MOD-MRF24J40 development board
Users Manual

Rev. Initial, May 2011
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INTRODUCTION:

MOD-MRF24J40 is a small module board with MRF24J40 – complete IEEE 802.15.4 radio and operates in the 2.4GHz freq band. The MRF24J40 supports ZigBee™, MiWi™ protocols and proprietary protocols. MOD-MRF24J40 has female UEXT extension connector for connecting to any of our development boards with male UEXT extension connector on it.

BOARD FEATURES:

- MRF24J40 RF transceiver

- UEXT connector

- On-board antenna

- Pin holes for most of the transceiver signals

- PCB: FR-4, 1.00 mm (0,039"), solder mask, silkscreen component print

- Dimensions: 39.55 x 20.40 mm (1.56 x 0.80")

ELECTROSTATIC WARNING:

The MOD-MRF24J40 board is shipped in protective anti-static packaging. The board must not be subject to high electrostatic potentials. General practice for working with static sensitive devices should be applied when working with this board.

RF TRANSCEIVER FEATURES:

- IEEE 802.15.4™ Standard Compliant RF Transceiver

- Supports ZigBee®, MiWi™, MiWi P2P and Proprietary Wireless Networking Protocols

- Simple, 4-Wire SPI Interface

- Integrated 20 MHz and 32.768 kHz Crystal Oscillator Circuitry

- Low-Current Consumption:

    - RX mode: 19 mA (typical)

    - TX mode: 23 mA (typical)

    - Sleep: 2 µA (typical)

- RF/Analog Features:

    - ISM Band 2.405-2.48 GHz Operation

    - Data Rate: 250 kbps (IEEE 802.15.4); 625 kbps (Turbo mode)

    - -95 dBm Typical Sensitivity with +5 dBm Maximum Input Level

    - +0 dBm Typical Output Power with 36 dB TX Power Control Range

    - Differential RF Input/Output with Integrated TX/RX Switch

    - Integrated Low Phase Noise VCO, Frequency Synthesizer and PLL Loop Filter

    - Digital VCO and Filter Calibration

    - Integrated RSSI ADC and I/Q DACs

    - Integrated LDO

    - High Receiver and RSSI Dynamic Range

- MAC/Baseband Features:

    - Hardware CSMA-CA Mechanism, Automatic Acknowledgement Response and FCS Check

    - Independent Beacon, Transmit and GTS FIFO

    - Supports all CCA modes and RSSI/ED

    - Automatic Packet Retransmit Capability

    - Hardware Security Engine (AES-128) with CTR, CCM and CBC-MAC modes

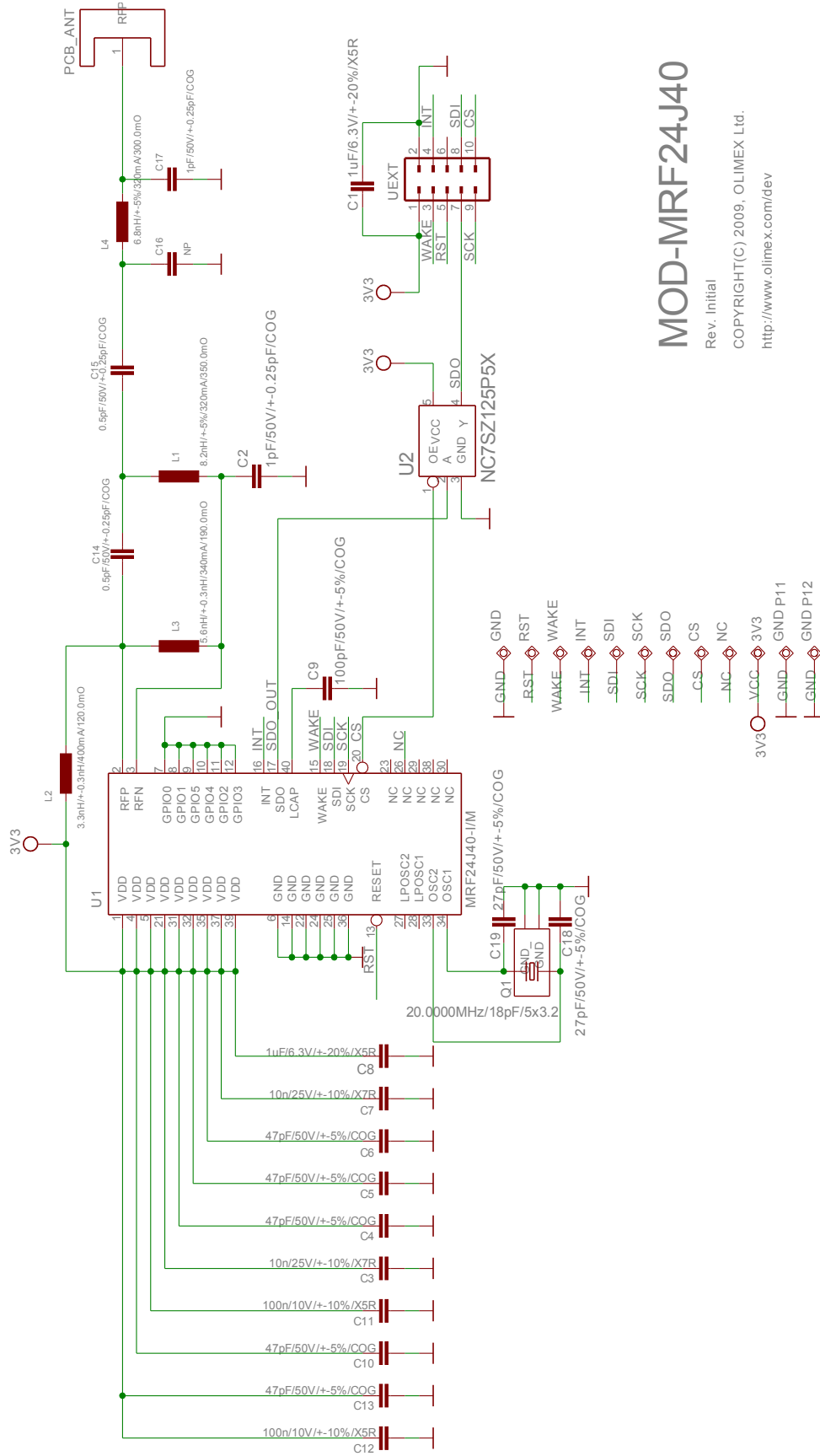   - Supports Encryption and Decryption for MAC Sublayer and Upper Layer

