DataReader description

1. General

1.1. Reference documents:
- 1.1.1. Main board circuit diagram, document 47D10010
- 1.1.2. RF board circuit diagram , 47D10100
- 1.1.3. LEDs board circuit diagram 47D10090

1.2. Pages number referenced in the following description, are referred to the schematics.

2. Functional Description

2.1. The DataReader is used as an interrogator to the DataSeal. The DataReader communicates with the DataSeal by RF of 916.5MHz FSK modulated with 40KHz deviation.

2.2. The DataReader is powered by an external 24VDC power supply.

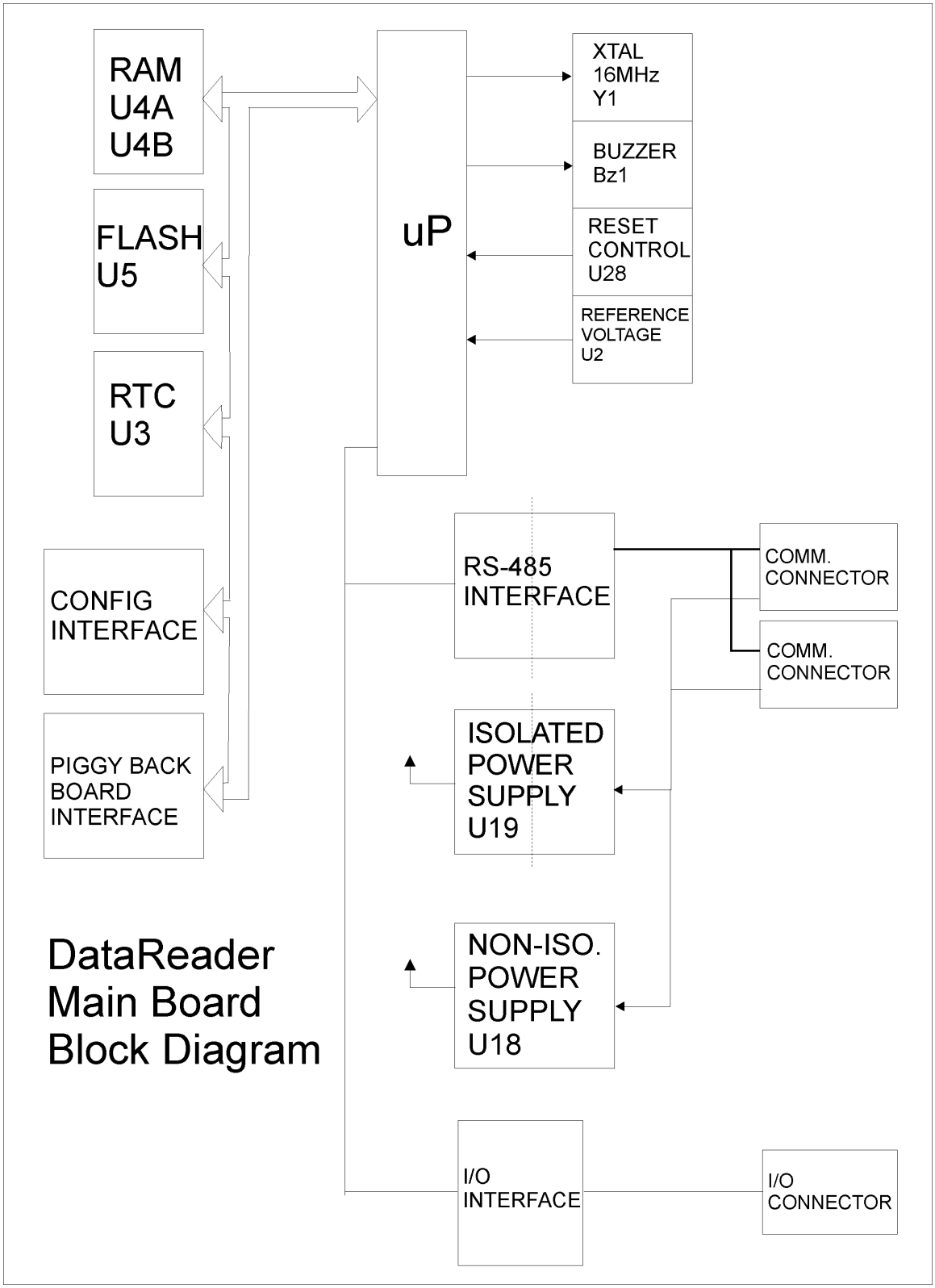
2.3. The DataReader has RS485 communication lines, so readers can be chained and be connected to a host.

2.4. An interrogation sequence can be initiated either by the host or by the DataReader independently. When an interrogation cycle starts, the DataReader transmits a header for 0.5-3Sec. Then it opens a receiving window for Trw seconds, typically 2sec. In this window, each DataSeal who received the DataReader message, replies with a short message, typically 10mS.

