LTM4622EV
Ultrathin Dual 2.5A, Single 5A Step-Down µModule Regulator

DESCRIPTION

Demonstration Circuit 2249A features the LTM®4622EV µModule® regulator, a tiny low profile high performance high efficiency dual step-down regulator. The LTM4622 has an operating input voltage range of 3.6V to 20V and is able to provide an output current of up to 2.5A for each channel. Each output's voltage is programmable from 0.6V to 5.5V. The LTM4622 is a complete DC-DC point of load regulator in a low profile thermally enhanced 6.25mm × 6.25mm × 1.82mm LGA package requiring only a few input and output capacitors. Output voltage tracking is available through the TRACK/SS pin for supply rail sequencing. External clock synchronization is available through the SYNC/MODE pin. For high efficiency, at low load currents, the MODE pin jumper (JP3) selects the Burst Mode® option for operation in less noise sensitive applications. The LTM4622 data sheet must be read in conjunction with this demo manual for working on or modifying DC2249A.

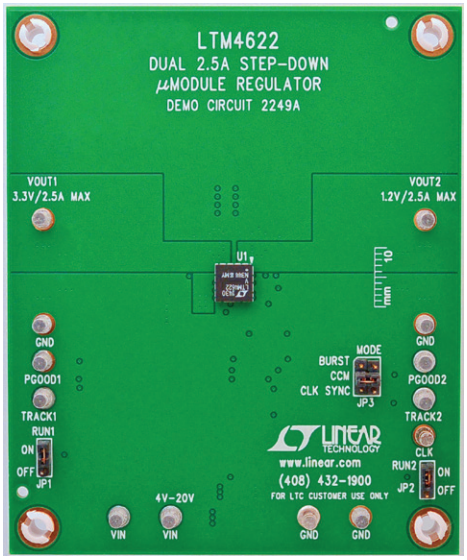
Design files for this circuit board are available at http://www.linear.com/demo/DC2249A

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

PARAMETER	CONDITIONS/NOTES	VALUE
Input Voltage Range		4V – 20V
Output Voltage V_{OUT1}, V_{OUT2}	Programmable with FB Pin Resistors	3.3VDC, 1.2VDC
Maximum Continuous Output Current Each Phase	Derating is Necessary for Certain Operating Conditions. See Data Sheet for Details	2.5ADC
Default Operating Frequency		1MHz
Efficiency	V_{IN} = 12V, V_{OUT1} = 3.3V, I_{OUT} = 2.5A, f_{SW} = 2MHz V_{IN} = 12V, V_{OUT2} = 1.2V, I_{OUT} = 2.5A, f_{SW} = 1MHz	87.5%, See Figure 2 76.7%, See Figure 2

BOARD PHOTO



QUICK START PROCEDURE

Demonstration Circuit 2249A is an easy way to evaluate the performance of the LTM4622. Please refer to Figure 1 for test setup connections and follow the procedure below.

1. With power off, place the jumpers in the following positions for a typical application for $3.3V_{OUT}$ and $1.2V_{OUT}$ rails:

JP1	JP2	JP3
RUN1	RUN2	MODE
ON	ON	CCM

2. Before powering up the input supply and loads, preset the input voltage supply to be between 4V to 20V. Preset the load current for each output rail to 0A.
3. With power off, connect the loads, input voltage supply and meters as shown in Figure 1.
4. Turn on the input power supply. The output voltage meters for each output rail should display the programmed output voltage ±2%.
5. Once the proper output voltages are established, adjust the load current on each rail within the 0A – 2.5A range and observe each output rail's load regulation, efficiency, and other parameters.
6. To observe increased light load efficiency, place the mode pin jumper (JP3) in the BURST position.

NOTE: Demonstration Circuit 2249A is designed to exhibit the wide output voltage range of the LTM4622. In order to keep inductor current ripple within reasonable limits, it is recommended to increase programmed switching frequency for higher output voltages. The programmed switching frequency for data provided in this manual is consistent with switching frequency recommendations corresponding to the programmed output voltage. Please refer to the LTM4622 data sheet for more details regarding recommended switching frequency for your particular application.

