

Test Report of SUBMITTED MEASURED DATA

	MEASUREMENT	Spec.	Page
I	RF Power Output	2.985	
	800 MHz Analog		2
	800 MHz TDMA		2
	1900 MHz TDMA		3
II	Audio Response AMPS	2.987(a)	4
III	Low Pass Filter Response AMPS	2.987(a)	5
IV	Modulation Limiting AMPS	2.987(b), 22.915(d1)	6
V	Occupied Bandwidth	2.989	7
	AMPS Wide Band Data	22.917(d)	8
	AMPS Voice	22.917(b)	9
	AMPS Voice + SAT2	22.917(b)	10
	AMPS ST	22.917(b)	11
	AMPS DTMF 9	22.917(b)	12
	800 MHz TDMA	22.917(b)	13
	1900 MHz TDMA		14
VI	Conducted Spurious Emissions	2.991	
	800 MHz Analog	22.917(e)	15
	800 MHz TDMA	22.917(e)	16
	1900 MHz TDMA	24.238	17
	Out of band PCS only		18
	Base Tx Band AMPS	22.917(f)	22
	Base Tx Band 800 MHz TDMA	22.917(f)	23
	Base Tx Band 1900 MHz TDMA	24.238	24
VII	Frequency Stability		
	A. Temperature	2.995(a)	
	800 MHz Analog		25
	800 MHz & PCS TDMA		26
	B. Supply Voltage	2.995(d)	
	800 MHz Analog		27
	800 MHz & PCS TDMA		28
VIII	Radiated Spurious Emissions	2.993	
	800 MHz Analog	22.917(e)	
	800 MHz TDMA	22.917(e)	
	1900 MHz TDMA	24.238	
VIII	Radiated Power		
	800 MHz Analog	22.913(a)	
	800 MHz TDMA	22.913(a)	
	1900 MHz TDMA	24.232	

- All measurements are at 25 C and at 4.8 Vdc unless otherwise noted.

RF POWER OUTPUT

Pursuant to FCC Rules 2.985

AMPS	Freq.	Freq.	Freq.			
PL	824.04	848.94	836.49	Upper Spec	Lower Spec	Pass/Fail
0	24.72	25.03	24.91	30	24	Passed
1	24.70	25.02	24.90	30	24	Passed
2	24.69	25.01	24.89	30	24	Passed
3	22.92	23.09	23.29	26	20	Passed
4	18.87	18.90	19.08	22	16	Passed
5	14.06	13.76	14.07	18	12	Passed
6	11.83	11.47	11.71	14	8	Passed
7	7.84	7.35	7.64	10	4	Passed
8	7.84	7.35	7.65	10	4	Passed
9	7.84	7.35	7.65	10	4	Passed
10	7.84	7.35	7.66	10	4	Passed

NADC	Freq.	Freq.	Freq.			
PL	824.04	848.94	836.52	Upper Spec	Lower Spec	Pass/Fail
0	24.78	24.95	24.70	30	24	Passed
1	24.81	24.94	24.69	30	24	Passed
2	24.92	24.86	24.70	30	24	Passed
3	23.28	23.74	23.49	26	20	Passed
4	19.52	19.68	19.47	22	16	Passed
5	15.13	15.10	14.75	18	12	Passed
6	11.39	12.25	12.04	14	8	Passed
7	8.47	8.37	8.02	10	4	Passed
8	4.03	3.25	2.82	8	-6	Passed
9	-1.36	-1.48	-1.80	4	-12	Passed
10	-6.70	-6.89	-7.04	0	-18	Passed

RF POWER OUTPUT (cont.)

PCS	Freq.	Freq.	Freq.			
PL	1850.04	1909.92	1879.98	Upper Spec	Lower Spec	Pass/Fail
0	27.43	27.00	27.35	30	24	Passed
1	27.35	27.05	27.23	30	24	Passed
2	27.43	26.94	27.22	30	24	Passed
3	23.92	23.50	23.95	26	20	Passed
4	19.24	18.83	19.38	22	16	Passed
5	14.55	14.39	14.68	18	12	Passed
6	12.66	12.15	12.71	14	8	Passed
7	8.66	8.26	8.72	10	4	Passed
8	2.51	2.01	2.52	8	-8	Passed
9	-1.87	-2.81	-2.30	4	-14	Passed
10	-7.55	-7.54	-6.82	0	-20	Passed

Method of Measurement

The RF power output is measured with the transmitter adjusted in accordance with the tune-up procedure to give the value of voltage and current specified in the tune-up procedure to give the value of voltage and current specified in the operation description as required by 2.983(d) (5). A 50 ohm RF attenuator of proper power rating was used as a load for making these measurements. The power measurements are made using a Gigatronics 8541C power meter and 20 dB attenuator.

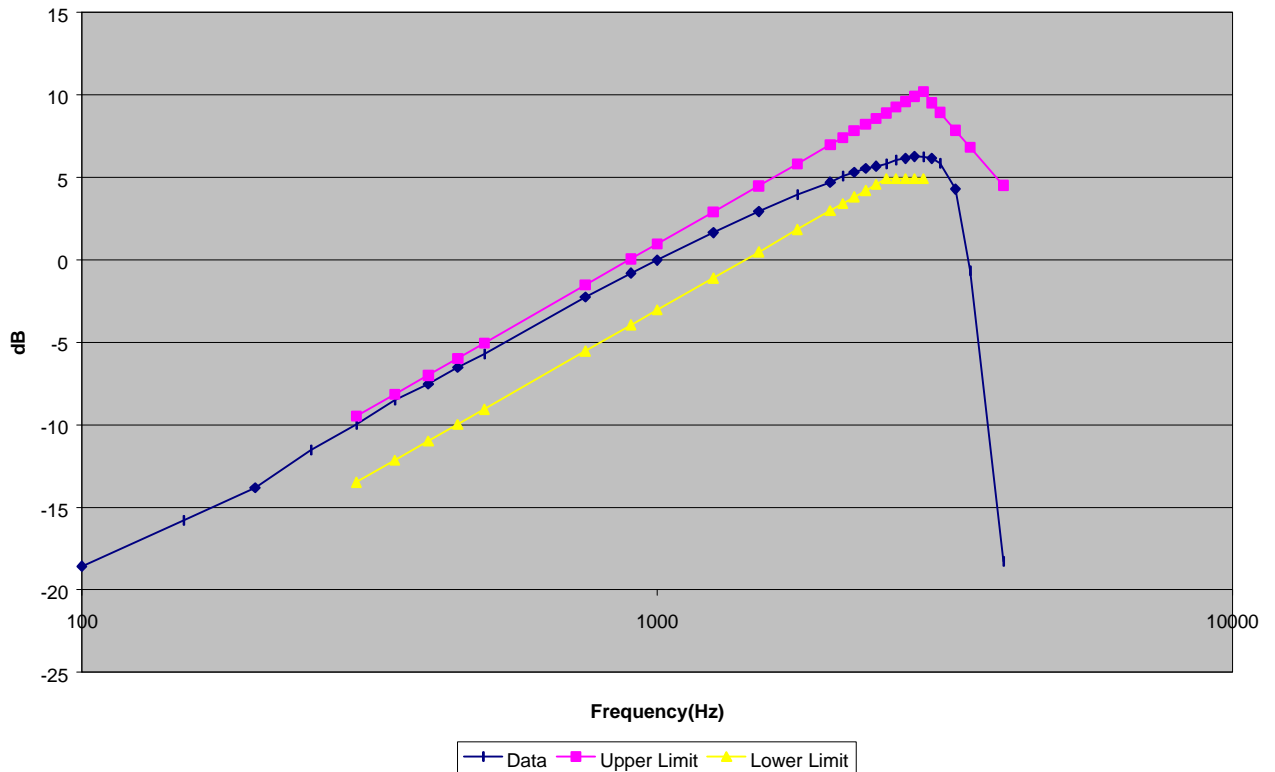
Minimum Standard

The specifications met are per IS137-A Tables 3.2.1-1 and 3.2.2-1.

Audio Frequency Response AMPS

Pursuant to FCC Rules 2.987 (a)

Transmit Audio Frequency Response



Method of Measurement

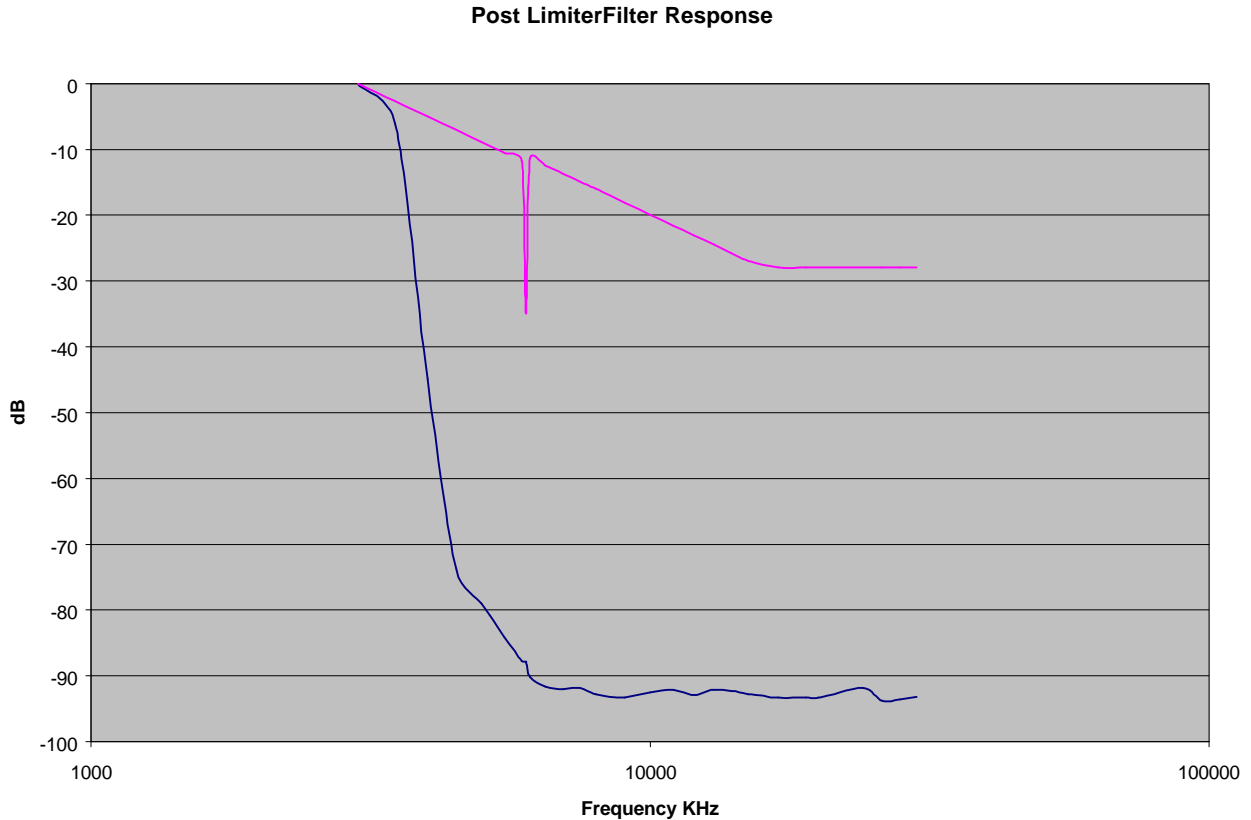
Operate the transmitter under standard test conditions and monitor the output with a frequency deviation meter or calibrated test receiver. With 1004 Hz sine wave audio input applied through a dummy microphone circuit, adjust the audio input to give 30% of full rated system deviation. Maintaining constant input, vary the input frequency from 100 to 5000 Hz, and observe the level of modulation measured.

