

Breakout Board MODEL: FIPBB01

# **GENERAL DESCRIPTION**

FIPBB01 is a simple , cheap , buffered nonisolated parallel breakout board . It supports four output control signal groups to drive four axis CNC machine. Each signal group supports three control signals (Enable , Direction and Clock ) . Two output relays could be enabled via DIP switch for additional spindle control. FIPBB01 also supports five dry contact inputs for travel limit switches.

## **FIPBB01** features

- 1- Four output control signal groups. labeled X-axis, Y-axis, Z-axis, V-Axis.
- 2- Ena , Dir , Clk control signals are available. For pin assignment and address show table1.
- 3- LED indicator for each output signal.
- 4- Two output relays 5V coil / 3A contacts (resistive load).
- 5- Normally open and normally closed contacts are available.
- 6- LED indicator for each output relay.
- 7- Five external inputs (dry contact).
- 8- LED indicator for each input status.
- 9- All outputs and inputs are brought out via pin header and screw clamp connector for flexibility.
- 10- no requirements for external power supply. Card is supplied from USB port.

11- Dimension: 180 x 70 x 18 mm.

## Figure 1. FIPBB01 real PCB view







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Figure 3. FIPBB01 input circuit schematic





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Table1 shows each output and input port, its pin number on DB25 socket and its function. Use this table to configure the software that interface FIPBB01 card.

## Table1.Input and output ports

Port #	Pin#	Function	Direction
378.0	2	CLK_X	Output
378.1	3	DIR_X	Output
378.2	4	ENA_X	Output
378.3	5	CLK_Y	Output
378.4	6	DIR_Y	Output
378.5	7	ENA_Y	Output
378.6	8	CLK_Z	Output
378.7	9	DIR_Z	Output
37A.0	1	ENA_Z	Output
37A.1	14	CLK_V	Output
37A.2	16	DIR_V	Output
37A.3	17	ENA_V	Output
379.3	15	IN5	Input
379.4	13	IN4	Input
379.5	12	IN3	Input
379.6	10	IN1	Input
379.7	11	IN2	Input

## How to Install

1- Hardware installation

- Connect one end of the USB cable to the USB connector on the board, and the other end of the USB cable to a USB port on the PC.
- Connect on end (female) of the parallel cable to the parallel socket (DB25 male) on the board, and the other end (male) of the parallel cable to the parallel socket (DB25 female) on the PC.
- 2 Software installation
  - Insert the CD-ROM into your PC's CD-ROM drive.
  - Install the demo test program (LPTTest Program)

## System Requirements

- One available LPT port.
- 64Mb RAM and 20MB free HD space.



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# Card Test

**1** – Run the demo test program from Start  $\rightarrow$  All Programs  $\rightarrow$  BBTest  $\rightarrow$  FIPBB01. The main window of the software will be opened as shown in figure2.





**2** – To test motor **X** click the associated buttons for X axis ( up button labeled (X+) and down button labeled (X-) ).

When up button is Pressed

- 1 Green LED labeled **ENA** is turned on.
- 2 Yellow LED labeled DIR is turned on.
- 3 Red LED labeled CLK is flicked.
- When down button is pressed
- 1 Green LED labeled **ENA** is turned on.
- 2 Yellow LED labeled DIR is turned off.
- 3 Red LED labeled CLK is flicked.

The activated outputs also are highlighted on main window.

**3** – To test motor **Y** click the associated buttons for Y axis ( right button labeled (Y+) and left button labeled (Y-) ).

When right button is Pressed

- 1 Green LED labeled  $\ensuremath{\textbf{ENA}}$  is turned on.
- 2 Yellow LED labeled DIR is turned on.
- 3 Red LED labeled CLK is flicked.
- When left button is pressed
- 1 Green LED labeled  $\ensuremath{\text{ENA}}$  is turned on.
- 2 Yellow LED labeled DIR is turned off.
- 3 Red LED labeled CLK is flicked.

The activated outputs also are highlighted on main window.



