



# DEMO MANUAL DC1663A

## PERFORMANCE SUMMARY $(T_A = 25^\circ\text{C})$

PARAMETER	CONDITION	VALUE
Input Voltage Range		4.5V to 26.5V
Output Voltage $V_{OUT1}$	$V_{IN} = 4.5$ to 26.5V, $I_{OUT1} = 0$ A to 8A, JP1: CCM	$1.5\text{V} \pm 1.5\%$ (1.4775V to 1.5225V)
Output Voltage $V_{OUT2}$	$V_{IN} = 4.5$ to 26.5V, $I_{OUT2} = 0$ A to 8A, JP1: CCM	$1.2\text{V} \pm 1.5\%$ (1.182V to 1.218V)
Per Channel Maximum Continuous Output Current	Derating is Necessary for Certain $V_{IN}$ , $V_{OUT}$ and Thermal Conditions, See Datasheet for Details.	8A
Default Operating Frequency		400kHz
External Clock Synchronous Frequency Range		400kHz to 780kHz
Efficiency of Channel 1	$V_{IN} = 5\text{V}$ , $V_{OUT1} = 1.5\text{V}$ , $I_{OUT1} = 8\text{A}$ , $f_{SW} = 400$ kHz	87.7% See Figure 2
Efficiency of Channel 2	$V_{IN} = 5\text{V}$ , $V_{OUT2} = 1.2\text{V}$ , $I_{OUT2} = 8\text{A}$ , $f_{SW} = 400$ kHz	85.5% See Figure 3
Load Transient of Channel 1	$V_{IN} = 12\text{V}$ , $V_{OUT1} = 1.5\text{V}$ , $I_{SETP} = 0$ A to 4A	See Figure 4
Load Transient of Channel 2	$V_{IN} = 12\text{V}$ , $V_{OUT2} = 1.2\text{V}$ , $I_{SETP} = 0$ A to 4A	See Figure 5

## QUICK START PROCEDURE

Demonstration circuit DC1663A is easy to set up to evaluate the performance of the LTM4628EV. Please refer to Figure 1 for proper measurement equipment setup and the following the procedure:

1. Place jumpers in the following positions for a typical application:

JP1	JP2	JP3	JP4	JP5	JP6
MODE	RUN1	RUN2	TRACK1 SEL.	TRACK2 SEL.	CLKOUT PHASE
CCM	ON	ON	SOFT-START	SOFT-START	60°

2. With power off, connect the input power supply, load and meters as shown in Figure 1. Preset the load to 0A and  $V_{IN}$  supply to 12V.
3. Turn on the power supply at the input. The output voltage in channel 1 should be  $1.5\text{V} \pm 1.5\%$  and the output voltage in channel 2 should be  $1.2\text{V} \pm 1.5\%$ .
4. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, output voltage ripple, efficiency and other parameters. Output ripple should be measured at J1 and J2 with SMA cables. 50 $\Omega$  termination should be set on the oscilloscope or SMA cables.
5. (Optional) For optional load transient test, apply an adjustable pulse signal between IOSTEP CLK and GND pins. Pulse amplitude (3V to 3.5V) sets the load step current amplitude. The pulse signal should have very small duty cycle (< 10%) to limit the thermal stress on the transient load circuit. The output transient current can be monitored at the SMA connector J3 (15mV/A). Apply the jumper resistors R34 or R35 (on the back-side of boards) to apply load transient on channel 1 or channel 2 correspondingly.
6. (Optional) LTM4628 can be synchronized to an external clock signal. Remove the jumper on JP1 and apply a clock signal (0V to 5V, square wave) on the CLKIN test point.
7. (Optional) The outputs of LTM4628 can track another supply. The jumpers JP4 and JP5 allow choosing soft-start or output tracking. If tracking external voltage is selected, the corresponding test points, TRACK1 and TRACK2, need to be connected to a valid voltage signal.
8. (Optional) LTM4628 can be configured for a 2-phase single output at up to 16A on DC1663A. Refer to the schematic for corresponding jumper resistor setup for dual phase single output applications.

