

GH327 Interface Board Reference Manual

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Overview

The GH327 Interface Board provides either a stand-alone FM RDS application device, or an interfacing bridge to other devices via either a UART interface, or an XBee ZigBee RF module. The board uses an 8-bit AVR MCU to control all the interfaces, including the FM board. The MCU can be reprogrammed via an ISP header on the board. The GH327 Interface Board also contains a RS232 transceiver converting the UART interface into a PC compatible RS232 port. Lastly, the board should be powered by a 5V source of at least 100mA.

Component Descriptions

MCU: ATmega644

The ATmega644 is a general purpose MCU with a rich set of peripherals built in. The processor is clocked with an external 8MHZ crystal, but a value of up to 10MHZ can be used. The MCU features a built-in Flash and EEPROM memories. The flash is used to store code which can be reprogrammed via the ISP header on the board. The EEPROM memory can be used by the application programmed into the chip, one such application is to provide a unique ID to each board as no unique hardware ID exists on the board.

The ATmega644 is the heart of the board, it interfaces to the FM RDS chip, as well as the UART bus. The MCU makes use of the UART bus by a built in UART peripheral. The UART bus can be used in two ways, either to interface to the XBee ZigBee radio, or to interface to an RS232 port through an RS232 transceiver. The UART peripheral can be programmed via either interrupts, or polling. The interface to the FM RDS chip is realized with the use of an I2C peripheral also built into the ATmega644. The bus is pulled up sufficiently via resistors to allow for the maximum 400Khz communication speed. Like the UART peripheral, the I2C can be programmed using interrupts or polling as well. Please refer to the ATmega644 datasheet for more information on these peripherals, and others.

FM RDS Interface: GH327

The GH327 board is a reference design board for the Philips TEA5764 FM RDS chip. The chip interfaces via an I2C interface at a maximum speed of 400Khz. The chip is controlled completely through this interface. The board also features a BUSEN and INTX chip which are used to enable the I2C bus, and to signal interrupts, respectively. The audio interface of the GH327 board is not connected on the GH327 Interface Board. Please refer to the TEA5764 datasheet for more details on communication protocols, and electrical characteristics.

802.15.4 ZigBee Radio: MaxStream XBee

The XBee board can be used for wireless communication with other XBee devices. This board interfaces to the MCU via the UART bus. Since this bus is also connected to the RS232 Transceiver, transceiver chip has to be disabled by jumpers in order to use the XBee radio.

RS232 Transceiver: MAX3222

The MAX3222 chip is an RS232 voltage level shifting chip required to interface the MCU to a PC-compatible COM port. This is necessary, because the MCU is powered via 3.3V, while the RS232 interface works with +/-12V signal levels. The chip features a shutdown feature in order to save power, however it is also necessary to use this feature to allow the XBee radio to function. If the RS232 port is to be used, the XBee radio board should be disconnected before the board is powered on, and the jumpers should be set to a position that enables the chip.

Voltage Regulator: LD1117V33

The voltage regulator on this board ensures that the voltage throughout the board is 3.3V. This is necessary since the FM RDS and the ZigBee boards require a 3.3V max voltage. There is only one power rail on the board, so all devices are powered from 3.3V. The voltage regulator is not fitted with a heat sink, therefore while it is possible to use an external supply of higher than 5V, it is not recommended. An external supply of at least 100mA should be used.

Header and Misc. Descriptions

Power Connector (J1)

The power connector is a 2.1mm diameter coaxial jack. The tip is positive, while the outside is ground. As mentioned before, the recommended power supply is 5V with a minimum of 100mA.

ISP Header (J4)

The ISP header is pin-compatible with the 6 pin ATMEL ISP programmers. It is used to program the MCU on this board.

RS232 DB9 (X1)

This is a female RS232 connector. It is to be used with a standard com port cable to interface to a PC, or any other device with a COM port.

RS232 Transceiver Jumpers (J3)

These jumpers are used to enable or disable the RS232 transceiver. When the jumpers short pins 3-5 and 4-6, then the transceiver is enabled. To disable the transceiver the jumpers should be in positions 1-3 and 2-4. If the transceiver is left enabled, it is necessary to remove the XBee radio from the board before it is powered on.

LEDS

There are four LEDs on this board; LED1 and LED4 are red, while LED2 and LED3 are green. LED1 is wired to the power rails, and is used to indicate the board is powered on. LED2,3,4 are wired to the MCU and can be used as diagnostic LEDs.

Reset Switch (S1)

The reset switch is used to reset the MCU.

UART Header (J2)

The UART header can be used to wire into the UART TX and RX lines on the board. If this is necessary, then in most cases the transceiver should be disabled, and the XBee radio board should be removed.

