

DESCRIPTION

Demonstration circuit DC1297B features the LTM[®]4612EV, the low noise, high input and output, high efficiency, high density switch mode step-down power module. The input voltage range is from 5V to 36V. The output voltage is programmable from 3.3V to 12V. The rated load current is 5A for 3.3V/5V, 3A for 12V V_{OUT} . Derating is necessary for certain V_{IN} , V_{OUT} , and thermal conditions: please refer to LTM4612's datasheet for derating curves. Integrated input and output filters enable a simple PCB layout. Only input and output capacitors are needed externally. The LTM4612 allows the user to pro-

gram output ramp-up and ramp-down through the TRACK/SS pin. The output can be set to coincidentally or ratiometrically track to another voltage rail. Output voltage margining can also be realized through jumper position selections.

Design files for this circuit board are available. Call the LTC Factory.


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Table 1. Performance Summary ($T_A = 25^\circ\text{C}$)

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		5V
Maximum Input Voltage		36V
Output Voltage V_{OUT}	Jumper selectable	3.3V, 5V, 12V; $\pm 2\%$
Maximum Continuous Output Current	De-rating is necessary for certain V_{IN} , V_{OUT} , and thermal conditions	$5A_{DC}$ for 3.3V and 5V; $3A_{DC}$ for 12V.
Default Operating Frequency		850 KHz for $V_{OUT}=12V$; 350kHz for $V_{OUT}=5V$; 235kHz for $V_{OUT}=3.3V$.
Efficiency	$V_{IN}=12V$, $V_{OUT}=5V$, $I_{OUT}=5A$	90.1%, See Figure 3 for detail
Load Transient	$V_{IN}=12V$, $V_{OUT}=5V$	See Figure 4 for detail

QUICK START PROCEDURE

Demonstration circuit DC1297B is easy to set up to evaluate the performance of the LTM4612EV. Please refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. Place jumpers in the following positions for a typical $5V_{OUT}$ application:

Vout Select	RUN	FCB	MARG1	MARG0
5V	ON	CCM	LO	LO

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 be 12V.
3. Turn on the power at the input. The output voltage should be $5V \pm 2\%$ (4.9V~5.1V).
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.
5. To measure input and output ripple, please refer to Figure 2 for proper setup.

- For optional load transient test, apply adjustable pulse signal between IOSTEP_CLK and GND pins. Pulse amplitude sets the current step. The pulse signal should have very small duty cycle (<5%) to limit the thermal stress on the transient load circuit. The output transient current can be monitored at BNC connector J3

(10mV/A), the output voltage can be monitor at BNC connector J4.

- Due to the 400ns minimum off time limit of LTM4612, V_{IN} needs to be higher than 18.5V for 12V V_{OUT} , and higher than 5.85V for 5V V_{OUT} . Otherwise, the switching frequency needs to be reduced by adding a resistor at R6. Please refer to the LTM4612 datasheet for details.

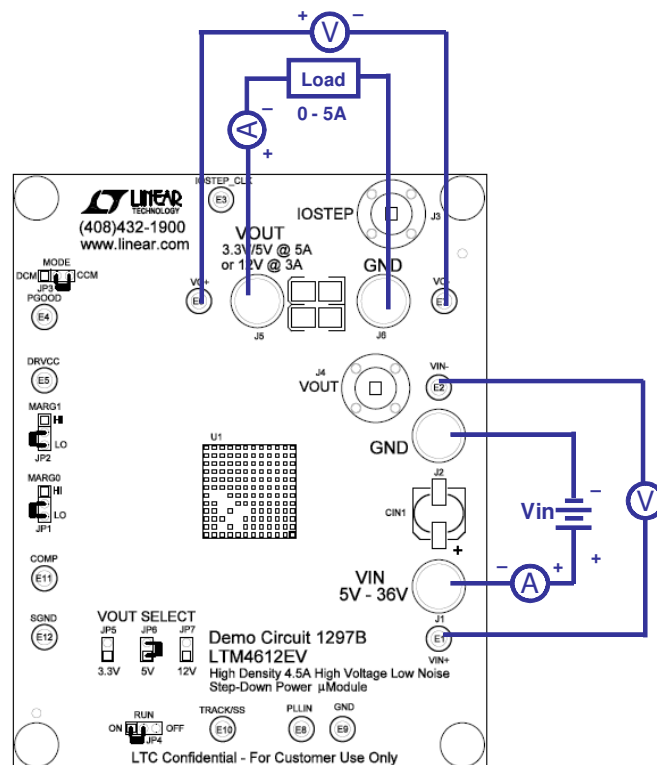
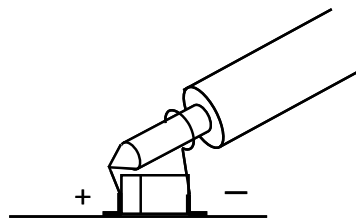


