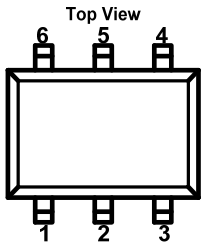
CJ9112T6

■ INTRODUCTION:

The CJ9112T6 is a compact, high-efficiency, fixed frequency, synchronous step-up DC-DC converter.This device provides an easy-to-use power supply solution for applications powered by either one-cell, two-cell or three-cell alkaline, NiCd, NiMH, one-cell Li-Ion or Li-Polymer batteries. A low-voltage technology allows the regulator to start up without high inrush current or output voltage overshoot from a low voltage input. High efficiency is accomplished by integrating the low-resistance N-Channel boost switch and synchronous P-Channel switch. All compensation and protection circuitry are integrated to minimize external components. CJ9112T6 consumes less than 14 μA from battery, while operating at no load (VOUT = 3.3V, VIN = 1.5V). The devices provide a true disconnect from input to output (CJ9112T6A) or an input-to-output bypass (CJ9112T6B), while in shutdown (EN = GND) state. Both options consume less than 0.6 μA from battery. Output voltage is set by a small external resistor divider.

■ PIN CONFIGURATION



■ DEVICE INFORMATION:

PART NUMBER	PACKAGE
CJ9112T6	SOT-23-6L

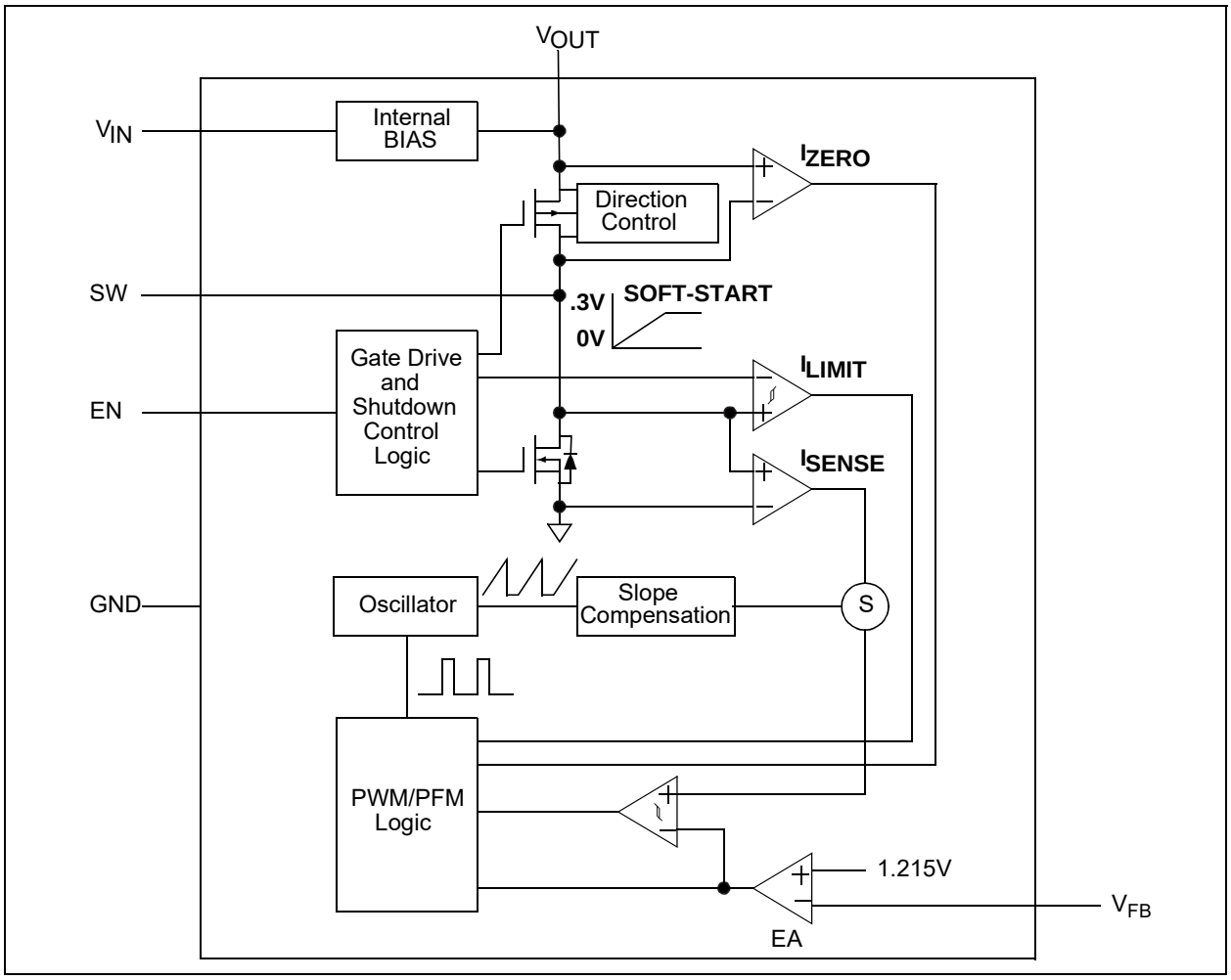
■ FEATURES:

- Up to 96% Typical Efficiency
- 1.0A Typical Peak Input Current Limit:
  I_{OUT} > 200mA@3.3V V_{OUT}, 1.2V VIN
  I_{OUT} > 400mA@3.3V V_{OUT}, 2.4V VIN
  I_{OUT} > 400mA@5.0V V_{OUT}, 3.3V VIN
- Low Device Quiescent Current:
  -Output Quiescent Current: < 4 μA typical, device is not switching (V_{OUT} > V_{IN}, excluding feedback divider current)
  -Input Sleep Current: 1 μA
  -No Load Input Current: 14 μA typical
- Shutdown Current: 0.6 μA typical
- Low Start-up Voltage: 0.82V, 1 mA load
- Low Operating Input Voltage: down to 0.65V
- Adjustable Output Voltage Range: 1.8V to 5.5V
- Maximum Input Voltage: V_{OUT} < 5.5V
- Automatic PFM/PWM Operation:
  -PWM Operation: 500 KHz
  -PFM Output Ripple: 150 mV typical
- Feedback voltage: 1.215V
- Inrush Current Limiting and Internal Soft Start (1 ms typical)
- Selectable, Logic Controlled, Shutdown States:
  -True Load Disconnect Option (CJ9112T6A)
  -Input to Output Bypass Option (CJ9112T6B)
- Over temperature Protection
- Output Short Protection

■ APPLICATIONS：

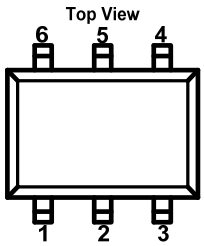
- One, Two and Three Cell Alkaline and NiMH/NiCd Portable Products
- Solar Cell Applications
- Personal Care and Medical Products
- Bias for Status LEDs
- Smartphones, MP3 Players, Digital Cameras
- Remote controllers, Portable Instruments
- Wireless Sensors
- Bluetooth Headsets
- +3.3V to +5.0V Distributed Power Supply

■ BLOCK DIAGRAM



CJ9112T6 Block Diagram

■ Pin Configuration



PIN NO.	PIN NAME	FUNCTION
1	SW	Switch Node, Boost Inductor Input Pin
2	GND	Ground Pin
3	V_{FB}	Feedback Voltage Pin
4	EN	Enable Control Input Pin
5	V_{OUT}	Output Voltage Pin
6	V_{IN}	Input Voltage Pin

■ ABSOLUTE MAXIMUM RATINGS(1)

(Unless otherwise specified, T_A=25°C)

PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage(2)		V_{IN}	-0.3~ 6	V
SW Voltage(2)			-0.3~ 6	V
CE,FB Voltage(2)			-0.3~ 6	V
V_{OUT} Voltage(2)			-0.3~6	V
Ourput Current Bypass Mode			1000	mA
Power Dissipation	SOT23-6L	P_D	400	mW
Operating Virtual Ambient Temperature Range		T_A	-40~+85	℃
Storage Temperature Range		T_{stg}	-40~+125	℃
Lead Temperature (Soldering, 10 sec)		T_{solder}	260	℃
ESD rating		Human Body Model (HBM)	4000	V
		Machine Model (MM)	400	V

(1) Stresses beyond those listed under *absolute maximum ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *recommended operating conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods my affect device reliability.

(2) All voltages are with respect to network ground terminal.

