

## Results of FCC Testing for the SX1127 UNII Head End Transceiver

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A SX1127 UNII Head End (HE) transceiver was tested for maximum power spectral density, maximum output power, and maximum bandedge emissions. Based on consultation with Greg Czumak at the FCC (11/5/99), the following methods were developed for testing U-NII transceivers (Point to Multi-Point Transceivers):

<b>Peak Power Spectral Density</b>	$17 \text{ dBm/MHz} - (\text{Antenna Gain}-6)$ (if Antenna Gain $\geq 6 \text{ dBi}$ )
	$17 \text{ dBm/MHz}$ (if Antenna Gain $< 6 \text{ dBi}$ )

Resolution Bandwidth = 1MHz  
Video Bandwidth = 1 MHz  
Average = 100 sweeps  
Peak Search  
Measure Peak

<b>Peak Transmit Power</b>	$17 \text{ dBm/MHz} + 10^* \text{Log}(\text{BW}) \text{ MHz} - (\text{Antenna Gain}-6)$ (if Antenna Gain $\geq 6 \text{ dBi}$ )
	$17 \text{ dBm/MHz} + 10^* \text{Log}(\text{BW}) \text{ MHz}$ (if Antenna Gain $< 6 \text{ dBi}$ )

Resolution Bandwidth ~ 1% Emission Bandwidth  
Video Bandwidth = Resolution Bandwidth  
Set Channel Bandwidth = Emission Bandwidth  
View Trace  
Measure Power in Channel Bandwidth

<b>Band Edge</b>	$-17 \text{ dBm/MHz} - \text{Antenna Gain (Bandedge)}$
	$-27 \text{ dBm/MHz} - \text{Antenna Gain (Bandedge} \pm 10 \text{ MHz)}$

Resolution Bandwidth ~ 1% Emission Bandwidth  
Video Bandwidth = Resolution Bandwidth/30  
Center Frequency = Band Edge  
Set Adjacent Channel Bandwidth = 1 MHz  
View Trace  
Measure Power in Adjacent Channel Bandwidth

Unit # 21500310002 was measured using the above methods. The power of the Orthogonal Frequency Division Multiplex (OFDM) input signal was  $-17 \text{ dBm}$ . A block Diagram of the measurement setup is shown in Figure 1. The frequency range of the unit is from 5773 MHz to 5823 MHz and therefore the worse case bandedge emmisions occur at the high end of the band. Tables 1 through 6 summarize the FCC limits and the measured results. The HE will be used with two antennas: an 8 dBi Omnidirectional antenna and a 17.5 dBi sector antenna. The bandwidth of the OFDM signal was 6 MHz.

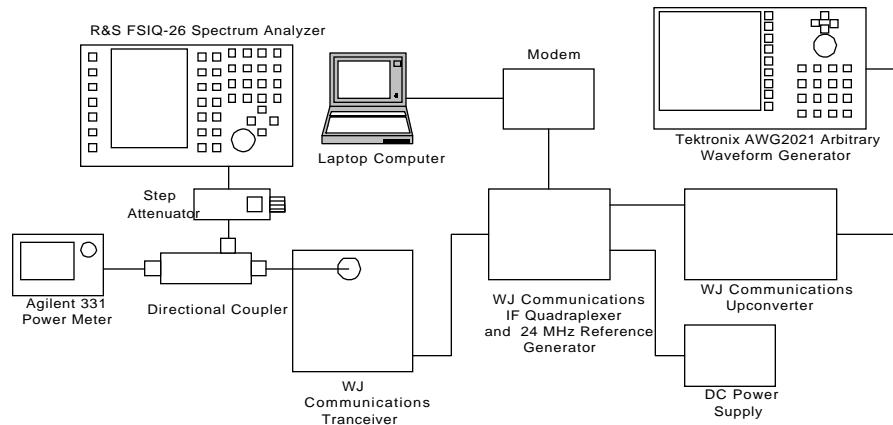


Figure 1. Block diagram of measurement setup.

Table 1. High Band data for Peak Spectral Density and Peak Transmit Power.

Antenna Gain (dBi)	Maximum Allowed PSD (dBm/MHz)	Measured PSD (dBm/MHz)	Maximum Allowed Peak Transmit Power (dBm)	Measured Peak Transmit Power (dBm)
17.5	5.5	5.5	13.3	13.3
8	15	7.2	22.8	15.0

Table 2. High Band data for Band Edge Emissions.