QUICK START PROCEDURE

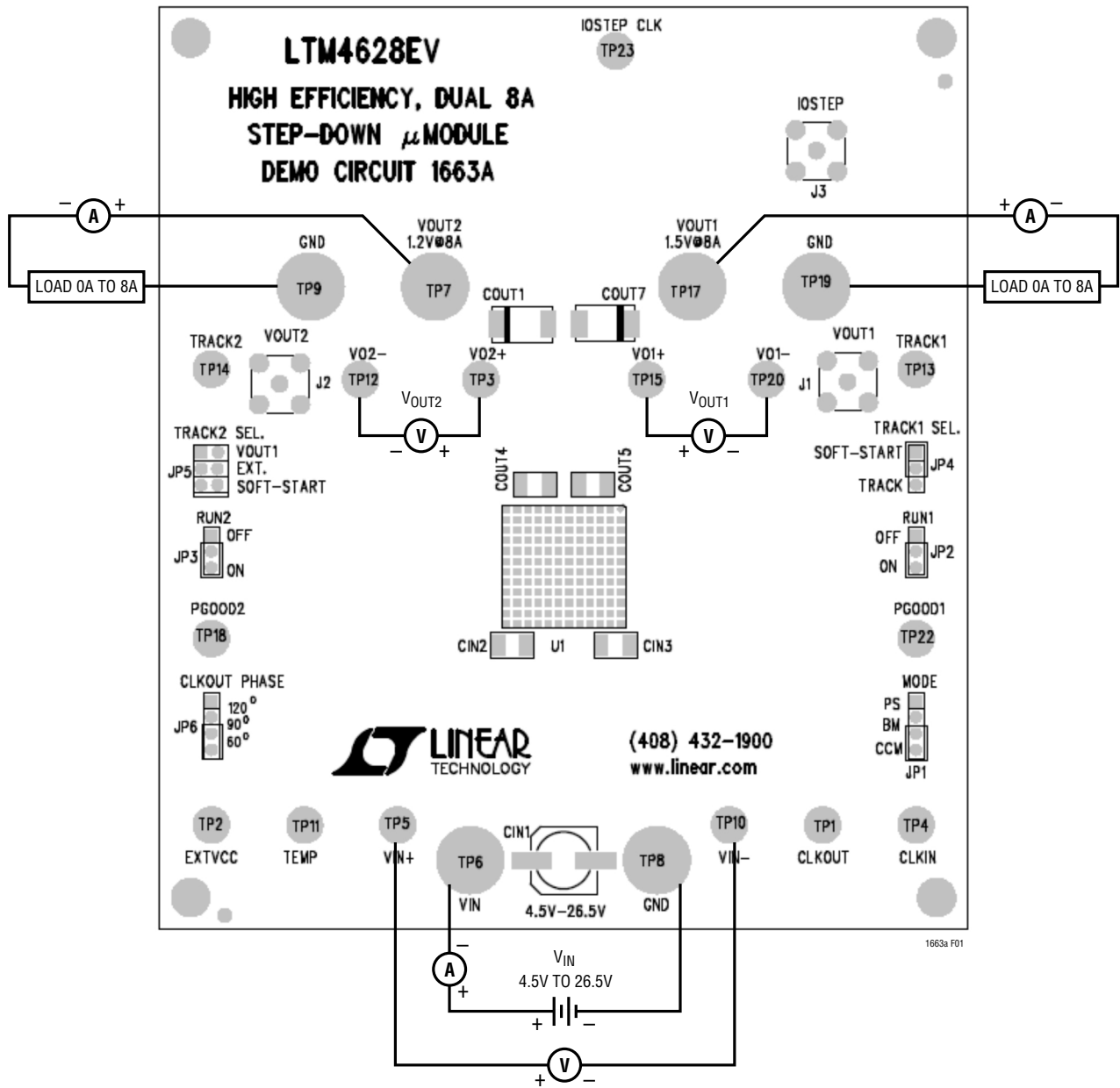
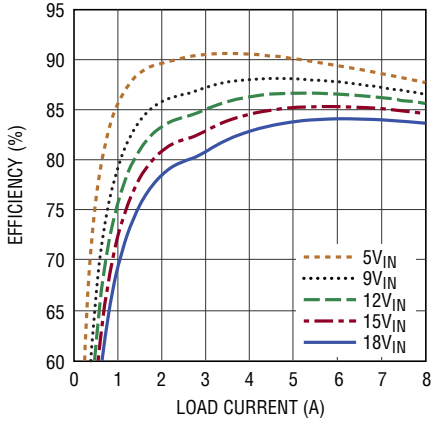
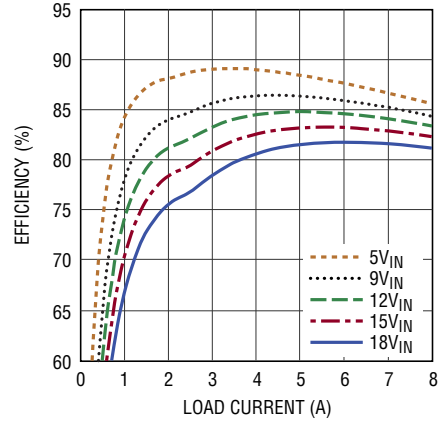


