NXP LCD segment drivers PCF8551 & PCF8553

Low-power, low-cost LCD segment drivers for compact, efficient applications

These highly integrated drivers, optimized for low voltage and low power at a low cost, have a minimum V_{DD} and V_{LCD} of only 1.8 V, and typically consume just 4.6 µA at mux 1:4, a frame frequency of 64 Hz, and all segments driven ON. Housed in small TSSOP packages, they are ideally suited for use in metering, consumer healthcare, small appliances, battery-operated systems, wearable devices, and more.

KEY FEATURES

▸ PCF8551: 4 x 36 LCD segment driver in TSSOP48 package
▸ PCF8553: 4 x 40 LCD segment driver in TSSOP56 package
▸ 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 128 Hz
▸ Selectable power-on-reset (POR) functionality via input pin PORE
▸ 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
  - 1.6 µA (typ) in static mode and all segments ON
  - 4.6 µA (typ) in mux 1:4 and all segments ON
▸ Operating temperature range −40 to +85 ºC

KEY BENEFITS

▸ Low voltage
▸ Low power
▸ Low cost
▸ High reliability
▸ Design versatility
▸ Suitable for a wide selection of LCDs

APPLICATIONS

▸ Utility meters
▸ Consumer healthcare devices, such as meters for blood glucose or blood pressure
▸ Small appliances, including coffee makers, weight scales, thermostats, etc.
▸ Wearable devices

The NXP PCF8551 and PCF8553 are single-chip LCD controllers and drivers that integrate an oscillator, bias generation, and instruction decoding. The PCF8551 is a 4 x 36 driver in a TSSOP48 package, while the PCF8553 is a 4 x 40 driver in a TSSOP56 package.

When designers replace a microcontroller that integrates an LCD driver with a two-chip combination that uses a lower-cost microcontroller and an external LCD driver like the PCF8551 or PCF8553, the result is greater design flexibility, better performance, and higher reliability – all at a comparable cost. For example, to create a very cost-effective solution without compromising quality or performance, designers can use the PCF8551 or PCF8553 with one of NXP's low-cost microcontrollers, such as the LPC812 in a TSSOP20 package.

The PCF8551 is available with a 2-line I2C interface that operates at up to 400 kHz, or a 3-line SPI interface that operates at up to 3 MHz. The PCF8553 has a selectable I2C or SPI interface.

Both devices offer very low current consumption. To reduce consumption even further, the designer can select a low-capacitance display and program it for a low multiplex rate (depending on the display resolution), and a low frame frequency. Selecting a low V_{LCD} voltage can help, too.
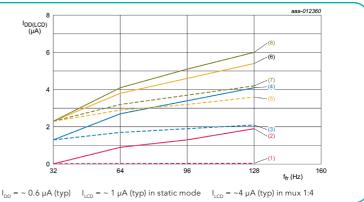
PCF8551 and PCF8553 pin configurations

aaa-012401 *aaa-012402* *aaa-011473*

Integrated versus standalone LCD driver

Features	Microcontroller / LCD driver	Microcontroller / LCD driver
Design flexibility	Limited	High
Resolution	Limited	High
Optical performance	Limited	High
Reliability	Limited	High
Cost	Low	Comparable

Ultra-low (Please see the datasheet for additional information)

I_{DD} = ~ 0.6 µA (typ) I_{LCD} = ~ 1 µA (typ) in static mode I_{LCD} = ~4 µA (typ) in mux 1:4

Ordering information

Type	Package and size	Marking	Interface	Delivery
PCF8551ATT/A	TSSOP48: 6.1 x 12.5 x 0.95 mm; pitch = 0.5 mm	PCF8551A	I2C (400 kHz)	Tape and Reel
PCF8551BTT/A	TSSOP48: 6.1 x 12.5 x 0.95 mm; pitch = 0.5 mm	PCF8551B	SPI (3 MHz)	Tape and Reel
PCF8553DTT/A	TSSOP56: 6.1 x 14.0 x 0.95 mm; pitch = 0.5 mm	PCF8553D	Selectable I2C or SPI	Tape and Reel