

High performances and cost effective Modules !



## AP1000 series/AP33XX series **Multi test platforms / Modules**

Tunable Laser Sources

DFB Lasers

Power Meters

EDFA

Variable Attenuators

Tunable Filters

Switches

# Plug-in modules mainframe

## AP1000 series

AVAILABLE MODULES: TUNABLE LASER SOURCES, DFB LASERS, POWER METERS, OPTICAL AMPLIFIERS, VARIABLE ATTENUATORS, TUNABLE FILTERS, SWITCHES

### Features:

- A variety of measurement modules
- Three USB connectors on the front panel that will accept a keyboard and mouse
- Internal memory
- GPIB and ethernet remote control
- .txt file format
- 5.7 inch touchscreen



AP1000-8 with (8) AP3350A Tunable Laser Sources.

### 4 PLUG-IN MAINFRAME MODELS



AP1000-2

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



AP1000-5

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



AP1000-8

AP1000-8 mainframe controller:  
- Accepts up to 8 modules  
- Can control up to 7 AP1000-12  
(92 modules in total)



AP1000-12

AP1000-12 mainframe expansion:  
- Accepts up to 12 modules  
- Must be connected to an AP1000-8  
- Allows the system to integrate up to 92 test modules using a single AP1000-8

### 7 PLUG-IN MODULES

- Tunable Laser Source
- DFB Lasers
- Optical Power Meters
- Optical Amplifiers (EDFA)
- Variable Attenuators
- Tunable Filters
- Optical Switches



AP3370 EDFA



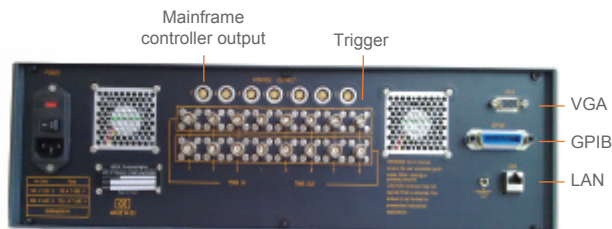
AP3350A Tunable Laser Sources



AP3344A Switches

## MULTIPLE CONNECTIONS

- Mainframe controller output (to control AP1000-12)
- Trigger function
- VGA connector
- USB connectors
- GPIB control
- LAN connector



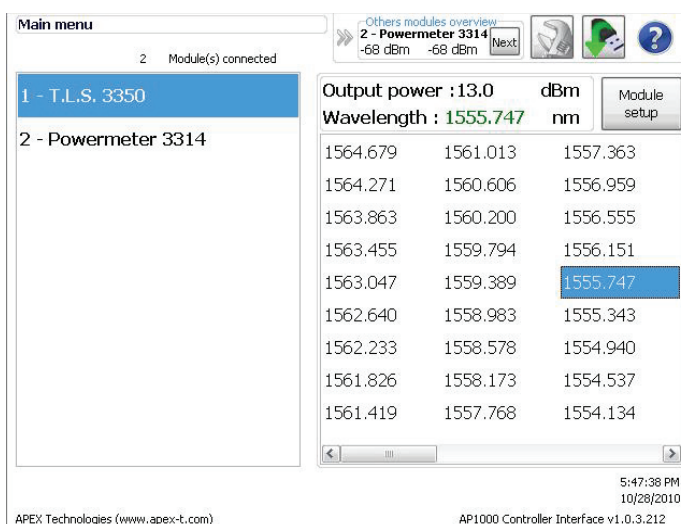
AP1000-8 back

## SPECIFICATIONS

	AP1000-2	AP1000-8	AP1000-12
Plug-in Slots	2	8	12
USB connectors	3	3	No
Internal memory	Yes	Yes	No
File format	.txt format		
GPIB connector	Yes	Yes	No
Ethernet connector	Yes	Yes	No
Mainframe controller outputs	No	7	No
Mouse and keyboard	Yes	Yes	No
Screen	Yes	Yes	No
Operating temperature	15°C to 35°C		
Power requirement	AC 100 to 120 V/200 to 250 V, 50/60 Hz		

## SOFTWARE

APEX Technologies Plug-in modules mainframe is appreciated by novice as well as expert users. It combines a full panel of functions with an impressive list of features:



## STORAGE

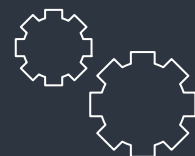
The instrument is equipped with an 160 Gb hard drive and three USB ports. bmp, txt and setup file formats are available.



