

3. DATA

3.1 APD

Representative man-made noise APDs, shown in Figures 5-16, characterize short term noise behavior. Of particular interest are the median, mean, and peak power, the percentage where the APD deviates from the straight Gaussian APD, and the shape of the low probability non-Gaussian component.

Figures 5 and 6 are representative of 137.5 MHz residential noise. The APD departs from Gaussian at 1% or less. The low probabilities are rectangular shaped, indicating little variation in amplitudes of the non-Gaussian component. Figures 7 and 8 depict 137.5 MHz business noise. Median, mean, and peak powers are high compared to system noise. The Denver, CO APD non-Gaussian component departs from Gaussian at 5%. This is high in comparison to the other representative APDs.

Figures 9 and 10 are representative of 402.5 MHz residential noise. In Figure 9 the non-Gaussian component departs from Gaussian at approximately the same percentile as 137.5 MHz residential. However, the non-Gaussian component is triangular rather than rectangular. The median is comparable to the system noise median and the peak has little effect on the mean. Figure 10 indicates Gaussian noise statistics. Figures 11 and 12 depict 402.5 MHz business noise. The Denver, CO APD non-Gaussian component departs from Gaussian at 5%. This high probability has a definite effect on mean power.

Figures 13 and 14 are representative of 761.0 MHz residential noise. Both have Gaussian noise statistics with means comparable to those of system noise. Figures 15 and 16 depict 761.0 MHz business noise. The non-Gaussian components depart from Gaussian at 1% or less and have little effect on mean power.

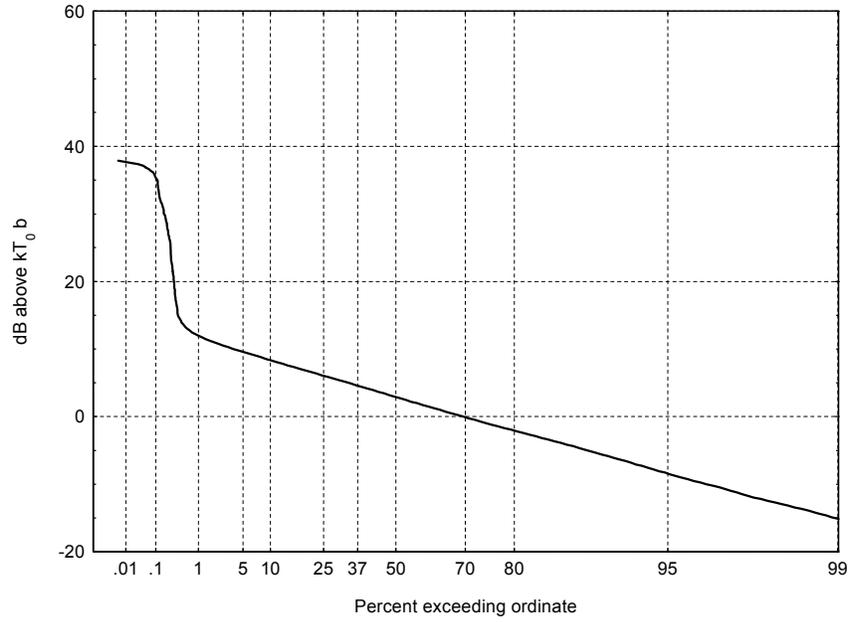


Figure 5. 137.5 MHz noise from measurements at Lakewood, Colorado residence on Tuesday, April 27, 1999 at 10:28:26 AM. Noise figure is 10.0 dB.

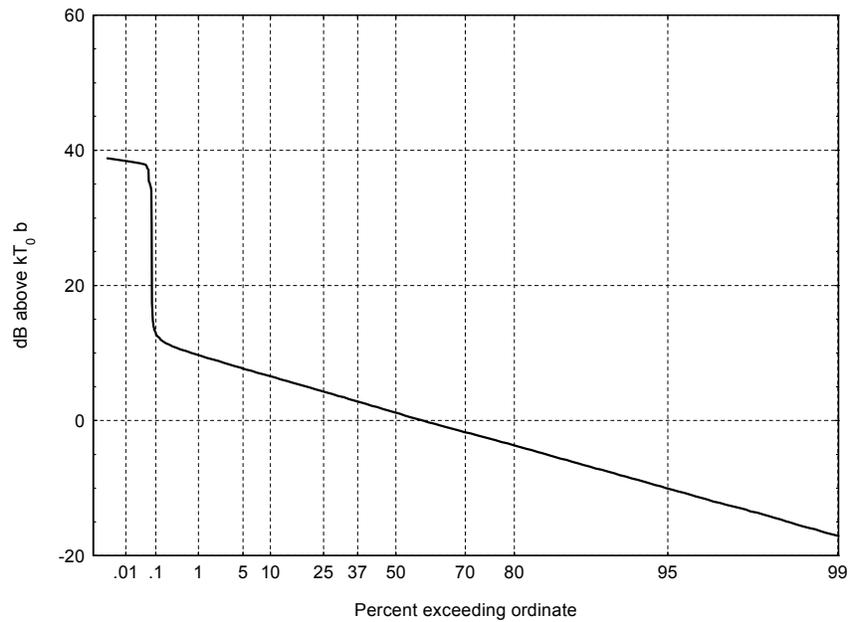


Figure 6. 137.5 MHz noise from measurements at Boulder, Colorado residence on Friday, May 21, 1999 at 03:38:55 PM. Noise figure is 8.1 dB.

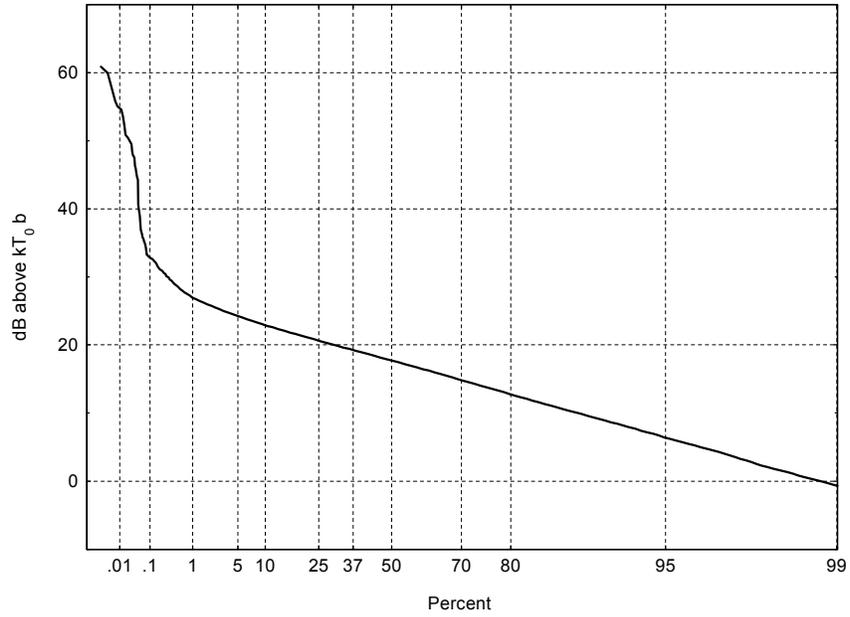


Figure 7. 137.5 MHz noise from measurements at downtown Boulder, Colorado on Friday, July 9, 1999 at 11:06:35 AM. Noise figure is 25.8 dB.

