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 300µA quiescent current.

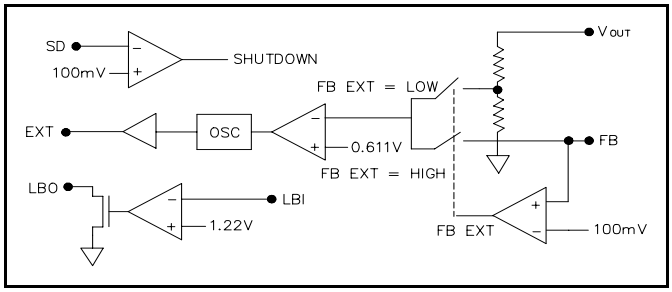
The output voltage can be internally set to 5V or externally set to an arbitrary value below breakdown voltage of the power switch. Logic-controlled shutdown mode is provided for power-saving. The low battery detector can also be configured as a linear regulator.

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

FEATURES

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

BLOCK DIAGRAM



APPLICATIONS

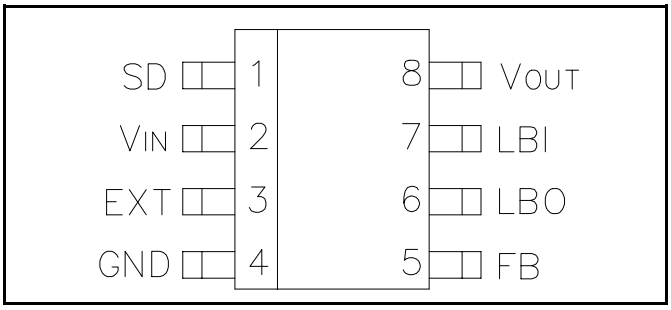
- Palmtop and notebook computers
- Battery charger supply
- Cellular telephones
- LCD contrast supply
- Flash memory programmer
- Battery backup supplies
- Portable instruments

ORDERING INFORMATION

DEVICE(1)	PACKAGE
SC1630CS	SO-8

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

PIN CONFIGURATION



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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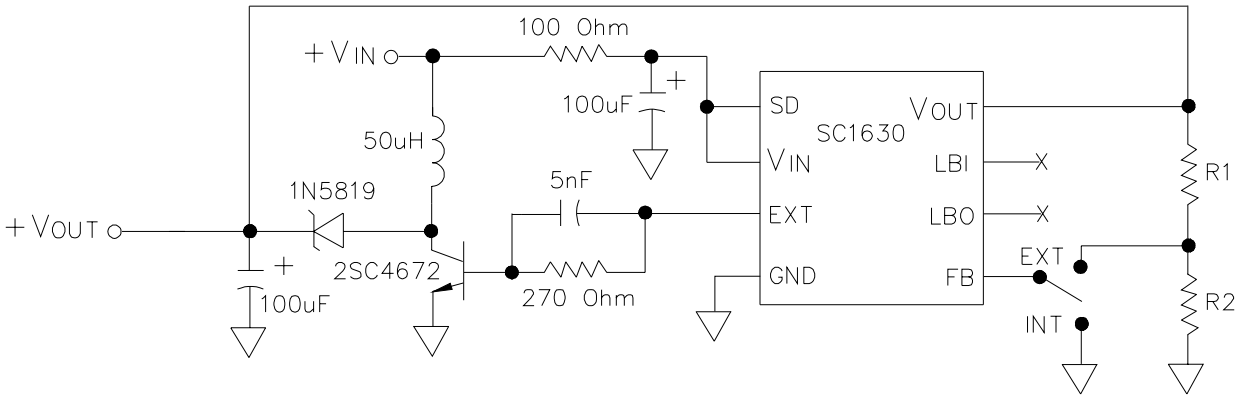
ELECTRICAL CHARACTERISTICS

