LTM8028
36V_{IN}, UltraFast, Low Output Noise, 5A µModule Regulator

DESCRIPTION

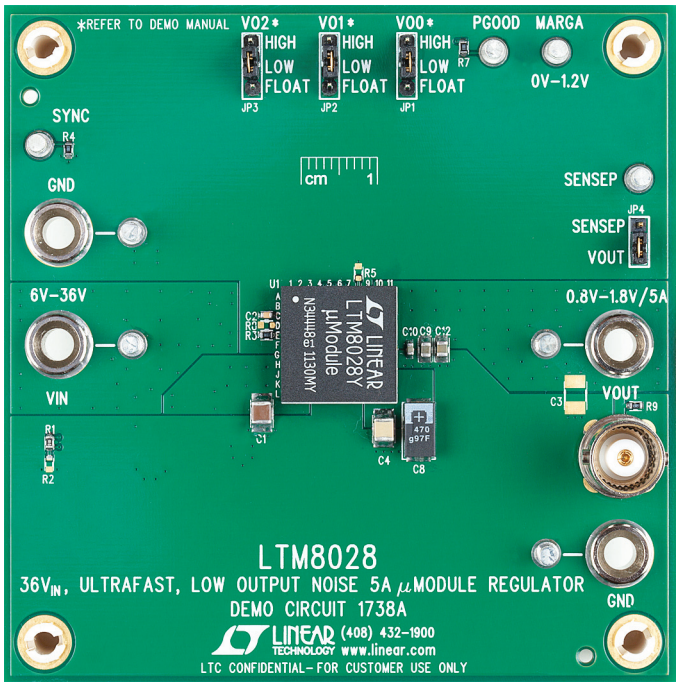
Demonstration circuit 1738A features the LTM®8028, a µModule® step-down converter that integrates both a high efficiency switching regulator and a 5A UltraFast™ linear regulator, resulting in a low noise solution suitable for high speed data applications. The demo circuit is designed for an input voltage of 6V to 36V and an operating frequency of 250kHz. The output voltage is digitally programmable from 0.8V to 1.8V in 50mV increments by adjusting the three tri-state inputs VO0, VO1, and VO2.

The user may adjust the output voltage over a continuous ±10% range by applying a voltage to MARGA. A PGOOD signal indicates that the output is within 10% of the target voltage. The SENSEP pin creates a Kelvin sense connection to account for voltage drops due to PCB resistances between the regulator and the load.

The LTM8028 data sheet gives a complete description of the part, operation and application information. The data sheet must be read in conjunction with this demo manual prior to working on or modifying DC1738A.

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

BOARD PHOTO



PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage Range	V_{OUT} = 0.8V to 1.8V	6		36	V
Output Voltage*	Default Setting	1.773	1.8	1.827	V
Maximum Output Current		5			A
Switching Frequency	R_T = 165kΩ		250		kHz

*For other output voltage settings, refer to Table 1

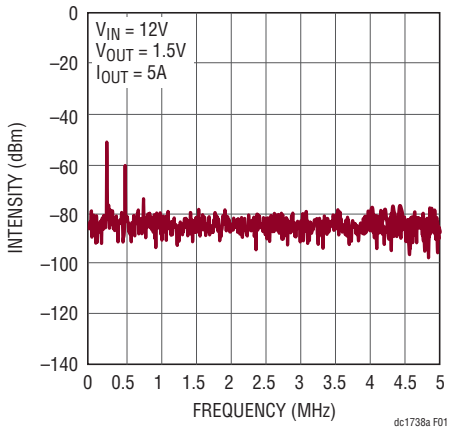


Figure 1. DC1738A Output Noise Spectrum

Table 1: VO2 to VO0 Setting vs Nominal Output Voltage

VO2	VO1	VO0	$V_{OUT(NOM)}$
Low	Low	Low	0.80V
Low	Low	Float	0.85V
Low	Low	High	0.90V
Low	Float	Low	0.95V
Low	Float	Float	1.00V
Low	Float	High	1.05V
Low	High	Low	1.10V
Low	High	Float	1.15V
Low	High	High	1.20V
Float	Low	Low	1.25V
Float	Low	Float	1.30V
Float	Low	High	1.35V
Float	Float	Low	1.40V
Float	Float	Float	1.45V
Float	Float	High	1.50V
Float	High	Low	1.55V
Float	High	Float	1.60V
Float	High	High	1.65V
High	Don't Care	Low	1.70V
High	Don't Care	Float	1.75V
High	Don't Care	High	1.80V

