Engineering and Testing for EMC and Safety Compliance

CERTIFICATION REPORT

Niigata Seimitsu Co., Ltd
Shiba Daimon, 116
Bldg 8F, 16-3 1-Chome
Shiba Daimon, Minato-Ku, Tokyo 105-0012 Japan

MODEL: NSA1800

FCC ID: NTRNSA1800

March 6, 2001

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 1999	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
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
RSS-118: Issue 2 Aug. 19, 1990, Supplement 1993-1 June 12, 1993, Amendment Issue 2 Aug. 24, 1996, Addendum Sept. 1, 1990	LAND AND SUBSCRIBER STATIONS: VOICE, DATA AND TONE MODULATED, ANGLE MODULATION RADIOTELEPHONE TRANSMITTERS AND RECEIVERS OPERATING IN THE CELLULAR MOBILE BANDS 824-849 MHz AND 869-894 MHz

FCC Rules Parts	Frequency Range	Output Power Conducted (W)	Freq. Tolerance	Emission Designator
22	824-849 MHz	1.4	2.5 ppm	40K0F1D
22	824-849 MHz	1.4	2.5 ppm	40K0F8W
Canadian	**Frequency Range**	**Output Power Conducted (W)**	**Freq. Tolerance**	**Emission Designator**
RSS-118	824-849 MHz	1.4	2.5 ppm	40K0F1D
RSS-118	824-849 MHz	1.4	2.5 ppm	40K0F8W

REPORT PREPARED BY:

Test Engineer: Daniel Baltzell
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1 GENERAL INFORMATION

The following Report of a Type Certification, is prepared on behalf of ***Niigata Seimitsu Co., Ltd*** in accordance with the Federal Communications Commissions and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was the ***NSA1800 FCC ID: NTRNSA1800***. 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: Part 22(H), Industry Canada RSS-118, and ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. 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 on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report submitted to 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 report.

1.3 CONFORMANCE STATEMENT

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 1999	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
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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 22(H) and Industry Canada RSS-118 Certification methodology.

Signature: 

Date: March 6, 2001

Typed/Printed Name: Bruno Clavier

Position: Vice President of Operations (NVLAP Signatory)

Signature: 

Date: March 6, 2001

Typed/Printed Name: Daniel Baltzell

Position: Test Engineer

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

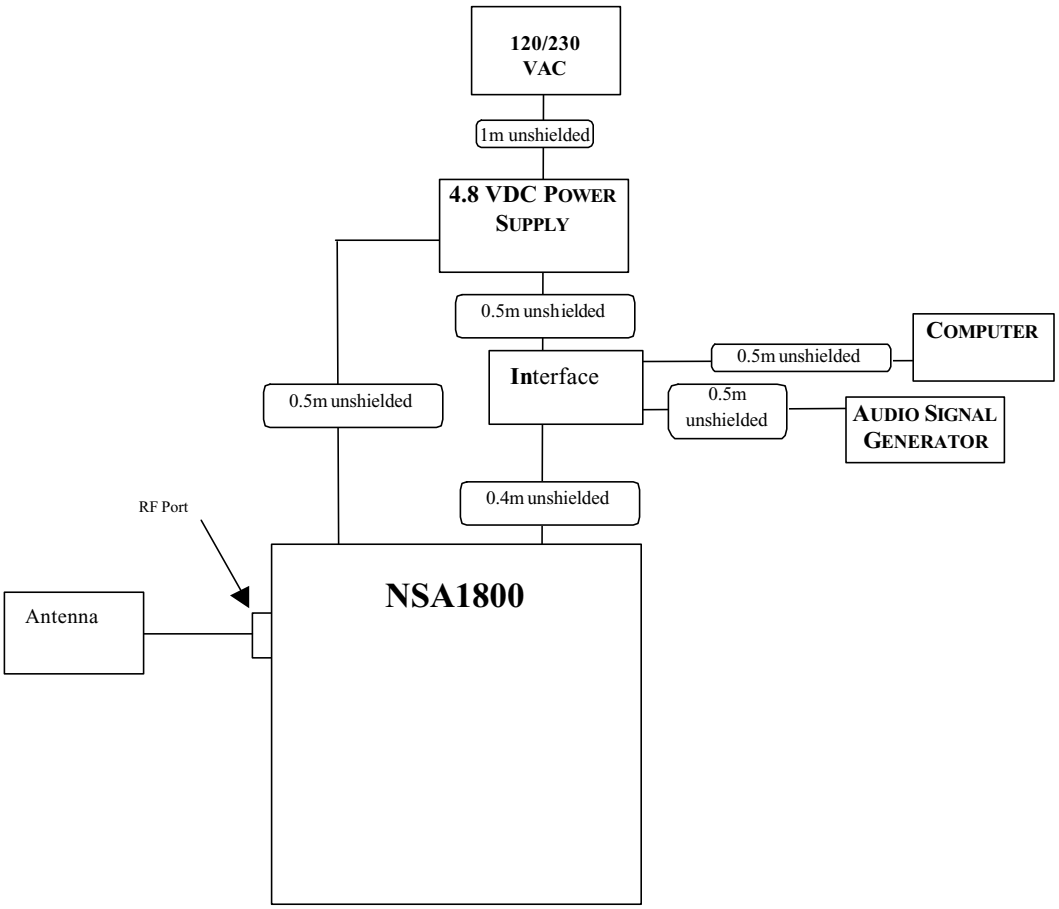
Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

1.4 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.

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID
NSA1800 RADIO	NIIGATA SEIMITSU CO., LTD		853391A	NTRNSA1800
ANTENNA "I" STUB	NIIGATA SEIMITSU CO., LTD		N/A	N/A
INTERFACE	NIIGATA SEIMITSU CO., LTD	N/A	N/A	N/A
INTERFACE CABLE	NIIGATA SEIMITSU CO., LTD	N/A	N/A	N/A

1.5 CONFIGURATION OF TESTED SYSTEM



1.6 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

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

1.7 RADIATED MEASUREMENT

Before final measurements of radiated emissions were made on the open-field three meter range, the EUT was scanned indoors at a three meter distance in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three-meter, open-field test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters 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.

2 FCC RULES AND REGULATIONS PART 2 §2.1046 (A): RF POWER OUTPUT: CONDUCTED

2.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.1
The EUT was connected to a coaxial attenuator having a 50 Ω load impedance.

2.2 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)

2.3 TEST DATA

The following channels (in MHz) were tested: 824.02; 836.52; 848.97

CARRIER OUTPUT POWER (UNMODULATED)

Low Channel			
Channel 991; 824.02 MHz			
Power level	**Measured Power (W)***	**Rated Power (W)**	**Difference (dB)**
0	1.349	1.2	0.5
2	0.5248	0.631	-0.8
3	0.2089	0.25	-0.8
4	0.0813	0.1	-0.9
5	0.0324	0.04	-0.9
6	0.0132	0.016	-0.8
7	0.0058	0.0063	-0.4

Mid Channel			
Channel 384; 836.52 MHz			
Power level	**Measured Power (W)***	**Rated Power (W)**	**Difference (dB)**
0	1.400	1.2	0.7
2	0.5248	0.631	-0.8
3	0.2089	0.25	-0.8
4	0.0832	0.1	-0.8
5	0.0324	0.04	-0.9
6	0.0123	0.016	-1.1
7	0.0054	0.0063	-0.7

High Channel			
Channel 799; 848.97 MHz			
Power level	**Measured Power (W)***	**Rated Power (W)**	**Difference (dB)**
0	1.023	1.2	-0.7
2	0.5129	0.631	-0.9
3	0.2042	0.25	-0.9
4	0.0813	0.1	-0.9
5	0.0324	0.04	-0.9
6	0.0123	0.016	-1.1
7	0.0049	0.0063	-1.1

*Measurement accuracy: +/- 3%

3 PART 2.1046 (A) AND PART 22.913 RF POWER OUTPUT: RADIATED - ERP

3.1 TEST PROCEDURE

Substitution Method:

The EUT was setup at an antenna to EUT distance of 3 meters on an open area test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane.

The physical arrangement of the EUT and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations.

The worst-case, maximum radiated emission was recorded and used as reference for the ERP measurement.

The EUT was then replaced by an ½ wave dipole antenna and polarized in accordance with the EUT's antenna polarization. The ½ wave dipole antenna was connected to a RF signal generator with a coaxial cable.

The search antenna height, and search antenna polarity was set to levels that produced the maximum reading obtained in step 3. The signal generator was adjusted to a level that produced the radiated emission level obtained in step 3.

The signal generator level was recorded and corrected by the power loss in the cable between the generator and the antenna and further corrected for the gain of the substitution antenna used relative to an ideal ½ wave dipole antenna. The signal generator corrected level is the ERP level

3.2 TEST DATA

Settings:

- High Power: 1.2 Watt rated delivered to antenna
- Radiated power measurements (3 meter)

ERP Substitution Method Data (dBm)							
Frequency (MHz)	**Antenna Orientation**	**Level Measured (dBµV)**	**Signal Generator Level (dBm)**	**Cable Loss (dB)**	**Antenna corrected gain (dBi)**	**Corrected Signal Generator Level (dBm)**	**ERP (W)**
824.02	V	102.4	36.4	3.8	-1.24	31.4	1.4
836.52	V	100.9	34.7	3.8	-1.24	29.7	0.9
848.97	V	100.4	34.7	3.8	-1.24	29.6	0.9

*Measurement accuracy is +/- 1.5 dB

3.3 TEST EQUIPMENT

Spectrum Analyser HP8566B
Antenna Roberts ½ wave dipoles

4 FCC RULES AND REGULATIONS PART 2 §2.1051: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

4.1 TEST PROCEDURE

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

The transmitter is terminated with a 50Ω 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.

4.2 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: 824.02; 836.52; 848.97

Channel 991 (824.02 MHz) – 1.2 Watt and 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBm)	Limit (dBm)	Margin (dB)
1648.04	-69.3	-13.0	-56.3
2472.06	-62.6	-13.0	-49.6
3296.08	-36.9	-13.0	-23.9
4120.10	-46.1	-13.0	-33.1
4944.12	-27.9	-13.0	-14.9
5768.14	-29.9	-13.0	-16.9
6592.16	-40.3	-13.0	-27.3
7416.18	-65.4	-13.0	-52.4
8240.20	-62.8	-13.0	-49.8

Channel 384 (836.52 MHz) – 1.2 Watt and 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBm)	Limit (dBm)	Margin (dB)
1673.04	-68.4	-13.0	-55.4
2509.56	-66.5	-13.0	-53.5
3346.08	-43.9	-13.0	-30.9
4182.60	-41.9	-13.0	-28.9
5019.12	-30.9	-13.0	-17.9
5855.64	-28.6	-13.0	-15.6
6692.16	-49.3	-13.0	-36.3
7528.68	-64.0	-13.0	-51.0
8365.20	-60.9	-13.0	-47.9

Channel 799 (848.97 MHz) – 1.2 Watt and 40 kHz Channel Bandwidth

Frequency (MHz)	Level Measured (dBm)	Limit (dBm)	Margin (dB)
1698.04	-69.3	-13.0	-56.3
2547.06	-65.9	-13.0	-52.9
3396.08	-40.2	-13.0	-27.2
4245.10	-40.9	-13.0	-27.9
5094.12	-44.1	-13.0	-31.1
5943.14	-32.8	-13.0	-19.8
6792.16	-64.0	-13.0	-51.0
7641.18	-65.8	-13.0	-52.8
8490.20	-65.2	-13.0	-52.2

4.3 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

5 FCC RULES AND REGULATIONS PART 2 §2.1053 (A): FIELD STRENGTH OF SPURIOUS RADIATION

5.1 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.

