SPECTRUM TECHNOLOGY, INC.

Field Strength of Radiated Fundamental and Spurious Emissions

47 CFR Part 15.231 - Final Data - Ref. SMARTIR3 .TV-1

Grantee: SmarTire Systems, Inc. 07/02/01
FCC ID: NATTX433TV-1

	Freq in MHz	Vert Rdg. dBuV	Horz Rdg. dBuV	Ant-F	Cable & BPF Loss	Amp Gain dB	Corrected Rdg in dBuV/m	uV/m Peak detector	Limit uV/m Average detector
Fo	433.92	57.33	59.5	21.60	2.4	0	83.50	14963	2768
2Fo	867.84	46.17	56.67	27.70	6.5	25	59.87	985	500
3Fo	1.30176	52.83	59.67	25.70	1.05	27.00	59.42	935	" "
4Fo	1.73568	49.33	53.67	27.15	1.22	25.30	56.74	687	" "
5Fo	2.16960	47.50	51.50	27.15	1.22	24.00	55.87	621	" "
6Fo	2.60325	35.67	35.33	28.37	1.38	22.10	43.32	141	" "
7Fo	3.03744	34.50	33.67	29.93	1.53	21.30	44.36	168	" "
8Fo	3.471360	53.33	49.17	31.01	1.67	21.20	64.65	1708	" "
9Fo	3.905280	51.33	42.67	34.45	1.80	21.60	65.98	1990	" "
10Fo	4.339200	52.33	42.50	31.98	1.92	22.5	63.73	1536	" "

Note: The highest level of the Vertical or Horizontal Reading in dBuV is calculated out above.

Limit for the band 260 - 470 MHz, uV/m at 3 meters = 16.6667(F) - 2833.3333.

Limit at 433.92 MHz = 4399 uV/m average detector limit, Section 15.231(e).

Peak detector field strength was measured at 21702 uV/m at 3 meters. **With the 18.5% duty cycle = 2768 uV/m** calculated average detector field strength with an average detector limit of 4399 uV/m.

Averaging Correction Applied

In accordance with Section 15.35(c) when the radiated emissions limits are expressed in terms of the average value of the emission [as in Section 15.231(b)(2)], and pulsed operation is employed, the field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative where the pulse train exceeds 0.1 seconds , the measured field strength shall be determined from the average absolute voltage during a 0.1-second interval during which its field strength is at its maximum value

ANSI C63.4-1992 Appendix I4 (10) also describes a method which we used to correct for duty cycle when average detector function limits are specified for a pulse-modulated transmitter, the average level of emissions may be found by measuring the peak level of emissions and correcting them with duty cycle.

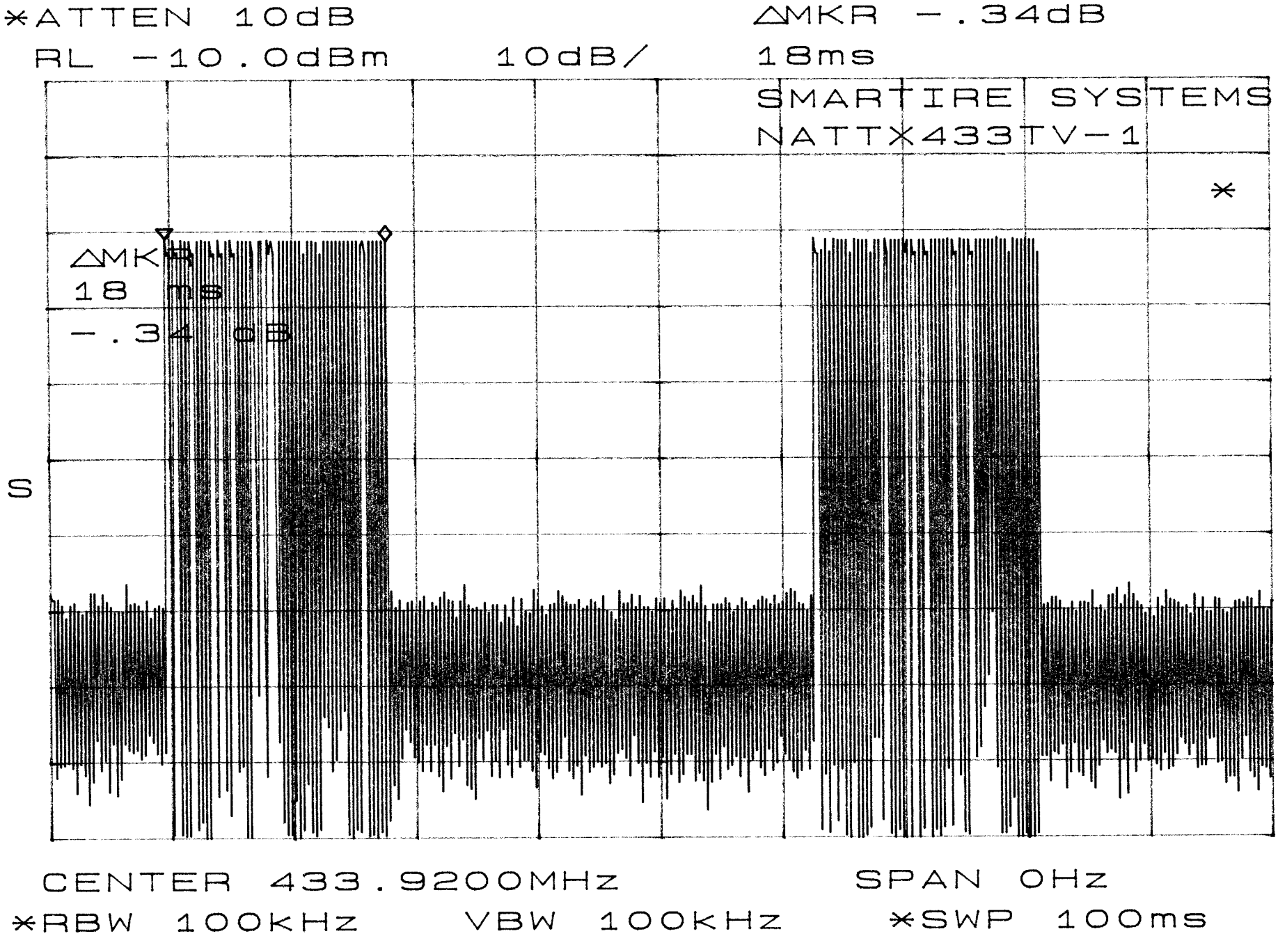
When the pulse train exceeds 100 ms calculate the duty cycle by averaging the sum of the pulse widths with the highest average over the 100 ms width with the highest average value. The duty cycle is the value of the sum of the pulse widths in one period (or 100 ms) divided by the length of the period (or 100 ms).

