

Interface

UARTs and Bridges

- USB Ethernet Bridge
- USB UARTs
- USB Hubs
- PCIe UARTs
- PCI UARTs
- I²C/SPI UARTs
- LPC UARTs
- 8-Bit UARTs
- Combo UARTs
- GPIO Expanders

Serial Transceivers

- Multiprotocol
- RS-485/RS-422
- RS-232
- CAN Transceivers

Sensor Interface AFEs

- 16:1 and 8:1 AFEs

Telecommunication

- T1/E1
- T3/DS3/E3
- Transceivers/CDR
- Mappers + Framers
- Co-Directional
- WAN Clocks
- BITS Clocks



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Interface Portfolio

UARTs and Bridges

USB Ethernet Bridge w/ I2C Master, UARTs/GPIOs								
No UART		1 UART			2 UARTs		4 UARTs	
XR22800		XR22801			XR22802		XR22804	
USB Hubs								
4 Ports				7 Ports				
XR22404		XR22414			XR22417			
USB UARTs								
1-Channel			2-Channel		4-Channel			
XR21V1410		XR21B1420		XR21V1412		XR21V1414		
XR21B1411		XR21B1421		XR21B1422		XR21B1424		
PCIe UARTs								
2-Channel			4-Channel			8-Channel		
XR17V352			XR17V354			XR17V358		
I ² C/SPI UARTs					LPC UARTs			
1-Channel		2-Channel			2-Channel		4-Channel	
XR20M1170		XR20M1172			XR28V382		XR28V384	
XR20M1280								
8-Bit UARTs								
1-Channel		2-Channel				4-Channel		8-Channel
ST16C1550	XR16M580	ST16C2450	XR16C2850	XR16L2751	XR68C192	ST68C554	XR16M654	XR16L788
ST16C550	XR16M581	ST16C2550	XR16C2852	XR16L2752	XR68C681	ST16C554/554D	XR16V554/554D	XR16V598
ST16C650A	XR16M770	ST16C2552	XR16L2550	XR16M2550	XR68C92	ST16C654/654D	XR16V654/654D	XR16V698
XR16C850	XR16M780	ST16C452	XR16L2551	XR16M752	XR68M752	XR16C864	XR16C854/854D	XR16V798
XR16L570	XR16M781	ST16C552	XR16L2552	XR16V2550	XR88C192	XR16L784	XR82C684	
XR16L580	XR16M890	XR16C2550	XR16L2750	XR16V2750	XR88C681	XR16M564		
Combo UARTs								
UART & RS-232 Transceiver					UART & RS-485 Transceiver			
XR19L200					XR19L400			
GPIO Expanders								
8-Bit I ² C/SMBus		16-Bit I ² C/SMBus			8-Bit SPI		16-Bit SPI	
XRA1200		XRA1201			XRA1402		XRA1403	
XRA1200P		XRA1201P			XRA1404		XRA1405	
XRA1202P		XRA1203						

Transceivers

Multiprotocol Transceivers							
Dual Protocol						Multiprotocol	
RS-232 Mode			RS-485 Mode				
2/2 Tx/Rx	3/5 Tx/Rx	4/4 Tx/Rx	1/1 Tx/Rx	2/2 Tx/Rx	2/4 Tx/Rx	7/7 Tx/Rx	8/8 Tx/Rx
SP335	SP334	SP331	SP330	SP331	SP338	SP504	SP3508
XR3160	SP337	SP332	SP335	SP332			SP508E
SP330	SP338	SP336	SP339	SP334			SP510E
	SP339		SP339B	SP336			
	SP339B		XR3160	SP337			
	XR34350						

Interface Portfolio (Continued)

RS-485/RS-422 Transceivers (Continued)

RS-485/RS-422 Transceivers								
3.3V						Wide Supply RS-485/422 Transceivers		
Half Duplex		Full Duplex		Driver	Receiver	Half Duplex	Full Duplex	Receiver
SP3072E	XR33032	SP3070E	SP3077E	XR33193	SP26LV432	XR33032	XR33053	XR33180
SP3075E	XR33035	SP3071E	SP3490	XR33194	XR33180	XR33035	XR33156	XR33181
SP3078E	XR33038	SP3073E	SP3491	XR33195	XR33181	XR33038		XR33183
SP3483	XR33052	SP3074E	XR33053		XR33183	XR33052		XR33184
SP3485	XR33055	SP3076E	XR33156		XR33184	XR33055		
SP3494	XR33058					XR33058		
XR3072	XR33152					XR33152		
XR3078	XR33155					XR33155		
	XR33158					XR33158		
	XR33202					XR33202		

5V						±60V Fault Tolerant	
Half Duplex			Full Duplex	Driver	Receiver	Half Duplex	Full Duplex
SP1485E	SP485	XR33038	SP3083E	SP487	XR33180	XR33052	XR33053
SP3082E	SP485E	XR33052	SP3084E		XR33181	XR33055	XR33156
SP3085E	SP485R	XR33055	SP490		XR33183	XR33058	
SP3088E	XR3082	XR33058	SP490E		XR33184	XR33152	
SP4082E	XR3085	XR33152	SP491			XR33155	
SP481E	XR3088	XR33155	SP491E			XR33158	
SP483	XR33032	XR33158	XR3087				
SP483E	XR33035	XR33202	XR33053				
			XR33156				

RS-232 Transceivers									
1/1 Tx/Rx	2/2 Tx/Rx		3/2 Tx/Rx	3/3 Tx/Rx	3/5 Tx/Rx	4/4 Tx/Rx	4/5 Tx/Rx	5/3 Tx/Rx	6/10 Tx/Rx
SP3220E	SP202E	SP3223E	SP3203E	XR32330	SP3243E	SP208	SP211E	SP3238E	SP2209E
SP3220EB	SP232A	SP3223EB			SP3243EB	SP208E	SP213E	SP3239E	
SP3220EU	SP232E	SP3223EU			SP3243EH		SP213EH		
SP3221E	SP233A	SP3232E			SP3243EU				
	SP233E	SP3232EB			XR32430				
	SP3222E	SP3232EH							
	SP3222EB	SP3232EU							
	SP3222EU	SP385E							
		XR32220							

CAN Transceivers		
XR31233		XR31234
		XR31235

Sensor Interface AFEs								
16:1					8:1			
XR10910					XR18910			

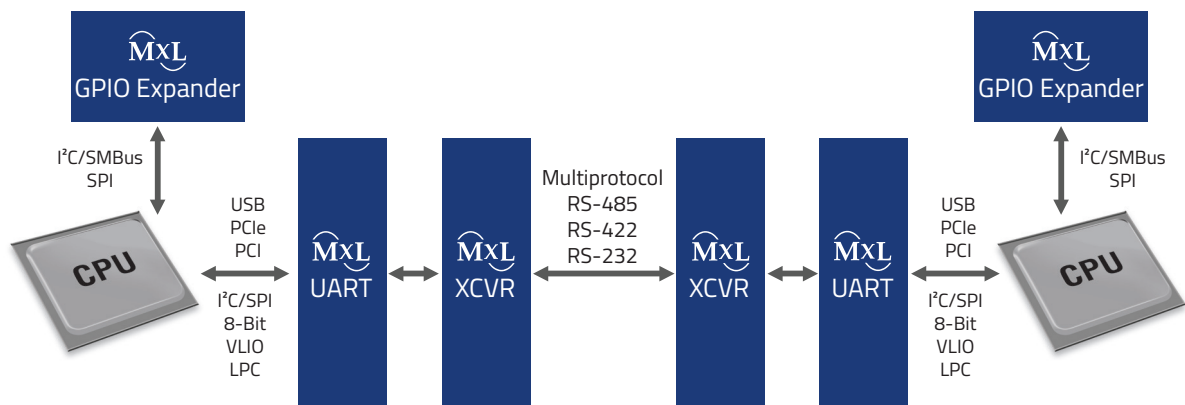
Telecommunication Products								
PDH				SDH/SONET		Timing		
T1 / E1 LIUs	T1/E1 Framer Combos	E1 LIUs	T3-DS3/ E3 LIUs	Transceivers/ CDRs	Mappers & Framers	Co-Directional Products	WAN Clocks	BITS Clocks
XRT83L30	XRT86VL30	XRT59L91	XRT7295AT	XRT91L31	XRT94L33	XRT6164	XRT8000	XRT86VL30
XRT83SL30	XRT86VL32	XRT5997	XRT75VL00D	XRT91L33		XRT6164A	XRT8001	
XRT83VSH38	XRT86VL34	XRT82L24A	XRT73L02M			XRT6165		
XRT83VSH316	XRT86VX38	XRT83SL28	XRT71D03			XRT6166		
	XRT86VX38A	XRT83VSH28	XRT75L04					
			XRT75R06D					
			XRT75R12					

Interface Products

Often, the simplest method to send data between two or more electronic devices is to use a Universal Asynchronous Receiver/Transmitter (UART) and a serial transceiver. MaxLinear offers a broad portfolio of industry-leading UART, serial transceiver and bridging solutions, including the industry's fastest data rate and smallest package UARTs. In addition, MaxLinear provides a complete family of general purpose input/output (GPIO) expanders. These GPIO devices enable design engineers to easily increase the number of I/O ports provided by a particular processor or to add application-specific functionality to embedded systems.

