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BL118 App. boards

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Bi-directional low power RF Remote Control boards

These simple application boards use firmware based on the BD118 remote control systems to implement a bi-directional control link. A system consists of a master board (which initiates communication burst cycles) and a slave (which responds to them). In hardware terms these boards are the same, but have different firmware loaded.

Figure 1: BL118 application boards

A single relay output is provided on each board, controlled by a logic (or switch) input on the "opposite" board. This product only operates in one mode: the radio link operates continuously, and the output simply reflects the state of the input ("momentary" operation).
The radio link uses a 4% duty cycle, 2 second burst cycle. The data format employed has an 8 bit address, which is set up on a DIP switch (master and slave addresses must be the same)

LED indicators are provided for power, relay output state and "valid communication link established".

Features

- 8 bit address select switch
- A relay to control mains powered devices rated up to 8A, 240VAC
- Visual LED indication of communication status and relay state
- Useful for RF module range testing
- Logic or Switch input for momentary control of relay
- Very low (1mA) average current. 2 years operating life from D cells
- Simple “plug-and-play” setup. No complex programming needed

Applications

- Security and Alarm systems
- Emergency assistance call system
- Status reporting and monitoring systems
- RF Remote control systems
- Industrial controls
- HVAC controls
- Simple On/Off switching
- Long range telecontrol with Narrow Band FM radios

Kit Contents

The BL118 Application kit is supplied with the following contents:

1 BL118 Encoder/Decoder Master board
1 BL118 Encoder/Decoder Slave board
2 Radiometrix Transceiver module *(ordered separately)*
2 1/4-wavelength monopole or helical antennas

Additional requirement

- External power supply (12V and 5V version available)

BL118 and it's variants

The term "BL118" actually refers to two different things: a 28 pin PIC programmed with bidirectional control code, and an applications board (equipped with a BIM radio, and a relay) that the BL118 chip can be used on. (There is actually nothing to prevent completely different firmware that complies with the pin allocations being used on the BL118 board)

Common features and characteristics of the BL118 boards

Interfaces	
Output	8A 240v rated SPDT "change over" relay (5v or 12v coils to order) (or an open collector switch in it's place) 3.81mm pitch 3 way 2 part "Phoenix" type terminal 4 pin ancillary connector (+5v, aux1, aux2, gnd)
Input	Active low logic input (3.81mm pitch 2 way 2 part "Phoenix" type terminal): Pull-up to 5V, and protection diodes provided, Compatible with N/O volt-free closing contact SETUP jumpers (two) Address DIP switch (8 way)
Power	12V and 5V versions available (3.81mm pitch 2 way 2 part "Phoenix" type terminal) 40mA peak (plus relay coil current if activated) 1mA average current (relay off, using 10mW BiM1-173 radio)
RF	SMA or MCX (or optional terminal block)
Indicators	
	Comms status LEDs (2 off, red)
	Relay state LED (red)
BL118 control chip	
28 pin PIC (16F883 or equivalent)	Clock 10MHz (ceramic resonator)
	Timer 1 . 32.768MHz crystal
	Data rate 3.6kbps Biphase coded burst
	Addressing User programmable 8bit address (DIP switch)
	Response time 2s
Extreme current saving measures	Switchable pullups on DIP switch Very low Iq 5V LDO regulator (HT7550)
Size	
	76 x 63 x 16mm (excluding connectors)
	(four 3.3mm diameter mounting holes are provided)
Operating temperature	
	-20 to +70 degrees centigrade (some radios may be limited to -10/+55)
	(Storage -30 to +70 degrees)
Radio modules	
	BiM pinout transceiver (NiM2, BiM1)
	Not compatible with RDL2 or high power BiM3H or BiM1H (BiM2 and BiM3 compatibility TBA)

LED Indications

The "blinking lights" on a BL118 look similar to a BD118, but the functions are actually very different (we cannot leave an LED constantly "on", or it's 2mA current drain will dominate the unit power consumption)

Master LEDs		
D1	Relay Activated	
D2	Regular Blink – In Lock	Regular Blink – Loss of communication link
D3	Short Blink – In Lock	OFF - Loss of communication link

Slave LEDs	A slave which has never achieved lock idles with all LEDs OFF	
D1	Relay Activated	
D2	OFF – In Lock	ON – Loss of communication link
D3	Regular Blink – In Lock	OFF - Loss of communication link

The BL118 CPU

All current BL118 systems (so far) share the same data burst structure and coding scheme. The bit coding is simple biphase, at approx 3600 bits per second. The burst is a 36mS long frame, incorporating 10mS of preamble, a framing /sync sequence, an 8 bit address, an 8 bit data word and a checksum. To date no BL118 uses any more than 1 bit of the data word, although in principle the whole word can be used, and it would not be difficult to add extra words to the burst (at the cost of a longer burst)

In the basic master/slave BL118 these bursts are used within a 2 second frame. Each frame begins with the master sending a burst, to which the slave replies. The timing permits 40mS for each transmission, and up to 50mS "listen" time on receive (these timings allow a good deal of timing slack). Throughout the rest of the frame the hardware goes into sleep mode and draws no more than 10uA. With a 10mW BiM1 VHF module this results in an average current consumption (relays off) of just under 1mA (a battery of 6 D cells will drive such a unit for over two years).

