

CAT4201AGEVB

CAT4201 LED Driver Evaluation Board User's Manual



ON Semiconductor®

<http://onsemi.com>

Introduction

This document describes the CAT4201AGEVB evaluation board for the CAT4201 high efficiency step-down LED driver. Boards equipped with a 9 V battery and separate LED module can be used for demonstrations (see Figure 1).

The CAT4201 is a high efficiency step-down LED driver from Catalyst Semiconductor. This device is designed to drive high brightness LEDs up to 350 mA from a power supply up to 28 V. The LED brightness is controlled by a single resistor from the RSET pin to GND. Analog dimming and idle mode control are available through the CTRL input. An external circuit is provided on the CAT4201AGEVB for PWM dimming.

Operation Procedure

The CAT4201AGEVB board has two modes of operation. The first is normal operation and the second is operation with PWM dimming. Normal operation is set by placing jumper J1 in the right side position with pins 2 and 3 tied together. In this mode, the CTRL pin is pulled up to the LED cathode (LED-). The LED(s) will be at full brightness as

long as the CTRL pin is greater than 3 V. LED current can be set from 70 mA to 350 mA by adjusting potentiometer R2.

To set the board for PWM dimming, jumper J1 should be placed in the left side position with pins 1 and 2 tied together. A PWM signal can be applied to the PWM pin to dim the LED brightness. The amplitude of the PWM signal should be greater than 1 V.

Device Demonstration

To set up the CAT4201AGEVB for demonstrations, the board should be configured for normal operation with a 9 V battery securely placed in the holder. A separate LED module should also be plugged into the 6-pin connector, as shown in Figure 1. To turn on the LED, press and hold the *POWER* button. The LED will turn off once the button is released.

