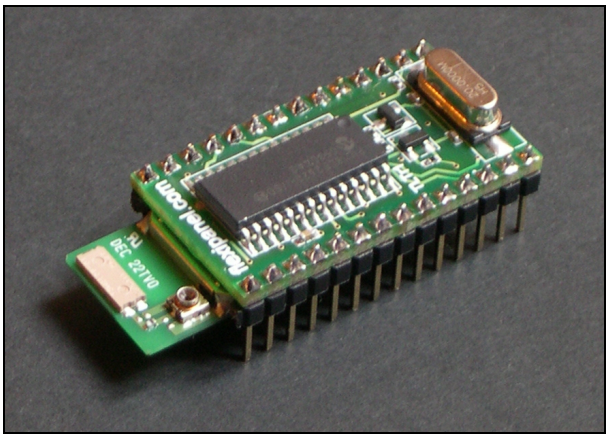
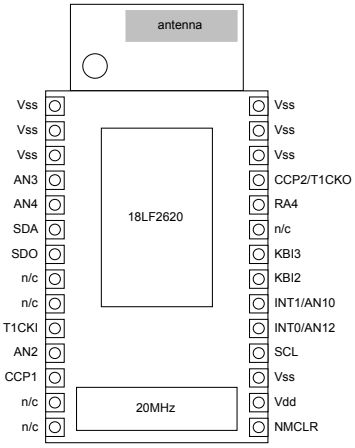
ToothPIC Lite™

Low-cost, reduced functionality ToothPIC module for volume applications

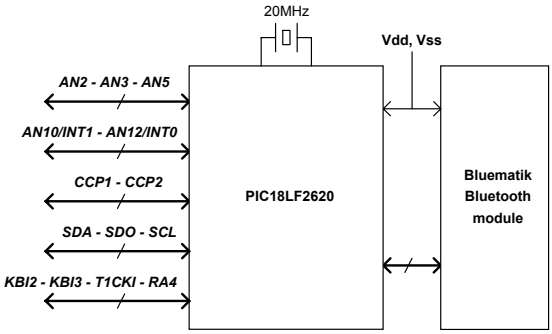




Summary

ToothPIC Lite is a reduced functionality version of ToothPIC intended for high-volume applications.

ToothPIC Lite is a pin-for-pin substitute where the total storage does not exceed 64K, compared to the regular 128K. It can only be supplied preloaded with code-protected firmware.



Hardware Features

Pin-for-pin compatible with ToothPIC, except:

- *64Kbyte Flash, of which 24K for development..*
- *14 I/O pins, including 5 × 10-bit A to D converter, 2 × 10-bit PWM outputs, 4 interrupts*
- *I2C and SPI communications but no serial UART*
- *32kHz oscillator, power regulator, LEDs, pushbutton added externally if required.*

Application Development Support

Applications should be initially developed using ToothPIC. The finished application is ported to ToothPIC Lite with the assistance of FlexiPanel Ltd. ToothPIC Lite is then be supplied with application firmware preloaded.