Unless otherwise specified, T_A = 25°C, V_{IN} = 3.0V

Parameter	Conditions	Min	Typ	Max	Units
Input Voltage		1.8		7.0	V
Default Output Voltage	I_L = 200mA	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} = 2.5V,I_L = 200mA		0.4		ms
Efficiency	I_L = 300mA (5V Output Step-Up Converter)		85		%
Line Regulation	V_{IN} = 2.2 - 3.3V V_{OUT} = 5V, I_L = 100mA		0.6		%V_{OUT}
Load Regulation	I_L = 10mA - 500mA V_{OUT} = 5V		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} = 2V		45		Ω
Input Pin Bias Current				10	nA/Pin
Output Pin Leakage				10	nA/Pin

TYPICAL APPLICATIONS



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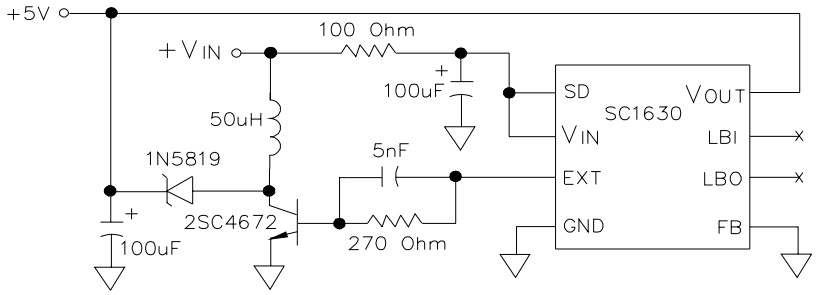
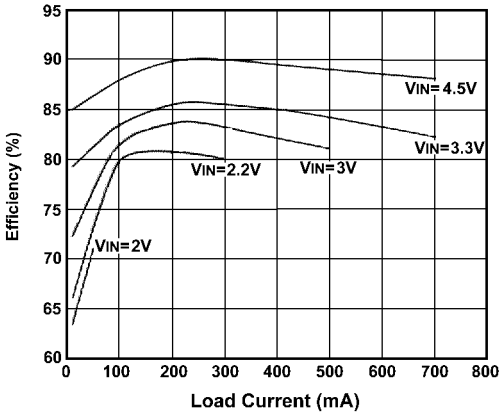
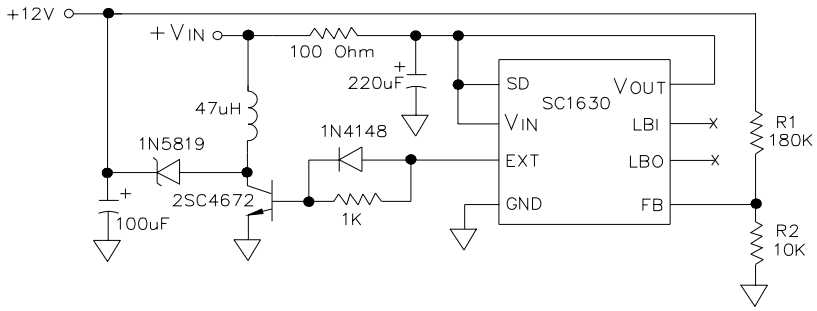
TYPICAL APPLICATIONS (cont.)

