omnitron 4 Port T1/E1 MUX Managed Ethernet User Manual

Contents

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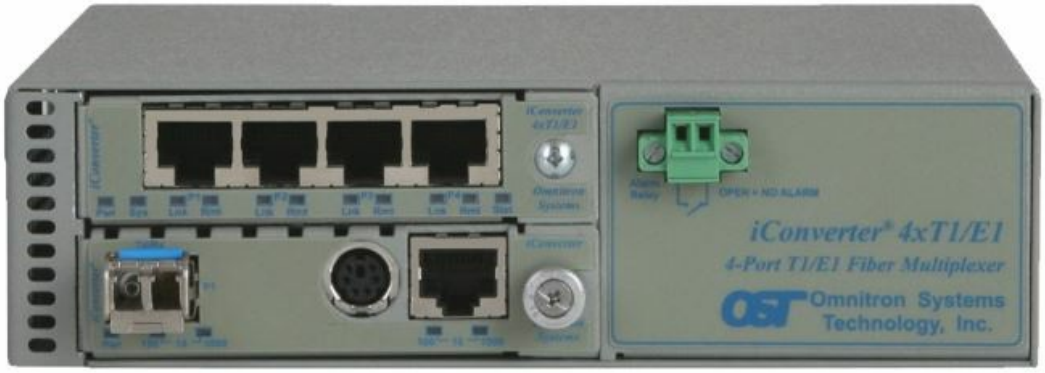


Product Overview

The 4 Port T1/E1 MUX modules support four copper RJ-48C ports for balanced T1/E1 applications and 4 E1 coax ports when used with external cabling. Model 8486- 4 features an external clock port that can be configured as a clock input or output. This User Manual is for product revision xx/20.
NOTE: All modules in the T1/E1 MUX grouping must be at the same firmware release to ensure proper operation and the fiber transport module should be at firmware release 4.2 or greater.
See full user manual for more detailed information. Registration is required.

DIP-Switches

DIP-Switch Bank 1

DIP-switches are located on the side of each T1/E1 MUX module. The DIP-switches are used to configure line codes, line build-out and different loopback and test conditions.
See the complete User Manual for detailed information on the loopback, test functions and management support

The location of the DIP-switches is shown in Figure

1. The functions of DIP-switch Bank 1 are outlined in Figure 2.

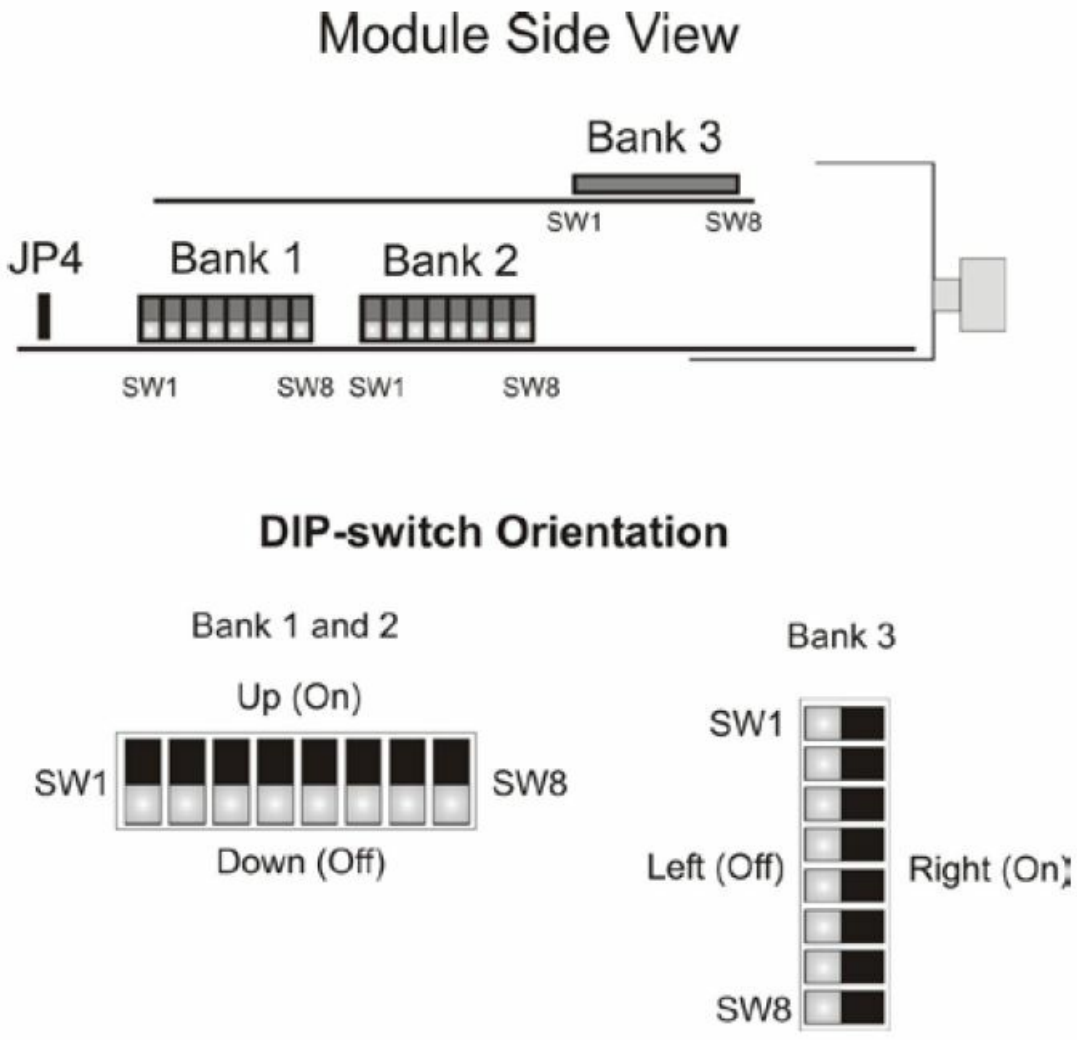


Figure 1: DIP-switch Location

SW1 – SW4: Local Loopback Port 1 – Port 4

When these DIP-switches are in the “On” position, the corresponding port initiates a local copper loopback. An AIS (all 1s signal) from the local port is transmitted across the fiber and out the corresponding T1/E1 port on the remote unit. When these DIP-switches are in the “Off” (default) position, the port functions normally. See the Modular T1/E1 Multiplexer User Manual for more information.

Switch	**Function**	**DOWN (Default)**	**UP**
SW1	Port 1 Local Loopback	Off	On
SW2	Port 2 Local Loopback	Off	On
SW3	Port 3 Local Loopback	Off	On
SW4	Port 4 Local Loopback	Off	On
SW5	Mode of Operation – T1 or E1	T1	E1
SW6	Line Build Out Settings		
SW7			
SW8			

SW5 – SW8: T1/E1 Line Configuration Settings
These DIP-switches configure the T1/E1 MUX modules for T1/E1 operation and the copper line build-out.

SW5	SW6	SW7	SW8	Description
Off	Off	Off	Off	T1 DSX-1: 0’ to 133’ (default)
Off	Off	Off	On	T1 DSX-1: 133’ to 266’
Off	Off	On	Off	T1 DSX-1: 266’ to 399’
Off	Off	On	On	T1 DSX-1: 399’ to 533’
Off	On	Off	Off	T1 DSX-1: 533’ to 655’
Off	Off	Off	Off	T1 DS1: 0dB
Off	On	Off	On	T1 DS1: -7.5dB
Off	On	On	Off	T1 DS1: -15dB
Off	On	On	On	T1 DS1: -22.5dB
On	Off	Off	Off	E1 75 W Coax/BNC Standard
On	Off	Off	On	E1 120 W RJ-45/48 Standard
On	Off	On	Off	E1 75 W Coax/BNC Extended/LH
On	Off	On	On	E1 120 W RJ-45/48 Extended/LH

DIP-Switch Bank 2

The functions of DIP-switch Bank 2 are outlined in Figure 4.

Switch	Function	Down (Default)	Up
SW1	Port 1 Alarm/LEDs Disable	Off	On
SW2	Port 2 Alarm/LEDs Disable	Off	On
SW3	Port 3 Alarm/LEDs Disable	Off	On
SW4	Port 4 Alarm/LEDs Disable	Off	On
SW5	Circuit Test	Off	On
SW6	Local Fiber Loopback	Off	On
SW7	Remote Fiber Loopback	Off	On
SW8	Line Code	B8ZS	AMI

SW1 – SW4: Port Alarm Relay/LED
These DIP-switches enable/disable the port alarm relay and LED functions for the corresponding port on the T1/E1 MUX module as shown in Figure 4. When these DIP-switches are in the “Off” position (default), the alarm relay and Link “Lnk” and Remote “Rmt” LEDs are enabled. When these DIP-switches are in the “On” position, the alarm relay, “Lnk” and “Rmt” LEDs are disabled.
Port Alarm Relay:
The port alarm relay will close when any of the following port alarm conditions are detected (i.e. alarm relay port 1 will activate when an alarm condition is detected on port 1).

- Power loss
- The detection of AIS or Loss of Signal (LoS) on any of the four local T1/E1 copper ports
- The detection of AIS or LoS on any of the four remote T1/E1 copper ports
- When the T1/E1 MUX is not peered with its remote partner

NOTE: The alarm relay uses pins 7 & 8 of port 1 on each T1/E1 MUX module. If more than one T1/E1 MUX module is installed, each alarm relay operates independently from the other modules. Use the optional breakout cable to access the alarm relay pins: part number 9142-1.

SW5: Circuit Test (C/T) Mode
When this DIP-switch is in the “Off” position (default), the Circuit Test Mode is disabled. When this DIP switch is in the “On” position, the Circuit Test Mode is enabled. Circuit Test Mode only needs to be enabled on one end for the test to initiate.
When Circuit Test mode is enabled, both T1/E1 MUX modules will transmit a known test pattern. The test pattern is received by the other unit and checked for errors. AIS is transmitted out all T1/E1 ports and incoming T1/E1 traffic is discarded. A solid green “Stat” LED indicates a successful test. See the Modular T1/ E1 Multiplexer User Manual for more information and description of each LED.

SW6: Local Fiber Loopback
When this DIP-switch is in the “Off” position (default), local fiber loopback is disabled. When this DIP-switch is in the “On” position, local fiber loopback is enabled on the MUX module. AIS is transmitted across the fiber and out all remote T1/E1 ports. Incoming T1/E1 traffic at the remote unit is discarded. See the Modular T1/E1 Multiplexer User Manual for more information.
NOTE: Only one loopback activation (Local Fiber Loopback or Remote Fiber Loopback) can be configured at the same time.

SW7: Remote Fiber Loopback
When this DIP-switch is in the “Off” position (default), remote fiber loopback is disabled. When this DIP-switch is in the “On” position, remote fiber loopback is enabled on the T1/E1 MUX module. In this mode, the local unit forces the remote T1/E1 MUX module into loopback. AIS is transmitted out all remote T1/E1 ports. Incoming T1/E1 traffic at the remote unit is discarded. See the Modular T1/E1 Multiplexer User Manual for more information.
NOTE: Only one loopback activation (Local Fiber Loopback or Remote Fiber Loopback) can be configured at the same time.

SW8: T1/E1 Line Codes
When this DIP-switch is in the “B8ZS” position (default), the MUX module is configured for B8ZS (T1) or HDB3 (E1) line coding. When the DIP-switch is in the “AMI” position, the MUX module is configured for AMI line coding.

DIP-Switch Bank 3

The functions of DIP-switch Bank 3 are outlined in Figure 5.

Switch	Function	Left (Default)	Right
SW1	Backplane Configuration	Auto	Manual
SW2	Backplane A	Disable	Enable
SW3	Backplane B	Disable	Enable
SW4	Payload LB Activation	Disable	Activated
SW5	Remote Fiber LB Override	Enable	Disable
SW6	Clock Timing Mode	Adaptive	Internal
SW7	Clock Termination	No Term	Term
SW8	On Board DIP-switch Control	Enable	Disable

SW1: Backplane Configuration
When this DIP-switch is in the Left “Auto” position (factory default), the Backplane Port of the T1/E1 MUX module automatically connects to adjacent T1/E1 MUX and TM3 modules creating a MUX group. When this DIP-switch is in the Right “Manual” position, the backplane port is forced on and Ethernet traffic is sent to and received from the backplane partner. When in “Auto” DIP-switches SW2 and SW3 are ignored. The recommended setting is “Auto”.

SW2 and SW3: Backplane
When these DIP-switches are in the Left “Disable” position and SW1 is set to “Manual”, the backplane is disabled. When these DIP-switches are in the Right ”Enable” position and SW1 is set to “Manual”, the backplane is

enabled. When SW1 is set to “Auto”, SW2 and SW3 are ignored.

SW4: Payload Loopback Activation
When this DIP-switch is in the Left “Disable” position, the ports will not respond to FAC2 NIU2/NIU5 loop-up and loop-down codes. When this DIP-switch is in the Right “Activate” position, the ports will respond to FAC2 NIU2/ NIU5 loop-up and loop-down codes.

SW5: Remote Fiber Loopback Override
When this DIP-switch is in the Left “Enable” position, the module will respond to the remote loopback request (DIP-switch BANK 2 SW7) from the remote T1/E1 MUX. When this DIP-switch is in the Right “Disable”, the module will not respond to the remote loopback request.

SW6: Clock Timing Mode
When this DIP-switch is in the Left “Adaptive” position, the module is set to line or adaptive clock timing mode. Line or adaptive clock mode is configured through management using Secondary Clock Mode soft-switch. Adaptive clock mode should be used at the remote end where the T1/E1 equipment uses loop timing (recovered clock). Line clock mode should be used at the head end where the T1/E1 equipment is clocked by an accurate source (Stratum 3 or better). When this DIP-switch is in the Right “Internal” position, the module is set to internal clock using an onboard clock oscillator. See the Modular T1/E1 Multiplexer User Manual for more information.

SW7: Clock Termination (For Model 8486-4 Only)
When this DIP-switch is in the Left “No Term” position, the module does not terminate to the Coax Clock I/O connector. When this DIP-switch is in the Right “Term” position, the module terminates the Coax Clock I/O connector with a 50 ohm termination.

SW8: On-Board DIP-switch Control
When this DIP-switch is in the Left “Enable” position, DIPswitch BANK 1 and DIP-switch BANK 2 are enabled and can be modified. When this DIP-switch is in the Right “Disable” position, DIP-switch BANK 1 and DIP-switch BANK 2 are disabled and will not accept modifications.
Jumper JP4 (For Model 8486-4 Only)

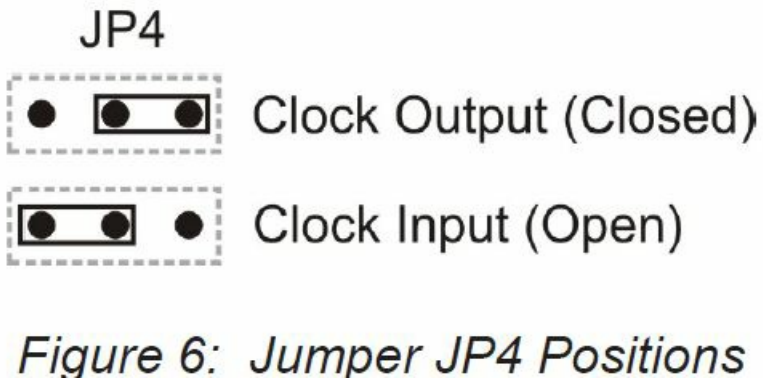


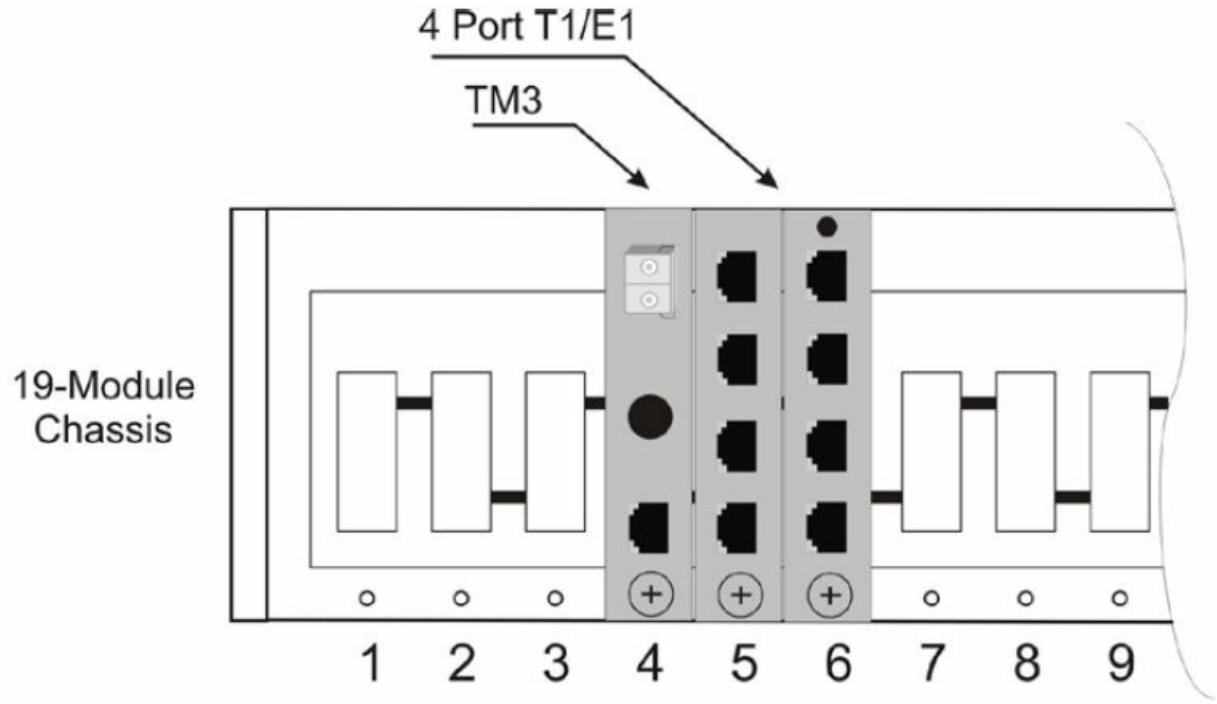
Figure 6: Jumper JP4 Positions

When JP4 is in the “Closed” position, the Coax Clock I/O connector is an output and the signal is the recovered transmission clock from Port 1. When JP4 is in the “Open position, the Coax Clock I/O connector is an input and the module uses the incoming clock signal. The input clock must match one of the acceptable clock signals to be used by the module; 10MHz, 1.544MHz or 2.048MHz (TTL).

Mounting and Cable Attachment

A TM3 Transport module and up to four contiguous 4 Port T1/E1 MUX modules combine to form a MUX group. A MUX group can connect with another MUX group at the opposite end of a dedicated fiber link. A MUX group can also interoperate with a Managed iConverter fixedconfiguration T1/E1 Multiplexer. Multiple MUX groups can be installed in a chassis, enabling high-density, star-topology deployments.
Caution: Use proper ESD protection to reduce the risk of damage to your equipment.

- **a)** Carefully slide the module into an open slot in the chassis. Align the module with the installation guides and ensure that the module is firmly seated against the backplane. Secure the module by fastening the front panel thumbscrew (push in and turn clockwise to tighten) to the chassis front. Verify the “Pwr” LED is ON (indicating the chassis is powered).
- **b)** The T1/E1 MUX modules must be installed in adjacent slots to the TM3 Transport module. The slot numbers must be greater then the slot number of the TM3 Transport module. Up to four T1/E1 MUX modules can be installed in adjacent slots.



4 Port T1/E1 MUX modules installed in adjacent slots with higher slot numbers than the TM3.

Figure 7: 19-Module Chassis Installation Example

Pin	Description	Signal
1	Customer Interface R1 – receive ring	C R1
2	Customer Interface T1 – receive tip	C T1
3, 6	Unused	
4	Customer Interface R – transmit ring	C R
5	Customer Interface T – transmit tip	C T
7	Alarm relay B (port 1 only)	AR_B
8	Alarm relay A (port 1 only)	AR_A

- **c)** Connect a Category 3 or better cable (Category 5 is recommended) to the RJ-48C connectors on the T1/E1 MUX module, and attach the other end of the UTP cable to the network equipment. The pinout for the RJ-48C is shown in Figure 8.
  NOTE: For some installations, a crossover cable may be required (Pin 1 to Pin 4, Pin 2 to Pin 5).
  d) When configured for E1 coax operation, use the optional adapter cables to convert the RJ-48C interface ports to dual BNC (part number 9140-3) and set the T1/ E1 Line Configuration DIP-switch for E1 75 W Coax.
  e) For Model 8486-4 only. Connect a coax cable with a female SMB connector to the Coax Clock I/O connector on the T1/E1 MUX module. Termination of the clock will be required via DIP-switch SW7 (23) or external termination using a “T” connector. To daisy chain multiple clock inputs, use a female BNC T connector. Only one termination on the cable is required at the end of the chain.

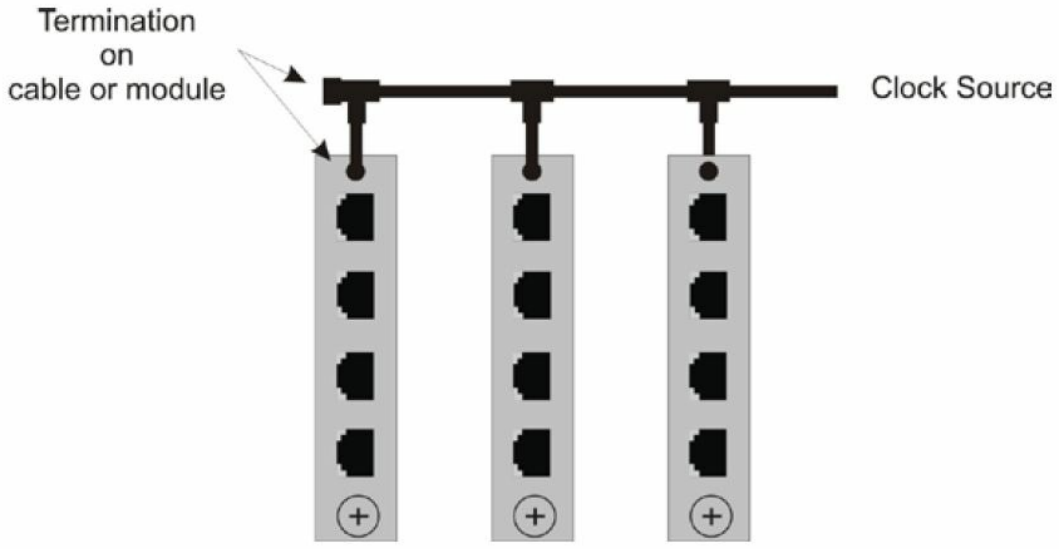


Figure 9: Daisy Chain Modules with Clock Termination

LED Indicators

LED	Color	Function
Sys	Green	**Green ON:** Normal remote system status **Green Blinking:** Testing in progress
Lnk	Green/ Amber	**OFF:** Loss of power or the Port Alarm Relay/LED switch is disabled **Green ON:** Local connected **Green Blinking:** Local T1/E1 port not connected **Amber ON:** Local port receiving AIS **Amber Blinking:** Local port in T1/E1 copper loopback mode
Rmt	Green/ Amber	**OFF:** Loss of power or the Port Alarm Relay/LED switch is disabled **Green ON:** Remote T1/E1 port connected **Green Blinking:** Remote T1/E1 port not connected or not synchronized **Amber ON:** Remote T1/E1 port connected but receiving LoS, AIS or port in local loopback
Stat	Green	**Green ON:** Normal remote system status **Green Blinking:** remote 4xT1/E1 MUX module has not synchronized with the local module
Lnk and Rmt all ports	Amber to Green	**Sequential Pattern (left to right):** MUX Initializing

The T1/E1 MUX operates in a bookend configuration. Each T1/E1 MUX must have the same physical configuration. During initialization, the MUX maps the modules and ports, creating a symmetrical pairing between the MUXes. Each T1/E1 MUX module has LEDs to indicate the status of the connection between the MUXes and the local and remote T1/E1 signals. The Sys LED (Local System Status) indicates the status of the local 4xT1/E1 MUX module. A solid green LED indicates normal system status. A blinking LED indicates different testing scenarios.

The Stat LED (Remote System Status) indicates the status of the remote 4xT1/E1 MUX module. A solid green LED indicates normal remote system status. A blinking green LED indicates the remote 4xT1/E1 MUX module has not synchronized with the local module or synchronization has started but not completed.

The Lnk LED (Local T1/E1 Link Status) indicates the local status of the T1/E1 signal. A solid green LED indicates a good T1/E1 signal is detected by the port. A blinking green LED indicates the port is not detecting the T1/E1 signal (a T1 crossover cable may be required). A solid yellow LED indicates the port is receiving an AIS signal. A blinking yellow LED indicates a test condition.

The Rmt LED (Remote T1/E1 Link Status) indicates the remote status of the T1/E1 signal. A solid green LED indicates a good T1/E1 signal is detected by the port. A blinking green LED indicates a synchronization problem. A solid yellow LED indicates the port is receiving an AIS signal or the port is in local loopback.

SPECIFICATIONS

Description	iConverter **4xT1/E1 MUX Module**	
StandardCompliances	ANSI: T1.403, T1.102 **AT&T**: T62411, ITU: G.703, G.704, G.706, G.736, G.775, G.823, G.824, G.8261 **ETSI:** ETS 300 166	
Regulatory Compliances	UL, CE, FCC Class A, NEBS 3 Compliant, UKCA	
Environmental	RoHS, WEEE, REACH	
Port Types	Copper:	T1/E1: RJ-48C
Cable Types	Copper:	EIA/TIA 568A/B, Cat 5 UTP and higher
DC Power Requirements	DC Input: (Backplane)	3.3VDC, 0.6A @ 3.3VDC
Dimensions W x D x H	0.85” x 4.5” x 2.8” (21.6 mm x 114.3 mm x 71.1 mm)	
Weight	8 oz. (226.8 grams)	
Temperature	Commercial: Wide: Storage:	0 to 50°C -40 to 60°C -40 to 80°C
Humidity	5 to 95% (non-condensing)	
Altitude	-100m to 4,000m	
MTBF (hrs)	410,000	
Warranty	Lifetime warranty and 24/7/365 free Technical Support	

iConverter 4xT1/E1 MUX Module with Clock

- **Input:** 10 MHz, 1.544 MHz, or 2.048 MHz
- **Output:** Recovered clock from Port 1
- **SMB Male Connector**, 50 ohms impedance
- **Signal level** is 3.3V TTL

General and Copyright Notice

Warranty

This product is warranted to the original purchaser (Buyer) against defects in material and workmanship for a period of two (2) years from the date of shipment. A lifetime warranty may be obtained by the original purchaser by registering this product at **www.omnitron-systems.com/support** within ninety (90) days from the date of shipment. During the warranty period, Omnitron will, at its option, repair or replace a product which is proven to be defective with the same product or with a product with at least the same functionality.

For warranty service, the product must be sent to an Omnitron designated facility, at Buyer's expense. Omnitron will pay the shipping charge to return the product to Buyer's designated US address using Omnitron's standard shipping method.

Limitation of Warranty
The foregoing warranty shall not apply to product malfunctions resulting from improper or inadequate use and/or maintenance of the equipment by Buyer, Buyer-supplied equipment, Buyer-supplied interfacing, unauthorized modifications or tampering with equipment (including removal of equipment cover by personnel not specifically authorized and certified by Omnitron), or misuse, or operating outside the environmental specification of the product (including but not limited to voltage, ambient temperature, radiation, unusual dust, etc.), or improper site preparation or maintenance. No other warranty is expressed or implied. Omnitron specifically disclaims the implied warranties of merchantability and fitness for any particular purpose. The remedies provided herein are the Buyer's sole and exclusive remedies. Omnitron shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any legal theory.

Environmental Notices

The equipment covered by this manual must be disposed of or recycled in accordance with the Waste Electrical and Electronic Equipment Directive (WEEE Directive) of the European Community directive 2012/19/EU on waste electrical and electronic equipment (WEEE) which, together with the RoHS Directive 2015/863/ EU, for electrical and electronic equipment sold in the EU after July 2019. Such disposal must follow national legislation for IT and Telecommunication equipment in accordance with the WEEE directive: (a) Do not dispose waste equipment with unsorted municipal and household waste. (b) Collect equipment waste separately. (c) Return equipment using collection method agreed with Omnitron. The equipment is marked with the WEEE symbol shown to indicate that

it must be collected separately from other types of waste. In case of small items the symbol may be printed only on the packaging or in the user manual. If you have questions regarding the correct disposal of equipment go to www.omnitonsystems.com/support or e-mail to Omnitron at intlinfo@omnitron-systems.com.

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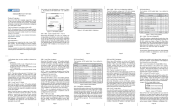
Safety Warnings and Cautions

- **ATTENTION:** Observe precautions for handling electrostatic discharge sensitive devices.
- **WARNING:** Potential damage to equipment and personal injury.
- **WARNING:** Risk of electrical shock.

Customer Support Information

- **Phone:** (949) 250-6510
- **Fax:** (949) 250-6514
- **Address:** Omnitron Systems Technology, Inc. 38 Tesla Irvine, CA 92618, USA
- **Email:** support@omnitron-systems.com
- **URL:** www.omnitron-systems.com

Documents / Resources

	omnitron 4 Port T1/E1 MUX Managed Ethernet [pdf] User Manual 4 Port T1 E1 MUX Managed Ethernet, 4 Port T1 E1, MUX Managed Ethernet, Managed Ethernet, Ethernet

References

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- Dual Media Converter | 2-Channel Gigabit Media Converter