1 Startup

The photo below shows the output voltage startup waveforms after the application of 12V in. The 5V, 3.3V and 1.1V outputs were loaded to 0A. (2V/DIV, 5mS/DIV)

The photo below shows the output voltage startup waveforms after the application of 12V in. The 5V, 3.3V and 1.1V outputs were loaded to 1A each. (2V/DIV, 5mS/DIV)
2 Efficiency

The converter efficiency is shown in the figure below. Each converter was powered up independently.

- **5V SEPIC Converter, Vin = 12V**

  ![Graph of 5V SEPIC Converter Efficiency and Power Dissipation](image)

- **3.3V TPS62065 Converter, Vin = 5V**

  ![Graph of 3.3V TPS62065 Converter Efficiency and Power Dissipation](image)
1.1V TPS62065 Converter, Vin = 5V

- Efficiency (%)
- Power Dissipation (W)

Output Current (A)

- 0.0
- 0.5
- 1.0
- 1.5
- 2.0
- 2.5

Efficiency (%)
- 90%
- 89%
- 88%
- 87%
- 86%
- 85%
- 84%
- 83%
- 82%
- 81%
- 80%
- 79%
- 78%
- 77%
- 76%
- 75%
- 74%
- 73%
- 72%
3 Output Ripple Voltage

The 5V output ripple voltage is shown in the figure below. The image was taken with the output loaded to 3.25A. The input voltage is set to 12V. (50mV/DIV, 2uS/DIV)

The 5V output ripple voltage is shown in the figure below. The image was taken with the output loaded to 3.25A. The input voltage is set to 42V. (50mV/DIV, 2uS/DIV)
The 5V output ripple voltage is shown in the figure below. The image was taken with the output loaded to 3.25A. The input voltage is set to 4.5V. (50mV/DIV, 2uS/DIV)

![Graph showing 5V output ripple voltage]

The 3.3V output ripple voltage is shown in the figure below. The image was taken with the output loaded to 2A. The input voltage is set to 5V. (10mV/DIV, 200nS/DIV)

![Graph showing 3.3V output ripple voltage]
The 1.1V output ripple voltage is shown in the figure below. The image was taken with the output loaded to 2A. The input voltage is set to 5V. (10mV/DIV, 200nS/DIV)
4 Load Transients

The photo below shows the output voltage (ac coupled) when the load current is stepped between 1.5A and 2A. Vin = 12V. (200mV/DIV, 1A/DIV, 500uS/DIV)
The photo below shows the output voltage (ac coupled) when the load current is stepped between 1A and 3A. Vin = 12V. (200mV/DIV, 1A/DIV, 500μS/DIV)
5  Switch Node Waveforms

The photo below shows the 5V SEPIC switch node. The input voltage is 42V and the output is loaded to 3.25A. (10V/DIV, 1uS/DIV)

The photo below shows the 5V SEPIC switch node. The input voltage is 12V and the output is loaded to 3.25A. (5V/DIV, 1uS/DIV)
The photo below shows the 5V SEPIC switch node. The input voltage is 4.5V and the output is loaded to 3.25A. (5V/DIV, 1μS/DIV)

The photo below shows the 3.3V switch node. The input voltage is 5V and the output is loaded to 2A. (2V/DIV, 200nS/DIV)
The photo below shows the 1.1V switch node. The input voltage is 5V and the output is loaded to 2A. (2V/DIV, 200nS/DIV)
Control Loop Gain / Stability

The plot below shows the 5V loop gain and phase margin with the output loaded to 1A and 3.25A. The input voltage was set to 42V.

Band Width = 2.98KHz, Phase Margin = 93 degrees (5V@1A)
Band Width = 3.89KHz, Phase Margin = 88 degrees (5V@3.25A)
The plot below shows the 5V loop gain and phase margin with the output loaded to 1A and 3.25A. The input voltage was set to 12V.

Band Width = 3.75KHz, Phase Margin = 84 degrees (5V@1A)
Band Width = 4.36KHz, Phase Margin = 76 degrees (5V@3.25A)
The plot below shows the 5V loop gain and phase margin with the output loaded to 1A and 3.25A. The input voltage was set to 4.5V.

Band Width = 2.73KHz, Phase Margin = 68 degrees (5V@1A)
Band Width = 2.86KHz, Phase Margin = 45 degrees (5V@3.25A)
7 Photo

The photo below shows the PMP8903 REVB assy.

8 Thermal Image

A thermal image is shown below when operating the 5V SEPIC converter at 12V input and 3.25A output, with no airflow.
IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as “components”) are sold subject to TI’s terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI’s terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers’ products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers’ products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have not been so designated is solely at the Buyer’s risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have not been so designated is solely at the Buyer’s risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products

<table>
<thead>
<tr>
<th>Audio</th>
<th><a href="http://www.ti.com/audio">www.ti.com/audio</a></th>
<th>Applications</th>
<th>Automotive and Transportation</th>
<th><a href="http://www.ti.com/automotive">www.ti.com/automotive</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Amplifiers</td>
<td>amplifier.ti.com</td>
<td>Communications and Telecom</td>
<td><a href="http://www.ti.com/communications">www.ti.com/communications</a></td>
<td></td>
</tr>
<tr>
<td>DSP</td>
<td>dsp.ti.com</td>
<td>Energy and Lighting</td>
<td><a href="http://www.ti.com/energy">www.ti.com/energy</a></td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>interface.ti.com</td>
<td>Medical</td>
<td><a href="http://www.ti.com/medical">www.ti.com/medical</a></td>
<td></td>
</tr>
<tr>
<td>Logic</td>
<td>logic.ti.com</td>
<td>Security</td>
<td><a href="http://www.ti.com/security">www.ti.com/security</a></td>
<td></td>
</tr>
<tr>
<td>Power Mgmt</td>
<td>power.ti.com</td>
<td>Space, Avionics and Defense</td>
<td><a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a></td>
<td></td>
</tr>
<tr>
<td>Microcontrollers</td>
<td>microcontroller.ti.com</td>
<td>Video and Imaging</td>
<td><a href="http://www.ti.com/video">www.ti.com/video</a></td>
<td></td>
</tr>
<tr>
<td>RFID</td>
<td><a href="http://www.ti-rfid.com">www.ti-rfid.com</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OMAP Applications Processors</td>
<td><a href="http://www.ti.com/omap">www.ti.com/omap</a></td>
<td>TI E2E Community</td>
<td>e2e.ti.com</td>
<td></td>
</tr>
<tr>
<td>Wireless Connectivity</td>
<td><a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</a></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2013, Texas Instruments Incorporated