QUICK START PROCEDURE

Demonstration circuit 1738A is an easy way to evaluate the performance of the LTM8028. Refer to Figure 2 for proper measurement equipment setup and follow the procedure below:

1. Place JP1-JP3 according to Table 1 to program the desired output voltage.
2. With power off, connect the input power supply, load and meters, as shown in Figure 2. Preset the V_{IN} supply between 6V to 36V.
3. Turn on the power at the input.
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 load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.
6. In order to use the Kelvin sense connection to account for output voltage drops, place JP4 in the SENSEP position and connect the SENSEP turret at the input of the load.
7. In order to minimize EMI noise, an input filter can be utilized by removing R6 on the bottom of the board and populating the optional circuit components.

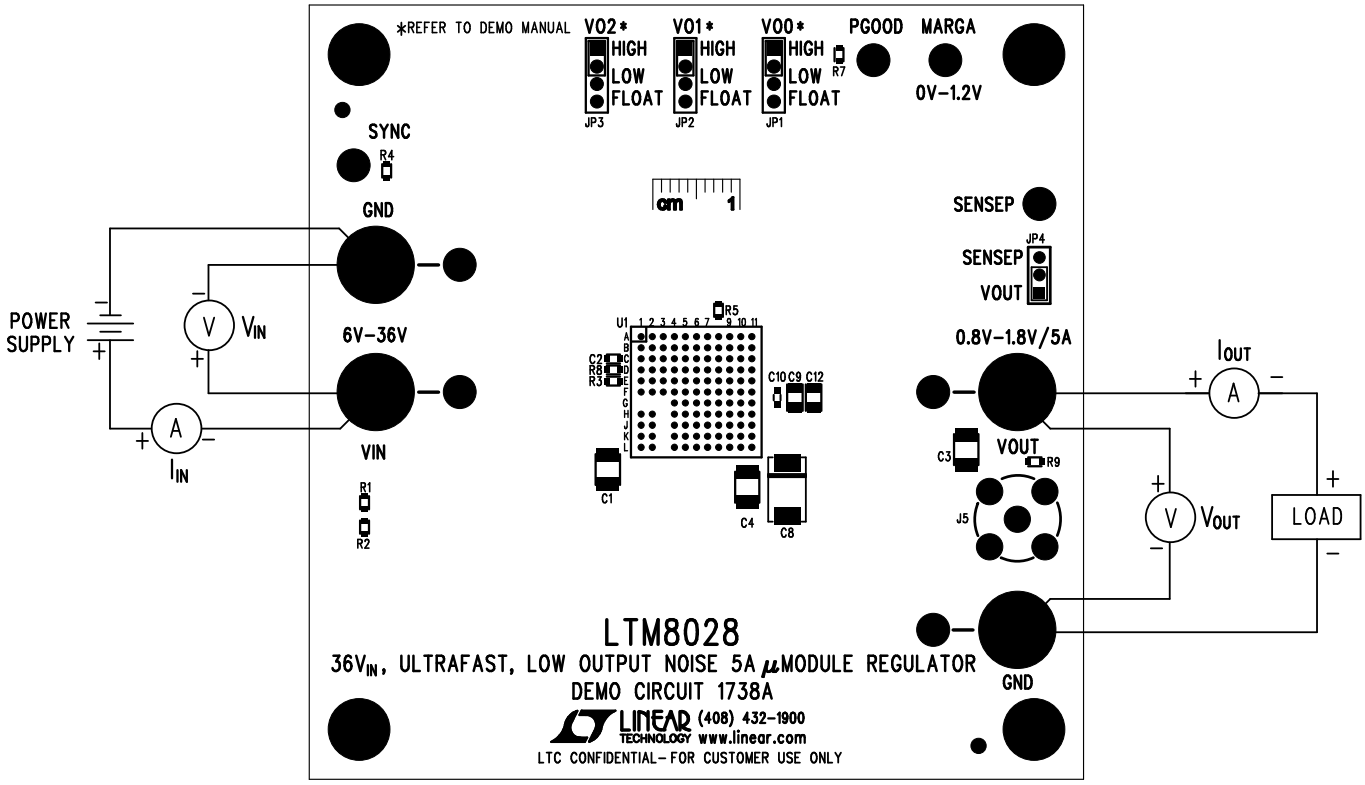


Figure 2. Proper Measurement Equipment Setup

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C1	CAP., X7R, 10µF, 50V, 10%, 1210	MURATA, GRM32ER71H106K
2	1	C2	CAP., X7R, 0.01µF, 16V, 5%, 0603	AVX, 0603YC103JAT2A
3	1	C4	CAP., X5R, 100µF, 6.3V, 20%, 1210	AVX, 12106D107MAT2A
4	1	C8	CAP., POSCAP, 470µF, 4V, D3L	SANYO, 4TPF470ML
5	1	C9	CAP., X5R, 10µF, 10V, 20%, 0805	TAIYO YUDEN, LMK212ABJ106MG-T
