communications brochure

T/E/J
SONET/SDH

EXAR
*Powering Connectivity*™

Communications :: T/E/J Carrier Products

Why Exar?

With over 30 years of mixed-signal design expertise, world-class product reliability and field support, Exar stays focused on leveraging its strengths to solve your design challenges. Innovative and leading edge design applies throughout Exar's T/E/J and SONET/SDH product families.

Exar has the broadest T/E/J physical layer product portfolio: Analog Front Ends (AFEs), Line Interface Units (LIUs), framers, LIU/framer combos, LIU/Jitter Attenuator Combos (with and without Desynchronization), optical transceivers, clock adapters, PCM line interfaces, and coming soon, Ethernet over PDH. Exar has a history of innovation with many industry firsts:

- R³ Technology™ (Reconfigurable, Relayless Redundancy)
- An eight-channel integrated LIU and framer device, replaces several discrete components
- A 14-channel long/short haul LIU ideal for mux/demux applications, and many more
- A 12-channel LIU and Jitter Attenuator for access, digital cross connect amongst others
- A 28-channel T1/E1 LIU/Framer with VT/TU Mapper and MI3 Multiplexer

Today's Access Control and Wide Area Network (WAN) Architecture
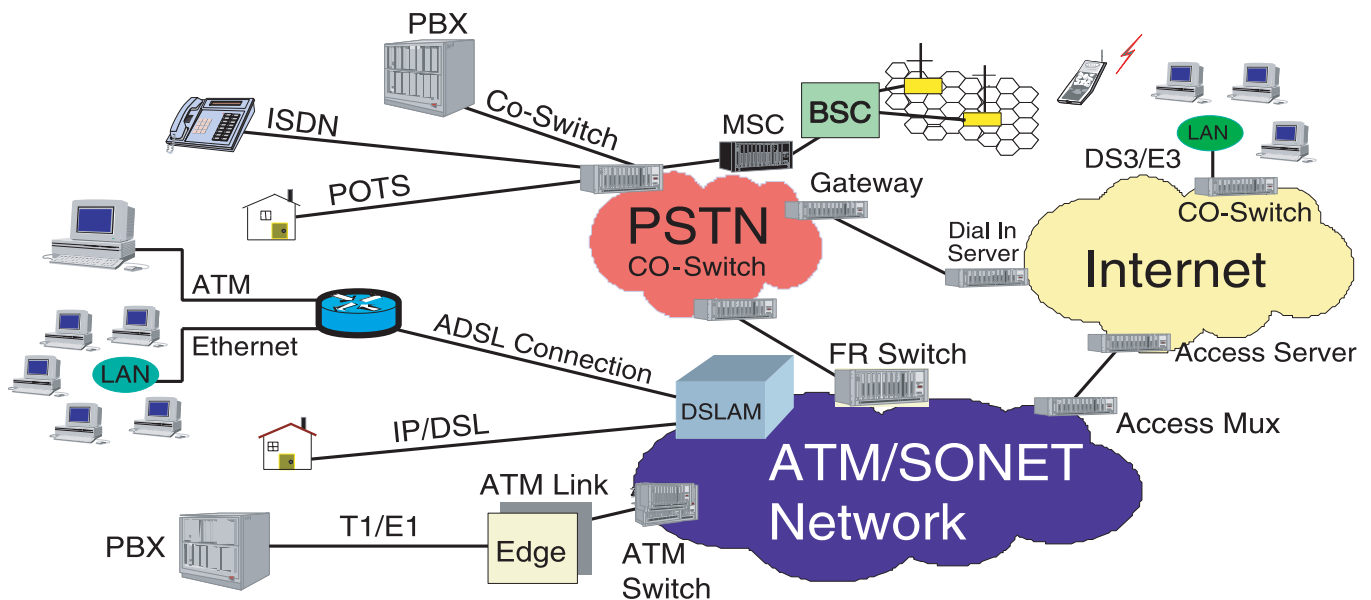
T/E/J Solutions for Today's Market

For T/E/J, Exar has built a reputation for creative, reliable products and design support including Analog Front Ends (AFEs), LIUs, Framers and LIU/Framer Combos.

Applications

Exar's world-class physical layer solutions are ideal for a wide variety of markets and applications:

- Access Concentrators
- ATM and Frame Relay Switches
- Optical Switches
- DSLAMs

- Digital Cross Connects
- Multi-Service Provisioning Platforms (MSPP)
- Routers
- Wireless Base Stations

High-speed optical networks transport many T/E/J circuits, so multi-channel LIUs and framers are key to designing high-density, low-power and low-cost boards or line-cards.

T3/E3/STS-1 Solutions for Today's Market

Exar has built a reputation for offering innovative T3/E3/STS-1 products with many industry firsts, including the single-chip jitter attenuators, integrated LIU plus JA, and an integrated LIU plus SONET/SDH desynchronizer incorporating R3 (Relay-less, Reconfigurable Redundancy) Technology(TM). In addition to innovation, Exar is well known for outstanding product reliability and design support over a wide range of devices. Used individually or in chipsets, these devices are processing data in installed systems for some of the world's leading networking equipment manufacturers. In addition, Exar has a full complement of physical-layer solutions, from T/E/J to SONET applications.

Applications

Exar's T3/E3/STS-1 physical layer devices are critical compnents for varied applications.
- Access Equipment
- ATM, Wan & LAN Switches
- Multiplexers
- DSLAMs
- Digital Cross Connects
- Routers
- Wireless Base Stations

Higher performance is continually demanded by service providers from the same system, which requires proven multi-channel, highly-integrated devices. For the growing line-card/board replacement market, as well as emerging new equipment orders, you can design with confidence using customer-validated T3/E3/STS-1 Exar solutions.

Exar Technology Advantages

Exar offers many advantages to system designers. Key among these are features that provide flexibility in design, enable system reliability, reduce cost, and provide standards-compliant solutions.

R³ Technology™

R³ Technology™ means Reconfigurable, Relayless Redundancy. Designers can configure or reconfigure a card (board) in software without changing any external components.
- Reduces time-to-market/manufacturing costs
- Allows single Bill-of-Material (BOM) for worldwide applications

Innovative Features

Redundancy
Internal switches help to implement 1:1 or 1+1 redundancy without the need for any relays, which helps to reduce cost and board space while improving reliability.

Hot Swapping
Exar's LIUs not only support 1:1 or 1+1 redundancy, but also support hot swapping without relays.

Integrated Timing Generator for T3/E3/STS-1
An on-board timing circuit generates the appropriate T3, E3 or STS-1 clock from a single crystal. This again eliminates the need to change any components externally.

Design Flexibility
Choice of Host (software) or Hardware mode for interfacing and control provide design flexibility.

Extensive Diagnostic Capability
System users can quickly isolate a fault location, use alarms, and determine the nature of the fault.

Seamless Connections
No external glue logic is needed for interfacing with Exar's framers.
- Simplifies designing and debugging using Exar products
- Enables shorter time-to-market

Built-in Redundancy Capability found in T1/E1 LIUs and Combos
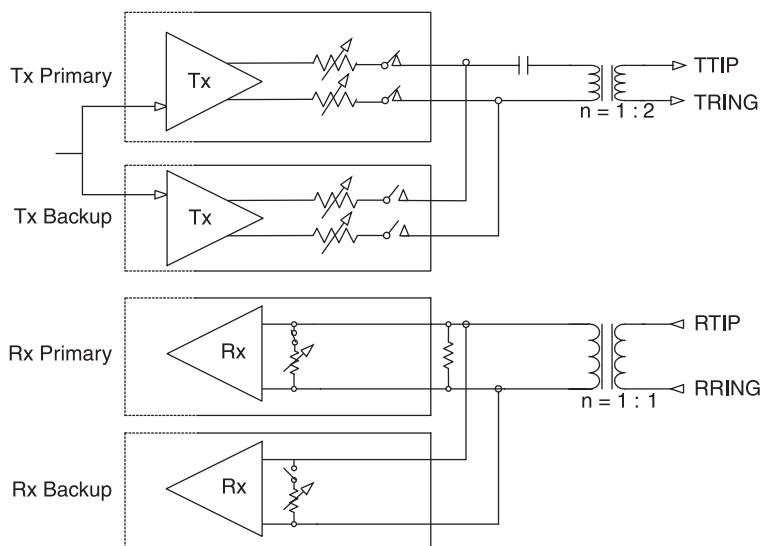
Product Overview

Line Interface Units (LIUs), Analog Front Ends (AFEs)

Exar's broad portfolio of LIUs is targetted at rapid design-ins for fast paced OEM product introductions.They span single-channel to 14-channel, long-haul (6000 ft.), and short-haul (655 ft. versions), plus many industry-first capabilities.

For the most cost-effective solution, Exar offers the widest range of one, four, seven, and 21 channel AFEs for E1 applications.

High-Performance Framers/LIU Combos Integrate State-of the-Art LIU Features with Advanced Framer Designs

Exar's Framer & LIU combo devices capitalize on proven functional elements and merge them into one highly-integrated solution. Exar offers a wide choice of T1 framing structures: D4, ESF, SLC,96, T1DM and N-frame (non-framing). For E1 applications, Common-Channel and Channel-Associated Signaling are supported in CRC Multi-frame and CAS Multi-frame formats. These options are software selectable.

The XRT86VL38 is an eight-channel 1.544 Mbit/s or 2.048 Mbit/s T1/E1/J1 framer and LIU integrated solution featuring R3 technology (Relayless, Reconfigurable, Redundancy). The physical interface is optimized with internal impedance, and with the patented pad structure, the XRT86VL38 provides protection from power failures and hot swapping.

The XRT86VL38 contains an integrated T1/E1/J1 framer and LIU which provide T1/E1/J1 framing and error accumulation in accordance with ANSI/ITU_T specifications. Each framer has its own framing synchronizer and transmit-receive slip buffers. The slip buffers can be independently enabled or disabled as required and can be configured to frame to the common T1/E1/J1 signal formats.

Each Framer block contains its own Transmit and Receive T1/E1/J1 Framing function. There are 3 Transmit HDLC controllers per channel which encapsulate contents of the Transmit HDLC buffers into LAPD Message frames. There are 3 Receive HDLC controllers per channel which extract the payload content of Receive LAPD Message frames from the incoming T1/E1/J1 data stream and write the contents into the Receive HDLC buffers. Each framer also contains a Transmit and Overhead Data Input port, which permits Data Link Terminal Equipment direct access to the outbound T1/E1/J1 frames. Likewise, a Receive Overhead output data port permits Data Link Terminal Equipment direct access to the Data Link bits of the inbound T1/E1/J1 frames.
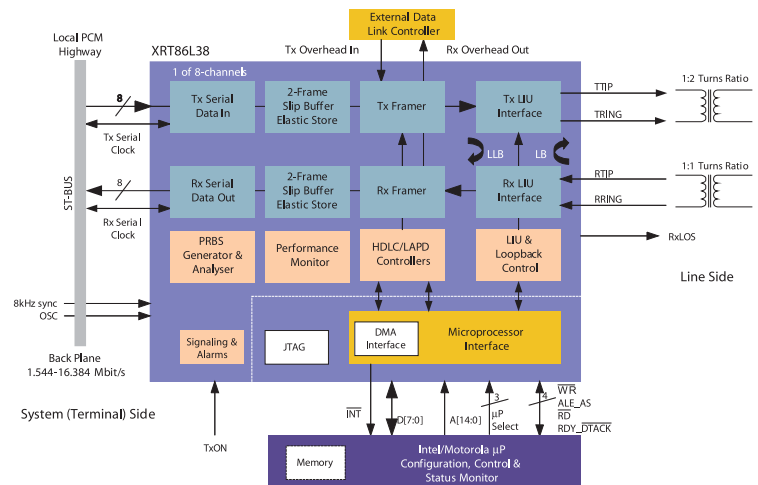
**Block Diagram of the XRT86VL38
8-Channel T1/E1 LUI + Framer**