RF TRANSCEIVER BLOCK DIAGRAM:
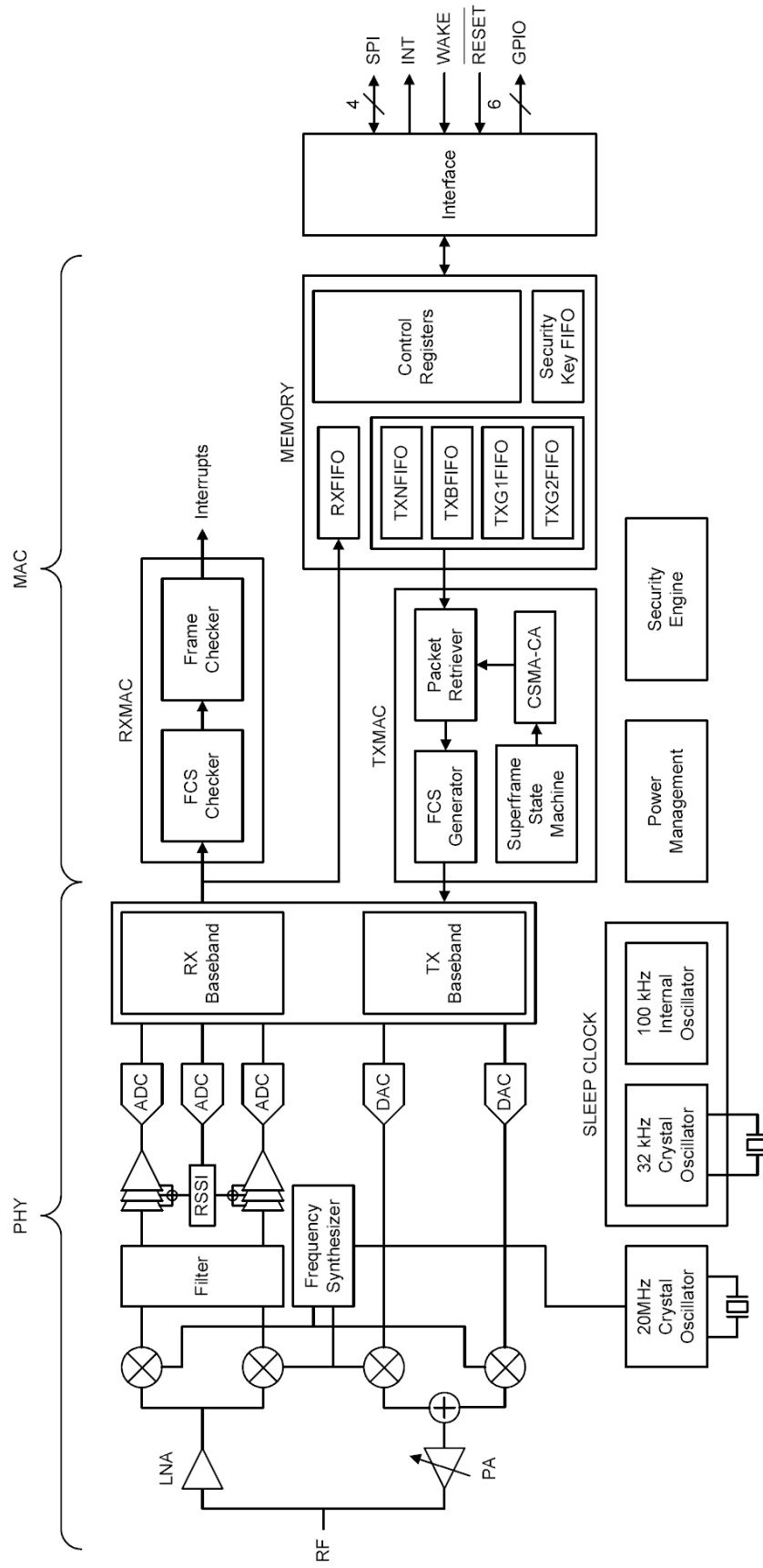
RF TRANSCEIVER MEMORY MAP:

Short Address Memory Space		Long Address Memory Space	
0x00 – 0x3F	Control Registers — 64 bytes	0x000 – 0x07F	TX Normal FIFO — 128 bytes
		0x080 – 0x0FF	TX Beacon FIFO — 128 bytes
		0x100 – 0x17F	TX GTS1 FIFO — 128 bytes
		0x180 – 0x1FF	TX GTS2 FIFO — 128 bytes
		0x200 – 0x27F	Control Registers — 128 bytes
		0x280 – 0x2BF	Security Key FIFO — 64 bytes
		0x2C0 – 0x2FF	Reserved
		0x300 – 0x38F	RX FIFO — 144 bytes

SCHEMATIC:

MOD-MRF24J40

Rev. Initial

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PCB_ANT
RFP

C17 1pF/50V/+-0.25pF/COG
L4 6.8nH/+-5%/320mA/300.0mO
C16 NP

C15 0.5pF/50V/+-0.25pF/COG
L1 8.2nH/+-5%/320mA/350.0mO
C2 1pF/50V/+-0.25pF/COG

C14 0.5pF/50V/+-0.25pF/COG
L3 5.6nH/+-0.3nH/340mA/190.0mO

L2 3.3nH/+-0.3nH/400mA/120.0mO

3V3

C9 100pF/50V/+-5%/COG

U1 MRF24J40-I/M
RFP 2
RFN 3
GPIO0 7
GPIO1 9
GPIO5 10
GPIO4 11
GPIO2 12
GPIO3
INT 16
SDO 17
LCAP 40
WAKE 15
SDI 18
SCK 19
CS 20
NC 23
NC 26
NC 29
NC 38
NC 30
VDD 1
VDD 4
VDD 5
VDD 21
VDD 31
VDD 32
VDD 35
VDD 37
VDD 39
GND 6
GND 14
GND 22
GND 24
GND 25
GND 36
RESET 13
LPOSC2 27
LPOSC1 28
OSC2 33
OSC1 34

RST

Q1 20.0000MHz/18pF/5x3.2
C19 27pF/50V/+-5%/COG
C18 27pF/50V/+-5%/COG
GND GND

UEXT
WAKE 1
RST 5
SCK 9
INT 2
SDI 6
CS 10
3 7
C1 1uF/6.3V/+-20%/X5R
3V3

U2 NC7SZ125P5X
OEVCC 5
A 2
GND Y 3
SDO 4
1
3V3

GND GND
RST RST
WAKE WAKE
INT INT
SDI SDI
SCK SCK
SDO SDO
CS CS
NC NC
VCC 3V3
GND P11
GND P12
3V3

C8 1uF/6.3V/+-20%/X5R
C7 10n/25V/+-10%/X7R
C6 47pF/50V/+-5%/COG
C5 47pF/50V/+-5%/COG
C4 47pF/50V/+-5%/COG
C3 10n/25V/+-10%/X7R
C11 100n/10V/+-10%/X5R
C10 47pF/50V/+-5%/COG
C13 47pF/50V/+-5%/COG
C12 100n/10V/+-10%/X5R

BOARD LAYOUT:

POWER SUPPLY CIRCUIT:

MOD-MRF24J40 may be power supplied with 3.3V - via UEXT and via pin holes 3V3 and GND.
The programmed board power consumption is about 25 mA with RF transceiver active.

CLOCK CIRCUIT:

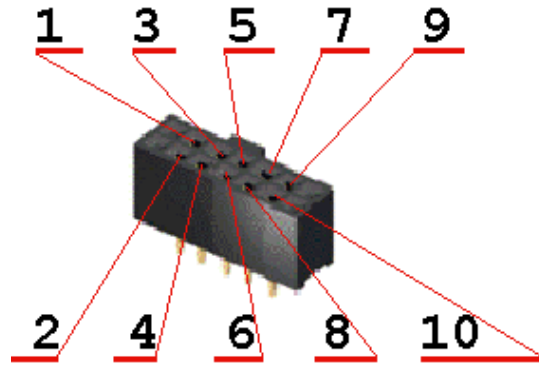Crystal Quartz 20 MHz connected to MRF24J40 pin 33 (OSC2) and pin 34 (OSC1).

RESET CIRCUIT:

MOD-MRF24J40 reset circuit includes MRF24J40 pin 13 (RESET), Pin hole RST and UEXT pin 5 (RST).

CONNECTOR DESCRIPTIONS:

UEXT:

Pin #	Signal Name
1	VCC (3V)
2	GND
3	WAKE
4	INT
5	RST
6	Not Connected
7	SDO
8	SDI
9	SCK
10	CS

PIN HOLES:

NC – Not Connected.

MECHANICAL DIMENSIONS:
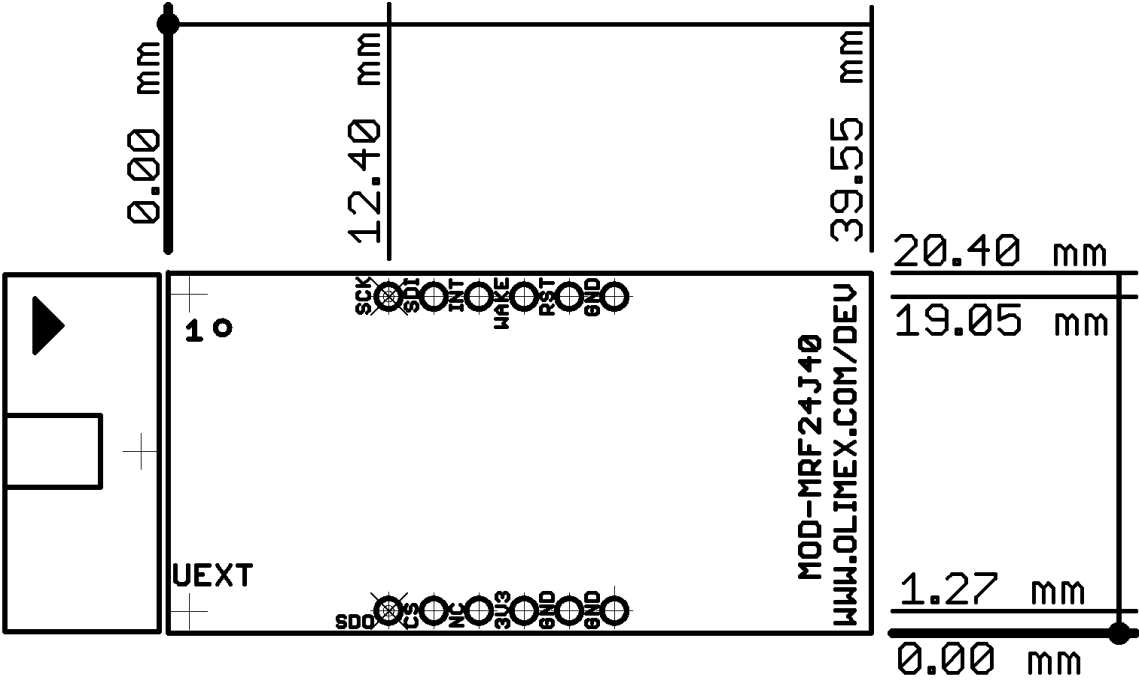
AVAILABLE DEMO SOFTWARE:

Available at www.olimex.com/dev

- Basic connectivity demo using Microchip MiWi stack. In order to use this demo you will need two MOD-MRF24J40 and two PIC32-MX460 boards.

ORDER CODE:

MOD-MRF24J40 assembled and tested.

How to order?
You can order to us directly or by any of our distributors.
Check our web www.olimex.com/dev for more info.

Revision history:

Board's revision: Rev. Initial   - created April 2009
Manual's revision: Rev. Initial   - created May 2011

Disclaimer: