



SDH/SONET ANALYZER

AP9942B



**New Test Solution for
10Gbit/s DWDM Transmission System**

Ando Electric Co., Ltd

Development of DWDM 10G Transmission System/Cost Reduction of Manufacture!

High quality multi-port measurement system, which inspects the quality of transmission device for 10Gbit/s DWDM transmission system, ADM, OXC etc

■ Outline:

AP9942B SDH/SONET ANALYZER is the measurement instrument which is made for 10 G DWDM transmission line terminal used for DWDM transmission system, ADM, OXC, etc and research, development, manufacture of these system combined.

Because DWDM is the technology, which transmit multi-optical wavelength with one optical fiber, it is possible to evaluate the 10 Gbit/s or 2.5 Gbit/s of multi-optical interface port signals simultaneously. Combine measurement transmitter module with multi-port, it would be possible to carry out the multi-port simultaneous test and get the merit of reducing the evaluation time.

■ Feature:

- Multi-port lump sum test can be carried out
Multi-port configuration for your use → scalable measurement system
(1 transmitter module + 2 receiver modules configuration)
(4 receivers module configuration)
Possible to configure the measurement system with system up of existing VXI module configuration
Possible to configure the measurement system relating function extension and other modules.
- 10 Gbit/s SDH/SONET frame test can be carried out with 1 system
SDH/SONET frame test
Alarm transmission test
BERT test
Mapping test: VC4-64c/STS-192c to VC3/STS1 (concatenation mapping)
APS test
Measurement function of service disruption time
- Drop /Insert function for 10 G bit/s signal (Option)
Adding Drop/Insert module, following function can be operated.
Optical interface signal of low-speed signal (156 Mbit/s to 2.5 G bit/s) can be mapped to 10 G bit/s SDH/SONET frame.
(Detail test can be operated connecting to existing low-speed measurement device)
(Expands the application width mapping the optical signal of various transmitters to 10 G bit/s SDH/SONET frame)
Ex: High-speed router signal, etc
Signal of less than 2.5 G bit/s mapped to 10 G bit/s SDH/SONET frame can be de-mapped to drop interface.
(Monitoring the service signal and used it as drop function)
(Connecting to existing low-speed measurement device, detail test can be operated)
- Reducing the development / manufacturing cost
Using VXI plug & play, configure the transmitter automated evaluation flexibly.

System evaluation by GUI!

Easy view

The measurement display can be customized

Receiver Setting

Clock Setting

Transmitter Setting

Measurement Results



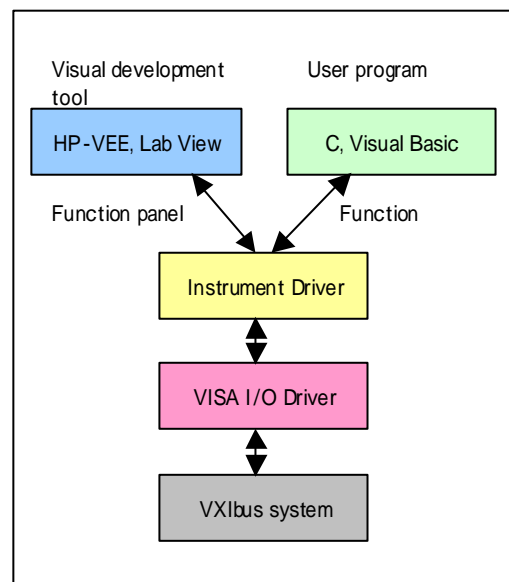
Software environment to reduce development and manufacturing cost

Operate Automated software to test function and performance

In the 10G SDH/SONET transmission system fields, enormous function and performance test like component test and system test will be required. In addition, when adding transmission system software and hardware, test will be repeated and if you can automate the regular function test, the productivity will be increased.