Minimum Standard

The audio frequency response shall not vary more than +1 or -3 dB from 300 to 3000 Hz as referenced to 1000 Hz level (with the exception of a permissible 6 dB/octave roll off from 2500 to 3000 Hz)

Post Limiter Filter Response

Pursuant to FCC Rules 2.987 (a)



Method of Measurement

Operate the transmitter under standard test conditions and monitor the demodulated output of a calibrated test receiver with a HP35665 Dynamic Signal Analyzer. With a reference of a 1004 Hz sine wave audio input from the HP8903B applied through a dummy microphone circuit and then adjusted to give 8 kHz system deviation, the level is increased by 20 dB. Maintaining that constant input, vary the input frequency from 3 to 30 kHz, and observe the level of the input frequency measured on the HP35665.

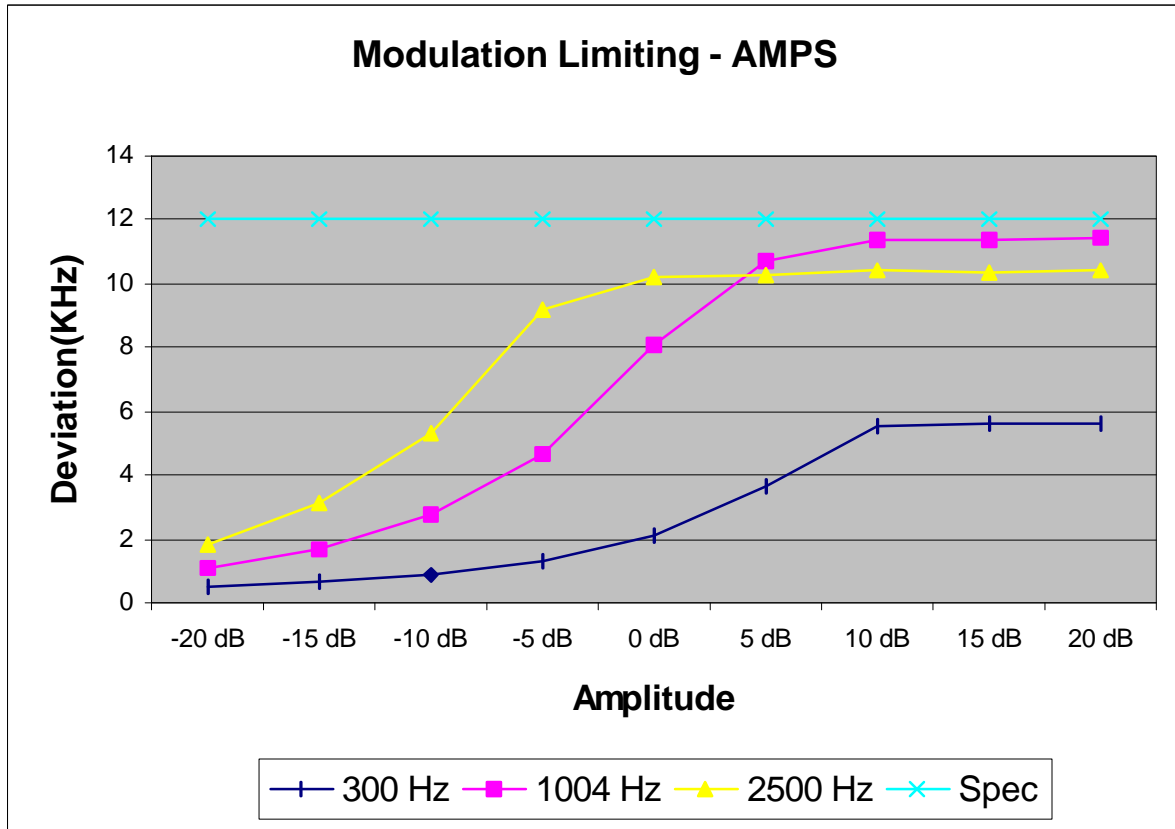
Minimum Standard

The response shall not exceed from:

3KHz to 5.9KHz	- 40Log(f/3000) dB
5.9 to 6.1 KHz	- 35 dB
6.1 to 15 KHz	- 40Log(f/3000) dB
15 to 30 KHz	- 28 dB

MODULATION LIMITING

Pursuant FCC Rules 2.987 (a), 22.915(b)



Method of Measurement

The transmitter shall be adjusted for full rated system deviation. Adjust the audio input for 60% of rated system deviation at 1000 Hz. Using this level as a reference (0 dB) vary the audio input level from the reference to a level 20 dB above it for modulation frequencies of 300, 1004 and 2500 Hz. Record the system deviation obtained as a function of the input level.

FCC Limits

Minimum Standard - The transmitter modulation must not exceed rated system deviation at any audio frequency input or reasonable change in input level.

OCCUPIED BANDWIDTH

Pursuant to FCC Rules 2.989, 22.917(b & d)

Method of Measurement

Data on occupied bandwidth is presented in the form of a spectrum analyzer photograph which illustrates the transmitter sidebands. An unmodulated carrier is used for reference and the spectrum analyzer is set to the center with a 0 dBC at the top of the screen. Each plot is superimposed with the proper modulation activated. For any display generated by modulating the carrier with audio, a 2500 Hz tone at a level 16 dB greater than that required to produce 50 percent modulation is injected. All signaling tones are generated internally by the phone. The spectrum analyzer settings are as follows: Span 100KHz, Resolution BW 10KHz, Video BW 1KHz. The two DTMA plots are aquired by the Anrisu 8801B.

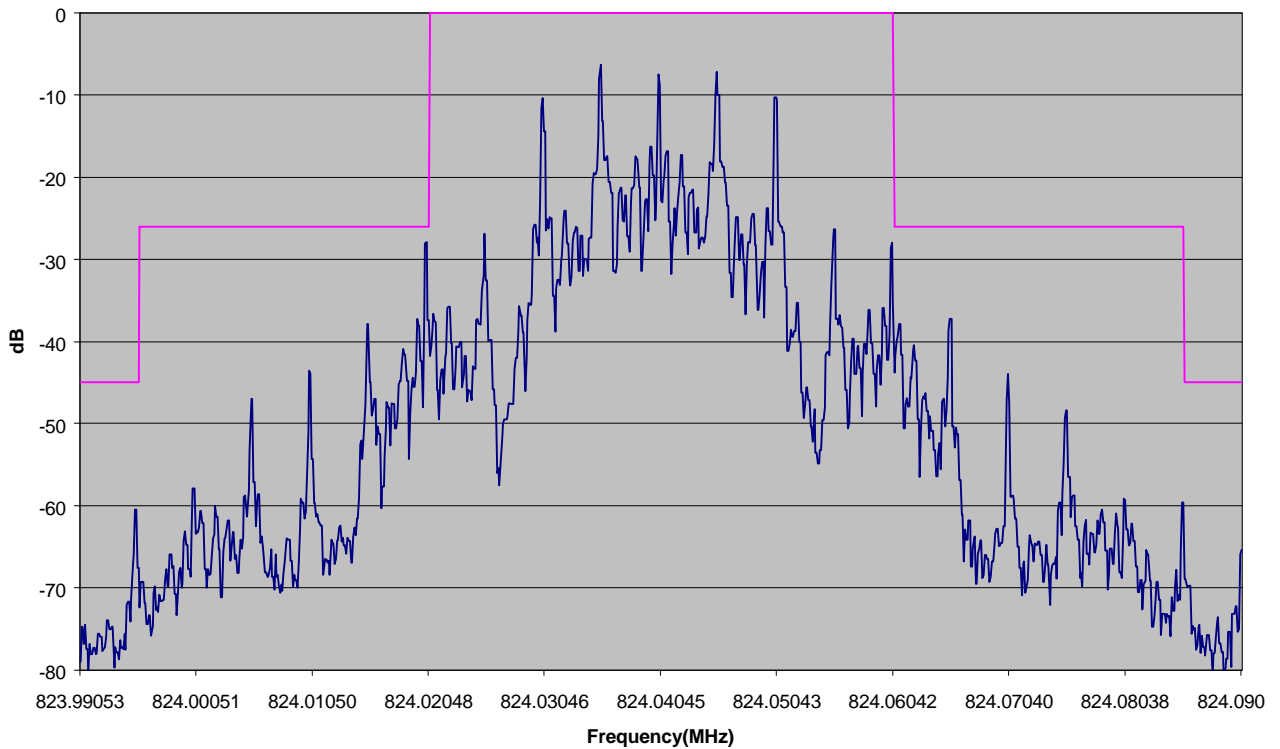
The following Plots are provided:

- AMPS Wide Band Data
- AMPS Voice
- AMPS Voice + SAT2
- AMPS ST
- AMPS DTMF 9
- 800 MHz TDMA
- 1900 MHz TDMA

OCCUPIED BANDWIDTH – Wideband Data

Pursuant to FCC Rules 2.989, 22.917(d)