Synergistic Interface Solutions

MaxLinear's interface products find ready application in a wide range of market segments, from industrial controls and telecommunications to consumer electronics and the burgeoning Internet of Things (IoT). MaxLinear has lead the industry in UART and serial transceivers by developing a complete line of interface products that are engineered to work in concert with each other as well as with industry standards. MaxLinear's serial transceiver and GPIO expander portfolios include pin-compatible replacements and upgrades in industry-standard pinouts. Software drivers, including source code, that are compatible with nearly every operating system are available for download from Exar's website. Custom driver development is also available, contact your local MaxLinear Sales representative or contact Technical Support at www.maxlinear.com/contact-us



Industrial/Embedded Systems

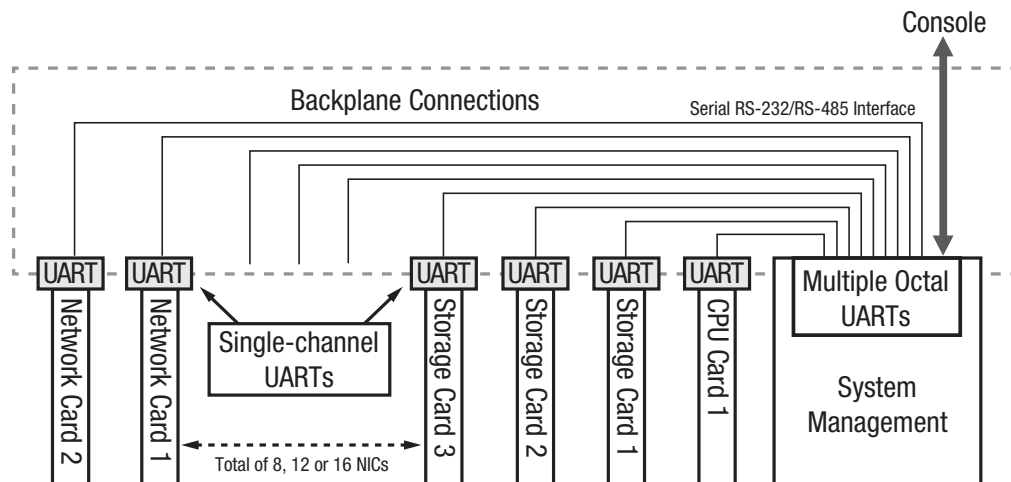
Factory and Process Control
HVAC and Building Automation
Industrial PCs
Security Systems

Networking and Storage

Console Access Ports
Server Management
Remote Network Access

Infrastructure and Communications

Wireless Access Points
ATM Kiosks
Point-of-Sale (POS)



UART Application Example: Server Management

USB Ethernet Bridges with I²C Master, UARTs, GPIOs

MaxLinear USB Ethernet bridges add Ethernet connectivity to any system with an available USB port. Designed for embedded and industrial applications where space is at a premium, MaxLinear’s USB Ethernet bridges pack the most functionality in the smallest package. The XR22800 and XR22801 USB Ethernet devices, which integrate an I²C master and multiple GPIOs, are delivered in a 5mm by 5mm QFN package. Even the XR22804, which bridges USB to Ethernet and integrates four UARTs, an I²C master and 32 GPIOs, is delivered in a compact 8mm by 8mm footprint. Other devices in similar package sizes only offer USB to Ethernet. All of MaxLinear’s USB Ethernet products are designed for reliability in consumer and industrial environments and provide the industry’s highest level of ESD protection at ±15kV HBM.

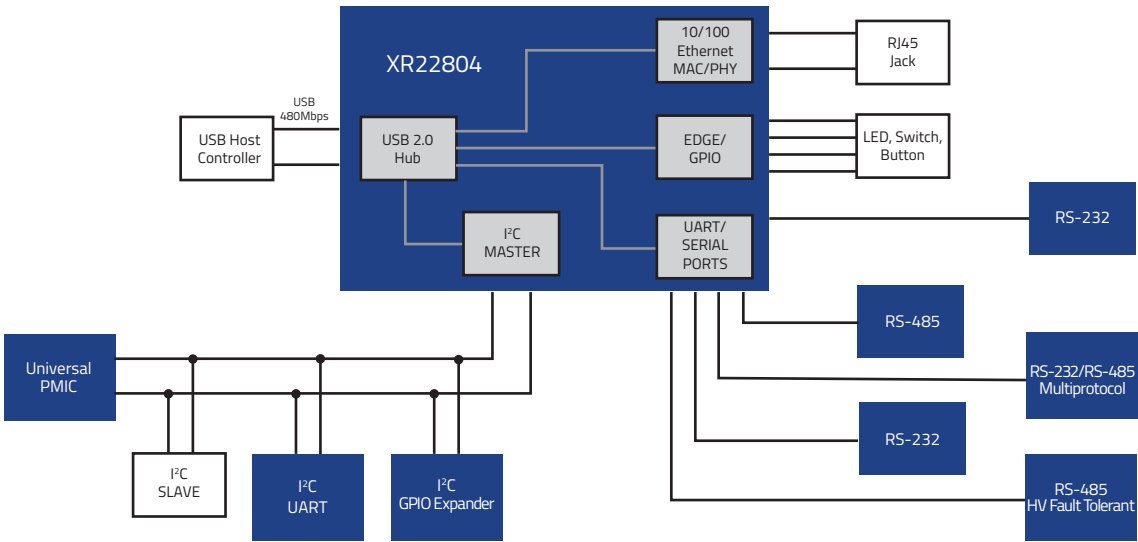
Development is simple with MaxLinear’s USB bridging products. The devices work with standard software drivers in Windows, Linux, Android and Mac OS X. For those designers who need to get to market quickly, enhanced features such as RS-485 Half-Duplex Control and 9-bit or Multidrop Mode can be enabled in MaxLinear’s USB bridges to simplify software and hardware development. Custom software drivers and applications are also available or for those instances where a standard driver is not available or where unique functionality is required. For example, the UART ports are easily configured for any non-standard baud rate over 300 bps and the GPIOs are readily tailored for enhanced functionality. All of MaxLinear’s custom Windows drivers are certified to the Microsoft WHQL/HCK standard to ensure compatibility and reliable performance.

Applications

- Point-of-Sale (POS) systems
- Docking stations
- USB Ethernet dongles
- Serial port expander
- Embedded connectivity



Part Number	CPU Interface	Ethernet MAC/PHY (Mbps)	UARTs	Max UART Data Rate (Mbps)	UART Tx/Rx FIFO (Bytes)	Max GPIOs	I ² C Master	Auto RS-485 Half-Duplex Control	Multi-Drop (9-bit) Mode	ESD (USB)	Supply Voltage Range V _{CC} (V)	Max UART/GPIO Input Voltage (V)	Max UART/GPIO Output Voltage (V)	Temp Range (°C)	Packages
XR22800	USB 2.0 HS	10/100	0	n/a	n/a	8	▪	▪	▪	±15kV HBM	4.4 to 5.25	3.6	3.6	-40 to 85	QFN-32
XR22801	USB 2.0 HS	10/100	1	15	1024/1024	8	▪	▪	▪	±15kV HBM	4.4 to 5.25	3.6	3.6	-40 to 85	QFN-32
XR22802	USB 2.0 HS	10/100	2	15	1024/1024	32	▪	▪	▪	±15kV HBM	4.4 to 5.25	3.6	3.6	-40 to 85	QFN-56
XR22804	USB 2.0 HS	10/100	4	15	1024/1024	32	▪	▪	▪	±15kV HBM	4.4 to 5.25	3.6	3.6	-40 to 85	QFN-56



Connectivity Bridges the I/O Gaps in the IoT Landscape

USB UARTs

MaxLinear USB UART devices are designed for peripheral or inter-system communication and offer up to four UART ports in an ultra-compact package. These USB UART bridges are designed for serial communication devices where space is at a premium. Such peripherals include keyboards, mice, barcode scanners, receipt printers and wireless modules. MaxLinear offers the industry's smallest USB UART devices targeted for these applications. The XR21B1411 and XR21V1410, for example, are delivered in 3mm by 3mm QFN packages.

All of MaxLinear's USB UART products are designed for reliability in consumer and industrial environments. Error checking is built in with MaxLinear's "Wide Mode" feature. This enables software to check error and status bits concurrently with data. For applications where the USB interface may be disconnected and reconnected while a COM port is still open, MaxLinear provides the XRUSB1 Windows driver that eliminates the need to close the COM port in the host application. To ensure robust operation and reliability in consumer and industrial environments, these bridging devices also offer the industry's highest level of ESD protection of up to $\pm 15\text{kV}$ HBM.

Development is simple with MaxLinear's USB UART bridging products. The devices work with the standard software drivers in Windows, Linux, Android and Mac OS X. For those designers who need to get to market quickly, enhanced features such as RS-485 Half-Duplex Control and 9-bit or Multidrop Mode can be enabled in MaxLinear's USB UART devices to simplify software and hardware development. Custom software drivers and applications are also available or for those instances where a standard driver is not available or where unique functionality is required. For example, MaxLinear USB UARTs are easily configured for any non-standard baud rate over 300bps and the GPIOs are readily tailored for enhanced functionality. All of the custom Windows drivers are certified to the Microsoft WHQL/HCK standard to ensure compatibility and reliable performance.

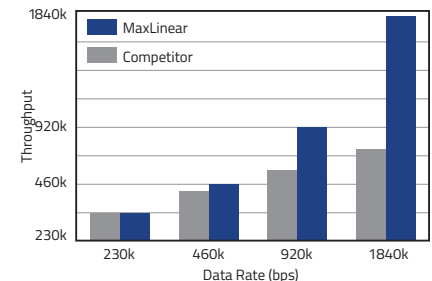
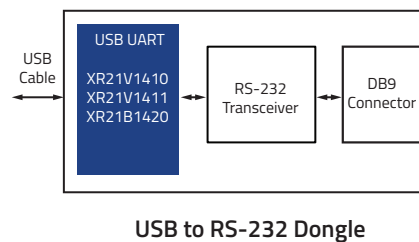
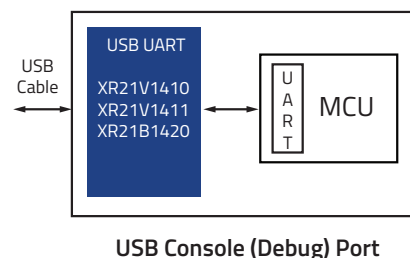
Applications

- Point-of-Sale (POS) systems
- USB to RS-232 dongle
- RS-232 debug port replacement
- Serial port expander
- Wearables



