MP1825B
4Tap Emphasis
14.1 Gbit/s
32.1 Gbit/s
The passage of signals through printed-circuit board (PCB) wiring causes signal level attenuation and quality degradation, resulting in a closed Eye diagram. Since it is impossible to transfer high-speed signals through PCBs without attenuation, many interconnect interfaces use pre-emphasis technology to maintain the Eye opening by correcting the level attenuation. The MP1825B 4Tap Emphasis is a 4 taps pre-emphasis converter for bit rates up to 32.1 Gbit/s; it supports easy changes to the pre-emphasis waveform amplitude, offset, amplitude of each tap, etc., for effective evaluation of the characteristics of high-speed interfaces below 10 Gbit/s, such as PCIe, USB, and Backplane Ethernet requiring pre-emphasis signals, as well as InfiniBand 26G-IB-EDR, CEI-28G-VSR, 32G FC, etc., in the 30 Gbit/s band.

**Target Applications**

CEI-28G-SR/VSR, InfiniBand FDR (14G) /EDR (26G), PCI express, 100GbE (100GBASE-CR4, KR4)

**Pre-emphasis up to 4 Taps**

Generates 2 and 3 taps pre-emphasis signals required for various standards and supports up to 4 taps. Since each tap can be changed independently, the effect of adding pre-emphasis can be confirmed accurately.

**Jitter Transparent**

Supports accurate jitter tolerance tests due to transparent input data and clock jitter.

**Compact Remote Head**

Shorter cable to DUT minimizes cable effects and assures high signal quality.

**Supports Two Ranges of Bit Rates**

Choice of two configurations tailored to application, supporting 1 Gbit/s to 14.1 Gbit/s (MP1825B-001, 005) and 1 Gbit/s to 32.1 Gbit/s (MP1825B-002, 006).

**Use as Front End for Other Makers’ BERTs and Customers’ Devices**

Independent operation via USB control can generate pre-emphasis signals using other makers’ devices as signal source to maximize efficiency of customers’ investment in signal sources.

**MP1825B**

4Tap Emphasis

14.1 Gbit/s

32.1 Gbit/s

* RoHS not supported at MP1825B.
Applications
BER Measurements and Jitter Tolerance Tests of Receivers using Pre-emphasis Signals

The MP1825B supports up to 4 taps at pre-emphasis ratio required by the various standards. Using pre-emphasis signals creates an interconnect standards-compliant measurement system supporting reliable BER measurements and jitter tolerance tests.

Jitter Tolerance Test Configuration using Pre-emphasis Signals

Frequency doubler I/O is used when the MP1825B-002 28 Gbit/s option is installed. Half-rate clock operation is supported at bit rates of 8 Gbit/s to 28.1 Gbit/s. The doubler circuit operation frequency is up to 28.1 GHz even when the MP1825B-006 32 Gbit/s Extension is installed. Bit rates of 28.1 Gbit/s to 32.1 Gbit/s require full-rate clock input.

Optimized Pre-emphasis

The pre-emphasis signal minimizes signal attenuation in the transmission path. Because the MP1825B can change the emphasis ratio for each tap individually, the optimum pre-emphasis for the transmission path is confirmed easily.

Optimized Pre-emphasis Effect
Setup

Using the MP1800A Signal Quality Analyzer as a signal source enables the MX180000A Signal Quality Analyzer Control Software installed in the MP1800A to control both MP1825B and MP1800A. When using signal sources other than the MP1800A, the MP1825B can be controlled independently via the USB interface from a PC with MX180000A installed.

Waveform

Test Pattern: PRBS31
Setting: 28.1 Gbit/s, Eye Amplitude: 0.5 Vp-p, Offset: 0 Vth, Cursor1: 6 dB, Cursor2: 3.5 dB, Cursor3: 3.5 dB

Test Pattern: FF00

MP1825B 4Tap Emphasis Setting Screen
Panel Layout

MP1825B (MP1825B-001 14 Gbit/s Operation)

1. Data/ Data Output
   Outputs pre-emphasized differential data signal
2. Clock Buffer Output
   Outputs clock for input to Clock Input
3. Data Input
   Input for data for conversion to pre-emphasis signal
4. Clock Input
   Input for clock synchronized with data signal
5. Channel Switch
   Set CH1 or CH2
6. Ground
   This terminal is used to discharge static electricity
7. DC Input
   For AC adapter
8. USB
   Connected to MP1800A or control PC

MP1825B (MP1825B-002 28 Gbit/s Operation)

