

From: Jeffrey Andle

To: Behnam Ghaffari

Date: November 20, 2014

Subject: FCC File No. 0697-EX-PL-2014

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Message:

Request from OET:

In great detail, please explain the characteristics of the requested emission designator "300K00P1N".

The indicated designator was given as 300KP1N.

In hindsight, based on the information below, the correct designation should be 300KP1A.

This applies to modification application 0764-EX-PL-2014 and the granted license (0446-EX-PL-2014 WH2XGR ) as well as the present modification application (0697-EX-PL-2014).

Necessary Bandwidth: 300K

The instantaneous emission bandwidth, measured by Curtis Strauss LLC during EN300-220 compliance certification and preliminary 15.231.e screening was less than 300KHz, rounding up the largest measured occupied bandwidth (275.3 MHz).

This data was obtained by executing a diagnostic "pulse train", which continuously emits 16µs Gaussian envelope modulated pulses of the center frequency at 42µs periodicity. In practice the device emits a series of 20 such pulses, followed by approximately ~90µs of silence while discrete Fourier transforms are calculated.

This process occupies about 910µs and allows the system to evaluate a single interrogation frequency. The number of such emissions and their center frequencies are defined by an algorithm to locate and measure the temperature dependent resonance of a passive SAW temperature sensor located on a nearby high voltage conductor.

The pulse shape is generated by a radio frequency application specific integrated circuit and is hard coded to the application. My understanding is that the necessary bandwidth is the occupied bandwidth.

Types of Modulation of the Main Carrier: P

The RF signal is modulated by a sequence of uniform pulses. The Gaussian shape of the pulse is constant to minimize occupied bandwidth.

The pulse width is constant to match the main frequency content to the resonance width of a 433MHz SAW resonator with an unloaded Q of > 10,000 (43KHz). The amplitudes of the pulses are unmodulated, although there is a slow variation for automatic level control in which the amplitude is reduced from 10mW peak to attain a target receive signal from the echoes.

The position and phase of the pulses is constant within a group of 20, allowing for coherent accumulation of the passive sensor echoes.

No other modulation exists.

Nature of Signal(s) Modulating the Main Carrier: 1

I considered the use of "0" or "X" since the pulses carry no information; however there is a single "channel" with smoothed on/off modulation. Therefore, I felt that "1" was the best fit since "P" was selected instead of "N" in the modulation type, above.

Types of Modulation of the Main Carrier: N

There is no information modulation, so I accidentally selected "N". There is on/off keying, so there must be sidebands. There is no sideband cancellation, so it is double sideband. I should have selected "A";