

E1 HDSL REG HDSL Regenerator, NTU Powerable Installation and Maintenance

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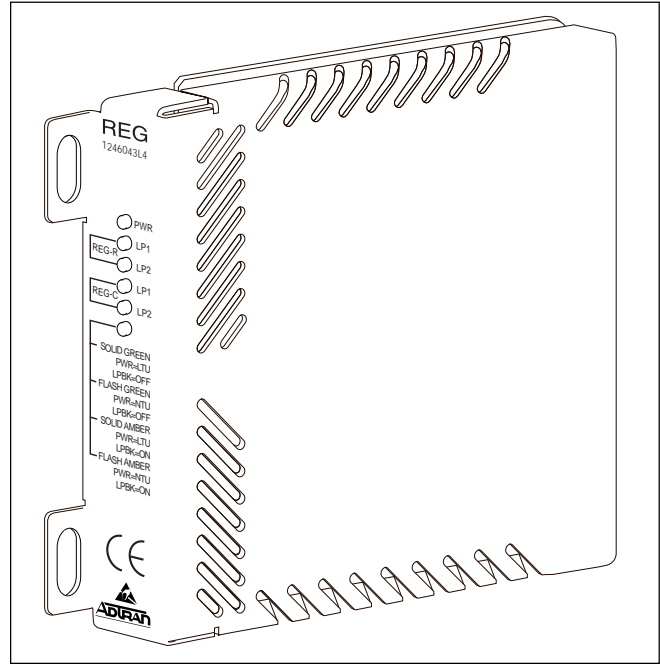


Figure 1. ADTRAN E1 HDSL REG

1. GENERAL

This practice is an installation and maintenance practice for the ADTRAN E1 HDSL Regenerator (REG), P/N 1246043L4. **Figure 1** is an illustration of the REG. REG equipment features include:

- Up to 4.75 km over 0.5 mm wire in each direction
- Span powered from NTU or LTU.
- 2B1Q line coding
- Lightning protection
- Type 200 mechanics
- Enhanced provisioning, performance monitoring, and diagnostics
- CISPR22 Class A
- CE Mark

The ADTRAN E1 HDSL REG is used to extend the effective range of an ADTRAN HDSL-based E1 circuit. It is capable of doubling the deployment range of standard HDSL, full-range loops on both sides of the REG extending the digital subscriber loop serving range up to 9.5 km of 0.5 mm twisted pair wire, using a centrally located unit.

Up to two REGs can be used in conjunction with an E1 HDSL transceiver unit for the exchange office (LTU) and an E1 HDSL transceiver unit for the remote end (NTU). Compatible ADTRAN HDSL transceiver units are as follows:

- P/N 1245011LX, E1 HDSL LTU
- P/N 1245031L1, E1 HDSL NTU Circuit Pack
- P/N 1245032LX, E1 NTU
- P/N 1245035LX, E1 NTU
- P/N 1246035LX, E1 NTU
- P/N 1181102LX, E1 Total Access LTU
- P/N 1182007LX, E1 Total Access LTU

There are no manual option settings on the REG.

REG operating power can be derived from the NTU or the LTU, independent of line impedance or wire diameter. The REG can detect whether span power is coming from the NTU, the LTU, or both. When span power is being supplied by both sides, the REG will automatically choose one unit from which to receive power. The LBK/PWR LED will indicate which unit is supplying the operating power to the REG.

The REG operates at line losses up to 27 dB at 150 kHz, in both directions from the extender and regenerates the 2B1Q signals to meet the transmitted power spectrum of ETSI TS 101 135.

The REG card plugs into a standard Type 400 or 200 mechanics.

CAUTION

Do not remove the metal shell enclosing the circuit packs.

Revision History

This is the initial release of this document. Future revisions to this document will be explained in this subsection.

2. INSTALLATION



The E1 HDSL REG is shipped in a separate container and must be installed in an environmental apparatus case or other type 200/400 mounting.

Remove the E1 HDSL REG from the blister pack and visually ensure that damage has not occurred during shipping or handling. If damage has occurred, file a claim immediately with your distributor, then contact ADTRAN customer service.

