MODTRONIX ENGINEERING Modular Electronic Solutions

SBC44EC

Single board computer for 44 pin PLCC PICs

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1 Introduction

The following documentation is for the SBC44EC Revision 1, which is marked on the PCB as SBC44ECR1!

SBC44EC is a single board computer with 10Mbs Ethernet and RS232 interface for 44 pin PLCC PIC18Fxxx microcontrollers. It is designed to run out the box with the free Microchip TCP/IP stack written in C, that can be compiled with the Hi Tech or Microchip PIC18 C compilers. See http://www.microchip.com/1010/suppdoc/design/netdez/internet/index.htm. Typical applications include HTTP Web servers, Mail clients, Ethernet to RS232 interface converter, Ethernet to RS485 interface converters, Remote control via Web Server, Protocol Bridge applications - Ethernet to USART, CAN, I2C, SPI etc.

It has been tested with the following 44 pin PLCC PIC chips and the Microchip TCP/IP stack:

- PIC18F452, PIC18F458

It can however also be used with any other 44 pin PLCC PIC18 chips, as long as it has enough FLASH memory.

Figure 1

2 Features

- Is part of our MicroX product range, meaning you can upgrade or expand it with any of the other MixroX products. For details see www.modtronix.com/microx.
- Modular, it has the following MicroX connectors(For details see www.modtronix.com/microx/expansion):
  - Frontend connector.
- Conforms to standard MicroX Compact Main Board dimensions (58mm wide and 54mm high). For details see www.modtronix.com/microx/dimensions.
- 2.1mm power connector for standard DC transformer.
- Wide operating voltage range from 7 – 30V.
- Assembled with 10BaseT Ethernet and RS232 interface with +- 15kV ESD protection.
- Has a standard MicroX ICSP (In Circuit Serial Programming) connector - CPU can be programmed in circuit. For details see http://www.modtronix.com/microx/icp.
- Is designed to run out the box with the excellent free Microchip TCP/IP stack (see http://www.microchip.com/1010/suppdoc/design/netdez/internet/index.htm) that features:
  - Includes MAC, IP, ARP, ICMP, TCP, UDP, HTTP, FTP, DHCP, IP Gleaning, MPFS
  - Socket support for TCP and UDP
  - Portable across PIC18 MCUs
  - Out-of-box support for Microchip C18 and Hi-Tech PICC-18 compilers
  - RTOS independent
  - Full TCP state machine
  - Modular Design

3 Expansion Connectors

3.1 Frontend Connectors

The SBC44EC's Frontend connectors can be used as an expansion port to add additional functionality. It contains all free CPU port pins, power, I2C, SPI, RS232 signal,..... For the location of the Frontend connectors, see the *Dimensions* chapter of this document. The Frontend connectors port pins are mapped to the following signals:

BRD2 Frontend Connector			*BRD1 Frontend Connector*		
Name	**Pin**	***Signal***	**Name**	**Pin**	***Signal***
TOP0	2	N.C.	TOP4	2	N.C.
TOP1	1	N.C.	TOP5	1	N.C.
TOP2	4	N.C.	TOP6	4	PIC pin RC0
TOP3	3	Ground	TOP7	3	PIC pin RC1
SIG0	6	RS232 transmit signal – at RS232 signal levels!	GND	5	Ground
SIG1	5	RS232 receive signal – at RS232 signal levels!	+5V	7	Regulated 0.5A 5V supply
B0	13	PIC pin RB0 – reserved! (3)	VIN	8	Unregulated input voltage
B1	14	PIC pin RB1 – reserved! (3)	CLR#	6	PIC pin /MCLR
B2	11	PIC pin RB2 – reserved! (3)	A0	10	PIC pin RA0
B3	12	PIC pin RB3 – reserved! (3)	A1	9	PIC pin RA1
B4	4	PIC pin RB4 – reserved! (3)	A2	12	PIC pin RA2
B5	10	PIC pin RB5	A3	11	PIC pin RA3
B6	7	PIC pin RB6 – also used for ICP (1)	C2	16	PIC pin RC2
B7	8	PIC pin RB7 – also used for ICP (1)	C3	15	PIC pin RC3 – also used for I²C (2)
A4	15	PIC pin RA4	C4	14	PIC pin RC4 – also used for I²C (2)
A5	16	PIC pin RA5	C5	13	PIC pin RC5

(1) Port Pins B6 and B7 are also used for in circuit programming, if the board is programmed in circuit! If they are used, and the board should still be in circuit programmable, make sure their impedance is greater than 1000 ohms!