Refer to section "Radiated Measurement" in this report for further information.

5.2 TEST DATA

The worst-case emissions test data are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

Radiated Emissions (Channel 991 at 824.02 MHz) Substitution Method						
Frequency (MHz)	**S/G level (dBm)**	**Cable Loss***	**Difference in gain (ref. To 1/2 wave dipole)**	**Emission Level (dBm)**	**Limit (dBm)**	**Margin (dB)**
1648.04	-14.4	6.9	4.8	-16.5	-13.0	-3.5
2472.06	-16.3	10.9	6.4	-20.8	-13.0	-7.8
3296.08	-19.8	13.6	7.1	-26.3	-13.0	-13.3
4120.10	-23.7	17.4	7.3	-33.8	-13.0	-20.8
4944.12	-16.5	20.8	8.2	-29.1	-13.0	-16.1
5768.14	-13.0	21.4	8.5	-25.9	-13.0	-12.9
6592.16	NF**					
7416.18	NF**					
8240.20	NF**					

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.
**NF: Noise Floor

Radiated Emissions (Channel 384 at 836.52 MHz) Substitution Method						
Frequency (MHz)	**S/G level (dBm)**	**Cable Loss***	**Difference in gain (ref. To 1/2 wave dipole)**	**Emission Level (dBm)**	**Limit (dBm)**	**Margin (dB)**
1673.04	41.7	-13.0	6.9	4.7	-15.2	-13.0
2509.56	35.5	-15.4	10.8	6.5	-19.7	-15.4
3346.08	23.5	-19.7	14.0	7.1	-26.6	-19.7
4182.6	18.5	-25.4	17.9	7.4	-35.9	-25.4
5019.12	24.4	-20.2	20.9	8.5	-32.6	-20.2
5855.64	17.7	-18.5	20.8	8.5	-30.8	-18.5
6692.16	NF**					
7528.68	NF**					
8365.2	NF**					

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.
**NF: Noise Floor

Radiated Emissions (Channel 799 at 848.97 MHz) Substitution Method						
Frequency (MHz)	**S/G level (dBm)**	**Cable Loss**	**Difference in gain (ref. To 1/2 wave dipole)**	**Emission Leve (dBm)**	**Limit (dBm)**	**Margin (dB)**
1698.04	45.7	-8.0	6.9	4.7	-10.2	-8.0
2547.06	36.4	-13.5	10.9	6.6	-17.8	-13.5
3396.08	24.2	-21.6	14.2	7.2	-28.7	-21.6
4245.10	NF*					
5094.12	NF*					
5943.14	NF*					
6792.16	NF*					
7641.18	NF*					
8490.20	NF*					

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.
**NF: Noise Floor

5.3 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

6 FCC RULES AND REGULATIONS PART 2 §2.1049 (C) (1): OCCUPIED BANDWIDTH

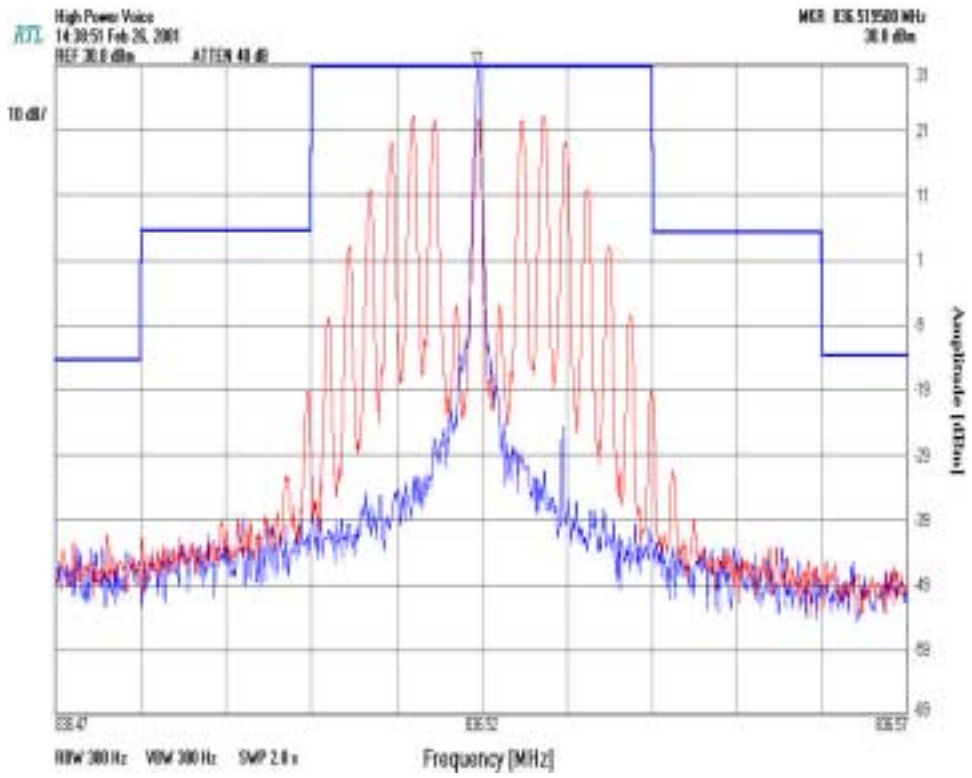
OCCUPIED BANDWIDTH - COMPLIANCE WITH THE EMISSION MASKS

6.1 TEST PROCEDURE

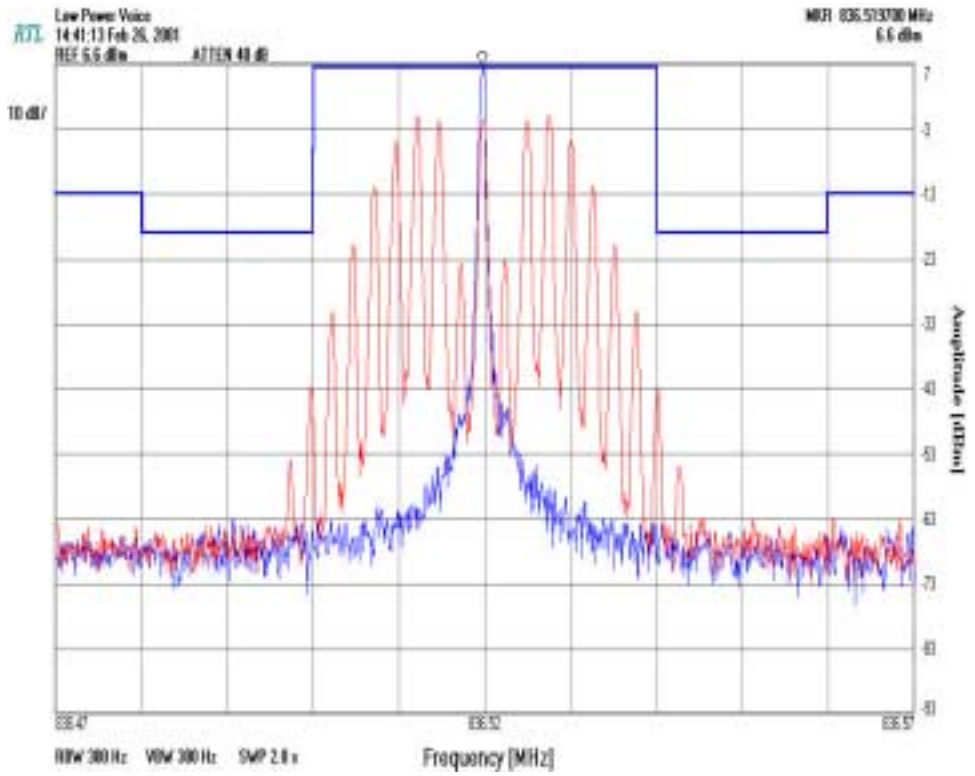
ANSI/TIA/EIA-603-1992, section 2.2.11
Part 22.917(b)

6.2 TEST DATA

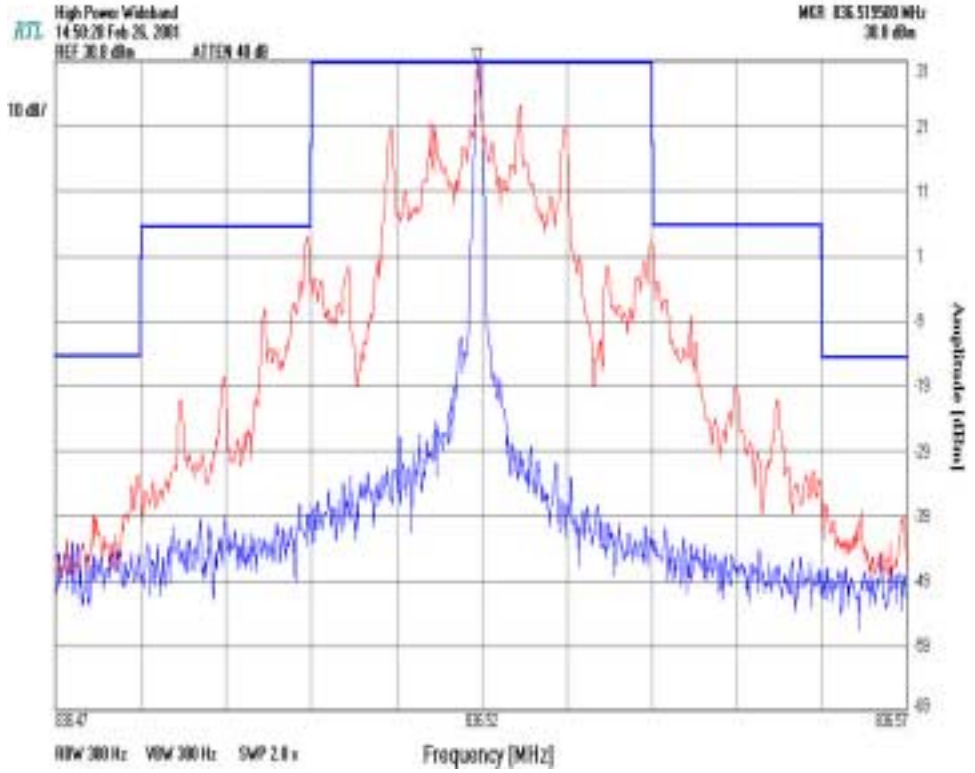
Channel 384: 1.2 W for 40 kHz Channel Bandwidth: (Audio Modulation: 2,500 Hz) Voice