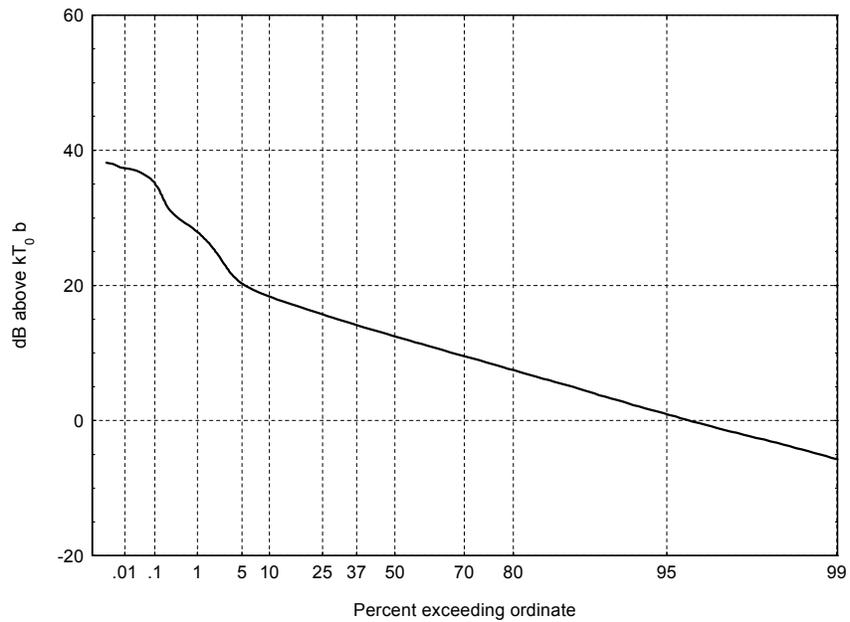


Figure 8. 137.5 MHz noise from measurements at downtown Denver, Colorado on Monday, August 30, 1999 at 10:52:04 AM. Noise figure is 16.7 dB.

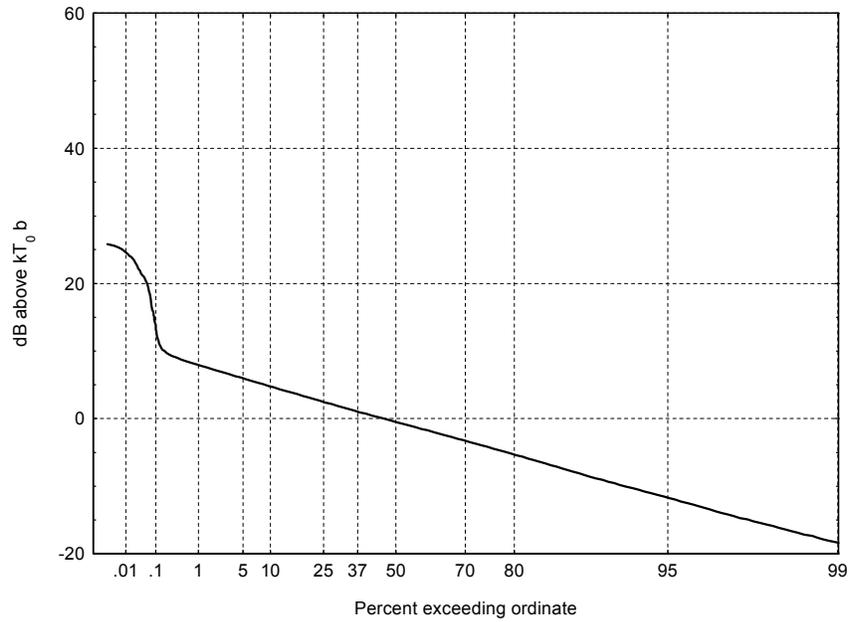


Figure 9. 402.5 MHz noise from measurements at Lakewood, Colorado residence on Wednesday, May 26, 1999 at 12:57:44 PM. Noise figure is 1.7 dB.

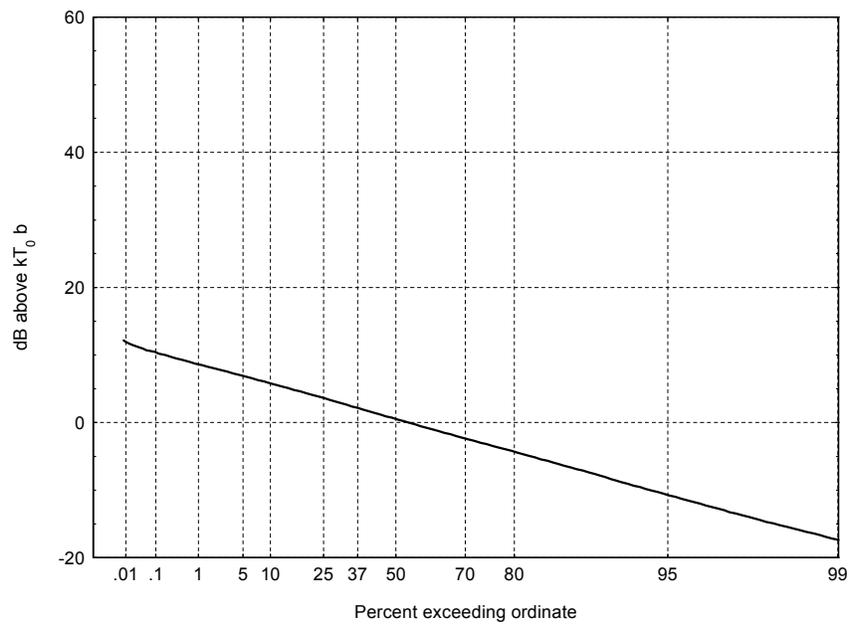


Figure 10. 402.5 MHz noise from measurements at Boulder, Colorado residence on Thursday, May 13, 1999 at 12:58:50 PM. Noise figure is 2.3 dB.