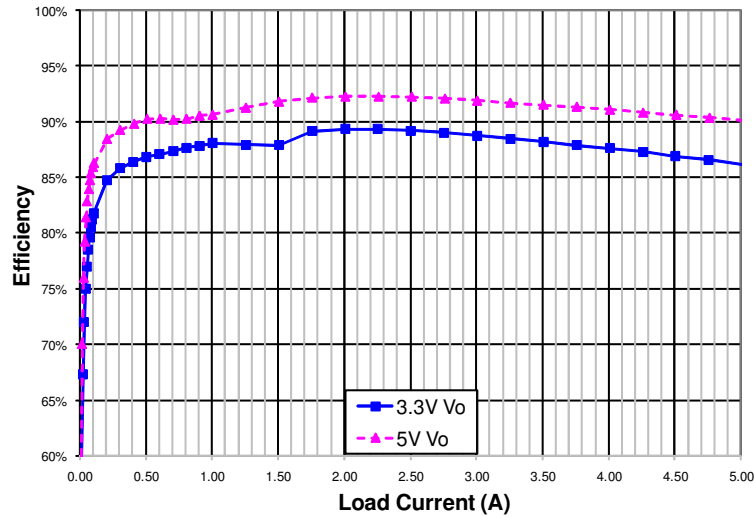
Figure 1. Test Setup of DC1297B.



Input or Output Capacitor

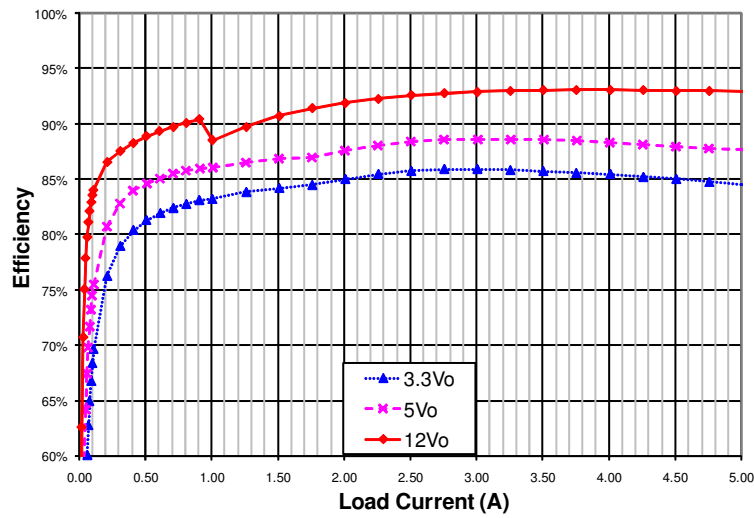
Figure 2. Scope Probe Placements for Measuring Input or Output Ripple.

