Emission Mask Compliance

To determine emission mask compliance the test equipment configuration shown on Figure 2 was used. The transmitter was tested for compliance with the stringent emission mask classification. The first part of the tests measured the adjacent channel emission and the second part of the tests measured the harmonic and spurious energy.

Step 1: The transmitter was energized at 800 watts on channel 11 (center frequency of 201 MHz) as calculated by the insertion loss of the directional coupler and the reference was established on the spectrum analyzer (using the channel power measurement mode).

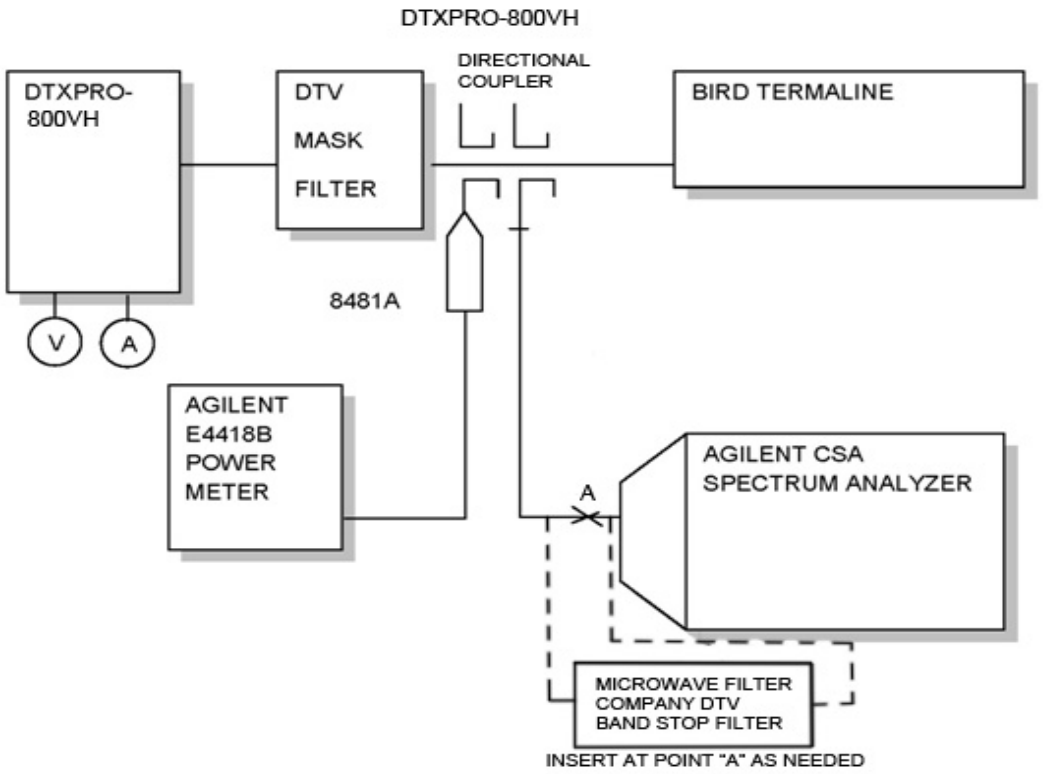
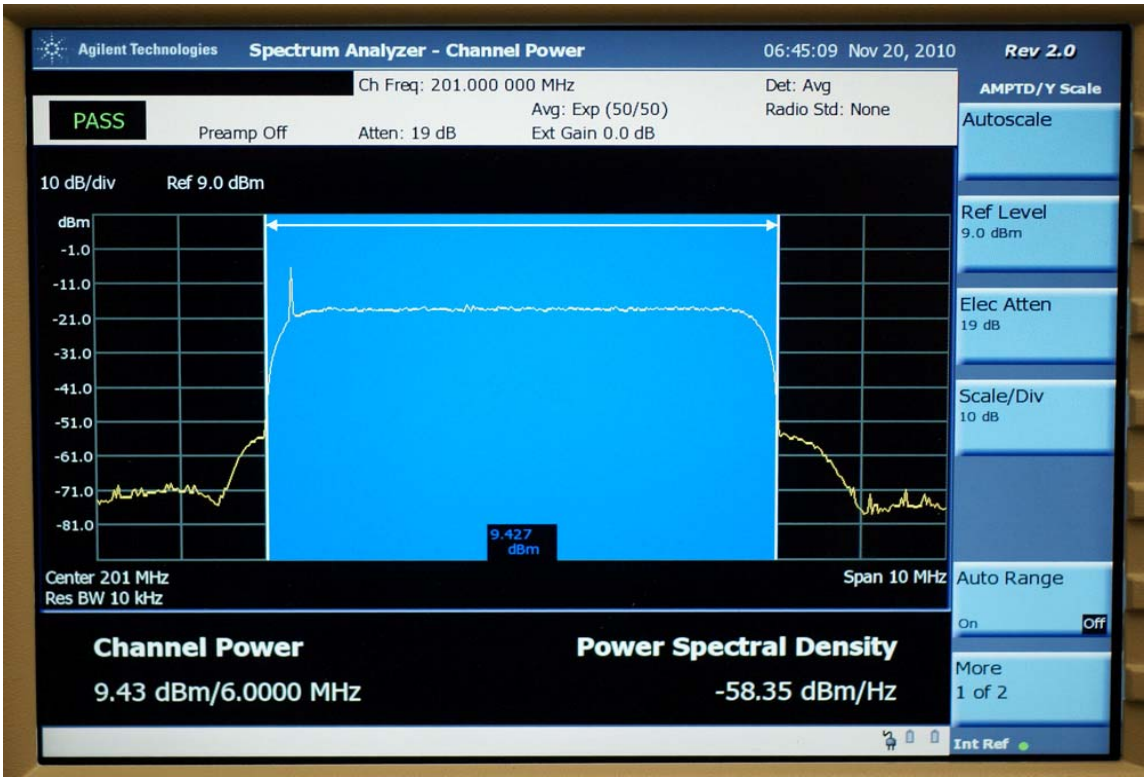


