HIGH-SPEED UARTS AND BRIDGE ICS

ADVANCED SERIAL-INTERFACE SOLUTIONS

NXP
SECURE CONNECTIONS FOR A SMARTER WORLD

Fastest baud rate: 5 Mbit/s

Deepest FIFO: 256 bytes SC28L202

Smallest footprint: 12.25 mm^2

NXP UARTS offer exception performance, size and FIFO depth.

- **Global supplier of a very broad portfolio**
- **High-performance solutions (speed, FIFO depth, baud rate)**
- **Focus on miniaturization (smaller packaging)**
- **In-house manufacturing and assembly**

NXP UART APPLICATIONS

General interface

A UART controller is a part of a system's serial data communication. UARTS are used to convert parallel data to serial data, and from serial data to parallel data.

Internet access equipment

Routers, high-end modems, remote-access service and modem-access equipment for ISPs

Telecom and networking communication

Basestations, PABX systems, serial-to-fiber optic converters, ADSL boxes, Bluetooth®-based phones, hubs, switches and WLAN/802.11 GPRS

Computing

PC, server, POS, storage, personal digital assistants (PDAs) and internet appliances, printers, scanners, fax servers, smart card readers

Appliances and terminals

Cash registers connected via serial cable to CPU, simple fixed data entry terminals for warehouse control, card readers connected with central unit for park-house control

Entertainment and gaming

MIDI interfaces on musical devices and stage equipment, data exchange and control of gambling equipment, toys, MP3, DTV, STB, projectors, digital cameras, digital LSRs, handheld games

Home security

Remote control of audio equipment from central unit, light and heating control devices in homes or offices, security sensors and surveillance devices

Robotics

Industrial control of CNC equipment, remote sensor equipment, motor control

Industrial

Elevators, car-control boxes, security, medical equipment, data exchange via serial ports, lighting/gas metering, warehouse control, POS terminals, equipment control through serial connection, remote measurement, GPS navigation systems

Smartphones

Bluetooth interface, CDMA and GSM baseband communication

NXP UARTs

NXP, an established, long-term supplier in UARTs, provides innovative solutions to help meet the application requirements of today and tomorrow.

INDUSTRIAL UARTs

NXP offers a broad line of single, dual and quad channel devices that deliver higher baud rates, exceptional error handling, deeper FIFOs, improved character recognition, responsive interrupt systems, and very fast host-bus cycle times. The latest implementation of the basic NXP UART architecture, the IMPACT family, offers special features such as lower operating voltage, programmable interrupt priority, and selectable Motorola®/Intel® bus interfaces that help lower overall cost, speed time-to-market, and improve system performance. A single IMPACT device can be used in multiple operating systems and in multiple applications, so designers can bring several systems to market using the same high-performance, simple-to-use UART.

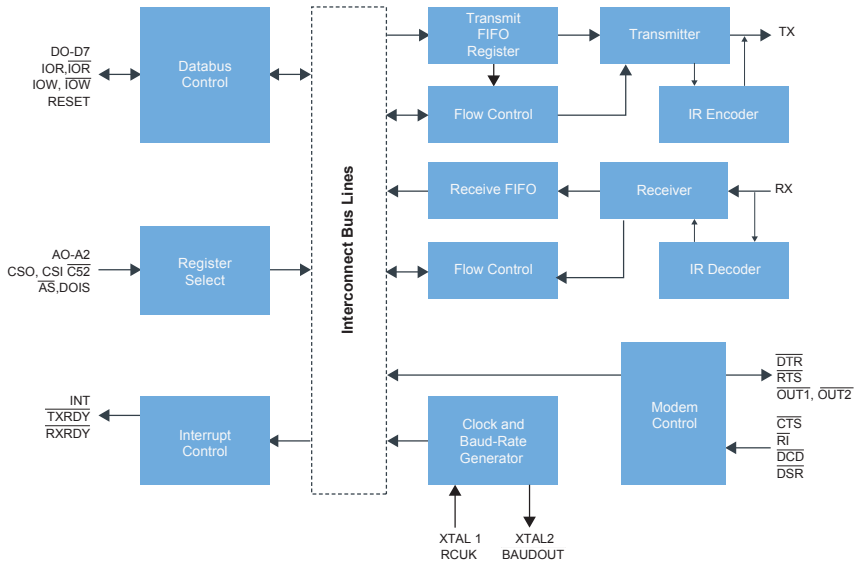
16C UARTs

NXP's enhanced 16C UARTs are drop-in compatible with industry-standard devices and offer added features without a price premium. The family includes CMOS-based, single- to quad-channel UARTs that support the widest supply voltage range (1.8, 2.5, 3.3 and 5 V), operate within the industrial temperature range (-40 to 85 °C), deliver baud rates up to 5 Mibit/s, and offer bus cycle times that are up to 20% faster than traditional devices. Many are available in tiny HVQFN and TFBGA packages that reduce PCB space by as much as 70%. The 16C UARTs are fully compatible with Linux® and Windows® OS drivers, thus helping to save precious design time and helping to lower overall cost.

SPECIAL NXP FEATURES

Both families of UARTs employ an architecture that has been carefully optimized for high performance. Programmable channel modes increase flexibility and make diagnostics easier to run. Multi-drop support (also known as "RS-485" or " 9-bit" mode) allows half-duplex long-distance communication. Hardware handshaking uses modem control signals to control the data stream, preventing FIFO overflow without interrupting the CPU.

COMMON UART ARCHITECTURE



NXP UARTs design into a very broad range of applications.

