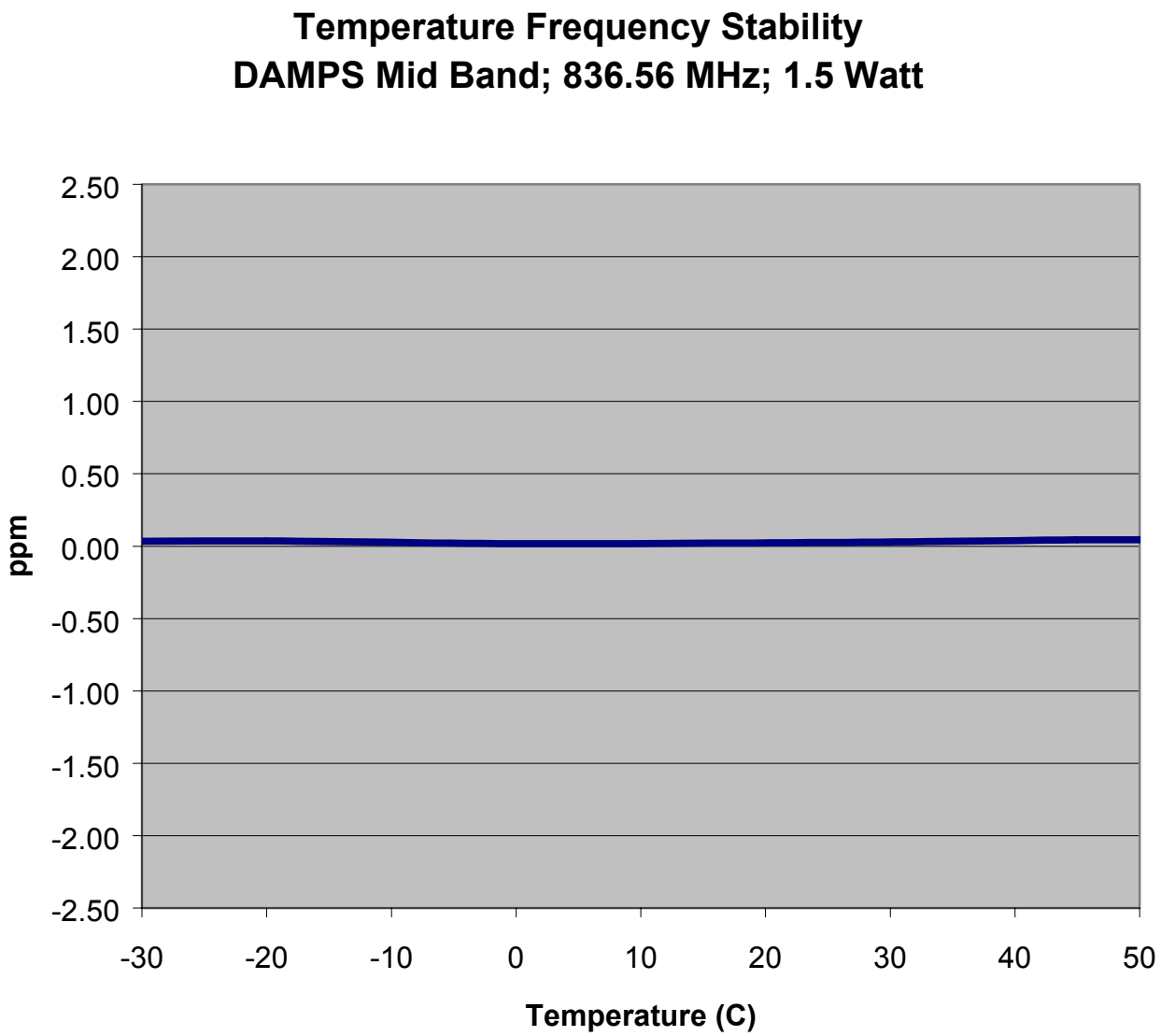
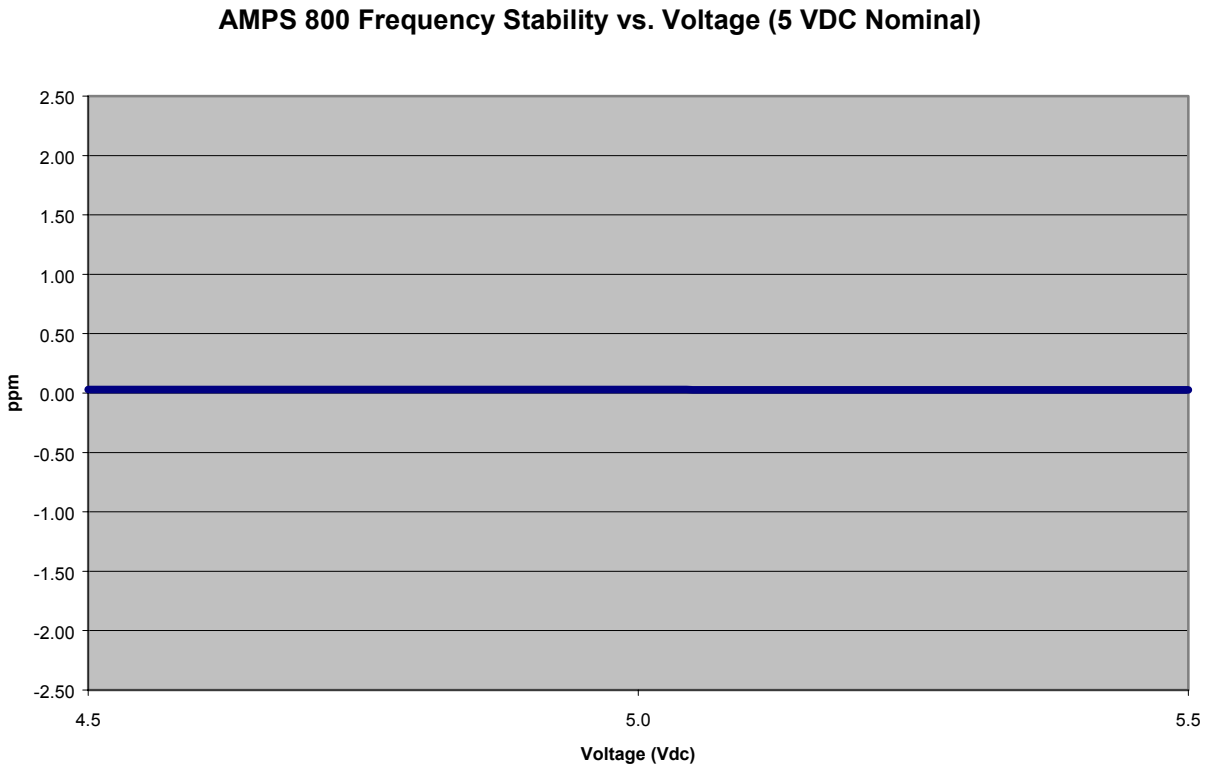
Temperature Frequency Stability
DAMPS Mid Band; 836.56 MHz; 1.5 Watt

