

Automotive 100 V, 1 A synchronous step-down converter



HSOP-8L

Maturity status link

[DCP10001Y](#)

Features

- 6 V to 100 V input voltage range
- Supports 36 V, 48 V, 60 V, 72 V electric battery packs
- 1.5 V to 30 V output voltage range
- AEC-Q100 Grade 1 qualified
- Compliant to IPC-2221B Requirements for clearance and creepage
- Programmable switching frequency from 100 kHz to 1 MHz
- 1.5% output voltage accuracy (all temperature range)
- 750 [mΩ] / 300 [mΩ] integrated power MOSFETs
- V²COT control mode architecture
- 14 μA no-load input quiescent current
- Dithering for EMI reduction
- Three different versions: 1 A, 0.7 A and 0.5 A
- Efficiency at 1 A load
 - 92% for 48 V to 12 V @ 400 kHz conversion
- Fixed 3.8 ms internal soft start timer
- Over current protection (OCP), Over-voltage protection (OVP), and over-temperature protection (OTP)
- Operating temperature range: -40 °C to 150 °C

Applications

- Battery electric vehicle control supply
- EV GPS tracker

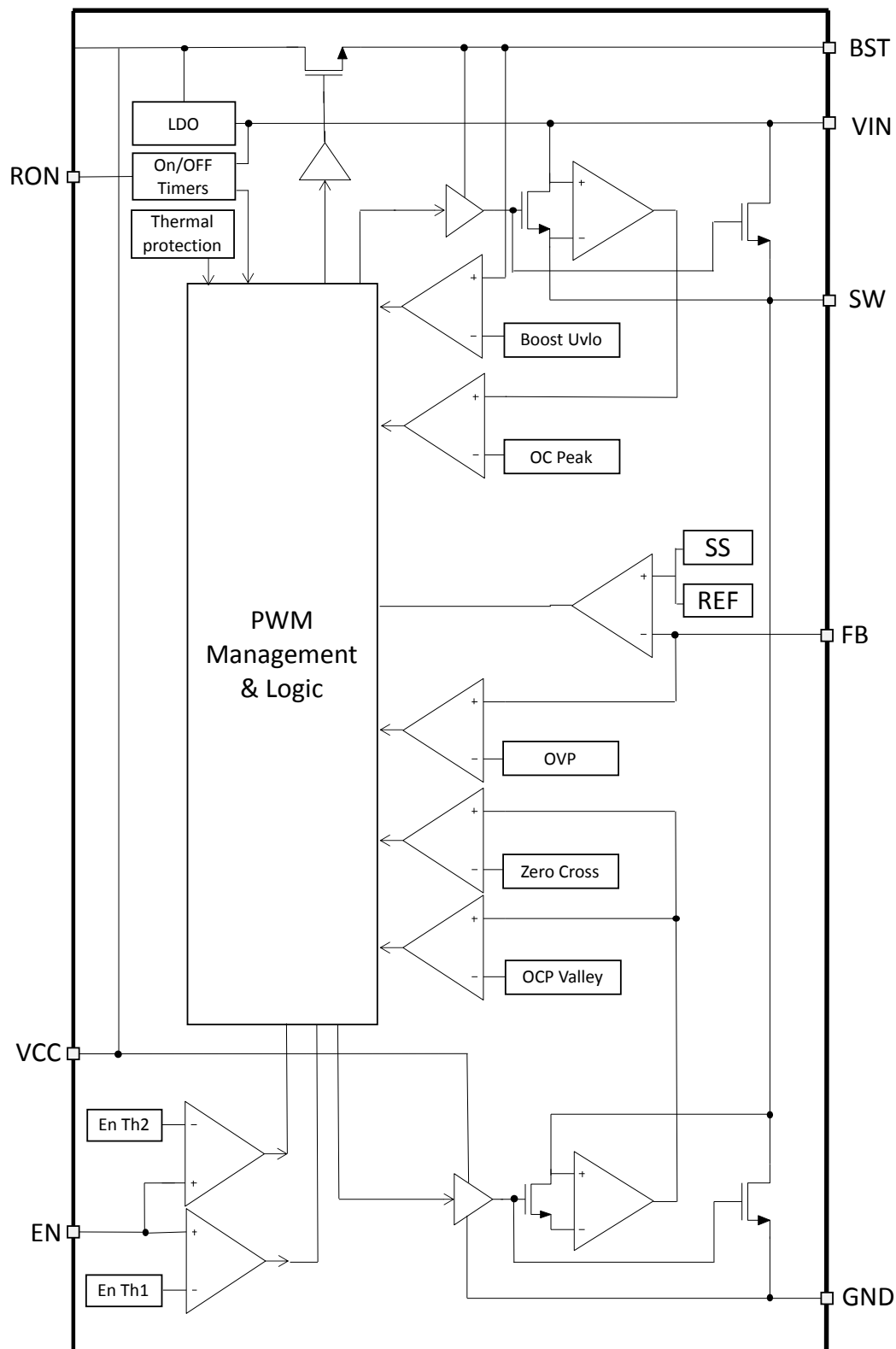
Description

The **DCP10001Y** is a user-friendly synchronous monolithic step-down converter, capable of delivering up to 1 A of direct current to the load. Its wide input voltage range makes it suitable for a diverse array of applications. Built on a V²COT (Voltage Mode Constant On-Time) architecture, the **DCP10001Y** ensures excellent load transient performance while maintaining a fixed switching frequency.

This device is qualified to automotive AEC-Q100 grade1 and is available in HSOP-8L 4x4, providing flexibility for integration into various designs. In shutdown mode, the **DCP10001Y** consumes less than 1 μA. When the EN pin is pulled high, the device is enabled, initiating an internal 3 ms soft start sequence. To minimize electromagnetic interference (EMI), Spread Spectrum technology is employed. The **DCP10001Y** is equipped with a comprehensive set of protections to ensure safe and reliable operation: Over current (OCP), Over output voltage (OVP) and Over Temperature (OTP).

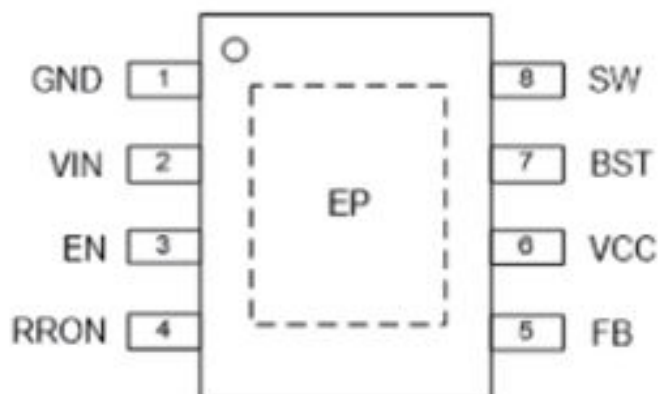
1 Diagram

Figure 1. Block diagram



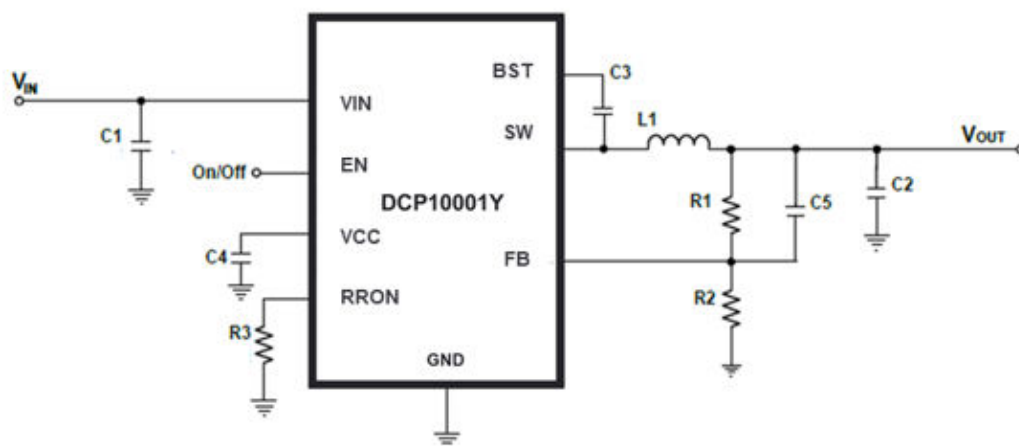
2 Pin connections

Figure 2. Pin configuration (top view)



3 Typical application circuit

Figure 3. Typical application



4 Functional description

4.1 Overview

The DCP10001Y is an automotive-grade monolithic step-down regulator, qualified to AEC-Q100 Grade 1 standards, capable of delivering up to 1 A of direct current to the load. Its wide input voltage range makes it suitable for a broad range of applications.

To achieve a wide input voltage range from 6 V to 100 V, the DCP10001Y utilizes a V²COT compensation loop. This architecture combines the fast load transient response benefits of a constant-on-time (COT) compensation network with the controlled ripple characteristics of fixed PWM switching loops.

With an internal reference voltage of 0.8 V, the device can precisely regulate output voltages ranging from 1.5 V to 30 V, maintaining an output voltage accuracy better than $\pm 1.5\%$ across variations in line, load, and temperature.

The DCP10001Y integrates low $R_{DS(on)}$ N-channel MOSFETs, with typical values of 350 m Ω for the low-side (LS) and 750 m Ω for the high-side (HS), to maximize full-load efficiency. Frequency dithering is consistently implemented to enhance EMI performance.

A single resistor connected to the Ron pin and grounded determines the Ton, thus selecting the application's switching frequency, which can range from 100 kHz to 1000 kHz.

For low current conditions, a SLEEP mode is activated, allowing the device to shut down internal blocks to achieve a quiescent current of 14 μ A and high efficiency. Transitions between Sleep, DCM, and CCM modes are rapid to ensure stable output voltage.

The dedicated enable pin (EN) provides straightforward control over power sequencing. When the EN pin is pulled low, the device enters a shutdown state, reducing the total bias current from V_{IN} to less than 1 μ A (typical).

5 Package information

To meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions, and product status are available at: www.st.com. ECOPACK is an ST trademark.

5.1 Power SO8 package information

Figure 4. Power SO8 package outline

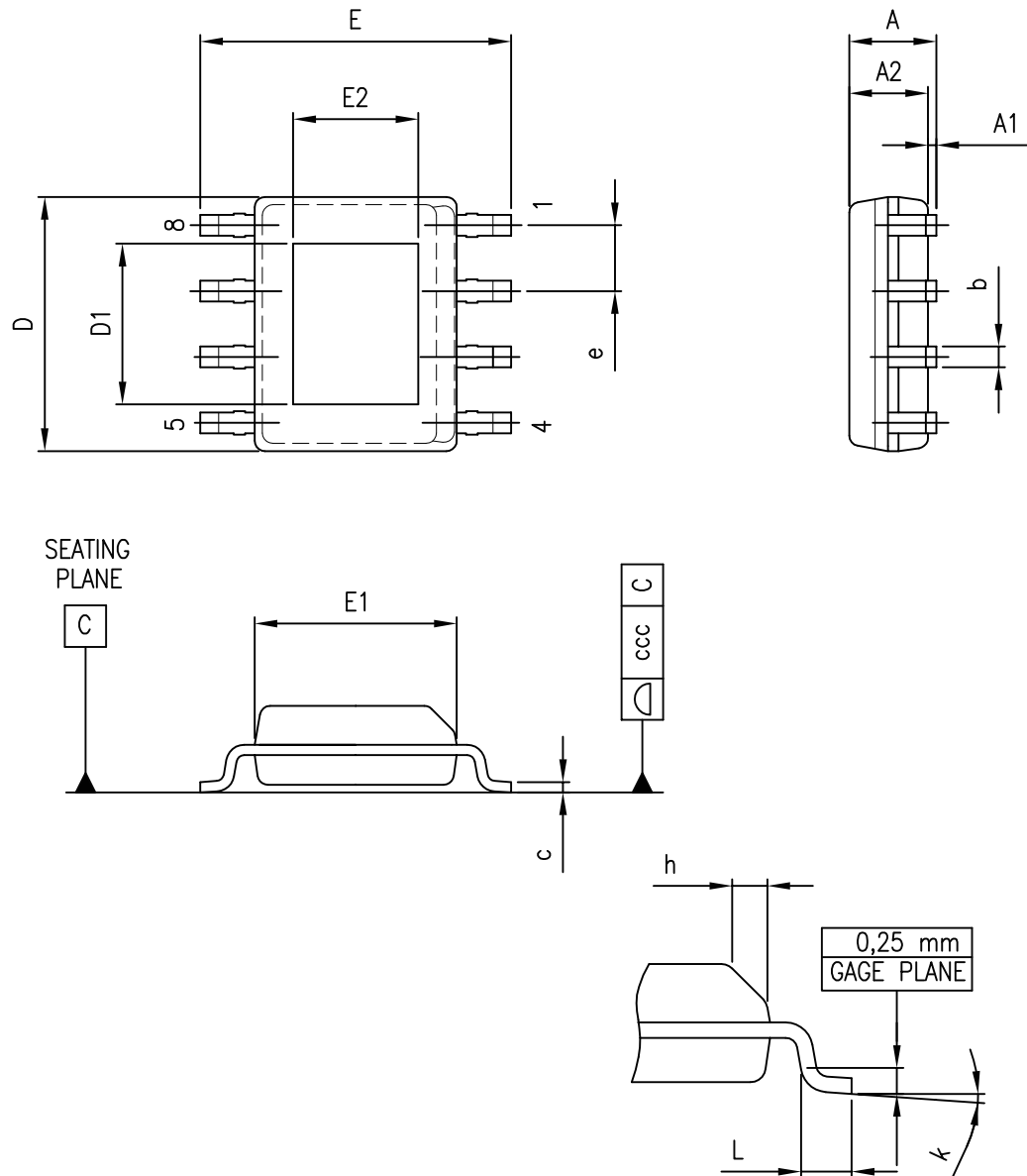


Table 1. Power SO8 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			1.70
A1	0.00		0.15
A2	1.25		
b	0.38		0.51
c	0.17		0.25
D	4.80	4.90	5.00
D1	3.10	3.30	3.50
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
E2	2.20	2.40	2.60
e		1.27	
h	0.30		0.50
L	0.45	0.60	0.80
k	0		8
ccc			0.10

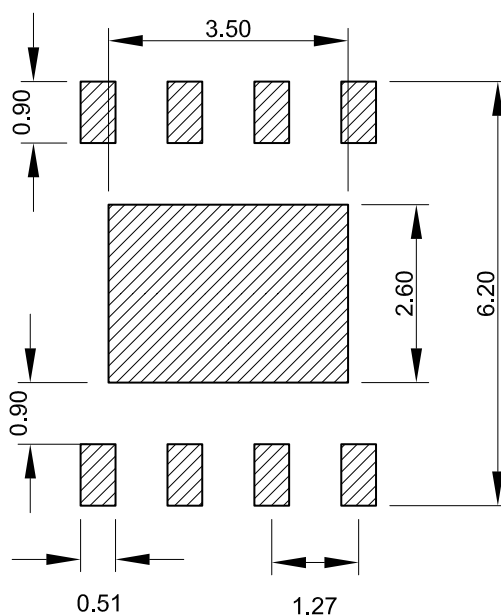
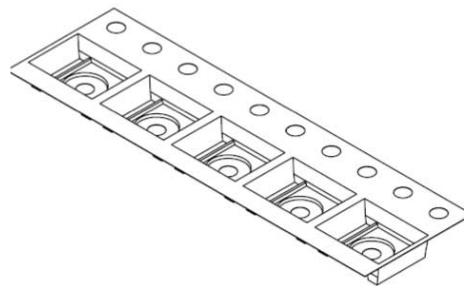
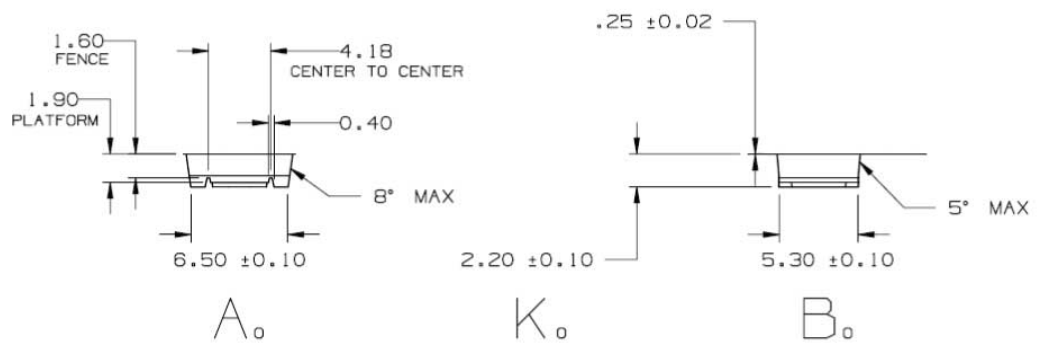
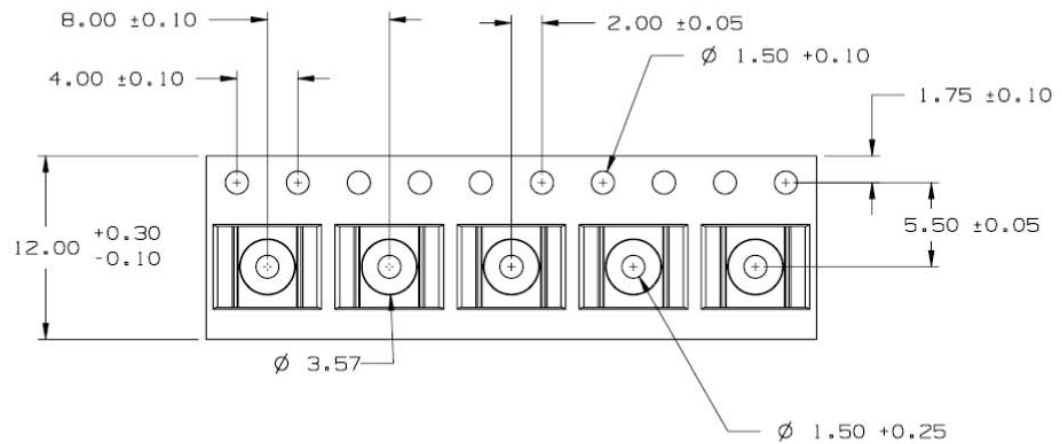
Figure 5. Power SO8 recommended footprint


Figure 6. Power SO8 tape and reel



Revision history

Table 2. Document revision history

Date	Revision	Changes
31-Jul-2026	1	Initial release.

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