AN-1899 LM3405A eMSOP Evaluation Board

1 Introduction

This evaluation board converts an input voltage of 5V to 18V, and can illuminate up to four 750 mA LEDs using the LM3405A eMSOP 1.6 MHz LED Driver samples. A bill of materials included describes the parts used on this evaluation board. A schematic and layout have also been included with measured performance characteristics of the evaluation board.

2 LM3405A eMSOP Evaluation Board Schematic

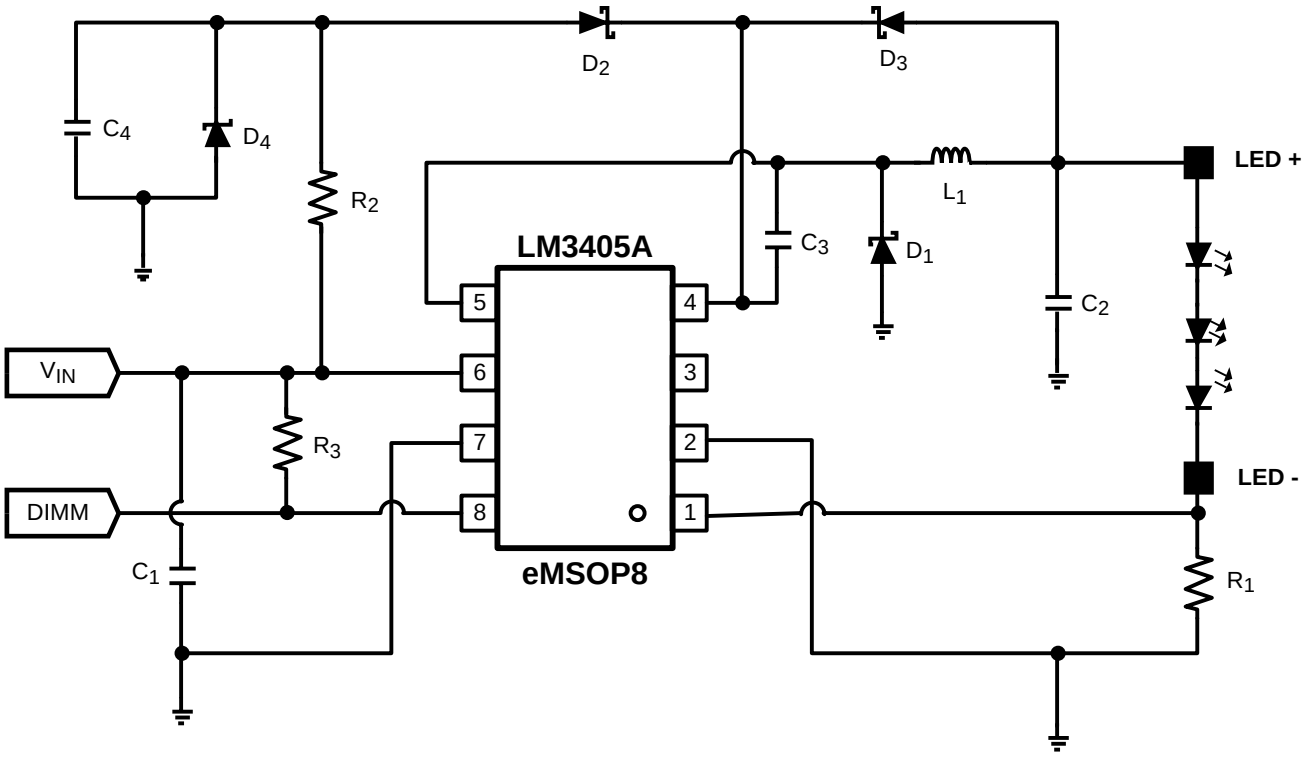

Figure 1. LM3405A eMSOP Evaluation Board Schematic

3 LM3405A eMSOP Pin-Out

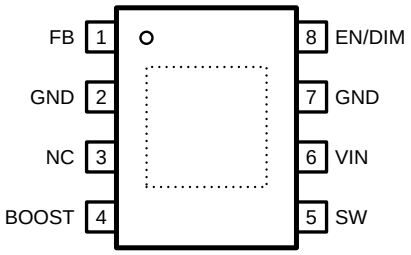

Figure 2. 8-Pin eMSOP Pin Out

4 Four Methods of Deriving V_{BOOST}

