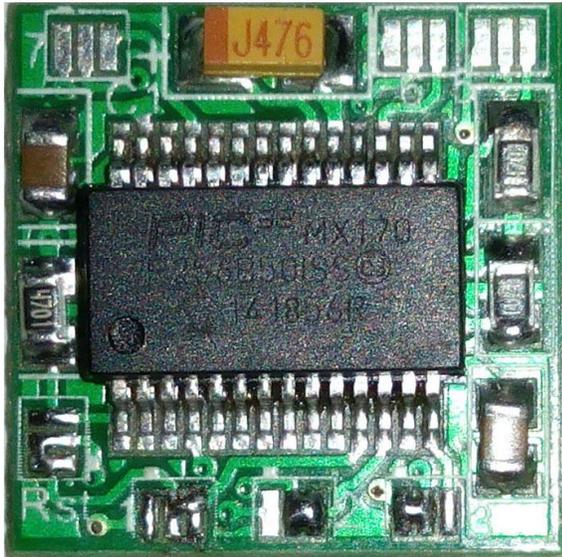+By Mick Gulovsen
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2-Dec-14 Ver.1

NanoMite

In line with my `Mick's uMite PCB' (MuP) series of boards I have introduced what is (at time of writing) probably the smallest MicroMite board out there, the NanoMite, previously called MuP-Mini but renamed thanks to TZAdvantage from The Back Shed Forum.

As its name suggests NanoMite is SMALL,
at 15mm x 15mm (0.59″ x 059″), it is designed
to plug into a standard 8pin IC socket (Wiper type,
not Machined pin) or even 2 rows of female header pins.

DIP
Pin 1
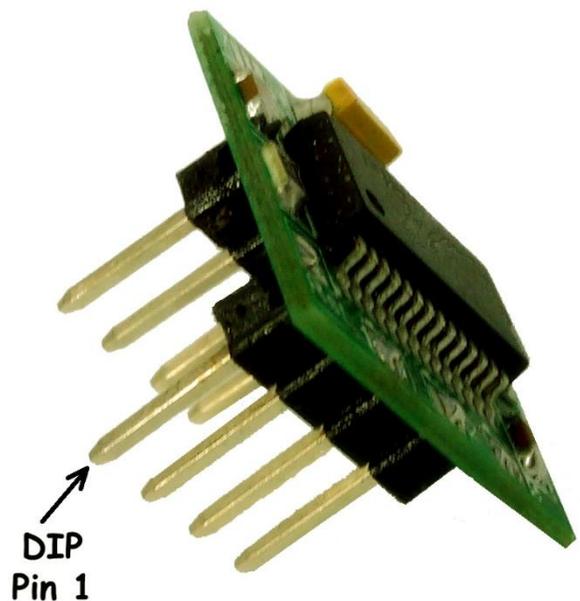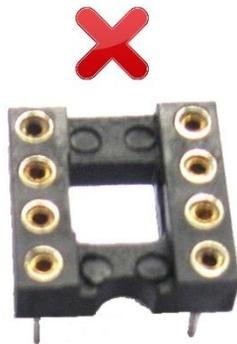
NOTE!!

NanoMite is entirely surface mount and for that reason it is not recommended that beginners attempt a build unless they are really keen to learn. I won't go into how to solder SMD devices, there are many useful video clips on the internet especially on Youtube.com

