6 FCC Rules and Regulations Part 2 §2.1053 (a): Field Strength of Spurious Radiation; RSS-119 §6.3: Unwanted Emissions

6.1 Test Procedure

ANSI TIA-603-C-2004, Section 2.2.12.

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 19,200 bps.

Analog Modulation: 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 1,000 Hz.

The spurious emissions levels were measured and the device under test was replaced by a substitution antenna connected to a signal generator. This signal generator level was then corrected by subtracting the cable loss from the substitution antenna to the signal generator, and the gain of the antenna was further corrected to a half wave dipole.

P_d(dBm) = P_g(dBm) – cable loss (dB) + antenna gain (dB)

where:

P_d is the dipole equivalent power
P_g is the generator output power into the substitution antenna

6.2 Test Data

6.2.1 CFR 47 Part 90.210 Requirements

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.

The VRM power was set to 40.0 dBm and the VRB was set to 34.8 dBm. Tests were run with both units were transmitting simultaneously at high power, and with both the VRM and VRB transmitting alone at high power.

Table 6-1: Field Strength of Spurious Radiation – VRM/VRB - 794.0125/764.0125 MHz; High Power

Freq = 794.0125 MHz
Limit = 43 + 10 Log P = 52.8 dBc
Conducted Power = 39.8 dBm = 9.6 W

Frequency (MHz)	Measured Level (dBuv)		Signal Gen. Level (db)		*Cable Loss (dB)	Antenna Gain (dBd)		Corrected level (dBc)		Limit (dBc)	Margin (dB)	
	H	V	H	V		H	V	H	V		H	V
1588.025	45.7	45.9	-19.5	-17.9	5.3	4.9	4.7	59.7	58.3	52.8	-6.9	-5.5
2382.038	47.2	48.2	-38.4	-37.5	6.2	6.5	6.6	77.9	76.8	52.8	-25.1	-24.0
3176.05	31.6	30.9	-43.8	-45.0	7.4	7.4	7.2	83.6	85.0	52.8	-30.8	-32.2
3970.063	36.5	33.8	-36.9	-40.1	8.5	7.2	7.0	78.0	81.4	52.8	-25.2	-28.6
4764.075	32.8	28.7	-31.8	-36.8	9.5	7.8	7.6	73.3	78.5	52.8	-20.5	-25.7
5558.088	20	20.9	-38.7	-37.6	10.4	8.2	8.2	80.7	79.6	52.8	-27.9	-26.8
6352.1	nf	nf	-	-	-	-	-	-	-	-	-	-
7146.13	nf	nf	-	-	-	-	-	-	-	-	-	-
7940.125	nf	nf	-	-	-	-	-	-	-	-	-	-

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

Freq = 764.0125 MHz
Limit = 43 + 10 Log P = 47.9 dBc
Conducted Power = 34.9 dBm = 3.1 W

Frequency (MHz)	Measured Level (dBuv)		Signal Gen. Level (db)		*Cable Loss (dB)	Antenna Gain (dBd)		Corrected level (dBc)		Limit (dBc)	Margin (dB)	
	H	V	H	V		H	V	H	V		H	V
1528.025	38.8	35	-26.6	-28.6	5.1	4.9	4.7	61.7	63.9	47.9	-13.8	-16.0
2292.038	31.4	33	-52.8	-51.7	6.2	6.8	6.2	87.1	86.6	47.9	-39.2	-38.7
3056.05	27	28.2	-49.8	-49.8	7.3	7.4	7.2	84.6	84.8	47.9	-36.7	-36.9
3820.063	22.5	23.2	-44.5	-45.4	8.3	7.0	7.1	80.7	81.5	47.9	-32.8	-33.6
4584.075	21.8	22.4	-42.1	-42.5	9.2	7.2	7.6	79.0	79.0	47.9	-31.1	-31.1
5348.088	20.4	20.7	-21.2	-22.9	10.2	8.3	7.8	58.0	60.2	47.9	-10.1	-12.3
6112.1	nf	nf	-	-	-	-	-	-	-	-	-	-
6876.113	nf	nf	-	-	-	-	-	-	-	-	-	-
7640.125	nf	nf	-	-	-	-	-	-	-	-	-	-

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

Table 6-2: Field Strength of Spurious Radiation – VRM/VRB - 794.0125/868.9875 MHz; High Power

Freq = 794.0125 MHz
Limit = 43 + 10 Log P = 52.8 dBc
Conducted Power = 39.8 dBm = 9.6 W

Frequency (MHz)	Measured Level (dBuv)		Signal Gen. Level (db)		*Cable Loss (dB)	Antenna Gain (dBd)		Corrected level (dBc)		Limit (dBc)	Margin (dB)	
1588.025	44	45.7	-21.2	-18.1	5.3	4.9	4.7	61.4	58.5	52.8	-8.6	-5.7
2382.038	49	47.8	-36.6	-37.8	6.2	6.5	6.6	76.1	77.2	52.8	-23.3	-24.4
3176.05	31	31.6	-44.4	-44.3	7.4	7.4	7.2	84.2	84.3	52.8	-31.4	-31.5
3970.063	35.3	34.9	-38.1	-39.0	8.5	7.2	7.0	79.2	80.3	52.8	-26.4	-27.5
4764.075	25.7	25.8	-38.9	-39.7	9.5	7.8	7.6	80.4	81.4	52.8	-27.6	-28.6
5558.088	19.5	20.8	-39.2	-37.7	10.4	8.2	8.2	81.2	79.7	52.8	-28.4	-26.9
6352.1	nf	nf	-	-	-	-	-	-	-	-	-	-
7146.113	nf	nf	-	-	-	-	-	-	-	-	-	-
7940.125	nf	nf	-	-	-	-	-	-	-	-	-	-

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

Freq = 868.9875 MHz
Limit = 43 + 10 Log P = 47.9 dBc
Conducted Power = 34.9 dBm = 3.1 W

Frequency (MHz)	Measured Level (dBuv)		Signal Gen. Level (db)		*Cable Loss (dB)	Antenna Gain (dBd)		Corrected level (dBc)		Limit (dBc)	Margin (dB)	
1737.975	23	23.2	-40.2	-40.2	5.3	5.1	4.8	75.3	75.6	47.9	-27.4	-27.6
2606.963	41.2	41.1	-41.6	-42.0	6.6	7.1	6.9	76.0	76.6	47.9	-28.1	-28.6
3475.95	20.6	24.4	-56.3	-53.7	7.8	7.6	7.3	91.4	89.1	47.9	-43.5	-41.1
4344.938	20.6	21.8	-45.6	-45.3	8.9	7.9	7.5	81.5	81.6	47.9	-33.5	-33.6
5213.925	21.8	22.9	-34.6	-34.8	10.0	7.9	7.8	71.6	71.9	47.9	-23.6	-23.9
6082.913	20.1	19.5	-35.6	-36.9	11.0	8.7	8.6	72.8	74.2	47.9	-24.8	-26.2
6951.9	nf	nf	-	-	-	-	-	-	-	-	-	-
7820.888	nf	nf	-	-	-	-	-	-	-	-	-	-
8689.875	nf	nf	-	-	-	-	-	-	-	-	-	-

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

Table 6-3: Field Strength of Spurious Radiation – VRM/VRB - 823.9875/764.0125 MHz; High Power

Freq = 823.9875 MHz
Limit = 43 + 10 Log P = 53 dBc
Conducted Power = 39.96 dBm = 9.9 W

Frequency (MHz)	Measured Level (dBuv)		Signal Gen. Level (db)		*Cable Loss (dB)	Antenna Gain (dBd)		Corrected level (dBc)		Limit (dBc)	Margin (dB)	
1647.975	41	37.3	-23.9	-26.4	5.3	5.0	4.7	64.1	67.0	53.0	-11.2	-14.0
2471.963	40.8	43.1	-43.0	-41.6	6.3	6.8	6.6	82.4	81.2	53.0	-29.5	-28.3
3295.95	40.3	39.5	-36.8	-38.7	7.7	7.5	7.4	76.9	79.0	53.0	-24.0	-26.0
4119.938	28.8	24.8	-39.9	-44.9	8.6	7.3	7.2	81.2	86.2	53.0	-28.2	-33.3
4943.925	22.9	20.5	-36.5	-40.2	9.8	7.7	7.7	78.5	82.2	53.0	-25.6	-29.3
5767.913	22.7	21.2	-39.4	-42.1	10.7	8.5	8.3	81.5	84.4	53.0	-28.6	-31.5
6591.9	nf	nf	-	-	-	-	-	-	-	-	-	-
7415.888	nf	nf	-	-	-	-	-	-	-	-	-	-
8239.875	nf	nf	-	-	-	-	-	-	-	-	-	-

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

Freq = 764.0125 MHz
Limit = 43 + 10 Log P = 47.6 dBc
Conducted Power = 34.67 dBm = 2.9 W

Frequency (MHz)	Measured Level (dBuv)		Signal Gen. Level (db)		*Cable Loss (dB)	Antenna Gain (dBd)		Corrected level (dBc)		Limit (dBc)	Margin (dB)	
1528.025	37.8	39.3	-27.6	-24.3	5.1	4.9	4.7	62.4	59.3	47.6	-14.8	-11.7
2292.038	32	29	-52.2	-55.7	6.2	6.8	6.2	86.2	90.3	47.6	-38.6	-42.7
3056.05	26.4	26.4	-50.4	-51.6	7.3	7.4	7.2	84.9	86.3	47.6	-37.3	-38.7
3820.063	23.3	22.8	-43.7	-45.8	8.3	7.0	7.1	79.6	81.6	47.6	-32.0	-34.0
4584.075	21.2	20	-42.7	-44.9	9.2	7.2	7.6	79.3	81.1	47.6	-31.7	-33.5
5348.088	20.5	20	-21.1	-23.6	10.2	8.3	7.8	57.6	60.6	47.6	-10.0	-13.0
6112.1	nf	nf	-	-	-	-	-	-	-	-	-	-
6876.113	nf	nf	-	-	-	-	-	-	-	-	-	-
7640.125	nf	nf	-	-	-	-	-	-	-	-	-	-

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

Table 6-4: Field Strength of Spurious Radiation – VRM/VRB - 823.0125/868.9875 MHz; High Power

Freq = 823.9875 MHz
Limit = 43 + 10 Log P = 53 dBc
Conducted Power = 39.96 dBm = 9.9 W

Frequency (MHz)	Measured Level (dBuv)		Signal Gen. Level (db)		*Cable Loss (dB)	Antenna Gain (dBd)		Corrected level (dBc)		Limit (dBc)	Margin (dB)	
1647.975	42.2	41.7	-22.7	-22.0	5.3	5.0	4.7	62.9	62.6	53.0	-10.0	-9.6
2471.963	43.2	42.5	-40.6	-42.2	6.3	6.8	6.6	80.0	81.8	53.0	-27.1	-28.9
3295.95	42.4	40.2	-34.7	-38.0	7.7	7.5	7.4	74.8	78.3	53.0	-21.9	-25.3
4119.938	29.5	26.5	-39.2	-43.2	8.6	7.3	7.2	80.5	84.5	53.0	-27.5	-31.6
4943.925	24	22.5	-35.4	-38.2	9.8	7.7	7.7	77.4	80.2	53.0	-24.5	-27.3
5767.913	25.7	22.4	-36.4	-40.9	10.7	8.5	8.3	78.5	83.2	53.0	-25.6	-30.3
6591.9	nf	nf	-	-	-	-	-	-	-	-	-	-
7415.888	nf	nf	-	-	-	-	-	-	-	-	-	-
8239.875	nf	nf	-	-	-	-	-	-	-	-	-	-

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

Freq = 868.9875 MHz
Limit = 43 + 10 Log P = 47.9 dBc
Conducted Power = 34.9 dBm = 3.1 W

Frequency (MHz)	Measured Level (dBuv)		Signal Gen. Level (db)		*Cable Loss (dB)	Antenna Gain (dBd)		Corrected level (dBc)		Limit (dBc)	Margin (dB)	
1737.975	25.1	24.8	-38.1	-38.6	5.3	5.1	4.8	73.2	74.0	47.9	-25.3	-26.0
2606.963	45.5	45.5	-37.3	-37.6	6.6	7.1	6.9	71.7	72.2	47.9	-23.8	-24.2
3475.95	23.2	23.8	-53.7	-54.3	7.8	7.6	7.3	88.8	89.7	47.9	-40.9	-41.7
4344.938	28	27.8	-38.2	-39.3	8.9	7.9	7.5	74.1	75.6	47.9	-26.1	-27.6
5213.925	21.6	22	-34.8	-35.7	10.0	7.9	7.8	71.8	72.8	47.9	-23.8	-24.8
6082.913	20.8	20.7	-34.9	-35.7	11.0	8.7	8.6	72.1	73.0	47.9	-24.1	-25.0
6951.9	nf	nf	-	-	-	-	-	-	-	-	-	-
7820.888	nf	nf	-	-	-	-	-	-	-	-	-	-
8689.875	nf	nf	-	-	-	-	-	-	-	-	-	-

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

Table 6-5: Field Strength of Spurious Radiation – VRM - 775.9875 MHz; High Power

Freq = 775.9875 MHz
Limit = 43 + 10 Log P = 53 dBc
Conducted Power = 40 dBm = 10 W

Frequency (MHz)	Measured Level (dBuv)		Signal Gen. Level (db)		*Cable Loss (dB)	Antenna Gain (dBd)		Corrected level (dBc)		Limit (dBc)	Margin (dB)	
1551.975	50.5	49.1	-14.9	-14.8	5.2	4.9	4.7	55.2	55.3	53.0	-2.2	-2.3
2327.963	50.9	47.8	-35.6	-38.8	6.2	6.5	5.8	75.3	79.2	53.0	-22.3	-26.2
3103.95	47.4	46.1	-31.0	-32.5	7.4	7.4	7.3	71.0	72.6	53.0	-18.0	-19.6
3879.938	34.8	35.2	-35.9	-35.4	8.4	7.2	7.1	77.1	76.7	53.0	-24.1	-23.7
4655.925	28	26.7	-36.4	-38.2	9.2	7.8	7.8	77.8	79.6	53.0	-24.8	-26.6
5431.913	20.7	20.7	-28.2	-28.0	10.3	8.3	7.8	70.2	70.5	53.0	-17.2	-17.5
6207.9	nf	nf	-	-	-	-	-	-	-	-	-	-
6983.888	nf	nf	-	-	-	-	-	-	-	-	-	-
7759.875	nf	nf	-	-	-	-	-	-	-	-	-	-

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

Table 6-6: Field Strength of Spurious Radiation – VRM - 805.9875 MHz; High Power

Freq = 805.9875 MHz
Limit = 43 + 10 Log P = 53 dBc
Conducted Power = 40 dBm = 10 W

Frequency (MHz)	Measured Level (dBuv)		Signal Gen. Level (db)		*Cable Loss (dB)	Antenna Gain (dBd)		Corrected level (dBc)		Limit (dBc)	Margin (dB)	
	H	V	H	V		H	V	H	V		H	V
1611.975	43.8	43.2	-21.5	-21.1	5.2	4.9	4.7	61.8	61.6	53.0	-8.8	-8.6
2417.963	40.6	41.2	-42.4	-43.3	6.2	6.8	6.5	81.8	83.0	53.0	-28.8	-30.0
3223.95	30.5	30.8	-46.0	-47.0	7.4	7.5	7.3	85.9	87.1	53.0	-32.9	-34.1
4029.938	37.1	36.2	-35.1	-37.2	8.6	7.1	6.9	76.6	78.9	53.0	-23.6	-25.9
4835.925	26.1	23.7	-35.1	-38.1	9.5	7.8	7.6	76.8	80.0	53.0	-23.8	-27.0
5641.913	23.1	21.9	-37.2	-39.4	10.6	8.3	8.3	79.5	81.7	53.0	-26.5	-28.7
6447.9	nf	nf	-	-	-	-	-	-	-	-	-	-
7253.888	nf	nf	-	-	-	-	-	-	-	-	-	-
8059.875	nf	nf	-	-	-	-	-	-	-	-	-	-

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

Table 6-7: Field Strength of Spurious Radiation – VRM – 806.0125 MHz; High Power

Freq = 806.0125 MHz
Limit = 43 + 10 Log P = 53.2 dBc
Conducted Power = 40.2 dBm = 10.4 W

Frequency (MHz)	Measured Level (dBuv)		Signal Gen. Level (db)		*Cable Loss (dB)	Antenna Gain (dBd)		Corrected level (dBc)		Limit (dBc)	Margin (dB)	
	H	V	H	V		H	V	H	V		H	V
1612.025	42.4	43.4	-21.9	-21.8	5.2	4.9	4.8	62.3	62.3	53.2	-9.2	-9.2
2418.038	45.7	41.6	-37.6	-42.5	6.2	6.8	6.5	77.1	82.3	53.2	-24.0	-29.2
3224.05	31.8	30.9	-45.1	-46.6	7.4	7.5	7.3	85.2	86.8	53.2	-32.0	-33.7
4030.063	32.6	34.5	-40.3	-39.4	8.6	7.1	6.9	81.9	81.2	53.2	-28.8	-28.1
4836.075	24.8	23.2	-37.0	-38.9	9.5	7.8	7.6	78.8	80.9	53.2	-25.7	-27.8
5642.088	23.3	21.8	-37.4	-39.7	10.6	8.3	8.2	79.8	82.2	53.2	-26.7	-29.1
6448.1	nf	nf	-	-	-	-	-	-	-	-	-	-
7254.113	nf	nf	-	-	-	-	-	-	-	-	-	-
8060.125	nf	nf	-	-	-	-	-	-	-	-	-	-

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

Table 6-8: Field Strength of Spurious Radiation – VRM – 851.0125 MHz; High Power

Freq = 851.0125 MHz
Limit = 43 + 10 Log P = 53 dBc
Conducted Power = 40.1 dBm = 10.1 W

Frequency (MHz)	Measured Level (dBuv)		Signal Gen. Level (db)		*Cable Loss (dB)	Antenna Gain (dBd)		Corrected level (dBc)		Limit (dBc)	Margin (dB)	
	H	V	H	V		H	V	H	V		H	V
1702.025	38.9	35.4	-25.4	-28.1	5.3	4.8	4.9	66.0	68.6	53.0	-12.9	-15.5
2553.038	48.2	46.7	-34.9	-35.1	6.5	7.0	7.1	74.5	74.6	53.0	-21.4	-21.5
3404.05	42.6	40.6	-34.8	-35.2	7.7	7.3	7.5	75.3	75.5	53.0	-22.2	-22.4
4255.063	53.5	50.3	-15.5	-19.9	8.8	7.3	7.6	57.1	61.2	53.0	-4.0	-8.1
5106.075	50.2	50	-12.9	-13.0	9.9	7.7	7.5	55.2	55.5	53.0	-2.1	-2.4
5957.088	43.6	38.7	-16.3	-21.6	11.0	8.5	8.5	58.9	64.2	53.0	-5.8	-11.1
6808.1	nf	nf	-	-	-	-	-	-	-	-	-	-
7659.113	nf	nf	-	-	-	-	-	-	-	-	-	-
8510.125	nf	nf	-	-	-	-	-	-	-	-	-	-

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

Table 6-9: Field Strength of Spurious Radiation – VRB – 764.0125 MHz; High Power

Freq = 764.0125 MHz
Limit = 43 + 10 Log P = 47.6 dBc
Conducted Power = 34.7 dBm = 2.9 W

Frequency (MHz)	Measured Level (dBuv)		Signal Gen. Level (db)		*Cable Loss (dB)	Antenna Gain (dBd)		Corrected level (dBc)		Limit (dBc)	Margin (dB)	
	H	V	H	V		H	V	H	V		H	V
1528.025	39.1	38.3	-26.3	-25.3	5.1	4.9	4.7	61.1	60.3	47.6	-13.5	-12.7
2292.038	34.4	34.9	-49.8	-49.8	6.2	6.8	6.2	83.8	84.4	47.6	-36.2	-36.8
3056.05	29.1	28	-47.7	-50.0	7.3	7.4	7.2	82.2	84.7	47.6	-34.6	-37.1
3820.063	26.5	24.5	-40.5	-44.1	8.3	7.0	7.1	76.4	79.9	47.6	-28.8	-32.3
4584.075	23.2	22.3	-40.7	-42.6	9.2	7.2	7.6	77.3	78.8	47.6	-29.7	-31.2
5348.088	22	21.6	-19.6	-22.0	10.2	8.3	7.8	56.1	59.0	47.6	-8.5	-11.4
6112.1	nf	nf	-	-	-	-	-	-	-	-	-	-
6876.113	nf	nf	-	-	-	-	-	-	-	-	-	-
7640.125	nf	nf	-	-	-	-	-	-	-	-	-	-

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

Table 6-10: Field Strength of Spurious Radiation – VRB – 851.0125 MHz; High Power

Freq = 851.0125 MHz
Limit = 43 + 10 Log P = 47.8 dBc
Conducted Power = 34.8 dBm = 3 W

Frequency (MHz)	Measured Level (dBuv)		Signal Gen. Level (db)		*Cable Loss (dB)	Antenna Gain (dBd)		Corrected level (dBc)		Limit (dBc)	Margin (dB)	
	H	V	H	V		H	V	H	V		H	V
1702.025	33.7	31.6	-30.6	-31.9	5.3	4.8	4.9	65.9	67.1	47.8	-18.1	-19.3
2553.038	38.7	40.6	-44.4	-41.2	6.5	7.0	7.1	78.7	75.4	47.8	-30.9	-27.6
3404.05	20.4	20.8	-57.0	-55.0	7.7	7.3	7.5	92.2	90.0	47.8	-44.4	-42.2
4255.063	28.6	24.7	-40.4	-45.5	8.8	7.3	7.6	76.7	81.5	47.8	-28.9	-33.7
5106.075	22.0	21.3	-41.1	-41.7	9.9	7.7	7.5	78.1	78.9	47.8	-30.3	-31.1
5957.088	22.1	21	-37.8	-39.3	11.0	8.5	8.5	75.1	76.6	47.8	-27.3	-28.8
6808.1	nf	nf	-	-	-	-	-	-	-	-	-	-
7659.113	nf	nf	-	-	-	-	-	-	-	-	-	-
8510.125	nf	nf	-	-	-	-	-	-	-	-	-	-

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

Table 6-11: Test Equipment for Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz – 2 GHz)	2648	11/1/07
900814	Electro-Metrics	EM-6961 (RGA-60)	Double Ridge Guide Antenna (1 - 18 GHz)	2310	3/30/09
900772	Emco	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	5/20/07
900321	Emco	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	5/20/07
900323	Emco	3160-07	Horn Antenna (8.2 - 12.4 GHz)	9605-1054	7/31/09
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	N/A
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz - 12.8 GHz)	3826A00144	10/16/07

Test Personnel:

Daniel Biggs	Daniel Biggs	January 18, 2007
Test Technician/Engineer	Signature	Date Of Test

7 FCC Rules and Regulations Part 90 §90.543(a): Emission Limitations: ACP Requirements

Transmitters designed to operate in the 764-776 MHz and 794-806 MHz frequency bands must meet the emission limitations of this section.

