DN05020/D

Automotive LED Driver with On/Off and Dimming Control

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DESIGN NOTE

Circuit Description

This Design Note features a combination of two integrated circuits (NCV7680 and NCV7608) for driving automotive LEDs, combining the best features of both ICs.

The NCV7680 creates the current source necessary to drive 8 strings of LEDs, while the NCV7608 allows the outputs to be segmented resulting in control of individual strings for On/Off control or dimming purposes.

The NCV7680 provides the DC current programming via the R_{STOP} programming resistor. A chart is available in the datasheet for programming the current up to 75 mA.

The NCV7608 On/OFF dimming control can be employed using either the SPI inputs or using the 4 parallel inputs.

Key Features

- Control of 8 Strings of LEDs
- Individual On/Off Control
- Individual Dimming Control
- Open Circuit Detection
- Short Circuit Detection

Table 1. DEVICE DETAILS

Device	Application	Load Dump	Channel Count	Output LED Current per Channel	Miscellaneous
NCV7680, NCV7608	Automotive Lighting	40 V	8	75 mA	Waveshaping

Table 2. OTHER SPECIFICATIONS

NCV7608 Output Current	800 mA	Max
NCV7608 SPI Frequency	5 MHz	Max
NCV7608 Frame Length	16	Bits

Open Load Detection	Yes, via NCV7608
Parallel Input for PWM	Yes, via NCV7608
Slew Rate Control	Yes, via NCV7608 & NCV7680
Current Programming	Yes, via NCV7680
3.3 V/5 V Compatible Logic	Yes, on the NCV7608
Daisy Chain Compatible	Yes, on the NCV7608
AEC Q10X−12−REV A Compatible	Yes, on the NCV7608

Others	When less than 8 strings of LEDs are utilized, the additional outputs on the NCV7608 can be used as either high-side or low-side drivers.

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SCHEMATIC

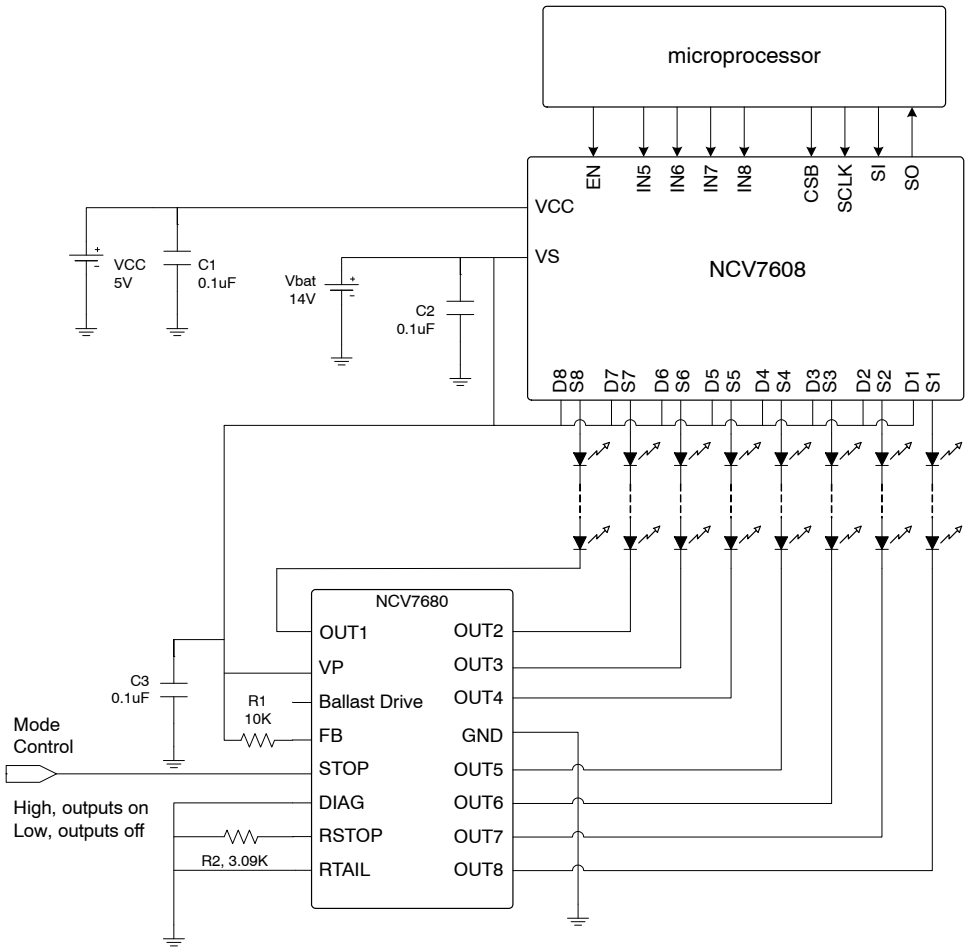

Figure 1. Complete Schematic

1. The number of diodes in each string is determined by the users choice of component and current used.
2. Mode Control can also be used as a modulating source for contiguous usage of LEDs.
3. Power supply capacitors may need to be increased depending on the current level and duty cycle used.

NCV7680 DC Current Programming

The DC current of each LED string is determined by the programming resistor on R_{STOP} (3.09K in Figure 1) of the NCV7680.

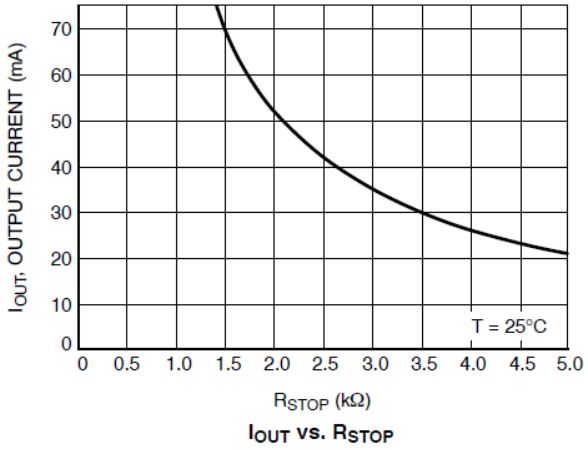

Figure 2. NCV7680 I_{OUT} vs R_{STOP}

NCV7608 SPI Frame

The NCV7608 SPI frame consists of input control for each individual output and control for open load diagnostic enable.

The output frame presents the output status for each individual driver, the parallel input state, and the battery supply status.

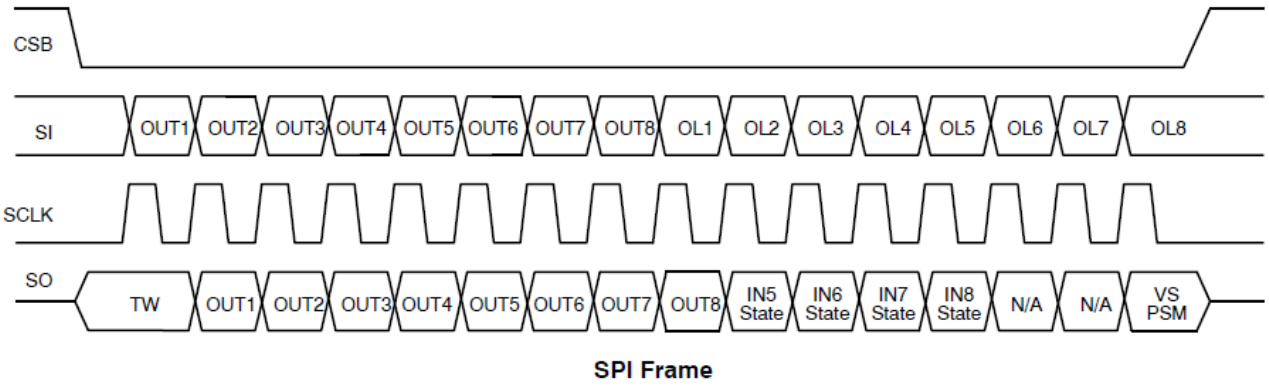

Figure 3. NCV7608 SPI Frame

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