6	1	C10	CAP., X5R, 4.7µF, 4V, 20%, 0603	AVX, 06034D475MAT2A
7	1	C12	CAP., X5R, 22µF, 10V, 20%, 0805	TAIYO YUDEN, LMK212BBJ226MG-T
8	1	R1	RES., CHIP, 402kΩ, 1/10W, 1%, 0603	VISHAY, CRCW0603402KFKEA
9	1	R3	RES., CHIP, 165kΩ, 1/16W, 1%, 0603	VISHAY, CRCW0603165KFKEA
10	2	R4, R7	RES., CHIP, 100kΩ, 1/16W, 1%, 0603	VISHAY, CRCW0603100KFKEA
11	1	R6	RES., CHIP, 0Ω, 1/4W, 1%, 1206	NIC, NRC12ZOTRF
12	1	R9	RES., CHIP, 49.9Ω, 1/16W, 1%, 0603	VISHAY, CRCW060349R9FKEA
13	1	U1	IC., MODULE REGULATOR, LTM8028EY, BGA-114 LEAD	LINEAR TECHNOLOGY CORPORATION, LTM8028EY
Additional Demo Board Circuit Components				
1	0	C3, C6 (OPT)	CAP., 1210	
2	0	C5 (OPT)	CAP., 0603	
3	0	C7 (OPT)	CAP., ALUM	
4	1	C11	CAP., ALUM, 22µF, 50V	SUN ELECT., 50CE22BS
5	0	R2, R5, R8 (OPT)	RES., CHIP, 0603	
6	0	FB1 (OPT)	FERRITE BEAD, M TYPE	TAIYO YUDEN, FBMJ3216HS800T
7	0	L1 (OPT)	IND., 10µH	VISHAY, IHLP-2525CZ-01
Hardware: For Demo Board Only				
1	8	E1-E8	TESTPOINT, TURRET, 0.094"	MILL-MAX, 2501-2-00-80-00-00-07-0
2	3	JP1-JP3	JMP, 0.079", SINGLE ROW HEADER, 4 PIN	SAMTEC, TMM-104-02-L-S
3	1	JP4	JMP, 0.079", SINGLE ROW HEADER, 3 PIN	SAMTEC, TMM-103-02-L-S
4	4	J1-J4	CONN, BANANA JACK, KEYSTONE-575-4	KEYSTONE, 575-4
5	1	J5	CONN, BNC	CONNEX, 112404
6	4	XJP1-XJP4	SHUNT, 0.079" CENTER	SAMTEC, 2SN-BK-G
7	4	MTGS AT 4 CORNERS	STAND-OFF, SNAP-ON, NYLON, 0.50" TALL	

