

LTM8074 1.2A Step-Down Silent Switcher μModule Regulator

DESCRIPTION

Demonstration circuit 2753A features the [LTM®8074EY](#) μModule regulator, a tiny high performance high efficiency step-down regulator with Silent Switcher® architecture. DC2753A has an operating input voltage range of 3.4V to 40V and is able to provide an output current of up to 1.2A. The output voltage can be programmed from 0.78V up to 15V. The LTM8074EY is a complete DC/DC point of load regulator in a thermally enhanced 4mm × 4mm × 1.82mm BGA package requiring only a few input and output capacitors.

The radiated EMI performances of the board (with EMI filter) are shown in Figure 6 and Figure 7. The demo board also has a conducted EMI filter installed. To use the conducted EMI filter, the input should be tied to V_{EMI} , not V_{IN} . An inductor L2, which is a 0Ω jumper on the board by default now, can be added in the EMI filter to further reduce the conducted emission.

The LTM8074 data sheet must be read in conjunction with this demo manual for working on or modifying DC2753A.

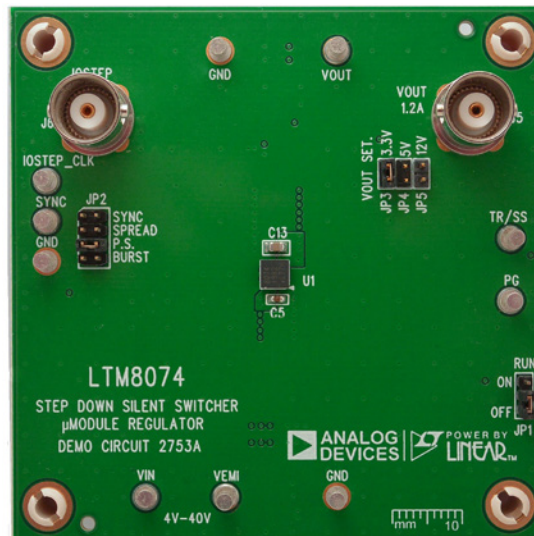
Design files for this circuit board are available.

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PERFORMANCE SUMMARY Specifications are at $T_A = 25^\circ\text{C}$

PARAMETER	CONDITIONS/NOTES	VALUE
Input Voltage Range		3.4V – 40V
Output Voltage V_{OUT}	Jumper Selectable	3.3V _{DC} , 5V _{DC} , 12V _{DC}
Maximum Continuous Output Current	De-Rating is Necessary for Certain Operating Conditions. See Data Sheet for Details	1.2A _{DC}
Default Operating Frequency		2MHz
Efficiency	$V_{IN} = 12\text{V}$, $V_{OUT} = 5\text{V}$, $I_{OUT} = 1.2\text{A}$	89% See Figure 2

BOARD PHOTO



QUICK START PROCEDURE

Demonstration circuit 2753A is an easy way to evaluate the performance of the LTM8074EY. 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 3.3V_{OUT} application:

JP1	JP2	JP3
RUN	MODE	V _{OUT} Select
ON	PS	3.3V

2. Before connecting input supply, load and meters, pre-set the input voltage supply to be between 3.4V to 40V. Pre-set the load current to 0A.

Note: V_{EMI} is the input pin with EMI filter. To bypass input EMI filer, connect supply to V_{IN} pin.

3. With power off, connect the load, input voltage supply and meters as shown in Figure 1.

4. Turn on input power supply. The output voltage meter should display the selected output voltage ± 2%.
5. Once the proper output voltage is established, adjust the load current within the 0A – 1.2A range and observe the load regulation, efficiency, and other parameters. Output voltage ripple should be measured across C12 with a BNC cable terminated into 50Ω and an oscilloscope.
6. To observe BURST light load efficiency, place the Mode pin jumper (JP2) in the BURST position.
7. An external clock can be added to the SYNC terminal when the SYNC function is used (JP2 on the SYNC position). Please ensure the chosen R_T sets the LTM8074 switching frequency to equal or below the lowest sync frequency.
8. A spread spectrum mode is available by moving the Mode pin jumper (JP2) in the SPREAD position. The spread spectrum modulation frequency is set to be 3kHz.