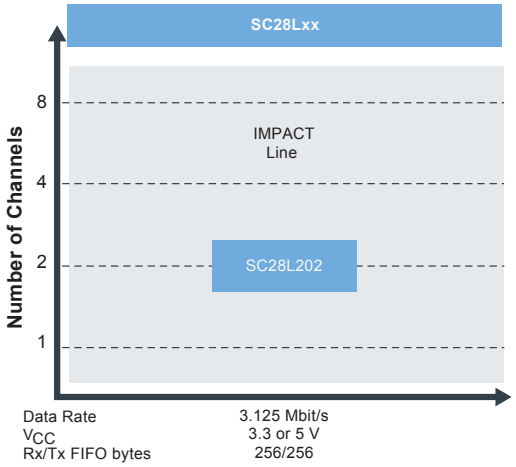
NXP INDUSTRIAL UARTs

Features	Benefits
Broad line of dual channel UARTs	Variety of choices for different applications
Industrial-grade temperature range (-40 to 85 °C)	Rugged performance in extreme conditions
Power-down mode	Ideal for battery-operated systems
Extensive interrupt support	Reduced software overhead
Automatic RS485 half-duplex control	Reduced CPU overhead (multi-drop support)
Automatic out-band flow control	Avoids loss of data
Rx/Tx-independent with respect to speed and clock frequency	Rx/Tx can operate at different baud rates
Flexible and programmable I/O structure	Allows usage of I/O pins for general purposes
RTS/CTS (hardware) flow control signals	Prevent receiver overrun
3.3 and 5 V operating range (IMPACT family)	Broader range of applications
Motorola®/Intel® interfaces (IMPACT family)	Industry-standard compatibility and faster design-in
Deep FIFO	Very high data throughput

FEATURES OF THE IMPACT FAMILY

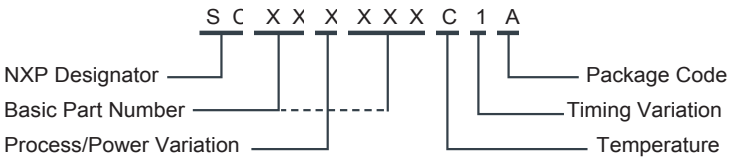
- Single part for multiple operating environments
- 3.3 and 5 V operation
- Compatible with Intel and Motorola bus interfaces
- FIFO depth up to 256 bytes
- Three bytes of character recognition
- Xon/Xoff in-band flow control
- Watchdog™ timer
- Character count mode
- Receiver time-out mode
- Programmable FIFO interrupt level
- Intelligent interrupt arbitration
- Real-time data error detection

INDUSTRIAL UART FAMILY



SC28L202: Intel and Motorola Bus Interfaces

NAMING CONVENTIONS



NXP INDUSTRIAL UARTs

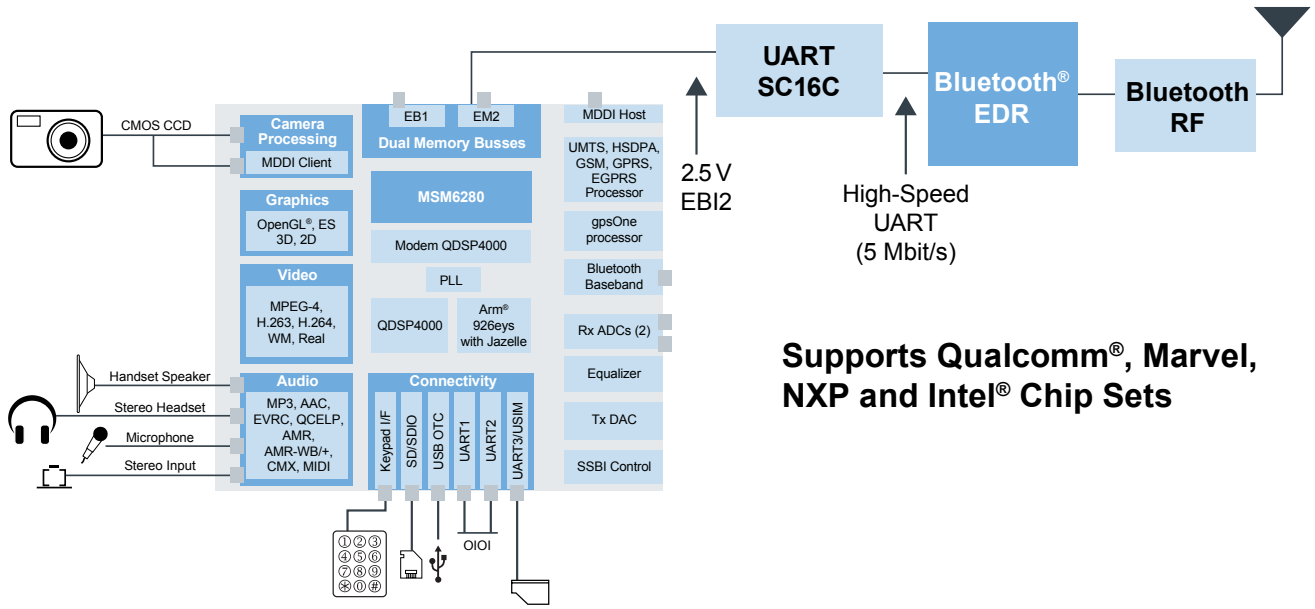
UART device	Comment	Channel	Vcc (±10%)	Data rate at Vcc (Kbit/s)	Rx/Tx FIFO bytes	Arbitrating interrupt	I/O pins	16-bit counter/ timer	Rx/Tx FIFO counters	Rx/Tx FIFO INT trigger	Software flow control	Intel® or Motorola® databus interface	Power-down mode	Package	Part number (temp range -40 to 85 °C)
SC28L202	Enhanced, faster version of SC28L92	2	3.3 or 5 V	3125	256/ 256	Normal Multi-level IACK/DACK I2A	16	2	Yes	All	Auto	Intel or Motorola (Pin select)	Yes	TSSOP56	SC28L202A1DGG

APPLICATION NOTES (INDUSTRIAL)