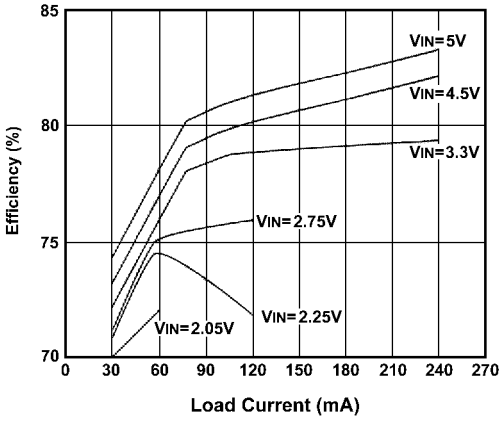
5V Output Step-Up Converter



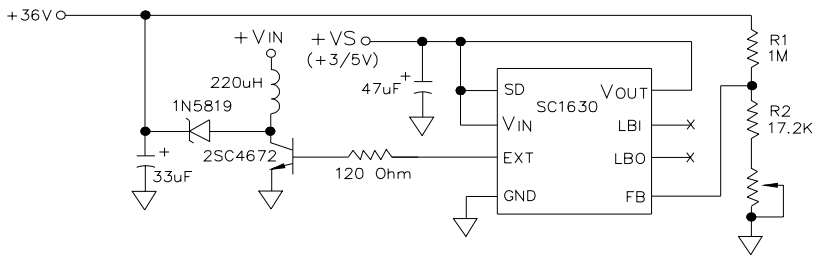


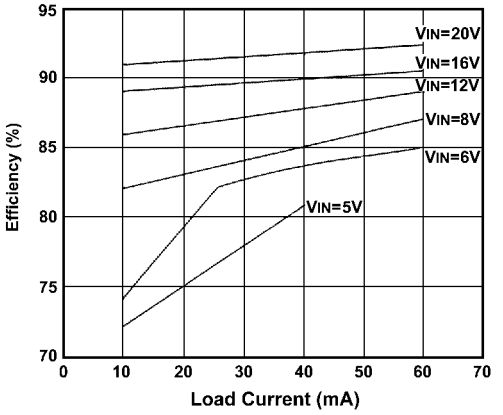
12V Output Step-Up Converter for Flash Memory





36V Output Step-Up Converter for Color LCD





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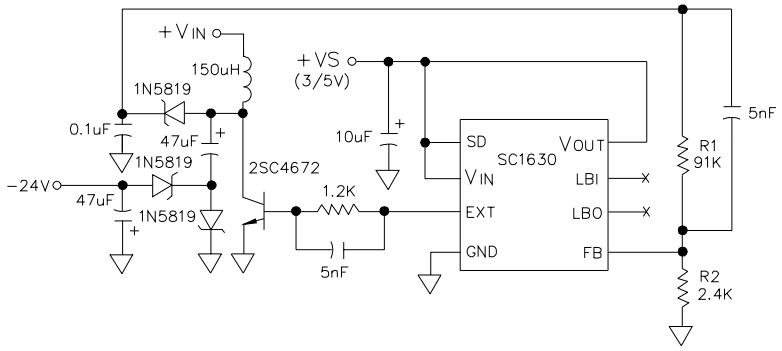
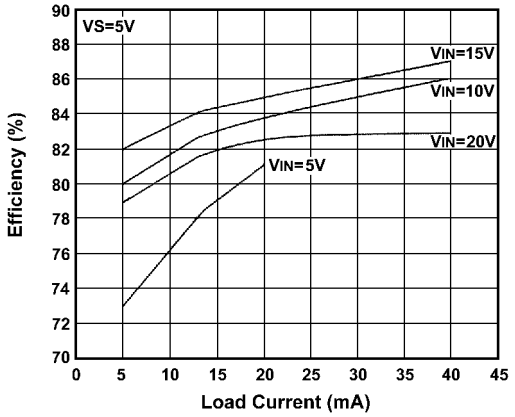
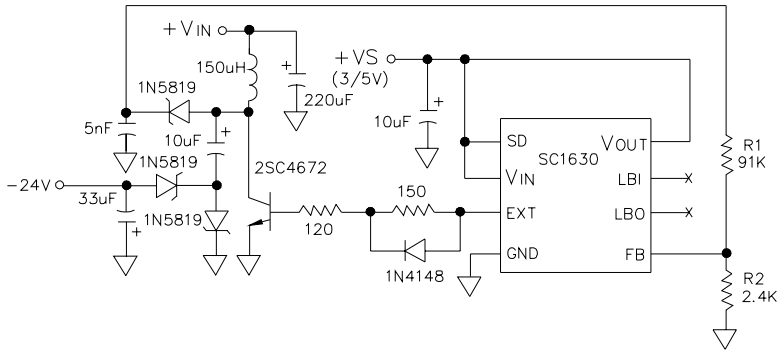
TYPICAL APPLICATIONS (cont.)

