



Interface

UART

8-bit

VLIO

USB

PCI/PCle

I²C/SPI

Combo

Wireless

Transceivers

Multiprotocol

RS-232

RS-422

RS-485

PROFIBUS



2009
EXAR CORPORATION

Interface :: UARTs

As the market leader in providing Universal Asynchronous Receiver and Transmitter (UART) solutions, Exar Corporation offers the broadest line of patented industry-proven product families. Exar's product line ranges from cost-effective industry-standard devices to high-performance multi-channel UARTs with a broad range of FIFO depths. Exar's stand-alone, off-the-shelf UART solutions reduce development time and provide an immediate competitive advantage in time-to-market and performance capabilities.

Legacy 8-bit UARTs provide parallel-to-serial or serial-to-parallel data conversion over industry standard asynchronous communication data interfaces such as RS-232, RS-422 and RS-485. In addition to the legacy 8-bit UART family, Exar also offers an I²C/SPI UART family, a PCI UART family, a PCIe UART family, a USB UART family, and an 8-bit VLIO UART family. Exar UARTs are found in consumer, industrial, telecommunication, and many other applications.

Key Features and Technologies

Low Voltage Operation

Exar offers low voltage UART product families that are capable of operating down to 1.62V. The lower operating power supply range is well suited for battery operated systems and handheld devices.

Industry Lowest Power Consumption

Exar's enhanced UARTs are low power devices. In addition, the devices feature sleep and Power Save modes for further power saving as low as 5 µA in sleep mode and 500µA in active mode.

Fastest Data Rates

At 25Mbps, Exar offers the industry's fastest UARTs. In addition, slower and lower cost crystals and oscillators can be used to generate higher data rates with Exar's 8X and 4X sampling rate features.

Fractional Baud Rate Generator

Exar's Fractional Baud Rate Generator feature allows more flexibility for the designer in selecting a crystal or oscillator since it can take any clock source to generate the standard legacy baud rates or any custom baud rates.

Large FIFOs

Exar offers devices with 1 to 256-Bytes of FIFOs with programmable trigger levels and FIFO level counters. Larger FIFO sizes allow increased data throughput by loading and unloading more data per transaction. Larger FIFOs improve the performance by reducing the number of interrupts.

Independent TX/RX Baud Rate Generator

The baud rates of the TX and RX no longer have to be the same. This new feature in the XR16Mxxx single-channel UARTs allows different TX and RX baud rates so that the single channel UART can communicate with different UARTs at the same time.

Automatic Flow Control

Exar's enhanced UARTs offer auto RTS/CTS hardware and software flow control that prevent data loss and the need for re-transmission.

Multidrop Mode with Auto Address Detect

This feature simplifies both the hardware and software for 9-bit applications. The receiver will only receive data after an address match and will automatically ignore data if the address byte does not match.

Auto RS-485 Half-Duplex Direction Control with Programmable Turn-Around Delay

Exar was the first to introduce this unique feature to simplify the hardware and software design for half-duplex RS-485 systems.

Pin-to-Pin Migration Path

Exar offers a migration path from legacy UART devices to enhanced high performance devices by maintaining pin-to-pin compatibility whenever possible. This minimizes hardware and software changes and reduces time-to-market.

Small Packages

Exar UARTs are currently offered in packages that are as small as 3mm x 3mm for space constrained applications without sacrificing any functionality or performance.

I²C and SPI Bus

Exar also offers UARTs with 2-wire (I²C) and 4-wire (SPI) interfaces to easily increase functionality and value to any embedded system design.

UARTs with Integrated Transceivers

Exar offers UART with integrated RS-232 or RS-485 transceiver combos in a single small footprint QFN package ideal for simplifying designs and using less board space.

Flexible 8-bit bus interfaces

Exar 8-bit UARTs have 3 different types of bus interfaces: Intel, Motorola & VLIO. The different interfaces allow for simple interfaces to MCUs/CPUs.

PCI Bus

All Exar PCI UARTs have undergone compliance testing, are fully PCI compliant and are listed on the PCI-SIG Integrator's List.

PCIe Bus

Exar's new PCIe UART family is software compatible with the existing PCI UART family which minimizes the software driver development time. At 25Mbps, the PCIe UARTs are the industry's fastest UARTs.

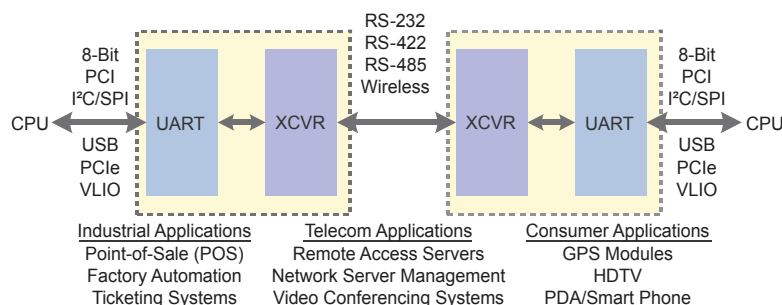
Full Speed USB

The new full-speed USB UART family is the only USB UART in the industry that is compatible with the standard CDC-ACM drivers in Windows and Linux. At a maximum data rate of 12 Mbps, Exar's USB UART is the industry's fastest USB UART.

Serial Cable Replacement Wireless Solution

Exar's Wireless UART chipset consists of a Wireless UART controller and 900MHz RF Transceiver. The Wireless UART controller has an 8051 embedded MCU, 32KB system memory, 128-bit AES engine and Exar's proprietary firmware. The RF Transceiver has extensive hardware support such as RSSI, ED, LQI and CRC detection, for insuring data integrity in a noisy environment.