XRT86SH328 (Voyager™) Integrated 28-Channel T1/E1 LIU/Framer with VT/TU Mapper and MI3 Multiplexer

The XRT86SH328 is an integrated VT/TU Mapper with 28/21 port T1/E1 Line Interface Units. The XRT86SH328 contains integrated T1/E1/J1 framers for performance monitoring.

The XRT86SH328 processes the section, line and path overhead in the SONET/SDH data-stream. The processing of path overhead bytes within the STS-1s or TUG-3s include 64 bytes of buffer for storing the section trace and path trace messages. Path overhead bytes can be accessed either by on-chip registers or a serial output port.

Each of the 28 T1 or 21 E1 channels use an internal De-Synchronizer circuit with a pointer leak algorithm. This removes the jitter due to mapping and pointer adjustments from the T1 or E1 signals that are de-mapped from the incoming SONET/SDH data-stream. These De-Synchronizer circuits do not need any external clock references for their operation.

**Application example using multiple
XRT86SH328 for SONET/SDH applications**
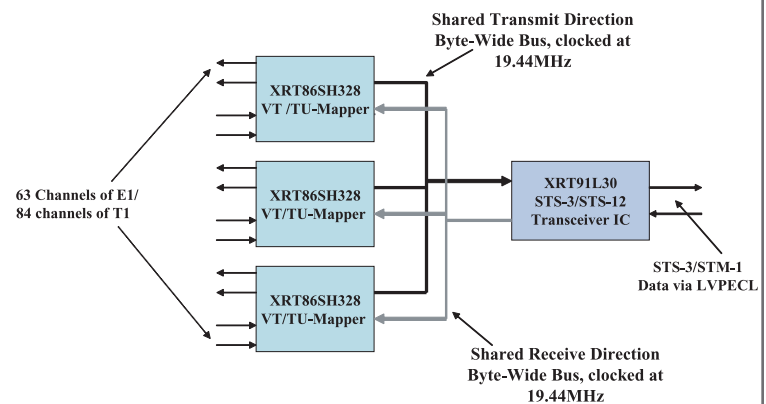
Communications :: T/E :: DS1/E1 LIUs

Part Number	Description	No. of Channels	Data Rate(s)	Clock Recovery	Short/Long Haul	Temp.	Operating Power Supply, Max Current	Package(s)
XRT5683A	PCM Line Interface Chip	1	T1, E1, T2, E2	✓ with Tank Ckt	S	I	5V ±5%, 40mA	PDIP-18, SOIP-18
XRT56L85	Low Power PCM Line Interface	1	E1	✓ with Tank Ckt	S	I	5V ±5%, 16mA	SOIC-18, CDIP-18
XRT5793	Quad E1 Line Interface Unit (LIU)	4	E1		S	I	5V ±5%, and −5V 5%, 68mA	TQFP-80, PLCC-68
XRT5794	Quad E1 LIU	4	E1		S	I	5V ±5%, and −5V 5%, 68mA	TQFP-80, PLCC-68
XRT5894	4-Ch E1 LIU (3.3V or 5.0V)	4	E1		S	I	3.3V, 5V ±5%, 210mA	TQFP-64
XRT5897	7-Ch E1 LIU	7	E1		S	I	3.3V ±5%, 340mA	TQFP-100
XRT5997	7-Ch E1 LIU	7	E1		S	I	3.3V ±5%, 175mA	TQFP-100
XRT59L91	Single Chip E1 LIU	1	E1		S	I	3.3V ±5%, 56mA	SOIC-16
XRT59L921	21-Ch E1 LIU	21	2.048 Mbps		S	I	3.3V/300ma	STBGA-316
XRT81L27	7-Ch E1 LIU with Clock Recovery	7	E1	✓	S	I	3.3V ±5%, 55mA	TQFP-128
XRT82D20	1-Ch E1 LIU	1	E1	✓	S	I	3.3V ±5%, 58mA	SOJ-28
XRT82L24A	4-Ch E1 Line Transceiver with Clock Recovery and Jitter Attenuator (JA)	4	E1	✓	S	I	3.3V, ±5%. 228mA	TQFP-100
XRT83D10	1-Ch DS1/CEPT LIU	1	E1	✓	n/a	I	3V ±5%, 5V ±5%	SOJ-28
XRT83L30	1-Ch T1/E1/J1 Long Haul Short Haul LIU	1	T1/E1/J1	✓	S/L	I	3.3V ±5%, TBD	PQFP-64
XRT83L314	14-Ch T1/E1/J1 Long Haul Short Haul LIU	14	T1/E1/J1	✓	S/L	I	3.3V ±5%	BGA-304
XRT83L34	4-Ch T1/E1/J1 Long Haul Short Haul LIU	4	T1/E1/J1	✓	S/L	I	3.3V ±5%, TBD	TQFP-128
XRT83L38	8-Ch T1/E1/J1 Long Haul Short Haul LIU	8	T1/E1/J1	✓	S/L	I	3.3V ±5%, TBD	TQFP-208
XRT83SH314	14-Ch T1/E1/J1 Short Haul LIU	14	T1/E1/J1	✓	S	I	3.3V ±5%, TBD	TBGA-304
XRT83SH38	8-Ch T1/E1/J1 Short Haul LIU	8	T1/E1/J1	✓	S	I	3.3V ±5%, TBD	BGA-225
XRT83SL216	16-Ch E1 Short Haul LIU	16	E1	✓	S	I	3.3V ±5%	BGA-289
XRT83SL28	8-Ch E1 Short Haul LIU	8	E1	✓	S	I	3.3V ±5%, TBD	TQFP-144
XRT83SL30	1-Ch T1/E1/J1 Short Haul Transceiver with Clock Recovery and JA	1	T1/E1/J1	✓	S	I	3.3V ±5%, TBD	TQFP-64
XRT83SL314	14-Ch T1/E1/J1 LIU	14	T1/E1/J1	✓	S	I	3.3V ±5%	BGA-304
XRT83SL34	Multi-Channel T1/E1/J1 LIU	4	T1/E1/J1	✓	S	I	3.3V ±5%, TBD	TQFP-128
XRT83SL38	Multi-Channel T1/E1/J1 LIU	8	T1/E1/J1	✓	S	I	3.3V ±5%, TBD	TQFP-208
XRT83VSH28	8-Ch E1 Short Haul LIU	8	E1	✓	S	I	3.3V ±5%, TBD	BGA-225
XRT83VSH314	14-Ch T1/E1/J1 Short Haul LIU	14	1.5 Mbps, 2 Mbps	✓	S	I	3.3V/1.8V,1 A	PBGA-304
XRT83VSH316	16-Ch T1/E1/J1 Short Haul LIU	16	T1 1.544MHz, E1 2.048MHz	✓	S	I	3.3V/1.8V with 5v tolerant	STBGA-316
XRT83VSH38	8-Ch T1/E1/J1 Short Haul LIU	8	T1/E1/J1	✓	S	I	3.3V, ±5%.TBD	BGA-225

