

# 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 m $\Omega$  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.

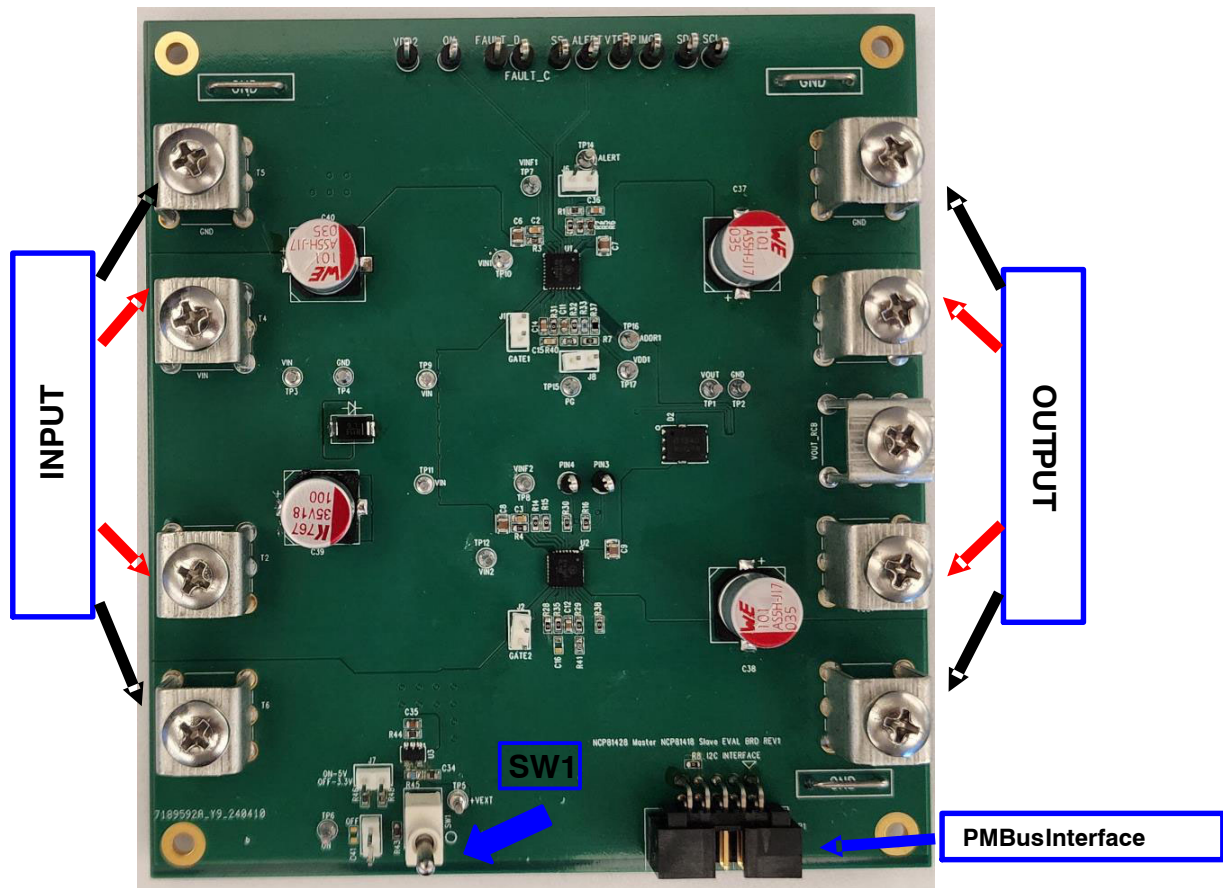


Figure 1. Evaluation Board Connection Diagram

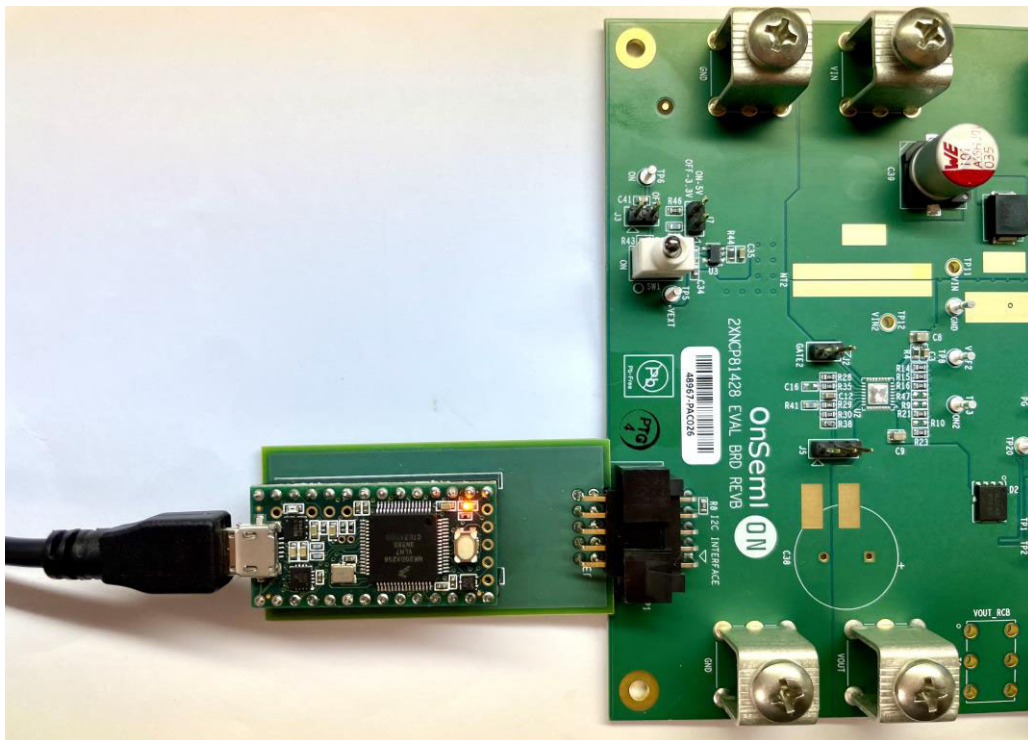


Figure 2. Evaluation Board PMBus Interface Module Connection Diagram

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.

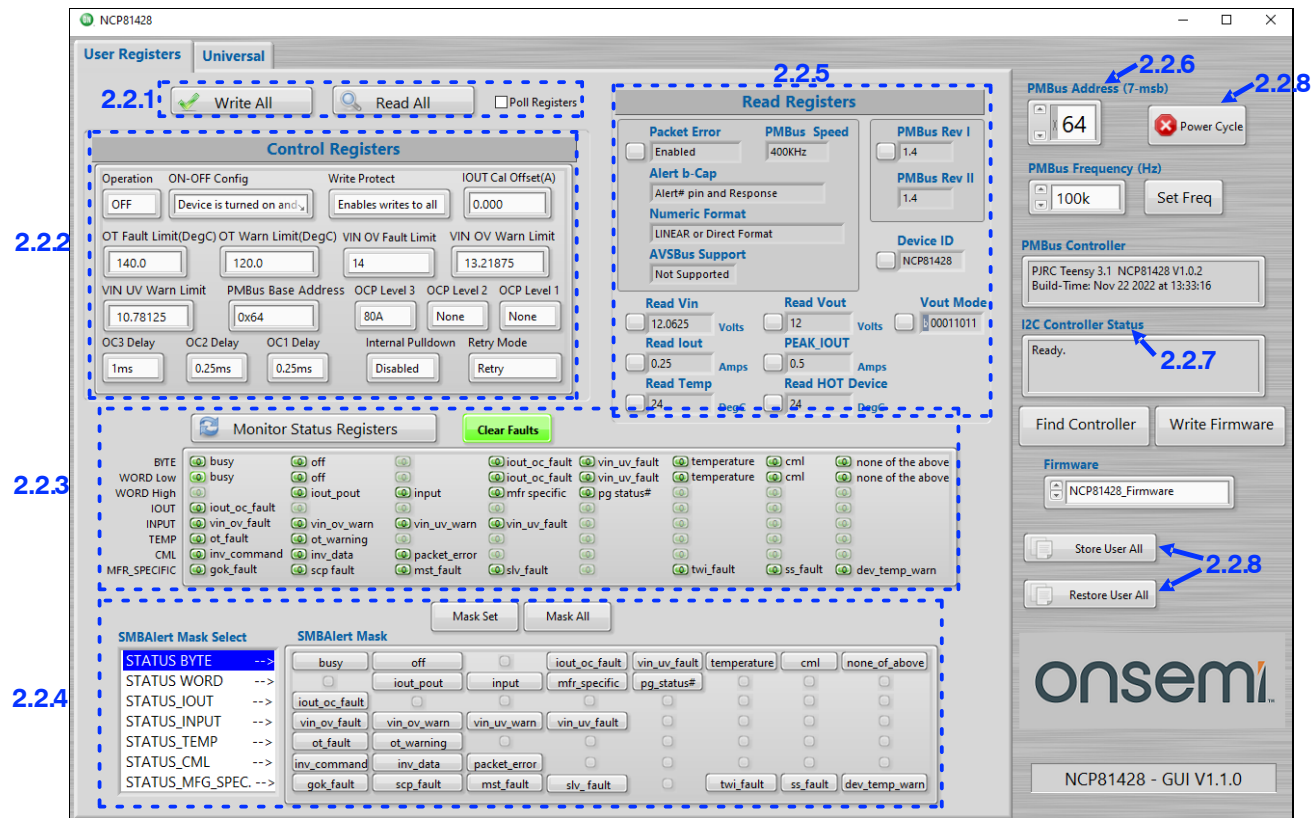


Figure 3. User Registers of GUI

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**

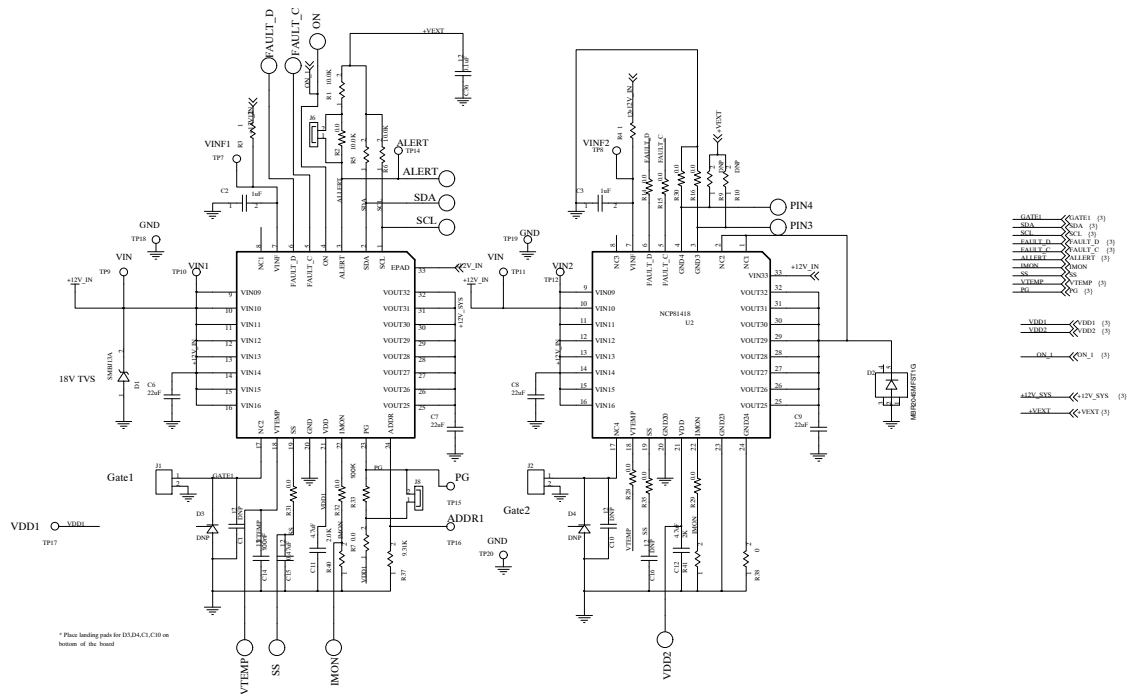
The default settings for the NCP81428 Evaluation Board are:

Resistor/ Capacitor Value	Settings
Master Raddr = 9.31 kΩ	Address = 64h (Master)
C <sub>SS</sub> = 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**