■ RECOMMENDED OPERATING CONDITIONS

	MIN.	NOM.	MAX.	UNITS
Supply voltage at V_{IN}	-0.3	-	6	V
Output voltage at V_{OUT}	-0.3	-	6	V
Operating free air temperature range, T_A	-40	-	85	℃

■ Electrical Characteristics

V_{IN}=1.5V, C_{OUT}=C_{IN}=10μF, L=4.7μH, V_{OUT}=3.3V, I_{OUT}=0mA，Typical values are at T_A=25℃, unless otherwise specified.

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP. (1)	MAX.	UNITS
Minimum Start-Up Voltage	V_{IN}	I_{LOAD} =1mA	-	0.82	-	V
Minimum Operating Voltage(2)	V_{IN}	I_{LOAD} =1mA	-	0.65	-	V
Input Voltage Range	V_{IN}		0.82		5.5	V
Feedback Voltage	V_{FB}		1.179	1.215	1.251	V
Feedback Input Bias Current	I_{VFB}		-	10	-	nA
Output Voltage Adjust Range(3)	V_{OUT}	V_{OUT}≥V_{IN}	1.8		5.5	V
Maximum Output Current	I_{OUT}	V_{IN}=1.2V,V_{OUT} = 2V		200	-	mA
		V_{IN}=2.4V,V_{OUT} = 3.3V		400	-	
		V_{IN}=3.3V,V_{OUT} = 5.0V		400	-	
V_{OUT} Quiescent Current(4)	I_{QOUT}	I_{OUT}=0mA, device is not switching, EN= V_{IN}=4V, V_{OUT}=5V,	-	4	8	μA
V_{IN} Sleep Current(5)	I_{QIN}	I_{OUT}=0mA, EN=V_{IN}	-	1	2.3	μA
No load Input Current	I_{INO}	I_{OUT} = 0mA, device is switching	-	14	25	μA
Quiescent Current Shutdown	I_{QSHDN}	V_{OUT} = 3.3V	-	0.6	-	μA

(1) Typical numbers are at 25°C and represent the most likely norm.

(2) Minimum V_{IN} operation after start-up is only limited by the battery's ability to provide the necessary power as it enters a deeply discharged state.

(3) For V_{IN} > V_{OUT}, V_{OUT} will not remain in regulation.

(4) I_{QOUT} is measured at V_{OUT}, V_{OUT} is external supplied for V_{OUT} > V_{IN} (device is not switching)

(5) I_{QIN} is measured at VIN pin during Sleep period, no load. Determined by characterization, not production tested.

■ Electrical Characteristics

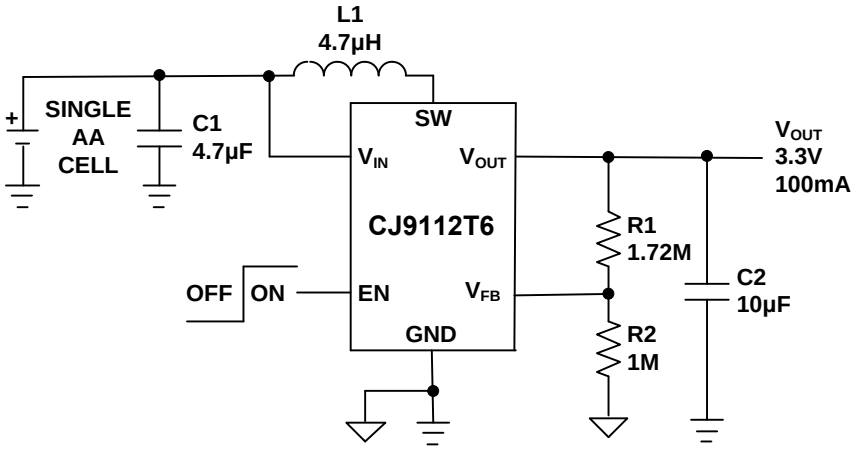
V_{IN}=1.5V, C_{OUT}=C_{IN}=10μF, L=4.7μH, V_{OUT}=3.3V, I_{OUT}=0mA，Typical values are at T_A=25℃, unless otherwise specified.

NMOS Switch Leakage	I_{NLK}	V_{IN}=V_{SW}=5V, V_{OUT} =5.5V, EN=V_{FB}=GND	-	0.15	-	μA
PMOS Switch Leakage	I_{PLK}	V_{IN}=V_{SW}=GND, V_{OUT}=5.5V	-	0.15	-	μA
NMOS Switch On Resistance	$R_{DS(ON)N}$	V_{OUT} = 3.3V, I_{SW}=100mA	-	0.25	-	Ω
PMOS Switch On Resistance	$R_{DS(ON)P}$	V_{OUT} = 3.3V I_{SW}=100mA	-	0.5	-	Ω
NMOS Peak Switch Current Limit(1)	$I_{N(MAX)}$		-	1	-	A
V_{OUT} Accuracy(2)	V_{OUT}%	V_{IN}=1.5V	-3	-	+3	%
Switching Frequency	f_{SW}			500		KHz
EN Input Logic High	V_{IH}	I_{OUT}=1mA	70	-	-	% of V_{IN}
EN Input Logic Low	V_{IL}	I_{OUT}=1mA	-	-	20	% of V_{IN}
EN Input Leakage Current	I_{ENLK}	V_{EN}=5V	-	5	-	nA
Line Regulation	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta V_{IN}}$	1.5V≤V_{IN}≤2.8V I_{OUT}=50mA	-0.4	0.3	0.4	%/V
Load Regulation	$\frac{\Delta V_{OUT}}{V_{OUT}}$	25mA≤I_{OUT}=≤100mA V_{IN}=1.5V	-1.5	0.1	1.5	%
Maximum Duty Cycle(1)	DC_{MAX}		87	89	91	%
Soft Start Time(1)	t_{ss}	EN Low to High 90% of V_{OUT}	-	1	-	ms
Thermal Shutdown Die Temperature	T_{SD}	I_{OUT}==20mA V_{IN}=1.4V	-	160	-	℃
Die Temperature Hysteresis	T_{SDHY}		-	20	-	℃

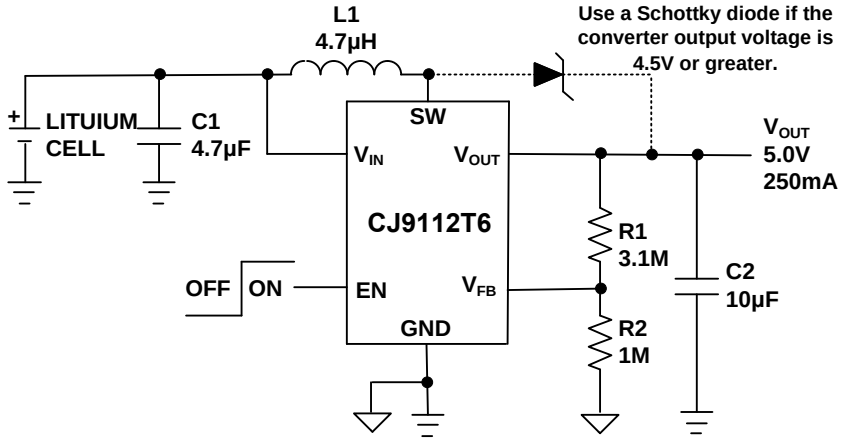
(1) Determined by characterization, not production tested.

(2) Includes Line and Load Regulation

■ Typical Application Citcuits



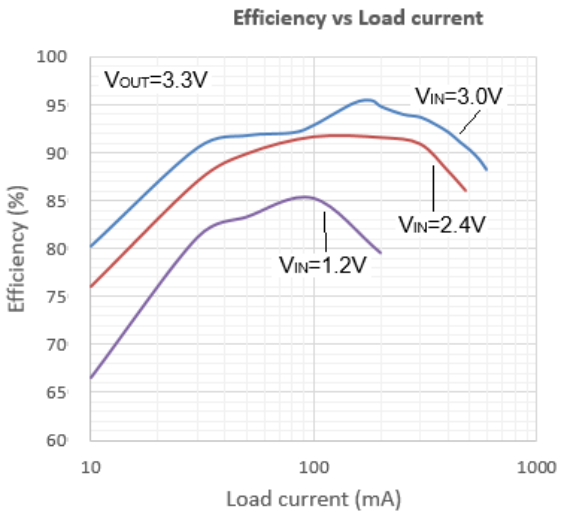
Circuit 1

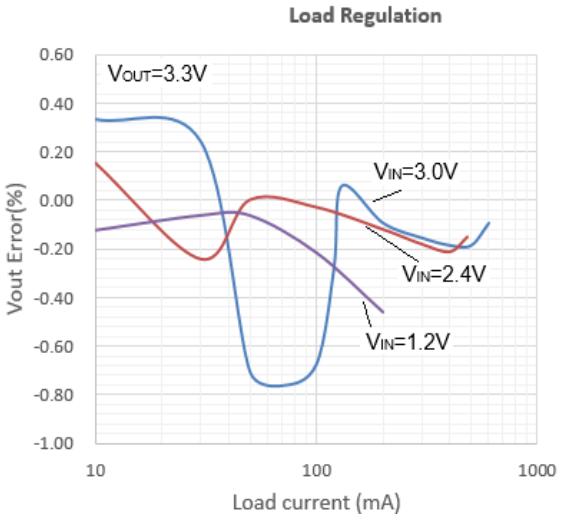


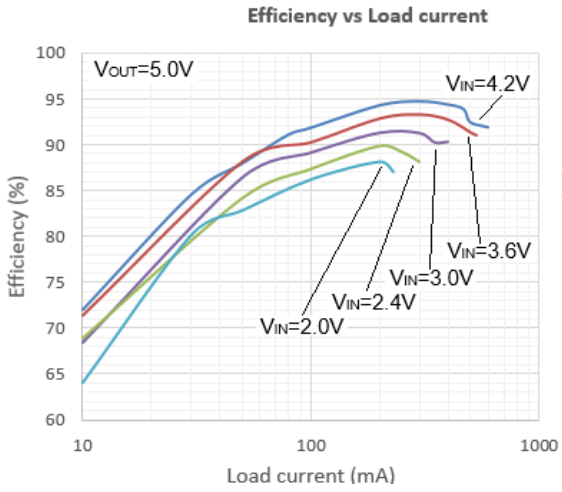
Circuit 2

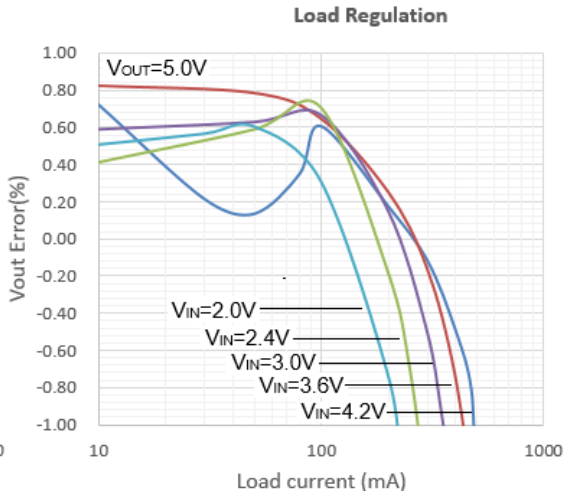
Typical Characteristics

(T_A=25℃, unless otherwise specified)

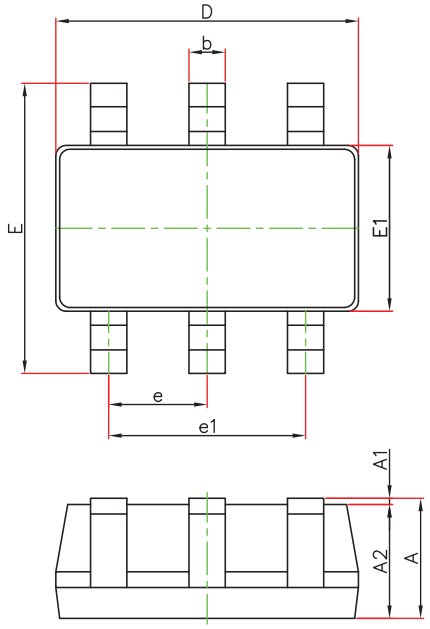


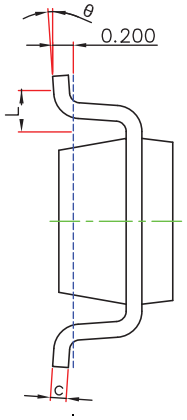






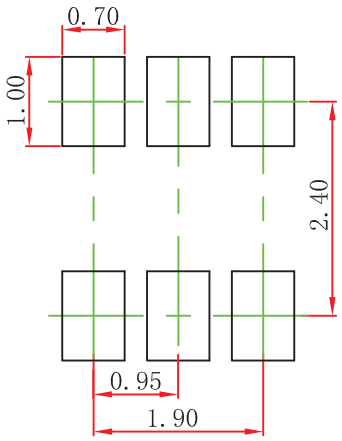
SOT-23-6L Package Outline Dimensions





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOT-23-6L Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.