

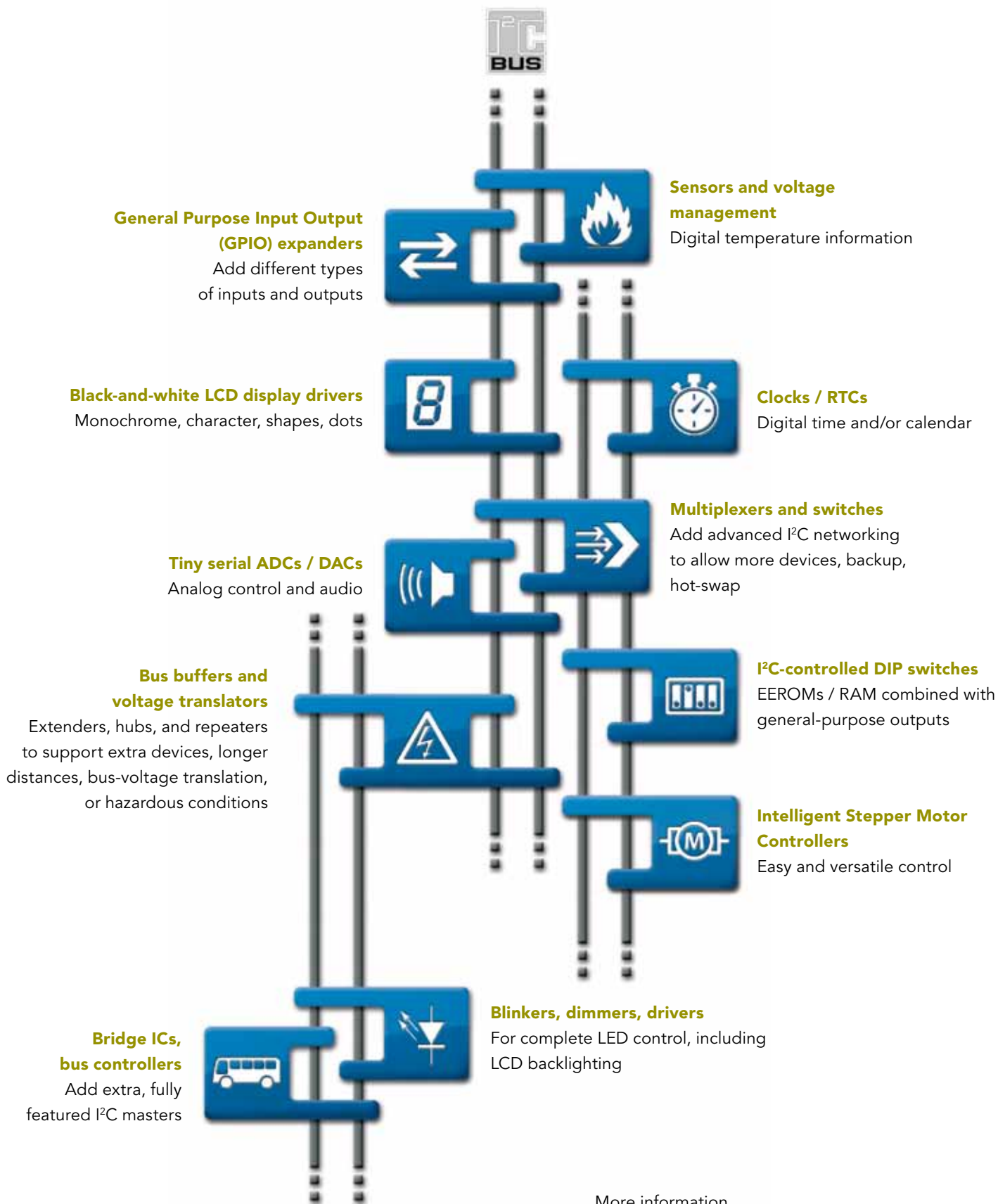


Smart, simple solutions for the 11 most common design concerns

NXP I²C-bus solutions
1H 2011





NXP's I²C peripherals portfolio is grouped into eleven families, one for each of the most common, everyday design concerns.





More information
www.nxp.com/interface


I²C-bus product summary


GPIO 		
4-bit GPIO	PCA9536	4-bit I ² C Fast-mode totem-pole GPIO with pull-up resistor
	PCA9537	4-bit I ² C Fast-mode totem-pole GPIO with interrupt and reset
8-bit GPIO	PCA8574	8-bit I ² C Fast-mode quasi-bidirectional GPIO with interrupt and pull-up resistors
	PCA8574A	8-bit I ² C Fast-mode quasi-bidirectional GPIO with interrupt and pull-up resistors (ALT address)
	PCA9500	8-bit I ² C Fast-mode quasi-bidirectional GPIO with pull-up resistors and 2-K EEPROM
	PCA9501	8-bit I ² C Fast-mode quasi-bidirectional GPIO with interrupt, pull-up resistors, and 2-K EEPROM
	PCA9502	8-bit I ² C /SPI Fast-mode totem-pole GPIO with interrupt and reset
	PCA9534	8-bit I ² C Fast-mode totem-pole GPIO with interrupt
	PCA9538	8-bit I ² C Fast-mode totem-pole GPIO with interrupt and reset
	PCA9554	8-bit I ² C Fast-mode totem-pole GPIO with interrupt and pull-up resistors (AEC-Q100)
	PCA9554A	8-bit I ² C Fast-mode totem-pole GPIO with interrupt and pull-up resistors (ALT address)
	PCA9557	8-bit I ² C Fast-mode totem-pole GPIO with reset
	PCA9574	8-bit I ² C Fast-mode LV totem-pole/OD GPIO with interrupt, reset, and pull-up/pull-down resistors
	PCA9621	8-bit I ² C Fast-mode Plus 65 mA open-drain GPO with reset
	PCA9670	8-bit I ² C Fast-mode Plus quasi-bidirectional GPIO with reset and pull-up resistors
	PCA9672	8-bit I ² C Fast-mode Plus quasi-bidirectional GPIO with interrupt, reset, and pull-up resistors
	PCA9674	8-bit I ² C Fast-mode Plus quasi-bidirectional GPIO with interrupt and pull-up resistors
	PCA9674A	8-bit I ² C Fast-mode Plus quasi-bidirectional GPIO with interrupt and pull-up resistors (ALT address)
	PCF8574	8-bit I ² C 100 kHz quasi-bidirectional GPIO with interrupt and pull-up resistors
	PCF8574A	8-bit I ² C 100 kHz quasi-bidirectional GPIO with interrupt and pull-up resistors (ALT address)
16-bit GPIO	PCA8575	16-bit I ² C Fast-mode quasi-bidirectional GPIO with interrupt and pull-up resistors
	PCA9535	16-bit I ² C Fast-mode totem-pole GPIO with interrupt
	PCA9535C	16-bit I ² C Fast-mode open-drain GPIO with interrupt
	PCA9539	16-bit I ² C Fast-mode totem-pole GPIO with interrupt and reset
	PCA9539R	
	PCA9555	16-bit I ² C Fast-mode totem-pole GPIO with interrupt and pull-up resistors
	PCA9575	16-bit I ² C Fast-mode LV totem-pole/OD GPIO with interrupt, reset, and pull-up/pull-down resistors
	PCA9671	16-bit I ² C Fast-mode Plus quasi-bidirectional GPIO with reset and pull-up resistors
	PCA9673	16-bit I ² C Fast-mode Plus quasi-bidirectional GPIO with interrupt, reset, and pull-up resistors
PCA9675	16-bit I ² C Fast-mode Plus quasi-bidirectional GPIO with interrupt and pull-up resistors	
PCF8575	16-bit I ² C Fast-mode quasi-bidirectional GPIO with interrupt and pull-up resistors	
PCF8575C	16-bit I ² C Fast-mode open-drain GPIO with interrupt	
40-bit GPIO	PCA9505	40-bit I ² C Fast-mode totem-pole GPIO with interrupt, reset, pull-up resistors and output enable
	PCA9506	40-bit I ² C Fast-mode totem-pole GPIO with interrupt, reset, and output enable
	PCA9698	40-bit I ² C Fast-mode Plus totem-pole GPIO with interrupt, reset, pull-up resistors and output enable


Stepper Motor 		
1 motor	PCA9629	Stepper Motor Controller with Fast-mode Plus totem-pole GPIO with interrupt and reset


Temp sensors 		
Local	LM75A	I ² C local ± 2 °C temperature sensor
	LM75B	I ² C local ± 2 °C temperature sensor with SMBus time-out
	SE95	I ² C local ± 1 °C temperature sensor
	SE98A	I ² C local ± 1 °C temperature sensor DIMM (1.7 - 3.6 V)
Local and EEPROM	SE97B	I ² C local ± 1 °C temperature sensor + SPD DIMM (3.0 - 3.6 V)
Local and remote	NE1617A	I ² C local ± 2 °C and remote ± 3 °C temperature sensor
	SA56004	I ² C local ± 2 °C and remote ± 1 °C temperature sensor
Local, remote, and voltage monitor	NE1619	I ² C local ± 2 °C and remote ± 3 °C temperature sensor with voltage monitor (12, 5, 3.3, and 2.5 V, V _{CCP} , and V _{DD})


LED controllers 		
Dimmer (2 PWM, 25 mA / 5 V)	PCA9530	2-channel I ² C Fast-mode open-drain LED with dimmer and reset
	PCA9531	8-channel I ² C Fast-mode open-drain LED with dimmer and reset
	PCA9532	16-channel I ² C Fast-mode open-drain LED with dimmer and reset
	PCA9533	4-channel I ² C Fast-mode open-drain LED with dimmer
Blinker (2 PWM, 25 mA / 5 V)	PCA9550	2-channel I ² C Fast-mode open-drain LED with blinker and reset
	PCA9551	8-channel I ² C Fast-mode open-drain LED with blinker and reset
	PCA9552	16-channel I ² C Fast-mode open-drain LED with blinker and reset
PCA9553	4-channel I ² C Fast-mode open-drain LED with blinker	
8-segment	SAA1064	16-channel I ² C Standard-mode current source/sink 4x8-segment LED display
Controller (PWM / Ch, 25 mA / 5 V)	PCA9632	4-channel I ² C Fast-mode Plus low-power totem-pole LED controller
	PCA9633	4-channel I ² C Fast-mode Plus totem-pole LED controller with output enable
	PCA9634	8-channel I ² C Fast-mode Plus totem-pole LED controller with output enable
	PCA9635	16-channel I ² C Fast-mode Plus totem-pole LED controller with output enable (AEC-Q100)
	PCA9685	16-channel I ² C Fast-mode Plus totem-pole LED controller with 12-bit PWMs and output enable (AEC-Q100)
Controller (PWM / Ch, 57 mA / 40 V)	PCA9952	16-channel I ² C Fast-mode Plus constant current LED controller
	PCA9955	16-channel I ² C Fast-mode Plus constant current LED controller
	PCU9955	16-channel I ² C Ultra Fast-mode constant current LED controller
Controller (PWM / Ch, 100 mA / 40 V)	PCA9624	8-channel I ² C Fast-mode Plus open-drain LED high-voltage/current controller with output enable
	PCA9622	16-channel I ² C Fast-mode Plus open-drain LED high-voltage/current controller with output enable
	PCA9626	24-channel I ² C Fast-mode Plus open-drain LED high-voltage/current controller with output enable
	PCA9655	16-channel I ² C Fast-mode Plus open-drain LED high-voltage/current controller
PCU9655	16-channel I ² C Ultra Fast-mode open-drain LED high-voltage/current controller	
LED flash	SSL3250A	500 mA sink dual LED flash with torch mode
	SSL3252	500 mA source dual LED flash with torch mode


Real-time clocks 		
Low-power	PCA8802	RTC for lowest power applications, smart cards
	PCF8523	Ultra low-power RTC with loss of main power detect and auto battery switch over
	PCF8563	Ultra low-power clock/calendar
	PCF8564A	Ultra low-power clock/calendar, COB
Normal	PCA8565	Automotive clock/calendar
	PCF8583	Clock/calendar resolution: 0.01 s, with 256x8 SRAM
	PCF8593	Low-power clock/calendar resolution: 0.01 s
Temp-compensated	PCF2127A	High-accuracy, low-voltage RTC with 512x8 RAM
	PCF/PCA2129A	High-accuracy RTC


Muxes and switches 		
2-channel	PCA9540B	2-channel I ² C mux
	PCA9542A	2-channel I ² C mux with interrupt
2-to-1 demux	PCA9543A/B/C	2-channel I ² C switch with interrupt and reset
	PCA9541A/01	2:1 I ² C demux with interrupt and reset (channel 0 default)
4-channel	PCA9541A/03	2:1 I ² C demux with interrupt and reset (no channel default)
	PCA9544A	4-channel I ² C mux with interrupt
	PCA9545A/B/C	4-channel I ² C switch with interrupt and reset
	PCA9546A	4-channel I ² C switch with reset
8-channel	PCA9646	4-channel Fast-mode Plus fully buffered switch with reset
	PCA9547	8-channel I ² C mux with reset (channel 0 default)
	PCA9548A	8-channel I ² C switch with reset


Bus buffers 		
Incremental Offset	PCA9510A	Fast-mode hot-swap I ² C/SMBus bus buffer
	PCA9511A	Fast-mode hot-swap I ² C/SMBus bus buffer
	PCA9512B	Fast-mode shift I ² C/SMBus bus buffer
	PCA9513A	Fast-mode hot-swap I ² C/SMBus bus buffer
	PCA9514A	Fast-mode hot-swap I ² C/SMBus bus buffer
	PCA9521	Fast-mode (1 MHz) shift I ² C-bus bus buffer
Amplifier	PCA9522	Fast-mode (1 MHz) hot-swap shift I ² C-bus bus buffer
	P82B715	Fast-mode I ² C bus extender
No Offset	P82B715	Fast-mode I ² C bus extender
	PCA9525	Fast-mode (1 MHz) I ² C-bus repeater unidirectional clock
Static Offset (1 side)	PCA9605	Fast-mode Plus I ² C-bus repeater unidirectional clock
	P82B96	Fast-mode bidirectional bus buffer
	PCA9507	Fast-mode shift DDC buffer with accelerator
	PCA9508	Fast-mode shift hot-swap I ² C bus repeater
	PCA9509	Fast-mode shift bus buffer with current source
	PCA9517A	Fast-mode shift I ² C bus repeater
	PCA9519	4-channel version of PCA9509
	PCA9527	Fast-mode shift DDC buffer with accelerator and CEC
	PCA9600	Fast-mode Plus bidirectional bus buffer
	PCA9601	Fast-mode Plus bidirectional bus buffer with stronger 15 mA local side drive to support multiple Fm+ slaves
Static Offset (All sides)	PCA9515/15A	Fast-mode I ² C bus repeater
	PCA9516A	Fast-mode 5-channel I ² C hub
	PCA9518A	Fast-mode expandable 5-channel I ² C hub
Voltage translator (doesn't isolate capacitance)	GTL2000	Fast-mode Plus 22-bit voltage clamp translator
	GTL2002	Fast-mode Plus 2-bit voltage clamp translator
	GTL2003	Fast-mode Plus 8-bit voltage clamp translator
	GTL2010	Fast-mode Plus 10-bit voltage clamp translator
	PCA9306	Fast-mode Plus dual I ² C/SMBus voltage translator
	NVT2001	Fast-mode Plus 1-bit voltage translator
	NVT2002	Fast-mode Plus 2-bit voltage translator for I ² C/SMBus applications
	NVT2003	Fast-mode plus 3-bit voltage translator for two power supply applications
	NVT2004	Fast-mode Plus 4-bit voltage translator for SPI applications
	NVT2006	Fast-mode Plus 6-bit voltage translator
NVT2008	Fast-mode Plus 8-bit voltage translator	
NVT2010	Fast-mode Plus 10-bit voltage translator	

LCD drivers 		
Character driver	PCF2113	1/2-line, 12-character, 120-icon driver
	PCF2116	2/4-line, 12-character driver
	PCF2119	1/2-line, 16-character, 160-icon driver
Graphic driver	PCF8531	34x128-pixel driver
	PCF8578	Dot-matrix LCD driver (row/column)
	PCF8579	Dot-matrix LCD driver (column)
Segment driver	PCF8811	80x128-pixel driver
	PCF8577C	64-segment driver
	PCF8566	96-segment driver
	PCF/PCA85162	128-segment driver
	PCF/PCA85176	160-segment driver
	PCF/PCA85134	240-segment driver
	PCF/PCA85133	320-segment, COG driver
	PCF/PCA8536	320-segment plus LED backlight control
	PCF8578	384-segment driver
	PCA9620	480-segment driver
	PCF/PCA85132	640-segment COG driver
PCA85232	640-segment COG driver	

A/D-D/A converters 		
8-bit ADC	PCA9691	Fast-mode Plus ADC/DAC I ² C
	PCF8591	Standard-mode ADC/DAC I ² C

EEPROMs 		
2-kbit	PCF85102C	256x8-bit EEPROM I ² C-bus
	PCF85103C	256x8-bit EEPROM I ² C-bus (ALT address)
	PCF8582C	256x8 EEPROM I ² C-bus
	PCF8570	256x8-bit RAM I ² C-bus
4-kbit	PCF8594C	1024x8-bit EEPROM I ² C-bus
8-kbit	PCA24S08A	1024x8-bit EEPROM I ² C with access protection
	PCF8598C	1024x8-bit EEPROM I ² C-bus
DIP switch	PCA8550	4-bit 1-of-2 I ² C mux
	PCA9558	5-bit MP/1-bit latch & 6-bit I ² C EEPROM
	PCA9559	5-bit mux/1-bit latch & 6-bit I ² C EEPROM
	PCA9560	2x5-bit mux/1-bit latch & 6-bit I ² C EEPROM
	PCA9561	4x6-bit mux & 6-bit I ² C EEPROM

Bridge and bus controllers 		
Bridge	SC16IS740	I ² C/SPI-to-UART bridge with IrDA
	SC16IS741	I ² C/SPI-to-UART bridge with IrDA
	SC16IS750	I ² C/SPI-to-UART bridge with IrDA and GPIO
	SC16IS752	I ² C/SPI-to-UART bridge with IrDA and GPIO
	SC16IS760	I ² C/SPI-to-UART bridge with IrDA and GPIO
	SC16IS762	I ² C/SPI-to-UART bridge with IrDA and GPIO
	SC18IM700	UART-to-I ² C-master bridge with GPIO
	SC18IS600	SPI-to-I ² C-master bridge, 4 M / GPIO
	SC18IS602	I ² C-slave-to-SPI master bridge
	Controller	PCF8584
PCA9564		400 kHz I ² C-bus controller
PCA9663		3-channel Fast-mode Plus I ² C-bus controller with 4 K-byte shared buffer per channel
PCA9665		Fast-mode Plus I ² C-bus controller with 68-byte buffer
PCU9669		1-channel Fast-mode Plus and 2-channel Ultra Fast-mode I ² C-bus controller with 4 K-byte buffer per channel

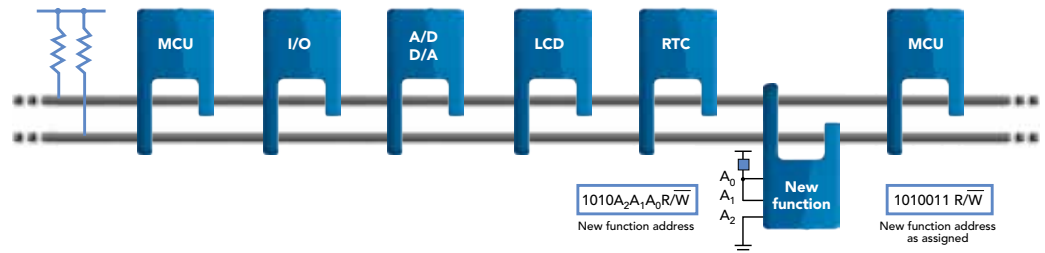
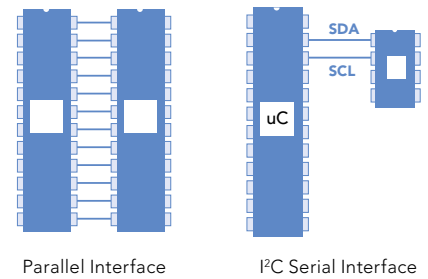
Demo boards 		
e-Tools	OM6270	SPI/I ² C-to-UART bridge demo (SC16IS750)
	OM6271	SPI-to-I ² C-master bridge demo (SC18IS600)
	OM6272	UART-to-I ² C-master bridge demo (SC18IM700)
	OM6273	SPI/I ² C-to-UART/IrDA/GPIO demo (SC16IS752)
	OM6274	I ² C-to-SPI-master bridge demo (SC18IS602)
	OM6275	I ² C 2005-1 evaluation board
	OM6276	PCA9633 demo board
	OM6277	PCA9564 evaluation board
	OM6278	I ² C 2002-1A evaluation board
	OM6279	LED dimmer demo board
	OM6281	PCA9698 daughter card for I ² C 2005-1
	OM6282	PCA9633 daughter card for I ² C 2005-1
	OM6285	I ² C 2002-1A evaluation board without PC controller board
	OM6290	LCD driver evaluation board: PCF8576D, PCF2119, PCF8531, PCA9633
	OM6293	PCA9600 daughter card for I ² C 2005-1
OM11051	PCF2127A demo board	
OM11757	PCF8536 touch display demo board	
OM13260	I ² C Fm+ development board (RoHS)	
OM13243	PCA9555 daughter card (RoHS)	
OM13243	GPIO target board (RoHS)	
OM13257	LM75B daughter card (RoHS)	
OM13285	PCA9629 demo board	
OM13270	PCA9555 daughter card	
OM13309	PCA9955 daughter card	

I²C-bus: The serial revolution

By replacing complex parallel interfaces with a straightforward yet powerful serial structure, the I²C-bus revolutionized chip-to-chip communications.

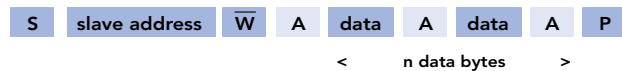
Invented by NXP (Philips) more than 30 years ago, the I²C-bus uses a simple two-wire format to carry data one bit at a time. It performs inter-chip addressing, selection, control, and data transfer. Speeds are up to 400 kHz (Fast-mode), 1 MHz (Fast-mode Plus), 3.4 MHz (High Speed-mode), or 5 MHz (Ultra Fast-mode).

The I²C-bus shrinks the IC footprint and leads to lower IC costs. Plus, since far fewer copper traces are needed, it enables a smaller PCB, reduces design complexity, and lowers system cost.

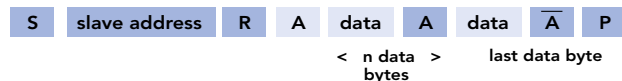


I²C-bus devices are available in a wide range of functions. Each slave device has its own I²C-bus address, selectable using address pins set high (1) or low (0). Information is transmitted byte by byte, and each byte is acknowledged by the receiver. There can be multiple devices on the same bus, and more than one IC can act as master. The master role is typically played by a microcontroller.

Write data

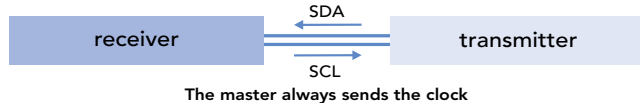
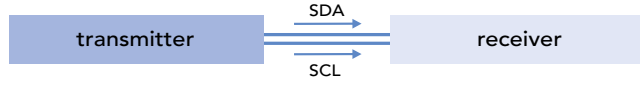


Read data



S = Start condition R/W = read/write
A = Acknowledge A-bar = Not acknowledge P = Stop condition

Master



Our I²C-bus website (www.nxp.com/interface) is a valuable resource for device information and training programs. It gives you direct access to a comprehensive handbook, application notes, information about evaluation kits and training materials, links to application and design support, and more.

The I²C Fm+ development board and daughter cards make it easy to program new peripherals and are a quick way to learn about the I²C-bus protocol.

OM6275 I2C 2005-1 evaluation board with OM6293 PCA9600 Fm+ 1-MHz bus buffer daughter card

OM6281 PCA9698 Fm+ 40-bit GPIO daughter card with PCA9530 2-bit LED dimmer

OM6290 LCD driver evaluation board: PCF8576D, PCF2119, PCF8531, PCA9633





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