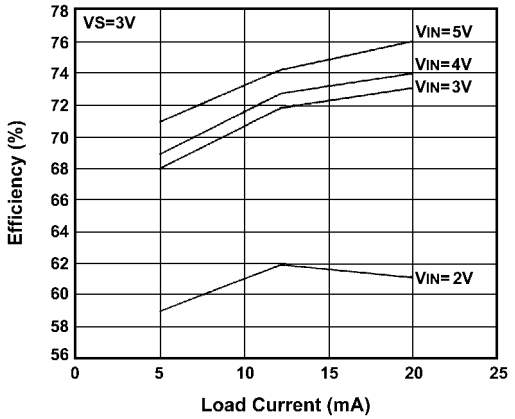
-24V Output Inverting Converter for LCD



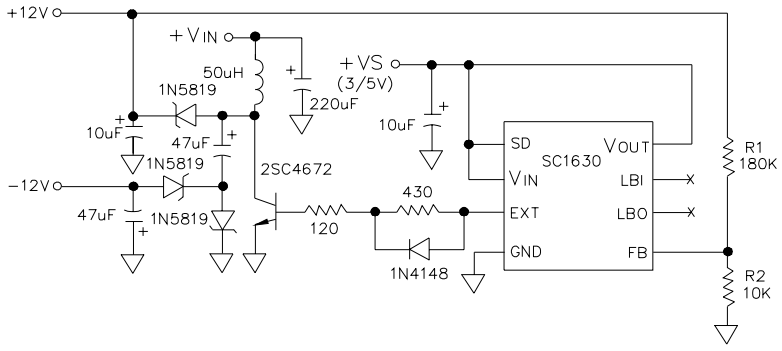


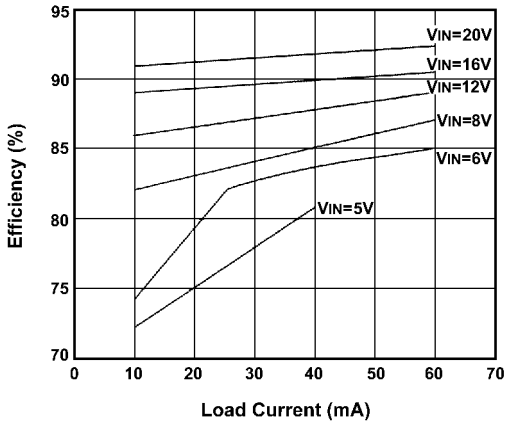
2V Input 20mA Load -24V Output Inverting Converter for LCD





