LTM4622
Ultrathin Dual 2.5A Step-Down µModule Regulator

DESCRIPTION

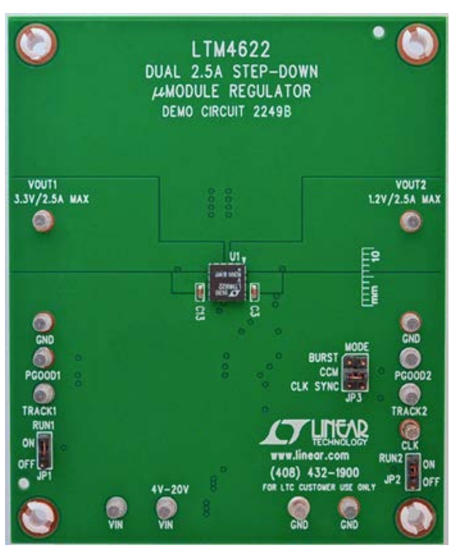
Demonstration circuit 2249B features the LTM®4622 µModule® regulator, a tiny low profile high performance high efficiency dual step-down regulator. The LTM4622 has an operating input voltage range of 3.6V to 20V and is able to provide an output current of up to 2.5A for each channel. Each output's voltage 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 demo circuit 2249B.

Design files for this circuit board are available.

PERFORMANCE SUMMARY **Specifications are at T_A = 25°C**

PARAMETER	CONDITIONS	VALUE
Input Voltage Range		4V to 20V
Output Voltage V_{OUT1}, V_{OUT2}	Programmable with FB Pin Resistors	$3.3V_{DC}$, $1.2V_{DC}$
Maximum Continuous Output Current Each Phase	Derating is Necessary for Certain Operating Conditions. See Data Sheet for Details	$2.5A_{DC}$
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 2249B 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 to 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 2249B 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.

