

# PET2000-12-074NA SINGLE CONNECTOR BOARD

P/N: YTM.00046.0 PCB version ZGN.U0P03.1

**User Manual** 

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# 1. INTRODUCTION

This user manual is for the PET2000-12-074NA Single Connector Board (YTM.00046.0).

PET2000-12-074NA Single Connector Board is intended for evaluation and testing of a single Platinum Front-End power system for Datacom servers, routers, and switches.

### 2. SAFETY WARNING

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THE ON-BOARD USB TO I2C INTERFACE IS NOT GALVANIC ISOLATED (see page 7, TEST SETUP for further information).

### 3. REFERENCE DOCUMENTS

BCD.00478PET2000-12-074NA DatasheetURP.00234PETxx00-12-074NA Communication Manual

### 4. YTM.00046.0 CONTENT

PET2000-12-074NA Connector Board USB Cable A-B

### 5. SPECIFICATION

General Condition: TA =  $0 \dots +55$  °C unless otherwise noted.

PARAMETER		CONDITIONS / DESCRIPTION	MIN	NOM	MAX	UNIT
V <sub>1</sub>	Main output voltage			12		VDC
I <sub>1 nom</sub>	Nominal output current				167	А
V <sub>SB</sub>	Standby output voltage			12		VDC
I <sub>SB nom</sub>	Standby output current				5	А
	Communication	PMBUS Protocol	I <sup>2</sup> C via	on-board U	SB convert	er



# 6. **DESCRIPTION**

The single connector board provides all necessary electrical connections on the output power and signals of the PET2000-12-074NA front-end power supplies with communication capabilities.

It also provides test points so that specific voltages and signals can be monitored.

Adding or removing jumpers allow configuration of certain functions of the power supply.



Operating the connector board at high load for long duration (more than 5 minutes) requires some kind of cooling of the board to ensure its temperature remains in a range not dangerous when touching.

#### **Evaluation Board Schematic**

The schematic of the single connector board can be found in Appendix A.

#### **Evaluation Board Assembly Drawing**

Use metric M5 screws to attach power cables to MP1 ... MP4. Use at least 35mm2 cable to connect to load.





#### **Test Points and Connectors**

#### Measurement Connectors and Test Points

CONNECTOR	NAME	DESCRIPTION	NOTES		
MP3, MP4	V1	12V main output	Main output load connection		
MP1, MP2	GND	Main output return	Main output load connection		
J7	V1	12V main output	Use to sense main output voltage, or low current load		
J6	GND	Main output return	max. 16A		
J8	VSB	12V standby output	Standby output load and conco connection		
J9	GND	12V standby return			
J4 pin 1	PSON_L	Power supply on input, active-low			
J4 pin 2	PWOK_H	Power OK signal output, active-high			
J4 pin 3	SMB_ALERT_L	SMB Alert signal output, active-low			
J4 pin 4	SCL	I2C clock line			
J4 pin 5	SDA	I2C data line			
J4 pin 6	HOTSTAND-BYEN_H	Hotstandby enable signal, active-high			
J4 pin 7	PRESENT_L	Power supply seated, active-low			
J4 pin 8	A2	I2C address selection input			
J4 pin 9	ISHARE	Analog current share bus			
J4 pin 10	V1	Main output sense			
J4 pin 11	VSB	Standby output sense			
J4 pin 12	GND	Signal return/reference			
J5	Bridge these pins through flat cable to any paralleled PET2000-12-074NA evaluation board				
J10	V1	12V main output	Lice for scene connection		
J11	VSB	12V standby output			
J2	USB	USB connection to computer			



