

LMR23630 SIMPLE SWITCHER® 36 V, 3 A Synchronous Step-Down Converter

1 Features

- 4 V to 36 V Input Range
- 3 A Continuous Output Current
- Integrated Synchronous Rectification
- Internal Compensation for Ease of Use
- 400 kHz Switching Frequency With PFM and Forced PWM Mode Options
- Frequency Synchronization to External Clock
- 75 μ A Quiescent Current at No Load
- Minimum Switch-On Time: 60 ns
- High Duty Cycle Operation Supported
- Precision Enable Input
- Output Short-Circuit Protection with Hiccup Mode
- Thermal and Overvoltage Protection
- 8-Pin HSOIC with PowerPAD™ Package

2 Applications

- Automotive Battery Regulation
- Industrial Power Supplies
- Telecom and Datacom Systems
- Battery Powered System

3 Description

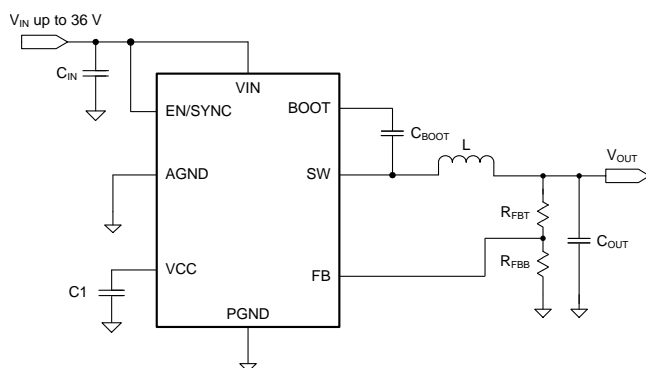
The LMR23630 SIMPLE SWITCHER® is an easy to use 36 V, 3 A synchronous step down regulator. With a wide input range from 4 V to 36 V, it's suitable for various applications from industrial to automotive for power conditioning from unregulated sources. Peak current mode control is employed to achieve simple control loop compensation and cycle-by-cycle current limiting. The regulator's quiescent current is 75 μ A makes it suitable for battery powered systems. An ultra-low 2 μ A current in shutdown mode can further prolong battery life. The switching frequency options allow either efficiency or solution size to be optimized. Internal loop compensation means that the user is free from the tedious task of loop compensation design. This also minimizes the external components of the device. The device has option for fixed frequency FPWM mode to eliminate frequency variation to minimize EMI. An extended family is available in 1 A and 2 A load current options in pin to pin compatible package which allows simple, optimum PCB layout. A precision enable input allows simplification of regulator control and system power sequencing. Protection features include cycle-by-cycle current limit, hiccup mode short circuit protection and thermal shutdown due to excessive power dissipation.

Device Information⁽¹⁾

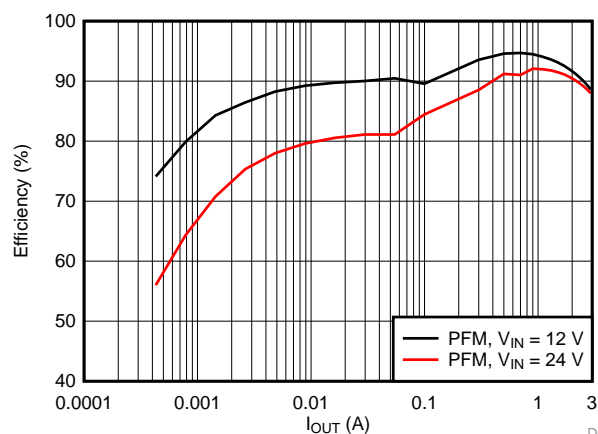
PART NUMBER	PACKAGE	BODY SIZE (NOM)
LMR23630A	HSOIC (8)	4.89 mm x 3.90 mm
LMR23630AF (FPWM Option)	HSOIC (8)	4.89 mm x 3.90 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

Simplified Schematic



Efficiency vs Load



D001

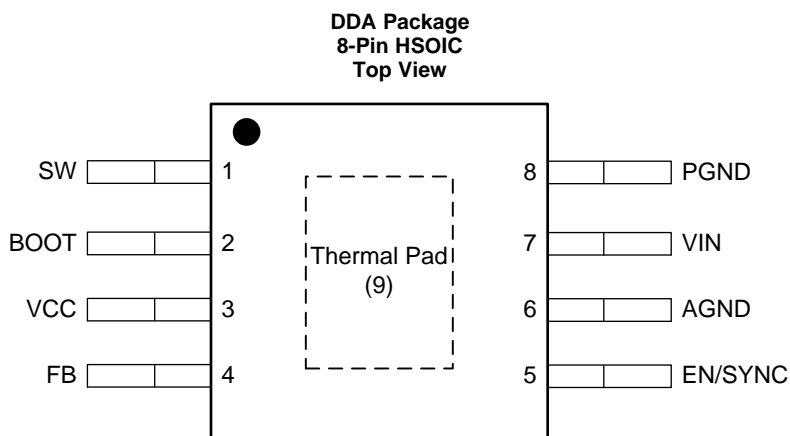
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4 Revision History

DATE	REVISION	NOTES
December 2015	*	Initial release.

5 Pin Configuration and Functions



Pin Functions

PIN		I/O ⁽¹⁾	DESCRIPTION
NAME	NO.		
SW	1	O	Switching output of the regulator. Internally connected to both power MOSFETs. Connect to power inductor.
BOOT	2	O	Boot-strap capacitor connection for high-side driver. Connect a high quality 470 nF capacitor from BOOT to SW.
VCC	3	O	Internal bias supply output for bypassing. Connect bypass capacitor from this pin to AGND. Do not connect external loading to this pin. Never short this pin to ground during operation.
FB	4	I	Feedback input to regulator, connect the feedback resistor divider tap to this pin.
EN/SYNC	5	I	Enable input to regulator. High = On, Low = Off. Can be connected to VIN. Do not float. Adjust the input under voltage lockout with two resistors. See the Enable and Adjusting Under voltage Lockout section. The internal oscillator can be synchronized to an external clock by coupling a positive pulse into this pin through a small coupling capacitor. See the frequency synchronization section for detail.
AGND	6	G	Analog ground pin. Ground reference for internal references and logic. Connect to system ground.
VIN	7	I	Input supply voltage with 4 V to 36 V operating range.
PGND	8	G	Power ground pin, connected internally to the low side power FET. Connect to system ground, PAD, AGND, ground pins of C _{IN} and C _{OUT} . Path to C _{IN} must be as short as possible.
PAD	9	G	Low impedance connection to AGND. Connect to PGND on PCB. Major heat dissipation path of the die. Must be used for heat sinking to ground plane on PCB.

(1) I = Input, O = Output, G = Ground.

6 Device and Documentation Support

6.1 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

TI E2E™ Online Community *TI's Engineer-to-Engineer (E2E) Community*. Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

Design Support *TI's Design Support* Quickly find helpful E2E forums along with design support tools and contact information for technical support.

6.2 Trademarks

PowerPAD, E2E are trademarks of Texas Instruments.
SIMPLE SWITCHER is a registered trademark of Texas Instruments.

6.3 Electrostatic Discharge Caution



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

6.4 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

PACKAGE OPTION ADDENDUM

2-Dec-2015

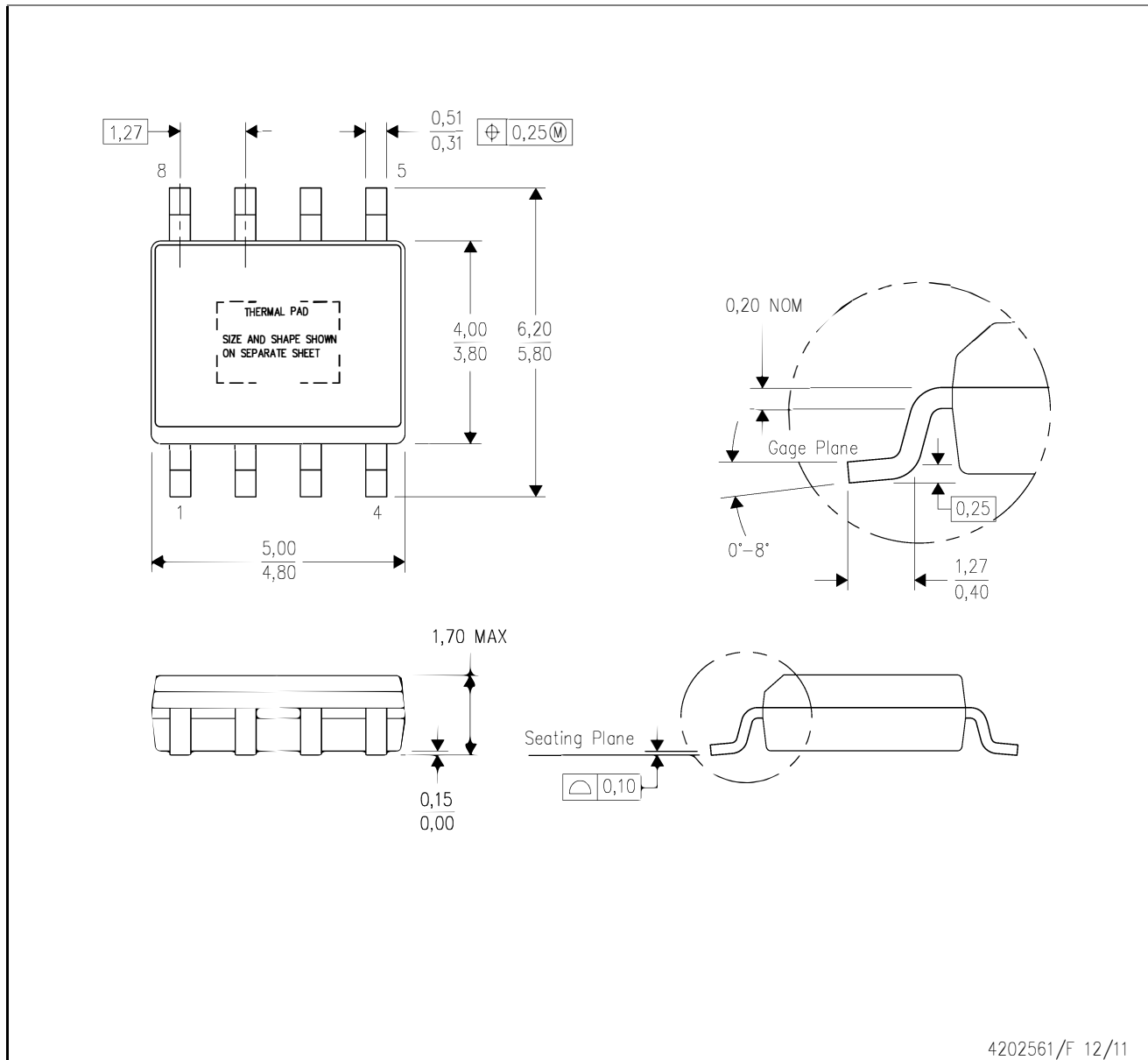
PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
LMR23630ADDA	PREVIEW	SO PowerPAD	DDA	8	75	TBD	Call TI	Call TI	-40 to 125		
LMR23630ADDAR	PREVIEW	SO PowerPAD	DDA	8	2500	TBD	Call TI	Call TI	-40 to 125		
LMR23630AFDDA	PREVIEW	SO PowerPAD	DDA	8	75	TBD	Call TI	Call TI	-40 to 125		
LMR23630AFDDAR	PREVIEW	SO PowerPAD	DDA	8	2500	TBD	Call TI	Call TI	-40 to 125		

MECHANICAL DATA

DDA (R-PDSO-G8)

PowerPAD™ PLASTIC SMALL-OUTLINE



4202561/F 12/11

- NOTES:
- All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5-1994.
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 - This package is designed to be soldered to a thermal pad on the board. Refer to Technical Brief, PowerPad Thermally Enhanced Package, Texas Instruments Literature No. SLMA002 for information regarding recommended board layout. This document is available at www.ti.com <<http://www.ti.com>>.
 - See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
 - This package complies to JEDEC MS-012 variation BA

PowerPAD is a trademark of Texas Instruments.