VersaTech Electronics

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Product Information

Over View

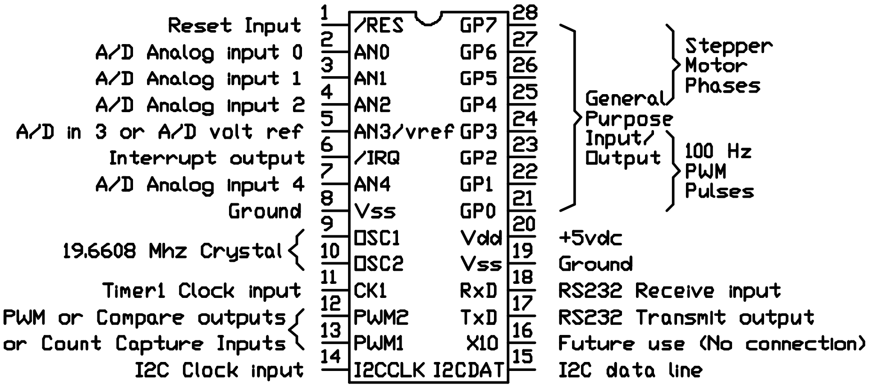
VersaTech's I^{2}C Xtender is the easy way to add Input Output capability to the FBASIC TICkit micro-controller system. The Xtender is a specially programmed PIC16C73-20 single chip processor. The Xtender responds to commands on two I^{2}C pins.

These commands control all of the Xtender's resources. Resources include a 5 channel 8bit A/D converter, a buffered full duplex RS232 port, Two multifunction counters/PWM generators, 128 bytes of SRAM, real time clock, math lookup table, 8 genreal purpose I/O lines and an IRQ time base.

The Xtender IC comsumes very little power and connects in parallel with the EEproms on the FBASIC TICkit. Therefore, up to 8 Xtender ICs may be connected to a single FBASIC TICkit controller (or any other I ^{2}C master device) without requiring a single I/O line of the host device. Two FBASIC functions accomplish all communication with the Xtender.

So many common hardware resources are provided on the Xtender it may be the only peripheral IC required. Because the Xtender is an additional processor working in the background, concurrent I/O is a simple monolithic solution.

Connection Diagram

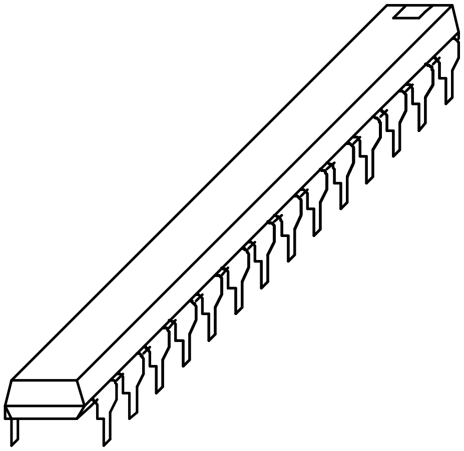


Reset Input	1	/RES	GP7	28	General Purpose Input/ Output	Stepper Motor Phases
A/D Analog input 0	2	AN0	GP6	27		
A/D Analog input 1	3	AN1	GP5	26		
A/D Analog input 2	4	AN2	GP4	25		
A/D in 3 or A/D volt ref	5	AN3/vref	GP3	24		100 Hz PWM Pulses
Interrupt output	6	/IRQ	GP2	23		
A/D Analog input 4	7	AN4	GP1	22		
Ground	8	Vss	GP0	21		
19.6608 Mhz Crystal	9	OSC1	Vdd	20	+5vdc	
	10	OSC2	Vss	19	Ground	
Timer1 Clock input	11	CK1	RxD	18	RS232 Receive input	
PWM or Compare outputs	12	PWM2	TxD	17	RS232 Transmit output	
or Count Capture Inputs	13	PWM1	X10	16	Future use (No connection)	
I2C Clock input	14	I2CCLK	I2CDAT	15	I2C data line	

Only the I2C clock and data lines, the Reset line, Ground, and the Interrupt line are connected to the host processor. The Xtender device requires a 19.6608 Mhz Cryxtal, two 12pf capacitors, and two pull up resistors for the I2C lines. The small number of components and connections simplifies construction and layout of prototypes and the final product.

X73E-Ix

I2C address follows P/N



(28 pin plastic DIP - .3 inch wide)