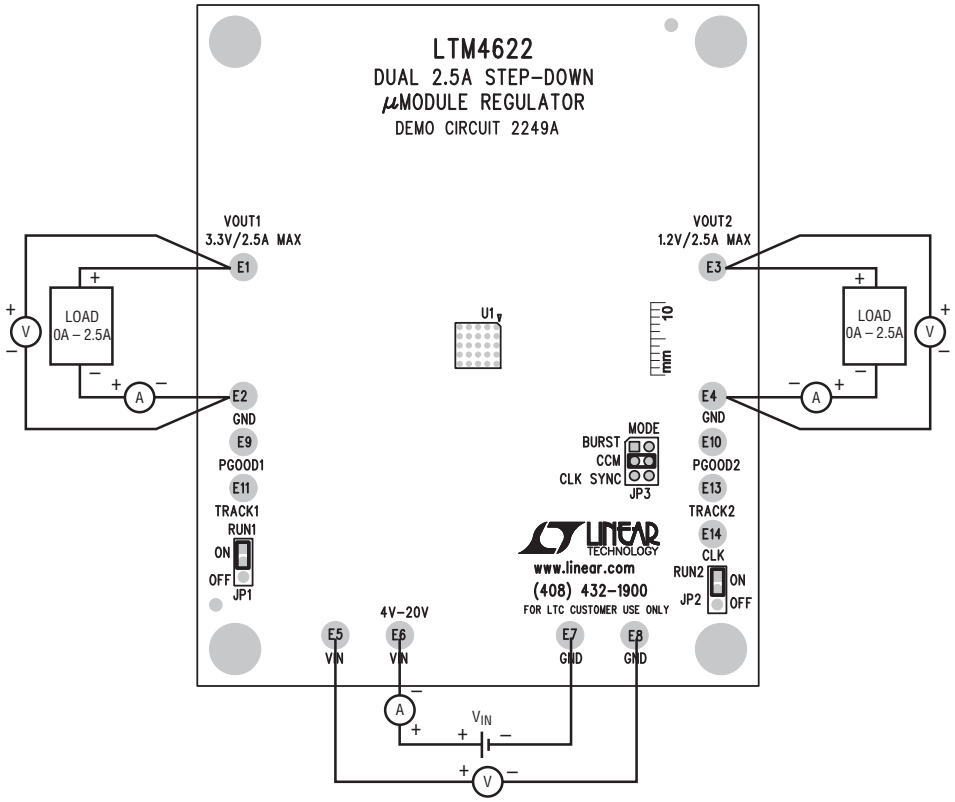
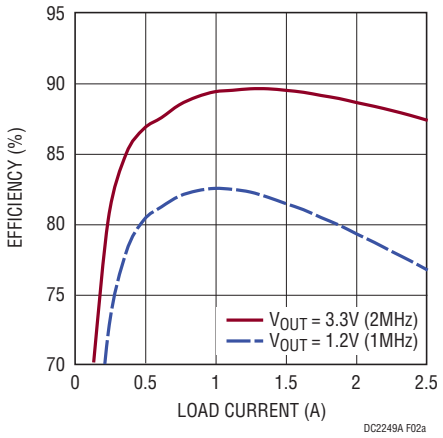


Figure 1. Test Setup

QUICK START PROCEDURE



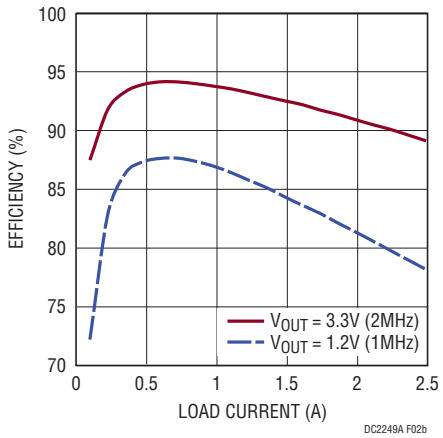
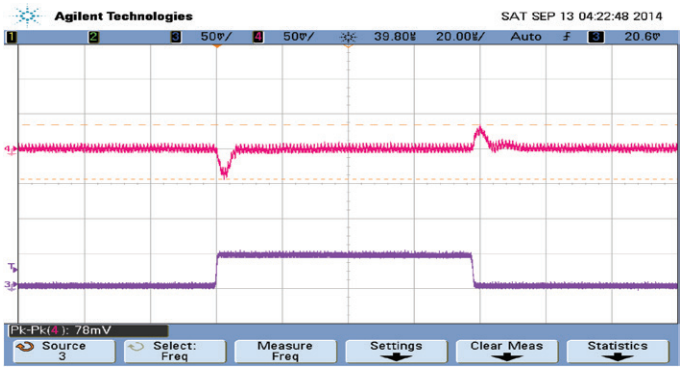
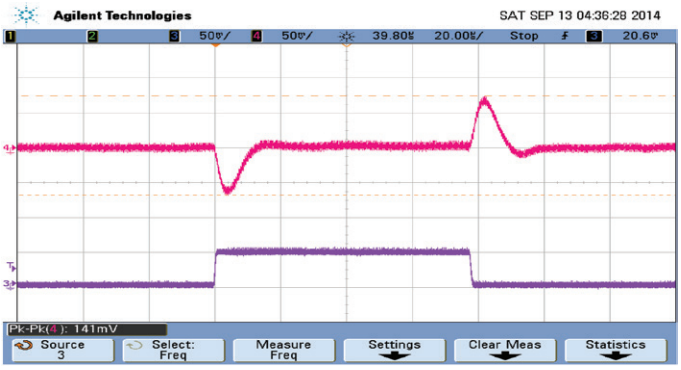