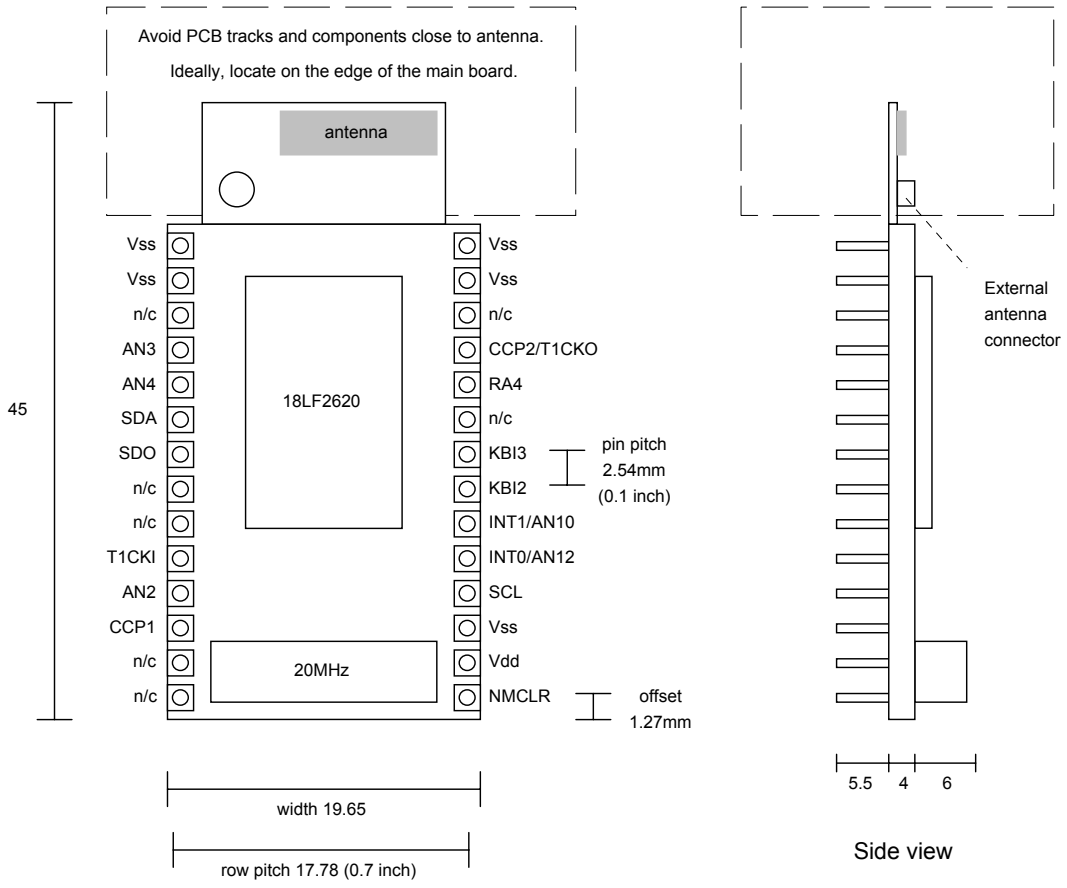
Development support is only available for a minimum order quantity of 1000 units.

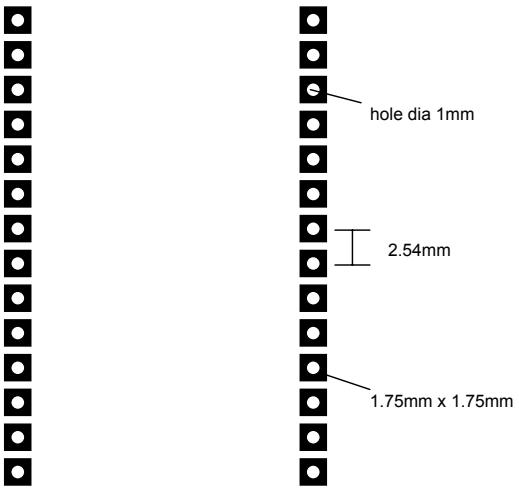
Ordering Information

Part No	***Description***
	ToothPIC Lite 28-pin Dual-in-Line package – Custom firmware xxx

Manufactured to ISO9001:2000 FM76316

Mechanical Data





Main board PCB pad layout

n/c = not connected

Dimensions in mm unless otherwise stated

Notes: Ensure the area where the module is mounted has a solid ground plane. To remove the module from an IC socket or breadboard, lever it out using a screwdriver against the pin headers at the sides. Levering from either end may damage components.

Pin Descriptions

Pin Name	***Description***
AN2	Analog input / analog negative voltage reference input / digital I/O
AN3	Analog input / analog positive voltage reference input / digital I/O
AN4	Analog input / digital I/O
CCP1	Capture / compare / pulse width modulation I/O
CCP2/T1CKO	Capture / compare / pulse width modulation I/O / 32kHz xtal circuit
INT0/AN12	Interrupt pin / digital I/O / analog input
INT1/AN10	Interrupt pin / digital I/O / analog input
KBI2/PGC	Interrupt pin / programming pin / digital I/O
KBI3/PGD	Interrupt pin / programming pin / digital I/O
NMCLR	Reset input / digital input RE3 (note 2) / programming pin (may be left unconnected)
RA4	Digital I/O / counter input
SCL	I2C clock / SPI clock / digital I/O
SDA	I2C data / SPI data input / digital I/O
SDO	SPI data output / digital I/O
T1CKI	Digital I/O / counter input / 32kHz xtal circuit
Vdd	Regulated +5V power input / output
Vss	Power ground reference (note 1)

1. Only one Vss pin needs to be connected. For optimum RF performance, connect as many as possible
2. An integral 10K pull-up resistor is usually fitted to this pin but it may be omitted on request

ToothPIC / ToothPIC Lite comparison

ToothPIC Lite differs from ToothPIC as follows:

- *18LF2620 used in place of 18F6720.*
- *RA4 is no longer multiplexed with SDO but has its own pin.*
- *RB6/KBI2 is no longer multiplexed with INT1 but has its own pin.*
- *RB7/KBI3 is no longer multiplexed with INT0 but has its own pin.*
- *INT0 can also be analog input AN12.*
- *INT1 can also be analog input AN10.*
- *No LEDs on-board.*
- *No pushbutton on-board.*
- *No power regulator on-board, no* Vin *pin.*
- *TxD and RxD are not available.*
- *CCP3, CCP4, CCP5 are not available.*
- *No 32kHz oscillator on-board but may be installed externally across CCP2 / T1CKI.*
- *Analog inputs AN0/1/4/6/7/8/9/11 not available.*

Technical Specifications

Physical

Max operating temperature	−20ºC to +75 ºC
Max storage temperature	−30ºC to +85 ºC
Dimensions L × W × H	45mm × 20mm × 10mm excluding pins

Electrical

Supply Voltage (regulated)	4.5V to 5.5V
Peak power requirement excluding draw on I/O pins	270mA
Maximum current on any I/O pin	25mA
Maximum total current on all I/O pins	200mA
Max voltage on I/O pins	−0.5V to +5.5V

Please consult the documentation for the PIC18LF2620 available from Microchip Technology (*www.microchip.com*) for further technical characteristics of the I/O pins.

Radio

Max RF output power	Class I = 100mW = +20dBm
RF frequency range	2402MHz to 2480MHz
RF channels	79
Frequency hopping	1600 Hz
Range	100m nominal
Communication latency, µP to µP via two BlueMatik radios	30ms to 50ms
Maximum data rate	50-90 Kbaud depending on conditions
Pairing method	Unit link key

Please consult the documentation for the BlueMatik available from FlexiPanel Ltd (*www.FlexiPanel.com*) for further technical characteristics of the Bluetooth radio.

FCC, CE and IC modular approval

The radio has 'modular approval' for USA, Canada and certain European countries, provided the existing integral antenna is used. The CE mark on the module indicates that it does not require further R&TTE certification. The exterior of the product should be marked as follows:

Contains Transmitter Module FCC ID: CWTUGPZ1
Contains Transmitter Module IC: 1788F-UGPZ1

Glossary and Notation

Hex Notation

Throughout this document, numbers with an '0x' prefix should be assumed to be in hex. For example, 0xFF is completely equivalent to decimal 255.

In some partners' documentation, a '$' prefix is used in place of an '0x' prefix. '$FF' is equivalent to '0xFF' and decimal 255.

In some partners' documentation, a 'H' suffix is used in place of an '0x' prefix. 'FFH' is equivalent to '0xFF' and decimal 255.

