

January 30, 1998

TEL:805-498-2111 FAX:805-498-3804 WEB:http://www.semtech.com

DESCRIPTION

The SC1630 is a DC-DC converter designed to drive an external power switch for more flexibility, especially in higher voltage and larger power applications. Typically six components are required to set up a step-up configuration easily achieving an efficiency beyond 80%. A few more components are required to set up a step down configuration delivering 4A load current with 83% typical efficiency, 86% at 2A load, and 300 μ A quiescent current.

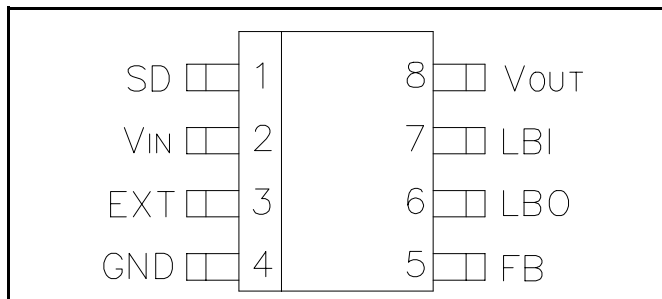
The output voltage can be internally set to 5V or externally set to an arbitrary value below breakdown voltage of the power switch. Logic-controlled shutdown mode is provided for power-saving. The low battery detector can also be configured as a linear regulator.

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

APPLICATIONS

- Palmtop and notebook computers
- Battery charger supply
- Cellular telephones
- LCD contrast supply
- Flash memory programmer
- Battery backup supplies
- Portable instruments

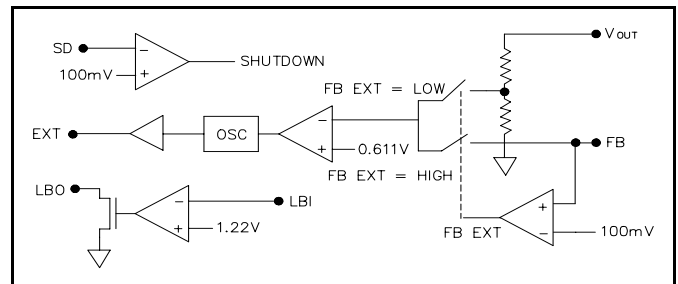
PIN CONFIGURATION



FEATURES

- Default +5V output voltage
- Adjustable output voltage with two resistors
- Power-saving shutdown mode (7 μ A typical)
- 120kHz switching rate
- On-chip low battery detector

BLOCK DIAGRAM



ORDERING INFORMATION

DEVICE ⁽¹⁾	PACKAGE
SC1630CS	SO-8

Note:

(1) Add suffix 'TR' for tape and reel.

ABSOLUTE MAXIMUM RATINGS

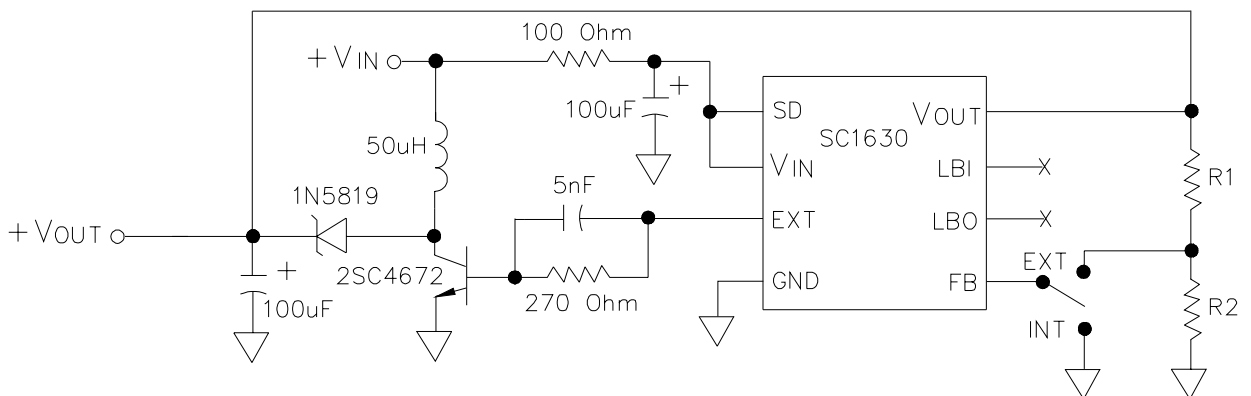
Parameter	Symbol	Maximum	Units
Supply Voltage	V _{IN}	7.0	V
Operating Temperature Range	T _A	0 to 70	°C
Storage Temperature Range	T _{STG}	-65 to 125	°C