(2) The Microchip TCP/IP stack also uses these pins as an I2C bus to access the external EEPROM if configured to use an external EEPROM. See Microchip TCP/IP stack documentation for more details.

(3) These pins are NOT available to be used, seeing that they are used for controlling the Ethernet chip!

Figure 2 shows the locations of the frontend connectors on the board.

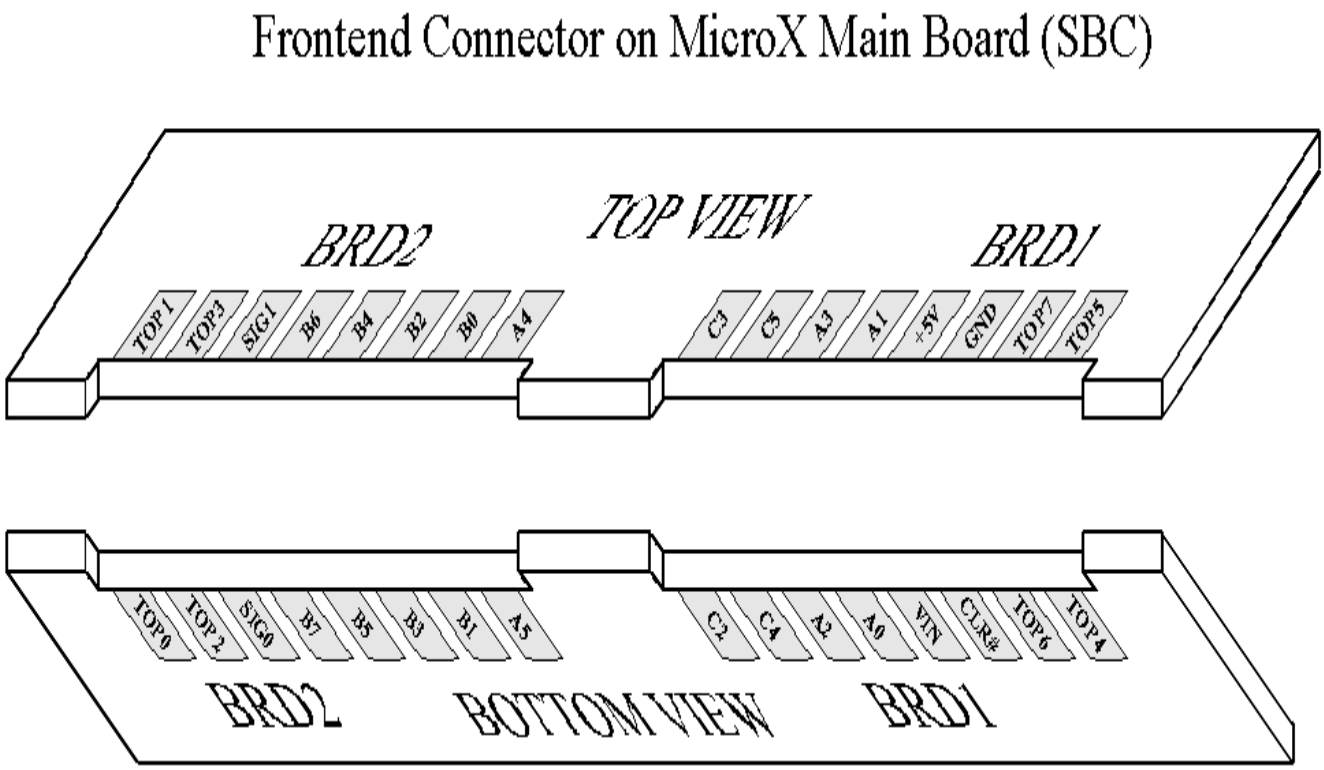
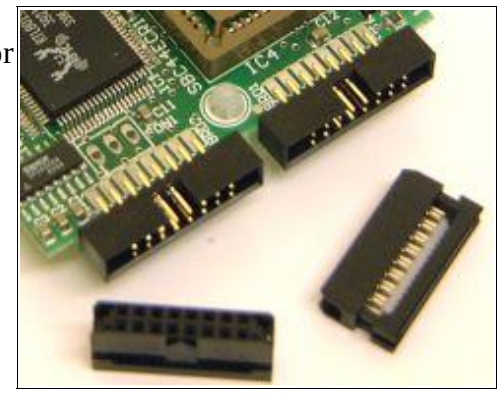


Figure 2

3.1.1 Connecting IDC connectors to the Frontend Connector

For an easy way of accessing the BRD1 and BRD2 Frontend Connectors signals, 2mm IDC connectors can be soldered onto one or both of the frontend connectors. By doing this, the frontend signals will be available via a standard 2mm ribbon cable. Note that the IDC connectors shown in the image are not soldered onto the Frontend Connector!