	SC28L202
AN405 SCN2681/SCN68681 and SCC2691 Data Communications, 21 Sept 1998	A
AN10251 Automatic '485' Turn-Around, 27 October 2003	A
AN10313 Reduce CPU Overhead with Intelligence Interrupt Arbitration (I2A) Feature, 25 June 2004	R
AN10319 8051 Microcontroller to UART Serial Interface Evaluation Board, 21 Aug 2004	A
AN10320 Addressing Migrations of SCN Devices to More Advanced Technologies, 29 Aug 2004	A
AN10339 UART Serial Interface Through USB Evaluation Board, 18 Feb 2005	A
AN10307 UART to Bluetooth® Interfacing, 11 Aug 2004	A
AN10353 Application of UART in GPS Navigation System, 1 March 2005	A
AN10380 Ensure Data Integrity with Real-Time Data Error Detection, 21 Jun 2005	R

A: Applicable

R: Recommended

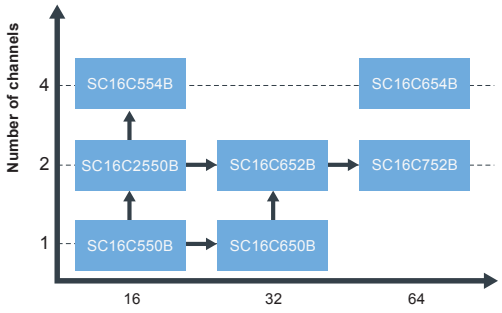


Supports Qualcomm®, Marvel, NXP and Intel® Chip Sets

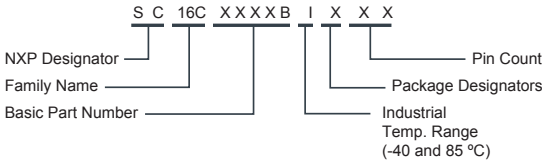
NXP HIGH-SPEED 16CxxB UARTs

Features	Benefits
Broad line of single- to quad-channel UARTs	One-stop shopping
Widest supply voltage range (1.8, 2.5, 3.3, 5 V) at industrial temperature range (-40 to 85 °C) without price premium	Single part can be used for multiple systems, multiple operating environments; contributes to lower overall cost of ownership—can replace
Over 20% faster bus cycle times and baud rates up to 5 Mbit/s	Compatible with high-speed processors Ideal for Bluetooth® applications
Power-down mode	Ideal for battery-operated systems
HVQFN and BGA package options	Ideal for small, portable systems
Windows and Linux OS-compatible	Simplifies software development
Infrared (IrDA) interface	Enables wireless, short-range applications
Software readily available	Shortens design cycle
Automatic software and hardware flow control	Reduces CPU overhead and data loss
DMA mode and wide variety of FIFO depths	Increases system throughput
Drop-in compatibility with existing 16C devices	Alternative manufacturing source
16C (Intel), 68(Motorola), VLIO(Variable Latency I/O)	Wide range of processors supported
Programmable Sampling Rate	Higher baud rates
Fully automatic RS-485	Reduce processor's software overhead

16C UART FAMILY

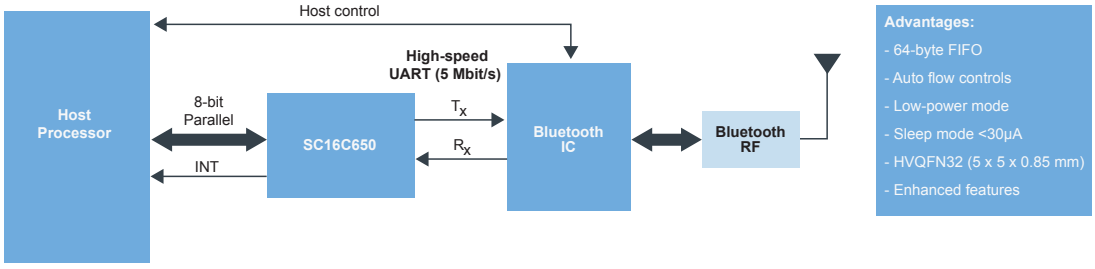


NAMING CONVENTIONS



NXP UART IN A BLUETOOTH-ENABLED W-CDMA PHONE

Low-voltage, high-speed Bluetooth® interface



NXP HIGH-SPEED 16CxxB UARTs

16C UARTs with Intel Databus Interface

UART device	Channel	Vcc	Data rate at 5/3.3/2.5/1.8 V (Mbit/s)	Rx/Tx FIFO bytes	IrDA	Modem pins/ channel	Rx/Tx FIFO INT trigger	RTS/CTS flow control	Software flow control	Power-down mode	Programmable Sampling rate	Package	Part number
SC16C550B	1	2.5-5.5 V	3.0/2.0/1.0/-	16	No	6	Four levels/ none	Yes	No	No		LQFP48 HVQFN32	SC16C550BIB48 SC16C550BIBS
SC16C650B	1	2.5-5.5 V	3.0/2.0/1.0/-	32	Yes	6	Four levels/ Four levels	Yes	Yes	Yes		HVQFN32	SC16C650BIBS
SC16C2550B	2	2.5-5.5 V	5.0/5.0/3.0/-	16	No	6	Four levels/ none	No	No	No		LQFP48	SC16C2550BIB48
SC16C652B	2	2.5-5.5 V	5.0/5.0/3.0/-	32	Yes	6	Four levels/ Four levels	Yes	Yes	Yes		HVQFN32	SC16C652BIBS
SC16C752B	2	2.5-5.5 V	5.0/5.0/3.0/-	64	No	6	Programmable	Yes	Yes	Yes		LQFP48	SC16C752BIB48
												HVQFN32	SC16C752BIBS
SC16C554B	4	2.5-5.5 V	5.0/5.0/3.0/-	16	No	6	Four levels/ none	Yes	No	No		LQFP64 LQFP64	SC16C554BIB64 SC16C654DBIB64
SC16C654B	4	2.5-5.5 V	5.0/5.0/3.0/-	64	Yes	6	Four levels/ Four levels	Yes	Yes	Yes		LQFP64 LQFP64	SC16C654BIB64 SC16C654DBIB64

