NCP81428 + NCP81418 Evaluation Board User's Manual

EVBUM2928/D

This user manual is intended to assist those using the NCP81428 + NCP81418 Evaluation Board. It will provide useful tips and procedures for powering up and using the Evaluation Board (EVB). It is intended as a quick-start guide rather than a comprehensive manual.

Description

The NCP81428 + NCP81418 Evaluation Board is a test vehicle for the PMBus-compatible NCP81428 and Slave only NCP81418 Smart Fuses in a dual phase design. The printed circuit board assembly (PCBA) contains all the circuitry and connections necessary to evaluate the performance of the NCP81428 + NCP81418 under various load and system conditions, including PMBus operation.

Features

Power Features

- Up to 160 A Peak Output Current, 100 A Continuous
- V_{IN} Operating Range: 4.5 to 18 V
- Up to 30 V Standby (PowerFet Off) Operation
- 0.65 mΩ Smart Fuse $R_{ds\ on}$

Control Features

- Enabled by Pin Assertion and/or Through PMBus
- Output Pulldown Selection Via PMBus
- External Soft-Start Programming
- Programmable VIN Under Voltage Warning and Over Voltage Fault
- 3 OCPs with Programmable Levels and Timers
- Soft Start Current Balancing Between Parallel Units
- Co-packaged Power Switch, Hotswap Controller and NVM
- (TWI) Two Wire Interface between Master and Slave(s)
- PMBus 1.4 Compliant for Telemetry
- 10-bit ADC for IOUT, VIN, IOUT_PK, VOUT, VTEMP
- Parallel Operation for High Current Applications
- Excellent Current Balancing in Parallel Operations
- Over-temperature Shutdown
- FAULT#_C& FAULT#_D Multi-purpose Pins
- Internal FET Health Diagnostics
- Excessive Soft-start Duration Protection
- Fault Event and Peak Current Recording
- Programmable Auto Retry/Latch Off Options
- 5 mm x 5 mm QFN32 Package
- Operating Temperature: −40 °C to 125 °C

Quick Start Connection Guide

1. Connect the power supplies to the connectors shown in the table below.

T5, T6	Input Power Ground
T2, T4	Input Power: 4.5 V to 18 V (12 V typ.)

2. Enable the device through the Enable Switch (SW1)
3. PMBus interface:
   a. Connect the PMBus Interface Module with the NCP81428 EVB through the I2C Interface Header JP1, as shown in Figure 2.
4. Start up the GUI application. If not installed, install GUI with setup.exe, which is located in the 'Full Installer' folder of the GUI file provided.
5. Connect the external load either or both pairs of screw terminals (T1/T3 and T5/T6). Leave the load disconnected or OFF until the board has been powered up successfully.

