

## 3-Cell, High-Efficiency, Step-Up DC/DC Converter

### FEATURES

- 4V to 24V Input Voltage Operation.
- Adjustable Output Voltage.
- Low Quiescent Current at 100 $\mu$ A.
- Pulse-Skipping and Pulse-Frequency Modulation Maintain High Efficiency (max. 95%).
- 90KHz to 250KHz Oscillator Frequency.
- Power-Saving Shutdown Mode (8 $\mu$ A Typical).
- Push-Pull Driver Output.

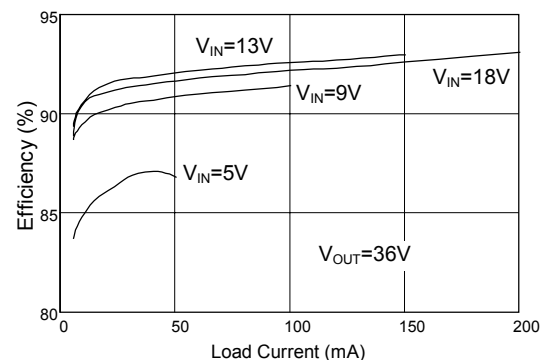
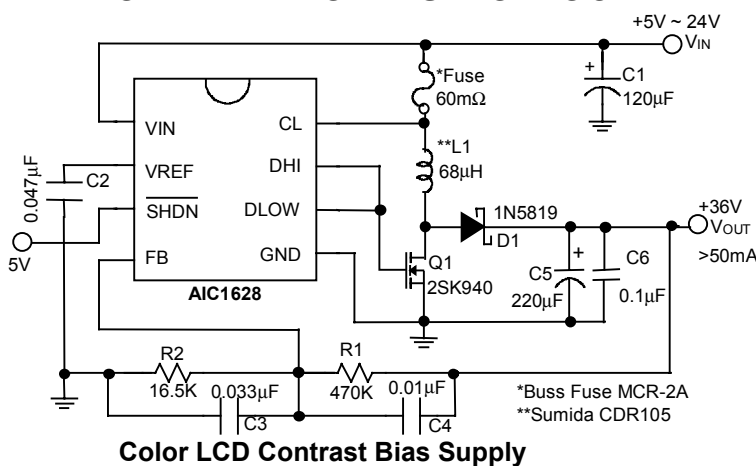
### APPLICATIONS

- Flash Memory Programming Power Supply.
- Positive LCD Contrast Bias for Notebook & Palmtop Computers.
- Step-Up DC/DC Converter Module.
- Telecom Power Supply.

### DESCRIPTION

The AIC1628 is a high performance step-up DC/DC converter, designed to drive an external power switch to generate programmable positive voltages. In the particularly suitable LCD contrast bias and flash memory programming power supply applications, typical full-load efficiencies are 85% to 95%. 4V to 24V input operation range allows the AIC1628 to be powered directly by the battery pack in the most battery-operated applications for greater efficiency. Output voltage can be scaled to 40V or greater by two external resistors. A Pulse-Frequency Modulation scheme is employed to maintain high efficiency conversion under wide input voltage range. Quiescent current is about 100 $\mu$ A and can be reduced to 8 $\mu$ A in shutdown mode. Switching frequency being around 90KHz to 250KHz range, small size switching components are ideal for battery powered portable equipments, like notebook and palmtop computers.

### TYPICAL APPLICATION CIRCUIT



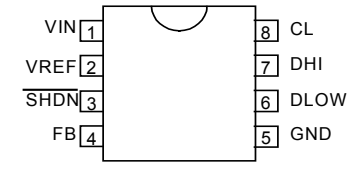
Efficiency vs. Output Current

## ORDERING INFORMATION

AIC1628 XX

PACKAGE TYPE  
 N: PLASTIC DIP  
 S: SMALL OUTLINE

TEMPERATURE RANGE  
 C=0°C~+70°C

ORDER NUMBER	PIN CONFIGURATION
AIC1628CN (PLASTIC DIP)	TOP VIEW 
AIC1628CS (PLASTIC SO)	