Figure 2. Measured Supply Efficiency at $12V_{IN}$ and $5V_{IN}$



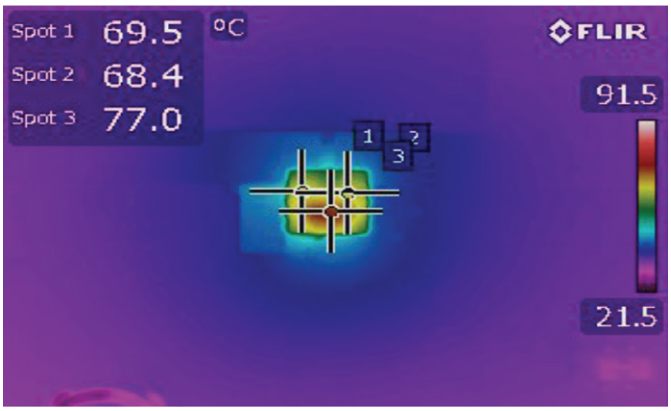
V_{IN} (V)	V_{OUT} (V)	C_{OUT}
12	1.2	1 × 22µF + 1 × 47µF

Figure 3. Measured Load Transient Response (1A – 2A Load Step)



V_{IN} (V)	V_{OUT} (V)	C_{OUT}
12	3.3	1 × 22µF + 1 × 47µF

Figure 4. Measured Load Transient Response (1A – 2A Load Step)



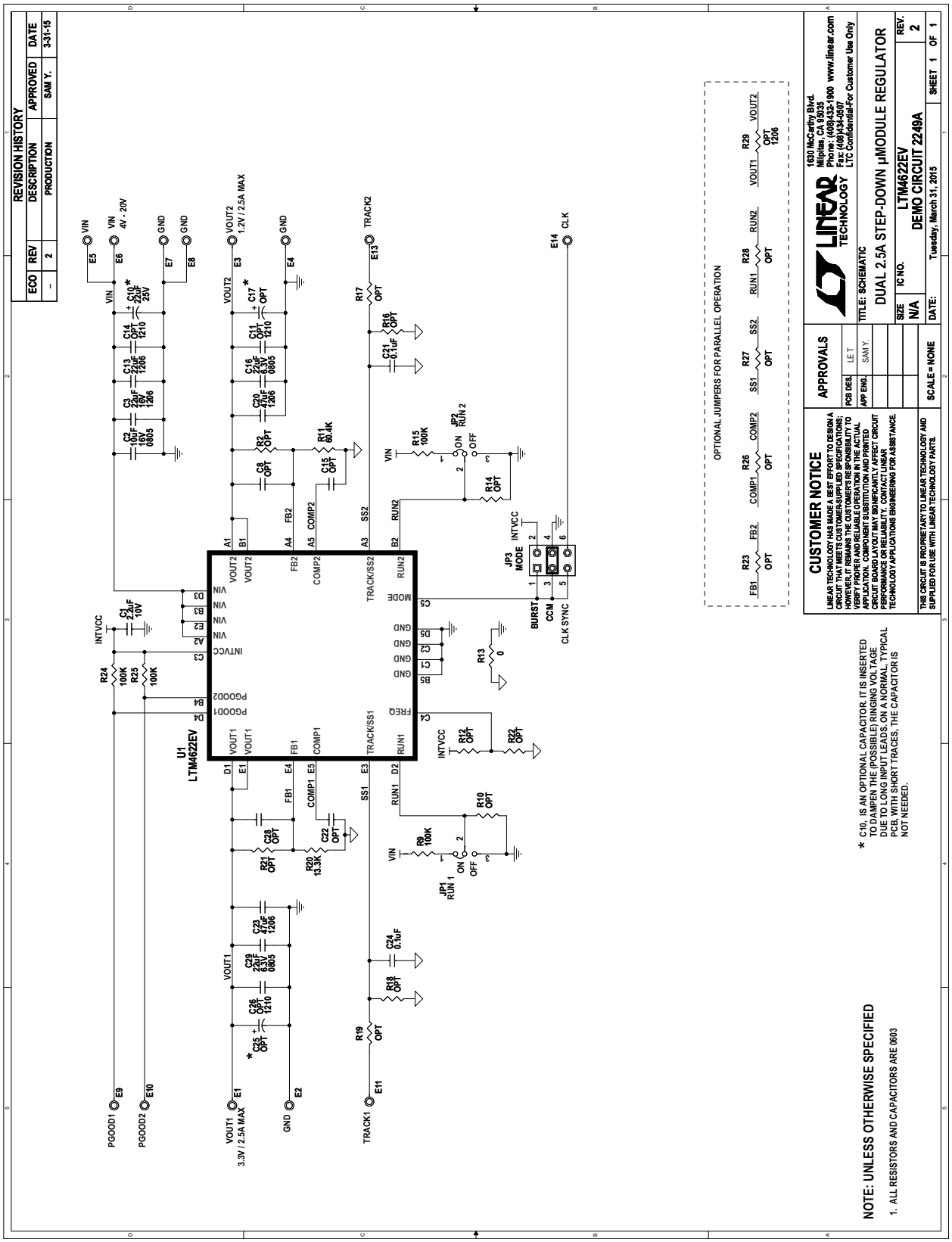
V_{IN} (V)	V_{OUT1} (V), I_{OUT1} (A)	V_{OUT2} (V), I_{OUT2} (A)	f_{SW} (MHz)	$T_{AMBIENT}$ (°C)
12	3.3, 2.5	1.2, 2.5	2	22