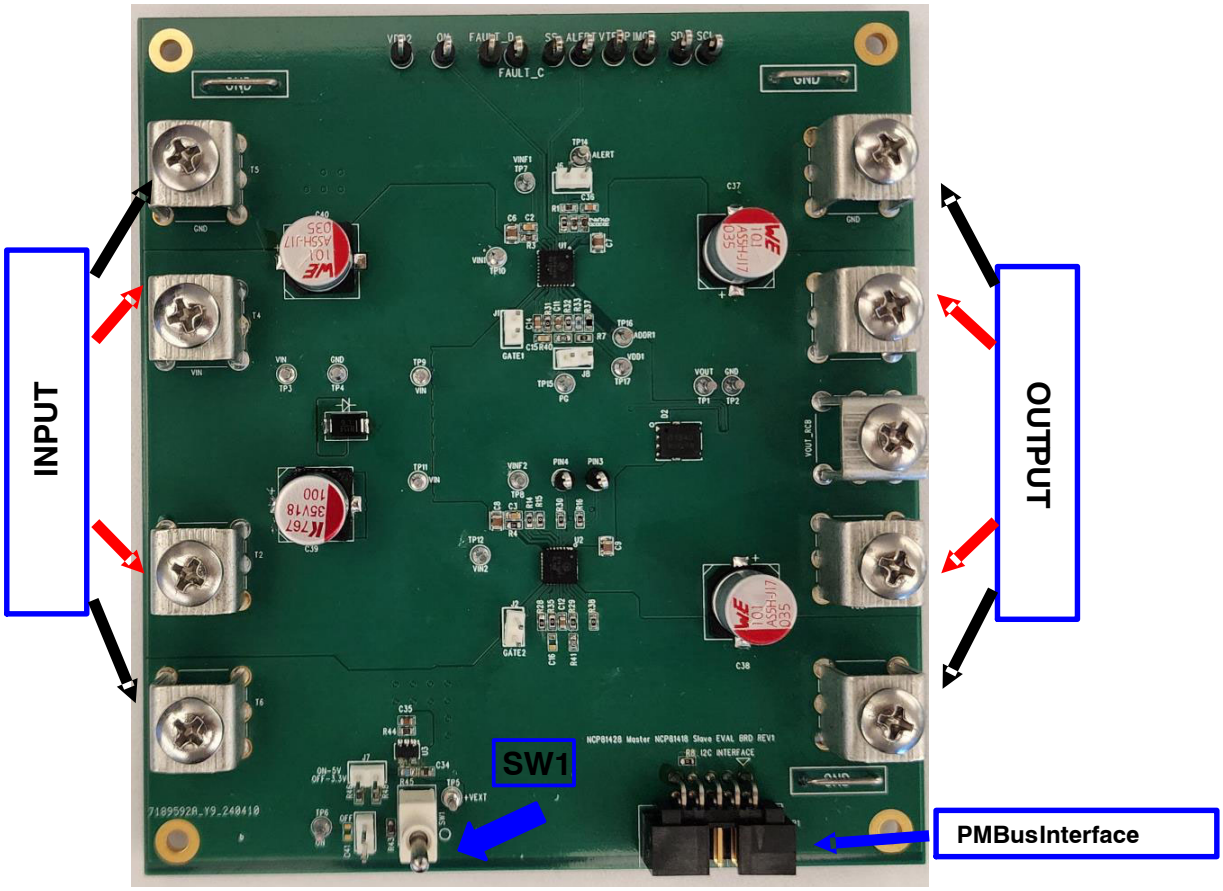

Figure 1. Evaluation Board Connection Diagram

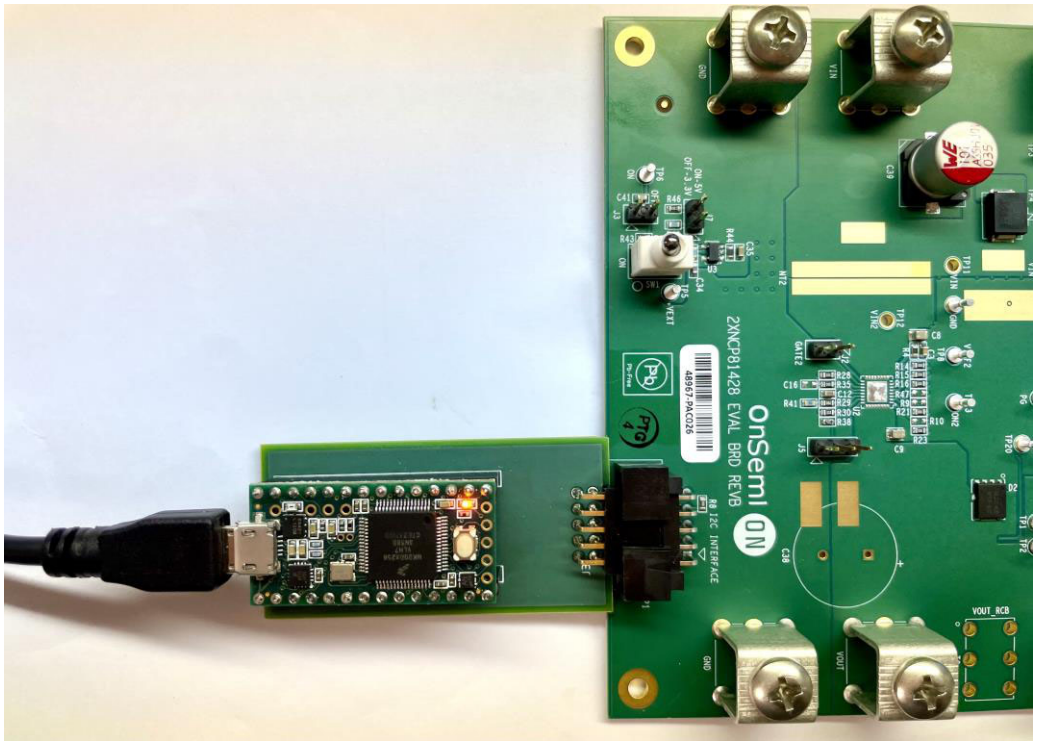

Figure 2. Evaluation Board PMBus Interface Module Connection Diagram

Evaluation Board Special Features

Direct Logic Signal Access

The evaluation board comes with the output pins to access logic controls including the PMBus through the pin headers (JP3 and JP4).