7.1 Test Procedure

Device with digital modulation: modulated to its maximum extent using a pseudo-random data sequence – 19,200 bps.

For a base transmitter designed to operate with a 25 kHz channel bandwidth, the ACCP shall be in accordance with the following table:

Offset from Center Frequency (kHz)	Measurement Bandwidth (kHz)	Maximum ACCP (dBc)
15.625	6.25	-40
21.875	6.25	-60
37.5	25	-60
62.5	25	-65
87.5	25	-65
150	100	-65
250	100	-65
>400 to receive band	30(s)	(1)
In the receive band	30(s)	-100

[1]-80 (continues @-6dB/oct)

For a base transmitter designed to operate with a 12.5 kHz channel bandwidth, the ACCP shall be in accordance with the following table:

Offset from Center Frequency (kHz)	Measurement Bandwidth (kHz)	Maximum ACCP (dBc)
9.375	6.25	-40
15.625	6.25	-40
21.875	6.25	-60
37.5	25	-60
62.5	25	-65
87.5	25	-65
150	100	-65
250	100	-65
>400 to receive band	30(s)	(1)
In the receive band	30(s)	-100

[1]-80 (continues @-6dB/oct)

FCC Rules and Regulations Part 90 §90.543(b)

Setting Reference Level - Part 90 §90.543(b)(1): using a spectrum analyzer capable of ACP measurements, set the measurement bandwidth to the channel size 25 kHz. Set the frequency offset of the measurement to zero and adjust the center frequency of the spectrum analyzer to give the power level in the measurement bandwidth. Record this power as the reference power level.

Measuring the power level at the frequency offset <600 kHz - Part 90 §90.543(b)(2): using a spectrum analyzer capable of ACP measurements, set the measurement bandwidth as shown in the table. Measure ACP in dBm. These measurements were made at maximum power. Calculate the coupled power by subtracting the measurements made in this step from the reference power level. The absolute ACP values must be less than the values given in the table for each condition.

Measuring the power level at the frequency offset >600 kHz - Part 90 §90.543(b)(3): set the spectrum analyzer to 30 kHz resolution bandwidth, 1 MHz video bandwidth, and sample detection mode. Sweep +/-6 MHz from the carrier frequency. Set the reference level to the RMS value of the transmitter power and note the power. The response at frequencies >600 kHz must be less than the values listed in the table.

7.2 Test Data

Table 7-1: ACP – VRM; P25 Mode; 12.5 KHz Channel

			764.0125		775.9875		805.9875	
Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)
(+/-)9.375	6.25	-40	-43.2	-43.3	-40.4	-42.6	-40.1	-40.1
(+/-)15.625	6.25	-40	-71.9	-71.2	-71.5	-71.3	-71.8	-72.0
(+/-)21.875	6.25	-60	-73.9	-73.5	-72.9	-73.1	-73.2	-73.4
(+/-)37.5	25	-60	-71.6	-71.3	-71.0	-71.4	-71.2	-71.3
(+/-)62.5	25	-65	-76.5	-75.6	-75.7	-75.8	-75.8	-75.8
(+/-)87.5	25	-65	-79.3	-78.7	-78.8	-78.9	-78.8	-78.8
(+/-)150	100	-65	-77.3	-77.2	-77.3	-77.2	-77.2	-77.3
(+/-)250	100	-65	-81.4	-81.4	-81.7	-81.8	-81.6	-81.7

Table 7-2: ACP – VRB; P25 Mode; 12.5 KHz Channel

			764.0125		775.9875	
Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)
(+/-)9.375	6.25	-40	41.1	-41.9	-40.7	-40.2
(+/-)15.625	6.25	-40	-71.4	-70.8	-71.1	-70.9
(+/-)21.875	6.25	-60	-71.8	-71.5	-71.2	-71.7
(+/-)37.5	25	-60	-71.0	-70.8	-71.4	-70.3
(+/-)62.5	25	-65	-75.6	-76.2	-70.3	-75.7
(+/-)87.5	25	-65	-78.7	-79.3	-78.5	-78.8
(+/-)150	100	-65	-76.9	-76.8	-76.9	-76.8
(+/-)250	100	-65	-81.3	-81.2	-81.0	-81.0

Table 7-3: ACP – VRM; P25 Mode; 12.5 KHz Channel

			764.0125	794.0125	805.9875
Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP Low Offset (dBc)	Max ACP Low Offset (dBc)
<400 to 12MHz	30(s)	-75	-86.7	-87.9	-87.6
12MHz to receive band	30(s)	-75	-92.2	-97.5	-91.7
In receive band	30(s)	-100	-108.2	-108.1	-108

Table 7-4: ACP – VRB; P25 Mode; 12.5 KHz Channel

			764.0125	775.9875
Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP Low Offset (dBc)
<400 to 12MHz	30(s)	-75	-87.6	-87.6
12MHz to receive band	30(s)	-75	-90.1	-93.0
In receive band	30(s)	-100	-107.8	-108.1

Table 7-5: ACP – VRM; OTP Mode; 25 KHz Channel

			794.0125		805.9875	
Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)
(+/-)15.625	6.25	-40	-54.2	-56.4	-54.2	-56.4
(+/-)21.875	6.25	-60	-73.1	-73.3	-73.1	-73.3
(+/-)37.5	25	-60	-71.5	-71.4	-71.5	-71.4
(+/-)62.5	25	-65	-76.1	-76.1	-76.1	-76.1
(+/-)87.5	25	-65	-79.2	-79.1	-79.2	-79.1
(+/-)150	100	-65	-77.3	-77.3	-77.2	-77.2
(+/-)250	100	-65	-81.8	-81.7	-81.5	-81.6

Table 7-6: ACP – VRB; OTP Mode; 25 KHz Channel

			764.0125		775.9875	
Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)
(+/-)15.625	6.25	-40	-70.0	-69.9	-69.5	-69.3
(+/-)21.875	6.25	-60	-71.9	-72.2	-70.9	-71.4
(+/-)37.5	25	-60	-70.5	-70.7	-69.7	-70.1
(+/-)62.5	25	-65	-76.0	-76.2	-75.5	-75.5
(+/-)87.5	25	-65	-78.9	-79.2	-78.2	-78.5
(+/-)150	100	-65	-77.0	-76.9	-76.7	-76.7
(+/-)250	100	-65	-81.3	-81.2	-81.0	-81.0

Table 7-7: ACP – VRM; OTP Mode; 25 KHz Channel

			794.0125	805.9875
Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP Low Offset (dBc)
<400 to 12MHz	30(s)	-75	-87.3	-87.8
12MHz to receive band	30(s)	-75	-97.4	-91.6
In receive band	30(s)	-100	-108.2	-108.3

Table 7-8: ACP – VRB; OTP Mode; 25 KHz Channel

			764.0125	775.9875
Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP Low Offset (dBc)
<400 to 12MHz	30(s)	-75	-87.5	-88.1
12MHz to receive band	30(s)	-75	-92.9	-92.9
In receive band	30(s)	-100	-108.1	-108.0

Table 7-9: ACP – VRM; OCF Mode; 12.5 KHz Channel

			764.0125		794.0125		805.9875	
Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)
(+/-)9.375	6.25	-40	-40.1	-41.3	-40.4	-41.4	-40.4	-41.3
(+/-)15.625	6.25	-40	-71.5	-72.2	-71.4	-71.5	-72.1	-72.1
(+/-)21.875	6.25	-60	-73.1	-73.7	-73.0	-73.0	-72.7	-73.3
(+/-)37.5	25	-60	-71.6	-71.5	-71.6	-71.4	-71.5	-71.5
(+/-)62.5	25	-65	-75.8	-76.2	-76.0	-76.1	-76.2	-76.2
(+/-)87.5	25	-65	-78.9	-79.2	-79.3	-79.3	-79.1	-79.2
(+/-)150	100	-65	-77.1	-77.1	-77.2	-77.3	-77.3	-77.3
(+/-)250	100	-65	-81.4	-81.3	-81.7	-81.7	-81.6	-81.7

Table 7-10: ACCP – VRM; OCF Mode; 12.5 KHz Channel

			764.0125	794.0125	805.9875
Offset from Center Frequency (kHz)	**Measurement BW (kHz)**	**Max ACP (dBc)**	**Max ACP Low Offset (dBc)**	**Max ACP Low Offset (dBc)**	**Max ACP Low Offset (dBc)**
<400 to 12MHz	30(s)	-75	-76.9	-78.5	-80.1
12MHz to receive band	30(s)	-75	-76.9	-78.5	-80.1
In receive band	30(s)	-100	107.1	-108.1	-108

Table 7-11: Test Equipment for Testing ACP

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	12/14/07
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	12/2/08
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	1/23/07

Test Personnel:

Daniel Biggs	Daniel Biggs	January 8, 2007
Test Technician/Engineer	Signature	Date Of Test

8 FCC Rules and Regulations Part 2 §2.1049 (c) (1): Occupied Bandwidth; RSS-119 §6.4: Emissions Masks

8.1 Test Procedure

ANSI TIA-603-C-2004, Section 2.2.11.

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 19,200 bps.

Limit Mask B:

(1) On any frequency removed from the assigned frequency by more than 50%, but not more than 100% of the authorized bandwidth: At least **25 dB**.
(2) On any frequency removed from the assigned frequency by more than 100%, but not more than 250% of the authorized bandwidth: At least **35 dB**.
(3) On any frequency removed from the assigned frequency by more than 250% of the authorized bandwidth: at least **43 + 10 log (P) dB**.

Limit Mask G:

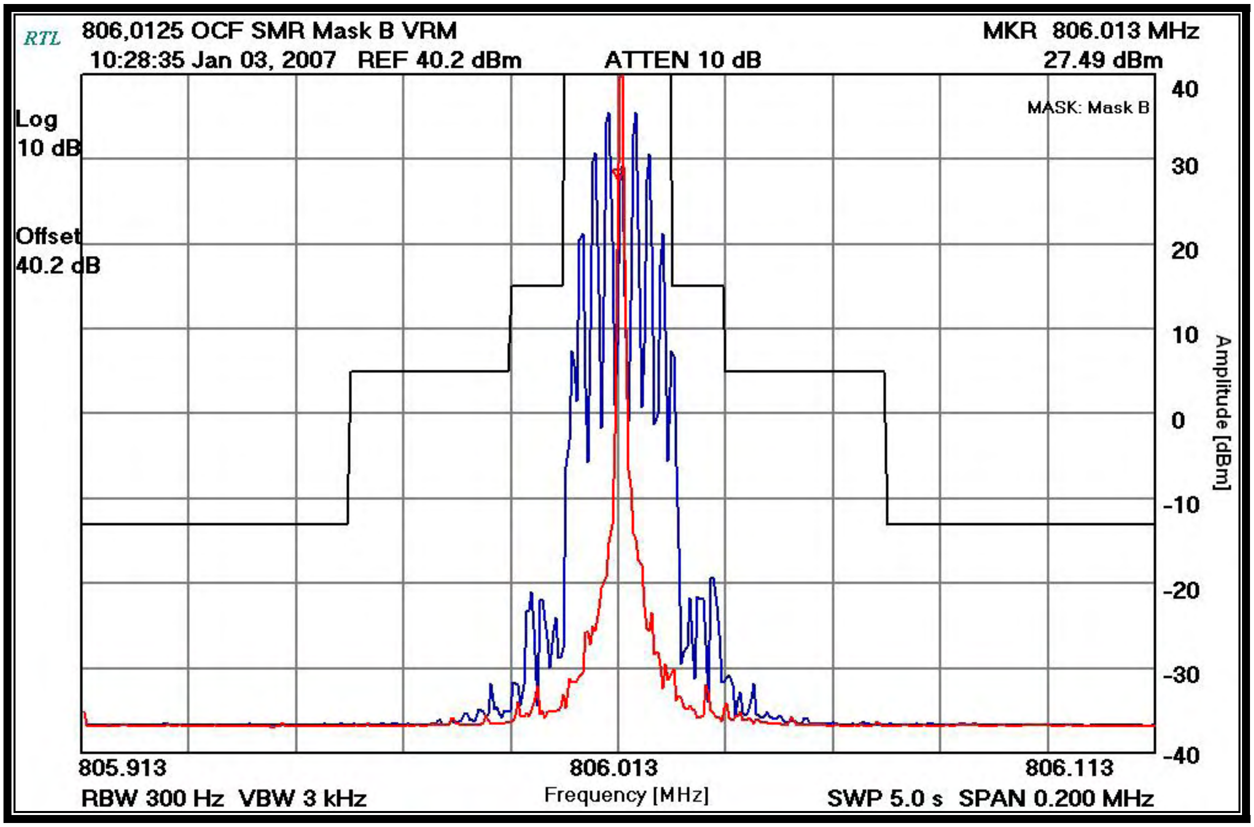
(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5 kHz, but not more than 10KHz: At least **83 log (fd/5) dB**;
(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 10 kHz, but not more than 250%, of the authorized bandwidth: At least **116 log (fd/6.1) dB** or **50+ 10 log (P) dB**, or **70 dB**, whichever is the lesser attenuation;
(3) On any frequency removed from the center of the authorized bandwidth by more than 250% of the authorized bandwidth: At least **43 + 10 log (P) dB**.

Limit Mask H:

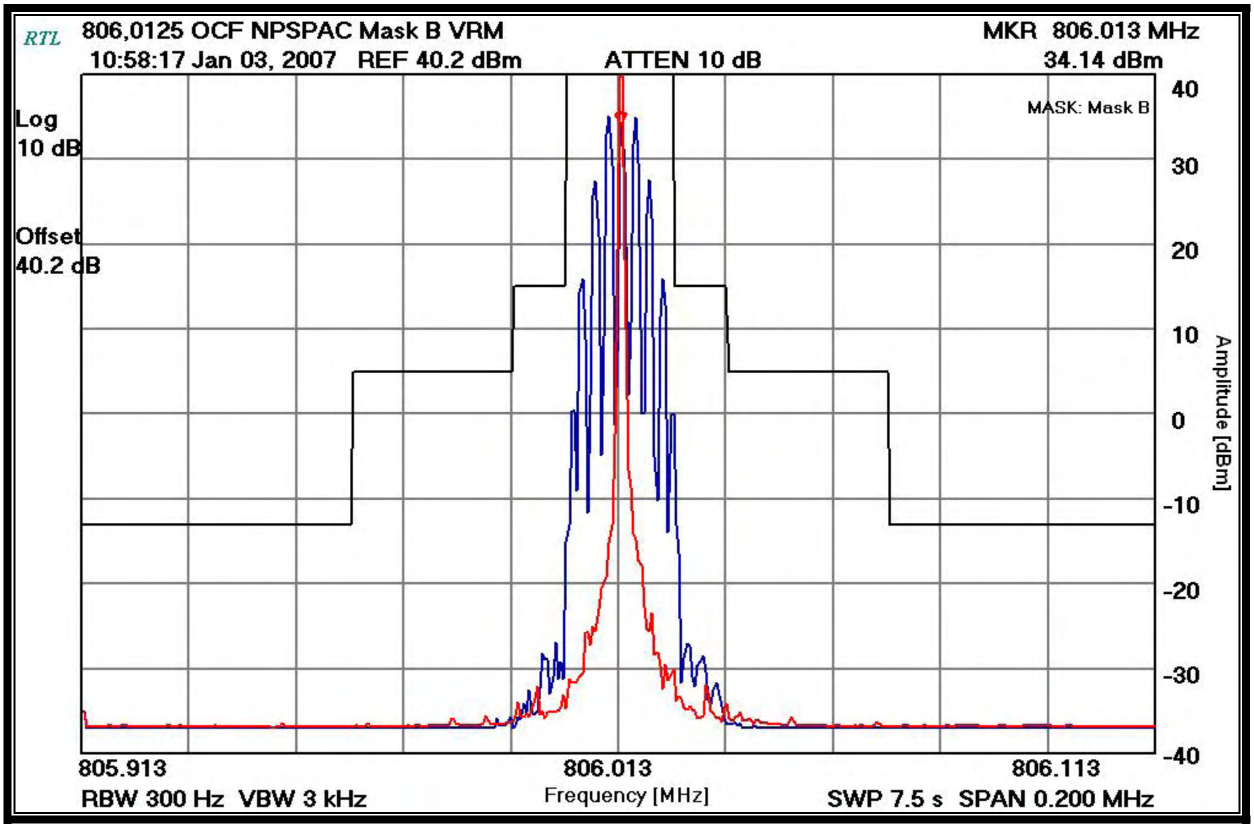
(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of 4 kHz or less, **Zero dB**;
(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 4 kHz, but not more than 8.5 kHz: At least **107 log (fd/4) dB**;
(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 8.5 kHz, but not more than 15 kHz: At least **40.5 log (fd/1.16) dB;**
(4) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 15 kHz, but not more than 25 kHz: At least **116 log (fd/6.1) dB;**
(5) On any frequency removed from the center of the authorized bandwidth by more than 25 kHz: At least **43 + 10 log (P) dB.**

8.2 Test Data

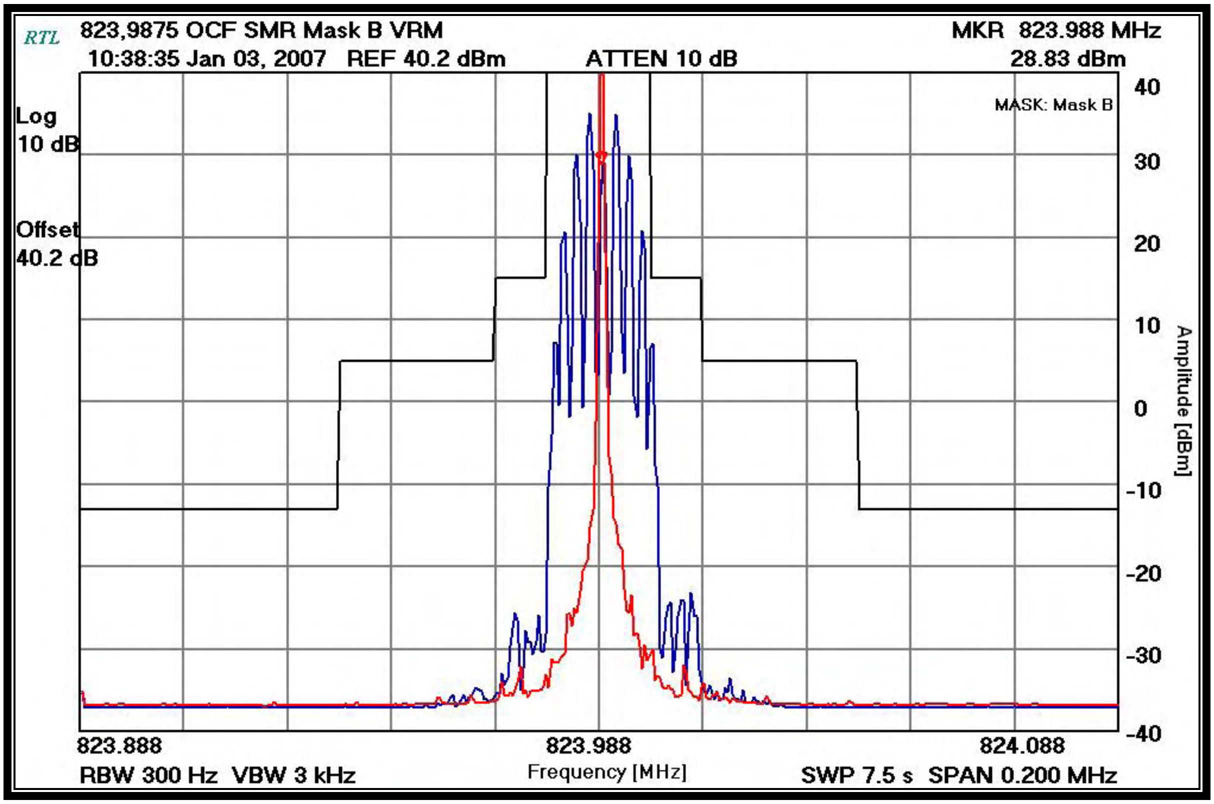
Plot 8-1: Emissions Masks – VRM – SMR; OCF; 806.0125 MHz



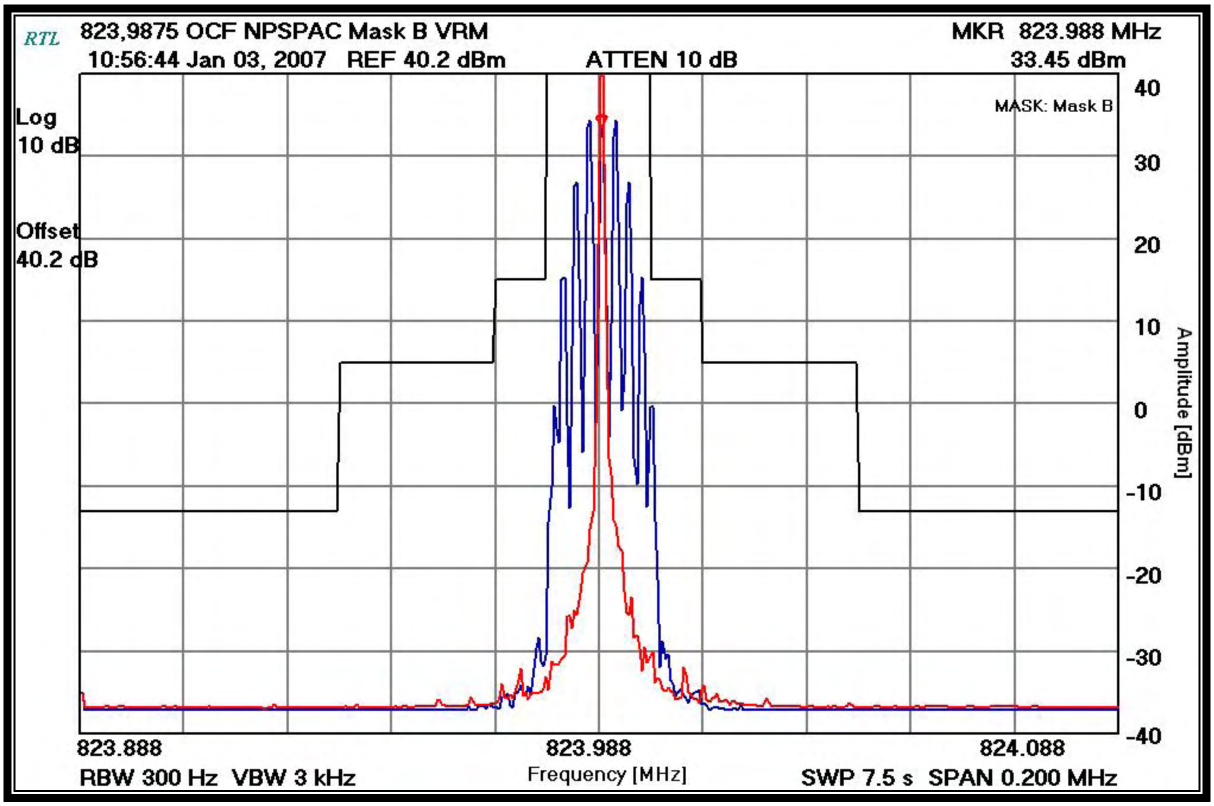
Plot 8-2: Emissions Masks – VRM – NPSPAC; OCF; 806.0125 MHz



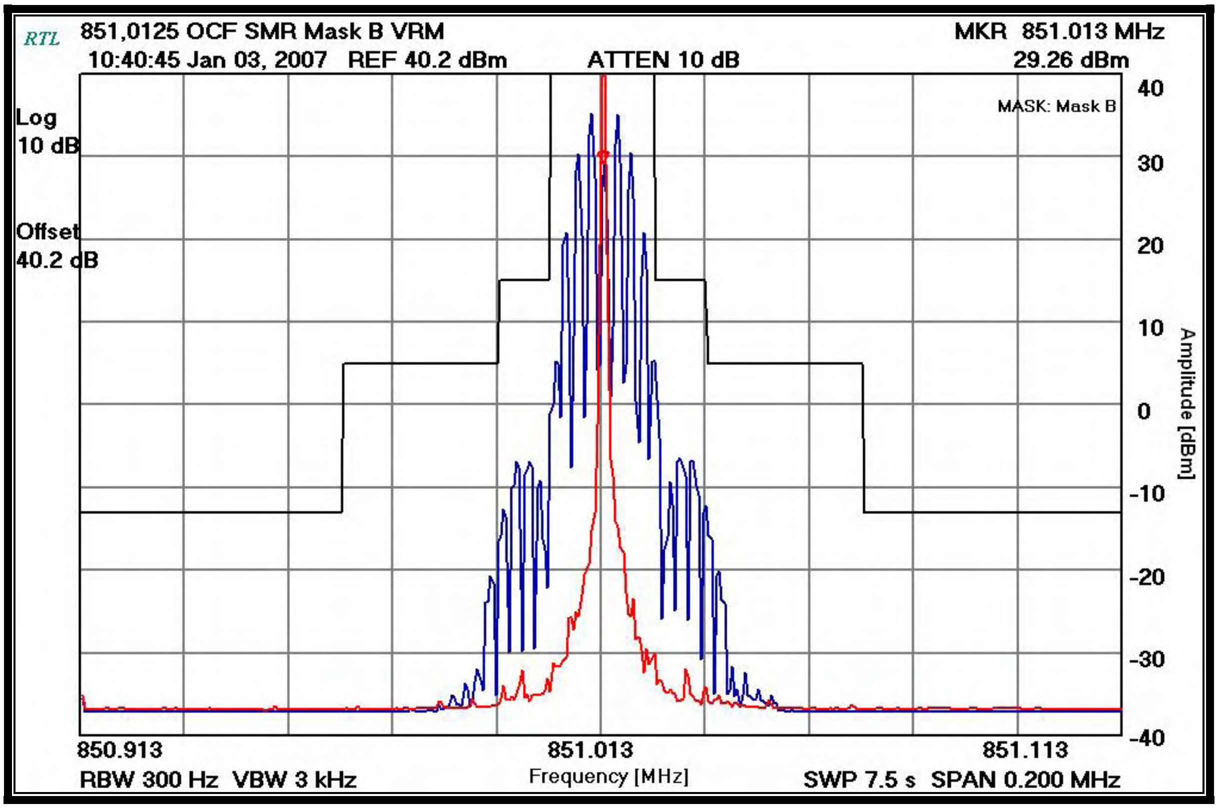
Plot 8-3: Emissions Masks – VRM – SMR; OCF; 823.9875 MHz



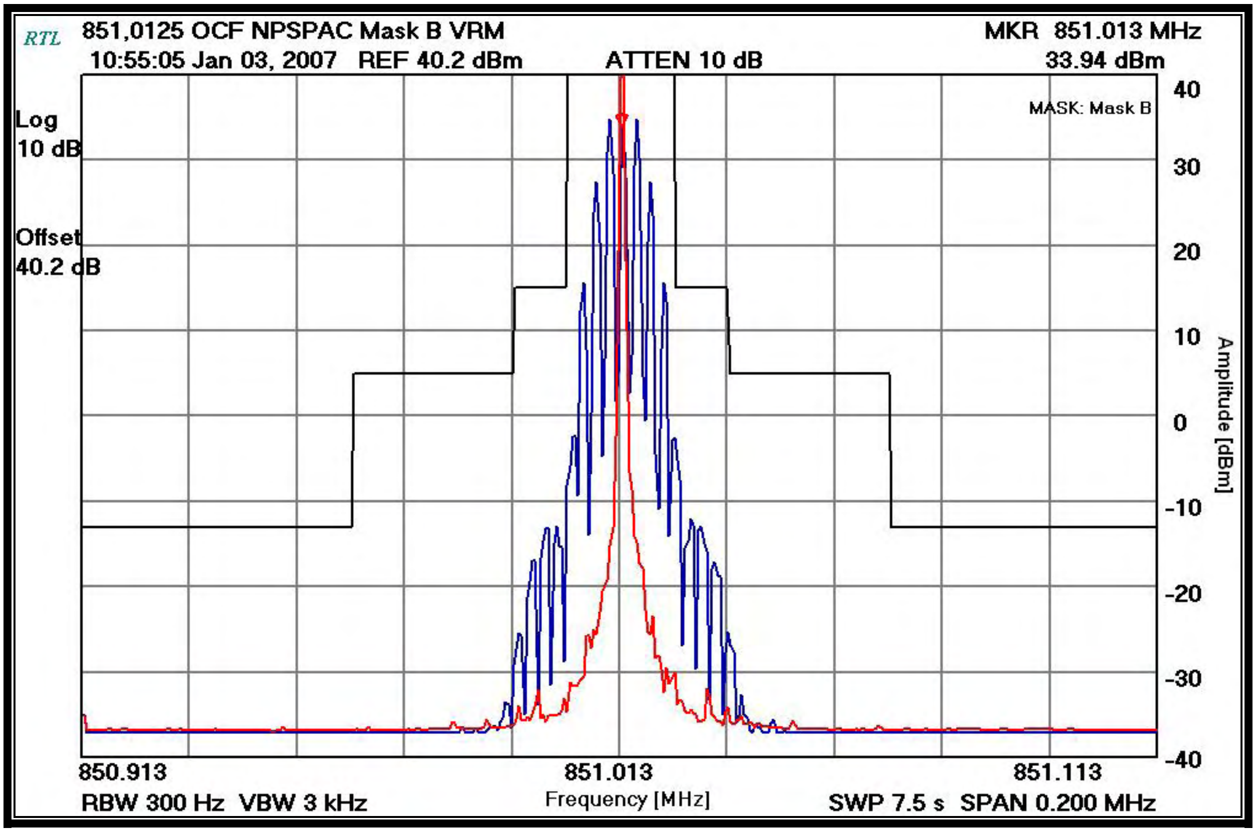
Plot 8-4: Emissions Masks – VRM – NPSPAC; OCF; 823.9875 MHz



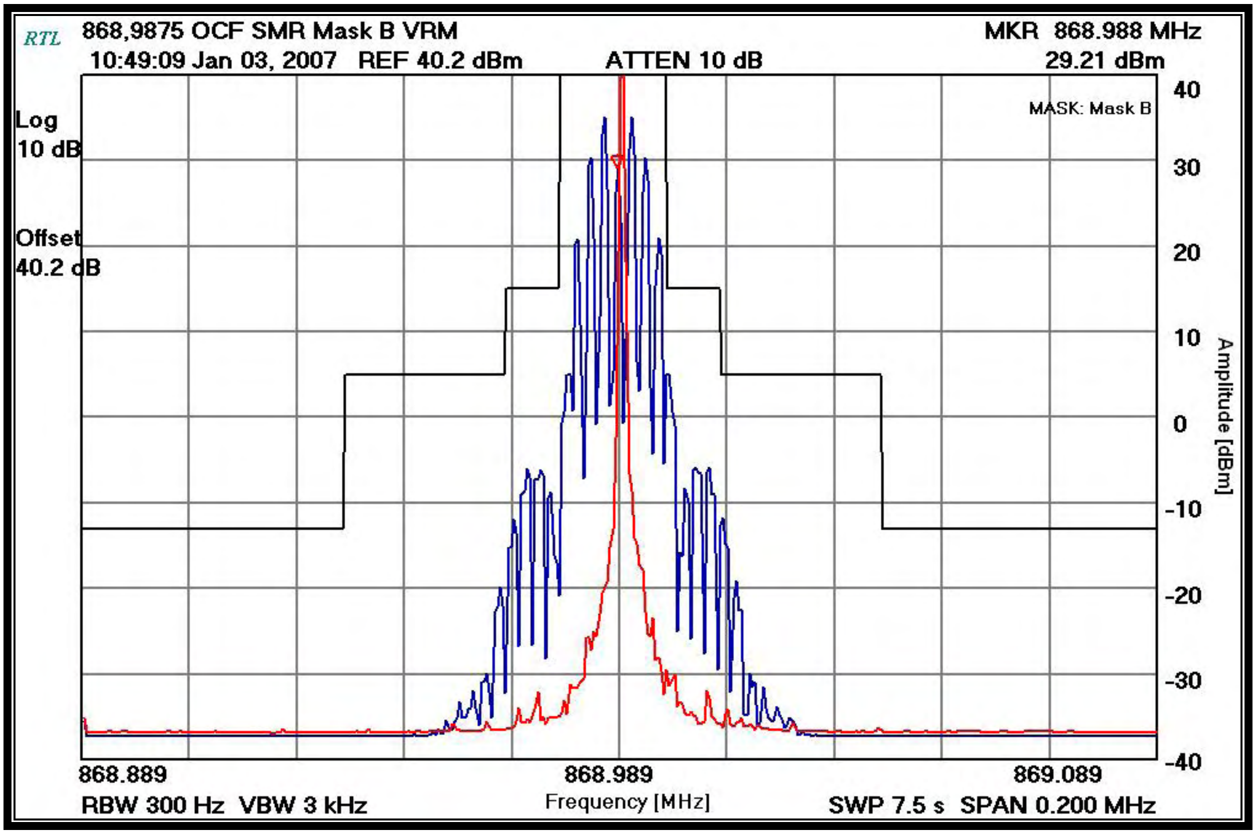
Plot 8-5: Emissions Masks – VRM – SMR; OCF; 851.0125 MHz



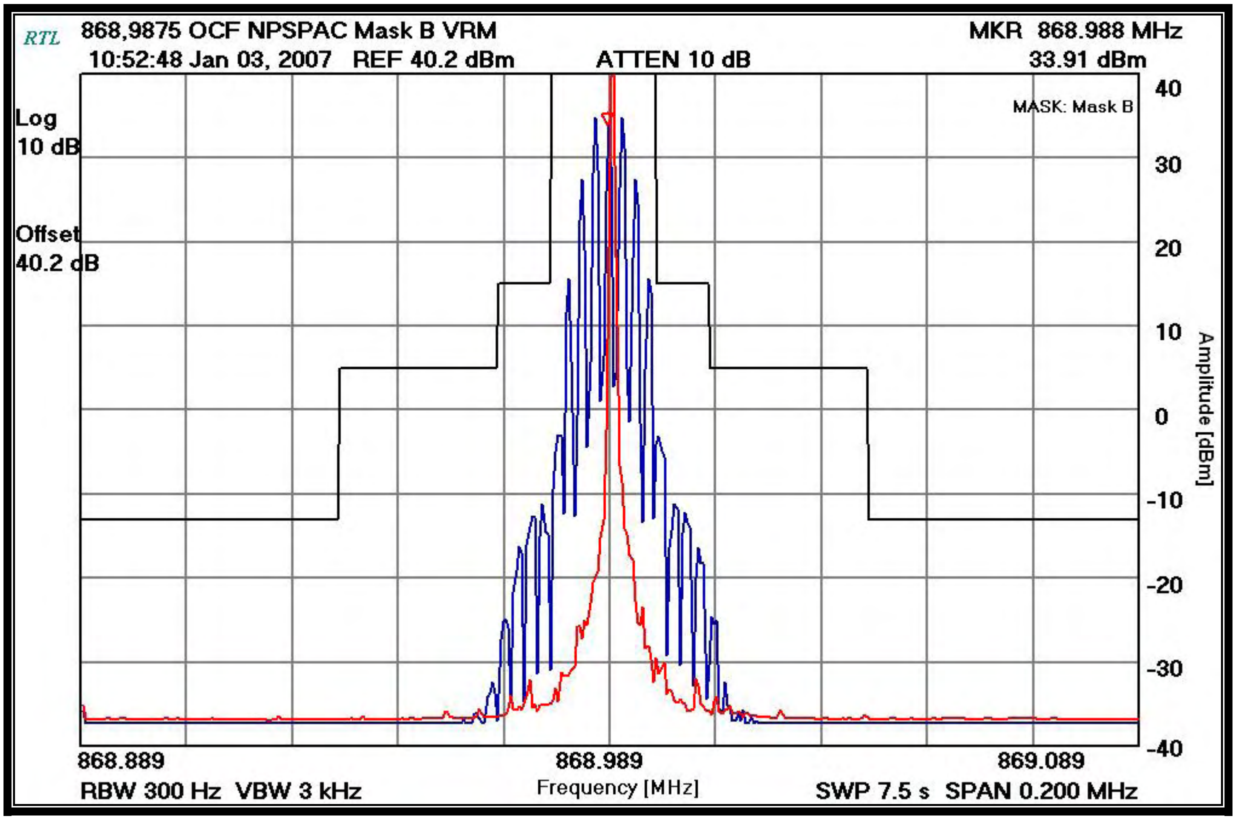
Plot 8-6: Emissions Masks – VRM – NPSPAC; OCF; 851.0125 MHz



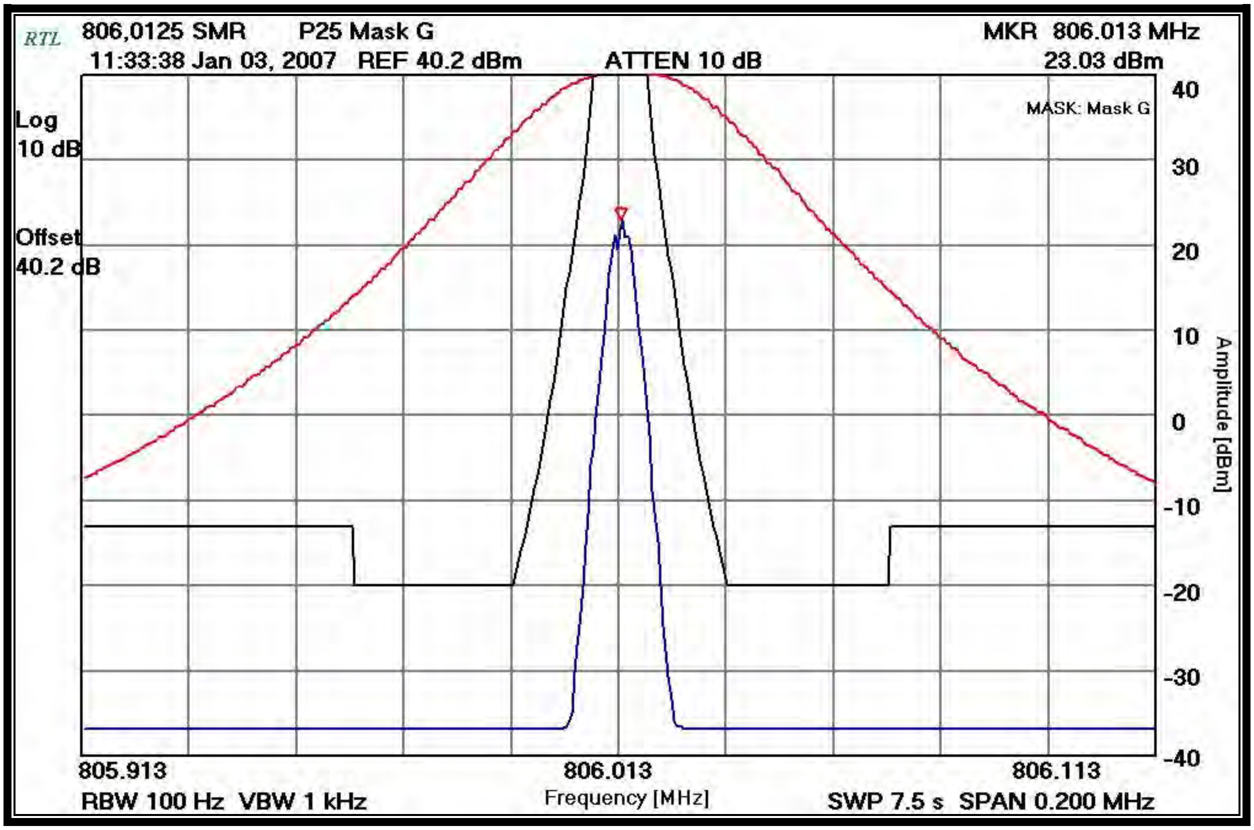
Plot 8-7: Emissions Masks – VRM – SMR; OCF; 868.9875 MHz



