MEASUREMENT REPORT

FOR THE

REFLEX TELEMETRY DEVICE, OMNIDATA, MODEL PT1005-A

FCC PART 2.1033(c)(13)
FCC PART 2.1033(c)(14) (PARTIAL)

COMPLIANCE

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This report contains a total of 10 pages.

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Modulation Information:
FCC Part 2.1033(c)(13)

Base-band Splatter Filter Response

The base band filtering of the data is done digitally in the DSP. Therefore there is no measured filter response, but the filter characteristic can be calculated. The base-band filter frequency response has been plotted in MATLAB. The filter is a Gaussian filter with BT=0.4896, it has linear phase and only the amplitude characteristic is shown.
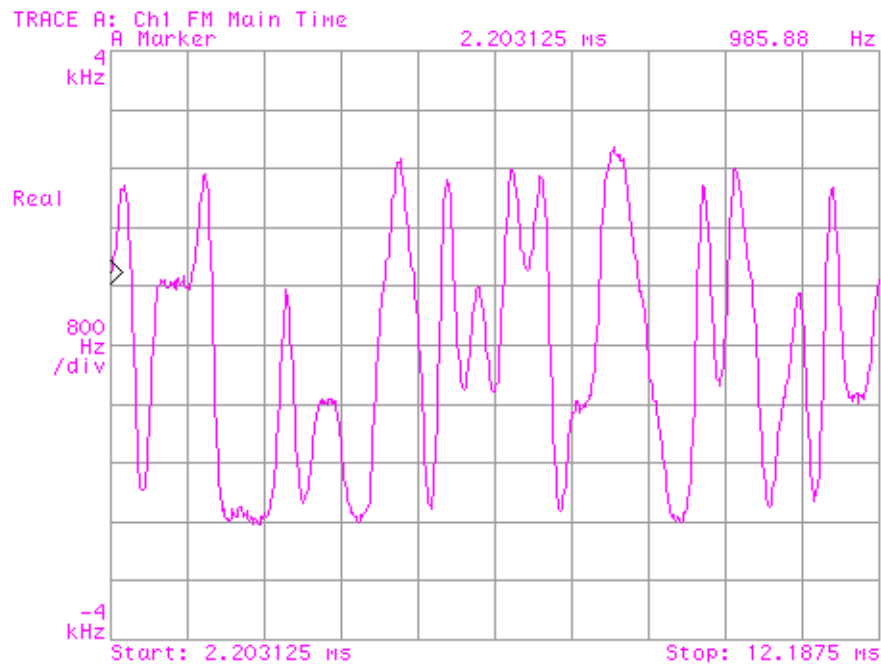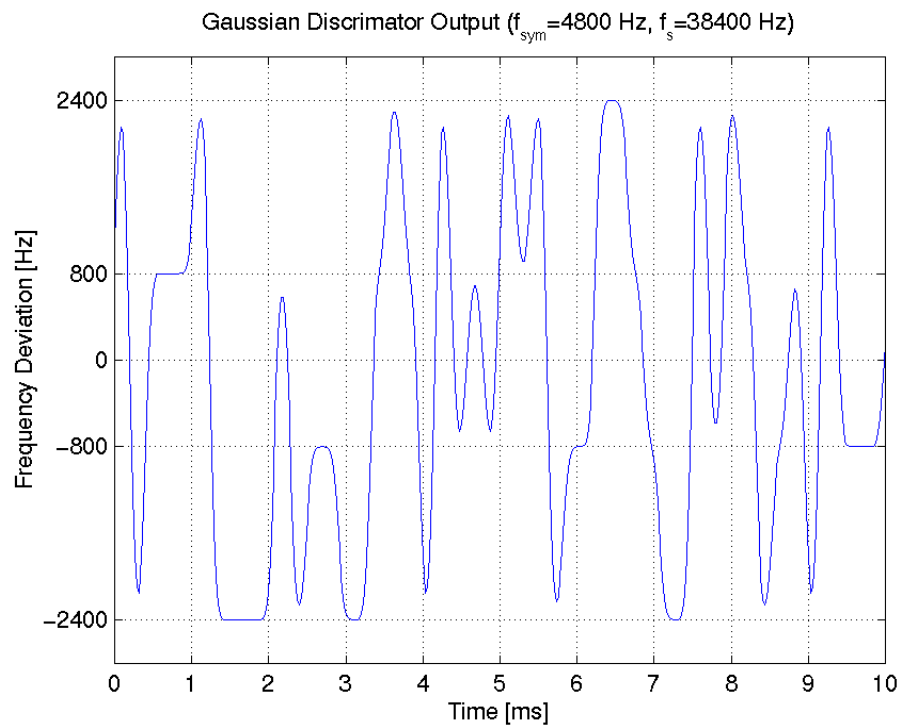

