

NXP 60 x 8 LCD segment driver PCA9620 for automotive & industrial

LCD high-drive segment driver for automotive & industrial applications

With the PCA9620, NXP expands its proven portfolio of LCD segment drivers into high-end applications. Optimized for use in automotive and demanding industrial applications, it delivers the kinds of features typically associated with larger dot-matrix drivers in a single LQFP80 package.

Key features

- ▶ AEC-Q100 grade 2 compliant qualification
- ▶ Extended operating temp range (-40 to +105 °C)
- ▶ Integrated charge pump for on-chip, factory-calibrated V_{LCD} voltage generation up to 9.0 V
- ▶ Integrated sensor for on-chip V_{LCD} temp compensation and digital temp read-back
- ▶ Software-programmable frame frequency: 60 to 300 Hz, step size 10 Hz, factory calibrated
- ▶ Software programmable backplane drive configuration: static, 2, 4, 6, or 8 backplane multiplexing
- ▶ Software-programmable bias voltage generation: 1/2, 1/3, and 1/4 bias
- ▶ Software-programmable inversion scheme for LCD driving waveforms: frame or line inversion
- ▶ 480-bit display data RAM to drive up to 480 display elements of any shape including dot matrices and icons
- ▶ Software-programmable linear temp compensation of V_{LCD} : 8 different temp slopes, 4 temp regions
- ▶ Wide LCD supply range: from 2.5 V for low-threshold LCD up to 9.0 V for high-threshold Twisted Nematic and Vertical Alignment LCD

Applications

- ▶ Automotive
 - Instrument cluster
 - Car radio
 - Climate control units
- ▶ Industrial
 - Machine control systems
 - Measuring equipment
- ▶ Signage
 - Information boards
 - Panels

Housed in a single LQFP80 package, this rugged device supports demanding automotive and industrial applications. It has a AEC-Q100 grade 2 compliant qualification, and supports 60 x 8 LCD displays with up to 480 elements.

The device can drive almost any LCD with low multiplex rates. It generates the drive signals for static or multiplexed LCD containing up to 8 backplanes, 60 segments, and 480 elements. The PCA9620 is compatible with most microcontrollers and communicates via the two-line bidirectional 400 kHz I²C-bus. Communication overhead



is minimized using an on-chip display RAM with auto-incremented addressing and display memory switching.

The integrated charge pump (booster circuitry) of the PCA9620 permits the programming of any LCD supply voltage in the range from 2.5 to 9.0 V. Therewith, a single (e.g. 3.3 V) external supply allows to generate an LCD supply voltage of up to 9.0 V. The corresponding LCD bias voltages are generated by the internal bias voltage generator.

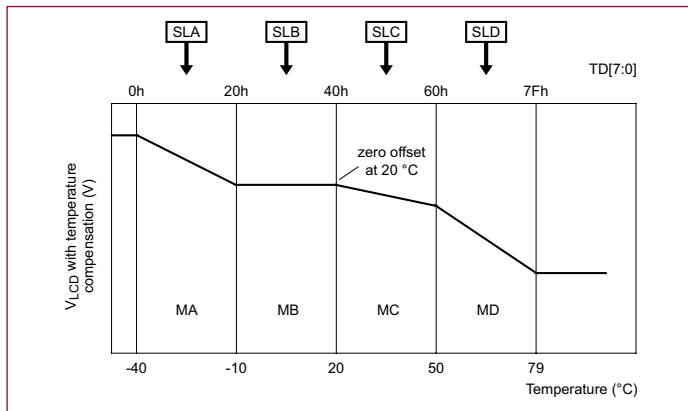
The PCA9620 features an LCD supply voltage temperature compensation circuitry that makes it possible to automatically offset the temperature dependency of the liquid crystal material. The system is based on a temperature sensor and four equally sized temperature regions. A different temperature coefficient can be applied to each of these

regions (parameters MA, MB, MC, and MD), whereas for each coefficient one of eight different slopes can be selected (parameters SLA, SLB, SLC, and SLD).

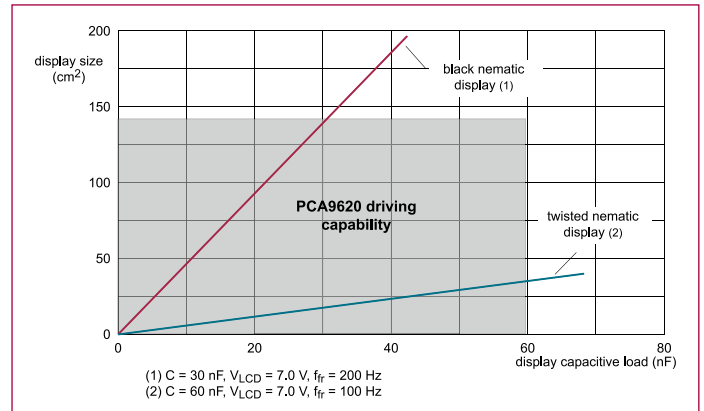
The PCA9620 is specifically designed for driving high display loads at high frame frequencies. To illustrate the driving capability of the PCA9620, two display cell technologies are used as examples: Twisted Nematic and Black Nematic cells. Compared to Twisted Nematic cells, Black Nematic cells have a smaller capacitive load in relation to the display area but should be driven at a higher frame frequency.

As an example, on one hand the PCA9620 is capable of driving a Black Nematic display with a display area of up to 140 cm². On the other hand, the PCA9620 can also drive a Twisted Nematic display with a display area of up to 35 cm².

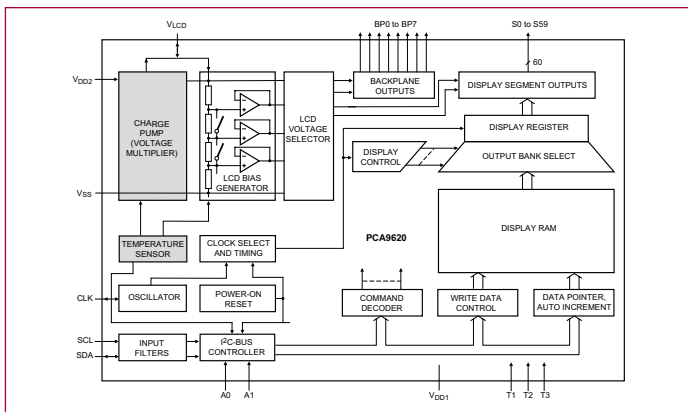
Temp regions used for LCD supply voltage temp compensation



PCA9620 driving capability



PCA9620 block diagram



PCA9620 operating characteristics

Supply voltage range	2.5 V to 5.5 V
LCD supply voltage range	2.5 V to 9.0 V
Power-down supply current	1 μ A
Temperature range	-40 °C to +105 °C
Frame frequency range	60 Hz to 300 Hz
Temperature accuracy	\pm 4 °C

PCA9620 ordering information

Type	Package tape and reel	Qualification	Version
PCA9620H	LQFP80, plastic low profile quad flat package; 80 leads, body 12 x 12 x 1.4 mm	AEC-Q100 grade 2	1