12W SEPIC Power Supply Reference Design for Industrial Applications

(ACTIVE) TIDA-00781

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Key Document

- TIDA-00781 Test Results (PDF 1148 KB)
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TIDA-00781 12W SEPIC Power Supply Reference Design for Industrial Applications Board Top View

Fully assembled board (shown above) developed for testing and performance validation only, not available for sale.

Description

The TIDA-00781 is a 12W SEPIC power supply reference design for industrial applications. It takes 12V nominal input voltage, and generates a 12V @ 1A output with 92% peak efficiency. The SEPIC converter topology allows voltage step-up and step-down conversion. The design covers a wide input range of 2.5V to 20V with a minimum start-up input voltage of 3.5V. When using a noisy 12V supply, the design can operate uninterrupted while maintaining a regulated 12V output. The reference design features the LM3481 as the SEPIC controller and uses a single coupled inductor to achieve compact solution size. The component area of the SEPIC is about 39 x 26 mm (1.5 x 1 inch). The reference board is layout-optimized for improved EMI performance.

The design can also use the output voltage to operate, which means after the output voltage reaches 12V under normal operating conditions, the input voltage can be reduced to as low as 2.5V with the system still maintaining output voltage regulation within 5%. Note that at input voltage of 2.5V, the high input current causes the inductor to heat up to over 130°C so this is not a recommended operating condition.

Features

- Input: 2.5V to 20V (3.5V minimum start-up), IC capable up to 48V input
- Outputs: 12V @ 1A
- 12W total output power
- Peak efficiency 92%
- Switching frequency 500kHz
- Output voltage ripple less than 50mV
- Compact 4 layer board, 1oz outer, 0.5oz inner copper layers
- Board Size: 76.2x54.8mm; solution size: 710.3 mm²

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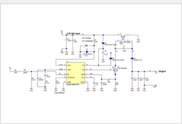
Schematic/Block Diagram

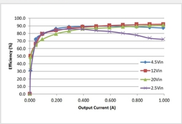
Quickly understand overall system functionality.



Download Schematic

Test Data

Get results faster with test and simulation data that's been verified.



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Design Files

Download ready-to-use system files to speed your design process. Get Viewer.

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Bill of Materials (BOM)

Find the complete list of components in this reference design.

Download BOM

Parametrics

	TIDA-00781
Vin (Min) (V)	2.5
Vin (Max) (V)	20
Vout (Nom) (V)	12
Iout (Max) (A)	1
Output Power (W)	12
Isolated/Non-Isolated	Non-Isolated
Input Type	DC
Topology	Sepic- CCM

TI Devices (2)

Order samples, get tools and find more information on the TI products in this reference design.

Part Number	Name	Product Family	Sample & Buy	Design Kits & Evaluation Modules
CSD18503Q5A	40V N-Channel NexFET™ Power MOSFET, CSD18503Q5A	Power MOSFET	Sample & Buy	Not Available
LM3481	High-Efficiency Controller for Boost, SEPIC and Flyback DC-DC Converters	Controller (External Switch)	Sample & Buy	View Design Kits & Evaluation Modules

CAD/CAE symbols

Part #	Package | Pins	CAD File (.bxl)	STEP Model (.stp)
LM3481	VSSOP (DGS) | 10	Download	Download

Texas Instruments and Accelerated Designs Inc. have collaborated together to provide TI customers with schematic symbols and PCB layout footprints for TI products.

Step 1: Download and install the Ultra Librarian software ZIP: 62MB

Step 2: Download the Symbol and Footprint .bxl file.

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Technical Documents

User guides (1)

Title	Abstract	Type	Size (KB)	Date	Views	TI Recommends
TIDA-00781 Test Results		PDF	1148	19 Oct 2015	69	✓

Design files (3)

Title	Abstract	Type	Size (KB)	Date	Views
TIDA-00781 Gerber		ZIP	318	19 Oct 2015	33
TIDA-00781 BOM		PDF	103	19 Oct 2015	43
TIDA-00781 Schematic		PDF	261	19 Oct 2015	98

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