

MULTI-TESTS PLATFORMS

AP1000 series



Tunable Laser source



DFB Laser Source



Optical Amplifier (EDFA)



Power Meter



Variable Optical Attenuator



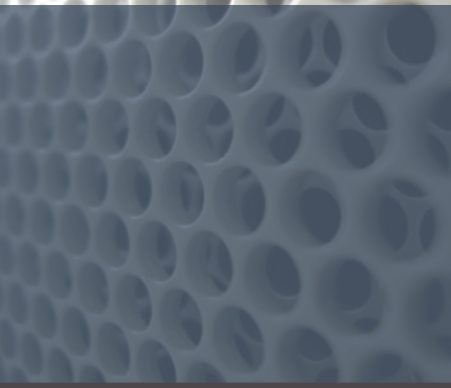
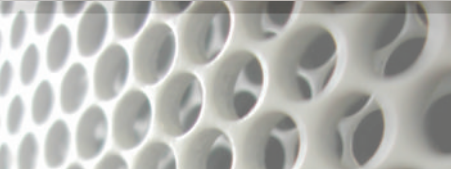
Polarimeter



Optical Tunable Filter



Optical Switch



HIGH PERFORMANCE & COST EFFECTIVE OPTICAL MULTITEST PLATFORM

BUILD YOUR OWN FLEXIBLE MULTI-TEST SYSTEM

AP1000-2
AP1000-5
AP1000-8
AP1000-12

Features

- A variety of measurement modules
- Three USB connectors on the front panel
- Internal memory
- GPIB and Ethernet remote control
- .txt file format
- 5.7 inch touchscreen

Modules

- Tunable Laser Source
- DFB Laser
- Optical Power Meter
- Optical Amplifier (EDFA)
- Optical Variable Attenuator
- Optical Tunable Filter
- Optical Switch
- Polarimeter



AP1000-2 mainframe controller:
- Accepts up to two modules



AP1000-5 mainframe controller:
- Accepts up to five modules



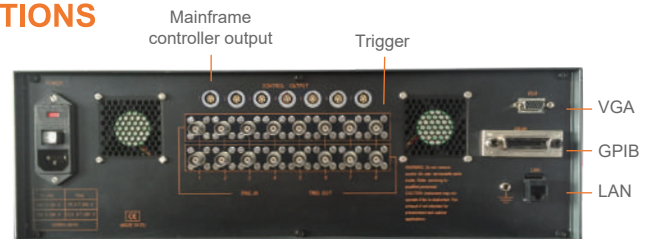
AP1000-8 mainframe controller:
- Accepts up to eight modules
- Can control up to seven AP1000-12 (92 modules in total)



AP1000-12 mainframe controller extension:
- Accepts up to twelve modules
- Can be controlled by an AP1000-8 or work independently by remote control
- Allows the system to integrate up to 92 test modules using a single AP1000-8

MULTIPLE CONNECTIONS

- VGA connector
- USB connectors
- GPIB control
- LAN connector
- Optional mainframe controller output
- Optional trigger function



AP1000-8 back

SPECIFICATIONS

	AP1000-2	AP1000-5	AP1000-8	AP1000-12
Module slot	2	5	8	12
Internal memory	64 Gbit			
File format	txt, bmp and setup file formats			
GPIB connector	Yes			
Ethernet connector	Yes			
USB connectors	3	3	3	0
Mainframe controller outputs	No	No	7	No
Screen	Yes	Yes	Yes	No
Dimensions (mm)	236x135x477	340x135x477	460x135x477	460x135x477
Mainframe weight (kg)	4.2	4.8	5.7	5.7
Modules weight (kg)	Average: 0.65			
Environmental conditions	Operating temperature: +5 to +35°C Storage temperature: -10 to +50°C Humidity: 20 to 80% RH (no condensation)			
Power requirement	AC 100-200V or 200-250V, 50/60Hz			

EQUIPMENT CONTROL

- Touchscreen
- Mouse and keyboard (three USB ports)

REMOTE CONTROL

- Control and perform data transfer with a computer through GPIB or ethernet
- Remote control of the equipment through Internet

