Introduction

The AAT1154 evaluation board demonstrates performance, along with the suggested size and placement of external components, for the AAT1154 integrated buck regulator. The external components are selected for minimum size and optimum operation up to 3.0A output current. Please refer to the AAT1154 datasheet for more details about this product.

Component Summary

Capacitor C4 is a high equivalent series resistance (ESR) tantalum for damping the high Q input network associated with the inductance of the leads feeding the input power to the evaluation board and the low ESR 10µF ceramic input capacitor (C1). R2 is a pull-up resistor to allow the enable pin to be used to enable and disable the IC by either shorting the enable pin to GND or leaving the pin open. Both R2 and C4 are for demonstration purposes only and are not necessary in the final solution. Resistors R3 and R4 are used with the 1V model to set the out voltage to any desired value from 1V to as high as 200mV below the minimum input voltage. They are not required for the fixed output voltage versions of the AAT1154. For fixed output voltage versions, R4 is omitted and R3 is replaced with a short.

Layout

As with all switching power supplies, the board layout for the AAT1154 is critical (see Figure 1). Special care has been taken with the placement of the external components. The input capacitor (C1) placement is critical; it must be placed immediately adjacent to the AAT1154. As can be seen in Figure 2, the LX node trace has been routed under C1 in order to facilitate placement of C1 close to the IC. The output voltage feedback trace has been routed on the portion of the back side of the board which has a ground plane on the top side (see Figure 3). The trace is routed to avoid the LX node and associated noise. Please refer to Table 1 for AAT1154 evaluation board specifications.

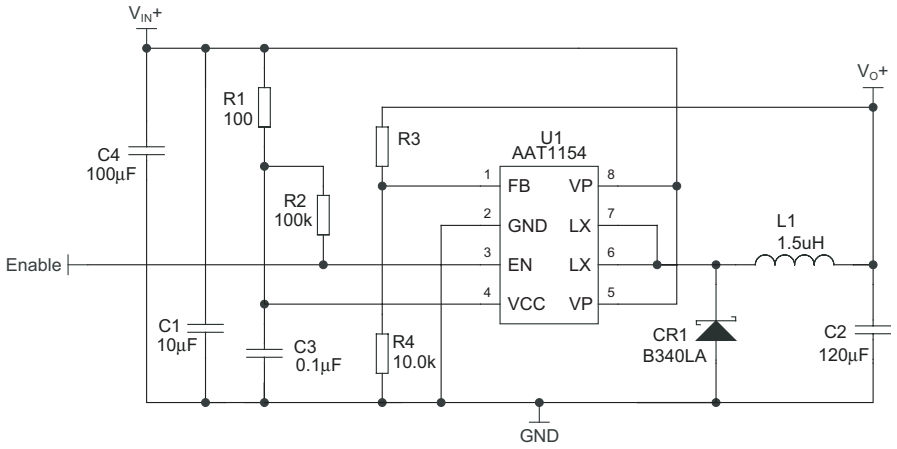

Figure 1: AAT1154 Evaluation Board Schematic.

Specification	Test Conditions	Min	Typ	Max	Units
Input Voltage		2.7	3.6	5.5	V
Output Error Voltage			±3		%
Output Current		0		3.0	A

Table 1: AAT1154 Evaluation Board Specifications.

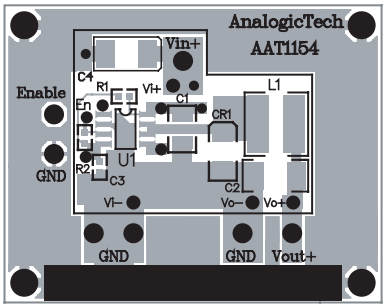

Figure 2: AAT1154 Evaluation Board PCB Top Side.

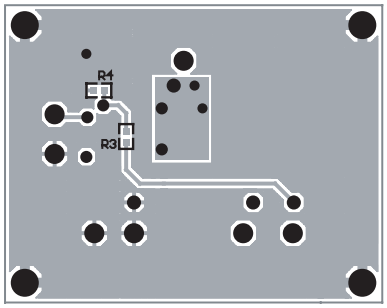

Figure 3: AAT1154 Evaluation Board PCB Bottom Side.

Test Equipment

1. 6.0V 10A laboratory power supply: HP33401A or equivalent.
2. DC 0A to 3.0A load capable of operation down to 1.0V: Keithley 2400 or equivalent. When using the Keithley 2400, set the meter to zero volts in voltage source mode and set the load current by varying the current compliance (maximum current) of the meter.
3. DC voltmeter: HP34401A or equivalent.
4. Oscilloscope: Tektronix TDS744A or equivalent.

