40V，3A，CC and CV Synchronous Buck DC/DC Converter

- Perfect Solution for Car Charger
- Input voltage withstand up to 40V
- Built in 50mΩ high side PMOS
- Built in 30mΩ low side NMOS
- Support 3A continuous output current
- Support 100% duty cycle
- Output voltage and can be set (2.5V~22V)
- Constant current accuracy ±5%
- Constant voltage accuracy ± 1%
- No external compensation is required
- 135KHz fixed switching frequency
- Cable compensation voltage drop
- Short circuit protection (SCP), overheating protection (OTP), over voltage protection (OVP) and under voltage protection (UVLO)
- Available Packages: ESOP-8

Application

- Car Chargers
- Adapters
- Intellingent Sockets
- Drive Recorders

Ordering Information

Device No.	Package	Quantity
ASP8434W-R	ESOP-8	4000pcs/Reel

Note: ”W” stands for package. "W": ESOP-8.
Note: ”R” stands for Packing, Tape&Reel.

Description

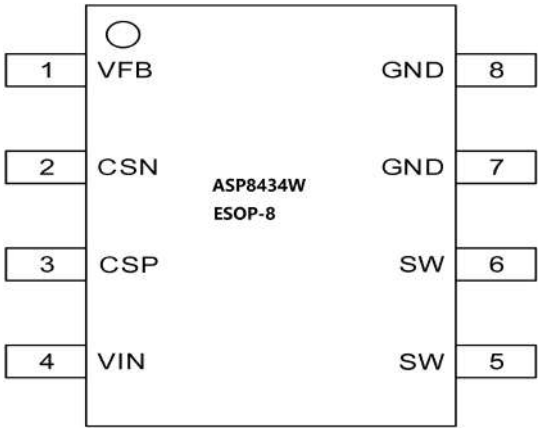
ASP8434W is a step-down DC-DC converter with input withstand voltage up to 40V and can realize accurate constant voltage and constant current. ASP8434W has built-in 50mΩ high side PMOS and 30mΩ low side NMOS, which can support 3A continuous output current, adjustable output voltage and 100% duty cycle at most.

ASP8434W has high-performance load response and input voltage response. At the same time, the accurate constant voltage and constant current control loop realizes minimal load adjustment rate and linear adjustment rate.

ASP8434W does not need external compensation. It can realize constant current and constant voltage control by relying on its own built-in stable loop. At the same time, it has the function of cable voltage drop compensation.

ASP8434W is a stable and reliable constant voltage constant current step-down DC-DC converter with excellent performance.

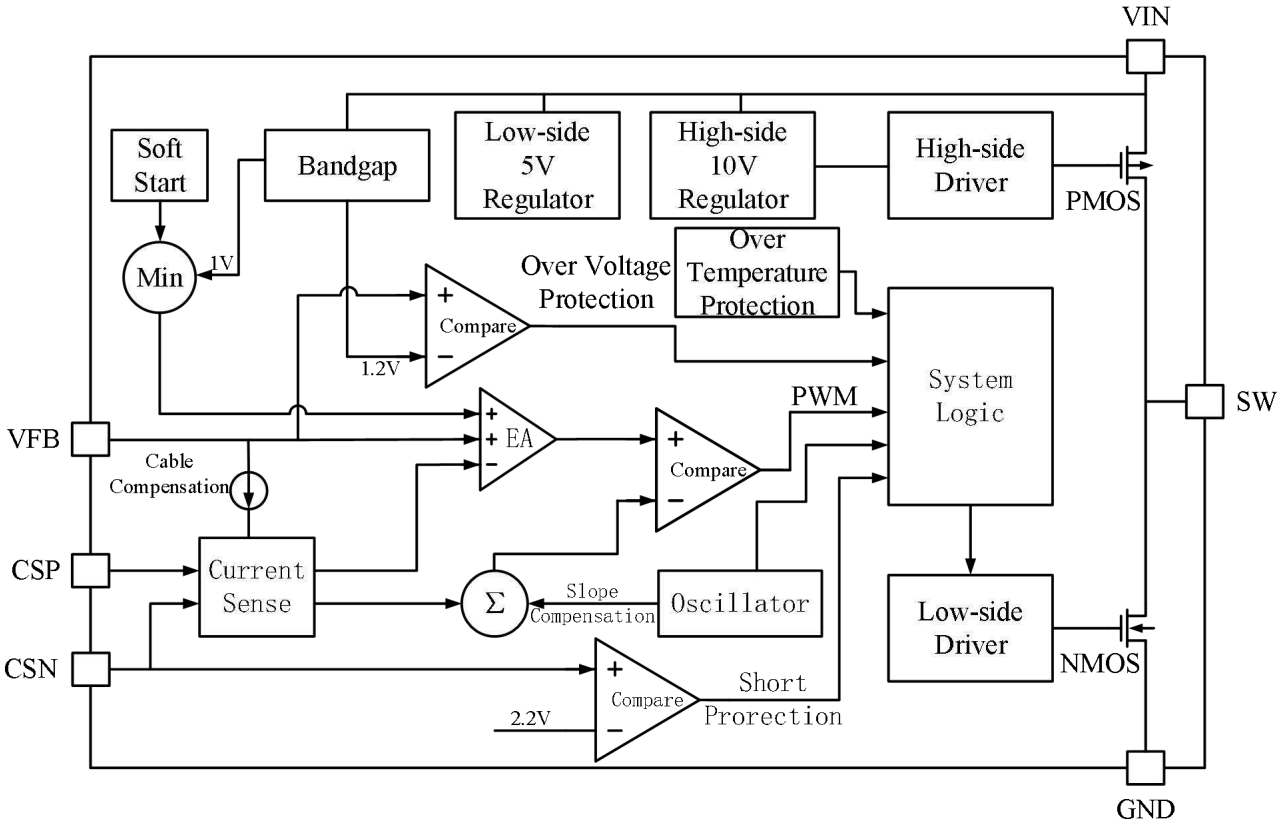
Marking Description



Pin Configuration

PIN	NAME	DISCRIPTION
1	VFB	Output voltage feedback
2	CSN	Negative current detection
3	CSP	Positive current detection
4	VIN	Power input pin and connect a 100uF / 50V electrolytic capacitor and a 1uF / 50V chip capacitor to the ground These two capacitors should be as close to the VIN pin as possible
5,6	SW	Switch
7,8	GND	Ground

Block Diagram



Absolute Maximum Ratings

Item	Description	Min	Max	Unit
Voltage	VIN ~ GND	-0.3	40	V
	SW ~ GND	-0.3	40	V
	FB ~ GND	-0.3	6	V
	SCP ~ GND	-0.3	20	V
	SCN ~ GND	-0.3	20	V
Temperature	Operating Temperature Range	-40	150	℃
	Storage Temperature	-55	150	℃
Thermal Resistance (Junction to Ambient)	SOP8	180		℃/W
Power Dissipation	SOP8	550		mW
Electrostatic discharge rating	Human Body Model（HBM）	3		kV
	Charged Device Model（CDM）	200		V

Note: exceeding the range specified by the rated parameters will cause damage to the chip, and the working state of the chip beyond the range of rated parameters cannot be guaranteed. Exposure outside the rated parameter range will affect the reliability of the chip.

Electrical Characteristics

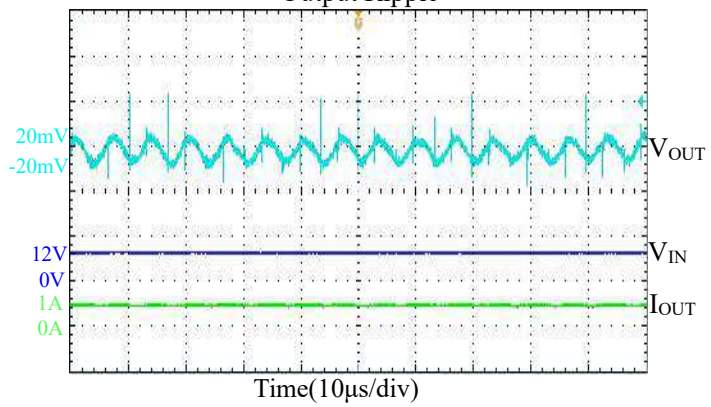
（At T_A=25°C, unless otherwise noted）

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Input Voltage		5		40	V
V_{UVLO}	UVLO Voltage				5	V
V_{HYS}	UVLO Hysteresis		0.3	0.5	0.8	V
I_Q	Quiescent current	V_{FB}=1.5V,Forced Shutdown		1500		μA
I_{SB}	Standby Current	No Load		1.5	2	mA
V_{FB}	Reference voltage of V_{FB}		0.99	1	1.01	V
OVP	Output Overvoltage protection voltage		1.27	1.30	1.35	V
F_{SW}	Switching Frequency	I_{OUT}=200mA	120	135	150	kHz
D_{MAX}	Maximum Duty Cycle			100		%
T_{ON}	Minimum On-Time			350		ns
V_{CSP} - V_{CSN}	Reference voltage of CSP	2.5V <V_{OUT} <5V	89	93	97	mV
V_{Cab}	Cable Compensation $R_{FB2}(\frac{V_{CSP}}{32K}-1\mu A)$	V_{CSP} - V_{CSN} <93mV			0.6	V
R_{DSON_H}	High-Side Switch	TJ =25℃	45	50	60	mΩ
R_{DSON_L}	Low-Side Switch		25	30	37	mΩ
V_{OUT}-V_{SHORT}	Output Short Circuit Voltage Threshold		2	2.2	2.5	V
T_{SHDN}	Thermal Shutdown Temperature	Shutdown, temperature increasing		140		°C
		Reset,temperature decreasing		110		°C

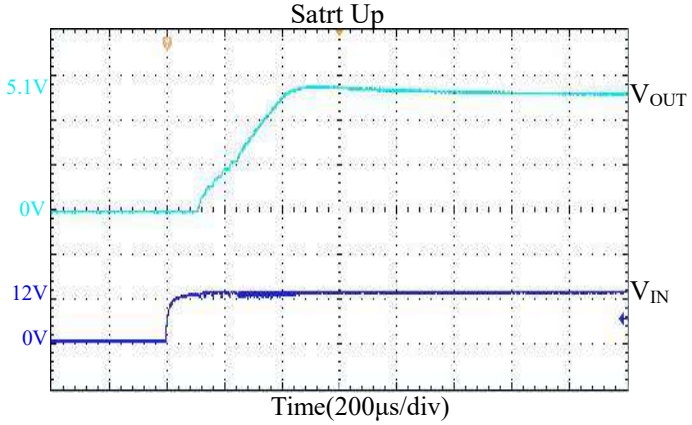
Typical Performance Characteristics

Test Condition: T_A=25°Cunless otherwise noted

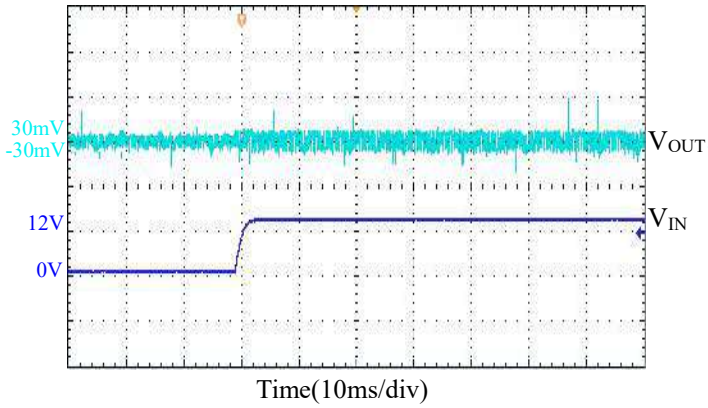
Output Ripple



Satrt Up



Line Transient



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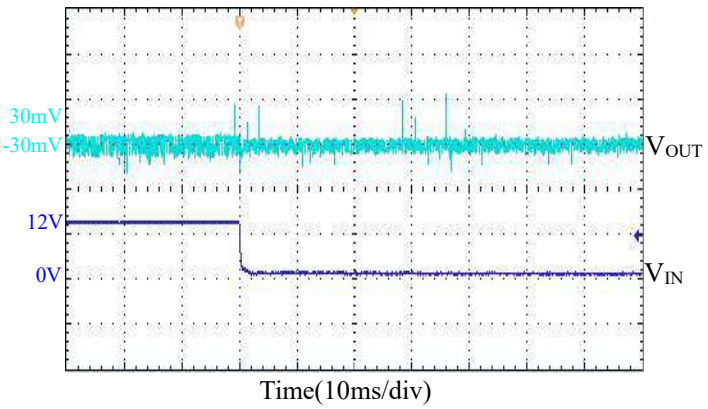
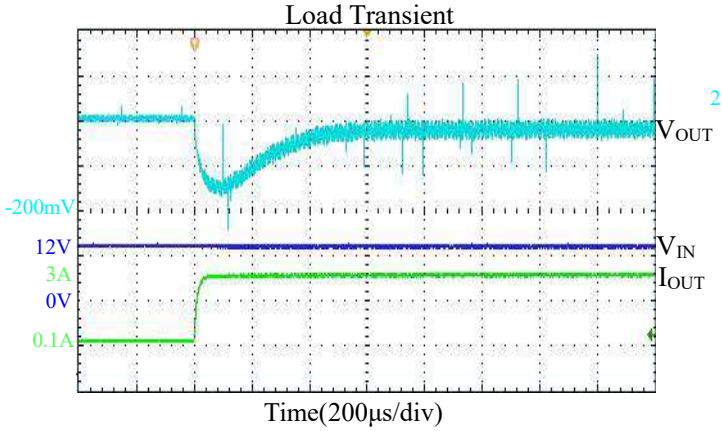
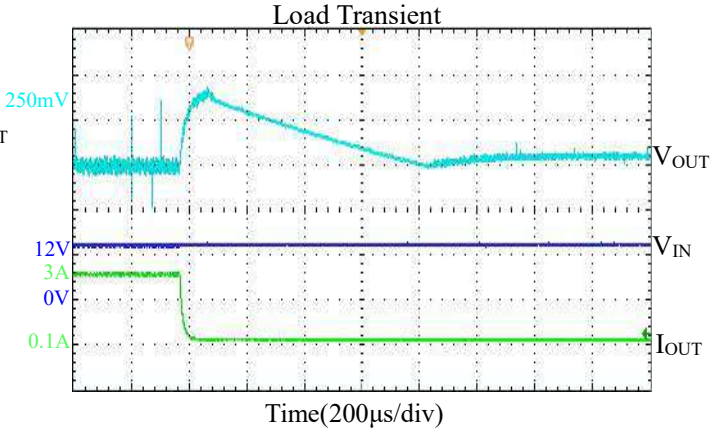


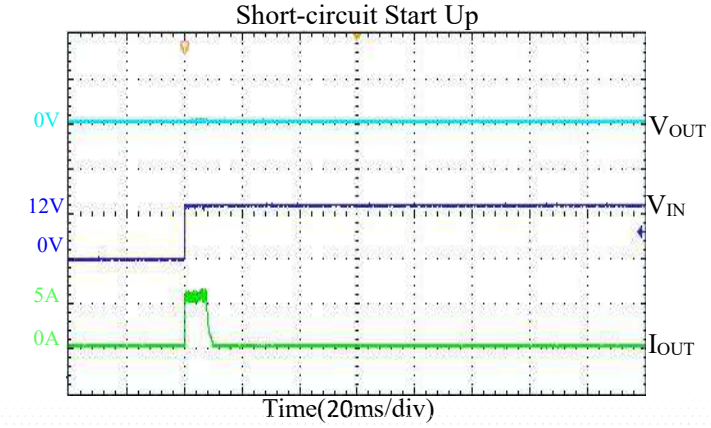
Load Transient



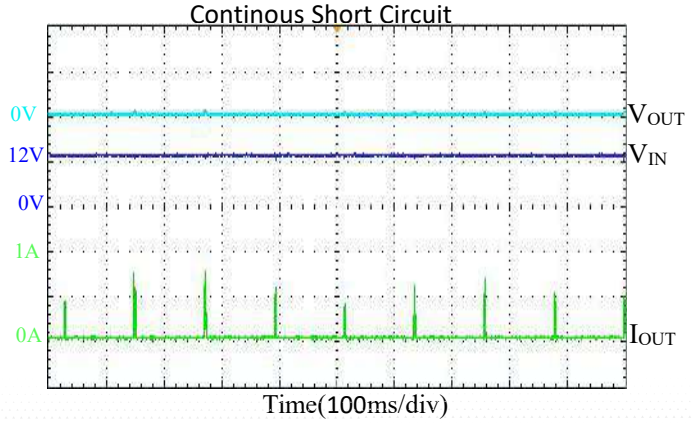
Load Transient



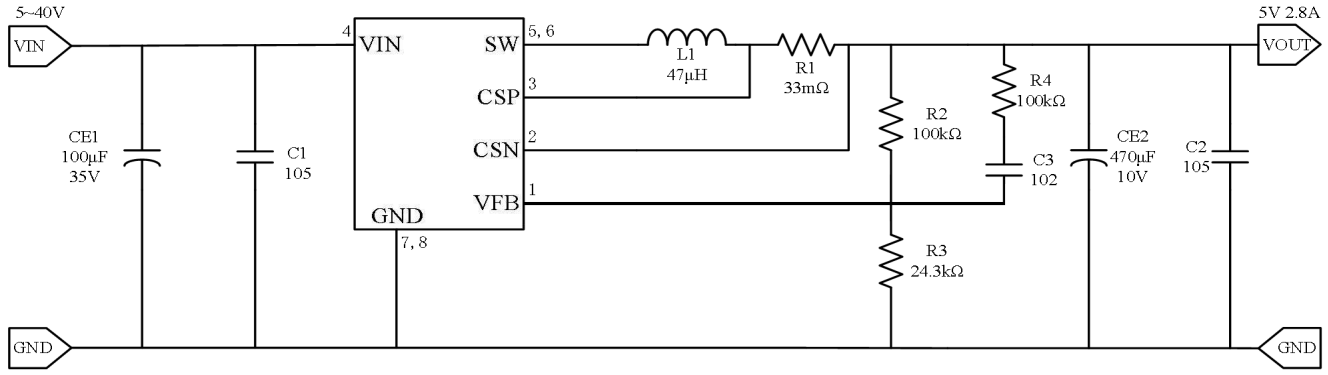
Short-circuit Start Up



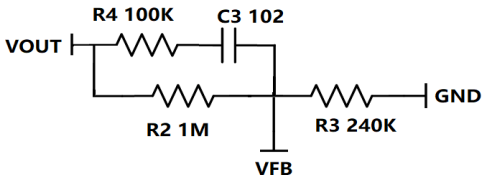
Continous Short Circuit



Typical Application



Note: if the cable compensation voltage is above 0.6V, add this typical circuit to the VFB pin of ASP8434W chip (as shown in the figure, the cable compensation voltage of the parameter is about 0.8V), the output voltage is 5V, the output current is 2.1A-2.4A, the inductance is 47μH, the output voltage is 5V, the output current is 1.5A~1.0A, and the inductance is 68μH.



Functional descriptions

UVLO

ASP8434W V_{IN} withstand voltage can reach 40V and can work in the range of 5 ~ 40V.

System soft start

When ASP8434W is just powered on or restarted after short-circuit protection, the internal constant voltage and constant current reference sources will slowly rise to the preset value from 0 through 300μs, so as to avoid excessive impulse current on the system just started.

Constant current output

Set the output voltage of the system through the voltage dividing resistor at V_{FB} end.

$$Vout = 1V * \frac{R2 + R3}{R1}$$

Output overvoltage protection

When it is detected that the voltage on the V_{FB} reaches 1.3V, ASP8434W stops output to avoid damage to the back-end electrical equipment under abnormal application conditions.

Constant current output

ASP8434W detects the output current by sampling the voltage difference between isen and vsen, and adjusts the output current to a preset value by closing the loop.

The output current can be set through the current detection resistance rsen:

$$Iout = \frac{93mV}{R_{SEN}}$$

The constant current output is effective when the output voltage is greater than 2.5V. When the output voltage is lower than 2.5V due to heavy load, ASP8434W will enter the short-circuit protection mode.

Short circuit protection

When the output voltage V_{OUT} drops below 2.5V due to heavy load, ASP8434W enters the short-circuit protection mode. In the short-circuit protection mode, the operating frequency of ASP8434W is reduced to 1/3 of the normal frequency. If Vout remains above 2.5V for 4ms, ASP8434W will stop output and restart after 32ms.

Cable voltage compensation

When users use different cables, different voltage drops will be generated on the cables. You can select the corresponding product model according to different cable compensation requirements:

ASP8434W:

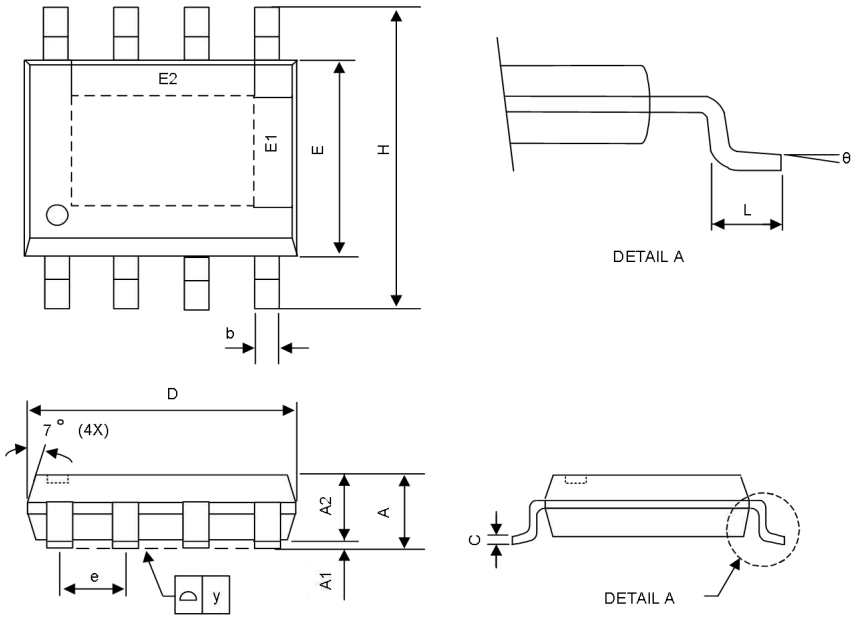
$$V_{OUT} = \left[\left(\frac{R_{FB2}}{R_{FB3}} + 1\right) * V_{FB}\right] + \left[R_{FB2} * \left(\frac{V_{CSP}}{32K} - 1uA\right)\right]$$

Overheat protection

When the ASP8434W detects that the internal temperature of the chip reaches 140 degrees, the output stops, and when the temperature drops below 110 degrees, the output resumes again.

Package Outline

ESOP-8



REF	Millimeter	
	Min	Max
A		1.75
A1	0.10	0.25
A2	1.25	
C	0.10	0.25
D	4.70	5.10
E	3.70	4.10
H	5.80	6.20
L	0.40	1.27
b	0.31	0.51
e	1.27 BSC	
y		0.10
θ	0	8°
E1	2.20 BSC	
E2	3.30 BSC	

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