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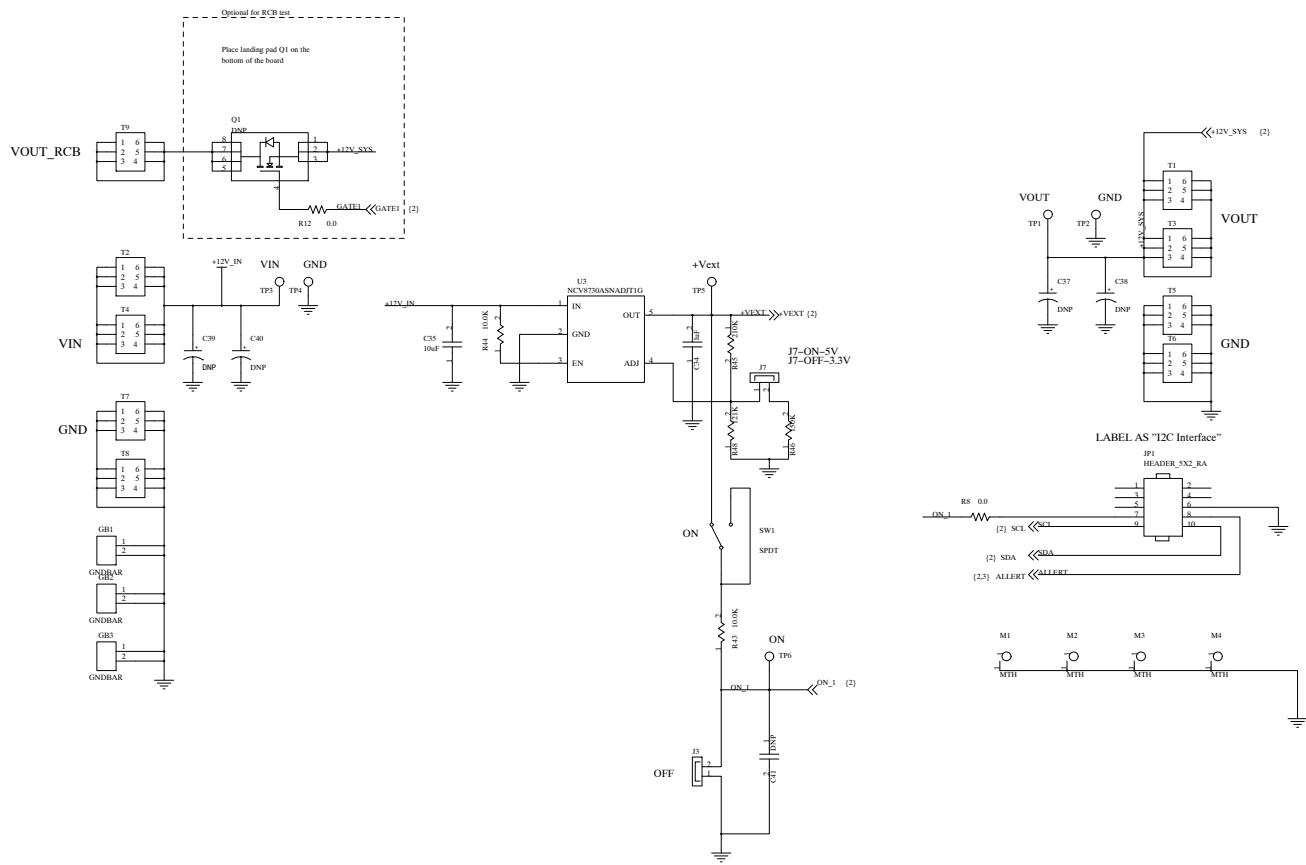