APPLICATION NOTES (16C)

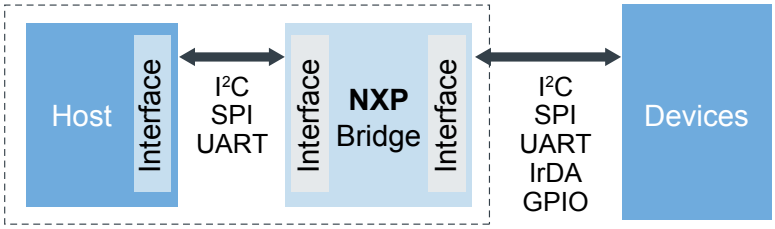
	SC16C550B	SC16C650B	SC16C652B	SC16C752B	SC16C554B	SC16C654B	SC16IS740/ 741/750/760/ 752/762
AN10219 Using SC16C650B to Implement an IrDA Interface, 12 Jul 2004	A	R	A			A	
AN10224 SC16C554B/SC16C654B ISA Bus Hardware Interface Example, 20 Aug 2004					R	R	
AN10249 SC16C752B/SC16C2550B ISA Bus Hardware Interface Example, 25 Jun 2005	A	A	A	R			
AN10250 Using a Philips 16C UART to Implement a Simple RS-485 Transmitter and Receiver Node, 20 Aug 2004	A	A	A	A	A	A	
AN10307 UART to Bluetooth® Interfacing, 8 Nov 2004	A	A	A	A	A	A	A
AN10312 Differences Between Philips 4-channel SC16C Devices and Philips Low-Power SC16CxxxB Devices, 26 Aug 2004					R	R	
AN10319 8051 Microcontroller to UART Serial Interface Evaluation Board, 26 Aug 2004	A	A	A	A	A	A	
AN10333 SC16CXXXB Baud Rate Deviation Tolerance, 6 Dec 2004	A	A	A	A			A
AN10339 UART Serial Interface Through USB Evaluation Board, 18 Feb 2005	A	A	A	A	A	A	
AN10353 Application of UART in GPS Navigation System, 1 March 2005	A	A	A	A	A	A	A
AN10366 HVQFN Application Information, 12 Jan 2006	A	A	A	A	A	A	
AN10386 Baud Rate Calculation for NXP 16C UARTs, 2 Aug 2005	A	A	A	A	A	A	A
AN10608 XTAL1 Clock and -IOW pulse Synchronization, 23 April 2007	A	A	A	A	A	A	
AN10251 Automatic RS-485 Turn-Around, 27 Oct 2003	A	A	A	A	A	A	A
AN10486 Automatic RS-485 Address Detection, 2 June 2006	A	A	A	A	A	A	A
AN10631 Possibility of Erroneous Transmitter Interrupt In 16C 4-Channel UARTs, 18 June 2007					A	A	
AN10485 SDA Pin Connection in SPI Mode, 2 June 2006							A
AN10571 Sleep Programming for Bridge ICs, 5 Jan 2007	R	R	R	R	R	R	A
AN10587 Interface NXP Bridge ICs with NXP Arm Controller, 23 Feb 2007							A
AN10417 SC16IS760/762 Fast IrDA Mode, 8 Jun 2006							A

NXP BRIDGES

NXP bridge ICs are the new generation of serial interface solutions for managing host-to-device communications among wide variety of serial bus interfaces such as I²C, SPI, and UART. Our bridges allow you to simply connect devices that use a different serial bus than your current system. These products operate at low voltages, consume little power and come in ultra-small packaging. They are ideal for battery-operated applications. In addition, our bridges help improve overall system performance by reducing software overhead while increasing design flexibility.

A host processor may not be able to communicate with devices using multiple I²C, SPI, UART, IrDA, and GPIO interfaces. For many advanced applications, multiple bus ports are required. Without using our bridges, host processing and system complexity can be overwhelming. Our bridges free up processor resources for code and data memory by handling the interfacing directly. Our bridge products are optimized for high-speed data throughput.

Our products bridge hosts to serial and wireless devices with minimal wire interconnection. Our bridges assist you in overcoming the limitations of your system's host while adding design flexibility and reducing complexity to implement other bus interfaces.



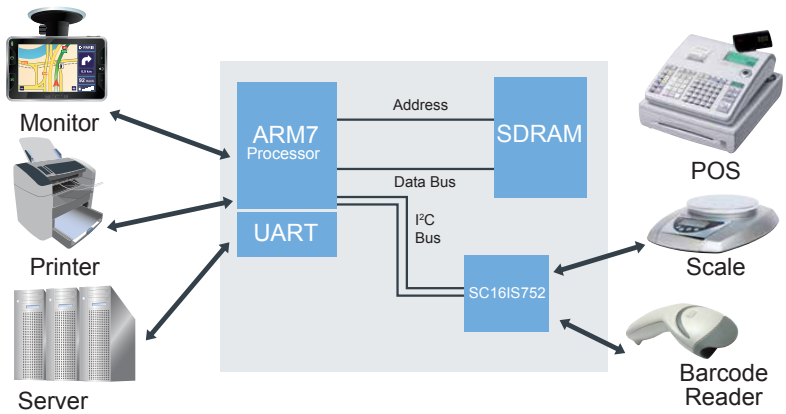
Bridge	Target	Controller
SC16IS7xx	I²C or SPI	UART
SC18IS604	SPI	I²C
SC18IS606	I²C	SPI
SC18IM704	UART	I²C

