DM-1

High Power Wireless Peripheral Board

Technical Manual

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BiPOM Electronics

WARRANTY:

BiPOM Electronics warrants DM-1 for a period of 1 year. If the board becomes defective during this period, BiPOM will at its option, replace or repair the board. This warranty is voided if the product is subjected to physical abuse or operated outside stated electrical limits. BiPOM Electronics will not be responsible for damage to any external devices connected to DM-1. BiPOM Electronics disclaims all warranties express or implied warranties of merchantability and fitness for a particular purpose. In no event shall BiPOM Electronics be liable for any indirect, special, incidental or consequential damages in connection with or arising from the use of this product. BiPOM Electronics' liability is limited to the purchase price of this product.

1. Overview

DM-1 is a high power, long range 900MHz wireless peripheral board for the MINI-MAX series of micro-controller boards. It offers a complete 900MHz wireless board using DigiMesh XTEND module.

2. Specifications

- Socket for DigiMesh XTEND 900MHz High power radio module
- SPI or UART interface to host microcontroller
- Software power control to the wireless module
- 20-pin Expansion Connector (X25) interface to a variety of micro-controller boards
- 5V or 3.3V power, on-board 3.3V regulator
- Mini USB input for powering the board
- Jumper selection of data path and power source
- Dimensions are 2.35 X 2.40 inches (5.97 X 6.10 centimeters)
- Mounting holes of 0.125 inches (3.18 millimeters) are on four corners
- -40° to +85° C operating and storage temperature range

3. Theory of Operation

The XTend OEM RF module provides unprecedented range in a low-cost wireless data solution. The module is easy to use, requires minimal power, provides reliable delivery of critical data between devices.
The XTend module utilizes FHSS (Frequency Hopping Spread Spectrum) agility to avoid interference by hopping to a new frequency on every packet transmission or re-transmission. Its transmit power is software adjustable from 1 mW to 1 W—the maximum output power allowable by governments that use 900 MHz as a license-free band. Innovations stamped in its design enable the XTend module to supply two- to eight-times the range of other modules operating within the unlicensed 900 MHz frequency band. The range gained by OEMs and integrators is due to proprietary technologies embedded into each module, including superior RX (receiver) sensitivity, interference immunity, modulation/demodulation techniques, and others. No configuration is necessary for out-of-the-box RF communication. The XTend module's default configuration supports a wide range of data system applications. Advanced configurations can be implemented using simple AT or binary commands.

4. Expansion Connector

The 14 control pins and 5 Volt power supply pins are available on the 20-pin connector (X25) for interfacing to a variety of micro-controller boards. DM-1 board can be connected to a host board either as a piggyback daughter-board using standoffs or can be placed away from the host board using a 20-wire ribbon cable (Part #: EXPCABLE-6).
Table 1 shows the pin assignments for the connector.

Expansion Connector (X25)

Signal	Pin	Pin	Signal
RSD0	20	19	TXD0
INT51	18	17	MISO
SCK	16	15	CS1
CS2	14	13	MOSI
INTAVR	12	11	SHDN_E
CS4	10	9	CS3
INTARM	8	7	INTMSP
Not Connected	6	5	Not Connected
Not Connected	4	3	GND
VCC (+5V)	2	1	Not Connected

Table 1

5. UART Connector

The 8-pin connector (X24) for interfacing to a PC COM port over RS232 adapter from BiPOM.
Table 2 shows the pin assignments for the connector.

UART Connector (X24)

Signal	Pin
VDM (3.3V)	8
GND	7
RXDU ()	6
TXDU ()	5
GND	4
Not Connected	3
Not Connected	2
GND	1

Table 2

6. Jumper Settings

The DM-1 board provides 21 jumpers to match different BiPOM MINI-MAX single board computers based on 8051, AVR, ARM, PIC micro-controllers.
Table 3 shows all the possible configuration features of jumpers.

Jumper Configuration Features

Designator	Setting	Feature
X1	CLOSED	GPIO2 shutdown
X2	CLOSED	SHDN_E shutdown
X3	CLOSED	SBC UART
X4	CLOSED	SPI UART
X5	CLOSED	RS232 ADAPTER
X6	CLOSED	SBC UART
X7	CLOSED	SPI UART
X8	CLOSED	RS232 ADAPTER
X9	CLOSED	GND as SPI UART CS
X10	CLOSED	CS1 as SPI UART CS
X11	CLOSED	CS2 as SPI UART CS
X12	CLOSED	CS4 as SPI UART CS
X13	CLOSED	CS3 as SPI UART CS
X14	CLOSED	Power XTEND from 3.3V regulator
X15	OPEN	Power XTEND from 3.3V regulator
X16	CLOSED	Power 3.3V regulator from Expansion
X17	CLOSED	Power 3.3V regulator from USB
X18	CLOSED	Interrupt pin for 8051
X19	CLOSED	Interrupt pin for AVR
X20	CLOSED	Interrupt pin for MSP
X21	CLOSED	Interrupt pin for ARM

Table 3

6.1. Jumper selection for shutdown

Shutdown for XTEND can be configured by three modes.
6.1.1. Jumpers X1 and X2 are open the XTEND module is enabled always.
6.1.2. X2 closed, X1 open - the XTEND module can be put in shutdown by SHDN_E pin.
6.1.3. X1 closed, X2 open - the XTEND module can be put in by GPIO2 of SPI UART expander.

