44 Pin Microcontrollers

The best chip to use is the PIC32MX150F128D-50I/PT which is guaranteed to run up to 48MHz and costs $3.72. Similar to the 28 pin package there are versions rated at 40MHz and versions that support USB (with the latter you loose access to two I/O pins which are reserved for USB functions (pins 10 and 42)).

The following is a summary of the recommended chips for the Micromite in a 44 pin package:

<table>
<thead>
<tr>
<th>Chip Type</th>
<th>Recommended Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIC32MX150F128D-50I/PT</td>
<td>Guaranteed to run at 48MHz.</td>
</tr>
<tr>
<td>PIC32MX150F128DI/PT</td>
<td>Should run at 48MHz despite its 40MHz spec.</td>
</tr>
</tbody>
</table>

The following will also run the firmware:

<table>
<thead>
<tr>
<th>Chip Type</th>
<th>Recommended Specifications</th>
</tr>
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<tbody>
<tr>
<td>PIC32MX250F128D-50I/PT</td>
<td>Guaranteed to run at 48MHz but only supports 31 I/O pins</td>
</tr>
<tr>
<td>PIC32MX250F128DI/PT</td>
<td>40MHz spec but should run at 48MHz - only supports 31 I/O pins</td>
</tr>
</tbody>
</table>

These chips are in a TQFP surface mount package which has a lead pitch of 0.8mm. This is reasonably easy to solder and the chip can be mounted on a carrier board which brings the pins out on an easy to use 0.1 inch grid. The firmware file used for the 44 pin chips is different from the 28 pin firmware but, once the firmware is loaded, MMBasic will work the same in either chip. The only difference is that this chip has an extra 14 I/O pins that are accessible from within MMBasic. The power requirements and the need for a 47μF capacitor are exactly the same as for the 28 pin chip.

Loading the Micromite firmware is done via a PIC32 programmer using the following circuit.
44 Pin Micromite Connections

The following diagram shows the possible functions of each I/O pin on the 44 pin Micromite. Note that the physical pins on the chip and the pin numbers used in MMBasic are the same. This means that eleven pins are not available in MMBasic (these pins are highlighted in grey).

- **Pin 1:** I2C Clock
- **Pin 2:** Count, I
- **Pin 3:** 5V, Count, Wakeup, IR
- **Pin 4:** 5V, Count, SPI Clock
- **Pin 5:** 5V, INT, Digital
- **Pin 6:** Ground
- **Pin 7:** 47uF TANT Capacitor (+)
- **Pin 8:** COM1: Transmit, 5V, INT, Digital
- **Pin 9:** COM1: Receive, 5V, INT, Digital
- **Pin 10:** INT, Digital, Analog
- **Pin 11:** PWM 2B, Digital, Analog
- **Pin 12:** 5V, Digital, Analog
- **Pin 13:** 5V, Digital
- **Pin 14:** SPI Clock, Digital, Analog
- **Pin 15:** PWM 2A, Digital, Analog
- **Pin 16:** Analog Ground
- **Pin 17:** Analog Power (+2.3 to +3.6V)
- **Pin 18:** RESET Wired to +V directly or via 10K resist
- **Pin 19:** Digital, Analog
- **Pin 20:** SPI Out (MOSI), Digital, Analog
- **Pin 21:** PWM 1A, Digital, Analog
- **Pin 22:** PWM 1B, Digital, Analog
- **Pin 23:** Analog, Digital, PWM 1C
- **Pin 24:** Analog, Digital, COM1: Enable
- **Pin 25:** Analog, Digital
- **Pin 26:** SPI Out (MOSI), Digital, Analog
- **Pin 27:** Analog, Digital
- **Pin 28:** POWER (+2.3 to +3.6V)
- **Pin 29:** Ground
- **Pin 30:** Digital, COM2: Transmit
- **Pin 31:** Digital, COM2: Receive
- **Pin 32:** Digital, 5V
- **Pin 33:** CONSOLE Tx (DATA OUT)
- **Pin 34:** CONSOLE Rx (DATA IN)
- **Pin 35:** Digital, 5V
- **Pin 36:** Digital
- **Pin 37:** Digital, 5V
- **Pin 38:** Digital, 5V
- **Pin 39:** Ground
- **Pin 40:** POWER (+2.3 to +3.6V)
- **Pin 41:** Digital, 5V, SPI In (MISO)
- **Pin 42:** Digital, 5V, Count
- **Pin 43:** Digital, 5V, Count, Wakeup, IR
- **Pin 44:** I2C Data, Count, 5V, INT, Digital
The notation is as follows (the mnemonic in brackets is the mode used in the SETPIN command):

ANALOG These pins can be used to measure voltage (AIN).
DIGITAL Can be used for digital I/O such as digital input (DIN), digital output (DOUT) and open collector output (OOUT).
INT Can be used to generate an interrupt (INTH, INTL and INTB).
COUNT Can be used to measure frequency (FIN), period (PIN) or counting (CIN).
5V These pins can be connected to 5V circuits. All other I/O pins are strictly 3.3V maximum.
COM.xxx These are used for serial communications (see Appendix A)
I2C.xxx These are used for I2C communications (see Appendix B)
SPI.xxx If SPI is enabled these pins will be used for SPI I/O (see Appendix D)
PWM.xxx PWM or SERVO output (see the PWM and SERVO commands)
IR This can be used to receive signals from an infrared remote control (see the IR command)
WAKEUP This pin can be used to wake the CPU from a sleep (see the CPU SLEEP command).

Pins 16 and 17 are the ground and power for analog measurements. Normally they are connected to the general ground and power (pins 29 and 28) but if you require noise free and accurate analog readings you should make sure that the power on pin 17 is regulated to 3.3V and well filtered. Also your analog inputs should be referenced to pin 16 (the analog ground).

Within MMBasic the SETPIN command is used to set the function of an I/O pin for general I/O. The PIN command or function is then used to interact with the pin. For example, this will print the voltage on pin 10:

```
SETPIN 10, AIN
PRINT "The voltage is" PIN(10) "V"
```

This voltage reading is referenced to pin 17 and assumes that the supply voltage on this pin is exactly 3.3V. You will need to scale the readings in your BASIC program if you use a supply voltage other than this.