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- **4** To test motor **Z** click the associated buttons for Z axis ( up button labeled (Z+) and down button labeled (Z-) ).
- When up button is Pressed
- 1 Green LED labeled **ENA** is turned on.
- 2 Yellow LED labeled DIR is turned on.
- 3 Red LED labeled CLK is flicked.
- When down button is pressed
- 1 Green LED labeled **ENA** is turned on.
- 2 Yellow LED labeled DIR is turned off.
- 3 Red LED labeled CLK is flicked.
- The activated outputs also are highlighted on main window.

 ${\bf 5}$  – To test motor  ${\bf V}$  click the associated buttons for V axis ( up button labeled (V+) and down button labeled (V-) ).

When up button is Pressed

- 1 Green LED labeled  $\ensuremath{\textbf{ENA}}$  is turned on.
- 2 Yellow LED labeled DIR is turned on.
- 3 Red LED labeled CLK is flicked.
- When down button is pressed
- 1 Green LED labeled  $\ensuremath{\textbf{ENA}}$  is turned on.
- 2 Yellow LED labeled DIR is turned off.
- 3 Red LED labeled CLK is flicked.

The activated outputs also are highlighted on main window.

 $\mathbf{6}$  – To test the input just apply the input and the state of inputs will be updated continuously every 100 msec.

The activated inputs appear as highlighted boxes labeled (ON), and the inactivated inputs appear as dimmed boxes labeled (OFF).

# Note

1 - All inputs are active low. I.e. to active an input apply ground  $(\ensuremath{\textbf{GND}})$  to it .

2 – The status of input LED is opposite to the input state. I.e if the input is activated (connected to ground), then the LED is turned off and vice versa.

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# To test FEPBB01 on Mach3Mill software, follow the next configurations

1 – Setup the Mach3 program and open Mach3Mill. The following screen will appear



2 – To configure output ports open (Config) – (Ports and Pins), as shown in figure

🕻 Mach3 CNC Controller	×					
File Config Function Cfg's View Witzards Operator PlugIn Control Help Select Native Links						
Pri Ports and Pins Alt2 ToolPath Alt4 Offsets Alt5 Settings Alt6 Diagnostics Alt-7 Mill->G15 G1 G17 G40 G20 G90 G94 G54 G49 G99 G64 G97						
Motor Turing         General Config         System Hotkeys         Honing/Limits         ToolPath         Slave Axis         Backlash         Fotures         ToolTable         Config Rules         Sinde Rules         Save Settings         OFFLINE         GOTO Z         To Go         Machine         Sort						
File: No File Loaded. Load Wizards Last Wizard Regen. Display Jog NFS Wizards Generation Mode Follow						
Edit G-Code       Rewind Ctrl-W         Single BLK Alt-N       Single BLK Alt-N         Close G-Code       Reverse Run         Load G-Code       Block Delete         Set Next Line       Block Delete         Line       Mi optional stop         Flood Ctrl-F       Dwell CV Mode         Preed Hold       G-Codes         Mi optional stop       Auto Tool Zero         Remember Return       G.00         Sono Official Solution       DiagoliofF Ctrl-Akt-J         Units/Min       0.00         Jog OliofF Ctrl-Akt-J       On Official Solution						
History Clear Status: Profile: Mach3Mill						



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3 - The following screen will appear. Check (**Port Enabled**) box and set the port no to 0x378.



4 – Select (**Motor Outputs**) tab as shown in figure. Enable the required axis and set Step Pin# and Dir Pin# as shown in figure