## ABSOLUTE MAXIMUM RATINGS

V <sub>IN</sub> Supply Voltage (V <sub>IN</sub> Pin)	24V
SHDN Pin Voltage	15V
Operating Temperature Range	0°C~70°C
Storage Temperature Range	-65°C~ 150°C

## TEST CIRCUIT

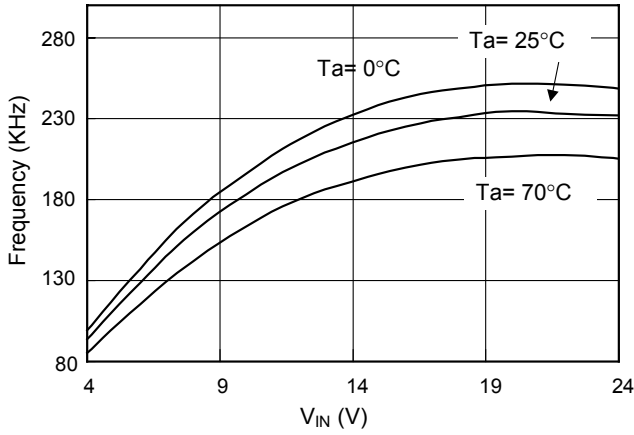
Refer to Typical Application Circuit

## ELECTRICAL CHARACTERISTICS (V<sub>IN</sub>= 13V, T<sub>a</sub>=25°C, unless otherwise specified.)

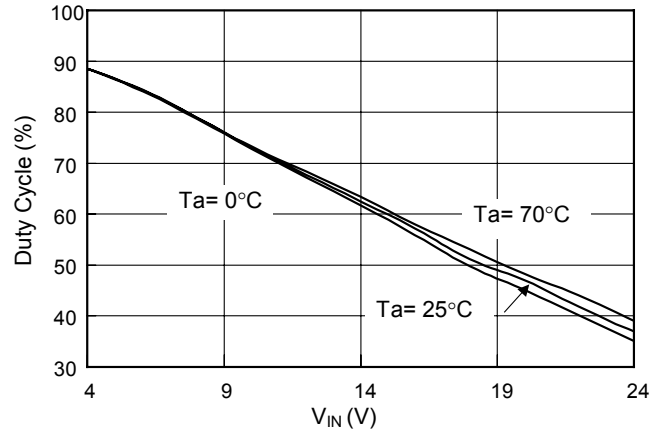
PARAMETERS	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Input Voltage		4		24	V
Quiescent Current	V <sub>FB</sub> = 1.5V		100	200	μA
Shutdown Mode Current	V <sub>SHDN</sub> = 0V		8	20	μA
V <sub>REF</sub> Voltage	I <sub>SOURCE</sub> = 250μA	1.16	1.22	1.28	V
V <sub>REF</sub> Source Current		250			μA
DLOW "ON Resistance"			15		Ω
DHI "ON Resistance"			10		Ω
CL Threshold	V <sub>IN</sub> - V <sub>CL</sub>	45	60	75	mV
Shutdown Threshold		0.8	1.5	2.4	V
Shutdown Input Leakage Current	V <sub>SHDN</sub> < 15V			1	μA

**TYPICAL PERFORMANCE CHARACTERISTICS**

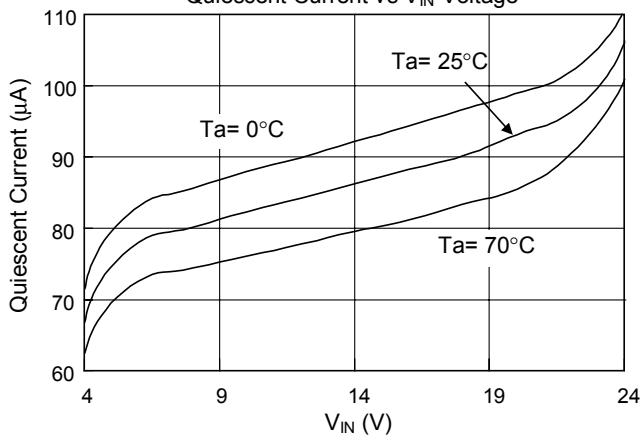
Frequency vs  $V_{IN}$  Voltage



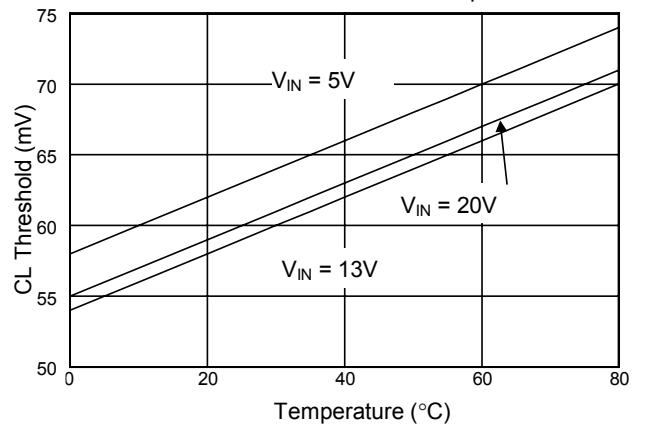
Duty Cycle vs  $V_{IN}$  Voltage



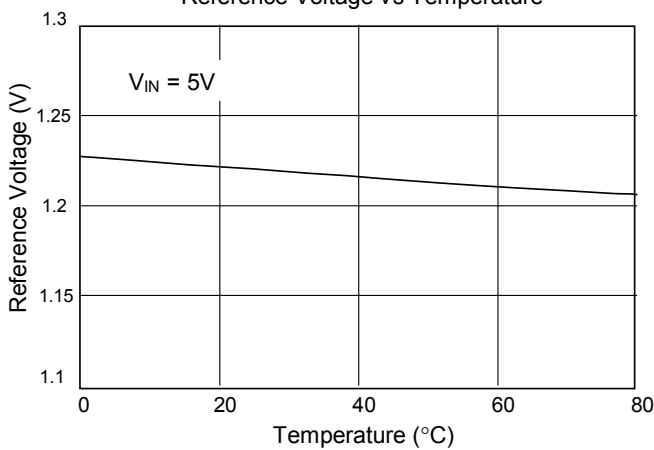
Quiescent Current vs  $V_{IN}$  Voltage

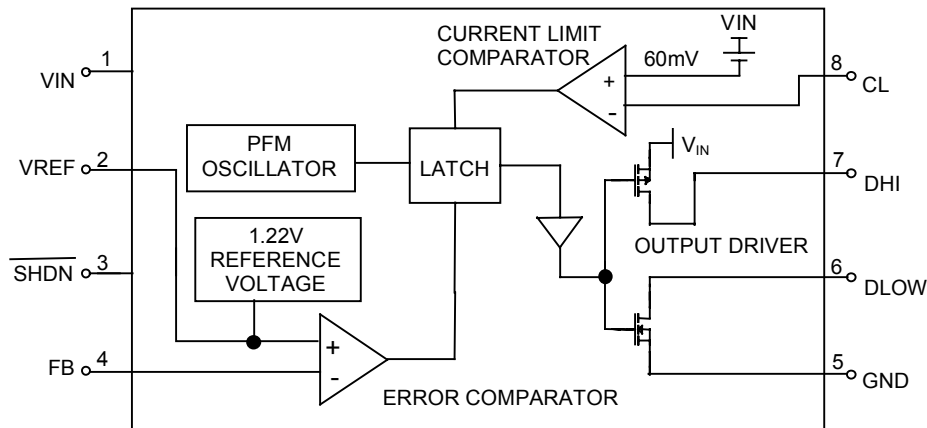


Current Limit Threshold vs Temperature



Reference Voltage vs Temperature



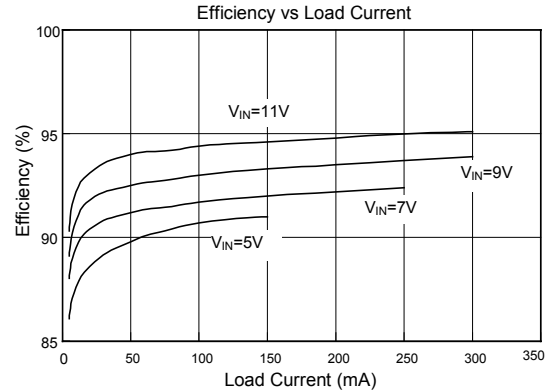
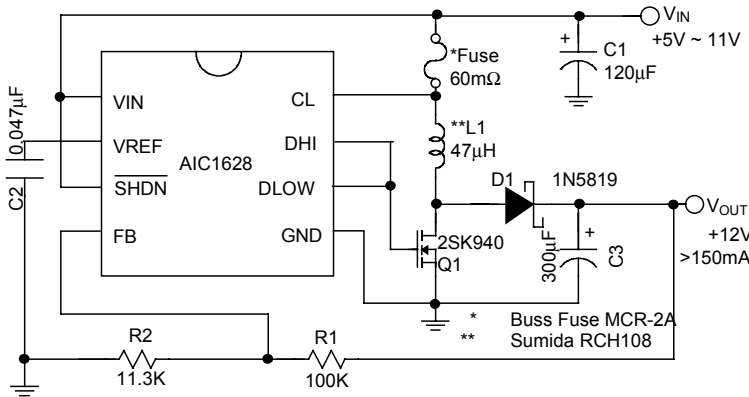
**■ BLOCK DIAGRAM**

**■ PIN DESCRIPTIONS**

- PIN 1: VIN - 4V to 24V input supply voltage.
- PIN 2: VREF - 1.22V reference output. Bypass with a 0.047 $\mu$ F capacitor to GND. Sourcing capability is guaranteed to be greater than 250 $\mu$ A.
- PIN 3:  $\overline{\text{SHDN}}$  - Logical input to shutdown the chip.  
 >1.5V = normal operation,  
 GND = Shutdown,  
 Can not be floating or forced greater than 15V. In shutdown mode DLOW and DHI pins are at low level.
- PIN 4: FB- Feedback signal input to sense VREF. Connecting a resistance R1 to V<sub>OUT</sub> and a resistance R2 to GND yields the output voltage:  

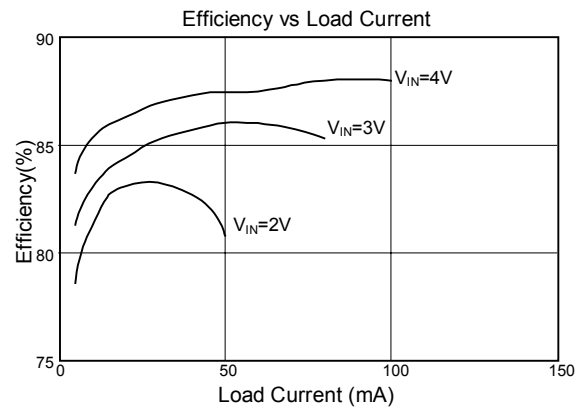
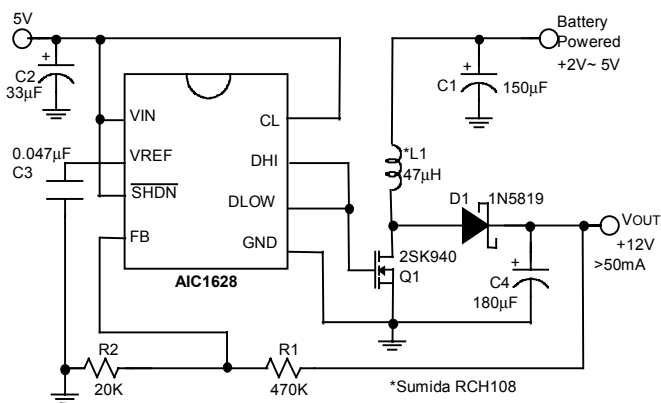
$$V_{\text{OUT}} = (R1+R2)/R2 \times V_{\text{REF}}$$
 (Refer to typical application circuit)

- PIN 5: GND - Power ground.
- PIN 6: DLOW -Driver sinking output. Connected to gate of the external N-channel MOSFET or base of the NPN bipolar transistor.
- PIN 7: DHI - Driver sourcing output. Connected to DLOW when using an external N-channel MOSFET. When using an external NPN bipolar transistor, connect a base resistance RB from this pin to DLOW. RB value depends on V<sub>IN</sub>, inductor and NPN current gain.
- PIN 8: CL - Current-limit input. Threshold voltage is 60mV from V<sub>IN</sub>. This pin clamps the switch peak current to prevent over-current damage to the external switch, under abnormal conditions.

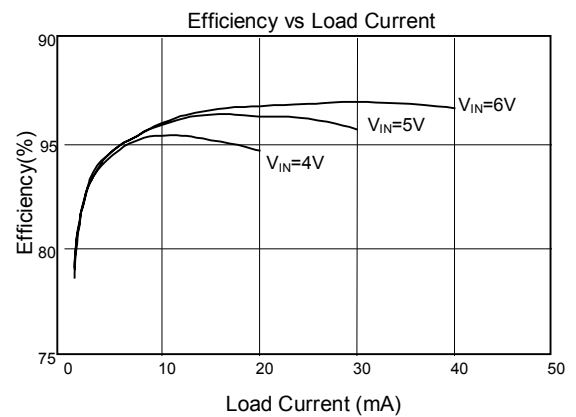
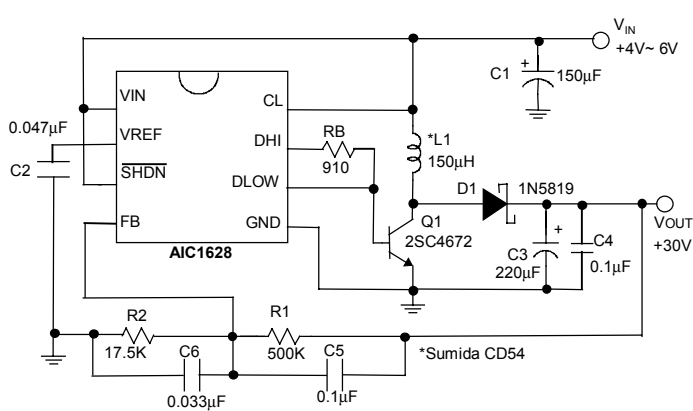
## APPLICATION EXAMPLES



**Fig. 1 Flash memory programming supply**

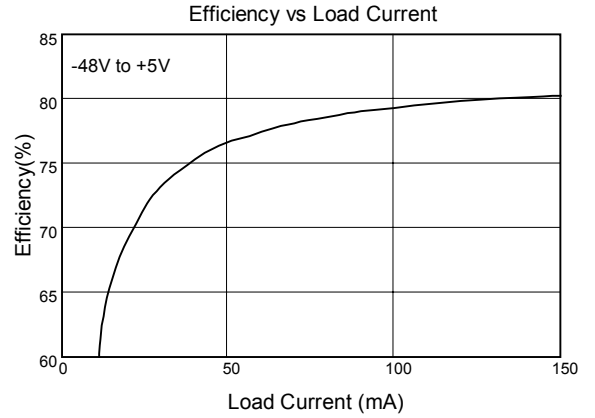
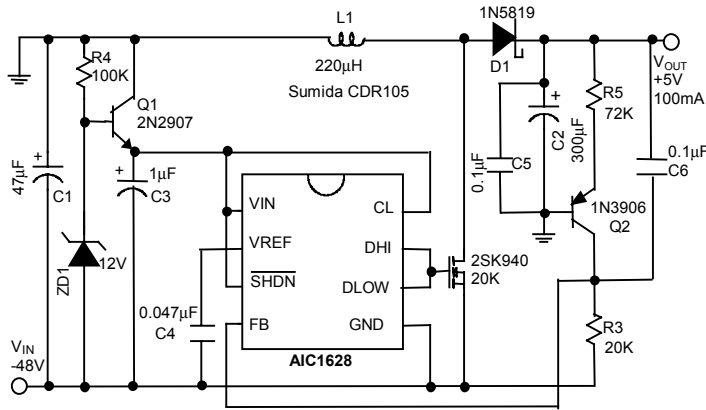