Temperature (°C)	Power (dBm)	Freq. Error (Hz)	Frequency Measured (MHz)	ppm
-40	32.86	23	836.520023	0.03
-20	32.17	30	836.520030	0.04
0	31.7	15	836.520015	0.02
25	30.9	22	836.520022	0.03
45	29.7	37	836.520037	0.04
65	29.23	56	836.520056	0.07
85	28.68	300	836.520300	0.36



12.2.2 FREQUENCY STABILITY/VOLTAGE VARIATION

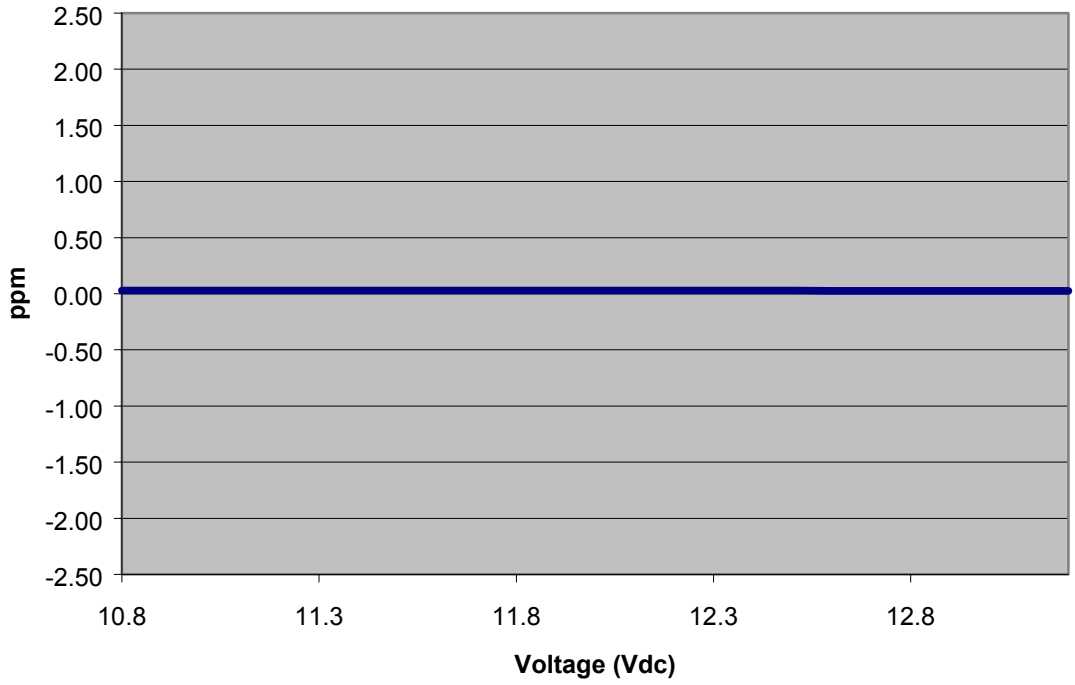
Battery end-point = 3.5 VDC for 13.8 VDC; N/A for 5 VDC



AMPS 800 Frequency Stability vs. Voltage (5 VDC Nominal)
Carrier Frequency = 836.52 MHz Maximum Power Level (1.5 Watt)

Voltage	Temperature (°C)	Freq. Error (Hz)
4.5	25	24
4.7	25	24
4.9	25	24
5.0	25	24
5.1	25	23
5.3	25	23
5.5	25	23

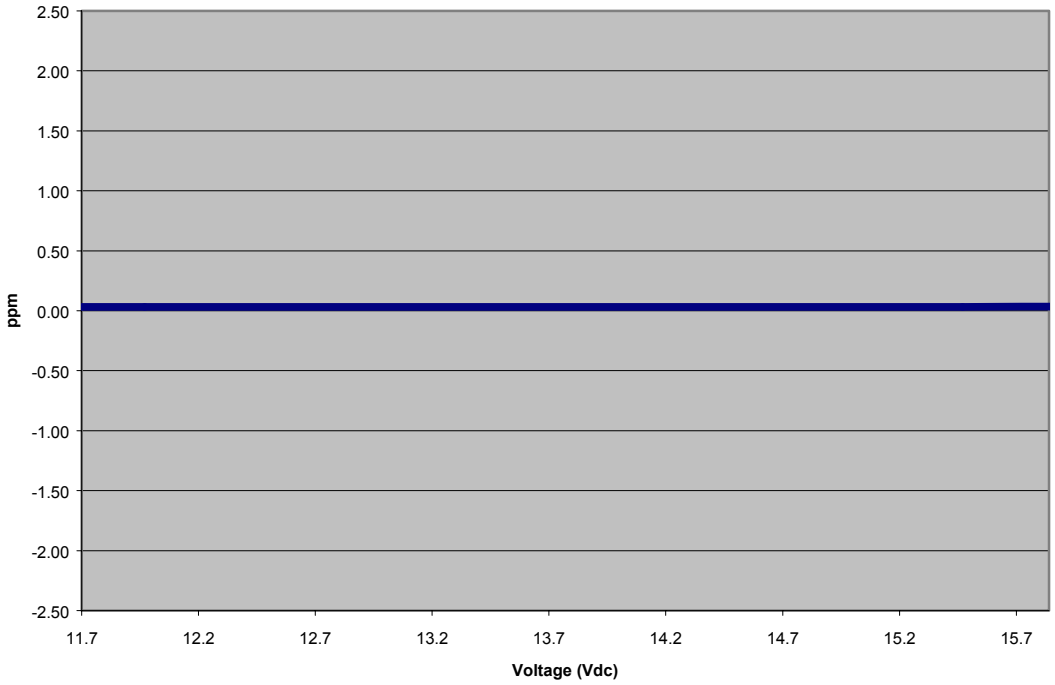
AMPS 800 Frequency Stability vs. Voltage (12.0 VDC Nominal)