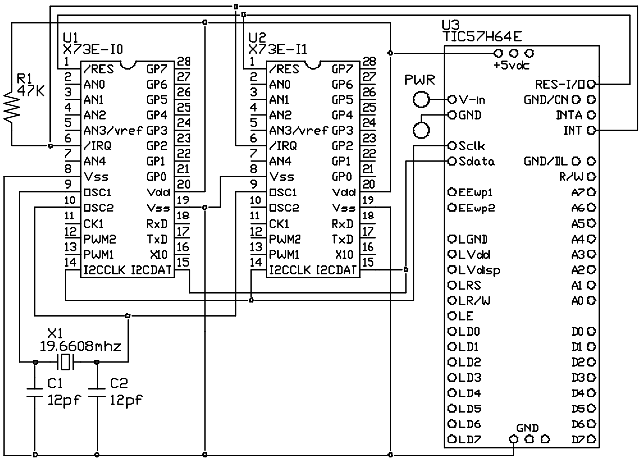
Features

- 8 general purpose I/O lines plus interrupt output line.
- General Purpose I/O can drive a unipolar stepper motor. Buffered module generates phase timing.
- General purpose pins can generate 100hz PWM to implement D/A conversions or pulse trains.
- I2C command buss uses two wire 400kbps connection to master.
- 128 bytes internal SRAM for temporary data storage.
- Single 5v @ 20ma requirement.
- Real time clock provides time keeping capability.
- 1/100 second Time Base.
- 5 Channel, 8bit A/D converter with optional external reference.
- Full Duplex, 16byte Buffered Serial Port. Programmable baud rates and interrupt protocols enable multi-drop networking schemes.
- Two PWM or generators for motors or other PWM control schemes.
- One 16bit counter with dual capture/compare capability.
- SIN and ATN Trigonometric lookup

Connection to FBASIC TICkit

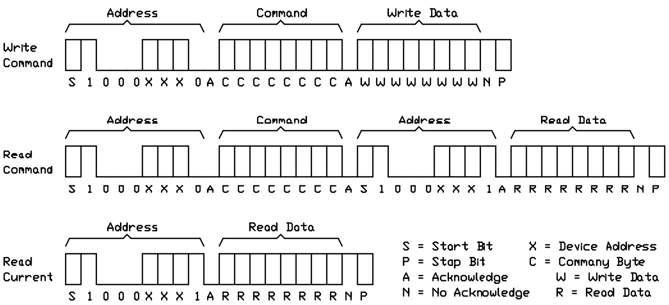
Up to 8 Xtender ICs may be connect to the FBASIC TICkit using the two I ^{2}C buss lines of the TICkit. This connection is shown below.

Multiple Xtender Connection



Each Xtender device on the buss has its own unique address. The protocol diagram below shows the three address bits used to select each device on the buss. When ordering Xtenders, indicate which buss address is required (0-7).

Xtender I2C Protocol

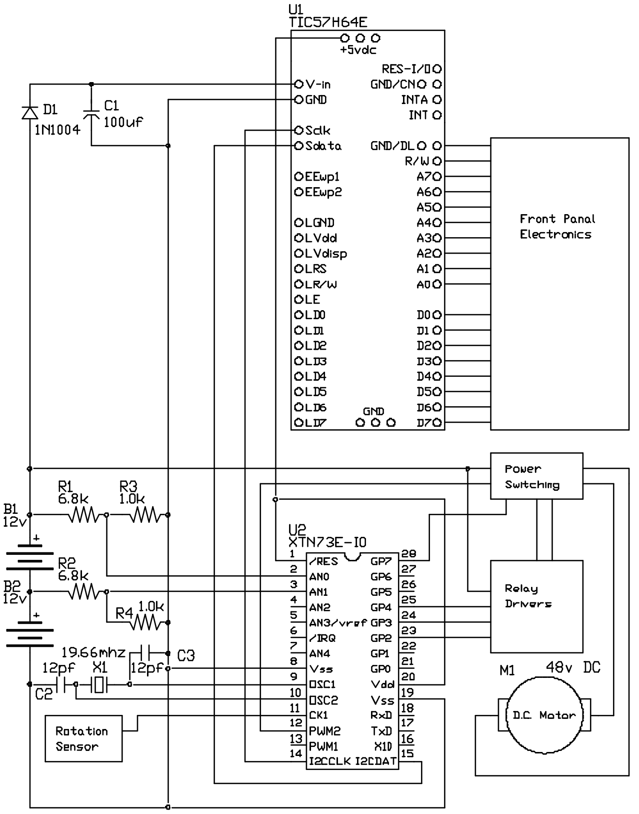


This command protocol is accomplished in FBASIC with the i2c_write and i2c_read functions. Both functions require a word parameter where the high byte is the address and the low byte is the command. The i2c_read function returns the byte sent from the Xtender. The i2c_write function sends the second parameter to the Xtender.

The i2c_read function performs both the 'read command' and 'read current' protocols. If the 8th bit of the addr/comm word is high, the shorter read current protocol is executed and the command portion of the argument is not sent.

Example Circuit using Xtender A/D

The following example uses an Xtender with an FBASIC TICkit. In this circuit, the extender is 1 meter from the control processor and is used for power management of large batteries and PWM control of a large DC motor.



Software Example

The I^{2}C Xtender has a large body of commands. The following code fragment shows how to read two A/D channels and might be used with a circuit similar to the one above.

```
i2c_write( 0x80C2, 0x08b )
=( top_volt, i2c_read( 0x80C2 ))
; uses command C2 to control A/D
; 08 turns A/D on selects channel 0
; and uses internal voltage ref
lcd_display( top_volt )
i2c_write( 0x80C2, 0x09b )
=( bot_volt, i2c_read( 0x80C2 ))
test_half( top_volt, bot_volt )
; verifies that batteries are sharing
IF <( top_volt, 192b )
   alarm_low()
ENDIF

IF <( top_volt, 128b )
   shut_down()
ENDIF
```