LTM4643EV
Quad DC/DC µModule Regulator with Configurable 3A Output Array

DESCRIPTION

Demonstration circuit 2453A features the LTM®4643 µModule® regulator, a high performance high efficiency 4 output step-down regulator. The LTM4643EV has an operating input voltage range of 4V to 20V and is able to provide up to 3A out output current from each of its phases. Each output's voltage is programmable from 0.6V to 3.3V. The LTM4643EV is a complete DC/DC point of load regulator in a thermally enhanced 15mm × 9mm × 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 also available through the CLKIN pin. The CLKOUT pin provides for synchronization of additional modules' phases. The LTM4643 data sheet must be read in conjunction with this demo manual for working on or modifying demo circuit 2453A.

Design files for this circuit board are available at http://www.linear.com/demo/DC2453A

BOARD PHOTO

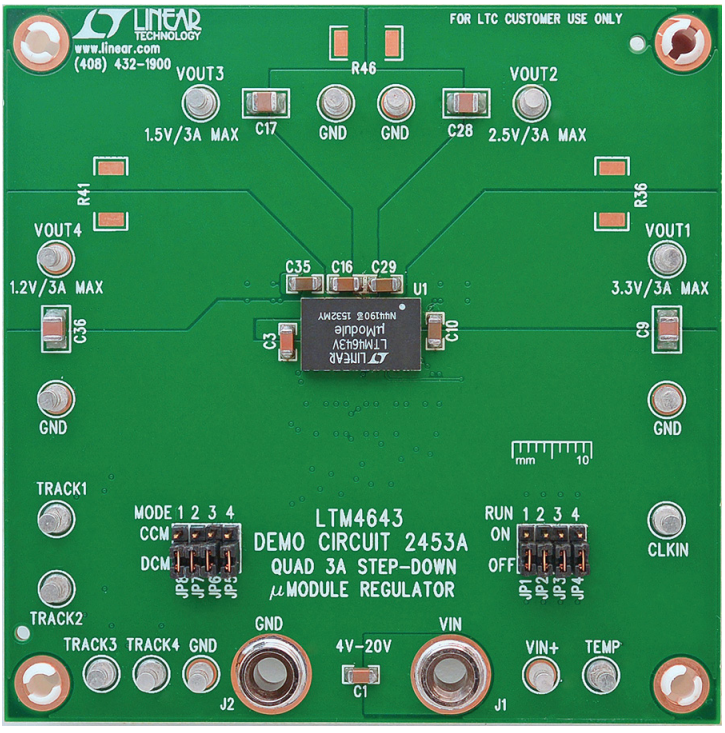


Figure 1. Quad 3A LTM4643; DC2453A

PERFORMANCE SUMMARY

PARAMETER	CONDITIONS/NOTES	VALUE
Input Voltage Range		4V – 20V
Output Voltage V_{OUT}	Jumper Selectable	V_{OUT1} = 3.3VDC, V_{OUT2} = 2.5VDC, V_{OUT3} = 1.5VDC, V_{OUT4} = 1.2VDC
Maximum Continuous Output Current per Phase	Derating is Necessary for Certain Operating Conditions. See Data Sheet for Details	3ADC
Default Operating Frequency		1.2MHz
Efficiency	V_{IN} = 12V, V_{OUT1} = 3.3V, I_{OUT} = 3A	89% See Figure 2

QUICK START PROCEDURE

Demonstration circuit 2453A is an easy way to evaluate the performance of the LTM4643EV. 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:

JP1	JP2	JP3	JP2
RUN1	RUN2	RUN3	RUN4
ON	ON	ON	ON

JP8	JP7	JP6	JP5
MODE1	MODE2	MODE3	MODE4
CCM	CCM	CCM	CCM

2. Before connecting input supply, loads and meters, preset the input voltage supply to be between 4V to 20V. Preset the load currents to 0A.
3. With power off, connect the loads, input voltage supply and meters as shown in Figure 1.
4. Turn on input power supply. The output voltage meters for each phase should display the programmed output voltage ±2%.
5. Once the proper output voltage is established, adjust the load currents for each phase within the 0A to 3A range and observe the load regulation, efficiency, and other parameters. Output voltage ripple should be measured at J6 with a BNC cable and oscilloscope.
6. To observe increased light load efficiency place, a Mode pin jumper (JP5-JP8) in the DCM Mode position.

QUICK START PROCEDURE

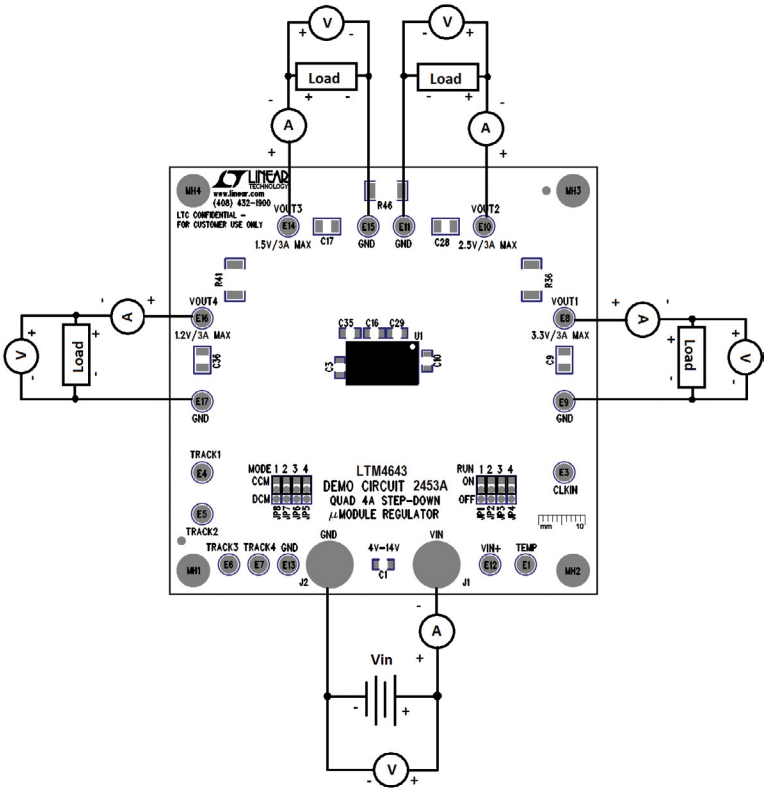


Figure 2. Test Setup of DC2453A

QUICK START PROCEDURE

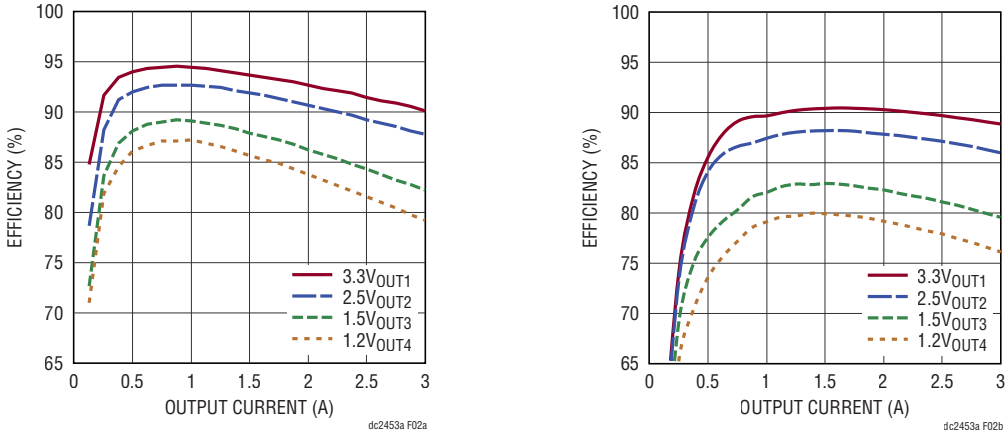
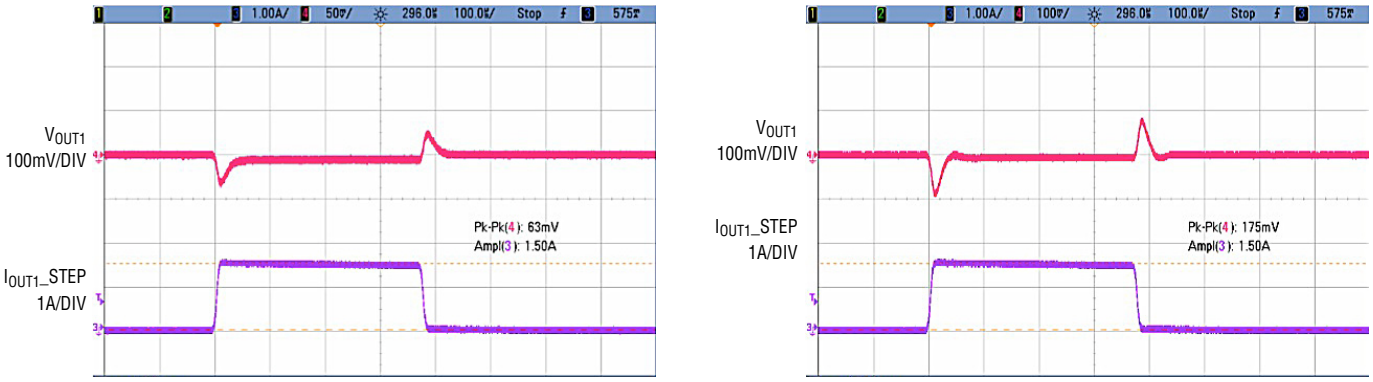


Figure 2. Measured Supply Efficiency at $5V_{IN}$ and $12V_{IN}$