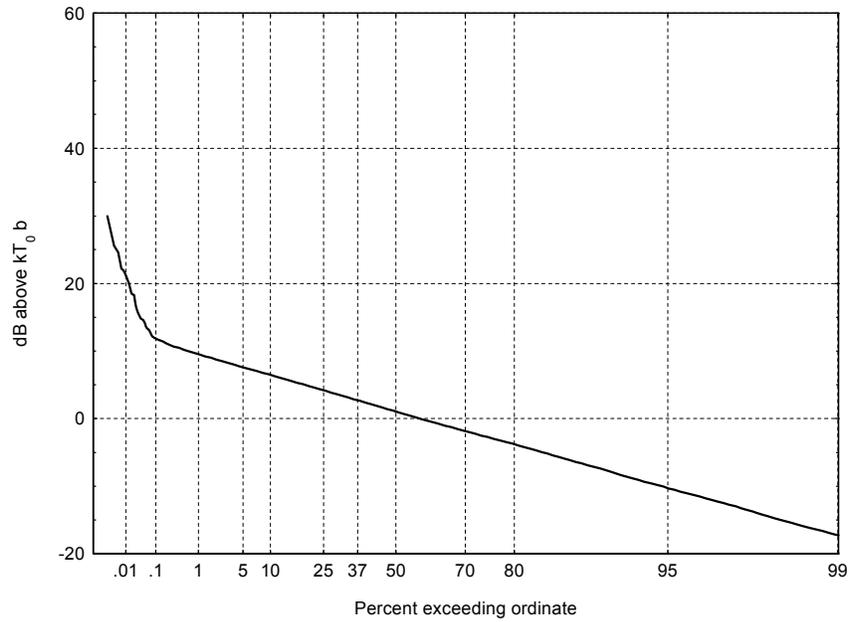


Figure 11. 402.5 MHz noise from measurements at downtown Boulder, Colorado on Thursday, July 1, 1999 at 12:51:52 PM. Noise figure is 3.1 dB.

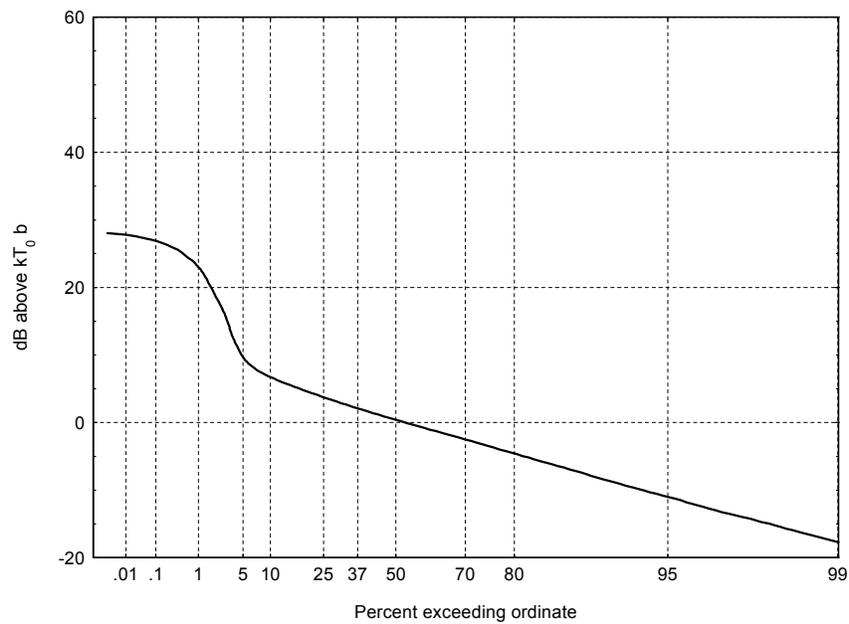


Figure 12. 402.5 MHz noise from measurements at downtown Denver, Colorado on Wednesday, August 25, 1999 at 09:52:57 AM. Noise figure is 8.6 dB.

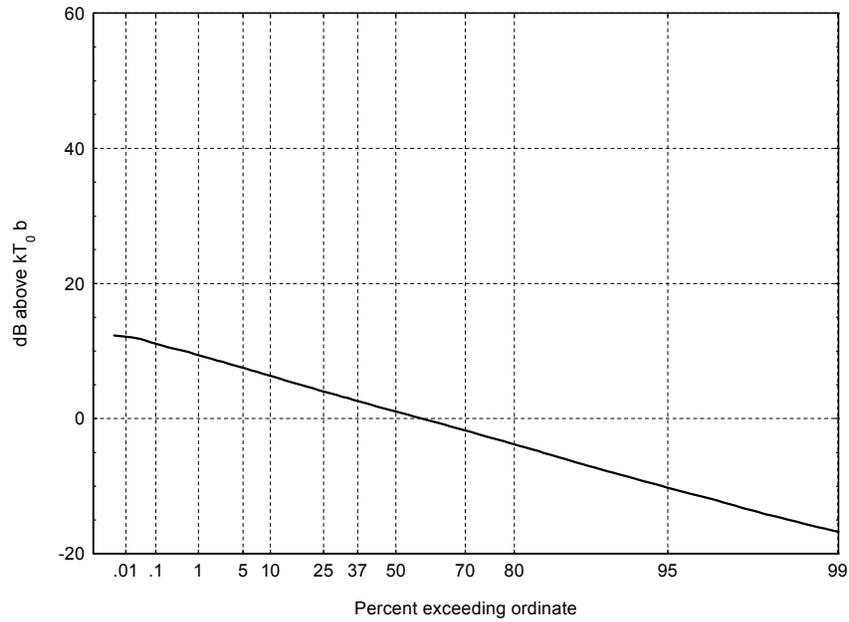


Figure 13. 761.0 MHz noise from measurements at Lakewood, Colorado residence on Thursday, April 29, 1999 at 11:55:15 AM. Noise figure is 2.8 dB.