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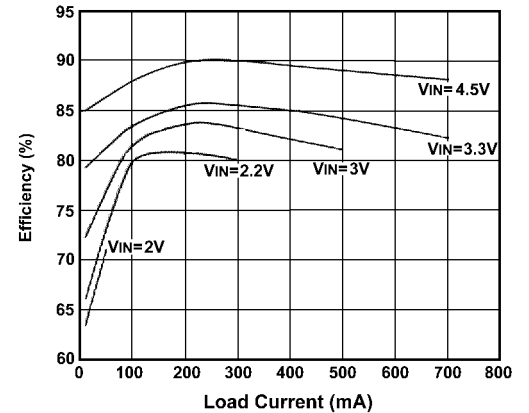
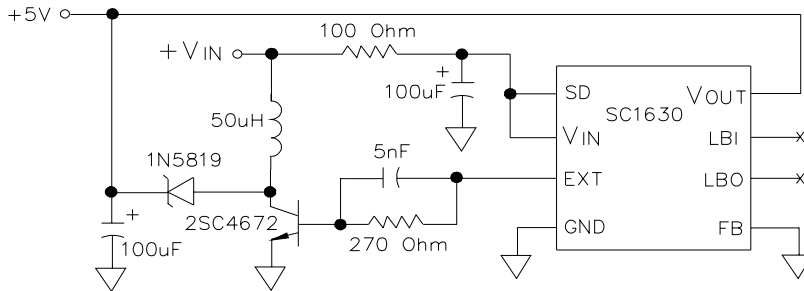
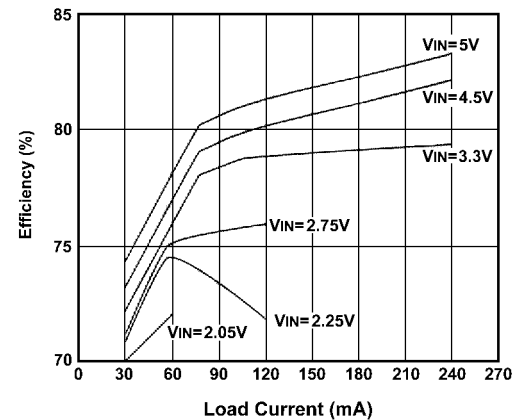
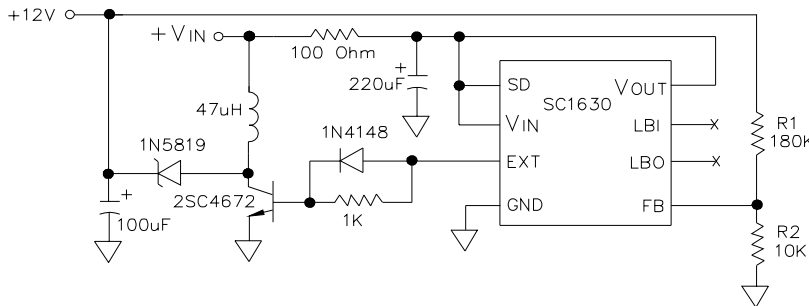
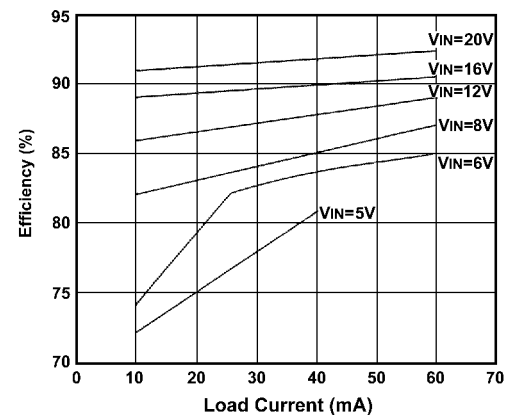
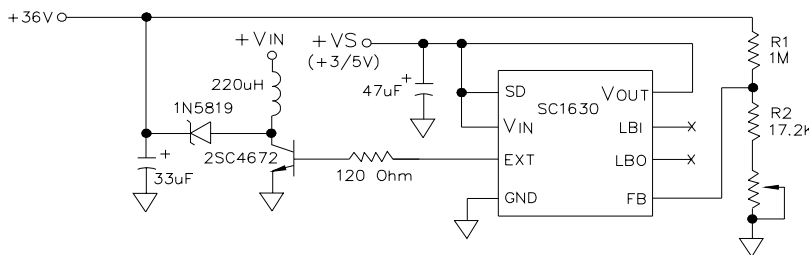
ELECTRICAL CHARACTERISTICS