±12V Dual Output Converter for Computer Interfacing





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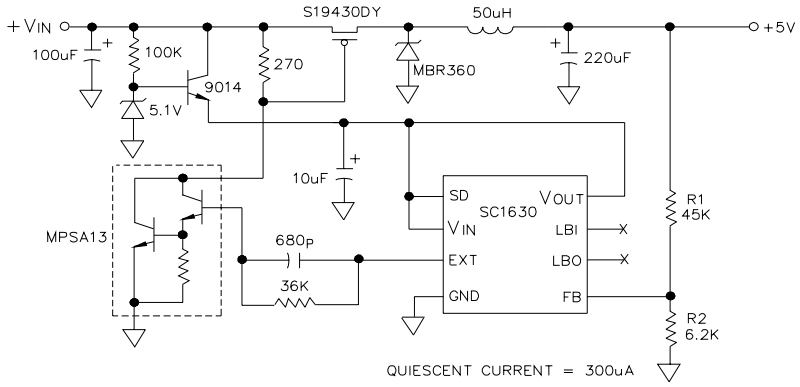
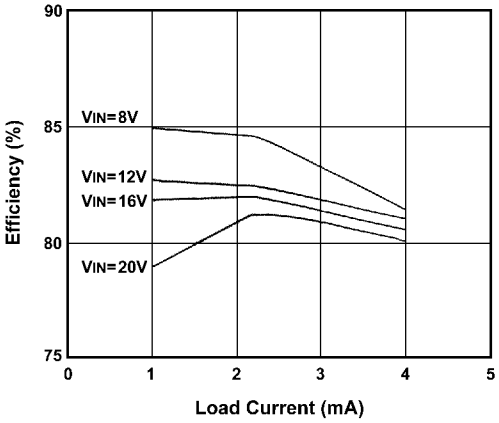
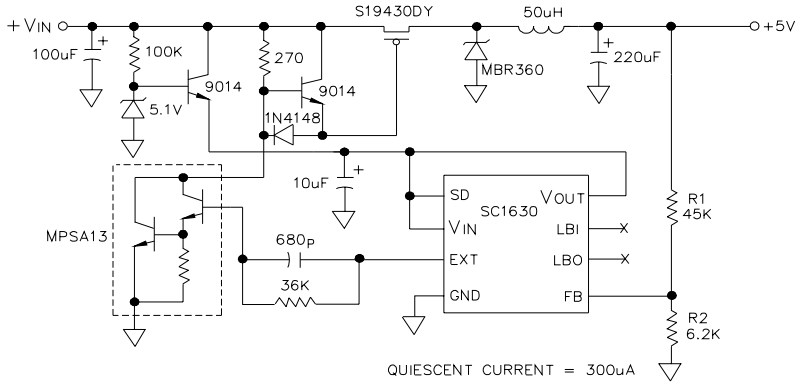
TYPICAL APPLICATIONS (cont.)

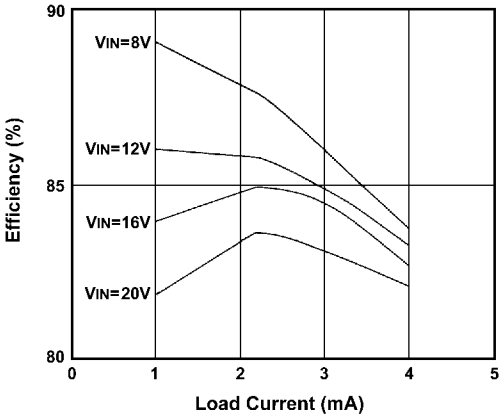
5V Output Step-Down Converter - 1





5V Output Step-Down Converter - 2





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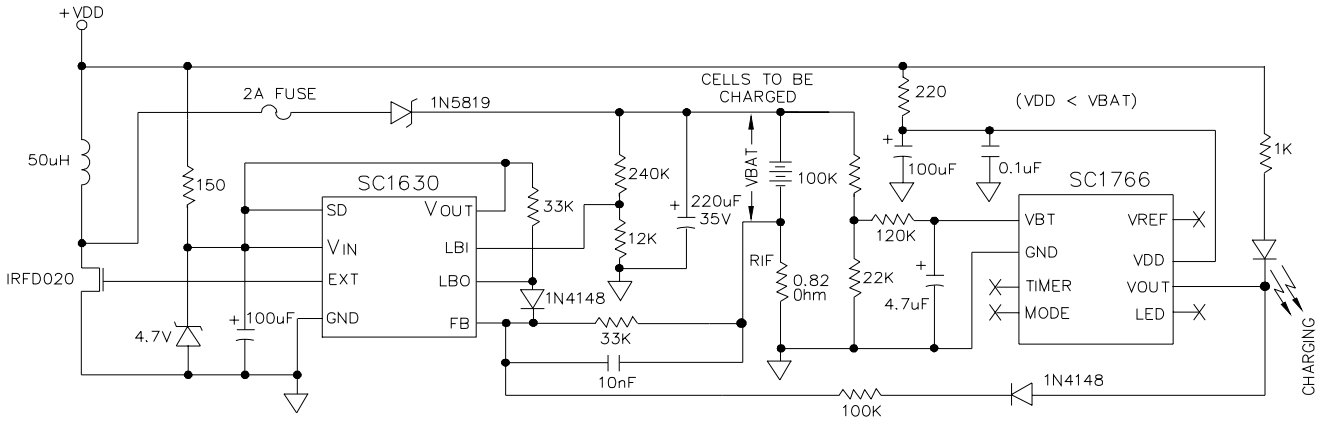
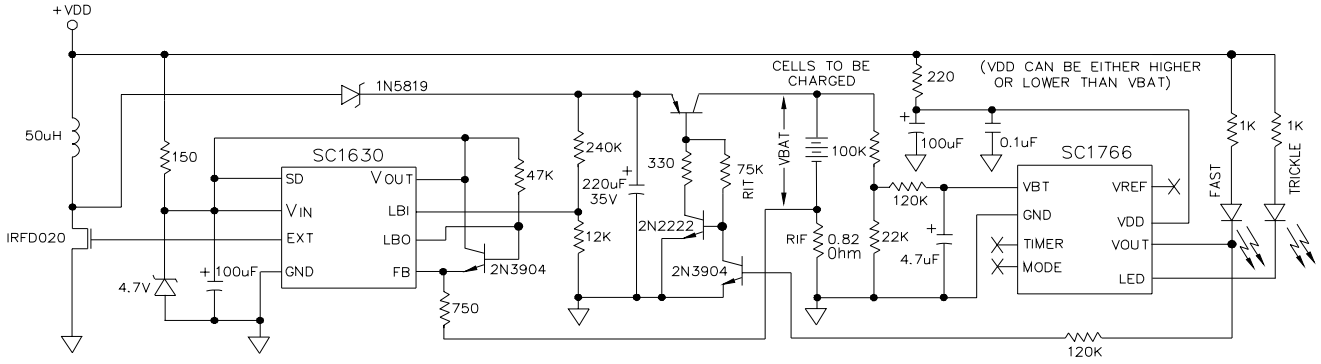
TYPICAL APPLICATIONS (cont.)

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.

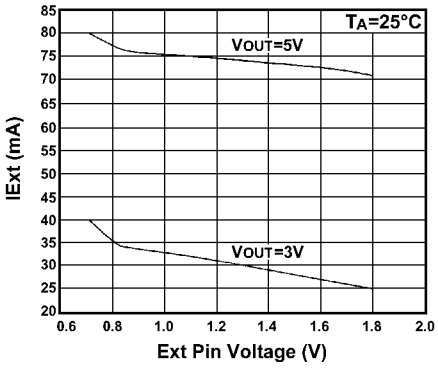
Step-Up/Step-Down Rechargeable Battery Charger



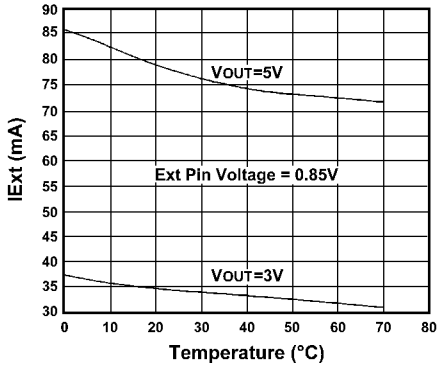
- Fast charge current =0.8A when VDD<VBAT, = (VDD-VBAT-0.5)/0.82 when VDD>VBAT.
- Trickle charge current = 30mA (RIF sets fast charge current, RIT sets trickle charge current).
- Typical efficiency = 75%.
- With short circuit protection.