AMPS 800 Frequency Stability vs. Voltage (12.0 VDC Nominal)
Carrier Frequency = 836.52 MHz Maximum Power Level (1.5 Watt)

Voltage	Temperature (°C)	Freq. Error (Hz)
10.8	25	24
11.0	25	24
11.2	25	23
11.4	25	23
11.6	25	23
11.8	25	23
12.0	25	23
12.2	25	23
12.4	25	23
12.6	25	22
12.8	25	21
13.0	25	22
13.2	25	21

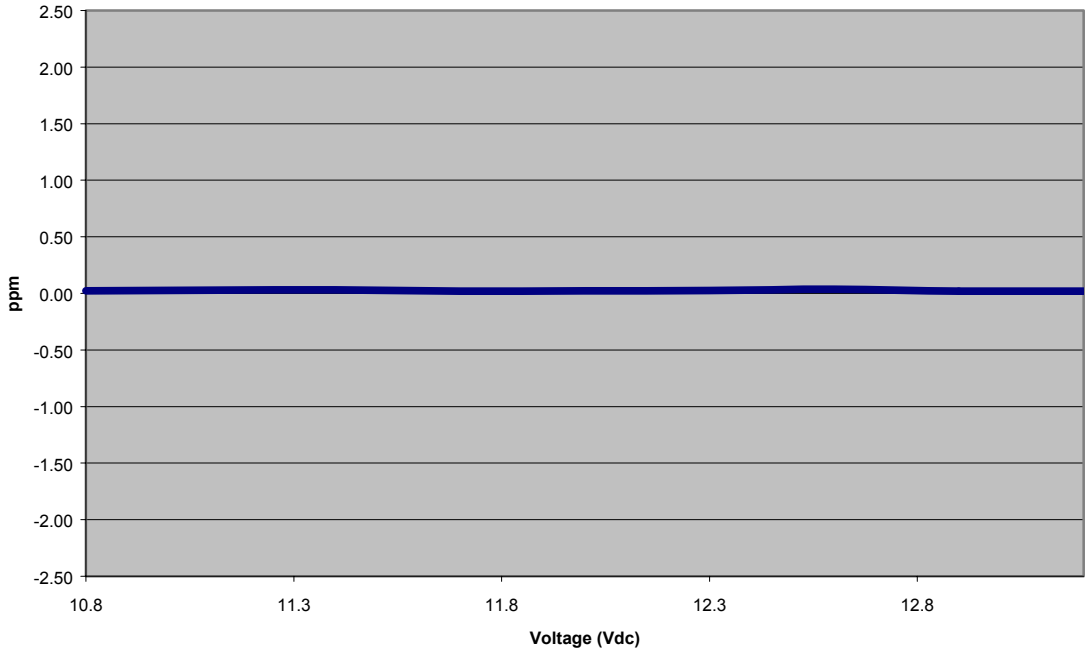
AMPS Burst Frequency Stability vs. Voltage (13.8 VDC Nominal)



AMPS Burst Frequency Stability vs. Voltage (13.8 VDC Nominal)
Carrier Frequency = 836.52 MHz Maximum Power Level (3 Watt)

Voltage	Temperature (°C)	Freq. Error (Hz)
11.0	25	25.4
11.5	25	25.6
12.0	25	26.2
12.5	25	26.7
13.0	25	26.8
13.5	25	27.0
14.0	25	27.1
14.5	25	26.9
15.0	25	27.1
15.5	25	27.3
16.0	25	28.3
16.5	25	28.2