Setup and Test

A: Load and Line Regulation (see connection diagram in Figure 4)

1. Apply a DC power supply and DC voltmeter across input voltage terminals: V_{IN}+ (positive terminal) and GND (negative terminal or return).
2. Apply a DC load and DC voltmeter to output terminals. $_{VO}$+ and GND.
3. Vary the load from 0 to 3.0A and the input voltage from 2.7V to 5.5V while monitoring the output voltage.
4. The output voltage as measured at the output terminals of the evaluation board should not vary by more than ±3% of the nominal voltage.

B: Short-Circuit and Over-Temperature Protection

1. Raise the input voltage to 5.5V.
2. Apply a short from V_O+ to GND at the evaluation board terminals.
3. Remove the short and verify that output returns to its initial value.

C: Enable Input and Power OK Output

1. Short the enable pin to GND. The output should decay to zero.
2. Remove the short applied to the enable pin. The output should recover to its initial value.

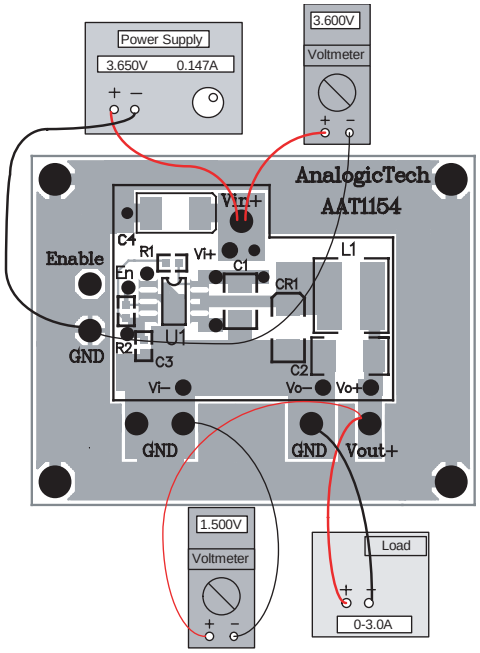

Figure 4: AAT1154 Connection Diagram.

Component	Part Number	Description	Manufacturer
U1	AAT1154IKS-1.0-T1	1.0V, 1MHz, 3.0A Buck Converter	AnalogicTech
U1	AAT1154IKS-1.8-T1	1.8V, 1MHz, 3.0A Buck Converter	AnalogicTech
U1	AAT1154IKS-2.5-T1	2.5V, 1MHz, 3.0A Buck Converter	AnalogicTech
U1	AAT1154IKS-3.3-T1	3.3V, 1MHz, 3.0A Buck Converter	AnalogicTech
CR1	B340LA	Low V_F, 3A, 40V Schottky Diode	Diodes Inc.
C2	594D127X96R6R3C2T	120µF, 6.3V, Tantalum	Vishay
C4	565D107X0016C	100µF, 16V, Tantalum	Vishay
C1	GRM319R60J106KE01	10µF, 6.3V, X5R, 10%, 1206	MuRata
C3	GRM155R61A104KA01	0.1µF, 25V, X5R, 10%, 0603	MuRata
R1	Chip Resistor	100kΩ, 5%, 1/10W, 0603	Vishay
R2	Chip Resistor	100kΩ, 5%, 1/10W, 0603	Vishay
L1	CDRH6D28-1R5	1.5µH Shielded Inductor	Sumida
R3	Chip Resistor	AAT1154IKS-1.0-T1, Table 3, 1%, 1/10W, 0603	Vishay
		AAT1154IKS-1.8-T1 thru AAT1154IKS-3.3 -T1; 0Ω, 0603	Vishay
R4	Chip Resistor	AAT1154IKS-1.0-T1 (for output greater than 1.0V); 10kΩ, 1%, 1/10W; 0603	Vishay
		AAT1154IKS-1.8-T1 thru AAT1154IKS-3.3 -T1	n/a

Table 2: AAT1154 EVAL Bill of Materials.

Output Voltage

For an adjustable output, set R4 to 10kΩ and select R3 according to Table 3 using the AAT1154IKS-1.0-T1.

V_O (V)	R3 (kΩ)
1.0	0.00 (short)
1.1	1.00
1.2	2.00
1.25	2.55
1.3	3.01
1.4	4.02
1.5	4.99
1.6	6.04
1.7	6.98
1.8	8.06
1.85	8.45
1.9	9.09
2.0	10.0
2.1	11.0
2.2	12.1
2.3	13.0
2.4	14.0
2.5	15.0
3.3	23.2

Table 3: Resistor Selection for Adjustable Output Voltage (R4=10.0kΩ).

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