QUICK START PROCEDURE

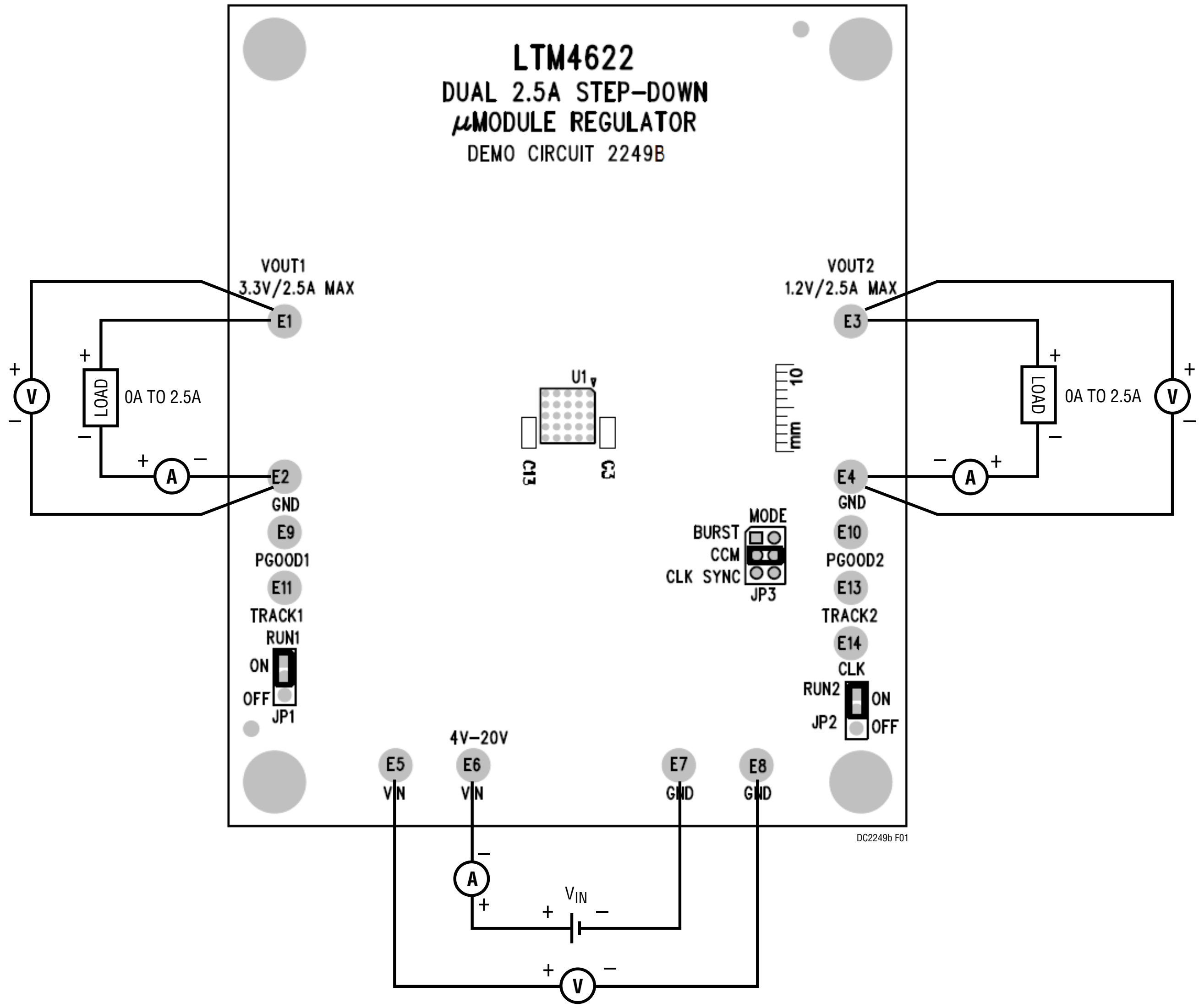


Figure 1. Test Setup

QUICK START PROCEDURE

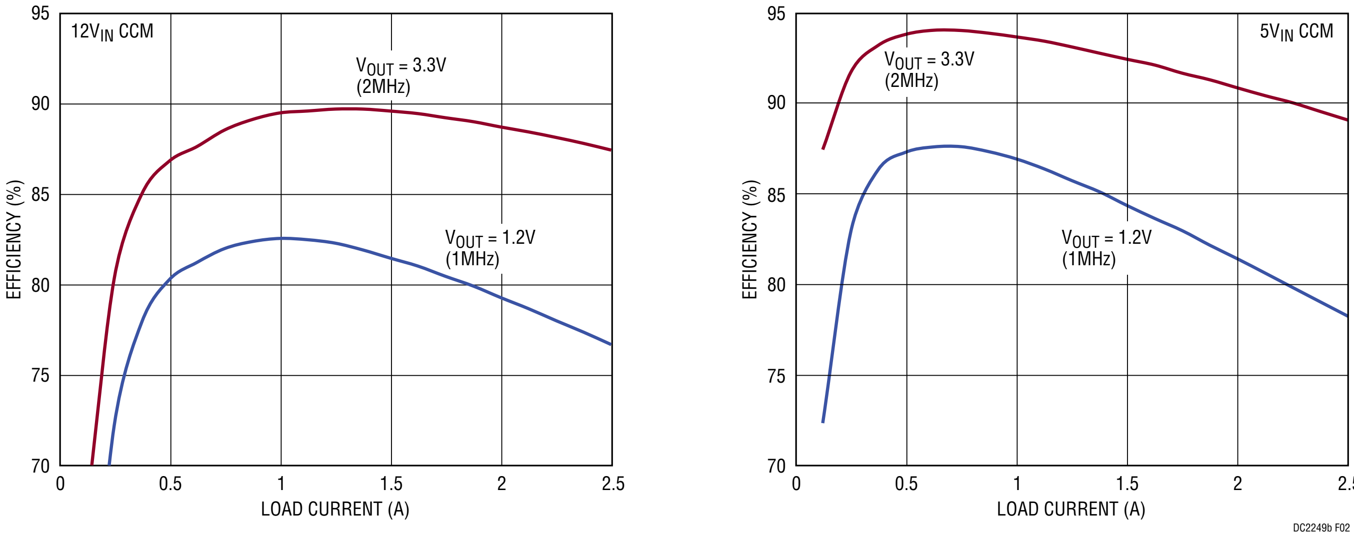
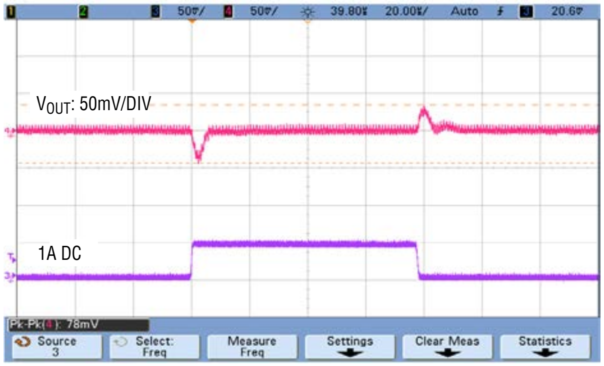


