

Introduction

The AAT1151 MSOP evaluation board demonstrates performance, along with the suggested size and placement of external components, for the AAT1151 integrated buck regulator. The external components are selected for minimum size and optimum operation up to 700mA output current. The output voltage can be adjusted with the use of the 1.0V version of the AAT1151 and external resistors R3 and R4. Please refer to the AAT1151 product datasheet for more details about this product.

Layout

As with all switching power supplies, the board layout for the AAT1151 is critical (see Figure 1). Special care has been taken with the placement of the external components. The input capacitor (C1) placement is critical and it must be located immediately adjacent to the AAT1151. As shown 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 see Table 1 for AAT1151 MSOP evaluation board specifications.

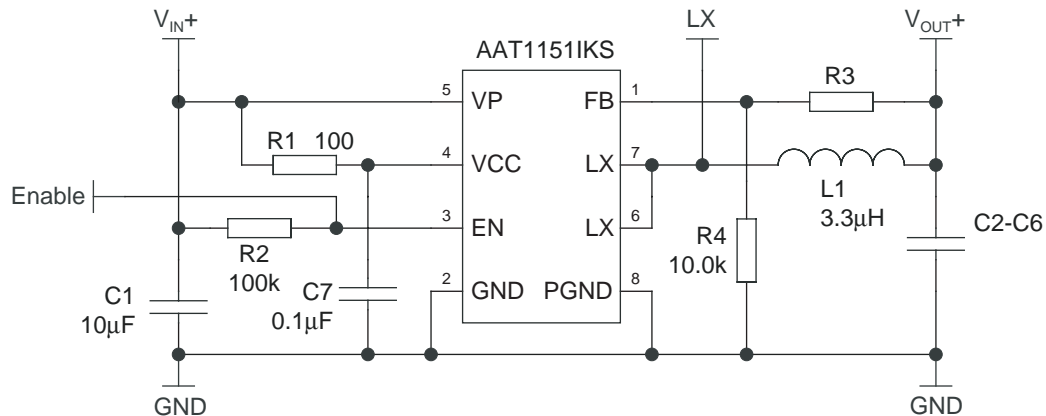
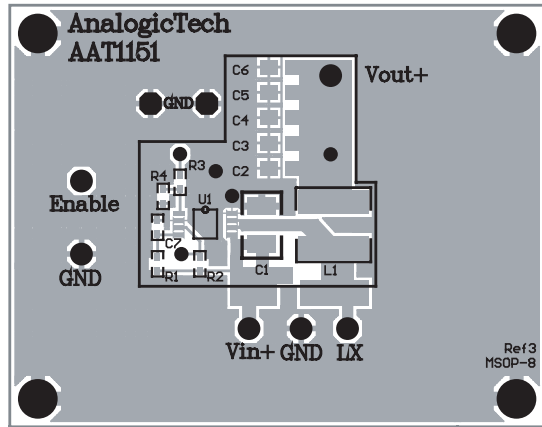


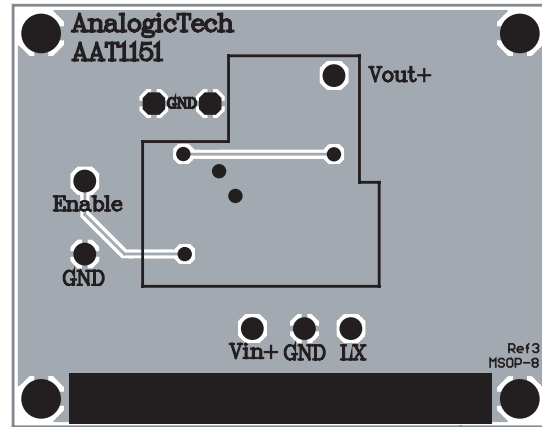
Figure 1: AAT1151 MSOP Evaluation Board Schematic.

Specification	Test Conditions	Min	Typ	Max	Units
Input Voltage		2.7	3.6	5.5	V
Output Error Voltage		-3		+3	%
Output Current		0		700	mA

Table 1: AAT1151 MSOP Evaluation Board Specifications.



**Figure 2: AAT1151 MSOP
Evaluation Board PCB Top Side.**



**Figure 3: AAT1151 MSOP
Evaluation Board PCB Bottom Side.**

Test Equipment

1. 6.0V 1.0A laboratory power supply: HP33401A or equivalent.
2. DC 0A to 700mA 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 V_{O+} and GND.
3. Vary the load from 0A to 0.7A 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 $\pm 3\%$ 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 the output returns to its initial value.

C. Enable Input

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.

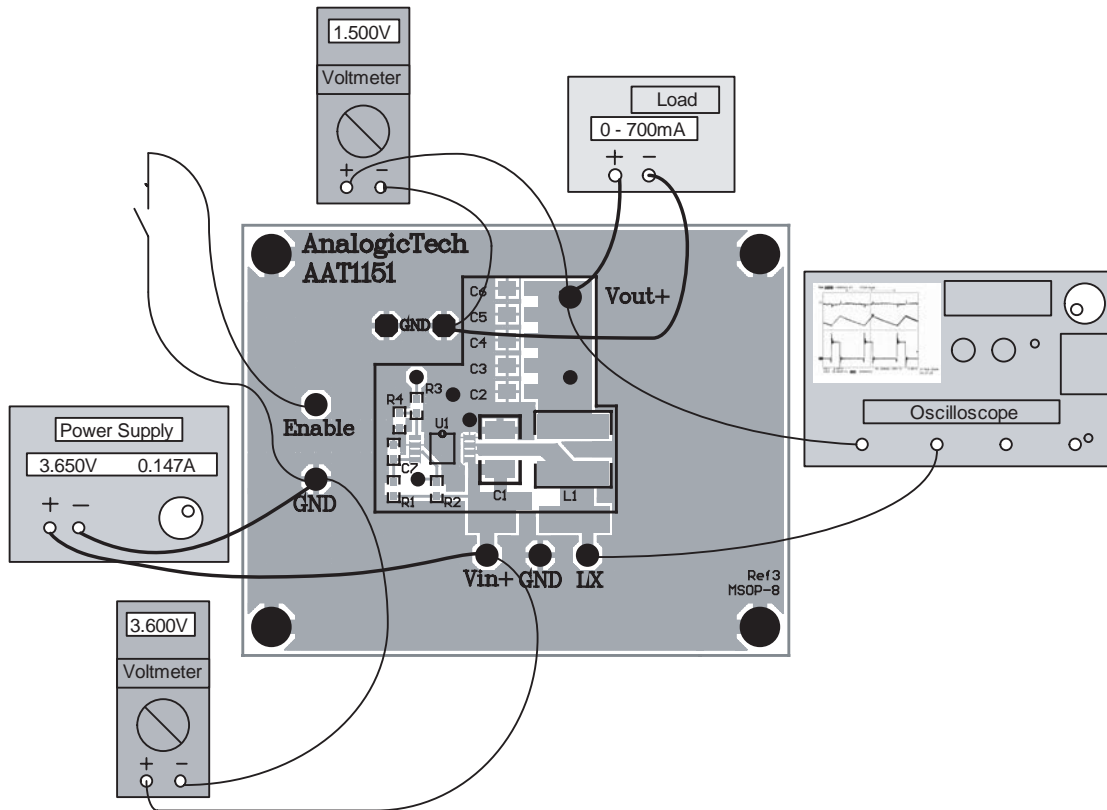


Figure 4: AAT1151 MSOP Connection Diagram.

Component	Part Number	Description	Quantity	Manufacturer	
U1	AAT1151IKS-1.0-T1	1.0V 700mA Adjustable Buck Converter	1	AnalogicTech	
U1	AAT1151IKS-1.8-T1	1.8V 700mA Buck Converter	1	AnalogicTech	
U1	AAT1151IKS-2.5-T1	2.5V 700mA Buck Converter	1	AnalogicTech	
C2-C6 ¹	GRM21BR60J106KE19	10µF, 6.3V, X5R, 10%, 0805	4	MuRata	
C2-C6 ¹	GRM21BR60J226KE39	22µF, 6.3V, X5R, 10%, 0805	2	MuRata	
C1	GRM319R60J106KE01	10µF, 6.3V, X5R, 10%, 1206	1	MuRata	
C7	GRM155R61A104KA01	0.1µF, 25V, X5R, 10%, 0402	1	MuRata	
R1	Chip Resistor	100kΩ, 5%, 1/16W; 0402	1	Vishay	
R2	Chip Resistor	100kΩ, 5%, 1/16W; 0402	1	Vishay	
R3	Chip Resistor	AAT1151IKS-1.0-T1	Table 3, 1%, 1/16W; 0402	1	Vishay
		AAT1151IKS-1.8-T1	0Ω, 0402	1	Vishay
		AAT1151IKS-2.5-T1	0Ω, 0402	1	Vishay
R4	Chip Resistor	10kΩ, 1%, 1/16W; 0402 (AAT1151IKS-1.0-T1 only)	1	Vishay	
L1	CDRH3D16-3R3	3.3µH 85mΩ 1.1A Shielded Inductor	1	Sumida	

Note 1. Either 4x 10µF or 2x 22µF capacitors can be used for C3-C7.

Table 2: AAT1151 MSOP EVAL Bill of Materials.

Output Voltage

For an adjustable output with the AAT1151IKS-1.0-T1, set R4 to 10k Ω and select R3 according to Table 3. When using a fixed output version of the AAT1151, R3 is a short and R4 is omitted.

V _O (V)	R3 (k Ω)
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 for AAT1151IKS-1.0-T1 (R4 = 10k Ω).

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