ACE721B

1.3A 1.4MHz Synchronous Step-Down Converter

Description

The ACE721B series are a high efficiency monolithic synchronous buck regulator using a constant frequency, current mode architecture. The device is available in an adjustable version. Supply current during operation is only 40μA and drops to ≤ 1μA in shutdown. The 2.5V to 5.5V input voltage range makes the ACE721B ideally suited for single Li-Ion battery-powered applications. 100% duty cycle provides low dropout operation, extending battery life in portable systems. Automatic Burst Mode operation increases efficiency at light loads, further extending battery life.

Switching frequency is internally set at 1.4MHz, allowing the use of small surface mount inductors and capacitors.

The internal synchronous switch increases efficiency and eliminates the need for an external Schottky diode. Low output voltages are easily supported with the 0.6V feedback reference voltage.

Features

- High Efficiency: Up to 95%
- Very Low Quiescent Current: 40μA
- 1.3A Output Current
- 2.5V to 5.5V Input Voltage Range
- 1.4MHz Constant Frequency Operation
- No Schottky Diode Required
- Low Dropout Operation: 100% Duty Cycle
- 0.6V Reference Allows Low Output Voltages
- Shutdown Mode Draws < 1μA Supply Current
- Current Mode Operation for Excellent Line and Load Transient Response
- Over temperature Protected

Application

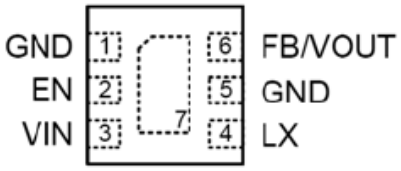
- Mobile Phones
- Personal Information Appliances
- Wireless and DSL Modems
- Digital Still Cameras
- MP3 Players
- Portable Instruments

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	V_{IN}	-0.3 to 6	V
EN, V_{FB} Voltages	V_{EN}	-0.3 to V_{IN}	V
SW Voltage	V_{SW}	-0.3 to V_{IN}+0.3	V
Peak SW Sink and Source Current	I_{PK}	3	A
Power Dissipation T_A=25℃	P_D	0.606	W
Operation Temperature	T_{OPR}	-40 to 85	℃
Storage Temperature Range	T_{STG}	-65 to 150	℃

Packaging Type

DFN2*2-6L



(TOP VIEW)

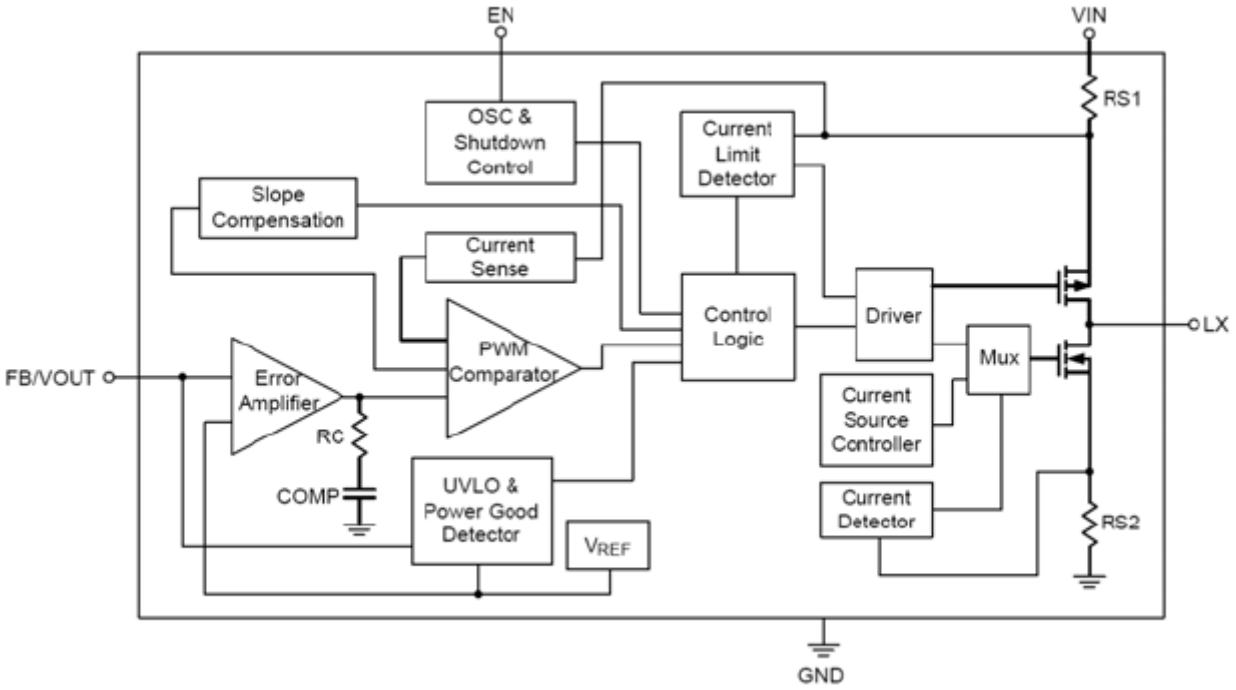
DFN2*2-6L	Description	Function
1	GND	Ground pin
2	EN	Chip Enable Pin. Drive EN above 1.5V to turn on the part. Drive RUN below 0.3V to turn it off. Do not leave RUN floating.
3	VIN	Supply input pin.
4	SW	Power Switch Output. It is the switch node connection to Inductor.This pin connects to the drains of the internal P-ch and N-ch MOSFET switches.
5	GND	Ground pin
6	FB/VOUT	Adjustable version feedback input. Connect FB to the center point of the external resistor divider. The feedback threshold voltage is 0.6V.
7	EP	Power Ground exposed pad, Must be connected to bare copper ground plane

Ordering information

ACE721B XX XX + H

- Halogen - free
- Pb - free
- MN : DFN2*2-6L
- ADJ: Adjustable Voltage/1.2V/1.5V/1.8V

Functional Block Diagram



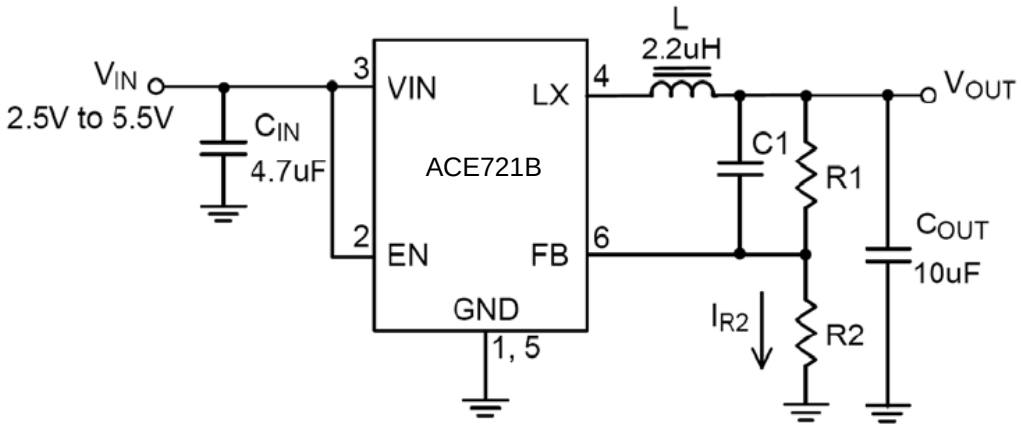
Electrical Characteristics

V_{IN}=3.6V, T_A=25℃, V_{OUT}=1.8V, L=2.2μH, C_{OUT}=10μF, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{IN}	Input Voltage Range		2.5		5.5	V
I_S	Input DC Supply Current PWM Mode PFM Mode Shutdown Mode	 Vout = 90%, Iload=0mA Vout = 105%, Iload=0mA V_{RUN} = 0V, V_{IN}=4.2V		 150 35 0.1	 300 75 1.0	μA
V_{FB}	Regulated Feedback Voltage	T_A = 25°C T_A= 0°C ≤ TA ≤ 85°C T_A = -40°C ≤TA ≤ 85°C	0.588 0.586 0.585	0.6 0.6 0.6	0.612 0.613 0.615	V
ΔV_{OUT}	Reference Voltage Line Regulation	V_{IN} =2.5V to 5.5V		0.1		%/V
$V_{LOADREG}$	Output Voltage Load Regulation	V_{IN} = 2.5V to 5.5V, Iout=10mA to 1300mA	-3		3	%Vout
$V_{VOLTAGEREG}$	Output Voltage Accuracy	Iout=10mA to 1300mA		0.2		%/A
F_{OSC}	Oscillation Frequency	Vout=100% Vout=0V		1.4 300		MHz KHz
R_{PFET}	On Resistance of PMOS	I_{SW}=100mA		150	200	mΩ
R_{NFET}	On Resistance of NMOS	I_{SW}=-100mA		120	180	mΩ
I_{PK}	Peak Current Limit	V_{IN} = 3V, Vout=90%		2.6		A
V_{IH}*	EN Threshold		0.3	1	1.5	V
I_{EN}	EN Leakage Current			±0.01	±1	μA
I_{LSW}	SW Leakage Current	V_{RUN}=0V,V_{IN}=Vsw=5V		±0.01	±1	μA

*:If need to use the EN pin close output, please make sure the EN level is lower than 0.3V.

Typical Application Circuit



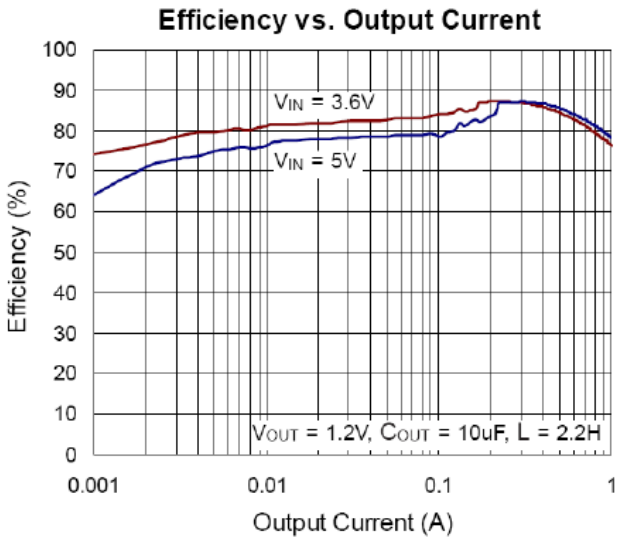
With R2 = 300kΩ to 60kΩ so the I_{R2} = 2μA to 10μA, and (R1 x C1) should be in the range between $3x10^{-6}$ and $6x10^{-6}$ for component selection.

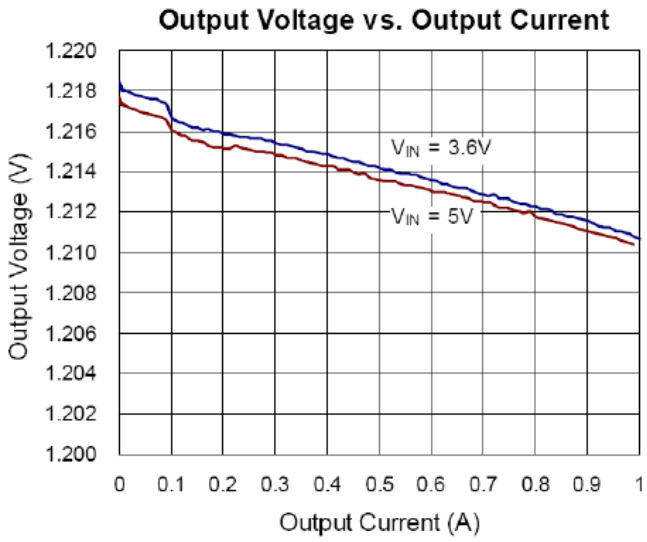
PCB Layout Checklist

When laying out the printed circuit board, the following checklist should be used to ensure proper operation of the ACE721B. Check the following in your layout:

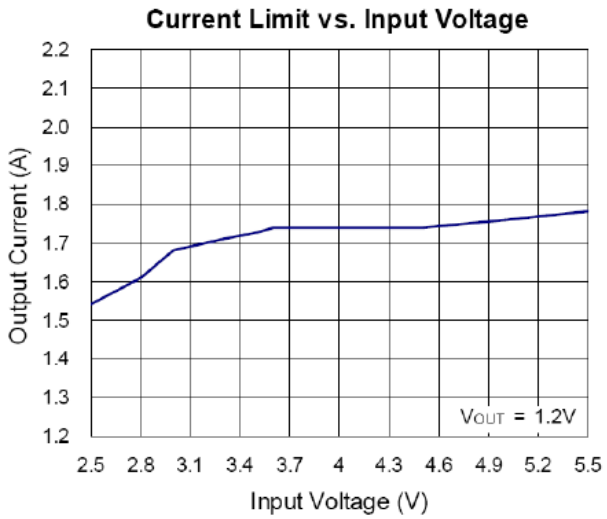
1. The power traces, consisting of the GND trace, the SW trace and the V_{IN} trace should be kept short, direct and wide.
2. Does the V_{FB} pin connect directly to the feedback resistors, The resistive divider R1/R2 must be connected between the (+) plate of C_{OUT} and ground.
3. Does the (+) plate of CIN connect to VIN as closely as possible, This capacitor provides the AC current to the internal power MOSFETS.
4. Keep the switching node, SW, away from the sensitive V_{FB} node.
5. Keep the (–) plates of C_{IN} and C_{OUT} as close as possible.

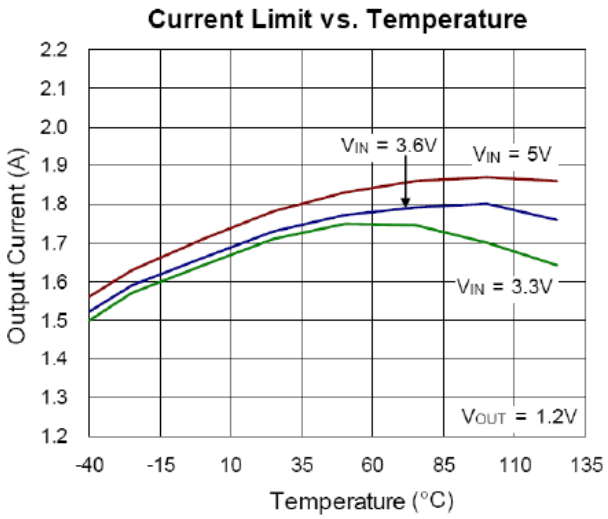
Typical Performance Characteristics

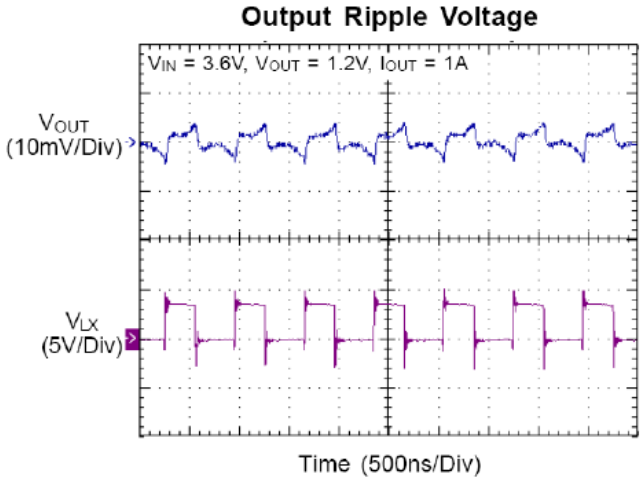


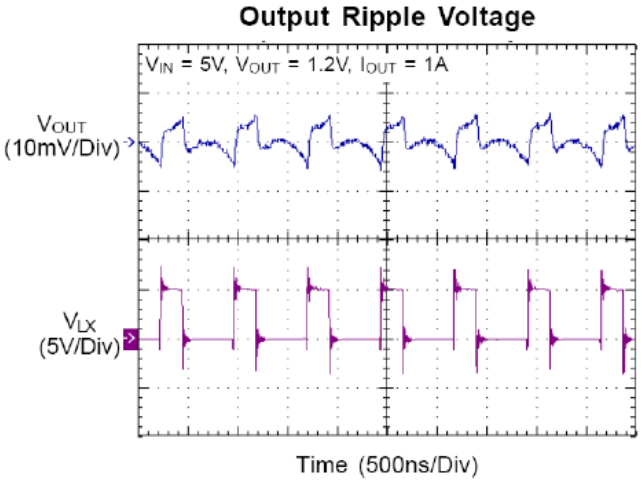


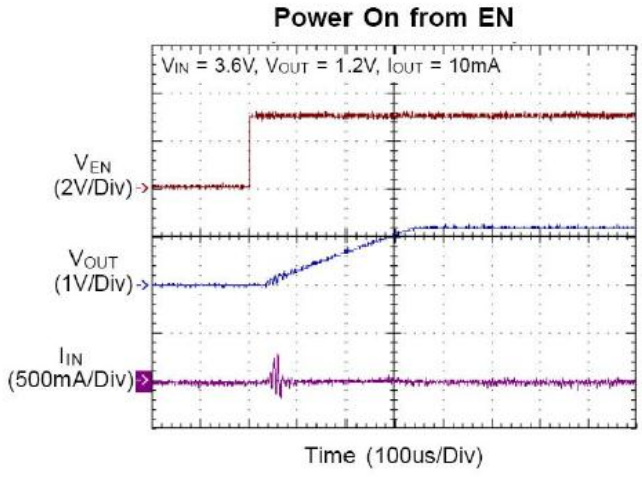
Typical Performance Characteristics

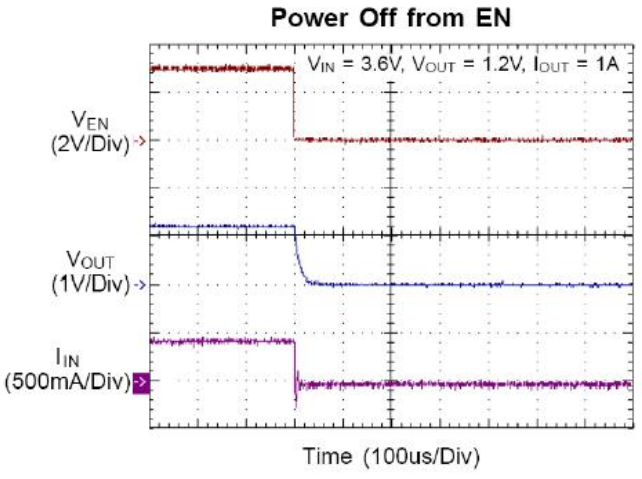






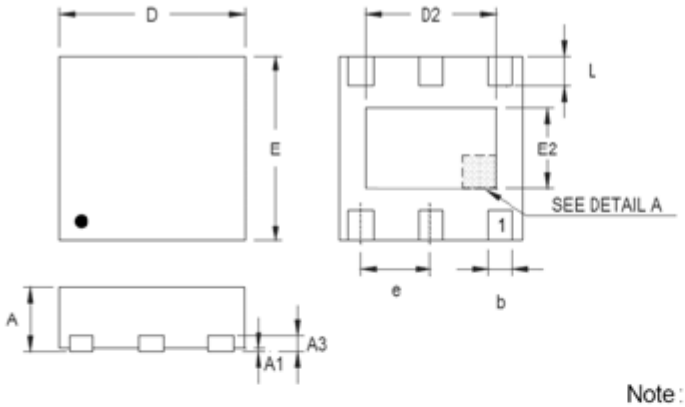






Packing Information

DFN2*2-6L



DETAIL A

Pin #1 ID and Tie Bar Mark Options

Note : The configuration of the Pin #1 identifier is optional, but must be located within the zone indicated.

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A3	0.175	0.250	0.007	0.010
b	0.200	0.350	0.008	0.014
D	1.950	2.050	0.077	0.081
D2	1.000	1.450	0.039	0.057
E	1.950	2.050	0.077	0.081
E2	0.500	0.850	0.020	0.033
e	0.650		0.026	
L	0.300	0.400	0.012	0.016

Notes

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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