### **Jumper Configuration**

JUMPER	NAME	DEFAULT	JUN	IPER	DESC	RIPTION							
121	V1_SENSE	Present	Open		Positive main output sense input of PSU is open, and can be manually connected through J21 pin 1, or by connecting to a paralleled evaluation board								
521			Pres	sent	Positi	Positive main output sense input of PSU is connected to V1 power rail							
100		SE_R Present	Оре	Negative main output sense input of PSU is open, and can be manually connected through J22 pin 1, or by connecting to a paralleled evaluation board						ł			
JZZ	VI_SENSE_K		Present		Negat	tive main output se	ense input of PSU i	s connected to G	SND power rail				
J23	A0	Present		J29 (A	2)			Controller	FEPROM				
124	Δ1	Present		0_0 ()	)	J24 (A1)	J23 (A0)	address	address				
J24	AI	Fleseni		Drees	<b>.</b> +	Procent (Low)	Present (Low)	0xB0	0xA0				
				(Low	n	Fleseni (LOW)	Open (High)	0xB2	0xA2				
				Defaul	t)	Open (High)	Present (Low)	0xB4	0xA4				
				Donad	.,	open (riigh)	Open (High)	0xB6	0xA6				
129	Δ2	Present				Present (Low)	Present (Low)	0xB8	0xA8				
020	72	Flesent		Open circuit (High)		t rocon (Lon)	Open (High)	0xBA	0xAA				
						Open (High)	Present (Low)	0xBC	0xAC				
							Open (Fign)	UXDE	UXAE				
	PSON_L			Оре	n	PSON as co	PSON_L input of PSU is only pulled low in case the microcontroller is pulling it low as commanded through USB						
J25		Present	Pres	sent	PSON	N_L input of PSU is	s pulled to GND, m	ain output is alwa	ays enabled				
					_	Оре	n	SDA I by co	line of PSU is left on necting to a paral	open, and could be lleled evaluation bo	manually conne	cted through J4 pin 5, c	or
J26	SDA	Present	Pres	sent	SDA I	ine of PSU is conr	nected to I2C-to-US	B conversion mi	crocontroller				
107			Open		SCL line of PSU is left open, and could be manually connected through J4 pin 4, or by connecting to a paralleled evaluation board				or				
J27	SCL	Present	Present		SDA line of PSU is connected to I2C-to-USB conversion microcontroller								
100	Pull up	Descent	Open		Pull up voltage for SMB_ALERT_L pull up resistor can be manually connected on J28 pin 2								
JZδ		Puil up Prese	Present	Pres	sent	Pull u which	p voltage for SMB	_ALERT_L pull up onnected USB	resistor is set to	3.3V generated from 5	V		

### NOTE:

The PSU device address will be calculated once during the Power-Up cycle, any change to the address jumper will be ignored until a complete Power-On-Reset occurs.



# 7. TEST SETUP



**WARNING:** The USB interface is NOT galvanic isolated, its GND is referenced to the PSU output GND pins. Within the power supply the GND pins are connected to PSU chassis and PE pin of the AC inlet. If a Desktop Computer is being used, there is a risk of generating an earth loop! A scope used to measure signals / output must always reference the scope probes to GND pins!

TEST EQUIPMENT	SPECIFICATION
AC Source	AC mains 100 240 VAC or AC electronic source capable of at least 2.5 kW / 5 kW in parallel configuration
DC Load V1	12 VDC / 167 A or 334 A in parallel configuration
DC Load VSB	12 VDC / 5 A
USB Communication	USB A-B cable connected to Laptop computer

#### Single Power Supply

In this configuration all jumpers J21..J29 should be present except J25; this allows correct remote sense in an internal point in the adapter board, I2C communication through USB interface, I2C address set 0xB0 (Controller) and 0xA0 (EEPROM), and SMB\_ALERT\_L having 3.3 V pull up voltage.

Regulated output voltage (i.e. 12.00 V ± 0.5 % at 50 % of the total load) is set in an internal point of the evaluation board.

NOTE: The main output V1 of the PET2000-12-074NA will only turn on if the USB cable is plugged into a powered USB port (else PSON\_L is not pulled low) or if jumper J25 is set (PSON\_L always pulled low).





#### Two Power Supplies in Parallel

In order to have correct parallel operation the connectors J5 of both Evaluation Boards need to be interconnected. This can be easily done by a 20 pin 1.27mm pitch flat cable with 2.54mm pitch female headers attached to both ends. This way the I2C lines, the ISHARE bus, both sense lines, PSON\_L, HOTSTANDBYEN\_H plus pull-up voltage SMB\_ALERT\_L are shared between the two Evaluation Boards.

The jumper position has to be set as shown in following pictures. The Evaluation Board with USB attached (connected to PSU0) has still the same jumper setting as in single power supply configuration. The paralleled one (connected to PSU1) needs to have jumpers removed as shown. This way PSU1 gets the I2C lines, the PSON\_L and the pull-up voltage for SMB\_ALERT\_L from Evaluation Board attached to PSU0. The jumper for I2C address configuration must be different on the two Evaluation Boards, in below example PSU0 has A[2..0] set to 000, while PSU1 has A[2..0] set to 001.

Regulated output voltage (i.e. 12.00 V  $\pm$  0.5 % at 50 % of the total load) is set in an internal point in the PSU0 adapter board, while PSU1 gets the output voltage sense information.





# 8. SOFTWARE SETUP

The latest "Bel Power Solutions I2C GUI" software can be downloaded from <u>www.belpowersolutions.com</u>. The downloaded archive contains a user guide (including installation steps) and an installer (BPS\_I2C\_GUI\_x\_x\_x.exe) that will guide you through the installation process of the GUI.

