LPM5005
Switched-Capacitor Voltage Converter

Overview

The LPM5005 is a highly efficient voltage converter that inverts V_{IN} (3 V to 5.5 V) to a negative V_{OUT}. The LPM5005 has a maximum output current of 200 mA, with typical output resistance of 3.5 Ω. The LPM5005 can be used for applications in need of dual-supply voltages.

Applications

The LPM5005 can be used in a variety of portable/hand-held devices. It can be applied to battery management applications of cellular devices. Liquid crystal display (LCD) bias and cold cathode fluorescent (CCF) backlight make the LPM5005 an ideal device for laptop computers.

Features

- 8-pin SOIC, small package.
- 200 mA maximum output current at R_{out} = 3.5 Ω.
- High power efficiency:
  — Typical = 86% at 200 mA.
  — V_{IN} = 5 V.
- Requires smaller capacitors for operation by using higher switching frequencies.
- Frequency controller: 200 kHz/400 kHz or externally driven oscillator.
- Low-heat dissipation.
- No inductors required for normal operations.
- Connecting two LPM5005 in parallel reduces R_{out} and V_{Ripple} by approximately half while using only three capacitors.

Markets

Possible markets are: mass storage, portable/hand-held devices, cellular devices, and power/battery management.

Packaging

Table 1. LPM5005 Packaging—8-Pin SOIC

Dimension	Distance mm (mils)
Lead Form	1.02 (40)
Pitch	1.27 (50)
Width	3.81 (150)
Length	4.93 (194)
Thickness	1.47 (58)
Maximum Height	1.73 (68)

Block Diagrams

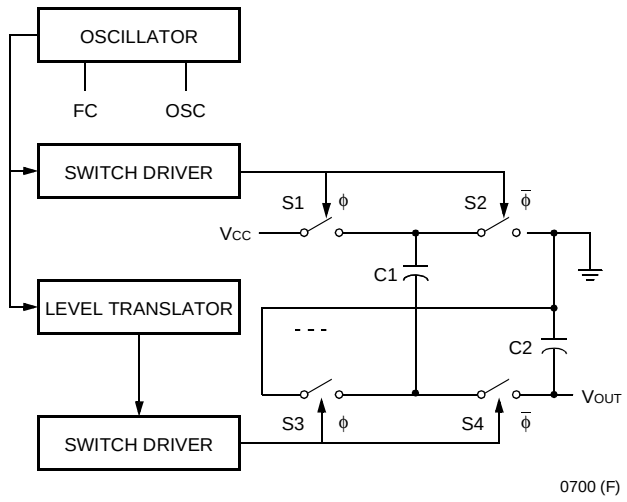

Figure 1. Block Diagram A

Block Diagrams (continued)

