

LT3033

3A, 0.95V to 10V Very Low Dropout Linear Regulator with Programmable Current Limit

DESCRIPTION

Demonstration circuit 2362A is an adjustable 3A linear regulator featuring the [LT[®]3033](#). The LT3033 is a very low dropout voltage (VLDO™) linear regulator that operates from a single input supply down to 0.95V. The device supplies 3A output current with 95mV typical dropout voltage. The LT3033 is ideal for low input voltage to low output voltage applications, providing comparable electrical efficiency to a switching regulator.

The LT3033 optimizes stability and transient response with low ESR ceramic output capacitors as small as 10μF. A 10nF bypass capacitor at REF/BYP pin typically reduces output voltage noise to 60μV_{RMS} in a 10Hz to 100kHz bandwidth. Soft-start time is directly proportional to the REF/BYP capacitor value.

The LT3033's current limit, accurate to ±12% over a wide input voltage and temperature range, can be programmed by a single resistor. When the input-to-output differential voltage exceeds 5V, foldback current limit lowers the internal current limit level, which may override the external programmable current limit.

LT3033 has a PWRGD pin which indicates when the ADJ pin is within 8% of its nominal value. By connecting an external pull-up resistor from PWRGD to either the IN

or OUT pin, PWRGD is pulled low when the output falls below 90.1% of the regulated voltage. As the output voltage rises above 92% of its regulated voltage, the PWRGD pin voltage is pulled up.

The LT3033 features output current monitoring by connecting a resistor from the IMON pin to GND. The IMON pin is the collector of a PNP current mirror that outputs 1/2650th of the power PNP current. This circuitry is active for $V_{IMON} \leq (V_{OUT} - 400mV)$.

The LT3033 also features shutdown, reverse-battery protection, thermal limiting with hysteresis and reverse-current protection.

The LT3033 is available as an adjustable device with an output voltage down to the 200mV reference. The device is available in a thermally enhanced, low profile 3mm × 4mm × 0.75mm QFN package.

The LT3033 data sheet gives a complete description of the part, operation and application information. The data sheet must be read in conjunction with this quick start guide for demo circuit 2362A.

[Design files for this circuit board are available.](#)

All registered trademarks and trademarks are the property of their respective owners.

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage Range	V _{OUT} = 0.9V	1.05		10	V
Output Voltage V _{OUT}	Shunt at 0.9V for JP2	0.863	0.899	0.935	V
	Shunt at 1V for JP2	0.966	1.006	1.046	V
	Shunt at 1.2V for JP2	1.152	1.2	1.248	V
	Shunt at 1.5V for JP2	1.44	1.5	1.56	V
	Shunt at 1.8V for JP2	1.74	1.81	1.88	V
	Shunt at 5V for JP2	4.86	5.06	5.26	V
Maximum Output Current	Shunt at 2A for JP3	1.8	2	2.2	A

QUICK START PROCEDURE

Demonstration circuit 2362A is easy to set up to evaluate the performance of the LT3033. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below.

NOTE: The shutdown jumper JP1 shunt is required to be in the OFF or ON position for proper operation.

NOTE: The PWRGD jumper JP4 shunt is required to be in the IN or OUT position for proper operation.

1. Use JP2 to set the desired output voltage. Use JP3 to set the output current limit at 2A or NA (NA = not applicable; internal current limit). Place JP1 shunt in the ON position.
2. With power off, connect the power supply, load and meters as shown in Figure 1.
3. Turn on the power at the input.

NOTE: Make sure that the input voltage does not exceed 10V.

4. Check for the proper output voltage.

NOTE: If there is no output, temporarily disconnect the load to make sure that the load is not set too high or is shorted.

5. Once the proper output voltage is established, adjust the input voltage and load current within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

NOTE: When measuring the input or output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the output voltage ripple by touching the probe tip directly across the +VOUT and GND terminals. See Figure 2 for proper scope probe technique.

NOTE: Make sure that the power dissipation is limited below the thermal limit.

