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**MEASUREMENT REPORT
FOR THE
TWO WAY PAGER, e80, MODEL 1100**

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

COMPLIANCE

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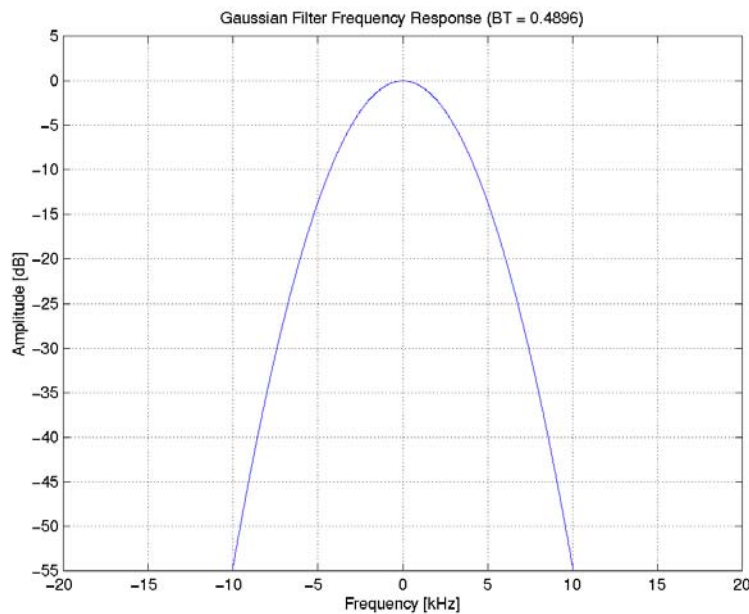
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Modulation Information: FCC Part 2.1033(c)(13)

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.



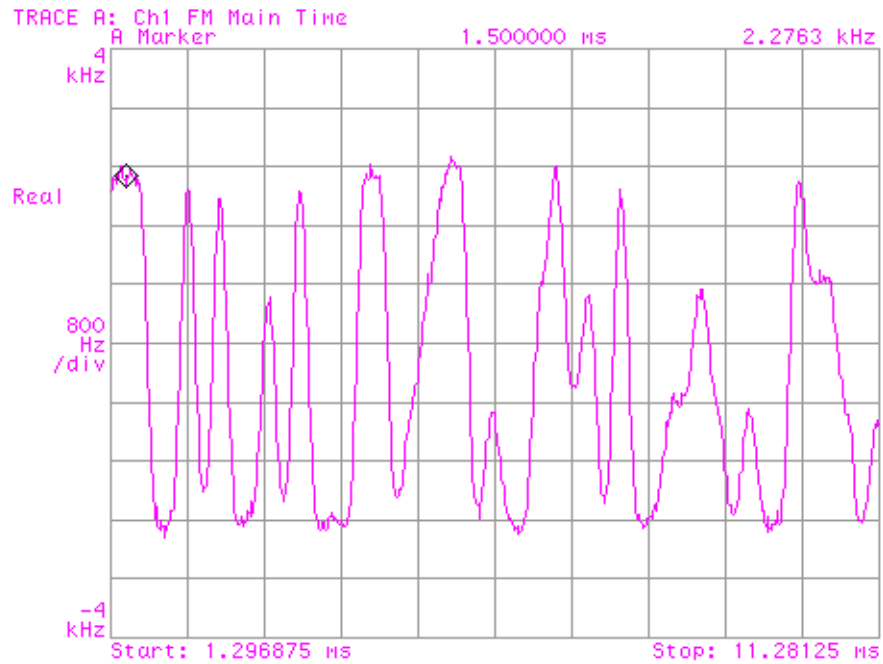
Filtered Base-band Data and Demodulated Data

The e80 device was placed inside the TEM cell and the TEM cell's port was connected to the vector signal analyzer (VSA). The VSA was configured as an analog frequency demodulator. The e80 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.