Figure 1. Test Setup of DC1663A

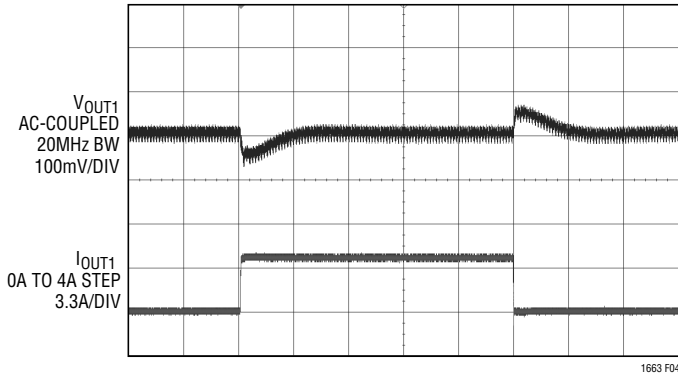
## QUICK START PROCEDURE



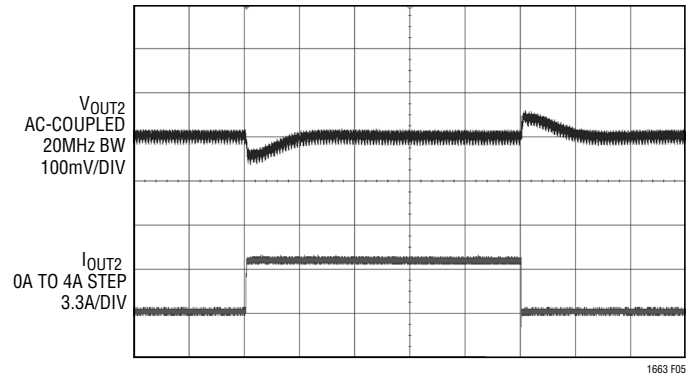
**Figure 2. Measured Efficiency on Channel 1**  
( $V_{OUT1} = 1.5V$ ,  $f_{SW} = 400kHz$ , Channel 2 Disabled)



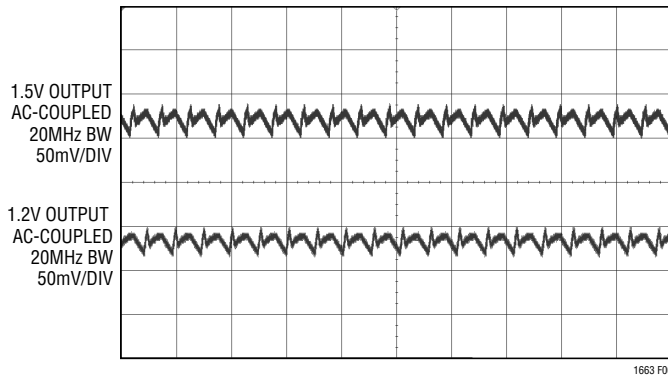
**Figure 3. Measured Efficiency on Channel 2**  
( $V_{OUT2} = 1.2V$ ,  $f_{SW} = 400kHz$ , Channel 1 Disabled)