## EQUIPMENT CONTROL

The equipment can be controlled by two different methods:

- The touch screen
- A mouse and keyboard



## REMOTE CONTROL

The remote control allows the operator to set measurement parameters and to execute a measurement. The user can take the control and perform data transfer with a computer through GPIB or ethernet. It is also possible to take the control of the equipment through the internet from anywhere in the world.

# Tunable Laser Source AP3350 series

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: < 1 pm



Module number and name display: 1 - T.L.S. setup menu

Access to other modules measurements: 2 - Powermeter 3314

Internal calibration: ?

Laser on/off: Laser ON

Wavelength or Frequency scale: GHz

Output wavelength: 1558.983 nm

Output power: 13.0 dBm

Start: 1525.930 nm

End: 1568.795 nm

Continuous sweeping parameters: Speed: 1.573125 nm/s

Step Delay: 2.5 s

Number of Steps: 1

Step Size: 42.865 nm

Set grid

Main menu

APEX Technologies (www.apex-t.com)

Saving, loading or creating grids

## 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

1 - T.L.S. Grid menu

Set: 192900.006 GHz

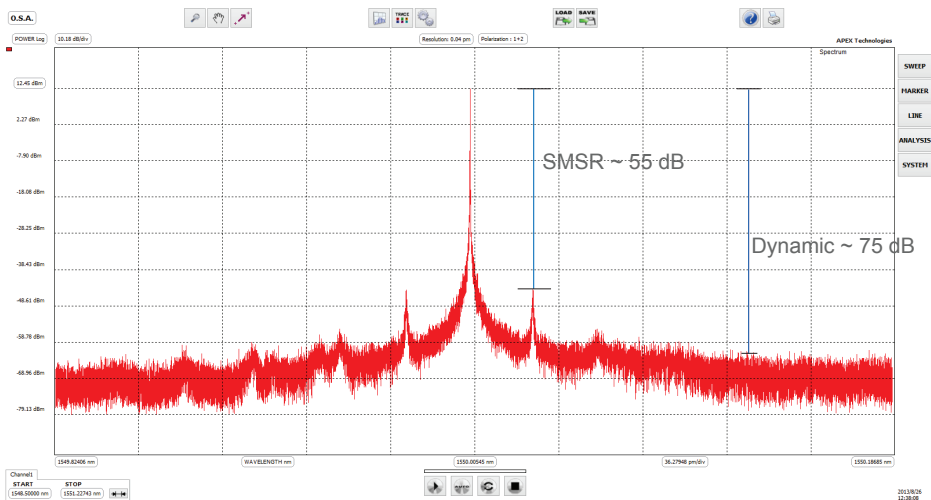
191600	192150	192700	193250	193800	194350
191650	192200	192750	193300	193850	194400
191700	192250	192800	193350	193900	194450
191750	192300	192850	193400	193950	194500
191800	192350	192900	193450	194000	194550
191850	192400	192950	193500	194050	194600
191900	192450	193000	193550	194100	194650
191950	192500	193050	193600	194150	194700
192000	192550	193100	193650	194200	194750
192050	192600	193150	193700	194250	194800
192100	192650	193200	193750	194300	194850

APEX Technologies (www.apex-t.com)