#### NOTES:

- The GUI uses Microsoft .Net 2.0 framework to display dialogs and other built in utilities. If the .Net framework is not installed on your computer, the installer will guide you through the download and installation of the framework before the GUI is installed.
- Make sure that you have Internet connection when installing the GUI, else the framework cannot be downloaded (if necessary) and the installation will fail.
- During the installation the driver to communicate over the I2C bus gets pre-installed. Click "Continue anyway" to pre-install the driver.
- The installer may request to re-start the computer.
- Once the GUI is installed, plug in the USB-I2C Converter. Windows will recognize the new hardware and ask to finish the installation. Once the Computer has reported "Found New Hardware" the software installation wizard will automatically pop up. Allow Windows to search for the software and select "Install software automatically (Recommended)". Again click "Continue anyway" to finish the driver installation. Note: this step may not pop up.
- Launch the GUI by double clicking the "Bel Power Solutions I2C GUI" icon on the desktop ( the Windows Start Menu.





# 9. OPERATION

- 1. Test setup according to chapter 1.
  - a) AC not yet applied to PSU(s).
  - b) DC Loads connected.
  - c) USB port connected to laptop.
- 2. Verify that the LED1 on the connector board is blinking (supplied by USB interface).
- 3. Turn-on AC source or connect AC mains.
- 4. Verify that PSU LED is green.
- 5. Set load to desired values.
- 6. Start the GUI on the Laptop
  - a) In the Home screen click "Add I2C device..."

bel Bel Power Solutions I2C - Net	wile	×
File Edit View Tools	Window Help	
i 🗋 💕 🗐 🍊 🚯 🍕 i 🛽		
Home I2C Bus	Configure V Device	
	What do you want to do?	
	Start new configuration     Open recent file       Open existing configuration     New x1c       New x1c     New x1c       New x1c     New x1c	
	Import p1c configuration	
	Z.One design wizard  Print configuration	
	Discover I2C bus 🕲 Exit application	
Configure	Command Log EXP Logio File TXT 12C III	EX DEC CLR HLP
Simulate		
Program		
Monitor	]	
Ready	X No Error	

b) On the Add I2C Device dialog, click "Category" and select PET. Then click on "Device" and select PET2000-12-074NA. Press "Add", once the process is completed, the GUI should show the identified power supply on the bus (see c)).

Add I2C Device					
Add I2C P1_Devices					
Category PET -					
Device	PET2000-12-074N/ -				
Add	Cancel				



c) Verify that the power supply has been identified correctly. PMBus communication is initially fixed to address 0xb6. Adjust I2C address according to the A1/A0 jumper settings on the Evaluation Board.

bel Bel Power Solutions I2C - New.z1c (modified)								
File Edit View Tools   Image: Im	Window     Help       Image: Configure C	Bus						
E 12C Bus PET2000-12-074NA	Type User Memory   Name   Device Type	Value F2000-12-074NA m2XW Front-End Power Solutions Intel Defined x 42.0 x 210.0mm Card Edge .0 264.0 VAC 12.0 V 166 A 2000 W 12.0 V 15 W D.0 45.0 °C						
Configure Simulate Program Monitor	Command Log EXP C Log to File TXT	2C HEX DEC CLR HLP						
Ready	No Error	.::						

Discover I2C bus...

Alternatively select "Discover I2C bus.." and let the GUI search for units connected to the I2C bus. Every powered unit on the bus will be prompted on the Device Navigation Tree.

- d) Switch to the Monitor View by clicking the Monitor button on the left bottom, or by pressing 'Alt-m', or by choosing View/Monitor in the main, or by selecting monitoring in the dropdown list-box. This opens the monitoring view of the PET2000-12-074NA power supply.
- e) In the monitor view click the ► button to start the monitoring process. Click the button to stop the monitoring process.
- f) In the monitor view click the Unit On/Off button to turn-on/off the monitored unit (chosen in the device navigation tree). Click the PSON On/Off button to turn-on/off all PSU connected to the PSON\_L signal.





If using two PET2000-12-074NA in parallel simply repeat step 6, and set I2C address according to jumper setting on the paralleled board. Note the parallel setup as shown in chapter 1 must be followed.

### **10. HISTORY**

REVISION	DESCRIPTION	DATE	AUTHOR
001	Initial Draft	May 22, 2014	U. Wild
AA	Added pins PRESENT_L and A2	Aug 18, 2014	U. Wild
AB	Updated for PCB ZGN.U0P03.1, Parallel operation test setup and new GUI print screen pictures	Aug 19, 2015	J.Schaerer, G.Parrino





#### Appendix A: Schematic YTM.00046.0 Evaluation Board



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### For more information on these products consult: tech.support@psbel.com

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