GUI Application

Below are two screen shots of the NCP81428 GUI that is used to communicate via PMBus.

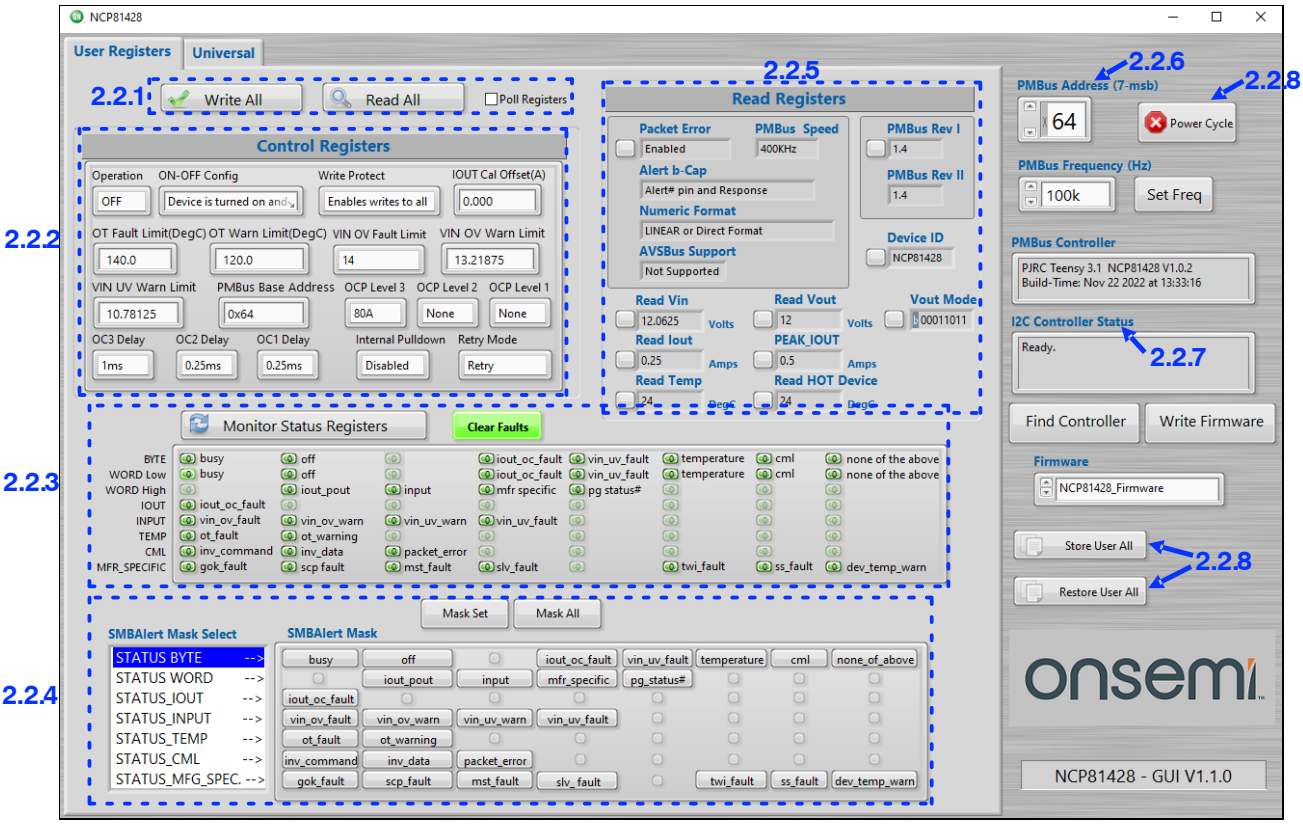

Figure 3. User Registers of GUI

2.2.1 Device Communication
- a. Write to and read from all the registers
- b. Select “Poll Registers” to read all the registers every 2 seconds

2.2.2 Control Registers
- a. Access to all the control registers

2.2.3 Status Registers
- a. Status update: Green= “0”, Red = “1”
- b. Click “Monitor Status Registers” to continuously read status registers
- c. Click “Clear Faults” Button to clear all the fault status bits, which sends “CLEAR FAULTS” command

2.2.4 SMBAlert Mask
- a. Select the register bit to mask: select the fault/warning register on the left side first and then select the data byte bits to be masked