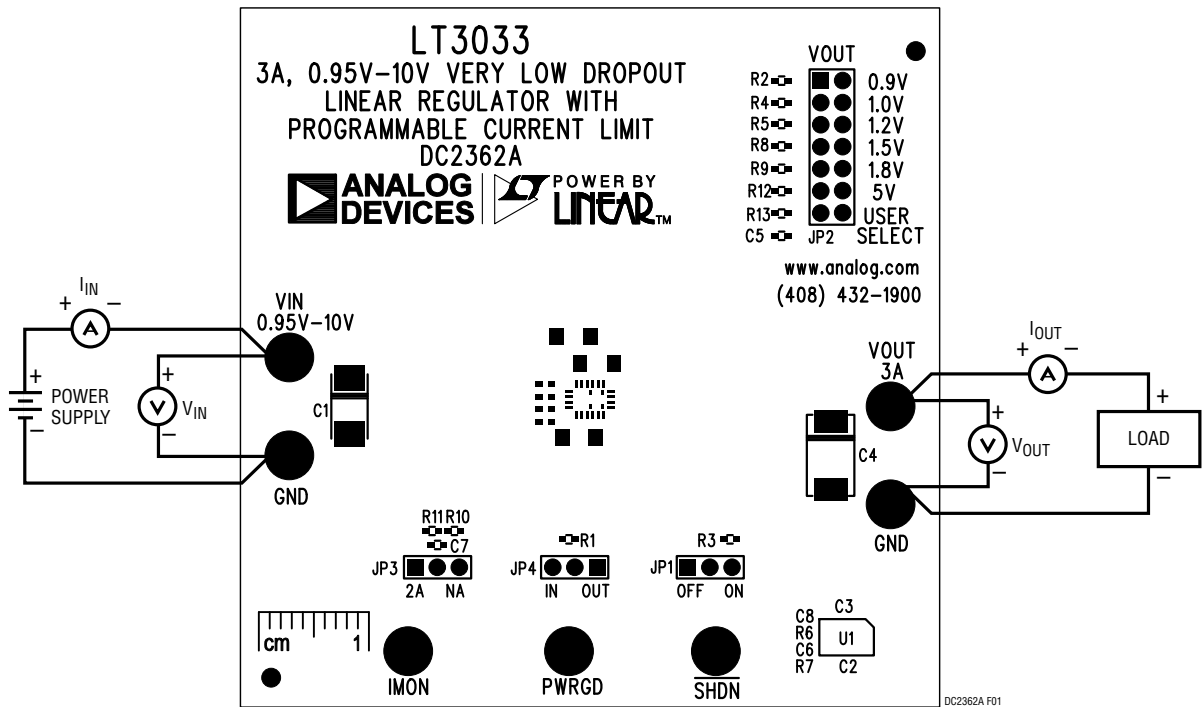


Figure 1. Proper Measurement Equipment Setup

QUICK START PROCEDURE

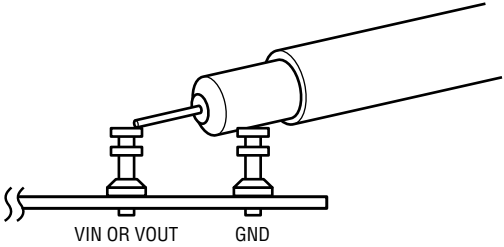


Figure 2. Proper Scope Probe Placement for Measuring Input or Output Ripple

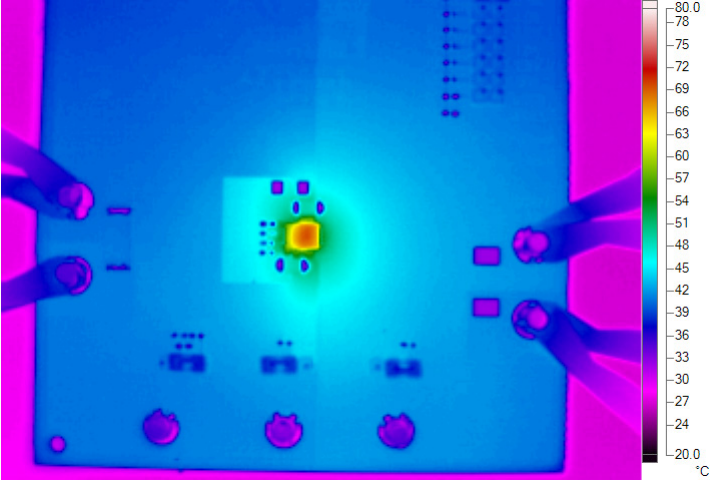


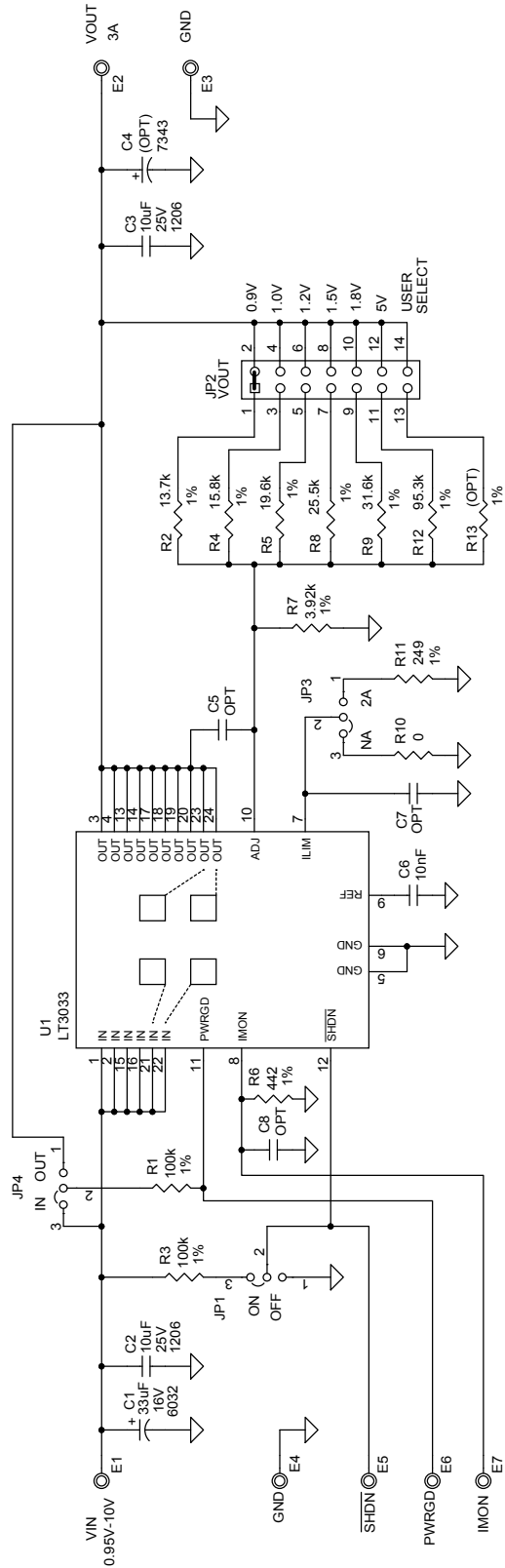
Figure 3. Temperature Rise at 1.5W Dissipation ($V_{IN} = 1.4V$, $V_{OUT} = 0.9V$, $I_{OUT} = 3A$, $T_A = 25^\circ C$)

DEMO MANUAL DC2362A

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C1	CAP, TANT, 33 μ F, 16V, 20% 6032	AVX, TAJW336M016
2	2	C2, C3	CAP, X7R, 10 μ F, 25V, 10% 1206	MURATA, GRM31CR71E106KA12L
3	1	C6	CAP, X7R, 10nF, 25V, 10% 0402	MURATA, GRM155R71E103KA01D
4	2	R1, R3	RES., CHIP, 100k, 1/16W, 1% 0402	VISHAY, CRCW0402100KFED
5	1	R2	RES., CHIP, 13.7k, 1/16W, 1% 0402	VISHAY, CRCW040213K7FKED
6	1	R4	RES., CHIP, 15.8k, 1/16W, 1% 0402	VISHAY, CRCW040215K8FKED
7	1	R5	RES., CHIP, 19.6k, 1/16W, 1% 0402	VISHAY, CRCW040219K6FKED
8	1	R6	RES., CHIP, 442 Ω , 1/16W, 1% 0402	VISHAY, CRCW0402442RFKED