3.2 Expansion boards

The SBC44EC's Frontend connectors can be used as an expansion port to add additional functionality. It contains all free CPU port pins, power, I2C, SPI, RS232 signal,..... For a list of Frontend Boards currently available from Modtronix Engineering, see www.modtronix.com/products/sbc44ec.

Additionally, users can download PCB templates for creating their own Frontend expansion boards from our Downloads page – see www.modtronix.com/downloads.

4 Part Lists

Part list for SBC44EC-IR2 (Fully assembled)

Designator:	Value:	Description:	Package:
C1 (1)	100nF 0805	Decoupling, Y5V or better, 50V or better	0805
C10	10uF Aluminium 6.3mm	35V or better, Diameter = 6.6mm	Capacitor 6.3mm x 6.3mm
C11	100nF 0805	Decoupling, Y5V or better, 50V or better	0805
C12	100nF 0805	Decoupling, Y5V or better, 50V or better	0805
C13	100nF 0805	Decoupling, Y5V or better, 50V or better	0805
C14	100nF 0805	Decoupling, Y5V or better, 50V or better	0805
C15	100nF 0805	Decoupling, Y5V or better, 50V or better	0805
C2(1)	100nF 0805	Decoupling, Y5V or better, 50V or better	0805
C3(1)	100nF 0805	Decoupling, Y5V or better, 50V or better	0805
C4(1)	100nF 0805	Decoupling, Y5V or better, 50V or better	0805
C5	15pf 0805	XR7, 10V or better	0805
C6	15pf 0805	XR7, 10V or better	0805
C7	100nF 0805	Decoupling, Y5V or better, 50V or better	0805
C8	100nF 0805	Decoupling, Y5V or better, 50V or better	0805
C9	100nF 0805	Decoupling, Y5V or better, 50V or better	0805
CON2	Power jack 2.1mm	Power jack 2.1mm pcb mount	Power socket, 2.1mm pcb
CON3	2x4 pin header, 2mm	2x4 pin male header, 2mm, pin length 3-4mm	male pin header, 2mm
D1	ES2B	Standard rectifier, I = 2A, V = 50V or better	SMB
IC1	RTL8019AS	Ethernet controller	PQFP 100
IC2	78M05 DPAK/TO252	regulator, 0.5A or higher	TO252
IC3(1)	SP202ECN	RS232 Line Driver, SO16, Commercial	SO16 150mil
IC4	PLCC44-SMD	SMD PLCC44 Socket	PLCC44 SMD SOCKET
IC5	DIL08 ic socket	8 pin TH ic socket, 300mil	SO08 150mil
LED1	LED standard red 1206	Standard Red LED, PLCC or 1206 package	LED PLCC or 1206
LED2	LED standard red 1206	Standard Red LED, PLCC or 1206 package	LED PLCC or 1206
LED3	LED standard green 1206	Standard Green LED, PLCC or 1206 package	LED PLCC or 1206
LED4	LED standard yellow 1206	Standard Yellow LED, PLCC or 1206 package	LED PLCC or 1206
P1	LF1S022	RJ45 connector with 10BaseT magnetics, shielded, horizontal TH pcb mount	RJ45, Horz, TH, Shielded
Q2	20 Mhz smd	20 Mhz crystal	HC49 SMD
Q2	20 Mhz smd	20 Mhz crystal	HC49 SMD
R1	4k7 0805	4k7 0805 Thick film resistor, 0.1W, 1%	0805
R2	4k7 0805	4k7 0805 Thick film resistor, 0.1W, 1%	0805
R3	10k 0805	10k 0805 Thick film resistor, 0.1W, 1%	0805
R4	1k 0805	1k 0805 Thick film resistor, 0.1W, 1%	0805
R5	22k 0805	22k 0805 Thick film resistor, 0.1W, 1%	0805
R6	200 0805	200R 0805 Thick film resistor, 0.1W, 1%	0805
R7	1k 0805	1k 0805 Thick film resistor, 0.1W, 1%	0805
R8	1k 0805	1k 0805 Thick film resistor, 0.1W, 1%	0805
R9	1k 0805	1k 0805 Thick film resistor, 0.1W, 1%	0805
TR1	BC807-40	PNP Transistor, 500mA	SOT23

(1) RS232 Interface Assembled

(2) EEPROM Assembled

5 Dimensions

The SBC44EC conforms the MicroX Compact Main Board Dimensions, as shown in Figure 3.