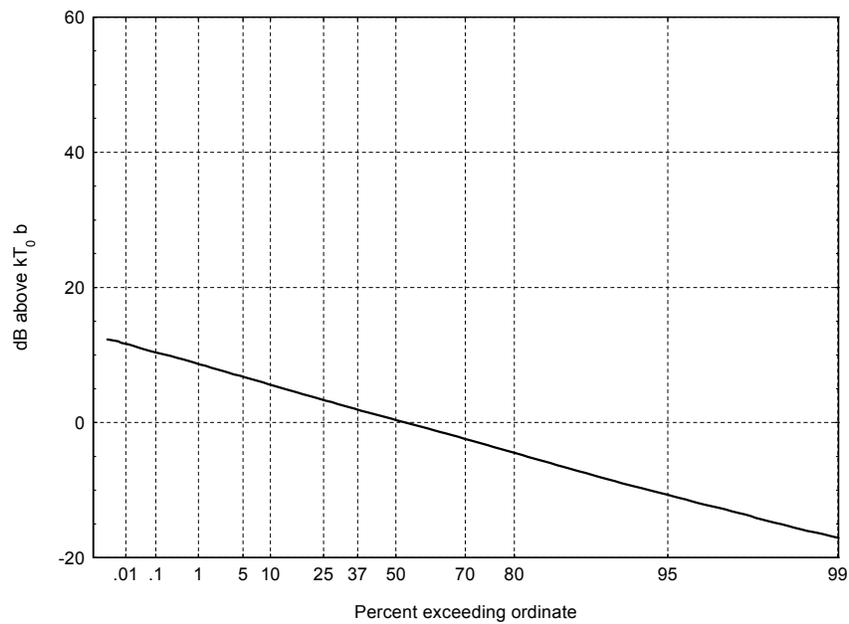


Figure 14. 761.0 MHz noise from measurements at Boulder, Colorado residence on Wednesday, May 19, 1999 at 12:56:22 PM. Noise figure is 2.1 dB.

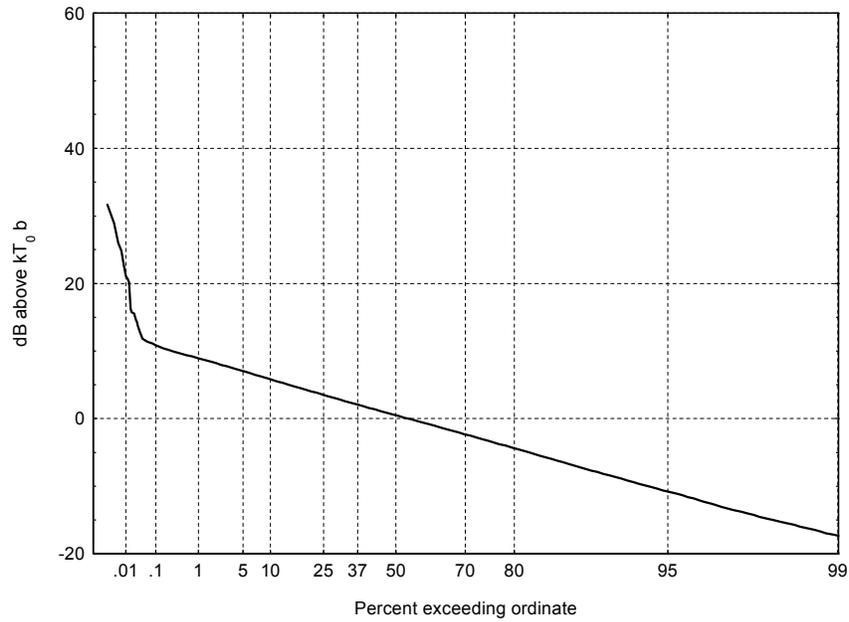


Figure 15. 761.0 MHz noise from measurements at downtown Boulder, Colorado on Monday, July 5, 1999 at 02:55:56 PM. Noise figure is 2.5 dB.

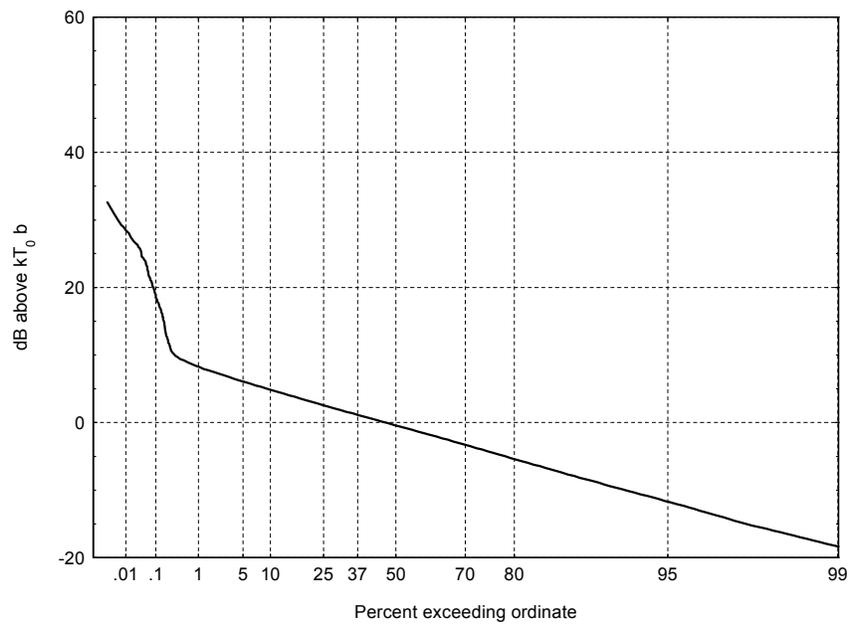


Figure 16. 761.0 MHz noise from measurements at downtown Denver, Colorado on Friday, August 27, 1999 at 07:31:10 PM. Noise figure is 2.5 dB.

3.2 24-hour Summaries

Figures 17-28 summarize long term noise behavior by plotting the peak, mean, and median noise power as a function of time. The median, mean, and peak powers are the bottom, middle, and top curves respectively of these graphs. Noise added by the measurement system has not been removed from these values. These graphs show how noise power statistics are correlated with time of day.

The 24-hour summary graphs show that median power varied much less than mean and peak power for all frequencies and locations. The only exception to this was when a weather satellite, which transmits an FM modulated signal at 137.5 MHz, was in view. Several examples of this, noticeable by the large increase in median noise power, can be found between 4:00 a.m. and 10:00 a.m. at the Lakewood, CO residence shown in Figure 17. Median power was typically very close to system noise median power. The main exception to this was the 137.5 MHz business measurements where it is elevated more than 10 dB.