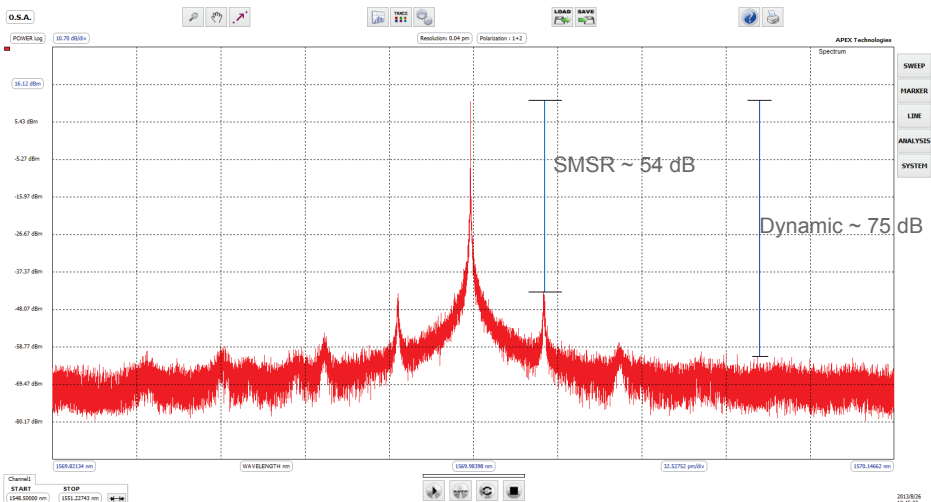
Specifications:

	AP3350A	AP3352A
Wavelength range	1526 nm to 1567 nm	1567 nm to 1608 nm
Wavelength setting resolution	1 pm	
Spectrum line width @ 3 dB	300 kHz typical	
Wavelength accuracy	± 6 pm	
Output power	10 dBm typical	
Output power adjustment	> 30 dB	
SMSR	47 dB (within a 0.1 nm resolution)	
Signal to source spontaneous-emission ratio	67 dB (within a 140 MHz resolution filter at ± 0.2 nm from the signal)	
Optical isolation	25 dB	
RIN	-135 dB/Hz	
Wavelength stability @ +9 dBm	1 pm @ 15 min, 2 pm @ 1 h	
Power stability @ +9 dBm	0.03 dB @ 15min, 0.05 dB @ 1h	
Static Wavelength tuning speed	Max. 3 s between any two static wavelength positions	
Continuous Sweeping Speed	Adjustable from 0.11 to 1.5 nm/s	
Fiber/connector type	Polarization maintaining fiber FC/APC connector	
Operating temperature	From 15°C to 35°C	
Weight	530g	
Dimensions (WxHxD)	35 x 130 x 175 mm	
Option TLS01	+13 dBm maximum output power	+11.7 dBm maximum output power
Option TLS02	External sine modulation (from 10 kHz to 20 MHz)	

Optical Spectrums\*:



Optical spectrum of AP3350A C-band Tunable laser source @1550 nm



Optical spectrum of AP3352A L-band Tunable laser source @1570 nm

\* The spectrums are obtained by the AP2040 series Optical Spectrum Analyzer with 5 MHz resolution

# Optical DFB Lasers

## AP3390 series

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)
- 50GHz spacing available
- Narrow linewidth (down to 1 MHz) available



### Specifications:

	AP3390A	AP3392A	AP3395A
Wavelength range	1530 nm to 1565 nm	1565 nm to 1610 nm	1290 nm to 1330 nm
Spectrum line width @ 3 dB	< 5 MHz		
Output power	20 mW Typ.		16 mW Typ.
Wavelength accuracy	+/- 6 pm		
Wavelength tenability	2 nm (without mode hopping)		
Side Mode Suppression Ratio	45 dB Typ.		
Min. optical isolation	30 dB		
RIN	-138 dB/Hz		-155 dB/Hz
Polarization Extinction Ratio	20 dB		
Fiber/connector type	Polarization maintaining fiber FC/APC connector		Corning SMF-28 FC/PC connector
Operating temperature	From 20°C to 35°C		