Filtered Base-band Data and Demodulated Data

The OMNIDATA device was placed on the test bench and the antenna port was connected to the vector signal analyzer (VSA). The VSA was configured as an analog frequency demodulator. The OMNIDTA transmitted a carrier modulated with a random pattern of data. The demodulated data was captured and is presented in the plot bellow. It was possible to reconstruct the discrete 4 level data from the waveform and that data was used to generate an ideal filtered base-band data. The plot of the calculated base-band data is shown on a separate plot.

List of Test Equipment

1. Vector Signal Analyzer, Hewlett Packard, Model No. 89441A, S/N 3416A02974.
2. Power Supply, Hewlett Packard, Model No. E3631A, S/N KR90917758.

Demodulated data captured by the VSA

Calculated base-band filtered data corresponding to the data captured by the VSA.

RF Power Output at Antenna Port:
FCC Part 2.1033(c)(14)/2.1046/24.132(a)

Test Conditions

The OMNIDATA device was placed on the test bench and the antenna port was connected to the input port of the Vector Signal Analyzer (VSA) via a 10dB coupler and 30dB attenuator. The thru port of the coupler was connected to an external antenna and the unit was communicating with the base-station. The insertion loss between the antenna port of the OMNIDATA device and the input port of the VSA measured with a vector network analyzer was 40.6dB. The VSA was configured as a time domain power detector. An ACK (acknowledgement) message, which is a representative of all transmissions from the device, was captured on the VSA screen.

Frequency (MHz)	Uncorrected Power (dBm)	Total Correction (dB)	Peak Power (dBm)	Peak Power (mW)
901.5	-10.9	40.6	29.7	933

The nominal output power is 1W.

List of Test Equipment

3. Vector Signal Analyzer, Hewlett Packard, Model No. 89441A, S/N 3416A02974.
4. Power Supply, Hewlett Packard, Model No. E3631A, S/N KR90917758.
5. Vector Network Analyzer, Model No. 8753E, S/N 38431808.