Figure 2

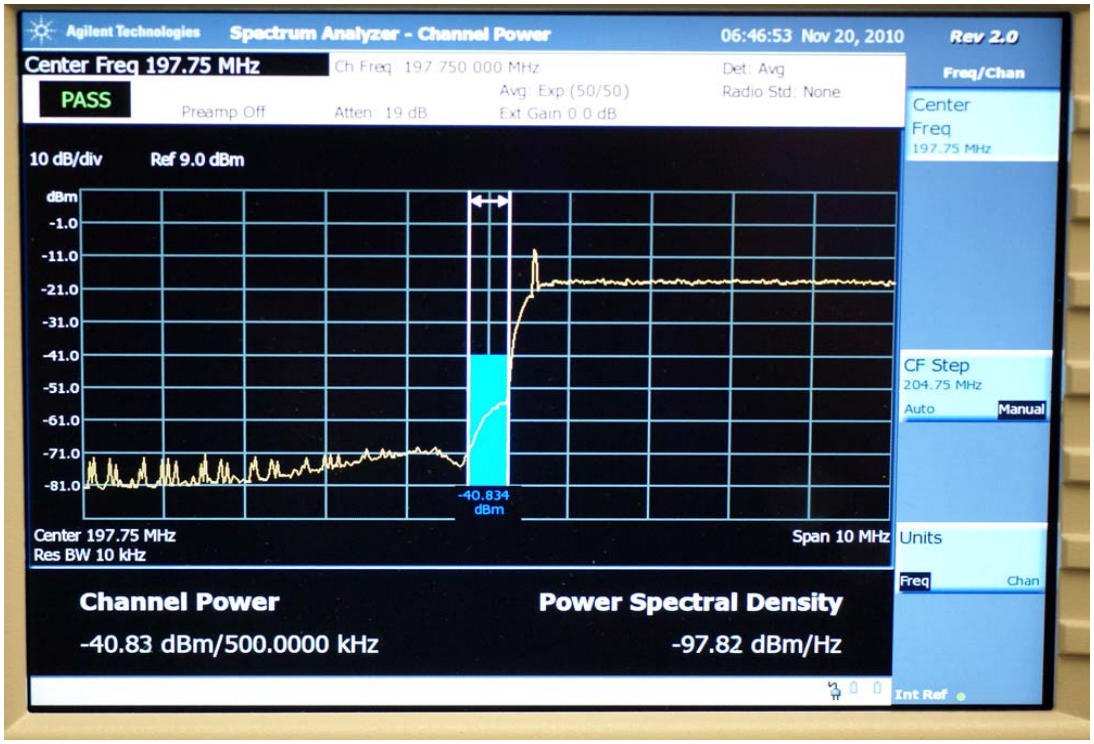
Emission Mask Compliance

Step 2: Measure the first four 500 kHz sub-bands on each side of the desired channel. For this part of the measurement, the stop band filter was not necessary. The attenuator on the spectrum analyzer was adjusted so that it was not being overloaded. Once the first four sub-bands were measured, the signal was close to the noise floor. Screenshots 2 and 3 show the spectrum on each side of the desired channel as an example of the measurements.