Part Number	CPU Interface	UARTs	Max Data Rate (Mbps)	Tx/Rx FIFO (Bytes)	Auto RS-485 Half-Duplex Control	Multi-Drop (9-bit) Mode	IrDA Sup	Supply Voltage Range V_{CC} (V)	Max UART/GPIO Input Voltage (V)	Max UART/GPIO Output Voltage (V)	Temperature Range ($^{\circ}\text{C}$)	Packages
XR21B1411	USB 2.0 FS	1	12	128/384	▪	▪		4.4 to 5.25	5.5	1.6 to 3.6	-40 to 85	QFN-16
XR21B1420	USB 2.0 FS	1	12	512/512	▪	▪	▪	3.0 to 3.6 4.4 to 5.25	5.5	3.6	-40 to 85	QFN-28
XR21B1421*	USB 2.0 FS	1	12	512/512	▪	▪	▪	3.0 to 3.6 4.4 to 5.25	5.5	1.8 to 3.6	-40 to 85	QFN-24 QFN-28
XR21B1422	USB 2.0 FS	2	12	512/512	▪	▪	▪	3.0 to 3.6 4.4 to 5.25	5.5	1.8 to 3.6	-40 to 85	QFN-40
XR21B1424	USB 2.0 FS	4	12	512/512	▪	▪	▪	3.0 to 3.6 4.4 to 5.25	5.5	1.8 to 3.6	-40 to 85	LQFP-64
XR21V1410	USB 2.0 FS	1	12	128/384	▪	▪		2.97 to 3.63	5.5	V_{CC}	-40 to 85	QFN-16
XR21V1412	USB 2.0 FS	2	12	128/384	▪	▪		2.97 to 3.63	5.5	V_{CC}	-40 to 85	QFN-32
XR21V1414	USB 2.0 FS	4	12	128/384	▪	▪		2.97 to 3.63	5.5	V_{CC}	-40 to 85	TQFP-48

* This is a USB HID device.



USB UART Data Throughput vs. Competitor

USB Hubs

MaxLinear's USB hubs provide a USB port expansion solution for USB 2.0 applications where ultra-low power consumption and board space are a concern such as Industrial IoT, point-of-sale terminals, USB port expansion, test instrumentation, and factory automation.

MaxLinear's USB hub controllers offer a combination of low power, small size and low cost that is unmatched in the industry and designers using these devices can easily add USB connectivity and stay within the stringent size, power and cost requirements of leading edge computing and industrial applications.

Applications

- **USB port expansion**
- **POS terminals**
- **Test instrumentation**
- **Factory automation**
- **Industrial process control**
- **Docking stations**

Part Number	Data Bus Interface	Downstream Ports	Downstream Ports Disable	Transaction Translator	Bus-Powered	Self-Powered	Battery Charging	Overcurrent Monitoring	Individual Port Power Management	Ganged Port Power Management	Supply Voltage Range VCC (V)	Temperature Range (°C)	Packages
XR22417	USB 2.0	7	▪	MTT or STT		▪		▪	▪		4.4-5.25	0 to 70	LQFP-48 LQFP-64
XR22414	USB 2.0	4		MTT	▪	▪		▪	▪	▪	3.0-3.6, 4.4-5.5	0 to 70	QFN-48 LQFP-48
XR22404	USB 2.0	4	▪	STT	▪	▪	▪	▪		▪	3.0-3.6, 4.4-5.25	0 to 70	QFN-24 SSOP-28

PCIe/PCI UARTs

The XR17xxx PCI and PCIe UARTs are designed for use in system boards or add-in cards. The 4-channel and 8-channel versions are pin compatible so a single design can support 4 or 8 ports depending on the end customer's requirements. The 4-channel and 8-channel PCIe UARTs have a proprietary master/slave expansion bus interface that enables up to 16 ports on a single x1 PCIe lane.

The XR17xxx PCI and PCIe UARTs are software compatible with the industry-standard 16550 UARTs. Native support for MaxLinear's PCI and PCIe UARTs is built-in to the latest Linux kernels. Custom software drivers for Windows, Windows Server, Windows Embedded Compact, Linux, VxWorks and QNX are also available from MaxLinear.

Applications

- **Multi-port RS-232/RS-422/RS-485 cards**
- **Point-of-Sale (POS) systems**
- **Factory automation and process control**
- **Network management**
- **Vending, ticketing and gaming**

Part Number	CPU Interface	UARTs	Max Data Rate 5V/3.3V (Mbps)	Tx/Rx FIFO (Bytes)	Auto RS-485 Half-Duplex Control	Multi-Drop (9-bit) Mode	Fractional Baud Rate Generator	GPIOs	Supply Voltage Range VCC (V)	PCI Interface Voltage Range VIO (V)	Max UART/GPIO Input Voltage (V)	Max UART/GPIO Output Voltage (V)	Temp Range (°C)	Packages
XR17V352	PCIe 2.0 (2.5Gbps)	2	na/31.25	256/256	▪	▪	▪	16	3 to 3.6	na	VCC	VCC	-40 to 85	FPBGA-113
XR17V354	PCIe 2.0 (2.5Gbps)	4	na/31.25	256/256	▪	▪	▪	16	3 to 3.6	na	VCC	VCC	-40 to 85	FPBGA-176
XR17V358	PCIe 2.0 (2.5Gbps)	8	na/31.25	256/256	▪	▪	▪	16	3 to 3.6	na	VCC	VCC	-40 to 85	FPBGA-176
XR17D152	33 MHz PCI	2	na/6.25/4	64/64	▪			8	3 to 3.6 4.5 to 5.5	3 to 3.6 4.5 to 5.5	6	VCC	-40 to 85	TQFP-100
XR17D154	33 MHz PCI	4	6.25/4	64/64	▪			8	3 to 3.6 4.5 to 5.5	3 to 3.6 4.5 to 5.5	6	VCC	-40 to 85	LQFP-144
XR17C158	33 MHz PCI	8	6.25/na	64/64	▪			8	4.5 to 5.5	4.5 to 5.5	6	VCC	-40 to 85	LQFP-144
XR17D158	33 MHz PCI	8	6.25/4	64/64	▪			8	4.5 to 5.5	3 to 3.6 4.5 to 5.5	6	VCC	-40 to 85	LQFP-144
XR17V258	66 MHz PCI	8	na/8	64/64	▪		▪	8	3 to 3.6	3 to 3.6	6	VCC	-40 to 85	LQFP-144

I²C/SPI UARTs

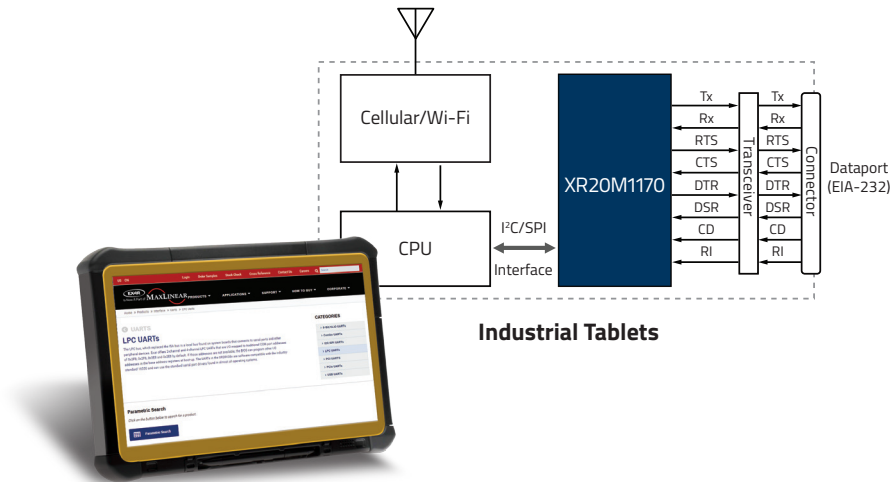
MaxLinear's I²C/SPI UARTs can easily be added to an embedded system design using a simple 2-wire (I²C) or 4-wire (SPI) interface. In addition to the UART ports, the XR20Mxxxx has up to 8 GPIOs that can be used for controlling or monitoring different functions in the embedded system.

A custom Linux software driver is available for download from Exar's website. For further technical assistance, please contact MaxLinear's UART technical support team.

Applications

- Mobile phones
- Tablets
- Embedded systems
- Diagnostic ports
- Industrial control

Part Number	CPU Interface	UARTs	Max Data Rate 3.3V/2.5V/1.8V (Mbps)	Tx/Rx FIFO (Bytes)	Auto RS-485 Half-Duplex Control	Multi-Drop (9-bit) Mode	Integrated Level Shifters	Supply Voltage Range V _{CC} (V)	Max UART/GPIO Input Voltage (V)	Max UART/GPIO Output Voltage (V)	Temp Range (°C)	GPIOs	Packages
XR20M1170	I ² C/SPI	1	16/12.5/8	64/64	▪			1.62 to 3.63	V _{CC}	V _{CC}	-40 to 85	0 8 0 8	TSSOP-16 TSSOP-24 QFN-16 QFN-24
XR20M1280	I ² C/SPI	1	24/16/10	128/128	▪	▪	▪	1.62 to 3.63	5.5	1.62 to 3.63	-40 to 85	4 8	QFN-24 QFN-32
XR20M1172	I ² C/SPI	2	16/12.5/8	64/64	▪			1.62 to 3.63	V _{CC}	V _{CC}	-40 to 85	8 8	QFN-32 TSSOP-28



Industrial Tablets

LPC UARTs

The LPC bus, which replaced the ISA bus is a local bus found on system boards that connects to serial ports and other peripheral devices. MaxLinear offers 2-channel and 4-channel LPC UARTs that are I/O mapped to traditional COM port addresses of 0x3F8, 0x2F8, 0x3E8 and 0x2E8 by default. If those addresses are not available, the BIOS can program other I/O addresses in the base address registers at boot-up. The UARTs in the XR28V38x are software compatible with the industry-standard 16550 and can use the standard serial port drivers found in almost all operating systems.