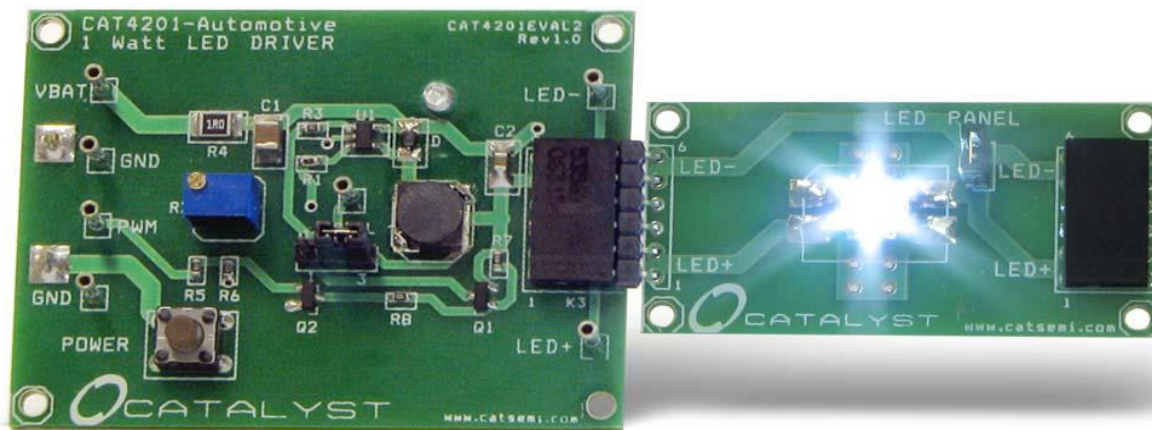


Figure 1. CAT4201AGEVB with LED Module

CAT4201AGEVB

SCHEMATIC

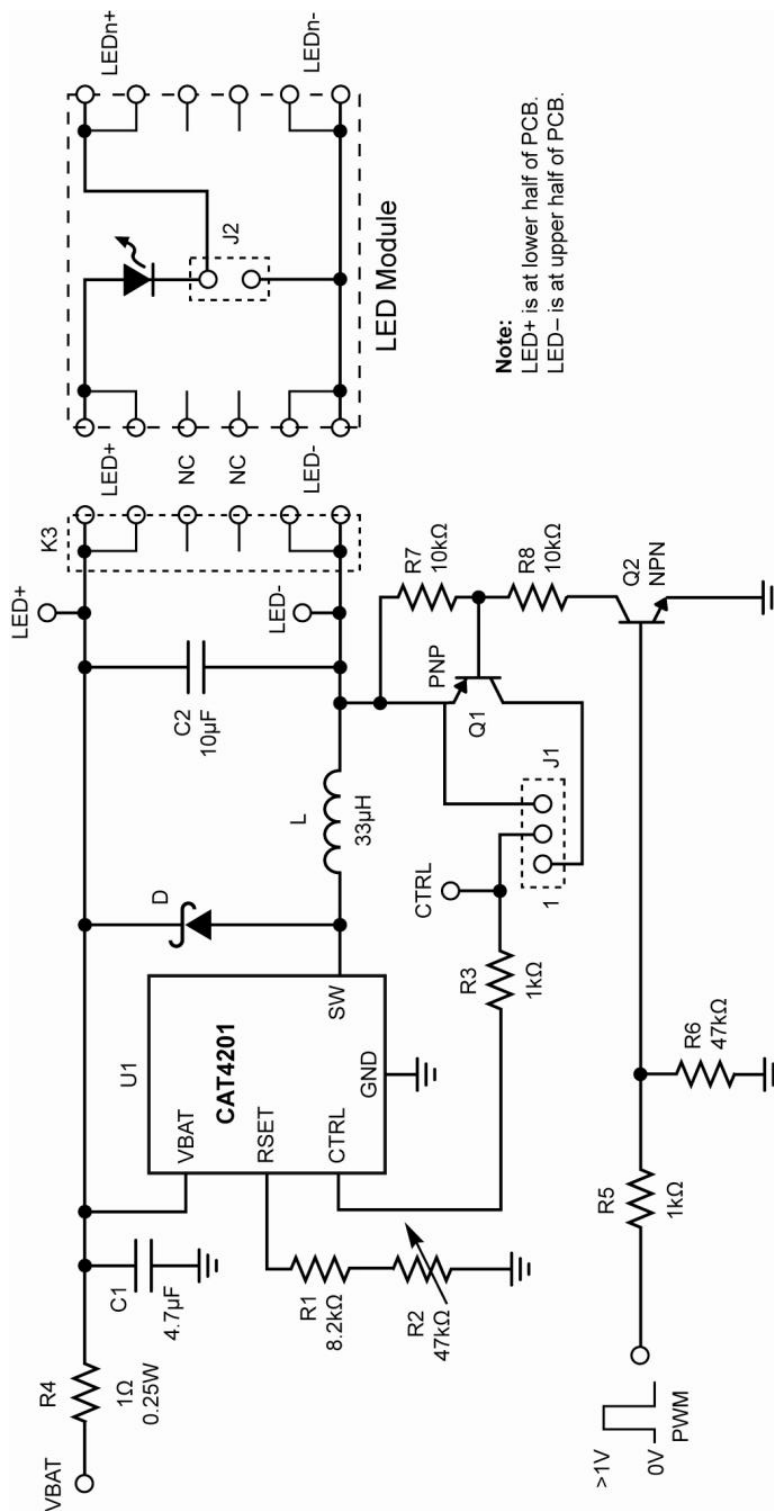


Figure 2. CAT4201AGEVB Schematic

CAT4201AGEVB

TEST PROCEDURE FOR THE CAT4201AGEVB EVALUATION BOARD

Introduction

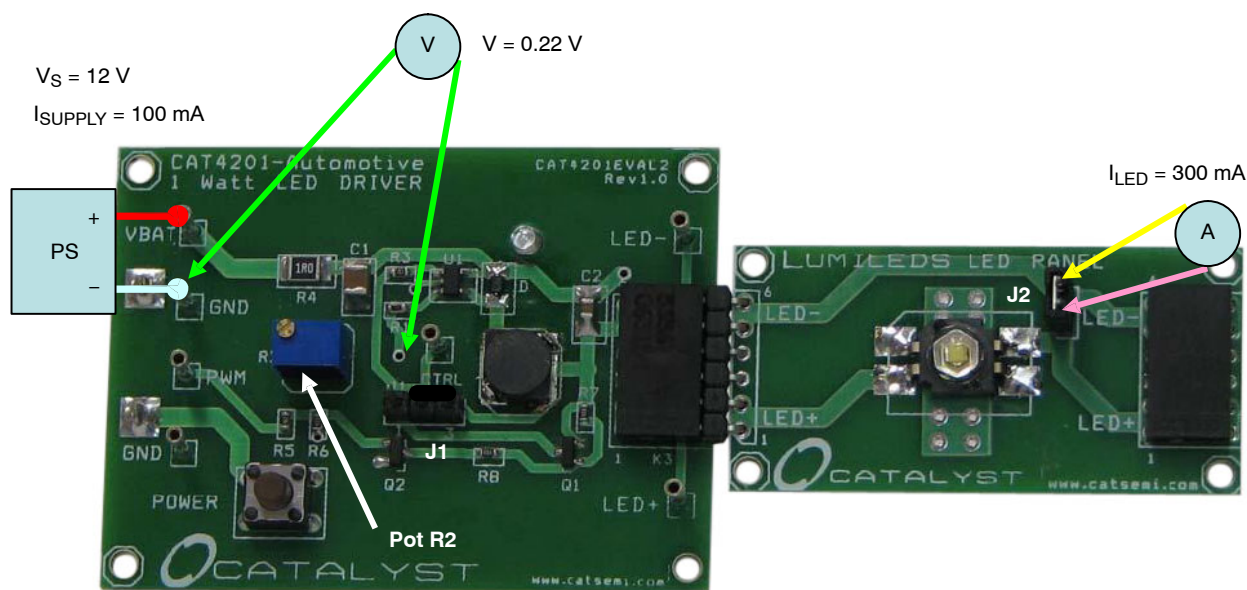
This document describes the test procedure for the CAT4201 evaluation board. The test procedure must be followed step-by-step in order to verify that the evaluation board is fully functional.

Test Set-up

The CAT4201 evaluation board must have the jumper J1 installed between pins 2 and 3 (right position).

The test set-up uses the LED module plugged into the CAT4201 evaluation board.

The LED current is measured by removing the LED module jumper J2 and connecting an ammeter (A) between those two pins, see figure below.



Legend:

- f (PS) = 12 V DC power supply, connected between GND and VBAT
- f (A) = Ammeter, connected to LED module across J2 connector (jumper removed)
- f (V) = Voltmeter, connected between R1/R2 midpoint and GND

Note: The LED of the LED module is very bright and should be covered for eye protection.

Figure 3. CAT4201AGEVB Test Set-up

Test Procedure

The test procedure is achieved by following the sequence below step-by-step.

1. Connect the voltmeter (V) between R1/R2 midpoint and GND.
2. Connect the power supply (PS) between VBAT (+) and GND (-).
3. Turn the power supply on.
4. Measure the voltage on voltmeter (V).
5. Turn the potentiometer R2 and adjust until voltage is 0.22 V.
6. Measure the LED current (A).
7. The LED current must be between:
 $270\text{ mA} \leq I_{LED} \leq 330\text{ mA}$.
8. Measure the supply current on the power supply.
9. The supply current must be between:
 $90\text{ mA} \leq I_{SUPPLY} \leq 115\text{ mA}$.
10. Turn off the power supply (PS).
11. Disconnect the CAT4201 evaluation board.

