## DESCRIPTION

Demonstration circuit DC823B-A features the LTM ${ }^{\circledR} 4600 \mathrm{EV}$, a 10 A high efficiency, high density switch mode step-down power module. The input voltage is from 4.5 V to 20 V . The output voltage is programmable from 0.6 V to 5 V . The rated load current is 10 A , while derating is necessary for different $\mathrm{V}_{\text {IN }}, \mathrm{V}_{\text {OUT }}$, and thermal conditions. Integrated input and output filters enable a simple PCB layout. Only bulk input and output capacitors are needed.

The LTM4600 data sheet must be read in conjunction with this demo manual prior to working on or modifying demo circuit DC823B-A.

Design files for this circuit board are available at http://www.linear.com/demo
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PGRFORMAOCE SUMMARY ( $\left.\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}\right)$

| PARAMETER | TEST CONDITION | VALUE |
| :--- | :--- | :--- |
| Input Voltage Range |  | 4.5 V to 20 V |
| Output Voltage $\mathrm{V}_{\text {OUT }}$ | Selectable with Jumpers (Open for 0.6 V ) | $1.2 \mathrm{~V}, 1.5 \mathrm{~V}, 1.8 \mathrm{~V}, 2.5 \mathrm{~V}, 3.3 \mathrm{~V}, 5 \mathrm{~V}$ |
| Maximum Continuous Output Current | 5 V to 20 V IN, 1.5 V OUT | $10 \mathrm{~A}_{\text {DC }}$ |
| Efficiency | $\mathrm{V}_{\text {IN }}=12 \mathrm{~V}, \mathrm{~V}_{\text {OUT }}=1.5 \mathrm{~V}, \mathrm{I}_{\text {OUT }}=10 \mathrm{~A}$ | $82 \%$, See Figure 2 |

## BOARD PHOTO



## DEMO MANUAL DC823B-A

## PUICK START PROCEDURE

Demonstration circuit DC823B-A is an easy way to evaluate the performance of the LTM4600EV. Refer to Figure 1 for proper measurement equipment set-up and follow the procedure below:

1. Place jumpers in the following positions for a typical $1.5 \mathrm{~V}_{\text {OUT }}$ application:

| FCB | RUN/SS | V OUT Select |
| :---: | :---: | :---: |
| CCM | ON | 1.5 V |

2. With power off, connect the input power supply, load, optional 5 V bias supply and meters as shown in Figure 1. Preset the load to 0 A and $\mathrm{V}_{\text {IN }}$ supply to be less than 20V. The optional 5 V bias supply applied to the EXTVCC pin must be off while the main $\mathrm{V}_{\text {IN }}$ is turned off.
3. Turn on the power at the input. The output voltage should be $1.5 \mathrm{~V} \pm 2 \%$.
4. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters. Output voltage ripple should be measured at J6 with a BNC cable.
5. For optional load transient test, apply an adjustable pulse signal between IOSTEP CLK and GND pins. Pulse amplitude sets the current step. The pulse signal should have very small duty cycle ( $<15 \%$ ) to limit the thermal stress of the transient load circuit. The output transient current can be monitored at BNC connector J5 (10mV/A).


Figure 1. Test Set-Up of DC823B-A (EXTVCC $V_{\text {BIAS }}$ Supply is Optional)

## PUICK START PROCEDURE




Figure 2. Measured Supply Efficiencies with Different $V_{I N}$ and $V_{\text {OUT }}$


Figure 3. Measured Load Transient Response (OA to 10A Step)

## DEMO MANUAL DC823B－A

## PARTS LIST

| ITEM | QTY | REFERENCE | PART DESCRIPTION | MANUFACTURER／PART NUMBER |
| :---: | :---: | :---: | :---: | :---: |
| Required Circuit Components |  |  |  |  |
| 1 | 1 | C1 | CAP，150＾F 20\％35V ALUM | SANYO 35MV150WXV（now SUNCON 35ME150WXV） |
| 2 | 2 | C5，C2 | CAP， 1206 10⿲㇒丨丶 20\％25V X5R | TDK C3216X5R1E106MT |
| 3 | 2 | C7，C8 | CAP，1812 100 ${ }^{\text {F } 20 \% ~ 6.3 V ~ X 5 R ~}$ | TDK C4532X5R0J107M |
| 4 | 1 | C10 | CAP， 1206 22 $2 \mathrm{~F} 20 \% 6.3 \mathrm{~V}$ X 5 R | TAIYO YUDEN JMK316BJ226ML－T |
| 5 | 1 | C12 | CAP， 0603 100pF 10\％50V X7R | AVX 06035C101KAT1A |
| 6 | 1 | R1 | RES， 0603 49．9k 1\％1／10W | AAC CR16－4992FM |
| 7 | 1 | R8 | RES， $06030 \Omega$ JUMPER | VISHAY CRCW06030000ZOEA |
| 8 | 1 | U1 | IC，LTM4600EV | LINEAR TECHNOLOGY LTM4600EV |

