

Character drivers

These low-power CMOS LCD controller/drivers are designed to drive dot-matrix LCD displays. The PCF2113x controls up to two lines of 12 or one line of 24 characters, with a dot format of 5 x 8, and supports up to 120 icons. The icon-driving feature can also be used to drive a number of segments, such as a line of 7- or 14-segment digits. The PCF2119x is the same as the PCF2113x, but controls up to two lines of 16 or one line of 32 characters and supports up to 160 icons. Both devices are standalone ICs with on-chip generation of LCD bias voltages, including temperature compensation. The result is fewer external components and lower current consumption. Both devices interface to most microcontrollers using a 4- or 8-bit parallel bus or the two-wire I²C-bus. Both devices also include a character generator and display alphanumeric and kana (Japanese) characters. Custom character sets can be provided on request. Combining a number of digits results in a full-graphic block with up to 16 x 40 pixels. The block can be controlled by the 16-digit CGRAM, which can also be used to generate custom, user-specific characters. To reduce power consumption during idle time, the Icon Mode can be used to show device activity status on the display.

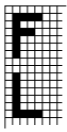
Key features

- ▶ Single-chip LCD controller / driver
- ▶ 5 x 7 character format plus cursor; 5 x 8 for kana (Japanese) and user-defined symbols.
- ▶ Very low power consumption (20 to 200 μ A), in Icon Mode < 25 μ A, in Power-down mode < 2 μ A
- ▶ Integrated generation of V_{LCD} with temperature compensation (external supply also possible)
- ▶ Icon and display blinking mode
- ▶ Display shift or static display modes
- ▶ Display data RAM: 80 characters
- ▶ Character generator ROM: 240 characters
- ▶ User-defined characters: 16
- ▶ Multiplex rates 1:18 (normal operation), 1:9 (single line operation) and 1:2 (for icon mode only)
- ▶ I²C-bus and parallel interfaces
- ▶ Internal oscillator, with external clock also possible

Character driver selection guide

| Type | Matrix size (lines x chars) | V _{DD} [V] logic | V _{DD2} [V] V _{LCD} gen. | Effective V _{LCD} [V] | I _{DD} , typ [μA] (int. V _{LCD} gen.) | On-chip bias/ V _{LCD} generator | Temp comp | Interface | Frame frequency [Hz] (internal osc) | Packages | Operating temperature [°C] |
|---------|---|---------------------------|--|--------------------------------|---|--|-----------|---|-------------------------------------|------------|----------------------------|
| PCF2113 | 2 lines by 12 + 120 icons or 1 line by 24 + 120 icons | 1.8 - 5.5 | 2.2 - 4.0 | 2.2 - 6.5 | 190 | Yes | Yes | I ² C Fast Mode and 4/8-bit parallel | 95, typ. | U, LQFP100 | -40 to +85 |
| PCF2116 | 1 or 2 lines by 24 or up to 4 lines by 12 | 2.5 - 6.0 | 2.5 - 6.0 | 3.5 - 9.0 | 700 | Yes | No | I ² C and 4/8-bit parallel | 65, typ. | U | -40 to +85 |
| PCF2119 | 2 lines by 16 + 160 icons or 1 line by 32 + 160 icons | 1.5 - 5.5 | 2.2 - 4.0 | 2.2 - 6.5 | 190 | Yes | Yes | I ² C Fast Mode and 4/8-bit parallel | 95, typ. | U | -40 to +85 |

Character drivers



Graphics drivers

Also known as dot-matrix drivers, these are low-power CMOS LCD row/column drivers, designed to drive dot-matrix graphic displays at multiplex rates up to 80. They can drive a large number of icons, and can drive a series of 7- or 14-segment digits. Each driver is a standalone IC, including on-chip generation of V_{LCD} and the LCD bias voltages. The result is fewer external components and lower power consumption. Most of the drivers communicate with a microcontroller using the two-wire, bidirectional I²C-bus; some use the SPI-bus or a parallel bus. Large display matrixes—such as 65 x 133 or 80 x 128—make it possible to display more text, and ensure that fonts are sharp and easy to read, with almost invisible pixels.

Key features

- ▶ Standalone LCD controller / driver
- ▶ Low power consumption, suitable for battery-operated systems
- ▶ Display data RAM with one-to-one pixel correspondence
- ▶ Can also drive icons
- ▶ Software-selectable multiplex rates
- ▶ Integrated generation of V_{LCD} with temperature compensation (external supply also possible)
- ▶ No external components required
- ▶ I²C-bus, SPI-bus and parallel interfaces

Graphic driver selection guide

| Type | Rows | Columns | Matrix size | V _{DD} [V] logic | V _{DD2} [V] V _{LCD} gen. | Effective V _{LCD} [V] | On-chip V _{LCD} generator | Temp comp | Interface | Frame frequency [Hz] (internal osc) | Packages | Operating temperature [°C] |
|---------|-----------------------|---------------|---|---------------------------|--|--------------------------------|------------------------------------|-----------|----------------------------|-------------------------------------|---------------------|----------------------------|
| PCF8531 | 34, 26, 17 | 128 | 34 x 128 or 33 x 128 plus 128 icons | 1.8 - 5.5 | 2.5 - 4.5 | 4.0 - 9.0 | Yes | Yes | I ² C Fast Mode | 66 (typ.) | U (chip with bumps) | -40 to +85 |
| PCF8578 | 8, 16, 24, 32 | 32, 24, 16, 8 | 8 x 32 or 16 x 24 stand alone Up to 40960 dots combined with 32 PCF8579 | 2.5 - 6.0 | - | 3.5 - 9.0 | No | No | I ² C | 64 (typ.) | VSO56, TQFP64 | -40 to +85 |
| PCF8579 | 32, driven by PCF8578 | 40 | 32 PCF8579 drive up to 40960 dots, matrix size 32 x 1280. Must be used with PCF8578 | 2.5 - 6.0 | - | 3.5 - 9.0 | No | No | I ² C | 64 (typ.) | VSO56, TQFP64 | -40 to +85 |

Graphic drivers



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