NanoMite incorporates a SSOP version of the PIC32MX170F256B and is intended to be programmed with Geoff Graham's MMBasic but of course if you are a fluent `C speaker' there is no reason you couldn't write your own code from the beginning.
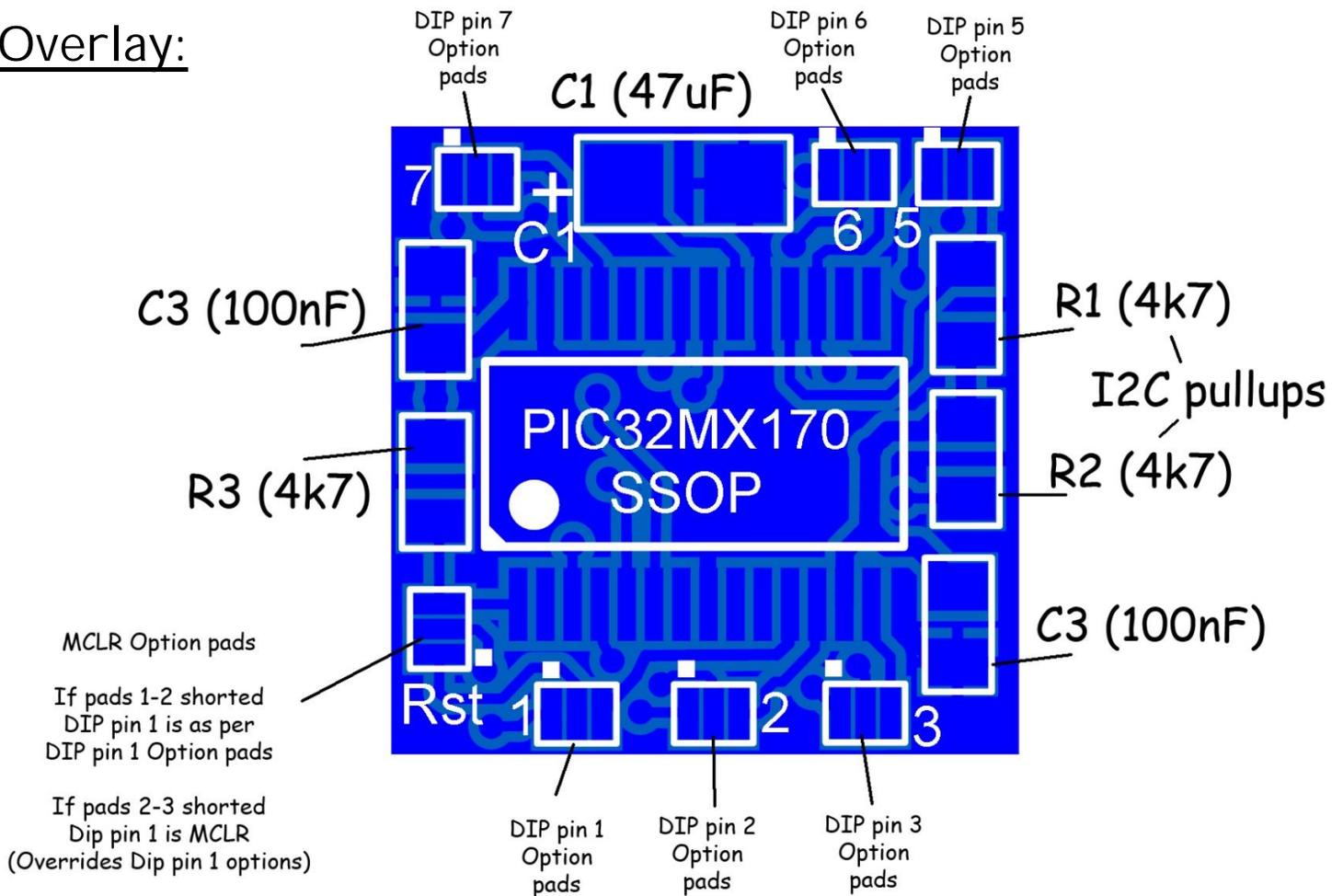
MMbasic (for the 28pin version of the '170 used here) supports 19 I/O lines. As the NanoMite only has 8 pins to connect to the outside world, 2 of which are GND and Power, some compromises had to be made as to which '170 pins were made available on the other 6 DIP socket pins. I selected a range of options to try to get as much versatility as possible. Each of the 6 configurable DIP pins can be optioned, via solder-link configuration pads, to either of 2 PIC32 pins.

The following table shows the configurations options available.

DIP8 Pin #	Link Pads 1-2		Link Pads 2-3	
	Pin Function	PIC32 Pin #	Pin Function	PIC32 Pin#
1	SPI Out/Dig/INT/Alog	3	Console Tx (Out)	11
2	PWM 1A/Dig/INT/Alog	4	Console Rx (In)	12
3	PWM 1B/Dig/INT/Alog	5	SPI In/Dig	14
4	GND			
5	Dig/Com1 Rx	22	Dig/Count/I^{2}C Data	18
6	Dig/Com1 Tx	21	Dig/Count/I^{2}C Clock	17
7	PWM 1C/Dig/INT/Alog	6	Alog/Dig/SPI Clock	25
8	Vcc (2.3-3.6V)			

NOTE! The Rst Link Overrides The Selected Function of DIP8 Pin #1
This Enables PIC32 Pin 1 (MCLR) to be connected to DIP8 Pin #1

Overlay:

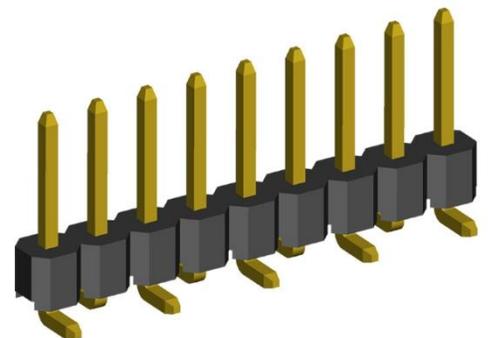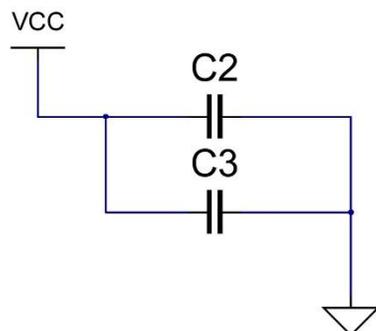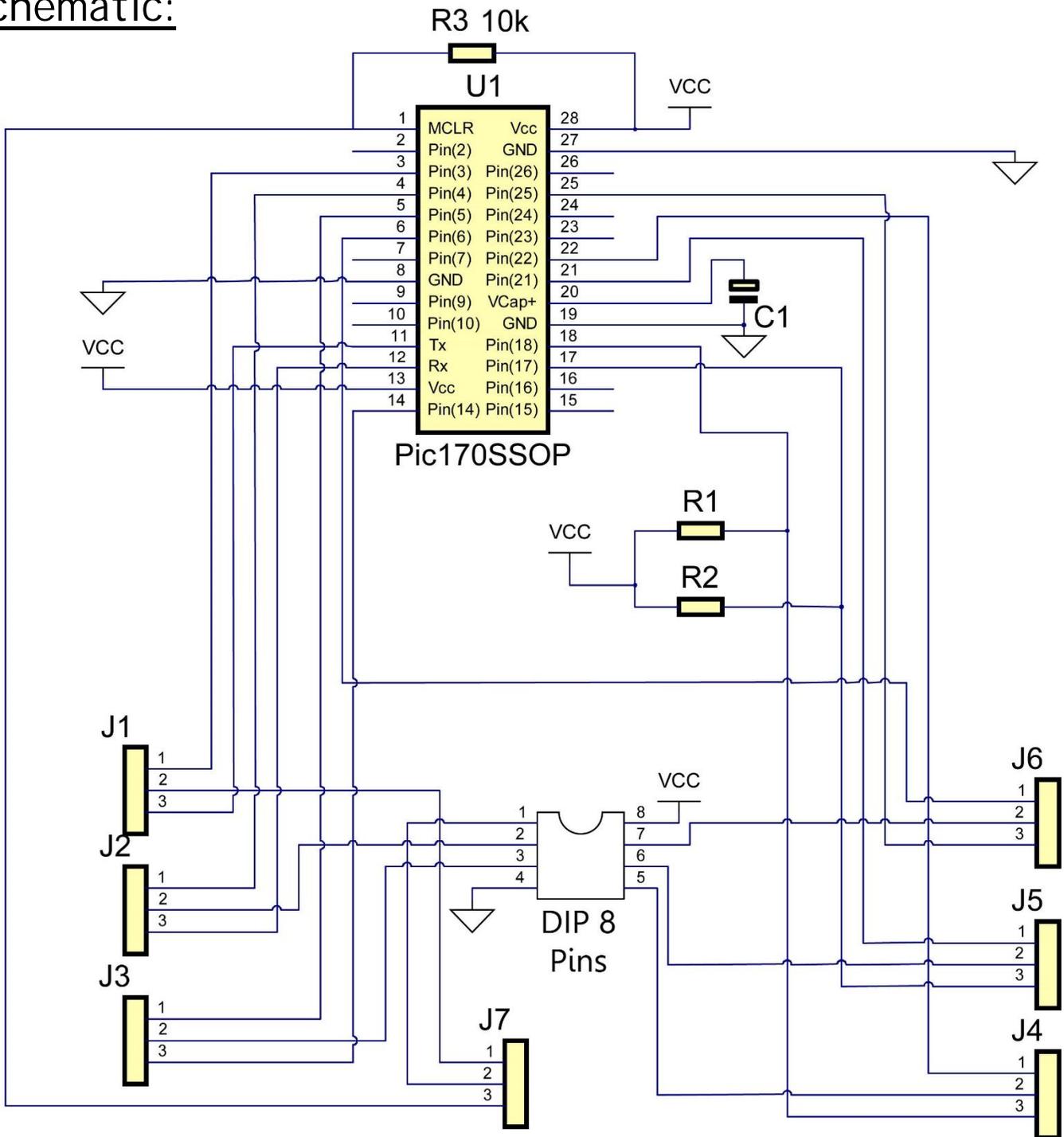DIP pin 7 Option pads

DIP pin 6 Option pads

DIP pin 5 Option pads

C1 (47uF)

7

+

C1

6 5

C3 (100nF)

R1 (4k7)

I2C pullups

R2 (4k7)

R3 (4k7)

PIC32MX170 SSOP

MCLR Option pads

If pads 1-2 shorted DIP pin 1 is as per DIP pin 1 Option pads

If pads 2-3 shorted Dip pin 1 is MCLR (Overrides Dip pin 1 options)

Rst 1

2

3

C3 (100nF)

DIP pin 1 Option pads

DIP pin 2 Option pads

DIP pin 3 Option pads

Bill of Materials:

U1	PIC32MX170F256B SSOP
C1	47uF 6v3 Low ESR SMD (1206 or 3228)
C2	100nF SMD (0805)
C3	100nF SMD (0805)
R1	4k7 SMD (0805)
R2	4k7 SMD (0805)
R3	4k7 SMD (0805)
--	2 rows of 4, 0.025" square SMD pins

R1 and R2 are pull-ups for the I^2C lines, If I^2C is not required you may omit these if desired.

NanoMite uses SMD square 0.025″ pins, similar to the ones shown here to plug into a standard `wiper' type 8pin IC socket (Machined Pin IC sockets will not accept these pins) of course there other types of pins out there but they are generally not cheap or as commonly available.

Schematic:

R3 10k

U1

	MCLR	Vcc	28
1	Pin(2)	GND	27
2	Pin(3)	Pin(26)	26
3	Pin(4)	Pin(25)	25
4	Pin(5)	Pin(24)	24
5	Pin(6)	Pin(23)	23
6	Pin(7)	Pin(22)	22
7	GND	Pin(21)	21
8	Pin(9)	VCap+	20
9	Pin(10)	GND	19
10	Tx	Pin(18)	18
11	Rx	Pin(17)	17
12	Vcc	Pin(16)	16
13	Pin(14)	Pin(15)	15
14			

VCC

VCC

C1

Pic170SSOP

VCC

R1

R2

J1
1
2
3

J2
1
2
3

J3
1
2
3

VCC

DIP 8
Pins

1   8
2   7
3   6
4   5

J7
1
2
3

J6
1
2
3

J5
1
2
3

J4
1
2
3

VCC

C2

C3

Flashing MMBasic:

As the PIC32MX170 has not been programmed with any firmware it will be necessary to flash it with the desired firmware.

To do this it will be necessary to configure solder-short link pads to the following settings:

Rst Pads 2-3   (this will put MCLR on DIP pin 1)
#2 Pads 1-2   (this will put PGD on DIP pin 2)
#3 Pads 1-2   (this will put PCC on DIP pin 3)

Then simply connect your PicKit3 or other programmer as shown in this diagram. In my testing I found it was possible to power the NanoMite from the PicKit3 whilst programming.
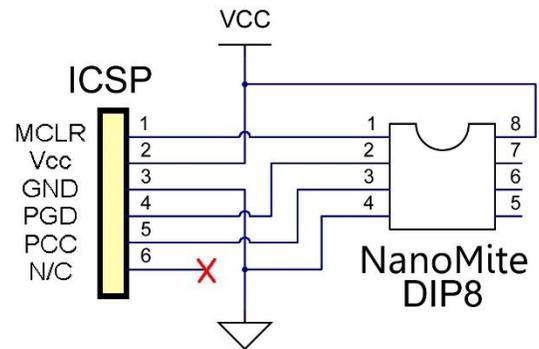
Once MMBasic has been flashed into NanoMite then reconfigure the solder-link pads according to your preferences by using the table on page 2.
Remember to reconfigure the Rst Solder-link pads back to pads 1-2 to allow the `#1' Solder-link pads to be selected (unless of course you actually want to have MCLR on DIP pin1).

Construction Suggestions:

As NanoMite is entirely SMD, a reasonable degree of skill is required and as such I won't profess to try to suggest how best to solder each of the components.

That aside, I would suggest mounting the 2 rows of 4 SMD square (0.025") pins first and using these to hold the board secure whilst soldering the top side components by plugging it into a breadboard.

Power Source:

NanoMite has no on board voltage regulator and requires this to be generated `off-board' and should be 2.3-3.6 Vdc.

Useful Links:

Geoff Graham's MicroMite

http://geoffg.net/micromite.html

The Back Shed Microcontroller Forum

http://www.thebackshed.com/forum/forum_topics.asp?FID=16

The thread where NanoMite was originally conceived

http://www.thebackshed.com/forum/forum_posts.asp?TID=6952&PN=7

A shameless plug of other Products and offerings I have to offer

http://www.thebackshed.com/forum/forum_posts.asp?TID=6992&KW=***