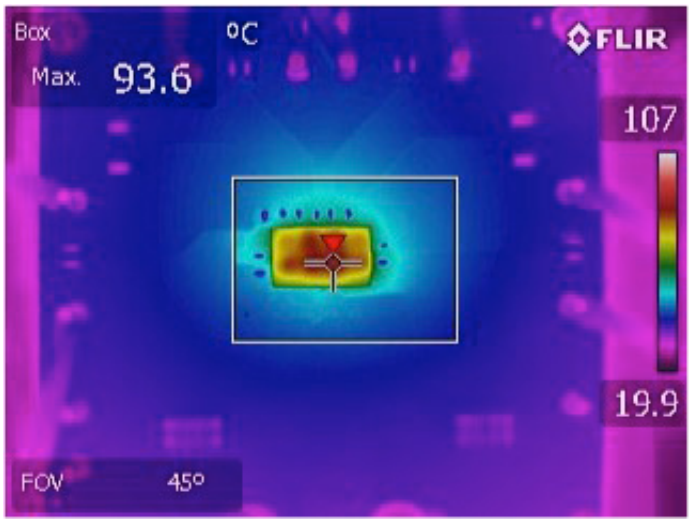


V_{IN} (V)	V_{OUT} (V)	C_{OUT} CERAMIC
12	3.3	2 × 47µF/6.3V/Ceramic

V_{IN} (V)	V_{OUT} (V)	C_{OUT} CERAMIC
12	1.2	2 × 47µF/6.3V/Ceramic

Figure 3. Measured V_{OUT1} = 3.3V and V_{OUT4} = 1.2V Load Transient Responses (1.5A to 3A Load Step)