Occupied Bandwidth - AMPS WIDEBAND DATA



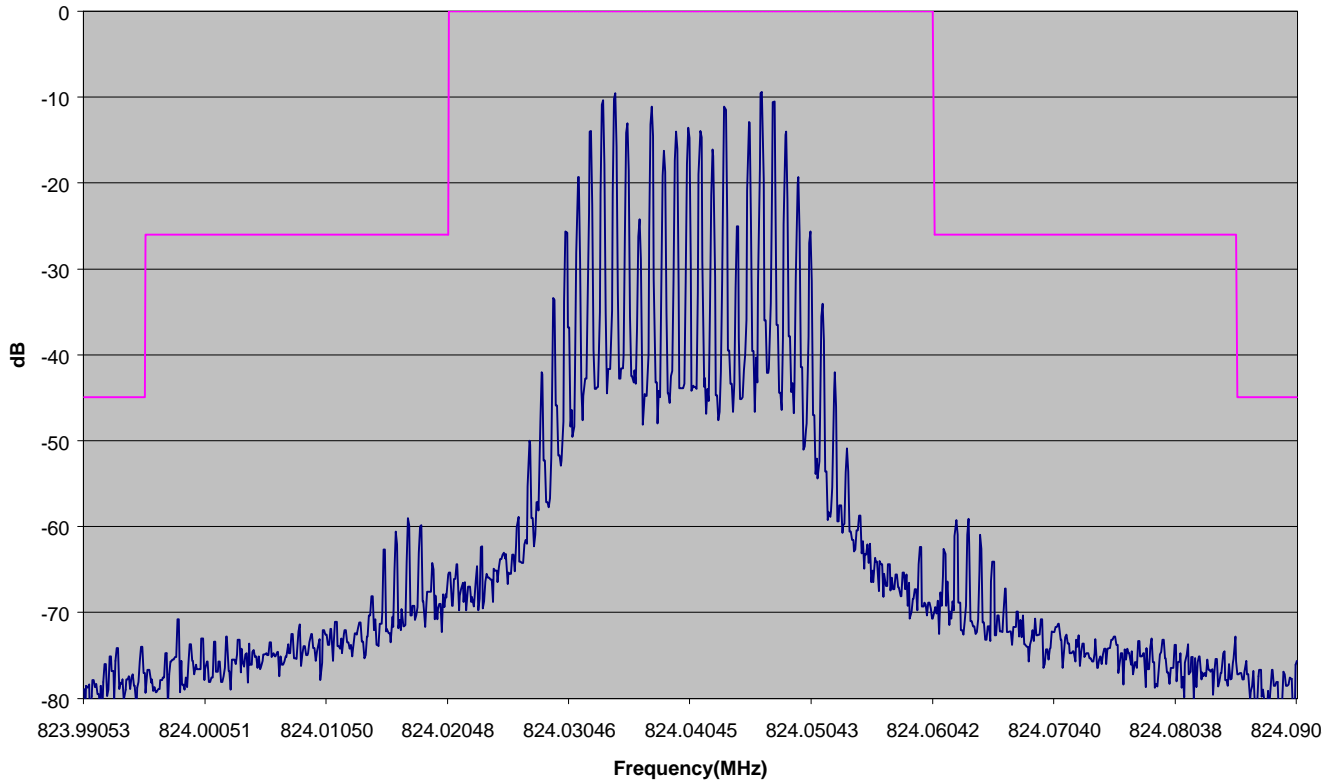
FCC Limits - (F1D Mask)

- On any frequency removed from the assigned carrier frequency by more than 20 kHz, up to and including 45 kHz, the side band is at least 26 dB below the carrier.
- On any frequency removed from the assigned carrier frequency by more than 45 kHz, up to and including 90 kHz, the side band is at least 45 dB below the carrier.
- On any frequency removed from the assigned carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency, the side band is at least 60 dB below the carrier or $43 + \log(\text{mean output power in Watts})$ dB, whichever is the smaller attenuation.

OCCUPIED BANDWIDTH – Voice

Pursuant to FCC Rules 2.989, 22.917(b)

Occupied Bandwidth - AMPS 2500 HZ Voice



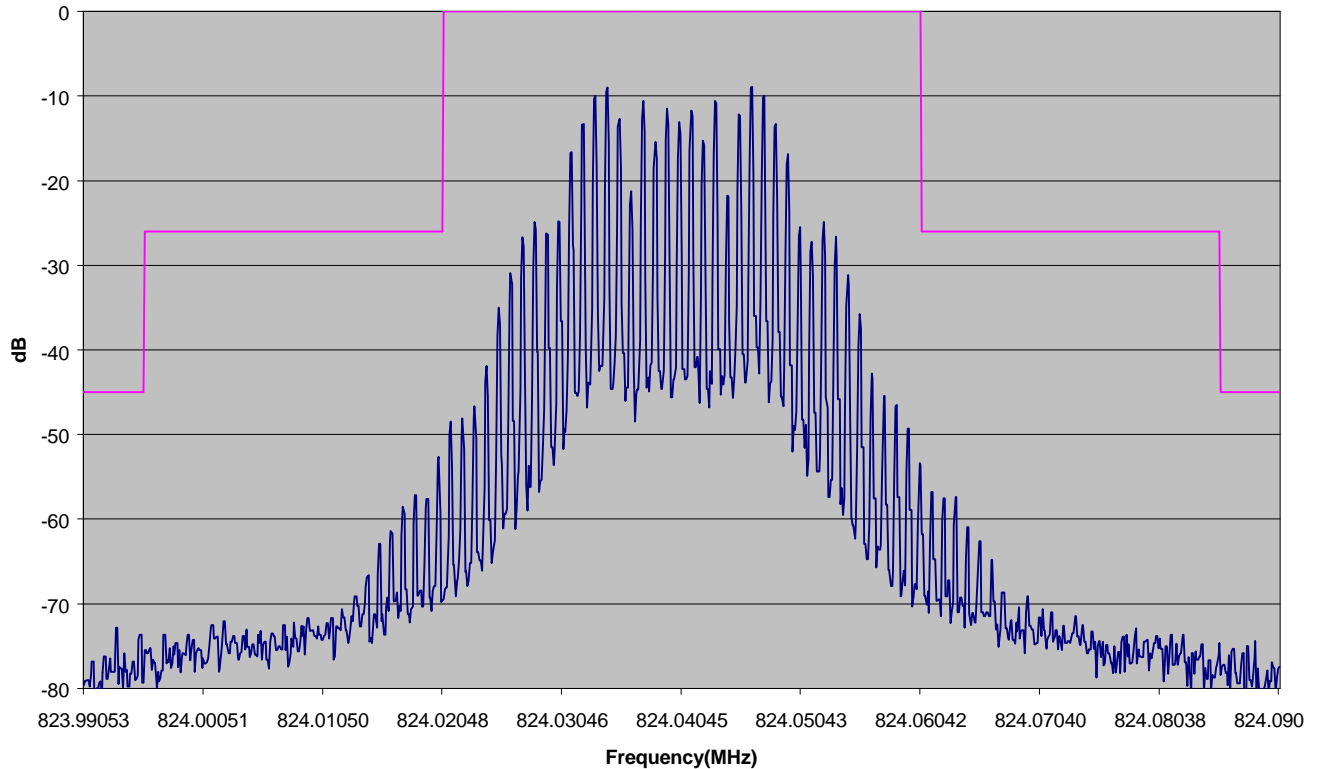
FCC Limits - (F3E Mask)

- On any frequency removed from the assigned carrier frequency by more than 20 kHz, up to and including 45 kHz, the side band is at least 26 dB below the carrier.
- On any frequency removed from the assigned carrier frequency by more than 45 kHz, up to the first multiple of the carrier frequency, the side band is at least 60 dB below the carrier or $43 + \log(\text{mean output power in Watts})$ dB, whichever is the smaller attenuation.

OCCUPIED BANDWIDTH – Voice & SAT2

Pursuant to FCC Rules 2.989, 22.917(b)

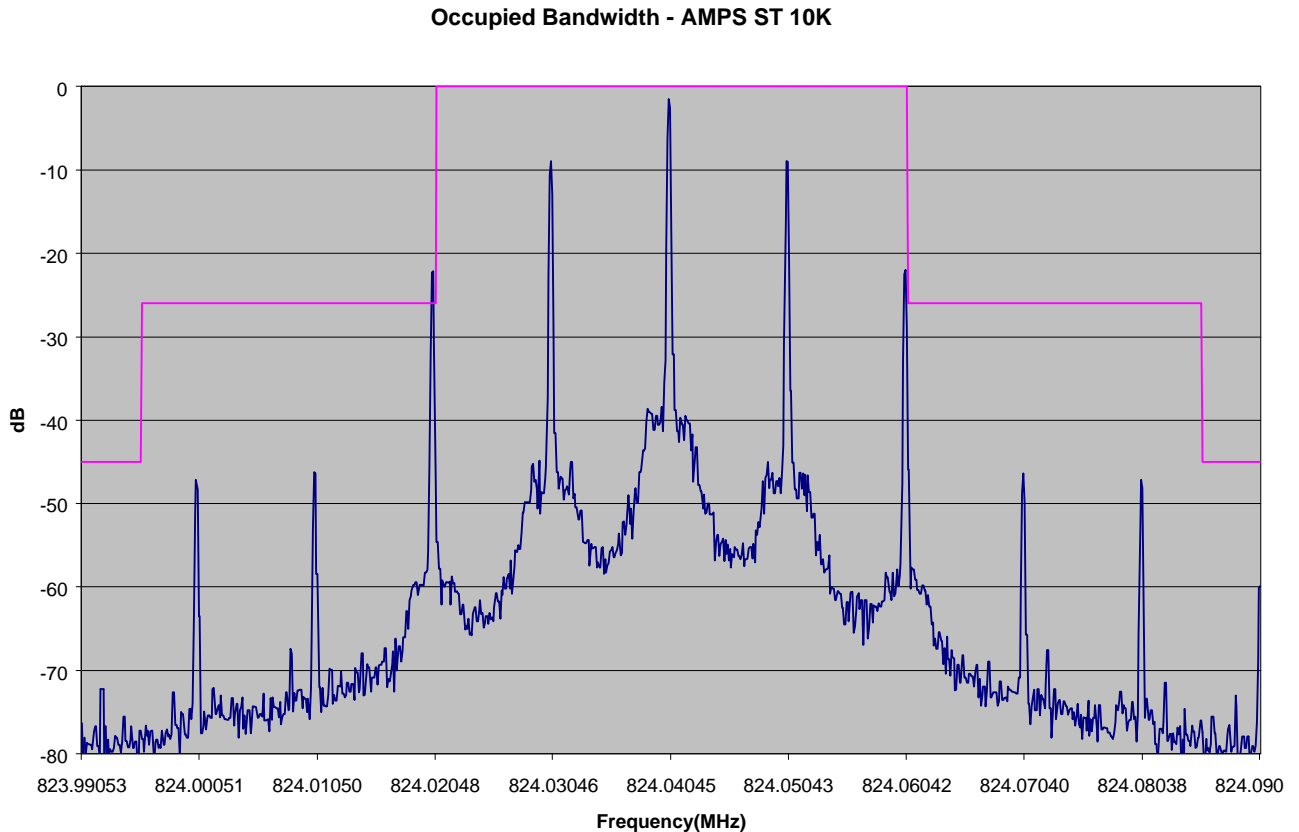
Occupied Bandwidth - AMPS VOICE & SAT2



FCC Limits - (F3E Mask)

- On any frequency removed from the assigned carrier frequency by more than 20 kHz, up to and including 45 kHz, the side band is at least 26 dB below the carrier.
- On any frequency removed from the assigned carrier frequency by more than 45 kHz, up to the first multiple of the carrier frequency, the side band is at least 60 dB below the carrier or $43 + \log(\text{mean output power in Watts})$ dB, whichever is the smaller attenuation.

OCCUPIED BANDWIDTH – ST Pursuant to FCC Rules 2.989, 22.917(b)



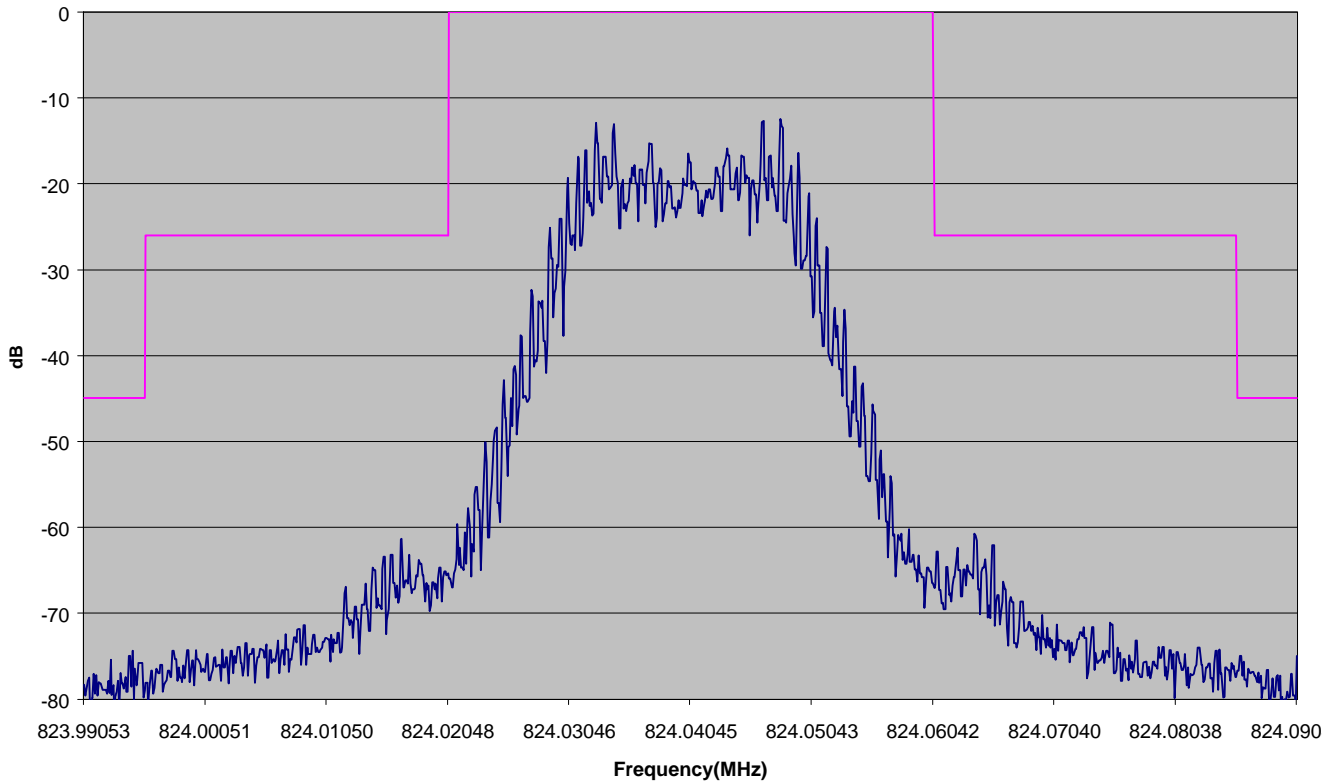
FCC Limits - (F3E Mask)

- On any frequency removed from the assigned carrier frequency by more than 20 kHz, up to and including 45 kHz, the side band is at least 26 dB below the carrier.
- On any frequency removed from the assigned carrier frequency by more than 45 kHz, up to the first multiple of the carrier frequency, the side band is at least 60 dB below the carrier or $43 + \log(\text{mean output power in Watts})$ dB, whichever is the smaller attenuation.

OCCUPIED BANDWIDTH – DTMF 9

Pursuant to FCC Rules 2.989, 22.917(b)

Occupied Bandwidth - AMPS DTMF9

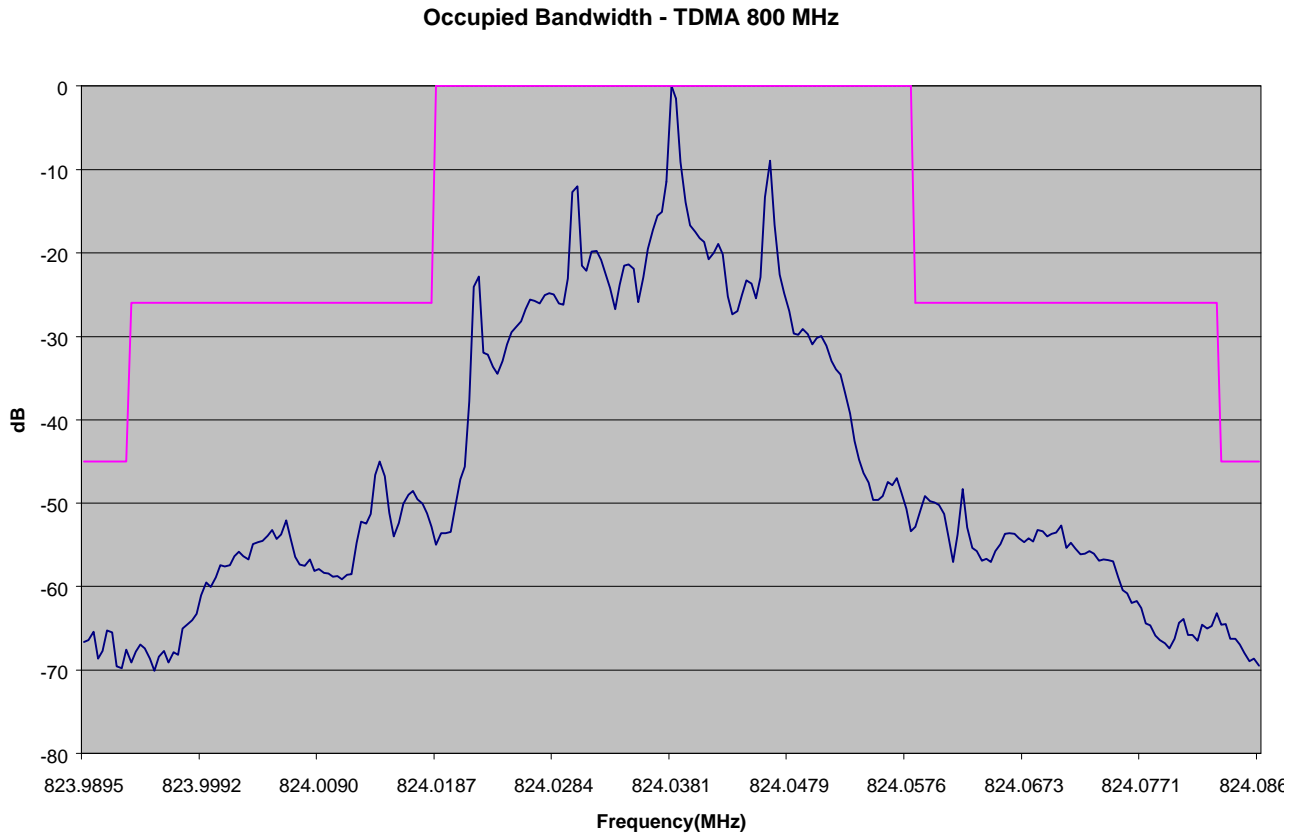


FCC Limits - (F3E Mask)

- On any frequency removed from the assigned carrier frequency by more than 20 kHz, up to and including 45 kHz, the side band is at least 26 dB below the carrier.
- On any frequency removed from the assigned carrier frequency by more than 45 kHz, up to the first multiple of the carrier frequency, the side band is at least 60 dB below the carrier or $43 + \log(\text{mean output power in Watts})$ dB, whichever is the smaller attenuation.

OCCUPIED BANDWIDTH – 800 MHz TDMA

Pursuant to FCC Rules 2.989



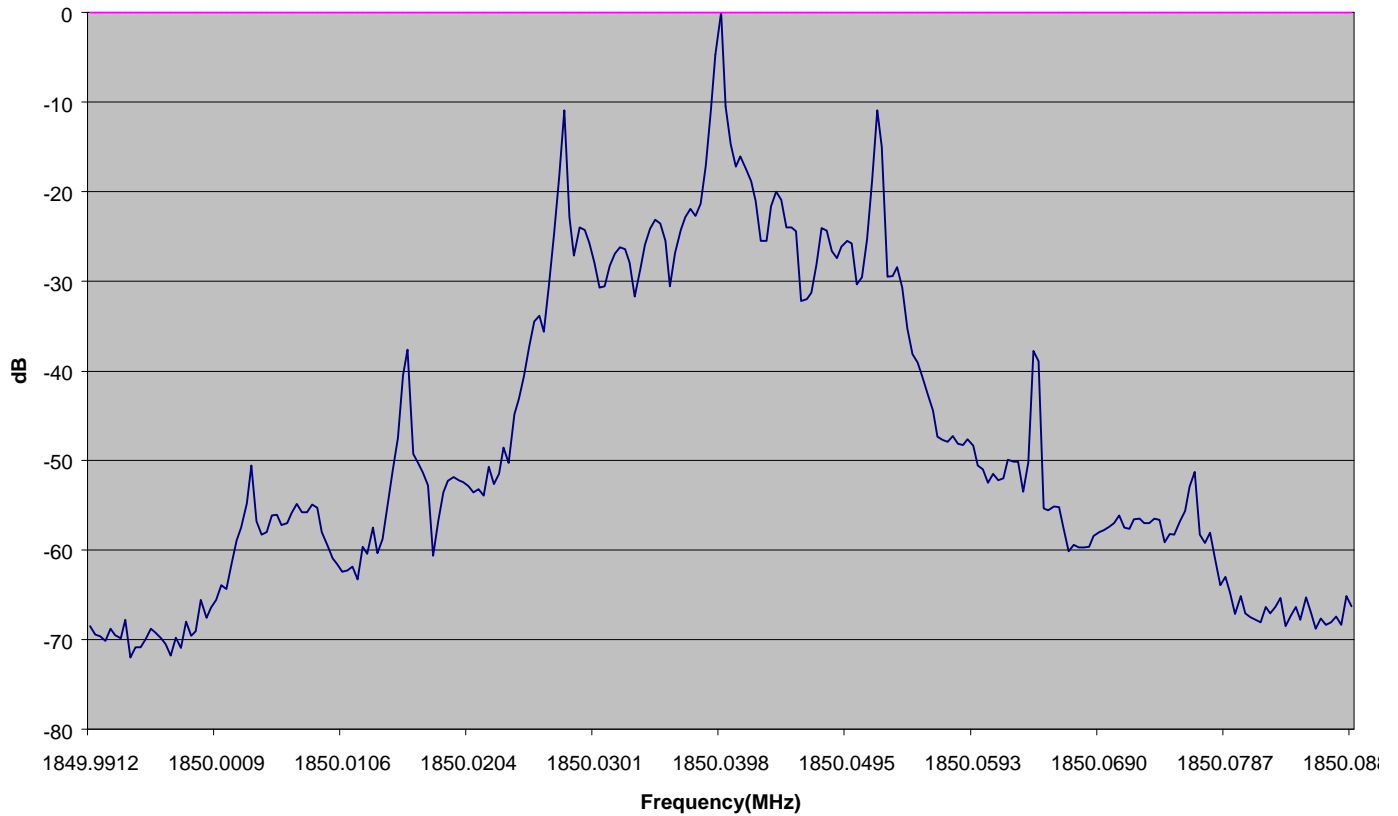
FCC Limits

- On any frequency removed from the assigned carrier frequency by more than 20 kHz, up to and including 45 kHz, the side band is at least 26 dB below the carrier.
- On any frequency removed from the assigned carrier frequency by more than 45 kHz, up to and including 90 kHz, the side band is at least 45 dB below the carrier.
- On any frequency removed from the assigned carrier frequency by more than 90 kHz, up to and including the first multiple of the carrier frequency, the side band is at least 60 dB below the carrier or $43 + \log(\text{mean output power in Watts})$ dB, whichever is the smaller attenuation.

OCCUPIED BANDWIDTH – 1900 MHz TDMA

Pursuant to FCC Rules 2.989

Occupied Bandwidth - TDMA PCS



Conducted Spurious Emission – 800 MHz AMPS

Pursuant to FCC Rules 2.991, 22.917(e)

AMPS

Spur Frequency(MHz)	Amp.(dBm)	Spec.(dBm)	P/F
1648.081	-58.6	-42.7	Pass
2472.121	-69.5	-42.7	Pass
3296.161	-88.5	-42.7	Pass

Method of Measurement:

The transmitter is terminated into a 50-ohm load and interfaced with a spectrum analyzer that allows the spurious emission level relative to the carrier level to be measured directly. Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of rated system deviation at 1000 Hz. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, or as high as the state of the art permits except for that region close to the carrier equal to $\pm 250\%$ of the authorized bandwidth.

FCC Limits

- 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.
- 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.

Conducted Spurious Emission – 800 MHz TDMA

Pursuant to FCC Rules 2.991, 22.917(e)

800 MHz TDMA

Spur Frequency(MHz)	Amp.(dBm)	Spec.(dBm)	P/F
1648.078	-53.8	-42.7	Pass
2472.116	-75.5	-42.7	Pass

Method of Measurement:

The transmitter is terminated into a 50-ohm load and interfaced with a spectrum analyzer that allows the spurious emission level relative to the carrier level to be measured directly. The transmitter is modulated with a pseudo random data. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, or as high as the state of the art permits except for that region close to the carrier equal to $\pm 250\%$ of the authorized bandwidth.

FCC Limits

- 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.
- 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.

Conducted Spurious Emission – 1900 MHz TDMA

Pursuant to FCC Rules 2.991, 24.238

1900 MHz TDMA

Spur Frequency(MHz)	Amp.(dBm)	Spec.(dBm)	P/F
1730.154	-77.9	-42.7	Pass
1930.526	-84	-42.7	Pass
3700.087	-64.2	-42.7	Pass
5550.127	-77.4	-42.7	Pass

Method of Measurement:

The transmitter is terminated into a 50-ohm load and interfaced with a spectrum analyzer that allows the spurious emission level relative to the carrier level to be measured directly. The transmitter is modulated with a pseudo random data. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, or as high as the state of the art permits except for that region close to the carrier equal to $\pm 250\%$ of the authorized bandwidth.

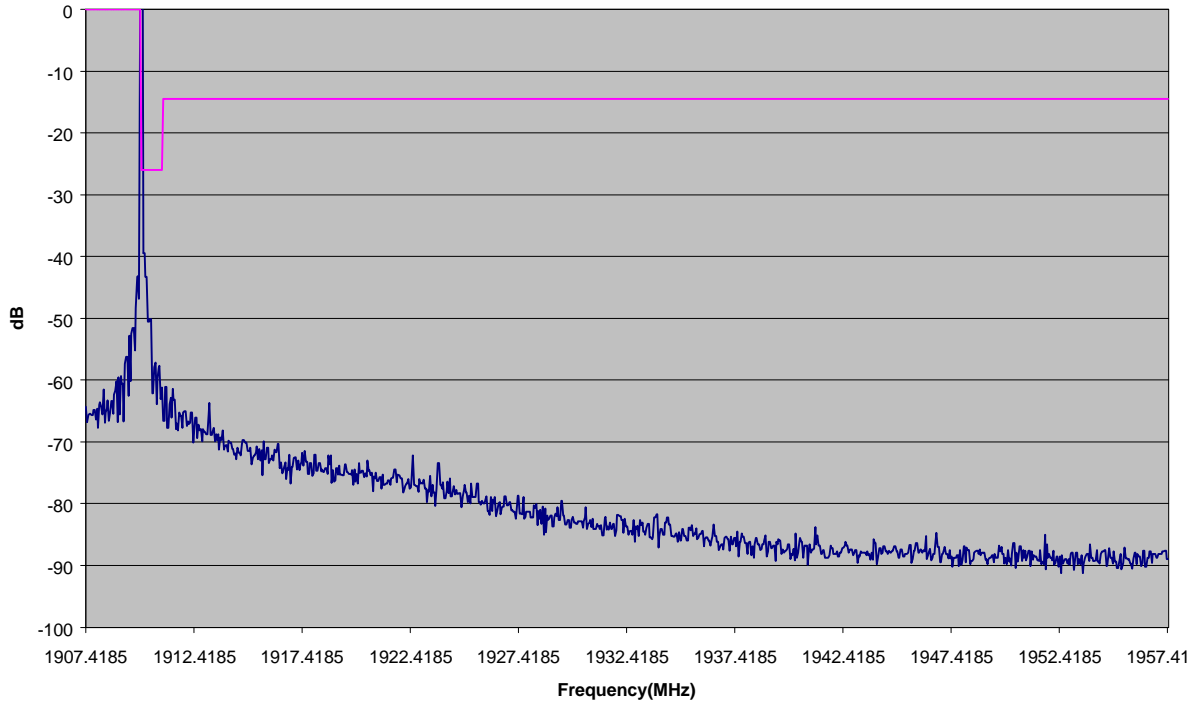
FCC Limits

- The mean power of emissions must be attenuated below the mean power of the carrier (P) on any frequency outside the frequency block by: at least $43+10 \log P$ dB.

Conducted Spurious Emission – Out of Band 1900 MHz TDMA

Pursuant to FCC Rules 2.991, 24.238

Out of Band Emissions - PCS High Side > 1 MHz



Method of Measurement:

The transmitter is terminated into a 50-ohm load and interfaced with a spectrum analyzer that allows the spurious emission level relative to the carrier level to be measured directly. The transmitter is modulated with a pseudo random data. Measurements shall be made from the lowest radio channel and the highest radio channel. One plots for each is shown.