Tunable Laser Source modules

VERY GOOD PERFORMANCE TO PRICE RATIO SOLUTIONS



Features:

- Continuous sweeping
- ITU channels selection
- Narrow linewidth: ~ 300 kHz
- High output Power: maximum +13 dBm
- Ultra high wavelength accuracy: +/- 6 pm
- High SMSR: > 47 dB
- Narrow wavelength setting resolution: < 1pm

Software features:

- Output modes
 - Static
 - Continuous sweep
 - Step by step sweep
 - Grid
- Scale modes
 - Wavelength or frequency
 - mW or dBm
- Calibration offset access
- Other modules measurement display

The screenshot shows the '1 - T.L.S. setup menu' with the following elements:

- Module number and name display:** '1 - T.L.S. setup menu' at the top left.
- Access to other modules measurements:** 'Others modules overview' and '2 - Powermeter 3314' at the top right.
- Internal calibration:** 'Internal calibration' label pointing to a button at the top right.
- Laser on/off:** 'Laser ON' button on the left.
- Wavelength or Frequency scale:** 'GHz' button on the left.
- Output power adjustment:** 'Output power: 13.0 dBm' with 'Dwn', 'Digit', and 'Up' buttons on the right.
- Continuous sweeping parameters:** 'Speed: 1.573125 nm/s' and 'Continuous Mode' button on the left.
- Step by step sweeping parameters:** 'Step Delay: 2.5 s', 'Number of Steps: 1', and 'Step Size: 42.665 nm' on the right.
- Wavelength and sweep range:** 'Output wavelength: 1558.983 nm', 'Start: 1525.930 nm', and 'End: 1568.795 nm' in the center.
- Control buttons:** 'Sweep', 'Single', 'Repeat', 'Stop', 'Set grid', and 'Main menu'.
- Footer:** 'APEX Technologies (www.apex-t.com)' at the bottom left.

Specifications:

	AP3350A	AP3352A
Wavelength range	1526nm to 1567nm	1567nm to 1608nm
Wavelength setting resolution	1pm	
Spectrum line width @ 3dB	300kHz typical	500kHz typical
Wavelength accuracy	+/- 6pm	
Output power	10dBm typical	
Output power adjustment	> 20dB	
SMSR	47dB (within a 0.1nm resolution)	
Signal to source spontaneous-emission ratio	67dB (within a 140MHz resolution filter at +/- 0.2nm from the signal)	
Optical isolation	25dB	
RIN	-135dB/Hz	
Wavelength stability @ +9dBm	1pm @ 15 minutes, 2pm @ 1 hour	
Power stability @ +9dBm	0.03dB @ 15 minutes, 0.05dB @ 1 hour	
Static Wavelength tuning speed	Max. 3s between any two static wavelength positions	
Continuous Sweeping Speed	Adjustable from 0.11 to 1.5nm/s	
Fiber/connector type	Polarization maintaining fiber FC/APC connector	
Operating temperature	From +5°C to +35°C	
Option TLS01	Typ. +13dBm maximum output power (up to +15dBm under request)	
Option TLS02	External sine modulation (from 10kHz to 20MHz)	
Option TLS03	Low SSE > 85dB	

DFB Laser modules

ITU GRID COVERING C-BAND, L-BAND AND O-BAND



Features:

- Selected wavelength according to ITU-T Grid, C-band, L-band and O-band available
- High optical output power up to 20 mW for C-band & L-band, up to 16 mW for O-band
- High side mode suppression ratio (SMSR)
- 50 GHz spacing available
- Narrow linewidth (down to 1 MHz) available

Specifications:

	AP3390A	AP3392A	AP3395A
Peak emission wavelength	ITU-Grid for C band	ITU-Grid for L band	1310nm
Spectrum linewidth @ 3dB	1MHz		5MHz
Output power	20mW Typ.		16mW Typ.
Wavelength accuracy	+/- 6pm		
Wavelength tunability	3nm (without mode hopping)		
Side Mode Suppression Ratio	45dB Typ.		
Min. optical isolation	30dB		
RIN	-138dB/Hz		-155dB/Hz
Polarization Extinction Ratio	20dB		
Fiber/connector type	Polarization maintaining fiber Standard FC/PC connector (FC/APC under request)		Corning SMF-28 FC/PC connector
Operating temperature	From +5°C to +35°C		