6.2. Jumper selection of data path

The board can be configured for three data paths.
6.2.1. SPI UART expander: X4, X6 – closed and X3, X5, X7, X8 – open.
6.2.2. SBC UART from Expansion: X3, X7 – closed and X4, X5, X6, X8 – open.
6.2.3. RS232 adapter: X5, X8 – closed and X3, X4, X6, X7 – open.

6.3. Jumper selection of power source

The board can be powered from different sources.
6.3.1. 5V from Expansion connector (X25): X14, X16 – closed and X15, X17 – open.
6.3.2. 3.3V from Expansion connector (X25): X15, X16 – closed and X14, X17 – open.
6.3.3. 5V from mini USB connector (X23): X14, X17 – closed and X15, X16 – open.

6.4. Jumper selection of CS pin

The board has 5 pins to select SPI UART expander.

6.4.1. CS1 of Expansion connector (X25): X10 – closed and X9, X11, X12, X13 – open.
6.4.2. CS2 of Expansion connector (X25): X11 – closed and X9, X10, X12, X13 – open.
6.4.3. CS3 of Expansion connector (X25): X13 – closed and X9, X10, X11, X12 – open.
6.4.4. CS4 of Expansion connector (X25): X12 – closed and X9, X10, X11, X13 – open.
6.4.5. Selected permanently. X9 – closed and X10, X11, X12, X13 – open.

6.5. Jumper selection of interrupt pin

The board has 4 pins to act as interrupts of SPI UART expander.

6.5.1. INTARM of Expansion connector (X25): X21 – closed and X18, X19, X20 – open.
6.5.2. INTAVR of Expansion connector (X25): X19 – closed and X18, X20, X21 – open.
6.5.3. INT51 of Expansion connector (X25): X18 – closed and X19, X20, X21 – open.
6.5.4. INTMSP of Expansion connector (X25): X20 – closed and X18, X19, X21 – open.