### ITU Frequency table:

#### AP3390A (C-band):

Wavelength (nm)	ITU Freq. (THz)	Wavelength (nm)	ITU Freq. (THz)	Wavelength (nm)	ITU Freq. (THz)	Wavelength (nm)	ITU Freq. (THz)
1529.55	196.00	1538.98	194.80	1548.51	193.60	1558.17	192.40
1530.33	195.90	1539.77	194.70	1549.32	193.50	1558.98	192.30
1531.12	195.80	1540.56	194.60	1550.12	193.40	1559.79	192.20
1531.90	195.70	1541.35	194.50	1550.92	193.30	1560.61	192.10
1532.68	195.60	1542.14	194.40	1551.72	193.20	1561.42	192.00
1533.47	195.50	1542.94	194.30	1552.52	193.10	1562.23	191.90
1534.25	195.40	1543.73	194.20	1553.33	193.00	1563.05	191.80
1535.04	195.30	1544.53	194.10	1554.13	192.90	1563.86	191.70
1535.82	195.20	1545.32	194.00	1554.94	192.80	1564.68	191.60
1536.61	195.10	1546.12	193.90	1555.75	192.70		
1537.40	195.00	1546.92	193.80	1556.55	192.60		
1538.19	194.90	1547.72	193.70	1557.36	192.50		

#### AP3392A (L-band):

Wavelength (nm)	ITU Freq. (THz)	Wavelength (nm)	ITU Freq. (THz)	Wavelength (nm)	ITU Freq. (THz)	Wavelength (nm)	ITU Freq. (THz)
1565.50	191.50	1577.03	190.10	1588.73	188.70	1600.60	187.30
1566.31	191.40	1577.86	190.00	1589.57	188.60	1601.46	187.20
1567.13	191.30	1578.69	189.90	1590.41	188.50	1602.31	187.10
1567.95	191.20	1579.52	189.80	1591.26	188.40	1603.17	187.00
1568.77	191.10	1580.35	189.70	1592.10	188.30	1604.03	186.90
1569.59	191.00	1581.18	189.60	1592.95	188.20	1604.88	186.80
1570.42	190.90	1582.02	189.50	1593.79	188.10	1605.74	186.70
1571.24	190.80	1582.85	189.40	1594.64	188.00	1606.60	186.60
1572.06	190.70	1583.69	189.30	1595.49	187.90	1607.47	186.50
1572.89	190.60	1584.53	189.20	1596.34	187.80	1608.33	186.40
1573.71	190.50	1585.36	189.10	1597.19	187.70	1609.19	186.30
1574.54	190.40	1586.20	189.00	1598.04	187.60	1610.06	186.20
1575.37	190.30	1587.04	188.90	1598.89	187.50	1610.92	186.10
1576.20	190.20	1587.88	188.80	1599.75	187.40	1611.79	186.00



# Optical Power Meters

## AP3314 series

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

### Features:

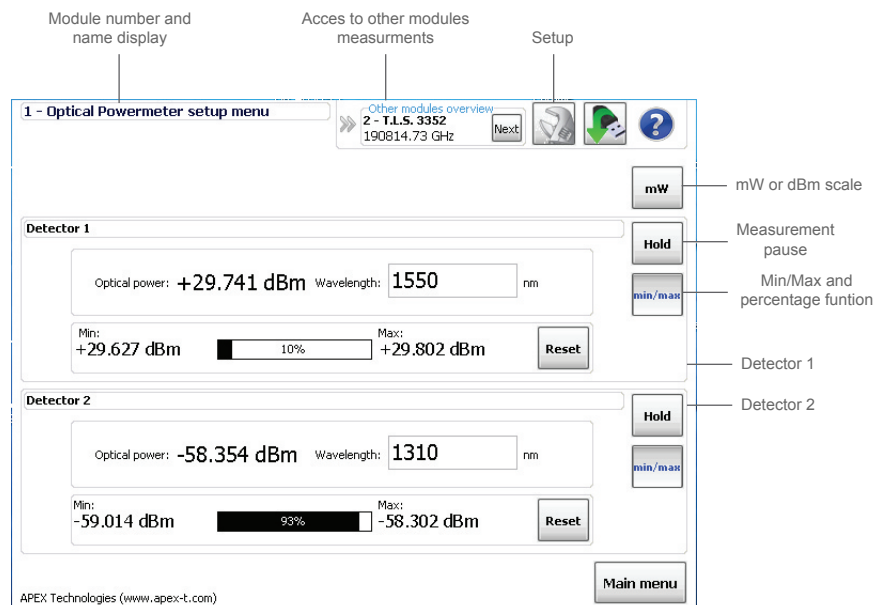
- 1 or 2 inputs
- Wavelength range : 800 to 1 700 nm
- Display range : -80 to +10 dBm & -60 to +30dBm
- Different style of interchangeable connectors
- InGaAs Photo diode



	AP3314A-1 (one input +10dBm max) AP3314A-11 (Two inputs +10dBm max)		AP3314A-3 (one input +33dBm max) AP3314A-33 (Two inputs +33dBm max)
	AP3314A-13 (Two inputs; one +10dBm max plus one +33dBm)		
Wavelength range	800 to 1700 nm		
Calibrated wavelengths	980,1310, 1480,1550,1610 nm		
Photo diode	InGaAs		
Fiber type	9/125 to 50/125 $\mu$ m		
Display range <sup>(*)2)</sup>	-70 to +10dBm		-50 to +30dBm
Display range after zeroing <sup>(*)2)</sup>	-80 to +10dBm		-60 to +30dBm
Max. permitted level	+10dBm		+30dBm (+33dBm few min)
Intrinsic uncertainty <sup>(*)1)</sup>	$\pm 0.21$ dB ( $\pm 5\%$ )		
Overall measurement uncertainty	-80 to +10dBm 980nm $\pm 0.5$ dB $\pm 0.2$ nW 1310~1610nm $\pm 0.2$ dB $\pm 0.1$ nW		-60 to +30dBm (+33dBm few mn) 980nm $\pm 0.5$ dB $\pm 0.2$ nW 1310~1610nm $\pm 0.2$ dB $\pm 0.1$ nW
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 9/125 or 50/125 $\mu$ m		
Ambient temperature	Nominal range of use -10°C to +40°C ; 40°C to +70°C		

(\*1) Under reference conditions: -20dBm (CW), 1310 nm $\pm$ 1nm, 23°C $\pm$ 3K, up to 75% relative humidity, 9 to 50 $\mu$ m test fiber with FC connector

(\*2) Testing wavelength is 1550nm.



# Optical Amplifiers (EDFA)

## AP3370 series

HIGH GAIN, LOW NOISE FIGURE, SATURATED OUTPUT POWER  
ACHIEVES UP TO +22 dBm



### Features:

- 3 series of EDFA module in standard version
  - Booster / Line / Pre-amplifier
- Gain flattened version available
- Input power down to -30 dBm
- Saturated output power up to +22 dBm
- Wavelength range 1528 to 1563 nm
- Large input power range
- Low noise figure
- Easy control

### AP3370A Booster amplifier module

	Min.	Typical	Max.
Output Power <sup>a</sup> (dBm)	From +13 dBm to +22 dBm according to the model		
Input Power Range <sup>b</sup> (dBm)	-10	0	+4
Operating Wavelength range (nm)	1528 to 1563 nm		
Noise Figure <sup>c</sup> (dB)		4.5	5.0
Polarization Dependent Loss (dB)	≤ 0.3		
Polarization Dependent gain (dB)	≤ 0.3		
Polarization Mode Dispersion (ps)	≤ 0.3		
Pump Power leakage (dB)	-30 Max.		
Output & input isolation	≥ 30		
Return loss (dB)	≥ 40		
Fiber type	SMF-28, 900 μm loose tube		
Operating temperature (°C)	0 to 65 °C		

### AP3370B Line amplifier module

	Min.	Typical	Max.
Output Power <sup>a</sup> (dBm)	From +13 dBm to +22 dBm according to the model		
Input Power Range <sup>b</sup> (dBm)	-20	-10	0
Operating Wavelength range (nm)	1528 to 1563 nm		
Noise Figure <sup>c</sup> (dB)		5.0	6.0
Polarization Dependent Loss (dB)	≤ 0.3		
Polarization Dependent gain (dB)	≤ 0.5		
Polarization Mode Dispersion (ps)	≤ 0.5		
Pump Power leakage (dB)	-30 Max.		
Output & input isolation	≥ 30		
Return loss (dB)	≥ 40		
Fiber type	SMF-28, 900 μm loose tube		
Operating temperature (°C)	0 to 65 °C		