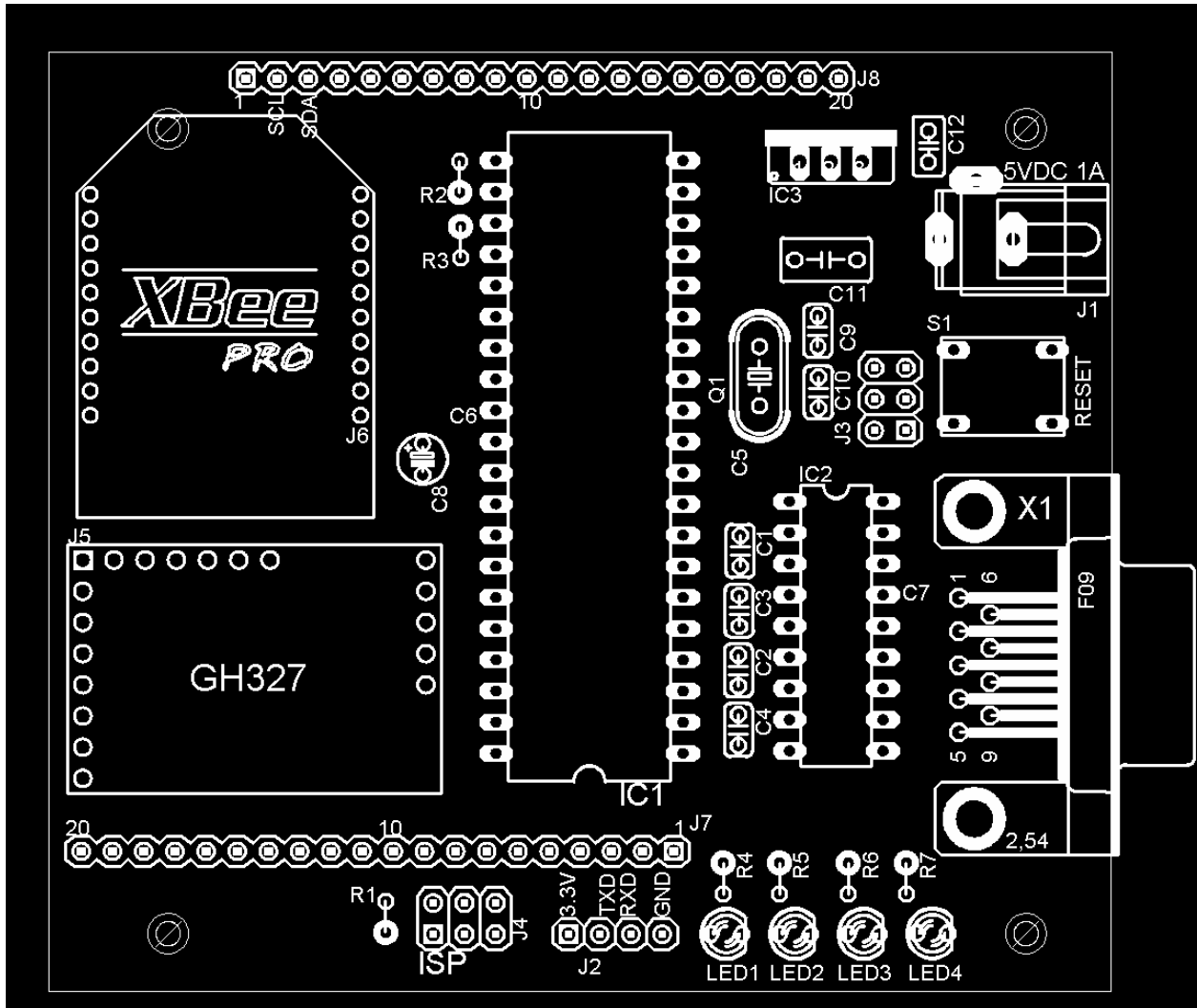
Expansion Headers (J7, J8)

The expansion header connects to most pins on the MCU and some pins on the XBee radio and the FM RDS board. This header is used in case any hardware

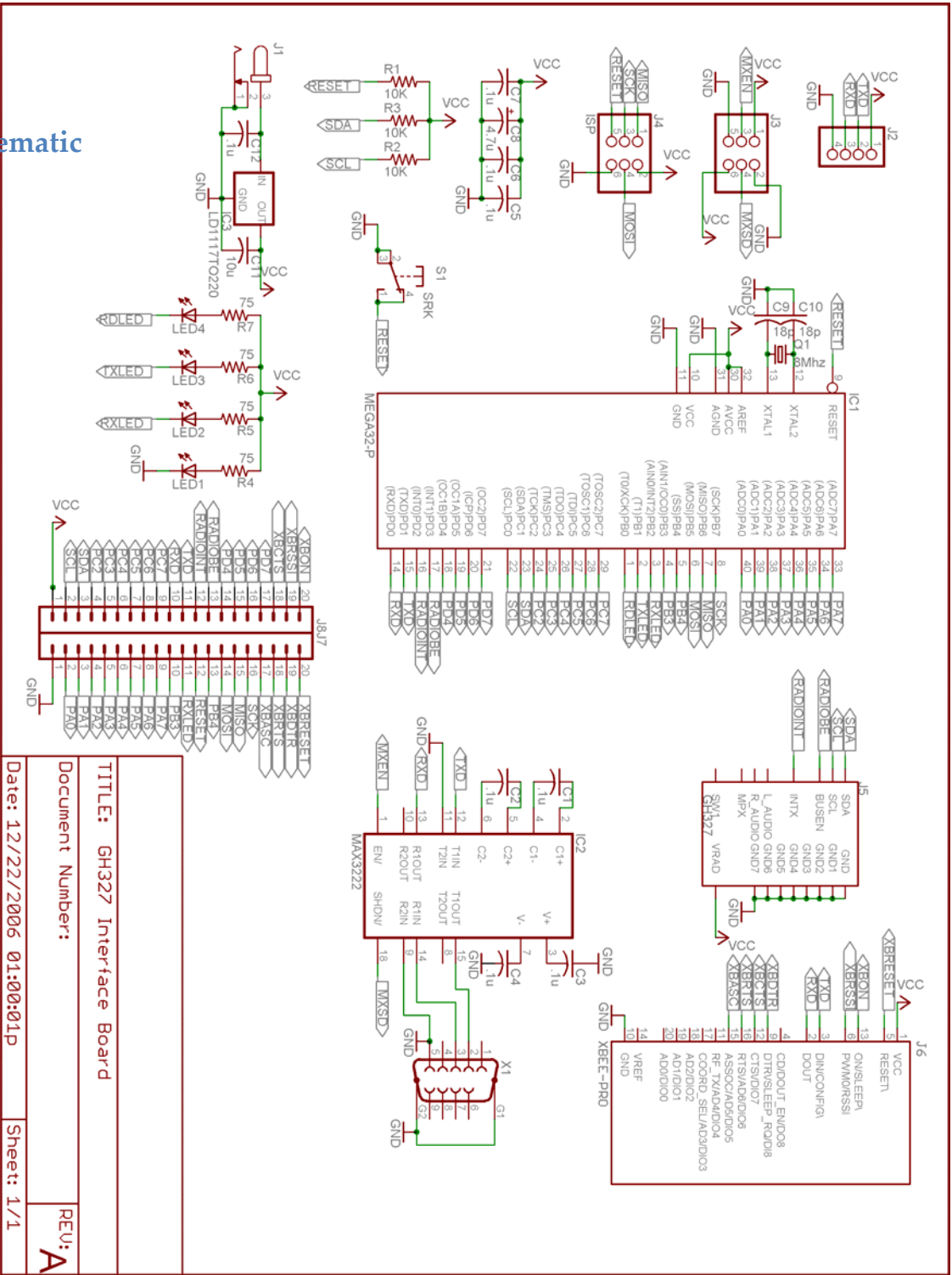
modifications are needed, which may be necessary for either bug fixes or hardware additions. Check the schematic for pinouts.

Appendix

Layout



Schematic



TITLE: GH327 Interface Board
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 Date: 12/22/2006 01:00:01p
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Bill Of Materials

Reference	Part	Description	Quantity	Supplier
		PCB	1	
IC1	ATMEGA644-20PU	IC AVR MCU FLASH 64K 40DIP	1	Digikey
IC2	MAX3222CPN+	IC TXRX RS232 120KBPS LP 18-DIP	1	Digikey
J2,J8,J7	4-103185-0	CONN HDR BRKWAY .100 40POS VRT	1.1	Digikey
J3,J4	4-103328-0-03	CONN HEADR BRKWAY .100 06POS	2	Digikey
R1,R2,R3	CFR-12JB-10K	RES 10K OHM 1/6W 5% CARBON FILM	3	Digikey
C1,C2,C3,C4,C12	C320C104K5R5TA	CAP .1UF 50V 10% CER RADIAL	5	Digikey
C5,C6,C7	ECJ-3VB1C104K	CAP .1UF 16V CERAMIC X7R 1206	3	Digikey
C8	T350A475K006AT	CAP TANT 4.7UF 6.3V 10% RADIAL	1	Digikey
C9,C10	K220J15C0GF5TL2	CAP 22PF 50V CERAMIC C0G 5%	2	Digikey
C11	FK26Y5V1C106Z	CAP CER 10UF 16V Y5V RAD	1	Digikey
Q1	AB-8.000MHZ-B2	CRYSTAL 8.000MHZ 18PF HC49/U	1	Digikey
X1	152-3409	Kobiconn D-Sub 9C R/A PCB RECPT	1	Mouser
J5	40-0518-10	Series X518 Collect Sockets	0.5	Digikey
J6	PPPN101BFCN-RC	CONN RECEPT 2MM SINGLE 10POS	2	Digikey
J1	PJ-102A	CONN POWER JACK 2.1MM PCB CIRC	1	Digikey
S1	ESE-20C343	SWITCH PUSH SPST MOM	1	Digikey
	881545-2	SHUNT LP W/HANDLE 2 POS 30AU	2	Digikey
IC3	LD1117V33	IC LDO REGULATOR +3.3V TO-220	1	Digikey
D1,D2	LTL-10223W	LED 5MM HIEFF RED DIFF NO FLANGE	2	Digikey
D3,D4	LTL-10233W	LED 5MM GREEN DIFF NO FLANGE	2	Digikey
R4,R5,R6,R7	CFR-12JB-75R	RES 75 OHM 1/6W 5% CARBON FILM	4	Digikey