7. Board Layout

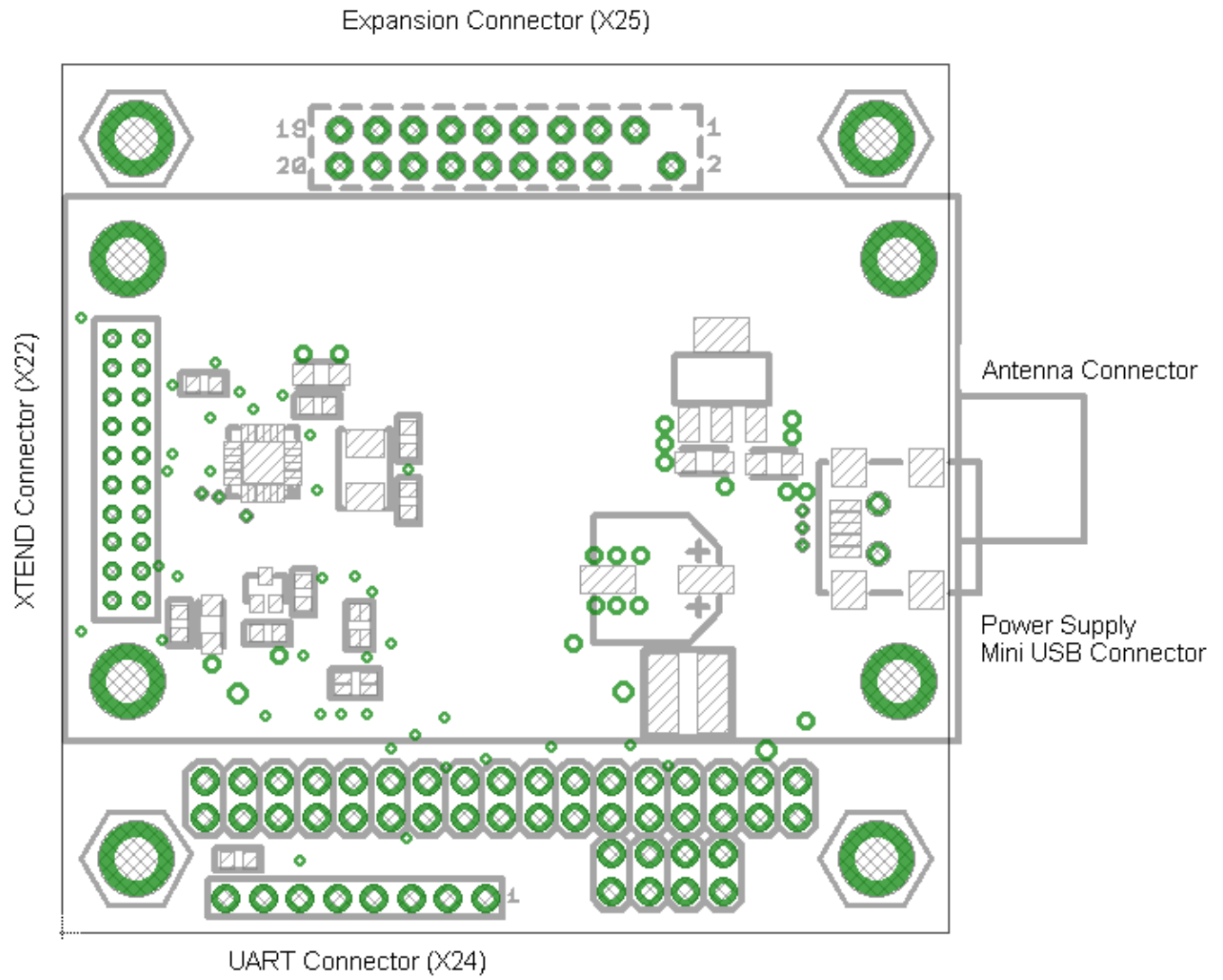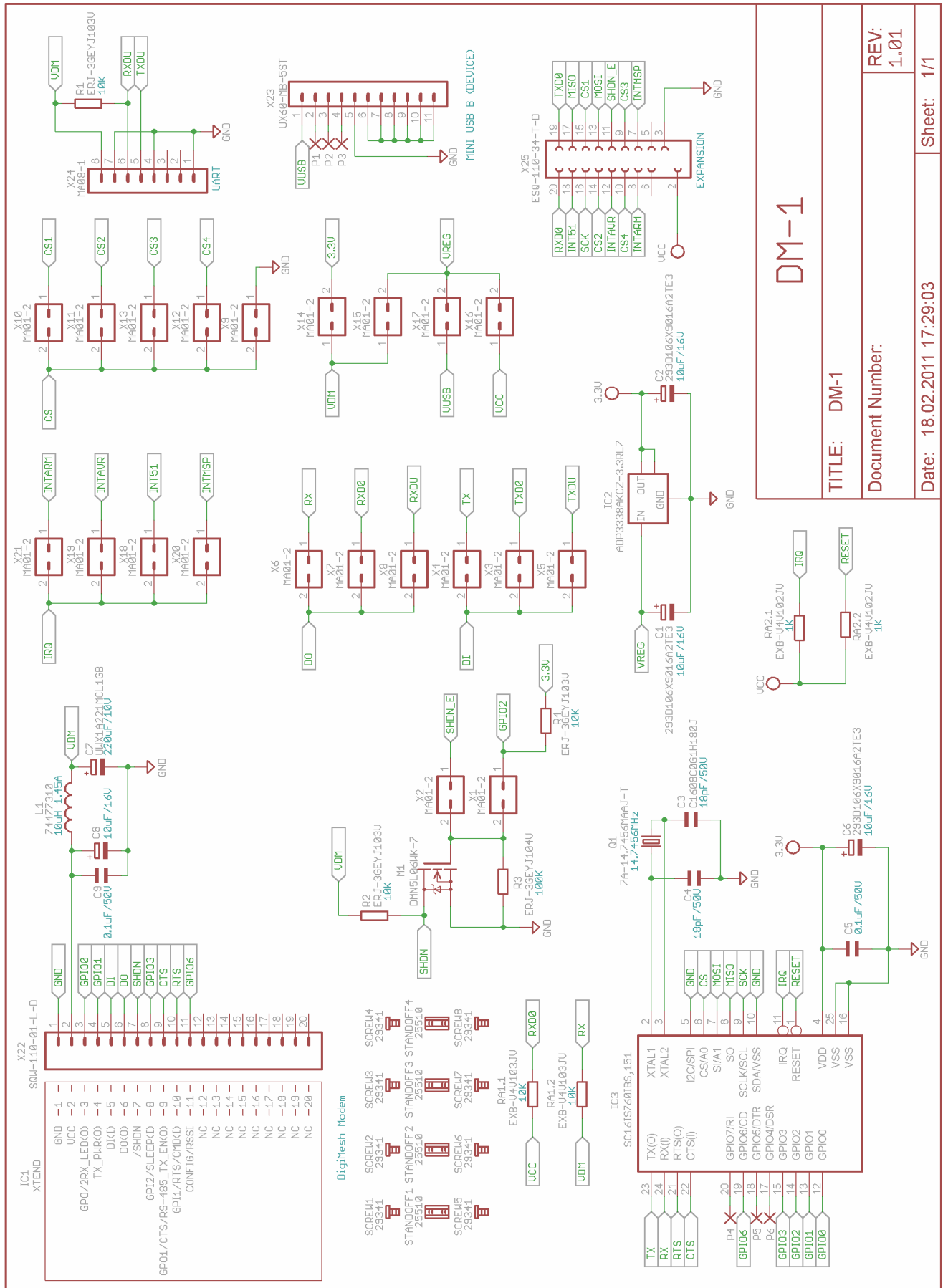Figure 1 shows positions of major components and connectors on the DM-1 board.

Expansion Connector (X25)

Figure 1

8. Schematics

DM-1

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Sheet: 1/1