Polarimeter module

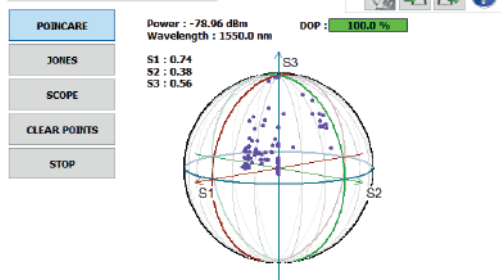
POLARIZATION ANALYSIS COVERING C+L BAND



Features:

- Four Stockes parameters measurement
- Instantaneous state of polarization (SOP)
- Degree of polarization of input light (DOP)
- Three different displaying modes: Jones graph, Poincaré sphere and Stockes parameters oscilloscope
- Extinction ratio measurements of polarizers or alignment of PM fiber
- PER measurement

01 - Polarimeter Setup Menu



	AP3321A
Optical connector	Standard FC/APC connector
Wavelength range	1520nm to 1610nm
Input power range	-60dBm to +10dBm
Maximum sampling rate	333 S/s
SOP accuracy	+/- 0.25° (-30 to +2 dBm) < 2° (-35 to +5 dBm)
Measurable SOP states	Full Poincaré sphere
Azimuth accuracy	+/-0.25° (-30 to +2 dBm)
Ellipticity accuracy	+/-0.25° (-30 to +2 dBm)
DOP accuracy	+/-0.5% (-35 to +5 dBm)
Rel. power meas. accu	+/-0.2% (-35 to +5 dBm)
Abs. power meas. accu	+/-1% (-35 to +5 dBm)
Environmental conditions	Operating temperature: +5 to +35°C Storage temperature: -10 to +50°C Humidity: 20 to 80% RH (no condensation)

Optical Power Meter modules

STANDARD DISPLAY RANGE FROM -80 dBm TO + 10 dBm
HIGH POWER DISPLAY RANGE FROM -60 dBm TO + 33 dBm



Features:

- 1 or 2 inputs
- Wavelength range: 800 to 1700 nm
- Display range: -70 to +10 dBm
- Different style of interchangeable connectors
- InGaAs Photodiode

Software features:

- 2 inputs immediate display
- Scale modes : mW or dBm
- Min/Max percentage function
- Other modules measurement display
- Active Power Control function :
Maintains a constant optical output
(Available with EDFA module and/or
Variable Optical Attenuator module)

Specifications:

	AP3314A-1 (one input +10 dBm max) AP3314A-11 (Two inputs +10 dBm max)
Wavelength range	800 to 1700nm
Calibrated wavelengths	980,1310, 1480,1550,1610nm
Photodiode	InGaAs
Fiber type	9/125 to 50/125µm
Display range	-68 to 10dBm
Max permitted level	10 dBm
Intrinsic uncertainty	± 0.2dB (down to -66dBm)
Overall measurement uncertainty	980nm ±0.5dB ±0.2nW 1310~1610nm ±0.2dB ±0.1nW
Optional optical connectors	FC (female): Different styles of optical connector interchangeable adapter (ST/SC/...) and bare optical fiber adapter can be defined by customer
Fiber type	Single-mode or Multimode 9/125µm or 50/125µm
Operating temperature	+5°C to +35°C

Optical Switch modules

1x2, 2x2, 1x4, 1x8 SWITCHES



Features:

- Wide Operating wavelength range
- Low Insertion loss
- Low Polarization dependence loss
- Fast Switch speed

Software features:

- Easy control
- Other modules measurement display

Specifications:

	AP3344-A			
	1x2	2x2	1x4	1x8
Wavelength	1290~1330nm and 1525~1610nm			
Insertion loss (max)	0.8dB	0.9dB	1.0dB	1.5dB
Return loss (min)	45dB			
Polarization Dependent loss (max)	0.07dB		0.1dB	
Crosstalk (min)	60dB			
Repeatability (max)	+/- 0.02dB		+/- 0.05dB	
WDL (max)	0.2 dB			
Switch time (max)	4ms		10ms	
Durability (min)	10 ⁷ times			
Operating temperature	+5°C to +35°C			