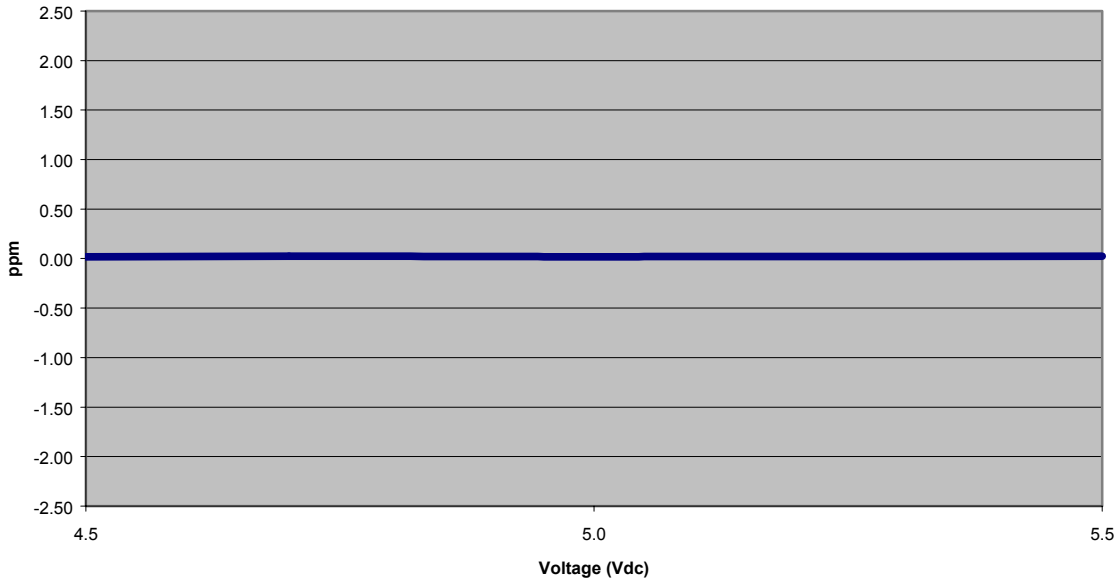
DAMPS 800 Frequency Stability vs. Voltage (12VDC nominal)



DAMPS 800 Frequency Stability vs. Voltage (12VDC nominal)
Carrier Frequency = 836.52 MHz Maximum Power Level (1.5 Watt)

Voltage	Temperature (°C)	Freq. Error (Hz)
10.8	25	20
11.1	25	23
11.4	25	25
11.7	25	16
12.0	25	18
12.3	25	21
12.6	25	31
12.9	25	17
13.2	25	17

DAMPS 800 Frequency Stability vs. Voltage (5 VDC nominal)



DAMPS 800 Frequency Stability vs. Voltage (5 VDC nominal)
Carrier Frequency = 836.52 MHz Maximum Power Level (1.5 Watt)

Voltage	Temperature (°C)	Freq. Error (Hz)
4.5	25	15
4.7	25	20
4.9	25	18
5.0	25	16
5.1	25	17
5.3	25	17
5.5	25	20

12.3 TEST EQUIPMENT

HP8920B	Communications Test Set
HP E3631A	Power Supply
HP E3610A	Power Supply
HP E4418B	Power Meter
ESPEC Model SH-240	Temperature Chamber

