DESCRIPTION

The A7534 is a step-up converter that provides a boosted output voltage from a low voltage source. Because of its proprietary design, it starts up at a very low input voltage down to 0.9V, and only consumes 15uA at standby, making it an ideal choice for single cell alkaline/NiMH battery operations.

A switching frequency of 1MHz minimizes solution footprint by allowing the use of tiny, low profile inductors and ceramic capacitors. The current mode PWM design is internally compensated, reducing external parts count.

The A7534 is available in SOT-23 and SOT89-3 packages.

ORDERING INFORMATION

Package Type	Part Number	
SOT-23 SPQ: 3,000pcs/Reel	E3	A7534E3R-XX
		A7534E3VR-XX
SOT89-3 SPQ: 1,000pcs/Reel	K3	A7534K3R-XX
		A7534K3VR-XX
Note	XX: Output Voltage, 33=3.3V V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

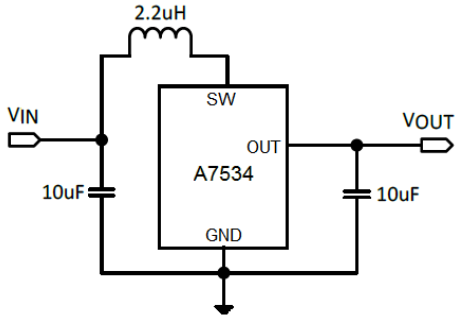
FEATURES

- Efficiency up to 95%@V_{IN}=2.7V, V_{OUT}=3.3V
- Typical 15uA standby current
- 1MHz Switching Frequency allows small inductor and output cap
- Input boost-strapping allows using small or no input cap
- Low Vin Start-up Voltage down to 0.9V Ideal for Single Alkaline Cell operations
- Maximum Output Current up to 300mA
- Low Noise PWM control
- Internally Compensated Current Mode Control
- Internal Synchronous Rectifier
- Available in SOT-23 and SOT89-3 packages

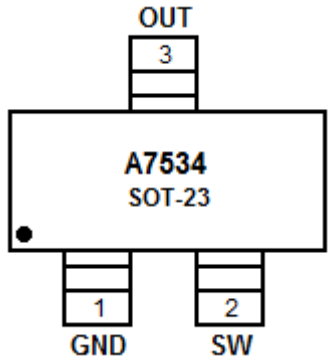
APPLICATION

- One to Three Cell Battery Operated Devices
- Medical Instruments
- Bluetooth Headsets
- Flash-Based MP3 Players
- Noise Canceling Headphones

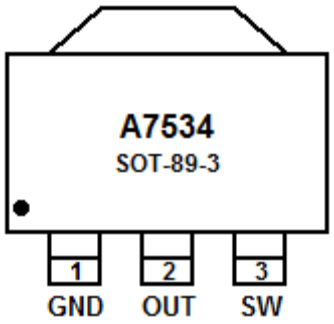
TYPICAL APPLICATION



PIN DESCRIPTION



Top View



Top View

Pin #		Symbol	Function
SOT-23	SOT89-3		
1	1	GND	Ground
2	3	SW	To connect inductor to V_{IN}
3	2	OUT	Output voltage pin, with 10uF ceramic capacitor closely connected to GND

ABSOLUTE MAXIMUM RATINGS

SW Voltage		-0.3V~6V
OUT Voltage		-0.3V~6V
T_J, Max Operating Junction Temperature		125°C
Maximum Power Dissipation	SOT-23	450mW
	SOT89-3	500mW
T_A, Ambient Temperature		-40°C~85°C
T_S, Storage Temperature		-55°C~150°C
Lead Temperature & Time		260°C, 10s

Stress beyond above listed "Absolute Maximum Ratings" may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