The E1 HDSL REG is designed for installation in a prewired ADTRAN apparatus case as follows:

- P/N 1150043L1, 4-slot, air- filled, houses three REGs
- P/N 1150043L2, 4-slot, gel-filled, houses three REGs
- P/N 1150087L1, T400 single slot (above-ground only), houses one REG

Compliance Codes

This product complies with EN 300, 386-2 and IEC 950. It is intended to be installed in a Restricted Access location only.

3. INSTALLING REG IN ADTRAN HOUSING

When installing the REG in an ADTRAN housing, refer to the ADTRAN Installation and Maintenance practice for the housing being used.

All connections are made through card edge connectors. **Table 1** details the card edge pin assignments.

CAUTION

Before use, remember that the REG dissipates a maximum of 5.5 watts.

Table 1. Card Edge Pin Definitions

Pin	Description
1	Chassis ground
5	HDSL Loop 1 tip (customer)
7	HDSL Loop 1 tip (exchange)
11	Chassis ground
13	HDSL Loop 1 ring (exchange)
15	HDSL Loop 1 ring (customer)
17	-48 V return (ground)
27	Chassis ground
41	HDSL Loop 2 tip (exchange)
47	HDSL Loop 2 ring (exchange)
49	HDSL Loop 2 ring (customer)
55	HDSL Loop 2 tip (customer)

4. FACEPLATE FEATURES

The ADTRAN REG faceplate has four tricolored LEDs, a power LED, and a test LED indicating different states of the HDSL circuit. **Table 2** explains the meaning of the different LED indications.

Table 2. LED Indications

LED	Description and Indications
PWR	<p>This LED indicates the unit is receiving sufficient power from the HDSL loops to power the REG.</p> <p><i>Off</i> Insufficient or no power present. <i>Green</i> Sufficient power for operation.</p>
REG-R LP1	<p>This LED indicates the HDSL signal quality and errors on REG-R loop 1. The REG-R LP1 LED will flash once when an errored second is detected on REG-R loop 1. If the REG-R LP1 LED flashes yellow rapidly (six times per second), sealing current is present and the REG is attempting to synchronize with the other HDSL circuit elements.</p> <p><i>Off</i> No synchronization with the LTU. <i>Green</i> Synchronized with good signal quality on REG-R loop 1 (> 2 dB margin above 10⁻⁷ BER). <i>Yellow</i> ... Synchronized with marginal signal quality on REG-R loop 1 (≤ 2 dB margin above 10⁻⁷ BER). <i>Red</i> Synchronized with poor signal quality on REG-R loop 1 (≥ 10⁻⁷ BER).</p>
REG-R LP2	<p>This LED indicates the HDSL signal quality and errors on REG-R loop 2. REG-R LP2 LED will flash once when an errored second is detected on REG-R loop 2.</p> <p><i>Off</i> No synchronization with the LTU. <i>Green</i> Synchronized with good signal quality on REG-R loop 2 (> 2 dB margin above 10⁻⁷ BER). <i>Yellow</i> ... Synchronized with marginal signal quality on REG-R loop 2 (≤ 2 dB margin above 10⁻⁷ BER). <i>Red</i> Synchronized with poor signal quality on REG-R loop 2 (≥ 10⁻⁷ BER).</p>
REG-C LP1	<p>This LED indicates HDSL signal quality and errors on REG-C loop 1. It will flash once when an errored second is detected on REG-C loop 1.</p> <p><i>Off</i> No synchronization with the NTU. <i>Green</i> Synchronized with good signal quality on REG-C loop 1 (> 2 dB margin above 10⁻⁷ BER). <i>Yellow</i> ... Synchronized with marginal signal quality on REG-C loop 1 (≤ 2 dB margin above 10⁻⁷ BER). <i>Red</i> Synchronized with poor signal quality on REG-C loop 1 (≥ 10⁻⁷ BER).</p>
REG-C LP2	<p>This LED indicates HDSL signal quality and errors on REG-C loop 2. It will flash once when an errored second is detected on REG-C loop 2.</p> <p><i>Off</i> No synchronization with the NTU. <i>Green</i> Synchronized with good signal quality on REG-C loop 2 (> 2 dB margin above 10⁻⁷ BER). <i>Yellow</i> ... Synchronized with marginal signal quality on REG-C loop 2 (≤ 2 dB margin above 10⁻⁷ BER). <i>Red</i> Synchronized with poor signal quality on REG-C loop 2 (≥ 10⁻⁷ BER).</p>
LBK/PWR LED.....	<p>This LED indicates the loopback and powering status of the REG.</p> <p><i>Green</i>..... No loopback in progress. LTU is powering the REG. <i>Amber</i>..... REG exchange loopback is active. LTU is powering the REG. <i>Flashing Green</i>..... No loopback in progress. NTU is powering the REG. <i>Flashing Amber</i>..... REG exchange loopback is active. NTU is powering the REG.</p>

5. MAINTENANCE

The ADTRAN E1 HDSL REG requires no routine maintenance. Performance monitoring, diagnostics, and loopbacks are available from the craft interface at the LTU and NTU.

When testing indicates a faulty circuit pack, refer to the housing Installation and Maintenance practice for the entry and pressurization control, then replace the faulty circuit pack.

ADTRAN does not recommend field repair of the circuit pack. Repair services may be obtained by returning the defective unit to the ADTRAN Repair Department.

6. DEPLOYMENT GUIDELINES

The ADTRAN HDSL system is designed to provide E1 services over loops designed to comply with ETSI guidelines. Deployment guidelines are given below.

1. All loops are non-loaded only.
2. For loops with 0.5 mm cable, the maximum loop length including bridged tap lengths is 4.75 km per loop.
3. Any single bridged tap is limited to 500 m.
4. Maximum number of bridge taps per loop is 2.

NOTE

These approximations are to be used as guidelines only and may vary slightly on different loops. Adhering to the guidelines should produce performance in excess of 10^{-7} BER.

7. SPECIFICATIONS

Table 3 lists the REG specifications.

Table 3. HDSL REG Unit Specifications

<p>Loop Interface</p> <p>Modulation Type: 2B1Q</p> <p>Mode: Full duplex, echo cancelling</p> <p>Number of Pairs: Two per loop interface</p> <p>Bit Rate: 1168 kbps per pair</p> <p>Baud Rate: 584K baud per pair</p> <p>Service Range: 4.5 km over 0.5 mm diameter wire</p> <p>Loop Loss: 27 dB maximum @ 150 kHz</p> <p>Bridged Taps: Two taps, 500 meters maximum each</p> <p>Performance: Compliant with ETSI TS 101 135</p> <p>Return Loss: 20 dB (40 kHz to 200 kHz)</p> <p>HDSL Tx Signal Level: 12.0 dBm - 14.0 dBm</p> <p>Input Impedance: 135 Ω</p>
<p>Power</p> <p>Input Power: (Span-powered by LTU or NTU) 5.5 W maximum</p>
<p>Tests</p> <p>Diagnostics: Loopback toward exchange initiated from LTU.</p>
<p>Physical</p> <p>Dimensions: 0.7" high x 5.5" wide x 6.0" deep (35.6mm high x 139.7mm wide x 152.4mm deep)</p> <p>Weight: < 1 lb.</p>
<p>Environment</p> <p>Temperature: Operating (Standard): -40°C to +70°C; Storage: -40°C to +85°C</p> <p>Relative Humidity: Up to 95%, non-condensing</p>

8. WARRANTY AND CUSTOMER SERVICE

ADTRAN will replace or repair this product within 5 years from the date of shipment if it does not meet its published specifications or fails while in service (see *ADTRAN International Equipment Warranty, Repair, and Return Policy and Procedure*, document 60000003-3).

Contact Customer and Product Service (CAPS) prior to returning equipment to ADTRAN.

For service, CAPS requests, or further information, contact one of the following numbers:

ADTRAN, Inc.

Attention: International Department
901 Explorer Boulevard
Huntsville, Alabama 35806
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Asia Pacific - Hong Kong

852 2824-8283 voice
852 2824-8928 fax
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Canada - Ontario

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1 514 940-2888 voice
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