**Figure 4. Measured Channel 1 Load Transient**  
( $V_{IN} = 12V$ ,  $V_{OUT1} = 1.5V$ )



**Figure 5. Measured Channel 2 Load Transient**  
( $V_{IN} = 12V$ ,  $V_{OUT2} = 1.2V$ )



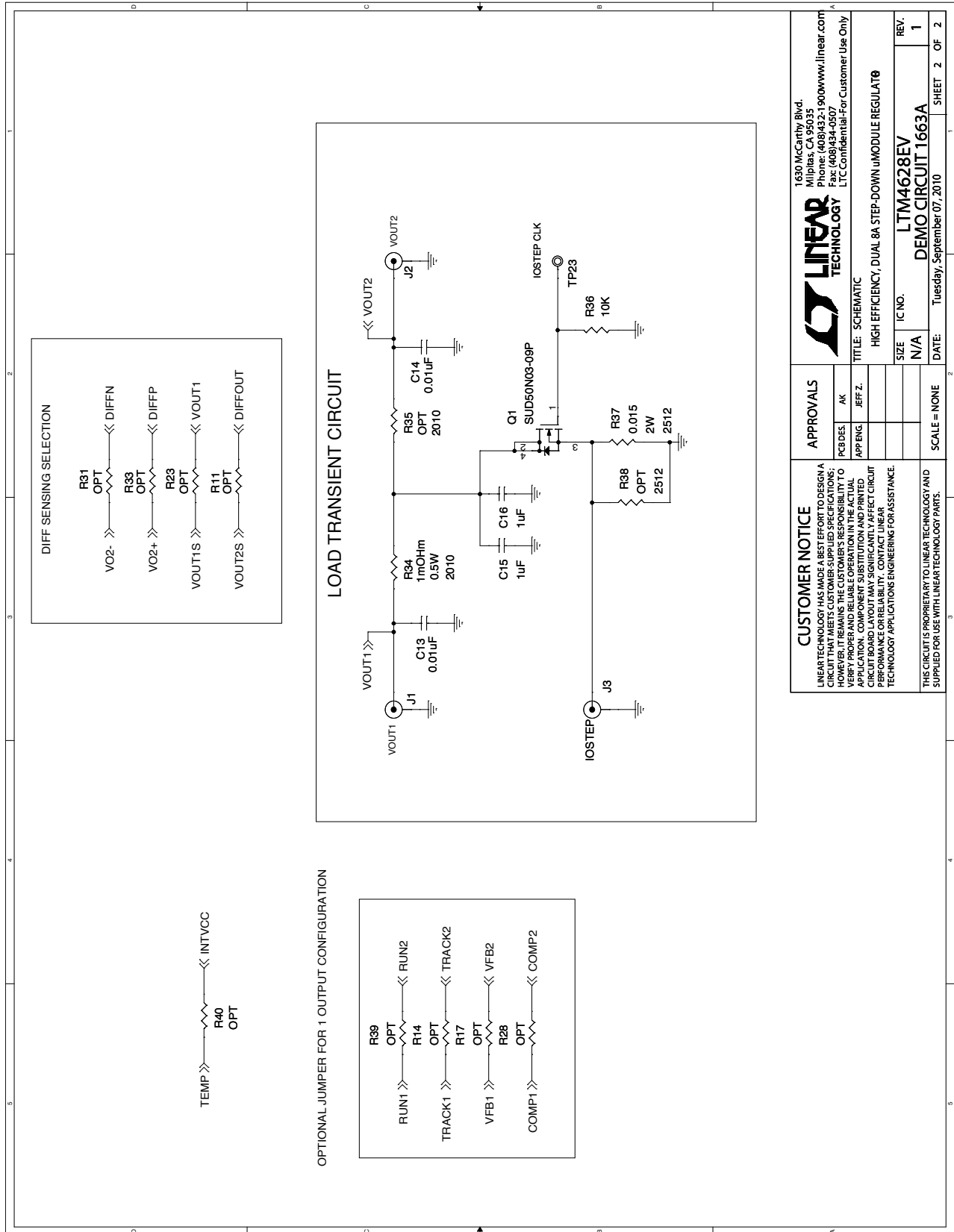
**Figure 6. Measured Output Voltage Ripple at 12V Input, 1.5V and 1.2V Output, 8A Per Channel with Standard Demo Circuit Default Setup**