 Unless otherwise specified, $T_A = 25^\circ\text{C}$, $V_{IN} = 3.0\text{V}$

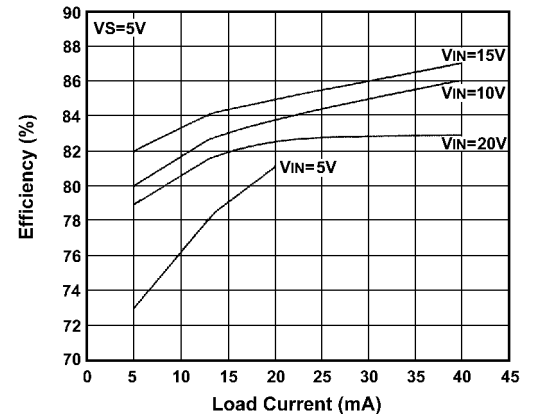
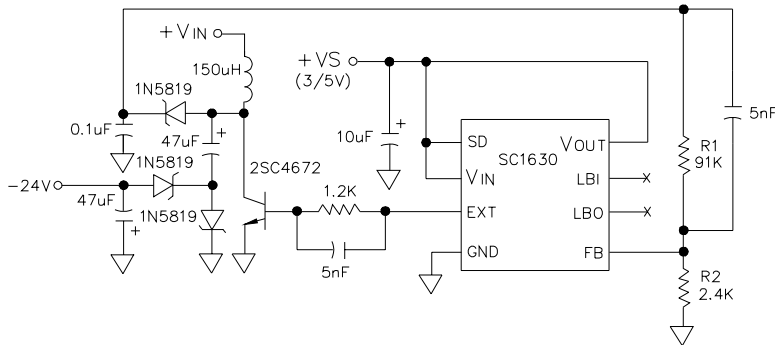
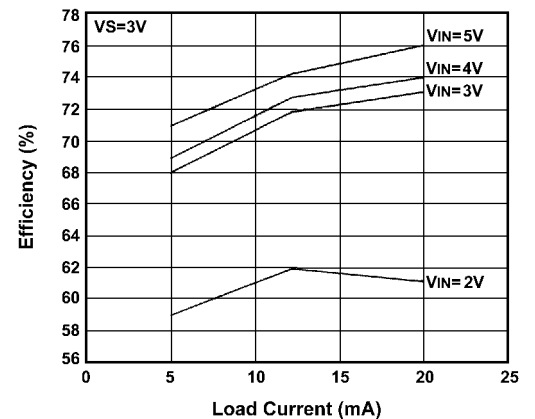
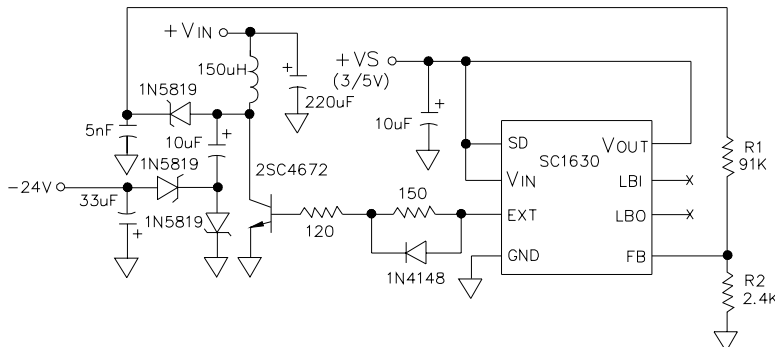
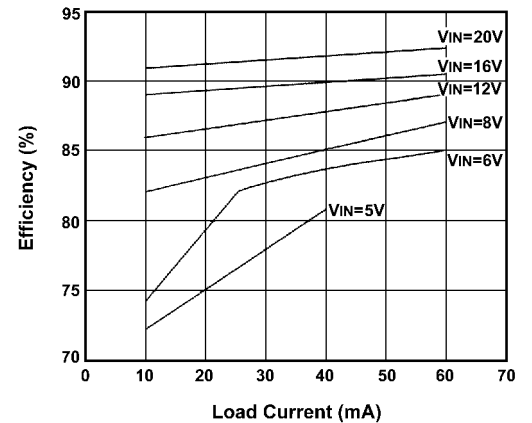
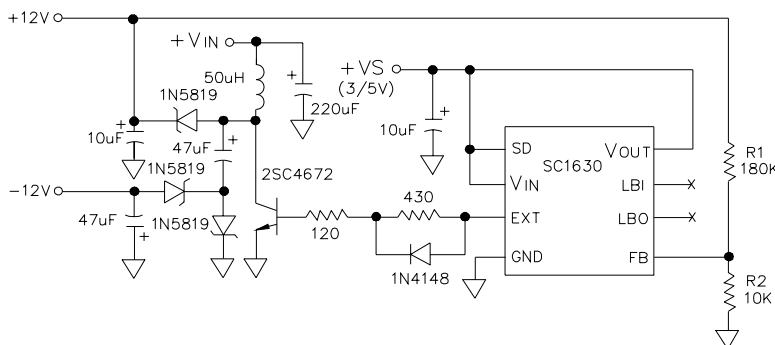
Parameter	Conditions	Min	Typ	Max	Units
Input Voltage		1.8		7.0	V
Default Output Voltage	$I_L = 200\text{mA}$	4.80	5.00	5.20	V
Switch Off Current			105	140	μA
Shutdown Mode Current			7	15	μA
Recovery Time from Shutdown	$V_{IN} = 2.5\text{V}, I_L = 200\text{mA}$		0.4		ms
Efficiency	$I_L = 300\text{mA}$ (5V Output Step-Up Converter)		85		%
Line Regulation	$V_{IN} = 2.2 - 3.3\text{V}$ $V_{OUT} = 5\text{V}, I_L = 100\text{mA}$		0.6		% V_{OUT}
Load Regulation	$I_L = 10\text{mA} - 500\text{mA}$ $V_{OUT} = 5\text{V}$		2.5		% V_{OUT}
Oscillator Frequency		90	120	150	kHz
LBI Pin Trip Point			1.22		V
EXT Pin Driving Capabilities	Pin 8 = 5V, Pin 3 = 0.85V Sourcing Sinking		80 50		mA mA
LBO "ON Resistance"	$V_{IN} = 2\text{V}$		45		Ω
Input Pin Bias Current				10	nA/Pin
Output Pin Leakage				10	nA/Pin