Antenna Gain (dBi)	Maximum Allowed Bandege PSD (dBm/MHz) 5825 MHz	Maximum Measured BandedgePSD (dBm/MHz) 5825 MHz	Maximum Allowed Bandege PSD (dBm/MHz) 5835 MHz	Maximum Measured BandedgePSD (dBm/MHz) 5835 MHz
17.5	-34.5	-41.1	-44.5	-68.0
8	-25.0	-39.0	-35.0	-67.4

Table 3. Mid Band data for Peak Spectral Density and Peak Transmit Power.

Antenna Gain (dBi)	Maximum Allowed PSD (dBm/MHz)	Measured PSD (dBm/MHz)	Maximum Allowed Peak Transmit Power (dBm)	Measured Peak Transmit Power (dBm)
17.5	5.5	5.5	13.3	13.3
8	15	7.2	22.8	15.0

Table 4. Mid Band data for Band Edge Emissions.

Antenna Gain (dBi)	Maximum Allowed Bandege PSD (dBm/MHz) 5825 MHz	Maximum Measured BandedgePSD (dBm/MHz) 5825 MHz	Maximum Allowed Bandege PSD (dBm/MHz) 5835 MHz	Maximum Measured BandedgePSD (dBm/MHz) 5835 MHz
17.5	-34.5	-65.6	-44.5	-65.1
8	-25.0	-65.2	-35.0	-64.2

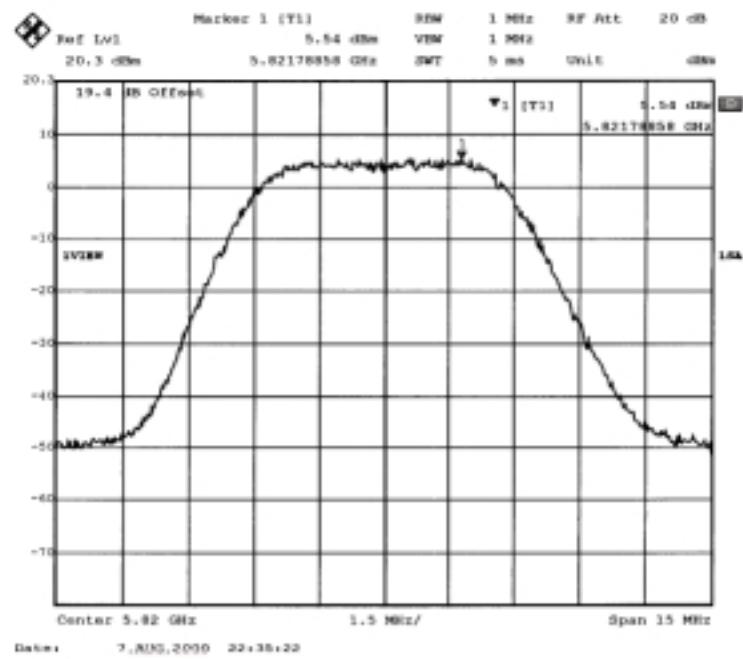
Table 5. Low Band data for Peak Spectral Density and Peak Transmit Power.

Antenna Gain (dBi)	Maximum Allowed PSD (dBm/MHz)	Measured PSD (dBm/MHz)	Maximum Allowed Peak Transmit Power (dBm)	Measured Peak Transmit Power (dBm)
17.5	5.5	5.5	13.3	13.3
8	15	7.2	22.8	15.0

