



FEATURES

- High Efficiency 90%.
- Power-Saving Shutdown Mode (7 μ A typical).
- Internal 2A Switch.
- 120KHz Switching Rate.
- Adjustable Switch Current Limit.
- On-Chip Low Battery Detector.

APPLICATIONS

- Palmtop & Notebook Computers.
- Pocket Organizers.
- Cameras.
- Pagers.
- Battery Backup Supplies.
- Portable Instruments.

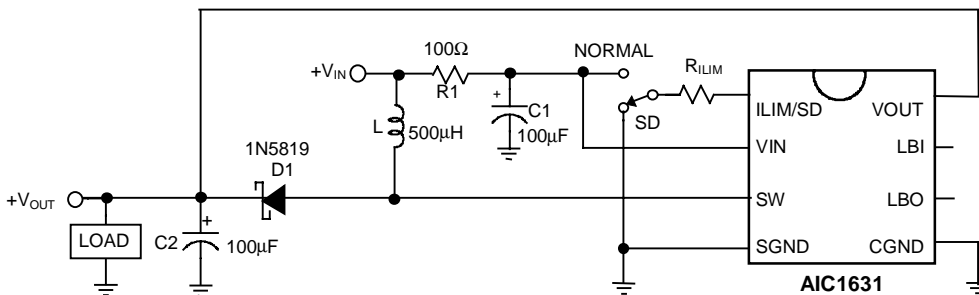
DESCRIPTION

The AIC1631 is a high efficiency step up DC-DC converter. Only four external components are required to deliver a fixed voltage of 3V, 3.3V, or 5V. Efficiency beyond 87% can be easily achieved at 100mA load with 2.2V to 3V input voltages.

Logic-controlled shutdown mode is provided for power saving. Switch current limit can be programmed with a resistor. The low battery detector can be configured as a linear regulator or a burst mode controller performing an extremely low supply current operation.

120KHz switching rate reduces the inductor size. Inductors of 25 μ H to 50 μ H inductance are recommended for most applications.

TYPICAL APPLICATION CIRCUIT



High Efficiency Step-Up DC/DC Converter

ORDERING INFORMATION

AIC1631 XXX

- PACKAGE TYPE
N: PLASTIC DIP
S: SMALL OUTLINE
- TEMPERATURE RANGE
C=0°C~+70°C
- OUTPUT VOLTAGE
DEFAULT: 3.3V
3: 3.0V
5: 5.0V

ORDER NUMBER	PIN CONFIGURATION
AIC1631CN AIC1631-3CN AIC1631-5CN (PLASTIC DIP)	TOP VIEW
AIC1631CS AIC1631-3CS AIC1631-5CS (PLASTIC SO)	

**ABSOLUTE MAXIMUM RATINGS**

Supply Voltage	7.0V
Operating Temperature Range	0°C ~ 70°C
Storage Temperature Range	-65°C ~ 150°C

TEST CIRCUIT

Refer to Typical Application Circuit.

ELECTRICAL CHARACTERISTICS ($V_{IN}=3.0V$, $T_a=25^{\circ}C$, unless otherwise specified.)

