# *DonTronics* DT.101 SimmStick™ Compatible SBC

The DT.101 can be configured in a variety of different ways depending on the application. The user only needs to install the components that best fits their needs.

Minimally Required Components

E1 Processor: All of the following Microchip microcontrollers may be used: PIC16C52, 54, 56, 58A, 554, 556, 558, C61, 620, 621, 622, C83, C84, F84

XTL1: Either a standard microprocessor crystal or a three leg ceramic resonator with internal capacitors may be used for the system clock. Consult the Microchip data books for more information.

Crystal: If a crystal is chosen, C3 and C4 should be fitted with a pair of 15pf to 22pf ceramic capacitors.
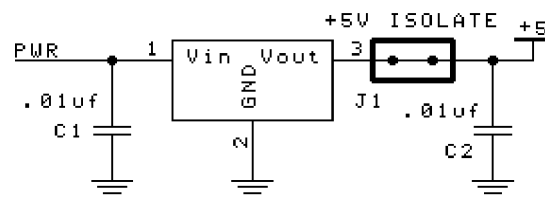
```
          XTL1
  CI ─────┤├─────  CO
        │  │  │
     ───┴─ ───┴─
  15pf│C3   C4│15pf
     ───     ───
      ▽       ▽
```
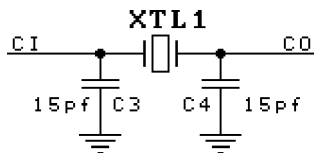
Ceramic Resonator: A three pin resonator may be installed at XTL1 facing either direction with no additional hardware.

Features:
* Supports all of the Microchip PIC™ 16CXX line of microcontrollers in 18 pin DIP packages
* RS-232 level converter
* Brown out circuit protection
* Real Time Clock
* 1 to 64K Serial EEPROM
* 12 and 8 bit A/D converters
* Compatibility with the many SimmStick™ prototyping and expansion boards
* Compatible with the DT.001 programmer for on the fly in-circuit programming

5V Power Supply: Many of the SimmStick expansion boards provide a +5V supply so in some cases the power supply portion is optional. It can be disabled by opening jumper J1.

```
          78L05 REGULATOR
                      +5V ISOLATE    +5
  PWR ──────┬──1 ┌────────────┐ 3 ┌──┐ ──┬── +5
            │    │ Vin   Vout │   │  │   │
  .01uf    ─┴─   │     GND    │   J1  .01uf │
  C1        ─    └─────2──────┘      ─┴─ C2
            │        │                 ─
            ▽        ▽                 ▽
```
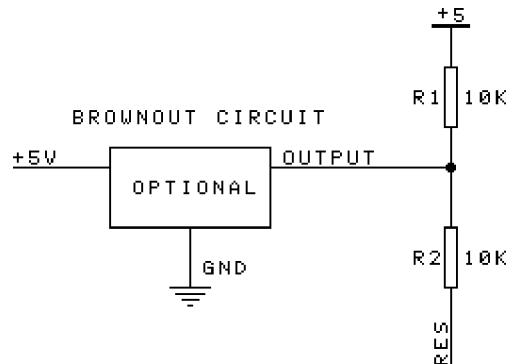
R1, R2, and R3 are 10K, 1/4 W resistors that fulfill the reset requirements of the microprocessor.
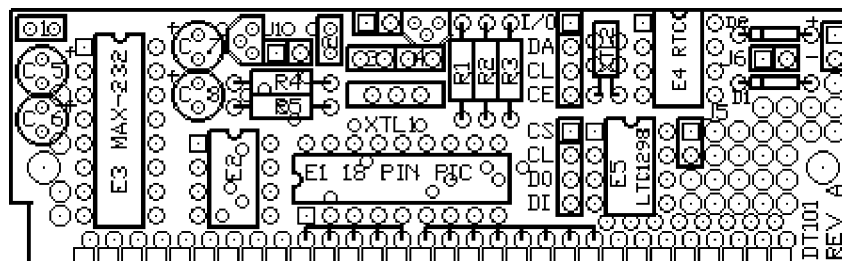
Optional Components:

Brown-Out Circuit:

The brown-out circuit is an IC in a TO-92 package used to stop the microcontroller operation from becoming unpredictable during power fluctuations. It is an added precaution for reliable operation and is not required in many cases. The older PIC16C5x, however may need the B/O.

```
                                          +5
                                          |
              BROWNOUT CIRCUIT      R1 |10K
  +5V ─────┬──────────┬── OUTPUT         |
           | OPTIONAL |            ──────┤
           └──────────┘            R2 |10K
                |                        |
               GND                       |
                                        RES
```

R1 and R2 should always be installed even if the B/O circuit is not used. The B/O IC should be CMOS or Open Collector type switching between 4.2 and 4.6 V for 5V operation.

Recommended B/O IC's:
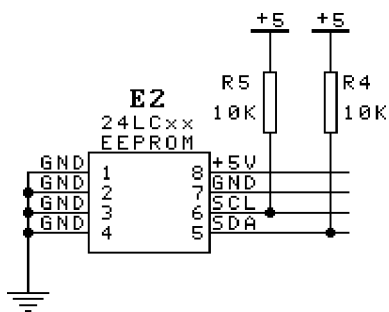Panasonic MN13811-S (Open Collector)
Panasonic MN1381-S (CMOS)
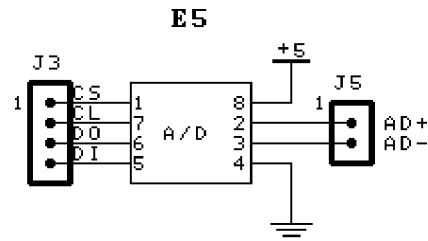Zetek ZM33064
Motorola MC33064P

E2 EEPROM
The DT.101 supports any of the Microchip serial 24LCxx type EEPROM's. The EEPROM is available in several sizes from 1 to 64 Kb. More information can be found on the Microchip Web Site.

R4 and R5 are 10K, 1/4 W pull-up resistors.

```
                          +5   +5
                          |    |
                        R5 |  R4 |
          E2           10K|  10K|
         24LCxx           |    |
         EEPROM           |    |
  GND ──┤1       8├── +5V
  GND ──┤2       7├── GND
  GND ──┤3       6├── SCL
  GND ──┤4       5├── SDA
         |
        GND
```

E5 A/D Converter

DT.101 is compatible with several different serial 8 pin A/D converters including the 12 bit Linear Devices LTC1298 and the 8 bit National Semiconductor ADC0831. Wire jumpers should be connected between J3 and the appropriate free I/O pins to complete the hardware interface. AD+ and AD- are the analog inputs.
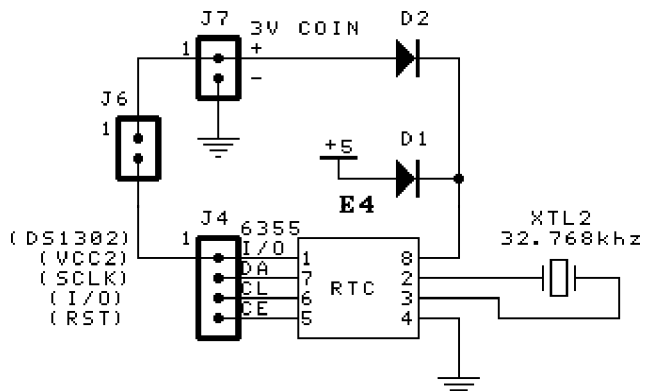
```
              E5
                              +5
    J3                         |        J5
  1 ┤ CS ──┤1    8├──┬─────── ┤1
    ┤ CL ──┤7    2├──│── A/D  ┤   AD+
    ┤ DO ──┤6    3├──│─────── ┤   AD-
    ┤ DI ──┤5    4├──┘
                              |
                             GND
```

RS-232 Level Converter

The RS-232 level converter circuit is composed of E3, a MAX-232 IC, and C5, C6, C7 and C8 1uf capacitors @ 16V. The SimmStick bus pins 1 and 2 are used for Tx and Rx respectively and may be hooked directly to PC's serial port or another DT.101 for serial communications.

E4 Real Time Clock

The DT.101 supports the Dallas Semiconductor DS-1202/1302 or Panasonic NJU-6355 real time clocks. The clocks count seconds, minutes, hours, and the date even when the device is powered down provided an optional battery backup is connected using a watch type battery to J7.

The Panasonic NJU-6355 requires a 32.768khz crystal with a load capacitance of 12pf installed at XTL2. The Dallas units need a 6pf crystal. Wire jumpers should be connected between J4 and the appropriate free I/O pins to complete the hardware interface.

```
       J7  3V COIN        D2
     1 ┤ +  ───────────────▷│───┐
       ┤ -                      |
    J6  |                       |
     1 ┤                  +5  D1 |
       ┤              ─────────▷│┤
                                |
  (DS1302) J4  6355        E4    |    XTL2
  (VCC2) 1 ┤ I/O ┤1   8├──┐  32.768khz
  (SCLK)   ┤ DA  ┤7   2├──│──────┤├──┐
  (I/O)    ┤ CL  ┤6 RTC 3├──│──────┤   |
  (RST)    ┤ CE  ┤5   4├──┘        |
                          |        |
                         GND ──────┘
```

Internet Resources:

Microchip PIC and EEPROM: http://www.microchip.com/
Linear Technology A/D's: http://www.linear.com/
Dallas Semiconductor RTC's: http://www.dalsemi.com/
National Semiconductor A/D's: http://www.national.com/
DonTronics RTC Examples: http://dontronics.com/rtc.html

DonTronics 1997(c)

SEE NOTE 1 ***
XTL2
32.768khz

D2
D1
J7 3V COIN
+5
E4
J6

E5
LTC1298
A/D
J3
CS
CL
DO
DI
AD+
AD-
J5
SEE NOTE 3 ***

6355
RTC
J4
I/O
DA
CL
CE

(DS1302)
(VCC2)
(SCLK)
(I/O)
(RST)

R4 10K
+5
R5 10K
+5
+5V
GND
SCL
SDA
E2
24LCxx
EEPROM
GND
GND
GND
GND

78L05 REGULATOR
+5V ISOLATE
+5
C2 .01uf
J1 .01uf
Vin Vout
GND
3

+9V AUX IN
GND
J2
PWR

.01uf
C1
PWR

+5
R1 10K
R2 10K
RES
SEE NOTE 2 ***
BROWNOUT CIRCUIT
OUTPUT
OPTIONAL
GND
+5V

MAX-232
E3
Comms Port
RS-232
+5
C7 1uf
C8
1uf
1uf
C5 1uf
C6 1uf
16
2
15
6
10
9
11
12
1
3
4
5
7
8
14
13

E1
18 PIN PIC MICRO
RA2
RA3
RTCC
MCLR
GND
RB0
RB1
RB2
RB3
RA1
RA0
OS1
OS2
+5V
RB7
RB6
RB5
RB4
18
17
16
15
14
13
12
11
10
SDA
SCL
CI
CO
+5V
D7
D6
D5
D4

SI
SO
IO
RES
GND
D0
D1
D2
D3
CO

XTL1
(READ TEXT XTL1)
C3 15pf
C4 15pf
CI

R3 10K
+5
IO

Simmstick Bus
A1 TX
A2 RX
A3
PWR
CI
CO
+5V
RES
SCL
SDA
SI
SO
IO
D0
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
D14
D15
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NOTE 1 *** FOR ACCURATE TIME KEEPING USE:
DALLAS DS1202/1302 6pf XTL
PANASONIC NJU6355 12pf XTL

NOTE 2 *** FOR OPTIONAL B/O CCT USE:
PANASONIC MN13811-S (O/C)
PANASONIC MN13811-S (CMOS)
ZETEK ZM33064
MOTOROLA MC33064P

NOTE 3 *** MOST A/D CHIPS WILL
FIT THIS 8 PIN LAYOUT.
EXAMPLE: ADC0831