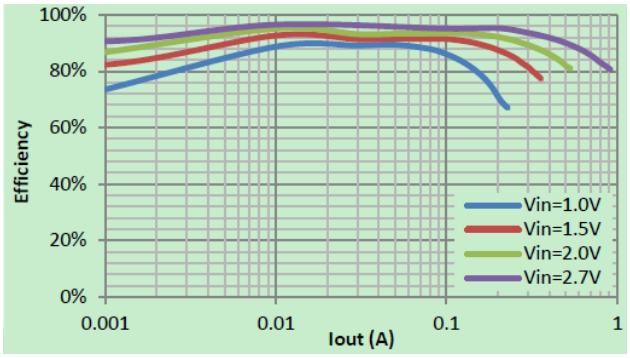
T_A = 25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	V_{IN}		0.9	-	5.0	V
Startup Voltage	V_{START}	I_{OUT} = 1mA	-	0.9	-	V
Hold Voltage	V_{HOLD}	I_{OUT} = 50mA	-	0.5	0.7	V
Output Voltage Range	V_{OUT}		1.8	-	3.6	V
Output Voltage Accuracy		I_{OUT} = 0mA	-	2	-	%
Line Regulation		I_{OUT} = 50mA	-	0.1	0.2	%/V
Load Regulation		I_{OUT} = 0~300mA	-	1	2	%
Switching Frequency	F_{SOC}	V_{OUT} =0.95V_O, No inductor	0.7	1	1.4	MHz
Max Duty Cycle		V_{OUT} =0.95V_O, No inductor	85	90	95	%
Quiescent Current at V_{OUT}	I_Q	V_{OUT} =1.05*V_O	5	8	15	μA
Supply Current at V_{IN}		I_{OUT} = 0mA	-	-	20	μA
Efficiency		I_{OUT} = 100mA	85	-	-	%
PMOS R_{DSON}	$R_{DSON}P$	I_{SW} =100mA	-	400	600	mohm
NMOS R_{DSON}	$R_{DSON}N$	I_{SW} =100mA	-	200	300	mohm
SW Leakage Current	I_{SWLK}	V_{OUT} =3.6V, V_{SW}=0 or 5.2V	-	-	1	μA

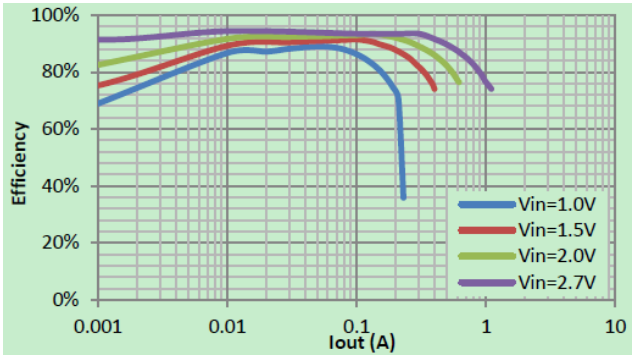
TYPICAL PERFORMANCE CHARACTERISTICS

Tested under C_{IN}=C_{OUT}=10uF, L=2.2uH, T_A=25°C, unless otherwise specified

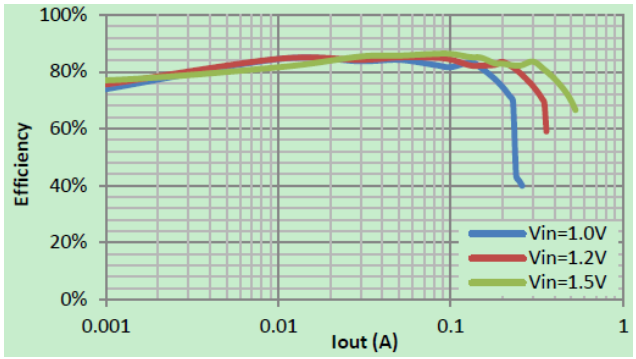
1. Efficiency vs. Output Current (V_{OUT}=3.3V)



