

12V AC-DC MC34063 LED Buck Driver

Application Brief



ON Semiconductor®

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Driving One 350 ma LED from a 12V source

Figure 1 shows a schematic for driving one 350 ma LED from a 12V DC source. The MC34063 is used in a step down topology. The chip is a basic DC/DC controller with a 1.5A switch. The current through the LED is sensed by a 3.6ohm 1W resistor. The voltage across the resistor is used as the feedback voltage (1.25V) for the controller. R2 keeps the current at about 350 ma. With 470 pf used as the timing capacitor the oscillator runs at about 50 khz. R1 limits the current for short circuit conditions and C4 provides filtering for the feedback voltage.

12 V DC Buck One LED

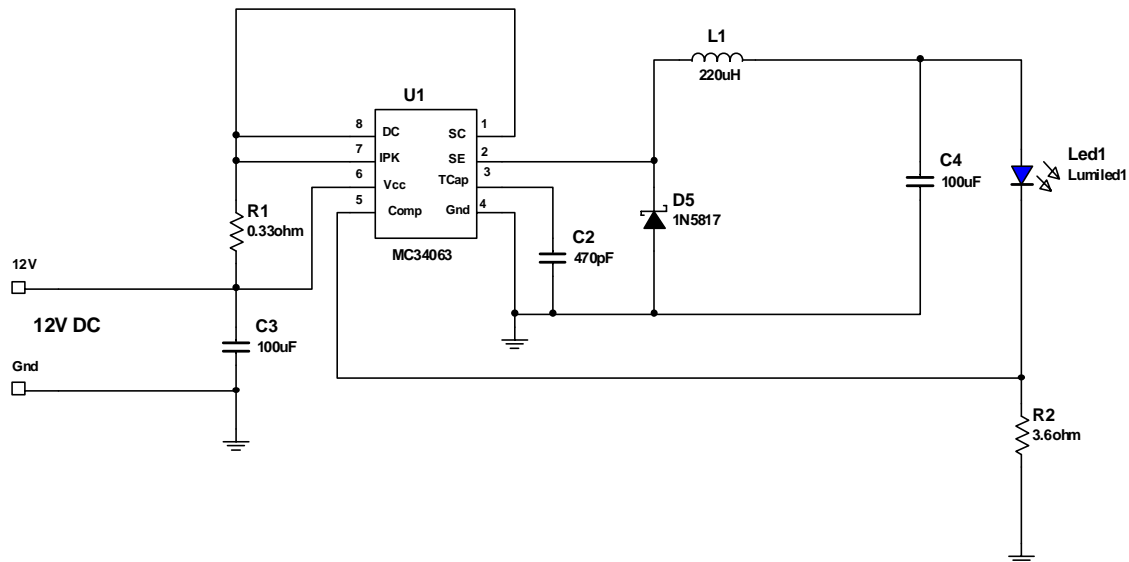


Figure 1

Figure 2 shows the same schematic with a diode bridge added. This allows operation with a 12V AC transformer.

12V AC Buck One LED

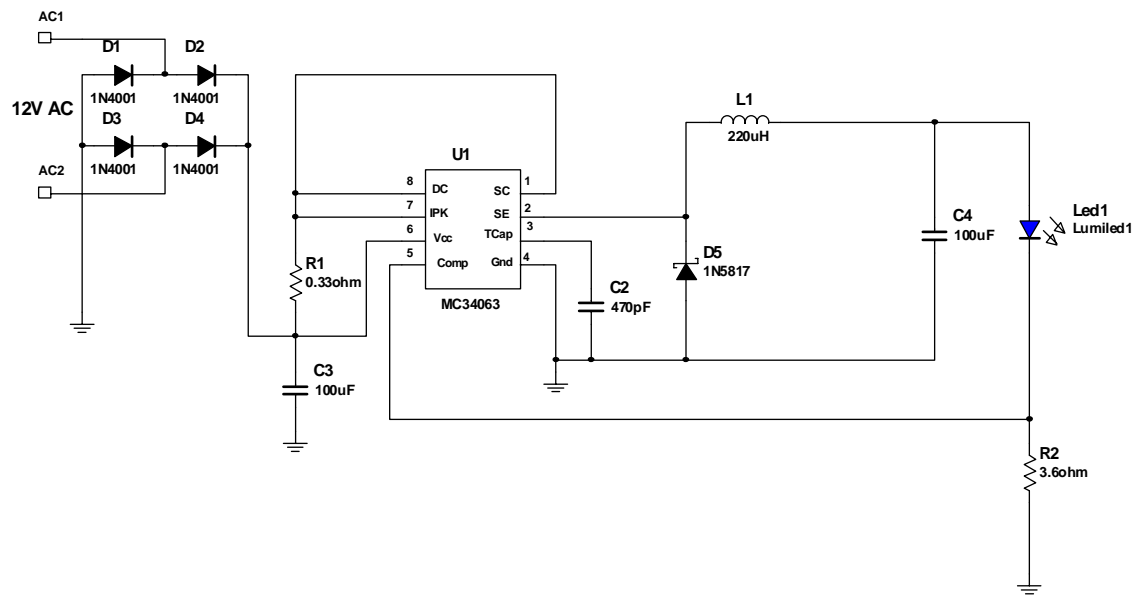


Figure 2

Figure 3 shows a further refinement with a PNP transistor (2N3906) used as a level shifter. This allows a smaller resistor (1.8 ohm) and reduces the power dissipated since the resistor voltage is now only about half (.65V) of what it was in the previous schematic.

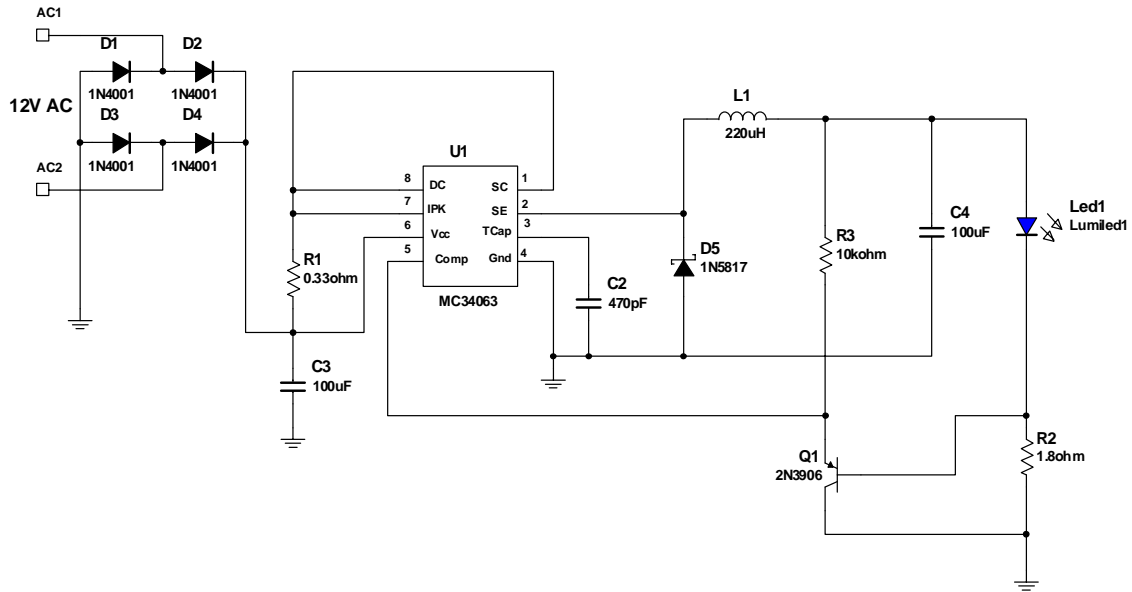


Figure 3

Figure 4 shows the 12V AC_DC demo board with a ACE microcontroller used for dimming with a PWM signal feeding the current sense node. By using the jumpers this board can work with either an AC or a DC 12V source.