UART and Transceiver Combination Overview



UARTs

High Performance 8-Bit Bus

Single Channel

16-Byte FIFO

XR16M570
XR16M580
XR16M581

32-Byte FIFO

XR16M670
XR16M680
XR16M681

64-Byte FIFO

XR16M770
XR16M780
XR16M781

Dual Channel

16-Byte FIFO

XR16M2550 / M2551
XR16V2550 / V2551 / V2552

32-Byte FIFO

XR16M2650 / M2651
XR16V2650 / V2651 / V2652

64-Byte FIFO

XR16M2750 / M2751 / M2752
XR16M752 / XR68M752
XR16V2750 / V2751 / V2752

Quad Channel

16-Byte FIFO

XR16M554 / M554D
XR16V554 / V554D

32-Byte FIFO

XR16M564 / M564D
XR16V564 / V564D

64-Byte FIFO

XR16M654 / M654D
XR16V654 / V654D
XR16V794

Octal Channel

16-Byte FIFO

XR16M598
XR16V598

32-Byte FIFO

XR16M698
XR16V698

64-Byte FIFO

XR16V798

Classic 8-Bit Bus

Single Channel

<16-Byte FIFO

ST16C450
ST16C1450

16-Byte FIFO

ST16C1550/1551
ST16C550
ST16C580
XR16L570
XR16L580

32-Byte FIFO

ST16C650A
XR16L651

128-Byte FIFO

XR16C850

Dual Channel

<16-Byte FIFO

ST16C452
ST16C2450
XR16L2450
XR68C681 / XR88C681
XR68C92 / XR88C92

16-Byte FIFO

ST16C552 / C552A
ST16C2550 / C2552
XR68C192 / XR88C192
XR16C2550
XR16L2550 / L2551 / L2552

64-Byte FIFO

XR16L2750 / L2751 / L2752

128-Byte FIFO

XR16C2850 / C2852

Quad Channel

<16-Byte FIFO

ST16C454
XR82C684

16-Byte FIFO

ST16C554 / C554D
ST68C554

64-Byte FIFO

ST16C654 / C654D
XR16L784

128-Byte FIFO

XR16C854 / C854D
XR16C864

Octal Channel

64-Byte FIFO

XR16L788

UARTs

PCI/PCIe UARTs

Dual Channel

33MHz PCI, 5V only

XR17C152 (PCI 2.2)

Universal 33MHz PCI, 3.3V or 5V

XR17D152 (PCI 2.2)

66MHz PCI, 3.3V

XR17V252 (PCI 3.0, Power Management 1.1)

PCIe, 2.5Gbps, x1 Link

XR17V352 (PCIe 1.1)

Quad Channel

33MHz PCI, 5V only

XR17C154 (PCI 2.2)

Universal 33MHz PCI, 3.3V or 5V

XR17D154 (PCI 2.2)

66MHz PCI, 3.3V

XR17V254 (PCI 3.0, Power Management 1.1)

PCIe, 2.5Gbps, x1 Link

XR17V354 (PCIe 1.1)

Octal Channel

33MHz PCI, 5V only

XR17C158 (PCI 2.2)

Universal 33MHz PCI, 3.3V or 5V

XR17D158 (PCI 2.2)

66MHz PCI, 3.3V

XR17V258 (PCI 3.0, Power Management 1.1)

PCIe, 2.5Gbps, x1 Link

XR17V358 (PCIe 1.1)

USB UART [Full-Speed]

Single Channel

128-Byte TX FIFO
384-Byte RX FIFO

XR21V1410

Dual Channel

128-Byte TX FIFO
384-Byte RX FIFO

XR21V1412

Quad Channel

128-Byte TX FIFO
384-Byte RX FIFO

XR21V1414

Wireless UART Chipset

Single Channel

Wireless UART Controller

XR18W750

RF Transceiver

900MHz RF

XR18W753

I²C / SPI Bus UART

Single Channel

64-Byte FIFO

XR20M1170

Dual Channel

64-Byte FIFO

XR20M1172

Integrated 8-Bit Bus UART & Transceiver

Single Channel

16-Byte FIFO, RS-232

XR19L200
XR19L210
XR19L220

64-Byte FIFO, RS-485

XR19L400

Dual Channel

64-Byte FIFO, RS-232

XR19L202
XR19L212
XR19L222

64-Byte FIFO, RS-485

XR19L402

Integrated I²C/SPI Bus UART & Transceiver

Single Channel

64-Byte FIFO, RS-232

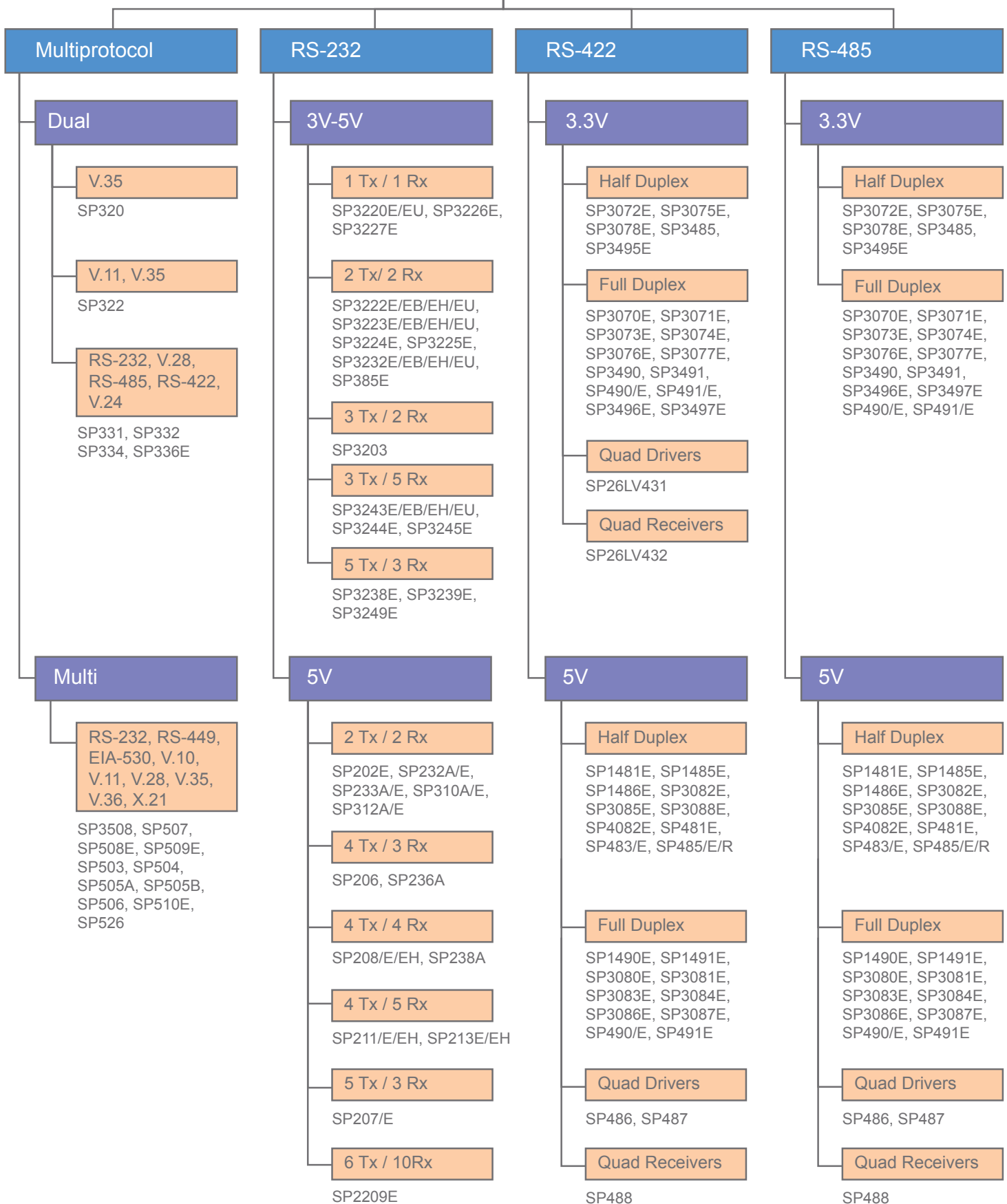
XR20V2170

Dual Channel

64-Byte FIFO, RS-232

XR20V2172

Transceivers



Interface :: Transceivers :: RS-232

Key Features and Capabilities

Robust Electrostatic Discharge (ESD) Protection

Exar uses state of the art structures to protect the transceiver pins against ESD of $\pm 15\text{kV}$ without damage. The ESD structures withstand high ESD in all states: normal operation, shutdown and powered down. After an ESD event, the transceivers keep working without latch-up or damage. ESD protection can be tested in various ways. The transmitter outputs and receiver inputs are characterized for protection to the following limits:

- $\pm 15\text{kV}$ using the Human Body Model
- $\pm 8\text{kV}$ using the Contact Discharge method specified in IEC 61000-4-2
- $\pm 15\text{kV}$ using the Air-Gap Discharge method specified in IEC 61000-4-2

Auto On-line® Plus Circuitry

The RS-232 transceivers have the advanced Auto On-line® Plus feature that saves power by turning off the charge pumps and driver outputs when the transceiver inputs are idle for more than 30 seconds.

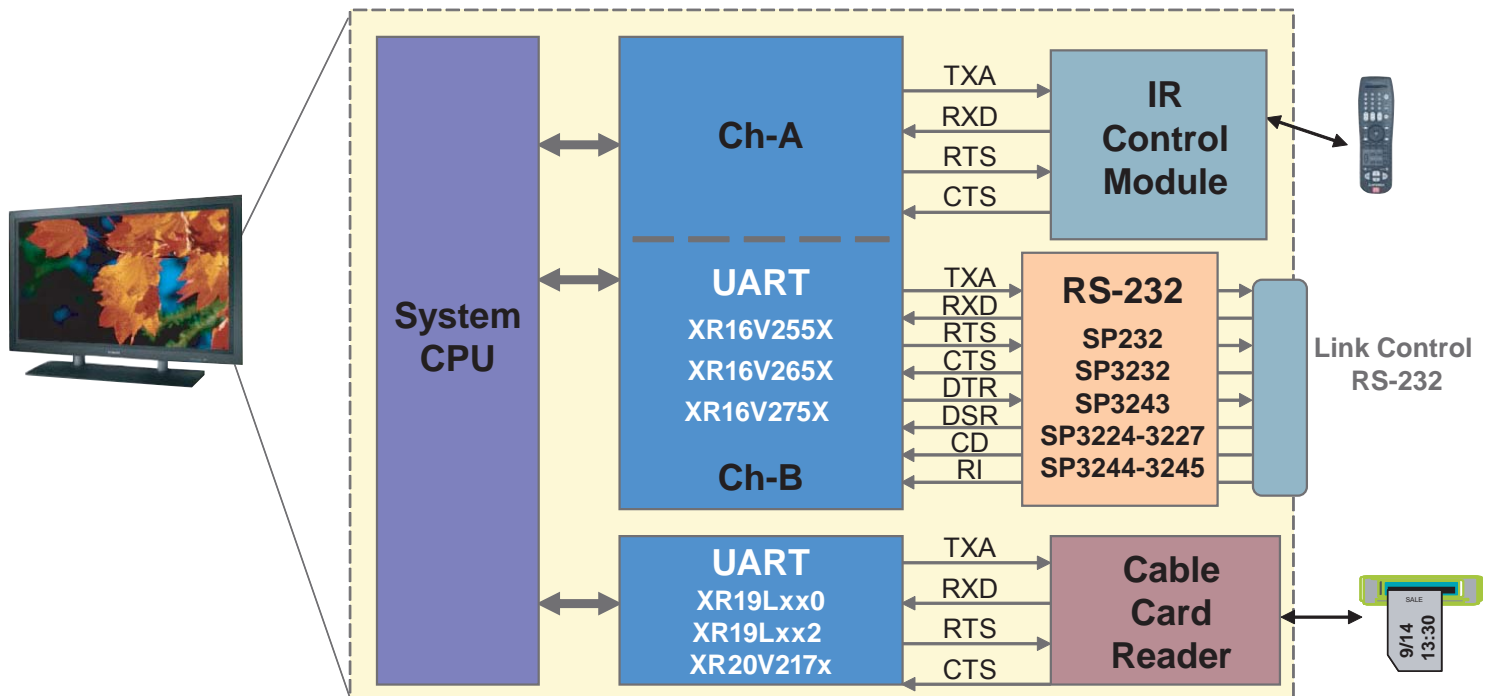
Highly Efficient Charge Pump

The charge pump is used to generate positive and negative signal voltages for the RS-232 drivers. This enables fully compliant RS-232 and V.28 signals from a single 3.0 or 5.5V power supply. The charge pumps use four external capacitors to hold and transfer electrical charge. The patented design uses a unique approach compared to older less efficient designs. The pumps use a four-phase voltage shifting technique to attain symmetrical V+ and V- power supplies. An intelligent control oscillator regulates the operation of the charge-pump to maintain the proper voltages at maximum efficiency.