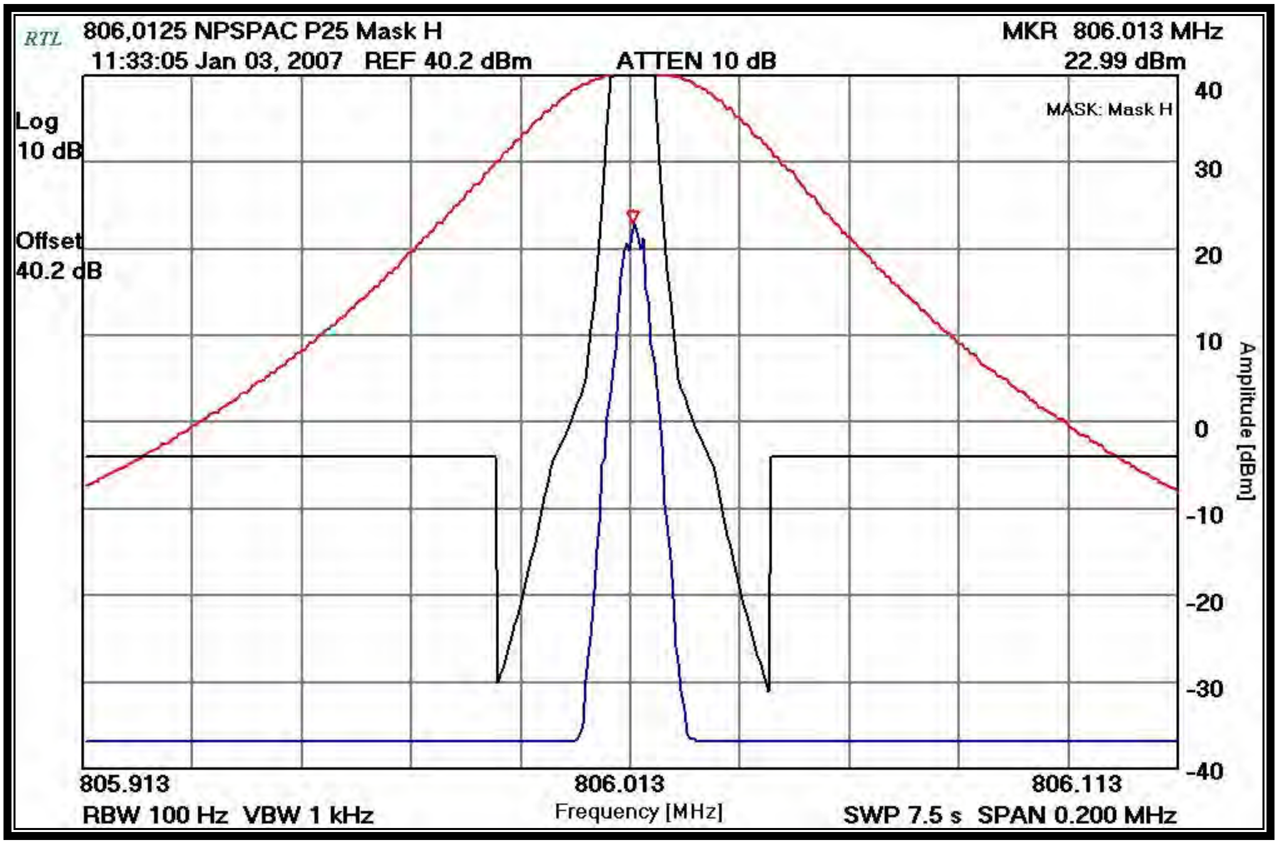
Plot 8-8: Emissions Masks – VRM – NPSPAC; OCF; 868.9875 MHz



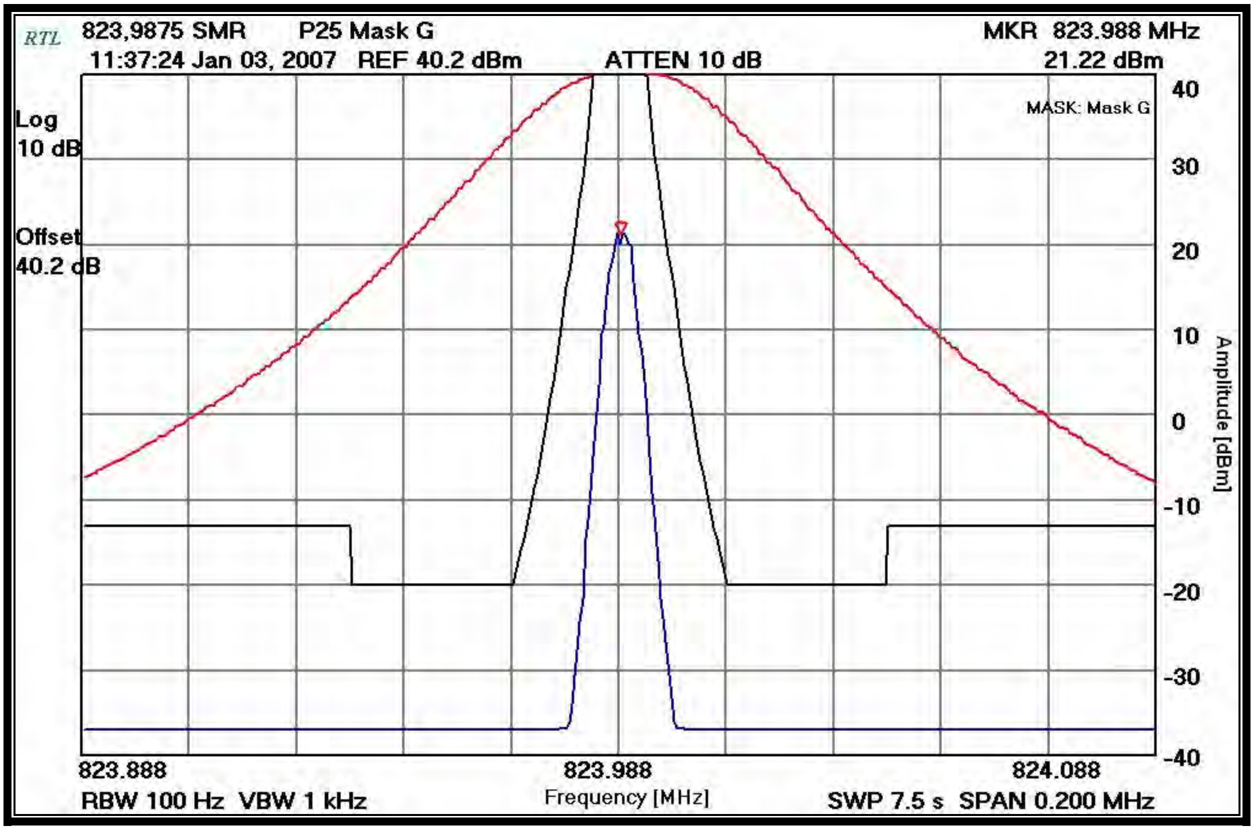
Plot 8-9: Emissions Masks – VRM – SMR; P25; 806.0125 MHz



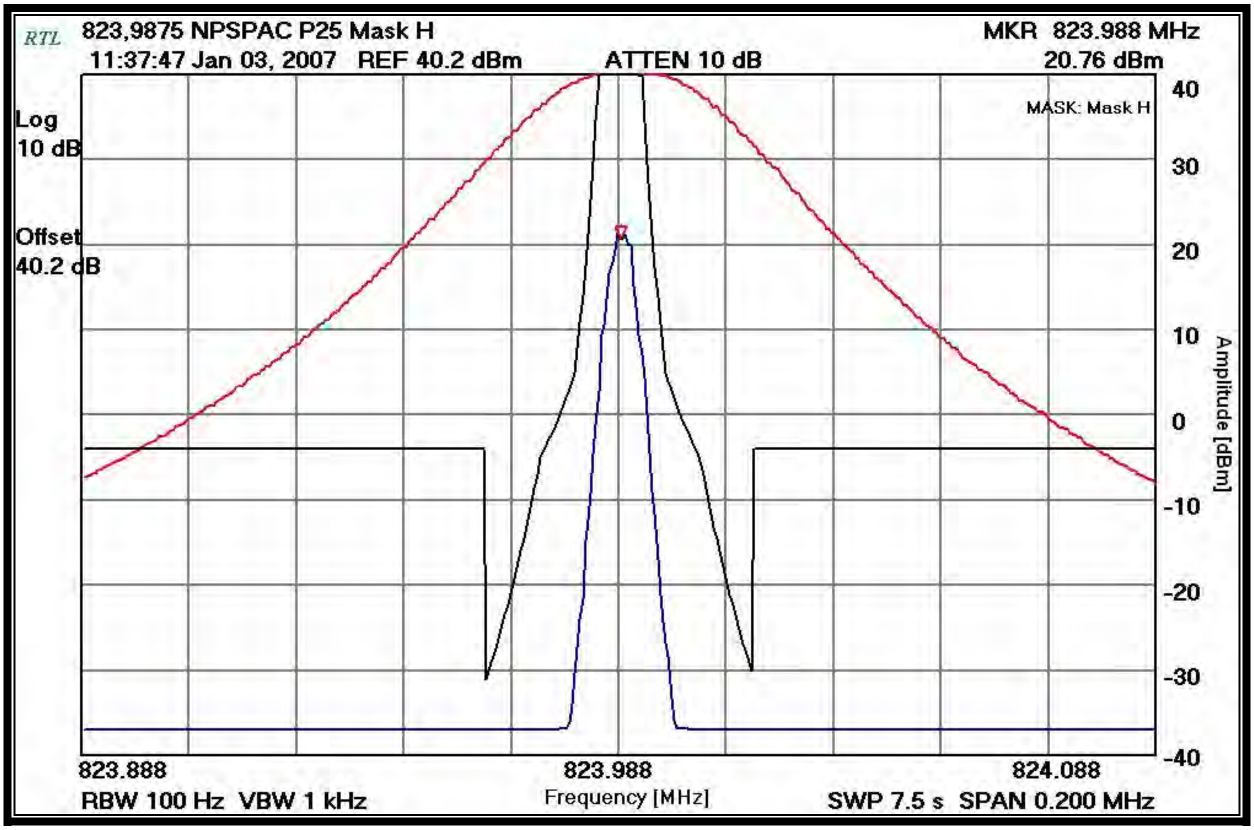
Plot 8-10: Emissions Masks – VRM – NPSPAC; P25; 806.0125 MHz



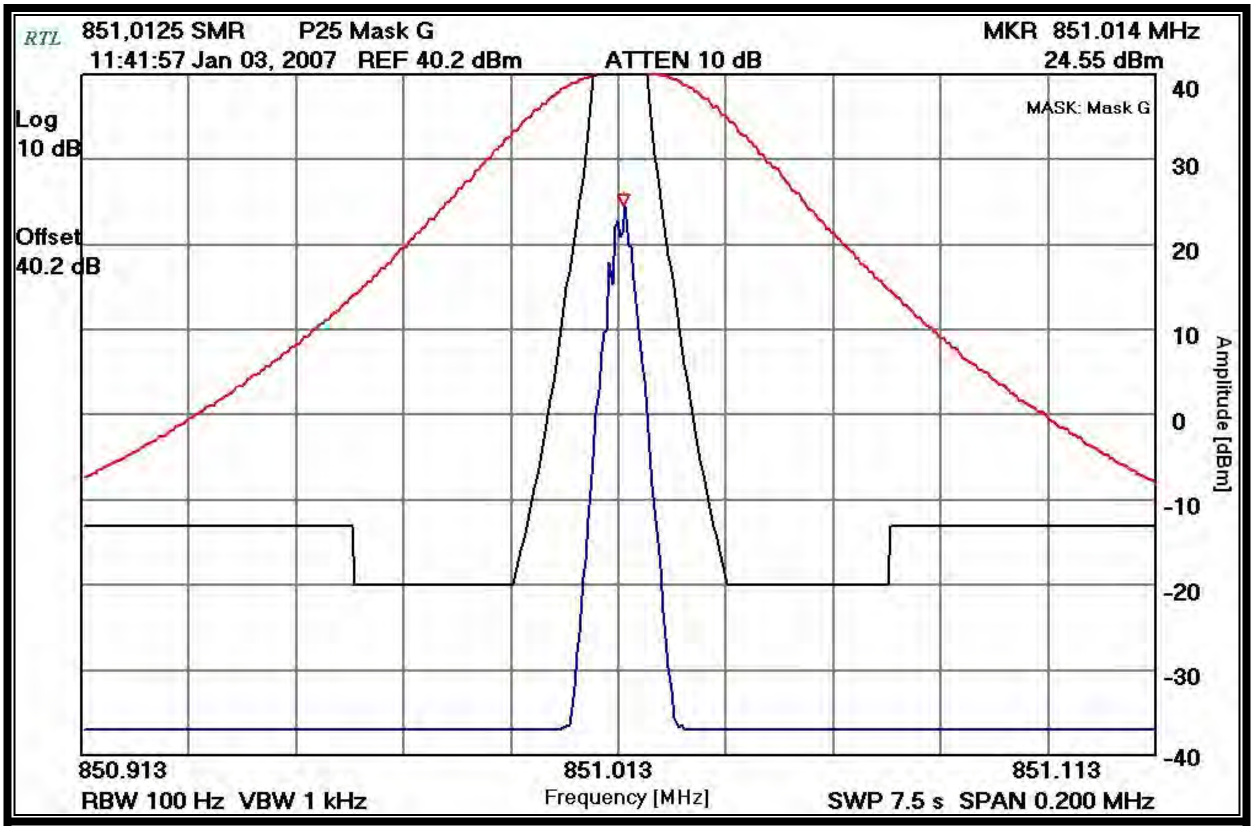
Plot 8-11: Emissions Masks – VRM – SMR; P25; 823.9875 MHz



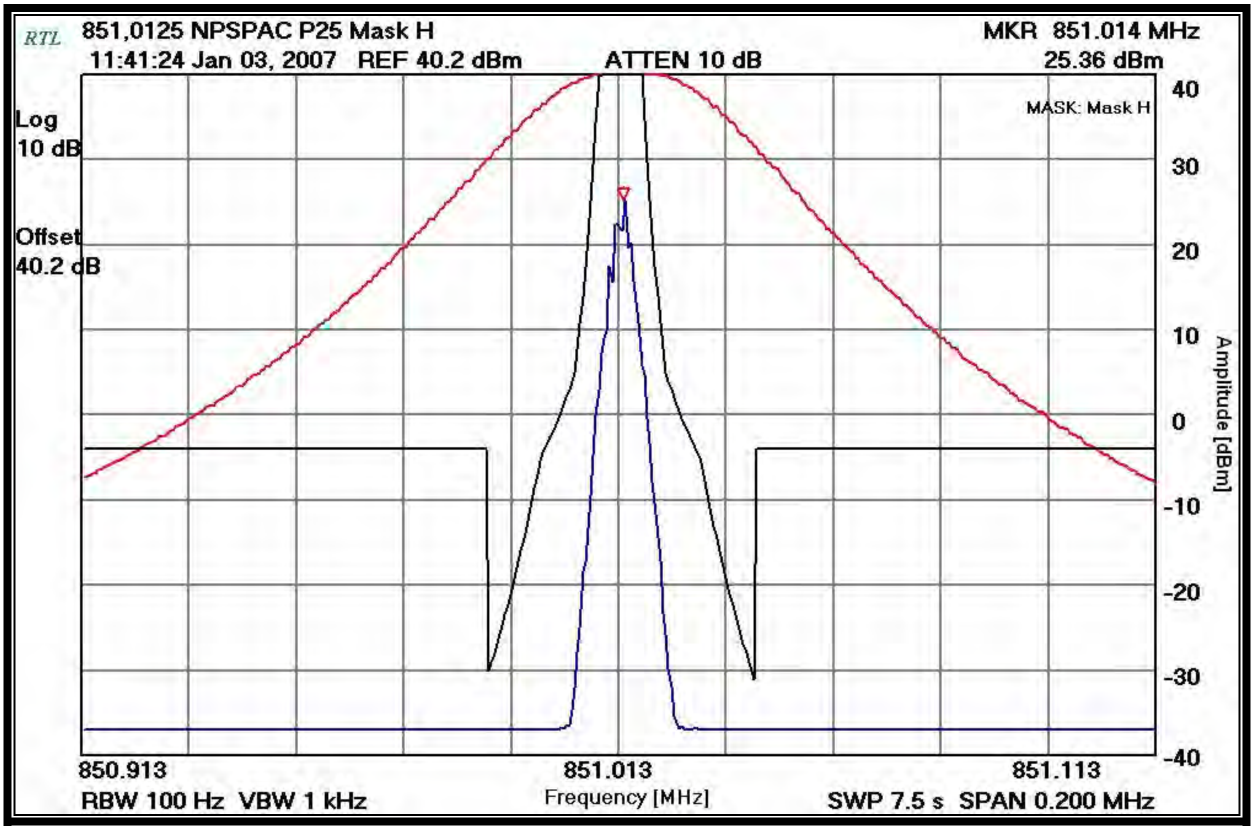
Plot 8-12: Emissions Masks – VRM – NPSPAC; P25; 823.9875 MHz



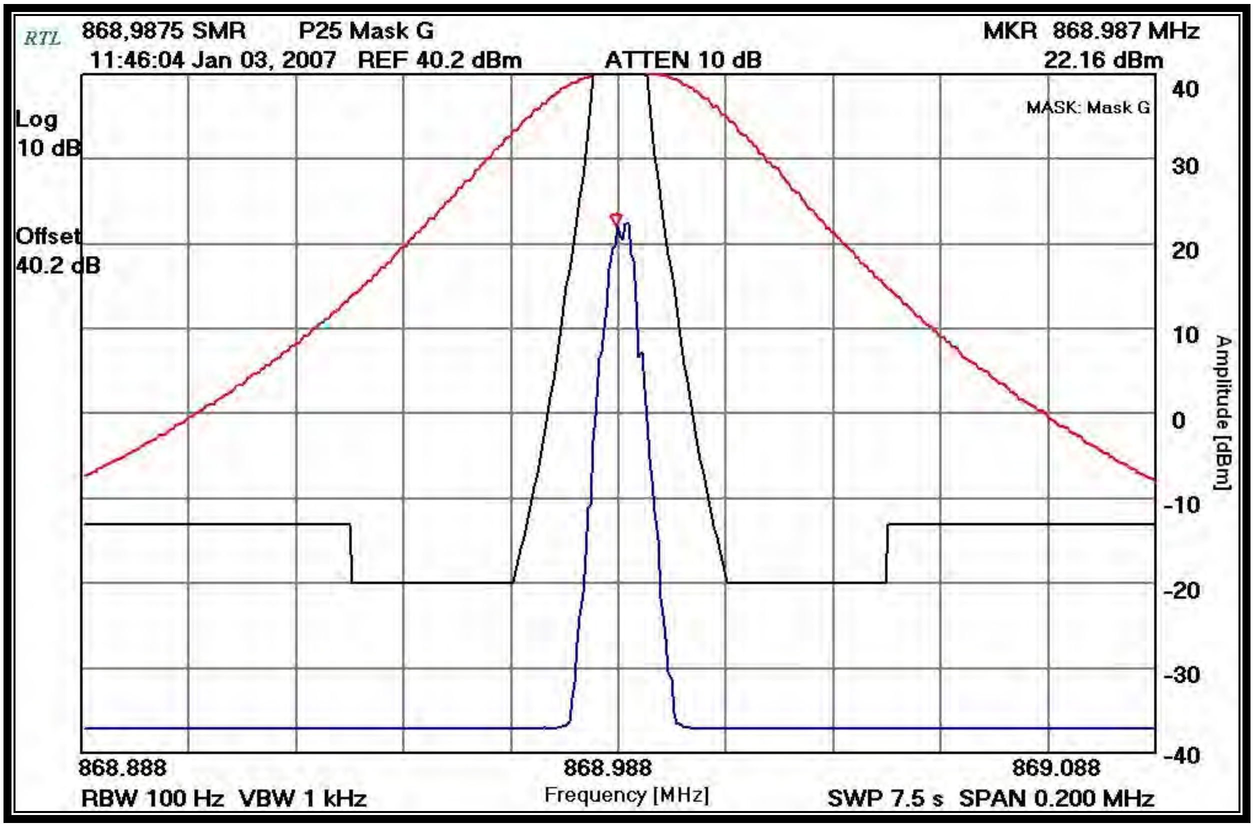
Plot 8-13: Emissions Masks – VRM – SMR; P25; 851.0125 MHz