13 FCC PART 2 §2.1047 (A): MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE

13.1 TEST PROCEDURE

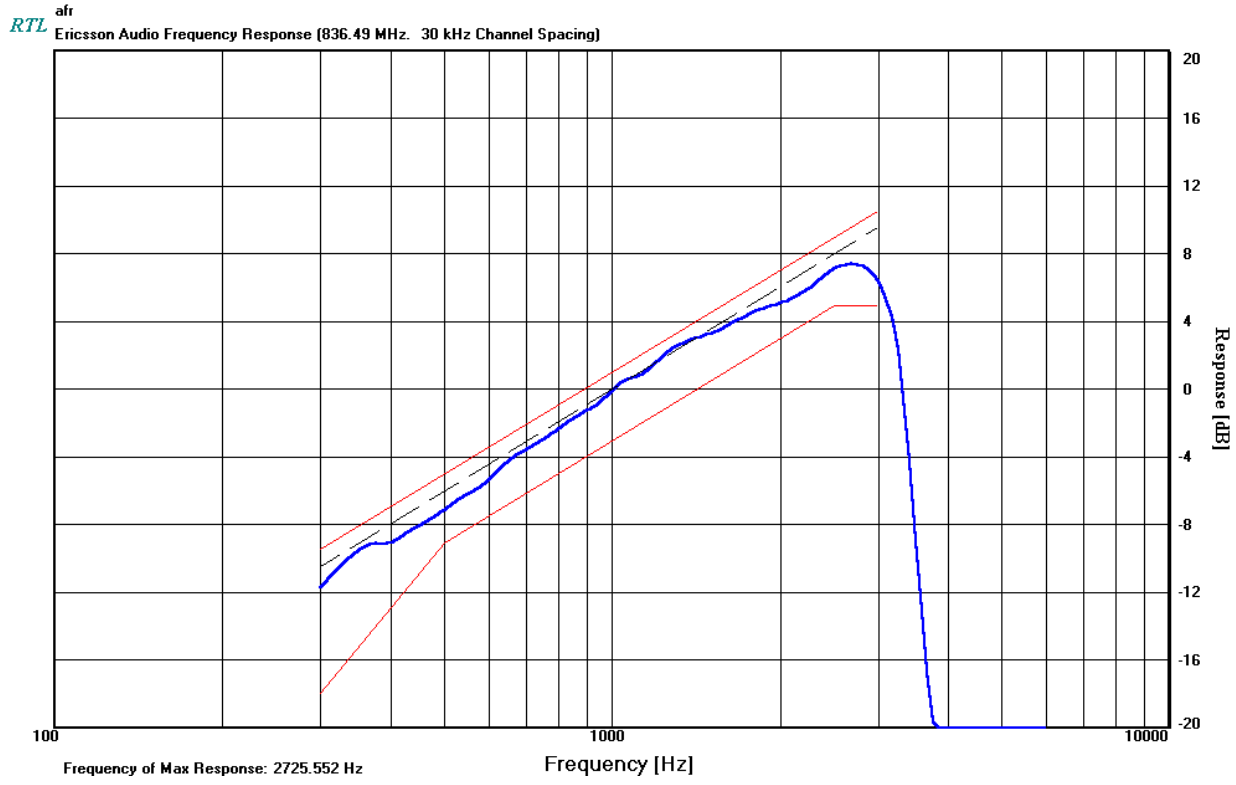
EIA/IS-19-B: 1988 Recommended Minimum Standards for 800MHz Cellular Subscriber Units

The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.

The input audio level at 1000 Hz is set to produce 20% of the rated system deviation. This point is shown as the 0 dB reference level, noted DEVref.
The audio signal generator was varied from 100Hz to 5kHz with the input level held constant.
The deviation in kHz was recorded using a modulation analyzer as DEVfreq.
The response in dB relative to 1 kHz was calculated as follows:

Audio Frequency Response = 20 LOG (DEVfreq/DEVref)

13.2 TEST DATA



13.3 TEST EQUIPMENT

Audio generator	HP3336B s/n 2127A00559
Modulation analyzer	HP8901A s/n 2545A04102

14 FCC PART 2 §2.1047 (A): MODULATION CHARACTERISTICS - AUDIO LOW PASS FILTER RESPONSE

14.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, 2.2.15 and Part 22. 915(d)(1)

The Audio Low Pass Filter Response is the frequency response of the post limiter low pass filter circuit above 3000 Hz.

14.2 TEST DATA

14.3 TEST EQUIPMENT

Audio generator	HP3336B s/n 2127A00559
Modulation analyzer	HP8901A s/n 2545A04102
Selective level meter	HP3586B s/n 1928A01892
Synthesizer/Level generator	HP3336B s/n 2514A02585

.