Better Noise Immunity

Since receiver input is usually from a transmission line where long cable lengths and system interference can degrade the signal, the inputs have a hysteresis margin of 500mV. This ensures that the receiver is virtually immune to noisy transmission lines.

RS-232 Example in HDTV



Interface :: Transceivers :: RS-422/485

Key Features and Capabilities

Robust Electrostatic Discharge (ESD) Protection

Similar to the RS-232, Exar uses state of the art structures to protect the transceiver pins against ESD of $\pm 15\text{kV}$ without damage. The ESD structures withstand high ESD in all states: normal operation, shutdown, and powered down. After an ESD event, the transceivers keep working without latch-up or damage. ESD protection can be tested in various ways. The transmitter outputs and receiver inputs are characterized for protection to the following limits:

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- $\pm 15\text{kV}$ using the Air-Gap Discharge method specified in IEC 61000-4-2

Slew Rate Limited

Slew Rate drivers minimize Electromagnetic Interference (EMI) and reduce reflections caused by improperly terminated cables. This allows for error-free data transmission.

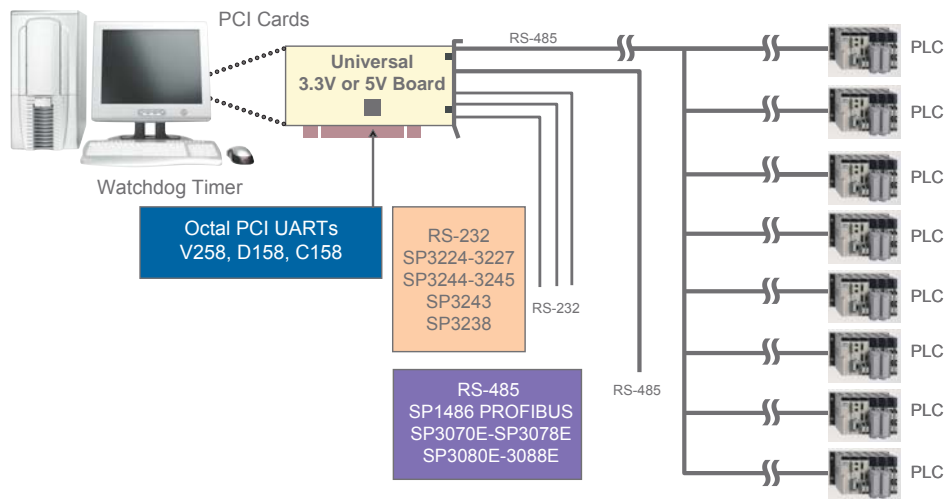
PROFIBUS

PROFIBUS is widely used in industrial control and automation applications and is ruggedized for use in harsh operating conditions. Higher differential output swing enhances noise immunity and drive longer data cables.

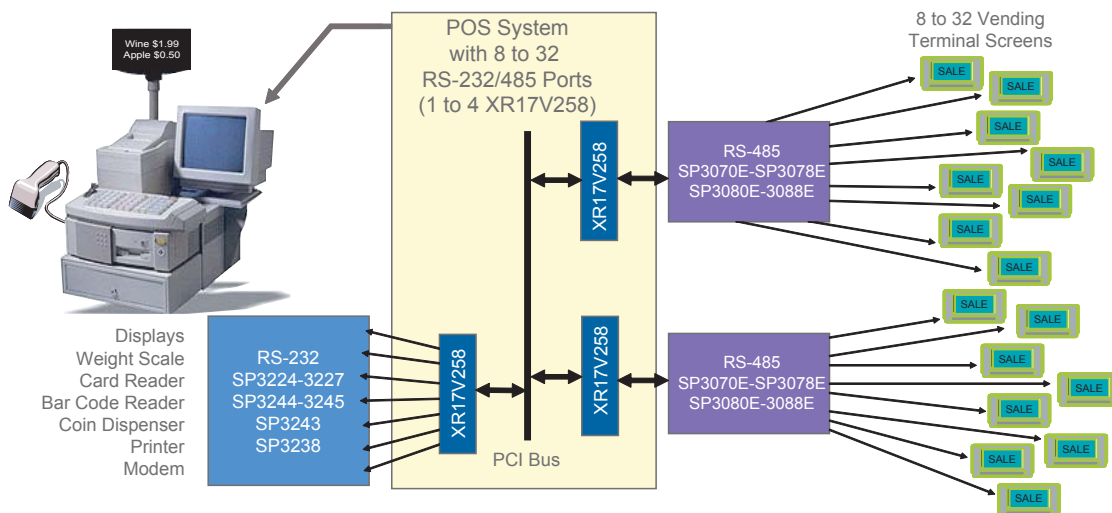
1/8 Unit Load

The standard RS-485 receiver input impedance is $12\text{k}\Omega$ (1 unit load). A standard driver can drive up to 32 unit loads. The 1/8th unit load receiver input impedance ($96\text{k}\Omega$), thereby allowing eight times as many transceivers (up to 256) to be connected in parallel on a communication line. Any combination of these devices and other RS-485 transceivers, up to a total of 32 unit loads, may be connected to the line.

RS-485 Example in Industrial Controls



RS-485 Example in Point of Sale (POS)



Interface :: Transceivers :: Multiprotocol

Key Features and Capabilities

Robust Electrostatic Discharge (ESD) Protection

Exar uses state of the art structures to protect the multiprotocol transceiver pins against ESD of $\pm 15\text{kV}$ without damage. The ESD structures withstand high ESD in all states: normal operation, shutdown, and powered down. After an ESD event, the transceivers keep working without latch-up or damage. ESD protection can be tested in various ways. The transmitter outputs and receiver inputs are characterized for protection to the following limits:

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- $\pm 8\text{kV}$ using the Contact Discharge method specified in IEC 61000-4-2
- $\pm 15\text{kV}$ using the Air-Gap Discharge method specified in IEC 61000-4-2

Industry's ONLY Single Chip Solution

Exar is the only one in the industry to offer single chip solutions that support RS-232, RS-485, RS-449, EIA-530, V.10, V.11, V.28, V.35, V.36, and X.21. As a result Exar's solution takes up to 40% less board space than competitor solutions.