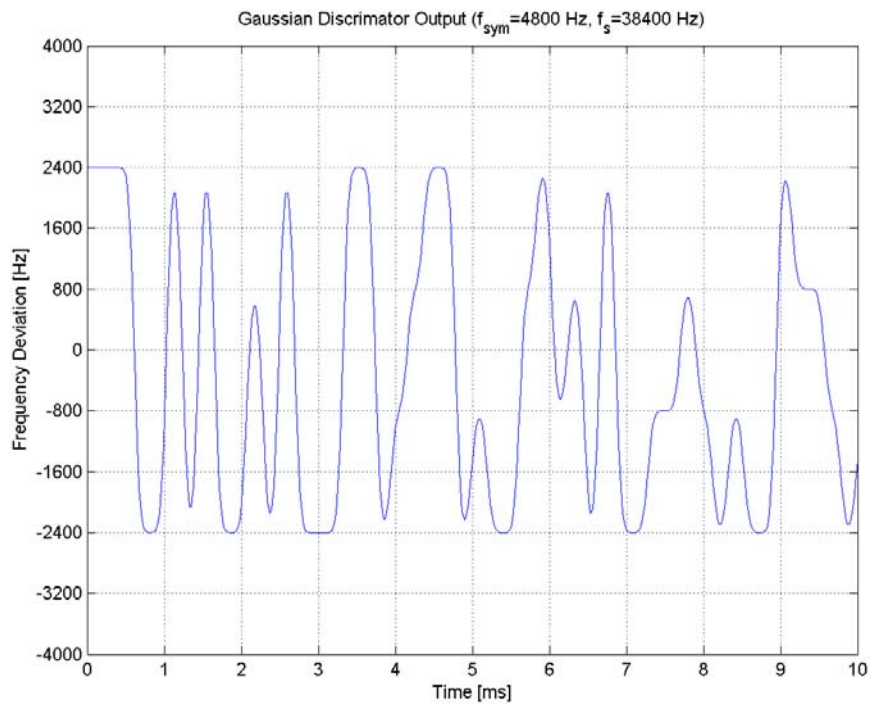
List of Test Equipment

1. Vector Signal Analyzer, Hewlett Packard, Model No. 89441A, S/N 3416A00986.
2. TEM cell, TESCOM, Model TC-5060B, S/N 5060B140093

Date: 02-25-03 Time: 04:20 PM



Demodulated data captured by the VSA



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

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

Test Conditions

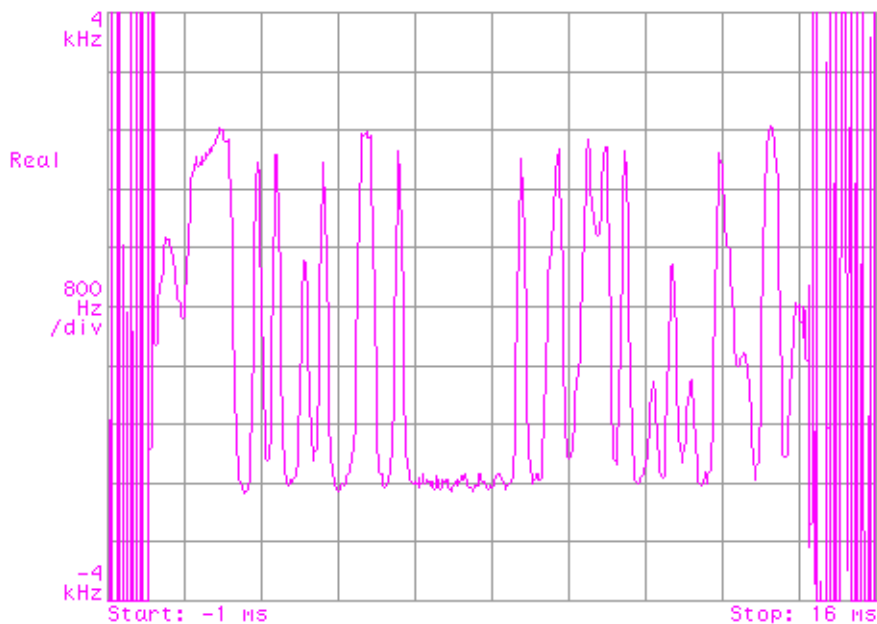
The e80 device was placed inside the TEM cell and the TEM cell's port was connected to the vector signal analyzer (VSA). The e80 device was communicating with a PC via serial port. A data packet was transmitted by the e80 and was captured on the vector signal analyzer (VSA). The VSA was configured as 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

1. Vector Signal Analyzer, Hewlett Packard, Model No. 89441A, S/N 3416A00986.
2. TEM cell, TESCOM, Model TC-5060B, S/N 5060B140093

