

LM5010 Design Document

National Semiconductor
LM5010
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1.0 Design Specifications

Inputs	Outputs #1
VinMin=8.0 V	Vout1=2.5 V
VinMax=40.0 V	Iout1=0.9 A

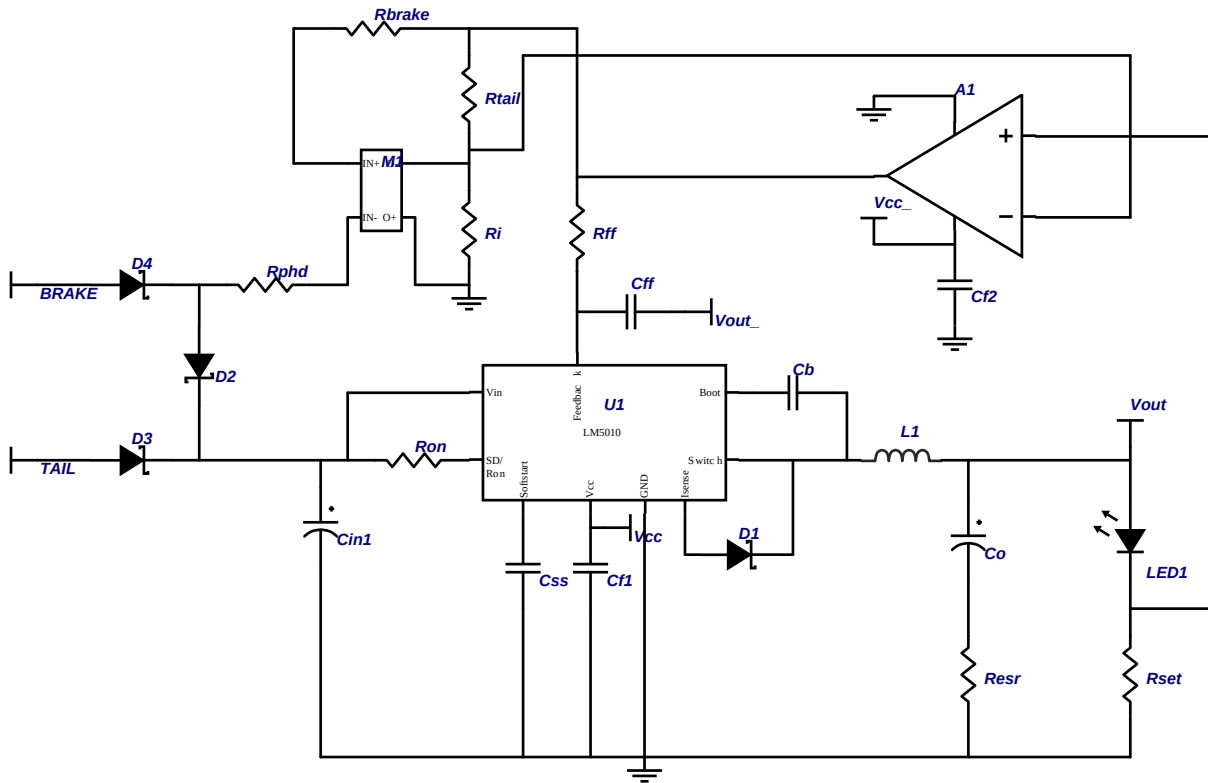
2.0 Design Description

This circuit is designed to replace a dual-filament incandescent bulb in a combined brake/tail light for automotive use. When power is applied to the 'Tail' input the current in the LED is regulated to 300mA. When power is applied to the 'Brake' input or both inputs simultaneously, the current in the LED increases to 900mA. The 'Brake' and 'Tail' input voltage can vary between 8V and 40V. This makes the circuit suitable for standard passenger cars and trucks with 8V-16V batteries as well as freight trucks, tow trucks, fork lifts, and other vehicles that use a double lead-acid battery system, or 16V-32V. Diodes D3 and D4 provide reverse battery protection, and D2

ensures that a 'Brake' input supercedes a 'Tail' input. The LM5010 can withstand input voltages of up to 75V. This circuit does not need additional protection from 'load dump' events up to 75V.

Although not shown, the brightness of the LED can be dimmed with a PWM input by placing a signal-level NFET from the RON pin to ground and driving the gate with the PWM signal. This circuit is also compatible with 100Hz PWM of the input voltage for 'theater dimming' of interior lights. Please note that the PhotoMOS M1 and the op-amp A1 are shown as Q1 and U2 in the PCB layout, respectively.

3.0 Schematic



241689_7202_0

FIGURE 1. Example Schematic Showing Connection for all Components.

4.0 Bill Of Materials

Part	Manufacturer	Part#	Attributes
A1	National Semiconductor	LMV321	
Cb	Vishay	VJ0805Y103KXXAT	10n F
Cf1	Vishay	VJ0805Y104KXXAT	100n F
Cf2	Vishay	VJ0805Y104KXXAT	100n F
Cff	Vishay	VJ0805Y102KXXAT	1n F
Cin1	TDK	C4532X7R2A105M	1u F, 1m Ohms
Co	TDK	C3216X7R1A106M	10u F, 1m Ohms
Css	Vishay	VJ0805A471KXXAT	470p F
D1	Vishay	S397D	0.75 V
D2	Vishay	S397D	0.75 V
D3	Vishay	S397D	0.75 V
D4	Vishay	S397D	0.75 V
L1	TDK	SLF7045T-150M1R1-PF	15u H, 0.052 Ohms
M1	NAiS	AQY221N2SX	
Rbrake	Vishay	CRCW08051963F	196k Ohms
Resr	Vishay	CRCW08051R00F	1 Ohms
Ri	Vishay	CRCW08051002F	10k Ohms
Ron	Vishay	CRCW08053242F	32.4k Ohms
Rphd	Vishay	CRCW08056040F	604 Ohms
Rset	Vishay	CRCW0805R20J	0.2 Ohms
Rtail	Vishay	CRCW08053923F	392k Ohms
U1	National Semiconductor	LM5010	

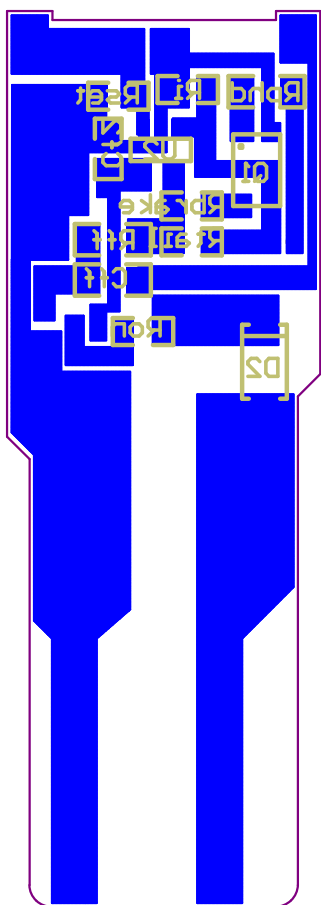


FIGURE 2. Board's Bottom View

PADC_NSCYYYY_lo_1

Notes

Notes

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