QUICK START PROCEDURE



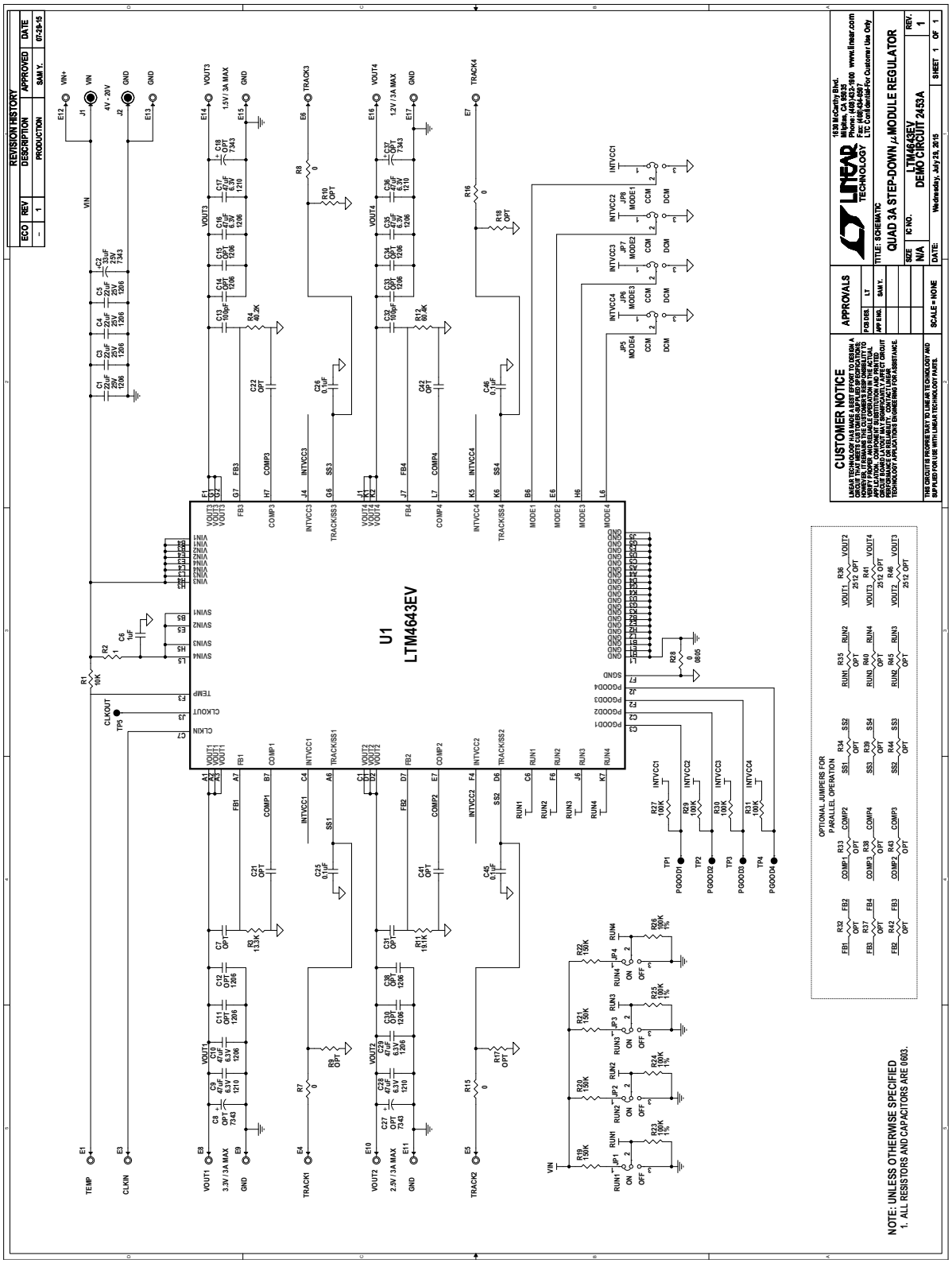
V_{IN} (V)	AIRFLOW	AMBIENT (°C)
5	Natural Convection	28