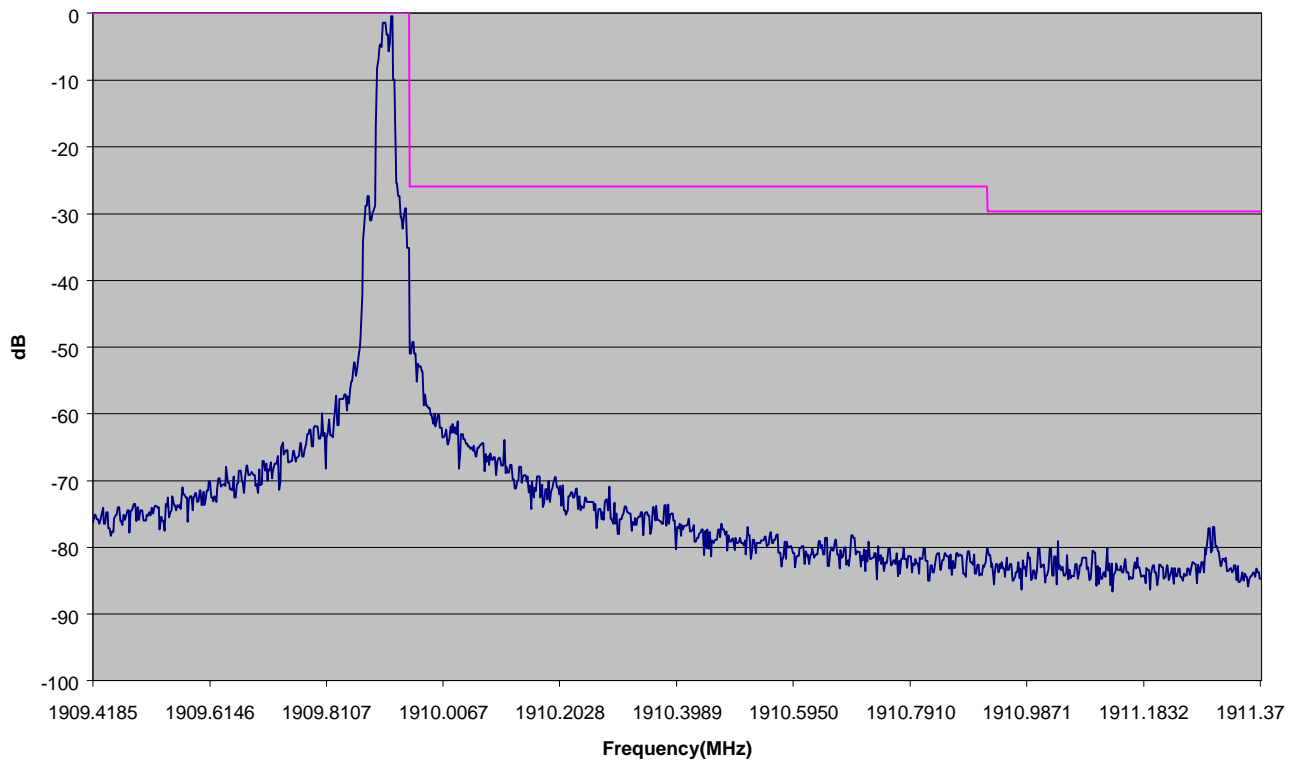
FCC Limits

- The mean power of emissions must be attenuated below the mean power of the carrier (P) on any frequency outside the frequency block by: at least $43+10 \log P$ dB.

Conducted Spurious Emission – Out of Band 1900 MHz TDMA

Pursuant to FCC Rules 2.991, 24.238

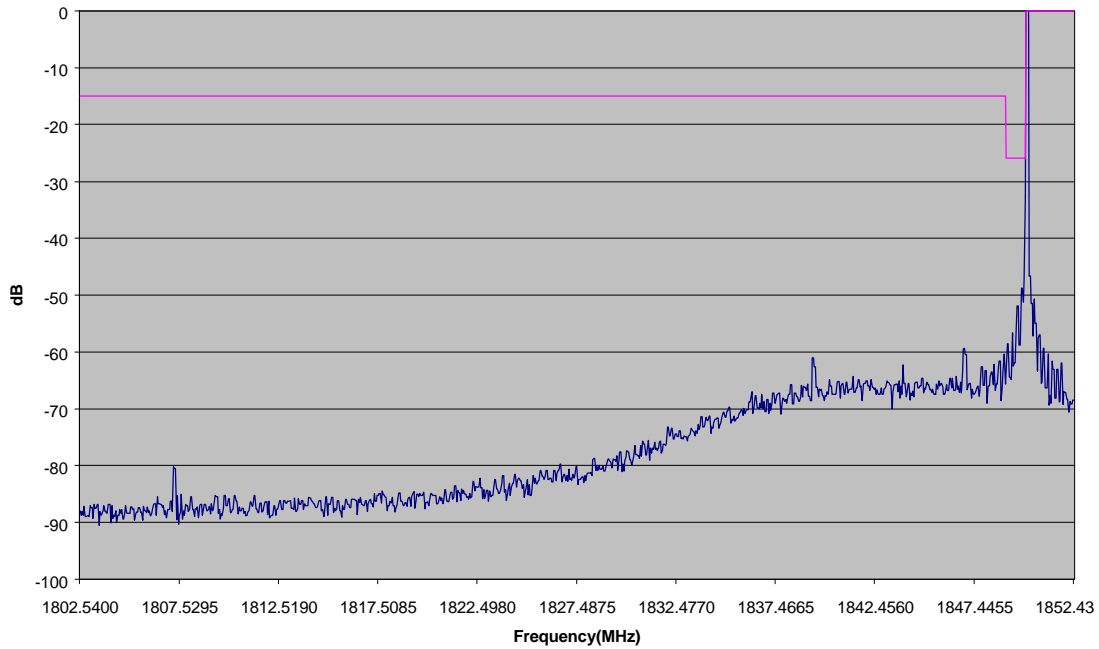
Out of Band Emissions - PCS High Side < 1 MHz



Conducted Spurious Emission – Out of Band 1900 MHz TDMA

Pursuant to FCC Rules 2.991, 24.238

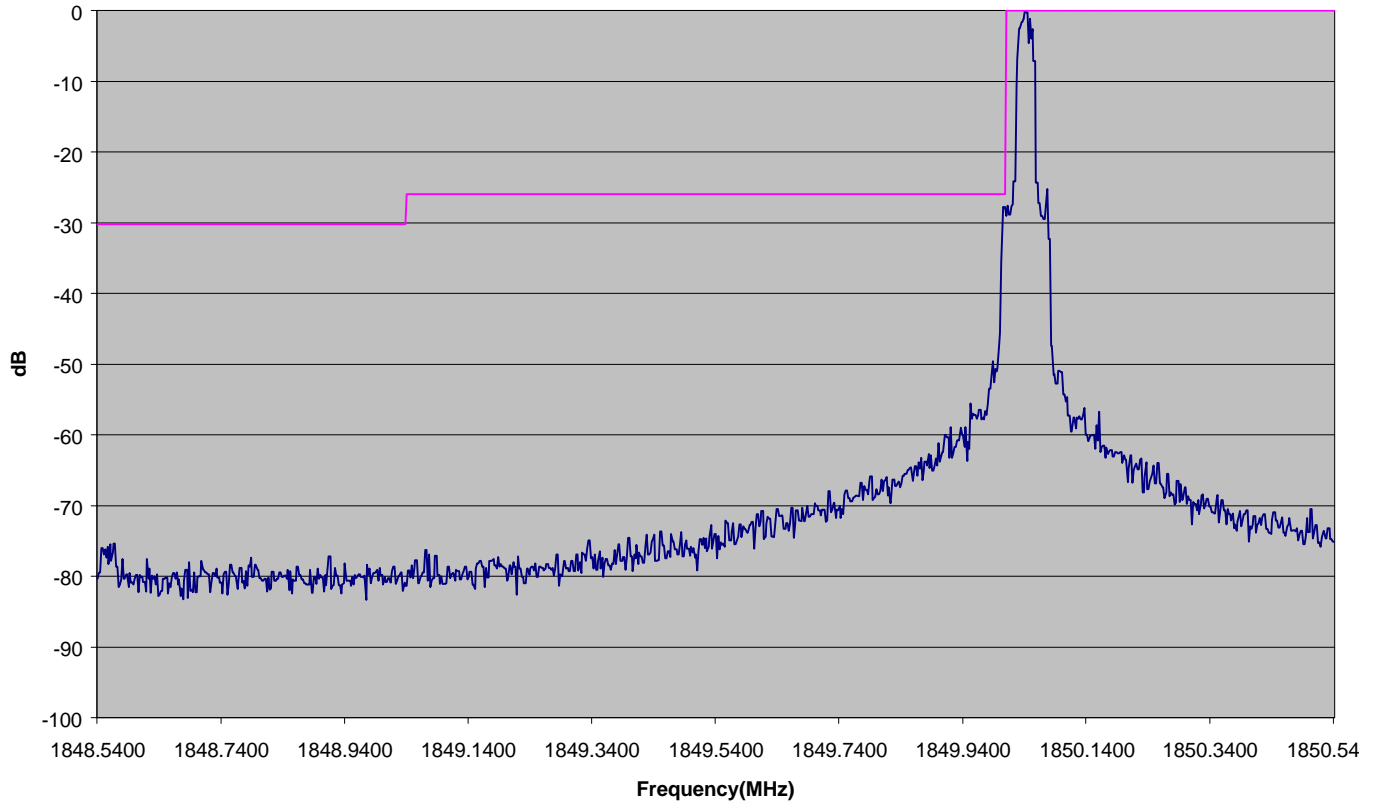
Out of Band Emissions - PCS Low Side > 1 MHz