Mean power was higher than system noise mean power for 137.5 MHz business, 137.5 MHz residential and 402.5 MHz business measurements. The increase in 402.5 MHz business mean power is most dramatically demonstrated in the downtown Denver, CO measurement shown in Figure 24.

Peak power variation was evident for all but 761.0 MHz residential measurements. In general, peak power was higher for business than residential and decreased with increasing frequency. Of the three power statistics, only peak power consistently showed higher levels during working hours. This is particularly evident in the downtown Boulder, CO measurements.

Gaussian noise, evident from the approximately 10-dB spread between mean and peak powers, was dominant at most frequencies and environments between midnight and 6:00 a.m. The most significant exception to this is the 402.5 MHz business downtown, Denver, CO measurement where Gaussian statistics were observed between 10:00 a.m. and 2:00 p.m. Gaussian noise was present at 761.0 MHz residential measurements the whole day.

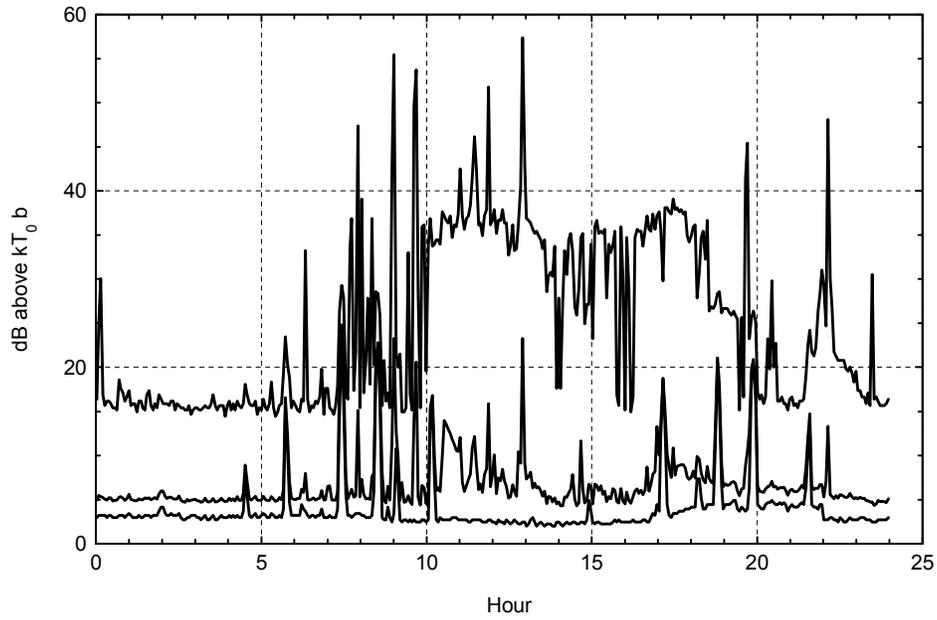


Figure 17. 137.5 MHz median, mean, and peak power at Lakewood, Colorado residence on Tuesday, April 27, 1999.

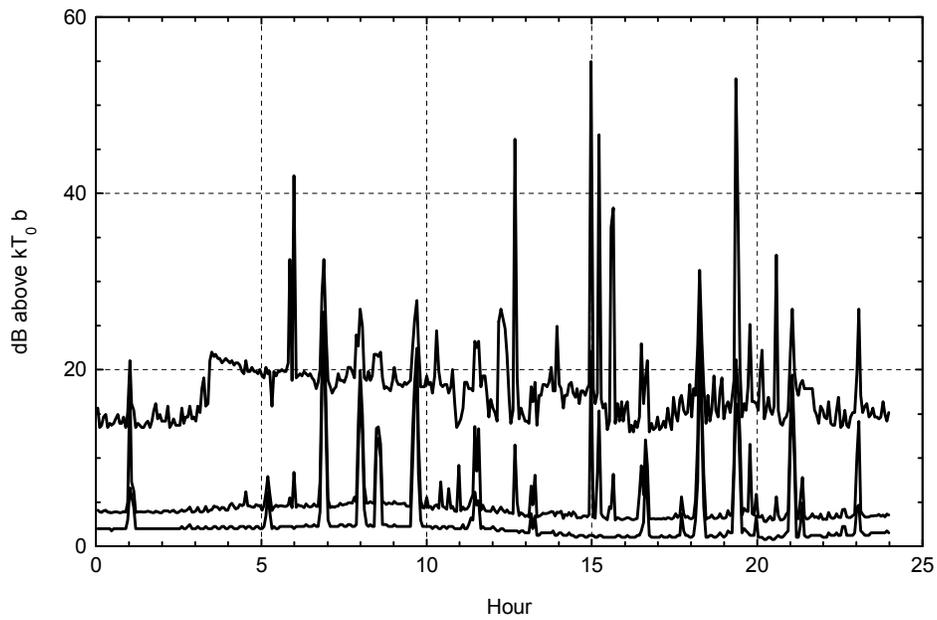


Figure 18. 137.5 MHz median, mean, and peak power at Boulder, Colorado residence on Friday, May 21, 1999.

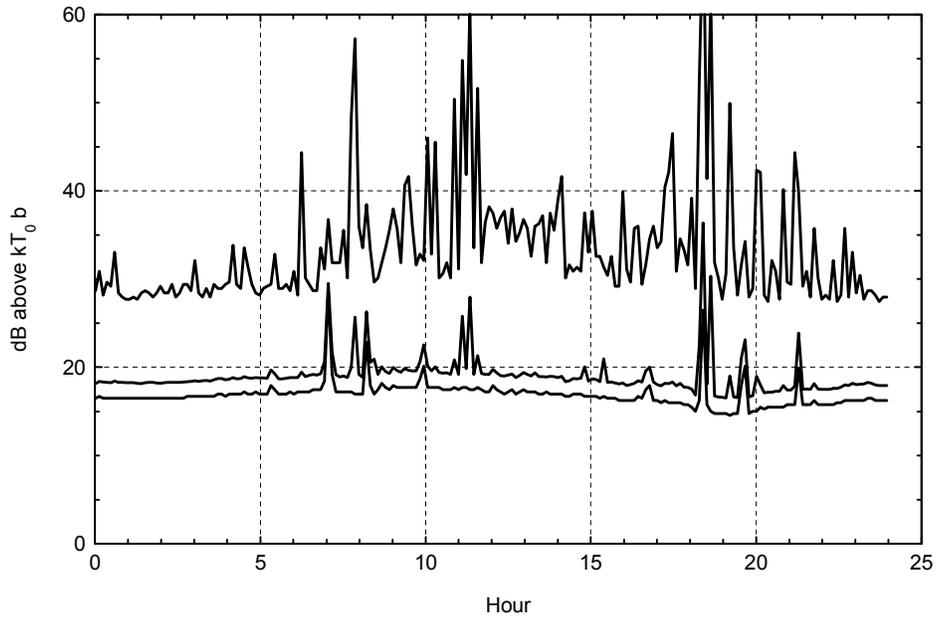


Figure 19. 137.5 MHz median, mean, and peak power at downtown Boulder, Colorado on Friday, July 9, 1999.

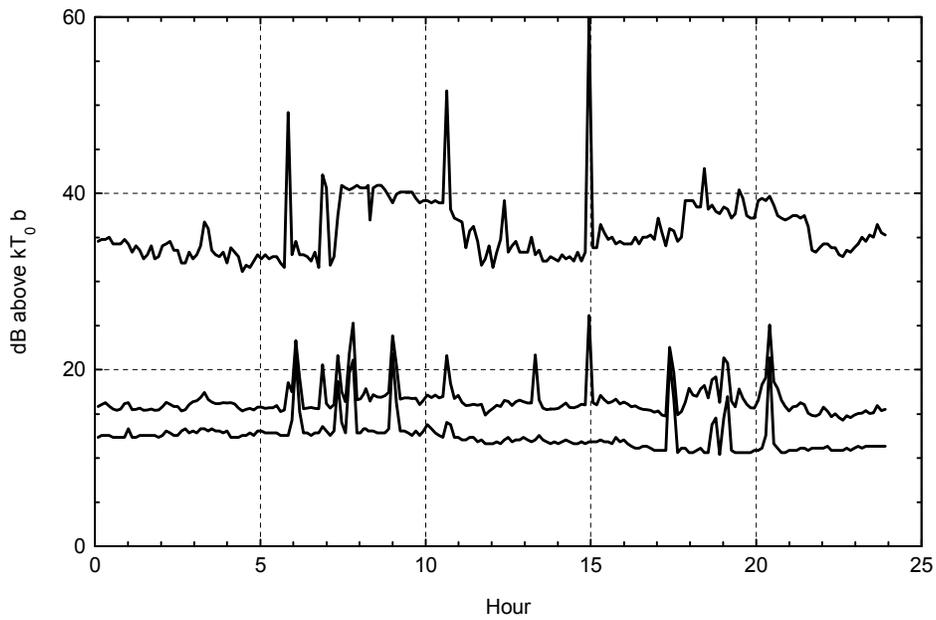


Figure 20. 137.5 MHz median, mean, and peak power at downtown Denver, Colorado on Monday, August 30, 1999.

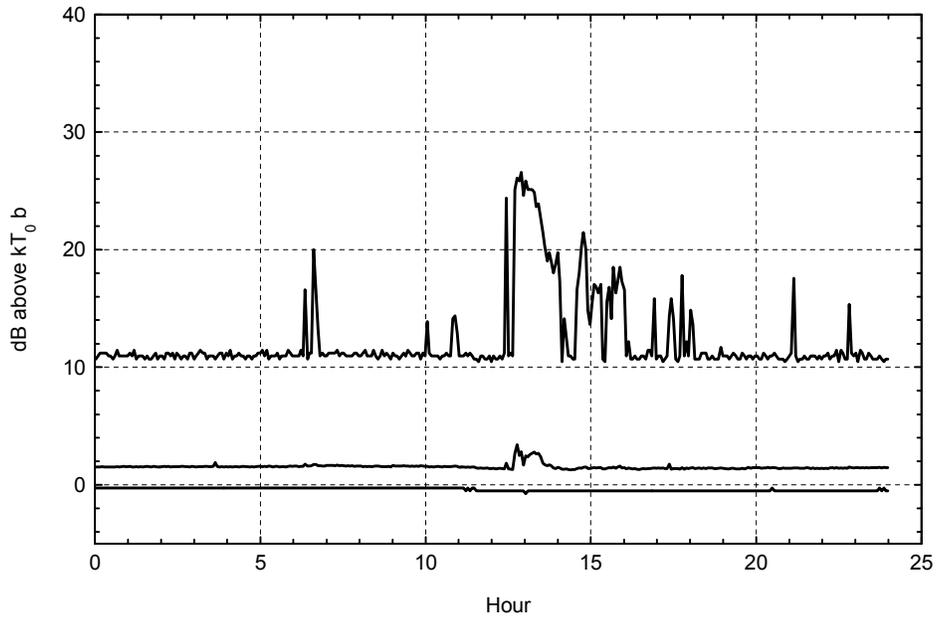


Figure 21. 402.5 MHz median, mean, and peak power at Lakewood, Colorado residence on Wednesday, May 26, 1999.

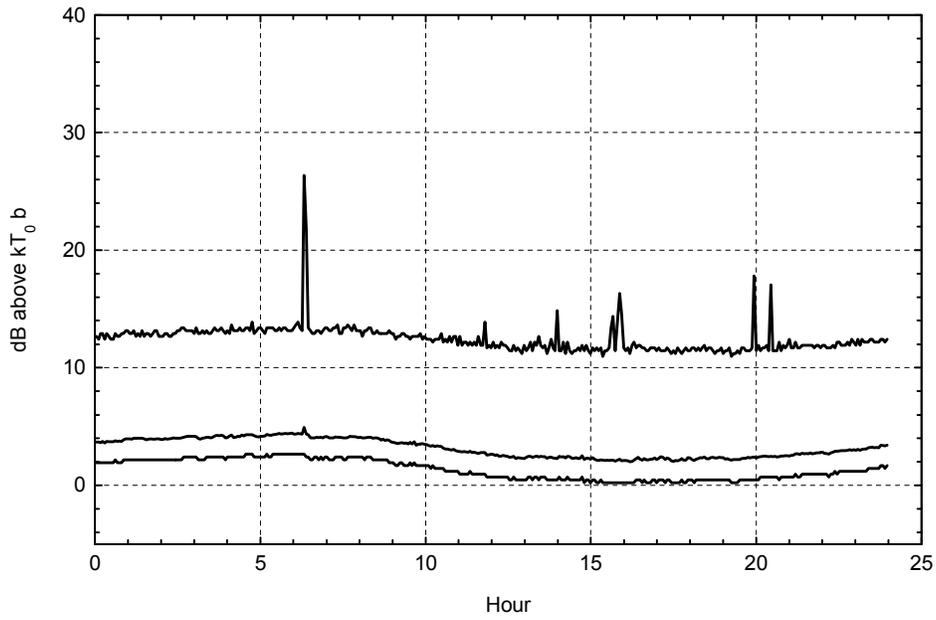


Figure 22. 402.5 MHz median, mean, and peak power at Boulder, Colorado residence on Thursday, May 13, 1999.

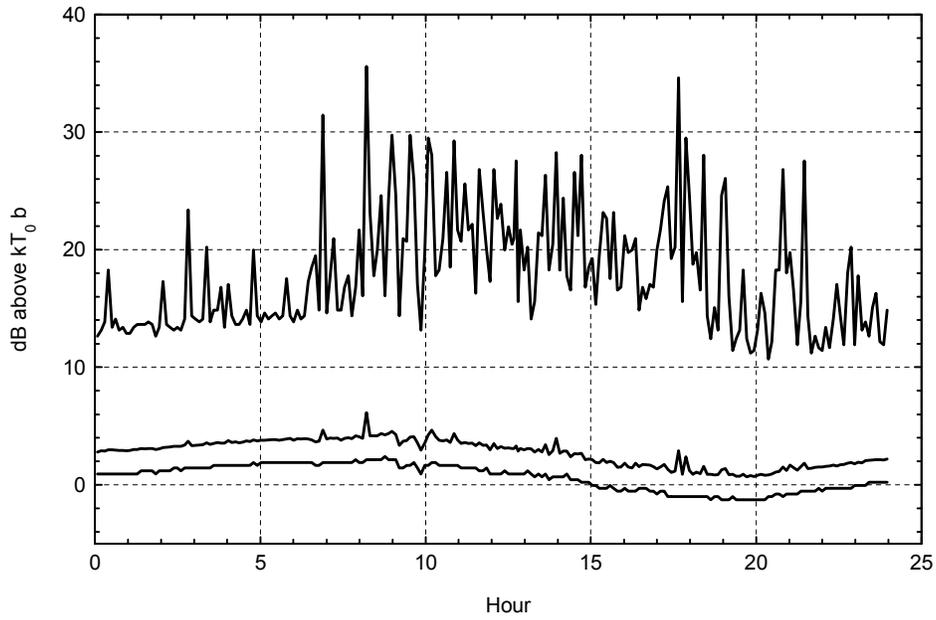


Figure 23. 402.5 MHz median, mean, and peak power at downtown Boulder, Colorado on Thursday, July 1, 1999.

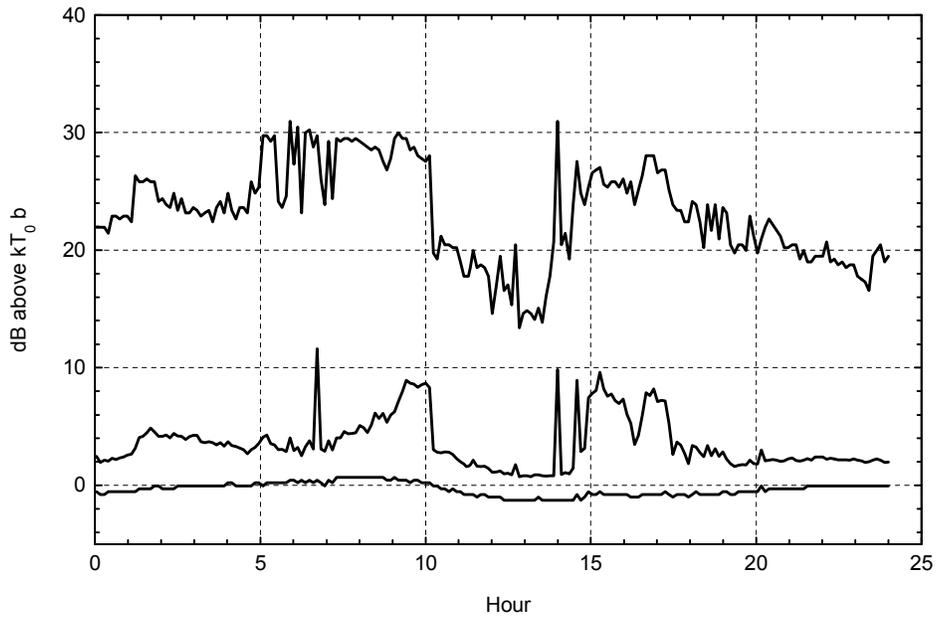


Figure 24. 402.5 MHz median, mean, and peak power at downtown Denver, Colorado on Wednesday, August 25, 1999.

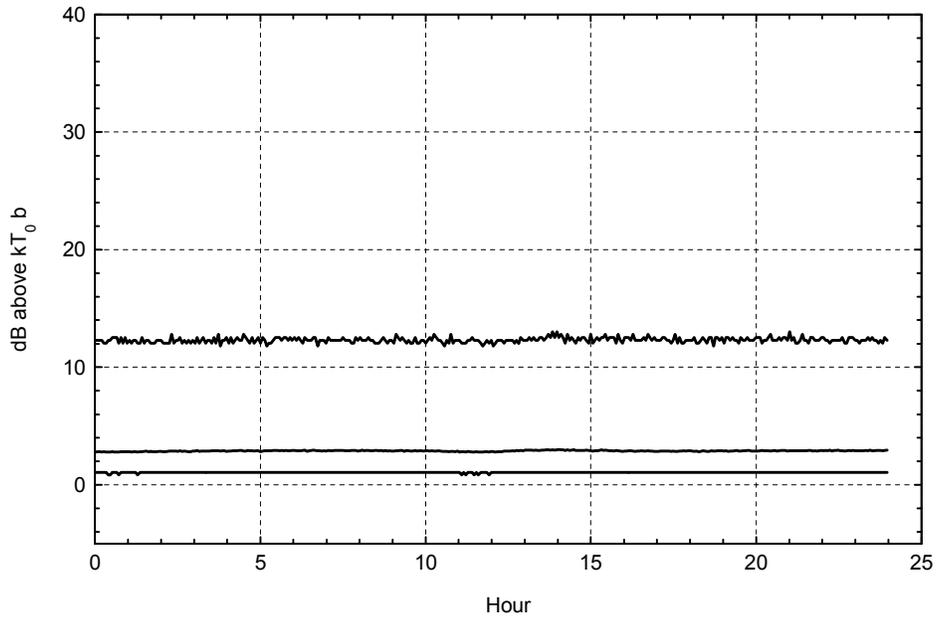


Figure 25. 761.0 MHz median, mean, and peak power at Lakewood, Colorado residence on Thursday, April 29, 1999.

