MX846-02

50 mA Switched Capacitor Buck-Boost DC/DC Converter with Regulated Output

Features:

- Fully Regulated Output Voltage (5 V and Adjustable)
- Input Voltage Range from 3 V to 5 V
- 50 mA Output Current
- Output Accuracy: ±5%
- High Switching Frequency: 1MHz
- Low Power Shutdown Mode: 1 µA (Typical)
- Minimum Number of Low Cost External Components
- 8 lead, RoHS compliant, SOIC package
- Wide Temperature Range: -40°C to +85°C

Applications:

- Local 3V to 5V Conversions
- Battery Powered Devices
- Computer Peripherals and Add-On Cards
- Portable Instruments
- Mobile Phones

General Description

The MX846 is a 50 mA regulated output switched capacitor Buck-Boost DC/DC Converter targeting portable, battery powered devices. The MX846 supplies a high efficiency regulated output voltage with a minimum number of external components. The output is adjustable from 3 to 5 volts with an accuracy of ±5%. The charge pump topology of the MX846 eliminates the need for an inductor making it ideal for low noise applications.

With an operating range of 3 to 5 volts, and a typical shutdown current of 1 µA, the MX846 is an optimum choice for portable battery powered devices. A 1MHz switching frequency enables the use of small charge pump and filter capacitors to meet the demands of size sensitive applications.

Ordering Information

Part No.	Description	Qty
MX846B	SOIC-8 Tube	100
MX846BTR	SOIC-8 Tape and Reel	2500

Functional Block Diagram

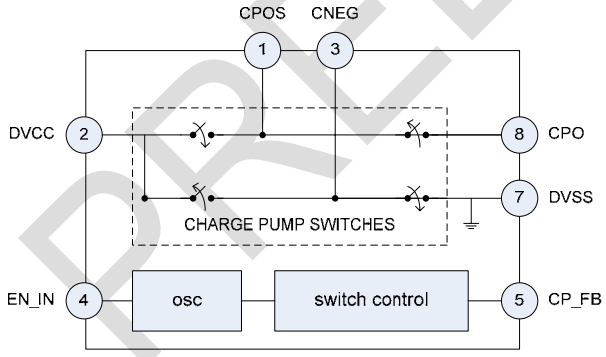


Fig. 1

Typical Application Circuit

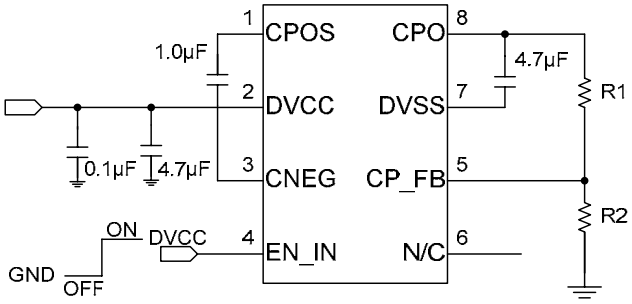


Fig. 2

Absolute Maximum Ratings

T_A = +25°C unless otherwise noted

Parameter	Min	Max	Unit
Input Voltage (V_{IN} to GND)		+7	V
Output Voltage (V_{OUT} to GND)		+7	V
Power Dissipation (θ_{JA} = 114 °C/W)		660	mW
Operating Temperature Range	-40	+85	°C
Storage Temperature Range	-65	150	°C

Absolute Maximum Ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this data sheet is not implied. Exposure of the device to the absolute maximum ratings for an extended period may degrade the device and affect its reliability.

Pin Description

Pin No.	Pin Name	Description
1	CPOS	Positive Terminal for the Pump Capacitor, (1.0 uF).
2	DVCC	Input Voltage. Connect a low ESR bypass capacitor between this pin and device ground to minimize supply transients.
3	CNEG	Negative Terminal for the Pump Capacitor, (1.0 uF).
4	EN_IN	Logic Level Enable. Apply a logic high or connect to DVCC to enable the device. Apply a logic low or connect to ground for shutdown. In Shutdown mode, the charge pump is turned off and quiescent current is reduced.
5	CP_FB	A resistor divider from CPO to CP_FB will set the CPO output voltage. $V_{CPO} = V_{REF} (1 + R_1/R_2) = 1.25\ V (1 + R_1/R_2)$
6	NC	Active Low Output Status, (Open Drain). A logic low indicates that the output voltage is at the set point level.
7	DVSS	Ground
8	CPO	Regulated Output Voltage. Connect a low ESR, 4.7 µF or larger capacitor between this pin and device ground.