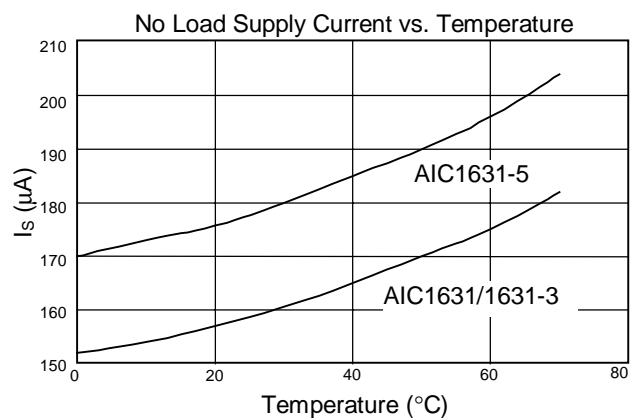
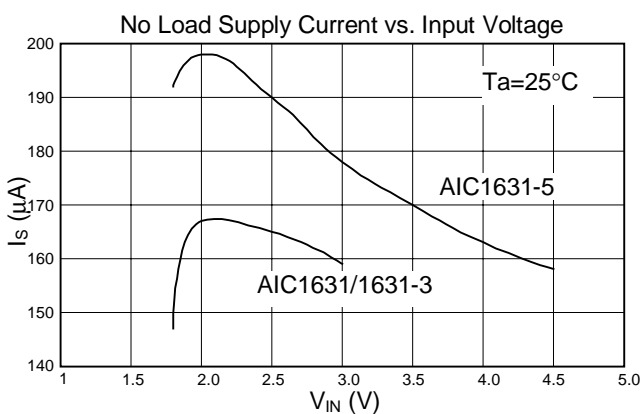
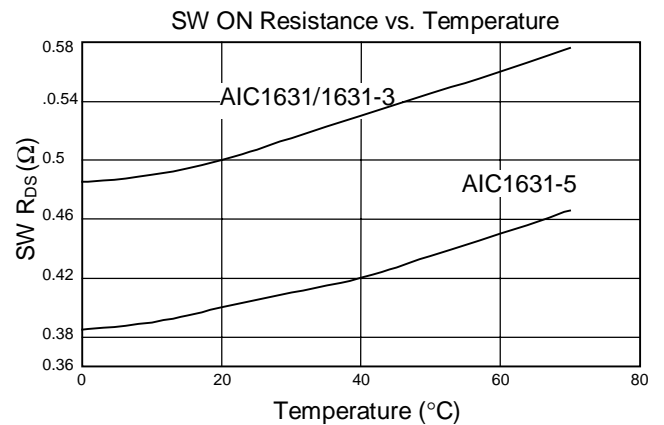
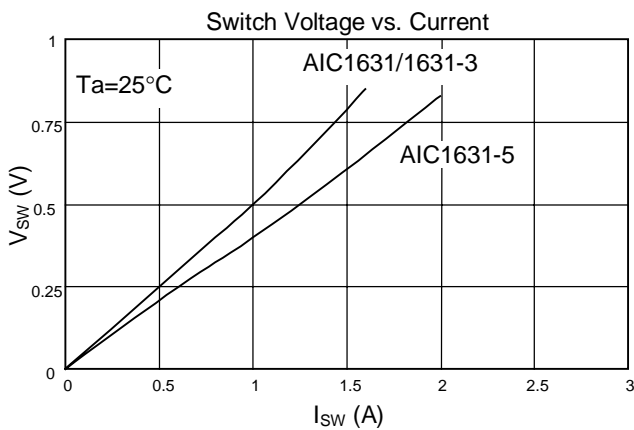
PARAMETER	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Input Voltage	Fig. 4 in Appl. Examples	1.5		7	V
Output Voltage	$I_{LOAD}=200mA$ AIC1631 AIC1631-3 AIC1631-5	3.16 2.88 4.80	3.3 3 5	3.44 3.12 5.20	V
Switch off Current			105	140	μA
No Load Current	AIC1631/AIC1631-3 AIC1631-5		160 180		μA
Shutdown Mode Current			7	15	μA
Shutdown Recovery Time	$V_{IN}=2.5V$, $I_{LOAD}=200mA$		0.4		mS
Efficiency	$I_{LOAD}=200mA$ AIC1631/AIC1631-3 AIC1631-5		87 90		%
Line Regulation	$I_{LOAD}=100mA$ AIC1631, $V_{IN}=1.8 \sim 3.3V$ AIC1631-3, $V_{IN}=1.8 \sim 3V$ AIC1631-5, $V_{IN}=2.2 \sim 3.3V$		0.6 0.5 0.8		% V_{OUT}
Load Regulation	$I_{LOAD}=10\sim 300mA$ AIC1631/AIC1631-3 AIC1631-5		0.3 0.8		% V_{OUT}
Oscillator Frequency		90	120	150	KHz
LBI Pin Trip Point		1.17	1.22	1.27	V
SW "ON Resistance"	AIC1631/AIC1631-3 AIC1631-5		0.5 0.4		Ω
LBO "ON Resistance"	$V_{IN}=2V$		45		Ω



