# CN8914

## 3-Channel PMU with Synchronous 38V-Buck, Boost and Super Capacitor Charger

## 1 Description

The CN8914 is a 3-channel PMU, including a synchronous step-down converter with a fixed 3.3V output, a fixed 12V output asynchronous boost converter,a 2.55V supercapacitor charger. The input voltage range of the step-down converter is 7.8V~38V, the maximum load is 800mA, the fixed switching frequency is 600KHz. The asynchronous boost converter is powered by a supercapacitor when the chip is powered off, with a working frequency of 1MHz, which can provide an output of 12V/450mA, which can ensure that the chip continues to work until the power-down program is completed. The charging module charges the supercapacitor to 2.55V during normal operation, and the charging is enabled by an external signal control.

The CN8914 also employs cycle by cycle current limit and hiccup OCP and Input OVP protections, as well as thermal shutdown.

The CN8914 is available in ESOP8L and DFN3X3-10L with exposed Thermal and GND pad.

## 2 Features

- 3-Channel PMU: Buck, Boost, Super Capacitor Charger
- Buck Wide Input from 7.8V to 38V with 42V Standoff
- Fixed Output Buck: 3.3V/800mA
- Fixed Output Boost: 12V/450mA at 2.5V Input
- Linear Charger for Super Capacitor with 60mA CC Current
- Up to 91% efficiency
- Enable pin to set Power Down Threshold
- External signal controls the charger to enable
- Hic-cup Mode OCP protections
- Thermal Shutdown

## 3 Applications

- Smart Power Meters
- PLC Modules
- System that needs backup power by super capacitors

## 4 Marking and ordering information

| Product Number | Package | Marking | Quantity/Tape |
|---|---|---|---|
| CN8914EHR | ESOP8L | CN8914 YYWW | 4000/Tape |
| CN8914DDR | DFN3X3-10L | CN8914 YYWW | 5000/Tape |

Note: YY=Year WW=Week.

Green (RoHS & HF): CHIPNORTH defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your CHIPNORTH representative directly.

Moisture sensitivity level (MSL):3

## 5 Pinout

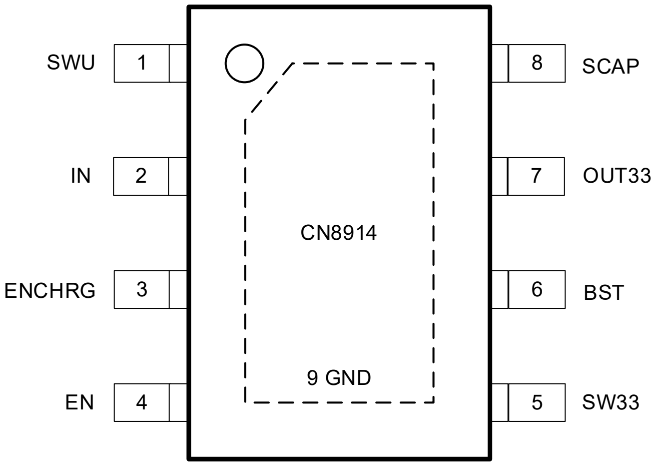



Figure 1 ESOP8L

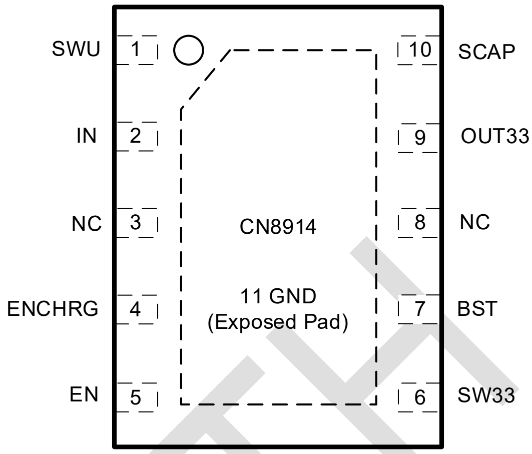



Figure 2 DFN3X3-10L

## 6 Typical Application

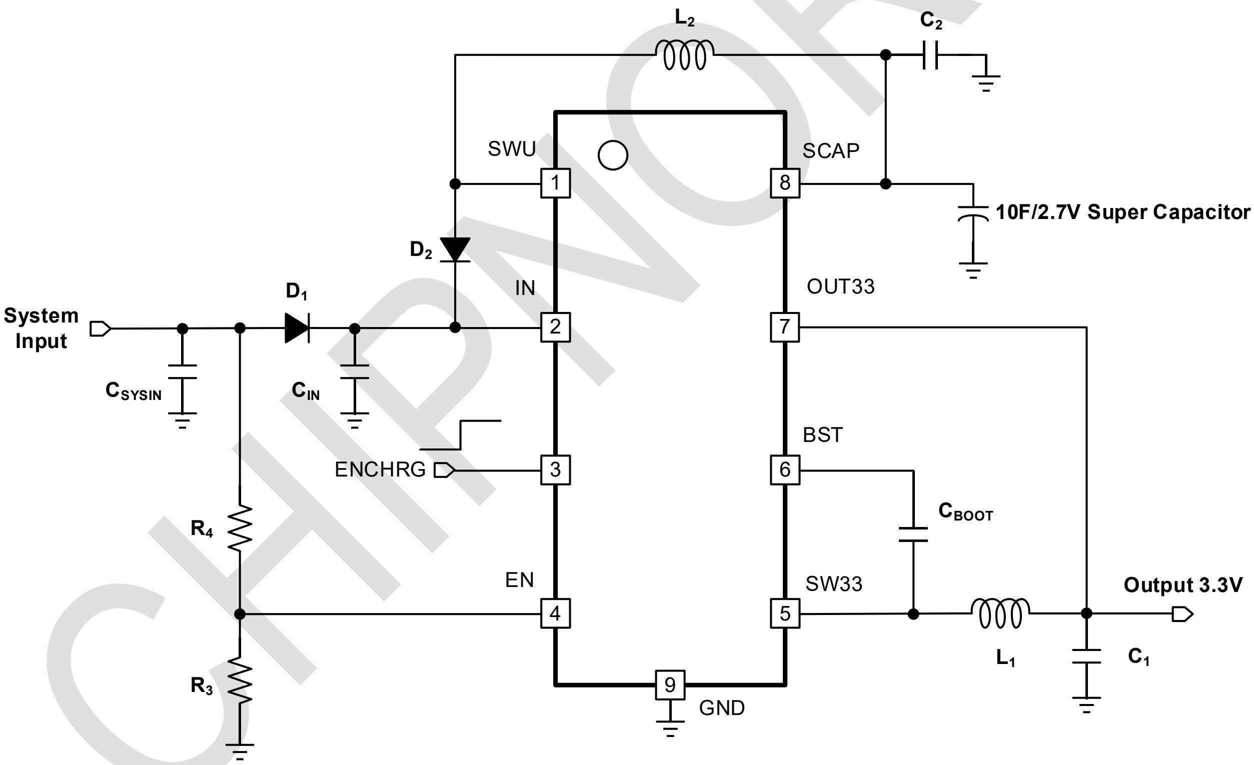



Figure 3 Typical Application

Note 1: System Input Power Down Threshold, $V_{PowerDown} = V_{EN} \times (R_3+R_4) / R_3$

## 7 Block Diagram

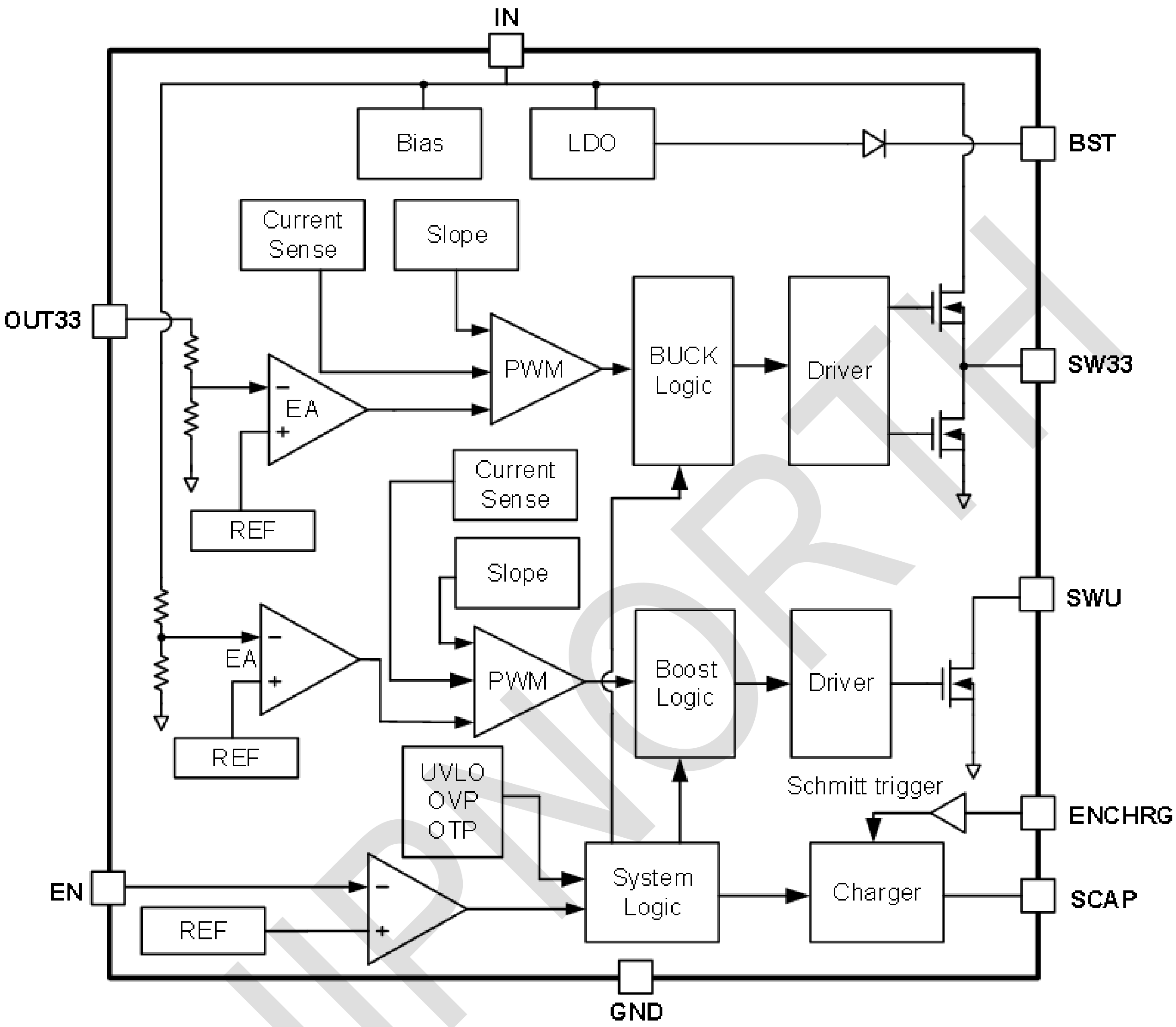



Figure 4 Block Diagram

## 8 Pin Descriptions

| Pin No. | | Pin Name | Descriptions |
|---|---|---|---|
| DFN3X3-10L | ESOP8L | | |
| 1 | 1 | SWU | Boost Converter Switch Node |
| 2 | 2 | IN | IC Power Supply Input Pin |
| 4 | 3 | ENCHRG | Enable Pin for charger. Use external signal to control the charger turn on or turn off. |
| 5 | 4 | EN | Enable Pin for auto-switching Boost and Charger. Use external resistors to set system input detection threshold to turn on Boost.<br>EN=0, ENCHRG=1, Boost On / Charger Off<br>EN=1, ENCHRG=1, Boost Off / Charger On<br>EN=0, ENCHRG=0, Boost On / Charger Off<br>EN=1, ENCHRG=0, Boost Off / Charger Off |
| 6 | 5 | SW33 | Fixed 3.3V Buck Converter Switch Node |
| 7 | 6 | BST | Bootstrap Pin for Fixed 3.3V Buck Converter |
| 9 | 7 | OUT33 | Output Pin for Fixed 3.3V Buck Converter |
| 10 | 8 | SCAP | Connect to Super Capacitor. It is Internally Programmed to CV at 2.55V |
| 11 | EPAD | GND | Connect to Ground. Analog and Power Ground Pin. Must Connected. |
| 3、8 | N/A | NC | NO Connect |

## 9 Specifications

### 9.1 Absolute Maximum Ratings

| Parameter | Symbol | Value | Units |
|---|---|---|---|
| Supply Input Voltage, EN Voltage | $V_{IN}$, $V_{EN}$ | -0.3 ~ 45 | V |
| Buck Switch Node Voltage | $V_{SW33}$ | -0.3 ~ VIN + 0.3 | V |
| Buck Bootstrap Voltage | $V_{BST}$ | -0.3 ~ Max. (VSW + 6.45) | V |
| Boost Switch Node Voltage | $V_{SWU}$ | -0.3 ~ 24 | V |
| Other Pins Voltage | | -0.3 ~ 6.5 | V |
| Operating Ambient Temperature Range | $T_A$ | -40 ~ 105 | °C |
| Storage Temperature Range | T | -55 ~ 150 | °C |
| Soldering Temperature | $T_{LEAD}$ | 260(soldering,10s) | °C |

Note1: Stress exceeds these ratings 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. Expose to absolute-maximum-rated conditions for extended periods may affect device reliability.

### 9.2 ESD Ratings

| Discharge mode | Value | Units |
|---|---|---|
| Human Body Model (HBM) | ±5000 | V |
| Charged Device Model (CDM) | ±2000 | V |

## 9.3 Recommended Operating Range

| Parameter | Symbol | Min. | Max. | Units |
|---|---|---|---|---|
| Operating Supply Voltage | $V_{IN}$ | 7.8 | 38 | V |
| Buck Output Voltage | $V_{OUT\_33}$ | 3.3 | | V |
| Boost Output Voltage | $V_{OUT\_BOOST}$ | | 20 | V |
| IC Input Capacitor Range | $C_{IN}$ | 10 | 1000 | μF |
| System Input Capacitor Range | $C_{SYSIN}$ | 10 | 1000 | μF |
| Buck Output Capacitor | $C_1$ | 10 | 220 | μF |
| Boost Input Capacitor | $C_2$ | 1 | | μF |
| Bootstrap Capacitor Range | $C_{BOOT}$ | Typical 100 | | nF |
| Fixed 3.3V Buck Inductor | $L_1$ | 10 | | μH |
| Boost Inductor | $L_2$ | 4.7 | | μH |

## 9.4 Thermal Information

| Parameter | Descriptions | Symbol | Value | Unit |
|---|---|---|---|---|
| Thermal Resistance (ESOP8L) | Junction to ambient | θja | 60 | °C/W |
| | Junction to case(top) | θjc(top) | 56.1 | °C/W |
| | Junction to case(bottom) | θjc(bot) | 3.8 | °C/W |
| Thermal Resistance (DFN3X3-10L) | Junction to ambient | θja | 40.9 | °C/W |
| | Junction to case(top) | θjc(top) | 46.6 | °C/W |
| | Junction to case(bottom) | θjc(bot) | 2.9 | °C/W |

## 9.5 Electrical Characteristics

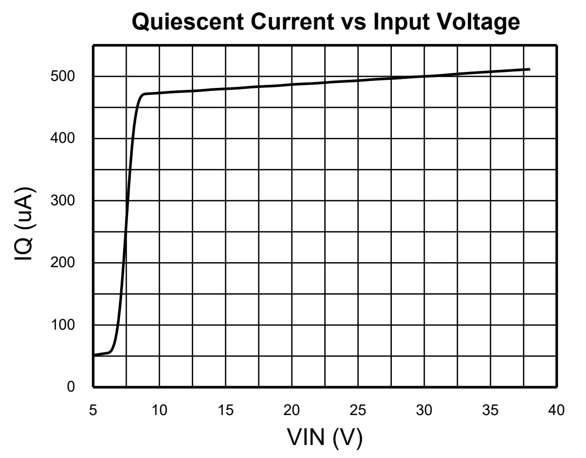
($V_{IN}$=12V, $T_A$=25°C, unless otherwise specified.)

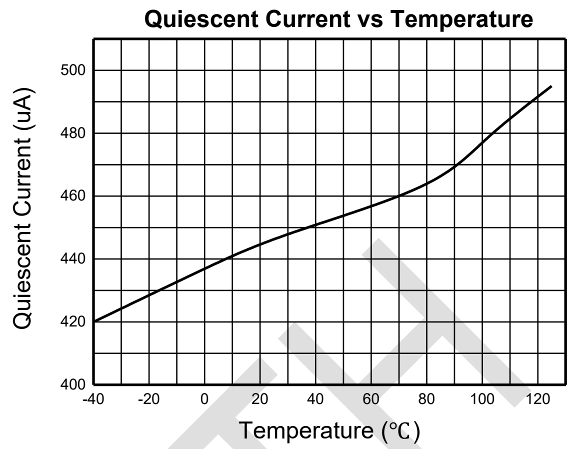
| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Power Supply** | | | | | | |
| Quiescent Current | $I_Q$ | EN on, $I_{LOAD}$ = 0A, $V_{OUT33}$=3.5V | | 465 | | μA |
| VIN Under Voltage Lockout | UVLO_R | VIN Rising | 7.2 | 7.5 | 7.8 | V |
| | UVLO_F | VIN Falling | 4.8 | 5 | 5.2 | V |
| VIN UVLO Hysteresis | $V_{HYS}$ | UVLO Hysteresis | | 2.5 | | V |
| VIN Over Voltage Threshold | OVP_R | VIN Rising | 37 | 39 | 41 | V |
| | OVP_F | VIN Falling | | 37.5 | | V |
| VIN Over Voltage Hysteresis | | OVP Hysteresis | | 1.5 | | V |
| **Buck Characteristics** | | | | | | |
| Buck Switching Frequency | $F_{OSC, BK33}$ | EN on, 3.3V Buck Switching | 520 | 600 | 680 | kHz |
| Buck Minimum On Time | $T_{ON\_MIN, BK33}$ | | | 80 | | ns |
| High Side MOSFET On-Resistance | $R_{ONH2}$ | | | 600 | | mΩ |
| Low Side MOSFET On-Resistance | $R_{ONL2}$ | | | 300 | | mΩ |
| Soft Start-Up Time | $T_{SS2}$ | | | 1 | | ms |
| High Side Current Limit | $I_{LIMITH2}$ | | | 1.1 | | A |
| Low Side Current Limit | $I_{LIMITL2}$ | | | 1 | | A |
| Buck Output Voltage | $V_{OUT\_33}$ | | | 3.3 | | V |
| Buck Output Voltage Accuracy | | | | 2 | | % |
| High Side MOSFET Leakage Current | $I_{LKH, BK33}$ | | | | 1 | μA |
| Low Side MOSFET Leakage Current | $I_{LKL, BK33}$ | | | | 1 | μA |
| **Boost Characteristics** | | | | | | |
| Boost Switching Frequency | $F_{OSC, BST}$ | EN on, Boost Switching | | 1 | | MHz |
| Boost Maximum Duty Cycle | $D_{MAX, BST}$ | | | 95 | | % |
| Boost Minimum On-Time | $T_{ON\_MIN, BST}$ | | | 100 | | ns |
| Power MOSFET On-Resistance | $R_{ONL3}$ | $I_{SWU}$=100mA | | 110 | | mΩ |
| Boost Current Limit | $I_{LIMITL3}$ | | | 3.76 | | A |
| Boost Output Voltage | $V_{OUT\_BOOST}$ | | | 12 | | V |
| Boost Output Voltage Accuracy | | | | 2 | | % |

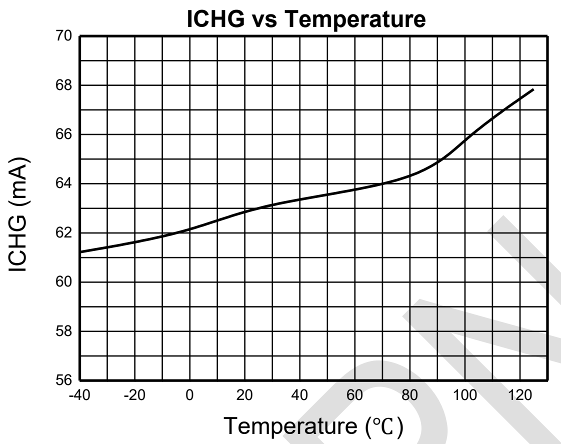
| | | | | | | |
|---|---|---|---|---|---|---|
| Power MOSFET Leakage Current | $I_{LKL, BST}$ | Boost off | | | 1 | μA |
| **Super Capacitor Charger** | | | | | | |
| Super Capacitor Charging Current | $I_{SCAP}$ | | | 60 | | mA |
| SCAP Charge Voltage | $V_{SCAP}$ | | | 2.55 | | V |
| SCAP Charge Voltage Accuracy | | | | 1 | | % |
| **EN Input** | | | | | | |
| EN Reference Voltage | $V_{EN}$ | EN Rising | | 1.5 | | V |
| EN Hysteresis | $V_{EN, hys}$ | Hysteresis | | 0.16 | | V |
| EN Input Current | $I_{EN}$ | $V_{EN}$=1.5V | | 0.5 | | μA |
| **ENCHRG** | | | | | | |
| ENCHRG Threshold | $V_{ENCHRG\_R}$ | ENCHRG Rising | 1.5 | | | V |
| | $V_{ENCHRG\_F}$ | ENCHRG Falling | | | 0.4 | V |
| EN Input Current | $I_{ENCHRG}$ | $V_{ENCHRG}$=1.5V | | 0.5 | | μA |
| **Thermal Shutdown** | | | | | | |
| Thermal Shutdown Threshold | $T_{SD}$ | Rising | | 155 | | °C |
| $T_{SD}$ Hysteresis | $T_{HYS}$ | Hysteresis | | 20 | | °C |

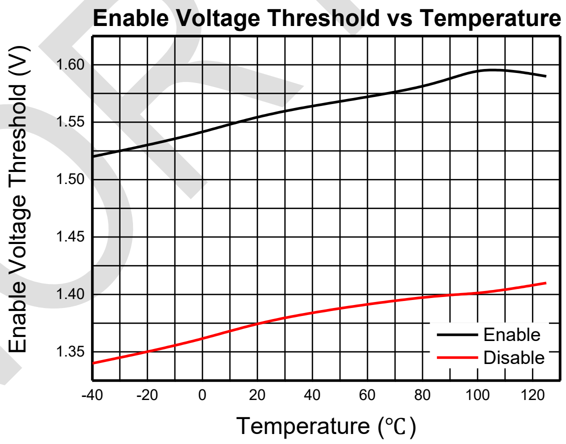
## 9.6 Characteristics Curve

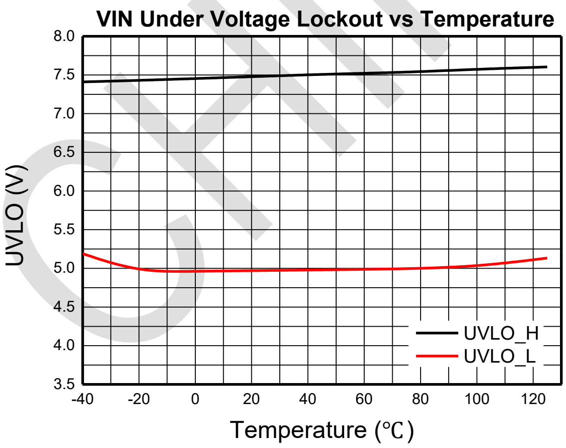
($V_{IN}$=12V, $T_A$=25°C, unless otherwise specified.)

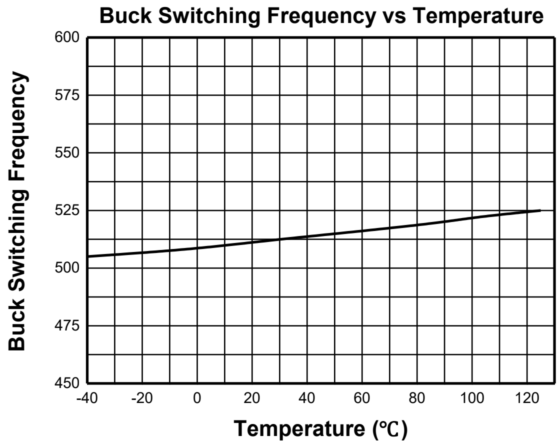


# 10 Detailed Description

## 10.1 Overview

The CN8914 is a 3-channel PMU that includes a HV fixed output synchronous buck converter, an asynchronous boost converter, a high accuracy super-capacitor charger. The fixed output buck outputs 3.3V/800mA. The boost converter could provide up to 12V/450mA output from super capacitor or other backup power supply at 2.5V. The boost output can be enabled via an external resistor. CN8914 also integrates a linear supercapacitor charger with a high accuracy CC and CV mode.

## 10.2 Buck Converter

The 3V3 buck converter use peak current control mode without external compensation, providing excellent transient performance while simplifying external component count and design. The chip can be seamlessly alternated between PSM mode and PWM mode, when activating PSM mode at light load to maintain high efficiency operation, when entering PWM mode at heavy load to provide stable switching frequency, lower ripple and fast transient response. The output of the 3V3 buck converter is fixed at 3.3V.

## 10.3 Boost Converter

CN8914 has a high-efficiency asynchronous boost converter that converts a supercapacitor or other spare 2.5V power to 12V with a maximum output current of 0.45A. The switching frequency is 1M, so small inductors and ceramic capacitors can be used to achieve a small solution.

## 10.4 Charger

The supercapacitor charger integrates constant current and constant voltage functions, and the constant voltage is set to 2.55V.; after the supercapacitor voltage reaches 2.55V, the charging voltage is constant. It is recommended to connect a 100nF capacitor to the charger output to suppress high-frequency noise.

## 10.5 Input Over Voltage Protection

An OVP function protects the IC itself and its downstream system against input surges. When the input voltage is above the OVP threshold, buck converters and boost converter power switches are shut down, and the chip is restarted after the input voltage drops to the OVP recovery threshold.

## 10.6 Over Current Protection

The buck converter will limit the peak inductor current to 1.1A and the inductor valley current to 1A when the overcurrent protection is triggered, and turn off the power switches after 1024 cycles, delay 2048 cycles before soft-start, and if the overcurrent still exists after soft-start, trigger OCP again and enter hiccup mode.

When the boost converter triggers the OCP protection, it will limit the inductor peak current to 3.76A and is turned off the power switch until the next cycle, and so on until the overcurrent disappears.

## 10.7 Thermal Shutdown

CN8914 has a thermal shutdown function to prevent damage to the chip due to excessive temperature. Thermal protection is triggered when the die junction temperature rises to 155°C, it will shut down the buck converters and the boost converter. When the junction temperature drops to 135°C, the chip will restart.

# 11 Application Information

## 11.1 Typical Application

Figure 5 shows a typical application schematic that can be used to evaluate CN8914 performance. This part describes the specific design process of the application schematic.

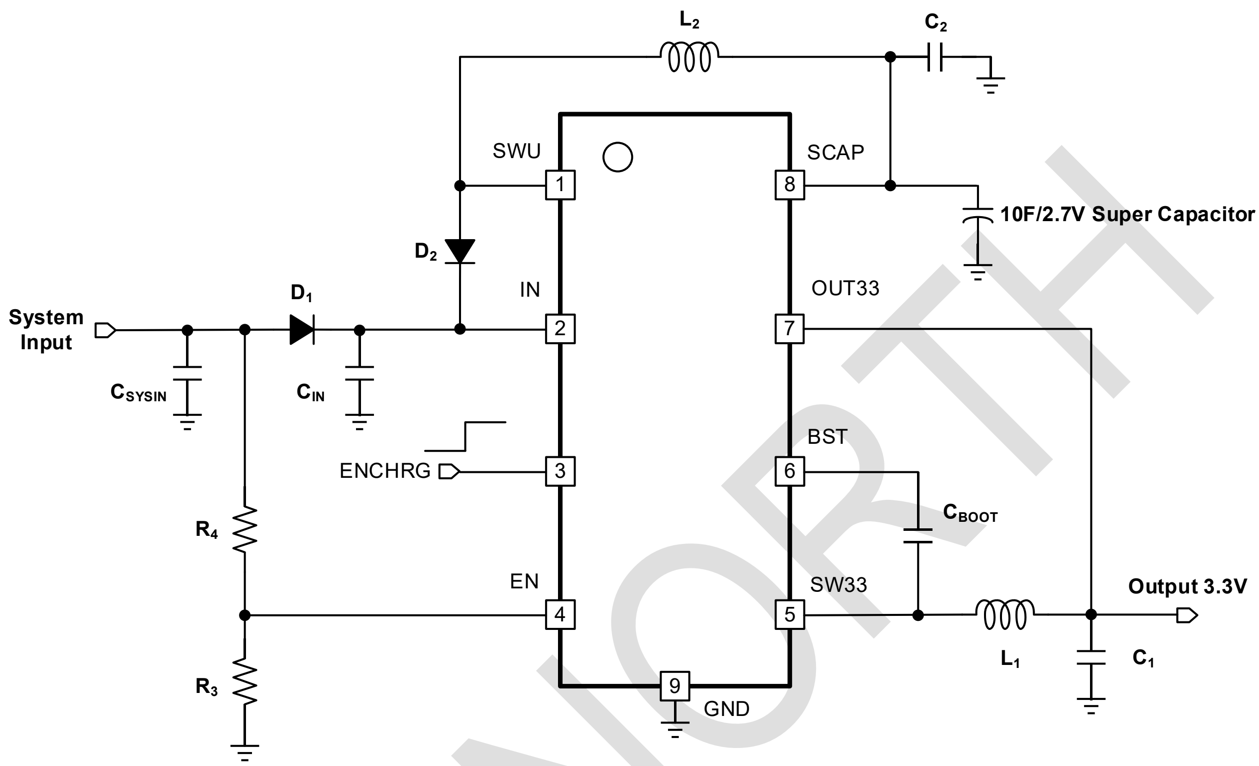



Figure 5 Typical Application

## 11.2 Design Requirements

| Requirement | Min | Typ | Max | Unit |
|---|---|---|---|---|
| 3V3 output voltage | 3.146 | 3.3 | 3.465 | V |
| 12V_BOOST output voltage | 11.4 | 12 | 12.6 | V |
| Input voltage | 10 | 12 | 24 | V |
| 3V3 output ripple | | 50 | | mV |
| BOOST output ripple | | 100 | | |

## 11.3 BUCK Circuit Design

### 11.3.1 Inductor

Recommend the inductor value is 10uH. The inductance value is calculated using the following formula:

$$L = \frac{V_{OUT}}{f_S * \Delta I_L} * (1 - \frac{V_{OUT}}{V_{IN}})$$

- $V_{IN}$ is the input voltage
- $V_{OUT}$ is the output voltage
- $f_s$ is the switch frequency
- $\Delta I_L$ is the peak-to-peak inductor ripple current, typically 30% of the load current
- $I_{OUT}$ is the load current

The main parameter for inductor selection is the saturation current of the inductor, which must be higher than the inductor peak current calculated by the design with an additional 20% margin, which is calculated using the following formula:

$$IL_{PEAK} = I_{OUT} + \frac{(V_{IN} - V_{OUT}) * V_{OUT}}{2 * V_{IN} * L * f_s}$$

The other important parameter is the inductor heat rating current, which must be higher than the load current with an additional 20% margin. On this basis, try to choose an inductor with a lower DC resistance to improve efficiency.

### 11.3.2 Output Capacitor

The selection of output capacitor is important because it directly affects output ripple, loop stability, and upshoot and undershoot during transient response. Recommend to choose ceramic capacitors, a 22uF ceramic capacitor or two 10uF ceramic capacitors in parallel can be selected in typical application. It is also necessary to pay attention to the DC Bias Characteristics.

Since the parasitic ESR and ESL of ceramic capacitors are very small and can be ignored, the output ripple $\Delta V_{OUT}$ is mainly determined by the capacitor value, and the calculation formula is:

$$\Delta V_{OUT} = \frac{V_{OUT}}{f_S * L} * \left(1 - \frac{V_{OUT}}{V_{IN}}\right) * (R_{ESR} + \frac{1}{8 * f_S * C_{OUT}})$$

- $C_{OUT}$ is the output capacitance value
- $R_{ESR}$ is the equivalent series resistance value of the output capacitor

In transient response, when the light load quickly becomes heavy load, the output capacitor needs to supply current to the load before the loop adjusts the inductor current to the appropriate current, and the loop control generally takes at least 4 cycles to respond to the drop of the output voltage. The output capacitance must be large enough to supply the current difference for four clock cycles to maintain the output voltage within the specified range. The minimum output capacitance required to meet the undershoot specification can be calculated using the following equation:

$$C_{OUT} > \frac{4 * (I_{OH} - I_{OL})}{f_s * V_{US}}$$

When a sudden large load decrease happens, the output capacitors absorb energy stored in the inductor, which results in an output voltage overshoot. The minimum capacitance required to keep the voltage overshoot within a specified range can be calculated:

$$C_{OUT} > \frac{{I_{OH}}^2 - {I_{OL}}^2}{(V_{OUT} + V_{OS})^2 - {V_{OUT}}^2} * L$$

- $I_{OH}$ is the high-level output current during load transient
- $I_{OL}$ is the low-level output current during load transient
- $V_{US}$ is the target output voltage undershoot
- $V_{OS}$ is the target output voltage overshoot

### 11.3.3 External Bootstrap Capacitor

CN8914 requires a bootstrap capacitor to supply the drive voltage to the high-side power switch of buck converters. It is recommended to connect a 0.1uF low ESR ceramic capacitor between the Boot33-SW33 and Boot-SW.

## 11.4 BOOST Circuit Design

### 11.4.1 Inductor

For typical application, a 4.7uH inductor is recommended. As with buck, Boost needs to consider inductance value, saturation current and heat rating current. Inductance value is calculated using the following formula:

$$D = \frac{V_{OUT} - V_{IN}}{V_{OUT}}$$

$$I_L = \frac{I_{OUT} * V_{OUT}}{V_{IN} * \eta}$$

$$L = \frac{(V_{OUT} - V_{IN}) * D}{\Delta I_L * f_s}$$

- D is the duty cycle
- $I_L$ is the inductor peak current
- $V_{OUT}$ is the output voltage
- $V_{IN}$ is the input voltage
- $I_{OUT}$ is the load current
- η is the efficiency of Boost converter
- $\Delta I_L$ is the inductor ripple current, typically 30% of the average inductor current
- $f_s$ is the switching frequency

The saturation current of the inductor must be higher than the peak inductor current calculated by the design with an additional 20% margin, and the inductor peak current is calculated using the following equation:

$$\Delta_{IL} = \frac{1}{\left\{L * f_s * \left(\frac{1}{V_{OUT} - V_{IN}} + \frac{1}{V_{IN}}\right)\right\}}$$

$$IL_{PEAK} = I_L + \frac{\Delta_{IL}}{2}$$

The other important parameter is the inductor heat rating current, which must be higher than the load current with an additional 20% margin. On this basis, try to choose an inductor with a lower DC resistance to improve efficiency.

### 11.4.2 Rectifier Diode Selection

To achieve high efficiency, a Schottky type must be used for the rectifier diode, its reverse rated voltage must be higher than the converter's maximum output voltage, and the forward average current must be greater than the maximum output current.

The average forward current of a Schottky diode is equal to the output current, and it is recommended that the average Schottky current be 2 times the output current, and the Schottky peak current needs to be higher than the inductor peak current with at least 20% margin.

### 11.4.3 Output Capacitor Selection

For typical applications, one 22uF ceramic capacitor or two 10uF ceramic capacitors in parallel are recommended.

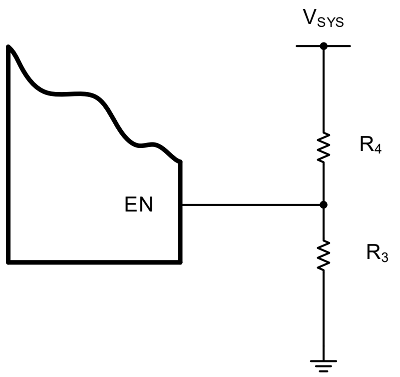
Since the parasitic ESR and ESL of ceramic capacitors are very small and can be ignored, the output ripple ΔVO is mainly determined by the capacitor capacity, and the calculation formula is:

$$\Delta V_{OUT\_C} = \frac{I_O}{(f_s * C_{OUT})} * \left(1 - \frac{V_{IN}}{V_{OUT}}\right)$$

### 11.4.4 Power System Power-down Threshold Setting

The power system power-down threshold can be set by the R3 and R4 resistors and is calculated as follows:

$$V_{PowerDown} = \frac{R_4 + R_3}{R_3} * 1.34$$




## 11.5 Bom List

| Symbol | Description | Manufacturers | Part Number | Qty |
|---|---|---|---|---|
| $C_{IN}$, $C_1$ | 22uF, 25V, X5R, ±20%, 0805 | TDK | C3216X5R1V226MTJ00E | 2 |
| $R_3$ | 12K, ±1%, 0603 | UNI-ROYAL(厚声) | 0603WAF1202T5E | 1 |
| $R_4$ | 68K, ±1%, 0603 | UNI-ROYAL(厚声) | 0603WAF6802T5E | 1 |
| $D_1$ | 500mV@1A, Vr=40V, Io=1A | GOOD-ARK(固锝) | SK14 | 1 |
| $D_2$ | 550mV@5A, Vr=40V, Io=5A | GOOD-ARK(固锝) | SK54 | 1 |
| $L_2$ | 4.7uH±20%, Irms=4A, Isat=6.2A, DCR=48.4mΩ | TDK | SPM6530T-4R7M-HZR | 1 |
| $C_2$ | 1uF/25V, X5R, ±10%, 0603 | Murata Manufacturing | GRM188R61E105KA12D | 1 |
| Super Capacitor | 10F, -10%~+30%, 2.7V, 35mΩ, 20uA@72hrs | Ymin | SDL2R7L1061025 | 1 |
| $C_{BOOT}$ | 100nF, 100V, X7R, ±10%, 0603 | Murata Manufacturing | GCM188R72A104KA64D | 1 |
| $L_1$ | 10uH, ±20%, Rated current 3.4A, 30mΩ, SMD | TDK | TU-B82464G4103M000 | 1 |

## 11.6 PCB Layout Guidelines

For all switching power supplies, the layout is an important step, especially in the case of high peak currents and high frequencies, and the careful layout may affect the stability of the converter and electromagnetic interference. Here are some suggestions for place-and-route:

### 11.6.1 BUCK Converter

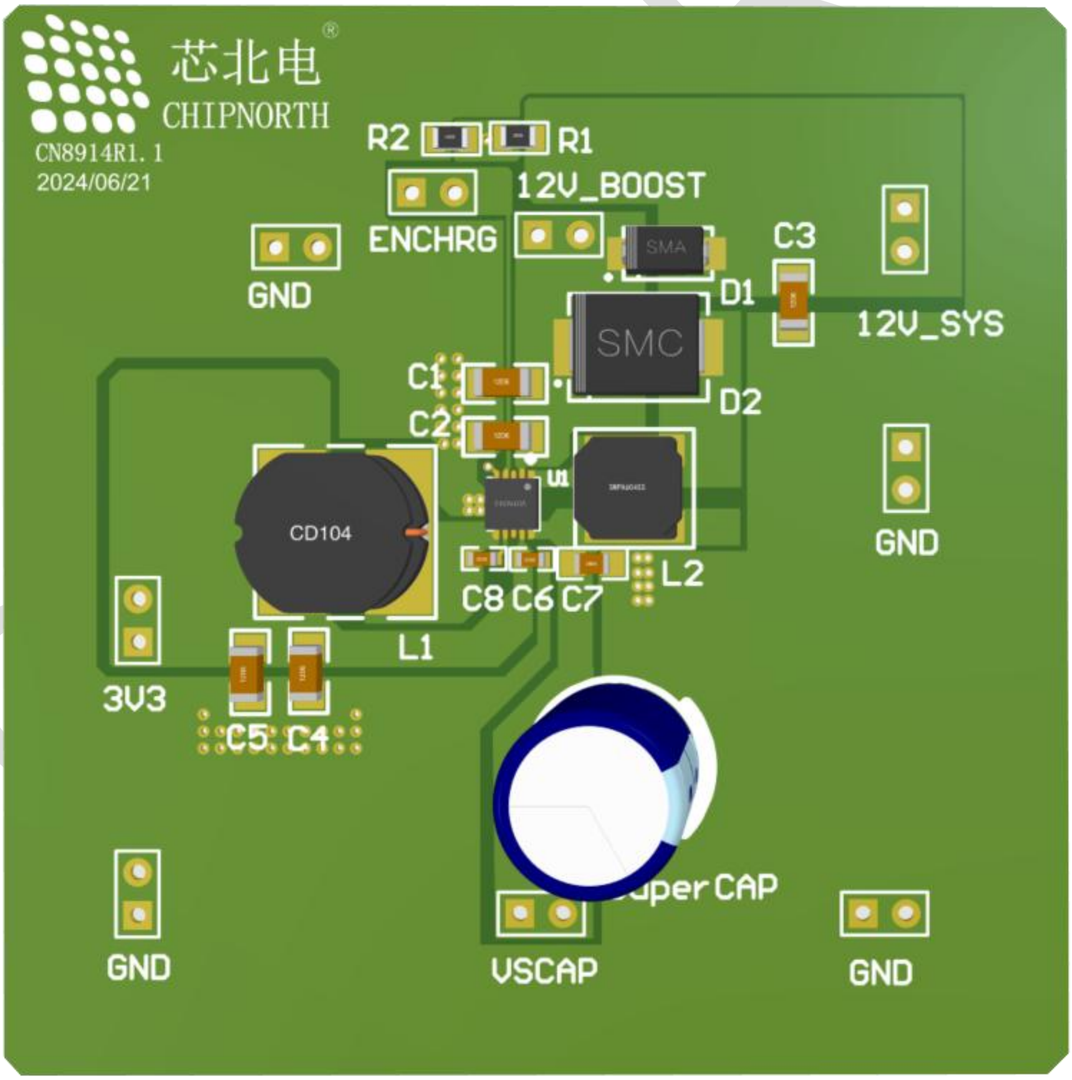
- The upper and the lower switch conduction loop should be as small as possible, especially the common loop of the upper and the lower switch parasitic diode should be small, the specific method is that the input capacitor, especially the small capacitor (such as 100nF) should be close to the VIN and GND of the chip, and the output capacitor should be close to the inductor and the chip GND
- The inductor should be placed close to the SW
- Vout feedback lines are kept away from interference sources such as inductor and SW, and ground wires are shielded and filtered on both sides of the traces

- The signal part and the power part should be separated, to avoid interference by the electromagnetic coupling of the power loop, refer to the datasheet is separated up and down, the signal part is below, and the power part is above
- The ground floor is as complete as possible, with less cutting
- Input and output positive and negative terminals should be placed close to the input and output capacitors, especially the GND terminal, which cannot be placed arbitrarily, which will affect the actual path of current return and affect the layout effect
- In addition, the point that needs to add power or signal, the point to be measured, it is best to lead out and connect to the terminal, convenient for testing, pay attention to these connections do not go arbitrarily, but also refer to the above principles to avoid interference and interference

### 11.6.2 BOOST Converter

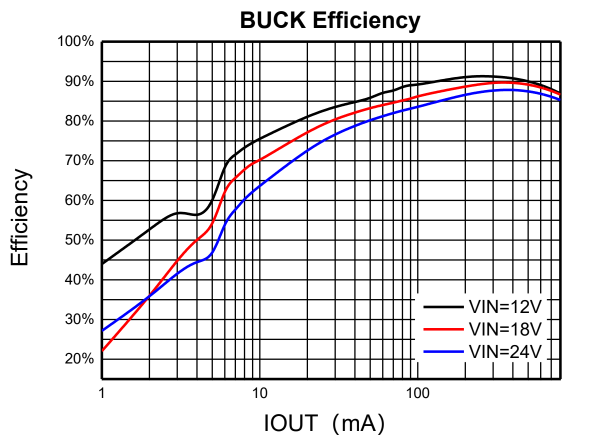
- Priority is given to ensuring that the ground terminal of the output capacitor is close to the GND of the IC and through the vias to the ground plane, the positive terminal of the output capacitor is close to the negative terminal of the diode, and the positive terminal of the diode is placed close to SW
- Place both ends of the inductor as close as possible to the power supply of the input capacitor and SW

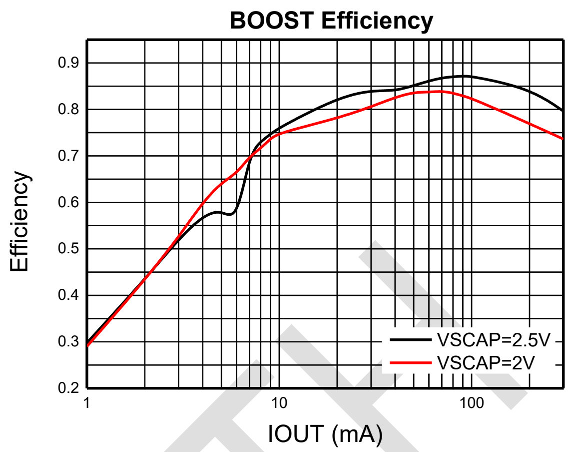
### 11.6.3 Layout

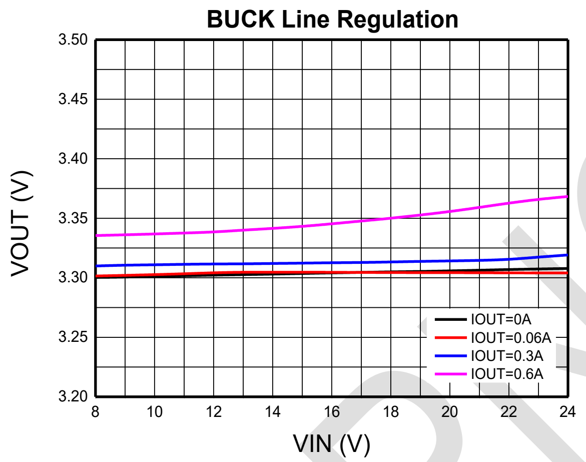


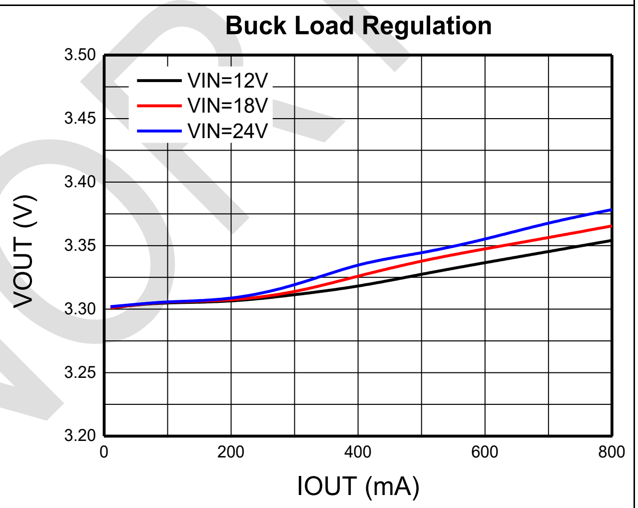
## 11.7 Basic performance

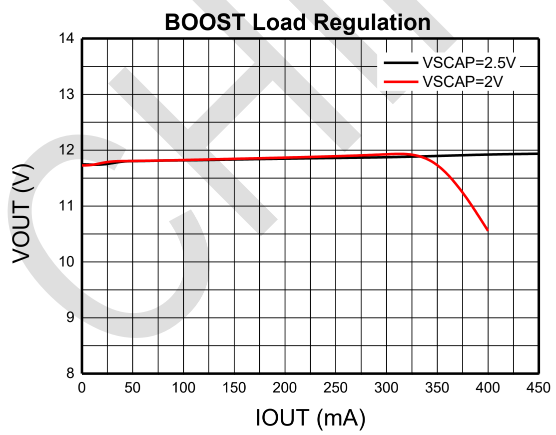
($V_{IN}$=12V, $T_A$=25°C, unless otherwise specified.)

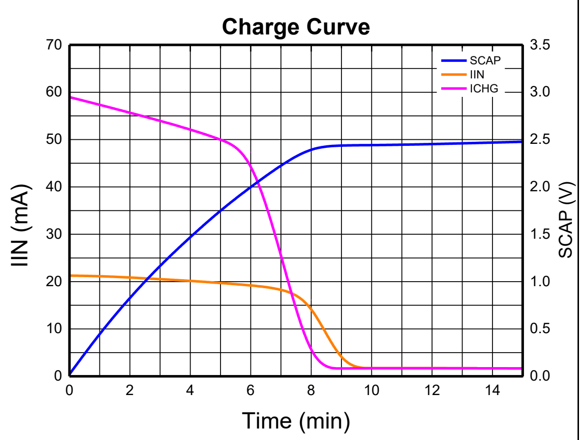


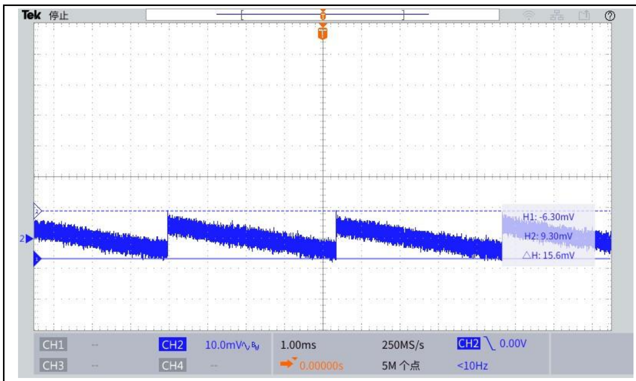



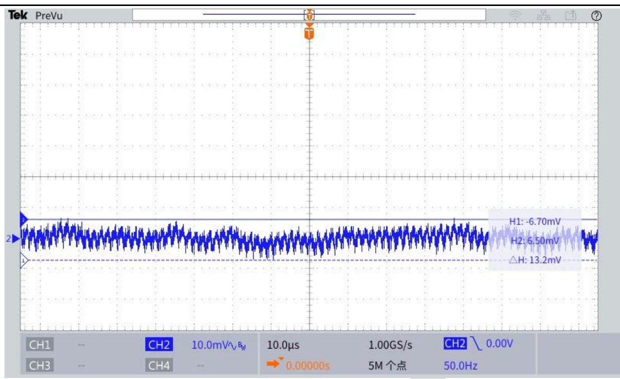



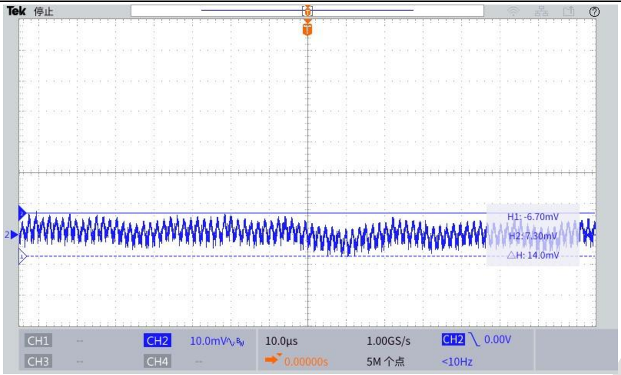





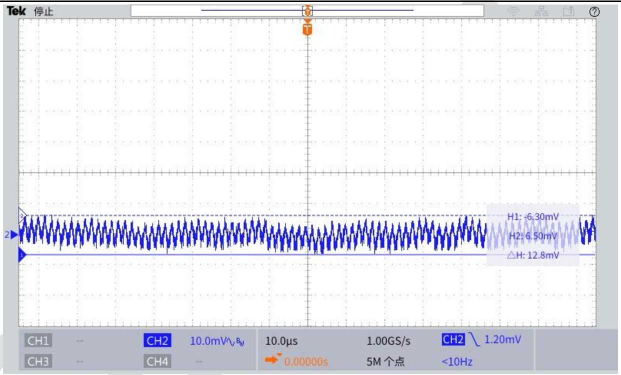

3V3 Ripple,IOUT=0



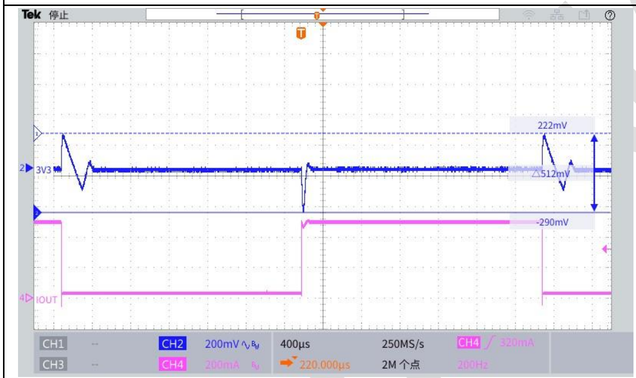

3V3 Ripple,IOUT=0.08A



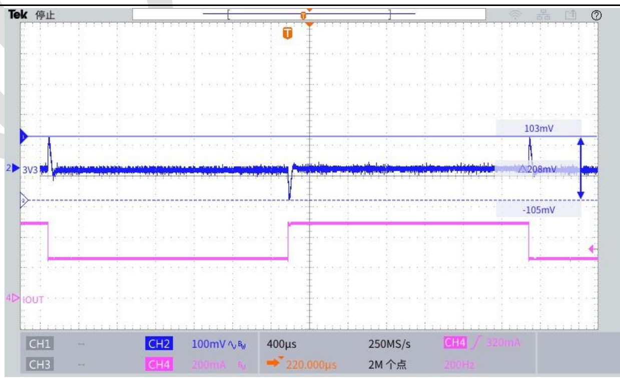

3V3 Ripple,IOUT=0.4A



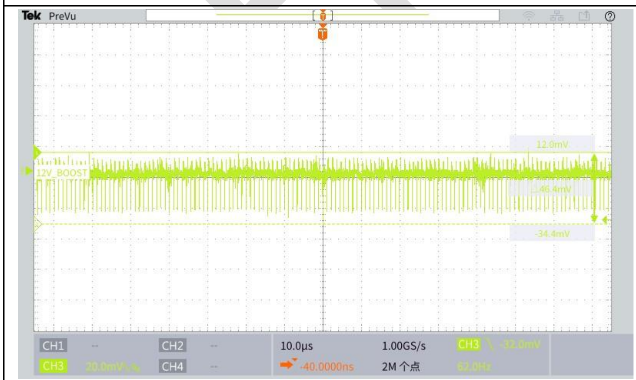

3V3 Ripple,IOUT=0.8A




3V3 Load Transient,IOUT=50mA-500mA,0.3A/us

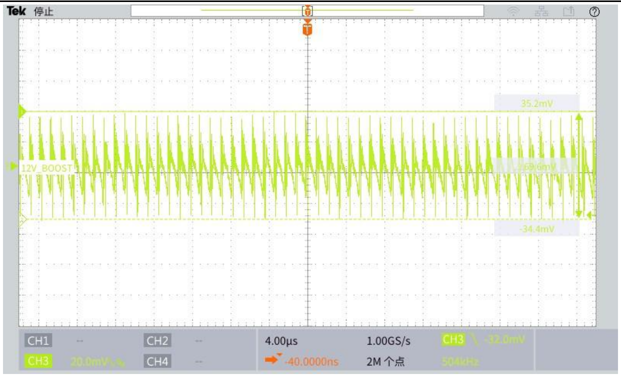



3V3 Load Transient,IOUT=250mA-500mA,0.3A/us




12V Ripple,SCAP=2.5V,IOUT=0A


12V Ripple,SCAP=2.5V,IOUT=0.1A




12V Ripple,SCAP=2.5V,IOUT=0.2A

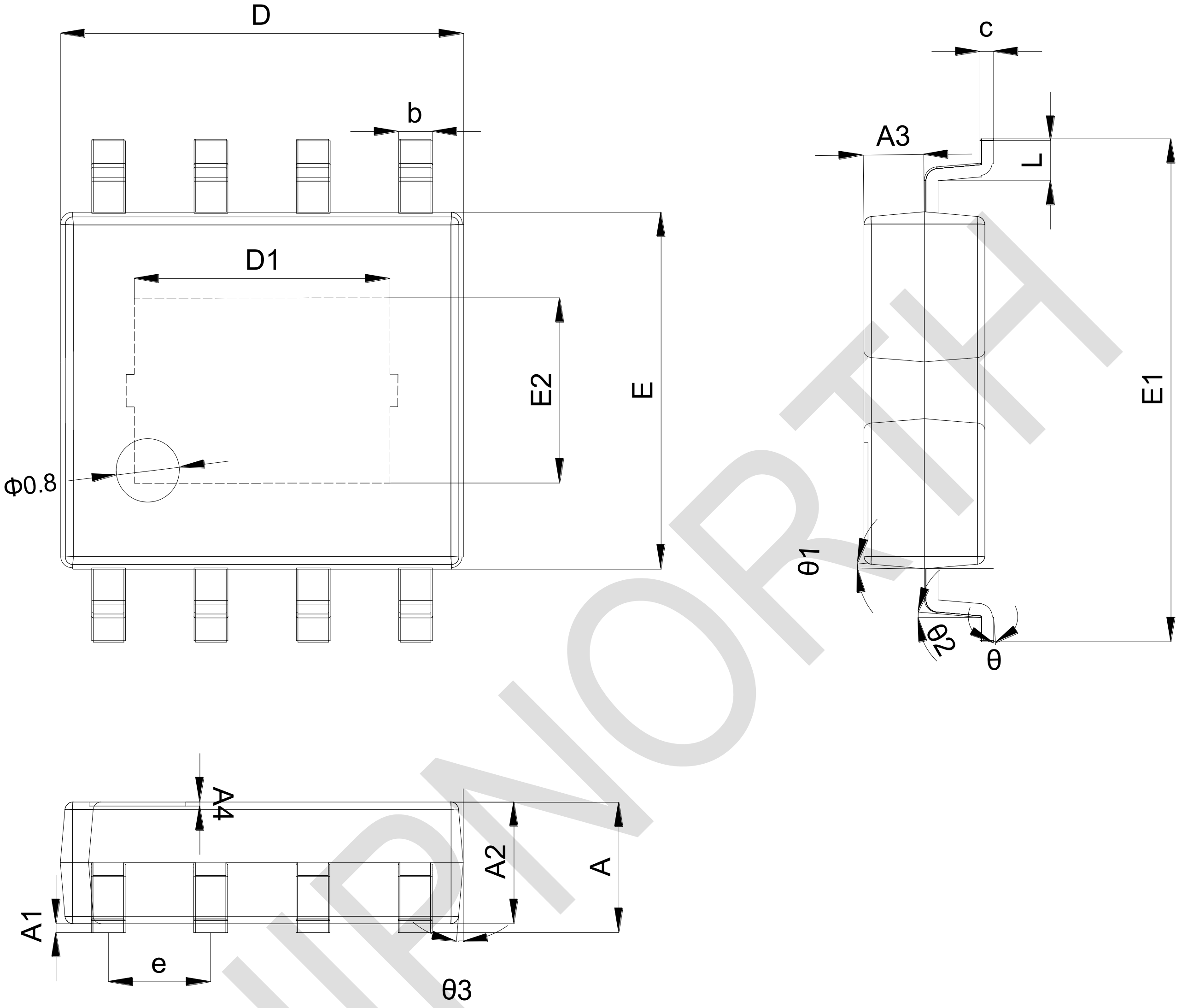

12V Ripple,SCAP=2.5V,IOUT=0.3A


12V Load Transient,SCAP=2.5V,IOUT=30mA-300mA,0.3A/us


12V Load Transient,SCAP=2.5V,IOUT=20mA-200mA,0.3A/us

## 12 Package Information

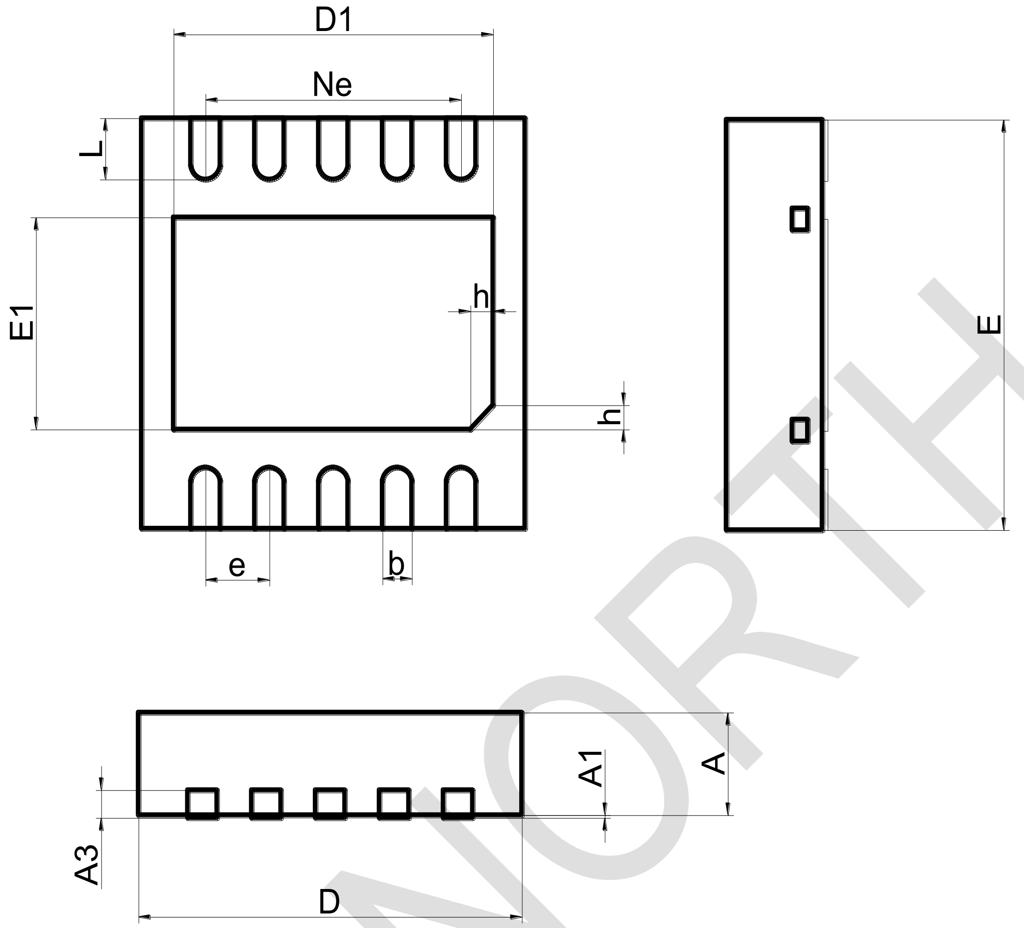
**ESOP8L**



| Symbol \ Dimension | Min (mm) | Nom (mm) | Max (mm) |
|---|---|---|---|
| A | 1.300 | 1.500 | 1.700 |
| A1 | 0.000 | 0.100 | 0.150 |
| A2 | 1.350 | 1.420 | 1.550 |
| A3 | 0.645 | 0.670 | 0.695 |
| A4 | 0.020 | -- | 0.050 |
| c | 0.170 | 0.203 | 0.250 |
| E | 3.800 | 3.900 | 4.000 |
| E1 | 5.800 | 6.000 | 6.200 |
| L | 0.450 | 0.600 | 0.750 |
| b | 0.330 | 0.400 | 0.510 |
| D | 4.800 | 4.900 | 5.000 |
| e | 1.270BSC | | |
| θ | 0° | 3° | 8° |
| θ1 | 12°REF | | |
| θ2 | 5°REF | | |
| θ3 | 12°REF | | |

| L/F Size (mil) | Symbol \ Dimension | Min (mm) | Nom (mm) | Max (mm) |
|---|---|---|---|---|
| 95*130 | D1 | 3.072 | 3.172 | 3.272 |
| | E2 | 2.183 | 2.283 | 2.383 |

**DFN3X3-10L**




| Dimension / Symbol | Min (mm) | Nom (mm) | Max (mm) |
|---|---|---|---|
| A | 0.700 | 0.750 | 0.800 |
| A1 | 0.000 | 0.020 | 0.050 |
| A3 | 0.203REF | | |
| D | 2.900 | 3.000 | 3.100 |
| E | 2.900 | 3.000 | 3.100 |
| D1 | 2.400 | 2.500 | 2.600 |
| E1 | 1.450 | 1.550 | 1.650 |
| h | 0.200 | 0.250 | 0.300 |
| b | 0.180 | 0.230 | 0.300 |
| e | 0.500BSC | | |
| Ne | 2.000BSC | | |
| L | 0.300 | 0.400 | 0.500 |

## 13 Important Statement

Chipnorth Electronic Technology (Nanjing) Co., Ltd. and its subsidiaries reserve the right to make modifications, improvements, corrections, or other changes to this document and to any of the products described herein at any time without notice. Chipnorth Electronic Technology (Nanjing) Co., Ltd. disclaims any liability arising out of the use of this document or any of the products described herein; Chipnorth Electronic Technology (Nanjing) Co., Ltd. does not transfer any license to its patents or trademarks or other rights. Any customer or user using this document or any of the products described herein assumes all risk and agrees to hold harmless Chipnorth Electronic Technology (Nanjing) Co., Ltd. and all companies whose products are displayed on Chipnorth Electronic Technology (Nanjing) Co., Ltd.

Chipnorth Electronic Technology (Nanjing) Co., Ltd. makes no warranty and assumes no responsibility for any products purchased through unauthorized sales channels. In the event that a customer purchases or uses a product from Chipnorth Electronic Technology (Nanjing) Co., Ltd. for any unintended or unauthorized use, the customer shall indemnify and hold harmless Chipnorth Electronic Technology (Nanjing) Co., Ltd. and its representatives from and against all claims, damages, and attorney's fees arising from any personal injury or death, directly or indirectly, arising out of or in connection with such purchase or use.

## 14 Revision History

| Date | Version Number | Revision Notes |
|---|---|---|
| 2026/09/11 | R1.2 | 1、Update Absolute Maximum Ratings<br>2、Update Operating Conditions<br>3、Update Overview |