Date: 02 07 23 Time: 16:37

OMNIDATA Device
Serial Number: 050608

Modulation Characteristics:
FCC Part 2.1033(c)(14)/2.1047(d)/24.131

Test Conditions

The OMNIDATA device was placed on the test bench and an external antenna was connected to the antenna port. The device was communicating with a base-station. An acknowledgement (ACK) message, which is representative of all transmissions from the device, was captured on the vector signal analyzer (VSA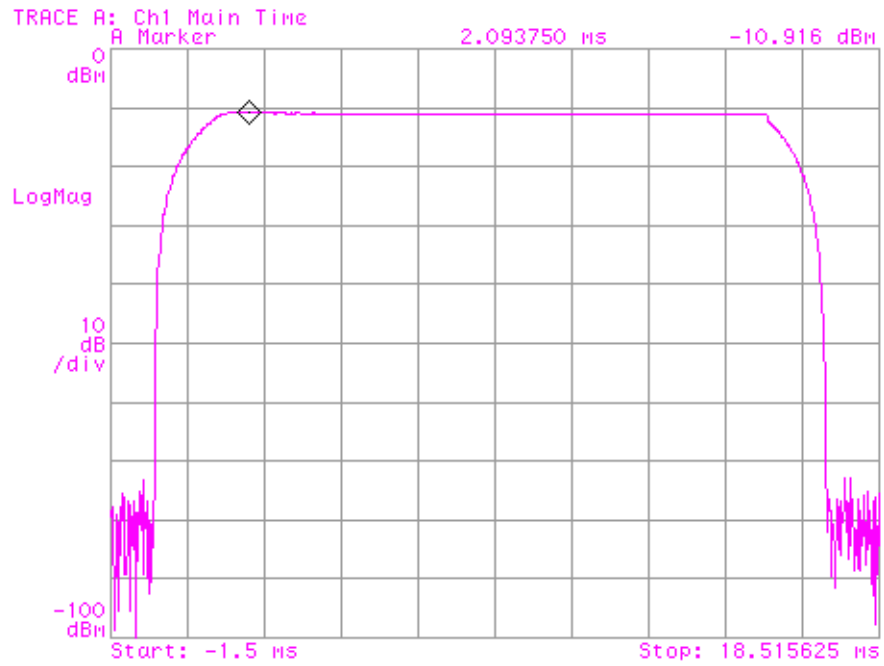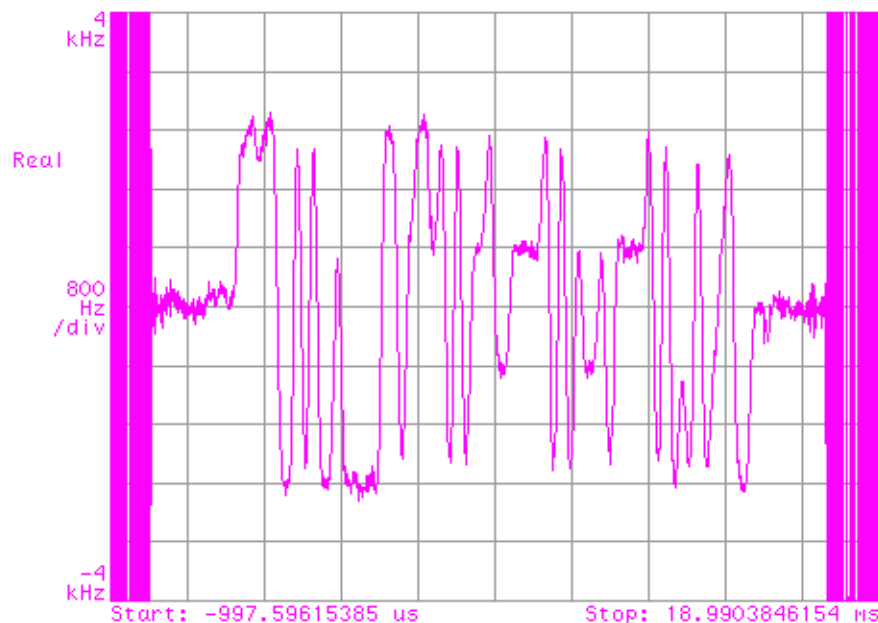). An antenna was connected to the input port of the VSA. The VSA was configured as an analog frequency demodulator. The VSA was triggered on the incoming signal and we used also the capability of having negative trigger delay. The first and the last portion of the waveform on the display represent frequency-demodulated noise.

List of Test Equipment

6. Vector Signal Analyzer, Hewlett Packard, Model No. 89441A, S/N 3416A02974.
7. Power Supply, Hewlett Packard, Model No. E3631A, S/N KR90917758.

Date: 02 07 22   Time: 12:05

TRACE A: Ch1 FM Main Time

OMNIDATA Device
Serial number: 050608

Occupied Bandwidth:
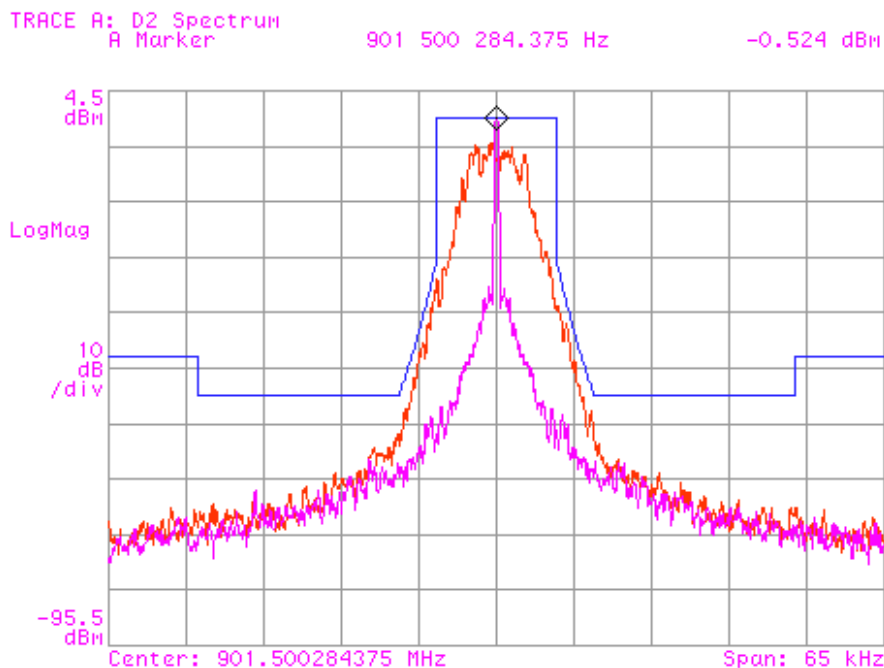# FCC Part 2.1033(c)(14)/2.1049(i)/24.133