### AP3370C Pre-amplifier module

	Min.	Typical	Max.
Signal gain <sup>d</sup> (dB)	From 20 dB to 40 dB according to the model		
Input Power Range <sup>b</sup> (dBm)		-30	
Operating Wavelength range (nm)	1528 to 1563 nm		
Noise Figure <sup>c</sup> (dB)		5.0	5.5
Polarization Dependent Loss (dB)	≤ 0.3		
Polarization Dependent gain (dB)	≤ 0.5		
Polarization Mode Dispersion (ps)	≤ 0.5		
Pump Power leakage (dB)	-30 Max.		
Output & input isolation	≥ 30		
Return loss (dB)	≥ 40		
Fiber type	SMF-28, 900 μm loose tube		
Operating temperature (°C)	0 to 65 °C		

- a) Pin = 0 dBm  
 b) The range of optical input power can be specified.  
 c) Pin = -6 dBm  
 d) Pin = -30 dBm



# Optical Variable Attenuator AP3364 series

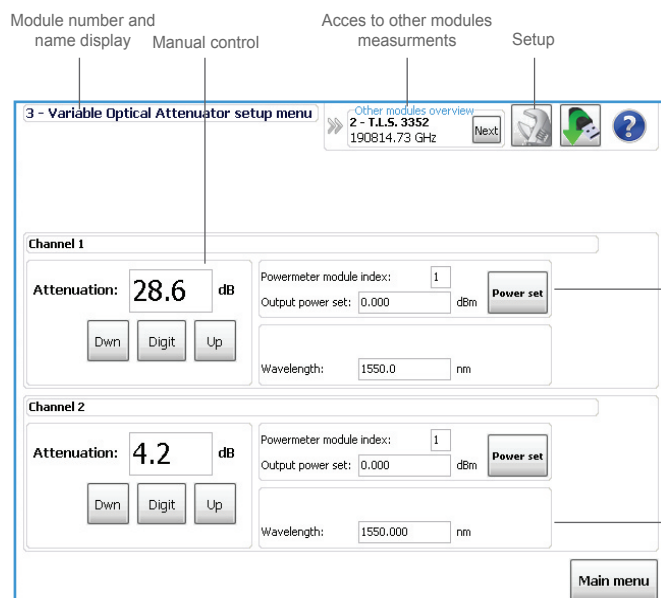
ATTENUATION RANGE OF 30 dB, ATTENUATION STEP OF 0.1 dB

## Features:

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



	AP3364A (simple variable optical attenuator) & AP3364A-2 (double variable optical attenuator)
Wavelength	1550 nm
Attenuation range	30 dB
Attenuation step size	0.1 dB
Minimum insertion loss	< 1 dB
Temperature dependence loss	< 0.2 dB
Wavelength dependence loss	< 0.3 dB
Polarization dependence loss	< 0.2 dB
Polarization mode dispersion	< 0.1 ps
Return loss	>45 dB
Response speed	< 100 ms / 3 dB
Attenuation setting repeatability	< 0.1 dB
Attenuation setting backlash	< 0.2 dB
Maximum optical power	300 mW
Operating temperature	-15°C to 35°C



## Software features:

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

# Optical Tunable Filter

## AP3380 series

### C-BAND AND 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 channel spacing
- Customized pass bands and tuning ranges available

	AP3380A	AP3382A
Tuning Range	1529 to 1564 nm	1575 to 1610 nm
Min IL @ Peak <sup>1</sup>	< 4.0 dB	
Bandwidth @ 3 dB	> 0.15 nm	
Bandwidth @ 20 dB	< 0.68 nm	
Back Re flection	> 40 dB	
PDL	< 0.3 dB	
Setting Error	< +/- 50 pm	
Tuning Resolution	10 pm	
Tuning Speed	< 30 ms	
Optical Power	< 500 mW	
Durability	> 1 billion cycles	
Operating Temp	-5 to 70 °C	
Storage Temp	-40 to 85 ° C	
Fiber Type	9/125 μm single mode	