Optical Variable Attenuator modules

ATTENUATION RANGE OF 30 dB, ATTENUATION STEP OF 0.1 dB



Features:

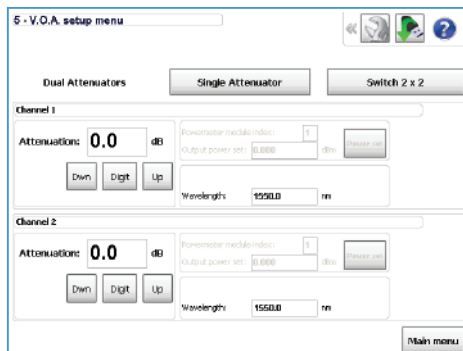
- Simple or Double module
- Attenuation range: 30dB
- Minimum insertion loss: < 1dB
- Attenuation step: 0.1 dB

Software features

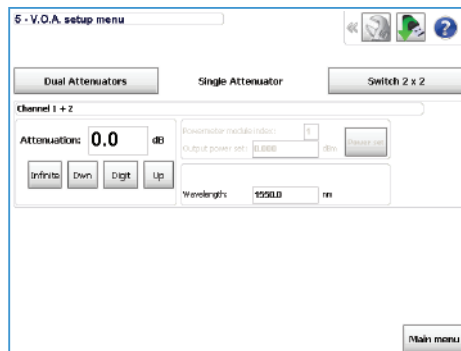
- Two channels immediate display
- Attenuation controlled by powermeter
- Other modules measurement display

AP3364-B-2 Wide attenuation range and multifunctional Optical Attenuator

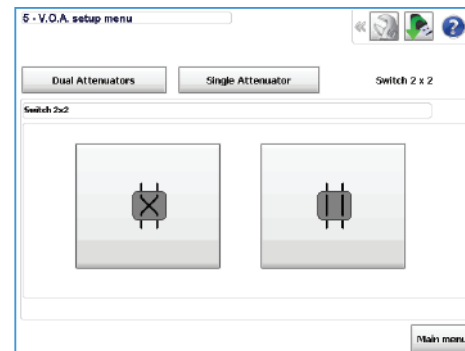
This Optical Attenuator Module is based on a highly integrated combination of dual variable attenuators and optical switch in a one slot module. This multifunctional attenuator works in three modes: Dual Attenuator Mode, Single Attenuator Mode and Switch Mode. In dual Attenuator Mode, the module can work as two independent attenuators. In Single Mode, the module provides a wider attenuation range, including a shutter function. In Switch Mode, this module can work as a 2x2 Switch.



- Dual attenuator mode:**
- 30 dB attenuation for each channel
 - Two channels simultaneous display



- Single attenuator mode:**
- 60 dB total attenuation
 - Shutter function



- Switch mode:**
- Switch 2 x 2

Specifications:

	AP3364A (single VOA)	AP3364B-2		
	AP3364A-2 (double VOA)	Dual VOA mode	Single VOA mode	Switch mode
Wavelength range	1310nm to 1550nm			
Attenuation range	30dB		60dB	
Attenuation step size	0.1dB			
Insertion loss	< 1dB	< 2dB	< 2.5dB	
Temperature dependent loss	< 0.2dB		< 0.25dB	
Wavelength dependent loss	< 0.3dB			
Polarization dependent loss	< 0.2dB			
Polarization mode dispersion	< 0.1ps			
Return loss	> 45dB			
Response speed	< 100ms/3dB			
Attenuation setting repeatability	< +/- 0.05dB			
Attenuation setting backlash	< 0.2dB			
Maximum optical power	300mW			
Operating temperature	+5°C to +35°C			

EDFA modules

C OR L BAND, HI-GAIN, LOW NOISE FIGURE, SATURATED OUTPUT POWER ACHIEVES UP TO +22 dBm



Features:

- Wavelength range: 1528 to 1563 nm or 1568 to 1612 nm
- Three series of EDFA modules: Booster / Line / Pre-amplifier
- Gain flattened version available
- Input power down to -40 dBm
- Saturated output power up to 22 dBm
- Large input power range
- Low noise figure

Software features:

- Manual or Automatic control
- Output and Gain control
- Scale modes: mW or dBm
- Easy parameter access
- Other modules measurement display

Specifications:

	AP3370A	AP3372A	AP3370B	AP3372B	AP3370C	AP3372C
	Booster Amplifier		Line Amplifier		Pre-Amplifier	
Operating wavelength range	1528-1563nm	1568-1612nm	1528-1563nm	1568-1612nm	1528-1563nm	1568-1612nm
Input power range	-10 to +4dBm	-10 to +6dBm	-20 to 0dBm	-25 to -10dBm	-38 to -6dBm	-35 to -16dBm
Output Power	From +13 to +22dBm ^a				From -10 to +10dBm ^a	
Noise figure	Typ: 4.5dB / Max: 5dB		Typ: 5dB / Max: 6dB		Typ: 5dB / Max: 5.5dB	
Polarization dependent loss	≤ 0.3dB					
Polarization dependent gain	≤ 0.3dB		≤ 0.5dB			
Polarization mode dispersion	≤ 0.3ps		≤ 0.5ps			
Pump power leakage	-30dB Max.					
Output & input isolation	≥ 30dB					
Return loss	≥ 40dB					
Fiber type	SMF-28, 900µm loose tube, FC/APC (FC/PC on demand)					
Operating temperature	+5°C to +35°C					
Control	Manual Automatic fixed Output control		Manual Automatic fixed Output control Automatic fixed gain control		Manual	
Gain Flattened option: Flatness<1.5 dB	Full range	1570-1609nm	Full range	1570-1609nm	Full range	1570-1609nm

a) According to the model

Optical Tunable Filter modules

C-BAND, L-BAND AND C+L-BAND TUNABILITY AND ATTRACTIVE FEATURES



Features:

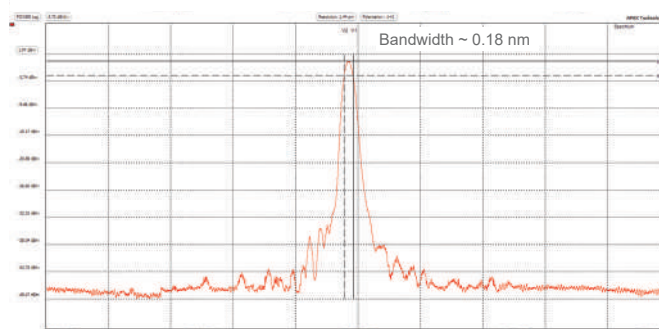
- Excellent MEMS durability, thermal stability and repeatability
- Superior optical performance
- Gaussian-shaped pass band
- Pass band optimized for 50 GHz and 100 GHz channel spacing
- C+L band tunable filter

Specifications:

	AP3380A	AP3381A	AP3382A
Tuning range (nm)	1529-1564	1526-1610	1575-1610
Min IL @ peak ^a	< 4.0dB	< 4.5dB	< 4.0dB
Bandwidth @ 3dB	> 0.15nm	< 0.32nm	> 0.15nm
Bandwidth @ 20dB	< 0.68nm	~1nm	< 0.68nm
PDL	< 0.3dB	< 0.4dB	< 0.3dB
Back reflection	> 40dB		
Setting error	< +/- 50pm		
Tuning resolution	10pm		
Tuning speed	< 30ms		
Optical power	< 500mW		
Durability	> 1 billion cycles		
Operating temperature	+5°C to +35°C		
Fiber type	9/125µm SM, FC/APC (FC/PC on demand)		

a) IL measured at 25°C. IL < 5.0 dB over entire operating temperature range

Optical Transmission Spectrum*:



Optical transmission spectrum of AP3380A C-band Tunable filter

* The spectrum is obtained with an AP208x series OSA in tracking mode (1 MHz resolution)

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