Wide Input CC/CV Synchronous Buck Converter

General Description

AT8802Z is a wide input voltage, high efficiency step-down DC/DC converter that operates in either CV (Constant Output Voltage) mode or CC (Constant Output Current) mode. AT8802Z provides up to 4A output current at 110kHz switching frequency ,and the CC level can be adjusted by changing external sensing resister.

The AT8802Z provides full protection functions, thermal shutdown is to prevent over temperature operating from damage; cycle by cycle current limit is against over current operating of the switch; under voltage protection (UVP); flexible over voltage protection threshold setting by OVP pin.

The devices is available in QFN5X4-24L package and require very few external devices for operation.

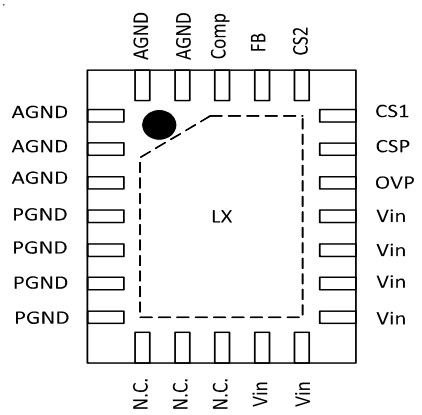
Features

- **Wide Input Voltage with 8V ~ 40V Operation**
- **Up to 4A Output Current**
- **Fixed Frequency 110 kHz with Easy EMI Control**
- **Constant voltage and constant voltage control**
- **Precision Feedback Voltage 1.2V+-1%**
- **Precision CC Limit with +-5% Accuracy**
- **3% Vout cable drop compensation**
- **Cable Compensation Output Voltage around 1.5% at 100% CC Limit Level**
- **Integrated 20mohm High Side MOS, 10mohm Low Side MOS**
- **Internal MOS 10A Current Peak Protected with Cycle by Cycle Current Limit**
- **QFN5X4-24L Package**

Applications

- **Car Charger/Adaptor**
- **General-Purposed DC/DC Converters with Constant Current Limit**
- **Rechargeable Portable Devices**

Pin Configuration

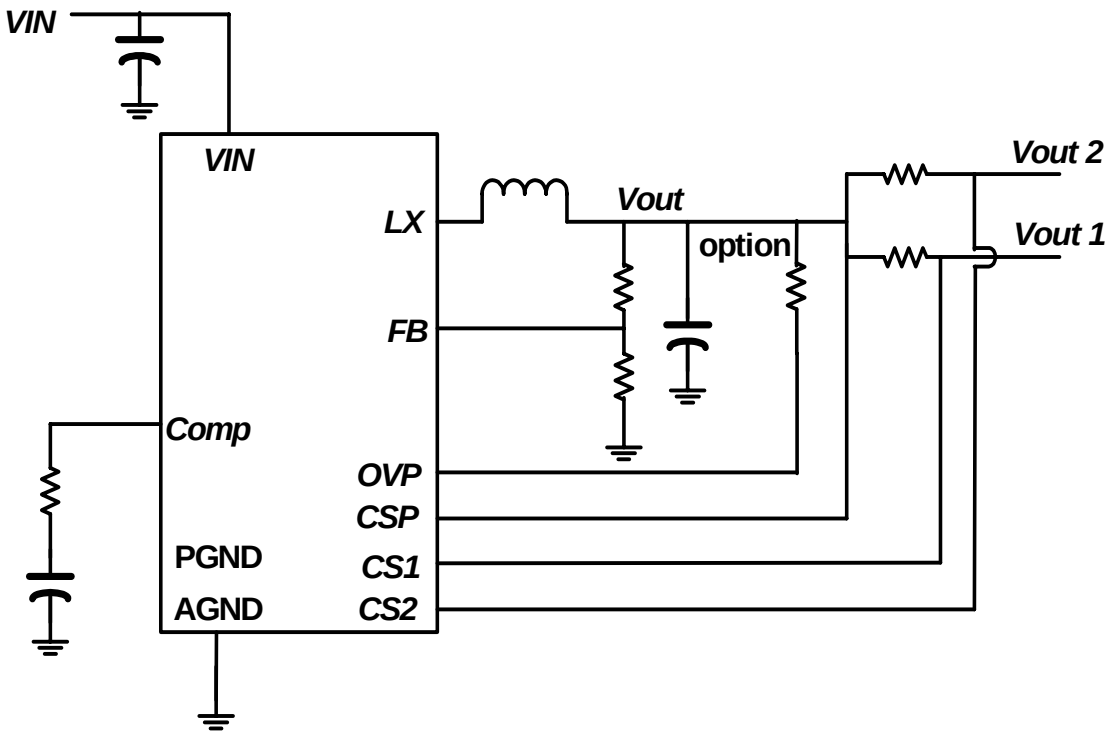


Ordering and Marking Information

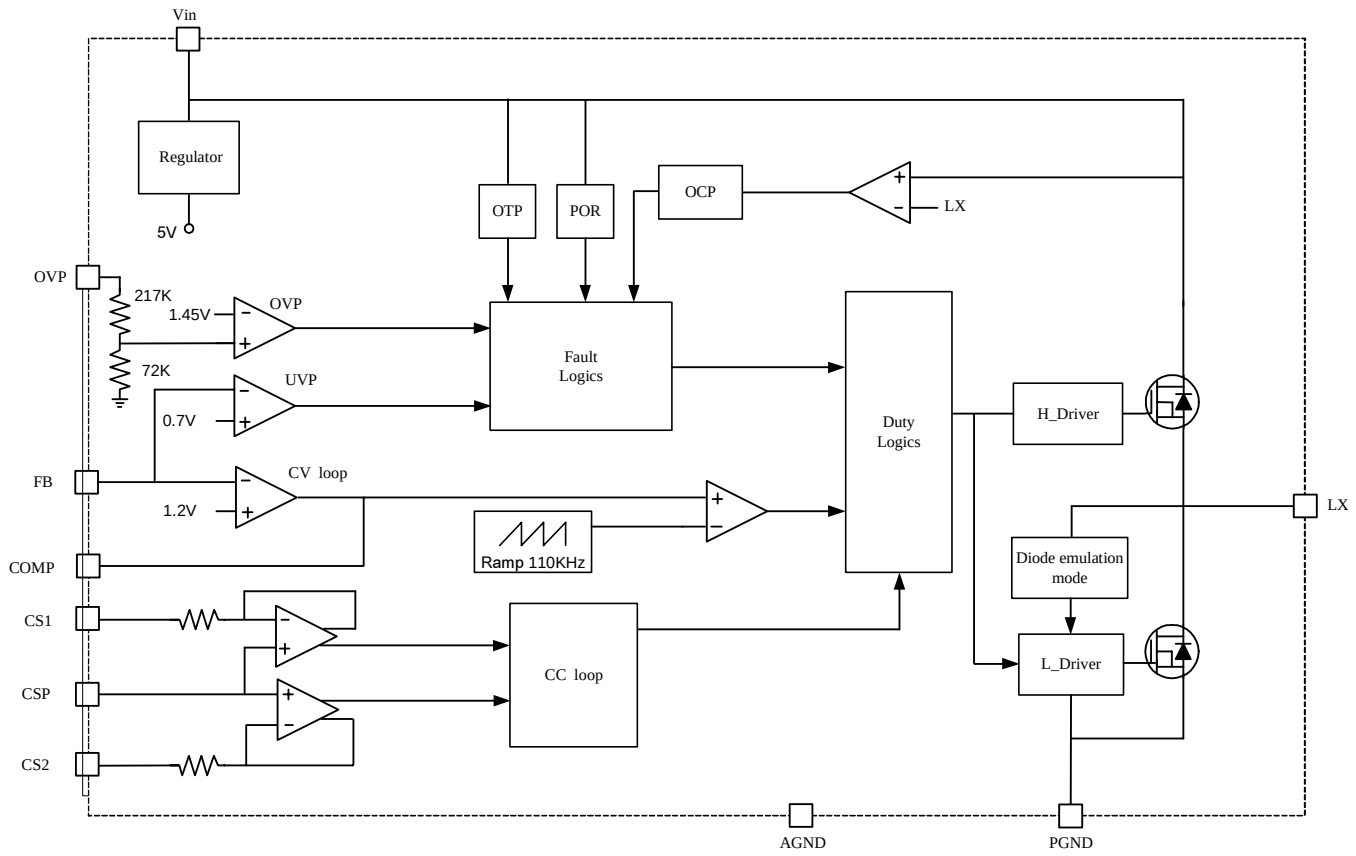
Order Number	Package	Top Marking
AT8802ZQFG	QFN5X4-24L	AT8802Z

Note: Aplustek products are compatible with the current IPC/JEDEC J-STD-020 requirement. They are halogen-free, RoHS compliant and 100% matte tin (Sn) plating that are suitable for use in SnPb or Pb-free soldering processes.

Typical Application Circuit



Function Blocks



Function Pin Description

No.	Pin Name	Pin Function
4~7	PGND	**Power Ground for Internal MOS.**
8~10	N.C.	**No Connection.**
11~16	Vin	**Power Supply Input**. Bypass this pin with a 0.1uF ceramic capacitor to GND, placed as close to the IC as possible.
17	OVP	**OVP threshold setting input Pin.** Connect a ressister to output capacitor.
18	CSP	**Current sense positive input pin.**Connect to output capacitor.
19	CS1	**Channel 1 Current sense negative input pin.**
20	CS2	**Channel 2 Current sense negative input pin.**
21	FB	**Feedback Input.** The voltage at this pin is regulated to 1.2V.Connect to resistor divider between output and GND to set the output voltage.
22	COMP	**Error Amplifier output Pin.**The pin is used to compensate the converter.
1~3, 23~24	AGND	**Power Ground for internal control circuit.**
E.pad	LX	**Power Switching Output to external Inductor.**

Absolute Maximum Ratings

(Note1)

Supply Input Voltage, V_{in} ---------- -0.3V to +44V

LX to PGND,AGND DC ---------- -0.3V to +44V

FB,COMP to AGND DC ---------- -0.3V to +7V

OVP,CSP,CS1,CS2 to AGND DC ---------- -0.3V to +16V

Storage Temperature Range ---------- -65°C to +150°C

Junction Temperature ---------- -40°C to +150°C

Lead Temperature Range(Soldering 10sec) ---------- 260°C

ESD Rating (Note2)

HBM(Human Body Mode)----------2KV

MM(Mechine Mode)----------200V

Thermal Characteristics

Package Thermal Resistance (Note3)

QFN5X4-24L θ_{JA} ---------- 33°C/W

QFN5x4-24L θ_{JC} ---------- 8°C/W

Power Dissipation, P_D @ T_A = 25°C

QFN5x4-24L ---------- 3W

Electrical Characteristics

(V_{CC} = 12V, T_A = +25°C unless otherwise specified.)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Supply Input Section						
VCC operation range	$V_{CC,R}$		8	--	40	V
VCC UVLO threshold	$V_{CC,R}$	VCC Rising	--	7.5	--	V
	$V_{CC,F}$	VCC Falling	--	6.3	--	V
VCC operation current	I_{CC}	VCC=9V to 40V, COMP short to FB	--	1	1.5	mA
Oscillation Section						
PWM Frequency	F_{SW}		--	110	--	kHz
			-15%	--	+15	%
Max Duty	D_{MAX}		--	92	--	%
PWM loop Section						
Feedback reference voltage	V_{REF}		--	1.2	--	V
Feedback reference accuracy			-1%	--	+1%	%
COMP source current		FB<1.2V	--	85	--	uA
COMP sink current		FB>1.2V	--	85	--	uA
COMP High voltae		FB<1.2V	--	5	--	V
Fault protection Section						
OVP threshold	V_{oVP}	OVP pin connect to VOut	--	5.9	--	V
FB under voltage level	V_{UVP}		--	0.7	--	V
FB short Impedance level	V_{SHORT}		--	0.2	--	V
Over Tempperature level	T_{OTP}		--	150	--	°C
	T_{HYS}		--	40	--	°C

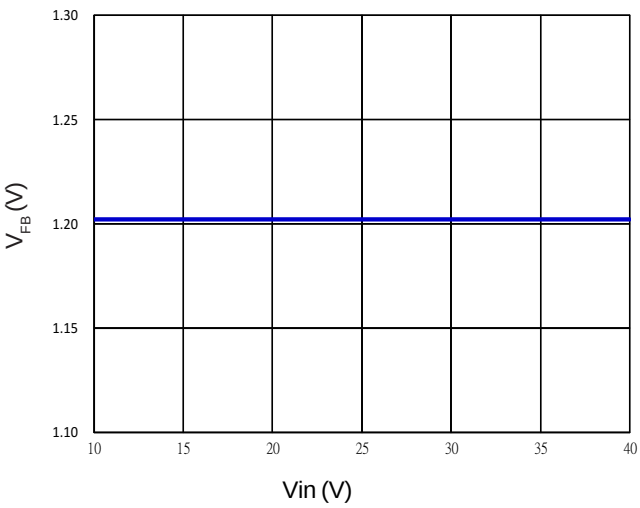
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Fault protection Section						
Internal Soft Start time	T_{SS}		--	4.5	--	mS
Fault recycle waitting time	$T_{recycle}$		--	0.5	--	S
CC Section						
CS1/2 OP setting voltage		|CSP-CS1/2|		82		mV
CC1/CC2 setting accuracy			-5		+5	%
Cable compensation		|CSP-CS1/2|=82mV		3		%
High/Low side MOS Section						
High side MOS ON resistance	R_{DSON_H}		--	0.02	--	ohm
Low side MOS ON resistance	R_{DSON_L}		--	0.01	--	ohm

Note 1. Exceeding these limits may impaire the life of the device. Exposure to absolute maximum rating conditions for long periods may affect device reliability.

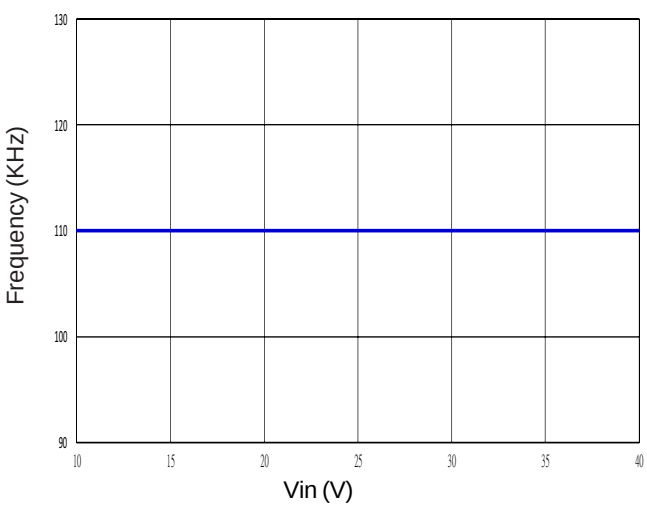
Note 2. θ_{JA} is measured with the component mounted on a high effective thermal conductivity test board in free air.The exposed pad of the package is soldered directly on the PCB.

Typical Operation Characteristics

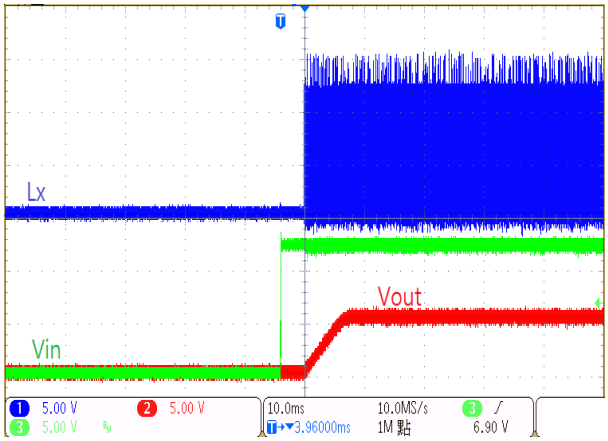
V_{FB} vs. Vin



Frequency vs. Vin

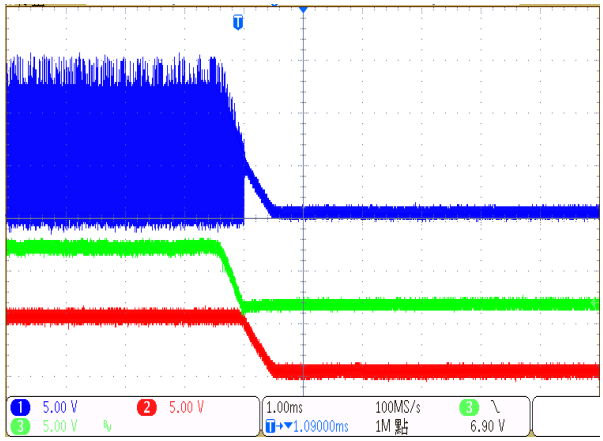


Power On from Vin



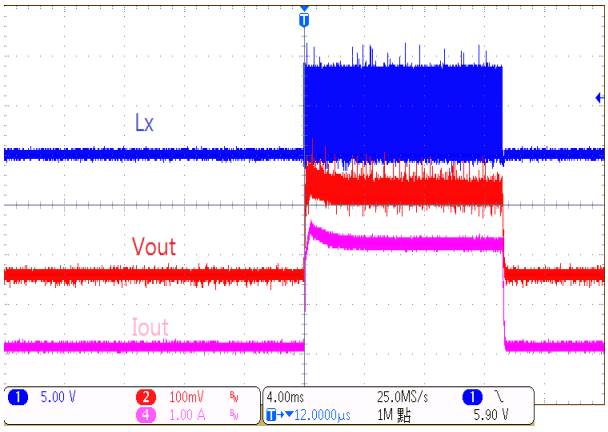
10ms/Div

Power Off from Vin



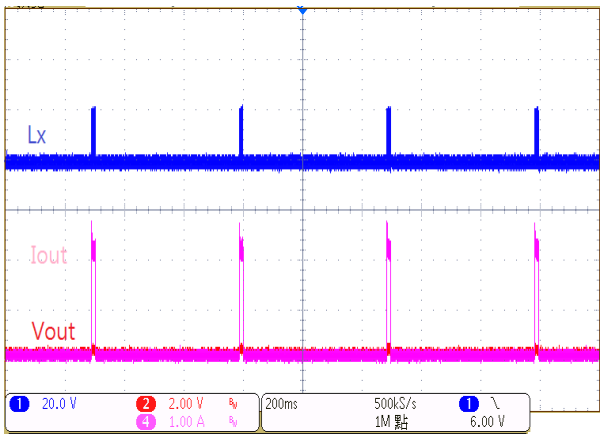
10ms/Div

CC setting=2.3A , Short Circuit Enter



4ms/Div

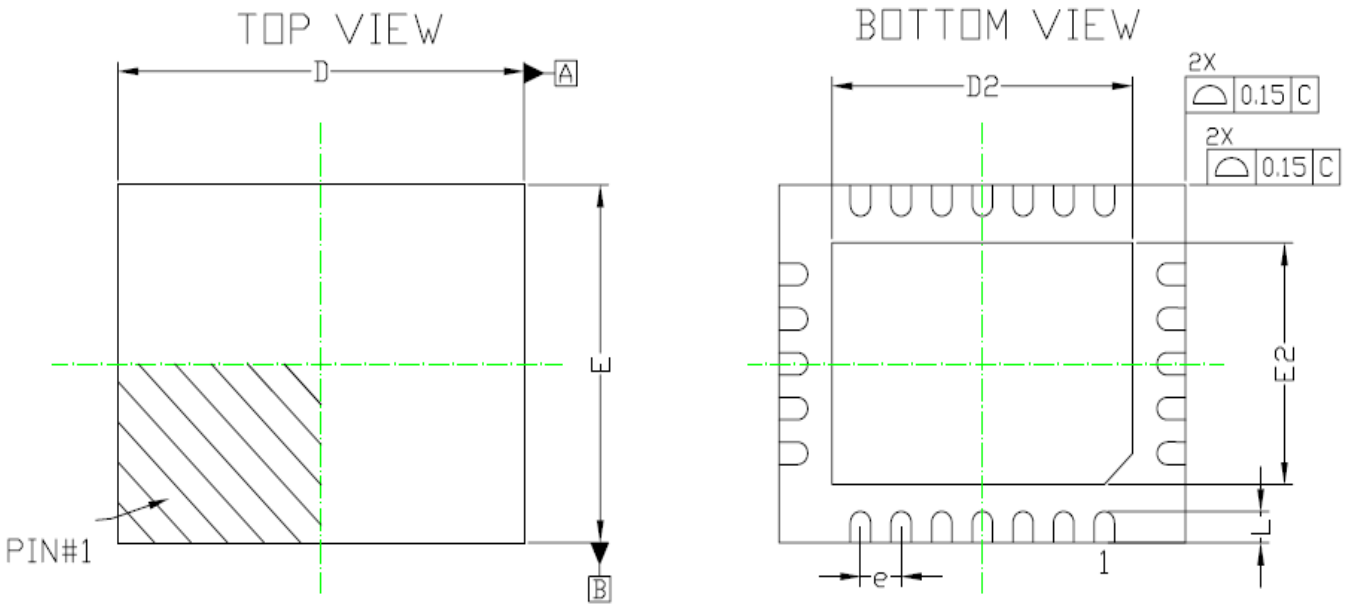
CC setting=2.3A , Short Circuit Recovery

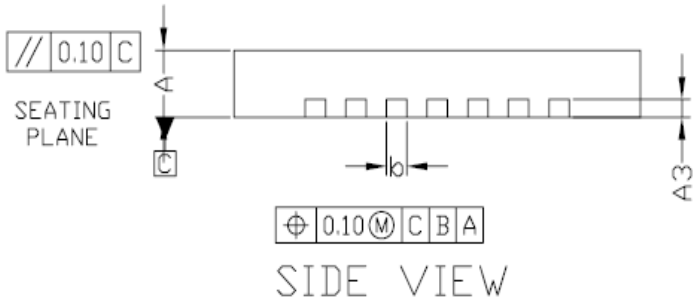


200ms/Div

Package Information

QFN5X4-24L





SYMBOL	COMMON		
	MIN	NOM.	MAX
A	0.70	0.75	0.80
A3		0.203 REF	
b	0.20	0.25	0.30
D	4.85	5.00	5.15
E	3.85	4.00	4.15
D2	3.55	3.70	3.85
E2	2.55	2.70	2.85
e		0.50 BSC	
L	0.30	0.35	0.40

Note

1. Package Outline Unit Description:
   BSC: Basic. Represents theoretical exact dimension .
   MAX: Maximum dimension specified.
   MIN: Minimum dimension specified.
   REF: Represents dimension for reference use only. The value is not the device specification.
   TYP: Represents as a typical value. The value is not the device specification.
2. All linear dimensions are in Millimeters.