Figure 5. 2-Phase Evaluation Board Schematic, Part 2

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## BILL OF MATERIALS

### 2-PHASE EVALUATION BOARD BILL OF MATERIALS

Quantity	Value	Part Reference	Description	PCB Footprint	Manufacture #	Part Number	Comment
3	1 $\mu$ F	C2, C3, C34	MLCC Cap	0603	YAGEO	CC0603KPX7R8BB105	
4	22 $\mu$ F	C6, C7, C8, C9	MLCC Cap	0805	Murata	GRM21BR61E226ME44K	
1	10 $\mu$ F	C35	MLCC Cap	0603	Murata	GRM188R61E106KA73D	
2	4.7 $\mu$ F	C11, C12	MLCC Cap	0603	Murata	GRM188C81E475KE11D	
4	DNP	C1, C10, C16, C41	MLCC Cap	0603			
1	100 nF	C14	MLCC Cap	0603	Murata		
1	0.47 $\mu$ F	C15	MLCC Cap	0603	YAGEO	CC0603KRX7R8BB474	
1	0.1 $\mu$ F	C36	MLCC Cap	0603	AVX	0603YC104KAT2A	
1	100 $\mu$ F	C39	Electrolytic Capacitors	MU_10	Wurth Elektronik	865230557006	
3	D=16 mm, Lead=7.5 mm	C37, C38, C40	Electrolytic Capacitors	D=16 mm, Lsp=7.5 mm, d=0.8 mm	United Chemi-Con	EKZN350ELL272MLN3S	DNP
1	SMBJ13A	D1	TVS Diodes			SMBJ13A	
1	MBR2045MFST1G	D2	Schottky Rectifiers	SO8FL	onsemi	MBR2045MFST1G	
2	DNP	D3,D4		SOT-23-3			
4	2PIN 1ROW	J1, J2, J3, J7	Headers	JTHI_HDR1R2PS	Amphenol FCI	10129378-902001BLF	
2	2PIN 1ROW_DNP	J6, J8	Headers	JTHI_HDR1R2PS	Amphenol FCI	10129378-902001BLF	DNP
1	HEADER_5X2_RA	JP1	Headers	5103308-1	MOLEX	702471051	
3	GNDBAR	GB1, GB2, GB3	Ground Bar	D3082-05	Harwin	D3082-05	
2	1	R3, R4	Resistors	0603	DALE	CRCW06031R00FKEA	
14	0.0	R2, R7, R8, R12, R14, R15, R16, R28, R29, R30, R31, R32, R35, R38	Resistors	0603	Vishay	CRCW06030000Z0EAC	
2	DNP	R9, R10	Resistors	0603			
1	9.31k	R37	Resistors	0603			
2	2.0k	R40, R41	Resistors	0603	DALE	CRCW06032K0FKEA	Use 0.05% Accuracy Resistor
5	10.0K	R1, R5, R6, R43, R44	Resistors	0603	DALE	CRCW060310K0FKEA	
1	100K	R33	Resistors	0604	DALE	CRCW0603100KFKEAC	
1	150K	R46	Resistors	0603	DALE	CRCW0603150KFKEAC	
1	210K	R45	Resistors	0603	KOA Speer	RK73H1JTDD2103F	
1	121K	R48	Resistors	0603	KOA Speer	RK73H1JTDD1213F	
1	DNP	Q1	FET	SO8FL			
1	SPDT	SW1	Toggle Switch	STHI_CK_ET01	C&K	ET01MD1CBE	
8	6PIN	T1, T2, T3, T4, T5, T6, T7, T8	SCREW TERMINAL	8196	KEYSTONE ELECTRONICS	8196	
1	6PIN	T9	SCREW TERMINAL	TRM6	KEYSTONE ELECTRONICS	8197	DNP
15	TP	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP14, TP15, TP16, TP17, TP18, TP19, TP20	Test Pin	TPTHI_100R76	MILL-MAX	2305-2-00-01-00-00-07-0	
4	TP	TP9, TP10, TP11, TP12	Test Pin	TPTHI_100R76	MILL-MAX	2305-2-00-01-00-00-07-0	DNP
1	NCP81428	U1	IC	LQFN32	onsemi	NCP81428	
1	NCP81418	U2	IC	LQFN32	onsemi	NCP81418	
1	NCV8730ASNADJT1G	U3	LDO	TSOP-5	onsemi	NCV8730ASNADJT1G	

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## REVISION HISTORY

Revision	Description of Changes	Date
2	Updated BOM list and Schematics to reflect actual components used for eval board builds.	1/22/2026
3	Correct components used in the NCP81428 Master / NCP81418 Slave eval board. Also to correct schematics to reflect NCP81428 Master / NCP81418 Slave setup.	5/19/2026

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

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