Screenshot 1 - Channel power measured at 201 MHz

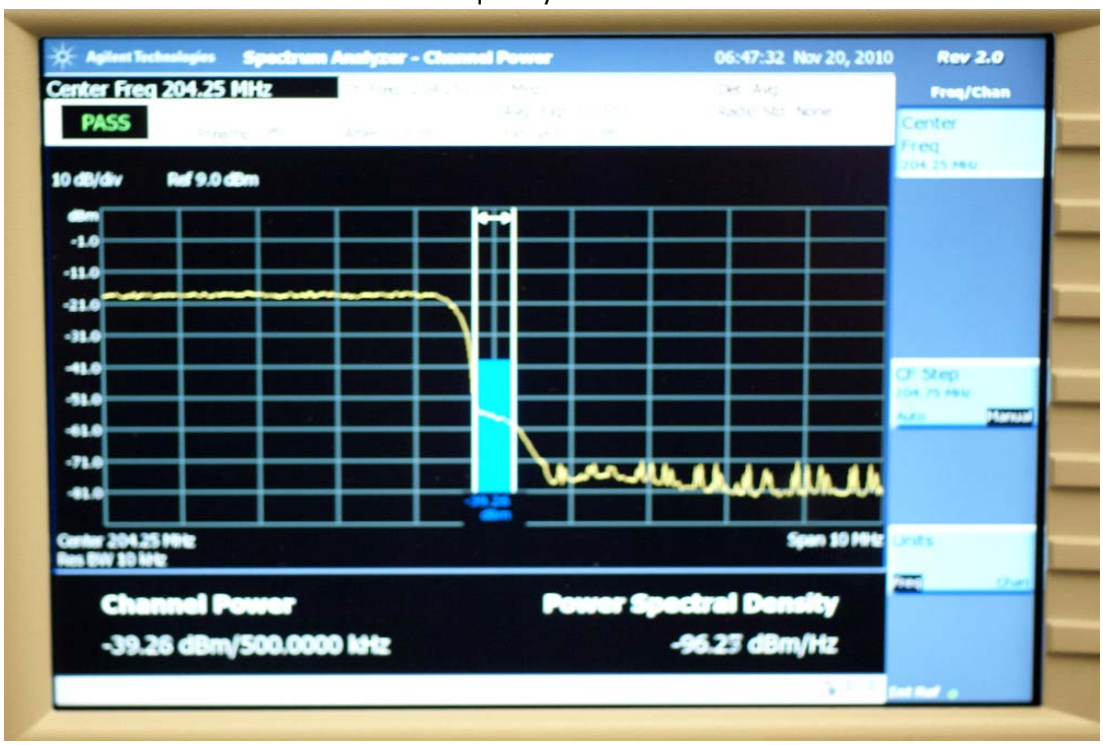
Emission Mask Compliance



Screenshot 2

Lower sideband spectrum measured using channel power mode

Center frequency = 197.75 MHz Sub Band -1



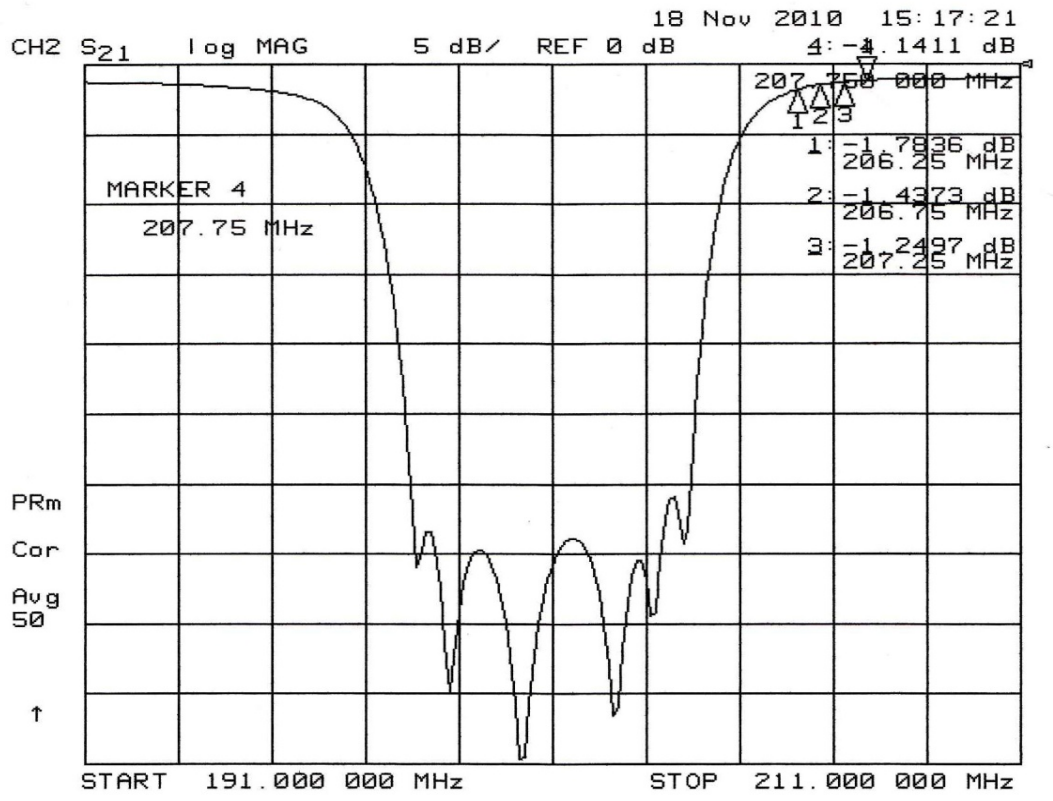
Screenshot 3

Upper sideband spectrum measured using channel power mode

Center frequency = 204.25 MHz Sub-band +1

Emission Mask Compliance

Step 3: Install the bandstop filter in the path from the coupler to the spectrum analyzer and reduce the attenuation so that the emissions in the remaining sub-bands could be measured. The band stop filter frequency response was determined using a network analyzer. The insertion loss at the center of each of the twelve 500 kHz segments on either side of the main channel was tabulated. The band stop filter response is shown below as Plot 1.



Plot 1

Emission Mask Compliance

The first step of the procedure optimized the level of the spectrum analyzer dynamic range ensuring the noise floor was below the value assumed if the transmitter spectrum just met the limits of the emission mask. Once that was done, the spectrum analyzer attenuator was not changed and the channel power mode was engaged to measure each of the remaining 500kHz segments (on both sides of the desired channel) using the center frequency of that segment.

The final step was to make any adjustments necessary for the proximity of the noise floor and to take into account the stop band filter loss in that order and record the values in the table. Then those recorded power levels were subtracted from the total power in the desired channel and values were tabulated to determine if they met the emission mask.

The table with the corrected emission mask measurement values is presented below. The transmitter emissions met the requirements as indicated by comparison with the FCC Stringent Emission Mask.