ELECTRICAL CHARACTERISTICS (CONTINUED)

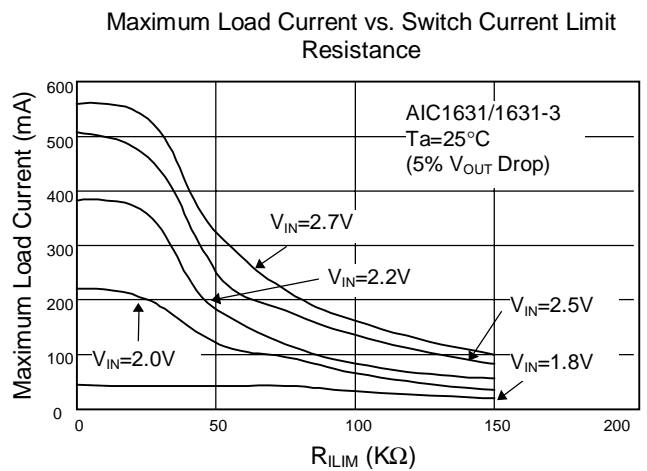
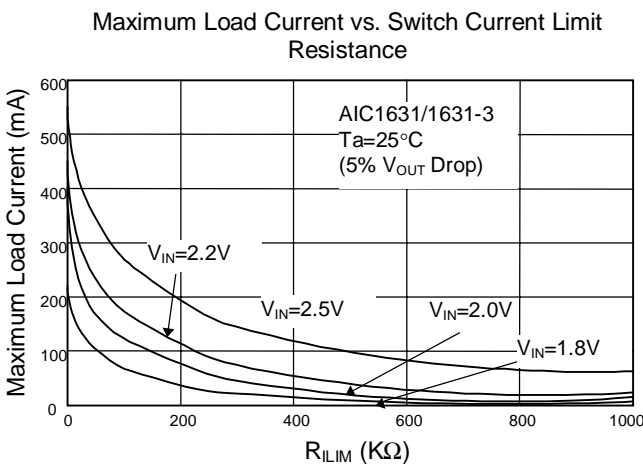
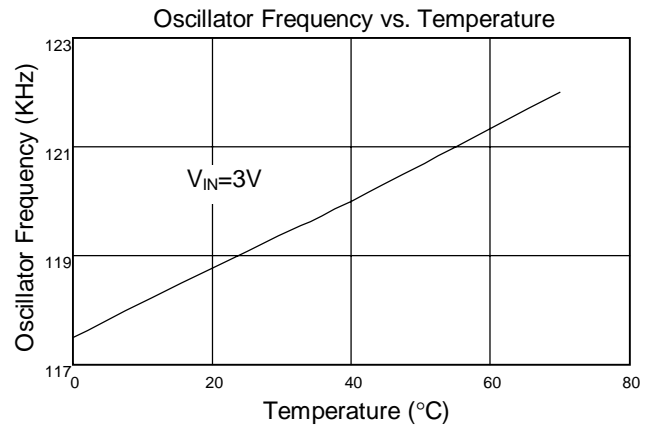
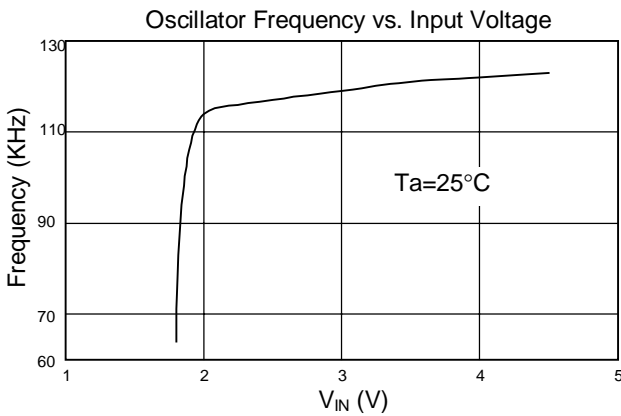
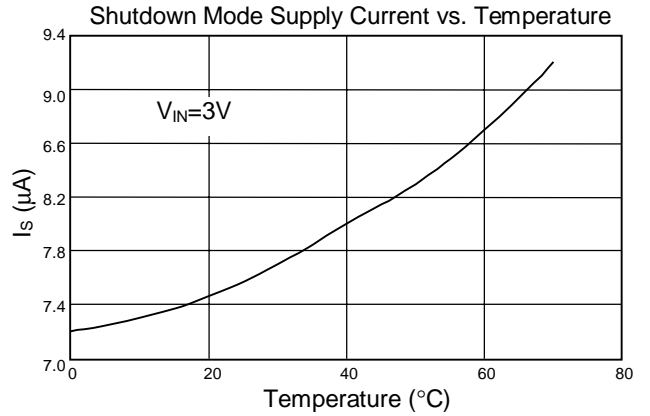
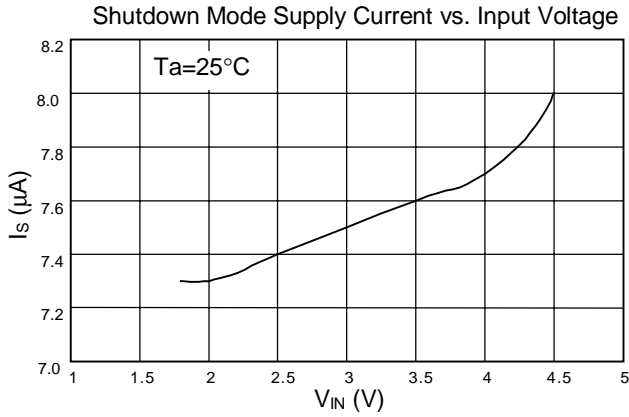
PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
SW Off Leakage				1	μA
Input Pin Bias Current				10	nA/Pin
Output Pin Leakage				10	nA/Pin