Conducted Spurious Emission – Out of Band 1900 MHz TDMA

Pursuant to FCC Rules 2.991, 24.238

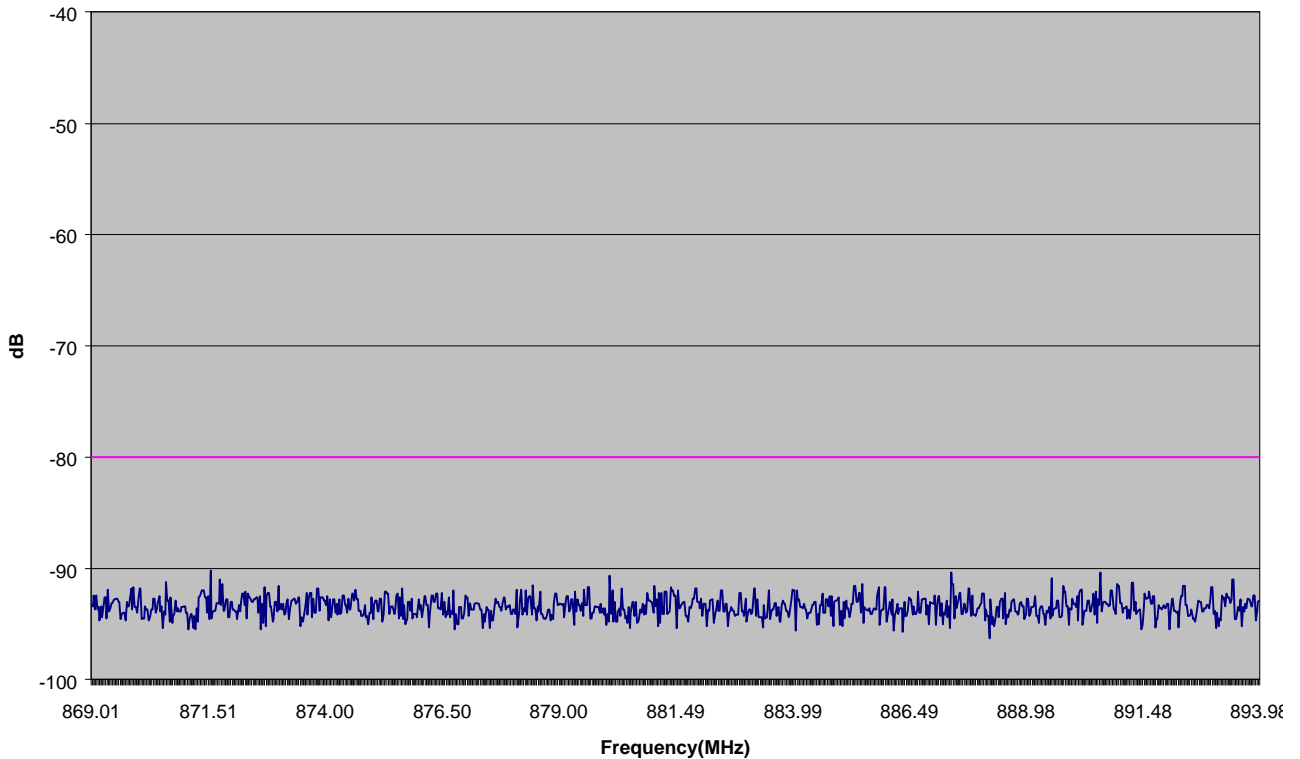
Out of Band Emissions - PCS Low Side < 1 MHz



Conducted Spurious Emission – Base Tx Band - AMPS

Pursuant to FCC Rules 2.991, 22.917(f)

Tx Mobile Band - AMPS



Method of Measurement:

The transmitter is terminated into a 50-ohm load and interfaced with a spectrum analyzer that allows the spurious emission level relative to the carrier level to be measured directly. Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of rated system deviation at 1000 Hz. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, or as high as the state of the art permits except for that region close to the carrier equal to $\pm 250\%$ of the authorized bandwidth.

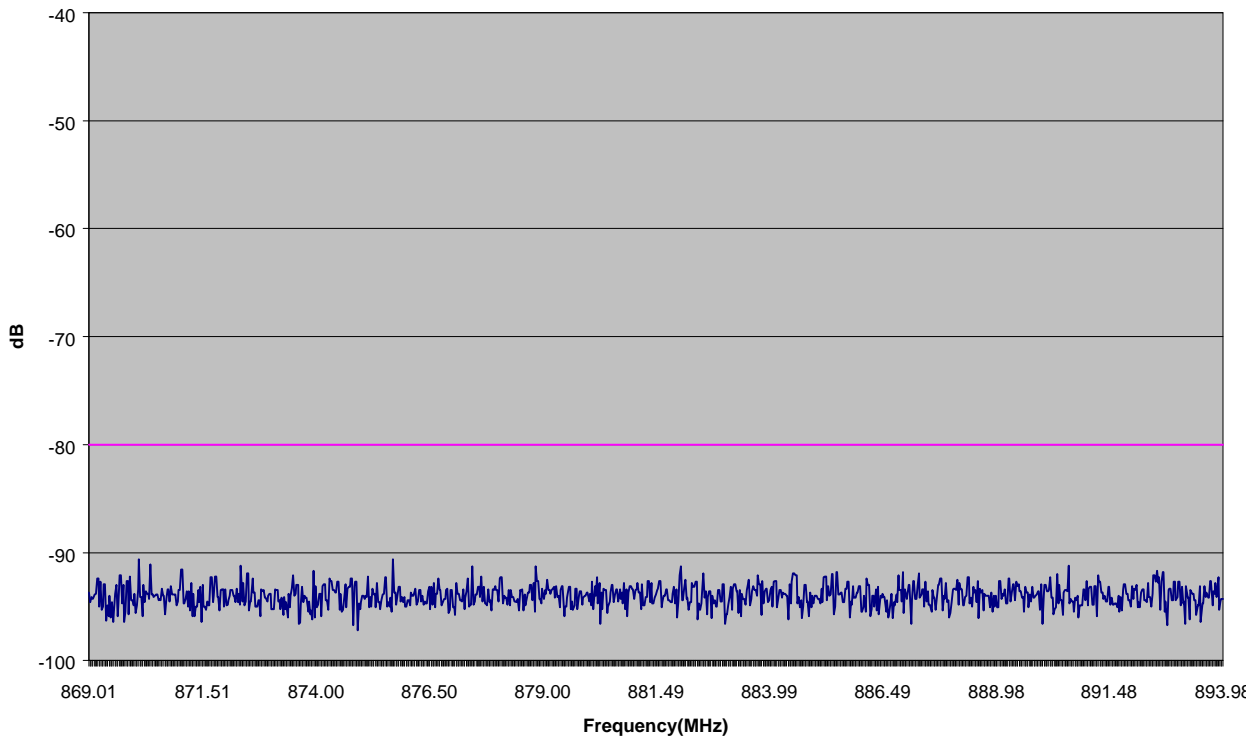
FCC Limits

- 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.

Conducted Spurious Emission – Base Tx Band – 800 MHz TDMA

Pursuant to FCC Rules 2.991, 22.917(f)

Tx Mobile Band - 800 MHz TDMA



Method of Measurement:

The transmitter is terminated into a 50-ohm load and interfaced with a spectrum analyzer that allows the spurious emission level relative to the carrier level to be measured directly. The transmitter is modulated with a pseudo random data. Measurements shall be made from the lowest radio channel and the highest radio channel. One plots for each is shown.

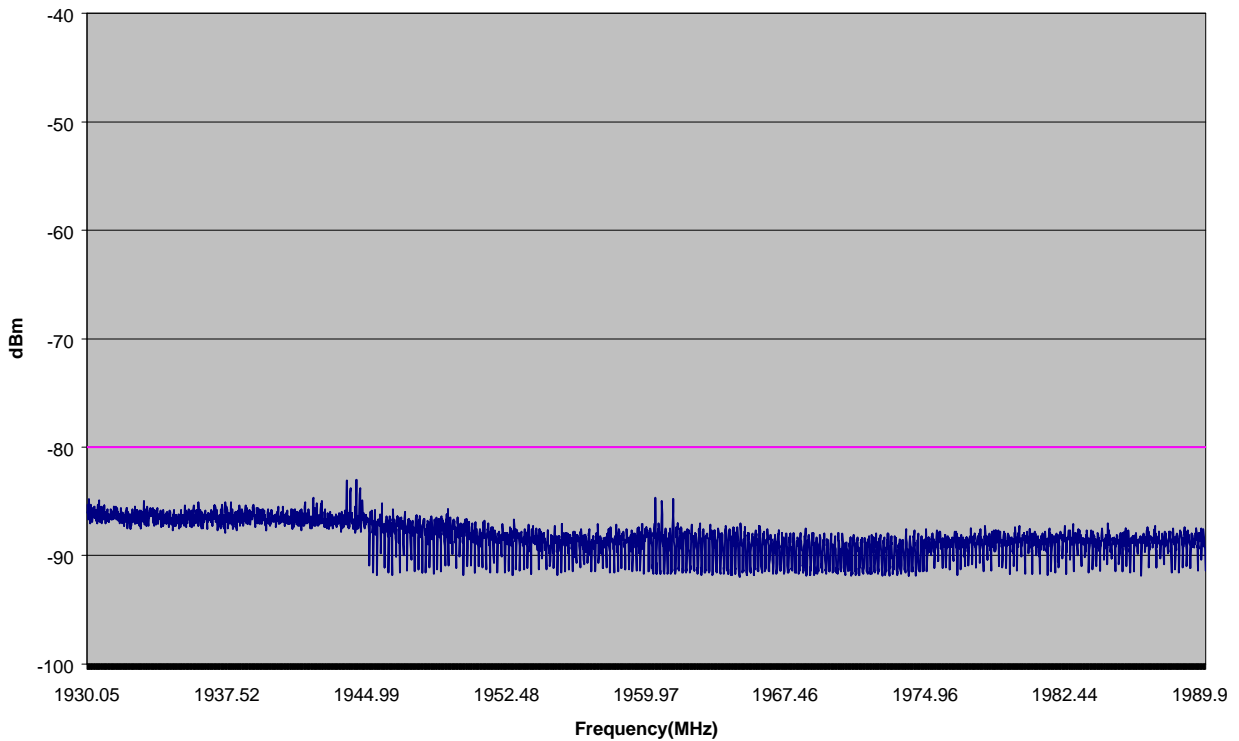
FCC Limits

- 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.

Conducted Spurious Emission – Base Tx Band – 1900 MHZ TDMA

Pursuant to FCC Rules 2.991, 24.238

Tx Mobile Band - PCS



Method of Measurement:

The transmitter is terminated into a 50-ohm load and interfaced with a spectrum analyzer that allows the spurious emission level relative to the carrier level to be measured directly. The transmitter is modulated with a pseudo random data. Measurements shall be made from the lowest radio channel and the highest radio channel. One plots for each is shown.