Lower Adjacent Channel Measurements (800 Watts Average)

Channel 36 Center Frequency 605

Sub-band	Center Freq MHz	6MHz Channel Power dBm ($0dB_{DTV}$)	500kHz Spectrum Analyzer Noise Channel Power dBm	500kHz Measured Channel Power dBm	Stop Band Filter Gain dB	500kHz Channel Power Corrected For Noise Floor	500kHz Channel Power Corrected For Stop Band Filter dBm	Sub Band Power dB_{DTV}	FCC Mask Limit dB_{DTV}
-1	197.75	9.4	-61.0	-41.7	----	**	-----	-51.1	-47.0
-2	197.25	9.4	-61.0	-54.9	----	**	-----	-64.3	-49.9
-3	196.75	9.4	-61.0	-54.7	----	**	-----	-64.1	-55.6
-4	196.25	9.4	-61.0	-55.8	----	**	-----	-65.2	-61.4
STOP BAND FILTER USED BELOW THIS LINE									
-5	195.75	9.4	-95.0	-63.9	-2.4	**	-61.5	-70.9	-67.1
-6	195.25	9.4	-95.0	-66.7	-2.0	**	-64.7	-74.1	-71.9
-7	194.75	9.4	-95.0	-69.6	-1.8	**	-67.8	-77.2	-76.0
-8	194.25	9.4	-95.0	-72.1	-1.6	**	-70.5	-79.9	-76.0
-9	193.75	9.4	-95.0	-74.7	-1.5	**	-73.2	-82.6	-76.0
-10	193.25	9.4	-95.0	-77.5	-1.4	**	-76.1	-85.5	-76.0
-11	192.75	9.4	-95.0	-79.9	-1.4	**	-78.5	-87.9	-76.0
-12	192.25	9.4	-95.0	-81.9	-1.3	**	-80.6	-90.0	-76.0
A	B	C	D	E	F	G	H	I	J

** Noise floor proximity correction was not necessary to meet the mask and was not computed here.

H = E-F I = E-C (sub band 1 thru 4) I = H-C (sub band 5 thru 12)

Emission Mask Compliance

Lower Adjacent Channel Measurements (800 Watts Average)

Channel 36 Center Frequency 605

Sub-band	Center Freq MHz	6MHz Channel Power dBm ($0dB_{DTV}$)	500kHz Spectrum Analyzer Noise Channel Power dBm	500kHz Measured Channel Power dBm	Stop Band Filter Gain dB	500kHz Channel Power Corrected For Noise Floor	500kHz Channel Power Corrected For Stop Band Filter dBm	Sub Band Power dB_{DTV}	FCC Mask Limit dB_{DTV}
-1	197.75	9.4	-61.0	-41.7	----	**	-----	-51.1	-47.0
-2	197.25	9.4	-61.0	-54.9	----	**	-----	-64.3	-49.9
-3	196.75	9.4	-61.0	-54.7	----	**	-----	-64.1	-55.6
-4	196.25	9.4	-61.0	-55.8	----	**	-----	-65.2	-61.4
STOP BAND FILTER USED BELOW THIS LINE									
-5	195.75	9.4	-95.0	-63.9	-2.4	**	-61.5	-70.9	-67.1
-6	195.25	9.4	-95.0	-66.7	-2.0	**	-64.7	-74.1	-71.9
-7	194.75	9.4	-95.0	-69.6	-1.8	**	-67.8	-77.2	-76.0
-8	194.25	9.4	-95.0	-72.1	-1.6	**	-70.5	-79.9	-76.0
-9	193.75	9.4	-95.0	-74.7	-1.5	**	-73.2	-82.6	-76.0
-10	193.25	9.4	-95.0	-77.5	-1.4	**	-76.1	-85.5	-76.0
-11	192.75	9.4	-95.0	-79.9	-1.4	**	-78.5	-87.9	-76.0
-12	192.25	9.4	-95.0	-81.9	-1.3	**	-80.6	-90.0	-76.0
A	B	C	D	E	F	G	H	I	J

** Noise floor proximity correction was not necessary to meet the mask and was not computed here.

H = E-F I = E-C (sub band 1 thru 4) I = H-C (sub band 5 thru 12)

Emission Mask Compliance

Upper Adjacent Channel Measurements (800 Watts Average)

