LEB-0024
CPC1601M Solid State Relay Evaluation Board

Introduction

The Littelfuse CPC1601M is a non-isolated, low operating current, 1-Form-A normally open solid state latching relay. It comes in a small 3 x 3 mm DFN package. The purpose of this user manual is to demonstrate the design and use of the Littelfuse CPC1601M solid state relay (SSR) evaluation board as displayed in Figure 1. Equipped with operation mode selection, signal inputs, and tactile switches, the board can be used to evaluate the CPC1601M in manual operation or through external control signals.

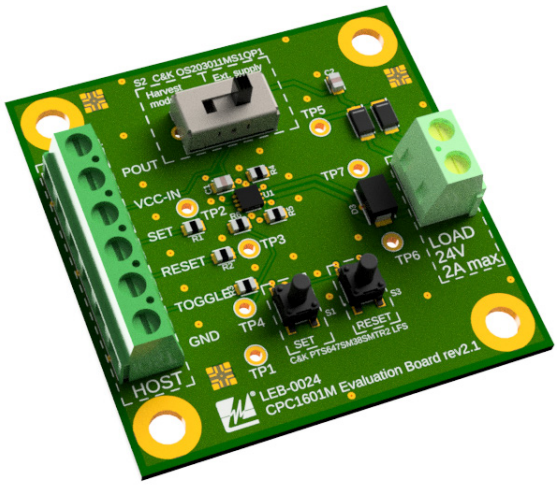

Figure 1. CPC1601M SSR evaluation board

Features

Device CPC1601M:

- 60 V peak AC or DC operation
- 2 A continuous load capability AC or DC
- Low on-resistance of typically 325 mΩ
- Set/Reset or Toggle operation
- 3…5.5 V operation
- <1 µA supply current
- Load-harvested power pin for powering external circuitry up to 10 mW
- Zero current from system power supply in load harvest mode
- No moving parts

Evaluation Board:

- Manual SSR load switching using C&K tactile switches
- External SSR control option through PCB control signal inputs
- Selection between external supply/energy harvesting mode through C&K slide switch
- $P_{out} – P_{in}$ to power external components
- SSR overvoltage protection through Littelfuse TVS

Contact Information

For more information on the evaluation board and application support, contact the Littelfuse Power Semiconductor team of product and applications experts: PowerSemiSupport@Littelfuse.com

Important Notes

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1. Overview

The top view of the CPC1601M evaluation board is shown in Figure 2. The unit includes input and load circuit terminal blocks along with C&K switches for mode selection and manual relay operation.

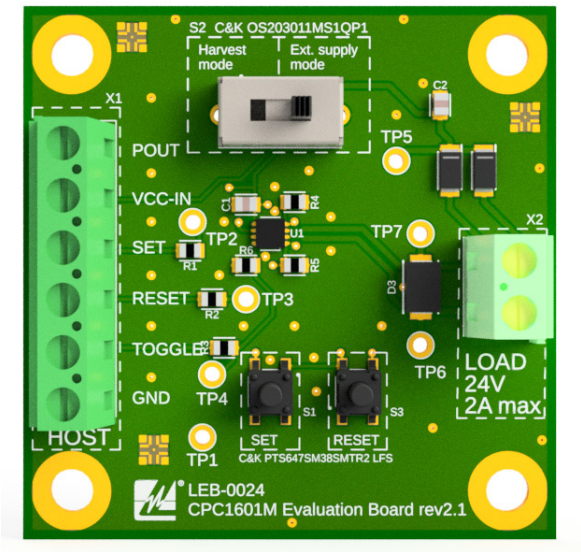


Figure 2. Top view of the CPC1601M evaluation board

Table 1 contains the operating conditions of the evaluation board.

Table 1. Operating conditions of the CPC1601M evaluation board

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
V_{CC1}	Board supply voltage	3	–	5.5	V
V_{IH}	Control signal input voltage high threshold (SET, RESET, TOGGLE)	1.4	–	–	V
V_{IL}	Control signal input low threshold (SET, RESET, TOGGLE)	–	–	0.5	V
HV_{CC}	Load circuit blocking voltage/ max. harvest mode supply voltage	–	–	60	V
	Load circuit operating voltage	–	24	–	V
T_{amb}	Operating ambient temperature	0	25	50	°C

2. Pin Assignments

Table 2 describes the electrical connections of the evaluation board.

Table 2. Pin assignments of the CPC1601M evaluation board

Connector Name	Pin Number	Pin Name	Description
X1	1	V_{CC1}	SSR external power supply pin
X1	2	SET(HOST)	SET control signal input
X1	3	RESET(HOST)	RESET control signal input
X1	4	TOGGLE(HOST)	TOGGLE control signal input
X1	5	V_{SS}	GND connection
X2	1	Load1	Load circuit input 1
X2	2	Load2	Load circuit input 2
–	–	TP1	GND reference test points
–	–	TP2	Supply input test point
–	–	TP3	SET input test point
–	–	TP4	RESET input test point
–	–	TP5	TOGGLE input test point
–	–	TP6	Load harvest SSR input voltage test point
–	–	TP9	Load input 1 test point
–	–	TP10	Load input 2 test point

3. Schematics

Figure 3 displays the evaluation board's schematic. External supply and control input signals can be provided via the terminal block X1. Via Pin 1 of X1, external circuitry can be supplied from the CPC1601M IC. The load circuit is connected on X2. Via the slide switch S3, the mode of operation can be chosen. In middle switching position, the CRC1601M IC is not supplied and remains off. When the switch is in external supply mode, an external voltage source must be connected at Pin 2 of X1. In energy harvesting mode, the power is supplied by the load. This requires operating the load circuit with AC voltage. Additional information on the energy harvesting mode is available in the CPC1601M datasheet.

Regardless of the operating mode, the tactile switches S1 and S2 can be used for SET and RESET of the SSR. Alternatively, the CPC1601M solid state relay can also be controlled externally. The control signals SET, RESET, and TOGGLE are connected to X1.