The standard evaluation board derives V_{BOOST} voltage using the "Shunt Zener" configuration, shown in Figure 1. Depending on the specific application, V_{BOOST} voltage can be derived by loading and no-loading external components on the evaluation PCB. The following four schematics show methods to derive V_{BOOST}.

4.1 V_{BOOST} Derived from Shunt Zener Configuration

This configuration, Figure 3, is recommended for distributed input voltages that have a wide voltage variation. The shunt zener acts as basic voltage regulator for the V_{BOOST} voltage. D4 should have a typical value of 3.6V to 5.1V, R2 = (V_{IN} - V_{zener})/4 mA, C4 = 0.10 µF.

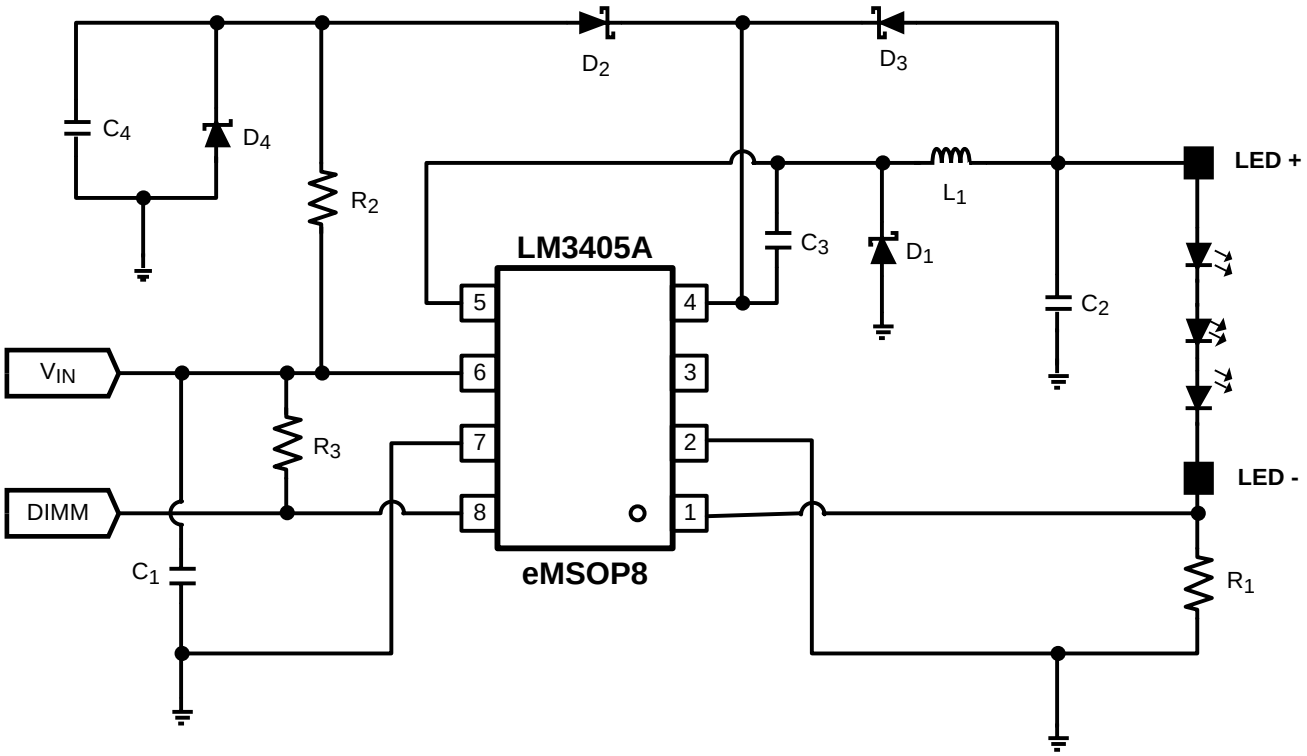

Figure 3. V_{BOOST} Derived from Shunt Zener Configuration

4.2 V_{BOOST} Derived from V_{OUT}

Use this configuration, Figure 4, for output voltages (V_{LED}) that are between 3V and 5.5V.