2.2.5 Read Registers
- a. All read registers updated once clicking “Read All”
- b. Click the box next to each read register to update it individually

2.2.6 PMBus Address
- a. Set the PMBus address of the device that the user wishes to communicate to

2.2.7 I2C Controller Status
- a. Shows “Ready” when PMBus communication is established

2.2.8 PMBus Command Buttons
- a. Send the particular PMBus command when the user clicks it

Evaluation Board Configurations

The default settings for the NCP81428 Evaluation Board are:

Resistor/ Capacitor Value	Settings
Master Raddr = 9.31 kΩ	Address = 64h (Master)
C_{SS} = 470 nF	SS time = 110 ms approximately at VIN = 12 V

Please refer to NCP81428 data sheet for details of other settings.

Schematic

2-Phase Evaluation Board Schematic

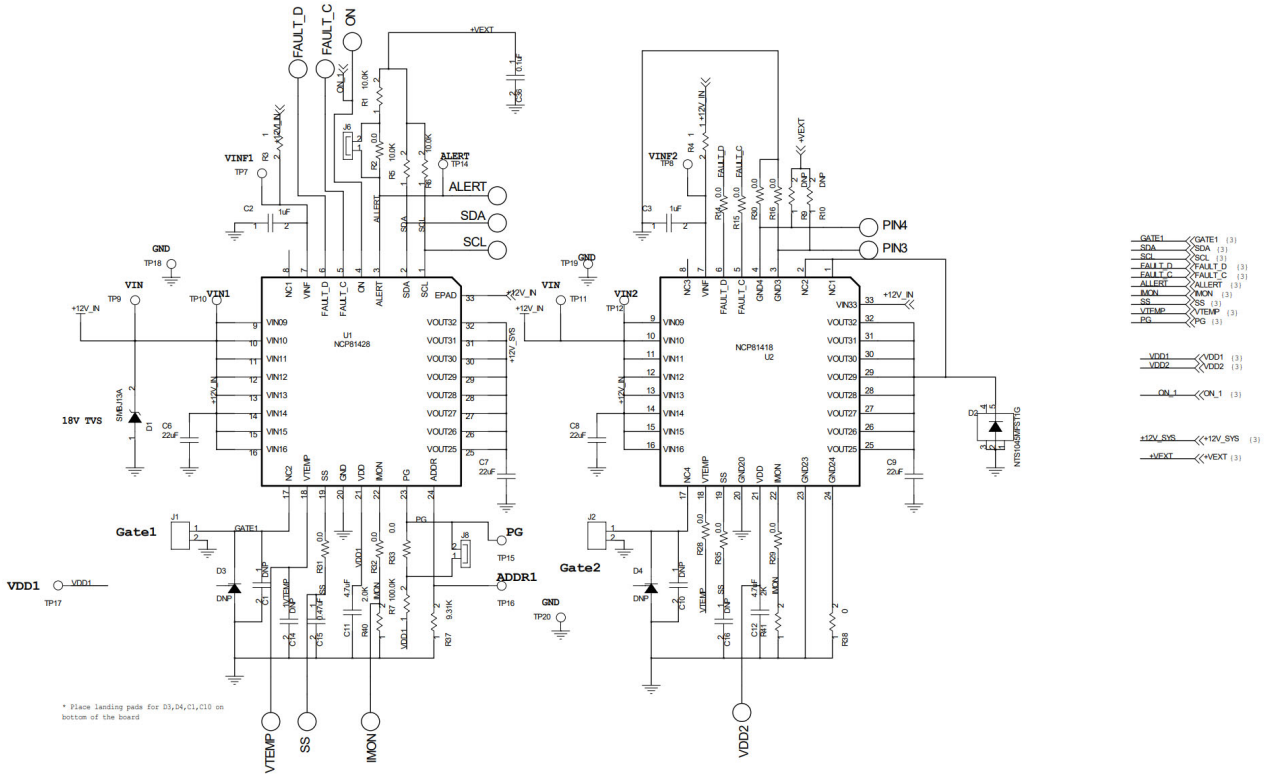

Figure 4. 2-Phase Evaluation Board Schematic, Part 1

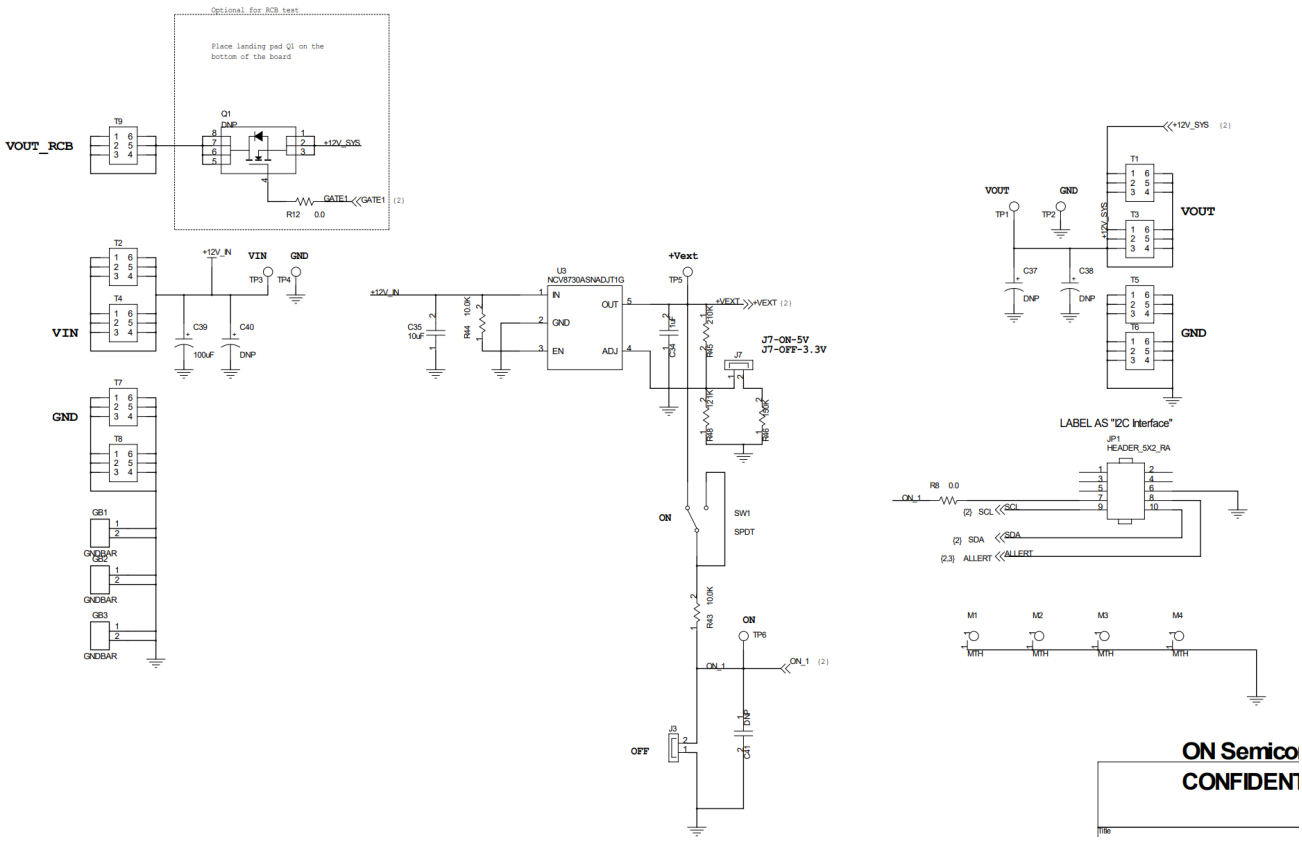

Figure 5. 2-Phase Evaluation Board Schematic, Part 2

BILL OF MATERIALS

2-PHASE EVALUATION BOARD BILL OF MATERIALS

Value	Part Reference	Description	PCB Footprint	Manufacture #1	Part Number #1	Manufacture #2	Part Number #2
1 μF	C2, C3, C34	MLCC Cap	0603	YAGEO	CC0603KPX7R8BB105	Murata	GCM188R71E105KA64D
22 μF	C6, C7, C8, C9	MLCC Cap	0805	Murata	GRM21BR61E226ME44K	YAGEO	CC0805MKX5R8BB226
10 μF	C35	MLCC Cap	0603	Murata	GRM188R61E106KA73D		
4.7 μF	C11, C12	MLCC Cap	0603	Murata	GRM188C8 1E475KE11 D	Kemet	C0603C475K9PACTU