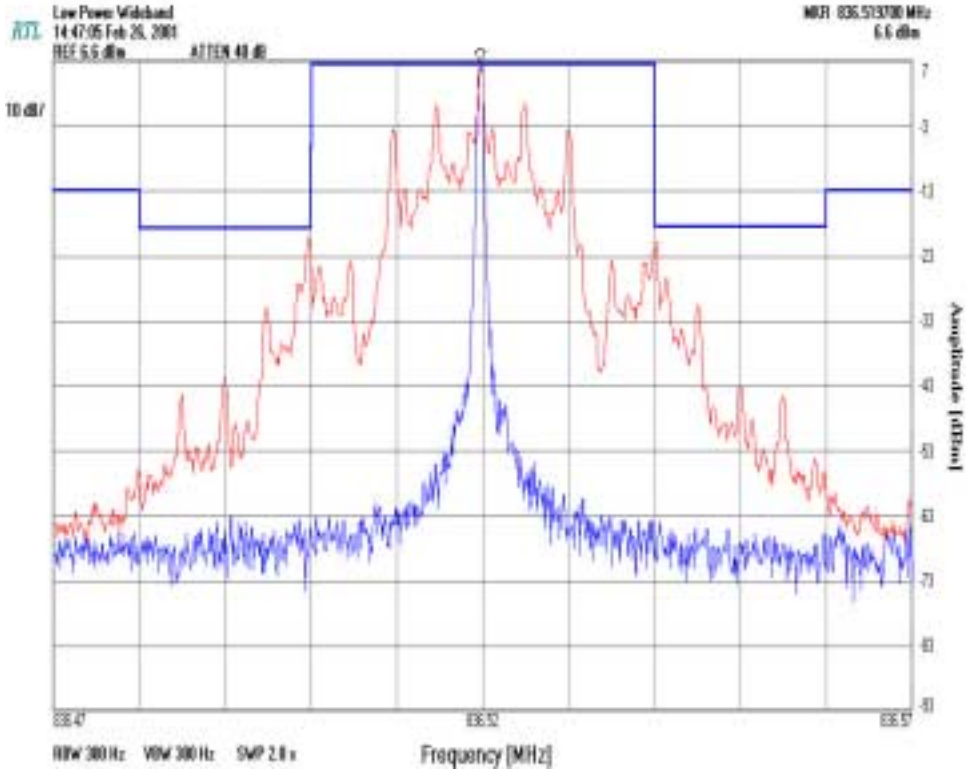
Channel 384: 0.0063 W for 40 kHz Channel Bandwidth: (Audio Modulation: 2,500 Hz) Voice



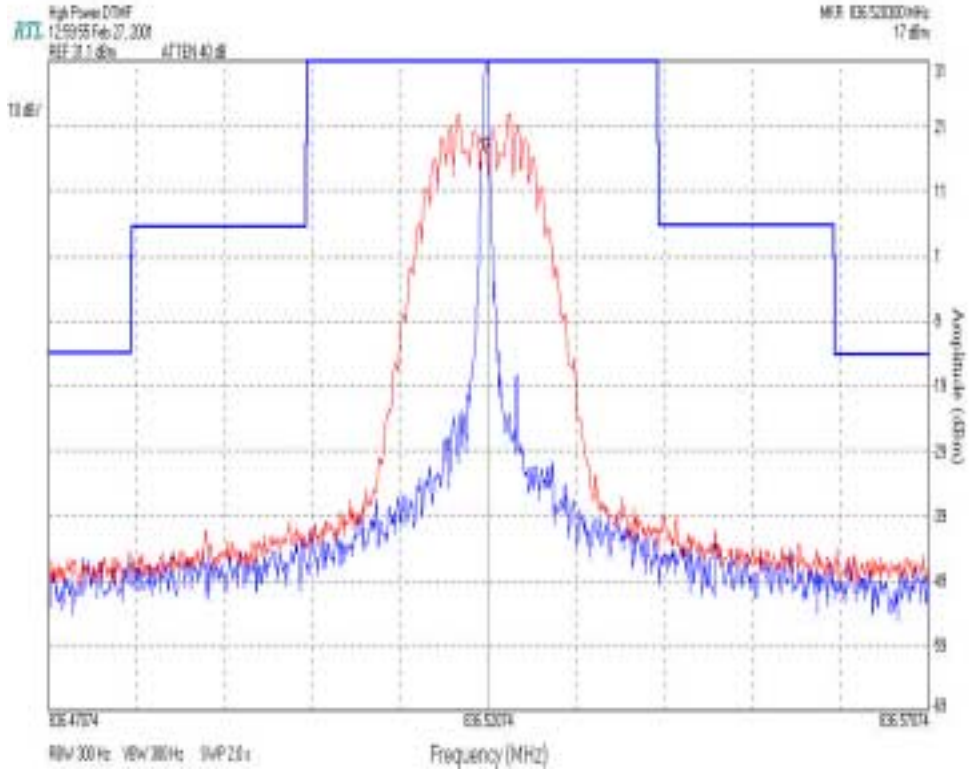
Channel 384 1.2 W for 40 kHz Channel Bandwidth: Wideband data



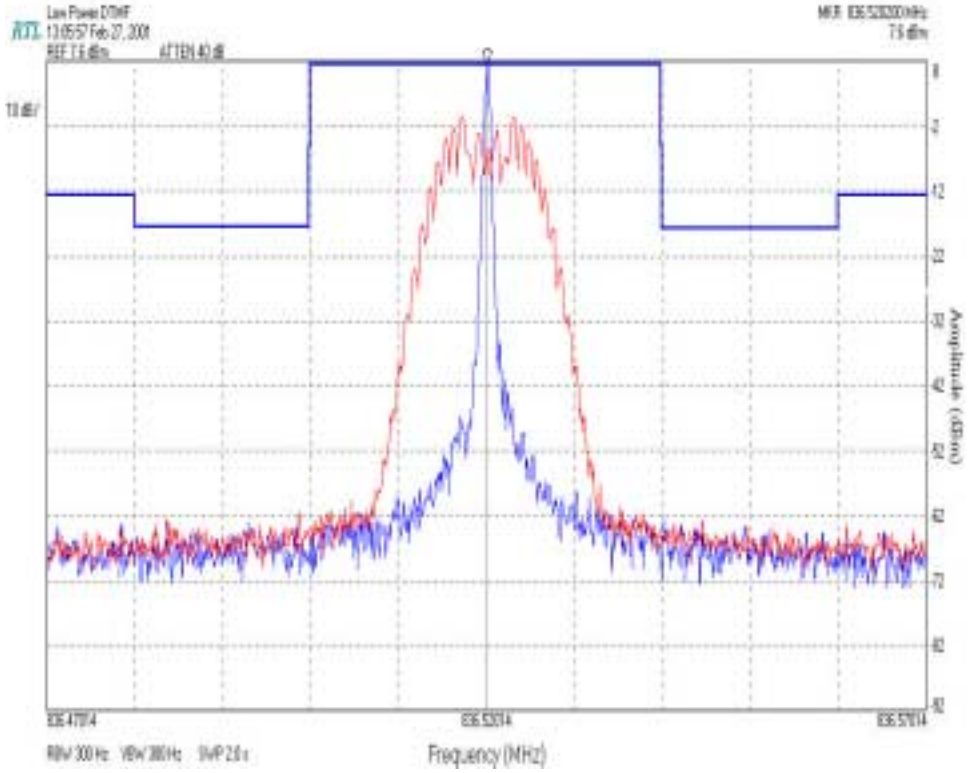
Channel 384 0.0063 W for 40 kHz Channel Bandwidth: Wideband data



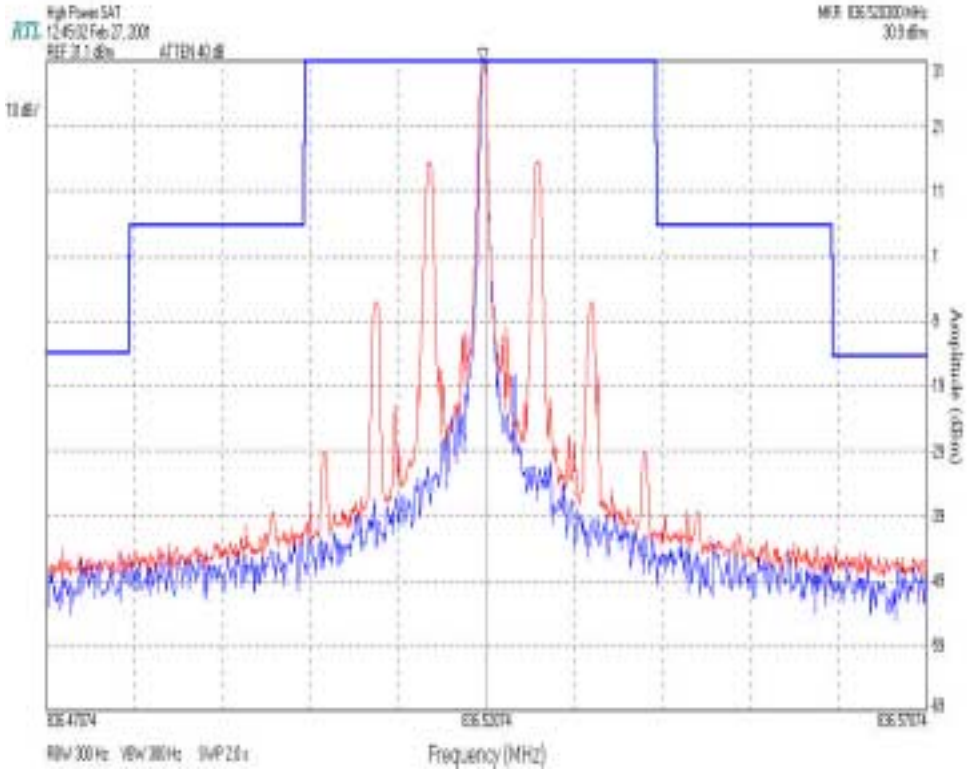
Channel 384 1.2 W for 40 kHz Channel Bandwidth: DTMF



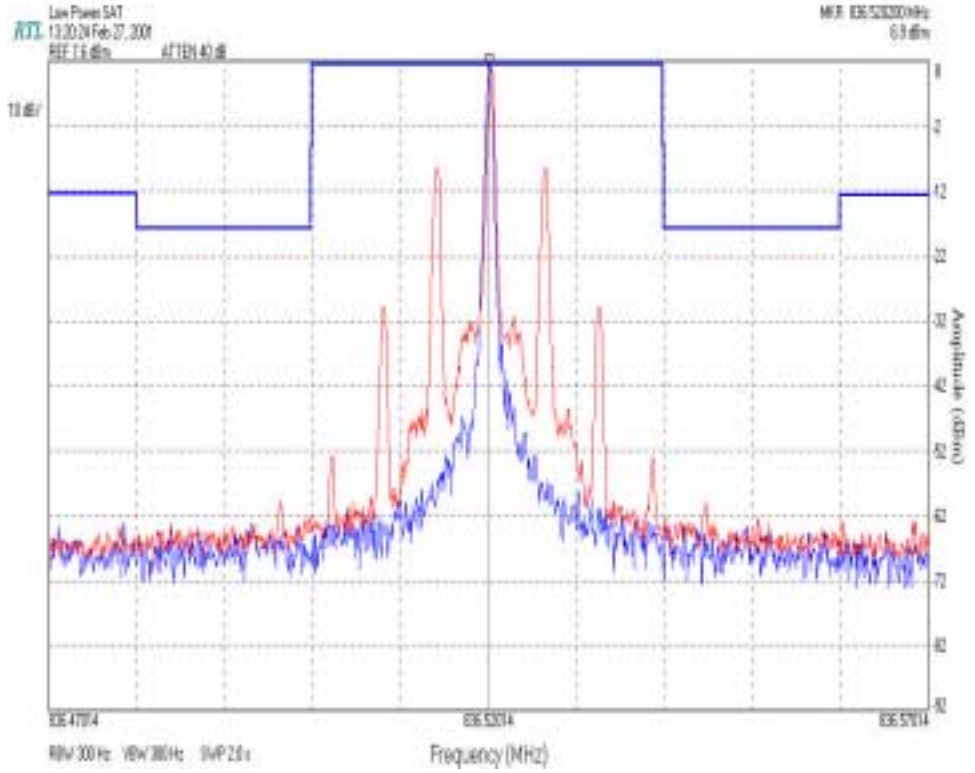
Channel 384 0.0063 W for 40 kHz Channel Bandwidth: DTMF



