

1. Measurement of the fundamental frequency, 15.231 (e)

Frequency [MHz]	Level (PK) [µV/m]	Polarization [HOR / VER]	Antenna height [m]	Table angle [degrees]	Limit (AV) [µV/m]
433.92	23713.7	HOR	2.11	311	4399

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.

ANSI C63.4-1992 Appendix I4 (10) also describes a method, which is used here 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.

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).

Calculation of the final result:

In this application, the peak detector field strength in µV/m of the emission from the transmitter is multiplied 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 RSPW-01T tire sensor transmits 2 packets of data with each packet length 8.5 ms within 100 ms every 13.6 seconds. So, typically 2 packets in 100 ms period with a total packet length of 17 ms in 100 ms. The transmission itself is OOK (On Off Keying) and the data is Manchester coded with 50% duty cycle. So, the transmitter total on time in 100ms is 8.5ms (8.5 ms + 8.5 ms = 17 ms total packet length at a 50% duty cycle = 8.5% / 100 ms).

Now, the peak detector field strength in µV/m of the emission from the transmitter is multiplied by the duty cycle calculated above to determine the average detector field strength of the emission for comparison to the average detector limit in Part 15.231.

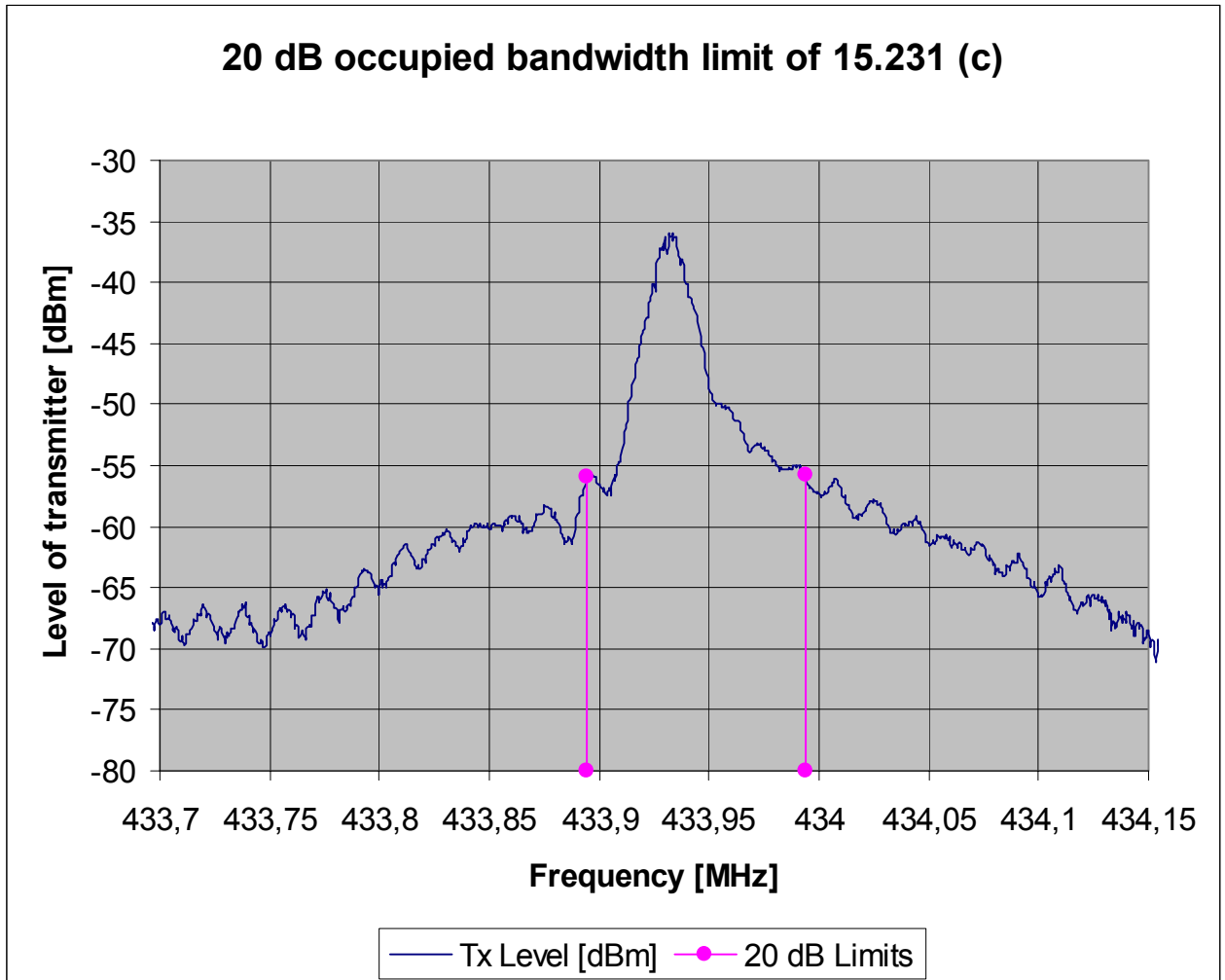
⇒ $23713.7 \mu\text{V/m} \times (8.5\% \text{ duty cycle}) = 2015.7 \mu\text{V/m}$ calculated average detector field strength.

The level of all harmonic components up to 10th harmonic was at least 20 dB below the maximum permitted fundamental level.

2. Transmission duration time limits, 15.231 (e)

The RSPW-01T tire sensor transmits 2 packets of data with each packet length 8.5 ms within 100 ms every 13.6 seconds. So, typically 2 packets in 100 ms period with a total packet length of 17 ms in 100 ms.

3. 20 dB occupied bandwidth limit, 15.231 (e)



Picture 1: 20 dB occupied bandwidth at 433.92 MHz

20 dB occupied bandwidth: 433.9939 MHz - 433.8944 MHz = 99.5 kHz.
 Limit value: 0.25 % x 433.92 MHz = 1084.8 kHz

4. Test set up

The measurements reported in the test report 1031681 have been performed with the transmitter installed inside the rubber wheel with plastic structure. This was due to the fact that the transmitter does not transmit if it is stationary. The measurements reported in this Appendix 1 have been performed with the modified transmitter, which transmits even if it is stationary. No rubber wheel has been used, see the pictures 2 and 3.



Picture 2: *Measurement set up without rubber wheel.*



Picture 3: *Measurement set up without rubber wheel.*