Channel 11 Center Frequency 201 MHz

Sub-band	Center Freq MHz	6MHz Channel Power dBm ($0dB_{DTV}$)	500kHz Spectrum Analyzer Noise Channel Power dBm	500kHz Measured Channel Power dBm	Stop Band Filter Gain dB	500kHz Channel Power Corrected For Noise Floor	500kHz Channel Power Corrected For Stop Band Filter dBm	Sub Band Power dB_{DTV}	FCC Mask Limit dB_{DTV}
1	204.25	9.4	-60.1	-38.2	----	**	-----	-47.6	-47.0
2	204.75	9.4	-60.1	-50.2	----	**	-----	-59.6	-49.9
3	205.25	9.4	-60.1	-58.5	----	**	-----	-67.9	-55.6
4	205.75	9.4	-60.1	-57.4	----	**	-----	-66.8	-61.4
STOP BAND FILTER USED BELOW THIS LINE									
5	206.25	9.4	-95.0	-63.7	-1.8	**	-61.9	-71.3	-67.1
6	206.75	9.4	-95.0	-65.5	-1.4	**	-64.1	-73.5	-71.9
7	207.25	9.4	-95.0	-69.2	-1.2	**	-68.0	-77.4	-76.0
8	207.75	9.4	-95.0	-71.0	-1.1	**	-69.9	-79.3	-76.0
9	208.25	9.4	-95.0	-74.6	-1.1	**	-73.5	-82.9	-76.0
10	208.75	9.4	-95.0	-77.8	-1.0	**	-76.8	-86.2	-76.0
11	209.25	9.4	-95.0	-81.1	-1.0	**	-80.1	-89.5	-76.0
12	209.75	9.4	-95.0	-84.0	-0.9	**	-83.1	-92.5	-76.0
A	B	C	D	E	F	G	H	I	J

** Noise floor proximity correction was not necessary to meet the mask and was not computed here.

H = E-F I = E-C (sub band 1 thru 4) I = H-C (sub band 5 thru 12)

Emission Mask Compliance

Upper Adjacent Channel Measurements (400 Watts Average)

Channel 11 Center Frequency 201 MHz

Sub-band	Center Freq MHz	6MHz Channel Power dBm (0dB$_{DTV}$)	500kHz Spectrum Analyzer Noise Channel Power dBm	500kHz Measured Channel Power dBm	Stop Band Filter Gain dB	500kHz Channel Power Corrected For Noise Floor	500kHz Channel Power Corrected For Stop Band Filter dBm	Sub Band Power dB$_{DTV}$	FCC Mask Limit dB$_{DTV}$
1	204.25	6.4	-61.2	-46.1	----	**	-----	-52.5	-47.0
2	204.75	6.4	-61.2	-56.6	----	**	-----	-63.0	-49.9
3	205.25	6.4	-61.2	-61.2	----	**	-----	-67.6	-55.6
4	205.75	6.4	-61.2	-60.5	----	**	-----	-66.9	-61.4
STOP BAND FILTER USED BELOW THIS LINE									
5	206.25	6.4	-95.3	-73.0	-1.8	**	-71.2	-77.6	-67.1
6	206.75	6.4	-95.3	-75.6	-1.4	**	-74.2	-80.6	-71.9
7	207.25	6.4	-95.3	-78.8	-1.2	**	-77.6	-84.0	-76.0
8	207.75	6.4	-95.3	-82.0	-1.1	**	-80.9	-87.3	-76.0
9	208.25	6.4	-95.3	-85.8	-1.1	**	-84.7	-91.1	-76.0
10	208.75	6.4	-95.3	-89.3	-1.0	**	-88.3	-94.7	-76.0
11	209.25	6.4	-95.3	-91.8	-1.0	**	-90.8	-97.2	-76.0
12	209.75	6.4	-95.3	-92.9	-0.9	**	-92.0	-98.4	-76.0
A	B	C	D	E	F	G	H	I	J

** Noise floor proximity correction was not necessary to meet the mask and was not computed here.

H = E-F I = E-C (sub band 1 thru 4) I = H-C (sub band 5 thru 12)

Step 4: Reconfigure the test setup as shown in Figure 1 in the Power Exhibit to insert the high pass filter NHB 400 at point "B".

The high pass filter attenuates the on-channel frequencies and passes the harmonic frequencies.

Proceed with spurs and harmonics measurements tests with results shown on following page.

Emission Mask Compliance

ATSC Transmitter Spurs and Harmonics Output Power: 400 Watts Average

Channel 11 Center Frequency 205 MHz

	Center Freq MHz	BW MHz	RF Sample Gain dB	Relative RF Sample Gain dB	Relative Cable Gain dB	High Pass Filter Gain dB	500kHz Spectrum Analyzer Noise Channel Power dBm	500kHz Signal Channel Power dBm	500kHz Signal Channel Power Corrected for Noise Floor	500kHz Corrected Spurious Power dBm	6 MHz Main Channel Power 0dBDTV	Spurious to Main Ratio dBDTV	FCC Limit dBDTV
Fc	205	6	-49	0.0	0.0	-57.5	-----	-----	**	-----	6.9	-----	-----
2Fc	410	12	-43.1	5.9	-0.1	-0.6	-96.6	-96.6	**	-101.8	6.9	-108.7	-76
3Fc	615	18	-39.6	9.4	-0.2	-0.3	-95.5	-95	**	-103.9	6.9	-110.8	-76
4Fc	820	24	-37.1	11.9	-0.2	-0.2	-95.3	-95.3	**	-106.8	6.9	-113.7	-76
5Fc	1025	30	-35.3	13.7	-0.3	-0.2	-93.6	-93.6	**	-106.8	6.9	-113.7	-76
6Fc	1230	36	-33.8	15.2	-0.3	-0.1	-92.1	-93.5	**	-108.3	6.9	-115.2	-76
7Fc	1435	42	-32.6	16.4	-0.4	-0.2	-92.1	-92.1	**	-107.9	6.9	-114.8	-76
8Fc	1640	48	-31.5	17.5	-0.4	-0.1	-92.5	-92.5	**	-109.5	6.9	-116.4	-76
9Fc	1845	56	-30.6	18.4	-0.4	-0.1	-90.7	-90.8	**	-108.7	6.9	-115.6	-76
10Fc	2050	60	-29.9	19.1	-0.5	-0.2	-90.8	-90.8	**	-109.2	6.9	-116.1	-76
A	B	C	D	E	F	G	H	I	J	K	L	M	N

ATSC Transmitter Spurs and Harmonics Output Power: 800W Watts Average

Channel 11 Center Frequency 205 MHz

	Center Freq MHz	BW MHz	RF Sample Gain dB	Relative RF Sample Gain dB	Relative Cable Gain dB	High Pass Filter Gain dB	500kHz Spectrum Analyzer Noise Channel Power dBm	500kHz Signal Channel Power dBm	500kHz Signal Channel Power Corrected for Noise Floor	500kHz Corrected Spurious Power dBm	6 MHz Main Channel Power 0dBDTV	Spurious to Main Ratio dBDTV	FCC Limit dBDTV
Fc	201	6	-49	0.0	0.0	-57.5	-----	-----	**	-----	10.0	-----	-----
2Fc	402	12	-43.1	5.9	-0.1	-0.6	-95.6	-95.5	**	-100.7	10.0	-110.7	-76
3Fc	603	18	-39.6	9.4	-0.2	-0.3	-94.5	-93.7	**	-102.6	10.0	-112.6	-76
4Fc	804	24	-37.1	11.9	-0.2	-0.2	-94.3	-94.3	**	-105.8	10.0	-115.8	-76
5Fc	1005	30	-35.3	13.7	-0.3	-0.2	-92.6	-92.3	**	-105.5	10.0	-115.5	-76
6Fc	1206	36	-33.8	15.2	-0.3	-0.1	-92.6	-92.6	**	-107.4	10.0	-117.4	-76
7Fc	1407	42	-32.6	16.4	-0.4	-0.2	-91.1	-91.0	**	-106.8	10.0	-116.8	-76
8Fc	1608	48	-31.5	17.5	-0.4	-0.1	-91.5	-91.5	**	-108.5	10.0	-118.5	-76
9Fc	1809	56	-30.6	18.4	-0.4	-0.1	-89.8	-89.8	**	-107.7	10.0	-117.7	-76
10Fc	2010	60	-29.9	19.1	-0.5	-0.2	-89.8	-89.8	**	-108.2	10.0	-118.2	-76
A	B	C	D	E	F	G	H	I	J	K	L	M	N

** Noise floor proximity correction was not necessary to meet the mask and was not computed here.

K=I-(E-F-G) M=K-L