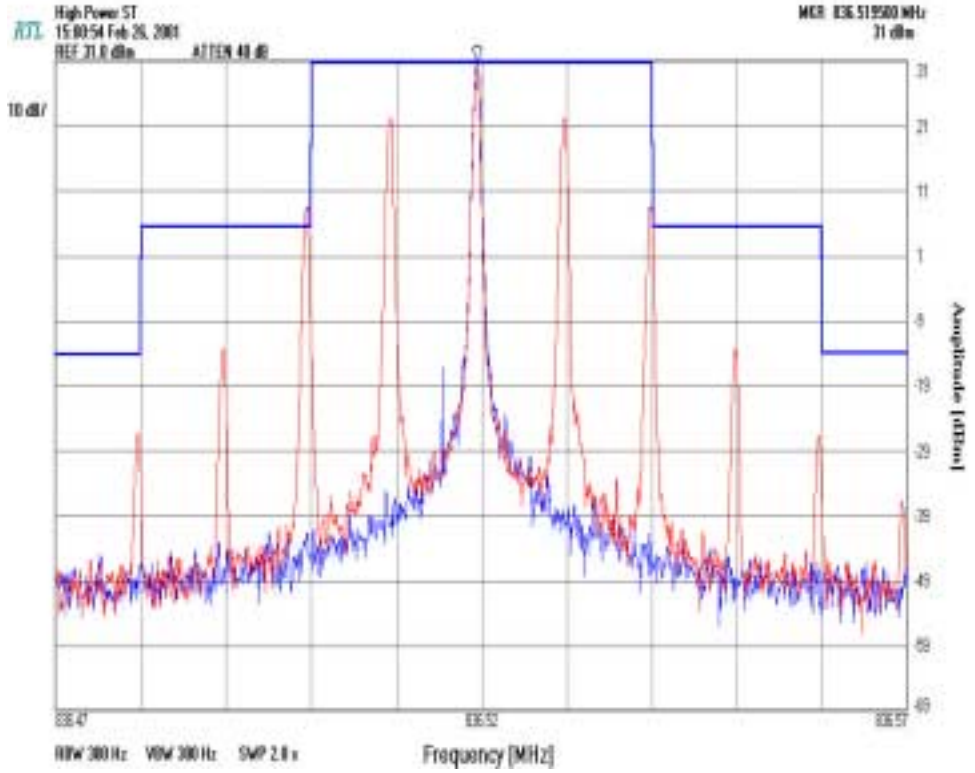
Channel 384 1.2 W for 40 kHz Channel Bandwidth: SAT



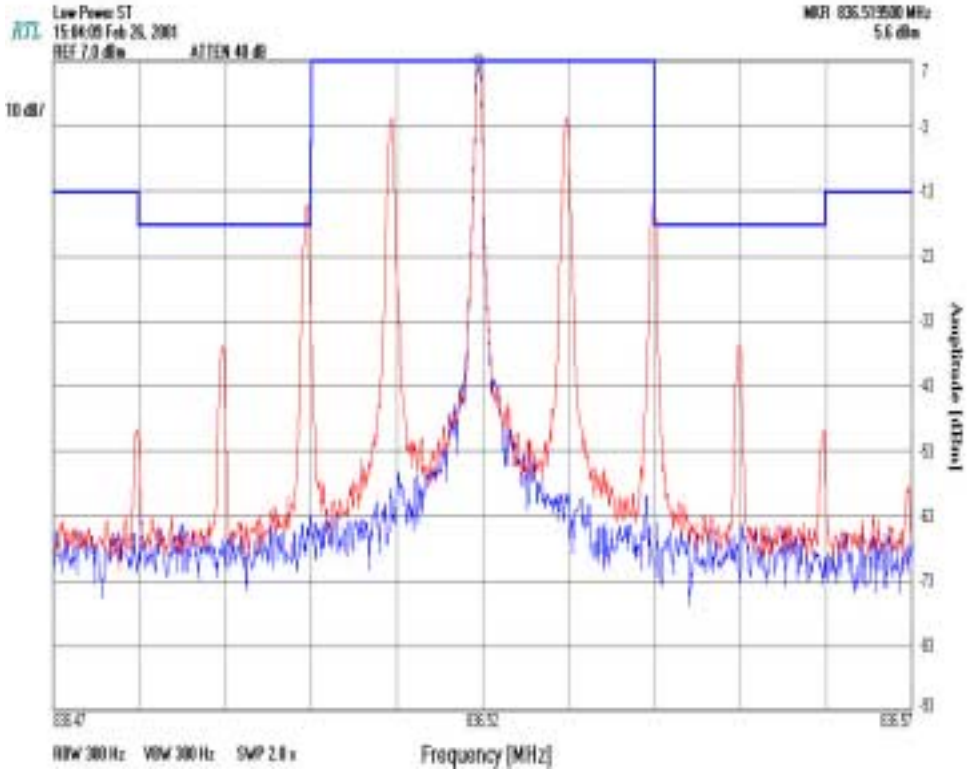
Channel 384 0.0063 W for 40 kHz Channel Bandwidth: SAT



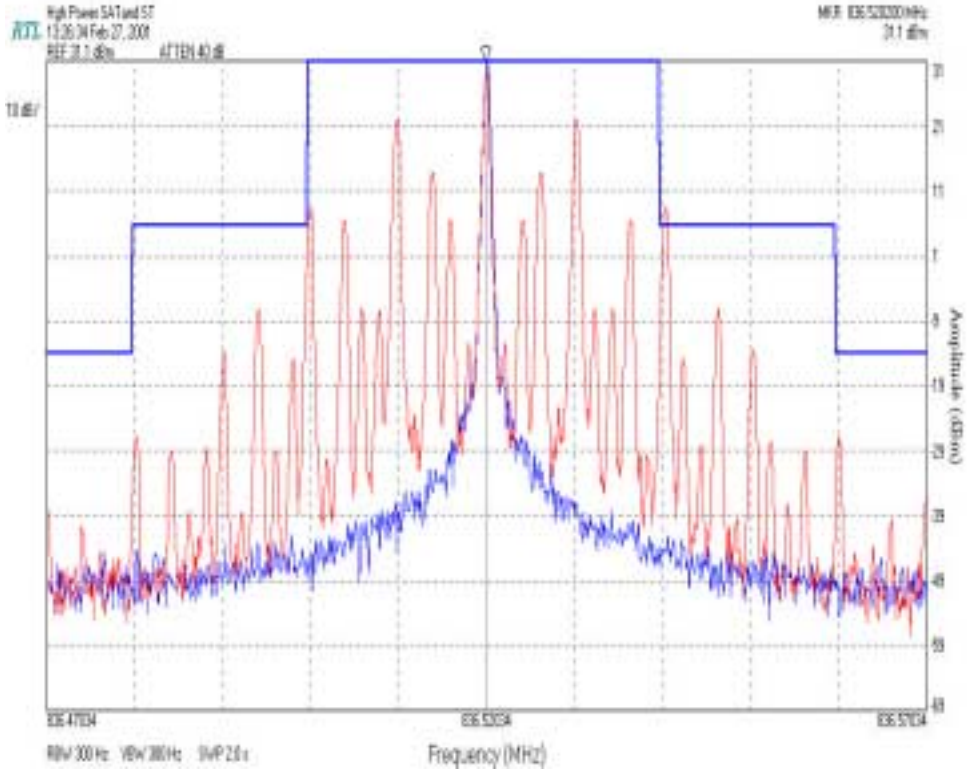
Channel 384 1.2 W for 40 kHz Channel Bandwidth: ST



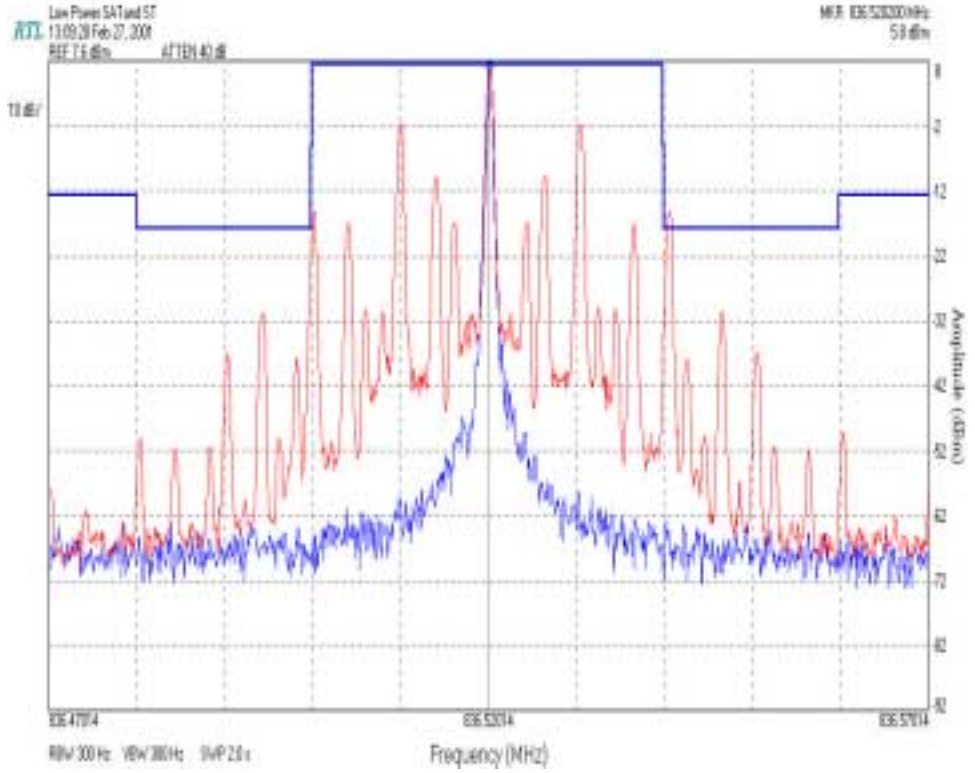
Channel 384 0.0063 W for 40 kHz Channel Bandwidth: ST