Test Conditions

The OMNIDATA device was placed on the test bench and the antenna port was connected to the input port of the Vector Signal Analyzer (VSA) via a 30dB attenuator. The VSA was configured as a spectrum analyzer with a resolution bandwidth of 300 Hz and a span of 65 kHz. All spectrum analyzer measurements were made using the continuous peak detector function. The spectrum analyzer reference level was set to the un-modulated (carrier only) peak power level. The carrier only tone was generated by a special test routine on the device. This reference trace was stored in the memory of the spectrum analyzer. Next, internal test code was started in the device that continuously modulates the transmitter with 9600 bps pseudo-random data. An overlay of the carrier-only spectrum, the modulated spectrum, and the FCC mask was plotted from the spectrum analyzer.

List of Test Equipment

8. Vector Signal Analyzer, Hewlett Packard, Model No. 89441A, S/N 3416A02974.
9. Power Supply, Hewlett Packard, Model No. E3631A, S/N KR90917758.

OMNIDATA Device
Serial Number: 050608

Frequency Stability vs. Temperature:
FCC Part 2.1033(c)(14)/2.1055/24.135

Test Conditions

The OMNIDATA device was placed inside a temperature test chamber with an external power supply and an external antenna. The device was communicating with a base-station. The device was programmed such that all transmissions from it were un-modulated (carrier only) for the first 15 ms in order to facilitate accurate measurements of the carrier frequency. An ACK (acknowledgement) message, which is a representative of all transmissions from the device, was captured on the vector signal analyzer (VSA) at temperatures between –30 and +75°C in 7.5°C. The VSA was set in analog frequency demodulation mode with no carrier tracking. The signal was capture by an antenna connected to the input port of the VSA. The carrier frequency offset was measured from vector signal analyzer capture.

List of Test Equipment

10. Vector Signal Analyzer, Hewlett Packard, Model No. 89441A, S/N 3416A02974.
11. Temperature test Chamber, Tenney Environmental, Model No. TUJR, S/N 27503-04.
12. Power Supply, Hewlett Packard, Model No. E3631A, S/N KR90917758.

Results

Temperature (°C)	Carrier offset (Hz)	Carrier offset (ppm)
-30	46.3	0.051
-22.5	38.4	0.043
-15	16.2	0.018
-7.5	14	0.016
0.0	4.3	0.005
7.5	-0.8	-0.001
15	-6.7	-0.007
22.5	-8.9	-0.010
30	-5.8	-0.006
37.5	-5.2	-0.006
45	0.3	0.000
52.5	6.9	0.008
60	12.4	0.014
67.5	22.7	0.025
75	39.2	0.044

OMNIDATA Device
Serial number: 050608

Frequency Stability vs. Supply Voltage:
FCC Part 2.1033(c)(14)/2.1055/24.135

Test Conditions

The OMNIDATA device was placed on the test bench and an external antenna was connected to the antenna port of the device. The device was communicating with a base-station. The device was programmed such that all transmissions from it were un-modulated (carrier only) for the first 15 ms in order to facilitate accurate measurements of the carrier frequency. An ACK (acknowledgement) message, which is a representative of all transmissions from the device, was captured on the vector signal analyzer (VSA). The VSA was set in analog frequency demodulation mode with no carrier tracking. The signal was capture by an antenna connected to the input port of the VSA. The power supply voltage of the device was varied from 4.5 Volt to 16 Volt. The carrier frequency offset was measured from vector signal analyzer capture.

List of Test Equipment

13. Vector Signal Analyzer, Hewlett Packard, Model No. 89441A, S/N 3416A02974.
14. Power Supply, Hewlett Packard, Model No. E3631A, S/N KR90917758.

Results

Supply Voltage (V)	Carrier offset (Hz)	Carrier offset (ppm)
4.5	-1.6	-0.002
5.0	-0.6	-0.001
6.0	0.14	0.000
7.0	-3.5	-0.004
8.0	1.1	0.001
9.0	-0.4	0.000
10.0	0.5	0.000
11.0	-0.9	0.001
12.0	-5.0	-0.006
13.0	1.3	-0.002
14.0	-2.9	-0.003
15.0	-3.0	-0.003
16.0	-8.0	0.009

OMNIDATA Device
Serial number: 050608