## PARTS LIST

ITEM	QUANTITY	REFERENCE-DESCRIPTION	DESCRIPTION	MANUFACTURER'S PART NUMBER
<b>Required Circuit Components</b>				
1	4	C <sub>IN2</sub> , C <sub>IN3</sub> , C <sub>IN4</sub> , C <sub>IN5</sub>	Cap., X5R, 10µF, 35V, 10%, 1210	Murata, GRM32ER6YA106KA12
2	2	C <sub>OUT1</sub> , C <sub>OUT7</sub>	Cap., 470µF, 4V, POSCAP, F8	Sanyo, 4TPE470MCL
3	2	C <sub>OUT4</sub> , C <sub>OUT5</sub>	Cap., X5R, 100µF, 6.3V, 20%, 1210	AVX, 12106D107MAT2A
4	2	C5, C7	Cap., X5R, 0.1µF, 25V, 10%, 0603	AVX, 06033D104KAT
5	4	R1, R3, R22, R26	Res., Chip, 10, 1%, 0603	NIC, NRC06F10R0TRF
6	1	R19	Res., Chip, 60.4k, 1%, 0603	Vishay, CRCW060360K4FKED
7	1	R25	Res., Chip, 40.2k, 1%, 0603	Vishay, CRCW060340K2FKED
8	1	R30	Res., Chip, 100k, 1%, 0603	Vishay, CRCW0603100KFKED
9	1	U1	IC, High Efficiency Step-Down Module	Linear Technology LTM4628EV
<b>Additional Demo Board Circuit Components</b>				
1	1	C <sub>IN1</sub>	Cap., 150µF, 35V, Aluminum Electr.,	Sun Electronics, 35CE150AX
2	0	C <sub>OUT2</sub> , C <sub>OUT3</sub> , C <sub>OUT6</sub> , C <sub>OUT8</sub>	Cap., X5R, 100µF, 6.3V, 20% 1210 Optional	AVX, 12106D107MAT2A Optional
3	0	C1	Cap., X7R, 1µF, 25V,10%, 0805 Optional	AVX, 08053C105KAT2A Optional
4	1	C2	Cap., X7R, 1µF, 25V,10%, 0805	AVX, 08053C105KAT2A
5	0	C3, C4, C6, C8 to C12	Cap., 0603, Optional	Optional
6	0	R2, R4, R6, R8, R16, R20, R40	Res., 0603, Optional	Optional
7	0	R11, R14, R17, R23, R28, R31, R33, R39	Res., Chip, 0, 1%, 0603, Optional	Vishay, CRCW06030000Z0ED, Optional
8	4	R5, R24, R27, R36	Res., Chip, 10k, 1%, 0603	Vishay, CRCW060310K0FKED
9	2	C13, C14	Cap., X7R, 0.01µF, 16V, 10%, 0603	AVX, 0603YC103KAT2A
10	2	C15, C16	Cap., X7R, 1µF, 10V, 10%, 0603	AVX, 0603ZC105KAT
11	4	R7, R21, R29, R32	Res., Chip, 0, 1%, 0603	Vishay, CRCW06030000Z0ED
12	4	R9, R10, R13, R15	Res., Chip, 60.4k, 1%, 0603	Vishay, CRCW060360K4FKED
13	1	R12	Res., Chip, 30.1k, 1%, 0603	Vishay, CRCW060330R1FKED
14	1	R18	Res., Chip, 90.9k, 1%, 0603	Vishay, CRCW060390K9FKED
15	1	R34	Res., Chip, 0.001Ω, 0.5W, 2010	Vishay, WSL20101L000FEA
16	0	R35	Res., 2010, Optional	Optional
17	1	R37	Res., Chip, 0.015Ω, 2W, 2512	Vishay, WSL2512R0150FEA
18	0	R38	Res., 2512, Optional	Optional
19	1	Q1	N-Channel 30-V MOSFET	Vishay, SUD50N03-09P
20	10	TP1 to TP5, TP10 to TP15	Testpoint, Turret, .094" pbf	Mill-Max, 2501-2-00-80-00-00-07-0
21	4	TP18, TP20, TP22, TP23	Testpoint, Turret, .094" pbf	Mill-Max, 2501-2-00-80-00-00-07-0
22	6	TP6, TP7, TP8, TP9, TP17, TP19	Jack Banana	Keystone, 575-4
<b>Hardware - for Demo Board Only</b>				
1	2	JP1, JP6	Header 4 Pin 0.079 Single Row	Samtec, TMM104-02-L-S
2	3	JP2, JP3, JP4	Header 3 Pin 0.079 Single Row	Samtec, TMM103-02-L-S
3	1	J5	Header 3 Pin 0.079 Double Row	Samtec, TMM-103-02-L-D
4	6	XJP1 to XJP6	Shunt, .079" Center	Samtec, 2SN-BK-G
5	3	J1, J2, J3	CON., SMA, PCB, Jack	Amphenol Connex, 132134
6	4	Stand-Off	Stand-Off, Nylon 0.50"	Keystone, 8833 (Snap On)



**SCHEMATIC DIAGRAMS**



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FCB DES.	AK	APP. ENG.	EFF. Z.								
<p><b>CUSTOMER NOTICE</b> THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.</p>		<p><b>SCALE = NONE</b></p>									
<p><b>LINEAR TECHNOLOGY</b> 1630 McCarthy Blvd. Milpitas, CA 95035 Phone: (408)432-1900 www.linear.com Fax: (408)434-0507 LTC Confidential-For Customer Use Only</p>		<p><b>TITLE: SCHEMATIC</b> HIGH EFFICIENCY, DUAL BA STEP-DOWN uMODULE REGULATØ</p>									
<p>SIZE: N/A</p>		<p>IC NO.: LTM4628EV</p>									
<p>DATE: Tuesday, September 07, 2010</p>		<p>REV.: 1</p>									
<p>SHEET 2 OF 2</p>		<p>DEMO CIRCUIT 1663A</p>									



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