QUICK START PROCEDURE

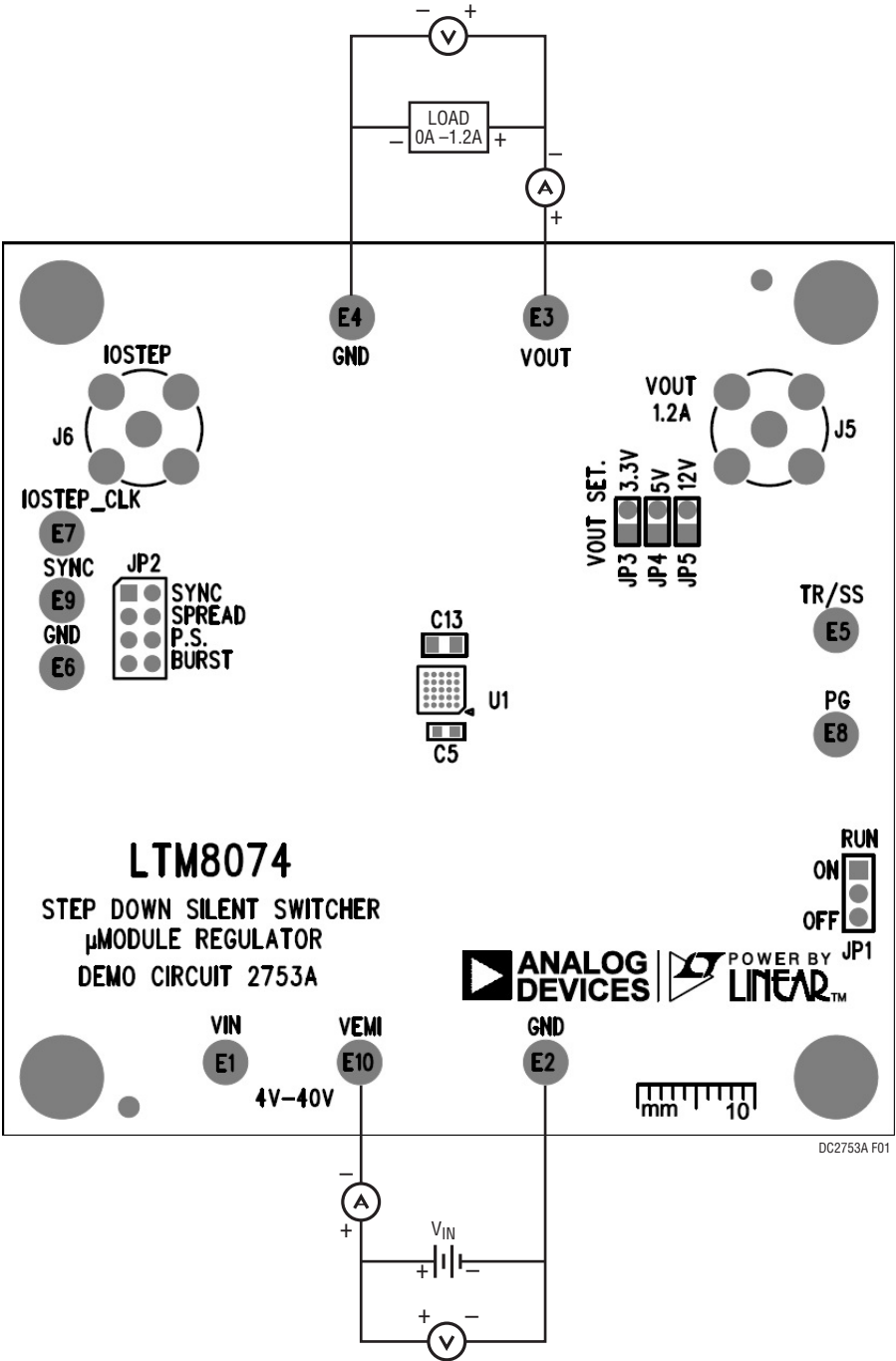


Figure 1. Test Setup

QUICK START PROCEDURE

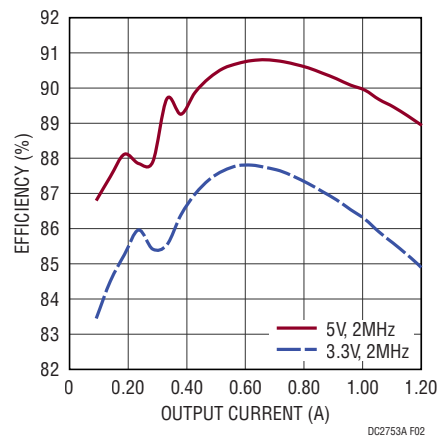


Figure 2. Measured Supply Efficiency at 12VIN

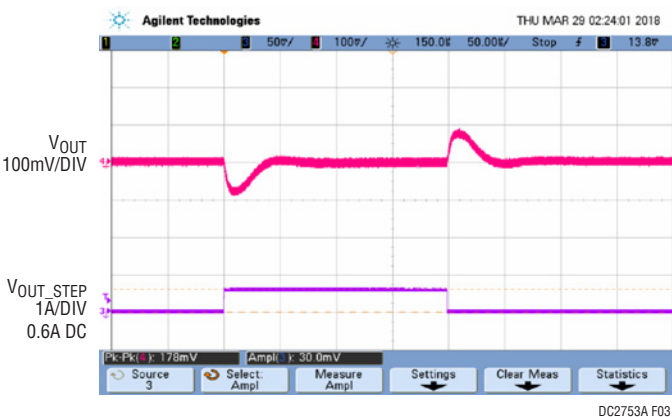


Figure 3. Measured Load Transient Response (0.6A – 1.2A Load Step)

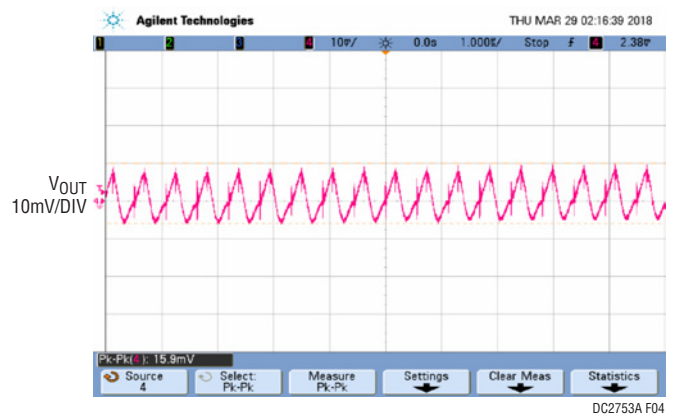


Figure 4. Measured V_{OUT} Ripple

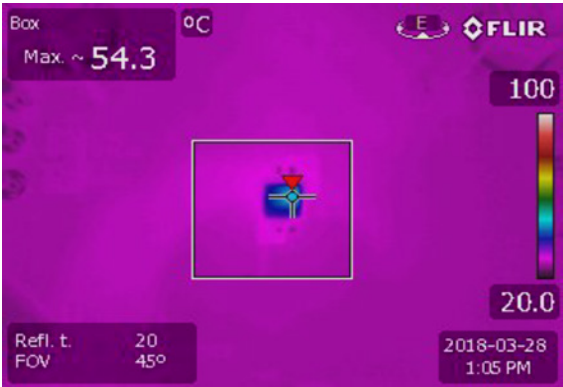


Figure 5. Measured Case Temperature

QUICK START PROCEDURE

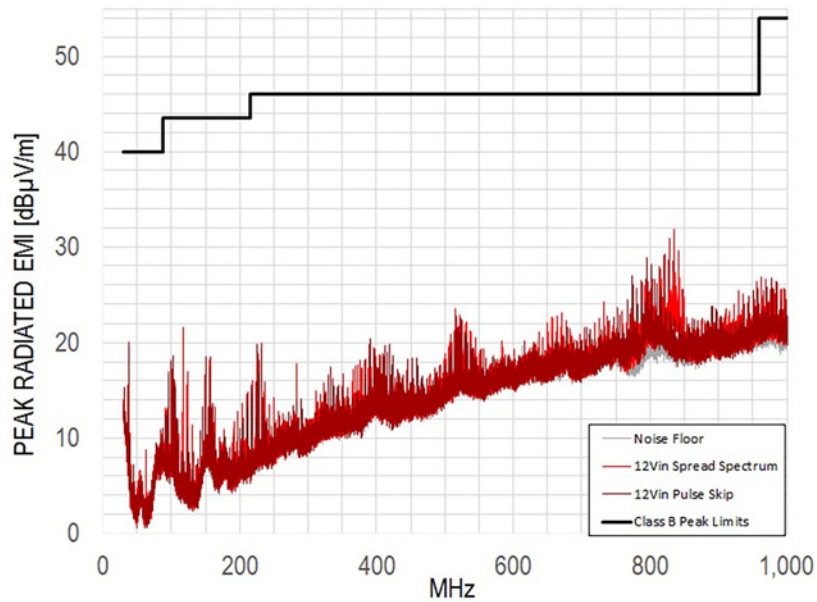


Figure 6. LTM8074 Demo Circuit EMI Performance, without EMI Filter, in CISPR22 Radiated Emission Test, Antenna Polarization: Vertical, 3 Meters ($V_{IN} = 12V$, $V_{OUT} = 3.3V$, $I_{OUT} = 1.2A$, 2MHz Switching Frequency)

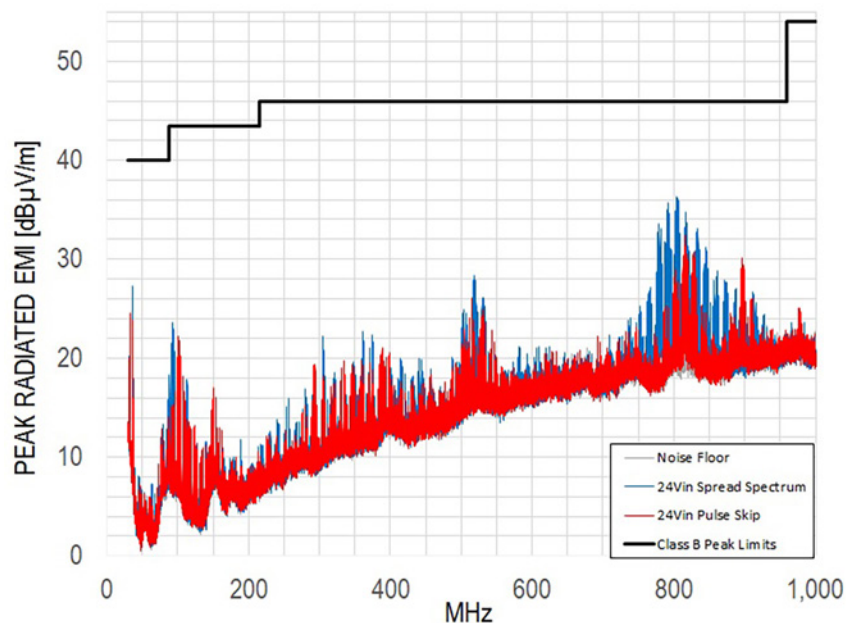


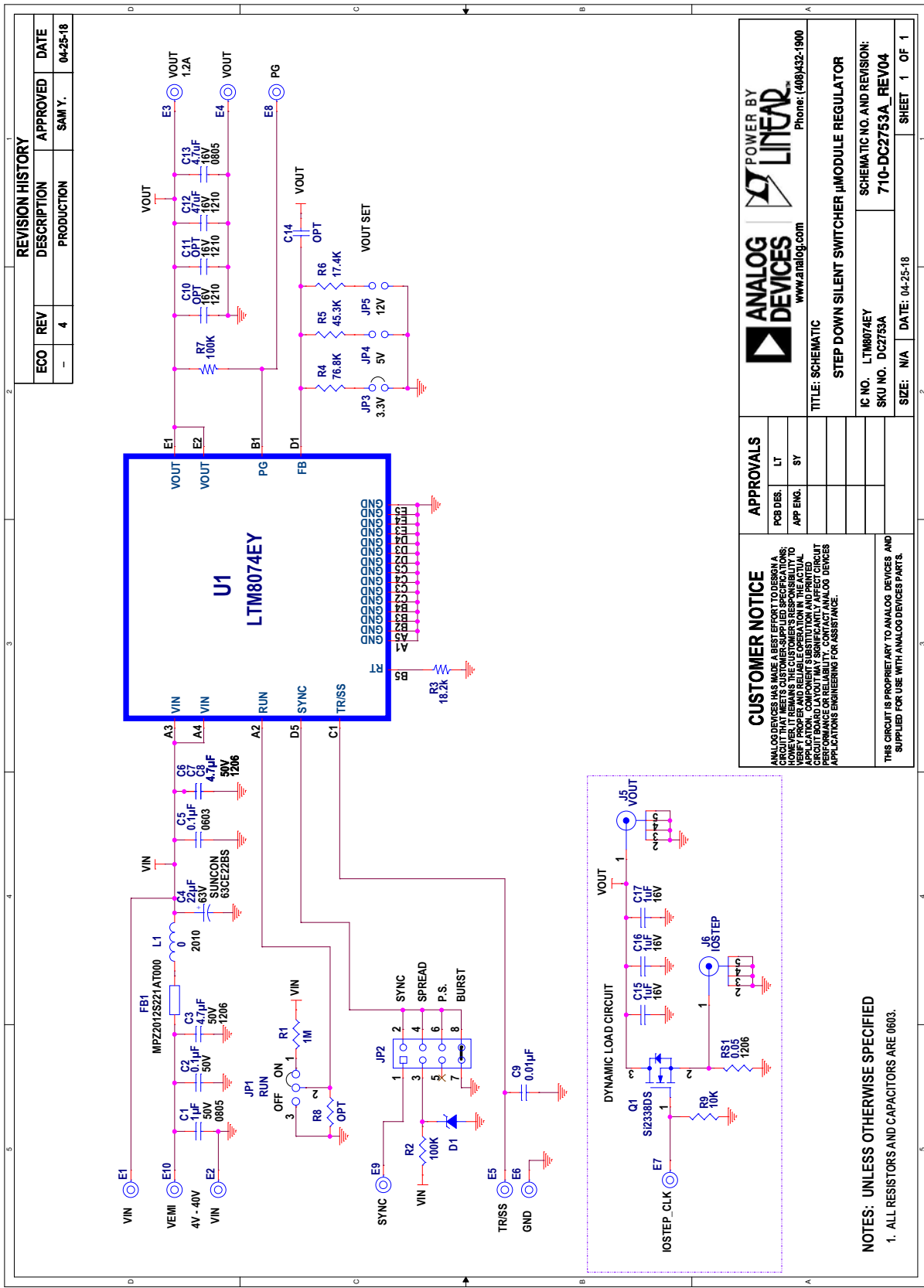
Figure 7. LTM8074 Demo Circuit EMI Performance, without EMI Filter, in CISPR22 Radiated Emission Test, Antenna Polarization: Vertical, 3 Meters ($V_{IN} = 24V$, $V_{OUT} = 3.3V$, $I_{OUT} = 1.2A$, 2MHz Switching Frequency)

DEMO MANUAL DC2753A

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	2	C3, C6	CAP, X7R, 4.7 μ F, 50V, 10% 1206	MURATA, GRM31CR71H475KA12L
2	1	C9	CAP, X5R, 0.01 μ F, 50V, 10%, 0603	AVX, 06035C103KAT2A
3	1	C12	CAP, X7R, 47 μ F, 10V, 10%, 1210	MURATA, GRM32ER71A476KE20L
4	1	R4	RES., 76.8k, 1%, 0603	VISHAY, CRCW060376K8FKEA
5	1	U1	IC, LTM8074EY, BGA-25-4 $\times$ 4-1566	ANALOG DEVICES, LTM8074EY#PBF
Additional Demo Board Circuit Components				
1	1	C1	CAP, X7R, 1 μ F, 50V, 10%, 0805	TDK, C2012X7R1H105K
2	1	C2, C5	CAP, X7R, 0.1 μ F, 50V, 10%, 0603	MURATA, GRM188R71H104KA93D
3	1	L1	RES., CHIP, 0 Ω , 3/4W, 2010	VISHAY, CRCW20100000Z0EF
4	1	FB1	FERRITE BEAD, 220 Ω , 0805	TDK, MPZ2012S221AT000
5	1	C5	CAP, X7R, 0.1 μ F, 50V, 10%, 0603	MURATA, GRM188R71H104KA93D
6	2	C7, C8	CAP, X7R, 4.7 μ F, 50V, 10% 1206	MURATA, GRM31CR71H475KA12L
7	1	C4	CAP, ALUM, 22 μ F, 63V	SUN ELECT, 63CE22BS
8	0	C10, C11	CAP, OPT, 1210	OPT
9	1	C13	CAP, X7R, 4.7 μ F, 16V, 10%, 0805	MURATA, GRM21BR71C475K73L
10	0	C14	CAP, OPT, 0603	OPT
11	3	C15, C16, C17	CAP, X7R, 1.0 μ F, 25V, 10%, 0603	MURATA, GRM188R71E105KA12D
12	1	D1	DIODE, ZENER, 3.6V, SOD323	CENTRAL SEMI, CMDZ3L6 TR
13	1	Q1	XSTR., MOSFET, N-CH, 30V, SOT23	VISHAY, Si2338DS-T1-GE3
14	1	RS1	SENSE RES, 0.05 Ω , 1W, 1%, 1206	VISHAY, WSLP1206R0500FEA
15	1	R1	RES., 1MEG, 1%, 0603	VISHAY, CRCW06031M00FKEA
16	2	R2, R7	RES., 100k, 1%, 0603	VISHAY, CRCW0603100KFKEA
17	1	R3	RES., 18.2k, 1%, 0603	VISHAY, CRCW060318K2FKEA
18	1	R5	RES., 45.3k, 1%, 0603	VISHAY, CRCW060345K3FKEA
19	1	R6	RES., 17.4k, 1%, 0603	VISHAY, CRCW060317K4FKEA
20	0	R8	RES., OPT, 0603	OPT
21	1	R9	RES., 10k, 1%, 0603	VISHAY, CRCW060310KFKEA
Hardware				
1	10	E1-E10	TESTPOINT, TURRET, 0.094" PBF	MILL-MAX, 2501-2-00-80-00-00-07-0
2	3	JP3, JP4, JP5	CONN., HEADER, 1mm $\times$ 2mm, 2mm	WURTH ELEKTRONIK, 62000211121
3	1	JP2	CONN., HEADER, 2mm $\times$ 4mm, 2mm	WURTH ELEKTRONIK, 62000821121
4	1	JP1	CONN., HEADER, 1mm $\times$ 3mm, 2mm	WURTH ELEKTRONIK, 62000311121
5	3	JP1, JP2, JP3	SHUNT, 2mm	WURTH ELEKTRONIK, 608 002 134 21
6	2	J5, J6	CONN, BNC, 5 PINS	CONNEX, 112404
7	4	(STAND-OFF)	STAND-OFF, SNAP ON NYLON 0.50" TALL	KEYSTONE, 8833(SNAP ON)

SCHEMATIC DIAGRAM



**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.

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