



# System Management I<sup>2</sup>C, I3C and SPI Selector Guide

A broad catalog of interface components for all your design needs



## Selector guide

System Management I<sup>2</sup>C, I3C and SPI

## I<sup>2</sup>C Bus: Serial Interface Standard

By replacing complex parallel interfaces with a straightforward yet powerful serial structure, the I<sup>2</sup>C-bus revolutionized chip-to-chip communications.

Invented by NXP (Philips) more than 30 years ago, the I<sup>2</sup>C-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). New 12.5 MHz I<sup>3</sup>C controllers with backwards compatibility to I<sup>2</sup>C are starting to hit the market which compete with the higher speeds of the SPI bus.

The I<sup>2</sup>C-bus shrinks the IC footprint and leads to lower IC costs. Additionally, since far fewer copper traces are needed, it enables a smaller PCB, reduces design complexity and lowers system cost.

I<sup>2</sup>C-bus devices are available in a wide range of functions. Each target device has its own I<sup>2</sup>C-bus address, selectable using address pins set high (1) or

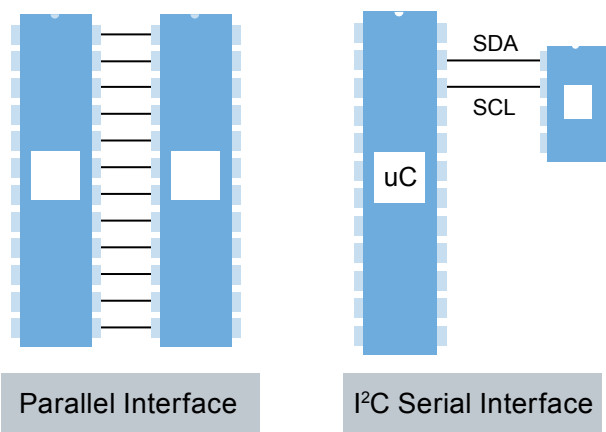


Figure 1 - Parallel interface versus I<sup>2</sup>C Bus interface

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 controller. The controller role is typically played by a microcontroller.

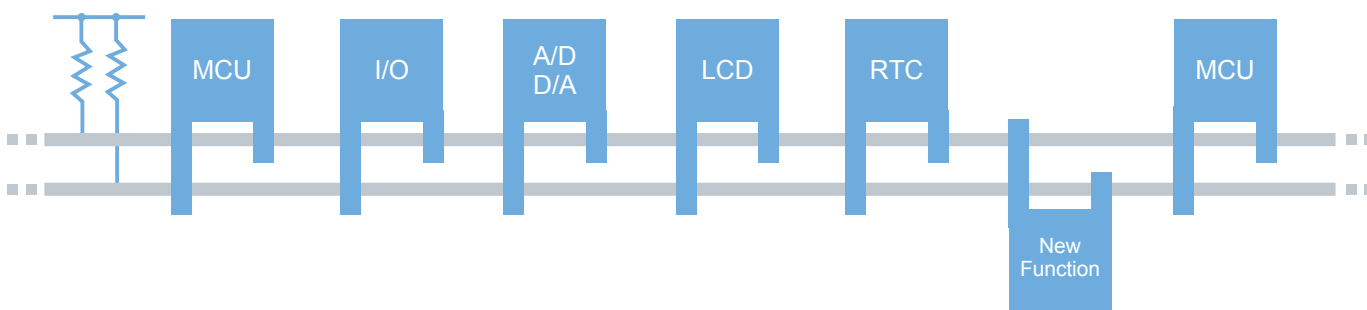
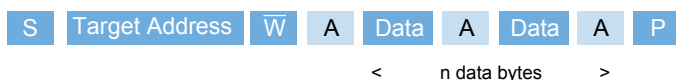


Figure 2 - I<sup>2</sup>C Bus with multiple devices

### Write data



### Read data



S = Start condition    R/W = Read/write  
A = Acknowledge    A = Not acknowledge    P = Stop condition

### Controller

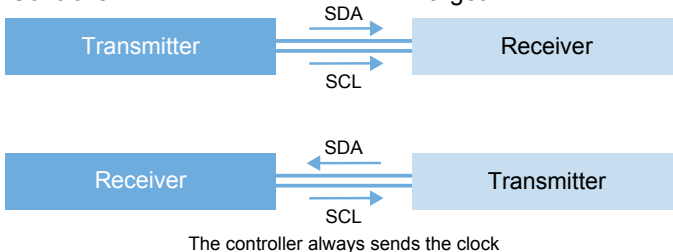


Figure 3 - Write and Read frame format

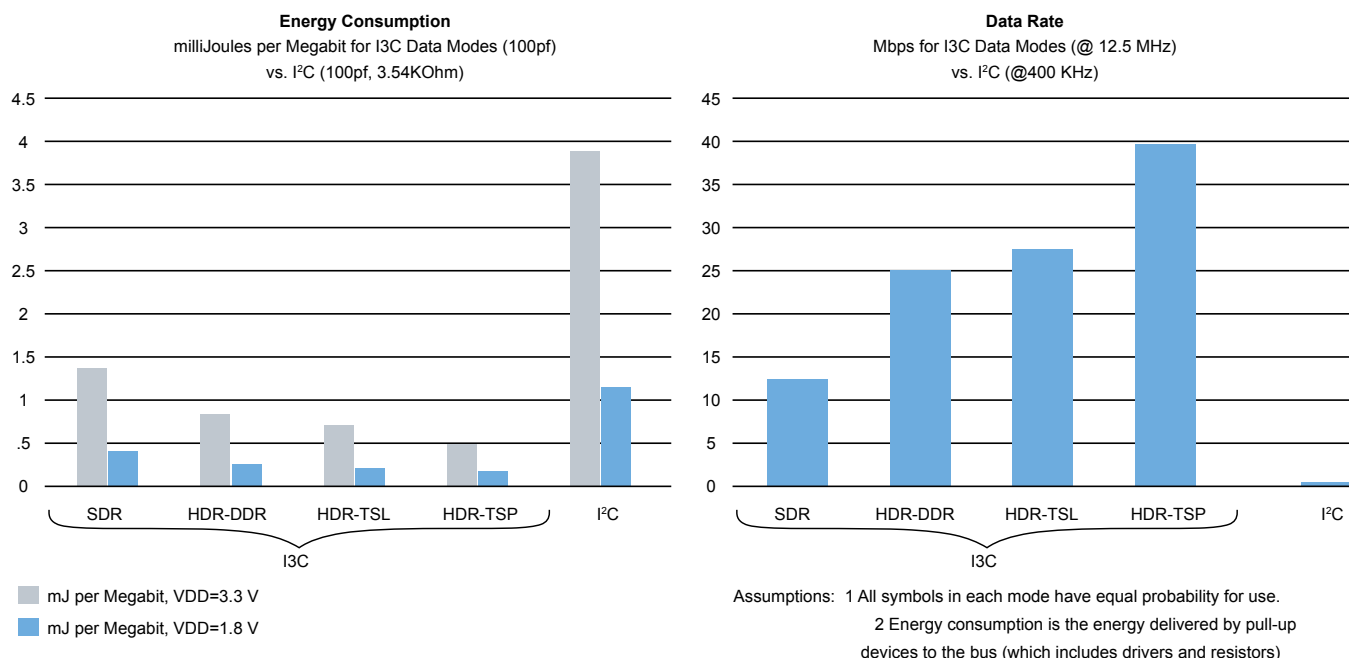


Figure 4 – I3C vs I<sup>2</sup>C energy and data rate comparison

## Overview of MIPI I3C

MIPI I3C (and the publicly available MIPI I3C Basic) provide a scalable, medium-speed, utility and control bus for connecting peripherals to an application processor. Its design incorporates key attributes from both I<sup>2</sup>C-bus and SPI interfaces to provide a unified, high-performance, low-power interface solution that delivers a flexible upgrade path for I<sup>2</sup>C-bus and SPI implementers. Originally introduced in 2017, I3C was the culmination of a multi-year development project based on extensive collaboration with the MEMS and Sensors Industry Group and across the broader electronics ecosystem.

As shown in Figure 1, I<sup>2</sup>C-bus targets (with 50 ns filter) can coexist with I3C controllers operating at 12.5 MHz, enabling the migration of existing I<sup>2</sup>C-bus designs to the I3C specification. Conversely, I3C targets operating at typical 400 kHz or 1 MHz I<sup>2</sup>C-bus speeds can coexist with existing I<sup>2</sup>C-bus controllers.

Just like I<sup>2</sup>C, I3C is implemented with standard CMOS I/O pins using a two-wire interface, but unlike I<sup>2</sup>C it supports in-band interrupts enabling target devices to notify controllers of interrupts, a design feature that eliminates the need for a separate general-purpose input/output (GPIO) interrupt for each target, reducing system cost and complexity. Support for dynamic address assignments help minimize pin counts, which is key for accommodating space-constrained form factors.

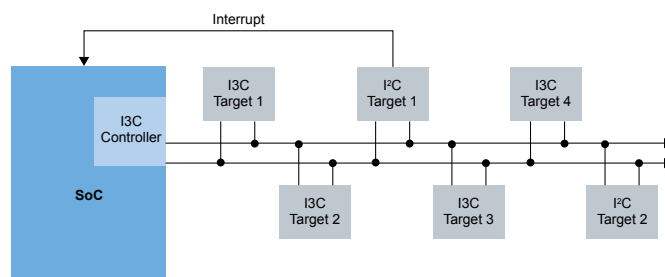


Figure 5 – Mixed Bus with I2C and I3C targets

I3C supports a multi-drop bus that, at 12.5MHz, supports standard data rate (SDR) of 10 Mbps with options for high-data-rate (HDR) modes. The net result is that I3C offers a leap in performance and power efficiency compared with I<sup>2</sup>C as shown in **Figure 5**.

Additional technical highlights for I3C include multi-controller support, dynamic addressing, command-code compatibility and a uniform approach for advanced power management features, such as sleep mode. It provides synchronous and asynchronous timestamping to improve the accuracy of applications that fuse signals from various peripherals. It can also batch and transmit data quickly to minimize energy consumption of the host processor.

While the full version of I3C is available only to MIPI Alliance members, MIPI has released a public version called **I3C Basic** that bundles the most commonly needed I3C features for use by developers and other standards organizations. I3C Basic is available

for implementation without MIPI membership and is intended to facilitate a royalty-free licensing environment for all implementers. Figure 3 summarizes key features supported by I3C and I3C Basic.

To support developers, compatibility between different I3C implementations has been confirmed through multiple interoperability workshops, and several supporting MIPI resources are available. These include:

- I3C Host Controller Interface – [MIPI I3C HCI<sup>SM</sup>](#)
- [I3C HCI Driver for Linux](#)
- I3C Discovery and Configuration Specification – [DisCo for I3C<sup>SM</sup>](#)
- I3C Debug and Test Interface – [MIPI Debug for I3C<sup>SM</sup>](#)

I3C intellectual property (IP) is available from multiple vendors, including a licence free version for I3C Basic. I3C conformance testing and verification IP test suites are also available from multiple vendors.

More information on I3C and I3C Basic is available via the [MIPI Alliance website](#).

## Comparison of Features

Feature	I3C v1.0	I3C Basic	I3C v1.1	I3C Basic v1.1
12.5 MHz SDR (Controller, Target and Legacy I <sup>2</sup> C Target Compatibility)	✓	✓	✓	✓
Target can operate as I <sup>2</sup> C device on I <sup>2</sup> C bus and on I3C bus using HDR modes	✓	✓	✓	✓
Target Reset			✓	✓
Specified 1.2V-3.3V Operation for 50pf C load	✓	✓	✓	✓
In-Band Interrupt (w/MDB)	✓	✓	✓	✓
Dynamic Address Assignment	✓	✓	✓	✓
Error Detection and Recovery	✓	✓	✓	✓
Secondary Controller	✓	✓	✓	✓
Hot-Join Mechanism	✓	✓	✓	✓
Common Command Codes (Required/Optional)	✓	✓	✓	✓
Specified 1.0V Operation for 100pf C load		✓		✓
Set Static Address as Dynamic Address CCC (SETAASA)		✓	✓	✓
Synchronous Timing Control	✓		✓	
Asynchronous Timing Control (Mode 0)	✓		✓	✓
Asynchronous Timing Control (Mode 1-3)	✓		✓	
HDR-DDR	✓		✓	✓
HDR-TSL/TSP	✓		✓	
HDR-BT (Multi-Lane Bulk Transport)			✓	✓
Grouped Addressing			✓	✓
Device to Device(s) Tunneling			✓	
Multi-Lane for Speed (Dual/Quad for SDR and HDR-DDR)			✓	
Monitoring Device Early Termination			✓	

**Figure 6 – Comparison of I3C and I3C basic features**

## Overview of the SPI bus

SPI is the full duplex synchronous serial interface consisting of four signals: SCLK (serial clock), COTI (controller out, target in), CITO (controller in, target out) and TS (target select). SPI bus operates with a single controller device and one or more target devices. Data rate ranges from 5 to 20 Mbps which is much higher than the I<sup>2</sup>C-bus rate but like the new I<sup>3</sup>C-bus.

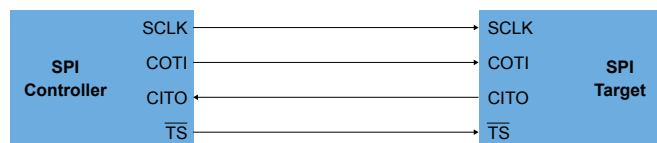


Figure 7 – SPI interface between controller and one target

Though target devices might operate in one polarity or phase only, clock polarity and phase of the SPI bus could be configured with respect to the data to establish the valid communication link by the controller. CPOL determines the polarity of the clock. When CPOL = 0, clock is low when idle. The leading edge is the rising edge and the trailing edge is the falling edge. When CPOL = 1, clock is high when idle. The leading edge is the falling edge and the trailing edge is the rising edge.