Industry's Fastest Transceivers

At 40Mbps, the SP509 is 4X faster than leading competitive solutions.

Widest Availability of Protocols

RS-232, RS-485, RS-449, EIA-530, V.10, V.11, V.28, V.35, V.36, and X.21.

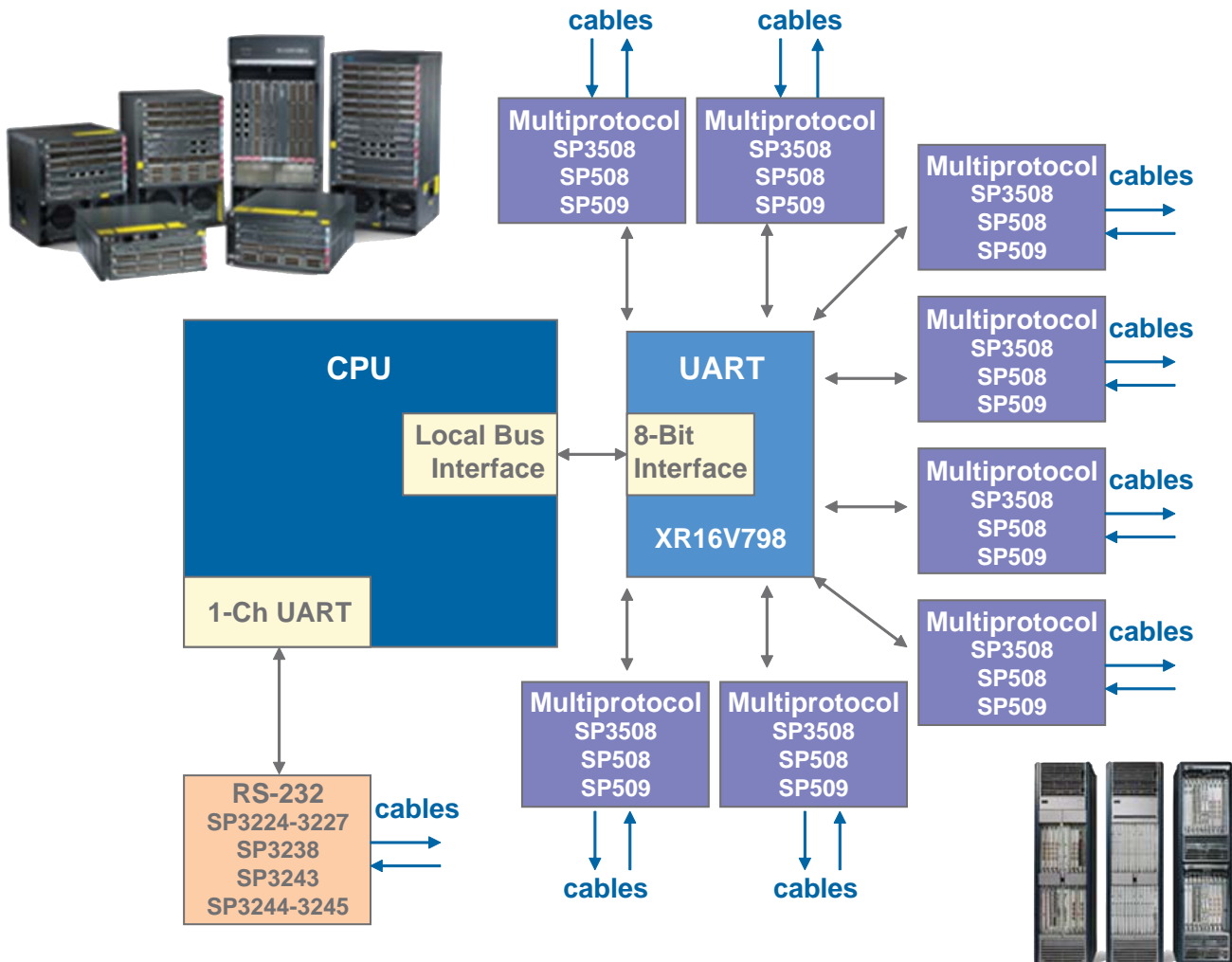
Internal Termination

The SP3508, SP508 and SP509 designs offer internal V.11 and V.35 termination networks for the clock and data lines. They also offer an internal loopback mode for diagnostic testing.

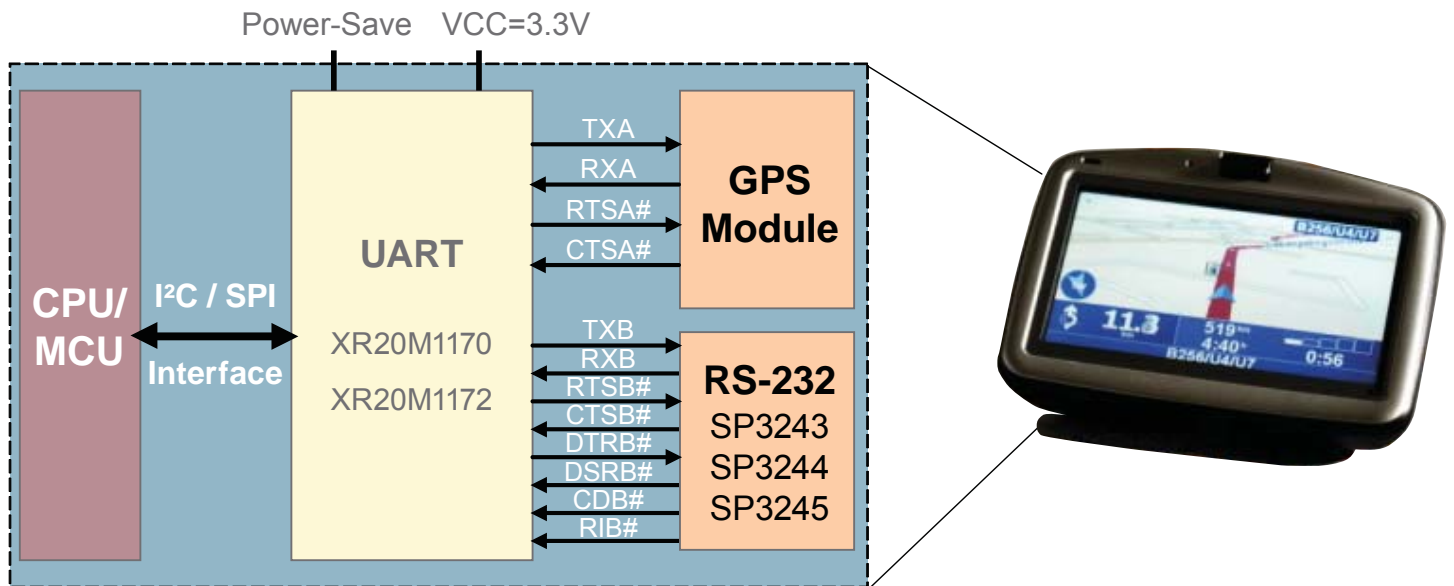
NET1/2 and TBR2 Compliance

SP3508, SP505, SP506, SP507, SP508, and SP509 are compliant to NET1/2 and TBR2 requirements.

