Application Note

Frequency Division Multiplexed RFoF and FSK RS232 Modem Optical Transceiver Link.

Provided by

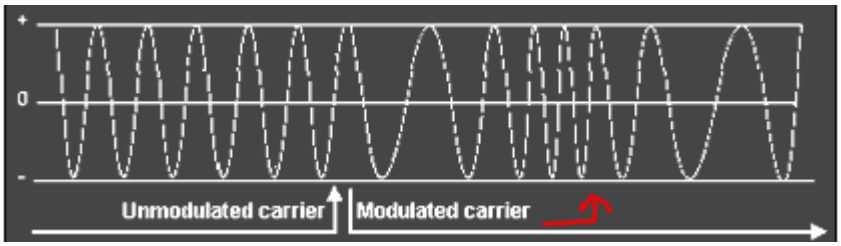
OPTICAL ZONU CORPORATION

Application Note

The Optical Zonu OZ810 with RS232 is designed to support RS232 levels at Baud rates of up to 19.2 Kbps. It does not require a dedicated fiber to transport the RS232 data. Rather, it utilizes the existing RF channel to handle the full duplex bidirectional data communications. This methodology utilizes the Frequency Shift Keying (FSK) modulation scheme at a frequency of 315 MHz (FSK Tone) to modulate and demodulate the incoming and outgoing RS232 data for seamless operation. The FSK modulator circuit works by shifting the carrier, a sine wave of a given frequency, to another frequency, back and forth, as the input signal changes. On the receiving end, the demodulator works by detecting one or both of the frequencies, often with a band-pass filter, regenerating the input signal.

The reasons to choose FSK Modulation over Amplitude Modulation are:

- Low Distortion
- FSK requires far less power to transmit a signal the same distance.
- High immunity from electrical and atmospheric interference.
- Accommodates much lower Signal to Noise ratio.
- Multiplexing an AM signal on top of the RF signal will cause in-band 2nd order and 3rd order distortion components in the user RF band. Whereas, a carefully selected FSK signal will not cause such artifacts.



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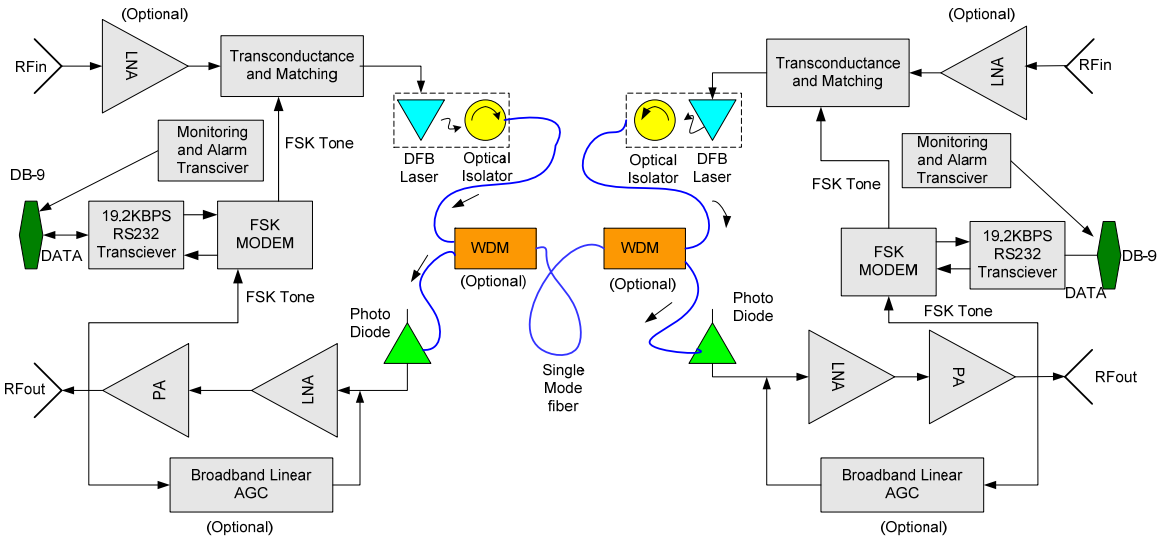
How does it work?

The block diagram below depicts how the OZ810 RF plus RS232 link works. The incoming RF signal may be amplified by the LNA built into the transmitter (optional) and then is fed through a Transconductance amplifier into the Laser. The RF signals will Intensity Modulate the Laser optical output into the fiber. Simultaneously, the +/- 12 Volts RS232 data, flowing In/Out of the OZ810 via the DB-9 pin connector, will be translated into a lower voltage Data format and transferred to the FSK Modem to be modulated or demodulated.

What comes out of the FSK Modem is an FSK modulated tone at 315 MHz at very low levels, in the range of -40 dBm (typically), which is combined with the RF signal and fed into the Laser. Since the RF levels are small and confined into a single tone with a bandwidth of only 200 KHz, the impact on the user RF signal will be minimal, or in many cases, nonexistent. The reverse occurs at the RFoF receiver-end of the link, where using a band-pass filter, a portion of the outgoing RF signal is sampled and fed into the FSK demodulator in order to recover the baseband data.

The block diagram below also demonstrates bidirectional RF channels using Wavelength Division Multiplexing over a single strand of Single Mode Fiber for ease of field deployment, or for applications where available dark fibers are limited. Multimode versions are also possible, with some variation of implementation, but using the same FSK modulation scheme.

Frequency division Multiplexed RFoF and FSK RS232
Modem Optical Transceiver Link on Single Fiber Strand.



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