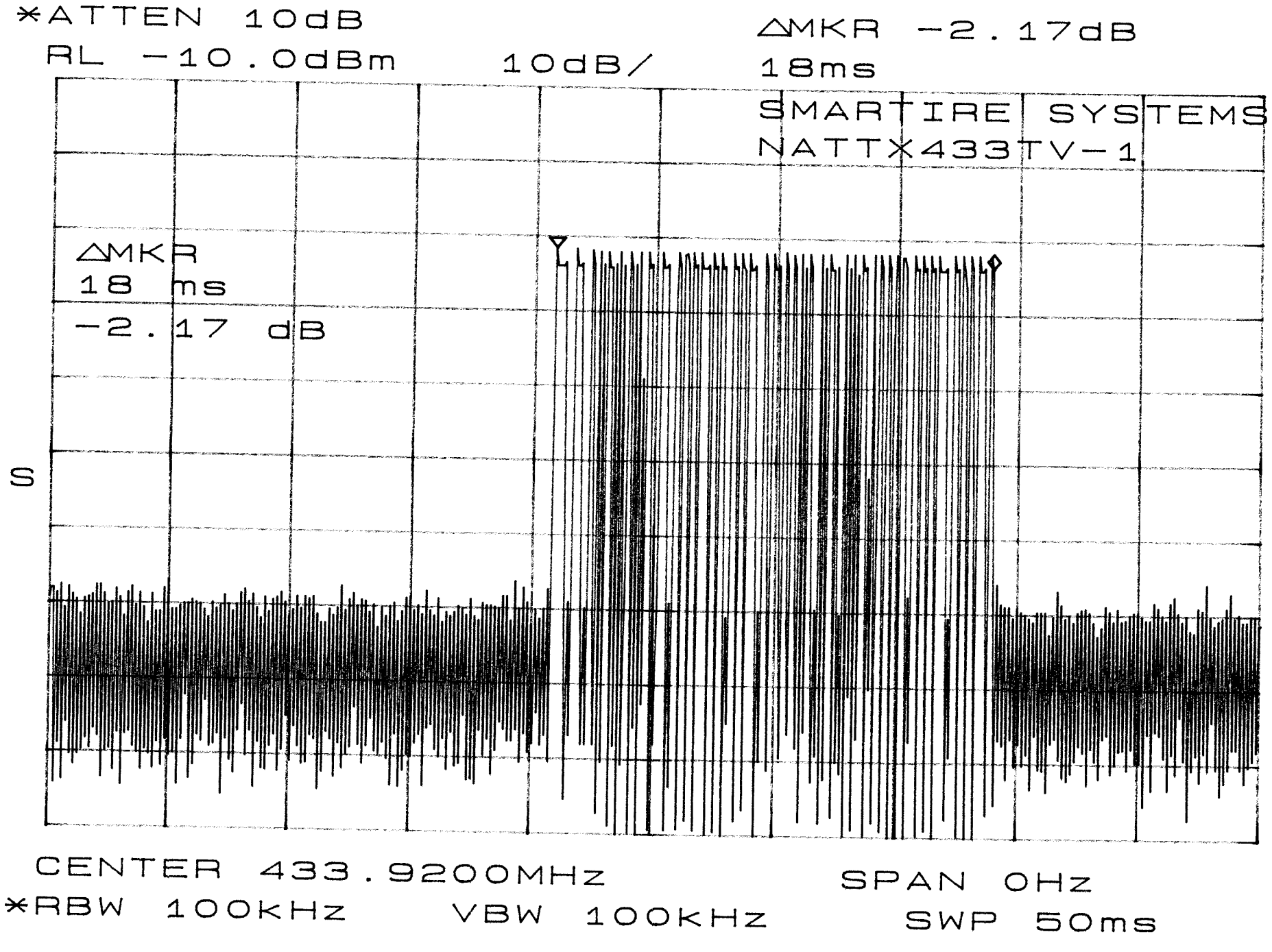
We multiplied the peak detector field strength in uV/m of the emission from the transmitter by the duty cycle calculated to determine the average detector field strength of the emission for comparison to the average detector limit in Part 15.231.

The sensor transmits 10 packets of data with each packet length 18.5 ms within 500 ms. every 4 – 6 minutes. So typically 2 packets in 100 ms period with a total packet length of 37 ms in 100 ms. With the transmission BiPhase with a 50% on off duty cycle the EUT total on time in 100 ms then is 18.5 %. (18.5 ms + 18.5 ms = 37 ms total packet length at a 50% duty cycle = 18.5% / 100 ms)

Note:

Two plots of the transmitter occupied bandwidth for your reference follow on the next two pages showing the time domain characteristics at 50 and 100 ms sweep settings.


*ATTEN 10dB
RL -10.0dBm
10dB/
ΔMKR -.34dB
18ms
SMARTIRE SYSTEMS
NATTX433TV-1
*
ΔMKR
18 ms
-.34 dB
S
CENTER 433.9200MHz
SPAN 0Hz
*RBW 100KHz
VBW 100KHz
*SWP 100ms


*ATTEN 10dB
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SMARTIRE SYSTEMS
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18 ms
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S
CENTER 433.920OMHz
SPAN OHz
*RBW 100KHz
VBW 100KHz
SWP 50ms