Efficiency vs. Load Current

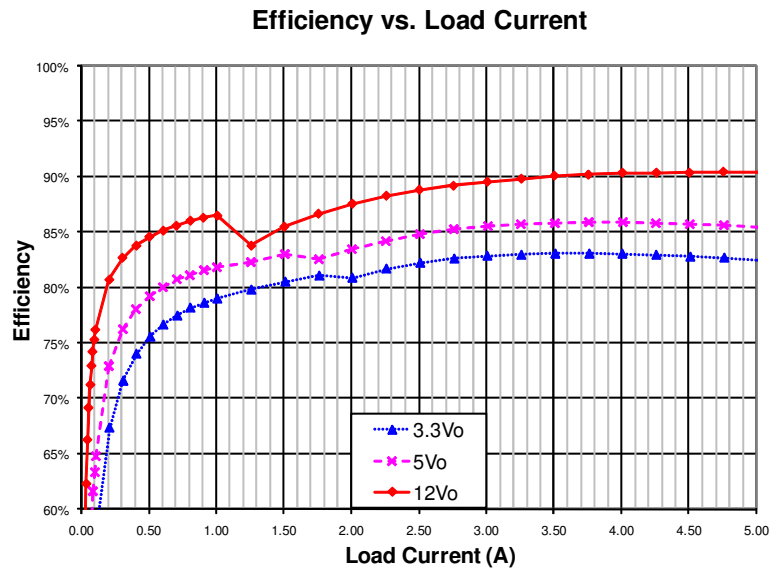


a) $V_{IN}=12V$

Efficiency vs. Load Current

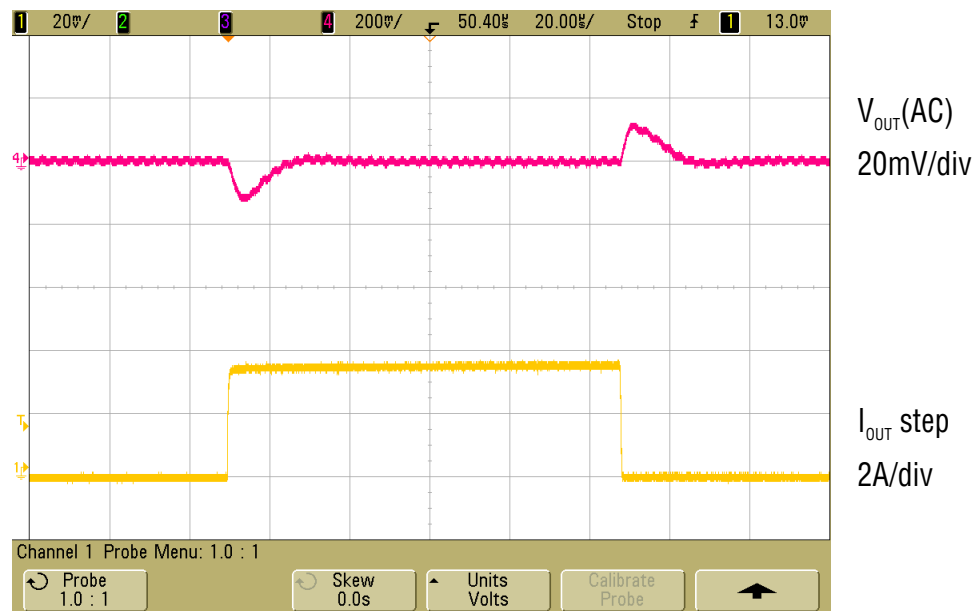


b) $V_{IN}=24V$



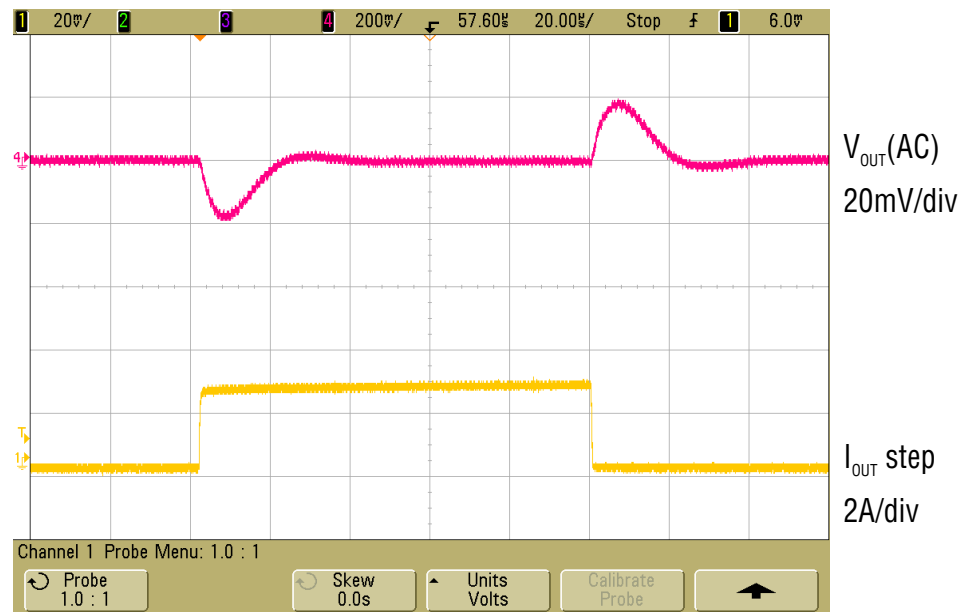
c) $V_{IN}=36V$

Figure 3. Measured DC1297B Efficiency @ Different V_{IN} and V_{OUT} (All Measurements Are @ DCM Mode).



$V_{IN}=12V$, $V_{OUT}=5V$, 1.25A to 5A load step (CCM)

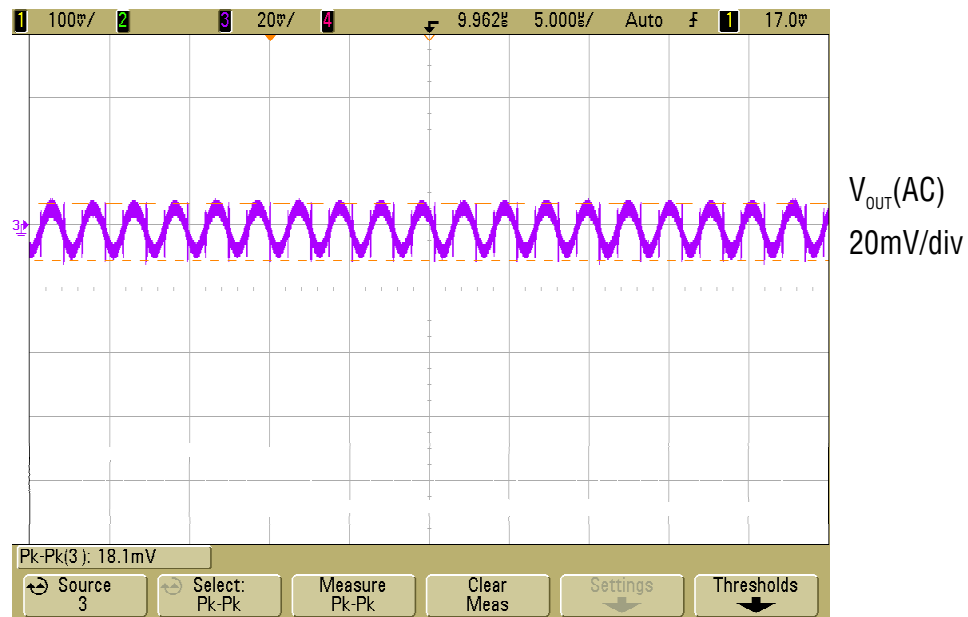
$C_{OUT}=2 \times 47\mu F/16V/X5R+10\mu F/16V/X5R$ ceramic capacitors



$V_{IN}=36V$, $V_{OUT}=12V$, 0.75A to 3A load step (CCM)

$C_{OUT}=2 \times 47\mu F/16V/X5R+10\mu F/16V/X5R$ ceramic capacitors

Figure 4. Measured Load Transient Responses.



$V_{IN}=12V$, $V_{OUT}=5V$, $I_{OUT}=5A$

V_{OUT} measured @ C_{OUT2} with 300MHz bandwidth scope

$C_{OUT}=2 \times 47\mu F/16V/X5R+10\mu F/16V/X5R$ ceramic capacitors

Figure 5. Measured Output Voltage Ripple.

