INTRODUCTION

The subject of this proposal is the Scenix V.23 modem reference design. Scenix Semiconductor, Inc., intends to complete the design for a V.23 modem, operating in originate mode, to suit the needs of some of its customers. The V.23 modem will meet or exceed the specifications outlined in this document.

The goal is to design a low cost, low speed modem to operate in the customer's end product. V.23 was a suitable standard, as it is a common specification and many of today's modern modems support V.23 in fallback mode.

Off the shelf modems are expensive and include more features than are needed in many low-speed applications. For embedded applications, these modems require an on-board CPU as a controller. The Scenix solution will allow the customer to tailor the modem's operation to the solution, and to embed the modem inside the system controller, decreasing the overall system cost. Some additional applications that could benefit from the Scenix solution include credit card readers, ATM's, remote data acquisition equipment, security systems, and set-top boxes.

TECHNICAL SPECIFICATIONS

User Interface

- Software UART will provide the modem's interface.
    - 1200 baud
    - No Parity
    - 8 Data Bits
    - 1 Stop Bit
    - Hardware Flow Control (CTS, RTS)

- Compact AT command set
    - 64-byte command buffer
    - Dial: "ATDTxxxxxxxxx..."
    - Switch from data mode to command mode: "+++"
    - Switch from command mode to data mode: "ATO"
    - Hang up: "ATH"
    - Initialize: "ATZ"

TECHNICAL SPECIFICATIONS

Signal Generation/Detection Software

- DTMF Generation for Dialing
  - Tones generated: 697Hz, 770Hz, 852Hz, 941Hz, 1209Hz, 1336Hz, 1477Hz,1633Hz
  - On time = 100ms
  - Off time = 100ms
  - Off-hook delay time before dialing = 4 s
  - D/A conversion provided by filtered PPM output

- Data transmission and modulation
  - FSK transmission data rate at 75bps
  - Hardware flow control, 16-byte buffer, and 75bps asynchronous transmitter for data rate conversion from 1200bps to 75bps
  - Logic '1' (mark) modulated by 390 Hz
  - Logic '0' (space) modulated by 450 Hz
  - Transmission power = -15dB
  - D/A conversion provided by filtered PPM output

- Data reception and demodulation
  - FSK reception data rate at 1200bps
  - Logic '1' (mark) demodulated from 1300Hz carrier
  - Logic '0' (space) demodulated from 2100Hz carrier
  - Carrier detection
  - Timed-Zero-Cross algorithm

- D/A conversion
  - Pulse Position Modulation with maximum output frequency of 307kHz

Hardware Specifications

- Filtering
  - Low pass filter on PPM output
  - High pass filter on FSK input

- Hybrid
  - Four settings provided for automatic hybrid adjustment for various line impedance's
  - Hybrid adjusted by outputting signal onto line and measuring fed-back signal with a low-resolution sigma-delta A/D converter

- FSK input sensitivity = -30dB

- UART
  - RS-232 interface provided through MAX232 or similar IC
  - Interface provided through RXD, TXD, RTS, and CTS lines

TECHNICAL SPECIFICATIONS

Testing Specifications

- Initial tests using function generator and off-the-shelf V.23 modems
- Second round of testing performed with IDC's modem test equipment
- Tests performed:
  - Input Sensitivity
  - DTMF output level
  - FSK output level
  - Error rate
- FCC part 68 and FCC part 15 qualified
- CTR-21 ready
- All test results will be documented

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