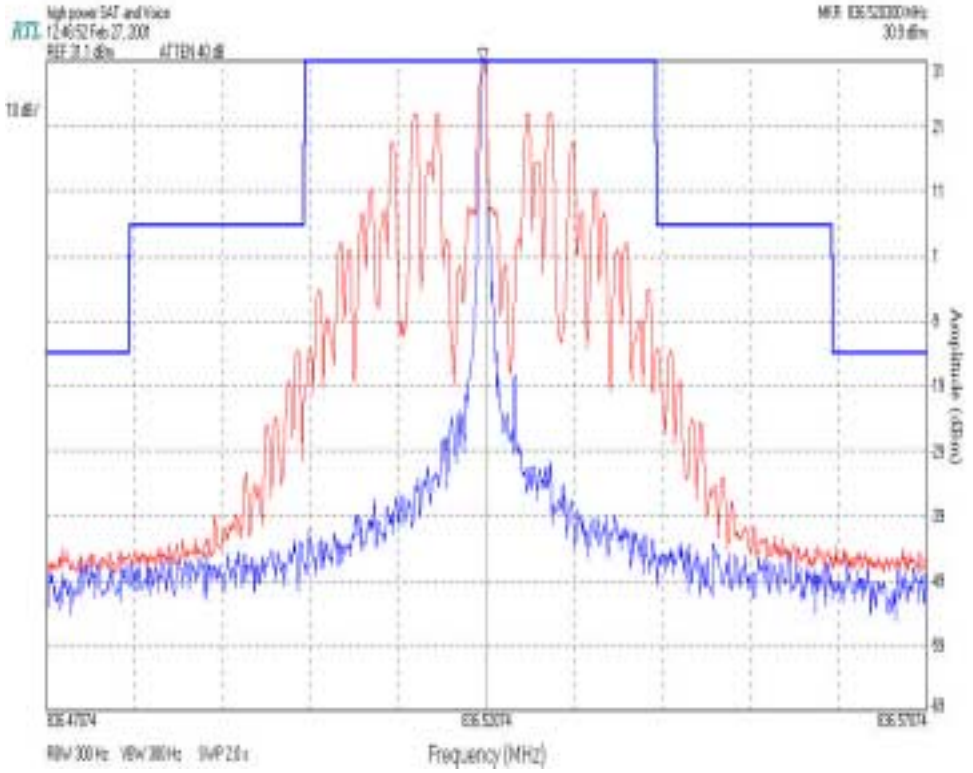
Channel 384 1.2 W for 40 kHz Channel Bandwidth: SAT and ST



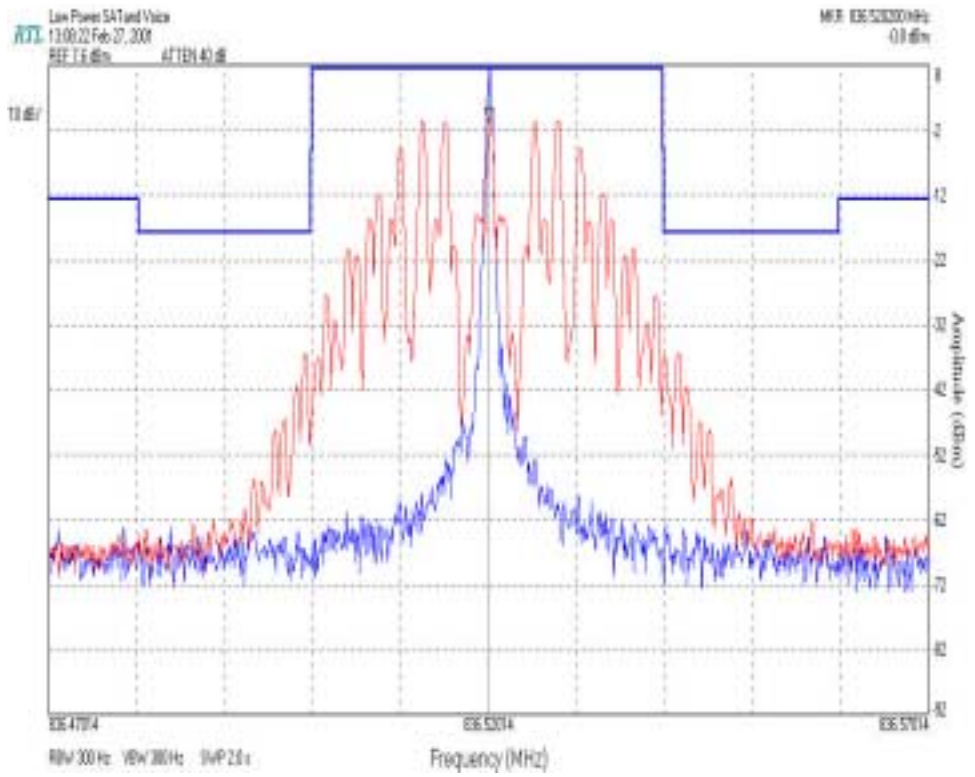
Channel 384 0.0063 W for 40 kHz Channel Bandwidth: SAT and ST



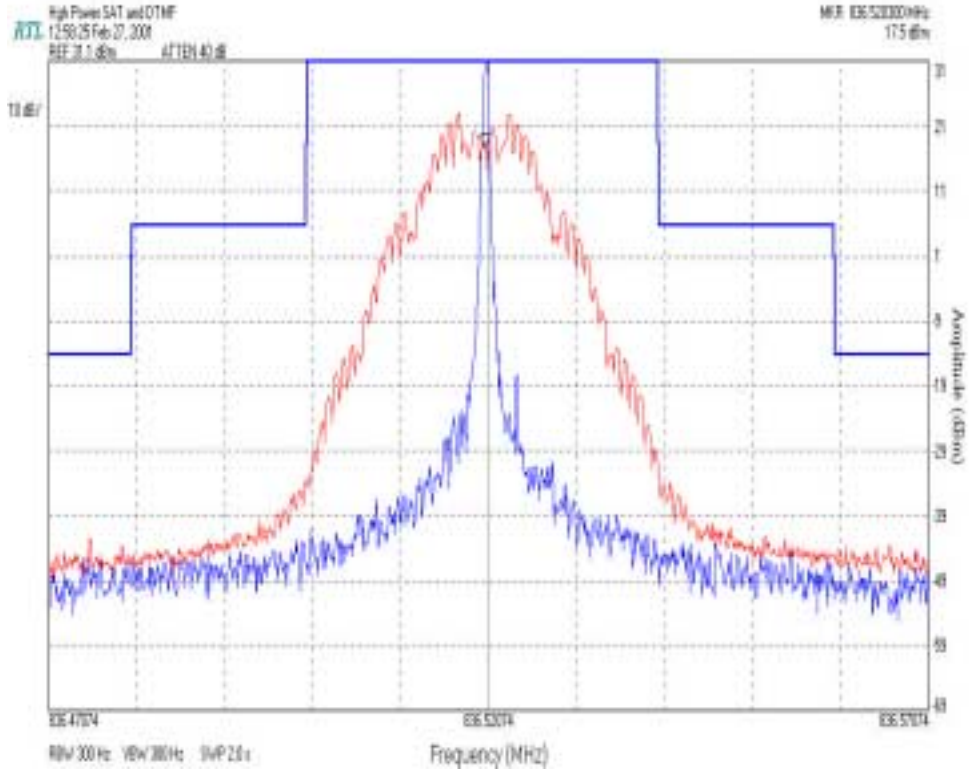
Channel 384 1.2 W for 40 kHz Channel Bandwidth: SAT and Voice



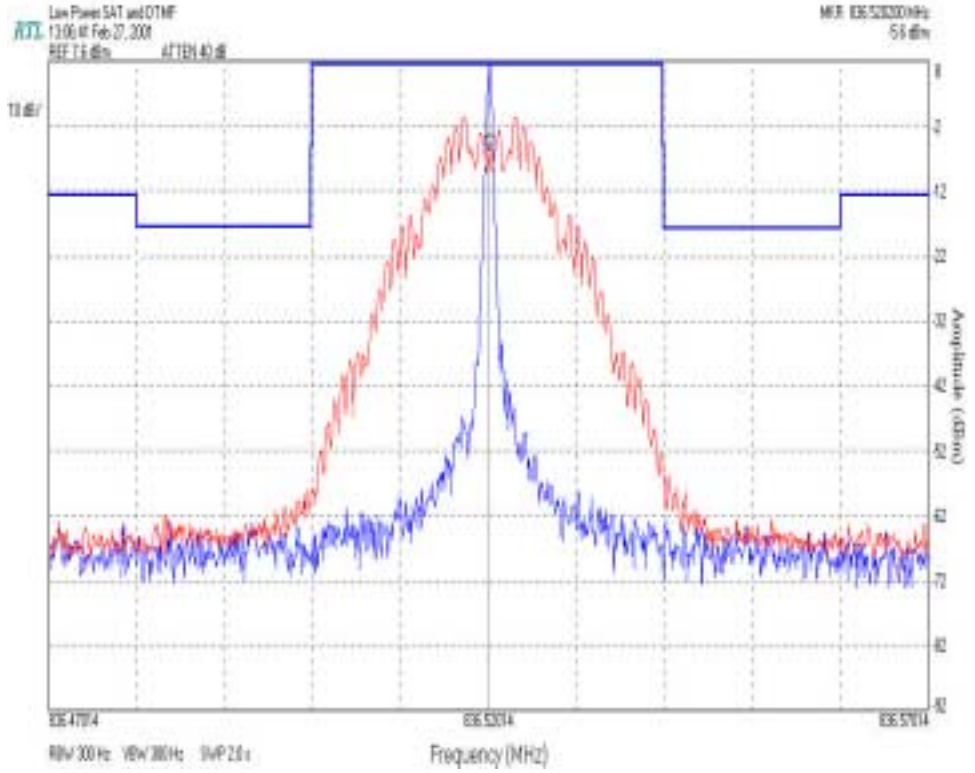
Channel 384 0.0063 W for 40 kHz Channel Bandwidth: SAT and Voice