TYPICAL PERFORMANCE CHARACTERISTICS



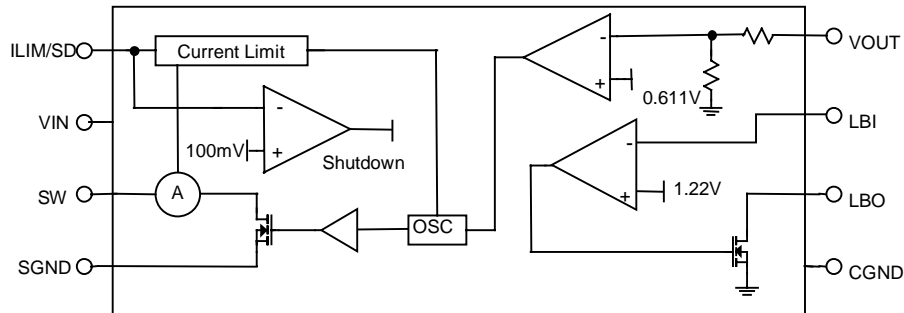


TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)





■ BLOCK DIAGRAM



■ PIN DESCRIPTIONS

- PIN 1: ILIM/SD-**
1. Connected to VIN pin through a resistor to set the switch peak current. It serves to protect IC and inductor, as well as to improve efficiency and output ripples. However, supply capability of the AIC1631 is limited by the current limit resistor. (See typical performance characteristics). The ILIM/SD pin should be shorted to VIN pin if limiting on switch peak current is not intended.
 2. The AIC1631 goes in shutdown mode and consumes less than $10\mu\text{A}$ when ILIM/SD pin is pulled to ground.

PIN 2: VIN - Input supply.

- PIN 3: SW** - Drain of the power switch, to be connected to inductor/ diode.
- PIN 4: SGND** - Ground connected to source of power switch.
- PIN 5: CGND** - Ground for control circuits of the IC. It should be separated from SGND to avoid the interference.
- PIN 6: LBO** - Open drain output of the battery low detector, with 45Ω "ON resistance" at $V_{IN}=2\text{V}$. It is pulled low when the voltage on LBI pin is below 1.22V.
- PIN 7: LBI** - The noninverting input of the battery low detector, of which the inverting input is internally connects to 1.22V voltage reference.
- PIN 8: VOUT** - The output voltage feedbacks to the IC through this pin.