SCHEMATIC DIAGRAM

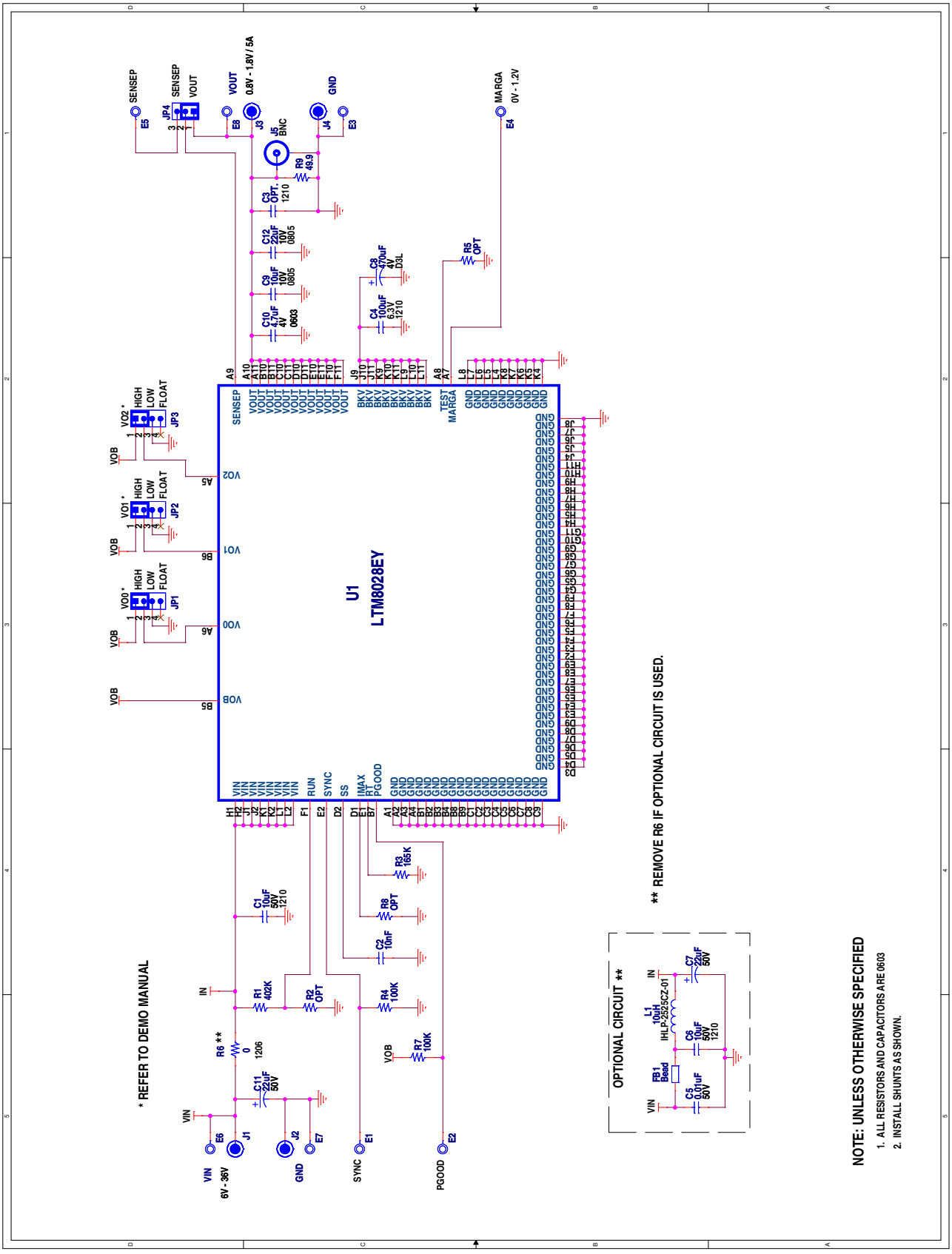


Figure 3. DC1738A Demo Circuit Schematic

DEMONSTRATION BOARD IMPORTANT NOTICE

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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