TYPICAL PERFORMANCE CHARACTERISTICS

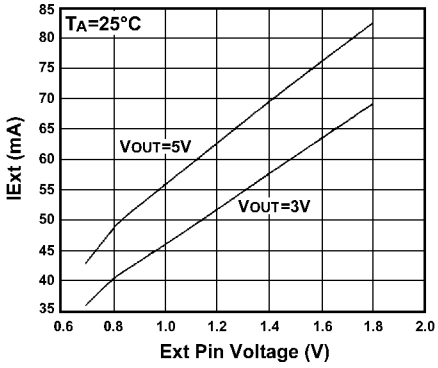
Ext Pin Sourcing Capability



Ext Pin Sourcing Capability vs. Temperature



Ext Pin Sinking Capability



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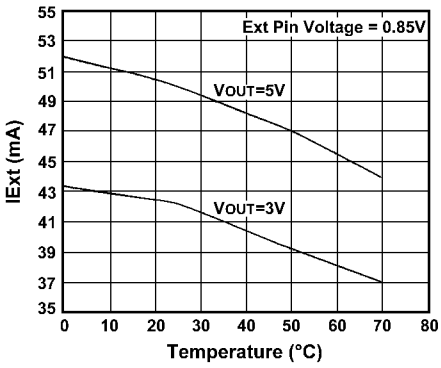
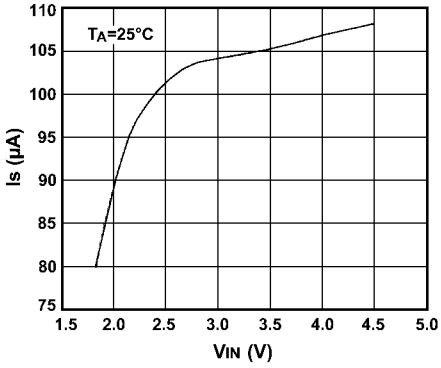
TYPICAL PERFORMANCE CHARACTERISTICS (cont.)

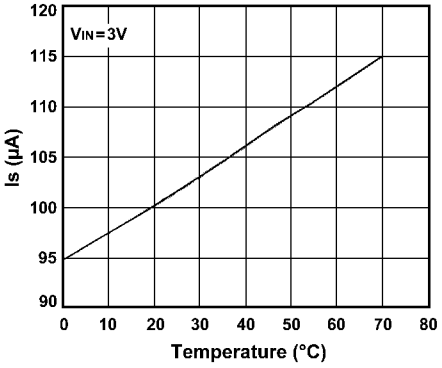
Ext Pin Sinking Capability vs. Temperature



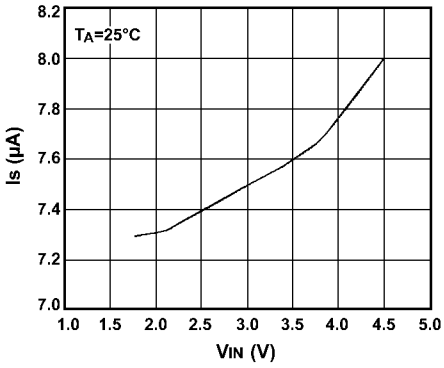
Switch Off Supply Current vs. Input Voltage



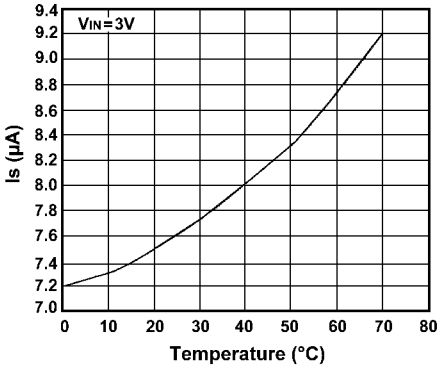
Switch Off Supply Current vs. Temperature