APPLICATION EXAMPLES

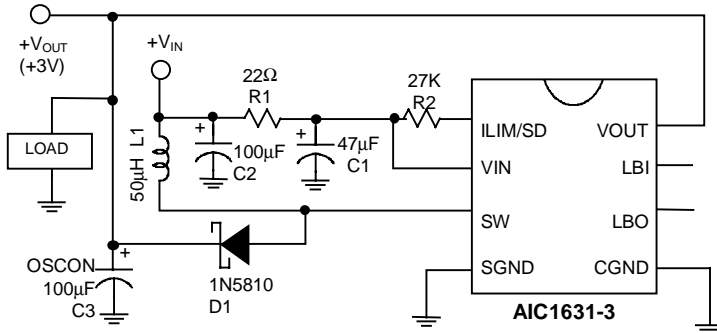


Fig. 1 3V Output Step-Up Converter

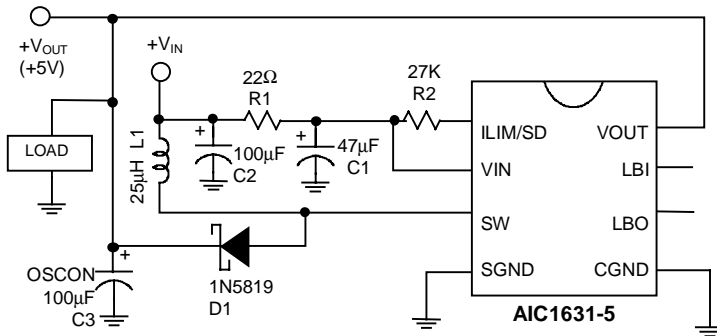
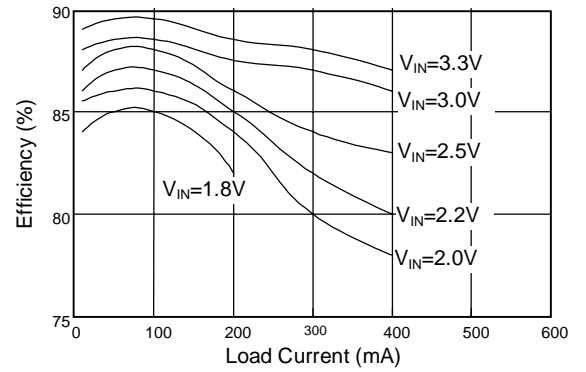


Fig. 2 5V Output Step-Up Converter

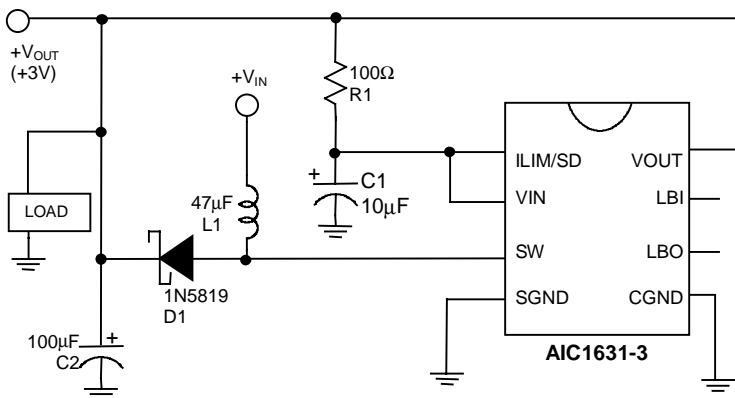
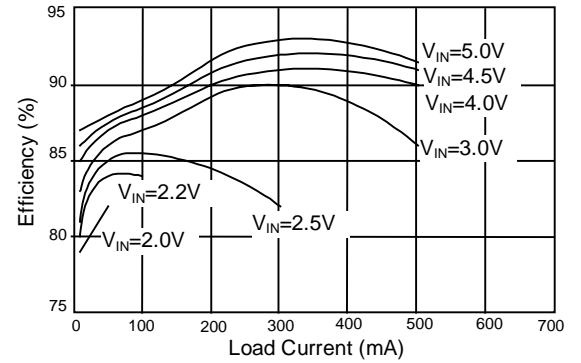
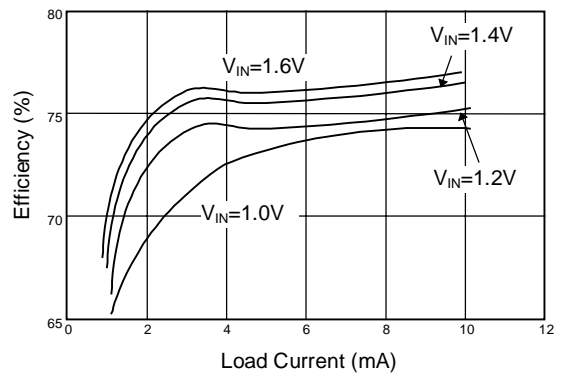