2.5. The DataReader contains 3 PCB's. Digital motherboard, RF board and LEDs board. The motherboard includes all the digital control, power supply and serial communication circuitry. The RF board includes the RF transmitter, RF receiver and a µP, which handle the base band processing. The LEDs boards include 3 LEDs for indications.

3. ***Mother Board Circuit description***

3.1. Block Diagram



3.3. **ì P**: (U1 Pg.2): 68HC812, main controller.

3.4. **XTAL** (Y1 Pg.2): 16MHz crystal, supply clock to the ì P.

3.5. **RAM** (U4A, U4B Pg.3): System RAM.

3.6. **Flash** (U5 Pg.3): System flash memory.

3.7. **RTC** (U3 Pg.3): Real time clock IC, it has an optional clock source, either a 32768Hz crystal (Y2) or 32768Hz oscillator (U6). *This circuit is optional and not populated in the board*.

3.8. **Buzzer** (BZ1 Pg.2): Piezo electric buzzer for audible alarm. *This circuit is optional and not populated in the board.*

3.9. **Reset Control** (U28 Pg.2): Reset control to the µP, includes power on reset and watch dog reset.

3.10. **Reference Voltage** (U2 Pg.2): reference voltage to A/D in the µP.

3.11. **Back up circuitry** (U7, BT1 Pg.3): This circuit supplies a back up voltage to RAM at power fail. *This circuit is optional and not populated in the board.*

3.12. **Config Interface** (U22, S1 Pg.4): a set of dip switches (S1) is used to determine DataReader operation mode. The switches are located in the bottom portion of the DataReader, so the user can determine the mode of operation. (See user manual parag. 3.1). The signals from the dip switches are protected by transient suppressor (U29) and by RC network (C39-C44, R98-R103, R119-R124).

3.13. **I/O interface** (U23, TB3, Pg.4): Terminal block TB3 is used to connect the I/O to the DataReader. The µP writes the outputs by latch (U23). There are 3 kinds of outputs:

3.13.1. 1 direct drive to a LED (Q4, TB3-10).
3.13.2. 2 optically isolated outputs (U25, U26, TB3-18, 22).
3.13.3. 1 Dry contact output (K1,TB3- 26-30)

There are 2 kinds of inputs:

3.13.4. 1 optically isolated input (U24,TB3-14)
3.13.5. 1 non isolated, used as external interrupt.

3.14. **RS485 Interface** (Pg. 5): Isolated RS485 circuitry is used. Signals are optically isolated by U12-U15; power is supplied by U11 and isolated by T1. Signals are buffered by U16, U17. S3 is configurable by user and determines half or full duplex application. S2 is configurable by user and connects termination resistor R71 when required in a RS485 chain.

3.15. **RS232 interface** (U9, Pg.5): RS232 interface (U9) is optional on the board; also power kick start circuit (Q5) is used in applications where power off stand by mode is required. *This circuit is optional and not populated in the board.*