The developed BL118 "multi-master" is a code version whereby a single master polls (up to) 16 slaves, by cycling through the lower 4 bits of the address word (each slave has a unique 4 bit "ID" set on the lower 4 bits of the address DIP switch. The upper 4 bits still constitute a "global" address). Each poll operation consists of a master transmission followed by a slave reply (as in the standard BL118) and all 16 such operations occupy 1.44s of the 2 second frame. Slave unit current consumption is unchanged, but the multi-master is understandably more hungry (around 16mA average for a unit fitted with a BiM1 VHF radio)

All slave outputs are commoned to the master input, while the master relay output is the "or" function of all the slave inputs. In addition, the master will re-transmit an "activate" command in the frame following one where any slave input was seen to be active (in this way it functions as a sort of system repeater)
In addition, once every frame the master outputs (via the JP7 auxiliary I/O pins) a stream of RS232 bytes (at 9600 baud) that report the input states of all the slaves (as received) and the presence or absence in system of each slave.

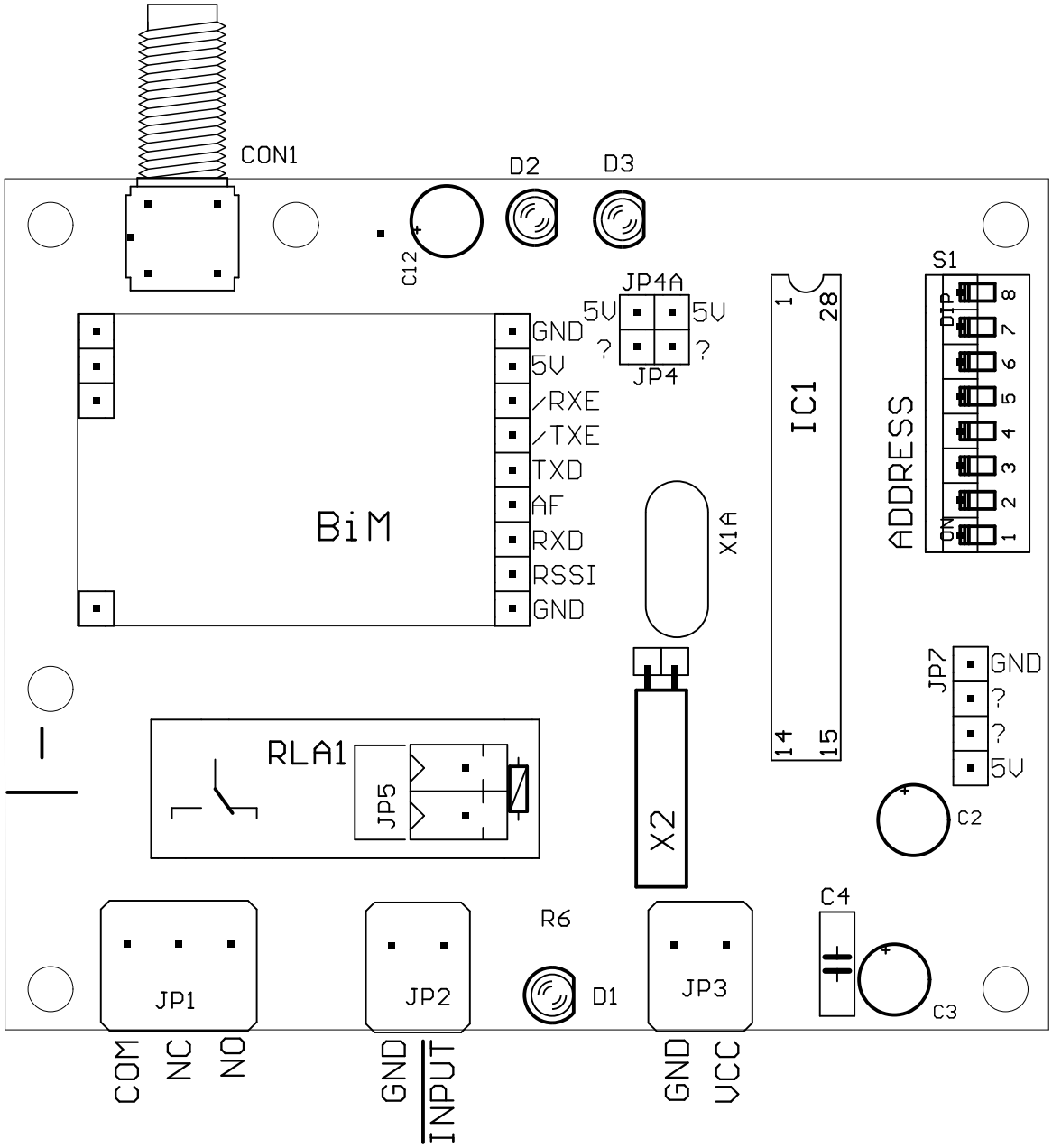

Figure 2: BL118 Board Component Layout

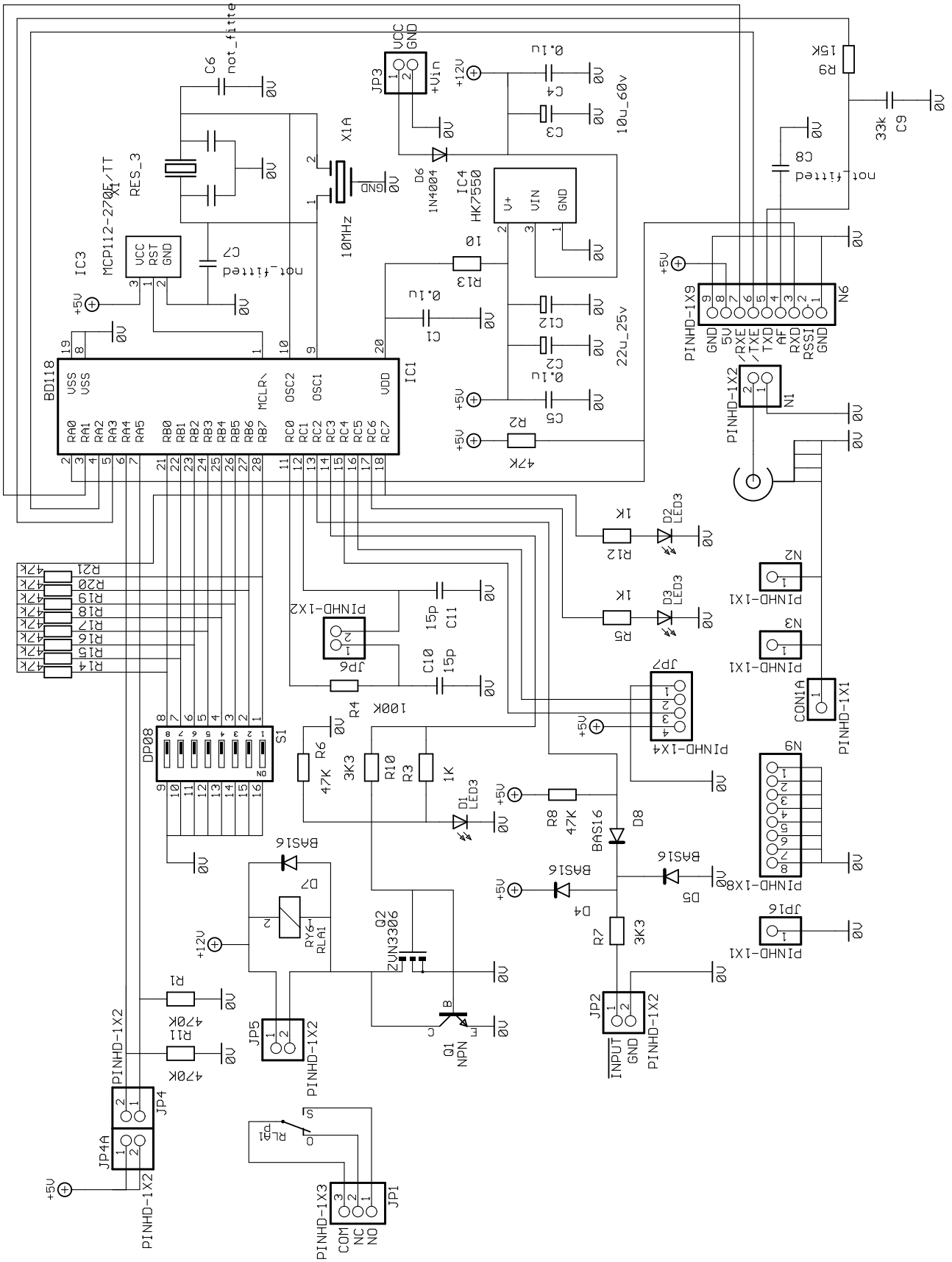

Figure 3: BL118 Schematics

Ordering Information

Part No.	Version	Frequency (MHz)
BL118-173.225-BiM1-M	Master control board	173.225
BL118-173.225-BiM1-MM	Multi-Master control board	173.225
BL118-173.225-BiM1-S	Slave control board	173.225
Other frequency variants can be supplied if required.		
BL118-434.650-NiM2-M	Master control board	434.650
BL118-434.650-NiM2-MM	Multi-Master control board	434.650
BL118-434.650-NIM2-S	Slave control board	434.650
Other frequency variants can be supplied if required.		

Note: For details relating to the radio module fitted on board, see relevant data sheet

http://www.radiometrix.com/files/additional/nim2.pdf

http://www.radiometrix.com/files/additional/bim1h.pdf

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The Intrastat commodity code for all our modules is: 8542 6000

R&TTE Directive

After 7 April 2001 the manufacturer can only place finished product on the market under the provisions of the R&TTE Directive. Equipment within the scope of the R&TTE Directive may demonstrate compliance to the essential requirements specified in Article 3 of the Directive, as appropriate to the particular equipment.
Further details are available on The Office of Communications (Ofcom) web site:
http://www.ofcom.org.uk/radiocomms/ifi/

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