



NCV78514 Evaluation Board documentation

Automotive intelligent LED Driver

Evaluation kit contents

NCV78514 evaluation PCB

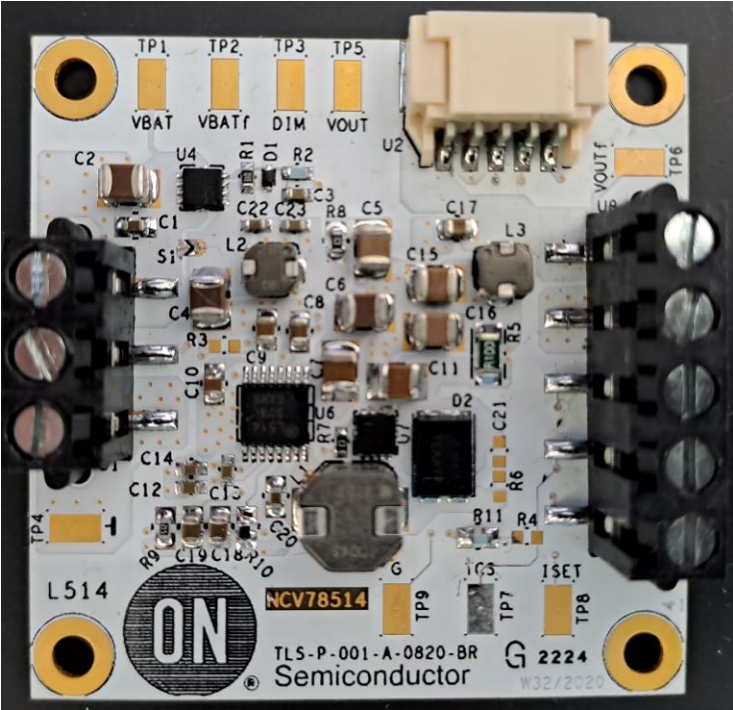
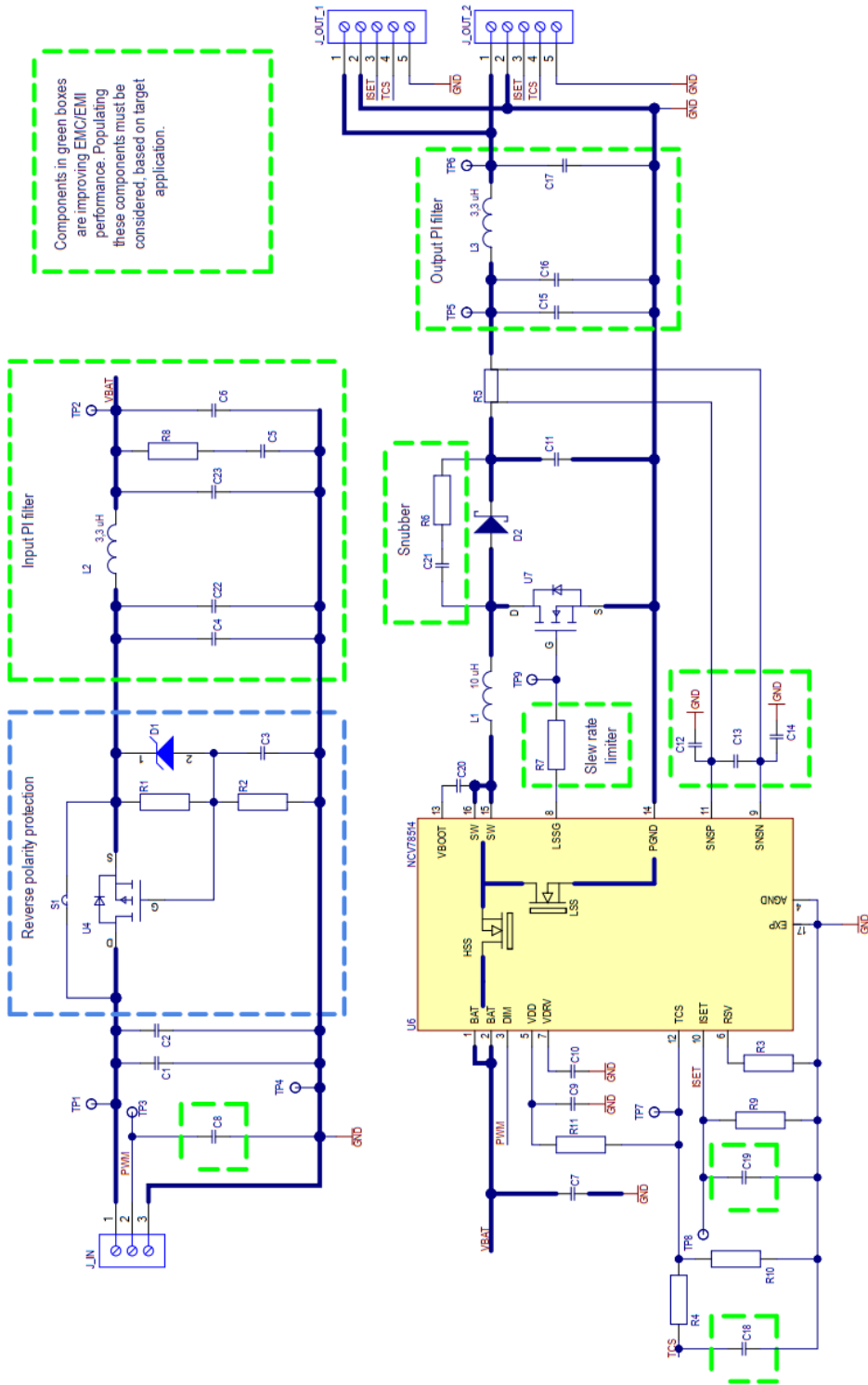