I²C and SPI serial bus target to I6C UART – SC16IS7xx

UART device	Channel	V_{CC}	Data rate (Mbps)	Rx/Tx FIFO	IrDA	Modem pins /channel	GPIO pins	Rx/Tx FIFO INT trigger	RTS/CTS flow control	Software flow control	Power-down mode	I²C Speed Max (Kbit/s)	SPI speed max (Mbit/s)	Package	Part number
SC16IS741	1	2.3 - 5.5 V	-/5/3/-	64	Yes	2	0	Programmable	Yes	Yes	Yes	400	4	TSSOP16	SC16IS741AIPW SC16IS740IPW/ Q900
SC16IS750	1	2.3 - 5.5 V	-/5/3/-	64	Yes	6	8 [1]	Programmable	Yes	Yes	Yes	400	4	HVQFN32	SC16IS750IBS
SC16IS760	1	2.3 - 5.5 V	-/5/3/-	64	Yes	6	8 [1]	Programmable	Yes	Yes	Yes	400	15	HVQFN32	SC16IS760IBS
SC16IS752	2	2.3 - 5.5 V	-/5/3/-	64	Yes	6	4 [2]	Programmable	Yes	Yes	Yes	400	4	TSSOP28 HVQFN32	SC16IS752IPW SC16IS752IBS
SC16IS762	2	2.3 - 5.5 V	-/5/3/-	64	Yes	6	4 [2]	Programmable	Yes	Yes	Yes	400	15	TSSOP28 HVQFN32	SC16IS762IPW SC16IS762IBS

[1] 4 pins are shared with modem pins
[2] share with modem pins

The SC16IS7xx is a target I²C-bus/SPI interface to a single- or dual-channel high-performance UART with data rates up to 5 mbit/s and guarantees low spending and sleeping currents. This product family helps enable smooth protocol conversion from I²C-bus or SPI to RS-232/RS-485. These bridges connect to an UART port of a microcontroller or other host processor and allow you to communicate with I²C-bus peripherals.



Bridge IC - SC16IS752 enables the processor to expand the communication for multiple peripherals such as a barcode reader and scale

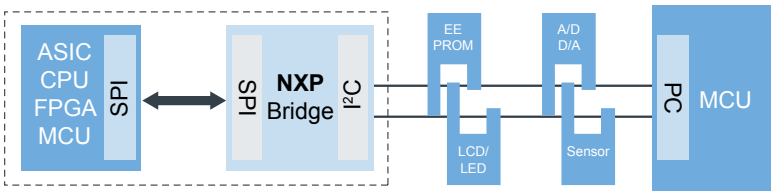
SPI TARGET TO I²C CONTROLLER/ GPIO BRIDGES – SC18IS604PW

NXP bridge solutions include products that provide protocol convergence between the two widely-used, bus-shared architectures: SPI and I²C. Our bridges allow hosts having an SPI bus to easily communicate with I²C-bus devices such as LCD displays, temperature/voltage sensors, and EEPROM data storage. These bridges' GPIOs further allow you to expand your system for detecting push buttons/ keypads and controlling LEDs and fans.

The bridge interface to the SPI bus is a target that uses four wires (2 data and 2 control signals) and operates at speeds as high as 1.2 Mbit/s. The bridge interface to the I²C bus is a controller that uses two wires (SCL and SDA) and supports speeds up to 400 KHz. The bridge GPIOs are configurable.

These bridges operate from 1.7 V to 3.6 V and come in TSSOP packages and feature a power-down mode. They can be used in industrial applications with a temperature range of -40 to +105 °C.

An SPI target to I²C-bus controller bridge allows a host with SPI-bus capability to transparently communicate to an I²C-bus. Our bridge's I²C bus controller has multi-controller capability. This allows it to share the bus with other I²C controller such as a microcontroller.



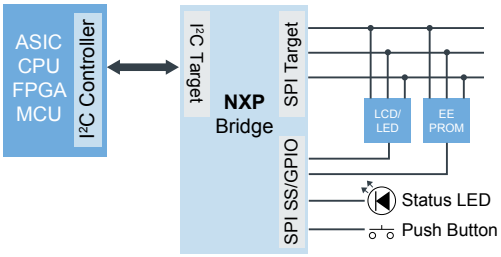
I²C TARGET TO SPI CONTROLLER/ GPIO BRIDGES – SC18IS606PW

These bridges connect to an I²C controller port of a microcontroller or other host processor and allow you to communicate with SPI target peripherals. The bridges have an I²C target interface on one side and an SPI controller interface on the other. The bridges can also be used to provide additional GPIO to an I²C controller by utilizing unused SPI target select outputs.

Each high-speed serial bridge allows you to add up to 3 SPI target devices making them suitable for host processors without native SPI capabilities. The bridges have 8 selectable I²C addresses allowing you to further expand the host processor's SPI capabilities by using multiple bridges. The multiple I²C addresses also help avoid conflict with other I²C devices.The SPI controller interface of our bridges support SPI speeds up to 1.8 Mbit/s using an internal oscillator. The I²C target interface of our bridges supports speeds up to 400 KHz. 1024 byte data buffers between the I²C and SPI interfaces enhance translation performance efficiency.

Our I²C target to SPI master/GPIO bridges operate from 1.7 V to 3.6 V and feature a low-power mode. They are available in TSSOP packaging.

I²C target to SPI controller bridging allows a host with an I²C interface to transparently communicate with devices attached to the SPI-bus. This allows you to retain proprietary or specialized SPI peripherals such as an LCD display or an EEPROM in your I²C-based design.