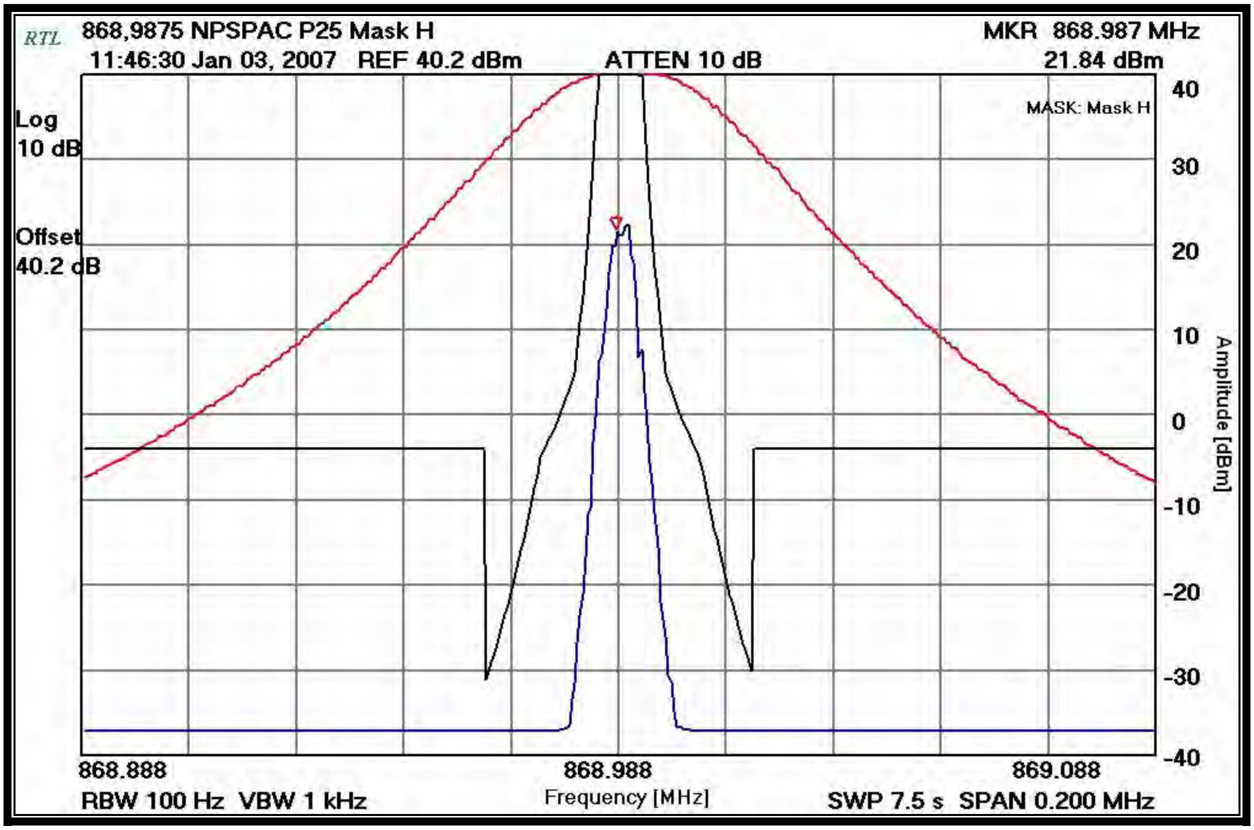
Plot 8-14: Emissions Masks – VRM – NPSPAC; P25; 851.0125 MHz



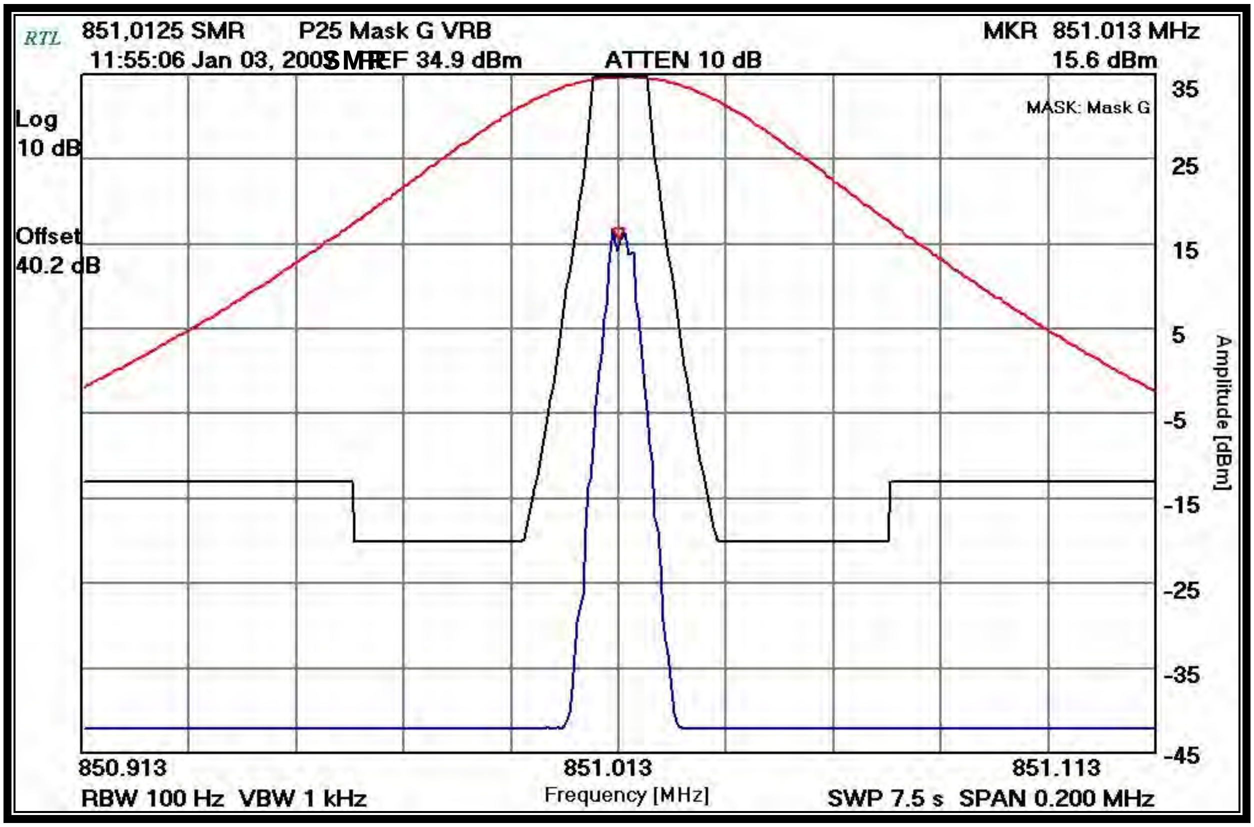
Plot 8-15: Emissions Masks – VRM – SMR; P25; 868.9875 MHz



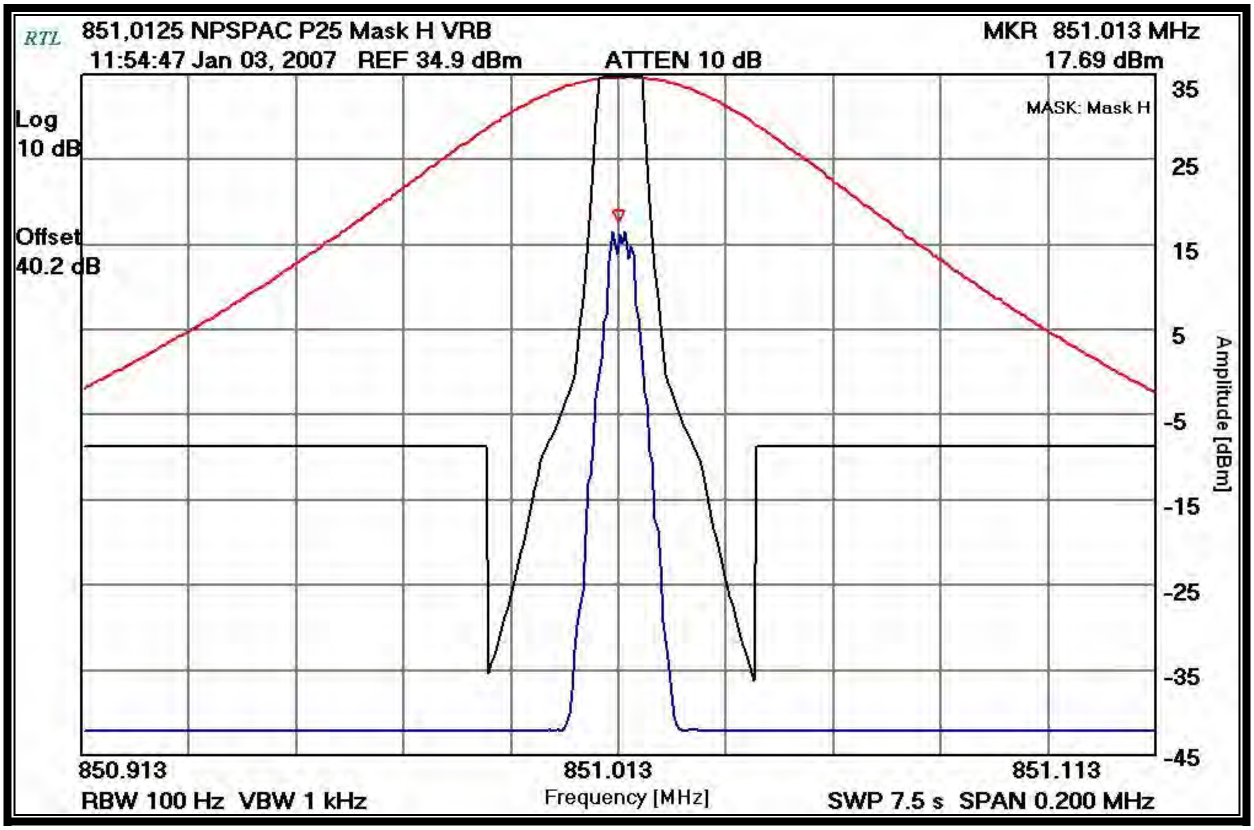
Plot 8-16: Emissions Masks – VRM – NPSPAC; P25; 868.9875 MHz



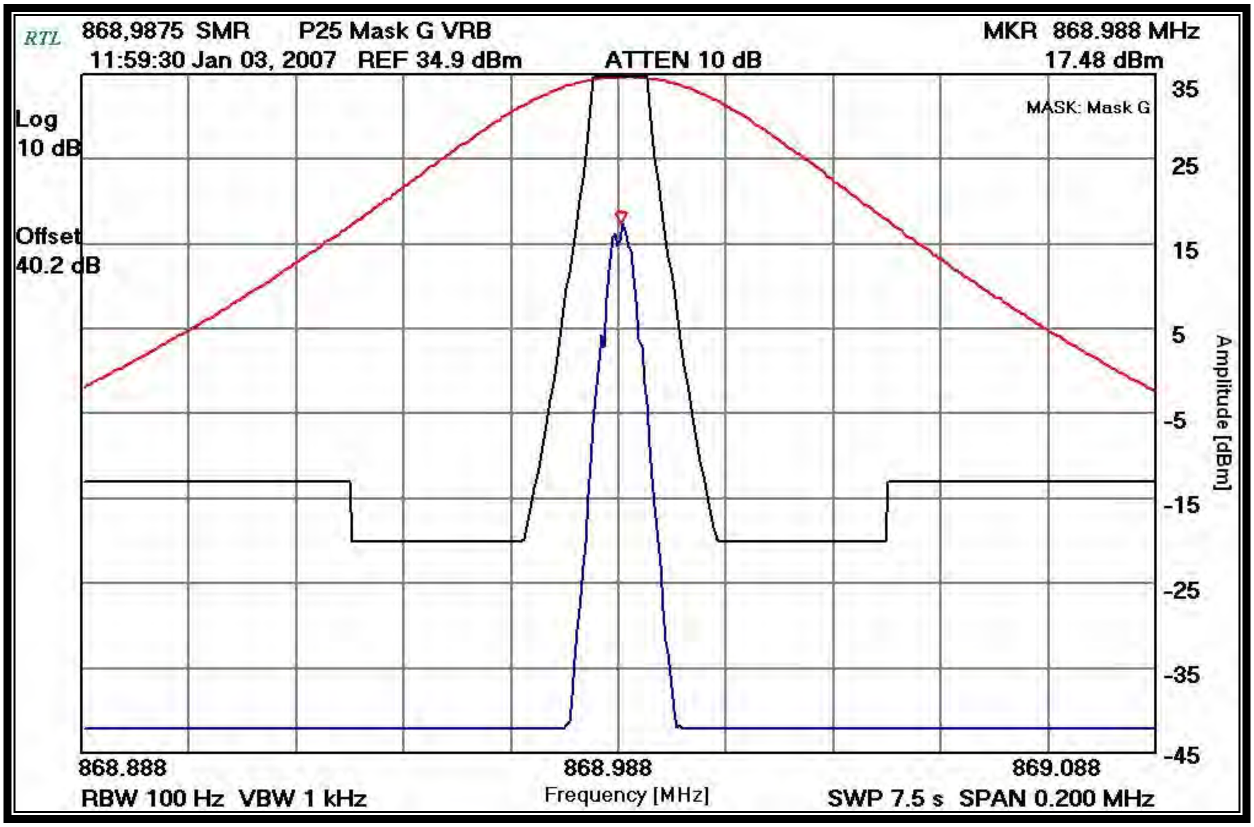
Plot 8-17: Emissions Masks – VRB – SMR; P25; 851.0125 MHz



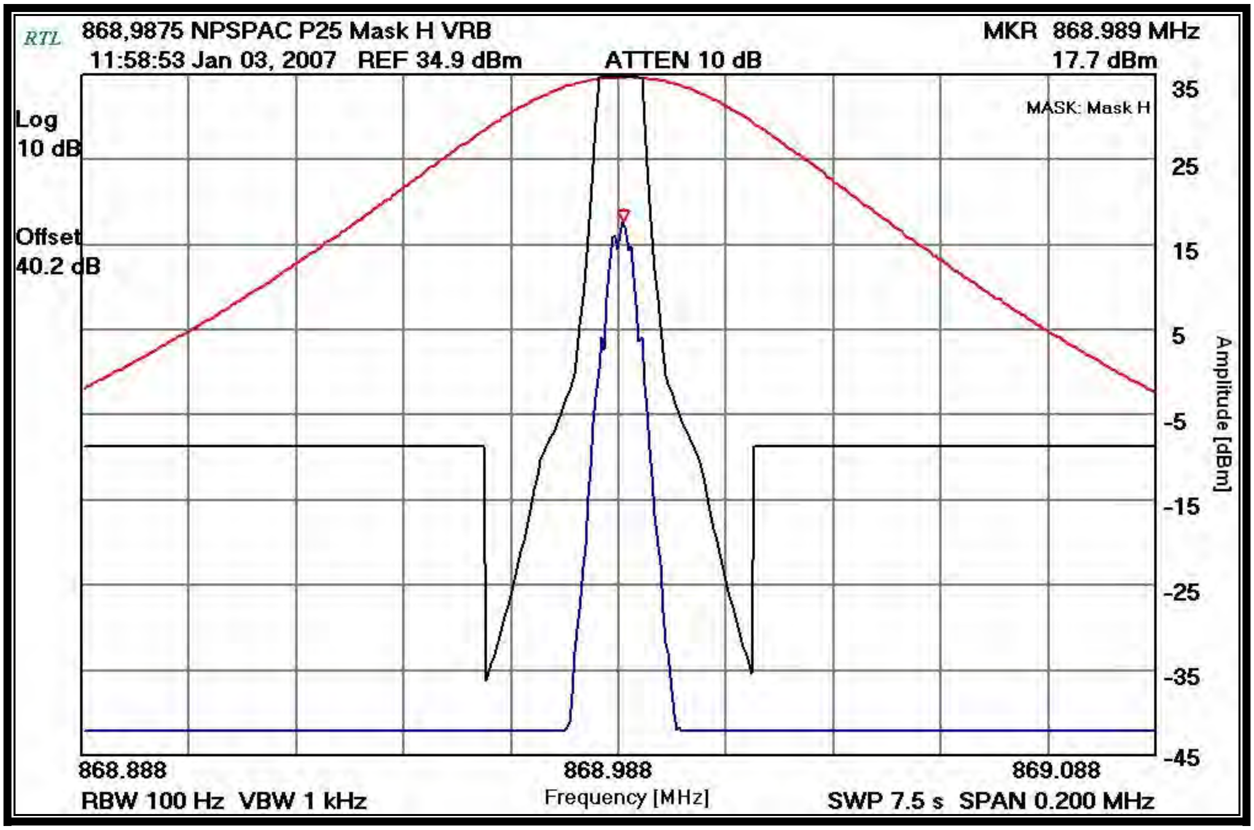
Plot 8-18: Emissions Masks – VRB – NPSPAC; P25; 851.0125 MHz



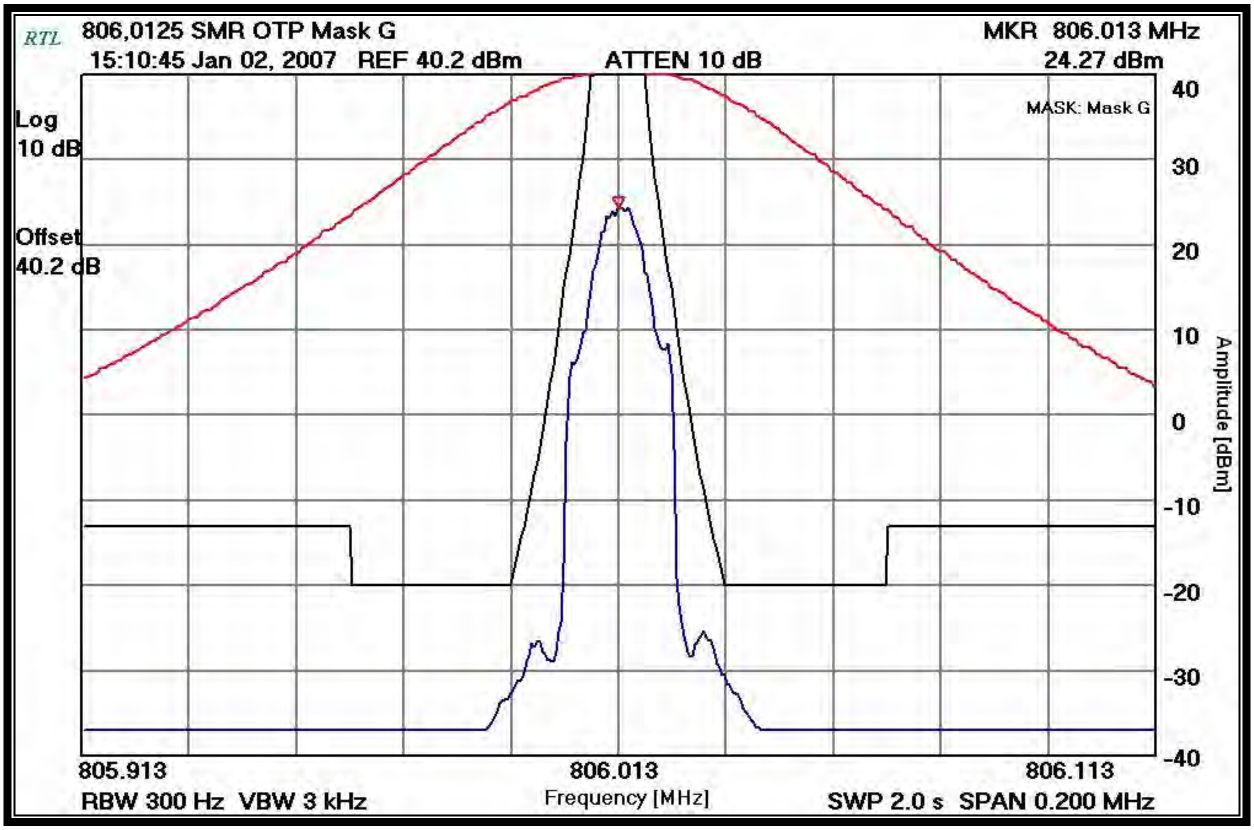
Plot 8-19: Emissions Masks – VRB – SMR; P25; 868.9875 MHz