Communications :: T/E :: DS1/E1 Framer Combos

Part Number	Description	No. of Channels	Data Rate(s)	Clock Recovery	Short/Long Haul	Temp.	Operating Power Supply, Max Current	Package(s)
XRT84L38	Octal T1/E1/J1 Framer	8	T1/E1	no	n/a	I	3.3V, ±5%, 450 mA	BGA-388
XRT86L30	Single T1/E1/J1 Framer/LIU Combo	8	T1/E1/J1	✓	S/L	I	3.3V +/-5%	TQFP-128
XRT86VL32	Dual T1/E1/J1 Framer/LIU Combo	2	T1/E1/J1	✓	S/L	I	3.3V +/-5%	BGA-225
XRT86VL34	Quad T1/E1/J1 Framer/LIU Combo	4	T1/E1/J1	✓	S/L	I	3.3V +/-5%	BGA-225
XRT86VL38	Octal T1/E1/J1 Framer/LIU Combo	8	T1/E1/J1	✓	S/L	I	3.3V +/-5%	BGA-484

Communications :: T/E :: DS3/E3 LIUs

Part Number	Description	No. of Channels	Data Rate(s)	Clock Recovery	Short/Long Haul	Temp.	Operating Power Supply, Max Current	Package(s)
XRT71D00	Single-Chip Jitter Attenuator for High-Speed DS3/E3 WANs	1	DS3, E3	✓	n/a	I	3V, 5V, ±5%	TQFP-32
XRT71D03	DS3/E3 Jitter Attenuator	3	DS3, E3, STS-1	✓	n/a	I	3V, 5V, ±5%	TQFP-64
XRT71D04	DS3/E3 Jitter Attenuator	4	DS3, E3, STS-1	✓	n/a	I	3V, 5V, ±5%	TQFP-80
XRT7295AE	DS3/STS-1 Integrated Line Receiver	1	E3	✓	n/a	I	5V ±5%, 106mA	SOJ-20, PDIP-20
XRT7295AT	DS3/STS-1 Integrated Line Receiver	1	DS3/STS-1		n/a	I	5V ±5%, 106mA	SOJ-20, PDIP-20
XRT7296	DS3/STS-1/E3 Integrated Line Transmitter	1	DS3, E3, SONET, STS-1		n/a	I	5V ±5%, 133mA	SOJ-28, PDIP-28
XRT7298	DS2/STS-1 E3 Integrated Line Transmitter	1	DS3, E3, SONET, STS-1	✓	n/a	I	5V ±5%, 133mA	SOJ-28, PDIP-28
XRT7300	DS3/E3/STS-1 Line Interface Unit (LIU)	1	DS3, E3, SONET, STS-1	✓	n/a	I	5V ±5%	TQFP-44
XRT73L02M	2-Ch DS3/E3/STS-1 LIU	2	DS3, E3, SONET, STS-1	✓	n/a	I	5V ±5%	TQFP-80
XRT73L03B	3-Ch E3/DS3/STS-1 LIU	3	DS3, E3, SONET, STS-1	✓	n/a	I	3V	TQFP-120
XRT73L04B	4-Ch DS3/E3/STS-1 LIU	4	DS3, E3, SONET, STS-1	✓	n/a	I	3V	TQFP-144
XRT73L06	6-Ch DS3/E3/STS-1 LIU	6	DS3, E3, SONET, STS-1	✓	n/a	I	3V	BGA-217
XRT73LC00A	DS3/E3/STS-1 LIU	1	DS3, E3, SONET, STS-1	✓	n/a	I	3V ±5%	TQFP-44
XRT73LC03A	3-Ch DS3/E3/STS-1 LIU	3	DS3, E3, SONET, STS-1	✓	n/a	I	3V	TQFP-120