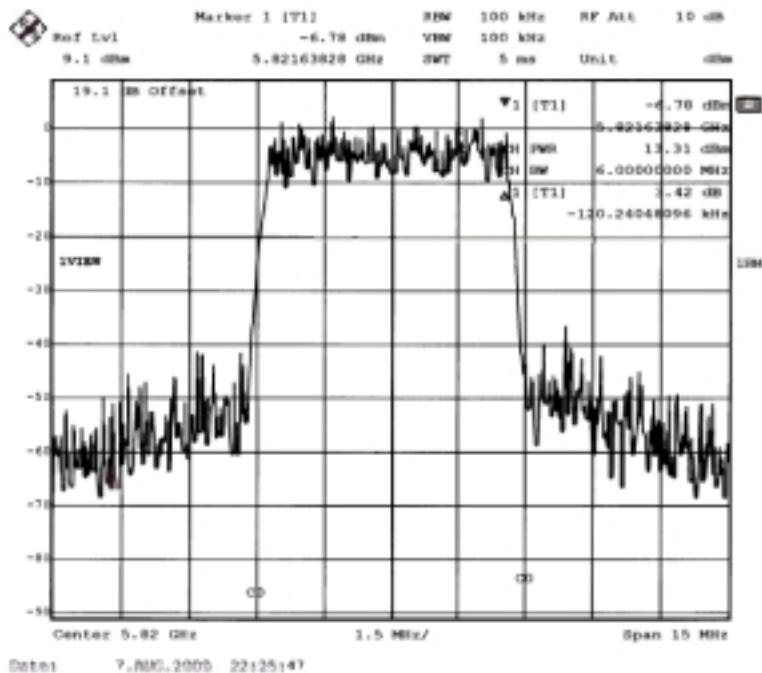
Table 6. Low Band data for Band Edge Emissions.

Antenna Gain (dBi)	Maximum Allowed Bandege PSD (dBm/MHz) 5825 MHz	Maximum Measured BandedgePSD (dBm/MHz) 5825 MHz	Maximum Allowed Bandege PSD (dBm/MHz) 5835 MHz	Maximum Measured BandedgePSD (dBm/MHz) 5835 MHz
17.5	-34.5	-65.4	-44.5	-65.1
8	-25.0	-64.3	-35.0	-65.5