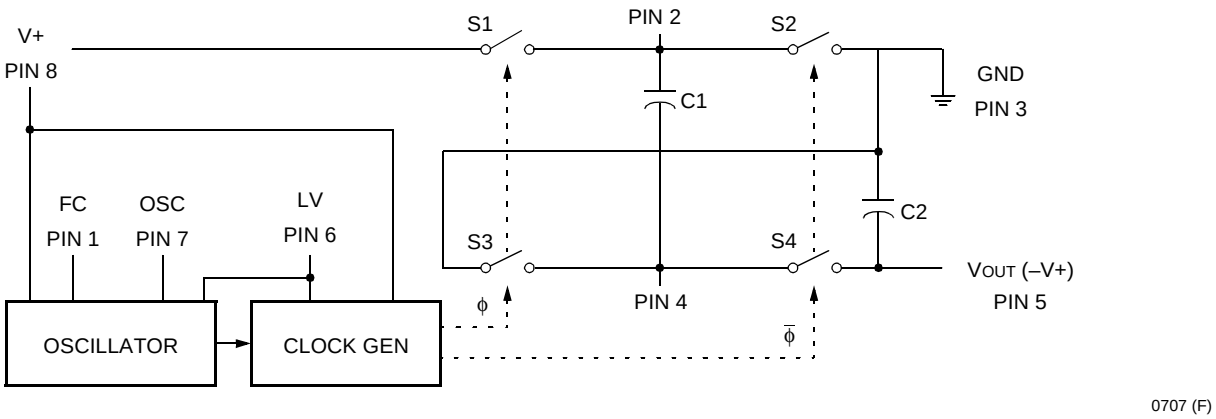

Figure 2. Block Diagram B

Competitors

Table 2. Product Analysis

Vendor	Agere	*National* [1]	*Maxim* [2]	*Maxim*	Linear Tech
Part Number	LPM5005	LM2662	MAX1680	MAX660	LTC660
Package	8 SOIC	8 SOIC	8 SOIC	8 SOIC	8 SOIC
I_Q (mA) (Max)	5 (at 200 kHz)	4 (at 150 kHz)	10.8 (at 250 kHz)	3 (at 40 kHz)	3 (at 80 kHz)
I_O (mA) (Max)	200	200	135	120	100
Power Efficiency at 100 mA (Typ)	94%	93%	85%	88%	88%
R_O (Ω): **Typ** **Max**	 3.5 4 (at 200 mA)	 3.5 7 (at 200 mA)	 3.5 — (at 125 mA)	 — 15 (at 100 mA)	 6.5 10 (at 100 mA)
V_{IN} (V)	3 to 5.5	1.5 to 5.5	2 to 5.5	3 to 5.5	1.5 to 5.5
V_O (V)	$-V_{IN}$	$-V_{IN}$	$-V_{IN}$	$-V_{IN}$	$-V_{IN}$
Pin-for-Pin Compatible	—	Yes[3]	No	No	No
Capacitance Needed (Normalized to 10 µF)	1x	5x	1x	15x	1x

1. *National* is a registered trademark of National Semiconductor Corporation.
2. *Maxim* is a registered trademark of Maxim Integrated Products.
3. Subject to operation voltage range.