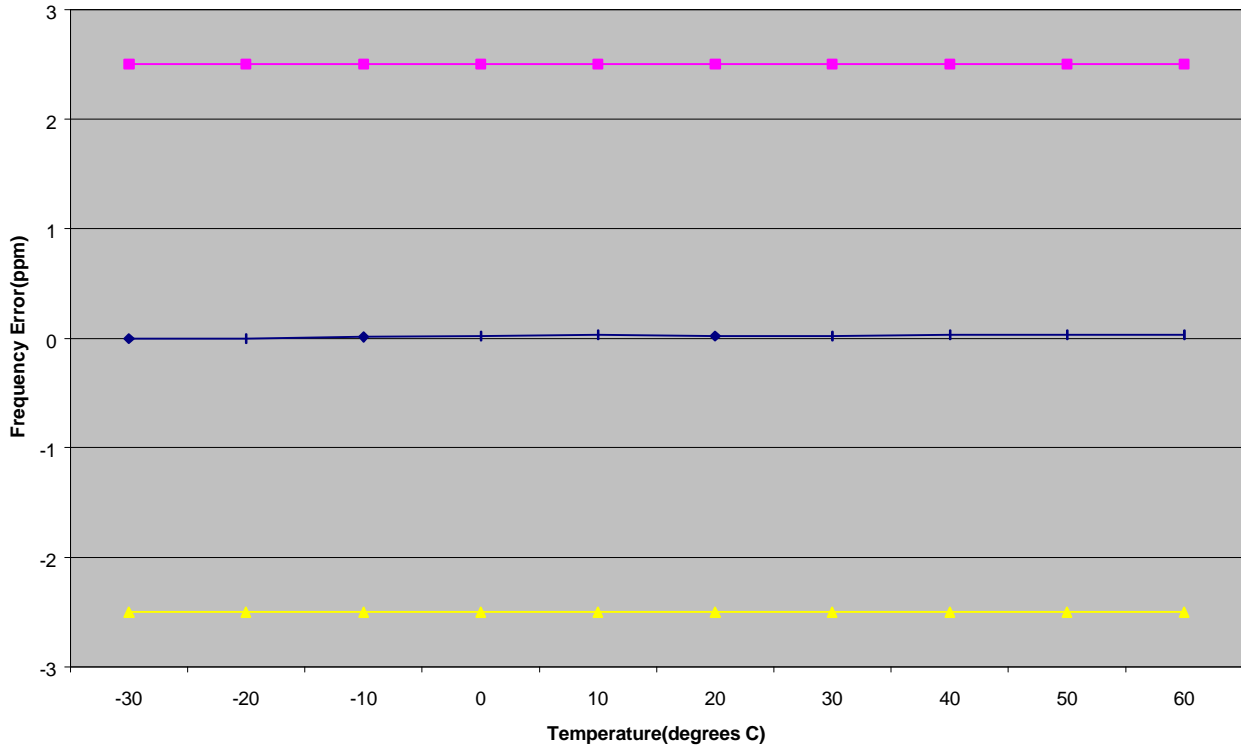
FCC Limits

- 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.

Frequency Stability over Temperature

Pursuant to FCC Rules 2.995(a)

Frequency Stability Over Temperature - AMPS



Method of Measurement:

Frequency measurements are made at the extremes of the temperature range -30 to +60 degrees centigrade and at intervals of not more than 10 degrees centigrade through out the range. Sufficient time is allowed prior to each measurement for the circuit components to stabilize.

FCC Limits -- Per 2.995 (1) & (2) and Applicable Rule Parts.

Part 22: - ± 2.5 ppm from -30 to +60 degrees centigrade

Part 24: - ± 200 Hz from -30 to +60 degrees centigrade

Frequency Stability over Temperature - TDMA

Pursuant to FCC Rules 2.995(a)

Method of Measurement:

Frequency measurements are made at the extremes of the temperature range -30 to +60 degrees centigrade and at intervals of not more than 10 degrees centigrade through out the range. Sufficient time is allowed prior to each measurement for the circuit components to stabilize.

FCC Limits -- Per 2.995 (1) & (2) and Applicable Rule Parts.

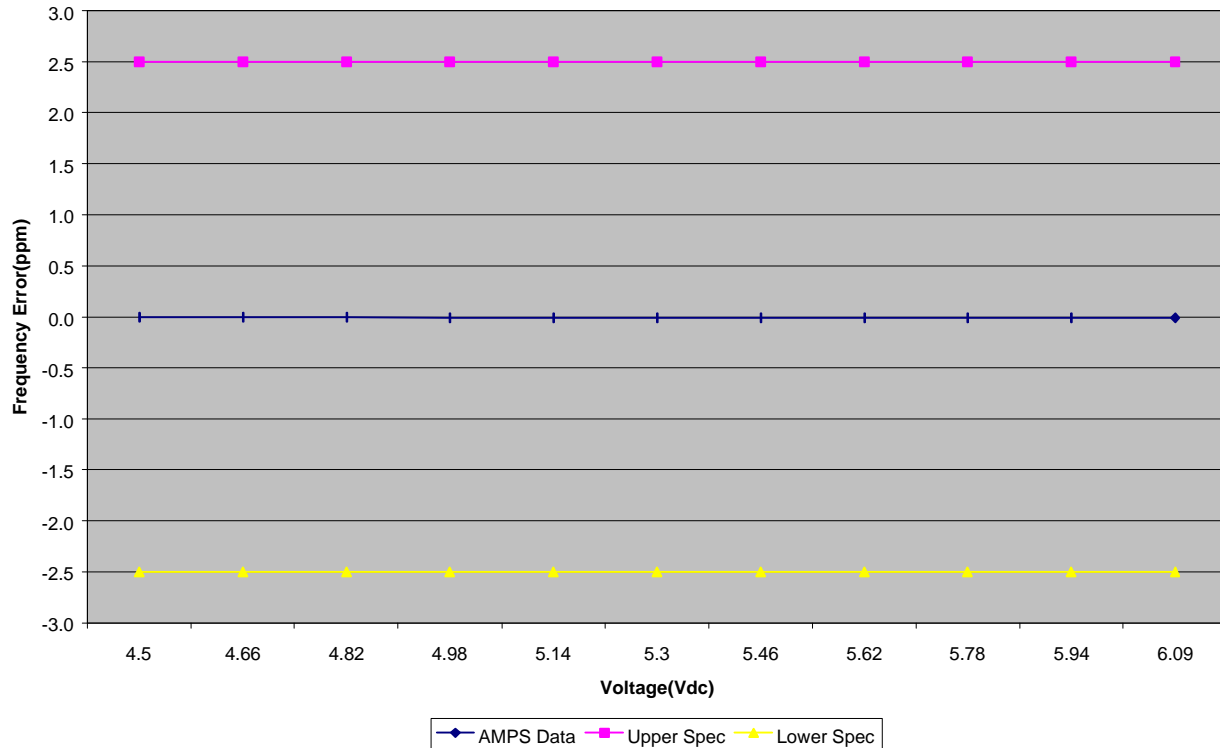
Part 22: - ± 2.5 ppm from -30 to +60 degrees centigrade

Part 24: - ± 200 Hz from -30 to +60 degrees centigrade

Frequency Stability over Voltage

Pursuant to FCC Rules 2.995(d)

Frequency Stability Over Voltage - AMPS



Method of Measurement:

The primary voltage was varied from 85% to 115% of the normal supply voltage. Voltage is measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

FCC Limits -- Per 2.995 (1) & (2) and Applicable Rule Parts.

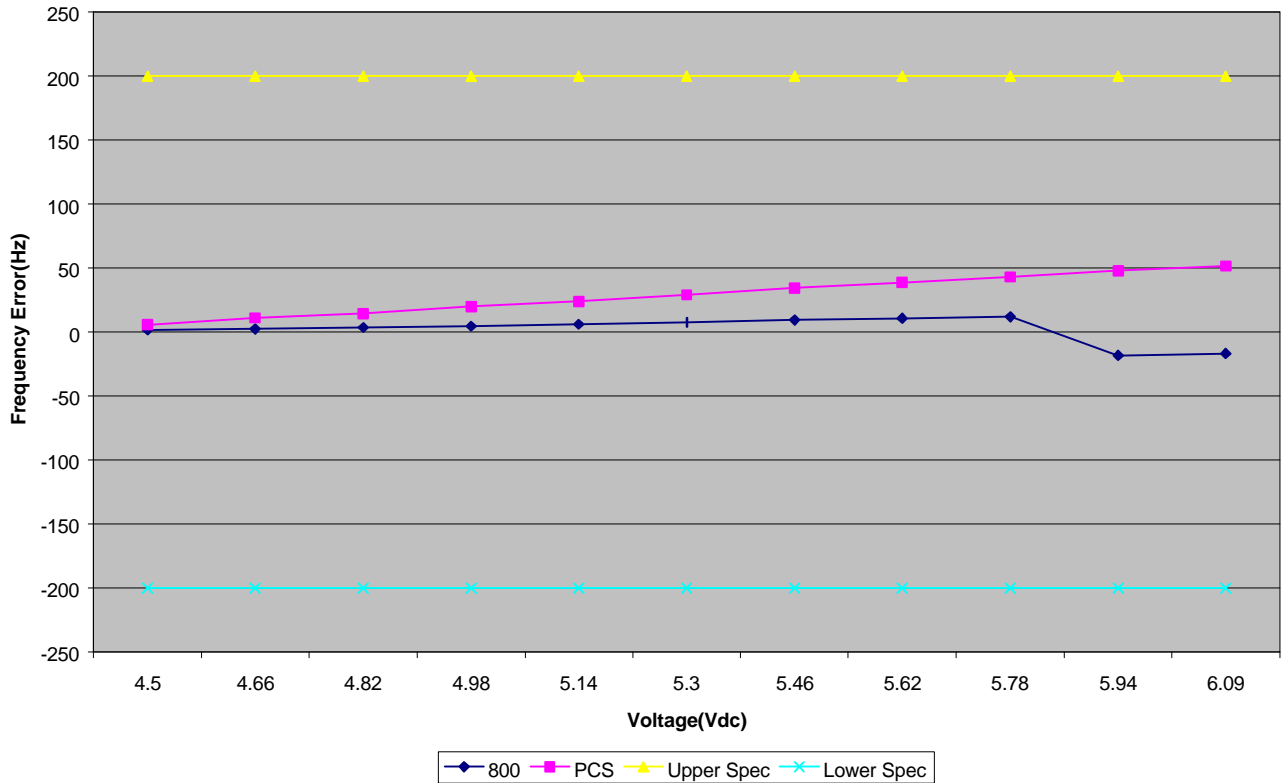
Part 22: - ± 2.5 ppm from 85% to 115% of nominal voltage.

Part 24: - ± 200 Hz from 85% to 115% of nominal voltage.

Frequency Stability over Voltage (cont.)

Pursuant to FCC Rules 2.995(d)

Frequency Stability Over Voltage - TDMA 800 & PCS



Method of Measurement:

The primary voltage was varied from 85% to 115% of the normal supply voltage. Voltage is measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

FCC Limits -- Per 2.995 (1) & (2) and Applicable Rule Parts.

Part 22: - ± 2.5 ppm from 85% to 115% of nominal voltage.

Part 24: - ± 200 Hz from 85% to 115% of nominal voltage.