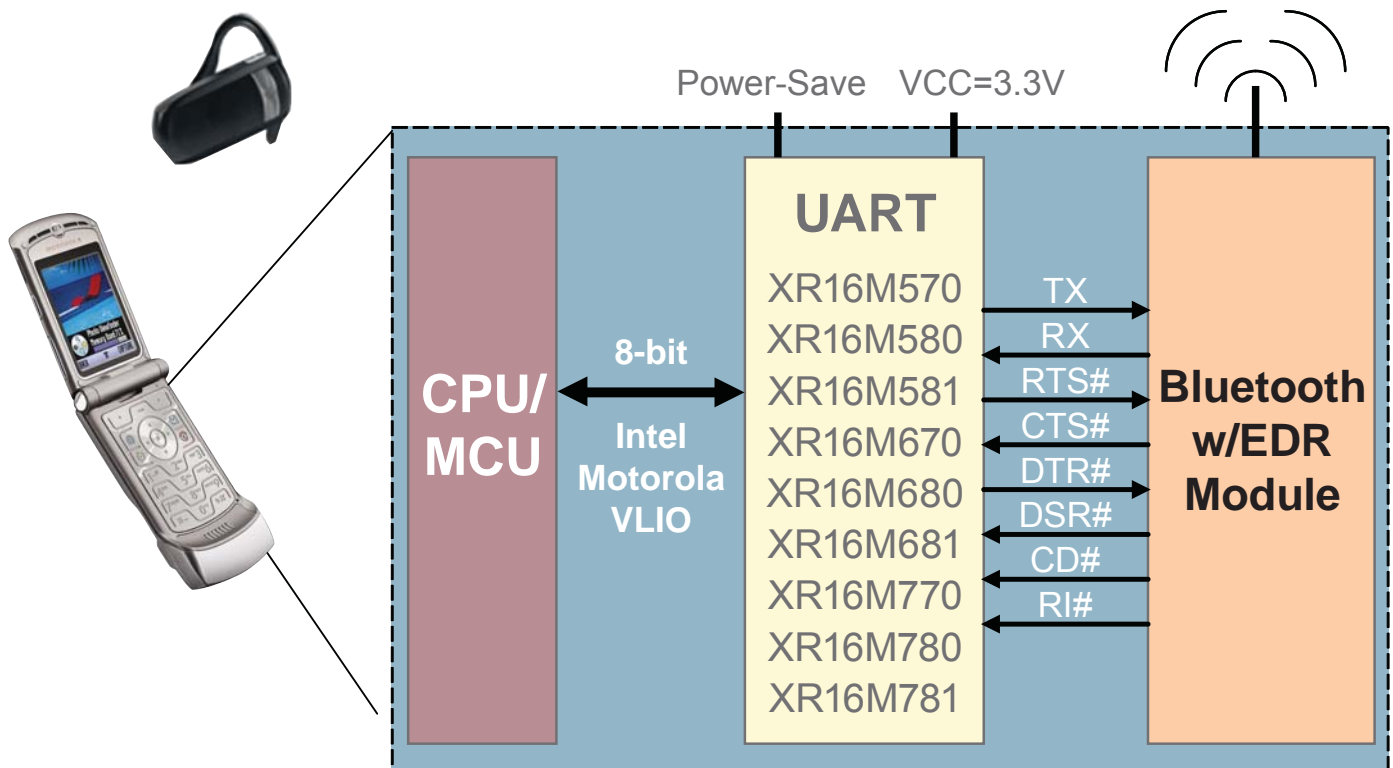
Multiprotocol Example in Network Switch Router



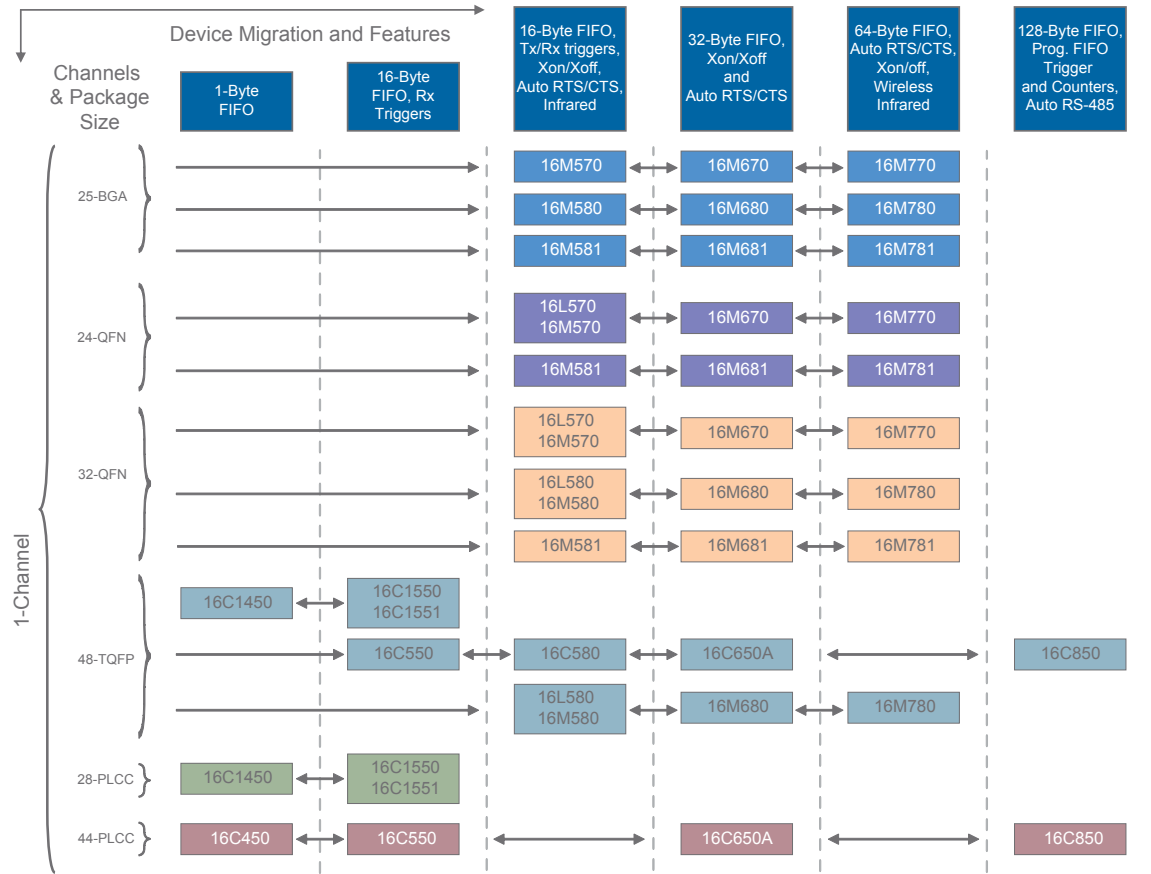
Global Positioning System (GPS)