**Fig. 2 2-cells to +12V Flash memory programmer**

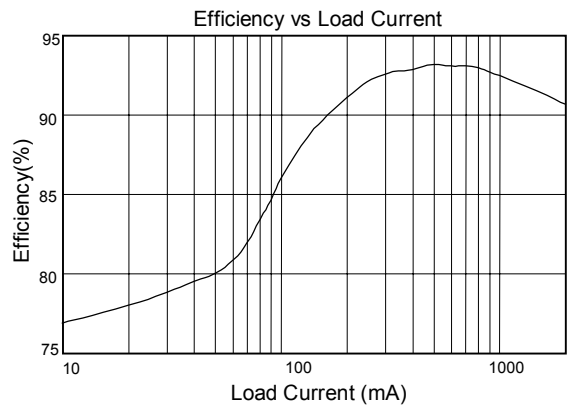
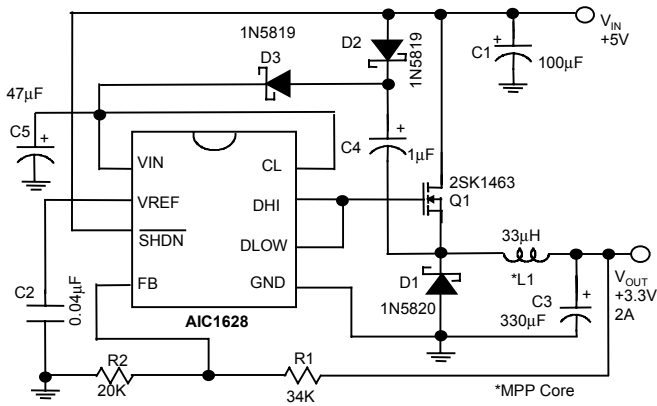


**Fig. 3 4-cells to +30V power supply**

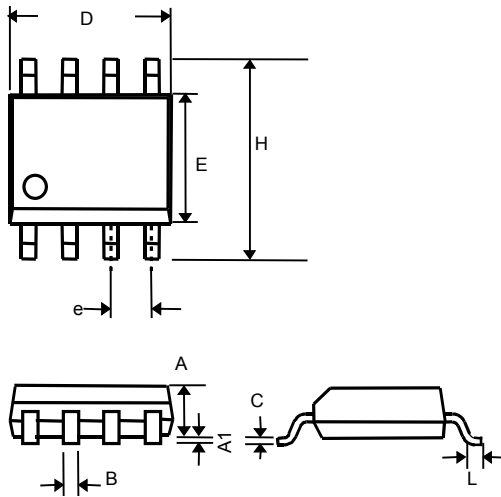
**APPLICATION EXAMPLES (CONTINUED)**



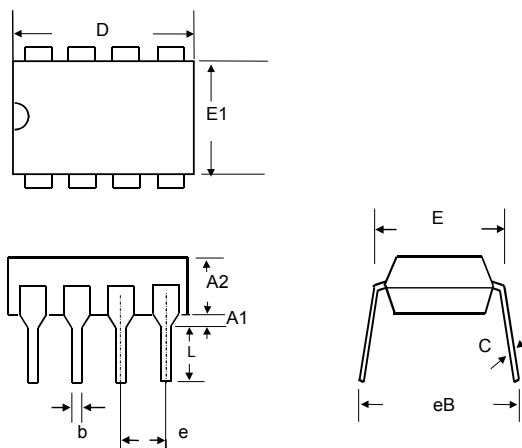
**Fig. 4 Telecom +5V supply**



**Fig. 5 5V to 3.3V step-down converter**

**PHYSICAL DIMENSIONS**
**● 8 LEAD PLASTIC SO (unit: mm)**


SYMBOL	MIN	MAX
A	1.35	1.75
A1	0.10	0.25
B	0.33	0.51
C	0.19	0.25
D	4.80	5.00
E	3.80	4.00
e	1.27(TYP)	
H	5.80	6.20
L	0.40	1.27

**● 8 LEAD PLASTIC DIP (unit: mm)**


SYMBOL	MIN	MAX
A1	0.381	—
A2	2.92	4.96
b	0.35	0.56
C	0.20	0.36
D	9.01	10.16
E	7.62	8.26
E1	6.09	7.12
e	2.54 (TYP)	
eB	—	10.92
L	2.92	3.81



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