Additional Demo Board Circuit Components

| 1 | 0 | C4，C3 | CAP， 1206 OPTION | TAIYO YUDEN EMK316BJ475ML－T OPTION |
| :---: | :---: | :---: | :---: | :---: |
| 2 | 0 | C8 | CAP， 1812 OPTION | TAIYO YUDEN JMK432BJ107MU－T OPTION |
| 3 | 0 | $\begin{aligned} & \text { C11, C14, C18, } \\ & \text { C19 } \end{aligned}$ | CAP， 0603 OPTION | OPTION |
| 4 | 1 | C13 | CAP， 0603 100pF 10\％50V NPO | AVX 06035A101KAT |
| 5 | 2 | C15，C16 | CAP， $06031 \mu \mathrm{~F} 20 \% 10 \mathrm{~V}$ X5R | TAIYO YUDEN LMK107BJ105MA－T |
| 6 | 0 | C17 | CAP， 0805 1 $\mu \mathrm{F} 20 \% 16 \mathrm{~V}$ X5R 0PTION | TAIYO YUDEN EMK212BJ105MG－T |
| 7 | 1 | D1 | DIODE，ZENER 4．7V | DIODES INC．BZX84C4V7－7－F |
| 8 | 1 | Q14 | XSTR，SUD50N03－10CP MOSFET | SILICONIX SUD50N03－10CP－E3 |
| 9 | 1 | R2 | RES， 0603 66．5k 1\％1／10W | AAC CR16－6652FM |
|  |  | R2－ALTERNATE | RES， 0603 66．5k 1\％1／10W | VISHAY CRCW06036652F |
| 10 | 1 | R3 | RES， 0603 31．6k 1\％1／10W | AAC CR16－3162FM |
|  |  | R3－ALTERNATE | RES， 0603 31．6k 1\％1／10W | PANASONIC ERJ－3EKF3162V |
| 11 | 1 | R4 | RES， 0603 22．1k 1\％1／10W | AAC CR16－2212FM |
| 12 | 1 | R5 | RES， 0603 13．7k 1\％1／10W | AAC CR16－1372FM |
| 13 | 3 | R6，R10，R12 | RES， 0603 10k 5\％1／10W | VISHAY CRCW060310KOJNEA |
|  |  | $\begin{aligned} & \text { R6, R10, } \\ & \text { R12- ALTERNATE } \end{aligned}$ | RES， 0603 10k 5\％1／10W | PANASONIC ERJ－3GEY512V |
| 14 | 1 | R7 | RES， 06035.1 k 5\％1／10W | AAC CR16－512JM |
| 15 | 1 | R9 | RES， $06031 \mathrm{M} \Omega$ 5\％1／16W | AAC CR16－105JM |
| 16 | 1 | R11 | RES， 2512 0．01 5 \％1W | IRC LRF2512－01－R010－J |
| 17 | 0 | R13 | RES， 0603 OPTION | OPTION |
| 18 | 1 | R14 | RES， 0603 100k 1\％1／10W | AAC CR16－1003FM |
| Hardware |  |  |  |  |
| 1 | 6 | JP0 T0 JP5 | HEADER，2－PIN，2mm | COMM CON 2802S－02G2 |
| 2 | 2 | JP6，JP7 | HEADER，3－PIN， 2 mm | COMM CON 2802S－03G2 |
| 3 | 4 | J1，J2，J3，J4 | JACK，BANANA | KEYSTONE 575－4 |
| 4 | 2 | J5，J6 | CONN，BNC， 5 PINS | CONNEX 112404 |
| 5 | 14 | TP1 T0 TP14 | TURRET | MILL－MAX 2501－2－00－80－00－00－07－0 |
| 6 | 3 | JP3，JP6，JP7 | SHUNT | SAMTEC 2SN－BK－G |
| 7 | 4 |  | STANDOFF，SNAP ON | KEYSTONE＿8831 |

## SCHEMATIC DIAGRAM



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