ESD Warning

ESD (electrostatic discharge) sensitive device. Although the MX846 features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

DC Electrical Characteristics[1, 2, 3]

V_{IN} = 3.3 V @ T_A = +25°C, C_{POS} = 1.0 µF, C_{PO} = 4.7 µF unless otherwise noted

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operating Supply Range	V_{DVCC}		3.0	3.3	5	V
Supply Current	I_{DVCC}	-40°C < T_A < +85°C		500		µA
Supply Current Shutdown	I_{DVCCSD}	EN_IN = GND, -40°C < T_A < +85°C		1		µA
Output Voltage[3]	V_{CPO}	I_O = 25 mA -40°C < T_A < +85°C 3.0 V ≤ V_S ≤ 3.6 V	4.85	5	5.15	V
	V_{CPO}	I_O = 10 mA to 50 mA -40°C < T_A < +85°C 3.0 V ≤ V_S ≤ 3.6 V	4.75	5	5.25	V
Load Regulation	$\Delta V_O/I_O$	I_O = 10 mA-25 mA		0.30		mV/mA
		I_O = 10 mA-50 mA		0.25		mV/mA
Output Resistance	R_O	Open Loop		12		Ω
Switching Frequency	F_S	V_{IN} = 3.3 V -40°C < T_A < +85°C		1		MHz
Shutdown						
Logic Input High	V_{IH}		DVCC-0.5V			V
Input Current	I_{IH}			1		µA
Logic Input Low	V_{IL}				0.4	V
Input Current	I_{IL}			1		µA

NOTES

[1]Capacitors C_{DVCC} and C_{CPO} in the test circuit are 4.7 µF with 0.1 Ω ESR. Capacitor C_{CPOS} in the test circuit is 1.0 µF with 0.1 Ω ESR. Capacitors with higher ESR may reduce output voltage and efficiency.

[2]See Figure 2 conditions.

[3]1% resistors should be used to maintain output voltage tolerance.

Typical Performance Characteristics (TA = 25°C unless otherwise specified)

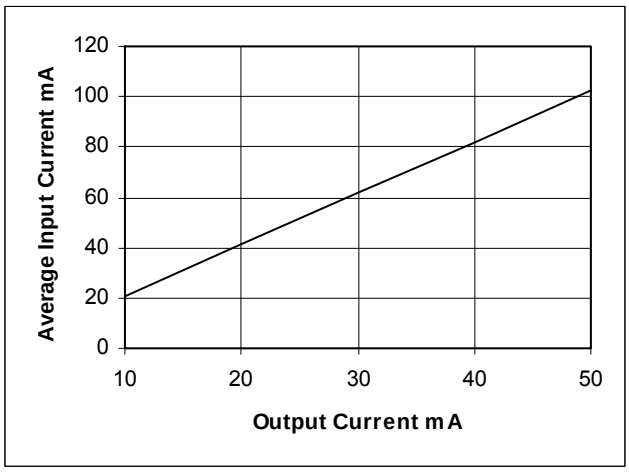


Fig. 3 Average Input Current vs. Output Current (Vin=3.3V)

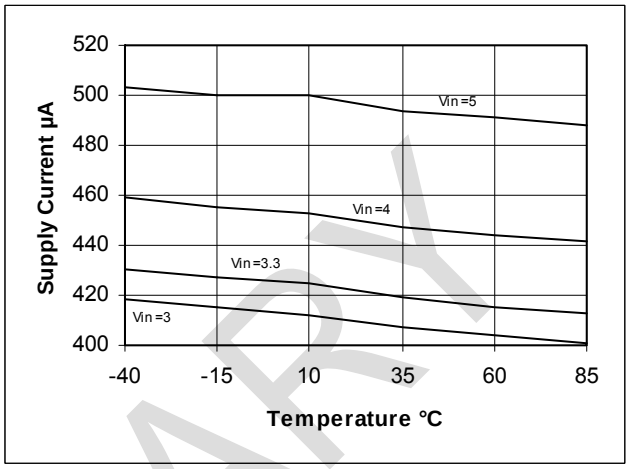


Fig. 4 Supply Current vs. Temperature in Normal Mode (No Load)