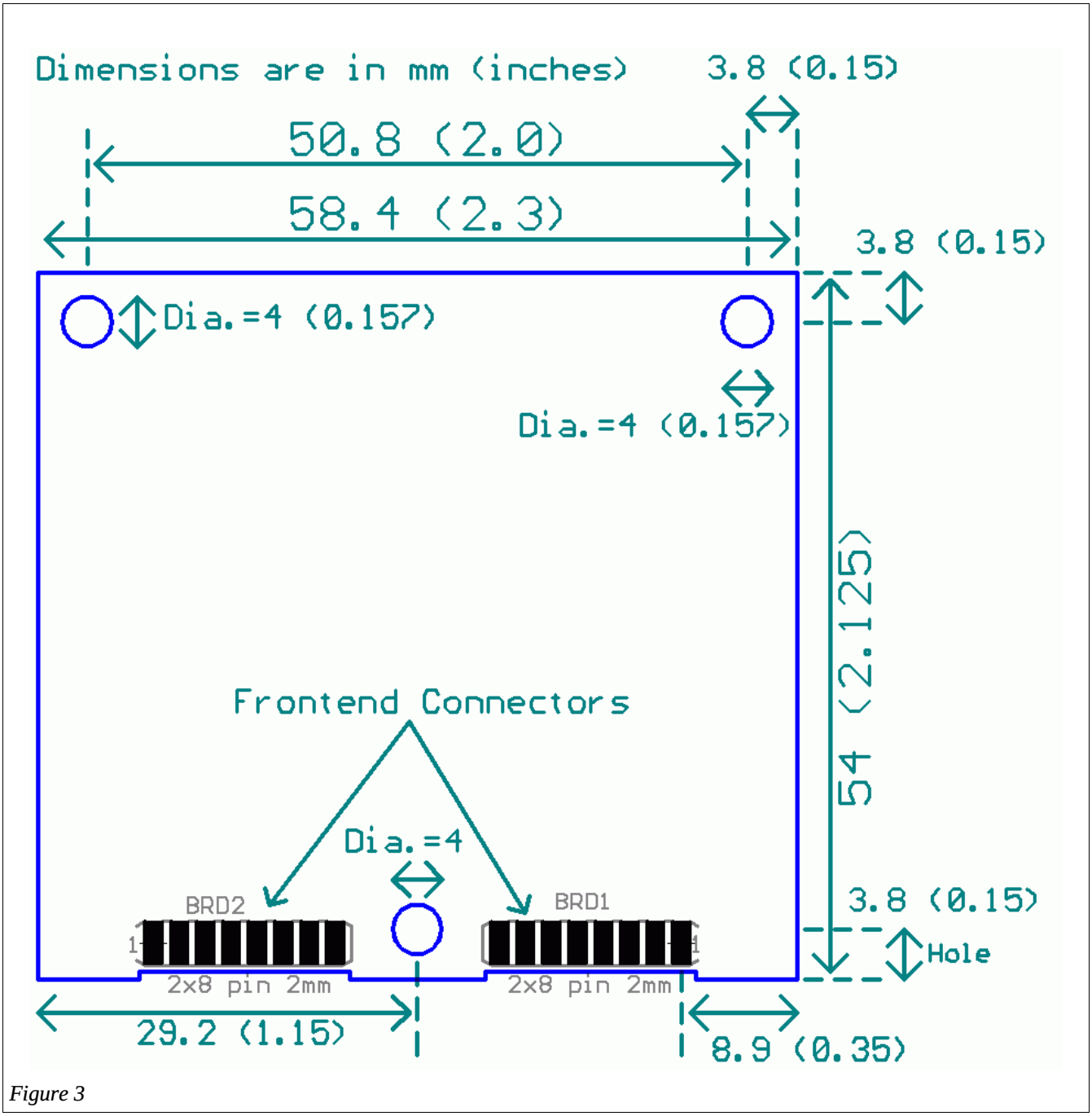
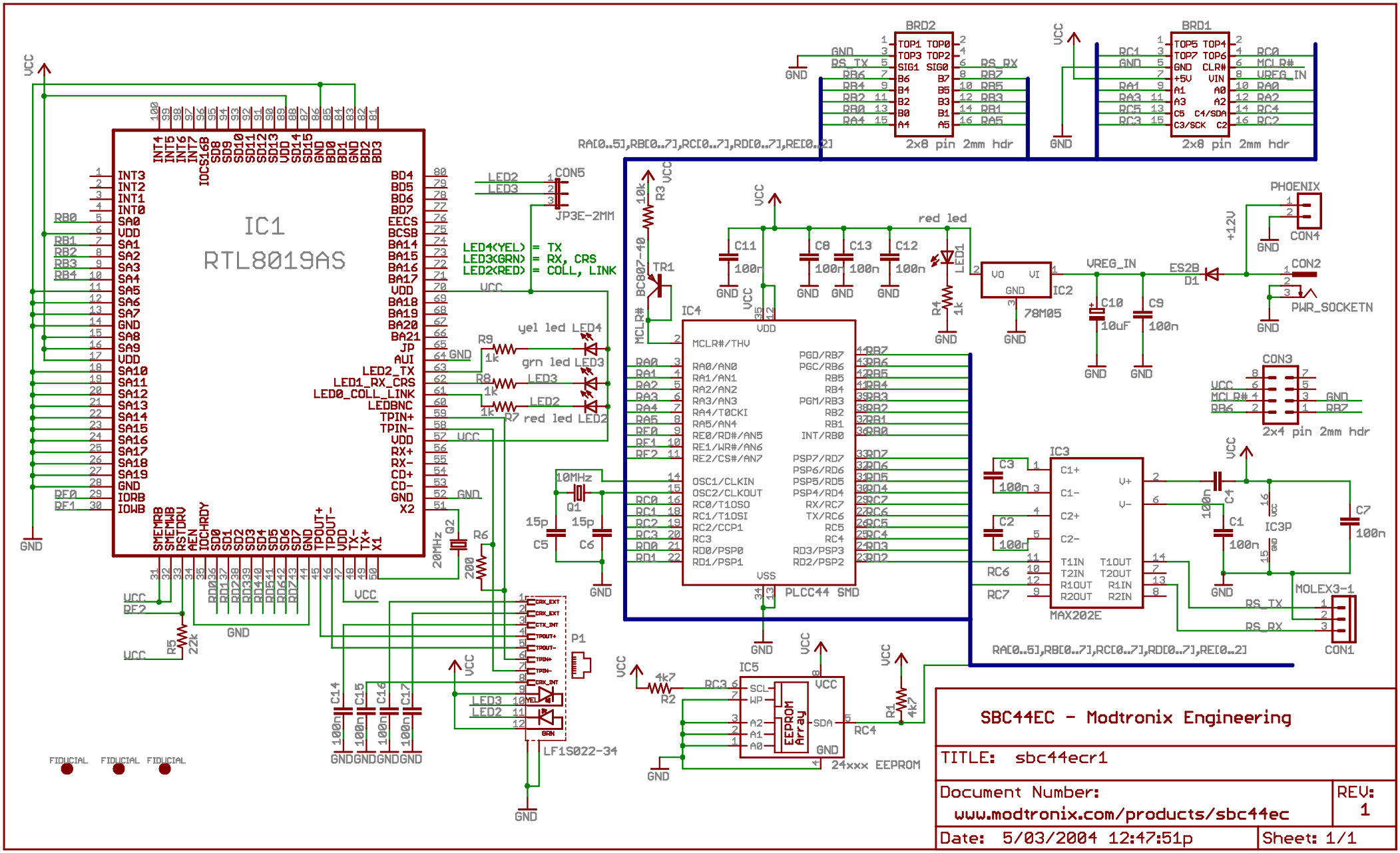


Figure 3


IC1
RTL8019AS
BRD2
2x8 pin 2mm hdr
BRD1
2x8 pin 2mm hdr
IC4
PLCC44 SMD
IC2
78M05
IC3
MAX202E
IC5
24xxx EEPROM
CON1
CON2
CON3
CON4
CON5
JP3E-2MM
PHOENIX
PWR_SOCKETN
MOLEX3-1
2x4 pin 2mm hdr
LF1S022-34
P1
Q1
Q2
10MHz
20MHz
TR1
BC807-40
D1
ES2B
LED1
red led
yel led LED4
grn led LED3
LED2
LED4(YEL) = TX
LED3(GRN) = RX, CRS
LED2(RED) = COLL, LINK
RA[0..5],RB[0..7],RC[0..7],RD[0..7],RE[0..2]
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