Bandwidth =6.0 MHz  
Pout= 13.3 dBm  
High Band

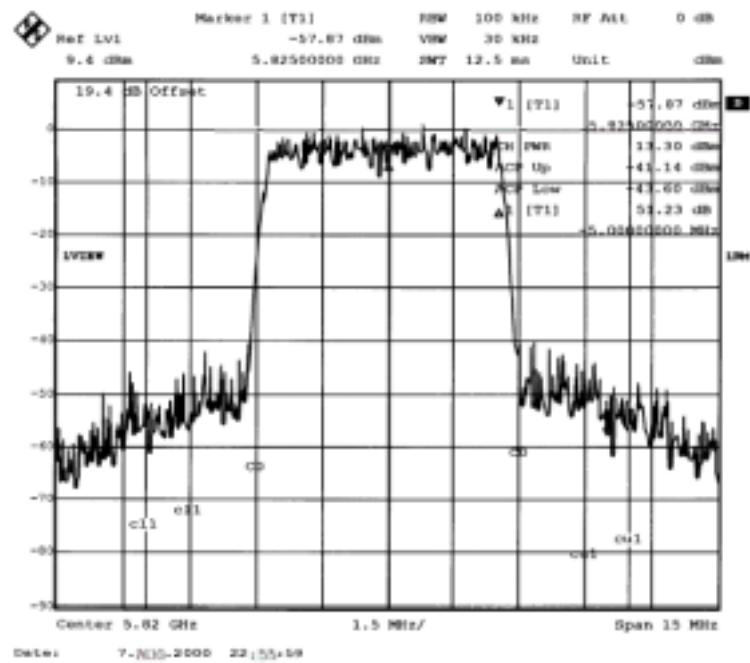


Maximum Power Spectral Density = 5.5 dBm/MHz

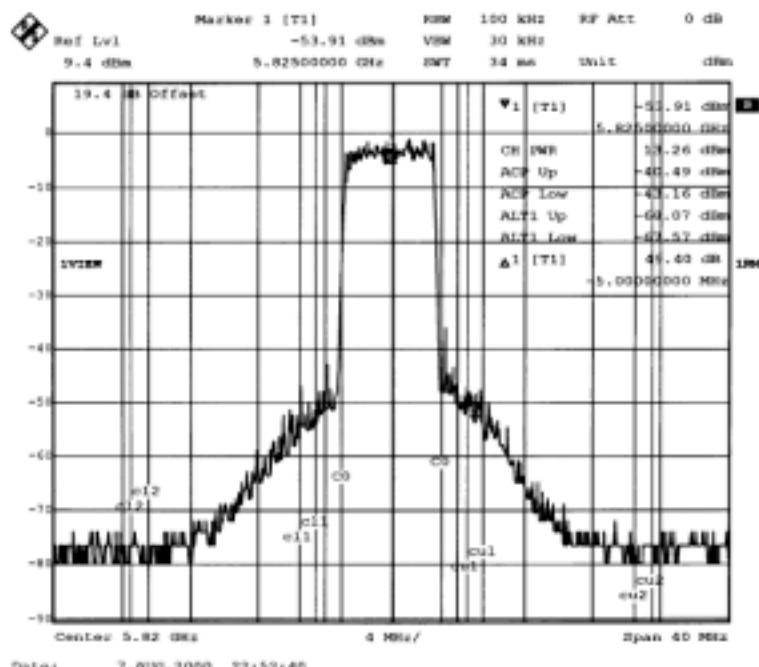


Maximum Transmit Output Power = 13.3 dBm

Bandwidth =6.0 MHz  
Pout= 13.3 dBm  
High Band



$$P_{5725 \text{ MHz}} = -41.1 \text{ dBm/MHz}$$

