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. Both character drivers are standalone ICs with on-chip generation of LCD bias voltages, including temperature compensation. The result is lower external components and lower power consumption. Both devices are capable of controlling a microcontroller 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.

Character driver selection guide

<table>
<thead>
<tr>
<th>Type</th>
<th>Matrix size</th>
<th>Row</th>
<th>Column</th>
<th>Max. Characters</th>
<th>Temp. range</th>
<th>DC/DC Idd typ.</th>
<th>Vdd</th>
<th>VlCd gen.</th>
<th>Vdd2</th>
<th>Interface</th>
<th>Operating temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCF2113x</td>
<td>12 lines (max.)</td>
<td>24</td>
<td>32</td>
<td>120</td>
<td>-40 to +85</td>
<td>150</td>
<td>5.0 - 6.0</td>
<td>2.5 - 5.0</td>
<td>2.5 - 5.0</td>
<td>I²C</td>
<td>100</td>
</tr>
<tr>
<td>PCF2113x</td>
<td>24 lines (max.)</td>
<td>48</td>
<td>48</td>
<td>240</td>
<td>-40 to +85</td>
<td>250</td>
<td>5.0 - 6.0</td>
<td>2.5 - 5.0</td>
<td>2.5 - 5.0</td>
<td>I²C</td>
<td>100</td>
</tr>
</tbody>
</table>

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 device is a standalone IC, including on-chip generation of VlCd 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 or 133 x 80 or 128 make it possible to display more text, and ensure that fonts are sharp and easy to read, with almost invisible pixels.

Key features
- On-chip LCD controller / driver
- Low-power consumption, suitable for battery-operated systems
- Display data RAM with on-chip 1-byte pixel correspondence
- Can also drive icons
- Software-selectable multiplex rates
- Integrated generation of VlCd with temperature compensation (external supply also possible)
- No external components required
- I²C-bus and parallel interfaces
- LCD shift or static display modes
- User-defined characters; 16
- Multiplex rates for normal operation, 1:6 (single line operation) and 1:2 (for icon mode only)
- Internal oscillator and external clock also possible
- Software-selectable multiplex rates
- Very low power consumption, < 25 µA in Icon Mode, < 2 µA in Power-down mode
- Software-selectable multiplex rates
- Integrated generation of VlCd with temperature compensation (external supply also possible)
- No external components required
- I²C-bus and parallel interfaces

Graphic driver selection guide

<table>
<thead>
<tr>
<th>Type</th>
<th>Matrix size</th>
<th>Rows</th>
<th>Columns</th>
<th>Max. Characters</th>
<th>Temp. range</th>
<th>DC/DC Idd typ.</th>
<th>Vdd</th>
<th>VlCd gen.</th>
<th>Vdd2</th>
<th>Interface</th>
<th>Operating temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCF8578</td>
<td>8 lines</td>
<td>8</td>
<td>32</td>
<td>256</td>
<td>-40 to +85</td>
<td>150</td>
<td>5.0 - 6.0</td>
<td>2.5 - 5.0</td>
<td>2.5 - 5.0</td>
<td>I²C</td>
<td>100</td>
</tr>
<tr>
<td>PCF8579</td>
<td>16 lines</td>
<td>16</td>
<td>64</td>
<td>512</td>
<td>-40 to +85</td>
<td>250</td>
<td>5.0 - 6.0</td>
<td>2.5 - 5.0</td>
<td>2.5 - 5.0</td>
<td>I²C</td>
<td>100</td>
</tr>
<tr>
<td>PCF8580</td>
<td>32 lines</td>
<td>32</td>
<td>128</td>
<td>1024</td>
<td>-40 to +85</td>
<td>500</td>
<td>5.0 - 6.0</td>
<td>2.5 - 5.0</td>
<td>2.5 - 5.0</td>
<td>I²C</td>
<td>100</td>
</tr>
<tr>
<td>PCF8581</td>
<td>40 lines</td>
<td>40</td>
<td>256</td>
<td>2048</td>
<td>-40 to +85</td>
<td>750</td>
<td>5.0 - 6.0</td>
<td>2.5 - 5.0</td>
<td>2.5 - 5.0</td>
<td>I²C</td>
<td>100</td>
</tr>
</tbody>
</table>

www.nxp.com
Lamp drivers

NXP's innovative LCD display drivers bring high reliability and low power consumption to a broad range of applications. They require few external components for operation, operate over a wide temperature range, support a wide range of supply voltages, and integrate vital interfaces. They are available in several different packages and delivery forms, to support various assembly technologies, and can be used in conjunction with an NXP RGB LED controller for backlighting.

NXP's portfolio includes segment, character, and graphic display drivers. NXP's segment display drivers lead the industry in terms of the number of segments that can be driven per device. That means more information can be displayed, at a lower cost. For automotive use, NXP even has options that are AEC-Q100 compliant, ensuring reliable operation under the harshest conditions. NXP's character display drivers can be configured to drive almost any character set, including Japanese, and support a large number of icons. The graphic display drivers, for use with monochrome, full-color LCDs, are available in two resolutions: 32 x 128 and 64 x 128.

For more information log on to: http://www.standard.nxp.com/supportboards/lcdboards.html

Segment drivers

These peripheral devices can be interfaced to almost any LCD with low multiplex rates. They generate the drive signals for a static or multiplexed LCD, with up to 164 segments, making it possible to drive up to 400 elements at once. Some devices can be used to drive eight or 16 backplanes. Most devices are easy to cascade together for use with larger LCDs. Most of the devices communicate via a two-line I2C-bus, a driver for the SPI-bus is also available. Several features minimize communication overhead, including a display RAM with auto-incremented addressing, hardware sub-addressing, and display memory watching (in static and dual drive modes).

Key features
- Standalone LCD controller/driver
- No external components required
- Low power consumption
- Wide temperature range
- Wide supply voltage range
- Various interfaces (including I2C-bus, SPI, and parallel)
- Suitable packages for different assembly technologies - SOIC, QFP, and surface-mount for standard assembly
- Bare die for chip-on-board (COB) module
- Bumped die for chip-on-flexfoil (COF) module
- Bumped die for chip-on-flexfoil (COF)
- Add NXP RGB LED controller for LCD backlighting in any color

Applications
- Warning (electricity, gas, water)
- Automotive display clusters
- Consumer electronics
- White goods
- Medical equipment
- Telecommunication equipment
- Industrial
- Test & measurement
- Simple graphical charts
- Plots and graph terminals

For more information log on to: http://www.standard.nxp.com/supportboards/lcdboards.html

Segment driver selection guide

PCF8532 – Automotive 60 x 8 segment driver with AEC-Q100 grade 2 compliance
- 162 elements
- Temp range: -40 to +115 °C
- Enhanced temp compensation
- Programmable temperature range
- Programmable compensation slope
- Selectable backlight configuration: static, 2, 4, 8, 16 backlight multiplexing
- Wide LED voltage range from 4.0 to 12.0 V for LCDs
- Programmable frame frequency from 45 to 300 Hz (factory calibrated)

PCF8532 and PCF8537 – Industrial and automotive 8 x 44 segment driver with AEC-Q100 compliance
- 32 elements
- Temp range: -40 to +115 °C
- Selectable backlight configuration: static, 2, 4, 8, 16 backlight multiplexing
- Integrated temp sensor with temperature read out

PCF8562TT 32 64 96 128 - - - Y - - Y Fast 1.8 5.5 8 2.5 6.5 -40 85 77 Y

OM4068H 32 64 - - - - - N Y - - - 2.5 5.5 12 3.5 6.5 -40 105 84 Y

PCF8576CHL 40 80 120 160 - - - N - - Y Standard 2 6 - 2.5 6 -40 85 69 Y

PCF8576CU 40 80 120 160 - - - N - - Y Standard 2 6 - 2.5 6 -40 85 90 Y

PCF8577CU 32 64 - - - - - N - - Y Standard 2.5 6 - 2.5 6 -40 85 69 Y

PCF8576CT 40 80 120 160 - - - N - - Y Standard 2 6 - 2.5 6 -40 85 69 Y

PCF85162T 32 64 96 128 - - - Y - - Y Fast 1.8 5.5 - 2.5 8 -40 95 110 Y

PCF8534AH 60 120 180 240 - - - Y - - Y Fast 1.8 5.5 8 2.5 8 -40 95 82 Y

PCF85132U 160 320 480 640 - - - Y - - Y Fast 1.8 5.5 - 1.8 8 -40 95 SEL Y

PCF85134HL 60 120 180 240 - - - N - - Y Fast 1.8 5.5 24 2.5 8 -40 85 82 Y

PCF85134H 60 120 180 240 - - - Y - - Y Fast 1.8 5.5 24 2.5 8 -40 95 82 Y

PCF85162T 32 64 96 128 - - - Y - - Y Fast 1.8 5.5 - 2.5 6.5 -40 85 82 Y

PCF8536 56-102 segment driver with AEC-Q100 2nd grade compliance
- 116 elements
- Temp range: -40 to +115 °C
- Enhanced temp compensation
- Programmable temperature range
- Programmable compensation slope
- Selectable backlight configuration: static, 2, 4, 8, 16 backplane multiplexing
- Wide LED voltage range from 4.0 to 12.0 V for LCDs
- Programmable frame frequency from 45 to 300 Hz (factory calibrated)

PCF85232U 160 320 480 640 - - - Y - - Y Fast 1.8 5.5 - 1.8 8 -40 95 SEL Y

PCF85232U 160 320 480 640 - - - Y - - Y Fast 1.8 5.5 - 1.8 8 -40 95 SEL Y

PCF8536U - Automotive 60 x 8 segment driver for multiplex rates up to 1:8

This 60 x 8 LCD high-drive segment driver offers AEC-Q100 grade 2 compliance and is optimized for use in automotive applications such as instrument clusters, car radios, and climate-control units. It also supports displays in demanding industrial applications, including machine control systems and measuring equipment.

The PCF85460 generates the drive signals for static or multiplexed LCDs containing up to 8 backplanes, 40 segments, and 400 elements. Included in a single LGF300 package, it can drive almost any LCD with low multiplex rates. It is compatible with most microcontrollers and communicates via the two-line bidirectional I2C-bus I2C-bus.

NEW
PCF8536 and PCF8536U – Automotive and industrial 40 x 8 segment driver with integrated PWM channels for LEDs

This advanced, highly integrated LCD controller drives up to eight backplanes, up to 44 segments, and up to 320 elements. It includes an on-chip PWM controller for LCD backlight illumination. The PWM controller allows up to 16 different channels for driving external transistors, up to 16 independent channels can be configured. The 128 channels per channel controls two RGB segments for a spectrum of more than 2 million colors. Each channel can also be used for static LCD drive or an on-chip color driver. Communication overhead is minimized by using a 2-wire I2C-bus display RAM with auto-incremented addressing. The device is available in an industrial version (PCF8536U), for white goods and consumer products and in an automotive version (PCF8536), e.g. for car radios, climate control and dashboard displays. The automotive type supports an extended operating temperature range up to 95 °C, and is AEC-Q100 compliant.

Both types of the peripheral device are equipped with a low-power serial interface: the two-line bidirectional I2C-bus (100 kHz) or the three-line unidirectional SPI bus (5 MHz). The interface controls and drives almost any LCD display with multiplex rates up to 1:8.