Software environment

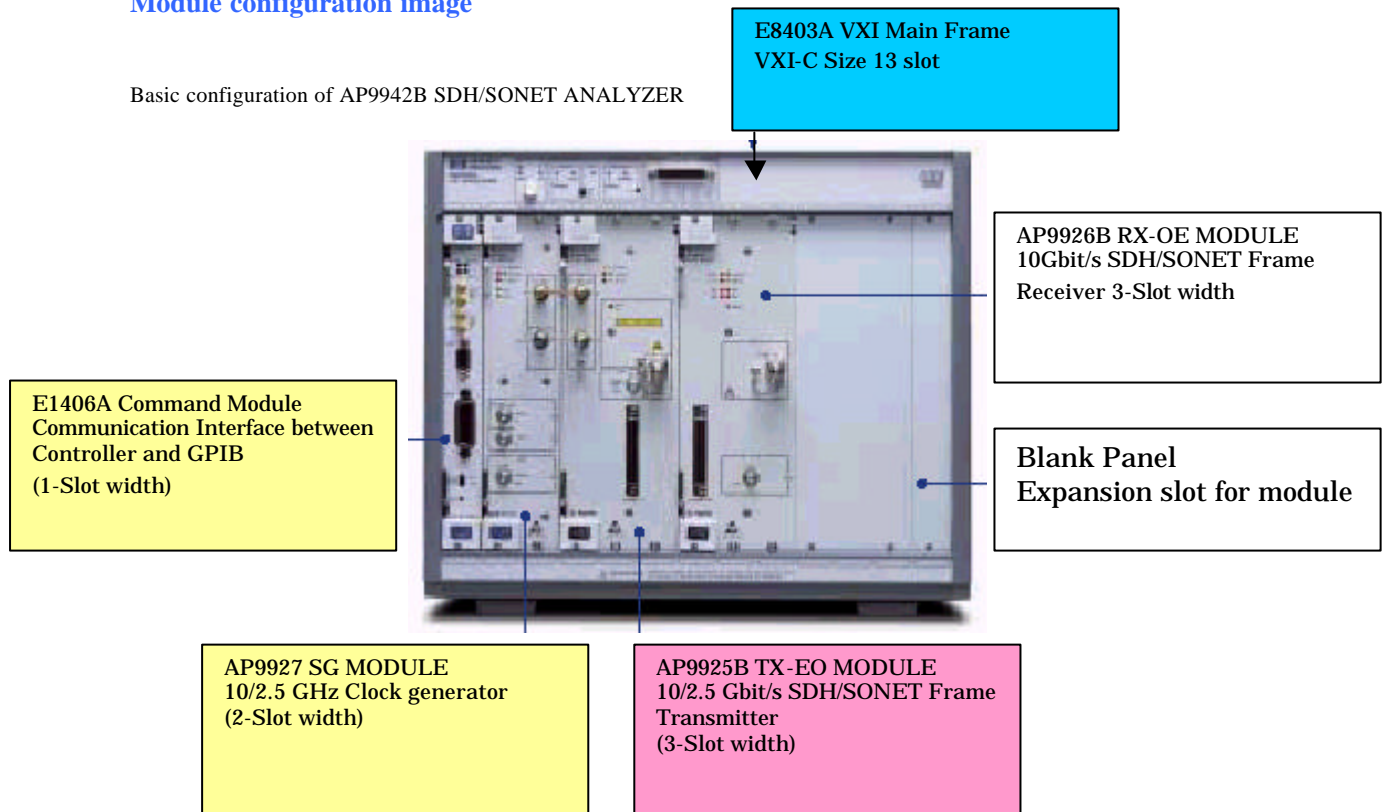
- *VXIplug&play Instrument Driver
- *Function interface
- *UID (Universal Instrument Driver) complied for OS (Windows 95, 98, NT) each development environment (Visual C++, Visual Basic, LabWindows/CVI, LabView, HP-VEE) and various GPIB interface cards has been tested.



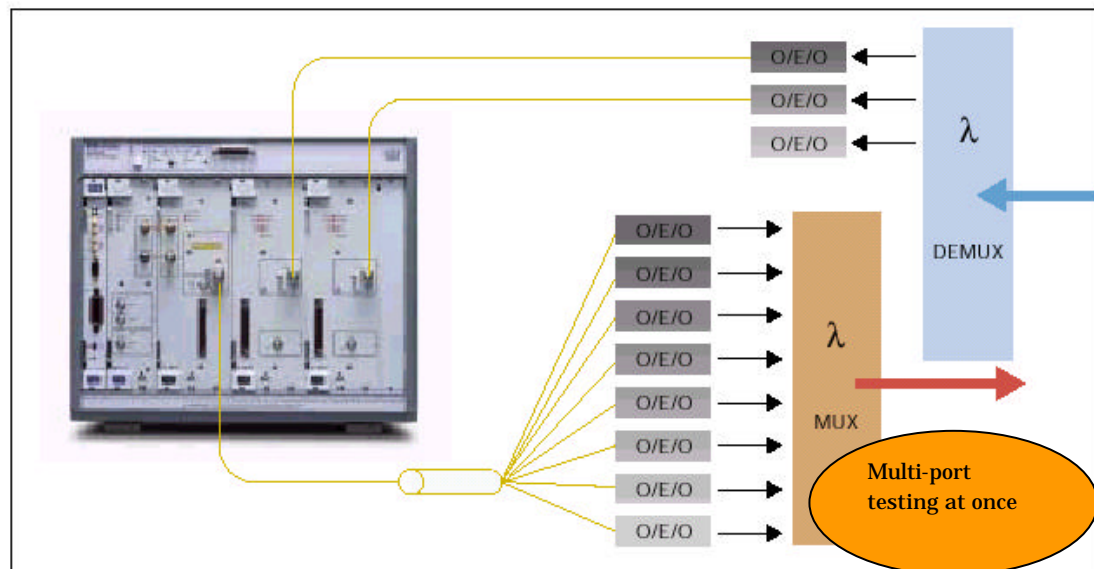
Scalable Plug-in Module configuration

Module configuration image





Basic configuration of AP9942B SDH/SONET ANALYZER



■ Image of Multiple module are installed into VXI Mainframe



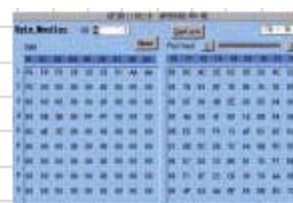
■ AP9942B SDH/SONET ANALYZER Basic Configuration

Product view	Model Type/Name	Outline	Notes
	AP9925B TX-EO MODULE	10/2.5 Gbit/s SDH/SONET frame transmitter Alarm Control: LOS, LOF, OOF, Line/MS-AIS, Line/MS-RDI Error injection: B1/B2/B3/BIT Mapping: VC4-64c/STS-192c – VC3/STS-1 Average output power: -1~+1dBm	High Power type: +2dBm or more (Option)
	AP9926B RX-OE MODULE	10Gbit/s SDH/SONET frame receiver Alarm detection: LOS, LOF, OOF, Line/MS-AIS, Line/MS-RDI Error measurements: B1/B2/B3/BIT Receiver sensitivity: <-12dBm (10Gbit/s)	2.5Gbit/s is Option
	AP9927 SG MODULE	Operating Mode: Internal/Insert/Slave/External Clock output: 9.95328Gbit/s, 2.48832Gbit/s	It uses as clock source of AP9925B.
	AP9942B SDH/SONET ANALYZER	Configuration AP9925B TX-EO MODULE AP9926B RX-OE MODULE AP9927 SG MODULE E1406A Command Module E8403A VXI Mainframe	Transmitter Receiver Clock source GPIB interface for PC VXI Module Mainframe

*Note: This product needs PC for GPIB control.

■ Option for AP9942B SDH/SONET ANALYZER

Option	Outline	Note
PC Controller	A PC controller equipped with GPIB interface (not supplied) is required to use this system.	Operating system Windows 95/98/NT CPU speed: Pentium more than 200MHZ Hard disc volume: Need more than 200MHZ RAM volume: More than 64 MB
GPIB Interface	PCMCIA type (National Instruments)	Tested by National Instrument & HP products. (VISA Complied)
2.5Gbit/s option for an AP9926B	2.5Gbit/s Optical receiver Interface	Factory option
AP9928 1.5M BITS MODULE	BITS input: 1.544Mbit/s, Bantam 100Ω Clock output: 155.52MHz	Synchronization clock for BITS Operate with an AP9927
AP9929 2M MTS MODULE	MTS input: 2.048MHz, BNC 75Ω Clock output: 155.52MHz	Synchronization clock for MTS Operate with an AP9927
AP9932 DROP MODULE	De-mapped signal from AP9926B can be outputted to the external interface	Interface Optical 1.3μm, STM16/OC48 –STM1/OC3
AP9933 INSERT MODULE	Input interface to be mapped into AP9925B SDH/SONET transmit frame	Interface Optical 1.3/1.55μm, STM16/OC48 –STM1/OC3



Set Alarm/Error

Alarm and Error can be transmitted at same time

GP1B1::10::5 AP9925B TX-ED

Alarm: OFF

Item: LOG

Mode: Repeat

Interval: 2

Duration: 1

Error: OFF

Item: Bit

Mode: Rate

Rate: 1E-6

Pointer setting

Set POS, NEG, Justification

GP1B1::10::5 AP9925B TX-ED

Pointer

Justification: Pos

Pointer Value: Apply

NDF: Disable

Value: 0

Current Pointer: 0

APS testing

APS sequence can be programmed and receive APS message by using capture function.

GP1B1::10::5 AP9925B TX-ED

APS Message

Send: ON

Mode: Single

Check: B

Data: Import

MD	K1	K2	Frame
01	00	10	8000
02	41	10	100
03	61	10	200
04	00	20	40000
05	00	10	80000
06	41	10	200
07	61	10	250
08	00	20	40000
09	00	00	1
10	00	00	1

SOH EDIT

Overhead edit function

GP1B1::10::5 AP9925B TX-ED

SOH Edit

Mode: User

Send SOH: 1

User Data

	1	2	3	4	5	6	7	8	9
1	F8	F8	F8	28	28	01	AA	AA	
2	A11	A12	A13	A21	A22	A23	J0	U10	U11
3	FF	FF	FF	FF	FF	00	FF	FF	
4	B1	U22	U23	E1	U25	U26	F1	U28	U29
5	FF	FF	FF	FF	FF	FF	FF	FF	
6	D1	U32	U33	D2	U35	U36	D3	U38	U39
7	68	68	38	06	FF	FF	60	60	60
8	H11	H12	H13	H21	H22	H23	H31	H32	H33
9	FF	FF	FF	FF	FF	00	FF	FF	
10	B21	B22	B23	B1	U45	U46	K2	U48	U49
11	FF	FF	FF	FF	FF	FF	FF	FF	
12	D4	U52	U53	D5	U55	U56	D6	U58	U59
13	FF	FF	FF	FF	FF	FF	FF	FF	
14	D7	U72	U73	D8	U75	U76	D9	U78	U79
15	FF	FF	FF	FF	FF	FF	FF	FF	
16	D10	U82	U83	D11	U85	U86	D12	U88	U89
17	60	60	60	04	04	00	FF	FF	
18	D1	U12	U13	D21	U15	U16	E2	U18	U19

POH EDIT

GP1B1::10::5 AP9925B TX-ED

POH Edit

Send POH: User

User Data

	Fore	Back
J1	00	00
C1	00	00
C2	01	01
G1	00	00
F2	00	00
H4	00	00
F3	00	00
K3	00	00
N1	00	00

GP1B1::10::5 AP9925B TX-ED

APS Message

Data: User

Start

Mode: Single

Point: 10

Pattern: 00 00

Frame Mask: 00 00

Service disruption Test

Service disruption test measures error burst length for measurement of protection switching times.

Result

Longest 1030250 us

Shortest 625 us

Last 609750 us

■ Specifications

AP9925B TX-EO MODULE

Environmental

Operating temperature : 5 to +35 ° C

Storage temperature: -20 to +60 ° C

Humidity: 30 to 85%RH

EMC: Meets EN50082-1

Physical

Size: 3-slot, C-size VXI module

Weight: 4.5Kg

Power Dissipation: 105W typical

Operating Modes: SONET/SDH

OC-192/STM-64, OC-48/STM-16

Optical Output

Wavelength: 1528nm to 1563nm,
1557nm typical

Fiber output power: 0dBm±1dBm

Option: +2dBm or more

Connector: FC/PC(standard)

Option: SC, ST, DIN etc

Payload Mode

1. R-SOH&M-SOH Mode (AP9942)

2. R-SOH Mode (AP9940)

3. Mapping Mode

SONET: STS-1, STS-Xc (X=3, 12, 48, 192)

)

SDH: VC-3, VC-4, VC-4-Nc (N=4, 16, 64)

■ Payload pattern

$2^{31}-1$, $2^{23}-1$, $2^{20}-1$, $2^{15}-1$, $2^{11}-1$,
 $2^{10}-1$, 2^9-1

Inverted or Non-inverted

■ Byte pattern

All ones, All zeros, User program pattern

■ External STS/STM input

Connect with AP9933 INSERT MODULE (STS-X/STM-X)

■ Mixed payload

Foreground and Background payload

CID Stressing

CIDstress: Consecutive 1's test to ITU-T G.958 Appendix 1.

TOH/SOH/POH Byte Access

Allows user-defined value in the range 00H to FFh to be programmed into any TOH/SOH/POH(except

B1/B2/B3 bytes).

SPE/AU Pointer control

Mode: POS, NEG, New Pointer

Alarm Generation

LOS, LOF, OOF, Line/MS-AIS, Line/MS-RDI, AU-AIS, AU-LOP, HP-RDI

Mode: Off, Single, Repeat, All

Error Add

B1, B2, L-REI/MS-REI(M1), B3, HP-REI, BIT(INFO)

Single: Single error

Rate: $m \cdot 10^{-n}$ ($m=1 \sim 9, n=3 \sim 12$)

J0/J1 message

16/64 repeating sequence

APS Sequencer

Mode: off, Step, Single, Repeat

Off: The static K1/K2 values are transmitted.

Single: K1/K2 sequencer is transmitted once only. (1 to 64 message)

Repeat: K1/K2 sequencer is transmitted repeatedly.

AP9926B RX-OE MODULE

Environmental

Operating temperature : 5 to +35 ° C

Storage temperature: -20 to +60 ° C

Humidity: 30 to 85%RH

EMC: Meets EN50082-1

Physical

Size: 3-slot, C-size VXI module

Weight: 4.8Kg

Power Dissipation: 120W typical

Operating Modes: SONET/SDH

OC-192/STM-64, OC-48/STM-16 (Option)

Optical Input

Wavelength: 1500nm to 1600nm

Sensitivity: -12dBm for BER $1 \cdot 10^{-12}$
-28dBm at 2.5Gbit/s

Max Input Power: -3dBm(10Gbit/s)

-10dBm(2.5Gbit/s)

Connector: FC/PC(Standard)

Option: SC, ST, DIN etc

Payload Mode

1. R-SOH&M-SOH Mode (AP9942)

2. R-SOH Mode (AP9940)

3. Mapping Mode

SONET: STS-1, STS-Xc (X=3, 12, 48, 192)

)

SDH: VC-3, VC-4, VC-4-Nc (N=4, 16, 64)

■ Payload pattern

$2^{31}-1$, $2^{23}-1$, $2^{20}-1$, $2^{15}-1$, $2^{11}-1$,
 $2^{10}-1$, 2^9-1

Inverted or Non-inverted

■ Byte pattern

All ones, All zeros, User programmed

■ External STS/STM output

Connect with AP9932 DROP MODULE (STS-X/STM-X)

SDH/SONET Frame monitor

Allows the values of the TOH/SOH/POH and payload of the selected test channel can be monitored and displayed.

SPE/AU Pointer Analysis

Pointer value, POS/NEG/NDF, missing NDF can be measured.

Alarm detection

LOS, LOF, OOF, Line/MS-AIS, Line/MS-RDI, AU-AIS, AU-LOP, HP-RDI

Error Detection

B1, B2, L-REI/MS-REI(M1), B3, HP-REI, BIT(INFO) G.826/G.828

Service Disruption Test

Service disruption test measures error burst length for measurement of protection switching times.

Results: Longest burst length, Shortest

burst length, last burst length

Accuracy: $\pm 0.01\% \pm 30\mu s$

Resolution: 1 μs

Range: 2S

APS Capture

Mode: Manual, Trigeer

Capture data: K1/K2 byte

Capture sequence: Up to 64 conditions.

Measurements

Mode: Manual, Single, Repeat

Manual: Start/Stop

Single/Repeat: User-defined timed

gating period from 1 to 999 seconds,

1 to 999 minutes or 1 to 999 hours.

Data logging function

AP9927 SG MODULE

Environmental

Operating temperature : 5 to +35 ° C

Storage temperature: -20 to +60 ° C

Humidity: 30 to 85%RH

EMC: Meets EN50082-1

Physical

Size: 2-slot, C-size VXI module

Weight: 3.5Kg

Power Dissipation: 57W typical

Operating Mode:

Interface rate:

2.48832GHz, 9.95328GHz

Timing source:

Internal :

Frequency accuracy: ± 4.6 ppm

Frequency offset: ± 20 ppm

Insert :

155.52MHz, 622.08MHz, 2.48832GHz

GHz

Slave : 155.52MHz

External : 2.48832GHz, 9.95328GHz

Clock output

Frequency: 2.48832GHz, 9.95328GHz

Level: +4dBm(Nominal)

Connector: APC-3.5

Trigger output

Waveform: 156MHz Square wave

Duty cycle: 50% \pm 5% (Nominal)

Connector: SMA

HP E8403A VXI Mainframe

Detail specifications of E8403A VXI mainframe can be found on the Internet at:

<http://www.tm.agilent.com>

ANDO ELECTRIC CO., LTD

3-484, Tsukagoshi, Saiwaiku, Kawasaki, Kanagawa, 212-8519 Japan Phone: +81(0)44 549 7300 Fax: +81(0)44 549-7450

ANDO CORPORATION

HEADQUARTERS: 2021 N. Capitol Avenue, San Jose, CA 95132, U.S.A. Phone: +1 408 941 0100 Fax: +1 408 941 0103

EAST OFFICE: 7617 Standish Place, Rockville, MD 20855, U.S.A. Phone: +1 301 294 3365 Fax: +1 301 294 3359

ANDO EUROPE B.V.

HEADQUARTERS: "Vijverdam" Dalsteindreef 57, 1112XC Diemen, The Netherlands. Phone: +31(0)20 698 1441 Fax: +31(0)20 699 8938

NIEDERLASSUNG DEUTSCHLAND: Nymphenburger Straße 119 B, D-80636 München, Germany Phone: +49(0)89 143 8150 Fax: +49(0)89 143 81555

ANDO ELECTRIC INC.

16 Kim Keat Road #05-03, Jumbo Industrial Building, Singapore 328804 Phone: +65 251 1391 Fax: +65 251 1987

Specifications are subject to change without notice.