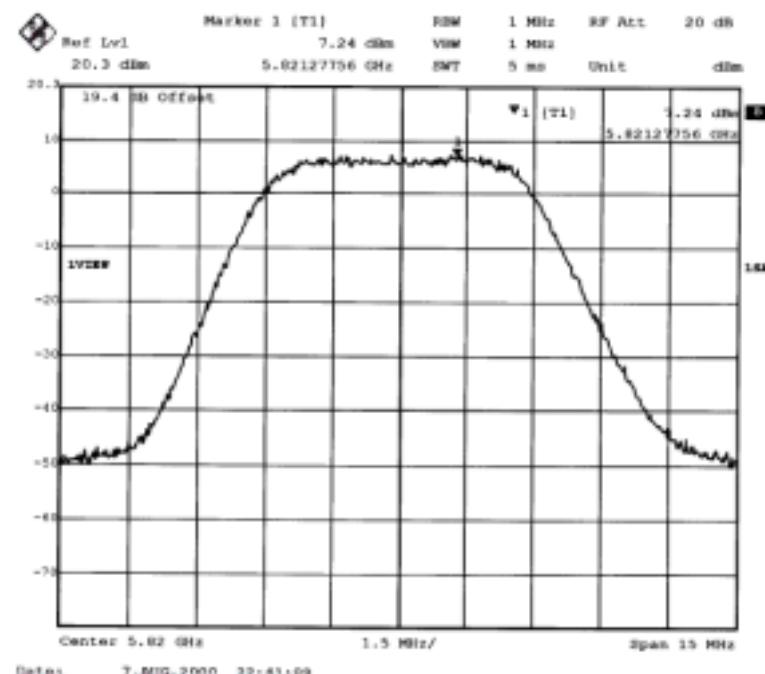


$P_{5715\text{ MHz}} = -68.0\text{ dBm/MHz}$

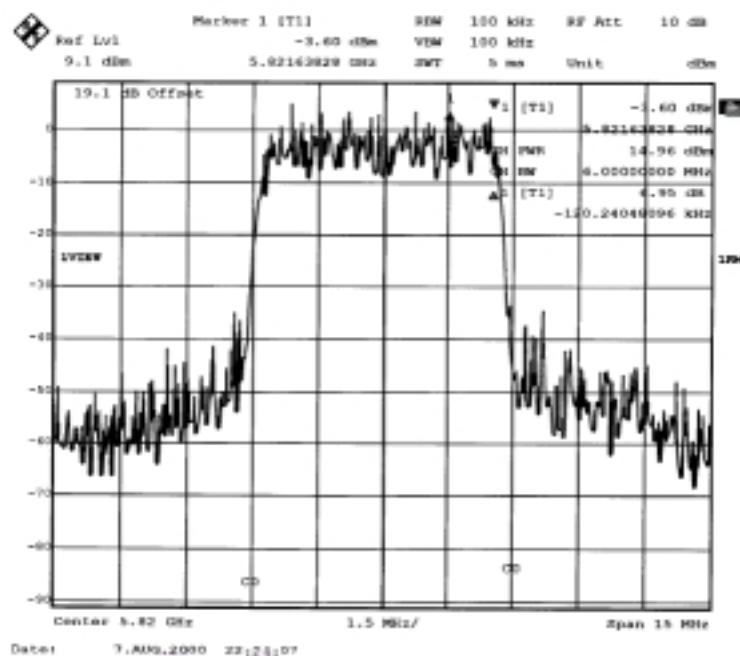
Bandwidth =6.0 MHz

Pout= 15.0 dBm

High Band

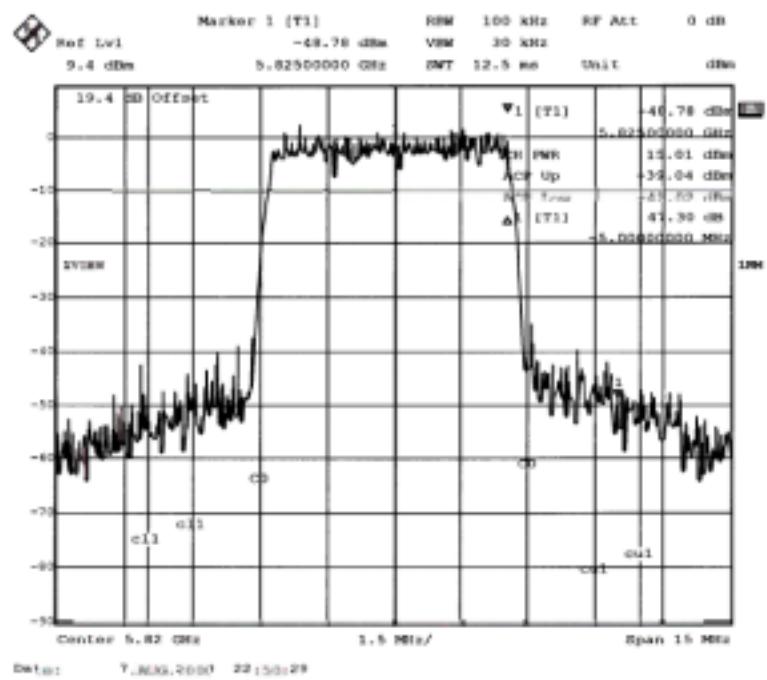


Maximum Power Spectral Density = 7.2 dBm/MHz

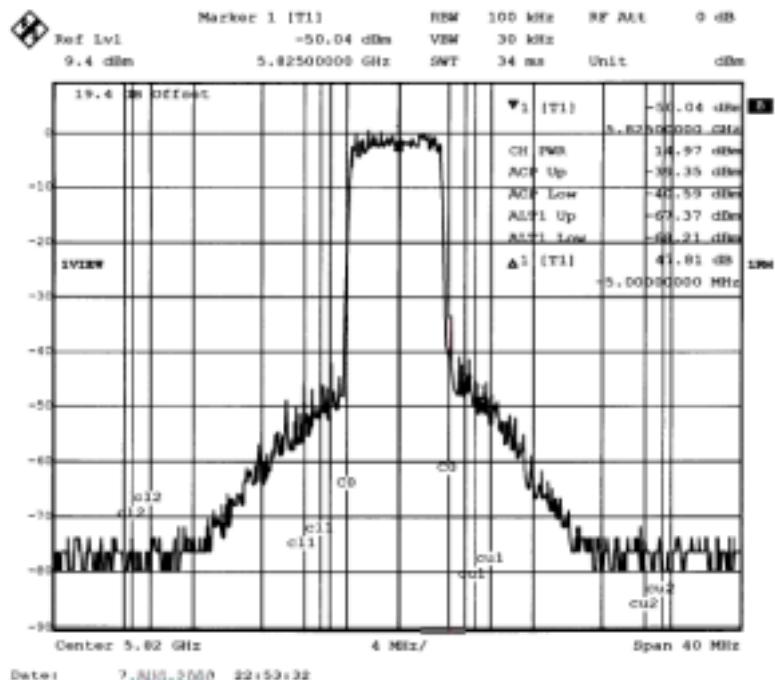


Maximum Transmit Output Power = 15.0 dBm

Bandwidth =6.0 MHz  
 Pout= 15.0 dBm  
 High Band

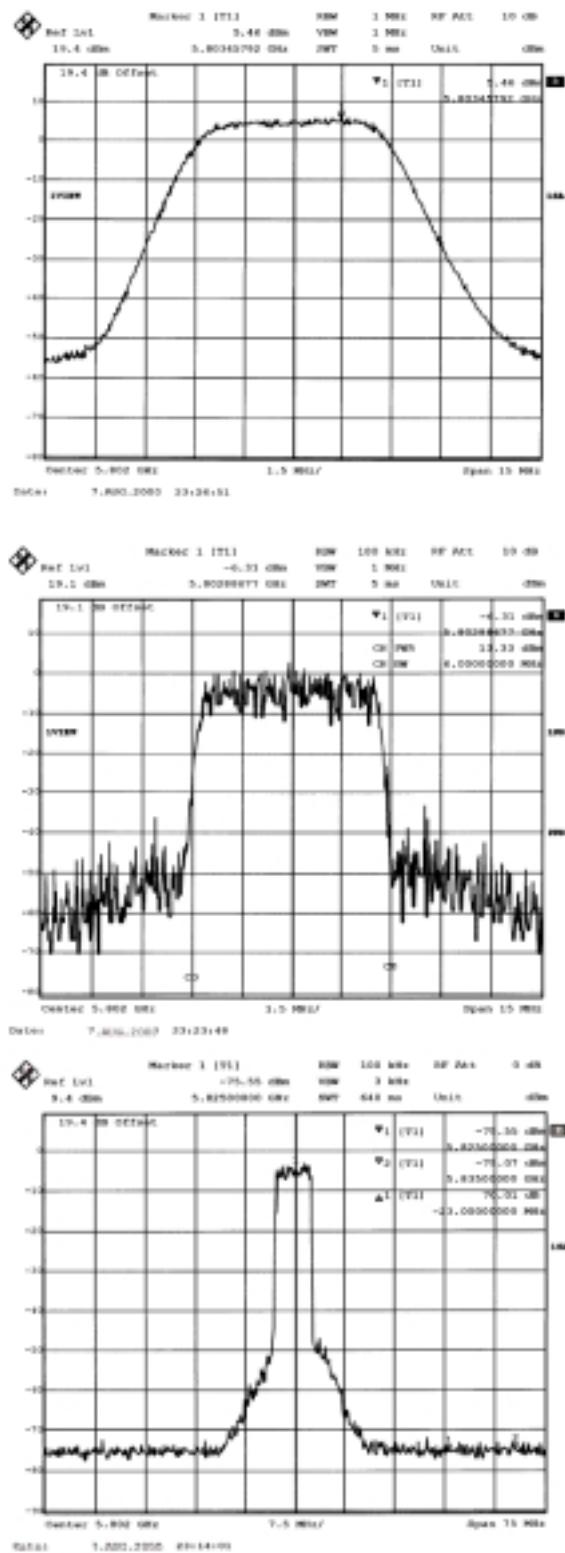


$$P_{5725 \text{ MHz}} = -39.0 \text{ dBm/MHz}$$



$$P_{5715 \text{ MHz}} = -67.4 \text{ dBm/MHz}$$

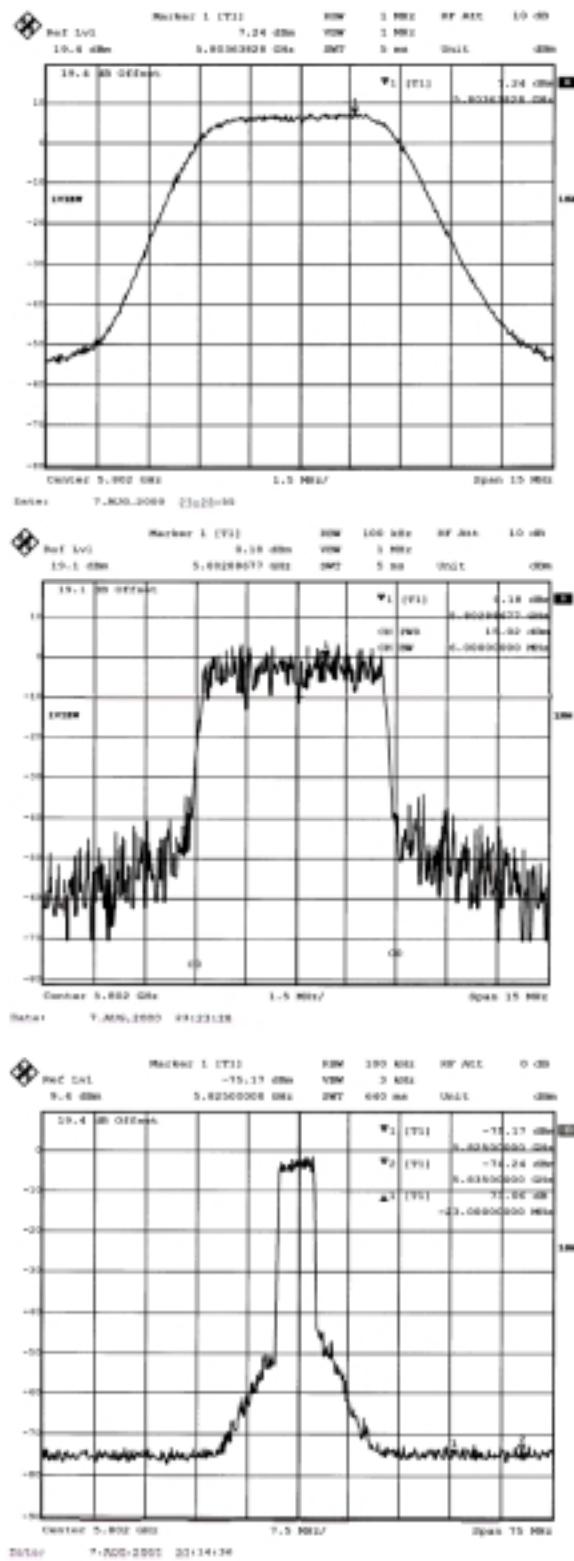
Bandwidth =6.0 MHz  
Pout= 13.3 dBm  
Mid Band