Applications

- System boards
- Embedded computers
- Diagnostic ports
- Serial port

Part Number	Data Bus Interface	UARTs	Max Data Rate (Mbps)	Tx/Rx FIFO (Bytes)	Auto RS-485 Half-Duplex Control	Multi-Drop (9-bit) Mode	5V Tolerant Inputs	Supply Voltage Range V _{CC} (V)	Watchdog Timer	Max UART/GPIO Input Voltage (V)	Max UART/GPIO Output Voltage (V)	Temp Range (°C)	Packages
XR28V382	Intel LPC	2	3	128/128	▪	▪	▪	3 to 3.6	▪	5.5	V _{CC}	-40 to 85	QFN-32
XR28V384	Intel LPC	4	3	128/128	▪	▪	▪	3 to 3.6	▪	5.5	V _{CC}	-40 to 85	TQFP-48

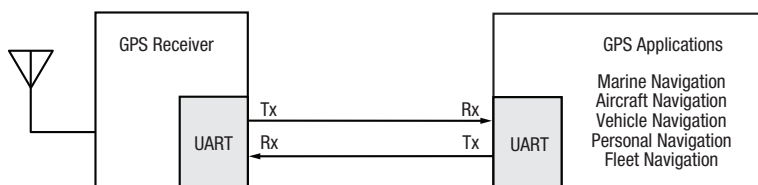
1-Channel

MaxLinear's 8-bit UARTs are the industry's largest UART product family offering devices from 1 to 8 channels and FIFO sizes up to 128 Bytes. Each UART has a parallel 8-bit bus interface. The UART offloads the serialization and de-serialization of the data from the MCU or processor. The enhanced features simplify hardware design and software development. The "Intel" interface has separate address, data, read and write lines. The "Motorola" interface has separate address and data lines, but the read/write lines are shared. The "VLIO" interface has separate read and write lines, but the address and data lines are multiplexed. Almost all of the 8-bit UARTs are compatible with the industry-standard 16550 UARTs, hence, they can use the standard serial port drivers in almost all operating systems.

Applications

- Mobile phones
- Tablets
- Diagnostic ports
- Point-of-Sale (POS) systems
- Barcode scanners

Part Number	CPU Interface	Ch.	Max Data Rate 5V/3.3V/2.5V/1.8V (Mbps)	Tx/Rx FIFO (Bytes)	Auto HW/SW Flow Control	Auto RS-485 Half-Duplex Control	Multi-Drop (9-bit) Mode	Fractional Baud Rate Generator	Supply Voltage Range V _{CC} (V)	Max UART/ GPIO Input Voltage (V)	Max UART/GPIO Output Voltage (V)	Temp Range (°C)	Packages
ST16C1550	Intel	1	1.5/0.5/na/na	16 / 16					2.97 to 5.5	V _{CC}	V _{CC}	-40 to 85	PLCC-28 TQFP-48
ST16C1551	Intel	1	1.5/0.5/na/na	16 / 16					2.97 to 5.5	V _{CC}	V _{CC}	-40 to 85	PLCC-28
ST16C550	Intel	1	1.5/1/na/na	16 / 16					2.97 to 5.5	V _{CC}	V _{CC}	-40 to 85	PLCC-44 TQFP-48
ST16C650A	Intel or PC COM Port	1	3.125/2/na/na	32 / 32	▪				2.97 to 5.5	V _{CC}	V _{CC}	-40 to 85	PLCC-44 TQFP-48
XR16C850	Intel or PC COM Port	1	2.2/1.3/na/na	128 / 128	▪	▪			2.97 to 5.5	V _{CC}	V _{CC}	-40 to 85	PLCC-44 TQFP-48
XR16L570	Intel	1	3/2/1.5/0.75	16 / 16	▪				1.62 to 5.5	5.5	V _{CC}	-40 to 85	QFN-32
XR16L580	Intel or Motorola	1	3/2/1.5/na	16 / 16	▪				2.25 to 5.5	5.5	V _{CC}	-40 to 85	QFN-32 TQFP-48
XR16M770	Intel	1	na/16/12.5/7.5	64 / 64	▪	▪	▪	▪	1.62 to 3.63	V _{CC}	V _{CC}	-40 to 85	QFN-24
XR16M780	Intel or Motorola	1	na/16/12.5/7.5	64 / 64	▪	▪	▪	▪	1.62 to 3.63	V _{CC}	V _{CC}	-40 to 85	TQFP-48
XR16M781	VLIO	1	na/20/16/10	64 / 64	▪	▪	▪	▪	1.62 to 3.63	V _{CC}	V _{CC}	-40 to 85	QFN-24 QFN-32
XR16M890	Intel/ Motorola/ VLIO	1	na/25/16/9	128 / 128	▪	▪	▪	▪	1.62 to 3.63	5.5	1.62 to 3.63	-40 to 85	QFN-32 QFN-40



Navigation and Fleet Management

2-Channel

The 2-channel 8-bit UART family integrates 2 UARTs into a single package and further simplifies the hardware design by eliminating redundant external components. In the "Intel" mode, there is a chip select and interrupt pin per channel. In the "Motorola" mode, there is only 1 chip select and 1 interrupt pin.

Most UARTs in this family are software compatible with the industry-standard 16550 UART, so they can be used with the standard serial port drivers in most operating systems. Some products in this family also have a parallel port (ST16C452/ 452PS/552/552A). The parallel ports will work with standard parallel port drivers.

Applications

- Multi-port RS-232/RS-422/RS-485 cards
- Point-of-Sale (POS) systems
- Factory automation and process control
- Network management
- Vending, ticketing and gaming

Part Number	CPU Interface	Ch.	Max Data Rate 5V/3.3V/2.5V/1.8V (Mbps)	Tx/Rx FIFO (Bytes)	Auto HW/SW Flow Control	Auto RS-485 Half- Duplex Control	Multi-Drop (9-bit) Mode	Fractional Baud Rate Generator	Supply Voltage Range V _{CC} (V)	Max UART/GPIO Input Voltage (V)	Max UART/GPIO Output Voltage (V)	Temp Range (°C)	Packages
ST16C2450	Intel	2	1.5/1/na/na	1 / 1					2.97 to 5.5	5.5	V _{CC}	-40 to 85	PLCC-44
ST16C2550	Intel	2	4/1.8/na/na	16 / 16					2.97 to 5.5	5.5	V _{CC}	-40 to 85	PLCC-44 TQFP-48
ST16C2552	Intel	2	4/1.8/na/na	16 / 16					2.97 to 5.5	5.5	V _{CC}	-40 to 85	PLCC-44
ST16C452*	Intel	2	1.5/0.5/na/na	1 / 1					2.97 to 5.5	5.5	V _{CC}	-40 to 85	PLCC-68
ST16C552*	Intel	2	1.5/0.5/na/na	16 / 16					2.97 to 5.5	5.5	V _{CC}	-40 to 85	PLCC-68
XR16C2550	Intel	2	4/1.875/na/na	16 / 16					2.97 to 5.5	5.5	V _{CC}	-40 to 85	TQFP-48
XR16C2850	Intel	2	6.25/4/na/na	128	▪	▪			2.97 to 5.5	5.5	V _{CC}	-40 to 85	PLCC-44 TQFP-48
XR16C2852	Intel	2	3.125/2/na/na	128	▪	▪			2.97 to 5.5	5.5	V _{CC}	-40 to 85	PLCC-44
XR16L2550	Intel	2	3.125/1.875/1/na	16 / 16	▪				2.25 to 5.5	5.5	V _{CC}	-40 to 85	QFN-32 TQFP-48
XR16L2551	Intel or Motorola	2	3.125/1.875/1/na	64 / 64	▪				2.25 to 5.5	5.5	V _{CC}	-40 to 85	QFN-32 TQFP-48
XR16L2552	Intel	2	3.125/1.875/1/na	64 / 64	▪				2.25 to 5.5	5.5	V _{CC}	-40 to 85	PLCC-44 TQFP-48
XR16L2750	Intel	2	6.25/4/3/na	64 / 64	▪	▪			2.25 to 5.5	5.5	V _{CC}	-40 to 85	TQFP-48
XR16L2751	Intel or Motorola	2	6.25/4/3/na	64 / 64	▪	▪			2.25 to 5.5	5.5	V _{CC}	-40 to 85	TQFP-48
XR16L2752	Intel	2	6.25/4/3/na	64 / 64	▪	▪			2.25 to 5.5	5.5	V _{CC}	-40 to 85	PLCC-44
XR16M2550	Intel	2	na/16/12.5/8	16 / 16	▪			▪	1.62-3.63	V _{CC}	V _{CC}	-40 to 85	TQFP-48 QFN-32
XR16M752	Intel	2	na/16/12.5/8	64 / 64	▪	▪		▪	1.62-3.63	V _{CC}	V _{CC}	-40 to 85	TQFP-48
XR16V2550	Intel	2	na/16/12.5/na	16 / 16	▪			▪	2.25-3.63	5.5	V _{CC}	-40 to 85	QFN-32
XR16V2750	Intel	2	na/8/6.25/na	64 / 64	▪	▪		▪	2.25-3.63	5.5	V _{CC}	-40 to 85	TQFP-48
XR68C192	Motorola	2	1/0.5/na/na	16 / 16	▪		▪		2.97-5.5	5.5	V _{CC}	-40 to 85	PLCC-44 LQFP-44
XR68C681	Motorola	2	1/na/na/na	1 / 3	▪		▪		4.5-5.5	V _{CC}	V _{CC}	-40 to 85	PLCC-44

*This device also has a printer port.