Figure 5. Thermal Capture at Full Load. Natural Convection

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C1	CAP., X5R, 2.2µF, 10V, 10%, 0603	MURATA, GRM188R61A225KE34D
2	2	C3, C13	CAP., X5R, 22µF, 16V, 20%, 1206	MURATA, GRM31CR61C226ME15L
3	2	C16, C29	CAP., X5R, 22µF, 6.3V, 20%, 0805	MURATA, GRM21BR60J226ME39L
4	2	C20, C23	CAP., X5R, 47µF, 6.3V, 20%, 1206	MURATA, GRM31CR60J476ME19L
5	2	C21, C24	CAP., X5R, 0.1µF, 25V, 10%, 0603	MURATA, GRM188R61E104KA01D
6	1	R11	RES., CHIP, 60.4k, 1/16W, 1%, 0603	VISHAY, CRCW060360K4FKEA
7	1	R20	RES., CHIP, 13.3k, 1/16W, 1%, 0603	VISHAY, CRCW060313K3FKEA
8	1	U1	I.C., LTM4622EV, LGA 25-6.25 × 6.25	LINEAR TECH., LTM4622EV#PBF
Additional Demo Board Circuit Components				
1	1	C2	CAP., X5R, 10µF, 16V, 20%, 0805	MURATA, GRM21BR61C106ME15L
2	0	C8, C15, C22, C28	CAP., OPT, 0603	OPT
3	0	C11, C14, C26	CAP., OPT, 1210	OPT
4	0	C10, C17, C25	CAP., OPT, 7343	OPT
5	0	R2, R10, R12, R14, R16-R19, R21, R22, R23, R26, R27, R28	RES, 0603	OPT
6	4	R9, R15, R24, R25	RES., CHIP, 100k, 1/16W, 1%, 0603	VISHAY, CRCW0603100KFKEA
7	1	R13	RES., CHIP, 0Ω, 1/16W, 1%, 0603	VISHAY, CRCW06030000Z0EA
8	0	R29	RES., OPT, 1206	OPT
Hardware				
1	13	E1-E11, E13, E14	TESTPOINT, TURRET, 0.095"	MILL-MAX, 2501-2-00-80-00-00-07-0
2	2	JP1, JP2	HEADER, 1 × 3 0.079	SULLINS, NRPN031PAEN-RC
3	1	JP3	HEADER, 2 × 3 0.079	SULLINS, NRPN032PAEN-RC
4	3	XJP1, XJP2, XJP3	SHUNT	SAMTEC 2SN-BK-G
5	4		STAND OFF, SNAP ON, 0.375" TALL	KEYSTONE_8832

SCHEMATIC DIAGRAM



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