Figure 1: Photo of evaluation module PCB

Schematic



Pinout – connector J_IN

pin	function	Note
1	VBAT	Input voltage
2	PWM	PWM in
3	GND	Ground connection

Pinout – connectors J_OUT_1 & J_OUT_2

pin	function	Note
1	LED Anode	LED string anode
2	LED Cathode	LED string cathode
3	ISET	Connection for current setting resistor
4	TCS	Connection for temperature sensing thermistor
5	GND	Signal ground connection

P Pinout – connectors J_OUT_1 & J_OUT_2

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EVK board description

The evaluation board is designed to showcase the features of the NCV78514. The input is protected by reverse polarity protection, followed by an input PI filter. Electrical current then flows through a DC/DC converter and an output PI filter. The output current is defined by a resistor attached to the ISET pin. The chip constantly evaluates the resistance to ensure a good electrical connection and to verify that the current-setting resistor is functioning correctly. The measured resistance must remain stable during operation. During the startup sequence, the resistance is evaluated, and the corresponding output current is calculated. The output current can also be modulated by a PWM signal applied to the DIM pin. The integrated circuit senses the applied PWM signal and measures its duty cycle. The output current is then pulse-width modulated at a frequency of 400 Hz, with the duty cycle matching the input PWM signal.

The current defined by the resistor sets the target output current, which is applied when no derating mechanisms are active. There are three derating mechanisms that can influence the output current: input voltage drop, integrated circuit overtemperature, and LED string overtemperature. The output current is governed by the derating mechanism that imposes the greatest reduction. This ensures that the system operates safely and efficiently under varying conditions.

The temperature of the LED module is measured using an NTC thermistor placed within the module. As the temperature of the LED module changes, the resistance of the thermistor also changes. A VCC voltage is applied to a pull-up resistor, with the NTC thermistor

connected between this pull-up resistor and ground. As the resistance of the NTC thermistor changes, the voltage drop across it changes as well. This voltage drop is sensed by the ADC (Analog-to-Digital Converter) of the integrated circuit, allowing it to accurately measure the temperature of the LED module.

Setup instructions

1. Carefully unpack the evaluation kit and ensure all components are present. The kit includes wires with banana plugs for connecting to a lab power supply and an LED load module.
2. Locate the wires with banana plugs included in the kit.
3. Connect the banana plugs to the corresponding terminals on your lab power supply.
4. Set your power supply to output 12 V and 1 A.
5. Ensure the LED load module is securely connected to the evaluation board as per the provided diagram.
6. Once all connections are secure, turn on the power supply.

Troubleshooting

- **Check PWM Input:**
 - Ensure the PWM input is connected. If it is unconnected, the sensed duty cycle will be 0%, resulting in no output current. 100 % Duty cycle can be reached by coupling the PWM and VBAT inputs.
- **Verify Voltages:**
 - Measure the voltage at the ISET pin. The expected voltage is approximately 1 V.
 - Measure the voltage at the PTC pin. It should be above $0.6 \times VCC$ to operate normally.
- **Inspect Connections:**
 - Check all connections to ensure they are secure and correctly placed.
- **Review Power Supply Settings:**
 - Confirm that the power supply and that the banana plugs are properly connected.
- **Examine Components:**
 - Inspect the current-setting resistor (R1) and the temperature-sensing thermistor (R2) to ensure they are functioning correctly and not placed simultaneously on both the LED module and the evaluation module.

Technical support

In case of any issue with the evaluation kit, please contact:

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The latest release of datasheet can be found on onsemi.com > [LINK](#)