2-Channel (Continued)

Part Number	CPU Interface	Ch.	Max Data Rate 5V/3.3V/2.5V/1.8V (Mbps)	Tx/Rx FIFO (Bytes)	Auto HW/SW Flow Control	Auto RS-485 Half-Duplex Control	Multi-Drop (9-bit) Mode	Fractional Baud Rate Generator	Supply Voltage Range V _{CC} (V)	Max UART/GPIO Input Voltage (V)	Max UART/GPIO Output Voltage (V)	Temp Range (°C)	Packages
XR68C92	Motorola	2	1/0.5/na/na	8 / 8	▪		▪		2.97-5.5	5.5	V _{CC}	-40 to 85	PLCC-44 LQFP-44
XR68M752	Intel or Motorola	2	na/16/12.5/8	64 / 64	▪	▪		▪	1.62-3.63	V _{CC}	V _{CC}	-40 to 85	TQFP-48 QFN-32
XR88C192	Intel	2	1/0.5/na/na	16 / 16	▪		▪		2.97-5.5	5.5	V _{CC}	-40 to 85	PLCC-44 LQFP-44
XR88C681	Intel	2	1/na/na/na	1 / 3	▪		▪		4.5-5.5	V _{CC}	V _{CC}	-40 to 85	PLCC-44
XR88C92	Intel	2	1/0.5/na/na	8 / 8	▪		▪		2.97-5.5	5.5	V _{CC}	-40 to 85	PLCC-44

4-Channel and 8-Channel

The 4-channel and 8-channel product families integrate 4 and 8 UARTs into a single package. In addition, the XR16L784 and XR16xx98 families also support a single chip select and single interrupt pin in both the “Intel” and “Motorola” mode to simplify the hardware design. These devices also have a global interrupt status register so the software can quickly determine which UART generated the interrupt without having to check the status of all of the individual UART channels.

Almost all of these UARTs are based on the industry-standard 16550 UART, and are therefore compatible with standard serial port drivers. However, some driver customization may be required. Assistance for customizing software drivers is available from MaxLinear’s UART technical support team.

Applications

- Multi-port RS-232/RS-422/RS-485 cards
- Point-of-Sale (POS) systems
- Factory automation and process control
- Network management
- Vending, ticketing and gaming

Part Number	CPU Interface	Ch.	Max Data Rate 5V/3.3V/2.5V/1.8V (Mbps)	Tx/Rx FIFO (Bytes)	Auto HW/SW Flow Control	Auto RS-485 Half-Duplex Control	Multi- Drop (9-bit) Mode	Fractional Baud Rate Generator	Supply Voltage Range V _{CC} (V)	Max UART/GPIO Input Voltage (V)	Max UART/GPIO Output Voltage (V)	Temp Range (°C)	Packages
ST16C554/554D	Intel or Motorola	4	1.5/0.5/na/na	16/16					2.97 to 5.5	V _{CC}	V _{CC}	-40 to 85	PLCC-68 LQFP-64
ST16C654/654D	Intel or Motorola	4	1.5/0.5/na/na	64/64	▪				2.97 to 5.5	V _{CC}	V _{CC}	-40 to 85	PLCC-68 QFP-100 LQFP-64
ST68C554	Motorola	4	1.5/0.5/na/na	16/16					2.97 to 5.5	V _{CC}	V _{CC}	-40 to 85	PLCC-68
XR16C854/854D	Intel or Motorola	4	2/1.5/na/na	128/128	▪	▪			2.97 to 5.5	5.5	V _{CC}	-40 to 85	PLCC-68 QFP-100 LQFP-64
XR16C864	Intel or Motorola	4	2/1.5/na/na	128/128	▪	▪			2.97 to 5.5	5.5	V _{CC}	-40 to 85	QFP-100
XR16L784	Intel or Motorola	4	6.25/4/na/na	64/64	▪	▪			2.97 to 5.5	5.5	V _{CC}	-40 to 85	LQFP-64
XR16M564	Intel or Motorola	4	na/16/12.5/8	32/32	▪			▪	1.62 to 3.63	V _{CC}	V _{CC}	-40 to 85	LQFP-64
XR16M654	Intel or Motorola	4	na/16/12.5/8	64/64	▪			▪	1.62 to 3.63	V _{CC}	V _{CC}	-40 to 85	QFN-48
XR16V554/554D	Intel or Motorola	4	na/4/3.125/na	16/16					2.25 to 3.63	5.5	V _{CC}	-40 to 85	LQFP-64

4-Channel and 8-Channel (Continued)

Part Number	CPU Interface	Ch.	Max Data Rate 5V/3.3V/2.5V/1.8V (Mbps)	Tx/Rx FIFO (Bytes)	Auto HW/SW Flow Control	Auto RS-485 Half-Duplex Control	Multi- Drop (9-bit) Mode	Fractional Baud Rate Generator	Supply Voltage Range V _{CC} (V)	Max UART/GPIO Input Voltage (V)	Max UART/GPIO Output Voltage (V)	Temp Range (°C)	Packages
XR16V564	Intel or Motorola	4	na/4/3.125/na	32/32					2.25 to 3.63	5.5	V _{CC}	-40 to 85	LQFP-64
XR16V654/654D	Intel or Motorola	4	na/16/12.5/na	64/64	▪			▪	2.25 to 3.63	5.5	V _{CC}	-40 to 85	LQFP-64 QFN-48 LQFP-80
XR82C684	Intel or Motorola	4	1/na/na/na	3/3			▪		4.5 to 5.5	V _{CC}	V _{CC}	-40 to 85	PLCC-44 PLCC-68
XR16L788	Intel or Motorola	8	6.25/4/na/na	64/64	▪	▪			2.97 to 5.5	5.5	V _{CC}	-40 to 85	QFP-100
XR16V598	Intel or Motorola	8	na/15/10/na	16/16	▪	▪	▪	▪	2.25 to 3.63	5.5	V _{CC}	-40 to 85	QFP-100
XR16V698	Intel or Motorola	8	na/15/10/na	32/32	▪	▪	▪	▪	2.25 to 3.63	5.5	V _{CC}	-40 to 85	QFP-100
XR16V798	Intel or Motorola	8	na/8/6.25/na	64/64	▪	▪		▪	2.25 to 3.63	5.5	V _{CC}	-40 to 85	QFP-100

Combo UARTs

MaxLinear's Combo UARTs combine a single channel Universal Asynchronous Receiver and Transmitter (UART) with a serial transceiver. They are designed to operate from a single 3.3V or 5V supply.

Applications

- Battery-Powered Equipment
- Handheld and Mobile Devices
- Handheld Terminals
- Industrial Peripheral Interfaces
- Point-of-Sale (POS) Systems

Part Number	Description	Data Bus Interface	# of Channels	RS-232 Tx/Rx	Max Data Rate 5V/3.3V (Mbps)	Tx/Rx FIFO (Bytes)	FIFO Level Counters	Selectable / Programmable Trigger Levels	5V Tolerant Inputs	Supply Voltage Range V _{CC} (V)	Max UART/GPIO Output Voltage (V)	Temp Range (°C)	Packages
XR19L200	1-Channel Integrated UART And RS-232 Transceiver	Intel or Motorola	1	1 / 1	na/0.25	16 / 16		Selectable	2.97 to 5.5	▪	V _{CC}	-40 to 85	QFN-32
XR19L400	1-Channel Integrated UART and RS-485 Transceiver	Intel or Motorola	1		8 / 8	64	▪	Programmable	2.97 to 5.5	▪	V _{CC}	-40 to 85	QFN-40

I²C/SMBus and SPI GPIO Expanders

The I²C/SMBus GPIO expanders are pin and software compatible to existing 8-bit and 16-bit I²C/SMBus GPIO expanders, but with enhanced features and functionality such as:

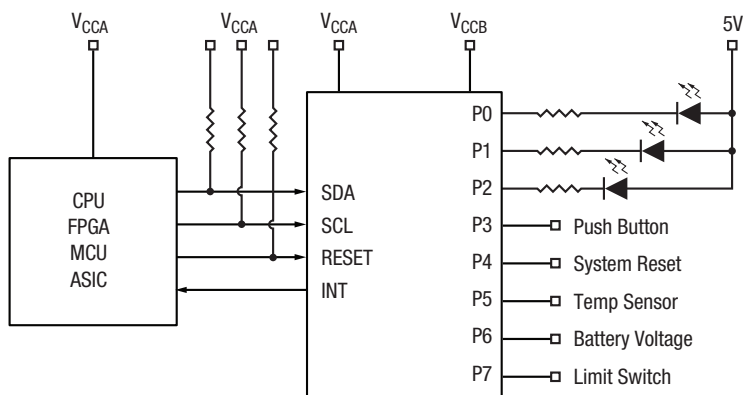
- Individually programmable interrupt masks
- Interrupts on rising edge, falling edge or both edges
- Internal pull-up resistor enable/disable
- Stored interrupt status mode
- Input glitch filtering
- Tri-stateable outputs

The SPI GPIO expanders are not pin compatible with any other 8-bit or 16-bit SPI GPIO expanders, but they do have the same enhanced features as the I²C/SMBus GPIO expanders listed above.

Applications

- Mobile phones
- Tablets
- System boards
- Embedded controllers
- Industrial control

Part Number	CPU Interface	GPIOs	Interrupt Output Pin	Reset Input Pin	Integrated Level Shifters	Internal Pull-Up Resistors Enabled at Power-up	5V Tolerant Inputs	Supply Range V _{CC} (V)	Max UART/GPIO Input Voltage (V)	Max UART/GPIO Output Voltage (V)	Temp Range (°C)	Packages
XRA1200	I ² C/SMBus	8	▪				▪	1.65 to 3.6	5.5	V _{CC}	-40 to 85	TSSOP-16
XRA1200P	I ² C/SMBus	8	▪			▪	▪	1.65 to 3.6	5.5	V _{CC}	-40 to 85	TSSOP-16
XRA1202P	I ² C/SMBus	8	▪	▪		▪	▪	1.65 to 3.6	5.5	V _{CC}	-40 to 85	QFN-16
XRA1201	I ² C/SMBus	16	▪				▪	1.65 to 3.6	5.5	V _{CC}	-40 to 85	QFN-24 TSSOP-24
XRA1201P	I ² C/SMBus	16	▪			▪	▪	1.65 to 3.6	5.5	V _{CC}	-40 to 85	QFN-24 TSSOP-24
XRA1203	I ² C/SMBus	16	▪	▪			▪	1.65 to 3.6	5.5	V _{CC}	-40 to 85	TSSOP-24
XRA1402	SPI	8	▪	▪			▪	1.65 to 3.6	5.5	V _{CC}	-40 to 85	TSSOP-16
XRA1404	SPI	8	▪		▪		▪	1.65 to 3.6	5.5	1.6 to 3.6	-40 to 85	TSSOP-16
XRA1403	SPI	16	▪	▪			▪	1.65 to 3.6	5.5	V _{CC}	-40 to 85	QFN-24 TSSOP-24
XRA1405	SPI	16	▪		▪		▪	1.65 to 3.6	5.5	1.6 to 3.6	-40 to 85	QFN-24



GPIO Expander Application Diagram

Multiprotocol Transceiver

MaxLinear offers the industry's largest portfolio of multiprotocol transceivers. Our dual protocol transceivers operate up to 20Mbps and allow RS-232 or RS-485 communication in a single IC. Our multiprotocol transceivers operate up to 52Mbps and support up to 12 serial protocols: RS-232, RS-485, RS-422, RS-449, EIA-530, EIA-530A, V.10, V.11, V.28, V.35, V.36 and X.21. Advanced features, like built-in cable termination, adjustable logic level, diagnostic loopback modes and 15kV ESD protection, provide maximum versatility and robust serial communication and greatly simplify the use of multiple serial protocol standards over a single connector. These products enable our customers to reduce their component and connector count, lower their Bill of Materials (BOM) costs and customize their end products on the fly or in the field.

Applications

- Factory automation
- Point-of-Sale(POS) equipment
- Industrial and single board computers
- Industrial and process control equipment
- HVAC controls
- Telecommunication equipment
- Gaming machines
- Network switches and data routers

Dual Protocol Transceivers (RS-232 + RS-485/RS-422)

Part Number	RS-232 Tx/Rx	RS-485 Tx/Rx	RS-232 Max Data Rate (Mbps)	RS-485/RS-422 Max Data Rate (Mbps)	HBM ESD (±kV)	Contact ESD (±kV)	120Ω Termination	VL Pin	Slew Limit Pin	Fault Tolerance	RS-485 Duplex	Max I _{CC} (mA)	Supply Voltage Range (V)	Temp Range (°C)	Packages
SP330	2 / 2	1 / 1	0.25 / 1	20	15	8		▪	▪	±18V	Half/Full	4.5	3 to 5.5	-40 to 85	TSSOP-24
SP331	4 / 4	2 / 2	0.12	10	2						Full	30	4.75 to 5.25	0 to 70 -40 to 85	SOIC-28
SP332	4 / 4	2 / 2	0.12	10	2						Full	120	4.75 to 5.25	0 to 70 -40 to 85	SOIC-28
SP334	3 / 5	2 / 2	0.12	10	2						Full	50	4.75 to 5.25	0 to 70 -40 to 85	SOIC-28
SP335	2 / 2	1 / 1	0.25 / 1	20	15	8	▪	▪	▪	±18V	Half/Full	4.5	3 to 5.5	0 to 70 -40 to 85	QFN-32
SP336	4 / 4	2 / 2	0.25 / 1	10	15	8			▪	±15V	Half/Full	30	3 to 5.5	0 to 70 -40 to 85	TSSOP-28 SOIC-28
SP337	3 / 5	2 / 2	0.25 / 1	15	15					±15V	Full	15	3 to 5.5	0 to 70 -40 to 85	TSSOP-28 SOIC-28
SP338	3 / 5	2 / 4	0.25 / 1	20	15	8	▪		▪	±18V	Half/Full	10	3 to 5.5	0 to 70 -40 to 85	QFN-40
SP339	3 / 5	1 / 1	0.25 / 1	20	15	8	▪		▪	±18V	Half/Full	8	3 to 5.5	0 to 70 -40 to 85	QFN-40
SP339B	3 / 5	1 / 1	0.25 / 1	20	15	8	▪		▪	±18V	Half/Full	8	3 to 5.5	-40 to 85	QFN-40
XR3160	2 / 2	1 / 1	0.25 / 1	20	15	8			▪	±18V	Half/Full	5.5	3 to 5.5	0 to 70 -40 to 85	SSOP-20
XR34350*	3 / 5	1 / 1	0.25 / 1	20	15	8	▪		▪	±18V	Half/Full	8	3 to 5.5	0 to 70 -40 to 85	QFN-40

*XR34350 features high swing RS-232 driver outputs (±10V no load).

Multiprotocol Transceivers

Part Number	Tx	Rx	Data Rate (Mbps)	HBM ESD (kV)	Internal Termination	RS-232	RS-485	RS-422	RS-449	EIA-530	EIA-530A	V.10	V.11	V.28	V.35	V.36	X.21	VL Pin	Supply Voltage Range (V)	Temp Range (°C)	Packages
SP3508	8	8	20	2	Complete	▪			▪	▪	▪	▪	▪	▪	▪	▪	▪		3 to 3.6	0 to 70 -40 to 85	LQFP-100
SP504	7	7	10	2	Basic	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪		4.75 to 5.25	0 to 70	LQFP-80
SP508E	8	8	20	15	Complete	▪			▪	▪	▪	▪	▪	▪	▪	▪	▪		4.75 to 5.25	0 to 70 -40 to 85	LQFP-100
SP510E	8	8	52	15	Complete	▪			▪	▪	▪	▪	▪	▪	▪	▪	▪		4.75 to 5.25	0 to 70 -40 to 85	LQFP-100

RS-485/RS-422 Transceiver

MaxLinear has a diverse portfolio of RS-485/RS-422 serial transceivers with wide supply voltage operation between 2.8V to 5.5V. Products range from industry-standard transceivers to ultra-high speed, 52Mbps and high differential output transceivers. In addition, MaxLinear has RS-485/RS-422 transceivers that are compliant with popular field buses including PROFIBUS. Advanced features, like hot swap, enhanced fail safe and 15kV ESD protection, ensure reliable and robust data communication over long cable lengths. Several transceivers feature a low voltage logic interface pin that allows system designers to interface directly with 1.8V devices without the need for external components, saving design time and board space.

The XR33x5x family of high performance RS-485/RS-422 transceivers are designed for improved performance in noisy industrial environments and increase tolerance to system faults. The analog bus pins can withstand direct shorts up to $\pm 60V$ and are protected against ESD events up to $\pm 15kV$ HBM. Multipoint applications over long cable runs will benefit from the extended $\pm 25V$ common mode voltage range of these transceivers.

Applications

- Motion control
- Point-of-Sale (POS) equipment
- Industrial and single board computers
- Industrial and process control equipment
- Long or unterminated transmission lines
- Remote utility reading
- Energy monitoring and control
- HVAC networks

$\pm 60V$ Fault Tolerant RS-485/RS-422 Transceivers

Part Number	Tx	Rx	Duplex	Data Rate (Mbps)	HBM ESD ($\pm kV$)	Rx Fail-Safe	Shutdown	Multi-Drop Nodes	Hot Swap	Transient Tolerance	Fault Tolerance	Tx EN	Rx EN	Cable Invert Pin	VL Pin	Supply Voltage Range (V)	Temp Range ($^{\circ}C$)	Packages
XR33052	1	1	Half	0.25	15	Open, Short, Idle	▪	320	▪	$\pm 100V$	$\pm 60V$	▪	▪			3 to 5.5	-40 to 85 -40 to 105	NSOIC-8
XR33053			Full	1				320										NSOIC-14
XR33055			Half	1				320										NSOIC-8
XR33058			Half	20				80										NSOIC-8
XR33152	1	1	Half	0.25	15	Open, Short, Idle	▪	320	▪	$\pm 100V$	$\pm 60V$	▪	▪	▪	▪	3 to 5.5	-40 to 85 -40 to 105	NSOIC-8
XR33155			Half	1				320										NSOIC-8
XR33156			Full	20				80										NSOIC-14
XR33158			Half	20				80										NSOIC-8

Wide Supply RS-485/RS-422 Transceivers

Part Number	Tx	Rx	Duplex	Data Rate (Mbps)	HBM ESD (kV)	Contact ESD ($\pm kV$)	Rx Fail-Safe	Shutdown	Multi-Drop Nodes	Hot Swap	Transient Tolerance	Fault Tolerance	Tx EN	Rx EN	Cable Invert Pin	VL Pin	Supply Voltage Range (V)	Temp Range ($^{\circ}C$)	Packages
XR33032	1	1	Half	0.25	15	8	Open, Short, Idle	▪	256	▪	$\pm 70V$	$\pm 18V$	▪	▪			2.8 to 5.5	-40 to 85 -40 to 125	NSOIC-8
XR33035			Half	1															NSOIC-8
XR33038			Half	10															NSOIC-8
XR33052	1	1	Half	0.25	15		Open, Short, Idle	▪	320	▪	$\pm 100V$	$\pm 60V$	▪	▪			3 to 5.5	-40 to 85 -40 to 105	NSOIC-8
XR33053			Full	1					320										NSOIC-14
XR33055			Half	1					320										NSOIC-8
XR33058			Half	20					80										NSOIC-8
XR33152	1	1	Half	0.25	15		Open, Short, Idle	▪	320	▪	$\pm 100V$	$\pm 60V$	▪	▪	▪	▪	3 to 5.5	-40 to 85 -40 to 105	NSOIC-8
XR33155			Half	1					320										NSOIC-8
XR33156			Full	20					80										NSOIC-14
XR33158			Half	20					80										NSOIC-8

Wide Supply RS-485/RS-422 (Continued)

Part Number	Tx	Rx	Duplex	Data Rate (Mbps)	HBM ESD (kV)	Contact ESD (±kV)	Rx Fail-Safe	Shutdown	Multi-Drop Nodes	Hot Swap	Transient Tolerance	Fault Tolerance	Tx EN	Rx EN	Cable Invert Pin	VL Pin	Supply Voltage Range (V)	Temp Range (°C)	Packages
XR33180	0	1		52	15	8	Open, Short, Idle		128								3 to 5.5	-40 to 125	TSOT23-5
XR33181																			TSOT23-6
XR33183																			TSOT23-6
XR33184																			TSOT23-6
XR33202	1	1	Half	20	15	8	Open, Short, Idle	▪	>256	▪			▪	▪		▪	3 to 5.5	-40 to 125	DFN-10

RS-485/RS-422 (3.3V)

Part Number	Tx	Rx	Duplex	Data Rate (Mbps)	HBM ESD (±kV)	Contact ESD (±kV)	Rx Fail-Safe	Shutdown	Multi-Drop Nodes	Hot Swap	Transient Tolerance	Fault Tolerance	Temp Range (°C)	Packages
SP3070E	1	1	Full	0.25	15	8	Open, Short, Idle	▪	256	▪			-40 to 85 -40 to 125	NSOIC-14
SP3071E			Full							NSOIC-8				
SP3072E			Half					▪		NSOIC-8				
SP3073E			Full	0.5				▪		▪				NSOIC-14
SP3074E			Full							NSOIC-8				
SP3075E			Half					▪		NSOIC-8				
SP3076E			Full	16				▪		▪				NSOIC-14
SP3077E			Full							NSOIC-8				
SP3078E			Half					▪		NSOIC-8				
SP3483	1	1	Half	0.25	2		Open	▪	32				0 to 70 -40 to 85	NSOIC-8
SP3485	1	1	Half	10	2		Open	▪	32				0 to 70 -40 to 85	NSOIC-8
SP3490	1	1	Full	10	2		Open		32				0 to 70 -40 to 85	NSOIC-8
SP3491							▪	NSOIC-14						
SP3494	1	1	Half	2.5	2		Open	▪	32				0 to 70 -40 to 85	NSOIC-8
XR3072	1	1	Half	0.25	15	8	Open, Short, Idle	▪	256	▪	±70V	±18V	-40 to 85 -40 to 125	NSOIC-8
XR3078				20										NSOIC-8
XR33032	1	1	Half	0.25	15	8	Open, Short, Idle	▪	256	▪	±70V	±18V	-40 to 85 -40 to 125	NSOIC-8
XR33035				1										NSOIC-8
XR33038				10										NSOIC-8
XR33052	1	1	Half	0.25	15		Open, Short, Idle	▪	320	▪	±100V	±60V	-40 to 85 -40 to 105	NSOIC-8
XR33053			Full	1					320					NSOIC-14
XR33055			Half	1					320					NSOIC-8
XR33058			Half	20					80					NSOIC-8
XR33152	1	1	Half	0.25	15		Open, Short, Idle		320		±100V	±60V	-40 to 85 -40 to 105	NSOIC-8
XR33155			Half	1				320	NSOIC-8					
XR33156			Full	20				▪	80	▪				NSOIC-14
XR33158			Half	20					80					NSOIC-8

RS-485/RS-422 Transceivers (Continued)

RS-485/RS-422 (3.3V) (Continued)

Part Number	Tx	Rx	Duplex	Data Rate (Mbps)	HBM ESD (±kV)	Contact ESD (±kV)	Rx Fail-Safe	Shutdown	Multi-Drop Nodes	Hot Swap	Transient Tolerance	Fault Tolerance	Temp Range (°C)	Packages
XR33180	0	1		52	15	8	Open, Short, Idle		128				-40 to 125	TSOT23-5
XR33181														TSOT23-6
XR33183														TSOT23-6
XR33184														TSOT23-6
XR33193	1	0		0.25	15	8				▪			-40 to 125	TSOT23-6
XR33194				2.5										
XR33195				20										
XR33202	1	1	Half	20	15	8	Open, Short, Idle	▪	>256	▪			-40 to 125	DFN-10

RS-485/RS-422 Transceivers (5V)

Part Number	Tx	Rx	Duplex	Data Rate (Mbps)	HBM ESD (±kV)	Contact ESD (±kV)	Rx Fail-Safe	Shutdown	Multi-Drop Nodes	Hot Swap	Transient Tolerance	Fault Tolerance	PROFIBUS	Temp Range (°C)	Packages
SP481E	1	1	Half	10	15		Open	▪	32					0 to 70 -40 to 85	NSOIC-8
SP483	1	1	Half	0.25	2	2	Open	▪	32					0 to 70 -40 to 85	NSOIC-8
SP483E	1	1	Half	0.25	15	8	Open	▪	32					0 to 70 -40 to 85	NSOIC
SP485	1	1	Half	5	2	2	Open		32					0 to 70 -40 to 85	NSOIC
SP485E	1	1	Half	10	15		Open		32					0 to 70 -40 to 85 -40 to 125	NSOIC
SP485R	1	1	Half	1	2		Open		400					0 to 70 -40 to 85	NSOIC
SP487	4	0	na	10	2				32					0 to 70	WSOIC-16
SP490	1	1	Full	5	2		Open		32					0 to 70 -40 to 85	NSOIC-8
SP490E				10	15										NSOIC-8
SP491				5	2			▪							NSOIC-14
SP491E				10	15			▪							NSOIC
SP1485E	1	1	Half	20	15		Open		32					0 to 70 -40 to 85	NSOIC-8
SP3082E	1	1	Half	0.115	15	8	Open, Short, Idle	▪	256	▪	±65V			-40 to 85	NSOIC-8
SP3083E			Full					▪		NSOIC-14					
SP3084E			Full							NSOIC-8					
SP3085E			Half					▪		NSOIC-8					
SP3088E			Half	20				▪		▪					NSOIC-8
SP4082E	1	1	Half	0.115	15		Open	▪	256					-40 to 85	NSOIC-8

Part Number	Tx	Rx	Duplex	Data Rate (Mbps)	HBM ESD (±kV)	Contact ESD (±kV)	Rx Fail-Safe	Shutdown	Multi-Drop Nodes	Hot Swap	Transient Tolerance	Fault Tolerance	PROFIBUS	Temp Range (°C)	Packages
XR3082			Half	0.25	15	8	Open, Short, Idle	▪	256	▪	±70V	±18V	▪	-40 to 85	NSOIC-8
XR3085			Half	1						▪					NSOIC-8
XR3087			Full	20						▪					NSOIC-8
XR3088			Half												NSOIC-8
XR33032	1	1	Half	0.25	15	8	Open, Short, Idle	▪	256	▪	±70V	±18V		-40 to 85	NSOIC-8
XR33035				1											NSOIC-8
XR33038				10											NSOIC-8
XR33052	1	1	Half	0.25	15		Open, Short, Idle	▪	320	▪	±100V	±60V		-40 to 85 -40 to 105	NSOIC-8
XR33053			Full	1					320						NSOIC-14
XR33055			Half	1					320						NSOIC-8
XR33058			Half	20					80						NSOIC-8
XR33152	1	1	Half	0.25	15		Open, Short, Idle		320		±100V	±60V		-40 to 85 -40 to 105	NSOIC-8
XR33155			Half	1					320	NSOIC-8					
XR33156			Full	20				▪	80	▪					NSOIC-14
XR33158			Half	20					80						NSOIC-8
XR33180	0	1		52	15	8	Open, Short, Idle		128					-40 to 125	TSOT23-5
XR33181															TSOT23-6
XR33183															TSOT23-6
XR33184															TSOT23-6
XR33202	1	1	Half	20	15	8	Open, Short, Idle	▪	>256	▪				-40 to 125	DFN-10

RS-422 Transceiver

Part Number	Description	Tx	Rx	Data Rate (Mbps)	HBM ESD (±kV)	Rx Fail-Safe	Shutdown	Multi-Drop Nodes	Voltage Range (V)	Temp Range (°C)	Packages
SP26LV432	High Speed, +3.3V Quad RS-422 Differential Line Receiver	0	4	50	2	Open	▪	10	3 to 3.6	0 to 70	NSOIC-16

RS-232 Transceivers

MaxLinear offers a large portfolio of RS-232 serial transceivers. The family consists of traditional RS-232 transceivers to the more advanced RS-232 transceivers with Auto On-line Plus and low voltage logic (1.65V to 5.5V I/O logic supply) features. In addition, many of the RS-232 transceivers have enhanced ESD protection. MaxLinear offers new RS-232 products that meet rigid IEC 61000-4-2 air-gap and contact ESD standards. This protection makes the product immune to damage from ESD strikes. Many of the devices are drop-in replacements and functional equivalents to existing industry- standard solutions.

Applications

- Building and security automation
- Point-of-Sale equipment(POS)
- Industrial and single board computers
- Industrial and process control equipment

Part Number	Tx	Rx	Data Rate (kbps)	HBM ESD (±kV)	Contact ESD (±kV)	No. of Ext Caps	Shutdown	Internal Caps	TTL Tri-State	Auto On-Line	Auto On-Line Plus	VL Pin	Supply Voltage Range (V)	Temp Range (°C)	Packages
SP3220E	1	1	120	15	8	4	▪		▪				3 to 5.5	0 to 70 -40 to 85	TSSOP-16 SSOP-16
SP3220EB	1	1	250	15	8	4	▪		▪				3 to 5.5	0 to 70 -40 to 85	TSSOP-16 SSOP-16
SP3221E	1	1	250	15	8	4	▪		▪	▪			3 to 5.5	-40 to 85	TSSOP-16 SSOP-16
SP3220EU	1	1	1000	15	8	4	▪		▪				3 to 5.5	-40 to 85	TSSOP-16
SP202E	2	2	120	15		4			▪				4.5 to 5.5	0 to 70 -40 to 85	NSOIC-16 WSOIC-16 PDIP-16
SP232A	2	2	120	2		4							4.5 to 5.5	0 to 70 -40 to 85	NSOIC-16 WSOIC-16
SP232E	2	2	120	15		4							4.5 to 5.5	0 to 70 -40 to 85	NSOIC-16 WSOIC-16 PDIP-16
SP233A	2	2	120	2		0		▪					4.5 to 5.5	0 to 70 -40 to 85	WSOIC-20 PDIP-20
SP233E	2	2	120	15		0		▪					4.5 to 5.5	0 to 70 -40 to 85	WSOIC-20
SP3222E	2	2	120	15	8	4	▪		▪				3 to 5.5	0 to 70 -40 to 85	TSSOP-20 SSOP-20 WSOIC-18
SP3223E	2	2	120	15	8	4	▪		▪	▪			3 to 5.5	0 to 70 -40 to 85	TSSOP-20 SSOP-20
SP3232E	2	2	120	15	8	4							3 to 5.5	0 to 70 -40 to 85	SSOP-16 NSOIC-16 WSOIC-16 TSSOP-16
SP385E	2	2	120	15	8	4	▪						3 to 5.5	0 to 70 -40 to 85	SSOP-20
SP3222EB	2	2	250	15	8	4	▪		▪				3 to 5.5	-40 to 85	TSSOP-20 SSOP-20
SP3223EB	2	2	250	15	8	4	▪		▪	▪			3 to 5.5	-40 to 85	TSSOP-20
SP3232EB	2	2	250	15	8	4							3 to 5.5	0 to 70 -40 to 85	SSOP-16 NSOIC-16 WSOIC-16 TSSOP-16 QFN-16
SP3232EH	2	2	460	15	8	4							3 to 5.5	0 to 70 -40 to 85	TSSOP-16
SP3222EU	2	2	1000	15	8	4	▪		▪				3 to 5.5	-40 to 85	TSSOP-20
SP3223EU	2	2	1000	15	8	4	▪		▪	▪			3 to 5.5	-40 to 85	TSSOP-20
SP3232EU	2	2	1000	15	8	4							3 to 5.5	0 to 70 -40 to 85	SSOP-16 TSSOP-16 NSOIC-16
XR32220	2	2	1000	15	8	4	▪		▪	▪		▪	3 to 5.5	-40 to 85	QFN-24
SP3203E	3	2	250	15	8	4	▪		▪				3 to 5.5	0 to 70 -40 to 85	TSSOP-20
XR32330	3	3	250	15	8	4	▪		▪	▪		▪	3 to 5.5	-40 to 85	QFN-24