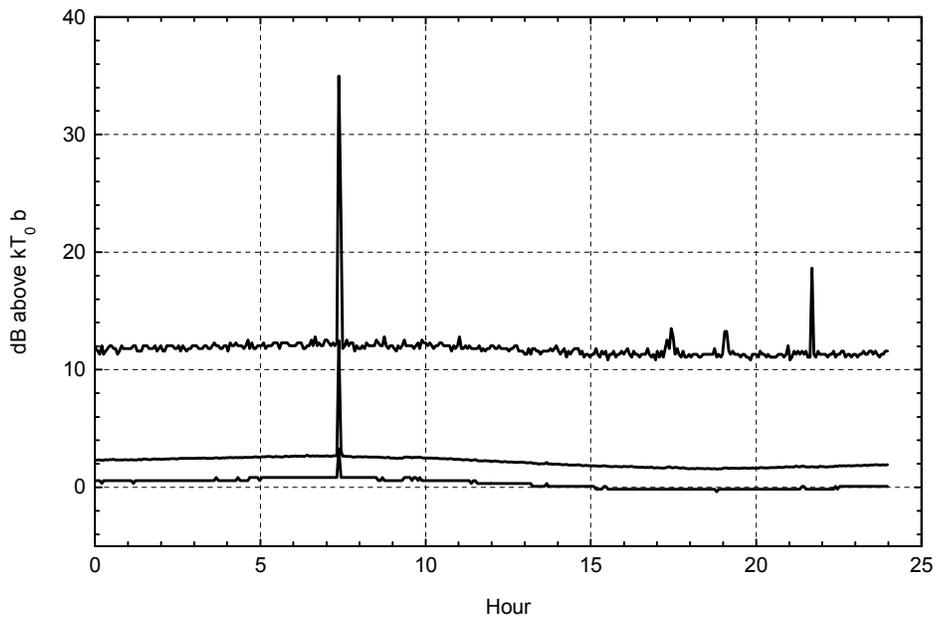


Figure 26. 761.0 MHz median, mean, and peak power at Boulder, Colorado residence on Wednesday, May 19, 1999.

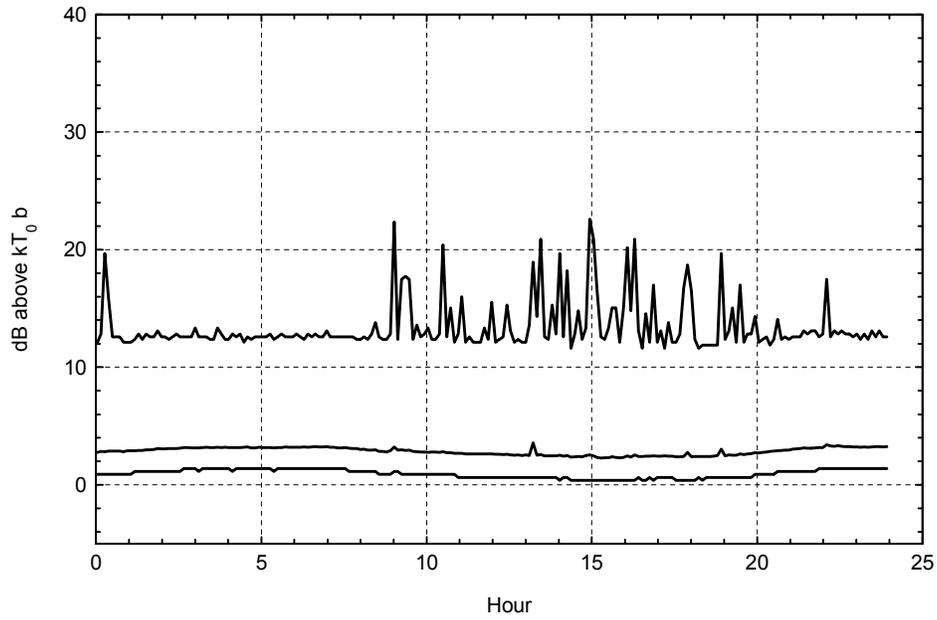


Figure 27. 761.0 MHz median, mean, and peak power at downtown Boulder, Colorado on Monday, July 5, 1999.

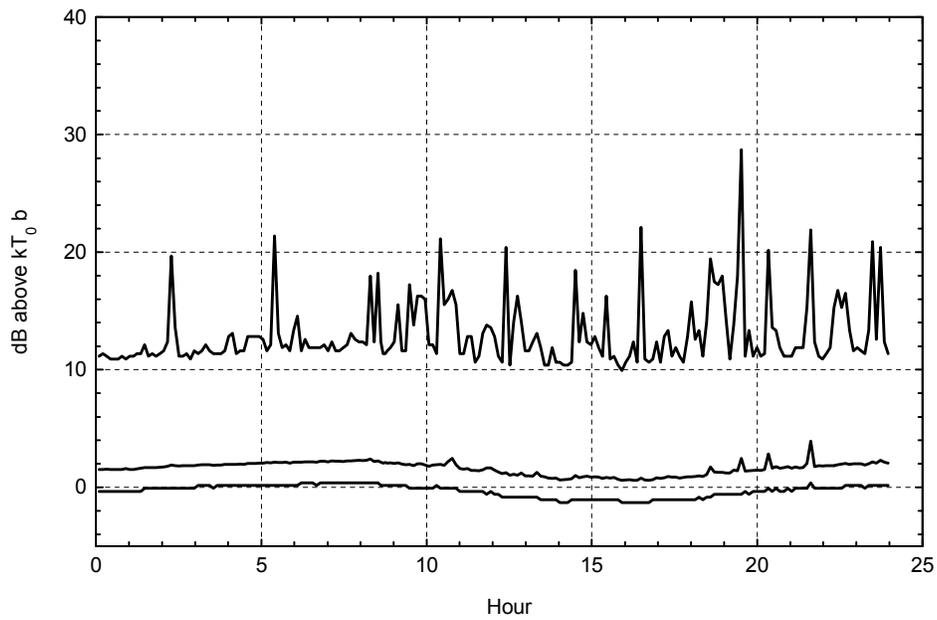


Figure 28. 761.0 MHz median, mean, and peak power at downtown Denver, Colorado on Friday, August 27, 1999.