Date: 02-25-03 Time: 04:28 PM

TRACE A: Ch1 FM Main Time



e80 Device
Serial number: XAAB3B22T

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

Test Conditions

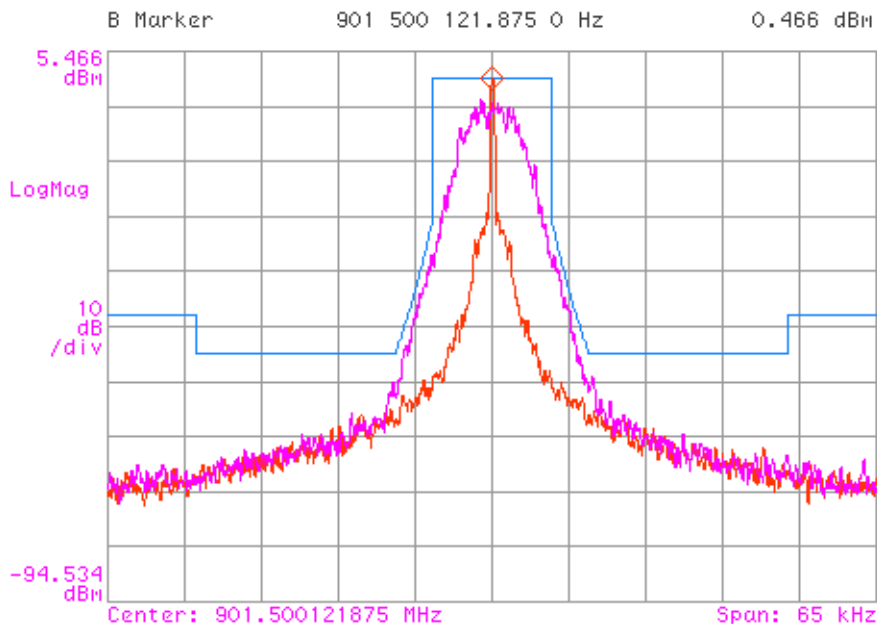
The e80 device was placed inside the TEM cell and the TEM cell's port was connected to the vector signal analyzer (VSA). The e80 device was communicating with a PC via serial port. The VSA was configured as a spectrum analyzer with a resolution bandwidth of 300 Hz and a span of 65 kHz. All spectrum analyzer 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

1. Vector Signal Analyzer, Hewlett Packard, Model No. 89441A, S/N 3416A00986.
2. TEM cell, TESCOM, Model TC-5060B, S/N 5060B140093.

Date: 02-26-03 Time: 10:53 AM

TRACE A: GPSFILTER



e80 Device
Serial Number: XAAB3B22T

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

Test Conditions

The e80 device was placed inside a temperature test chamber with an external power supply. The device was communicating with TC2000A replacing 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 +60°C in 10°C steps. The VSA was set in analog frequency demodulation mode with no carrier tracking. The signal was captured 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

1. Vector Signal Analyzer, Hewlett Packard, Model No. 89441A, S/N 3416A00986.
2. Temperature test Chamber, Tenney Environmental, Model No. TUJR, S/N 27503-04.
3. Universal Pager Tester TC-200A, TESCO, S/N2000A080037.
4. Power Supply, Hewlett Packard, Model No. E3631A, S/N KR64306064.

Results

Temperature (°C)	Carrier offset (Hz)	Carrier offset (ppm)
-30	46.3	0.051
-20	2.0	0.002
-10	17.8	0.020
0.0	3.3	0.003
10	23.0	0.025
20	7.6	0.009
30	14.9	0.017
40	15.3	0.017
50	5.4	0.006
60	3.7	0.004

e80 Device
Serial number: XAAB3B22T

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

Test Conditions

The e80 device was placed inside the TEM cell and powered with an external power supply. The device was communicating with TC2000A replacing 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 base station and the VSA were connected via combiners to the port of the TEM cell. The VSA was set in analog frequency demodulation mode with no carrier tracking. The carrier frequency offset was measured from vector signal analyzer capture. The voltage on the external power supply was fixed at the minimum voltage allowed for transmission 3.4V. The voltage on the battery is measured before each transmission and if it is not above 3.4V the message is not sent.

List of Test Equipment

1. Vector Signal Analyzer, Hewlett Packard, Model No. 89441A, S/N 3416A00986.
2. Power Supply, Hewlett Packard, Model No. E3631A, S/N KR64306064.
3. TEM cell, TESCO, Model TC-5060B, S/N 5060B140093.
4. Universal Pager Tester TC-200A, TESCO, S/N2000A080037.

Results

Voltage (V)	Carrier offset (Hz)	Carrier offset (ppm)
3.4	14.6	0.016

e80 Device
Serial number: XAAB3B22T