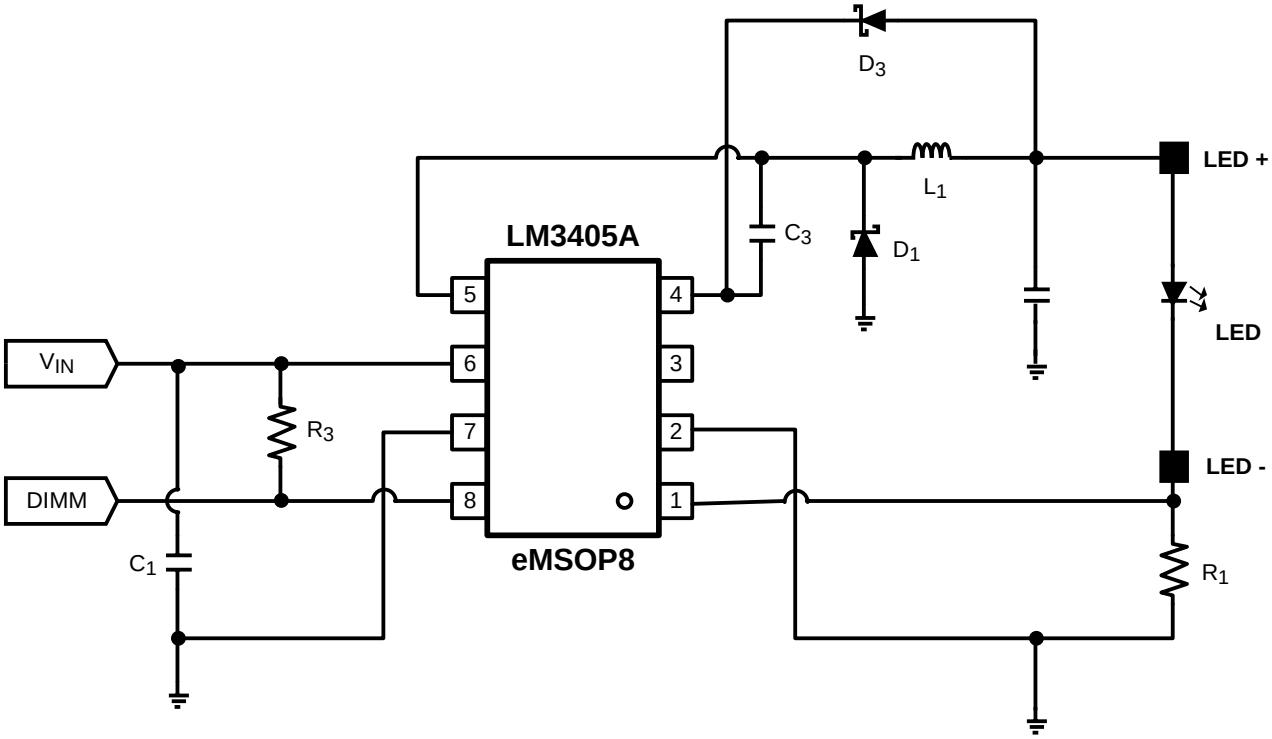

Figure 4. V_{BOOST} Derived from V_{OUT}

4.3 V_{BOOST} Derived from V_{IN}

Use this configuration, Figure 5, for input voltages that are between 3V and 5.5V.