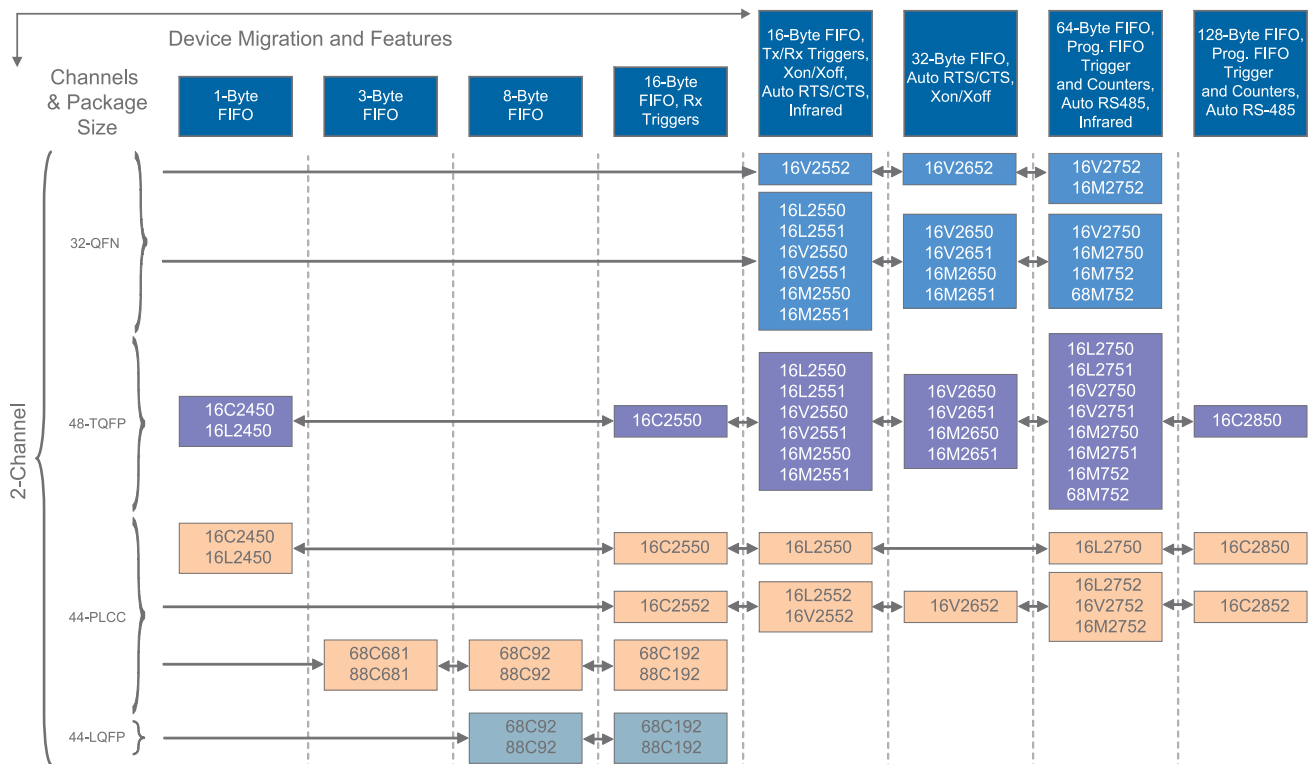
Cell Phone with Bluetooth



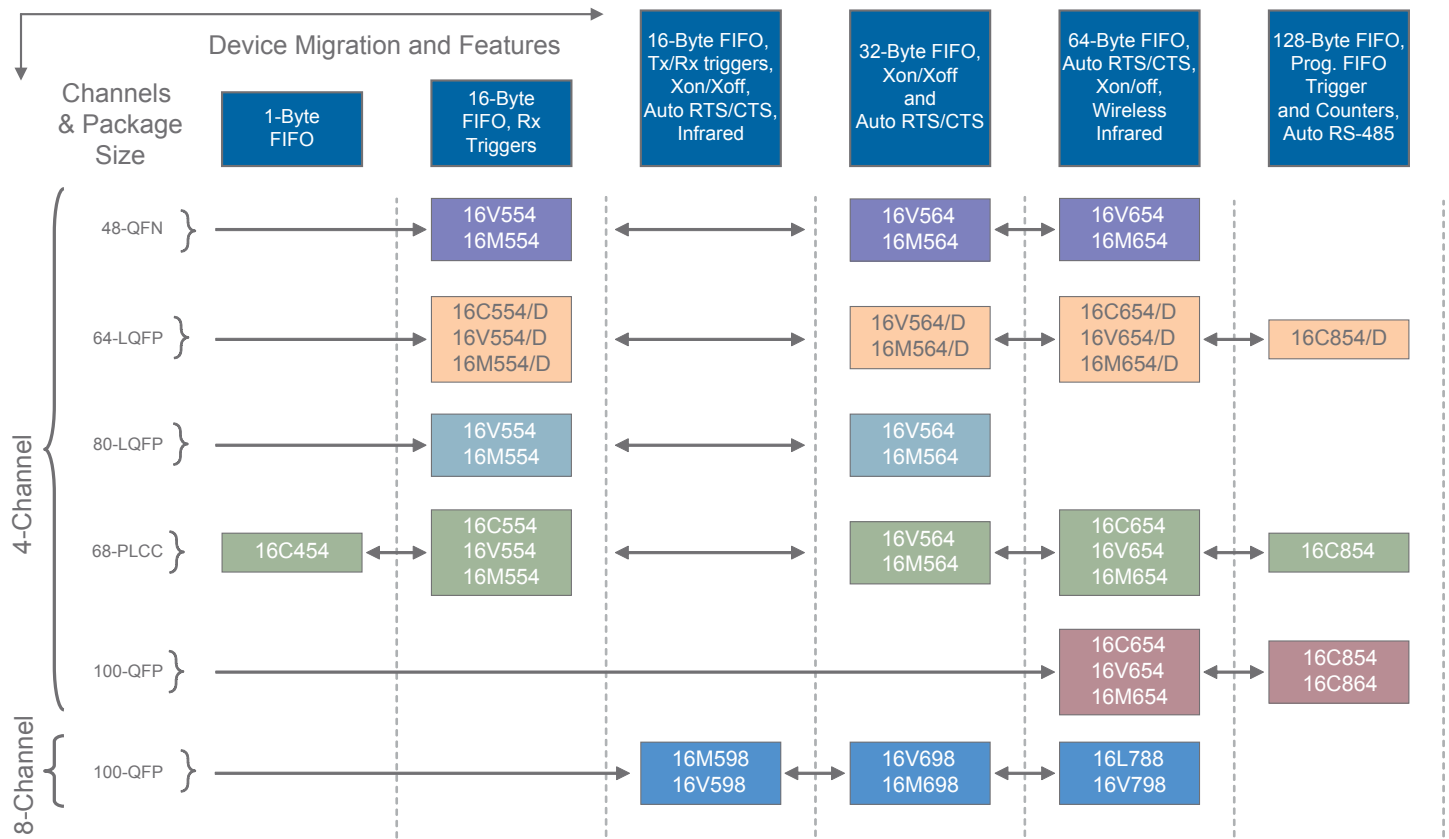
1-Channel UART Package Migration Chart S/W and Pin Compatible Upgrade



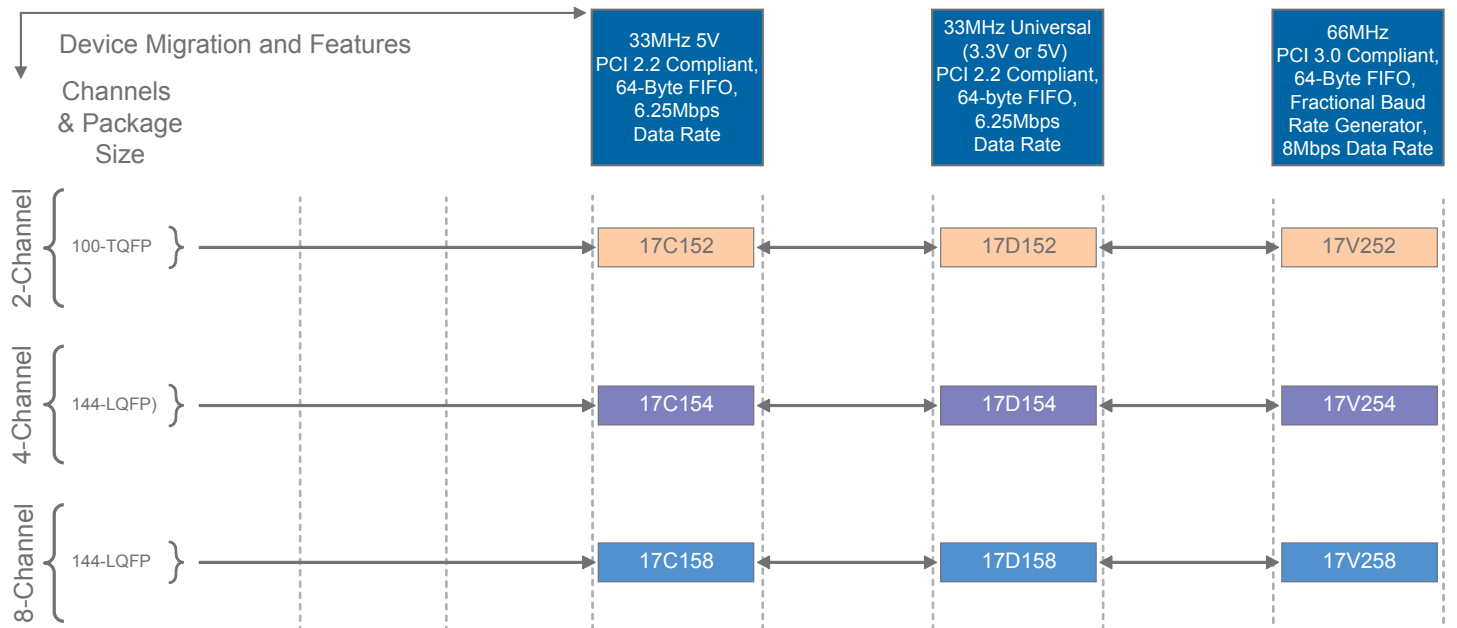
2-Channel UART Package Migration Chart S/W and Pin Compatible Upgrade



4-Channel and 8-Channel UART Package Migration Chart S/W and Pin Compatible Upgrade



PCI UART Package Migration Chart S/W and Pin Compatible Upgrade





NORTH AMERICA

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Exar Corporation, Raleigh, NC, USA
Exar Corporation, Center Valley, PA, USA
Exar Corporation, Dallas, TX, USA
Exar Corporation, Atlanta, GA, USA
Exar IC Canada Corporation, Montreal, Quebec, Canada

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Exar SRL, Milano, Italy

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