Part Number	Tx	Rx	Data Rate (kbps)	HBM ESD (±kV)	Contact ESD (±kV)	No. of Ext Caps	Shutdown	Internal Caps	TTL Tri-State	Auto On-Line	Auto On-Line Plus	VL Pin	Supply Voltage Range (V)	Temp Range (°C)	Packages
SP3243E	3	5	120	15	8	4	▪		▪	▪			3 to 5.5	0 to 70 -40 to 85	SSOP-28 TSSOP-28
SP3243EB	3	5	250	15	8	4	▪		▪	▪			3 to 5.5	0 to 70 -40 to 85	SSOP-28 TSSOP-28
SP3243EH	3	5	460	15	8	4	▪		▪	▪			3 to 5.5	0 to 70 -40 TO 85	SSOP-28
SP3243EU	3	5	1000	15	8	4	▪		▪	▪			3 to 5.5	0 to 70 -40 to 85	SSOP-28 QFN-32 TSSOP-28
XR32430	3	5	1000	15	8	4	▪		▪	▪			3 to 5.5	0 to 70 -40 to 85	QFN-32
SP208	4	4	120	15	8	4							4.5 to 5.5	0 to 70 -40 to 85	SSOP-24
SP208E	4	4	120	15	8	4							4.5 to 5.5	0 to 70 -40 to 85	WSOIC-24 SSOP-24
SP211E	4	5	120	15	8	4	▪		▪				4.5 to 5.5	0 to 70 -40 to 85	WSOIC-28 SSOP-28
SP213E	4	5	120	15	8	4	▪		▪				4.5 to 5.5	0 to 70 -40 to 85	SSOP-28
SP213EH	4	5	460	15	8	4	▪		▪				4.5 to 5.5	0 to 70 -40 to 85	SSOP-28
SP3238E	5	3	250	15	8	4	▪		▪	▪			3 to 5.5	0 to 70 -40 to 85	SSOP-28 TSSOP-28
SP3239E	5	3	250	15	8	4	▪		▪				3 to 5.5	-40 to 85	SSOP-28
SP2209E	6	10	460	15	8	2							10.8 to 13.2	-40 to 85	TSSOP-38

CAN Transceivers

Part Number	Bus Fault Voltage (V)	Common Mode Voltage (V)	Max Data Rate (Mbps)	Low Power Mode	HBM ESD (±kV)	IEC 61000-4-2 Contact (±kV)	Supply Voltage Range (V)	Temp Range (°C)	Packages	Features
XR31233	±36	±25	1	No	16	8	3 to 3.6	-40 to 125	SOIC-8	High Speed, Slope Control, Loop Back
XR31234	±36	±25	1	Yes	16	8	3 to 3.6	-40 to 125	SOIC-8	High Speed, Slope Control, Ultra Low Current Sleep Mode
XR31235	±36	±25	1	No	16	8	3 to 3.6	-40 to 125	SOIC-8	High Speed, Slope Control, Autobaud Loop Back

Sensor Interface AFEs

Part Number	Number of Channels	Interfaces	Integrated Features	Gain Range (V/V)	Gain Error (%)	V _{IO} Max (mV)	I _b Max (pA)	CMRR Min (dB)	V _{CC} Min (V)	V _{CC} Max (V)	V _{DD} Min (V)	V _{DD} Max (V)	Temp Range (°C)	Packages
XR10910	16	I ² C	16:1 Diff Mux, INA, LDO, Offset correction DAC	8 gains from 2 to 760	±0.5	1	100	75	2.7	5.25	1.7	5.25	-40 to 85	QFN-40
XR18910	8	I ² C	8:1 Diff Mux, INA, LDO, Offset correction DAC	8 gains from 2 to 760	±0.5	1	100	75	2.7	5.25	1.7	5.25	-40 to 85	QFN-24

PDH

T1 / E1 LIUs

Part Number	Number of Channels	Data Rate	Clock Recovery	Short/Long Haul	Temp Range (°C)	Operating Power Supply (V)	Packages
XRT83L30	1	T1/E1/J1	Yes	S/L	-40 to 85	3.3	PQFP-64
XRT83SL30	1	T1/E1/J1	Yes	S	-40 to 85	3.3	PQFP-64
XRT83VSH38	8	T1/E1/J1	Yes	S	-40 to 85	3.3, 1.8	BGA-225
XRT83VSH316	16	T1/E1/J1	Yes	S	-40 to 85	3.3, 1.8 with 5V tolerant	STBGA-316

T1-E1 Framer Combos

XRT86VL30	1	T1/E1/J1	Yes	S/L	-40 to 85	3.3, 1.8	TQFP-128 TQFP-80
XRT86VL32	2	T1/E1/J1	Yes	S/L	-40 to 85	3.3, 1.8	BGA-225
XRT86VL34	4	T1/E1/J1	Yes	S/L	-40 to 85	3.3, 1.8	BGA-225
XRT86VX38	8	T1/E1/J1	Yes	S/L	-40 to 85	3.3, 1.8	fpBGA-256, fpBGA-329
XRT86VX38A	8	T1/E1/J1	Yes	S/L	-40 to 85	3.3, 1.8	fpBGA-256

E1 LIU

Part Number	Number of Channels	Data Rate	Clock Recovery	Short/Long Haul	Operating Power Supply (V)	Max Current (mA)	Packages
XRT59L91	1	E1	No	S	3.3	56mA	SOIC-16
XRT5997	7	E1	No	S	3.3	175mA	TQFP-100
XRT82L24A	4	E1	Yes	S	3.3	228mA	TQFP-100
XRT83SL28	8	E1	Yes	S	3.3		TQFP-144
XRT83VSH28	8	E1	Yes	S	3.3		BGA-225

T3-DS3/E3 LIUs

Part Number	Number of Channels	Data Rate	Clock Recovery	Short/Long Haul	Temp Range (°C)	Operating Power Supply (V)	Packages
XRT7295AT	1	DS3/STS-1	Yes	n/a	-40 to 85	5	SOJ-20
XRT75VL00D	1	DS3, E3, STS-1	Yes	n/a	-40 to 85	3	TQFP-52
XRT73L02M	2	DS3, E3, STS-1	Yes	n/a	-40 to 85	3	TQFP-80
XRT71D03	3	DS3, E3, STS-1	No	n/a	-40 to 85	5, 3	TQFP-64
XRT75L04	4	DS3, E3, STS-1	Yes	n/a	-40 to 85	3	TQFP-176
XRT75R06D	6	DS3, E3, STS-1	Yes	n/a	-40 to 85	3	BGA-217
XRT75R12	12	DS3, E3, STS-1	Yes	n/a	-40 to 85	3	TBGA-420

SDH/SONET

Transceivers / CDRs

Part Number	Number of Channels	Line Interface	Protocols	Power Supply (V)	Packages
XRT91L31	OC-12/OC-3	SONET/SDH	8-Bit TTL	3.3	PQFP-64
XRT91L33	OC-12/3 STM-4/1	SONET/SDH	LVDS	3.3	TSSOP-20

Mappers + Framers

Part Number	Line Interface	Protocols	Bus Interface	System Bus Interface	Power Supply	Packages
XRT94L33	1xSTS-3 1xSTM-1 3xDS3/E3/STS-1	SONET/SDH ATM, PPP	8-Bit, 77.76MHz	Utopia/POS PHY	3.3V	PBGA-504

Timing

Co-Directional Products

Part Number	Number of Channels	Data Rate	Clock Recovery	Short/Long Haul	Temp Range (°C)	Operating Power Supply (V)	Max Current (mA)	Packages
XRT6164	1	64Kbps, E1	No	S	0 to 70	5	26.5	SOIC-16
XRT6164A	1	64Kbps, E1	No	S	0 to 70	5	26.5	SOIC-16
XRT6165	1	64Kbps, E1	Yes	n/a	0 to 70	5	2	SOIC-24
XRT6166	1	64Kbps, E1	Yes	n/a	0 to 70	5	2	SOIC-28

WAN Clocks

Part Number	Number of PLLs	Input Frequency Range	Output Frequency Range	Temp Range (°C)	Supply Voltage (V)	Packages
XRT8000	2	8kHz to 32,768kHz	56kHz to 16,384kHz	-40 to 85	5, 3.3	SOIC-18
XRT8001	2	8kHz to 32,768kHz	56kHz to 16,384kHz	-40 to 85.	5, 3.3	SOIC-18

BITS Clock

Part Number	64Khz / 8Khz / 400Hz modes	BITS Rx	BITS Tx	SSM
XRT86VL30	FALSE	TRUE	TRUE	TRUE

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