Data Types

Data types are C standard data types; no floating point is used. C standard notation and calling conventions are assumed. Integers are explicitly defined as:

bool – unsigned char, zero for *false,* otherwise *true*

byte – 8 bit unsigned integer

int16 – 16 bit signed integer

int32 – 32 bit signed integer

signed char – 8 bit signed integer

uint16 – 16 bit unsigned integer

uint32 – 32 bit unsigned integer

unsigned char – 8 bit unsigned integer

word – 16 bit unsigned integer

Glossary

> *symbol* – Navigation drilldown to a particular item in a piece of software. A list of phrases separated by **>** symbols means: go to the program, menu or tab indicated by the first phrase, look for the second phrase and select it, look for the third phrase and select it, etc, until you find the item at the end of the list.

Big-Endian – see *Endian.*

Buffer – A linear region of memory designed for storing data entering from or departing to a communications channel.

Circular buffer – A 'first-in-first-out' buffer which wraps around. It has a start pointer indicating when the next byte is to be dispatched (i.e. read or transmitted) and an end pointer indicating the last piece of data to be dispatched. The start pointer advances when its data is dispatched; the end pointer advances when new data arrives. When either pointer reaches the end of the buffer it starts at the beginning again. If the end pointer catches up with the start pointer, the buffer is full and a *buffer* overrun occurs.

<*CR*> – The ASCII carriage return character 0x0D.

CTS – 'Clear to Send' flow control input to a DTE serial device to tell it that it is OK to transmit on its TxD line. In FlexiPanel 3.0 documentation, all devices are DTE devices and CTS on one device is connected to RTS on the corresponding device.

DTE – 'Data Terminal Emulator'. A serial device whose TxD line is a data output, *RxD* line is a data input, etc. In FlexiPanel 3.0 documentation, all devices are *treated* as DTE devices. A PC's serial port is DTE. The opposite is DCE.

DCE – 'Data Circuit Equipment'. A serial device whose TxD line is a data input, RxD line is a data output, etc. In FlexiPanel 3.0 documentation, all devices are treated as DTE devices, not DCE devices.

FlexiPanel client – Hardware or software that creates a control panel when requested to by a FlexiPanel server.

Endian – Refers to the order in which multibyte integers are stored and/or transmitted. In *Little-Endian* format, bytes are in increasing order of significance, least significant byte first. In *Big-Endian* format, bytes are in increasing order of significance, most significant byte first. In general, Flexipanel Ltd uses little-endian format, but there are exceptions.

FlexiPanel server – Hardware or software that requests a control panel to be created on a FlexiPanel client.

IC – Integrated *Circuit.*

KIPS – thousand instruction cycles per second.

<*LF*> – The ASCII line feed character 0x0A.

Little-Endian – see Endian.

LSB – least significant bit or byte, depending on context.

MIPS – million instruction cycles per second.

MSB – most significant bit or byte, depending on context.

OS – Operating System.

Overrun – A circular buffer overruns if an attempt is made to add more data to it when it is full (see *definition of circular buffer).*

PWM – Pulse Width Modulation.

RTS – 'Request to Send' flow control output from a DTE serial device to indicate that it is OK to send it data on its RxD line. In FlexiPanel 3.0 documentation, all devices are DTE devices and RTS on one device is connected to CTS on the corresponding device.

RxD – 'Receive Data' serial input to a DTE serial device. In FlexiPanel 3.0 documentation, all devices are DTE devices and RxD on one device is connected to TxD on the corresponding device.

RxD – 'Transmit Data' serial output from a DTE serial device. In *FlexiPanel* 3.0 documentation, all devices are DTE devices and TxD on one device is connected to RxD on the corresponding device.

Underrun – A circular buffer underruns if an attempt is made to dispatch data from it when it is empty.

Unicode – Two-byte integer array representing text characters. ASCII characters keep the same values in the Unicode character set.

User – The person using the finished product (as opposed to the *Developer).*

Zero Terminator – A zero-valued character used to indicate the end of a string of characters.

Legal Notices

If any of this is not clear, contact FlexiPanel Ltd for clarification.

General

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FlexiPanel Protocol

The FlexiPanel protocol and the products which use it are protected by pending patents and copyright law.

The FlexiPanel protocol allows *servers* to create user interfaces on remote *clients.*

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Contact Details

Manufacturer

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