TYPICAL APPLICATIONS


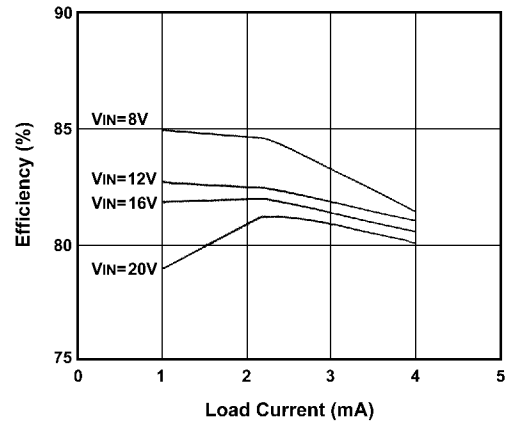
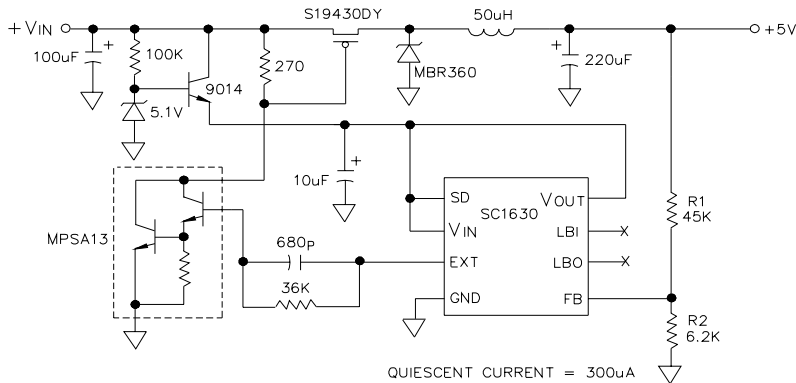
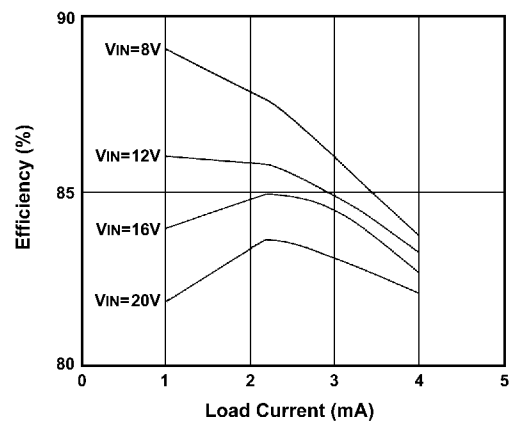
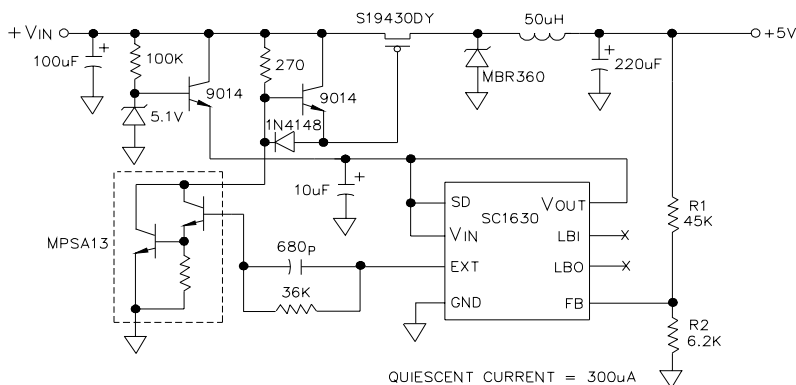
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TYPICAL APPLICATIONS (cont.)
5V Output Step-Up Converter

12V Output Step-Up Converter for Flash Memory

36V Output Step-Up Converter for Color LCD


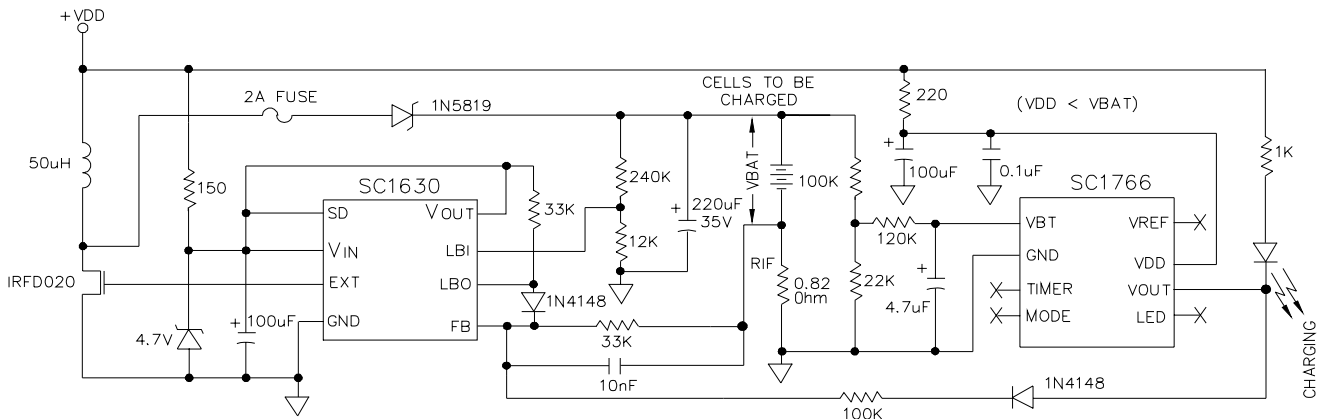
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TYPICAL APPLICATIONS (cont.)
-24V Output Inverting Converter for LCD

2V Input 20mA Load -24V Output Inverting Converter for LCD

±12V Dual Output Converter for Computer Interfacing


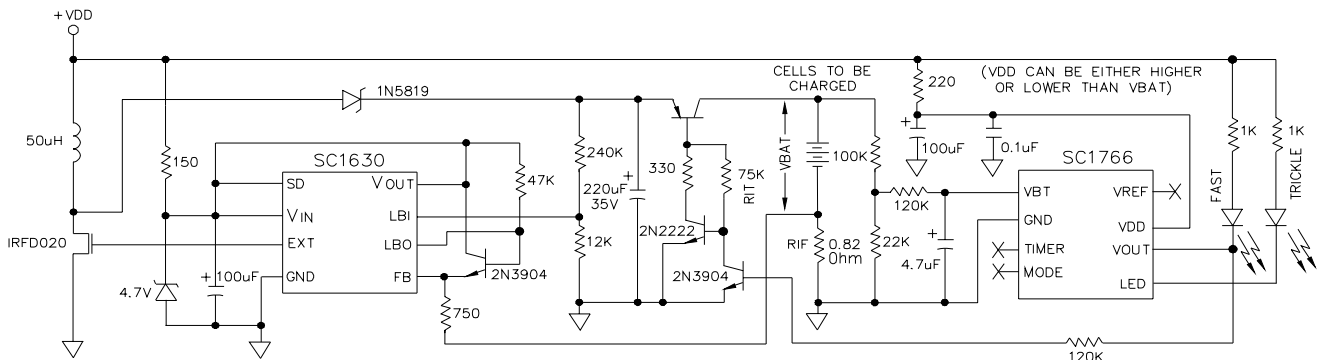
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TYPICAL APPLICATIONS (cont.)
5V Output Step-Down Converter - 1

5V Output Step-Down Converter - 2


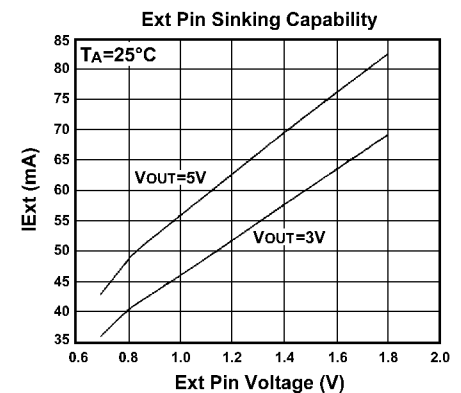
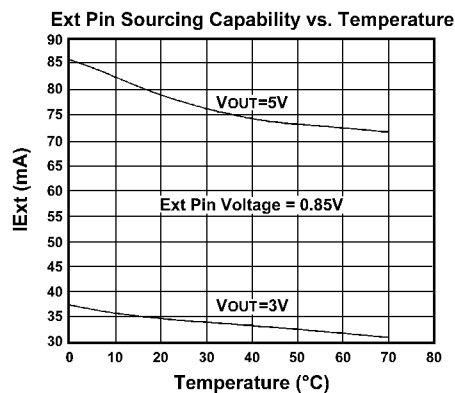
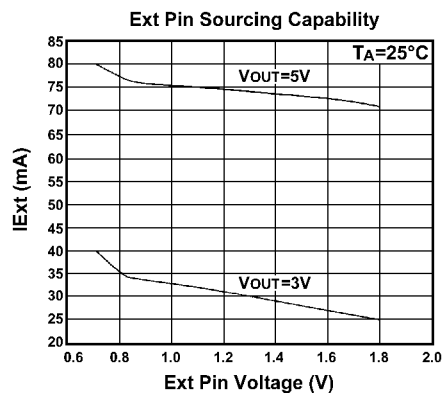
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TYPICAL APPLICATIONS (cont.)
Step-Up Rechargeable Battery Charger


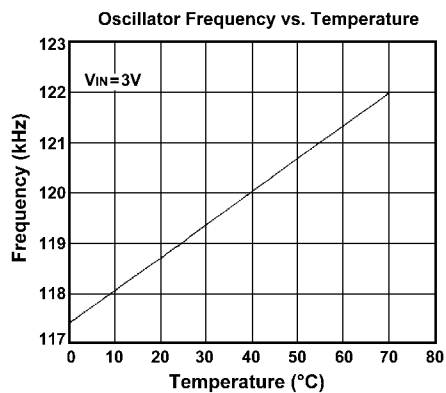
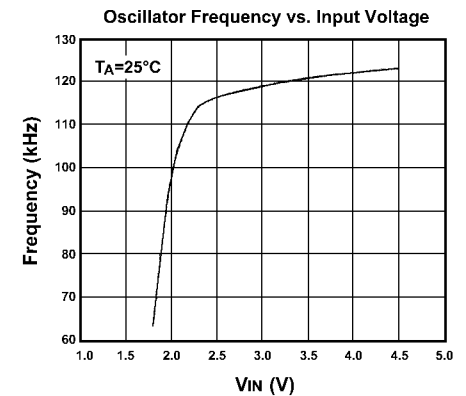
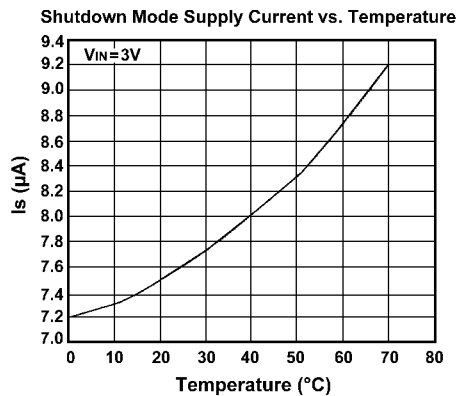
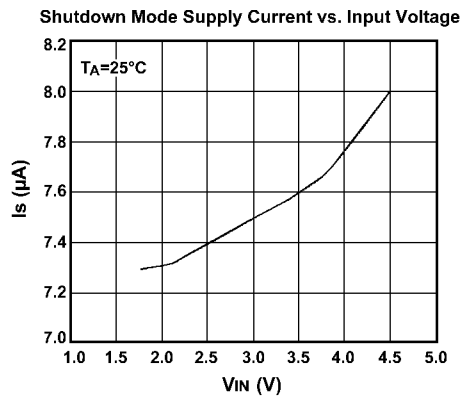
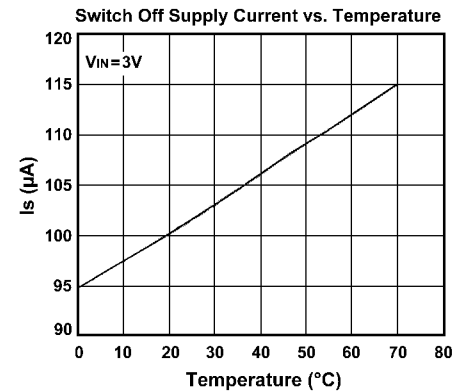
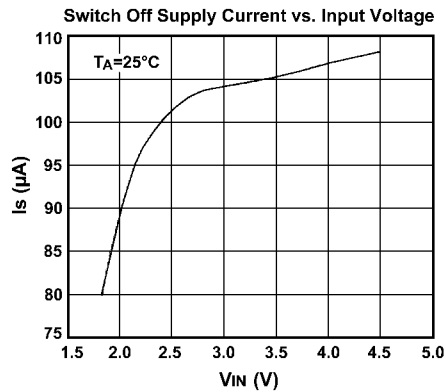
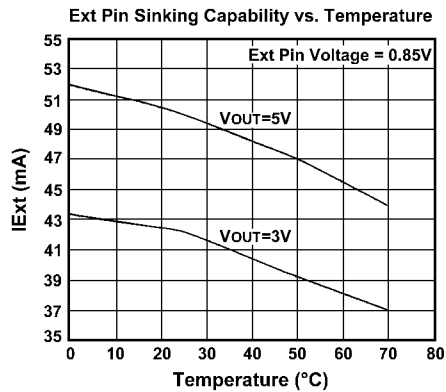
- Charging current = 0.8A, Auto Cut-Off at 0.25% -Delta-V point and fault conditions (RIF sets the charging current).
- VDD must be lower than VBAT.
- Short circuit condition is protected with a 2A fuse.