CPHA determines the timing of the data bits relative to the clock pulse. When CPHA = 1, the transmitting side changes data on the leading edge of the clock and the receiving side captures data on the trailing edge of the clock. When CPHA = 0, the transmitting side changes data on the trailing edge of the clock and the receiving side captures data on the leading edge of the clock.

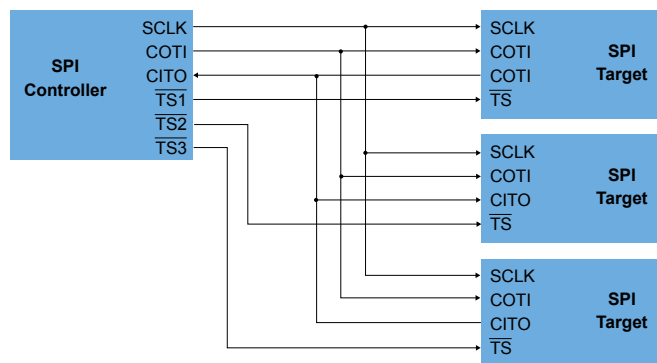


Figure 8 – SPI interface with independent targets

The controller could connect with multiple independent targets in parallel. Each target is controlled with the separate TS signal. When TS = 0, only the corresponding target will response to the controller. Outputs of all others with TS = 1 remain in high impedance.

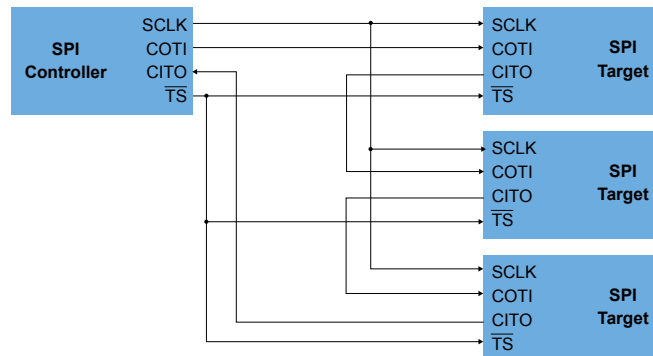


Figure 9 – SPI interface with daisy chain targets

Alternatively, targets could be connected in a daisy chain configuration to reduce number of the target select signals. The controller output is connected to the first target input. The first target output is connected to the second target input and so on. Then the last target output is connected back to the controller input. Each target is designed to send out during the second group of the clock pulses the exact copy of the data it received during the first group of clock pulses. The controller receives data from the last target first then data from the first target last during the same clock group. It requires two clock groups to complete each operation which would be only one clock group in the parallel configuration

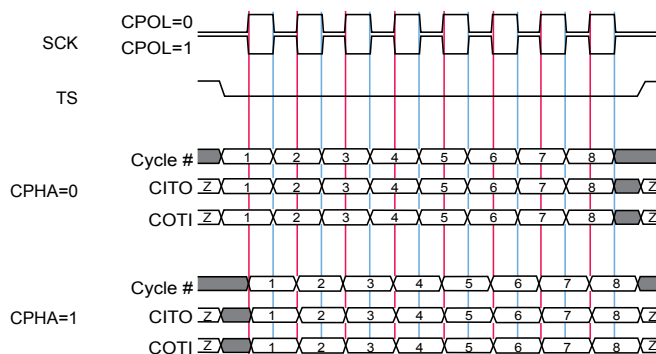


Figure 10 – SPI timing diagram with CPOL and CPHA

# NXP I<sup>2</sup>C, I<sup>3</sup>C and SPI Product Lines

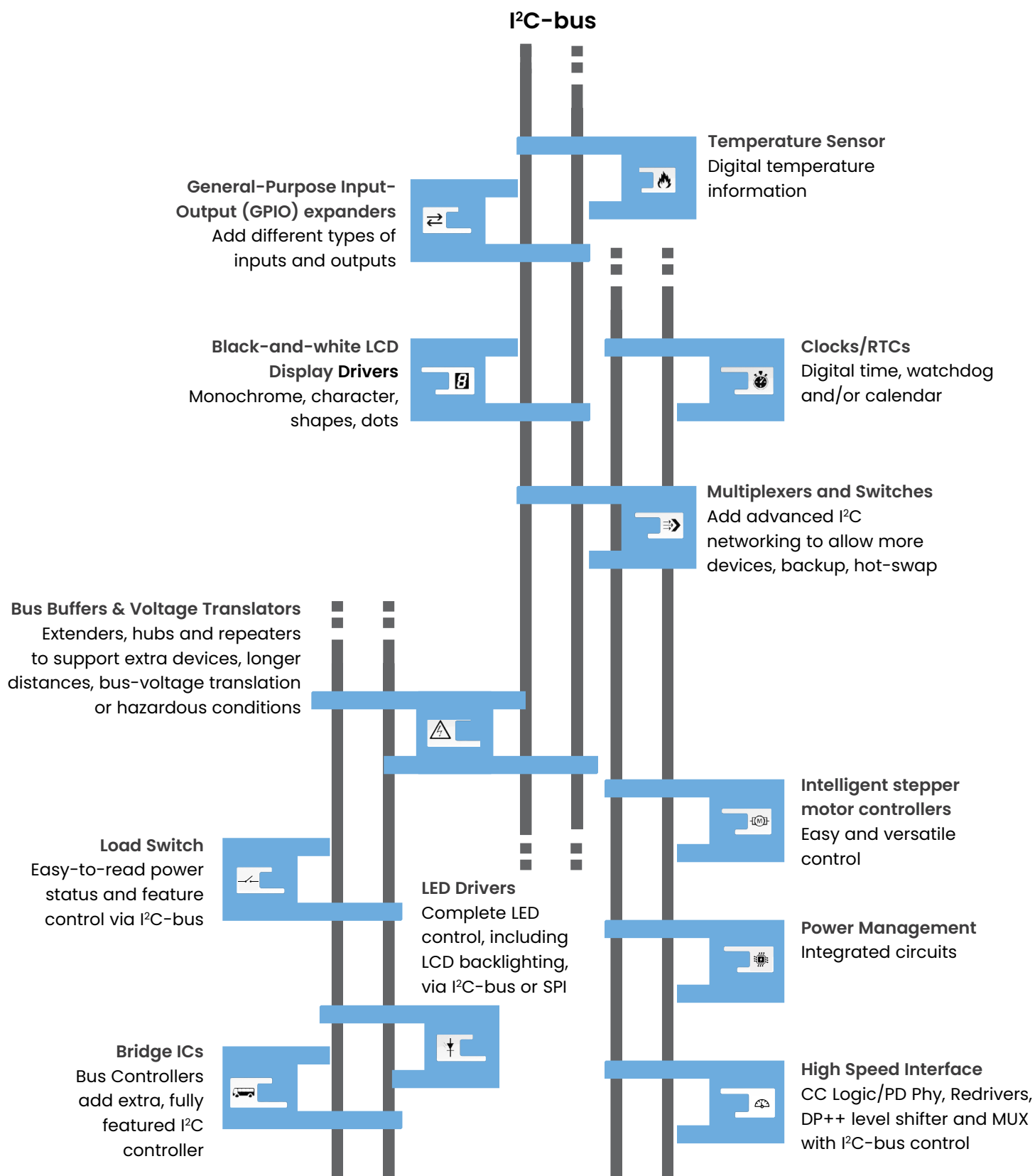



Figure 11 – NXP's broad portfolio of I<sup>2</sup>C, I<sup>3</sup>C and SPI devices


More information: [I<sup>2</sup>C, SPI, I<sup>3</sup>C Interface Devices](#).


[nxp.com](http://nxp.com)





# I<sup>2</sup>C-Bus, I<sup>3</sup>C-Bus and SPI Product Summary

Bridge and Bus Controllers 		
Bridge	+ SC16IS740	I <sup>2</sup> C Fm/SPI-to-UART bridge with IrDA
	SC16IS741A	I <sup>2</sup> C Fm/SPI-to-UART bridge with IrDA
	SC16IS750	I <sup>2</sup> C Fm/SPI-to-UART bridge with IrDA and GPIO
	SC16IS752	I <sup>2</sup> C Fm/SPI-to-DUART bridge with IrDA and GPIO
	SC16IS760	I <sup>2</sup> C Fm/SPI-to-UART bridge with IrDA and GPIO
	SC16IS762	I <sup>2</sup> C Fm/SPI-to-DUART bridge with IrDA and GPIO
	SC18IM704	UART-to-I <sup>2</sup> C Fm controller bridge with GPIO (Replacement for SC18IM700)
	SC18IS604	SPI-to-I <sup>2</sup> C Fm controller bridge with GPIO (Replacement for SC18IS600)
	SC18IS606	I <sup>2</sup> C Fm target-to-SPI controller bridge (Replacement for SC18IS602B)
Controller	P3H2440	I <sup>3</sup> C Hub with 2 controller ports and 4 target ports (pre-config) - Coming soon
	P3H2441	I <sup>3</sup> C Hub with 2 controller ports and 4 target ports (pre-config) - Coming soon
	P3H2840	I <sup>3</sup> C Hub with 2 controller ports and 4 target ports (pre-config) - Coming soon
	P3H2841	I <sup>3</sup> C Hub with 2 controller ports and 8 target ports (pre-config) - Coming soon

Bus Buffers 		
Incremental offset	PCA9510A	I <sup>2</sup> C Fm incremental offset hot-swap bus buffer (no RTA)
	PCA9511A	I <sup>2</sup> C Fm incremental offset hot-swap bus buffer
	PCA9512A	I <sup>2</sup> C Fm incremental offset VLT hot-swap bus buffer
	PCA9513A	I <sup>2</sup> C Fm incremental offset hot-swap bus buffer (92 µA CS)
Differential driver with static offset (1 side)	PCA9614	I <sup>2</sup> C Fm+ VLT differential (4-wire) bus buffer
	PCA9615	I <sup>2</sup> C Fm+ VLT differential (4-wire) hot-swap bus buffer
	PCA9616	I <sup>2</sup> C Fm+ 0.8 V LV VLT differential (4-wire) hot-swap bus buffer with INT (2-wire)
No offset	PCA9646	4-channel I <sup>2</sup> C Fm+ no offset buffer/switch with RST
Static offset (1 side)	P82B96	I <sup>2</sup> C Fm HV bus buffer
	PCA9507	I <sup>2</sup> C Fm VLT DDC buffer with accelerator
	PCA9508	I <sup>2</sup> C Fm VLT hot-swap bus repeater
	PCA9509	I <sup>2</sup> C Fm 1.0 V VLV VLT bus buffer with current source
	PCA9517A	I <sup>2</sup> C Fm 0.9 V ULV VLT bus repeater
	PCA9600	I <sup>2</sup> C Fm+ HV bus buffer
	PCA9601	I <sup>2</sup> C Fm+ HV bus buffer with stronger 15 mA local side drive to support multiple Fm+ followers
Static offset (All sides)	PCA9617A	I <sup>2</sup> C Fm+ 0.8 V ULV VLT bus repeater
	PCA9515A	I <sup>2</sup> C Fm bus repeater
	PCA9516A	I <sup>2</sup> C Fm 5-channel hub
	PCA9518A	I <sup>2</sup> C Fm expandable 5-channel hub


GPIO Expander 		
4-bit	PCA9536	4-bit I <sup>2</sup> C Fm TP GPIO with PU
	PCA9537	4-bit I <sup>2</sup> C Fm TP GPIO with INT and RST
8-bit	PCF8574	8-bit I <sup>2</sup> C Fm QB GPIO with INT and PU
	PCF8574A	8-bit I <sup>2</sup> C Sm QB GPIO with INT and PU (alternate address)
	PCA9500	8-bit I <sup>2</sup> C Fm QB GPIO with PU and 2-K EEPROM
	PCA9501	8-bit I <sup>2</sup> C Fm QB GPIO with INT, PU and 2-K EEPROM
	PCA9502	8-bit I <sup>2</sup> C Fm/SPI TP GPIO with INT and RST
	PCA9534	8-bit I <sup>2</sup> C Fm TP GPIO with INT
	+ PCA9538	8-bit I <sup>2</sup> C Fm TP GPIO with INT and RST
	PCA9538A	8-bit I <sup>2</sup> C Fm LV TP GPIO with INT and RST
	PCAL9538A	8-bit I <sup>2</sup> C Fm LV TP/OD GPIO with INT, RST, latch and PU/PD
	PCA6408A	8-bit I <sup>2</sup> C Fm LV VLT TP GPIO with INT and RST
	PCAL6408A	8-bit I <sup>2</sup> C Fm LV VLT TP/OD GPIO with INT, RST, latch and PU/PD
	PCA9554	8-bit I <sup>2</sup> C Fm TP GPIO with INT and PU
	PCA9554A	8-bit I <sup>2</sup> C Fm TP GPIO with INT and PU (alternate address for PCA9554)
	PCA9554B	8-bit I <sup>2</sup> C Fm LV TP GPIO with INT and PU
	PCAL9554B	8-bit I <sup>2</sup> C Fm LV TP/OD GPIO with INT, latch and PU/PD (PU default)
	PCA9554C	8-bit I <sup>2</sup> C Fm LV TP GPIO with INT and PU (alternate address for PCA9554B)
14-bit	PCAL9554C	8-bit I <sup>2</sup> C Fm LV TP/OD GPIO with INT, latch and PU/PD (PU default) (alternate address for PCAL9554B)
	PCA9557	8-bit I <sup>2</sup> C Fm TP GPIO with RST
	PCA9574	8-bit I <sup>2</sup> C Fm LV VLT TP/OD GPIO with INT, RST, latch and PU/PD
	+ PCA9704	8-bit SPI 18 V GPI with maskable INT
	+ PCAL9714	14-bit SPI LV VLT TP/OD GPIO with INT, RST, latch and PU/PD
16-bit	PCF8575	16-bit I <sup>2</sup> C Fm QB GPIO with INT and PU
	PCA9535	16-bit I <sup>2</sup> C Fm TP GPIO with INT
	PCA9535C	16-bit I <sup>2</sup> C Fm OD GPIO with INT
	PCA9535A	16-bit I <sup>2</sup> C Fm LV TP GPIO with INT
	PCAL9535A	16-bit I <sup>2</sup> C Fm LV TP/OD GPIO with INT, latch and PU/PD
	+ PCA9539	16-bit I <sup>2</sup> C Fm TP GPIO with INT and RST
	+ PCA9539R	16-bit I <sup>2</sup> C Fm TP GPIO with INT and RST (state machine only)
	PCA9539A	16-bit I <sup>2</sup> C Fm LV TP GPIO with INT and RST
	PCAL9539A	16-bit I <sup>2</sup> C Fm LV TP/OD GPIO with INT, RST, latch and PU/PD
	PCA6416A	16-bit I <sup>2</sup> C Fm LV VLT TP GPIO with INT and RST
	PCAL6416A	16-bit I <sup>2</sup> C Fm LV VLT TP/OD GPIO with INT, RST, latch and PU/PD
	PCA9555	16-bit I <sup>2</sup> C Fm TP GPIO with INT and PU
	PCA9555A	16-bit I <sup>2</sup> C Fm LV TP GPIO with INT and PU
	PCAL9555A	16-bit I <sup>2</sup> C Fm LV TP/OD GPIO with INT, latch and PU/PD (PU default)
	PCA9575	16-bit I <sup>2</sup> C Fm LV VLT TP/OD GPIO with INT, RST, latch and PU/PD
	PCA9671	16-bit I <sup>2</sup> C Fm+ QB GPIO with RST and PU
	PCA9701	16-bit SPI 18 V GPI with INT
22-bit	+ PCAL9722	22-bit SPI LV VLT TP/OD GPIO with INT, RST, latch and PU/PD
24-bit	PCAL6524	24 bit I <sup>2</sup> C Fm+ ULV VLT TP/OD GPIO with INT, RST, latch and PU/PD
	PCAL6534	34 bit I <sup>2</sup> C Fm+ ULV VLT TP/OD GPIO with INT, RST, latch and PU/PD
40-bit	PCA9505	40-bit I <sup>2</sup> C Fm TP GPIO with INT, RST, OE and PU
	PCA9506	40-bit I <sup>2</sup> C Fm TP GPIO with INT, RST and OE
	PCA9698	40-bit I <sup>2</sup> C Fm+ TP/OD GPIO with INT, RST, OE and PU


LCD Drivers 		
Segment driver	+ PCA8561	I <sup>2</sup> C Fm or SPI 72-segment low-power LCD driver in HVQFN32 package
	+ PCA/PCF85162	I <sup>2</sup> C Fm 128-segment LCD driver in TSSOP48 package
	+ PCA85262	I <sup>2</sup> C Fm 128-segment LCD driver with higher frame frequency in TSSOP48 package
	+ PCA/PCF8551A/B	I <sup>2</sup> C Fm or SPI 144-segment low-power LCD driver with programmable frame frequency in TSSOP48 package
	+ PCA/PCE/PCF85176	I <sup>2</sup> C Fm 160-segment LCD driver in TSSOP56 or TQFP64 package
	+ PCA85276	I <sup>2</sup> C Fm 160-segment LCD driver with higher frame frequency in TSSOP56 package
	PCF8553	40 × 4 LCD segment driver – ultra low-power LCD segment driver with 4 backplane- and 40 segmentdriver outputs, with either an I <sup>2</sup> C- or an SPI-bus interface.
	+ PCA/PCF85134	I <sup>2</sup> C Fm 240-segment LCD driver in LQFP80 package
	+ PCA/PCF8536A/B	I <sup>2</sup> C Fm or SPI 320-segment LCD driver with programmable frame frequency and LED backlight PWM control in TSSOP56 package
	+ PCA/PCF8576D/E	I <sup>2</sup> C Fm 160-segment COG LCD driver
	+ PCA8576F	I <sup>2</sup> C Fm 160-segment COG LCD driver with higher frame frequency and higher VLCD
	+ PCA/PCF85133	I <sup>2</sup> C Fm 320-segment COG LCD driver with selectable frame frequency
Character drivers	+ PCA85233	I <sup>2</sup> C Fm 320-segment COG LCD driver with higher selectable frame frequency
	+ PCA85232	I <sup>2</sup> C Fm 640-segment COG LCD driver with higher programmable frame frequency
	PCF2119	I <sup>2</sup> C Fm or parallel bus 2 x 16 characters + 160-icon COG LCD driver with charge pump,VLCD temperature compensation


LED Drivers 		
Open Drain Constant Current		
Driver (PWM/Ch, 57 mA/ 20 V)	+ PCA9955B	16-channel I <sup>2</sup> C Fm+ CC LED driver
	PCA9956B	24-channel I <sup>2</sup> C Fm+ CC LED driver
Driver (PWM, 5 V)	PCA9957	24-channel SPI CC LED driver – 32 mA per ch
	+ PCA9958	24-channel SPI CC LED driver – 63 mA per ch
	PCA9959	24-channel SPI CC LED driver – 63 mA per ch – 64 grids


#### Open Drain or Totem Pole Voltage Source

Dimmer (2 PWM, 25 mA/ 5 V)	PCA9531	8-channel I <sup>2</sup> C Fm OD LED dimmer with RST
	PCA9532	16-channel I <sup>2</sup> C Fm OD LED dimmer with RST
Blinker (2 PWM, 25 mA/ 5 V)	PCA9551	8-channel I <sup>2</sup> C Fm OD LED blinker with RST
	PCA9552	16-channel I <sup>2</sup> C Fm OD LED blinker with RST
	PCA9553	4-channel I <sup>2</sup> C Fm OD LED blinker
Controller (PWM/Ch, 25 mA/ 5 V)	PCA9632	4-channel I <sup>2</sup> C Fm+ low-power TP LED controller
	PCA9633	4-channel I <sup>2</sup> C Fm+ TP LED controller with OE
	PCA9634	8-channel I <sup>2</sup> C Fm+ TP LED controller with OE
	+ PCA9635	16-channel I <sup>2</sup> C Fm+ TP LED controller with OE
	+ PCA9685	16-channel I <sup>2</sup> C Fm+ TP LED controller with 12-bit PWMs and OE


Load Switch 		
Load Switch	NX3P2902BUK	500 mA / 3.6 V load switch
	NX3P1108UK	1.5 A / 3.6 V load switch
	NX5P3363UK	3 A / 5 V source load switch
	NX20P5090UK	5 A / 20 V sink load switch
	NX30P6093UK	I <sup>2</sup> C-controlled OVP load switch


Level Translators 		
SIM Card Translator	NVT4555	SIM card VLT level translator and LDO
	NVT4557	SIM card VLT level translator for 1.8 V node
	NVT4558	SIM card VLT level translator for 1.2 V and 1.8 V node
SD Card Translator	NVT4857	SD 3.0 – SDRI04 auto-direction control memory card level translator and LDO – also support SIM card for combo socket
	NVT4858	SD 3.0 – SDRI04 auto-direction control memory card level translator for both 1.2 V and 1.8 V node – also supports SIM card for combo socket
eUSB2 Repeater and Level Shifter	PTN3222	1-port eUSB2 to USB2 redriver functionality
GTL to LVTTTL Translators with Direction Pin	GTL2014	4-bit LVTTTL to GTL transceiver
	GTL2012	2-bit LVTTTL to GTL transceiver


Level Translators 		
FET No Direction Pin	NVT2002	2-bit I <sup>2</sup> C Fm+ VLT 1.0 V to 5.5 V
	PCA9306	Dual I <sup>2</sup> C/SMBus Fm+ VLT 1.0 V to 5.5 V
	NVT2008	8-bit I <sup>2</sup> C Fm+ VLT 1.0 V to 5.5 V
	NVT2010	10-bit I <sup>2</sup> C Fm+ VLT 1.0 V to 5.5 V
FET One Shot No Direction Pin	P3A1604	4-Bit Dual Supply Bidirectional I3C/I <sup>2</sup> C-Bus, SMBus and SPI Voltage-Level Translator
	P3A9606	Dual I3C 12.5 MHz and I <sup>2</sup> C/SMBus Fm+ VLT 0.72 V to 1.98 V
	NTS0102	2-bit I <sup>2</sup> C Fm+ VLT 1.65 V to 3.6 V A side and 2.3 V to 5.5V B side
	P3S0210	Dual bidirectional I3C-bus, 1:2 and 2:1 switch and VLT
	NTS0104	4-bit I <sup>2</sup> C Fm+ VLT 1.65 V to 3.6 V A side and 2.3 V to 5.5 V B side, AEC Q100 part add “+”
	NTS0302	2-bit improved smart one shot I <sup>2</sup> C Fm+ VLT 0.95 V to 3.6 V A side and 1.65 V to 5.5 V B side
	NTS0304E	4-bit improved smart one shot I <sup>2</sup> C Fm+ VLT 0.95 V to 3.6 V A side and 1.65 V to 5.5 V B side with IEC 61000-4-2 Class 4, 8 kV contact on B side
	NTS0308E	8-bit improved smart one shot I <sup>2</sup> C Fm+ VLT 0.95 V to 3.6 V A side and 1.65 V to 5.5V B side with IEC 61000-4-2 Class 4, 8 kV contact on B side
Buffer One Shot No Direction Pinc	NTB0102	2-bit SPI VLT 1.2 V to 3.6 V A side and 1.65 V to 5.5 V B side
	+ NTB0104	4-bit SPI VLT 1.2 V to 3.6 V A side and 1.65 V to 5.5 V B side, AEC Q100 part add “+”


High Speed Interface 		
CC Logic/PD Phy	PTN5150	USB Type-C Rev 1.1 CC-Logic, Pin to control NXP redriver
	PTN5110	USB Type-C Rev 3.0 PD PHY, TCPC Rev 2.0 version 1.0. Laptop/tablet applications
Redrivers	PTN38003A	Multi-protocol USB3.2 and DisplayPort linear redriver
	PTN3944	Multi-channel PCIe 4.0 linear equalizer
DP++ Level Shifter	PTN3360	Enhanced performance HDMI/DVI level shifter with active DDC buffer, supporting 3 Gbi t/s operation
	PTN3361B	HDMI/DVI level shifter with dongle detect support and active DDC buffer
	PTN3365	Enhanced performance HDMI/DVI level shifter with active DDC buffer, supporting 3 Gbit/s operation




Real-time Clocks 		
Low-power	PCF2123	SPI lower power RTC with alarm, timer and interrupt
	PCF85053A	Bootable CPU I <sup>2</sup> C Fm RTC with two I <sup>2</sup> C controllers, 128 Byte SRAM and alarm function
	PCF85063	I <sup>2</sup> C Fm/Tiny RTC with 30s, 60s interrupt
	PCF85063A/B	I <sup>2</sup> C Fm or SPI/Tiny RTC with alarm and 30s, 60s interrupt
	PCF85263A	I <sup>2</sup> C Fm/Tiny RTC with alarms, time stamp and battery backup +1-byte RAM 0.25 mm pitch WLCSP12 for cellular modem
	PCF85363A	I <sup>2</sup> C Fm/Tiny RTC with alarms, time stamp and battery back-up switch + 64-byte RAM
	PCF8523	I <sup>2</sup> C Fm+ ultra-low-power RTC with loss of main power detection and automatic battery backup
	PCF8563	I <sup>2</sup> C Fm low-power clock/calendar
	PCF8583	I <sup>2</sup> C Sm Clock and calendar with 240 x 8-bit RAM and alarm
	PCF8593	I <sup>2</sup> C Sm Low power clock and calendar with alarm
Automotive high temperature	+ PCA21125	SPI lower power RTC with alarm, timer and interrupt to 125 °C
	+ PCA85073A	I <sup>2</sup> C Fm/Tiny RTC with alarm and 30s, 60s interrupt -40 °C to 105 °C
	+ PCA8565	I <sup>2</sup> C Fm high-temperature clock/calendar -40 °C to +125 °C
	+ PCA2131	I <sup>2</sup> C Fm or SPI high accuracy, low voltage 100 mA RTC with embedded crystal, time stamp, tamper pins -40 °C to 105 °C
Temperature compensated high accuracy with embedded crystal	PCF2131	I <sup>2</sup> C Fm or SPI high accuracy, low voltage 64 nA RTC time stamp, tamper pins -40 °C to 85 °C

Stepper Motor Controller 		
1 motor controller	PCA9629A	Improved I <sup>2</sup> C Fm+ stepper motor controller with TP GPIO with INT and RSTC

Power Management Integrated Circuits (PMIC) 		
PCA942X	i.MX RT5/600 including battery charger	
PCA9450	i.MX 8M family with 12 power rails	
PCA9460	i.MX 8ULP with 13 power rails	
PCA9451	i.MX 93 with 12 power rails	

Temp Sensors 		
Local	LM75B	I <sup>2</sup> C Fm TS local with ± 2 °C accuracy and SMBus timeout
	SE98A	I <sup>2</sup> C Fm JEDEC DDR3 TS, no SPD, ±1 °C accuracy and SMBus timeout
	PCT2075	I <sup>2</sup> C Fm+ TS with ±1 °C accuracy and SMBus timeout Default interrupt trip is + 85 °C
	P3TI085UK	I <sup>3</sup> C and I <sup>2</sup> C TS with ±0.5 °C accuracy and SMBus timeout
	P3TI084UK	±0.4 °C accuracy temperature sensor with I <sup>3</sup> C/I <sup>2</sup> C interface in WLCSP6 package
	P3TI755DP	I <sup>3</sup> C and I <sup>2</sup> C TS with ±0.5 °C accuracy and SMBus timeout
	P3TI750DP	±1 °C accuracy temperature sensor with I <sup>3</sup> C/I <sup>2</sup> C interface in TSSOP8 package
	P3TI035x	I <sup>3</sup> C and I <sup>2</sup> C interface with ±0.5C accuracy with 8 address options
	P3T2030x	I <sup>3</sup> C and I <sup>2</sup> C interface with ±2C accuracy with 8 address options
Local and EEPROM	SE97B	I <sup>2</sup> C Fm JEDEC DDR3 TS local with ±1 °C accuracy, 2K SPD and SMBus timeout
Local and remote	SA56004	I <sup>2</sup> C HSMsTS, 1.8 V, + 1 °C accuracy and SMBus timeout

Muxes and Switches 		
2-channel	+ PCA9540B	2-channel I <sup>2</sup> C Fm mux
	P3S0210	Dual bidirectional I <sup>3</sup> C-bus, 1:2 and 2:1 switch and VLT
	P3S0200	Dual bidirectional I <sup>3</sup> C-bus, 2:1 and 1:2 switch
	PCA9542A	2-channel I <sup>2</sup> C Fm mux with INT
	PCA9543A	2-channel I <sup>2</sup> C Fm switch with INT and RST
2-to-1 demux	PCA9541A/01	2-to-1 I <sup>2</sup> C Fm demux with INT and RST (channel 0 default)
	PCA9541A/03	2-to-1 I <sup>2</sup> C Fm demux with INT and RST (no channel default)
4-channel	PCA9544A	4-channel I <sup>2</sup> C Fm mux with INT
	PCA9545A	4-channel I <sup>2</sup> C Fm switch with INT and RST
	PCA9546A	4-channel I <sup>2</sup> C Fm switch with RST
	PCA9646	4-channel I <sup>2</sup> C Fm+ no offset buffer/switch with RST
	PCA9846	4-channel ULV VLT I <sup>2</sup> C Fm+ switch with RST
	PCA9849	4-channel ULV VLT I <sup>2</sup> C Fm+ mux with RST
	PCA9547	8-channel I <sup>2</sup> C Fm mux with RST (channel 0 default)
	PCA9847	8-channel ULV VLT I <sup>2</sup> C Fm+ mux with RST
8-channel	PCA9548A	8-channel I <sup>2</sup> C Fm switch with RST
	PCA9848	8-channel ULV VLT I <sup>2</sup> C Fm+ switch with RST
Arbiter	PCA9641	2 controllers to shared target I <sup>2</sup> C Fm+ arbiter with INT and RST (no channels selected at default)

## Legend

Code	Description	Code	Description	Code	Description
Sm	100 kHz Standard-mode I <sup>2</sup> C-bus	ADC	Analog Digital Converter	INT	Interrupt
Fm	400 kHz Fast-mode I <sup>2</sup> C-bus	LV	Supply Voltage < 2.3 V	RST	Reset
Fm+	1 MHz Fast-mode Plus I <sup>2</sup> C-bus	VLV	Supply Voltage < 1.65 V	OE	Output enable
HSm	3.4 MHz High-speed Mode I <sup>2</sup> C-bus	ULV	Supply Voltage < 1.0 V	Latch	Input latch
+	AEC-Q100 Compliance	HV	Outputs >10 V	PU	Pull-up resistors
GPIO	General-purpose I/O Expander	VLT	Voltage Level Translator – 2 Supplies	PU/PD	Pull-up/pull-down resistors
TS	Thermal Sensor	TP	Totem-pole (push-pull)	COG	Chip on glass
RTC	Real-time Clock	QB	Quasi-bidirectional	SPI	Serial peripheral interface
LCD	Liquid Crystal Display	OD	Open Drain	SPMI	System power management interface
DAC	Digital Analog Converter	CC	Constant current	P3A, P3T, P3S	3 indicates I <sup>3</sup> C Bus capable

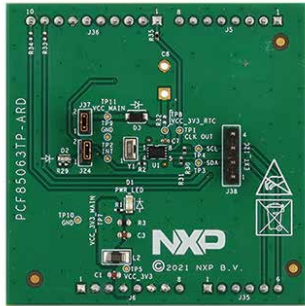
# Evaluation Boards

Bridges	OM6270	SC16IS750_760 SPI_I <sup>2</sup> C-UART EV
	OM6273	SC16IS752_762 SPI_I <sup>2</sup> C-UART EV
	SC18IS604-EVB	SPI-to-I <sup>2</sup> C Fm controller bridge Eval Board
	SC18IS606-EVB	I <sup>2</sup> C Fm target-to-SPI controller bridge Eval Board
	SC18IM704-EVB	UART-to-I <sup>2</sup> C Fm controller bridge Eval Board
LCD display	OMI3506	PCF8553 LCD Demo
RTC	OMI1059	PCF85063B RTC Eval - SPI
	OMI1059A	PCF85063A RTC Eval - I <sup>2</sup> C
	OMI3510	PCF85263 RTC Eval
	OMI3511	PCF8523 RTC Eval
	OMI3512	PCF2123 SPI-bus RTC Eval
	OMI3514	PCF85363 RTC Eval
	OMI3515	PCF85063A RTC Eval
	OMI3517	PCA21I25 RTC Eval 9 pin
	OMI3519	PCA8565 RTC Eval
Voltage-Level Translator	OMI3317	NVT2008PW VLT Eval
	OMI3318	NVT2002DP VLT Eval
	OMI3480	NVT4555UK SIM Card Eval
	NVT4858-4557-EVB	NVT4858 SD and NVT4557 SIM Card Eval
	P3A9606JK-EVB	P3A9606JK VLT Eval
LED driver	OMI3269	PCA9632 LED Eval
	OMI3321	PCA9956B LED Eval Fm_Plus
	OMI3332	PCA9685 demo board, 16-channel voltage source with 12-bit PWM demo board I <sup>2</sup> C Fm+
	OMI3333	PCA9635 LED Eval
	OMI3483	PCA9955B LED Eval
	OMI3528	PCA9532BS LED Eval
	OMPCA9957-LEDEV	PCA9957 LED Eval Socket — MCU
	OMPCA9959-LEDEV	PCA9959 LED Eval Socket — MCU
Temperature Sensors	OMI3257	Universal TS DC Fm_Plus
Bus Buffers	OMI3523	PCA9616PW dI <sup>2</sup> C Buffer Eval
GPIO	OMI3488	Universal 8-bit GPIO DC — Fm
	OMI3489	Universal 16-bit GPIO DC — Fm
	OMI3526	PCAL6524 GPIO Eval
	OMI3529	PCAL6524EV GPIO Eval Fm_Plus
	OMI3541	PCAL6534EV GPIO Eval

Arduino Board	PCF85063AT-ARD	Industry Standard RTC
	PCT2075DP-ARD	Temp Sensor
	PCA9957HN-ARD	24-channel LED controller
	PCA9959HN-ARD	24-channel LED controller with 64-grid
	PCF85063TP-ARD	RTC
	IMX8MMINI-IARD	Interposer Board for i.MX8 EVB
	NTS0304EUK-ARD	4cch Voltage Level Translator
	PCAL6534EV-ARD	34-bit GPIO
	PCAL6524EV-ARD	24-bit GPIO
	PCF85263ATL-ARD	Full Function RTC
	PCA9955BTW-ARD	16 ch LED Controller
	PCA8561AHN-ARD	LCD Display
	PCAL6408A-ARD	8-bit GPIO
	PCAL6416AEV-ARD	16-bit GPIO
	PCA9617ADP-ARD	I <sup>2</sup> C Bus Buffer
	PCA9846PW-ARD	I <sup>2</sup> C Low Voltage Switch
	PCT2131-ARD	Low Power Temperature Compensated RTC
	PCF85053ATK-ARD	Dual Controller RTC with RAM
	P3T1085UK-ARD	Temp Sensor - 6 pin 0.5 °C accuracy
	P3T1755DP-ARD	Temp Sensor - 8 pin 0.5 °C accuracy
	P3T1035XUK-ARD	Temp Sensor - 4 bump with 0.5C accuracy
	P3T2030XUK-ARD	Temp Sensor - 4 bump with 2.0C accuracy
	PCAL9722HN-ARD	22-Bit SPI, GPIO Expander Evaluation Board
	PCA9958HN-ARD	24-Channel LED Driver
	PCF2131-ARD	PCF2131/PCA2131 Evaluation Board
	P3A1604UK-ARD	P3A1604UK Evaluation Board
	P3H2440HN-ARD	P3H2440HN Evaluation Board - Coming soon
	P3H2441HN-ARD	P3H2441HN Evaluation Board - Coming soon
	P3H2840HN-ARD	P3H2840HN Evaluation Board - Coming soon
	P3H2841HN-ARD	P3H2841HN Evaluation Board - Coming soon
	P3S0210BQ-ARD	P3S0210 Evaluation Board

# Arduino™ Evaluation Boards

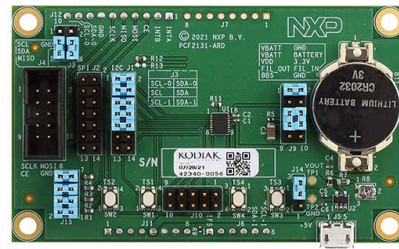
## RTCs



PCF85063TP-ARD



PCF85263ATL-ARD



PCF2131-ARD

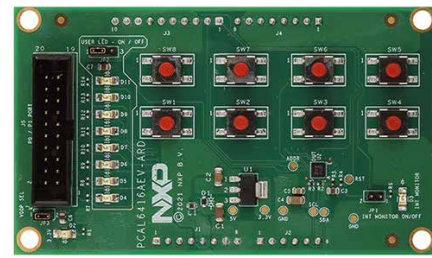
## GPIO Expanders



PCAL9722HN-ARD



PCAL6408A-ARD



PCAL6416AEV-ARD

## LED Drivers

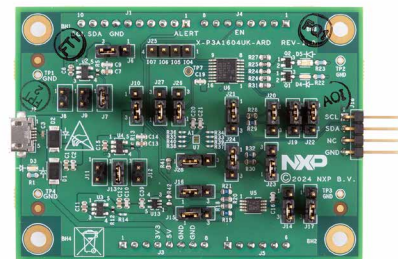


PCA9955BTW-ARD



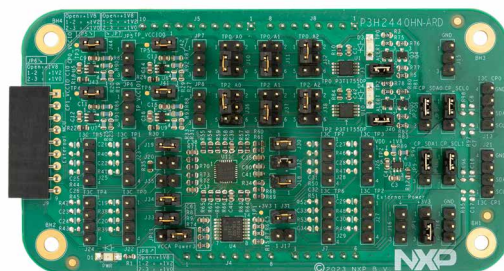
PCA9957HN-ARD

## VLT



P3A1604UK-ARD – coming soon

## Bus Controller

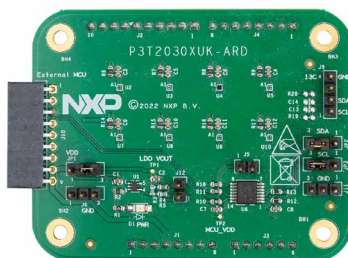


P3H2440HN-ARD – Coming soon  
P3H2441HN-ARD – Coming soon  
P3H2840HN-ARD – Coming soon  
P3H2841HN-ARD – Coming soon

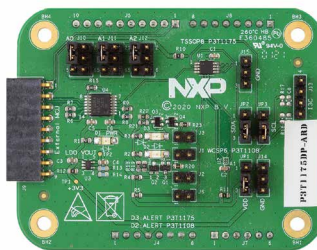
## Temperature Sensors



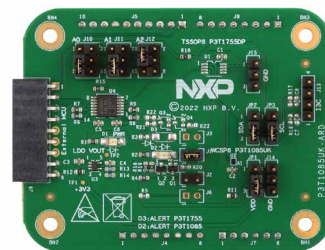
PCT2075DP-ARD



P3T2030XUK-ARD

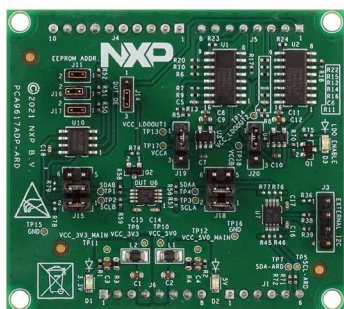


P3T1755DP-ARD

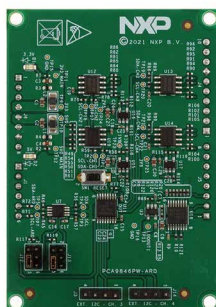


P3T1085UK-ARD

## I<sup>2</sup>C Bus Enablers

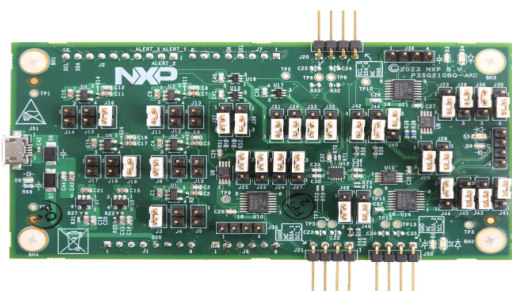


PCA9617ADP-ARD



PCA9846PW-ARD

## Muxes and Switches



P3S0210BQ-ARD

Our I<sup>2</sup>C-bus website ([www.nxp.com/i2c](http://www.nxp.com/i2c)), SPI website ([www.nxp.com/SPI](http://www.nxp.com/SPI)) and I3C-bus website ([www.nxp.com/i3c](http://www.nxp.com/i3c)) are 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 development boards and daughter card make it easy to program new peripherals and are a quick way to learn about the I<sup>2</sup>C-bus and I3C-bus protocol. Samples and demo boards are available on request; contact a local NXP distributor.

[nxp.com/i3c](http://nxp.com/i3c)   [nxp.com/spi](http://nxp.com/spi)   [nxp.com/i2c](http://nxp.com/i2c)

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