9	1	R7	RES., CHIP, 3.92k, 1/16W, 1% 0402	VISHAY, CRCW04023K92FKED
10	1	R8	RES., CHIP, 25.5k1/16W, 1% 0402	VISHAY, CRCW040225K5FKED
11	1	R9	RES., CHIP, 31.6k1/16W, 1% 0402	VISHAY, CRCW040231K6FKED
12	1	R10	RES., CHIP, 0 Ω , 1/16W, 1% 0402	VISHAY, CRCW04020000Z0ED
13	1	R11	RES., CHIP, 249 Ω , 1/16W, 1% 0402	VISHAY, CRCW0402249RFKED
14	1	R12	RES., CHIP, 95.3k, 1/16W, 1% 0402	VISHAY, CRCW040295K3FKED
15	1	U1	I.C. LINEAR REGULATOR	ANALOG DEVICES, LT3033EUDC#PBF
Additional Demo Board Circuit Components				
1	1	C4	CAP, 7343	
2	3	C5, C7, C8	CAP, 0402	
3	1	R13	RES., 0402	
Hardware: For Demo Board Only				
1	7	E1, E2, E3, E4, E5, E6, E7	TESTPOINT, TURRET, .094" pbf	MILL-MAX, 2501-2-00-80-00-00-07-0
2	3	JP1, JP3, JP4	HEADER 3 PIN 0.079 SINGLE ROW	WURTH ELEKTRONIK, 620 003 111 21
3	1	JP2	2X7, 0.079 DOUBLE ROW HEADER	SAMTEC, TMM107-02-L-D
4	4	XJP1-XJP4	SHUNT, 0.079" CENTER	WURTH ELEKTRONIK, 608 002 134 21

SCHEMATIC DIAGRAM



NOTE: UNLESS OTHERWISE SPECIFIED
 1. ALL RESISTORS AND CAPACITORS ARE IN 0402.