NXP BRIDGES

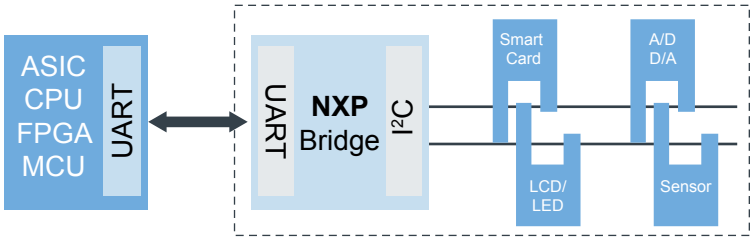
UART TO I²C CONTROLLER/GPIO BRIDGES – SC18IM70PW

NXP Semiconductors offers bridge solutions that help enable long-distance communication with remote I²C or GPIO devices via a simple RS232 connection. By using our UART to I²C controller/GPIO bridges, you can easily detect remote push button/keypad presses, sense environmental conditions in distant systems, control LEDs/displays and operate fans.

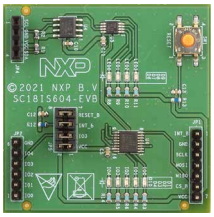
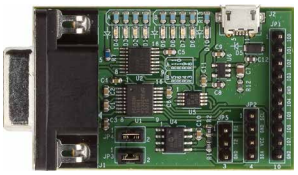
The bridges' I²C controller interface controls the I²C bus without needing a remote host processor. For more advanced remote systems, the I²C interface is also multi-controller capable. The I²C interface supports speeds up to 375 kHz. The bridges' UART interface offers high-speed transfer rates up to 460.8 Kbit/s and has a sleep/power-down mode with wake-up pin.

The bridges operate from 1.7 V to 3.6 V with 5 V over tolerance and come in TSSOP packages. They can be used in industrial applications with a temperature range of -40 to +105 °C.

The UART to I²C-bus controller bridge functionality allows a host with RS232 capability to communicate with remote I²C devices. Remote I²C devices can include temperature sensors, LCD displays, A/D converters, and smart card readers.



Demo Board Kit

I²C/SPI Target UART	SPI to I²C Controller	I²C to SPI Controller	UART to I²C Controller
SC16IS7xx	SC18IS604PW	SC18IS606PW	SC18IM704PW
			
Kits include • Sample code: RS232, RS485, and IrDA	Kits include • Sample code: SPI and NXP I²C devices • User manual UM11665	Kits include • Sample code: I²C and NXP SPI devices • User manual UM11666	Kits include • Sample code: RS232 and NXP I²C devices • User manual UM11664
Key benefits • Easy interface to I²C/SPI host and IrDA, RS232/RS485, and GPIO devices • Selectable I²C or SPI-bus interface	Key benefits • Easy interface to SPI host and various I²C and GPIO devices • On-board I²C EEPROM and I²C • LED dimmer	Key benefits • Easy interface to I²C host and SPI and GPIO devices • Up to 3 SPI chip selects	Key benefits • Easy interface to UART host and various I²C and GPIO devices • On-board I²C EEPROM and I²C • LED dimmer
OM6270 – SC16IS750 OM6273 – SC16IS752	SC18IS604PW-EBV	SC18IS606PW-EBV	SC18IM704PW-EBV

APPLICATION NOTES (BRIDGES)

	SC18IS604	SC18IS606	SC18IM704
AN10397 How to Use The SC18IM700 to Control Any I²C-Bus device, 5 December 2005			R
AN10452 Interfacing NXP Bridge ICs with Microcontroller, 17 May 2006	A	A	
AN10462 SPI Programming for NXP Bridge ICs, 1 June 2006	A	A	
AN10587 Interfacing NXP Bridge ICs with NXP Arm Microcontroller, 23 Feb 2007	A	A	

*Note:

SC18IS604 is functional replacement for SC18IS600

SC18IS606 is functional replacement for SC18IS602B

SC18IM704 is functional replacement for SC18IM700

EXAR COMPETITIVE CROSS-REFERENCE

Exar part number	Exar description	Exar package	Cross type	NXP part number	NXP description
XR16V654IV-F	High-performance quad UART with 64-byte FIFO	LQFP-64	Similar part	SC16C754BIBM	2.5 V-5 V quad UART with 64-byte FIFO
UART with I²C/SPI interface					
XR20M1170IL24-F	Single-channel UART, 64-byte FIFO, I²C/SPI interface	24-QFN	Similar part	SC16IS760IBS	Single-channel UART, 64-byte FIFO, I²C/SPI interface
XR20M1170IL16-F	Single-channel UART, 64-byte FIFO, I²C/SPI interface	16-QFN	Similar part	SC16IS740IPW	Single-channel UART, 64-byte FIFO, I²C/SPI interface
XR20M1170IG16-F	Single-channel UART, 64-byte FIFO, I²C/SPI interface	16-TSSOP	Similar part	SC16IS740IPW	Single-channel UART, 64-byte FIFO, I²C/SPI interface
XR20M1172IL32-F	Dual-channel UART, 64-byte FIFO, I²C/SPI interface	32-QFN	Similar part	SC16IS762IBS	Dual-channel UART, 64-byte FIFO, I²C/SPI interface
XR20M1172IG28-F	Dual-channel UART, 64-byte FIFO, I²C/SPI interface	28-TSSOP	Similar part	SC16IS762IPW	Dual-channel UART, 64-byte FIFO, I²C/SPI interface

NXP package	Comments if not drop-in replacement	Hardware change	Software change
LQFP64	Pin-map compatible. Automatic hardware flow control enabled differently. SC16C754B does not have DLD (4x, 8 x sampling rates), FSTAT (FIFO status) registers.	NO	YES
HVQFN24	Different pin map. SC16IS760 does not have these features: 8x sampling rate, fractional baud rate generator. SC16IS760 supports SPI speed up to 15 MH while XR20M1170 supports SPI speed of 5 MH max. Software compatible.	YES	YES
TSSOP16	Different pin map. SC16IS740 does not have these features: 8x sampling rate, fractional baud rate generator. Software compatible.	YES	YES
TSSOP16	Different pin map. SC16IS740 does not have these features: 8x sampling rate, fractional baud rate generator. 5 MH max. Software compatible.	YES	YES
HVQFN32	Different pin map. SC16IS762 does not have these features: ENIR and EN485 pins, 8X sampling rate, fractional baud rate generator. SC16IS762 supports SPI speed up to 15 MH while XR20M1172 supports SPI speed of 5 MH max. Software compatible.	YES	YES
TSSOP28	Different pin map. SC16IS762 does not have these features: 8x sampling rate, fractional baud rate generator. SC16IS762 supports SPI speed up to 15 MH while XR20M1172 supports SPI speed of 5 MH max. Software compatible.	YES	YES

EXAR COMPETITIVE CROSS-REFERENCE

Exar part number	Exar description	Exar package	Cross type	NXP part number
Single UART				
ST16C550CQ48-F or IQ48-F	Single-channel UART with 16-byte FIFO	TQFP-48	Drop-in	SC16C550BIB48
XR16L570IL32-F	Smallest 1.62 V to 5.5 V UART with 16-byte FIFO and PowerSave	QFN-32	Similar Part	SC16C650BIBS
XR16L580IL-F	Smallest 2.25 V to 5.5 V UART with 16-byte FIFO and PowerSave	QFN-32	Similar Part	SC16C550BIBS
ST16C650ACQ48-F or IQ48-F	2.90 V to 5.5 V UART with 32-byte FIFO	TQFP-48	Drop-in	SC16C650BIB48
Dual UART				
ST16C2550CQ48-F or IQ48-F	2.97 V to 5.5 V DUART with 16-byte FIFO	TQFP-48	Drop-in	SC16C2550BIB48
XR16L2551IM-F	2.25 V to 5.5 V DUART with 16-byte FIFO	TQFP-48	Similar Part	SC16C652BIB48
XR16M2750IM48-F	High-performance, low-voltage DUART with 64-byte FIFO	TQFP-48	Similar Part	SC16C752BIB48
XR16M2750IL32-F	High-performance, low-voltage DUART with 64-byte FIFO	QFN-32	Similar Part	SC16C752BIBS
XR16M752IM48-F	High-performance DUART with 64-byte FIFO	TQFP-48	Similar Part	SC16C752BIB48
Quad UART				
XR16V554IV-F	High-performance quad UART with 16-byte FIFO	LQFP-64	Drop-in	SC16C554BIB64
XR16V554DIV-F	High-performance quad UART with 16-byte FIFO	LQFP-64	Drop-in	SC16C554DBIB64
ST16C654CQ64-F or IQ64-F	2.25 V to 5.5 V quadUART with 64-byte FIFO	LQFP-64	Drop-in	SC16C654BIB64
XR16V654IV-F	High-performance quad UART with 64-byte FIFO	LQFP-64	Similar Part	SC16C654BIB64

NXP description	NXP package	Comments if not drop-in replacement	Hardware change	Softeware change
2.5 V-5 V single UART with 16-byte FIFO	LQFP48		NO	NO
2.5 V-5 V single UART with 32-byte FIFO	HVQFN32	Pin map not compatible. Software similar to the SC16C650B. XR16L570 has 16-byte FIFO while SC16C650 has 32-byte FIFO.	YES	YES
2.5 V-5 V single UART with 16-byte FIFO	HVQFN32	Pin map not compatibe, similar software, SC16C550 does not have DREV and DVID registers.	YES	YES
2.5 V-5 V single UART with 32-byte FIFO	LQFP48		NO	NO
2.5 V-5 V dual UART with 16-byte FIFO	LQFP48		NO	NO
2.5 V-5 V dual UART with 32-byte FIFO	LQFP48	Pin map similar: SC16C652B does not have PwrSave pin, 16/-68 pin. Software similar: XR16L2551 does not support FCR[5:4], or Xon any and XR16L2551 has 16-byte FIFO.	YES	YES
2.5 V-5 V dual UART with 64-byte FIFO	LQFP48	Pin map compatible. SC16C752B does not have these registers: EMSR, FLVL, DREV, DVID, TRG, FC, FCTR.	NO	YES
2.5 V-5 V dual UART with 64-byte FIFO	HVQFN32	Pin map NOT compatible. SC16C752B does not have these registers: EMSR, FLVL, DREV, DVID, TRG, FC, FCTR	YES	YES
2.5 V-5 V dual UART with 64-byte FIFO	LQFP48	Pin map compatible. Software similar but XR16M752IM48 has Fractional baud rate generator and 4X, 8X sampling rates.	NO	YES
2.5 V-5 V quad UART with 16-byte FIFO	LQFP64		NO	NO
2.5 V-5 V quad UART with 16-byte FIFO	LQFP64		NO	NO
2.5 V-5 V quad UART with 64-byte FIFO	LQFP64		NO	NO
2.5 V-5 V quad UART with 64-byte FIFO	LQFP64	Pin map compatible. Software compatible but SC16C654BIB64 does not support 4X, 8X sampling rates and FSTAT register.	NO	YES