DNP	C1, C10, C16, C41(DNP)	MLCC Cap	0603				
100 nF	C14	MLCC Cap	0603	Murata			
0.47 μF	C15	MLCC Cap	0603	YAGEO	CC0603KRX 7R8BB474	Murata	GCM188R71E4 74KA64J
0.1 μF	C36	MLCC Cap	0603	AVX	0603YC104 KAT2A	Murata	GRM39X7R104K016AD
100 μF	C39	Electrolytic Capacitors	MU_10	Wurth Elektronik	865230557006	KEMET	A767MU107M1VLAE029
D = 16 mm, Lead = 7.5 mm	C37, C38, C40(DNP)	Electrolytic Capacitors	D=16 mm, Lsp=7.5 mm, d=0.8 mm	United Chemi-Con	EKZN350EL L272MLN3S	Panasonic	EEU-FC1V272L
SMBJ13A	D1	TVS Diodes			SMBJ13A		
NTS1045MFST1G	D2	Schottky Rectifiers	SO8FL	**onsemi**	NTS1045M FST1G	**onsemi**	MBR2045EMFS
	D3, D4(DNP)		SOT-23-3				
2PIN 1ROW	J1, J2, J3, J7	Headers	JTHI_HDR 1R2PS	Amphenol FCI	10129378-902001BLF	MOLEX	22-10-2021
2PIN 1ROW_DNP	J6, J8(DNP)	Headers	JTHI_HDR 1R2PS	Amphenol FCI	10129378-902001BLF	MOLEX	22-10-2021
HEADER_5X 2_RA	JP1	Headers	5103308-1	MOLEX	702471051	Sullins	SBH11-PBPC-D05-RA-BK
header1x3	J5, J9	Headers	HD_1x3-2_54MM	Amphenol FCI	10129378-903001BLF		
header2x10	JP3, JP4	Headers	HD_2x10-2_54MM	Sullins	PRPC010DAAN-RC		
DNP	M1, M2, M3, M4	Mounting hole	MTH				
DNP	NT1, NT2	net_tie	net_tie				
1	R3,R4	Resistors	0603	DALE	CRCW0603 1R00FKEA	KOA	RK73H 1JTTD1R00F
0.0	R2, R7, R8, R14, R15, R16, R21, R23, R28, R29, R30, R31, R32, R35, R38	Resistors	0603	Vishay	CRCW0603 0000Z0EAC	YAGEO	RC0603JR-070RL
0.0	R12(DNP)	Resistors	0603	Vishay	CRCW0603 0000Z0EAC	YAGEO	RC0603JR-070RL
DNP	R9, R10, R47(DNP)	Resistors	0603				
9.31k	R37	Resistors	0603				
2.0k	R40, R41	Resistors	0603	DALE	CRCW0603 2K0FKEA	KOA	RK73H1JTTD2001F
10.0K	R1, R5, R6, R43, R44	Resistors	0603	DALE	CRCW0603 10K0FKEA	KOA	RK73H1JTTD1002F
100K	R33	Resistors	0604	DALE	CRCW0603 100KFKEAC	Bourns	CR0603-FX-1003ELF
150K	R46	Resistors	0603	DALE	CRCW0603 150KFKEAC	Bourns	CR0603-FX-1503ELF
210K	R45	Resistors	0603	KOA Speer	RK73H1JTT DD2103F	DALE	CRCW0603210KFKEB
121K	R48	Resistors	0603	KOA Speer	RK73H1JTT DD1213F	DALE	CRCW0603121KFKEB
DNP	Q1(DNP)	FET	SO8FL				
SPDT	SW1	Toggle Switch	STHI_CK_ET01	C&K	ET01MD1CBE		

2-PHASE EVALUATION BOARD BILL OF MATERIALS (continued)

Value	Part Reference	Description	PCB Footprint	Manufacture #1	Part Number #1	Manufacture #2	Part Number #2
6PIN	T1, T2, T3, T4, T5, T6, T7, T8	SCREW TERMINAL	8196	Keystone Electronics	8196		
6PIN	T9(DNP)	SCREW TERMINAL	TRM6	Keystone Electronics	8197		
TP	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP13, TP14, TP15, TP16, TP17, TP18, TP19, TP20	Test Pin	TPTHI_100 R76	MILL-MAX	2305-2-00-01-00-00-07-0	Keystone Electronics	1573-2
TP	TP9, TP10, TP11, TP12(DNP)	Test Pin	TPTHI_100 R76	MILL-MAX	2305-2-00-01-00-00-07-0	MILL-MAX	
NCP81428	U1	IC	LQFN32	**onsemi**	NCP81428		
NCP81418	U2	IC	LQFN32	**onsemi**	NCP81418		
NCV8730AS NADJT1G	U3	LDO	TSOP-5	**onsemi**	NCV8730AS NADJT1G		

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales