

45V, 500mA Low Noise Linear Regulator with Programmable Current Limit and Power Good

DESCRIPTION

Demonstration circuit 2072A is an adjustable 500mA linear regulator featuring the [LT[®]3065](#). The LT3065 is a micropower, low noise and low dropout voltage linear regulator. The device supplies 500mA of output current with a typical dropout voltage of 300mV. A 10nF bypass capacitor reduces output noise to 25 μ V_{RMS} in a 10Hz to 100kHz bandwidth and soft-starts the reference. The LT3065's \pm 45V input voltage rating combined with its precision current limit make the IC an ideal choice for robust, high reliability applications.

LT3065 current limit can be programmed by a single resistor, accurate to \pm 10% over a wide input voltage and temperature range. The internal current limit should be considered when the input-to-output differential is high.

The LT3065 has a PWRGD pin, which becomes high when the output rises above 90% of its nominal value. If the output falls below 88.4% of its nominal value for more than 25 μ s, the PWRGD pin asserts low. The use of

a feedforward cap may cause the PWRGD flag to assert early during a startup transient. To avoid this, ensure that the REF/BYP capacitor is significantly larger than the feedforward capacitor.

LT3065 optimizes stability and transient response with low ESR ceramic capacitors, requiring a minimum capacitance of 3.3 μ F.

The LT3065 is available in the thermally-enhanced 10-lead 3mm \times 3mm DFN and 12-lead MSOP packages.

The LT3065 data sheet gives a complete description of the device, operation and application information. The data sheet must be read in conjunction with this quick start guide for DC2072A.

Design files for this circuit board are available at <http://www.linear.com/demo/DC2072A>

LT, LT, LTC, LTM, Linear Technology and the Linear logo are registered trademarks of Linear Technology Corporation. All other 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} = 5V	5.35		45	V
Output Voltage V _{OUT}	Header in JP1	1.176	1.2	1.22	V
	Header in JP2	1.46	1.5	1.54	V
	Header in JP3	1.75	1.8	1.74	V
	Header in JP4	1.94	1.99	2.04	V
	Header in JP5	2.43	2.5	2.57	V
	Header in JP6	3.23	3.32	3.41	V
	Header in JP7	4.85	4.99	5.13	V
Maximum Output Current	V _{IN} = 6V, V _{OUT} = 5V, R ₁₀ = 604 Ω	445	495	545	mA

QUICK START PROCEDURE

DC2072A is easy to set up to evaluate the performance of the LT3065. Refer to Figure 1 for the proper measurement equipment setup and follow the procedure below:

NOTE: Make sure that the input voltage does not exceed 45V.

NOTE: The shutdown jumper JP2 shunt is required to be placed in the OFF or ON position for proper operation.

NOTE: Place the output voltage selection jumper JP1 at the desired position.

NOTE: Do not hot-plug the input voltage terminal V_{IN} . The absolute maximum voltage on V_{IN} is 50V and hot-plugging a power supply through wire leads to the demonstration circuit can cause the voltage on the extremely low-ESR ceramic input capacitor to ring to twice its DC value. In order to protect the IC, a higher ESR Aluminum Electrolytic capacitor is placed at the input terminals. This may protect against some, but not all, input transients due to hot-plugging with a power supply. See Application Note 88 for more details.

NOTE: Connect the power supply (with power off), load, and meters as shown in Figure 1.

1. After all connections are made, turn on input power and verify that the output voltage according to the output voltage selection jumper JP1. If the output voltage is different from the above values, use the USER option and install R8. Select R8 according to the following equation:

$$R8 = (V_{OUT}/0.6-1) \cdot 60.4k$$

NOTE: If the output voltage is too low, temporarily disconnect the load to make sure that the load is not set too high.

2. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, PWRGD and other parameters.

QUICK START PROCEDURE

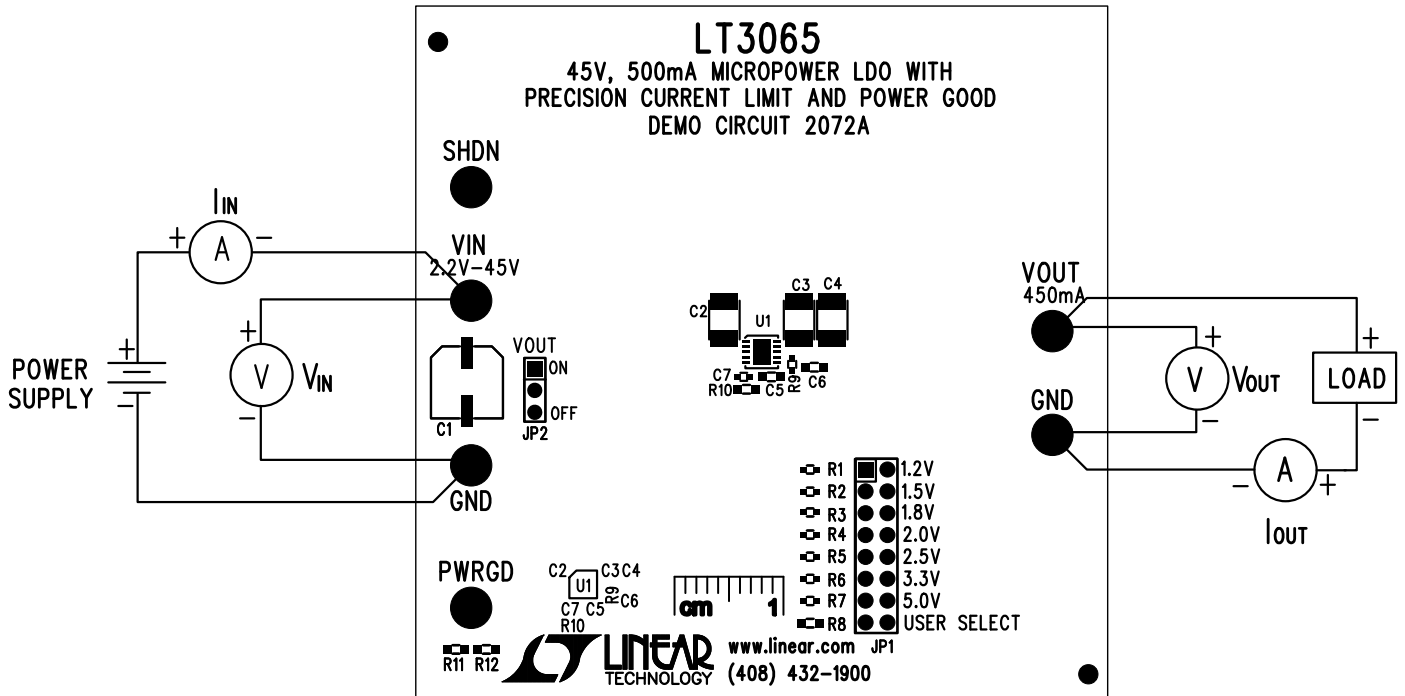


Figure 1. Proper Measurement Equipment Setup