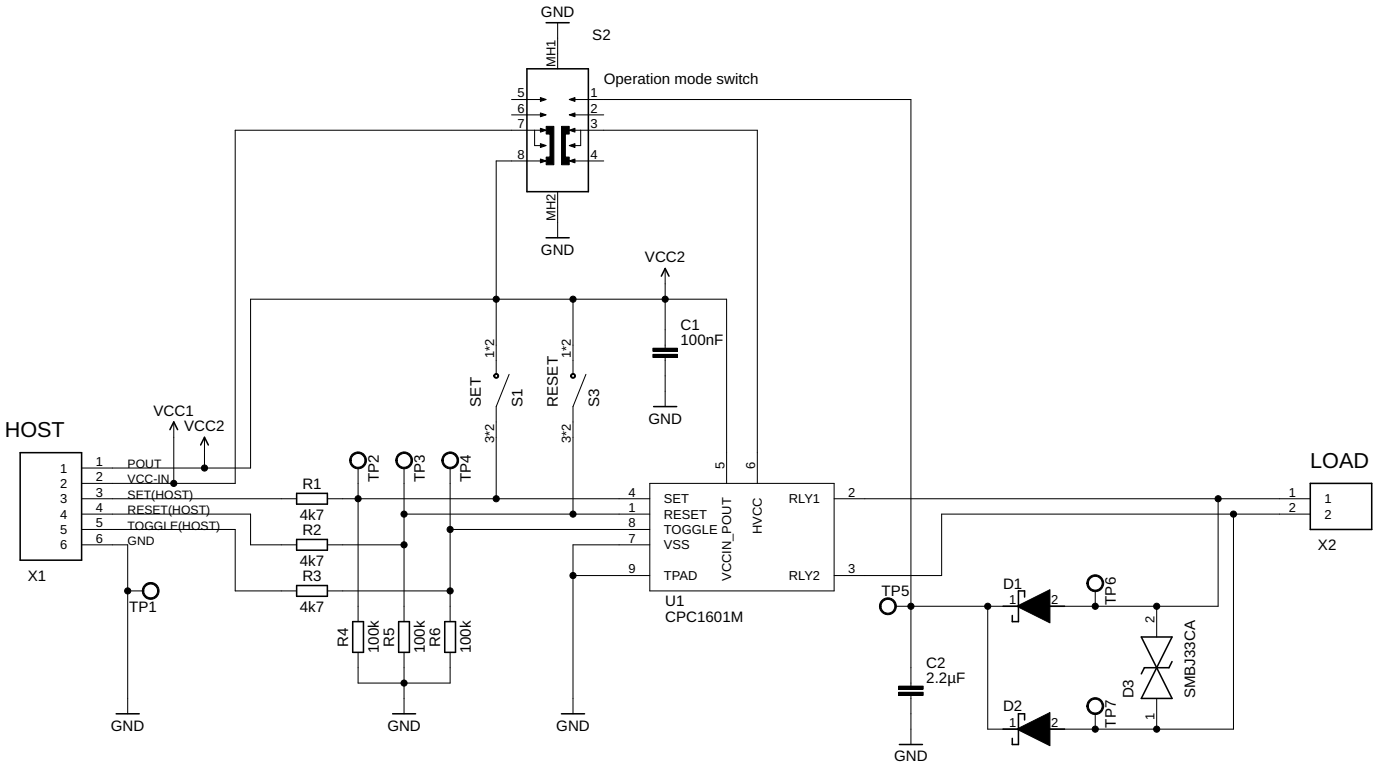


Figure 3. CPC1601M evaluation board schematics

4. Bill of Materials

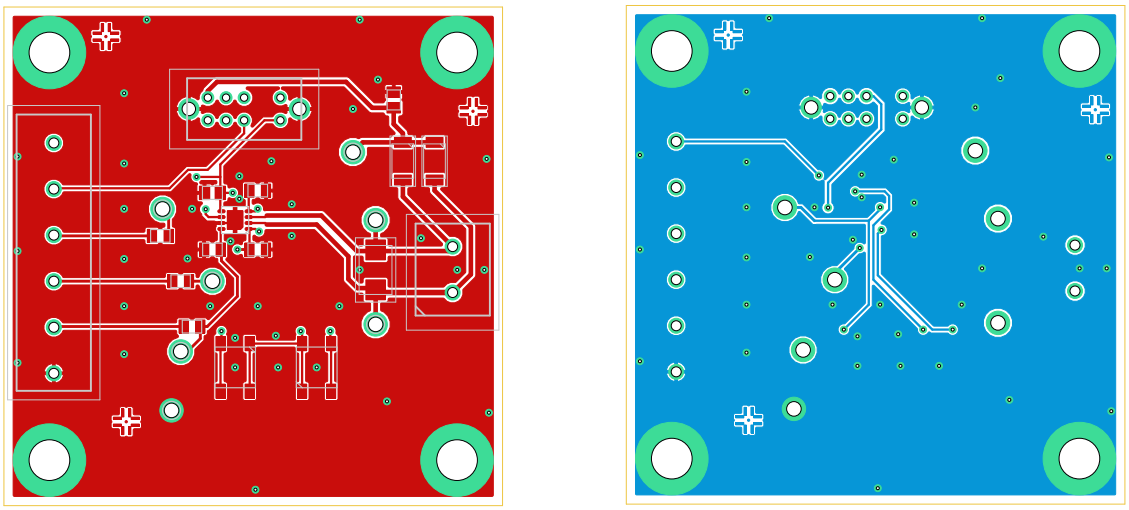
Table 3 lists the components used for the evaluation board.

Table 3. Bill of materials for the CPC1601M evaluation board

Item	Quantity	Reference	Value	Description	Manufacturer	MPN
1	–	C2	2.2 µF	Cap 2,2 µF 100 V 10 % X7R 0805	-generic-	–
2	–	C1	100 nF	Cap 100 nF 50 V 10 % X7R 0805	-generic-	–
3	–	R1, R2, R3	4.7 kΩ	Res 4.7 kΩ 10 % 0805	-generic-	–
4	–	R4, R5, R6	100 kΩ	Res 100 kΩ 10 % 0805	-generic-	–
5	–	D1, D2	–	SCHOTTKY RECTIFIER, 60 V, 3 A	ST Microelectronics	STPS360AF
6	–	D3	–	TVS Diode, 600 W, 33 V	Littelfuse	SMBJ33CA
7	–	U1	–	60 V, 2 A 1-Form-A Solid State Latching Relay	Littelfuse	CPC1601M
8	–	S2	–	Slide Switch	C&K/Littelfuse	OS203011MS1QP1
9	–	S1, S3	–	Tactile Switch SPST-NO Top Actuated	C&K/Littelfuse	PTS647SM38SMTR2 LFS
10	1	X2	–	Terminal block 2P, 5.08 mm pitch	TE Connectivity	282837-2
11	1	X1	–	Terminal block 6P, 5.08 mm pitch	TE Connectivity	282837-6
12	8	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8	–	Testpoint THT	Keystone	5006

5. PCB Layout

Figure 4 depicts the copper layers of the PCB.



Top layer

Bottom layer

Figure 4. PCB layers

6. PCB Assembly Data

Figure 5 represents the PCB assembly, including the mechanical dimensions of the evaluation board.

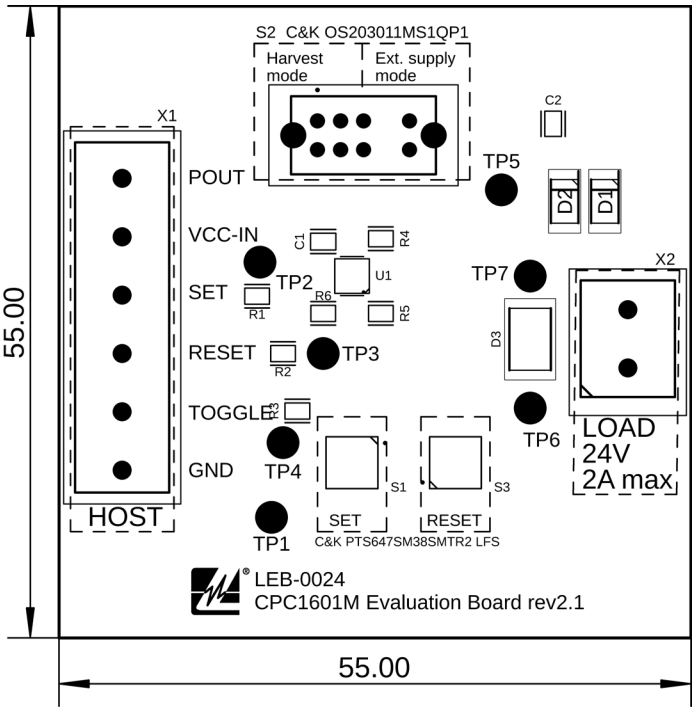


Figure 5. PCB assembly

Revision History

Date	Revision	Changes
March 2025	1.0	Initial Release
April 2025	1.1	