Response to FCC Email.

POINT 1

The proposed uses for this equipment are expected to be predominantly in the industrial radio service. Particularly the power radio service, petroleum radio service and business radio service. That is part 90 subpart D 90.63, 90.65, 90.75.

POINT 2

The emission designator of 18K4D1WET does not change. The radio continually transmits a digital data stream and only the data in the stream changes according to its use. The data stream is scrambled so that it presents the same characteristics to the radio under all operating conditions.

POINT 4

4.1 Frequency stabilisation

The frequency determining circuit of the radio is a phase locked loop oscillator in the transmitter unit. The LC oscillator is phase locked to a temperature compensated crystal oscillator with a 1.5ppm rating.

4.2 Spurious radiation

The Suppression of spurious radiation is controlled by filtering in a number of stages.

1. The output of the transmitter has a bandpass filter to allow only the signal to be radiated from the transmitter to be passed to the power amplifier.
2. The power amplifier has matching networks for each stage of the unit that roll off above and below the signal passband.
3. The power amplifier output is fed to a duplexer with high pass low pass elements which provide the final spurious signal suppression.

4.3 Power control

The control of the power output from the radio is under software control. There is a coupler at the power amplifier output that feeds a sample of the output power to a power detector. This detector provides an output voltage that is proportional to the input radio frequency power. This voltage is fed to an analogue to digital converter. The RF microprocessor calculates any adjustments required and then outputs a control word to a Digital to analogue converter that controls the voltage fed to a voltage controlled attenuator in the transmitter driver so that the output power is kept constant.

4.4 Limiting of modulation

As the modulation is digital this is dealt with in point 5 below.

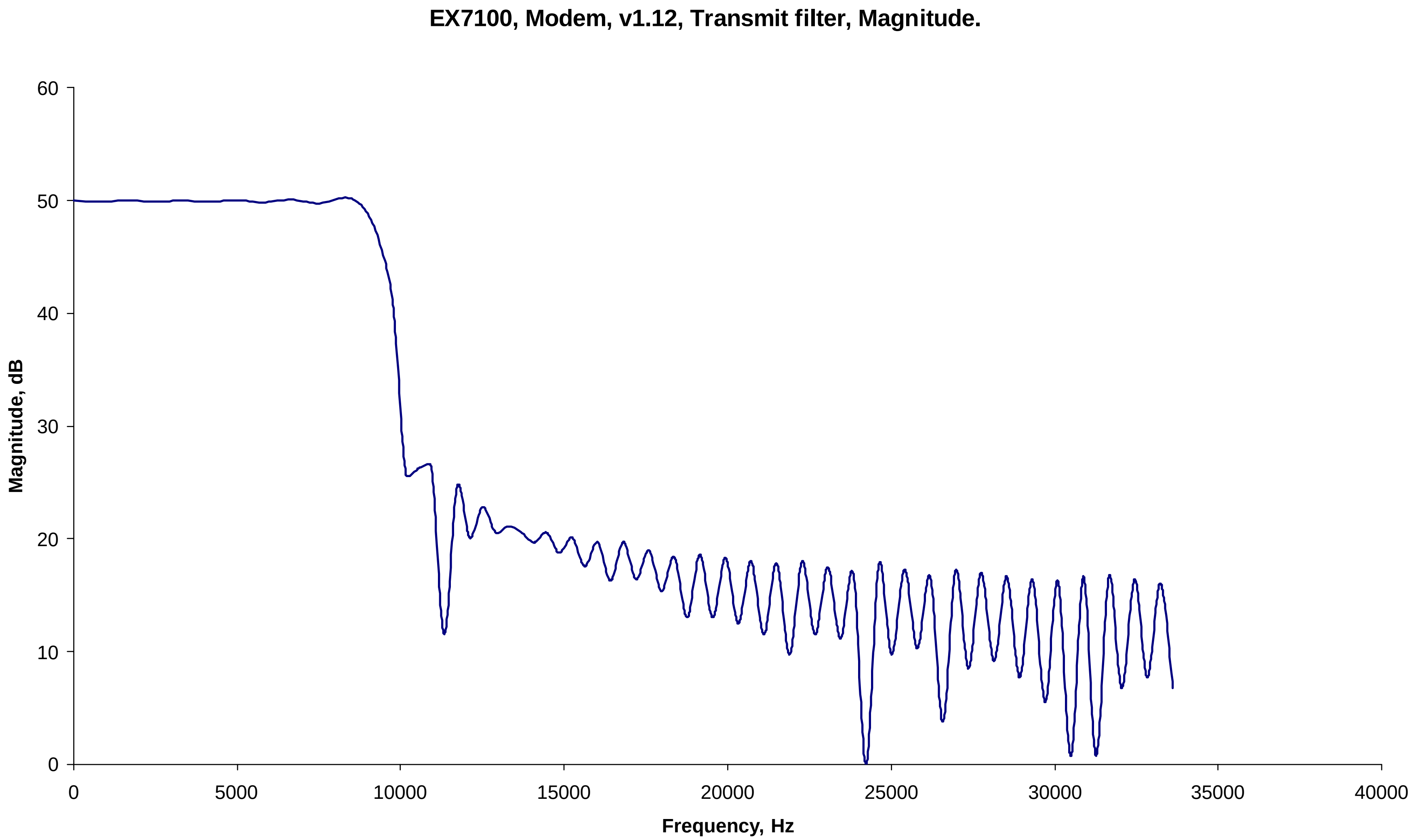
POINT 5

The EX7100 uses 16QAM modulation with a 17 kilo symbols per second symbol rate.

The digital signal is first scrambled using a V.35 scrambler as detailed below.