# Optical Switches AP3344 series

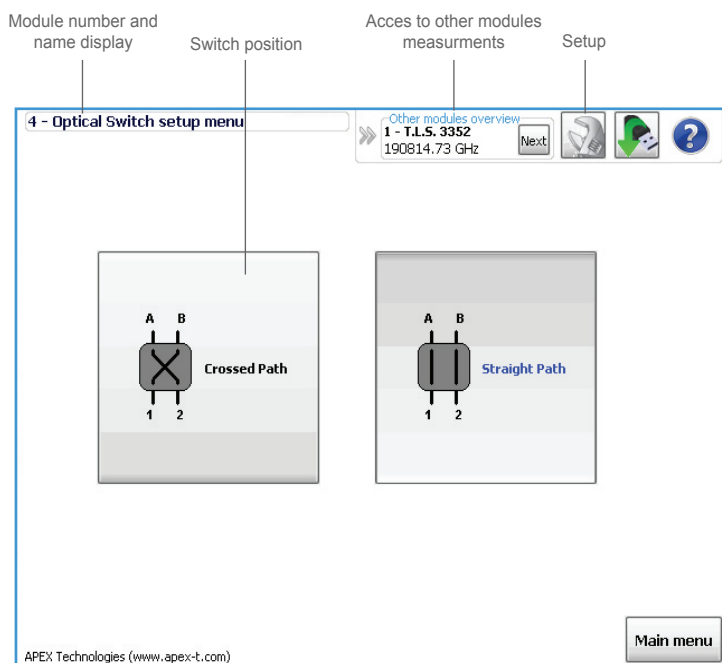
1x2, 2x2, 1x4, 1x8 SWITCHES

## Features:

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



	AP3344A Switches			
	1x2	2x2	1x4	1x8
Wavelength	1290~1330 nm and 1525~1610 nm			
Insertion loss (max)	0.8 dB	0.9 dB	1.0 dB	1.5 dB
Return loss (min)	45 dB			
Polarization Dependent loss (max)	0.07 dB		0.1 dB	
Crosstalk (min)	60 dB			
Repeatability (max)	+/- 0.02 dB		+/- 0.05 dB	
WDL (max)	0.2 dB			
Switch time (max)	4 ms		10 ms	
Durability (min)	10^7 times			
Operating temperature	-10 to +40°C			



## Software features:

- Easy control
- Other modules measurement display



## APEX Technologies

APEX Technologies is located in Marcoussis in the French Optics Valley. The company was founded in 1998 and our first equipment was shipped in 2001. We develop and produce innovative ultra high performance test equipment intended for fiber optic telecommunications research. Our policy "knowledge is power" reflects our work mode, the main part of our team are researchers. Our goal is to stay at the top of the advanced technology...

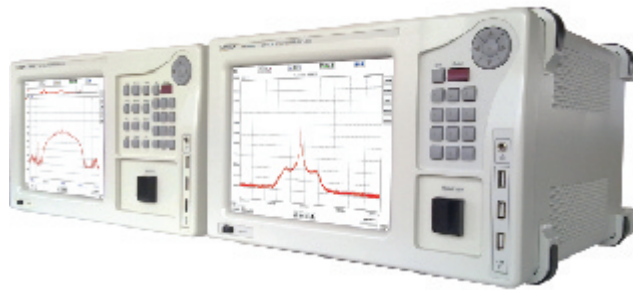
## Related products

### Optical Spectrum Analyzer:

Based on an interferometric method, APEX Technologies ultra high resolution optical spectrum analyzer combines high resolution (up to 5 MHz), wavelength accuracy ( $\pm 3\text{pm}$ ) and high dynamic range. This equipment is also able to measure two channels spectrums, one per polarization axis. The user can also use it like a tunable laser source or measure components transmissions (insertion loss/gain) thanks to the tracking generator function.

### Optical Complex Spectrum Analyzer:

This equipment is also based on an interferometric method and is able to measure spectrums with the same specifications as the optical spectrum analyzer, but it can also measure the phase as a function of frequency. Thanks to the phase and the intensity information, it uses inverse Fourier transform calculation to display chirp, phase, alpha parameter or pulse shape as a function of time, furthermore it can display constellation, phase and intensity eye diagrams. This equipment has no modulation format and bit rate limitation.



For any information, feel free to contact us  
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