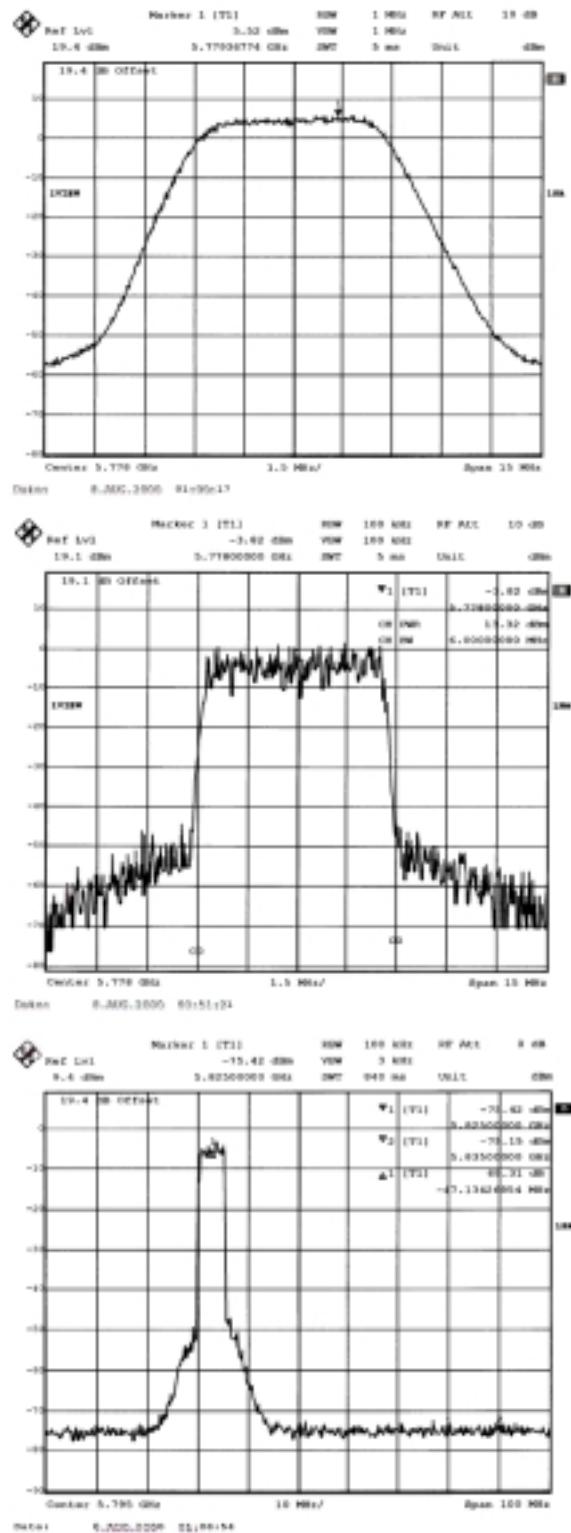
Bandwidth =6.0 MHz

Pout= 15.0 dBm

Mid Band



Bandwidth =6.0 MHz  
Pout= 13.3 dBm  
Low Band



Bandwidth =6.0 MHz  
 Pout= 15.0 dBm  
 Low Band