Channel 384 1.2 W for 40 kHz Channel Bandwidth: SAT and DTMF



Channel 384 0.0063 W for 40 kHz Channel Bandwidth: SAT and DTMF



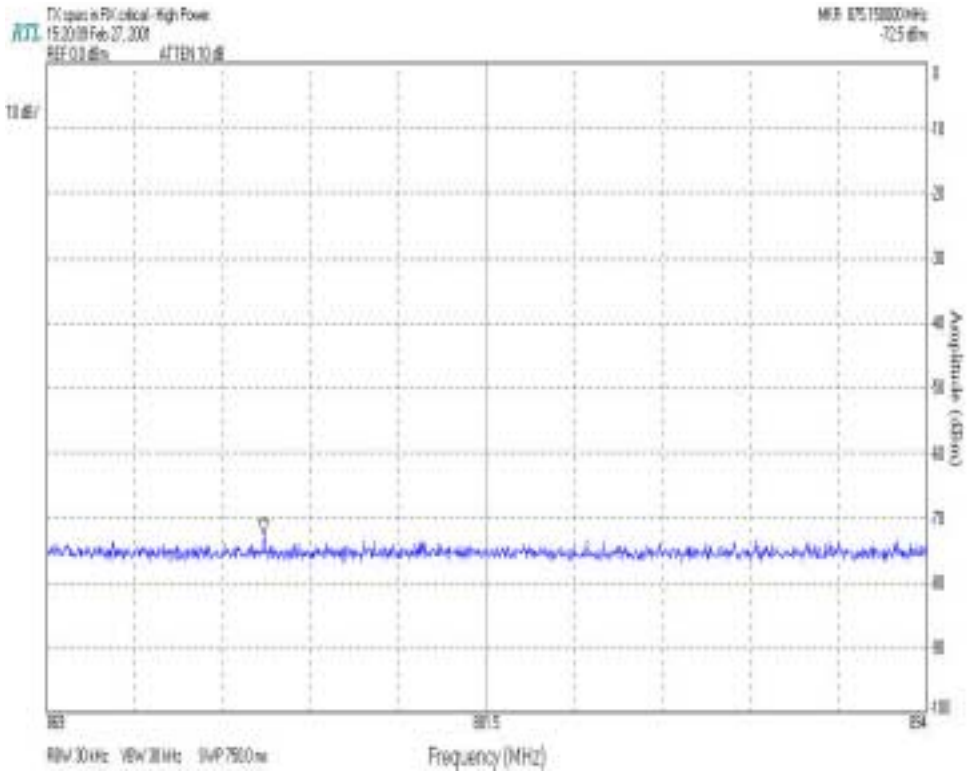
6.3 TEST EQUIPMENT

Spectrum Analyzer HP8564E s/n 3943A01719

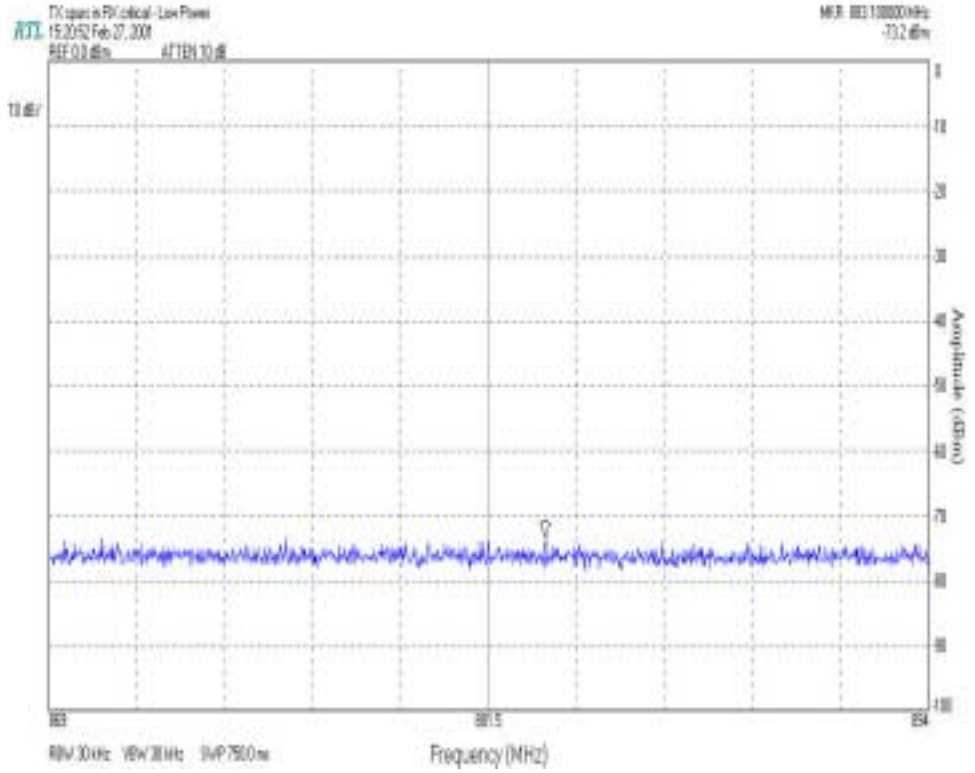
7 FCC PART 22.917 (F) EMISSIONS IN BASE STATION FREQUENCY BAND FROM MOBILES

7.1 TEST DATA

TX spurs in RX critical (High Power)



TX spurs in RX critical (Low Power)



7.2 TEST EQUIPMENT

Spectrum Analyzer HP8564E s/n 3943A01719

8 FCC RULES AND REGULATION PART 2 §2.1055: FREQUENCY STABILITY

8.1 TEST PROCEDURE

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

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

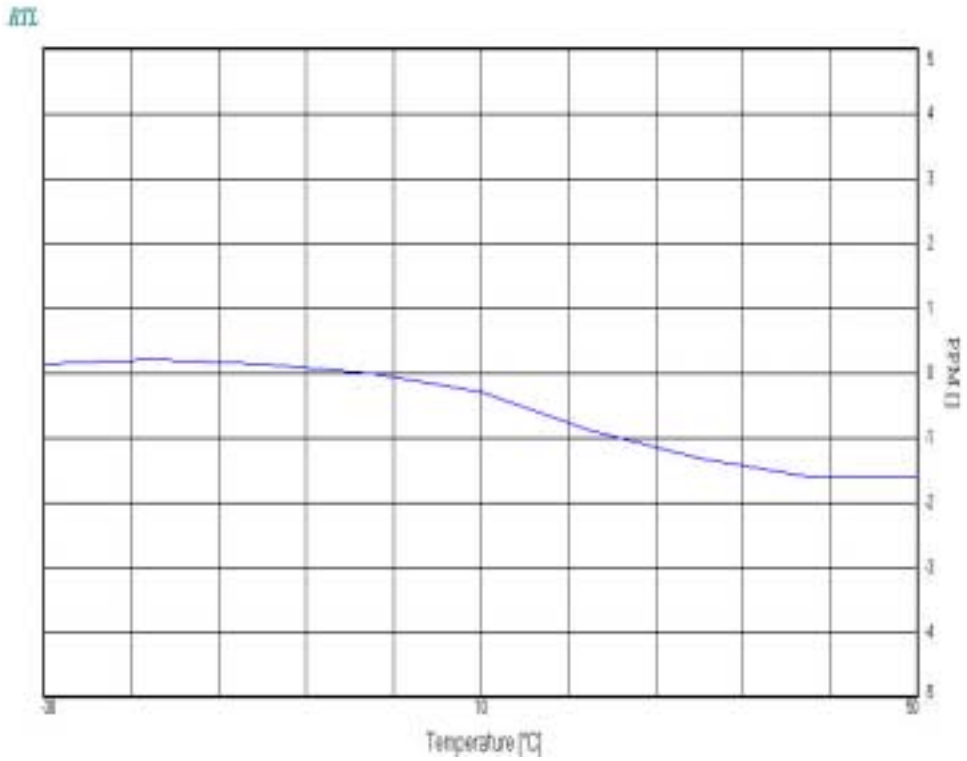
The EUT was evaluated over the temperature range -30°C to +50°C.

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.

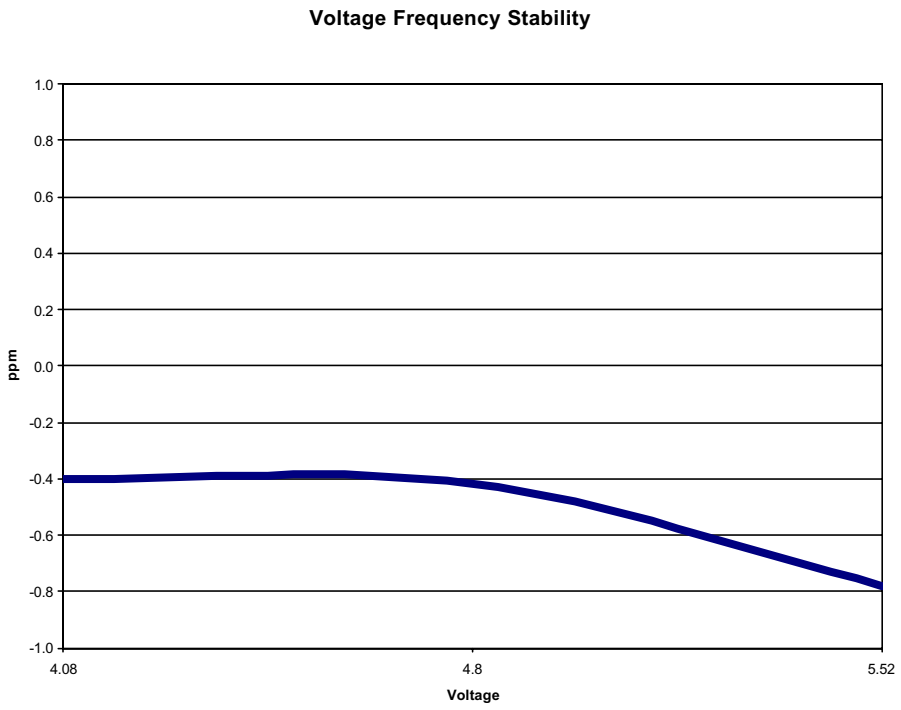
8.2 TEST DATA

8.2.1 FREQUENCY STABILITY/FREQUENCY VARIATION



8.2.2 FREQUENCY STABILITY/VOLTAGE VARIATION

Battery end-point = 2.83 V



8.3 TEST EQUIPMENT

Temperature Chamber Tenney TH65 s/n 11380

Frequency Counter HP8901A (Frequency Mode) s/n 2545A04102

9 FCC RULES AND REGULATIONS PART 2 §2.1047 (A): MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE

9.1 TEST PROCEDURE

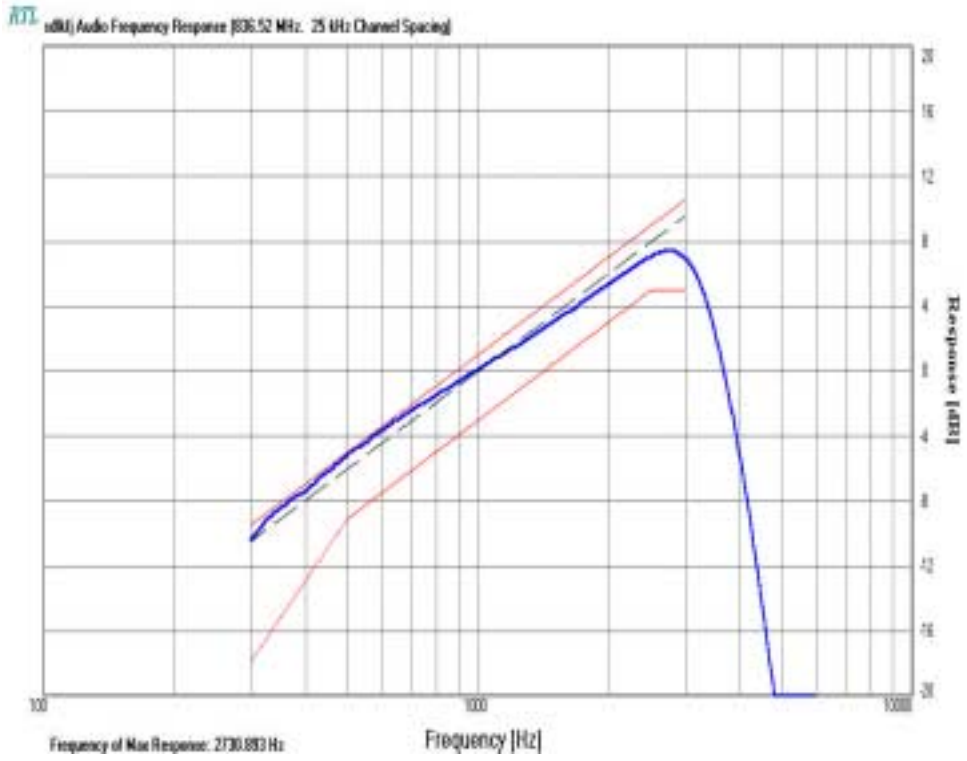
EIA/IS-19-B: 1988 Recommended Minimum Standards for 800MHz Cellular Subscriber Units