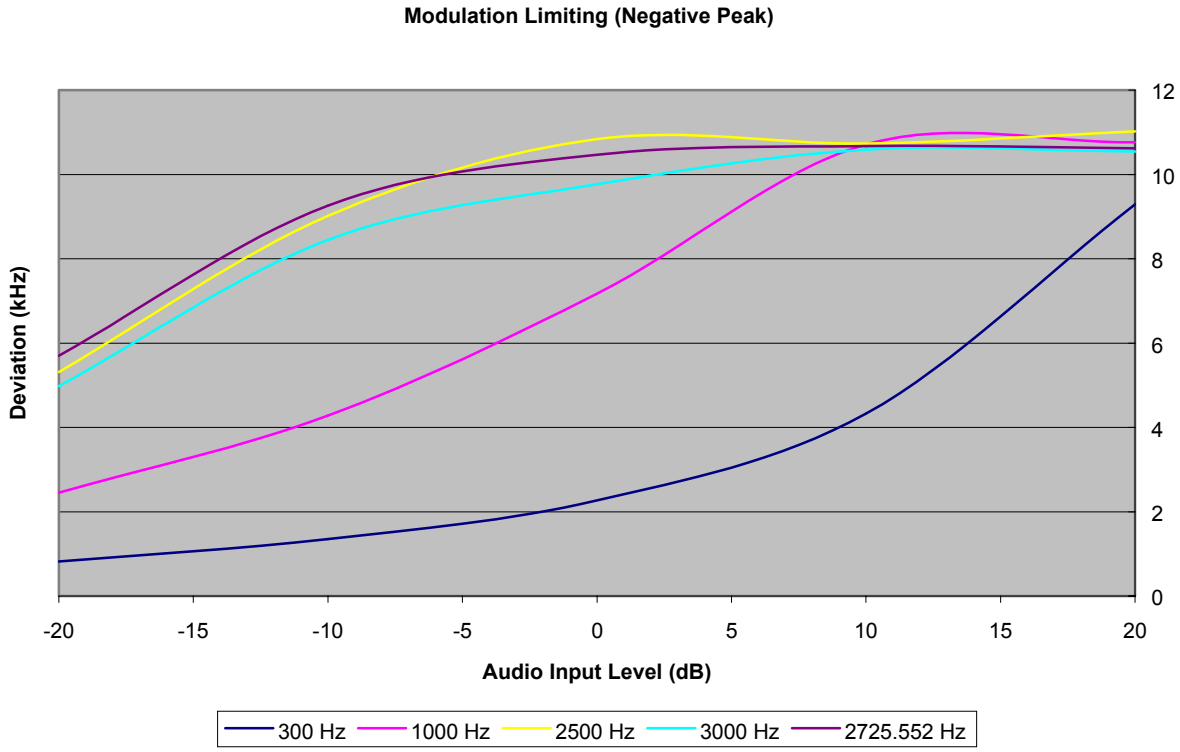
15 FCC PART 2 §2.1047 (B): MODULATION CHARACTERISTICS - MODULATION LIMITING

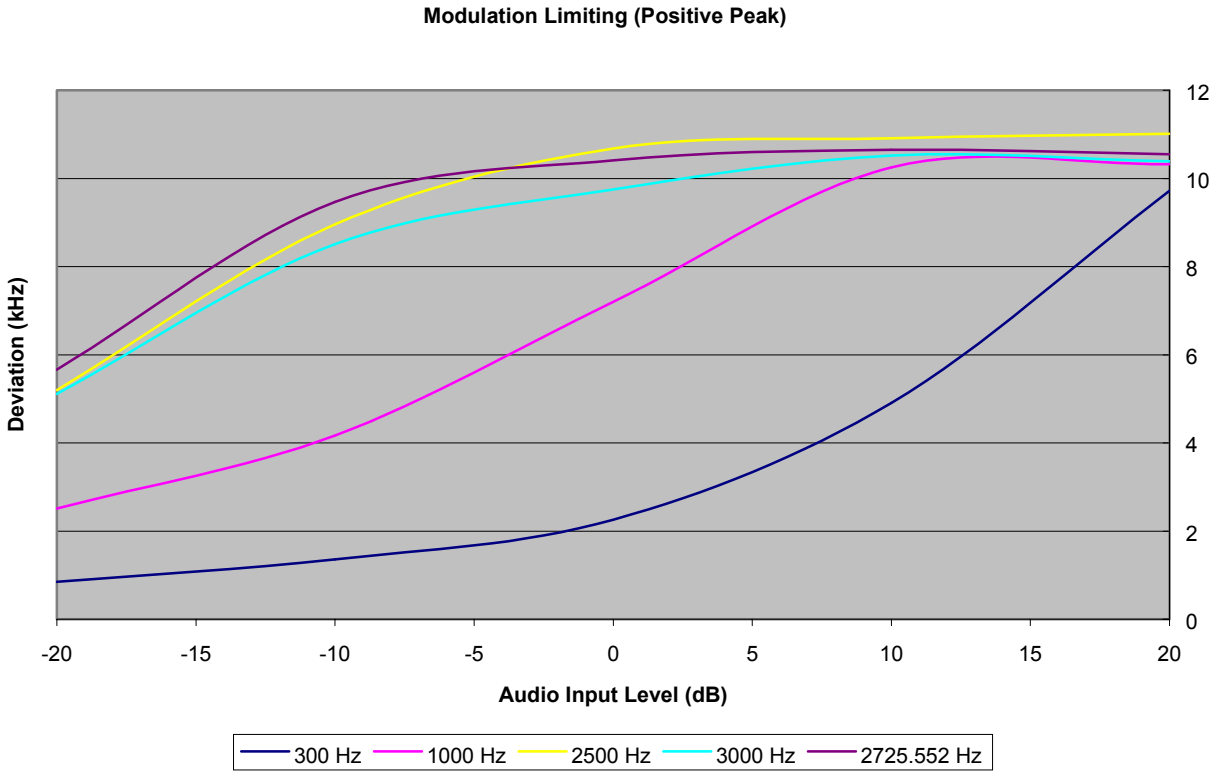
15.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.3 and Part 22.915 (B)

The transmitter is adjusted for full rated system deviation. The audio input level is adjusted for 60% of rated system deviation at 1000Hz. Using this level as a reference (0dB) the audio input level is varied from the reference to a level +25 dB above it and –25 dB under it, for modulation frequencies of 300Hz, 1,000Hz, and 2,500Hz. The system deviation obtained as a function of the input level is recorded.
Both Positive and Negative Peak deviations were recorded.

15.2 TEST DATA





Measurement of Maximum Deviation

Type	Measured (kHz)	Rated (kHz)
Voice	11.65	10
Wideband	8.44	8
SAT	1.95	2
ST	7.59	8

15.3 TEST EQUIPMENT

Audio generator HP3336B s/n 2127A00559
Modulation analyzer HP8901A s/n 2545A04102

16 FCC PART 2.202: NECESSARY BANDWIDTH AND EMISSION BANDWIDTH

Type of Emission: F8W, F1D

Necessary Bandwidth and Emission Bandwidth:
40K0F1D
40K0F8W

Calculation for 40K0F8W

1/ Voice + SAT
Modulation: Voice is 2.5 kHz and SAT is 6kHz, thus the maximum modulation is M = 6 kHz
Deviation: Voice is 12kHz and SAT is 2kHz, thus the maximum deviation is D= 12+2= 14 kHz
Bn = 2xM+2xDK with K =1
Bn= 40 kHz

2/ Signaling Tone (ST) + SAT
Modulation: ST is 10 kHz and SAT is 6kHz, thus the maximum modulation is M = 10 kHz
Deviation: ST is 8kHz and SAT is 2kHz, thus the maximum deviation is D= 8+2= 10 kHz
Bn = 2xM+2xDK with K =1
Bn= 40 kHz

Calculation for 40K0F1D (wide Band Data)

1/ Voice + SAT
Modulation: Wideband Data is 10 kHz and SAT is 6kHz, thus the maximum modulation is M = 10 kHz
Deviation: Wideband Data is 8kHz and SAT is 2kHz, thus the maximum deviation is D= 8+2 = 10 kHz
Bn = 2xM+2xDK with K =1
Bn= 40 kHz

17 FCC PART 2.1033(C)(8); DC VOLTAGES AND CURRENTS

The dc voltages applied to and dc currents into the several elements of the final radio frequency amplifying device for normal operation over the power range.

VCC_12V	13.8 volt ± 20%, 1.5 A max
VCC_5V	5 volt ± 13.3% regulated, 1A max