1. Data/ Data Output
   Outputs pre-emphasized differential data signal
2. Clock Buffer Output
   Outputs clock for input to Doubler Clock Input
3. Data Input
   Input for data for conversion to pre-emphasis signal
4. Clock Input
   Input for clock synchronized with data signal
5. Doubler Clock Output
   Outputs clock with doubled frequency for input to Doubler Clock Input
6. Doubler Clock Input
   Input for half-rate clock synchronized with data signal
7. Channel Switch
   Set CH1 or CH2
8. Ground
   This terminal is used to discharge static electricity
9. DC Input
   For AC adapter
10. USB
    Connected to MP1800A or control PC
### Selection Guide

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<th>No.</th>
<th>Main Frame</th>
<th>Bit Rate</th>
<th>Data Delay</th>
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<td>4Tap Emphasis</td>
<td>MP1825B-001 14 Gbit/s Operation</td>
</tr>
<tr>
<td>2</td>
<td>MP1825B-001</td>
<td>14 Gbit/s Operation</td>
<td>MP1825B-005 14.1 Gbit/s Extension</td>
</tr>
<tr>
<td>3</td>
<td>MP1825B-002</td>
<td>28 Gbit/s Operation</td>
<td>MP1825B-004 28 Gbit/s Variable Data Delay</td>
</tr>
<tr>
<td>4</td>
<td>MP1825B-003</td>
<td>14 Gbit/s Variable Data Delay</td>
<td>* Requires MP1825B-001.</td>
</tr>
<tr>
<td>5</td>
<td>MP1825B-004</td>
<td>28 Gbit/s Variable Data Delay</td>
<td>* Requires MP1825B-002.</td>
</tr>
<tr>
<td>6</td>
<td>MP1825B-005</td>
<td>14.1 Gbit/s Extension</td>
<td>* Requires MP1825B-001.</td>
</tr>
<tr>
<td>7</td>
<td>MP1825B-006</td>
<td>32.1 Gbit/s Extension</td>
<td>* Requires MP1825B-002.</td>
</tr>
</tbody>
</table>

**MP1825B 4Tap Emphasis**
Converts input signals to pre-emphasis signals and outputs signals.

**MP1825B-001 14 Gbit/s Operation**
Covers bit rate from 1 Gbit/s to 14.05 Gbit/s. Select either MP1825B-001 or MP1825B-002.

**MP1825B-002 28 Gbit/s Operation**
Covers bit rate from 1 Gbit/s to 28.1 Gbit/s. Select either MP1825B-001 or MP1825B-002.

**MP1825B-003 14 Gbit/s Variable Data Delay**
Phase shifts input data and input clock. Select this option to input ideal phase when data and clock phase shift function not available at signal source. * Requires MP1825B-001.

**MP1825B-004 28 Gbit/s Variable Data Delay**
Phase shift input data and input clock. Select this option to input ideal phase when data and clock phase shift function not available at signal source. * Requires MP1825B-002.

**MP1825B-005 14.1 Gbit/s Extension**

**MP1825B-006 32 Gbit/s Extension**
Extends bit rate from 1 Gbit/s to 32.1 Gbit/s. * Requires MP1825B-002.

### Block Diagrams

**MP1825B 4Tap Emphasis with MP1825B-001 14 Gbit/s Operation**

**MP1825B 4Tap Emphasis with MP1825B-002 28 Gbit/s Operation**

Even when the MP1825B-006 32 Gbit/s Extension option is installed, the upper limit of the MP1825B-004 28 Gbit/s Variable Data Delay operation range is 28.1 Gbit/s. The Data/Clock phase between the MU183020A/21A PPG and MP1825B is auto-adjusted by the MU183020A/21A-030/031 Data Delay function.
<table>
<thead>
<tr>
<th>Specifications</th>
<th>Data Output *1</th>
<th>Bit Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Output: 2 (Data/xData)</td>
<td>1 Gbit/s to 14.05 Gbit/s [MP1825B-001]</td>
</tr>
<tr>
<td></td>
<td>Emphasis Setting:</td>
<td>1 Gbit/s to 14.1 Gbit/s [MP1825B-001, 005]</td>
</tr>
<tr>
<td></td>
<td>a) 2post-cursor, 1pre-cursor</td>
<td>1 Gbit/s to 28.1 Gbit/s [MP1825B-002, when not using Doubler Input/Output]</td>
</tr>
<tr>
<td></td>
<td>b) 3post-cursor</td>
<td>1 Gbit/s to 32.1 Gbit/s [MP1825B-002, 006, when not using Doubler Input/Output]</td>
</tr>
<tr>
<td></td>
<td>c) 1post-cursor, 1pre-cursor</td>
<td>8 Gbit/s to 28.1 Gbit/s [MP1825B-002, when using Doubler Input/Output]</td>
</tr>
<tr>
<td></td>
<td>d) 2post-cursor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e) 1post-cursor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>f) Rev. 3post-cursor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Peak Voltage: 100 mVp-p to 1.5 Vp-p (Single-ended)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Offset: –1.0 Vth to +1.0 Vth, Steps: 2 mVp-p</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Jitter*: 8 ps p-p (typ.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tr/Tf*: 20 ps (typ.), ±25 ps (20 to 80%) [MP1825B-001]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 ps (typ.), ±16 ps (20 to 80%) [MP1825B-002]</td>
</tr>
<tr>
<td></td>
<td>Cursor1 Emphasis: –20 to +20 dB, 20log (Eye Amplitude/Cursor1), Steps: 0.1 dB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cursor2 Emphasis: –20 to +20 dB, 20log (Eye Amplitude/Cursor2), Steps: 0.1 dB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cursor3 Emphasis: –20 to +20 dB, 20log (Eye Amplitude/Cursor3), Steps: 0.1 dB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>On/Off Function: Supported</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connector: K (f.), Termination: 50 Ω/AC Coupling</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data Input</td>
<td>0.4 Vp-p to 1.2 Vp-p [MP1825B-001, K (f.) [MP1825B-002]. Termination: 50 Ω/GND</td>
</tr>
<tr>
<td></td>
<td>Connector: SMA (f.) [MP1825B-001], K (f.) [MP1825B-002]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clock Input</td>
<td>1 GHz to 14.05 GHz [MP1825B-001]</td>
</tr>
<tr>
<td></td>
<td>Frequency Range: 1 GHz to 14.05 GHz [MP1825B-001]</td>
<td>1 GHz to 12.1 GHz [MP1825B-002, 006]</td>
</tr>
<tr>
<td></td>
<td>Amplitude: 0.25 Vp-p to 1.0 Vp-p</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connector: SMA (f.) [MP1825B-001], K (f.) [MP1825B-002]</td>
<td>Termination: 50 Ω/AC Coupling</td>
</tr>
<tr>
<td></td>
<td>Clock Buffer Output</td>
<td>Frequency Range: 1 GHz to 14.05 GHz [MP1825B-001]</td>
</tr>
<tr>
<td></td>
<td>Frequency Range: 1 GHz to 14.05 GHz [MP1825B-001]</td>
<td>1 GHz to 12.1 GHz [MP1825B-002, 006]</td>
</tr>
<tr>
<td></td>
<td>Amplitude: 0.4 Vp-p to 1.2 Vp-p</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connector: SMA (f.) Termination: 50 Ω/AC Coupling</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Doubler Input [MP1825B-002]</td>
<td>Frequency Range: 4 GHz to 14.05 GHz</td>
</tr>
<tr>
<td></td>
<td>Frequency Range: 4 GHz to 14.05 GHz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Amplitude: 0.25 Vp-p to 1.2 Vp-p</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connector: SMA (f.) Termination: 50 Ω/AC Coupling</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Doubler Output [MP1825B-002]</td>
<td>Amplitude: 0.4 Vp-p (Min.), 1.0 Vp-p (Max.) (Fixed)</td>
</tr>
<tr>
<td></td>
<td>Phase Variable Range: –1000 mUI to +1000 mUI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accuracy: 50 mUIp-p (typ.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Variable Data Delay [MP1825B-003 or MP1825B-004]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>General Specification</td>
<td>Channel Switch: CH1/CH2 (Rear panel switch)</td>
</tr>
<tr>
<td></td>
<td>Operation Interface: USB 2.0 or 1.1 Type B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Power Supply: 100 V(ac)/200 V(ac) to 240 V(ac), 50 Hz/60 Hz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Power Consumption: &lt;100 W</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dimensions: 120 (W) × 90.9 (H) × 140 (D) mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mass: ≤5 kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operating Temperature: 15°C to 35°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EMC: EN61326-1, EN61000-3-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LVD: EN61010-1</td>
<td></td>
</tr>
</tbody>
</table>

*1: Measured at PRBS 2^{21} – 1, Mark Ratio 1/2 with 50 GHz sampling oscilloscope
*2: Measured at 14.05 Gbit/s or 28.1 Gbit/s (with MP1825B-002) with the sampling oscilloscope, intrinsic jitter should be less than 200 fs (rms)
*3: Emphasis Function: Off
## Ordering Information

Please specify the model/order number, name and quantity when ordering. The names listed in the chart below are Order Names. The actual name of the item may differ from the Order Name.

<table>
<thead>
<tr>
<th>Model/Order No</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP1825B</td>
<td>– Main frame – 4 Tap Emphasis</td>
</tr>
<tr>
<td>J1137</td>
<td>Termination: 3 pcs</td>
</tr>
<tr>
<td>J1341A</td>
<td>Open: 2 pcs</td>
</tr>
<tr>
<td>J1359A†1</td>
<td>Coaxial Adapter (K-P, K-J, SMA compatible): 2 pcs/3 pcs</td>
</tr>
<tr>
<td>J1507A‡2</td>
<td>Semirigid Cable: 1 pc</td>
</tr>
<tr>
<td>J1475A</td>
<td>USB Cable: 1 pc</td>
</tr>
<tr>
<td>Z1312A</td>
<td>AC Adaptor: 1 pc</td>
</tr>
<tr>
<td>Z0897A</td>
<td>Power Cord: 1 pc</td>
</tr>
<tr>
<td>Z0918A</td>
<td>MP1800A Manual CD: 1 pc</td>
</tr>
<tr>
<td></td>
<td>MX180000A Software CD: 1 pc</td>
</tr>
</tbody>
</table>

#1: MP1825B-001: 2 pcs, MP1825B-002: 3 pcs
#2: Select MP1825B-002
#3: For jitter tolerance measurement, 2 pcs

<table>
<thead>
<tr>
<th>Model/Order No</th>
<th>Name</th>
</tr>
</thead>
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<td>– Options –</td>
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<td>MP1825B-001</td>
<td>14 Gbit/s Operation</td>
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<tr>
<td>MP1825B-002</td>
<td>28 Gbit/s Operation</td>
</tr>
<tr>
<td>MP1825B-003</td>
<td>14 Gbit/s Variable Data Delay</td>
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<tr>
<td>MP1825B-004</td>
<td>28 Gbit/s Variable Data Delay</td>
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<td>MP1825B-005</td>
<td>14.1 Gbit/s Extension</td>
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<tr>
<td>MP1825B-006</td>
<td>32.1 Gbit/s Extension</td>
</tr>
<tr>
<td>MP1825B-010</td>
<td>14 Gbit/s Variable Data Delay Retrofit</td>
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<td>MP1825B-014</td>
<td>28 Gbit/s Variable Data Delay Retrofit</td>
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<td>MP1825B-015</td>
<td>14.1 Gbit/s Extension Retrofit</td>
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<td>MP1825B-016</td>
<td>32.1 Gbit/s Extension Retrofit</td>
</tr>
<tr>
<td>J1342A</td>
<td>Coaxial Cable 0.8 m (APC-3.5, DC to 27.5 GHz)</td>
</tr>
<tr>
<td>J1439A</td>
<td>Coaxial Cable (0.8 m, K Connector) (DC to 40 GHz)</td>
</tr>
<tr>
<td>J1615A</td>
<td>Coaxial Cable set (PPG-Emphasis)</td>
</tr>
<tr>
<td>W3482AE</td>
<td>MP1825B Operation Manual</td>
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<table>
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<tr>
<th>– Optional accessories –</th>
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<tr>
<td>Coaxial Cable set</td>
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<table>
<thead>
<tr>
<th>– Maintenance service –</th>
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<tbody>
<tr>
<td>Extended Three Year Warranty Service</td>
</tr>
<tr>
<td>Extended Five Year Warranty Service</td>
</tr>
</tbody>
</table>

### Specifications are subject to change without notice.

---

**United States**
- **Anritsu Company**
  - 1155 East Collins Blvd., Suite 100, Richardson, TX 75081, U.S.A.
  - Toll Free: 1-800-267-4878
  - Phone: +1-972-644-1777
  - Fax: +1-972-671-1877

**Canada**
- **Anritsu Electronics Ltd.**
  - 700 Silver Seven Road, Suite 120, Kanata, Ontario K2V 1C3, Canada
  - Phone: +1-613-591-2003
  - Fax: +1-613-591-1006

**Brazil**
- **Anritsu Eletronica Ltda.**
  - Praça Amadeu Amaral, 27 - 1 Andar 01327-010 - Bela Vista - Sao Paulo - SP
  - Brazil
  - Phone: +55-11-2383-2511
  - Fax: +55-11-2388-6940

**Mexico**
- **Anritsu Company, S.A. de C.V.**
  - Av. Ejercito Nacional No. 579 Piso 9, Col. Granada 11520 Mexico, D.F., Mexico
  - Phone: +52-55-1101-2370
  - Fax: +52-55-5254-3147

**United Kingdom**
- **Anritsu EMEA Ltd.**
  - 200 Capability Green, Luton, Bedfordshire, LU1 3LU, U.K.
  - Phone: +44-1582-433200
  - Fax: +44-1582-731303

**France**
- **Anritsu S.A.**
  - 12 avenue du Québec, Bâtiment Iris 1 - Slic 612, 91140 VILLEBON SUR YVETTE, France
  - Phone: +33-1-60-92-15-50
  - Fax: +33-1-64-46-10-65

**Germany**
- **Anritsu GmbH**
  - Nemetschek Haus, Konrad-Zuse-Platz 1 81829 München, Germany
  - Phone: +49-89-442308-0
  - Fax: +49-89-442308-65

**Italy**
- **Anritsu S.r.l.**
  - Via Elio Vittorini 129, 00144 Roma, Italy
  - Phone: +39-6-509-9711
  - Fax: +39-6-502-2425

**Sweden**
- **Anritsu AB**
  - Kastagången 26B, 164 40 KISTA, Sweden
  - Phone: +46-8-534-707-00
  - Fax: +46-8-534-707-30

**Finland**
- **Anritsu AB**
  - Teknobulevard 5-5, FI-01530 VANTAA, Finland
  - Phone: +358-20-741-8100
  - Fax: +358-20-741-8111

**Denmark**
- **Anritsu A/S**
  - Kay Fiskers Plads 9, 2300 Copenhagen S, Denmark
  - Phone: +45-7211-2200
  - Fax: +45-7211-2210

**Russia**
- **Anritsu EMEA Ltd.**
  - Representation Office in Russia
  - Tverskaya str. 16/2, bld. 1, 7th floor.
  - Moscow, 125000, Russia
  - Phone: +7-495-363-1694
  - Fax: +7-495-935-8936

**Spain**
- **Anritsu EMEA Ltd.**
  - Representation Office in Spain
  - Edificio Cuzco IV, P. de la Castellana, 141, Pta. 5
  - 28046, Madrid, Spain
  - Phone: +34-915-726-761
  - Fax: +34-915-726-621

**United Arab Emirates**
- **Anritsu EMEA Ltd.**
  - Dubai Liaison Office
  - 902, Aurora Tower, P O Box: 500311- Dubai Internet City
  - Dubai, United Arab Emirates
  - Phone: +971-4-3758479
  - Fax: +971-4-2449036

**India**
- **Anritsu India Private Limited**
  - 2nd & 3rd Floor, #37171, Binnamangla 1st Stage, Indiranagar, 100ft Road, Bangalore - 560038, India
  - Phone: +91-80-4058-1300
  - Fax: +91-80-4058-1301

**Singapore**
- **Anritsu Pte. Ltd.**
  - 11 Chang Charn Road, #04-01, Shriro House Singapore 159640
  - Phone: +65-6282-2400
  - Fax: +65-6282-2533

**P.R. China (Shanghai)**
- **Anritsu (China) Co., Ltd.**
  - Room 2701-2705, Tower A, New Cohejing International Business Center No. 391 Gui Ping Road Shanghai, 200233, P.R. China
  - Phone: +86-21-6237-0898
  - Fax: +86-21-6237-0899

**P.R. China (Hong Kong)**
- **Anritsu Company Ltd.**
  - Unit 1006-7, 10/F., Greenfield Tower, Concordia Plaza, No. 1 Science Museum Road, Tsim Sha Tsui East, Kowloon, Hong Kong, P.R. China
  - Phone: +852-2301-4860
  - Fax: +852-2301-3545

**Japan**
- **Anritsu Corporation**
  - 8-5, Tamura-cho, Atsugi-shi, Kanagawa, 243-0016 Japan
  - Phone: +81-46-296-6509
  - Fax: +81-46-225-8359

**Korea**
- **Anritsu Corporation, Ltd.**
  - SFL, 235 Pangiyoero-kvo, Bundang-gu, Seongnam-si, Gyeonggi-do, 13494 Korea
  - Phone: +82-31-696-7750
  - Fax: +82-31-696-7751

**Australia**
- **Anritsu Pty. Ltd.**
  - Unit 20, 21-35 Ricketts Road, Mount Waverley, Victoria 3149, Australia
  - Phone: +61-3-9558-8177
  - Fax: +61-3-9558-8255

**Taiwan**
- **Anritsu Company Inc.**
  - 7F, No. 316, Sec. 1, Neihu Rd., Taipei 114, Taiwan
  - Phone:+886-2-8751-1816
  - Fax:+886-2-8751-1817

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