

Introduction

The AAT1143 evaluation board demonstrates performance, as well as suggested size and placement of external components, for the AAT1143 integrated buck regulator. The external components are selected for minimum size and optimum operation up to 400mA output current. Resistors R1 and R2 set the output voltage. For improved transient response, a 100pF to 150pF capacitor can be used for C4, along with increasing the value of C1 to 10 μ F. C3 is available for cases where additional external compensation is necessary; for most applications it is not used. Refer to the AAT1143 datasheet for more details about this product.

Layout

As with all switching power supplies, the board layout for the AAT1143 is critical (see Figure 1). Special care has been taken with the placement of external components. The input capacitor (C2) placement is critical. It must be placed immediately adjacent to the AAT1143. As shown in Figure 2, 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 also routed to avoid the LX node and associated noise. Resistors R1 and R2 are placed as closely as possible to the AAT1143 in order to minimize the length of the trace for the high impedance node associated with the OUT pin. This minimizes the potential for external noise associated with the power stage of the AAT1143 and other circuitry coupling into the feedback of the AAT1143. Please refer to Table 1 for AAT1143 evaluation board specifications.

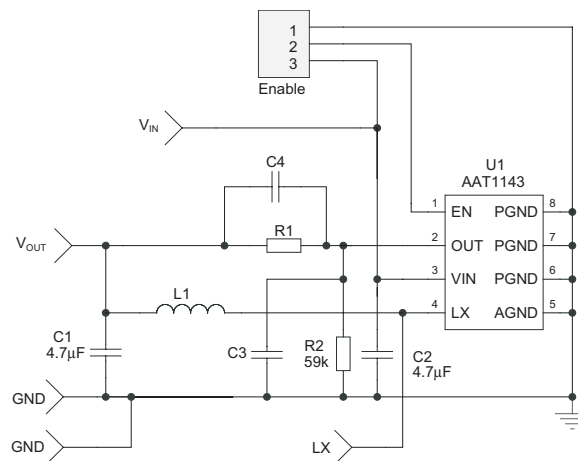


Figure 1: AAT1143 Evaluation Board Schematic for Enhanced Transient Response Version; C4 = 100pF; C1 = 10 μ F.

Specification	Test Conditions	Min	Typ	Max	Units
Input Voltage		2.7	3.6	5.5	V
Output Error Voltage		-3		+3	%
Output Current		0		0.4	A

Table 1: AAT1143 Evaluation Board Specifications.

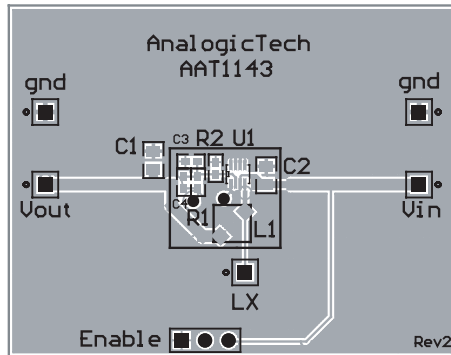


Figure 2: AAT1143 Evaluation Board PCB Top Side.

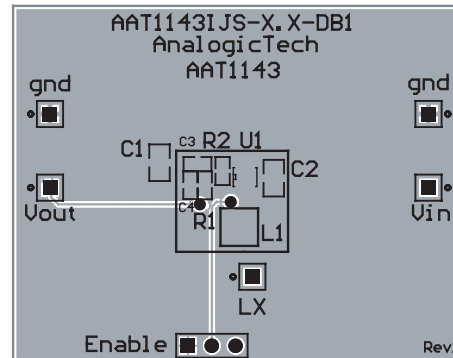


Figure 3: AAT1143 Evaluation Board PCB Bottom Side.

Test Equipment

1. 6.0V 1.0A laboratory power supply: HP33401A or equivalent.
2. DC 0 to 0.4A electronic load, capable of operation down to 0.6V: Keithley 2400 or equivalent. (When using the Keithley 2400, set the meter to operate 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. Short (apply jumper to) Pins 2 and 3 of the enable connector.
2. Apply a DC power supply and DC voltmeter across input voltage terminals: V_{IN} (positive terminal) and GND (negative terminal or return).
3. Apply a DC load and DC voltmeter to output terminals V_{OUT} and GND.
4. Vary the load from 0 to 0.4A and the input voltage from 2.7V to 5.5V while monitoring the output voltage.
5. The output voltage as measured at the output terminals of the evaluation boards should not vary by more than $\pm 1\%$ 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_{OUT} to GND at the evaluation board terminals.
3. Remove the short and verify that output returns to its initial value.

C: Enable Input

1. Remove the jumper from Pins 2 and 3 of the enable connector and apply to Pins 1 and 2. The output should decay to zero.
2. Remove the short and replace the short from Pins 2 to 3 of the enable connector. The output should recover to its initial value.