Communications :: T/E :: DS3/E3 LIUs

Part Number	Description	No. of Channels	Data Rate(s)	Clock Recovery	Short/Long Haul	Temp.	Operating Power Supply, Max Current	Package(s)
XRT73LC04A	4-Ch DS3/E3/STS-1 LIU	4	DS3, E3, SONET, STS-1	✓	n/a	I	3V	TQFP-144
XRT73R06	6-Ch DS3/E3 LIU with R³ Technology™	6	DS3, E3, SONET, STS-1	✓	n/a	I	3V ±5%	BGA-217
XRT73R12	12-Ch LIU	12	DS3, E3, SONET, STS-1	✓	n/a	I	3V ±5%	TBGA-420
XRT75L00	Single Chip LIU with Jitter Attenuator (JA) for DS3/E3 Environments	1	DS3, E3, STS-1	✓	n/a	I	3V ±5%	TQFP-52
XRT75L00D	Single Chip Desynchronizer & JA for Mapping/Demapping between SONET/SDH & DS3/E3 Environments	1	DS3, E3, STS-1	✓	n/a	I	3V ±5%	TQFP-52
XRT75L02	2-Ch E3/DS3/STS-1 LIU with JA	2	DS3, E3, STS-1	✓	n/a	I	3V ±5%	TQFP-100
XRT75L02D	2-Ch E3/DS3/STS-1 LIU with SONET Desynchronizer	2	DS3, E3, STS-1	✓	n/a	I	3V ±5%	TQFP-128
XRT75L03	3-Ch DS3/E3/STS-1 LIU with Jitter Attenuator	3	DS3, E3, STS-1	✓	n/a	I	3V ±5%	TQFP-128
XRT75L03D	3-Ch E3/DS3/STS-1 LIU with SONET Desynchronizer	3	DS3, E3, STS-1	✓	n/a	I	3V ±5%	TQFP-120
XRT75L04	4-Ch E3/DS3/STS-1 LIU with Jitter Attenuator	4	DS3, E3, STS-1	✓	n/a	I	3V ±5%	TQFP-176
XRT75L04D	4-Ch DS3/E3/STS-1 LIU with SONET Desynchronizer	4	DS3, E3, STS-1	✓	n/a	I	3V ±5%	TQFP-176
XRT75L06	6-Ch DS3/E3/STS-1 LIU with Jitter Attenuator	6	DS3, E3, STS-1	✓	n/a	I	3V ±5%	BGA-217
XRT75L06D	6-Ch DS3/E3/STS-1 LIU with SONET Desynchronizer	6	DS3, E3, STS-1	✓	n/a	I	3V ±5%	BGA-217
XRT75R03	Multi-Channel LIU Family Desynchronizer and JA with with R³ Technology™	3	DS3, E3, STS-1	✓	n/a	I	3V ±5%	TQFP-128
XRT75R03D	Multi-Channel LIU Family Desynchronizer and JA with with R³ Technology™	3	DS3, E3, STS-1	✓	n/a	I	3V ±5%	TQFP-128
XRT75R06	6-Ch DS3/E3 LIU with JA with with R³ Technology™	6	DS3, E3, STS-1	✓	n/a	I	3V ±5%	BGA-217
XRT75R06D	6-Ch DS3/E3 LIU with JA, SONET Desynchronizer and with R³ Technology™	6	DS3, E3, STS-1	✓	n/a	I	3V ±5%	BGA-217
XRT75R12	Multi-Channel LIU Family Desynchronizer and JA with with R³ Technology™	12	DS3, E3, STS-1	✓	n/a	I	3V ±5%	TBGA-420
XRT75R12D	Multi-Channel LIU Family Desynchronizer and JA with with R³ Technology™	12	DS3/E3/STS-1	✓	n/a	I	3V ±5%	TBGA-420
XRT75VL00	E3/DS3/STS-1 LIU with JA	1	E3/DS3/STS-1	✓	n/a	I	3V ±5%	TQFP-52
XRT75VL00D	E3/DS3/STS-1 LIU with SONET Desynchronizer	1	E3/DS3/STS-1	✓	n/a	I	3V ±5%	TQFP-52

Communications :: T/E :: DS3/E3 Framer Combos

Part Number	Description	No. of Channels	Data Rate(s)	Temp.	Operating Power Supply, Max Current	Package(s)
XRT7250	DS3/E3 Framer IC	1	DS3, E3	I	3V ±5%	PQFP-100
XRT72L50	1-Ch DS3/E3 Framer IC with HDLC Controller	1	DS3, E3	I	3V ±5%	PQFP-100
XRT72L52	2-Ch DS3/E3 Framer IC with HDLC Controller	2	DS3, E3	I	3V ±5%	PQFP-100
XRT72L53	3-Ch DS3/E3 Framer	3	DS3, E3	I	3V ±5%	PQFP-100
XRT72L54	4-Ch DS3/E3 Framer IC	4	DS3, E3	I	3V ±5%	BGA-272
XRT72L56	6-Ch DS3/E3 Framer IC	6	DS3, E3	I	3V ±5%	BGA-388
XRT72L58	8-Ch DS3/E3 Framer IC	8	DS3, E3	I	3V ±5%	BGA-388
XRT72L71	Single Chip, 1-Ch ATM UNIs for DS3 ATM	1	DS3	I	3.3V, 5.0V ±10%	PQFP-160
XRT74L73	3-Ch ATM UNI/PPP DS3/E3 Framing Controller	3	DS3/E3 UNI/PPP	I	3.3V	PBGA-388
XRT74L74	4-Ch ATM UNI/PPP DS3/E3 Framing Controller	4	DS3/E3 UNI/PPP	I	3.3V	PBGA-388
XRT79L71	1-Ch DS3/E3 ATM UNI/PPP	1	DS3/E3 UNI/PPP	I	3.3V	PBGA-208
XRT79L72	2-Ch DS3/E3 ATM UNI/PPP with Jitter Attenuator	2	DS3/E3 UNI/PPP	I	3.3V, 5V	PBGA-456
XRT79L73	3-Ch DS3/E3 ATM UNI/PPP with Jitter Attenuator	3	DS3/E3 UNI/PPP	I	3.3V, 5V	PBGA-456
XRT79L74	4-Ch DS3/E3 ATM UNI/PPP with Jitter Attenuator	4	DS3/E3 UNI/PPP	I	3.3V, 5V	PBGA-456

Communications :: T/E ::Data Transceivers :: Network Interface Products - V.35 Interfaces

Part Number	Description	No. of V.35 Rec.	No. of V.35 Trans.	Loop-back	RCV V.11	Supplies	Max Speed	XMT Disable	Disable	Max P PCon. (mW).	Max Shutdown Current	Temp.	Package(s)
XRT3588	V.35 Interface Receiver/ Transmitter	n/a	3	n/a	n/a	+5, −5	10 Mbps	✓	n/a	1280mW	10.2mA	C	PDIP-18, CDIP-18
XRT3589	V.35 Interface Receiver/ Transmitter	3	n/a	n/a	n/a	+5, −5	10 Mbps	n/a	✓	345mW	1mA	C	CDIP-14
XRT3590	Single Chip V.35 Transceiver	3	3	✓	✓	+5, −5	20 Mbps	✓	✓	600mW	300µA	I	CDIP-14
XRT3591B	Single Chip V.35 Transceiver	3	3	✓	✓	+5, −5	20 Mbps	✓	✓	600mW	300µA	I	PDIP-24, SOIC-24

Communications :: T/E :: Data Transceivers :: Network Interface Products - V.35 Interfaces

Part Number	Description	No. of Channels	Data Rate(s)	Clock Recovery	Short/ Long Haul	Temp.	Operating Power Supply, Max Current	Package(s)
XRT6164	Digital Line Interface Transceiver	1	64Kbps, E1		S	C	5V ±5%, 26.5mA	PDIP-24, SOIC-24
XRT6164A	Digital Line Interface Transceiver	1	64Kbps, E1		S	C	5V ±5%, 26.5mA	PDIP-16, SOIC-16
XRT6165	Codirectional Digital Data Processor	1	64Kbps, E1	✓	n/a	I	5V ±10%, 2mA	PDIP-16, SOIC-16
XRT6166	Codirectional Digital Data Processor	1	64Kbps, E1	✓	n/a	I	5V ±10%, 2mA	PDIP-22, SOIC-24

Communications :: T/E :: DS1/E1 & DS3/E3 Timing ICs :: General Purpose Clock Generators/Multipliers

Part Number	Description	Input Frequency Range	Output Frequency Range	Package(s)
ST49C101A	Preprogrammed High Speed Frequency Multiplier	12-30MHz	25-200MHz	SOIC-8

Communications :: T/E :: DS1/E1 & DS3/E3 Timing ICs :: Phase Lock Loop (PLL)

Part Number	Description	Frequency	Supply Voltage	Package(s)
XR215A	Monolithic Phase-Locked Loop (PLL)	0.5Hz to 25MHz	5V to 26V	SOIC-16, PDIP-16
XR2212	Precision Phase-Locked Loop (PLL)	0.01Hz to 300KHz	4.5V to 20V	CDIP-16, PDIP-16

Communications :: T/E :: DS1/E1 & DS3/E3 Timing ICs :: SONET Clock Generators

Part Number	Description	Multiplication Ratio	Power Supply	Package(s)
XRT8010	350MHz Clock & Crystal Multiplier with LVDS Outputs	8, 16	3.3V	QFN-16
XRT8020	650 MHz High-Speed Clock Synthesizer	8, 16, 32	3.3V	QFN-16
XRT85L61	BITS (Building Integrated Timing Supply) Clock Extractor	N/A	3.3V	TSSOP-28

Communications :: T/E :: DS1/E1 & DS3/E3 Timing ICs :: Voltage Controled Oscillator (VCO)

Part Number	Description	Frequency	Supply Voltage	Package(s)v
XR2207	Voltage Controled Oscilator (VCO)	0.01Hz to 1MHz	4V to 13V	CDIP-14, PDIP-14, SOIC-16
XR2209	Voltage Controled Oscilator (VCO)	0.01Hz to 1MHz	4V to 13V	CDIP-8, PDIP-8

Communications :: T/E :: DS1/E1 & DS3/E3 Timing ICs :: Voltage to Frequency Convertor

Part Number	Description	Internal Power Dissipation	Supply Voltage	Package(s)
XR4151	Voltage to Frequency Convertor	500mW	8V to 22V	PDIP-8, SOIC-8

Communications :: T/E :: DS1/E1 & DS3/E3 Timing ICs :: WAN Clocks

Part Number	Description	Multiplication Ratio	Power Supply	No. of PLLs	Input Frequency Range	Output Frequency Range	Temp.	Operating Power Supply, Max Current	Package(s)
XRT8000	WAN Clock	N/A	N/A	2	8kHz to 32,768kHz	150Hz to 2,048kHz	I	5.0V, 3.3V	PDIP-18, SOIC-18
XRT8001	WAN Clock	N/A	N/A	2	8kHz to 32,768kHz	56kHz to 16,384kHz	I	5.0V, 3.3V	PDIP-18, SOIC-18

Communications :: T/E :: General Purpose Timing Products :: Function/Waveform Generators

Part Number	Description	Sweep Range	Supply Voltage	Package(s)
XR2206	Monolithic Function Generator	2000:1	10V to 26V	PDIP-16, CDIP-16, SOIC-16