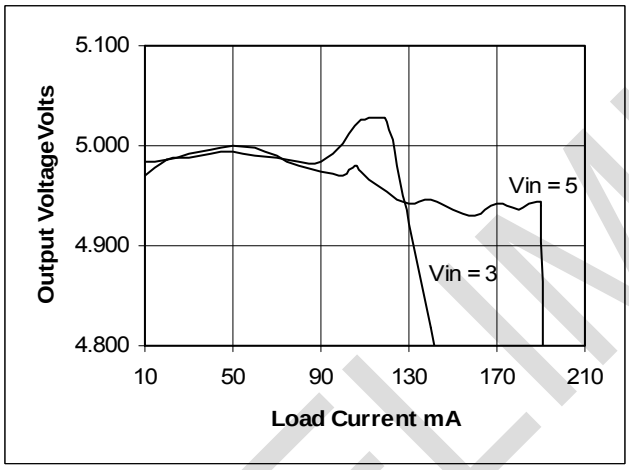


Fig. 5 Output Voltage vs. Load Current

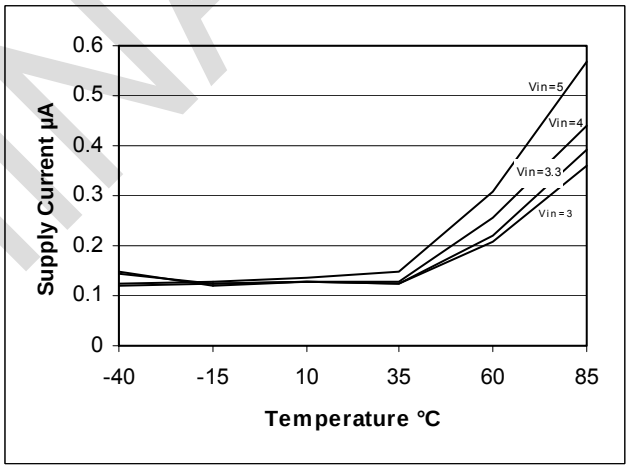


Fig. 6 Supply Current vs. Temperature in Shutdown Mode

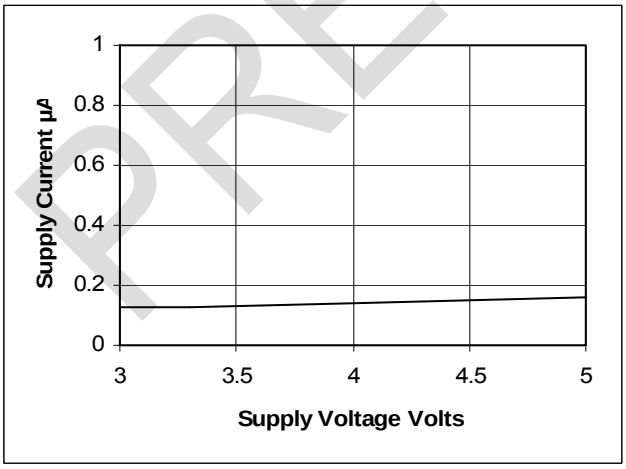


Fig. 7 Supply Current vs. Supply Voltage in Shutdown Mode

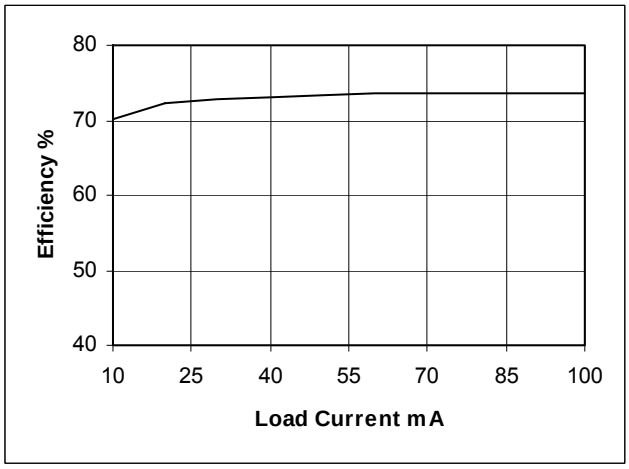
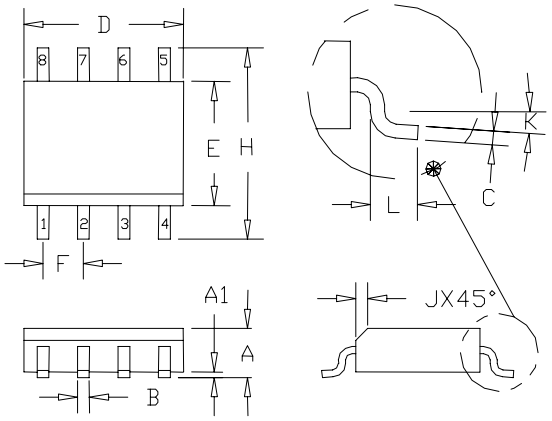


Fig. 8 Efficiency vs. Load Current
(See Figure 2 Application Circuit, Vin = 3.3V and CPO = 5V)

8-Lead SOIC



DIMENSIONS (1)					
DIM.	INCH		MM.		NOTE
	MIN.	MAX.	MIN.	MAX.	
A	.0532	.0688	1.35	1.75	----
A1	.0040	.0098	.10	.25	----
B	.013	.020	.33	.51	----
C	.0075	.0098	.19	.25	----
D	.1890	.1968	4.80	5.00	(2)
E	.1497	.1574	3.80	4.00	(2)
F	.050 BSC		1.27 BSC		----
H	.2284	.2440	5.80	6.20	----
J	.0099	.0196	.25	.50	----
K	0°	8°	0°	8°	----
L	.016	.050	.40	1.27	----

3. MOLDED PACKAGE SHALL CONFORM TO JEDEC STANDARD CONFIGURATION MS-012 VARIATION AA.

(2) DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.

(1) CONTROLLING DIMENSIONS: MILLIMETERS.

NOTES: (UNLESS OTHERWISE SPECIFIED)

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