CAT4201AGEVB

Table 1. CAT4201AGEVB BILL OF MATERIALS

Name	Qty.	Description	Manufacturer	Part Number
U1	1	High Efficiency Step-down LED Driver, SOT-23-5	ON Semiconductor	CAT4201
Q1	1	PNP Bipolar Transistor -45 V/-500 mA, SOT-23	ON Semiconductor	BC807-25LT1G
Q2	1	NPN Bipolar Transistor 45 V/100 mA, SOT-23	ON Semiconductor	BC847CLT1G
D	1	Schottky Diode 40 V/500 mA, Size SOD-323	Central Semi	CMDSH05-4
C1	1	Ceramic Capacitor 4.7 μ F/50 V, X7R, Size 1210	Murata	GRM32ER71H475KA88L
C2	1	Ceramic Capacitor 10 μ F/35 V, X5R, Size 1210	Taiyo Yuden	GMK325BJ106KN-T
L	1	Inductor 33 μ H, low DCR, 0.97 A	Sumida	CDRH6D28-330
R1	1	SMT Resistor 1/10 W, 8.2 k Ω , 0603	Yageo	9C06031A8201FKHFT
R2	1	Trim Pot. 47 k Ω	Vishay	T63YB473K
R3, R5	2	SMT Resistor 1/10 W, 1 k Ω , 0603	Yageo	9T06031A1001FBHFT
R4	1	SMT Resistor 1 Ω /500 mW Size 1210	Panasonic	ERJ-P14J1R0U
R6	1	SMT Resistor 1/10 W, 47 k Ω , 0603	Yageo	9T06031A4702FBHFT
R7, R8	2	SMT Resistor 1/10 W, 10 k Ω , 0603	Yageo	9T06031A1002FBHFT
J1	1	3 Pin Header Connector 0.1" Pitch	Tyco	640452-3
J2	1	2 Pin Header Connector 0.1" Pitch	Tyco	640452-2
K3	1	6 Pin Header Receptacle 0.1" Pitch	Tyco	535676-5
	1	SPST Pushbutton Switch (Not Shown in Schematic)	HDK	KSM0631A
	1	9 V Battery Holder (Optional)	Keystone	1294

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

The evaluation board/kit (research and development board/kit) (hereinafter the "board") is not a finished product and is as such not available for sale to consumers. The board is only intended for research, development, demonstration and evaluation purposes and should as such only be used in laboratory/development areas by persons with an engineering/technical training and familiar with the risks associated with handling electrical/mechanical components, systems and subsystems. This person assumes full responsibility/liability for proper and safe handling. Any other use, resale or redistribution for any other purpose is strictly prohibited.

The board is delivered "AS IS" and without warranty of any kind including, but not limited to, that the board is production-worthy, that the functions contained in the board will meet your requirements, or that the operation of the board will be uninterrupted or error free. ON Semiconductor expressly disclaims all warranties, express, implied or otherwise, including without limitation, warranties of fitness for a particular purpose and non-infringement of intellectual property rights.

ON Semiconductor reserves the right to make changes without further notice to any board.

You are responsible for determining whether the board will be suitable for your intended use or application or will achieve your intended results. Prior to using or distributing any systems that have been evaluated, designed or tested using the board, you agree to test and validate your design to confirm the functionality for your application. Any technical, applications or design information or advice, quality characterization, reliability data or other services provided by ON Semiconductor shall not constitute any representation or warranty by ON Semiconductor, and no additional obligations or liabilities shall arise from ON Semiconductor having provided such information or services.

The boards are not designed, intended, or authorized for use in life support systems, or any FDA Class 3 medical devices or medical devices with a similar or equivalent classification in a foreign jurisdiction, or any devices intended for implantation in the human body. Should you purchase or use the board for any such unintended or unauthorized application, you shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the board.

This evaluation board/kit does not fall within the scope of the European Union directives regarding electromagnetic compatibility, restricted substances (RoHS), recycling (WEEE), FCC, CE or UL, and may not meet the technical requirements of these or other related directives.

FCC WARNING – This evaluation board/kit is intended for use for engineering development, demonstration, or evaluation purposes only and is not considered by ON Semiconductor to be a finished end product fit for general consumer use. It may generate, use, or radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment may cause interference with radio communications, in which case the user shall be responsible, at its expense, to take whatever measures may be required to correct this interference.

ON Semiconductor does not convey any license under its patent rights nor the rights of others.

LIMITATIONS OF LIABILITY: ON Semiconductor shall not be liable for any special, consequential, incidental, indirect or punitive damages, including, but not limited to the costs of requalification, delay, loss of profits or goodwill, arising out of or in connection with the board, even if ON Semiconductor is advised of the possibility of such damages. In no event shall ON Semiconductor's aggregate liability from any obligation arising out of or in connection with the board, under any theory of liability, exceed the purchase price paid for the board, if any.

For more information and documentation, please visit www.onsemi.com.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Email Requests to: orderlit@onsemi.com

ON Semiconductor Website: www.onsemi.com

TECHNICAL SUPPORT

North American Technical Support:

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative