LT3020
100mA, Low Voltage, Very Low Dropout Linear Regulator

DESCRIPTION

Demonstration circuit 687A is a low input voltage and ultra-low dropout voltage supply using the LT®3020 linear regulator, which comes in a small 8-lead DFN package. The DC687A has an input voltage range from 1V to 10V, an output voltage range between 0.2V and 10V minus the dropout voltage, and is capable of delivering 100mA max. Due to the 0.2V reference of the LT3020, the DC687A is capable of supplying power to very low voltage applications, such as (relatively) high current voltage references. DC687A uses ceramic capacitors because of the LT3020's ability to maintain stability even with the low ESR of ceramic output capacitors.

The LT3020 data sheet gives a complete description of the part, operation and applications information. The data sheet must be read in conjunction with this demo manual for demonstration circuit DC687A. The LT3020 is assembled in an 8-lead MSOP and 3mm x 3mm DFN packages with an exposed pad on the bottom-side of the IC. Proper board layout is essential for maximum thermal performance.

Design files for this circuit board are available.

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

PARAMETERS	CONDITIONS	MIN	TYP	MAX
Input Voltage Range (V_{IN})	I_{OUT} = 100mA, V_{OUT} = 3.3V	1.05V		10V
Output Voltage (V_{OUT}) (JP2 in 1V Position)	V_{IN} = 1.3V, I_{OUT} =100mA	0.96V	1V	1.04V

QUICK START PROCEDURE

The DC687A is easy to set up to evaluate the performance of the LT3020. For proper measurement equipment configuration, set up the circuit according to the diagram in Figure 1.

Please follow the procedure outlined below for proper operation.

1. Before proceeding to test, insert jumper JP1 into the OFF position, and insert jumper JP2 into the 1V option.
2. Apply 1.3V across V_{IN} (to GND). Insert jumper JP1 into the ON position. Draw 10mA of load current. Measure V_{OUT}; it should be 1V ±2% (0.98V to 1.02V).
3. Vary the input voltage from 1.3V to 10V and the load current from no load to 100mA. V_{OUT} should measure 1V ±4% (0.96V to 1.04V).
4. Insert jumper JP1 into the OFF position and move jumper JP2 into any of the remaining output voltage options: 1.2V, 1.5V, or 1.8V. Re-insert jumper JP1 into the ON position. Just as in the 1V out test, the output voltage should read V_{OUT} ±2% tolerance under static line and load conditions, and ±4% tolerance under dynamic line and load conditions.
5. When finished evaluating, insert jumper JP1 into the OFF position.
6. **WARNING:** If long leads are used to power the demo circuit, the input voltage at the part could “ring”. This ringing could affect the operation of the circuit or even exceed the maximum voltage rating of the IC. To eliminate this, insert a small tantalum capacitor (for instance, an AVX part # TAJW226M010R) on the pads between the input power and return terminals on the bottom of the demo board. The (greater) ESR of the tantalum will dampen the (possible) ringing voltage due to the use of long input leads. On a normal, typical PCB, with short traces, the capacitor is not needed.

QUICK START PROCEDURE

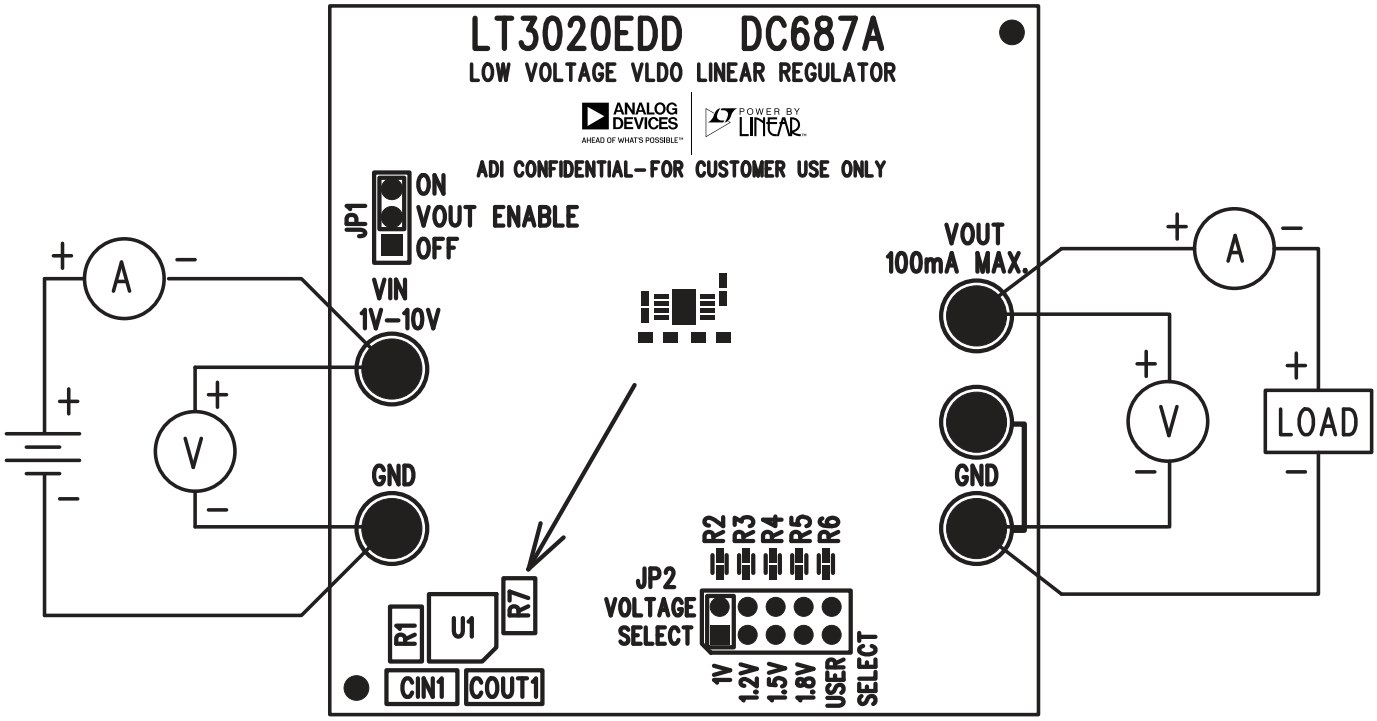


Figure 1. Test Procedure Setup Drawing for DC687A

QUICK START PROCEDURE

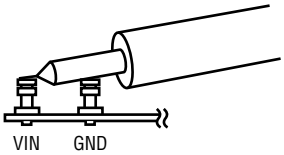
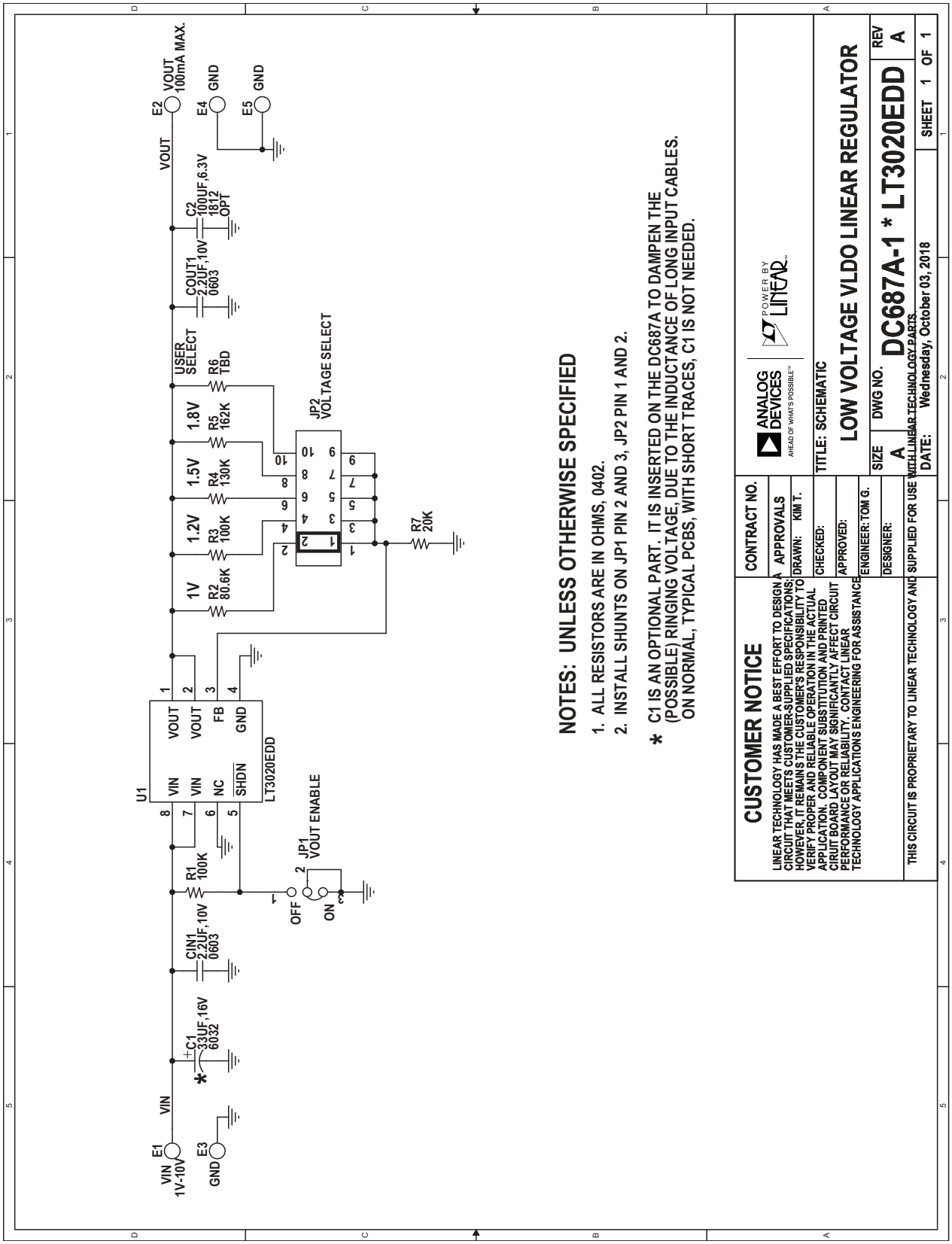


Figure 2. Measuring Input or Output Ripple

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	2	CIN1, COUT1	CAP., X5R 2.2µF 10V 10%, 0603	TDK C1608X5R1A225MA
2	1	C1	CAP., TANT, 33µF 16V, 20%, 6032	AVX, TAJW336M016R
3	2	R3, R1	RES., CHIP 100k 1/16W 1%, 0402	AAC, CR05-1003FM
4	1	R2	RES., CHIP 80.6k 1/16W 1%, 0402	AAC, CR05-8062FM
5	1	R4	RES., CHIP 130k 1/16W 1%, 0402	AAC, CR05-1303FM
6	1	R5	RES., CHIP 162k 1/16W 1%, 0402	AAC, CR05-1623FM
7	1	R7	RES., CHIP 20k 1/16W 1%, 0402	AAC, CR05-2002FM
8	1	U1	I.C., LT3020EDD, DD	ANALOG DEVICES, LT3020EDD#PBF
Optional Electronic Components				
1	0	C2	CAP., 100µF 6.3V, 1812	
2	0	R6	RES., CHIP, 0402	
Hardware				
1	5	E1, E2, E3, E4, E5	TESTPOINT, TURRET, .094"	MILL-MAX, 2501-2
2	1	JP1	JMP, 3PIN 1 ROW .079CC	COMM-CON, 2802S-03-G1
3	1	JP2	JMP, 2 × 5, .079CC	COMM-CON, 2202S-10-G2
4	2	SHUNTS FOR JP1 (2 AND 3) AND JP2 (1 AND 2)	SHUNT, .079 CENTER	COMM-CON CCIJ2MM-138W

SCHEMATIC DIAGRAM



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.

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