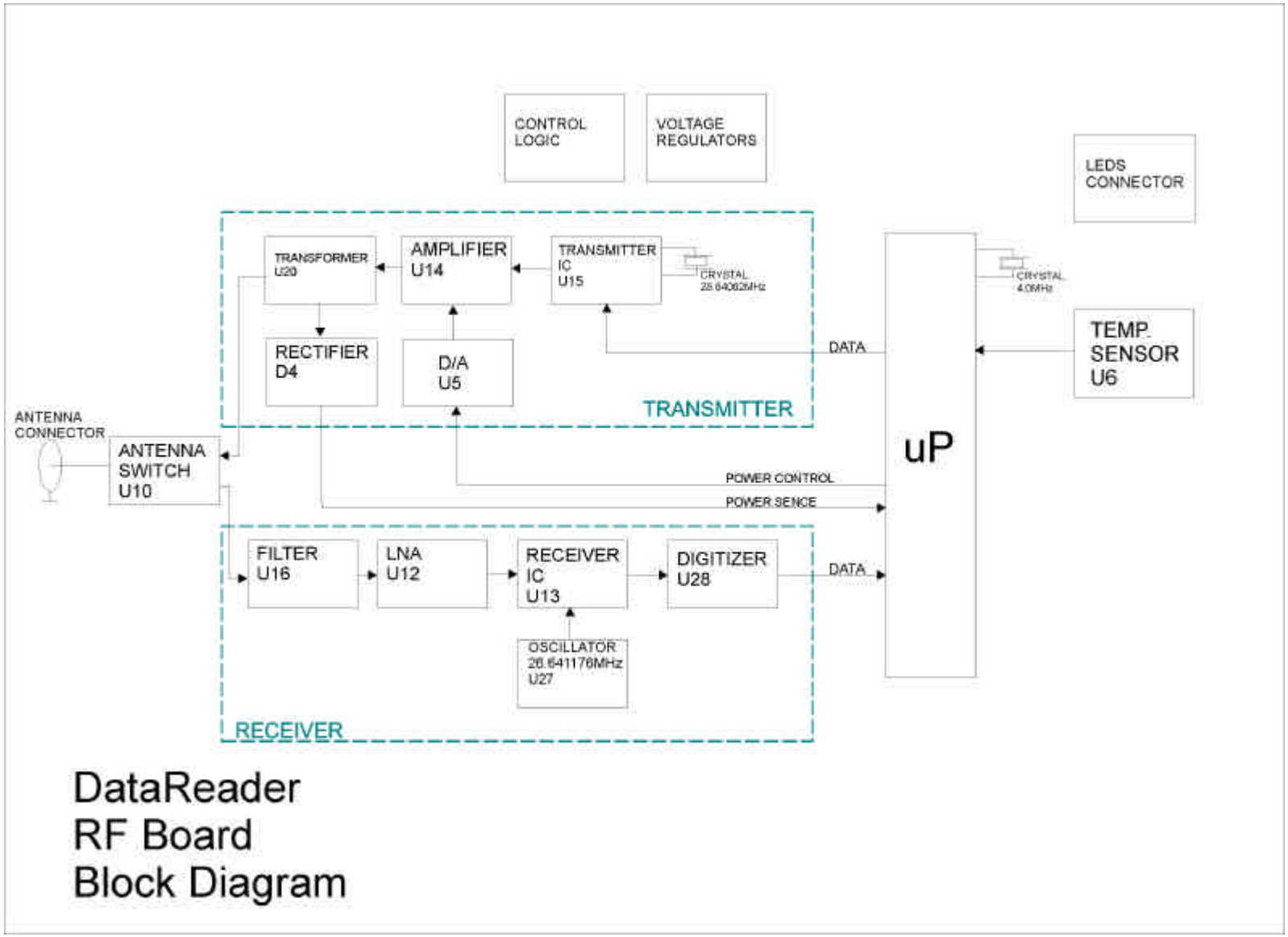
3.16. **Piggy Back Board Interface** (Pg. 6) Mother board can accept two piggyback boards; a pair of connectors are assigned to each board (JA1-2, JB1-2). All circuitry in Pg. 2 includes data lines and control lines between boards.

3.17. **Isolated Power Supply** (U19, Pg.7): Switching power supply module (U19) is used as 5V supply to all circuitry. F1, F2 are non serviceable 1A fuses, D10 provides reverse polarity protection, D11 provides transients protection and Q7 functions soft start to limit inrush current during start up. S4 is DIP switch, which can be used by the user to shut down individual DataReader in chain for service.

3.18. **Non Isolated Power Supply** (U18, Pg.7): A non isolated power supply (U18), is optional on board. *This circuit is optional and not populated in the board.*

4. RF Board Circuit Description

4.1. Block Diagram



4.2. **ìP** (U1 Pg.2): RF board µP with 4MHz crystal.

4.3. **Temperature sensor** (U6, Pg.2): The IC supply analog voltage, which represents temperature, to the ìP.

4.4. **Voltage regulators**: The RF board supply comes from the man board. The RF board includes linear regulators to different parts of the board. U8, U19 Pg.2 supply voltage to the RF circuitry. U23 Pg.3 is optional, and not populated. U24 Pg.4 is optional and not populated.

4.5. **Antenna switch** (U10 Pg.3): The antenna switch is controlled by the ìP; it switches the antenna between transmitter and receiver.

4.6. **Receiver** (Pg.3): The received RF signal goes through the antenna switch (U10) then to a band pass filter (U16), amplifier (U12) and receiver IC U13. The receiver includes a local oscillator of 26.641176MHz (U27). The data channel through the receiver IC includes 10.7MHz IF which is filtered by Y4, and a discriminator circuit Y5, D6. The output of the receiver IC, is digitized with U28 and U29, then goes to the ì P. (*Crystal Y3 is optional, and not populated*)

4.7. **Transmitter** (Pg. 4): A 26.64062MHz crystal (Y6) is connected to the transmitter IC (U15). The transmitter generates a 916.5MHz carrier, FSK modulated, with ±20KH deviation. Data is supplied by the ìP. The RF signal goes to a voltage controlled power amplifier, to a transformer (U20) and through the antenna switch (U10 Pg.3) to the antenna. The RF power is sampled by the transformer (U20) rectified (D4) and measured by the ì P. The closed loop guaranties accurate transmission power independent of temperature or component variations.

4.8. **LEDS** (D1-D3 Pg.8): *Leds are optional and not populated.* The Leds signals goes to the Leds connector (JP1), and to the Leds board.

5. Leds board circuit description

5.1. This board includes 3 Leds, one for power and built in test indications, one for transmit/receive indication, and one is optional.