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)

9.2 TEST DATA



9.3 TEST EQUIPMENT

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

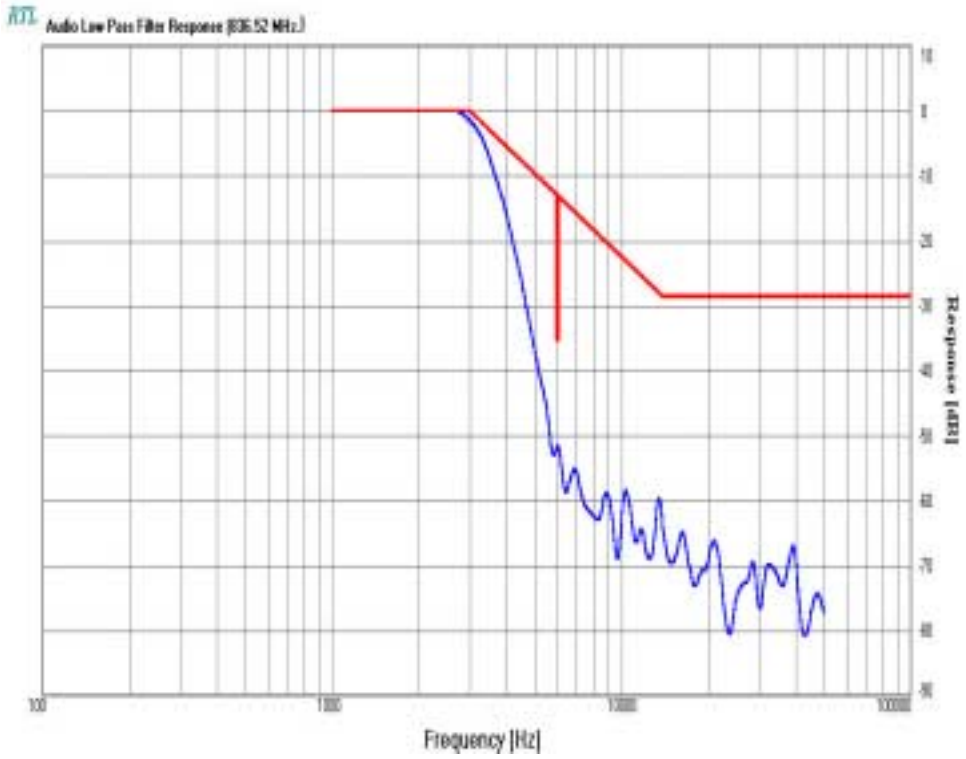
10 FCC RULES AND REGULATIONS PART 2 §2.1047 (A): MODULATION CHARACTERISTICS - AUDIO LOW PASS FILTER RESPONSE

10.1 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.

10.2 TEST DATA



10.3 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

.

11 FCC RULES AND REGULATIONS PART 2 §2.1047 (B): MODULATION CHARACTERISTICS - MODULATION LIMITING

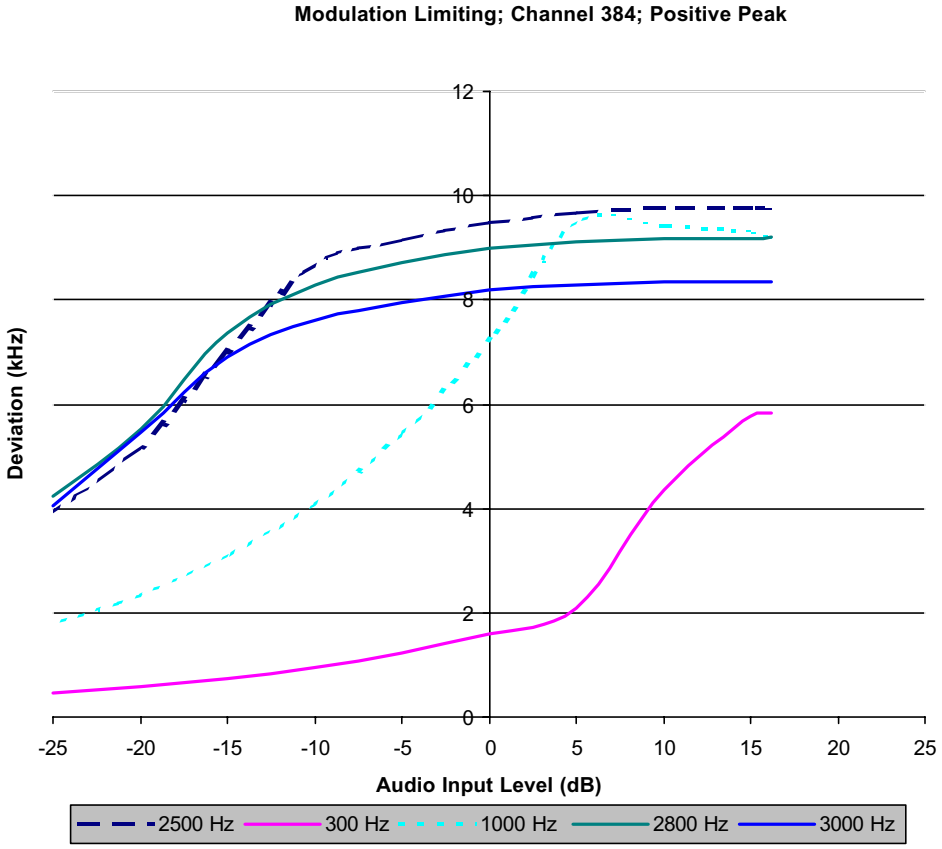
11.1 TEST PROCEDURE

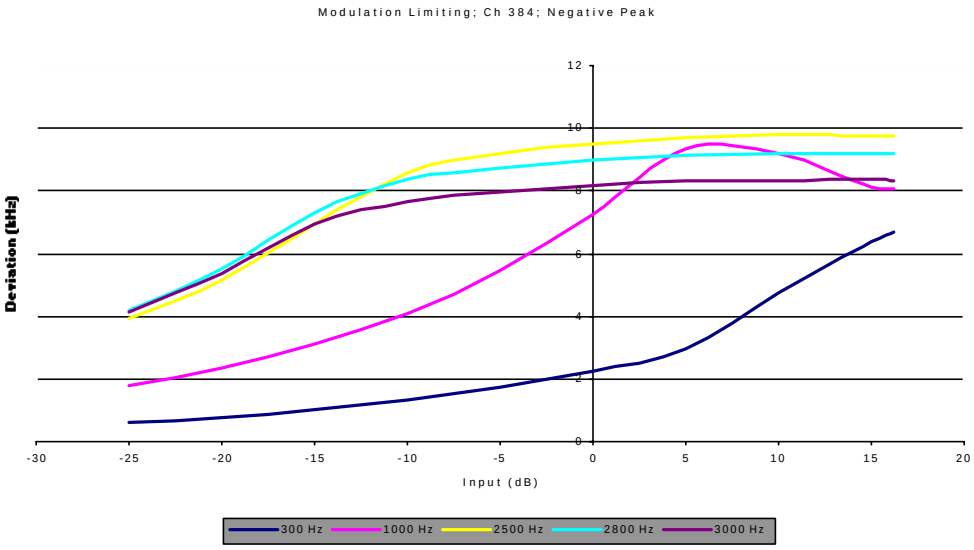
ANSI/TIA/EIA-603-1992, section 2.2.3 and Part 22.915 (B)

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.

11.2 TEST DATA

Type	Measured	rated
Voice	10.2	10
Wideband	8.2	8
SAT	2.099	2
ST	8.6	8





11.3 TEST EQUIPMENT

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

12 FCC RULES AND REGULATIONS 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

13 PER 2.1033(C)(8)

min =4.0 VDC
max =4.8VDC
min I=350mA
I = 830mA

14 FCC RULES AND REGULATIONS PART 1.1307, 1.1310, 2.1091, 2.1093: RF EXPOSURES COMPLIANCE

The antenna, used with this device, is fixed-mounted on indoor permanent structures providing a separation distance of at least 20 cm from all persons during normal operation. The device is typically enclosed in another enclosure such as an alarm panel. Users are not near the device unless servicing the unit.

The manufacturer specifies that the gain of the antenna used with this device will not exceed 0 dBd.
The maximum ERP is 1.4 Watts.
The manufacturer applies for the General Population/Uncontrolled Exposure Environment.

The maximum distance, from the antenna at which MPE is met or exceeded, is calculated from the equation relating field strength E in V/m, transmit power P in Watts, transmit antenna numeric gain G , and separation distance in meters:

$$E(V/m) = \frac{\sqrt{30 \times P \times G}}{d}$$

Power density: $P_d(mW/cm^2) = \frac{E^2}{3770}$

The limit for general population/uncontrolled exposure environment applicable to users and bystanders (at 824 MHz) is f(MHz)/1500 in mW/cm^2

MPE Calculation

Frequency [A] 824 MHz

Limit for General Population/Uncontrolled Environment (Users+Bystanders): 0.55 mW/cm^2

SEPARATION DISTANCE:

Power[B]	(dBi) Antenna Gain	
	2.15	
(Watt)	(in)	(cm)
1.4	7	18

Notes:
[A] = Distances are calculated for the largest (worst-case) separation distance
[B] = Maximum Conducted Output Power delivered to the antenna

CONCLUSION:
The device complies with the MPE requirements by providing a safe separation distance between the antenna (including any radiating structure) and any persons.
The device must be mounted in a manner to ensure that a minimum separation distance of 20cm is normally maintained between all users, bystanders and the antenna (including any radiating structure).

15 LABEL INFORMATION

16 PRODUCT DESCRIPTION

The NSA1800 is a high performance, small footprint, AMPS RF module with advanced OEM development features.