ESD Caution

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

Legal Terms and Conditions

By using the evaluation board discussed herein (together with any tools, components documentation or support materials, the "Evaluation Board"), you are agreeing to be bound by the terms and conditions set forth below ("Agreement") unless you have purchased the Evaluation Board, in which case the Analog Devices Standard Terms and Conditions of Sale shall govern. Do not use the Evaluation Board until you have read and agreed to the Agreement. Your use of the Evaluation Board shall signify your acceptance of the Agreement. This Agreement is made by and between you ("Customer") and Analog Devices, Inc. ("ADI"), with its principal place of business at One Technology Way, Norwood, MA 02062, USA. Subject to the terms and conditions of the Agreement, ADI hereby grants to Customer a free, limited, personal, temporary, non-exclusive, non-sublicensable, non-transferable license to use the Evaluation Board FOR EVALUATION PURPOSES ONLY. Customer understands and agrees that the Evaluation Board is provided for the sole and exclusive purpose referenced above, and agrees not to use the Evaluation Board for any other purpose. Furthermore, the license granted is expressly made subject to the following additional limitations: Customer shall not (i) rent, lease, display, sell, transfer, assign, sublicense, or distribute the Evaluation Board; and (ii) permit any Third Party to access the Evaluation Board. As used herein, the term "Third Party" includes any entity other than ADI, Customer, their employees, affiliates and in-house consultants. The Evaluation Board is NOT sold to Customer; all rights not expressly granted herein, including ownership of the Evaluation Board, are reserved by ADI. CONFIDENTIALITY. This Agreement and the Evaluation Board shall all be considered the confidential and proprietary information of ADI. Customer may not disclose or transfer any portion of the Evaluation Board to any other party for any reason. Upon discontinuation of use of the Evaluation Board or termination of this Agreement, Customer agrees to promptly return the Evaluation Board to ADI. ADDITIONAL RESTRICTIONS. Customer may not disassemble, decompile or reverse engineer chips on the Evaluation Board. Customer shall inform ADI of any occurred damages or any modifications or alterations it makes to the Evaluation Board, including but not limited to soldering or any other activity that affects the material content of the Evaluation Board. Modifications to the Evaluation Board must comply with applicable law, including but not limited to the RoHS Directive. TERMINATION. ADI may terminate this Agreement at any time upon giving written notice to Customer. Customer agrees to return to ADI the Evaluation Board at that time. LIMITATION OF LIABILITY. THE EVALUATION BOARD PROVIDED HEREUNDER IS PROVIDED "AS IS" AND ADI MAKES NO WARRANTIES OR REPRESENTATIONS OF ANY KIND WITH RESPECT TO IT. ADI SPECIFICALLY DISCLAIMS ANY REPRESENTATIONS, ENDORSEMENTS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, RELATED TO THE EVALUATION BOARD INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, TITLE, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. IN NO EVENT WILL ADI AND ITS LICENSORS BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES RESULTING FROM CUSTOMER'S POSSESSION OR USE OF THE EVALUATION BOARD, INCLUDING BUT NOT LIMITED TO LOST PROFITS, DELAY COSTS, LABOR COSTS OR LOSS OF GOODWILL. ADI'S TOTAL LIABILITY FROM ANY AND ALL CAUSES SHALL BE LIMITED TO THE AMOUNT OF ONE HUNDRED US DOLLARS (\$100.00). EXPORT. Customer agrees that it will not directly or indirectly export the Evaluation Board to another country, and that it will comply with all applicable United States federal laws and regulations relating to exports. GOVERNING LAW. This Agreement shall be governed by and construed in accordance with the substantive laws of the Commonwealth of Massachusetts (excluding conflict of law rules). Any legal action regarding this Agreement will be heard in the state or federal courts having jurisdiction in Suffolk County, Massachusetts, and Customer hereby submits to the personal jurisdiction and venue of such courts. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to this Agreement and is expressly disclaimed.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.