



NXP automotive-grade, low-resolution LCD segment driver PCA8561

Compact, AEC-Q100 LCD segment driver for small displays

Housed in a tiny HVQFN32 package with wettable flanks, this highly integrated, automotive-qualified LCD segment driver fits in exceptionally small spaces, so it's ideal for use with low-resolution displays in vehicles, small appliances, and low-power, battery-operated applications.

KEY FEATURES

- ▶ 18 segment and 4 backplane outputs to drive
 - Up to 72 display elements or icons
 - Up to 9 seven-segment numeric characters
 - Up to 4 fourteen-segment alphanumeric characters
- ▶ HVQFN32 package (5 x 5 x 0.85 mm; 0.5 mm pitch)
- ▶ V_{DD} and V_{LCD} with independent supplies (range: 1.8 to 5.5 V)
- ▶ Multiplex drive mode selectable for static, 1:2, 1:3 and 1:4
- ▶ Display bias configuration selectable for static, 1/2 and 1/3
- ▶ Display inversion mode selectable for line (driving scheme A) and frame inversion (driving scheme B)
- ▶ Selectable internal or external clock via input pin CLK
- ▶ Programmable frame frequency from 32 to 256 Hz
- ▶ Selectable power-on-reset (POR) functionality via input pin PORE
- ▶ Hardware reset input pin RST
- ▶ Blinking functionality and selectable blinking frequencies
- ▶ Programmable power drive boost mode to increase driving capability of LCD outputs and support large displays with higher effective capacitance
- ▶ Ultra-low power ($I_{DD} + I_{LCD}$):
 - 50 nA (typ) in power-down mode
 - 1.2 μ A (typ) in static mode and all segments ON
 - 4.1 μ A (typ) in mux 1:4 and all segments ON

- ▶ ESD Human Body Model (HBM) up to ± 2 kV
- ▶ Temperature range: -40 to $+105$ °C
- ▶ AEC-Q100 grade 2 compliant

KEY BENEFITS

- ▶ Automotive grade up to 105 °C
- ▶ Very small footprint
- ▶ Cost-effective optical inspection
- ▶ Low power
- ▶ Low cost
- ▶ High reliability
- ▶ Plug-and-play simplicity
- ▶ Suitable for a wide selection of LCDs

APPLICATIONS

- ▶ Automotive displays for climate control, secondary displays in the instrument clusters, rear seat control, etc.
- ▶ Consumer healthcare
- ▶ Small appliances
- ▶ Wearable devices
- ▶ Battery-operated devices



The NXP PCA8561 is a single-chip LCD controller and driver with integrated oscillator, bias generation, and instruction decoding. It is available in two versions: the AHN version has a 2-line I²C interface that operates at up to 400 kHz, and the BHN version has a 3-line SPI interface that operates at 3 MHz. Both versions are housed in a tiny HVQFN32 package that measures just 5 x 5 x 0.85 mm, with a pitch of 0.5 mm.

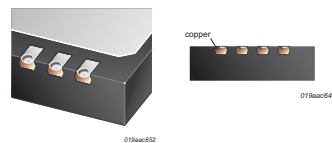
The HVQFN package fits where a standard TSSOP doesn't. For example, the PCA8561 is small enough to be mounted inside a small knob in the car's climate-control panel to display the temperature settings. This enables a mechanically reliable design and a superior industrial design, since the knobs can be mounted in the most convenient place without restrictions.

The HVQFN (DFN5050-32) package has wettable flanks, and that makes visual inspection easier and more cost-effective. The exposed edge of each terminal contains a small plated cavity, ensuring the solder flows into it and adheres to the side of the terminal. Non-wetting of the sides can be detected easily during optical inspection.

In systems that use a microcontroller for to support a TFT display, in the instrument cluster, for example, the microcontroller may not have enough resources to drive additional displays. The PCA8561 can be used to drive the passive LCDs used in secondary displays.

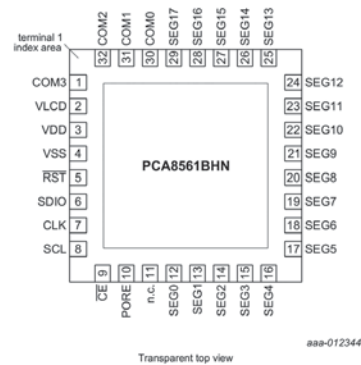
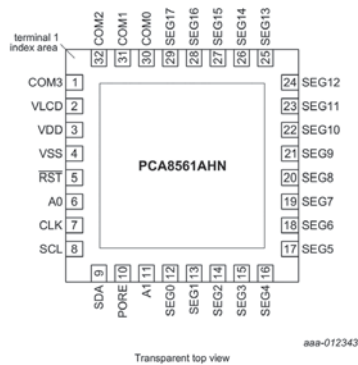
The PCA8561 offers a programmable frame frequency up to 256 Hz and a V_{LCD} up to 5.5 V, so it can be used to drive Vertical Alignment (VA) displays that have high contrast and a wide viewing angle. Optical performance can be further enhanced by programming a lower multiplex rate.

Beyond automotive applications, the small footprint and ultra-low power make the PCA8561 an excellent choice for driving the small displays found in many battery-operated devices in medical and healthcare applications. Other applications including driving an LED or an electro-acoustic converter, such as a buzzer or speaker, or even implementing a charge pump to generate an external V_{LCD} higher than V_{DD} .



Wettable flanks on the HVQFN package make visual inspection easier

PCA8561 pinouts for I²C (AHN) and SPI (BHN) versions



Selection guide

Type	Package and size	Marking	Interface	Delivery format
PCA8561AHN	HVQFN32: 5 x 5 x 0.85 mm; pitch 0.5 mm	PCA8561A	I ² C (400 kHz)	Tape and Reel
PCA8561BHN	HVQFN32: 5 x 5 x 0.85 mm; pitch 0.5 mm	PCA8561B	SPI (3 MHz)	Tape and Reel

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