Typical Configurations

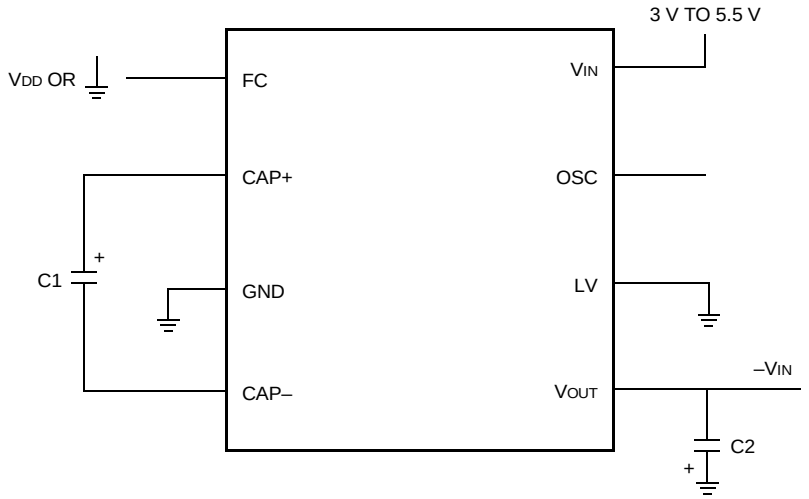

Figure 3. Typical LPM5005 Configuration

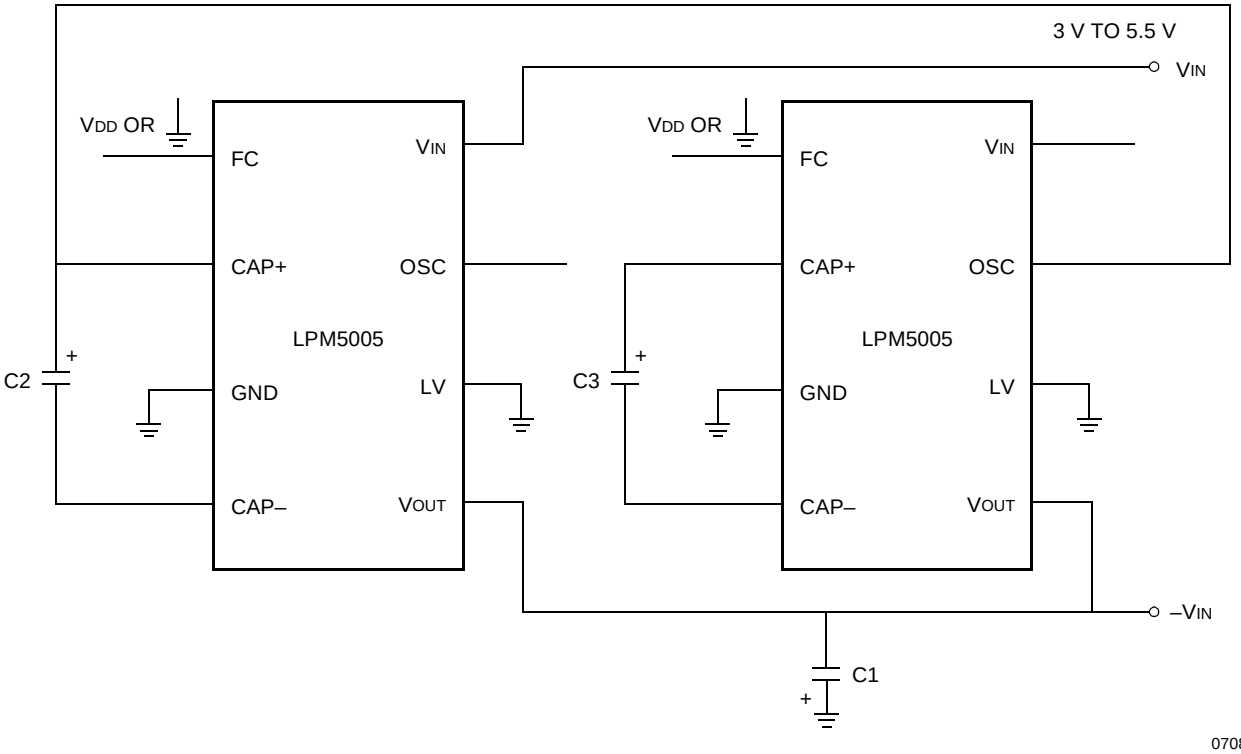

Figure 4. Alternative LPM5005 Configuration—Parallel

For additional information, contact your Agere Systems Account Manager or the following:
INTERNET: **http://www.agere.com**
E-MAIL: **docmaster@micro.lucent.com**
N. AMERICA: Agere Systems Inc., 555 Union Boulevard, Room 30L-15P-BA, Allentown, PA 18109-3286
1-800-372-2447, FAX 610-712-4106 (In CANADA: **1-800-553-2448**, FAX 610-712-4106)
ASIA PACIFIC: Agere Systems Singapore Pte. Ltd., 77 Science Park Drive, #03-18 Cintech III, Singapore 118256
Tel. (65) 778 8833, FAX (65) 777 7495
CHINA: Agere Systems (Shanghai) Co., Ltd., 33/F Jin Mao Tower, 88 Century Boulevard Pudong, Shanghai 200121 PRC
Tel. (86) 21 50471212, FAX (86) 21 50472266
JAPAN: Agere Systems Japan Ltd., 7-18, Higashi-Gotanda 2-chome, Shinagawa-ku, Tokyo 141, Japan
Tel. (81) 3 5421 1600, FAX (81) 3 5421 1700
EUROPE: Data Requests: DATALINE: **Tel. (44) 7000 582 368**, FAX (44) 1189 328 148
Technical Inquiries: GERMANY: **(49) 89 95086 0** (Munich), UNITED KINGDOM: **(44) 1344 865 900** (Ascot),
FRANCE: **(33) 1 40 83 68 00** (Paris), SWEDEN: **(46) 8 594 607 00** (Stockholm), FINLAND: **(358) 9 3507670** (Helsinki),
ITALY: **(39) 02 6608131** (Milan), SPAIN: **(34) 1 807 1441** (Madrid)

Agere Systems Inc. reserves the right to make changes to the product(s) or information contained herein without notice. No liability is assumed as a result of their use or application.

Copyright © 2001 Agere Systems Inc.
All Rights Reserved
Printed in U.S.A.

April 23, 2001 Rev 2.1
PB01-081ANET (Replaces PB01-016ANET)