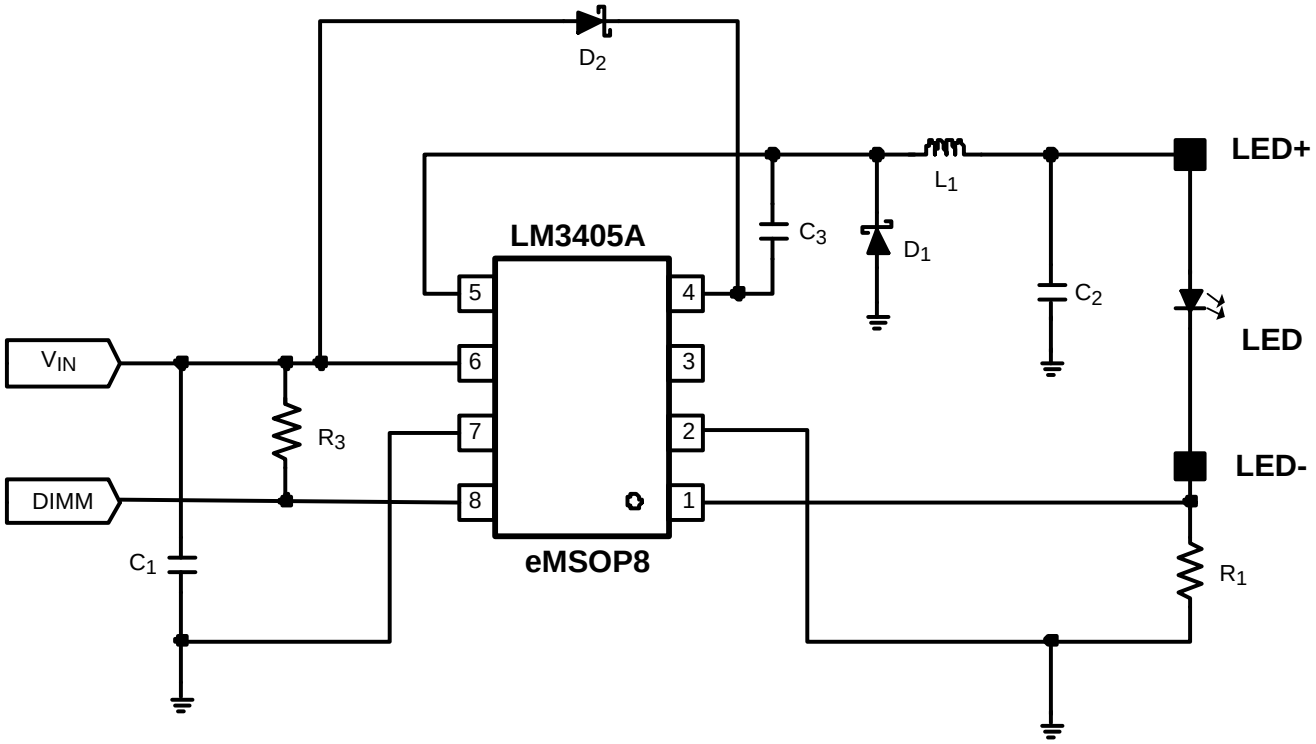

Figure 5. V_{BOOST} Derived from V_{IN}

4.4 V_{BOOST} Derived from External Supply

This method of deriving the V_{BOOST} voltage, Figure 6, is recommended if the distributed voltage used for point of load regulation is greater than 5V, but there is access to an external voltage between 3V and 5V. The typical current draw from the external supply would be approximately 2.50 mA.

5.5V >$V_{EXTERNAL}$ > 3V

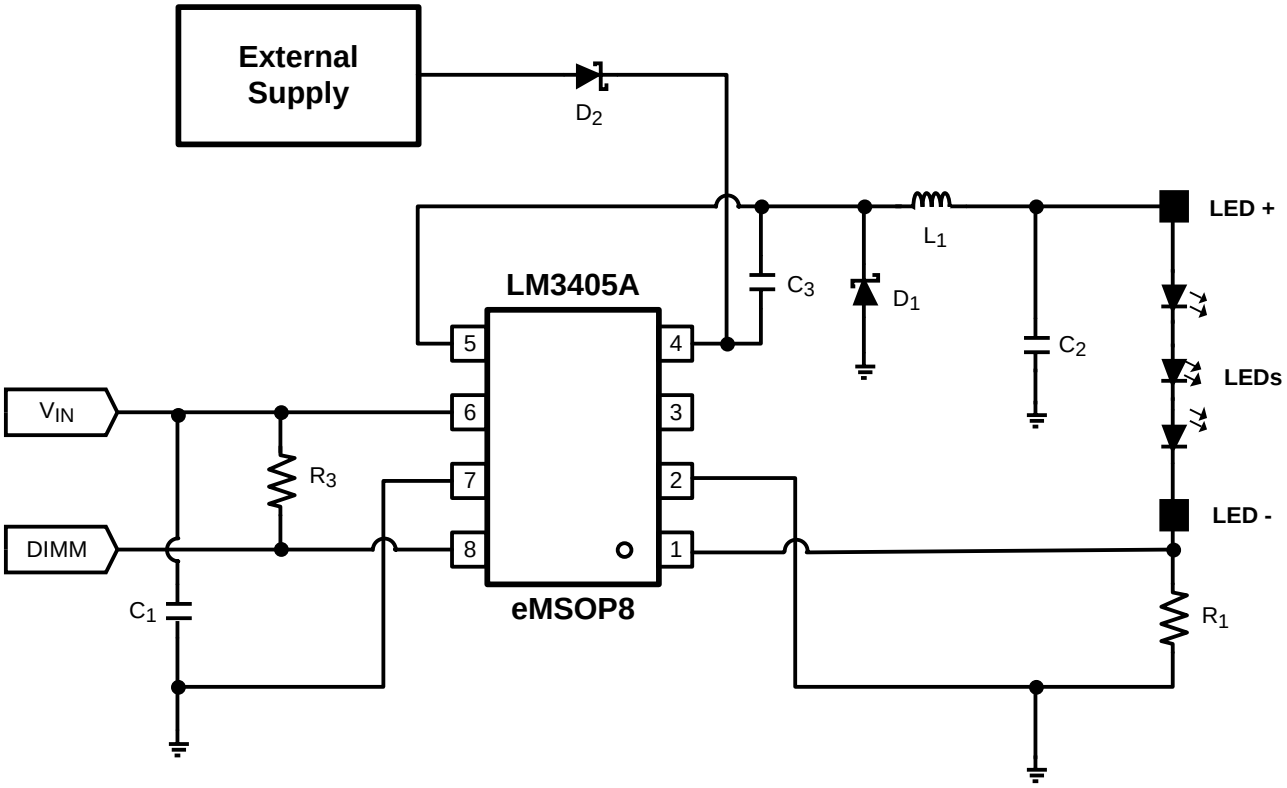

Figure 6. V_{BOOST} Derived from External Supply

5 PCB Top Layer

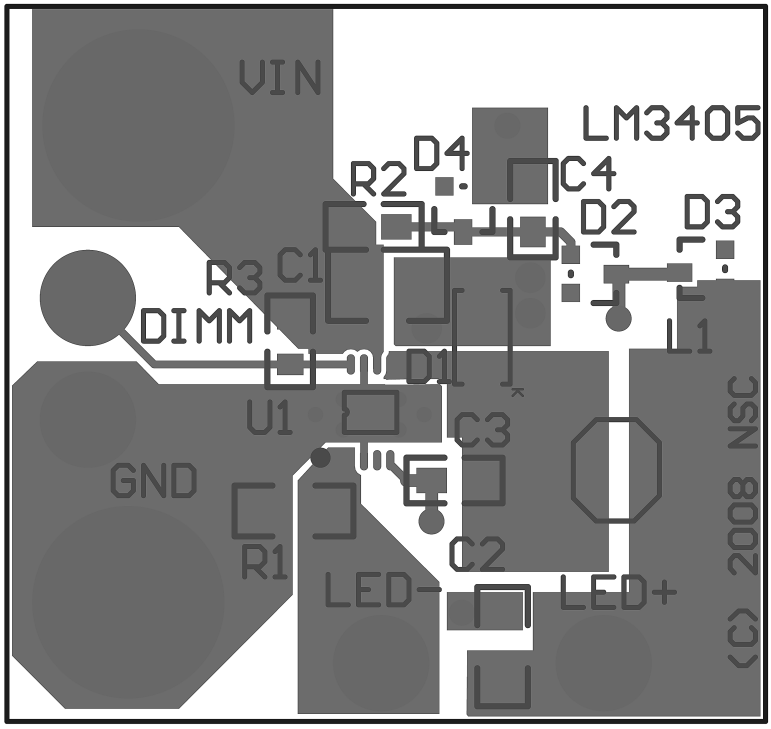

Figure 7. Layout, Top Layer

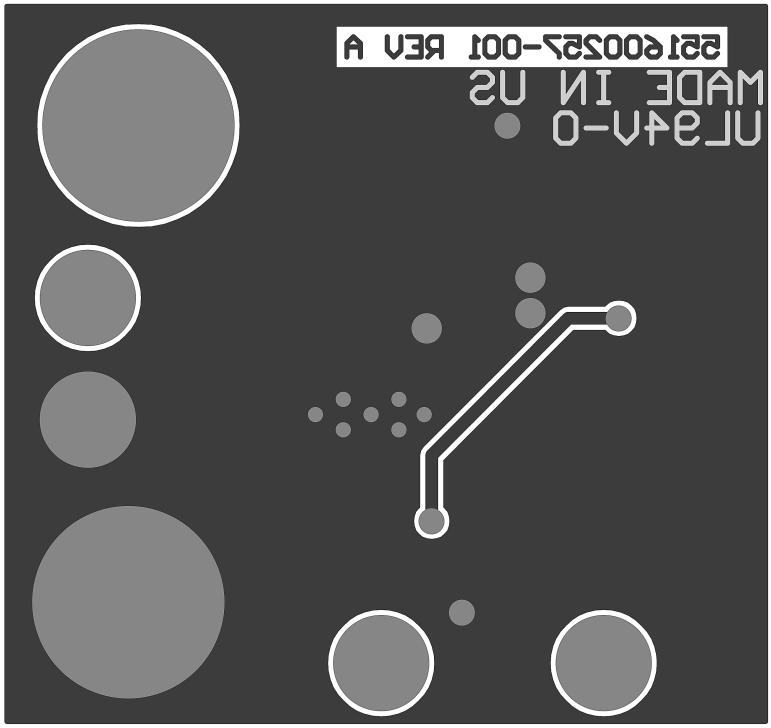

Figure 8. Layout, Bottom Layer

6 Bill of Materials

Table 1. Bill of Materials

Part ID	Part Value	Manufacturer	Part Number
U1	1A Buck LED Driver eMSOP	Texas Instruments	LM3405AXMY
C1, Input Cap	10 µF, 25V, X5R (1210)	TDK	C3225X5R1E106M
C2, Output Cap	4.7 µF, 25V, X5R (1206)	TDK	C3216X5R1E475M
C3	2.2 µF (0805)	TDK	C2012X5R1E225M
C4	1.0 µF (0805)	TDK	C2012X5R1E105M
D1, Catch Diode	$0.3V_f$ Schottky 1.5A, $30V_R$	TOSHIBA	CRS08
D2	SOT23 Schottky	Vishay	BAT54-V
D3	SOT23 Schottky	Vishay	BAT54-V **(No Load)**
D4	4.3V Zenner SOT23	Vishay	BZX84C4V3-V
L1	4.7 µH, 1.5A,	CoilCraft	MOS6020-472MLB
R1	267 mΩ (1206)	Vishay	
R2	1 kΩ, 1%	Vishay	CRCW08051001F
R3	10.0 kΩ, 1%	Vishay	CRCW08051002F

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