- EIA553 AMPS Cellular Air Protocol
- 5 Volt Operation
- Compatible with Voice and Control Channel data solutions
- Serial Communications Interface
- FLASH memory for field upgrades
- Assembled & tested to IS19B Class A standards
- Common 14 pin Header Interface
- Common form factor and mounting design
- Modem interface for host controlled applications
- Small profile desitn

17 SCHEMATICS

18 BLOCK DIAGRAM

19 OPERATOR'S MANUAL

20 PARTS LIST

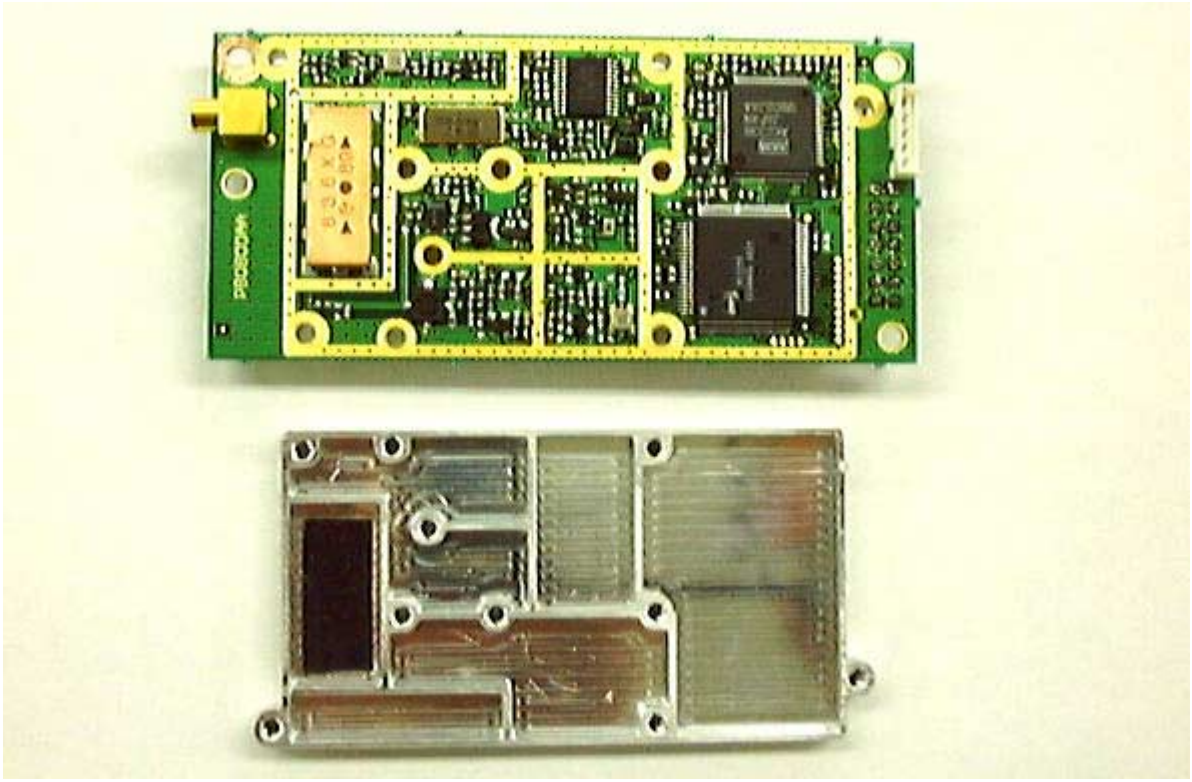
21 TEST CONFIGURATION PHOTOGRAPHS

Radiated Front View

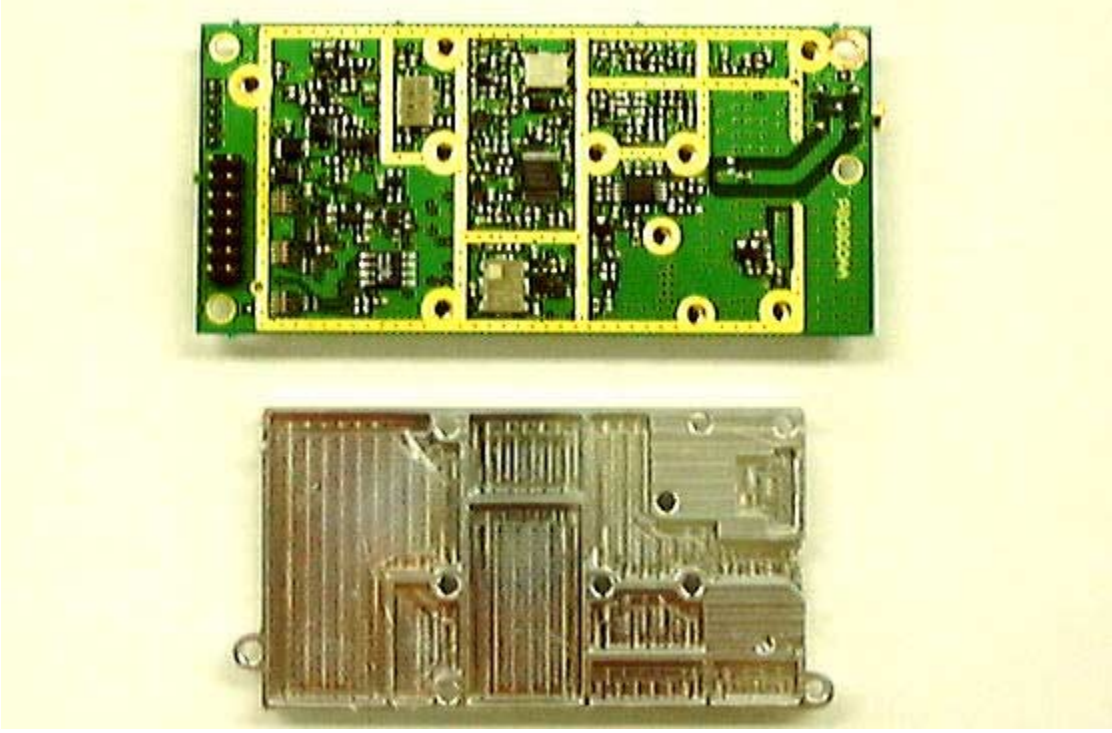
Radiated Back View

21.1 INTERNAL PHOTOGRAPHS

Model No.: NSA 1800
Inside Top View - PCB

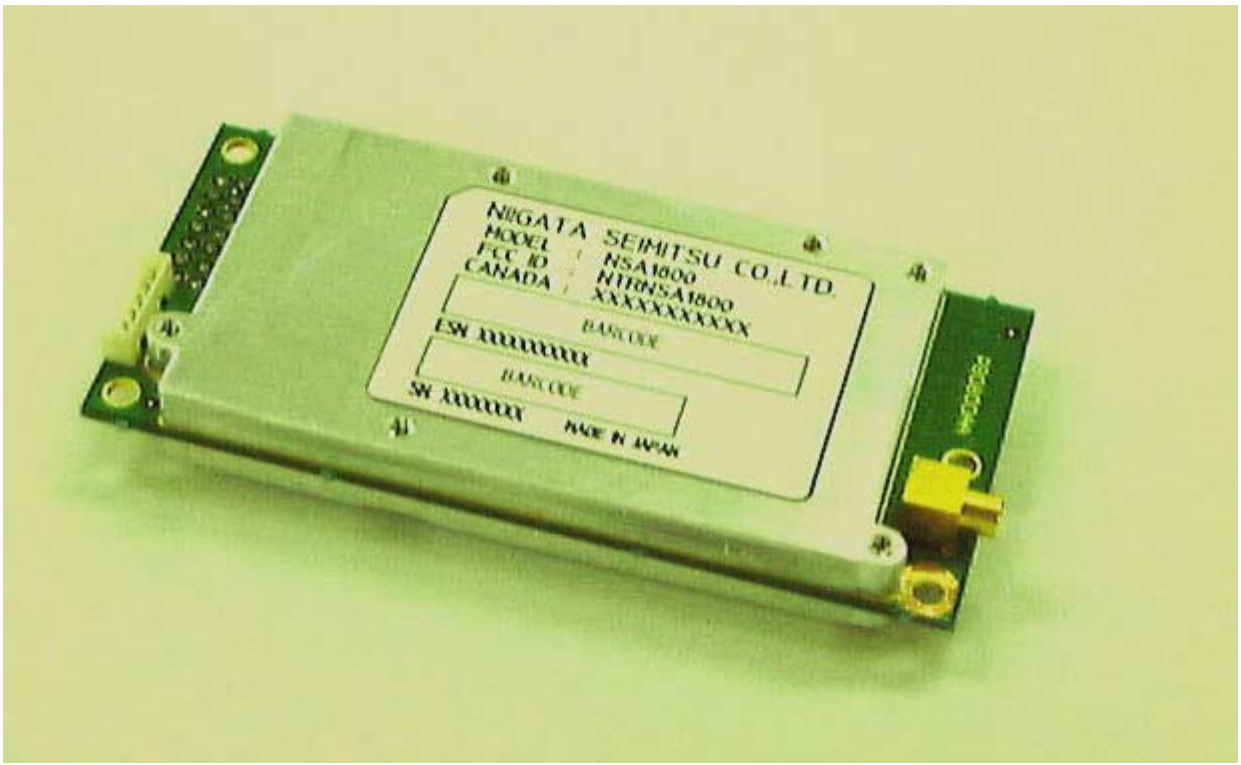


Model No.: NSA 1800
Inside Bottom View - PCB

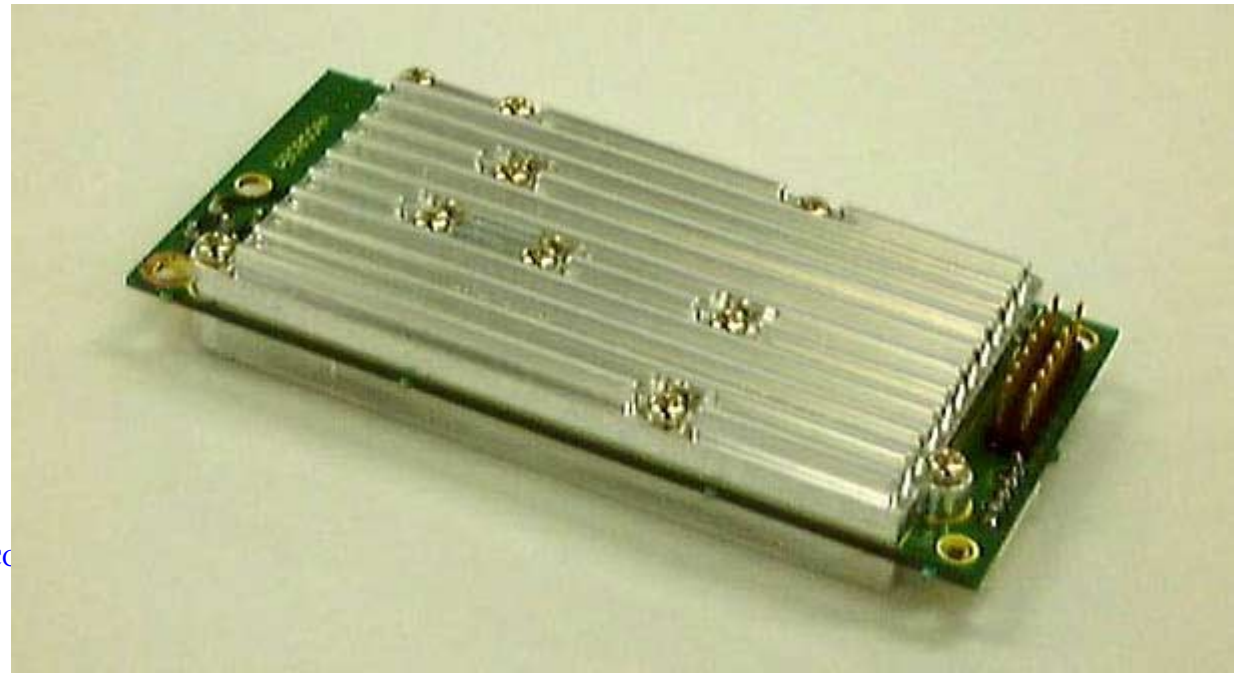


22 EXTERNAL PHOTOGRAPHS

Model No.: NSA 1800
General Top View



Model No.: NSA 1800
General Bottom View



Model No.: NSA 1800
Exterior Top View

Model No.: NSA 1800
Exterior Bottom View