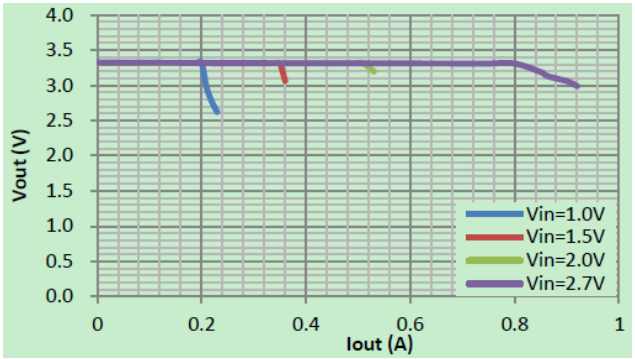
2. Efficiency vs. Output Current (V_{OUT}=3.0V)



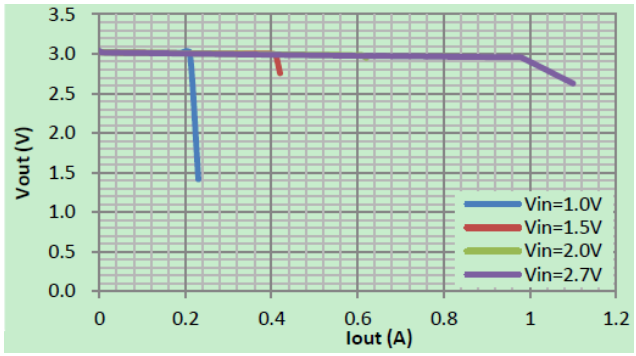
3. Efficiency vs. Output Current (V_{OUT}=1.8V)



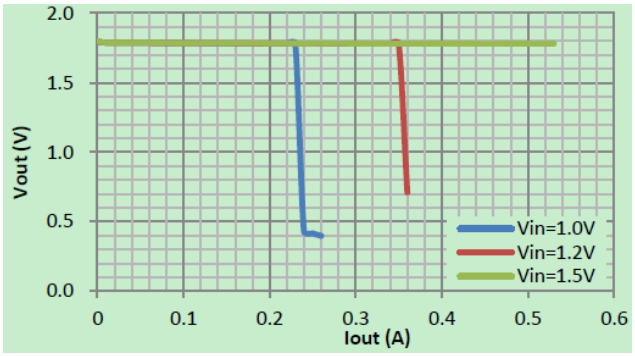
4. Output Voltage vs. Output Current (V_{OUT}=3.3V)



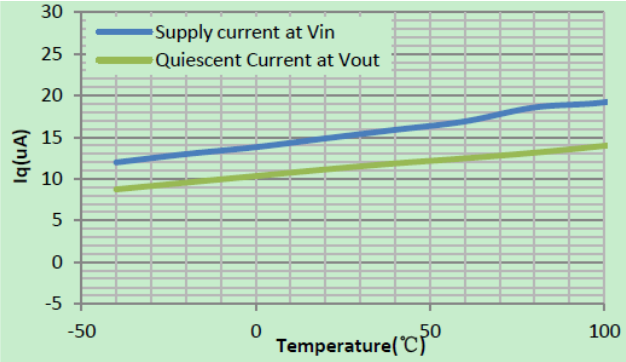
5. Output Voltage vs. Output Current (V_{OUT}=3.0V)



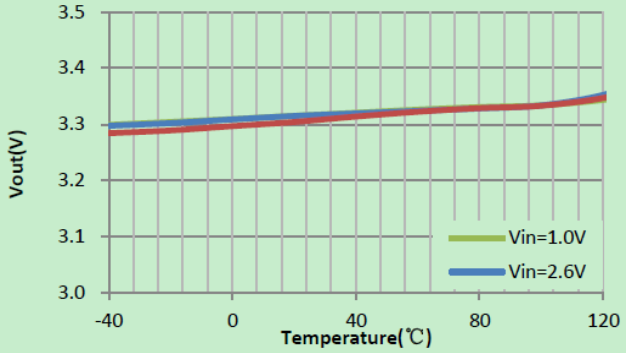
6. Output Voltage vs. Output Current (V_{OUT}=1.8V)



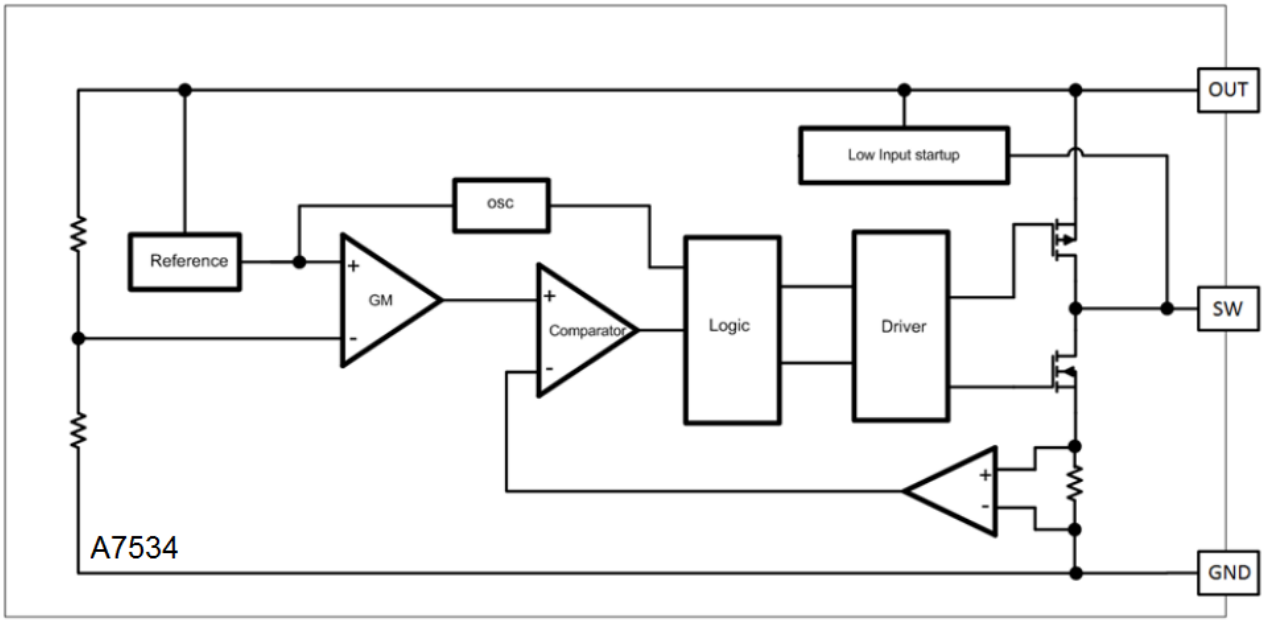
7. I_Q vs. Temperature



8. Output Voltage vs. Temperature



BLOCK DIAGRAM



DETAILED INFORMATION

A7534 is a low input voltage start up, current mode DC-DC step up converter. It's operation can be best understood by referring to the block diagram. Upon starting up, the low voltage startup circuitry drives SW with on-off cycles, transferring energy from input to OUT by storing energy in the inductor during on-time and releasing it to the output during off-time. When OUT reaches 2V, the startup circuit turns off and the main controller takes over. The main control loop consists of a reference, a GM error amplifier, a PWM controller, a current sense amplifier, an oscillator, a PWM logic control, and it is power stage including its driver. The main control loop is a classic current mode control loop. The GM stage integrates the error between FB and REF, and its output is used to compare with a triangular wave which the summing result of the current sense amplifier output and a slope compensation voltage. The output of the comparator is used to drive the power stage to reach regulation.

Application Information

Inductor selection

With switching frequency up to 1MHz, small surface mount inductors can be used with values from 2.2uH to 4.7uH. For a given chosen inductor value and application conditions make sure the peak inductor current does not exceed the maximum current rating of the selected vendor's inductor.

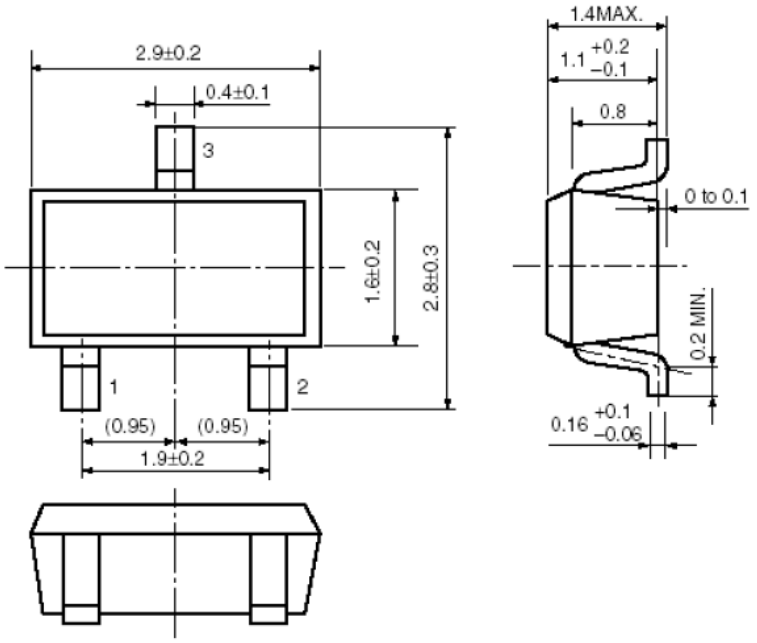
Input and output capacitor selection

The A7534's bootstrap architecture allows the use of very small input capacitor. For applications that only need to drive small output load current, the input capacitor is optional, because once output is started up, the IC's is powered by OUT, a quiet power supply.

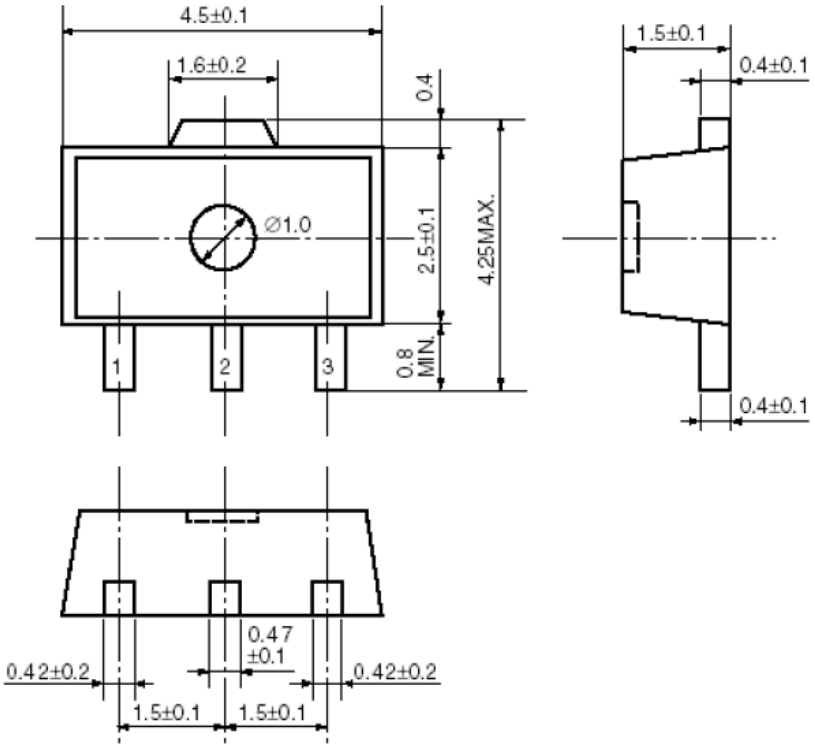
The output capacitor is used to stabilize the loop and provide ac current to the load. A low ESR ceramic cap with values from 2.2uF to 22uF can be used. Smaller value capacitors are generally cheaper with small footprints, while larger capacitor provides lower ripples and better transient load responses. Also, when extreme low startup voltage is needed, larger output capacitors are needed for the part to startup under heavy load condition.

PACKAGE INFORMATION

Dimension in SOT-23 (Unit: mm)



Dimension in SOT89-3 (Unit: mm)



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