Mach3 CNC Controller									
Program Run Alt-1 MDI Alt2 ToolPath Alt4 Offsets Alt5 Settings Alt6 Diagnostics Alt-7 Mill->G15 G1 G17 G40 G20 G90 G94 G54 G49 G99 G64 G97									
R     Zero     +0.0000     Scale       F     Zero     +0.0000     Scale       Engine Configuration Ports & Pins     X									
	Gianal	Eashlad	Shan Din #	Div Die #	Dir LaurActiva	Shap Law As	Step Dert	Dir Dert	
	X Axis		2	3		Scep Low Ac	1	Dir Port	
	Y Axis	4	5	6	*	*	1	1	
	Z Axis	4	8	9	×	×	1	1	
File: No File Loade	A Axis	4	14	16	×	*	1	1	Display Jog Mode Follow
	B Axis	×	0	0	×	X	0	0	
Cycle Start Re	C Axis	×	0	0	×	×	0	0	pindle Speed
Clos	Spindle	4	17	0	×	×	0	0	vindle CW F5 100
Feed Hold     Loa <spc>     Set       Stop     Line       <alt-s>     DK       Cancel     Apply       0     0</alt-s></spc>									
On/Off         Citabseo J. CO. CO. CO         Units/Min         O.00         Spindle Speed           G-Codes         M-Codes         +0.000         Units/Rev         0.00         0         0									
History Clear Status: Profile: Mach3Mill									



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5 – Select **(Output Signals)** as shown in figure and assign pin number for each output enable.

🗸 Mach3 CNC Controller									
ile Conng Huncoon uns view witards Operator Hugu Control Hep									
Program Run Alt-1 MDI Alt2 ToolPath Alt4 Offsets Alt5 Settings Alt6 Diagnostics Alt-7 Mill->G15 G1 G17 G40 G20 G90 G94 G54 G49 G99 G64 G97									
R         Zero         +0.0000         Scale         +1.0000           F         Zero         +0.0000         Scale         +1.0000           Engine Configuration Ports & Pins         X									
		Port Setup and Axis Se	ection   Motor Out	outs   Input Signals	Output Signals Encoder	/MPG's Spindle Setup	Mill Options		
		Signal	Epobled	Bort #	Dip Number	Active Low			
		Digit Trig		1	0	X			
		Enable1	-	1	4	*			
		Enable2	4	1	7	X			
		Enable3	4	1	1	X			
	_	Enable4	4	1	17	X			
	a a da	Enable5	*	1	0	*		Display Jog	
File: No File Lo	oade	Enable6	*	1	0	X		Mode Follow	
	_	Output #1	*	1	0	<b>X</b>			
	Edi	Output #2	× .	1	0	X		pindle Speed	
Cycle Start	Re	Output #3	× .	1	0	X		sindle speed	
<alt-r></alt-r>	Clos	Output #4	×	1	0	<b>X</b>	~	indle CW F5 SRO %	
Cross     Prins 2 · 9 , 1, 14, 16, and 17 are output pins. No other pin numbers should be used.     Image: Cross of the pin numbers should be used.       Stop     Set       Line									
-	Run								
Mode Active       On/Off Z Inhibit       Elapsed ):00:00:00       6.00       Spindle Speed         G-Codes       M-Codes       +0.000       Units/Min       0.00       Spindle Speed									
History Clear Status: ReConfiguration Estop. Profile: Mach3Mill									

6 – Select **(Input Signals)** as shown in figure and assign pin number for the input correspond to axis.

A Mach3 CNC Controller								
Program Run Alt-1 MDI Alt2 ToolPath Alt4 Offsets Alt5 Settings Alt6 Diagnostics Alt-7 Mill->G15 G1 G17 G40 G20 G90 G94 G54 G49 G99 G64 G97								
	Engine Configu	uration Por	ts & Pins	R Zero F Zero A Zero Y	+ + ut Sianals   Enco	0.000	0 Scale + 1.000 5cale + 1.000 + 1.000	Tool:0
	Signal	Enabled	Port #	Pip Number	Active Low	Emulated	HotKey	
	X ++		1	11	X		0	
	X	4	1	12	X	X	0	
	X Home	X	1	0	×	X	0	
	Y ++	4	1	13	×	*	0	
	Y	4	1	15	X	X	0	
	Y Home	X	1	0	X	X	0	Display
ite: No File Loade	Z ++	2	1	0	X	*	0	Mode Follow
	Z	<b>X</b>	1	0	8	X	0	
Ed	Z Home	<b>X</b>	1	0	X	X	0	pindle Speed
Cycle Start Re	A ++	2	1	0	X	×	0	prince opece
<alt-r></alt-r>	Δ	2	1	n	<b>X</b>	×	n	indle CW F5 SRO %
Clor Feed Hold <\$pc> Set Line Automated Setup of Inputs OK Cancel Apply								
Incy Mode Active     On/Off     Elapsed ):00:00:00     6.00     0       Jog Oli OFF Ctrl-Alt.J     Units/Min     0.00     Spindle Speed       Units/Rev     0.000     0								
History Clear Status: ReConfiguration Estop. Profile: Mach3Mill								