Figure 4. Measured Thermal Capture with All Phases at Full Load (3A)

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	2	C1, C3	CAP, CER, 22µF, 25V, X5R, 20%, 1206	MURATA, GRM31CR61E226ME15L
2	1	C6	CAP, X5R, 1µF, 16V 10%, 0603	AVX, 0603YD105KAT2A
3	4	C9, C17 ,C28, C36	CAP, CER, 47µF, 6.3V, X5R, 20%,1210	AVX, 12106D476MAT2A
4	4	C10, C16, C29, C35	CAP, CER, 47µF, 6.3V, X5R, 20%, 1206	TAIYO YUDEN, JMK316ABJ476MLHT
5	4	C25, C26, C45, C46	CAP, CER, 0.10µF, 50V, X7R, 10%, 0603	TDK, C1608X7R1H104K
6	1	R1	RES, 10k, 1%, 1/10W, 0603	VISHAY, CRCW060310K0FKED
7	1	R2	RES, 1Ω, 5%, 1/10W, 0603	VISHAY,CRCW06031R00JNEA
8	1	R3	RES, 13.3k, 1%, 1/10W, 0603	VISHAY CRCW060313K3FKEA
9	1	R4	RES, 40.2k, 1%, 1/10W, 0603	VISHAY CRCW060340K2FKEA
10	1	R11	RES, 19.1k, 1%, 1/10W, 0603	VISHAY CRCW060319K1FKEA
11	1	R12	RES, 60.4k, 1%, 1/10W, 0603	VISHAY CRCW060360K4FKEA
12	1	R28	RES, 0805, 0Ω 5% 1/16W	VISHAY, CRCW08050000Z0EA
13	1	U1	LTM4643EV, BGA-15X9-5.01	LINEAR TECH. CORP. LTM4643EV#PBF
Additional Demo Board Circuit Components				
1	2	C4, C5	CAP, CER, 22µF, 25V, X5R, 20%, 1206	MURATA, GRM31CR61E226ME15L
2	1	C2	CAP, POSCAP, 33µF, 25V, 7343	PANASONIC, 25TQC33MYF
3	6	C7, C21, C22, C31, C41, C42	CAP, 0603	OPTION
4	4	C8, C18, C27, C37	CAP, POSCAP, 7343	OPTION
5	8	C11, C12, C14, C15, C30, C33, C34, C38	CAP, CER, 1206	OPTION
6	2	C13, C32	CAP, CER, 100pF, 25V, X7R, 10%, 0603	AVX 06033C101KAT2A
7	4	R7, R8, R15, R16	RES, 0Ω, 1%, 1/10W, 0603	VISHAY, CRCW06030000Z0ED
8	4	R19, R20, R21, R22	RES, 150k, 5%, 1/10W, 0603	VISHAY CRCW0603150KJNEA
9	8	R23, R24, R25, R26, R27, R29, R30, R31	RES, 100k, 5%, 1/10W, 0603	VISHAY CRCW0603100KJNEA
10	16	R9, R10, R17, R18, R32-R35, R37-R40, R42-R45	RES, 0603,OPT	OPT
11	3	R36, R41, R46	RES, 0 OHM, 2512,OPT	OPT
Hardware				
1	16	E1, E3-E17	TESTPOINT, TURRET 0.094"	MILL MAX 2501-2-00-80-00-00-07-0
2	2	J1, J2	JACK, BANANA	KEYSTONE 575-4
3	8	JP1-JP8	HEADER, 0.079" SINGLE ROW, 3-PIN	SULLINS, NRPN031PAEN-RC
4	8	XJP1-XJP8	SHUNT, 0.079" CENTER	SAMTEC, 2SN-BK-G
5	4	STAND-OFFS	STAND-OFF, NYLON 0.375" TALL (SNAP ON)	KEYSTONE, 8832

SCHEMATIC DIAGRAM



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