Fig. 3 1-Cell Input 3V Output Step-Up Converter





APPLICATION EXAMPLES (CONTINUED)

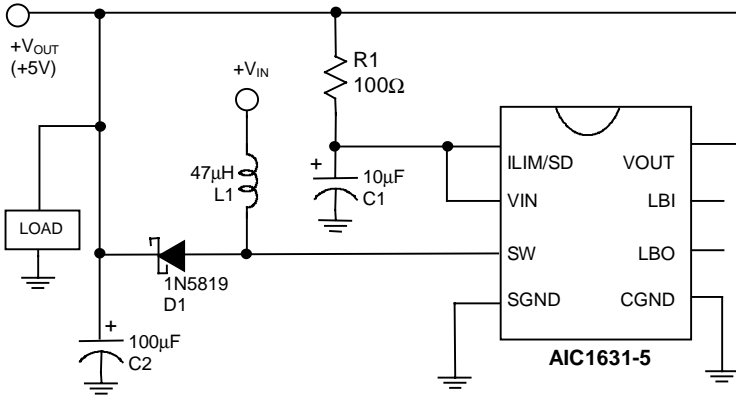


Fig. 4 1-Cell Input 5V Output Step-Up Converter

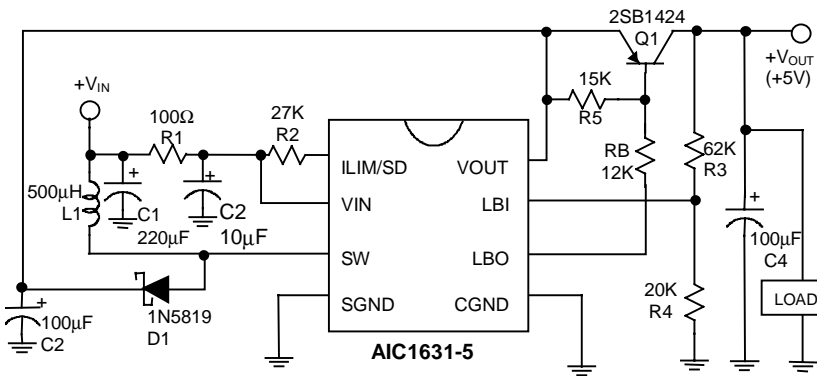
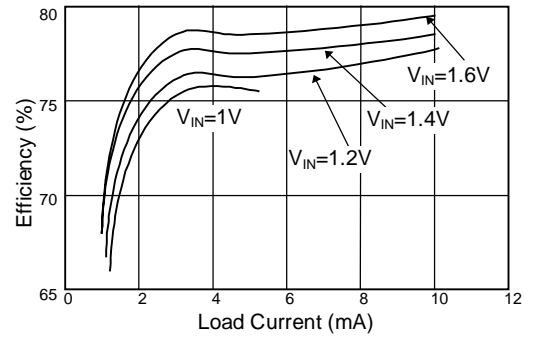