Step-Up/Step-Down Rechargeable Battery Charger


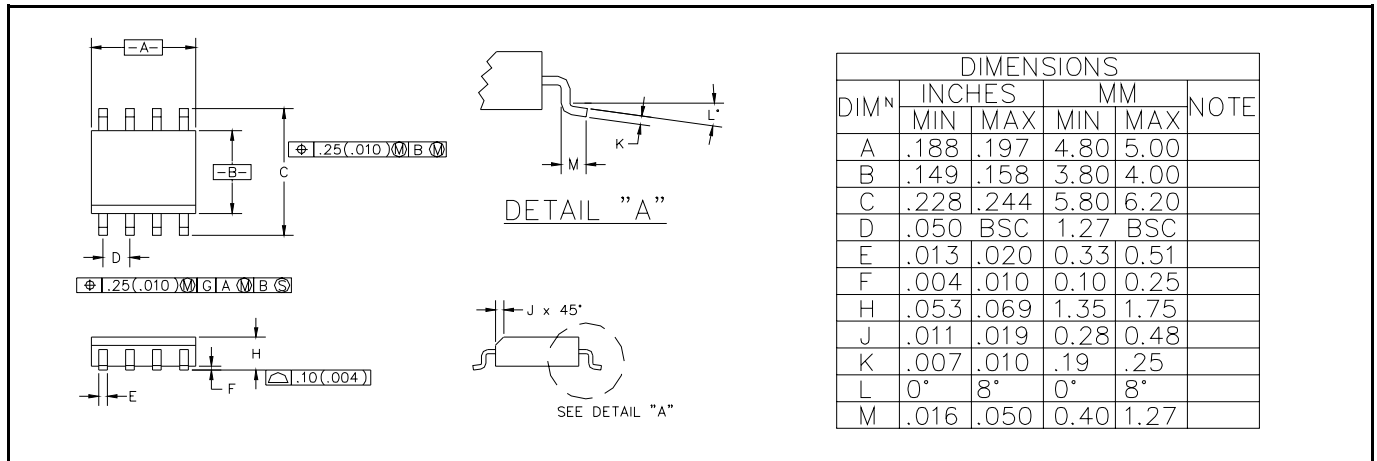
- Fast charge current = 0.8A when $VDD < VBAT$, $= (VDD - VBAT - 0.5) / 0.82$ when $VDD > VBAT$.
- Trickle charge current = 30mA (RIF sets fast charge current, RIT sets trickle charge current).
- Typical efficiency = 75%.
- With short circuit protection.

TYPICAL PERFORMANCE CHARACTERISTICS


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TYPICAL PERFORMANCE CHARACTERISTICS (cont.)


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DEVICE OUTLINE - SO-8

PIN DESCRIPTIONS

- PIN 1: SD** The SC1630 goes into shutdown mode and consumes less than 10 μ A when the SD pin is pulled to ground, and it goes into normal operating mode when the SD pin is pulled to a positive voltage above 100mV.
- PIN 2: V_{IN}** Input supply.
- PIN 3: EXT** Push-Pull driver output to drive external power switch.
- PIN 4: GND** Ground.
- PIN 5: FB** The output voltage can either be internally set to 5 volts by grounding the FB pin, or it can be externally set to an arbitrary voltage by applying to the FB pin the divider voltage of two external divider resistors. V_{OUT} voltage is given by the following equation:

$$V_{OUT} = 0.611 \left(1 + \frac{R_1}{R_2} \right)$$

- Where: R1= Resistor connected between FB Pin and V_{OUT} pin.
 R2= Resistor connected between FB Pin and ground.
 V_{OUT} = Output voltage to be set.

- PIN 6: LBO** Open drain output of the battery low detector, with 45 Ohm "On Resistance" at V_{IN}=2V. It is pulled low when the voltage on LBI pin is below 1.22 volts.
- PIN 7: LBI** The inverting input of the battery low detector, of which the non-inverting input is internally connected to the 1.22V voltage reference.
- PIN 8: V_{OUT}** The output voltage feeds back to the IC through this pin for internally set 5V operation. If the output voltage is externally set, the V_{OUT} pin can be tied to any low impedance node with voltage between the external power switch threshold and 7 volts.

PIN CONFIGURATION