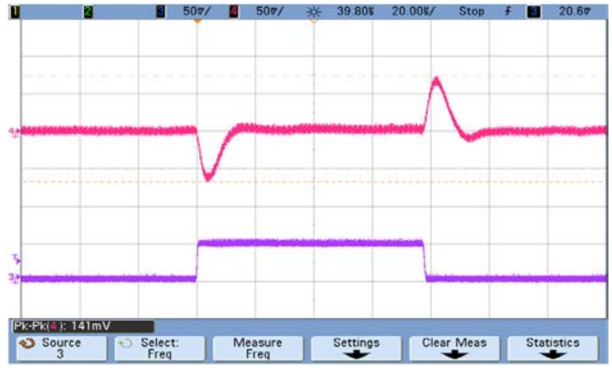
Figure 2. Measured Supply Efficiency at 12V_{IN} and 5V_{IN}

QUICK START PROCEDURE



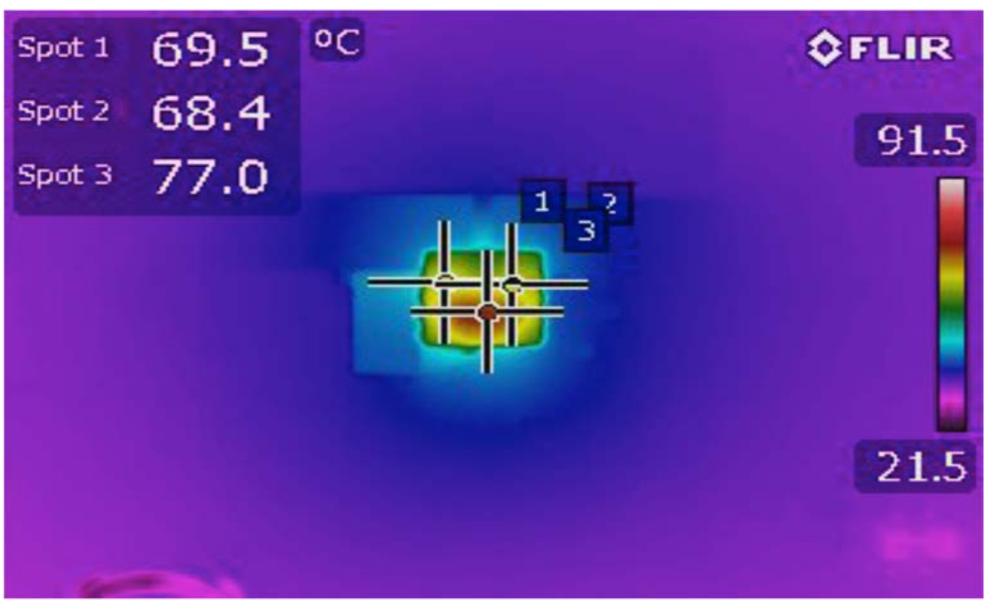
V_{IN} (V)	V_{OUT} (V)	C_{OUT}
12	1.2	1 × 22µF + 1 × 47µF

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



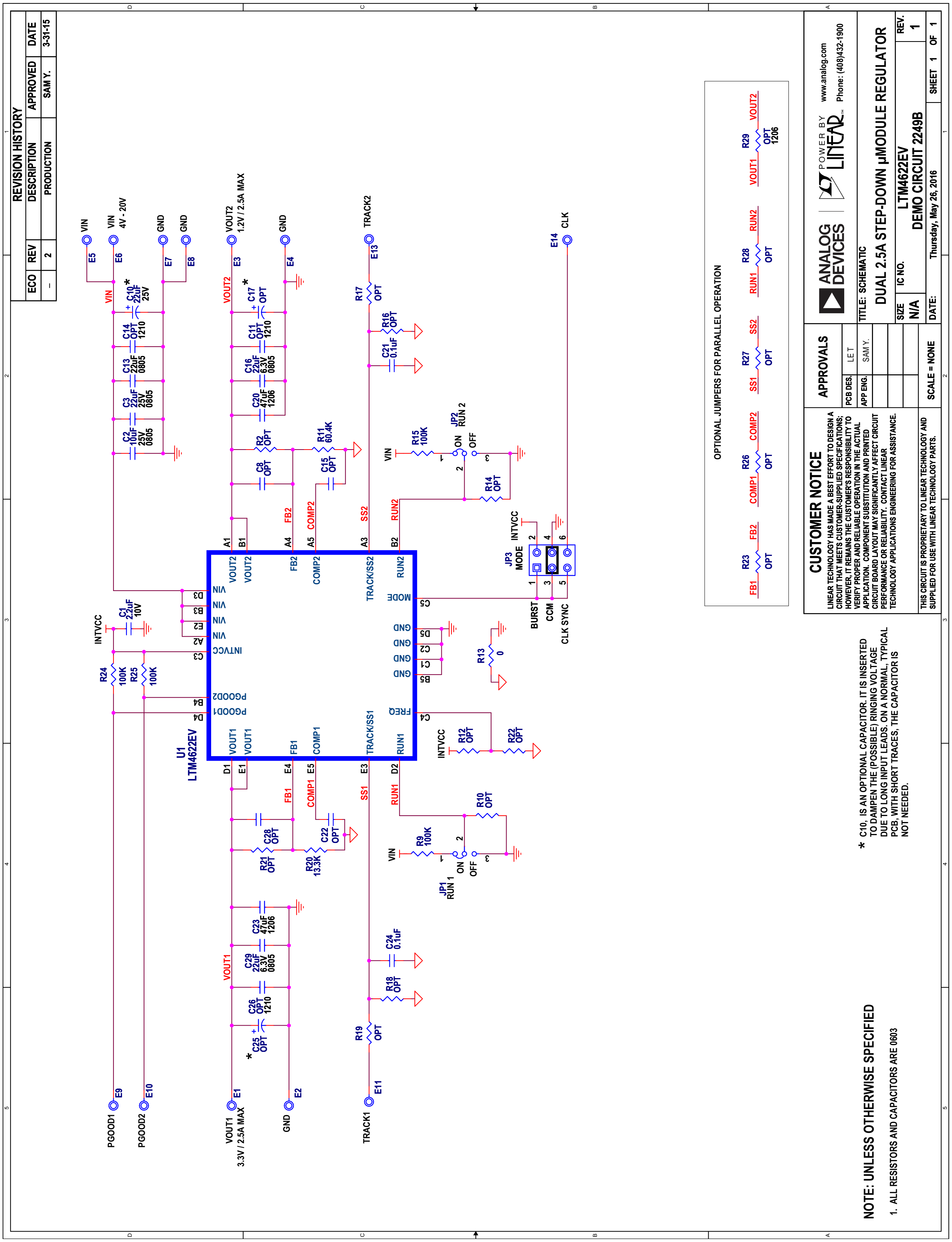
V_{IN} (V)	V_{OUT1} (V), I_{OUT1} (A)	V_{OUT2} (V), I_{OUT2} (A)	f_{SW} (MHz)	$T_{AMBIENT}$ (°C)
12	3.3, 2.5	1.2, 2.5	2	22

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, 25V, 20%, 0805	MURATA, GRM21BR61E226ME-44L
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	IC, LTM4622EV, LGA 25-6.25X6.25	ANALOG DEVICES, LTM4622EV#PBF
Additional Demo Board Circuit Components				
2	1	C2	CAP, X5R, 10µF, 25V, 10%, 0805	TAIYO YUDEN, TMK212BBJ106KGHT
4	3	C4, C6, C18	CAP, X5R, 1µF, 10V, 10%, 0603	MURATA, GRM188R61A105KA61D
5	0	C8, C15, C22, C28	CAP, 0603	OPTION
6	1	C10	CAP, X5R, 22µF, 25V, 10%, 7343	SANYO, 25TQC22MV
10	0	C17, C25	CAP, 7343	OPTION
18	1	Q1	XSTR, SUD50N04-8M8P-4GE3 MOSFET TO-252	VISHAY, SUD50N04-8M8P-4GE3
19	1	RS1	RES, CHIP, 0.05Ω, 1/4W, 1%, 1206	VISHAY, WSL1206R0500FEA
20	0	R2, R10, R12, R14, R16 TO R19, R21, R22, R23, R26 TO R29	CAP, 0603	OPTION
21	1	R3	RES, CHIP, 10k, 1/16W, 1%, 0603	VISHAY, CRCW060310K0FKEA
22	4	R9, R15, R24, R25	RES, CHIP, 100k, 1/16W, 1%, 0603	VISHAY, CRCW0603100KFKEA
24	1	R13	RES, CHIP, 0, 1/16W, 1%, 0603	VISHAY, CRCW06030000Z0EA
Hardware: For Demo Board Only				
13	14	E1 TO E14	TESTPOINT, TURRET, 0.095"	MILL-MAX, 2501-2-00-80-00-00-07-0
14	2	JP1, JP2	HEADER, 1X3 0.079	SULLINS, NRPN031PAEN-RC
15	1	JP3	HEADER, 2X3 0.079	SULLINS, NRPN032PAEN-RC
16	3	XJP1, XJP2, XJP3	SHUNT	SAMTEC 2SN-BK-G
17	2	J1, J2	CONN, BNC, 5PINS	CONNEX, 112404
28	4	STAND OFF	STAND OFF, SNAP ON, 0.375" TALL	KEYSTONE_8832

SCHEMATIC DIAGRAM



Rev. 0

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.