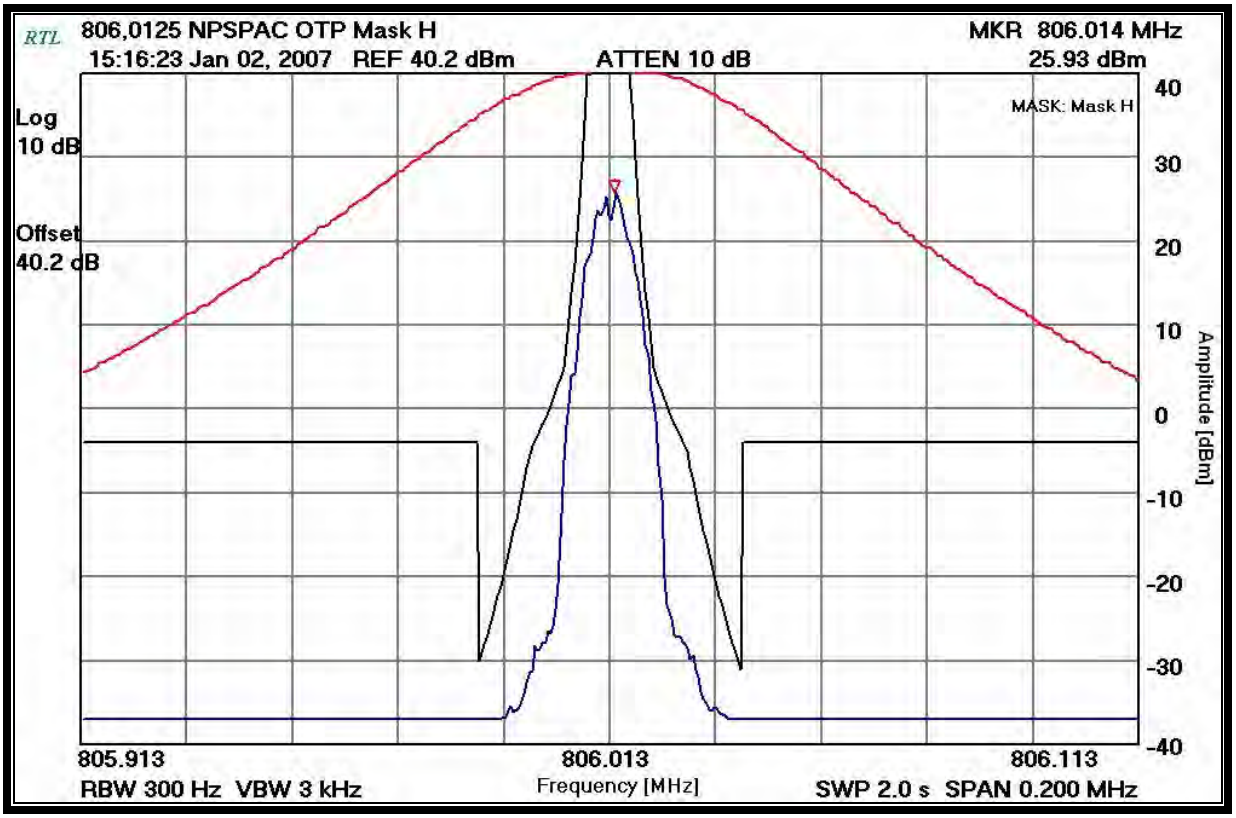
Plot 8-20: Emissions Masks – VRB – NPSPAC; P25; 868.9875 MHz



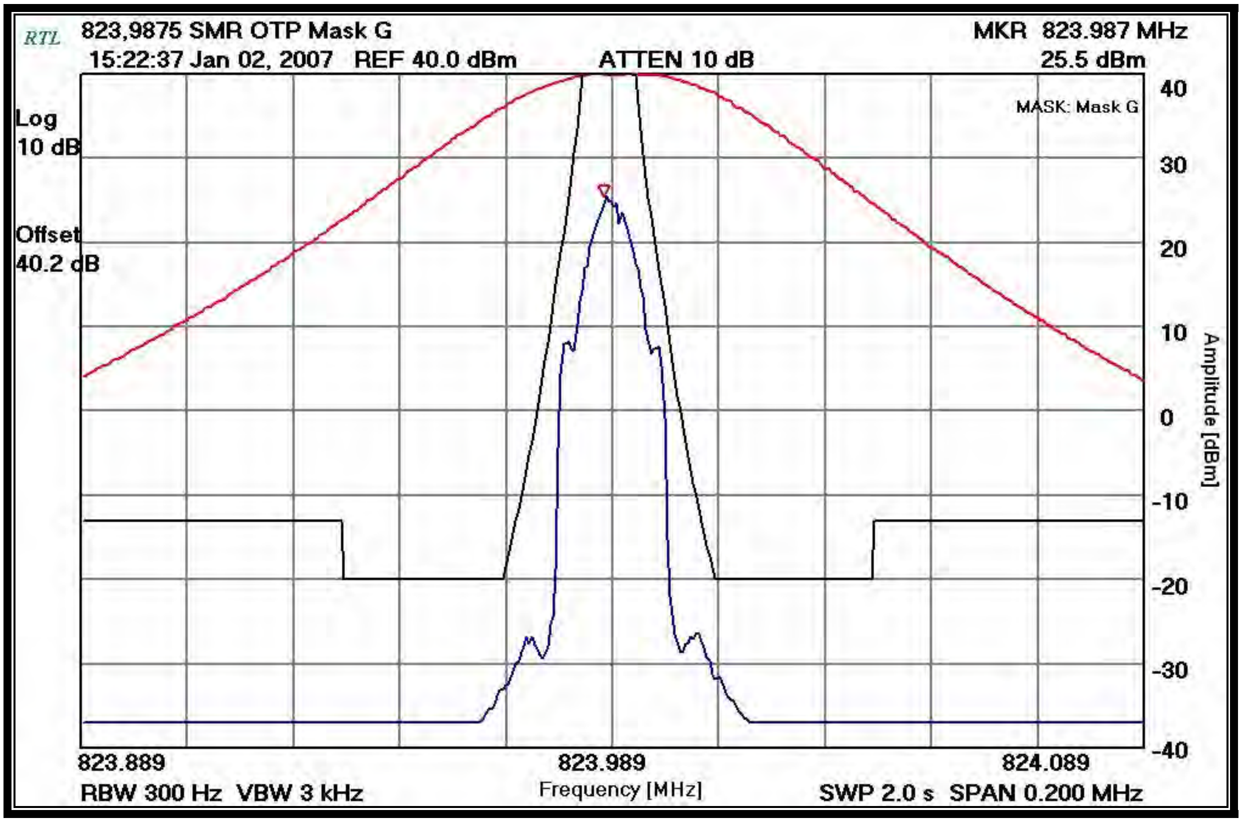
Plot 8-21: Emissions Masks – VRM – SMR; OTP; 806.0125 MHz



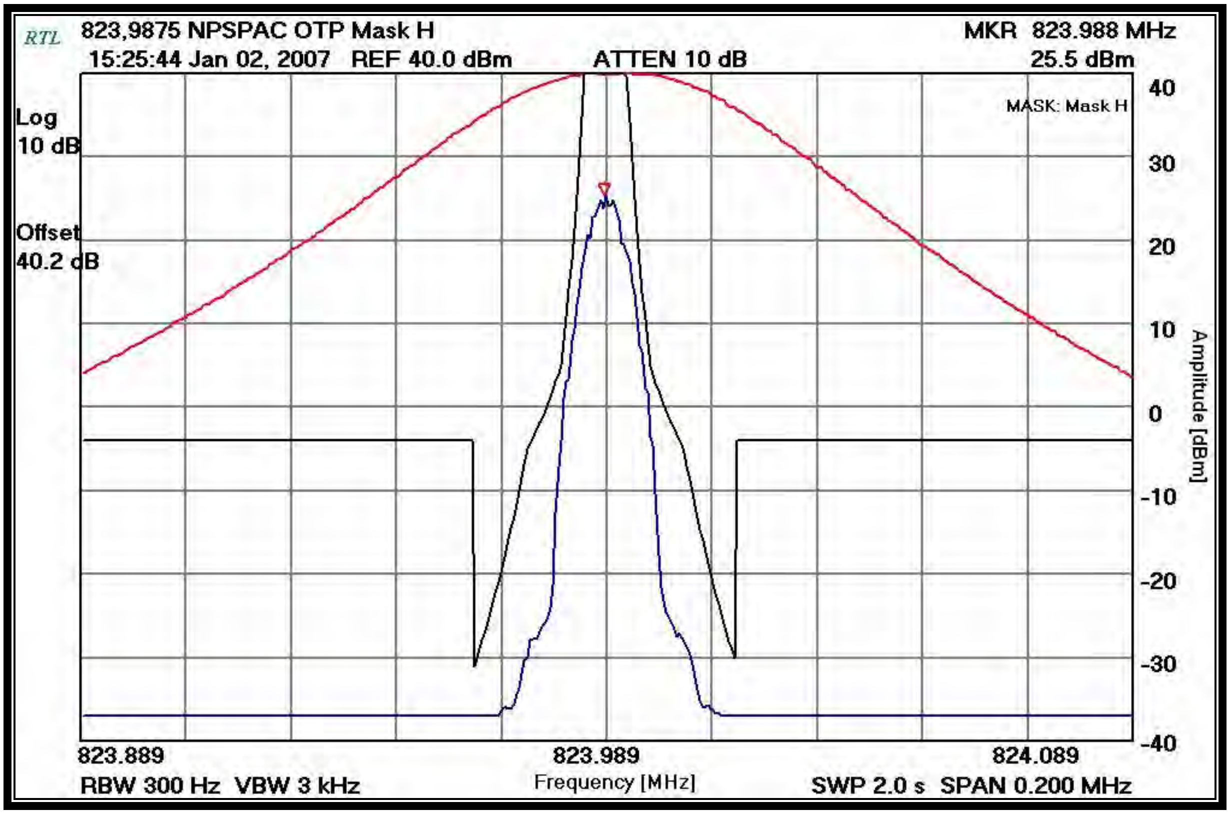
Plot 8-22: Emissions Masks – VRM – NPSPAC; OTP; 806.0125 MHz



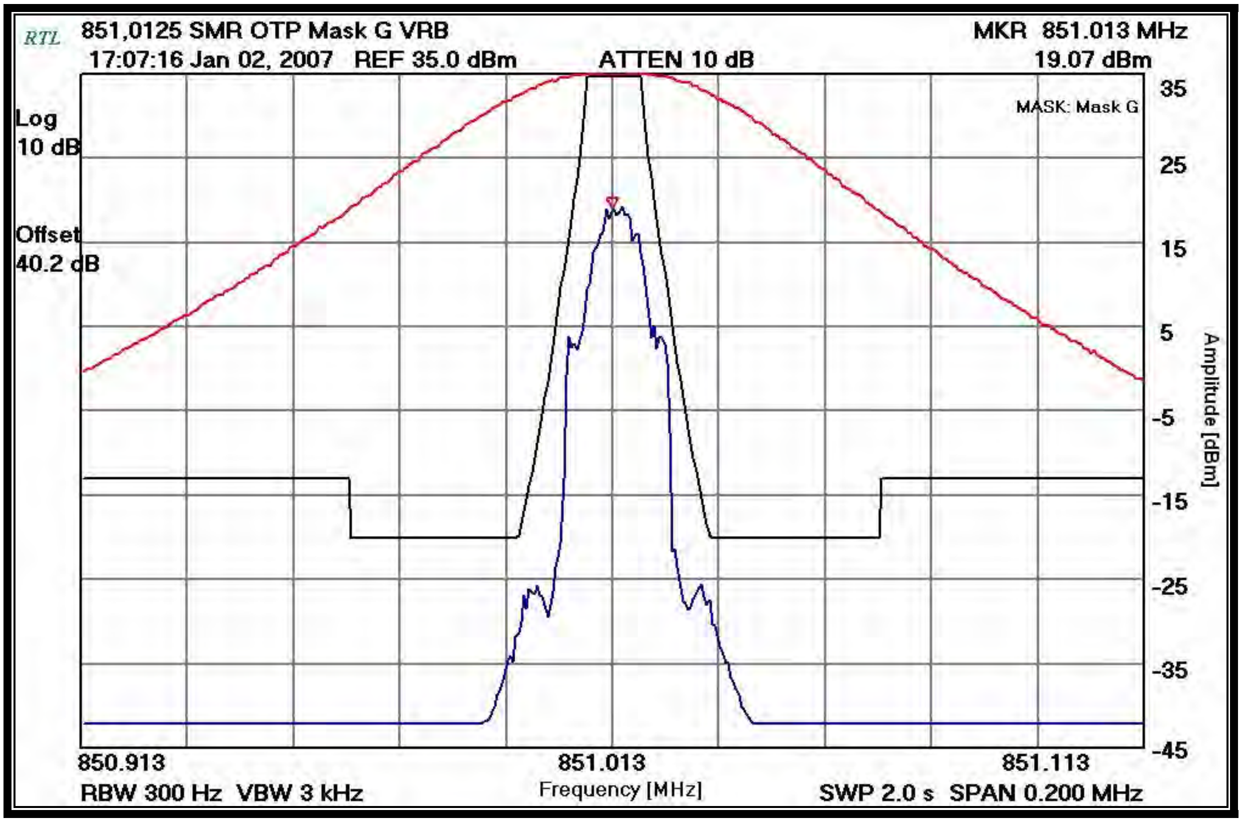
Plot 8-23: Emissions Masks – VRM – SMR; OTP; 823.9875 MHz



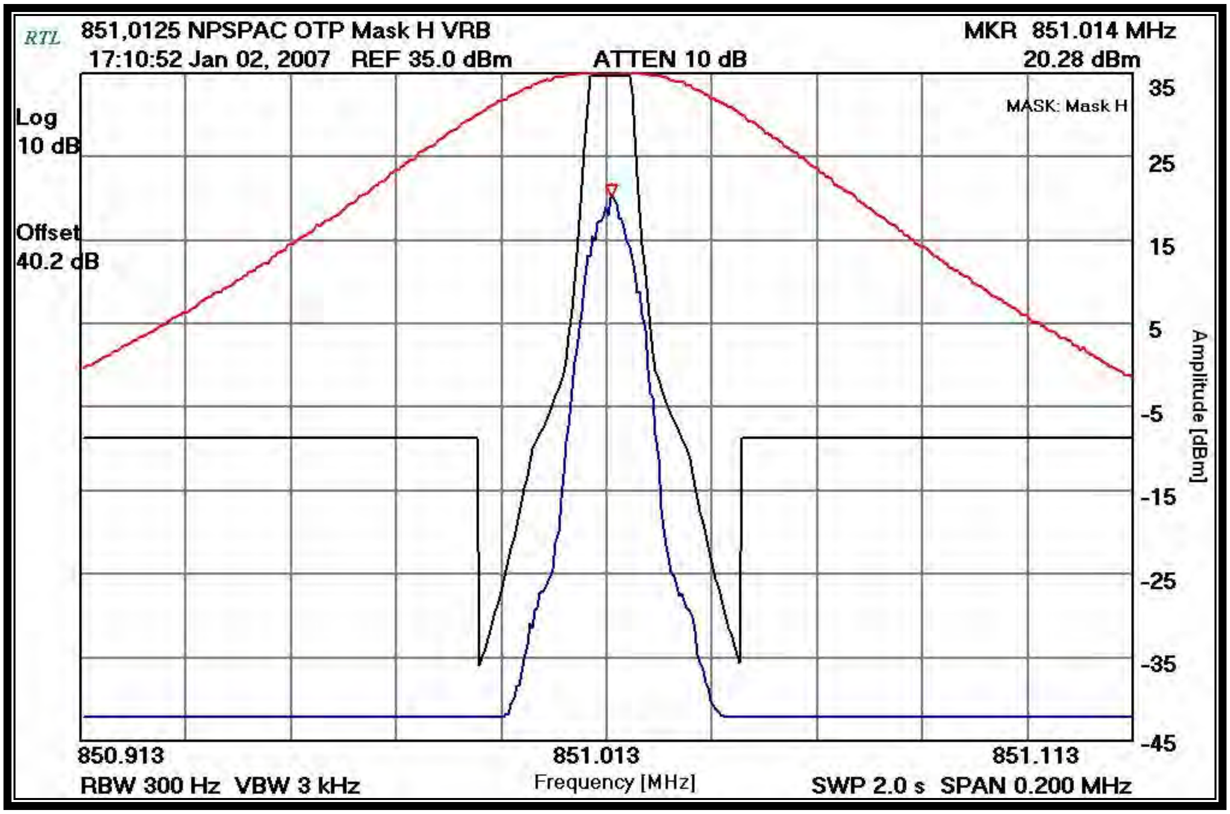
Plot 8-24: Emissions Masks – VRM – NPSPAC; OTP; 823.9875 MHz



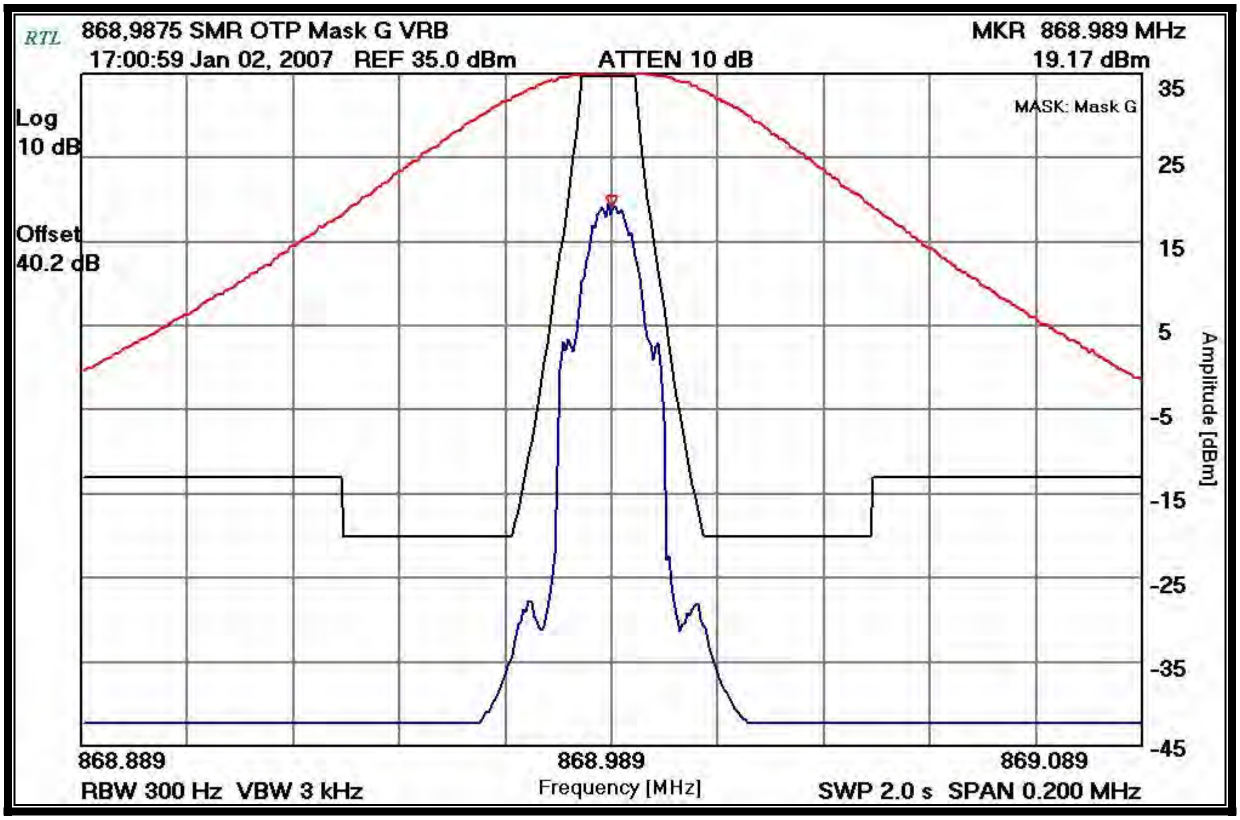
Plot 8-25: Emissions Masks – VRB – SMR; OTP; 851.0125 MHz



Plot 8-26: Emissions Masks – VRB – NPSPAC; OTP; 851.0125 MHz



Plot 8-27: Emissions Masks – VRB – SMR; OTP; 868.9875 MHz



Plot 8-28: Emissions Masks – VRB – NPSPAC; OTP; 868.9875 MHz

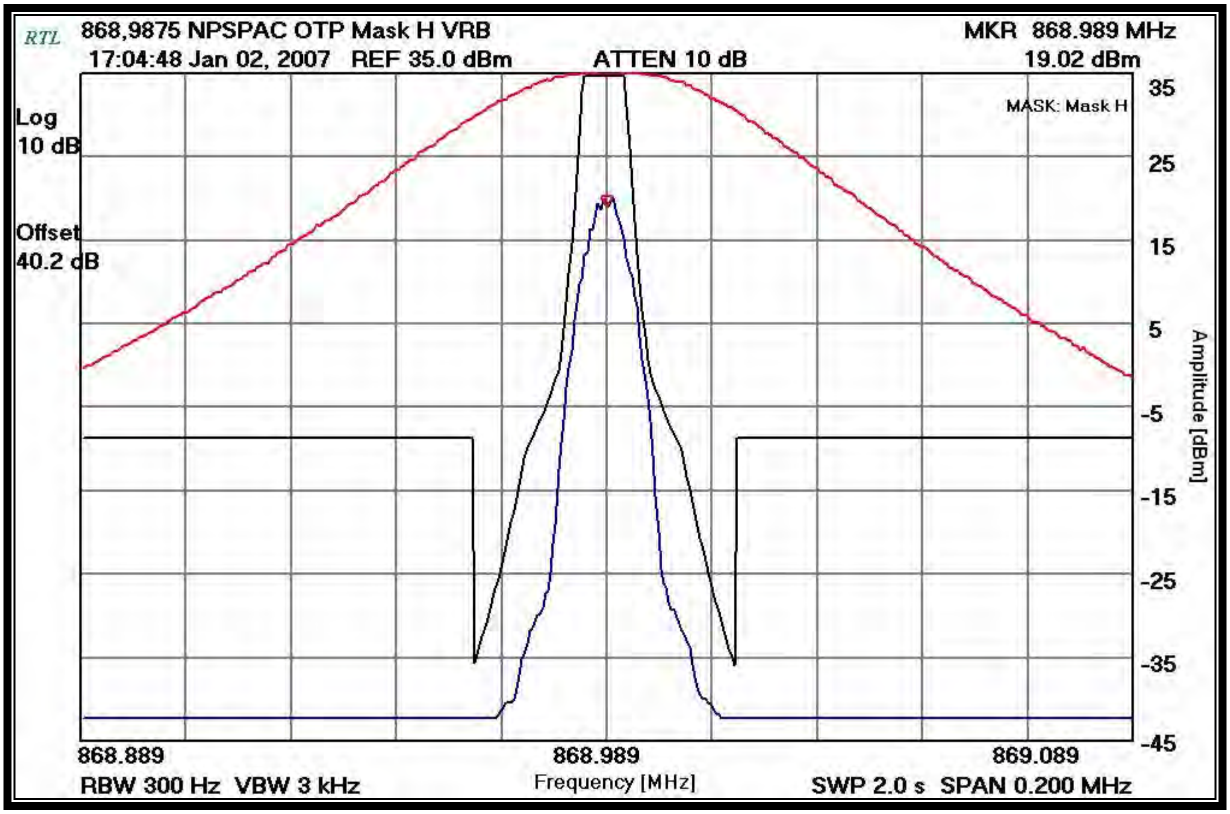


Table 8-1: Test Equipment for Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz - 12.8 GHz)	3826A00144	10/16/07

Test Personnel:

Daniel Biggs		January 2 & 3, 2007
Test Technician/Engineer	Signature	Dates Of Tests

9 FCC Rules and Regulations Part 90 §90.213 and Part 2 §2.1055: Frequency Stability

9.1 Test Procedure

ANSI TIA-603-C-2004, section 2.2.2.

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 +60°C.

The temperature was initially set to -30°C and a 2-hour period was observed for stabilization of the EUT. The EUT was then operated in standby mode for 15 minutes before proceeding. The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10°C through the range. A ½ 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 +/-15% nominal input voltage.

Limit for Mobile Station with power over 2W:

Limit for frequency block 806 – 809 MHz: 1.5 ppm

Limit for frequency block 851 – 854 MHz: 1.5 ppm

9.2 Test Data

9.2.1 Frequency Stability/Temperature Variation

Table 9-1: Frequency Stability/Temperature Variation – VRM - 806.0125 MHz

Temperature °C	Channel Frequency	Measured Frequency (MHz)	ppm
-30	806.0125	806.0121672	-0.41
-20	806.0125	806.0121377	-0.45
-10	806.0125	806.0121617	-0.42
0	806.0125	806.0122488	-0.31
10	806.0125	806.0123417	-0.20
20	806.0125	806.0123574	-0.18
30	806.0125	806.0123762	-0.15
40	806.0125	806.0124481	-0.06
50	806.0125	806.0126237	0.15
60	806.0125	806.0127993	0.37

Table 9-2: Frequency Stability/Temperature Variation – VRB - 851.0125 MHz

Temperature °C	Channel Frequency	Measured Frequency (MHz)	ppm
-30	851.0125	851.0122897	-0.25
-20	851.0125	851.0122866	-0.25
-10	851.0125	851.0122753	-0.26
0	851.0125	851.0123067	-0.23
10	851.0125	851.0123622	-0.16
20	851.0125	851.0123682	-0.15
30	851.0125	851.0123781	-0.14
40	851.0125	851.0124292	-0.08
50	851.0125	851.0125729	0.09
60	851.0125	851.0127722	0.32

Table 9-3: Test Equipment for Testing Frequency Stability/Temperature - 800 MHz

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380	01/20/07
901300	Agilent Technologies	53131A	Frequency Counter	MY40001345	12/15/07
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	12/2/08
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	1/23/07

Test Personnel:

Daniel Biggs	Daniel Biggs	January 5, 2007
Test Engineer	Signature	Date Of Test

9.2.2 Frequency Stability/Voltage Variation

Table 9-4: Frequency Stability/Voltage Variation – VRM - 806.0125 MHz

Voltage (VDC)	Channel Frequency (MHz)	Measured Frequency (MHz)	ppm
11.73	806.0125	806.0124192	-0.10
13.8	806.0125	806.0124206	-0.10
15.87	806.0125	806.0124293	-0.09

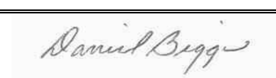
Table 9-5: Frequency Stability/Voltage Variation – VRB - 851.0125 MHz

Voltage (VDC)	Channel Frequency (MHz)	Measured Frequency (MHz)	ppm
11.73	851.0125	851.0124230	-0.09
13.8	851.0125	851.0124256	-0.09
15.87	851.0125	851.0124286	-0.08

Table 9-6: Test Equipment for Testing Frequency Stability/Voltage - 800 MHz

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901300	Agilent Technologies	53131A	Frequency Counter	MY40001345	12/15/07
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	1/13/09
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	N/A	1/23/07
901354	Meterman	37XR	Digital Multimeter	N/A	10/19/07

Test Personnel:

Daniel Biggs		January 4, 2007
Test Engineer	Signature	Date Of Test

9.3 FCC Rules and Regulation Part 90 §90.539 and Part 2 §2.1055: Frequency Stability; RSS-119 §7: Frequency Stability - 700 MHz

Transmitters designed to operate in the 764-776 MHz and 794-806 MHz frequency bands must meet the frequency stability requirements in this section.

a) Mobile, portable, and control transmitters must normally use automatic frequency control (AFC) to lock on to the base station signal.

b) The frequency stability of the base transmitters operating in the narrowband segment must be 100 parts per billion or better.

c) The frequency stability of mobile, portable, and control transmitters operating in the narrowband segment must be 400 parts per billion or better when AFC is locked to the base station. When AFC is not locked to the base station, the frequency stability must be at least 1.0 ppm for 6.25 kHz, 1.5 ppm for 12.5 kHz (2 channel aggregate), and 2.5 ppm for 25 kHz (4 channel aggregate).

d) The frequency stability of base transmitters operating in the wideband segment must be 1 part per million or better.

e) The frequency stability of mobile, portable, and control transmitters operating in the wideband segment must be 1.25 parts per million or better when AFC is locked to a base station, and 5 parts per million or better when AFC is not locked.

9.4 Test Procedure

ANSI TIA-603-C-2004, section 2.2.2.

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 +60°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°C through the range. A ½ 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 +/-15% nominal input voltage.

The worst-case test data are shown below in Table 9-7 and Table 9.8.

9.5 Test Data

9.5.1 Frequency Stability/Temperature Variation

Table 9-7: Frequency Stability/Temperature Variation – 764.00625 MHz

Temperature °C	Measured Frequency (MHz)	ppm
-30	764.005822	-0.56
-20	764.005770	-0.63
-10	764.005788	-0.61
0	764.005855	-0.52
10	764.005942	-0.40
20	764.006002	-0.32
30	764.006055	-0.26
40	764.006225	-0.03
50	764.006387	0.18
60	764.006573	0.42

9.5.2 Frequency Stability/Voltage Variation

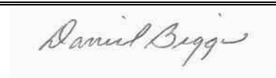
Table 9-8: Frequency Stability/Voltage Variation – 764.00625 MHz

Voltage (VDC)	Channel Frequency (MHz)	Measured Frequency (MHz)	ppm
11.73	764.00625	764.006122	-0.17
13.8	764.00625	764.006145	-0.14
15.87	764.00625	764.006160	-0.12

Table 9-9: Test Equipment for Testing Frequency Stability/Temperature - 700 MHz

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380	01/20/08
901300	Agilent	53131A	Frequency Counter	MY40001345	12/15/07
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	12/2/08
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	N/A	1/24/08
901354	Meterman	37XR	Digital Multimeter	N/A	10/19/07

Test Personnel:

Daniel Biggs		March 2, 2007
Test Engineer	Signature	Date Of Test

10 FCC Part 2 §2.1047(a): Modulation Characteristics - Audio Frequency Response

10.1 Test Procedure

ANSI TIA-603-C-2004, section 2.2.6.

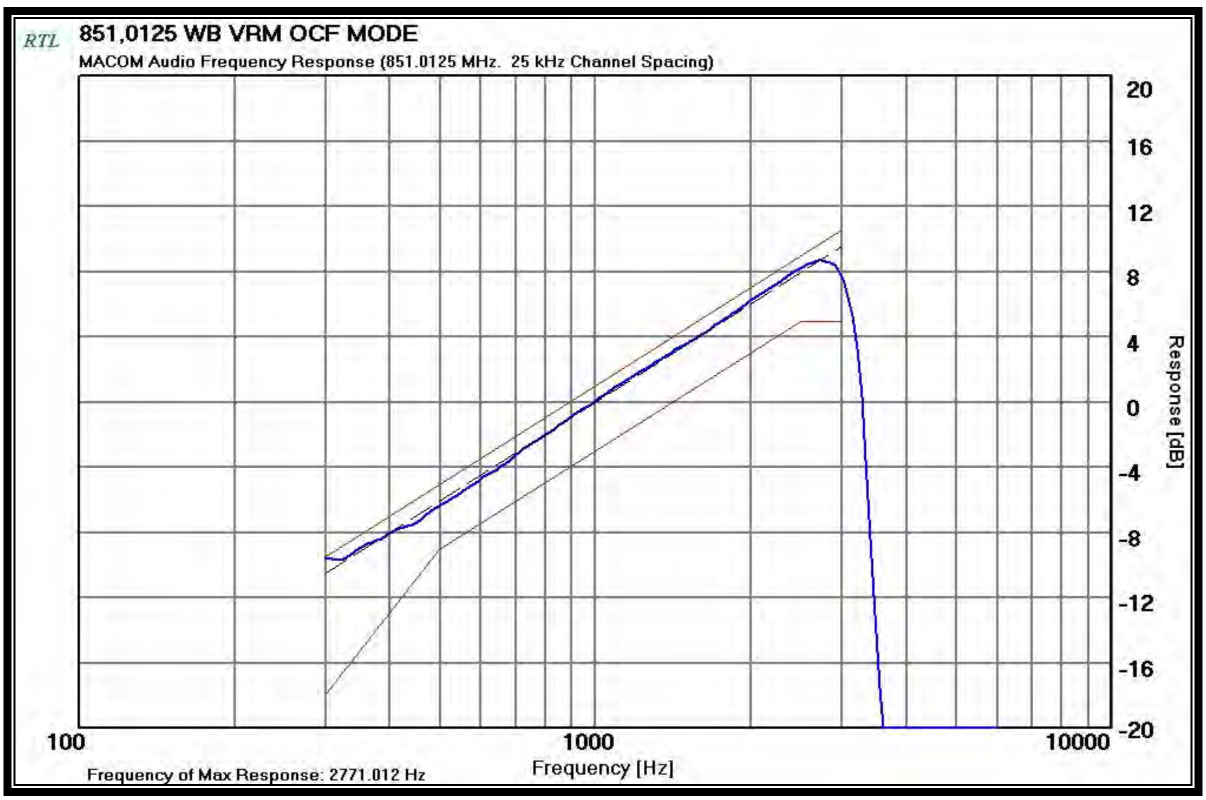
The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.

The input audio level at 1000 Hz was 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 100 Hz to 5 kHz 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)

10.2 Test Data

Plot 10-1: Modulation Characteristics - Audio Frequency Response - VRM; Wideband



Plot 10-2: Modulation Characteristics - Audio Frequency Response - VRM; Narrowband

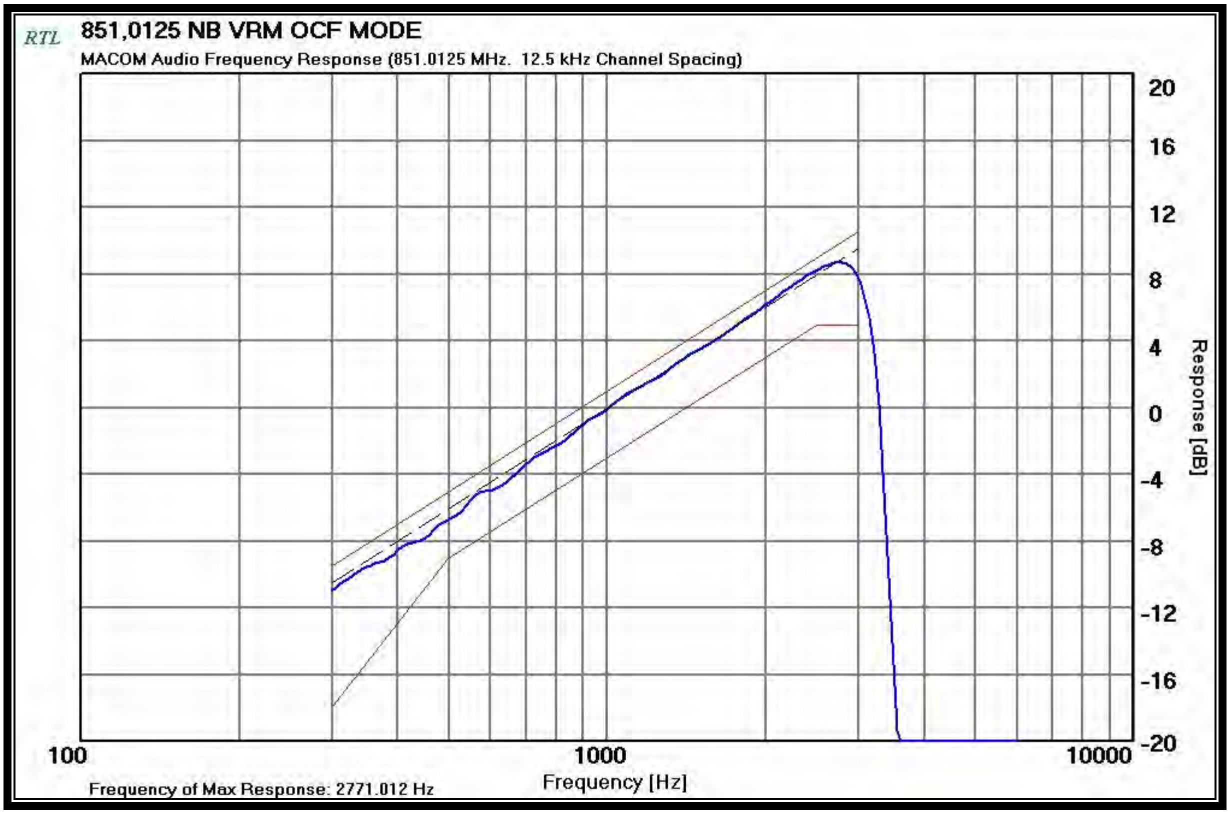


Table 10-1: Test Equipment for Testing Audio Frequency Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	12/19/07
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/21/07
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	10/19/07

Test Personnel:

Daniel Biggs	Daniel Biggs	January 4, 2007
Test Technician/Engineer	Signature	Date Of Test

11 FCC Part 2 §2.1047(a): Modulation Characteristics – Audio Low Pass Filter

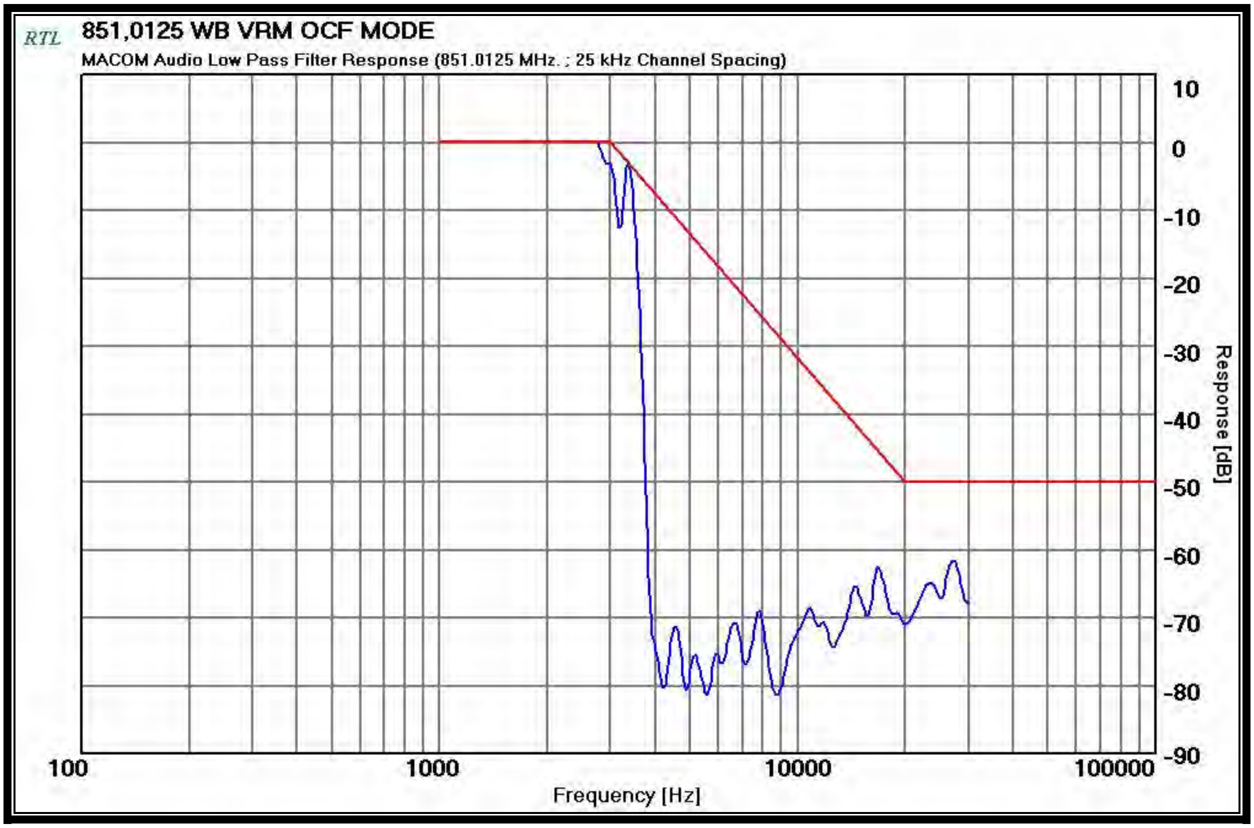
11.1 Test Procedure

ANSI TIA-603-C-2004, 2.2.15.

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

11.2 Test Data

Plot 11-1: Modulation Characteristics – Audio Low Pass Filter – VRM; Wideband



Plot 11-2: Modulation Characteristics – Audio Low Pass Filter – VRM; Narrowband

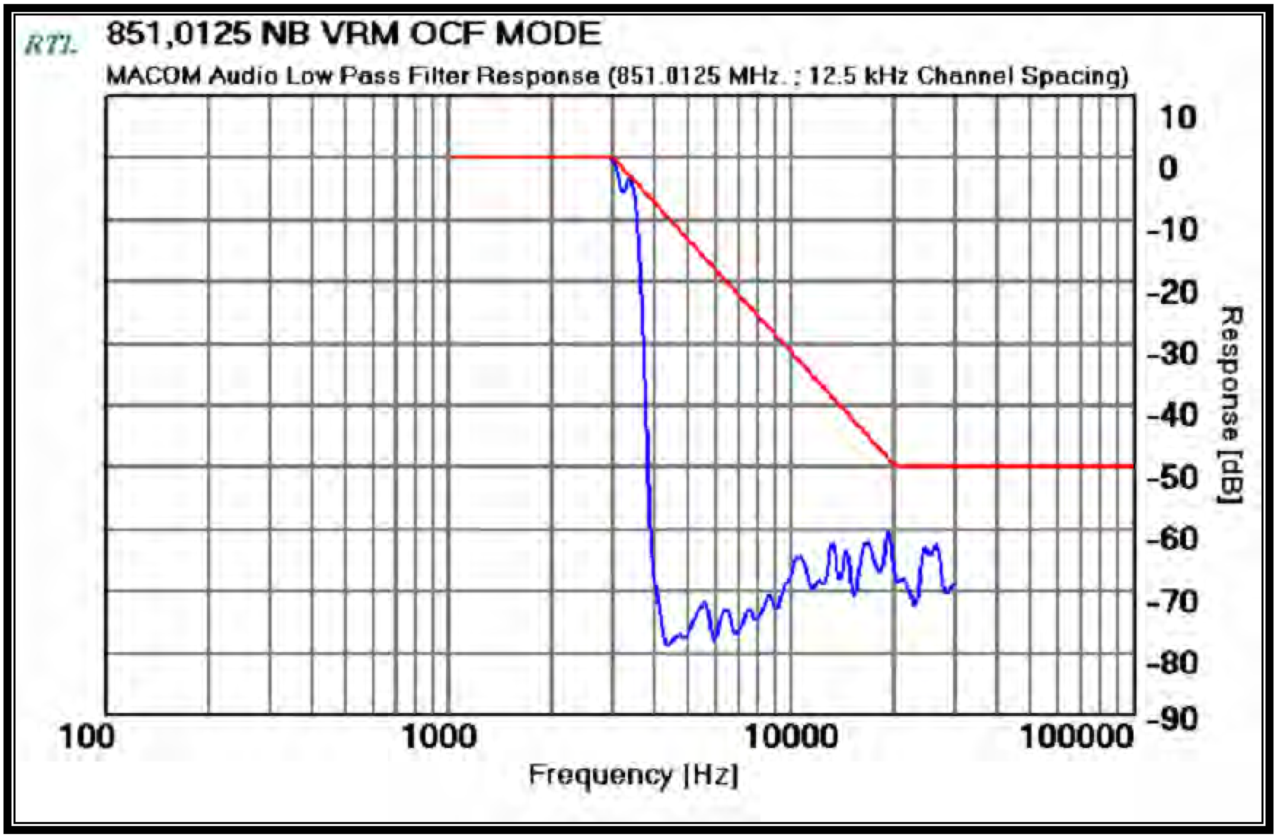


Table 11-1: Test Equipment for Testing Audio Low Pass Filter Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	12/19/07
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/21/07
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	10/19/07

Test Personnel:

Daniel Biggs	Daniel Biggs	January 4, 2007
Test Technician/Engineer	Signature	Date Of Test

12 FCC Rules and Regulations Part 2 §2.1047(b): Modulation Characteristics - Modulation Limiting

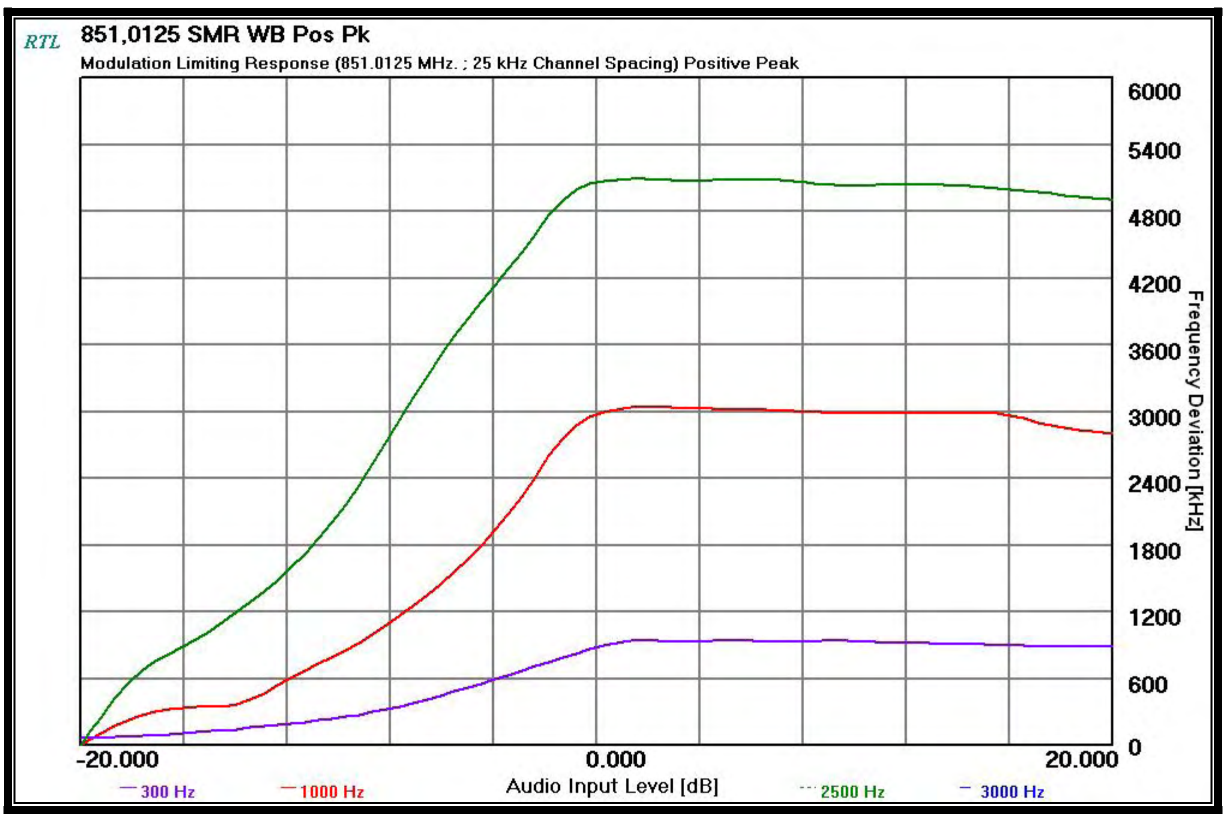
12.1 Test Procedure

ANSI TIA-603-C-2004, section 2.2.3.

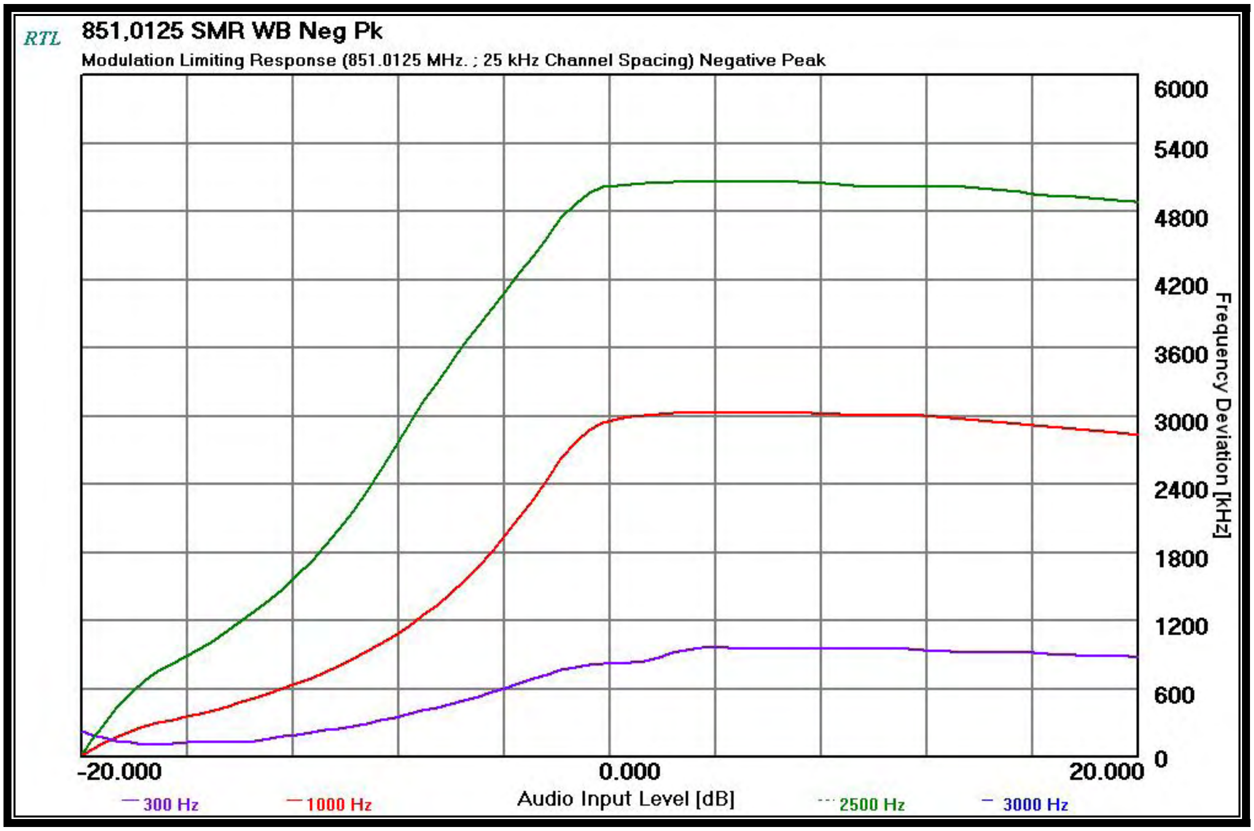
The transmitter was adjusted for full rated system deviation. The audio input level was adjusted for 60% of rated system deviation at 1000 Hz. Using this level as a reference (0 dB), the audio input level was varied from the reference +/-20 dB for modulation frequencies of 300 Hz, 1,000 Hz, and 2,500 Hz. The system deviation obtained as a function of the input level was recorded. Both positive and negative peak deviations were recorded.

12.2 Test Data

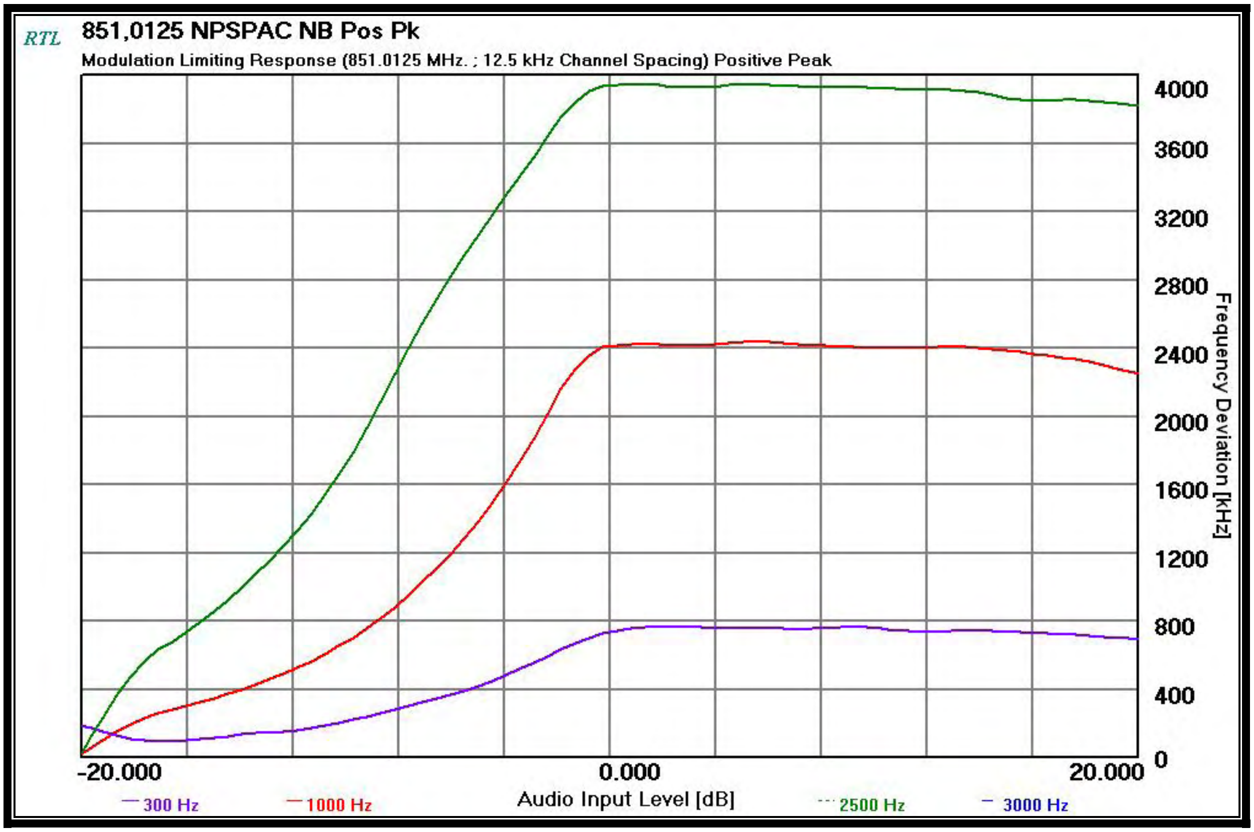
Plot 12-1: Modulation Characteristics – Modulation Limiting: Wide Band; Positive Peak



Plot 12-2: Modulation Characteristics – Modulation Limiting: Wide Band; Negative Peak



Plot 12-3: Modulation Characteristics – Modulation Limiting: NPSPAC; Positive Peak



Plot 12-4: Modulation Characteristics – Modulation Limiting: NPSPAC; Negative Peak

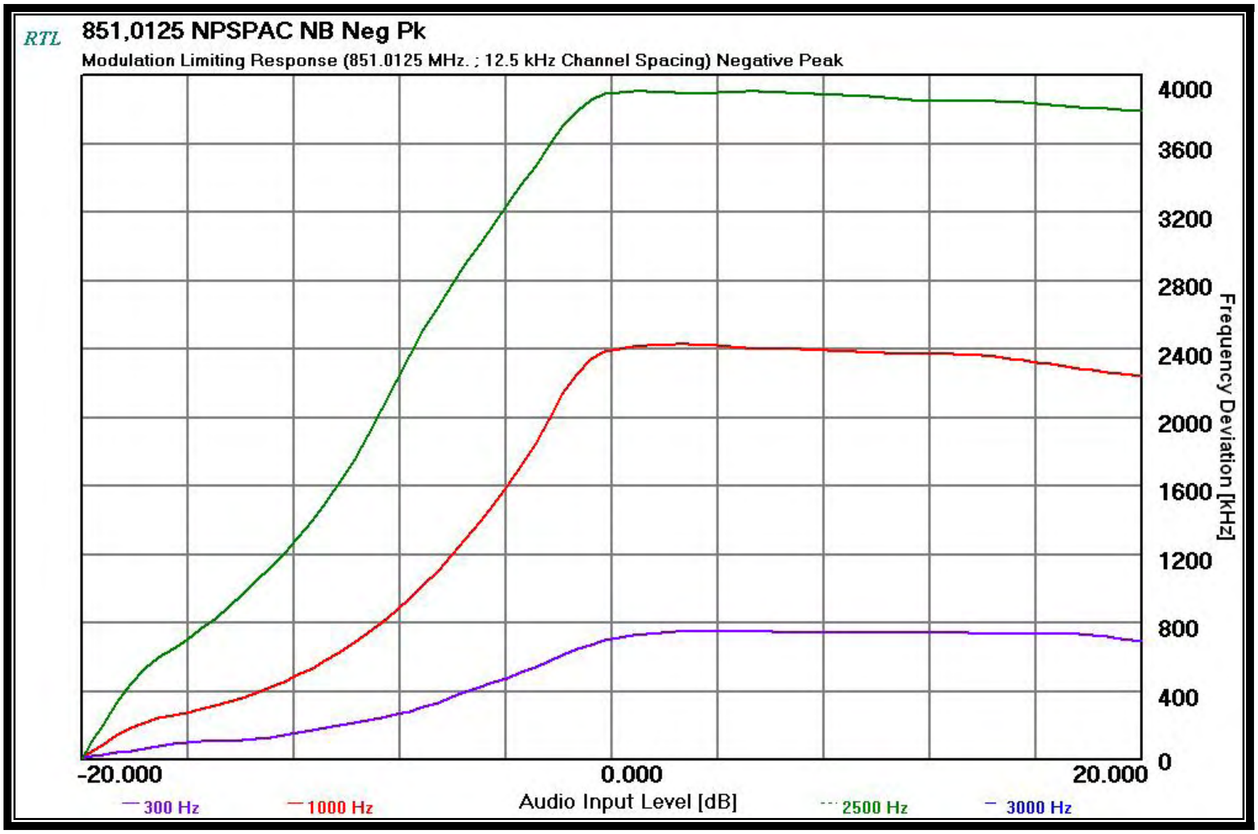


Table 12-1: Test Equipment for Testing Modulation Limiting

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	12/19/07
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/21/07
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	10/19/07

Test Personnel:

Daniel Biggs	Daniel Biggs	January 4, 2007
Test Technician/Engineer	Signature	Date Of Test

13 FCC Rules and Regulations Part 2 §2.202: Necessary Bandwidth and Emission Designator

Analog FM

764-767/773-776 MHz Talkaround; 794-797/803-806 MHz Trunked/Conventional
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 2.5
Constant factor (K): 1 (default)
Bn = 2xM+2xDK = 11.0 kHz
Emission designator: 11K0F3E

806-824 MHz Trunked/Conventional; 851-869 MHz Talkaround
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 5.0
Constant factor (K): 1 (default)
Bn = 2xM+2xDK = 16.0 kHz
Emission designator: 16K0F3E

806-824 MHz Trunked/Conventional; 851-869 MHz Talkaround on NPSPAC Channels
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 4.0
Constant factor (K): 1 (default)
Bn = 2xM+2xDK = 14.0 kHz
Emission designator: 14K0F3E

2-Level Voice/Data

**806-809, 821-824 MHz NPSPAC Trunked/Conventional;
851-854, 866-869 MHz NPSPAC Talkaround**
Calculation:
Data rate in bps (R) = 9,600
Peak deviation of carrier (D) = 2,400 Hz
2D/R = 0.5
Bn = (3.86*D)+(0.27*R) = 11,856 kHz
Emission designator: 11K9F1D, 11K9F1E

**806-809, 809-821, 821-824 MHz SMR Trunked/Conventional;
851-854, 854-866, 866-869 MHz SMR Talkaround**
Calculation:
Data rate in bps (R) = 9,600
Peak deviation of carrier (D) = 3,000 Hz
2D/R = 0.625
Bn = (3.86*D)+(0.27*R) = 14,172 kHz
Emission designator: 14K2F1D, 14K2F1E

OTP Modulation

764-767/773-776/794-797/803-806 MHz Trunked
Calculation:
Data rate in bps (R) = 19,200
Deviation of carrier (D) = 3750 Hz
Number of state in each symbol (S) = 4
K = 0.334
Bn = [R/log$_2$(4) + 2(D)(K)] = 12.1 kHz
Emission designator: 12K1F9W

806-809, 809-821, 821-824, 851-854, 854-866, 866-869 MHz SMR Trunked
Calculation:
Data rate in bps (R) = 19,200
Deviation of carrier (D) = 3900 Hz
Number of state in each symbol (S) = 4
K = 0.415
Bn = [R/log$_2$(4) + 2(D)(K)] = 12.8 kHz
Emission designator: 12K8F9W

806-809, 809-821, 821-824, 851-854, 854-866, 866-869 MHz NPSPAC Trunked
Calculation:
Data rate in bps (R) = 19,200
Deviation of carrier (D) = 3750 Hz
Number of state in each symbol (S) = 4
K = 0.334
Bn = [R/log$_2$(4) + 2(D)(K)] = 12.1 kHz
Emission designator: 12K1F9W

P25 Voice/Data

764-767/773-776 MHz Trunked/Conventional + Talkaround;
794-797/803-806 MHz Trunked/Conventional
Calculation:
Data rate in bps (R) = 9,600
Deviation of carrier (D) = 1,800 Hz
Number of state in each symbol (S) = 4
Bn = [R/log$_2$(4) + 2(D)(1)] = 8,400 kHz
Emission designator: 8K4F1D, 8K4F1E

806-824 MHz Trunked/Conventional
851-869 MHz Trunked/Conventional + Talkaround
Calculation:
Data rate in bps (R) = 9,600
Deviation of carrier (D) = 1,800 Hz
Number of state in each symbol (S) = 4
Bn = [R/log$_2$(4) + 2(D)(1)] = 8,400 kHz
Emission designator: 8K4F1D, 8K4F1E

14 Conclusion

The data in this measurement report shows that the **M/A-COM, Inc**. Model **M7200 V-TAC 700/800 MHz Mobile Radio; FCC ID: BV8M7200VTAC, IC: 3670A-M72VTAC,** complies with the applicable requirements of Parts 90 and 2 of the FCC Rules and IC RSS-119 Issue 7.