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# 7 – To configure the operating keys used in manual testing open **(Config)** – **(System Hotkeys)** as shown in figure



8 – The following screen will appear

🖁 Mach3 CNC Controller 📃 🗖 🔀							
File Config Function Cfg's View Wizards Operator PlugIn Control Help							
Program Run Alt-1 MDI Alt2 ToolPath Alt4 Offsets Alt5 Settings Alt6 Diagnostics Alt-7 Mill->G15 G1 G17 G40 G20 G90 G94 G54 G49 G99 G64 G97							
R         Zero         +0.0000         Scale           F         Zero         +0.0000         5cale         +1.0000           System HotKeys Setup         System HotKeys Setup         X         X	Tool:0						
Jog Hotkeys       Tigger # DEM Code         Y++ 38       X- 40         Y++ 33       Y- 37         Z++ 33       Z- 34         A/U++1 187       A/U-1189         B/V++1 939       B/V-1939         B/V++1 939       B/V-1939         Cycle Start       Recent File         Close G-Code       ScanCode         Load G-Code       System Hotkeys         System Hotkeys       ScanCode         Stop       Line         MDI Select       939         Load G-Code       939         Code       14         Jago UIOFF Ctri-Aitr.J       Units/Min         On/Off       Jindint         Jog OIIOFF Ctri-Aitr.J       Units/Rev         On/Off       Jin	Regen.       Display       Jog         Toolpath       Mode       Follow         Spindle Speed       SPIND       100         Image: Spindle Speed       100       Spindle Speed         RPM       0       S-ov       0         Spindle Speed       0       Spindle Speed       0						
History Clear Status: ReConfiguration Estop. Profile: Mach3Mill							



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9 – Click X axis in the increment direction (X++) then the following screen will appear

🖁 Mach3 CNC Controller 📃 🗖 🔀						
ile Config Function Cfg's View Wizards Operator Plugin Control Help						
Program Run Alt-1 MDI Alt2 ToolPath Alt4 Offsets Alt5 Settings Alt6 Diagnostics Alt-7 Mill->G15 G1 G17 G40 G20 G90 G94 G54 G49 G99 G64 G97						
Sy	R         Zero         +0.0000         Scale         +1.0000         +1.0000         scale         +1.0000					
File: No File Loaded.	Jog Hotkeys       External Buttons - DEM Codes         Y++       38       X         1       1       8         2       1       9         3       1       10         2++       33       2         3       1       10         1       1       1         A/U       +1187       A/U         B/V++       939       B/V         C/W++       939       B/V         System Hotkeys       5-1         ScanCode       ScanCode         MDI Select       993         Load G-Code       993         Mol Select       993         Load G-Code       1939         Mol Select       993         Load G-Code       100         Jog OBIOFF Ctri-Ait-J       Units/Min         Units/Rev       0.00         Spindle Speed       0         O       0					
History Clear Status: ReConfiguration Estop. Profile: Mach3Mill						

 $10\,$  – Press right arrow on the keyboard to assign this key to move the X motor in the increment direction

11 – Repeat steps 9,10 to assign different key for each movement and direction for every axis( table shows the recommended keys to use in control motors in X,Y,Z axis)

### Table2. Keys assigned to motor movements.

Axis	Increment (++)	Decrement ()
Х	Right	Left
Y	Up	Down
Z	Page Up	Page down
V	+	-

12 – Press **(RESET)** button to inactive emergency stop and start move the motors by clicking the above selected keys.

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