MC34063 AC/DC Buck Demo Board

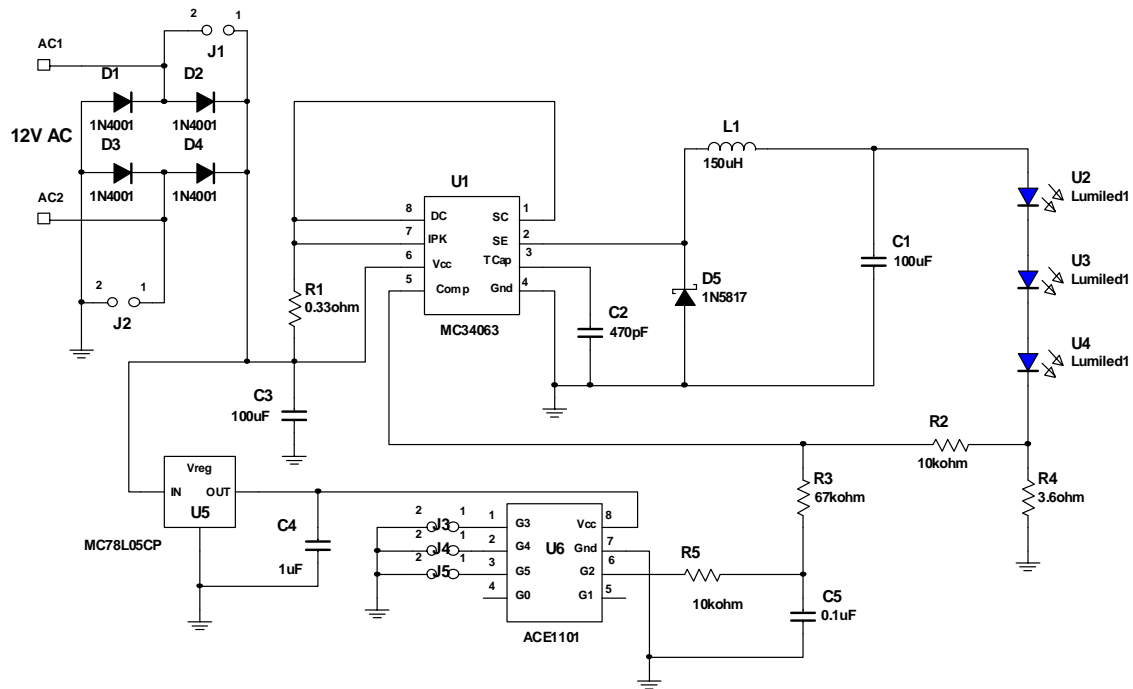
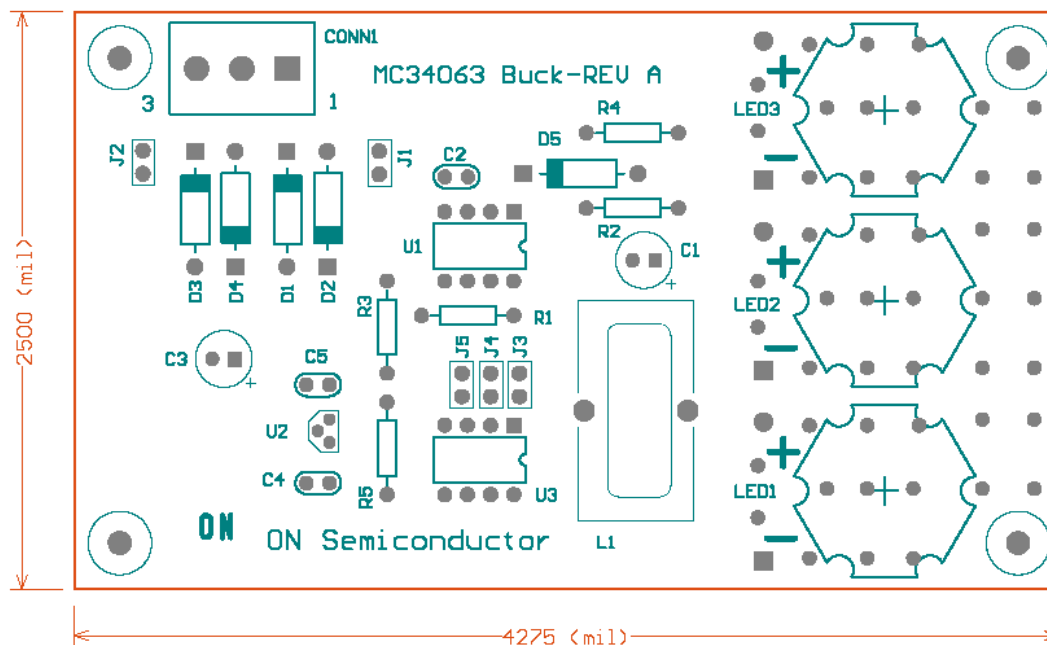
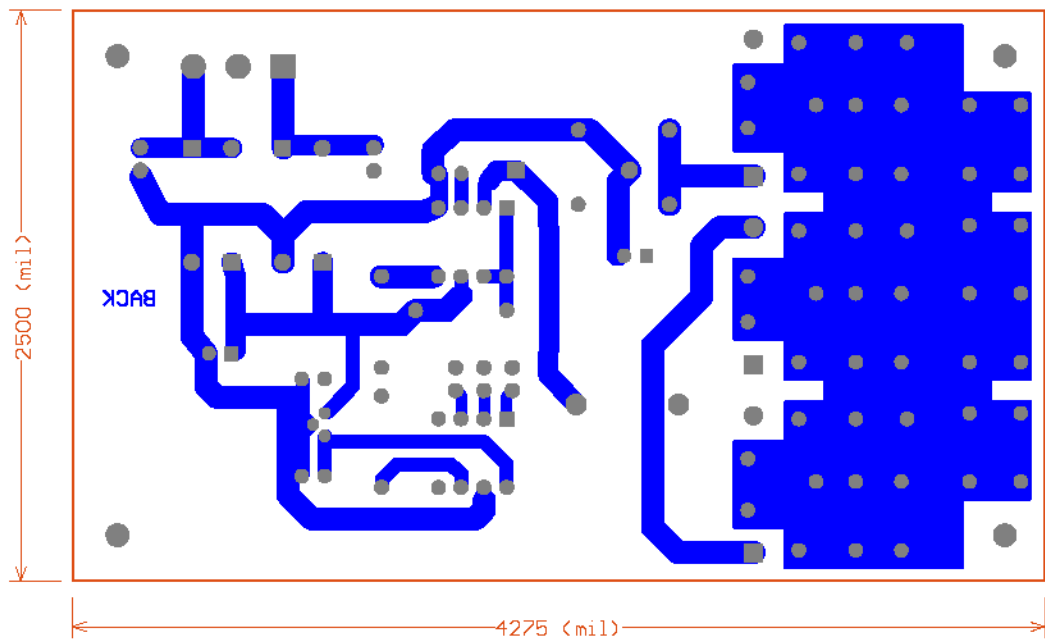
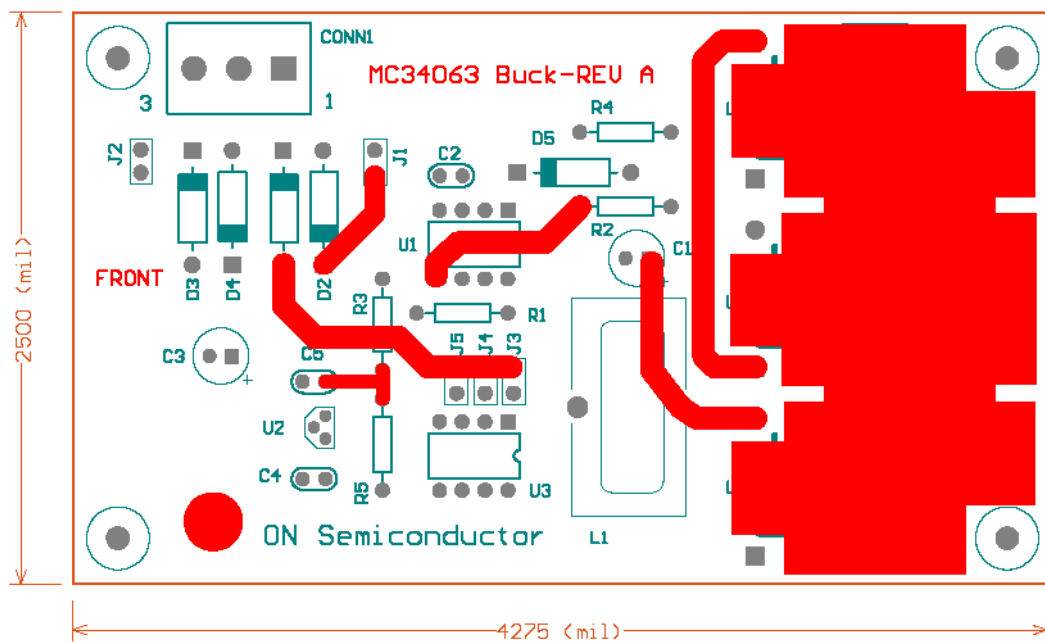


Figure
4





Bill of Materials

Ref.	Qty.	Description	Value	Package	Vendor	Vendor PN	Digikey #
U1	1	IC, Current-Mode Controller		Dip 8	ON Semi	MC34063AP1	
U2	1	White LumiLED		Star	Luxeon	LXHL-MWIC	
U3	1	White LumiLED		Star	Luxeon	LXHL-MWIC	
U4	1	White LumiLED		Star	Luxeon	LXHL-MWIC	
D1	1	Diode	50V 1A	DO-41	ON Semi	1N4001	
D2	1	Diode	50V 1A	DO-41	ON Semi	1N4001	
D3	1	Diode	50V 1A	DO-41	ON Semi	1N4001	
D4	1	Diode	50V 1A	DO-41	ON Semi	1N4001	
D5	1	Diode	20V Schottky	DO-41	ON Semi	1N5817	
C1	1	Capacitor	100uf	Leaded	Panasonic	EEU-FC1H101	
C2	1	Capacitor	470 pf	Leaded	Kemet	C315C471K1G5CA	
C3	1	Capacitor	100 uf	Leaded	Panasonic	EEU-FC1H101	
C4	1	Capacitor	1uF	Leaded	B.C.		BC1151CT-ND
C5	1	Capacitor	.1uF	Leaded	Kemet	C320C104K5R5CA	399-2054-ND
R1	1	Resistor	0.33 ohm		Ohmite		41FR33-ND
R2	1	Resistor	.1 ohm		Dale	LV4-1-0.1-1%	
R3	1	Resistor	67 K ohm		YAGEO		66.5KXBK-ND
R4	1	Resistor	3.6 ohm		Panasonic		P3.6W-1BK-ND
R5	1	Resistor	10K ohm		YAGEO		10.0KXBK-ND
L1	1	Inductor	100 uh		Talema	SWC-3.0-150	TE2024-ND
PCB	1	MC34063 BUCK REV A					