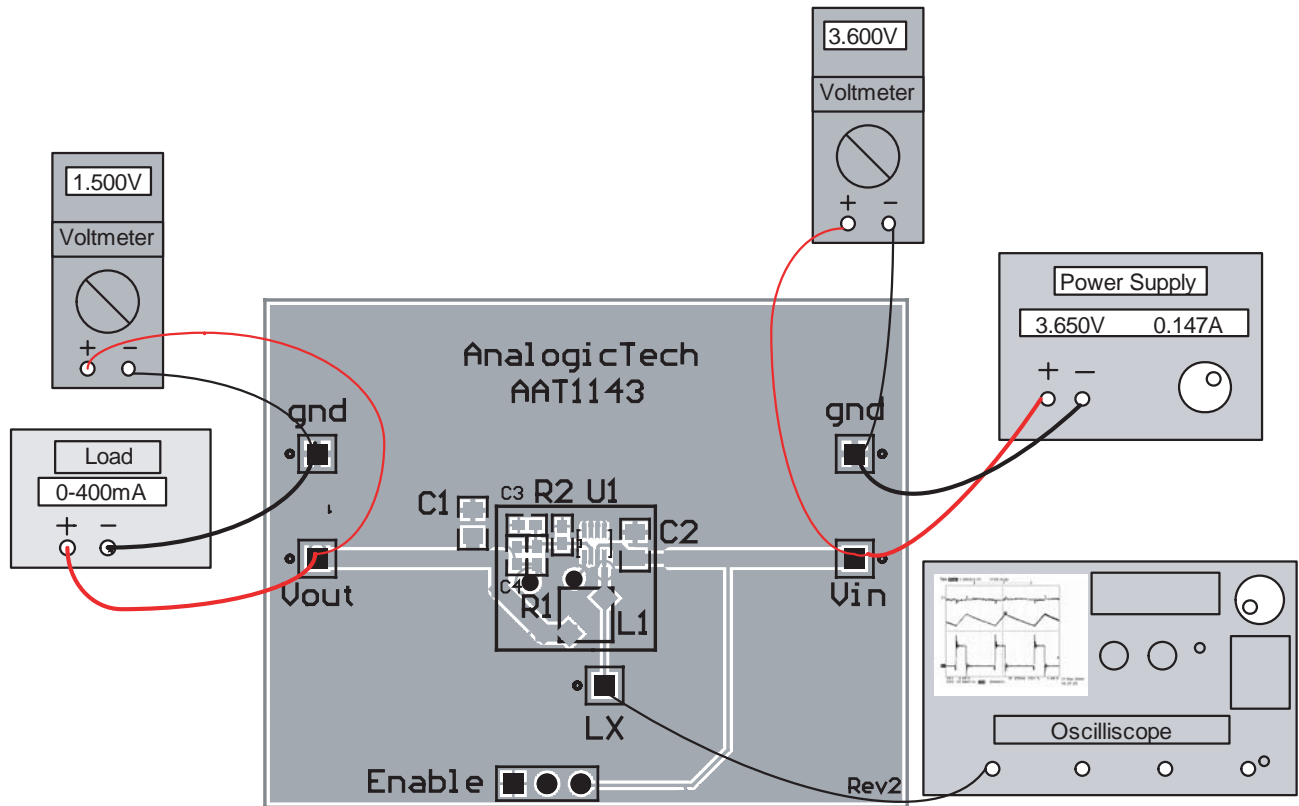


Figure 4: AAT1143 Connection Diagram.

Component	Part Number	Description	Manufacturer
U1	AAT1143IJS-0.6-T1, AAT1143IJS-1.5-T1	1MHz 0.4A Buck Converter	AnalogicTech
C2	GRM319R60J476KE01	4.7 μ F, 10V, X5R, 10%, 0805	MuRata
C1	GRM319R60J476KE01	4.7 μ F, 10V, X5R, 10%, 0805	MuRata
	GRM319R60J106KE01	10 μ F, 6.3V, X5R, 10%, 0805 (optional for improved transient response ¹)	
R1	Chip Resistor	See Table 3, 1%, 1/16W, 0402	Vishay
R2	Chip Resistor	59.0k Ω , 1%, 1/16W, 0402	Vishay
L1	CDRH3D16-4R7	4.7 μ H, 105m Ω , 900mA, Shielded	Sumida
	CDRH3D16-10R	10 μ H, 210m Ω , 550mA, Shielded (see Table 3)	
C4	Chip Capacitor	100pF, 25V, C0G, 10%, 0402 (optional for improved transient response ¹)	Vishay
C3	Chip Capacitor	N/A	Vishay

Table 2: AAT1143 EVAL Bill of Materials.

1. For improved transient response version, add C4 and increase C1 to 10 μ F.

Output Voltage

For an adjustable output, set R2 to 59kΩ and select R1 according to Table 3.

V _O (V)	R1 (kΩ)	L1 (μH)
0.6	0	4.7
0.8	19.6	4.7
1.0	39.2	4.7
1.5	88.7	4.7
1.6	97.6	4.7
1.7	110	4.7
1.8	118	4.7
2.5	187	10

Table 3: Component Selection for Adjustable Output Voltage (R2 = 59.0kΩ).

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