TI 16C COMPETITIVE CROSS-REFERENCE

TI Part Number	TI description	TI package	Cross type	NXP part number	NXP description	NXP package	Hardware change?	Software change?	Commnent if not drop-in
Single UART									
TL16C450	Single UART without FIFO	PLCC-44	Similar	SC16C550B	5 V, 3.3 V and 2.5 V UART with 16-byte FIFO	HVQFN-32, LQFP-48	No	Yes	
TL16C451	Single UART without FIFO and with Parallel Port	PLCC-68	No Cross	N/A	N/A	N/A	N/A	N/A	
TL16C550C	Single UART with 16-byte FIFO and Auto Flow Control	PLCC-44, LQFP-48, TQFP-48	Drop-in	SC16C550B	5 V, 3.3 V and 2.5 V UART with 16-byte FIFO	HVQFN-32, LQFP-48	No	No	
TL16C550D	Asynchronous Communications Element with Auto Flow Control	BGA-24 µ*Jr, QFN-32, LQFP-48, TQFP-48	Drop-in	SC16C550B	5 V, 3.3 V and 2.5 V UART with 16-byte FIFO	HVQFN-32, LQFP-48	No	No	
TL16C750	Single UART with 64-byte FIFO, Auto Flow Control and Low Power Modes	PLCC-44, LQFP-64	Drop-in	SC16C750B	5 V, 3.3 V and 2.5 V UART with 64-byte FIFO	HVQFN-32, LQFP-64	No	No	
Dual UART									
TL16C2550	1.8 V to 5 V Dual UART with 16-byte FIFO	QFN-32, TQFP-48, DIP-40	Similar	SC16C2550B	5 V, 3.3 V and 2.5 V Dual UART, 5-Mbit/s (max.), with 16-byte FIFO	HVQFN-32, LQFP-48	No	Yes	No Auto RTS/ CTS, 32 pin package is not drop-in
TL16C2752	1.8 V to 5 V Dual UART with 64-byte FIFO	PLCC-44	Similar	SC16C752B	5 V, 3.3 V and 2.5 V Dual UART, 5-Mbit/s (max.), with 64-byte FIFO	LQFP-48, HVQFN-32	Yes	Yes	Does not support these registers: EMSR, FLVL, AFR, DREV, DVID, TRG, FC, FCTR
TL16C752B	Dual UART with 64-byte FIFO	LQFP-48	Drop-in	SC16C752B	5 V, 3.3 V and 2.5 V Dual UART, 5-Mbit/s (max.), with 64-byte FIFO	LQFP-48, HVQFN-32	No	No	
TL16C752B-EP	Enhanced Product, 3.3 V Dual UART with 64-byte FIFO	LQFP-48	Drop-in	SC16C752B	5 V, 3.3 V and 2.5 V Dual UART, 5-Mbit/s (max.), with 64-byte FIFO	LQFP-48	No	No	-40 to 85 while TI support -55 to 110
TL16C752C	Dual UART with 64-byte FIFO	QFN-32, TQFP-48	Similar	SC16C752B	5 V, 3.3 V and 2.5 V Dual UART, 5-Mbit/s (max.), with 64-byte FIFO	LQFP-48, HVQFN-32	No	Yes	Does not support AFR register
Quad UART									
TL16C554	Quadruple UART with 16-byte FIFO	PLCC-68, LQFP-80	Drop-in	SC16C554B, SC16C554DB	5 V, 3.3 V and 2.5 V Quad UART, 5-Mbit/s (max.), with 16-byte FIFO	LQFP-64	No	No	
TL16C554A	Quadruple UART with 16-byte FIFO	PLCC-68, PQFP-64, TQFP-80	Drop-in	SC16C554B, SC16C554DB	5 V, 3.3 V and 2.5 V Quad UART, 5-Mbit/s (max.), with 16-byte FIFO	LQFP-64	No	No	

DIFFERENCES BETWEEN NXP INDUSTRIAL UARTS* AND NXP SC16XXXB DEVICES

Feature	Industrial	SC16CxxxB
Supply voltage	3.3 and 5.0 V	2.5, 3.3 and 5.0 V
Temperature range	-40 to +85°C (1)	-40 to +85°C (1)
Channels	1 and 2	1, 2, and 4
Synchronous bus interface	Yes (2)	No
Independent transmit and receive baud rates	Yes	No
Maximum FIFO depth	Up to 256 bytes	64 bytes
Transmit and receive FIFOs	Yes (3)	Yes (3)
In-band (software) flow control (xon/xoff)	Yes	Yes
Out-of-band (hardware) flow control (RTS/CTS)	Yes	Yes
Multi-drop mode/RS485	Auto	Software required
Character recognition (also used for xon/xoff)	Yes	Yes
Bus cycle time (read strobe and read cycle delay)	40 ns–125 ns	43 ns
Bus interface	Intel®, Motorola®, or both	Intel, Motorola, or both
Interrupt priority	Programmable	Fixed
Programmable interrupt vector format	Yes	No
IACKN and DACKN signal pins	Yes	No
Transmitter and receiver software reset	Yes	No
Independent transmitter and receiver enable/disable	Yes	No
Maximum baud rate	3.125 Mbit/s	5 Mbps
Receiver Watchdog timer	Yes	No
Programmable data format	5 to 8 data bits	5 to 8 data bits
Parity format	Odd, even, forced, none	Odd, even, forced, none
Number of stop bits	1, 1-1/2, or 2	1, 1-1/2, or 2
Baud rate selection	Programmable	Programmable
Parity, framing, and overrun detection	Yes	Yes
Line-break detection and generation	Yes	Yes
Automatic echo of received character	Yes	No
Local loop back	Yes	Yes
Remote loop back	Yes	No
Loop back error check	Yes	No
Programmable I/O port pins	Yes	No
Infrared IrDA interface	No	Yes
Change-of-state detection	CD, RI, CTS, DSR, and all I/O pins	CD, RI, CTS, DSR
Power-down mode	Yes (4)	Yes (4)
Clock frequency using on-chip oscillator and external crystal	Up to 16.2 MHz	Up to 24 MHz
TTL input levels	Yes	Yes
Software	Similar structures but different low-level routines	
Receiver time-out mode	Yes	Yes

*Note: UART products falling into industrial category: SC28Lx

[1] Industrial temperature at commercial price
[2] Synchronous use requires a clock from host
[3] FIFO depth varies depending on UART
[4] Clock is shut off but register contents remain

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