(Extract from the V.35 standard)
The binary value of the next transmitted bit shall be such as to produce odd parity when considered together with the twentieth and third earlier transmitted bits and the applied data bit unless an adverse state is apparent, in which case the binary value of the next transmitted bit shall be such as to produce even instead of odd parity.
An adverse state shall be apparent only if the binary values of the pth and (p + 8)th earlier transmitted bits have not differed from one another when p represents all the integers from 1 to q inclusive. The value of q shall be such that, for p = (q + 1), the pth and (p + 8)th earlier transmitted bits had opposite binary values and q = (31 + 32 r), r being 0 or any positive integer.
At the time of commencement, i.e. when no earlier bits have been transmitted, an arbitrary 20-bit pattern may be assumed to represent the earlier transmitted bits. At this time also it may be assumed that the pth and (p + 8)th earlier transmitted bits have had the same binary value when p represents all the integers up to any arbitrary value. Similar assumptions may be made for the descrambling process at commencement.

The scrambler ensures that the data presented to the modulator has no repetitive patterns or spectral components that could affect the modulated spectrum. This data stream is then split into I and Q channels and filtered so that the final spectrum will be within the channel limitations. These filters operate in the time domain but equivalent frequency responses are shown on the attached graphs. The filtered signals are fed to an IQ modulator to produce the final modulated spectrum.


EX7100, Modem, v1.12, Transmit filter, Magnitude.
Magnitude, dB
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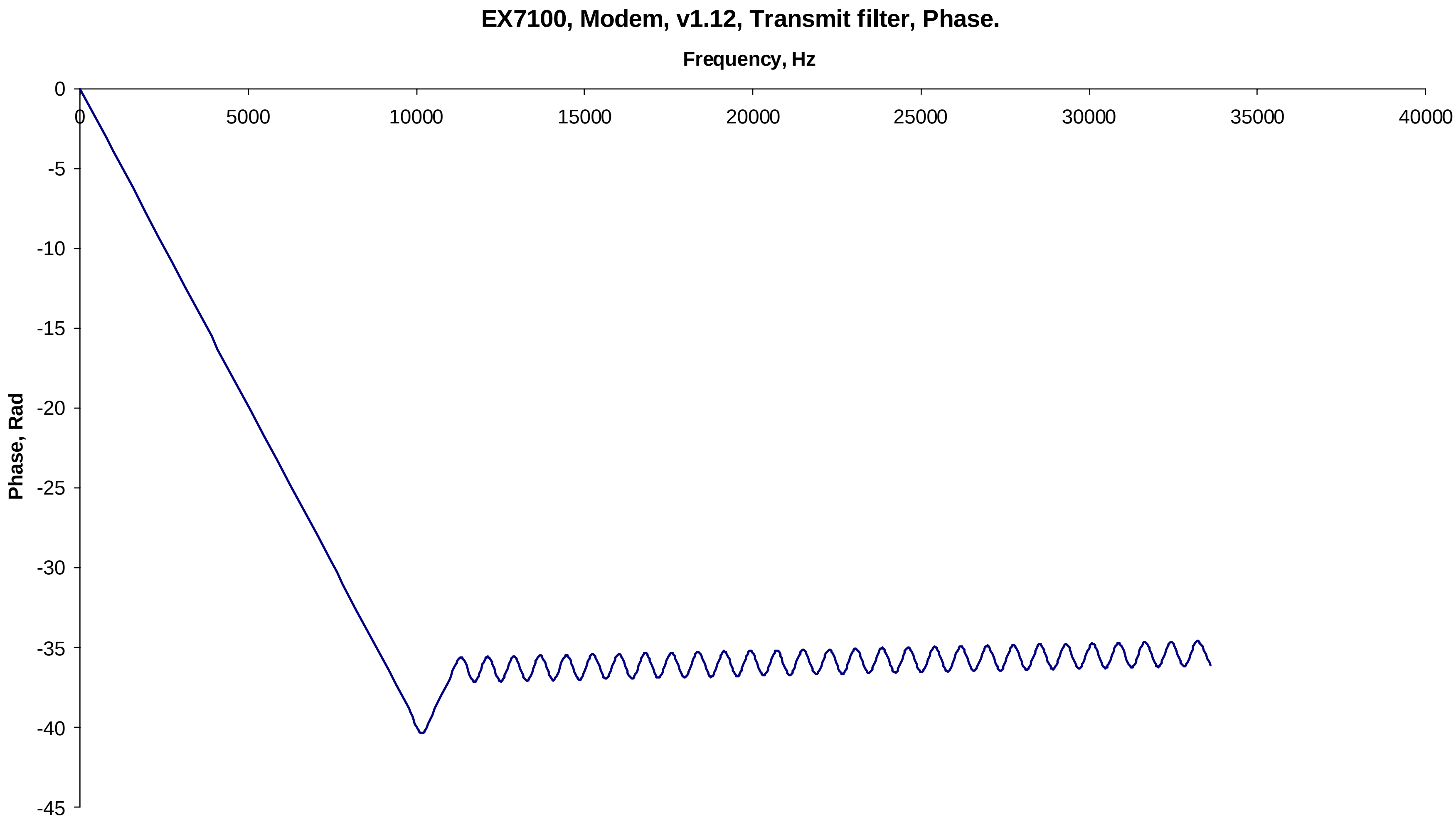
50
40
30
20
10
0
0
5000
10000
15000
20000
25000
30000
35000
40000
Frequency, Hz


EX7100, Modem, v1.12, Transmit filter, Phase.
Frequency, Hz
Phase, Rad
0
5000
10000
15000
20000
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30000
35000
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0
-5
-10
-15
-20
-25
-30
-35
-40
-45