Fig. 5 4-Cell Input Step-Up / Step-Down Converter

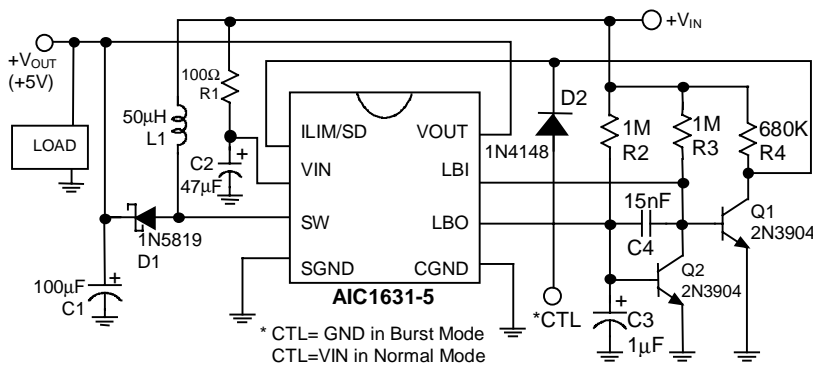
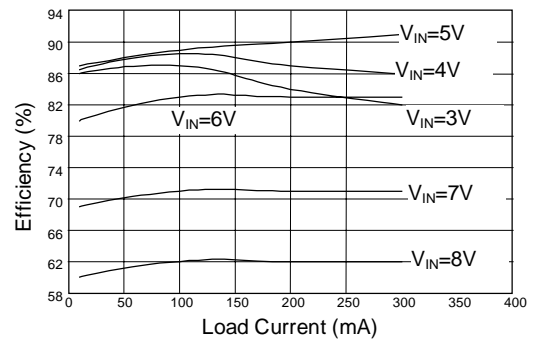
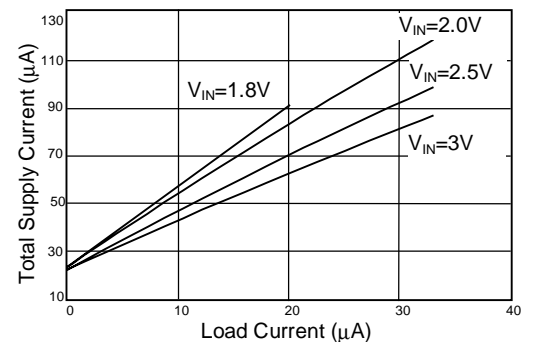


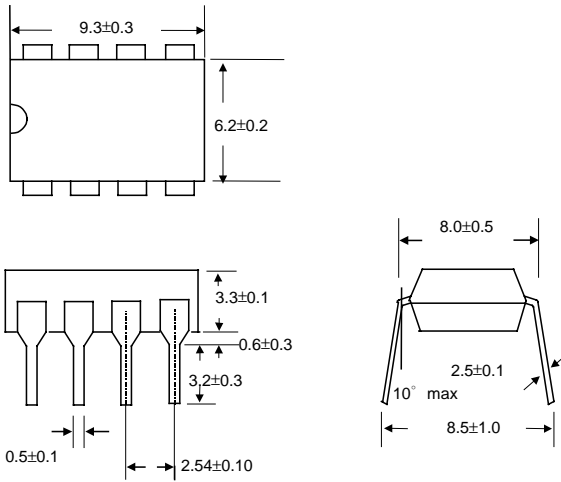
Fig. 6 Low Supply Current Burst Mode Step-Up Converter



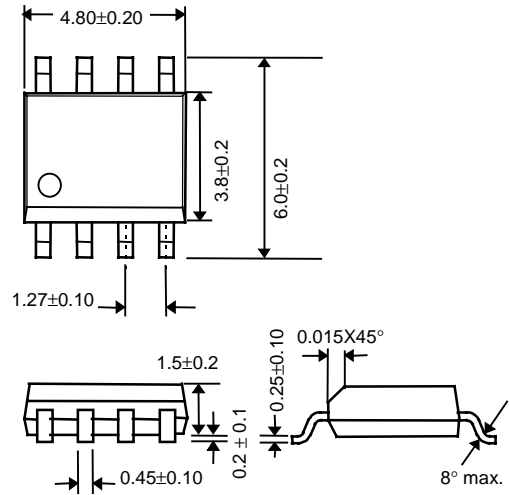


PHYSICAL DIMENSION

8 LEAD PLASTIC DIP



8 LEAD PLASTIC SO



UNIT: mm