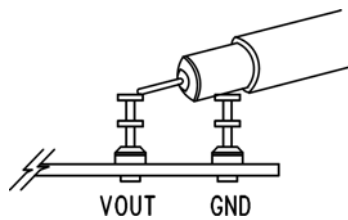


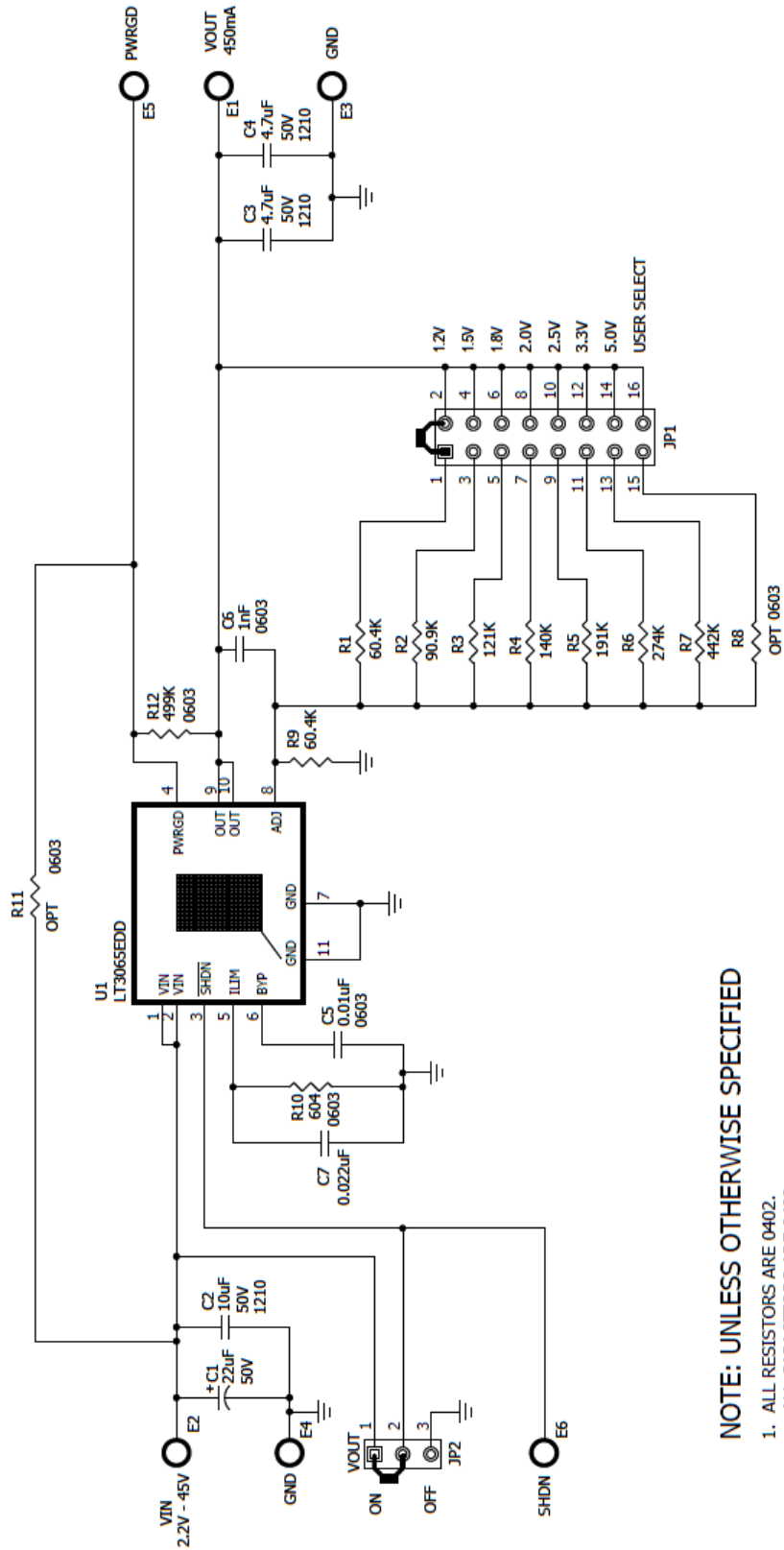
Figure 2. Measuring Input or Output Ripple

DEMO MANUAL DC2072A

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C2	CAP., X7R, 10µF, 50V, 10% 1210	MURATA, GRM32ER71H106KA12L
2	2	C3, C4	CAP., X7R, 4.7µF, 50V, 10% 1210	MURATA, GRM32ER71H475KA88L
3	1	C5	CAP., X7R, 0.01µF, 16V, 20% 0603	AVX, 0603YC103MAT2A
4	1	C6	CAP., X7R, 1nF, 16V, 20% 0603	AVX, 0603YC102MAT2A
5	1	C7	CAP., X7R, 0.022µF, 16V, 20% 0402	AVX, 0402YC223KMAT2A
6	2	R1, R9	RES., CHIP, 60.4k, 0.06W, 1% 0402	VISHAY, CRCW040260K4FKED
7	1	R2	RES., CHIP, 90.9k, 0.06W, 1% 0402	VISHAY, CRCW040290K9FKED
8	1	R3	RES., CHIP, 121k, 0.06W, 1% 0402	VISHAY, CRCW0402121KFKED
9	1	R4	RES., CHIP, 140k, 0.06W, 1% 0402	VISHAY, CRCW0402140KFKED
10	1	R5	RES., CHIP, 191k, 0.06W, 1% 0402	VISHAY, CRCW0402191KFKED
11	1	R6	RES., CHIP, 274k, 0.06W, 1% 0402	VISHAY, CRCW0402274KFKED
12	1	R7	RES., CHIP, 442k, 0.06W, 1% 0402	VISHAY, CRCW0402442KFKED
13	1	R10	RES., CHIP, 604Ω, 0.06W, 1% 0603	VISHAY, CRCW0603604RFKEA
14	1	R12	RES., CHIP, 499k, 0.06W, 1% 0603	VISHAY, CRCW0603499KFKEA
15	1	U1	I.C., MICROPOWER LDO DFN-10-3X3	LINEAR TECH., LT3065EDD
Additional Demo Board Circuit Components				
1	1	C1	CAP., ALUM., 22µF, 50V, CE-BSS SERIES	SUN SELECT., 50CE22BSS
2	0	R8, R11 (OPT)	RES., 0603	
Hardware: For Demo Board Only				
1	6	E1-E6	TESTPOINT, TURRET, .094" PBF	MILL-MAX, 2501-2-00-80-00-00-07-0
2	1	JP1	HEADERS, 2 × 8 (2mm Ctrs.)	SAMTEC, TMM-108-02-L-D
3	1	JP2	HEADERS, 3 PINS 2mm Ctrs.	SULLINS, NRPN031PAEN-RC
4	2	XJP1, XJP2	SHUNT, .079" CENTER	SAMTEC, 2SN-BK-G

SCHEMATIC DIAGRAM



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

DEMO MANUAL DC2072A

DEMONSTRATION BOARD IMPORTANT NOTICE

Linear Technology Corporation (LTC) provides the enclosed product(s) under the following **AS IS** conditions:

This demonstration board (DEMO BOARD) kit being sold or provided by Linear Technology is intended for use for **ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY** and is not provided by LTC for commercial use. As such, the DEMO BOARD herein may not be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including but not limited to product safety measures typically found in finished commercial goods. As a prototype, this product does not fall within the scope of the European Union directive on electromagnetic compatibility and therefore may or may not meet the technical requirements of the directive, or other regulations.

If this evaluation kit does not meet the specifications recited in the DEMO BOARD manual the kit may be returned within 30 days from the date of delivery for a full refund. **THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY THE SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THIS INDEMNITY, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.**

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user releases LTC from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge. Also be aware that the products herein may not be regulatory compliant or agency certified (FCC, UL, CE, etc.).

No License is granted under any patent right or other intellectual property whatsoever. **LTC assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or any other intellectual property rights of any kind.**

LTC currently services a variety of customers for products around the world, and therefore this transaction **is not exclusive**.

Please read the DEMO BOARD manual prior to handling the product. Persons handling this product must have electronics training and observe good laboratory practice standards. **Common sense is encouraged.**

This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact a LTC application engineer.

Mailing Address:

Linear Technology
1630 McCarthy Blvd.
Milpitas, CA 95035

Copyright © 2004, Linear Technology Corporation