Communications :: SONET/SDH :: OC-3 to OC-192 Multi-Rate Framers & Mappers

Part Number	Description	Data Rate	Protocols	Transceiver I/F	System Bus I/F	Power Supply	Package(s)
PEB1756E	Tethys™ 448 16 STS-48/STM-16 MUX/DE-MUX	16x OC-48, 16x OC-12, 16x OC-3	N/A	Serial 2.5 Gbps; Serial 622 Mbps	N/A	3.3V/1.2V	CBGA-1397
PEB1757E	Tethys™ 4192 QUAD STS-192/STM-64 MUX/DEMUX	4x OC-192, 16x OC-12	N/A	SFI-4.2/SFI-4.1	N/A	3.3V/1.2V	CBGA-1397
XRT86SH221	SDH-to-PDH Framer/Mapper with Integrated 21-Channel E1 SH	2.048MHz-19MHz	SONET, SDH, E1	19MHz	Parallel	3.3V/1.8V	PBGA-388
XRT86SH328	Integrated 28-Channel T1/E1 LIU/Framer, VT/TU Mapper and M13 Multiplexer	1x STS-1	SONET/ SDH	n/a	n/a	3.3V/1.8V	BGA-568

Communications :: T/E :: DS1/E1 & DS3/E3 SONET/SDH Mappers

Part Number	Description	Protocols	Data Rate(s)	Transceiver Bus I/F	System Bus I/F	Power Supply	Operating Power Supply, Max Current	Package(s)
XRT86SH328	Integrated 28-Channel T1/E1 LIU/Framer, VT/TU Mapper and M13 Multiplexer	SONET/ SDH	1x STS-1	n/a	n/a	3.3V/ 1.8V	n/a	PBGA-388
XRT86SH221	SDH-to-PDH Framer/Mapper with Integrated 21-Channel E1 SH	SONET, SDH, E1	2.048MHz 19MHz	19MHz	Parallel	3.3V/ 1.8V	n/a	BGA-568
XRT94L31	3-Channel DS3/E3/STS-1 to STS-3/ STM-1 Mapper	SONET/ SDH	1x OC-3	n/a	n/a	3.3V	n/a	TBGA-504
XRT94L33	Multi-Channel, Multi-Function Device Aggregates 3 DS3/E3/STS-1 into OC3/STM-1	ATM, PPP	1x STS-3, 3x STM-1, 3x DS3/E3/STS-1	TBD	Utopia/ POS PHY	3.3V	n/a	PBGA-504
XRT94L43	SONET/SDH STS-12/STM-4 to E3/DS3/STS-1 Mapper/Demapper	n/a	1x OC-12, 4x OC-3, 12x DS3/E3/STS-1	8-Bit, 7.76MHz	n/a	2.5V	n/a	PBGA-516
XRT94L33	Multi-Channel, Multi-Function Device Aggregates 3 DS3/E3/STS-1 into OC3/STM-1	n/a	1x OC-12, 4x OC-3, 12x DS3/E3/STS-1	8-Bit, 77.76MHz	n/a	2.5V	n/a	PBGA-516

Communications :: SONET/SDH :: OC-3 to OC-192 Multi-Rate Framers & Mappers

Part Number	Description	Data Rate	Protocols	Transceiver I/F	System Bus I/F	Power Supply	Package(s)
PEB1756E	Tethys™ 448 16 STS-48/STM-16 MUX/ DEMUX	16x OC-48, 16x OC-12, 16x OC-3	N/A	Serial 2.5 Gbps; Serial 622 Mbps	N/A	3.3V/1.2V	CBGA-1397
PEB1757E	Tethys™ 4192 QUAD STS-192/STM-64 MUX/DEMUX	4x OC-192, 16x OC-12	N/A	SFI-4.2/SFI-4.1	N/A	3.3V/1.2V	CBGA-1397
XRT86SH221	SDH-to-PDH Framer/Mapper with Integrated 21-Channel E1 SH	2.048MHz-19MHz	SONET, SDH, E1	19MHz	Parallel	3.3V/1.8V	PBGA-388
XRT86SH328	Integrated 28-Channel T1/E1 LIU/Framer, VT/TU Mapper and M13 Multiplexer	1x STS-1	SONET/SDH	n/a	n/a	3.3V/1.8V	BGA-568

Communications :: SONET/SDH :: OC-48/OC-12/OC-3 Transceivers

Part Number	Description	Data Rate	Protocols	Transceiver I/F	System Bus I/F	Power Supply	Package(s)
XRT91L30	STS-12/STM-4 OR STS-3/STM-1 SONET/ SDH Transceiver	1xOC-12, 1xOC-3, 1xSTM-4, 1xSTM-1	ATM, POS	TBD	n/a	3.3V with 3.3V I/O	PQFP-64
XRT91L31	3-Channel DS3/E3/STS-1 to STS-3/STM-1 Mapper	1x STS-1	SONET/SDH	n/a	n/a	3.3V/1.8V	BGA-568
XRT91L32	STS-12/STM-4 or STS-3/STM-1 SONET/ SDH Transceiver	1x OC-3	SONET/SDH	8-Bit TTL	n/a	3.3V	QFP-100
XRT91L34	Quad Channel Multirate STS-12/3/1 and STM-4/1/0 SONET/SDH CDR	STS-12/3/1, STM-4/1/0	SONET/SDH	TBD	n/a	1.8V with 3.3V I/O	LQFP-128
XRT91L80	OC-48/STM-16 SONET/SDH Transceiver (2.488/2.666 Gbps)	1xOC-48, 1xSTM-16	ATM, POS	TBD	n/a	1.8V with 3.3V I/O	STBGA-196
XRT91L82	2.488/2.666 GBPS STS-48/STM-16 SONET/SDH Transceiver	1xOC-48, 1xSTM-16	ATM, POS	TBD	n/a	1.8V with 3.3V I/O	STBGA-196

Communications :: SONET/SDH Products

Exar Advantages

Why Exar?

We offer countless advantages to SONET/SDH system designers through integrated and innovative products. Key among these are products that enable higher levels of integration, superior jitter performance and lowered system cost for today's, and next-generation SONET/SDH networks.

Higher Levels of Integration and Functionality

Exar's expertise combined with cost-effective CMOS processes enable higher levels of integration. In addition to multiple channels, Exar can also incorporate critical functionality. CDR (Clock Data Recovery) with SONET/SDH framing is one example where value is added through integration.

Superior Jitter Performance

Exar delivers market-proven solutions to one of the most complicated challenges modern network equipment designers face: jitter - the accumulation of errors and noise introduced into transmitted data when it moves from one end of a system to another.

Exar utilizes functional blocks (timing control, phase lock loop, etc.) that accept recovered clock and data signals where they are applied to the jitter attenuator Phase Lock Loop (PLL). The PLL tracks and regenerates the recovered clock signal with significantly less jitter, and the smoothed clock signal is routed back to the network. Exar's products exceed the strictest requirements defined for telecommunications (Telecordia and ITU) standards.

Desynchronization

Exar developed the industry's first monolithic desynchronization solution, which addresses mapping/demapping data from SONET/SDH (synchronous) to DS3/E3 (asynchronous) networking environments. This function is used for clock smoothing and removes jitter due to mapping and pointer movements. It is accomplished without the need for an external crystal oscillator.

APS (Automatic Protection Switching)

How can you quickly recover from a line or equipment failure condition? Easily if you leverage Exar's on-chip or line equipment APS interfaces. They can restore important services in less than 50 ms and do so with minimal, or no additional external components. Exar's mapper devices can also recover DS3 frequency in less than 3ms during an APS event.

Finding Faults

Employing a full suite of loop-backs, Exar devices can quickly identify a fault location, invoke a complete set of alarms, and easily determine the fault type for the network operator. This detection and diagnostic capability is critical to reliable data transmission. Exar's SONET/SDH products have the appropriate loop-backs for each function providing designers with a built-in solution for the network layer.
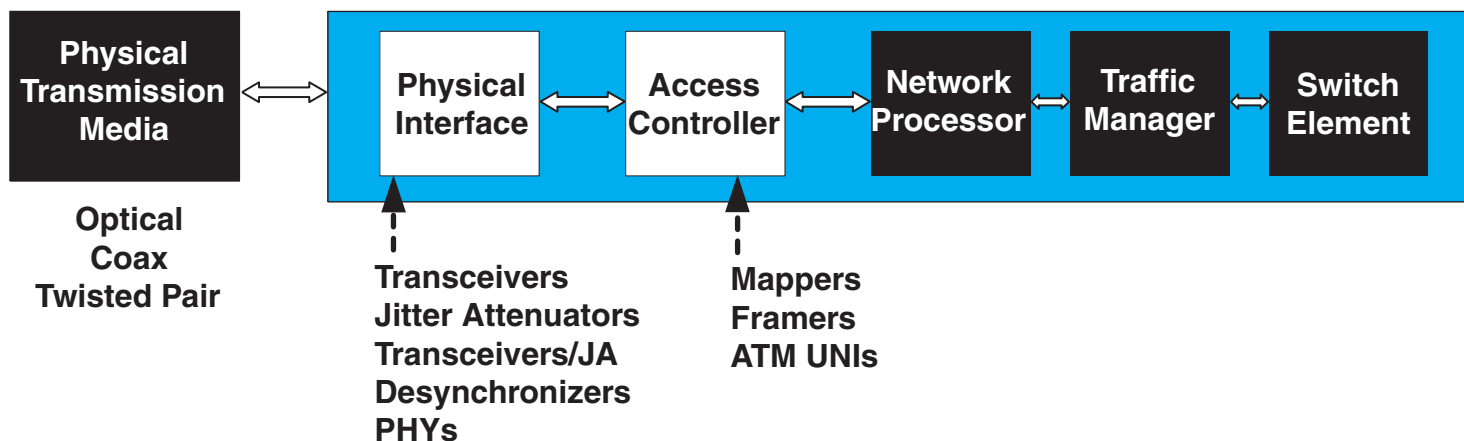
Clock Synthesis

Exar's SONET/SDH products enable an efficient and cost effective approach to synthesizing higher-rate clocks from lower-rate clocks. Synthesizing clocks up to 10 GHz from either 19.44 MHz, 38.88 MHz, 51.84 MHz or 77.76 MHz clocks provide the system designer more flexibility to use a common clock source and at the same time reduce overall system cost.

Software Support

Exar provides a full set of device driver software for all of its SONET/SDH products. The device driver software for Exar's SONET/SDH devices consist of a concise set of API (Application Programming Interface) calls. These API function calls enable software engineers to circumvent the complex configuration details of Exar's SONET/SDH devices and permit them to focus on developing their network management software. These drivers substantially decrease the amount of time required for bringing up networking equipment during the development phase. They also provide an easy path for future upgrades.

Exar's device driver software for SONET/SDH products is fully tested and is operating system and processor independent. These device drivers (written in ANSI C) permits the user to compile and port this code very efficiently into their system software.

Typical Silicon Functions Found in High-Speed Communications Equipment

| Physical Transmission Media | Physical Interface | Access Controller | Network Processor | Traffic Manager | Switch Element |

Optical Coax Twisted Pair

Transceivers Jitter Attenuators Transceivers/JA Desynchronizers PHYs

Mappers Framers ATM UNIs

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