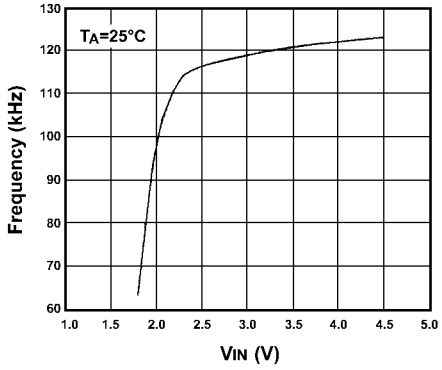
Shutdown Mode Supply Current vs. Input Voltage



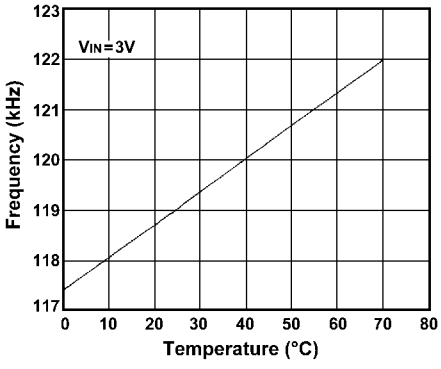
Shutdown Mode Supply Current vs. Temperature



Oscillator Frequency vs. Input Voltage



Oscillator Frequency vs. Temperature



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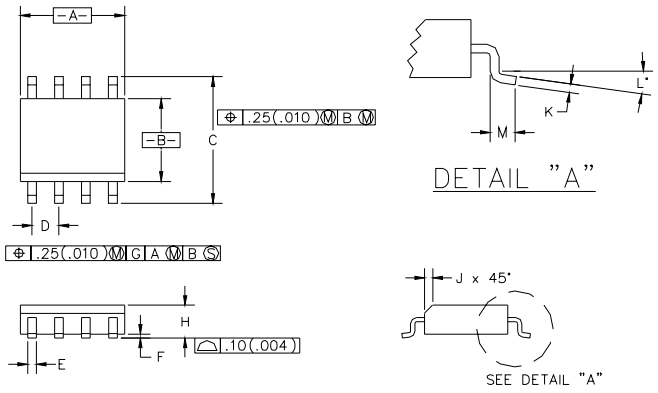
DEVICE OUTLINE - SO-8



DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.188	.197	4.80	5.00	
B	.149	.158	3.80	4.00	
C	.228	.244	5.80	6.20	
D	.050 BSC		1.27 BSC		
E	.013	.020	0.33	0.51	
F	.004	.010	0.10	0.25	
H	.053	.069	1.35	1.75	
J	.011	.019	0.28	0.48	
K	.007	.010	.19	.25	
L	0°	8°	0°	8°	
M	.016	.050	0.40	1.27	

PIN DESCRIPTIONS

PIN 1: SD The SC1630 goes into shutdown mode and consumes less than 10µA 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:

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

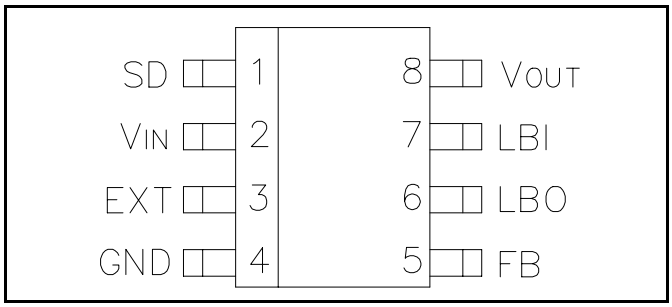
Where: R1= Resistor connected beween FB Pin and V_{OUT} pin.
R2= Resistor connected between FB Pin and ground.
V_{OUT} = Output voltage to be set.

PIN 6: LBO Open drain output of the battery low detector, with 45 Ohm "On Resis tance" 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



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