

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



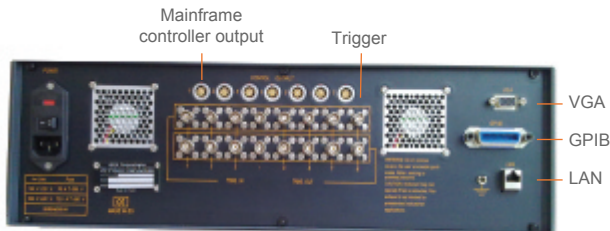
AP3350A Tunable Laser Sources



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:

Others modules overview
2 - Powermeter 3314
-68 dBm -68 dBm Next

Output power : 13.0 dBm
Wavelength : 1555.747 nm

| | | |
|----------|----------|----------|
| 1564.679 | 1561.013 | 1557.363 |
| 1564.271 | 1560.606 | 1556.959 |
| 1563.863 | 1560.200 | 1556.555 |
| 1563.455 | 1559.794 | 1556.151 |
| 1563.047 | 1559.389 | 1555.747 |
| 1562.640 | 1558.983 | 1555.343 |
| 1562.233 | 1558.578 | 1554.940 |
| 1561.826 | 1558.173 | 1554.537 |
| 1561.419 | 1557.768 | 1554.134 |

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10/28/2010

APEX Technologies (www.apex-t.com) AP1000 Controller Interface v1.0.3.212



STORAGE

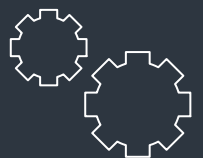
The instrument is equipped with an 160 Gb hard drive and three USB ports. bmp, txt and setup file formats are available.



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

Output power adjustment: Dwn, Digit, Up

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

Buttons: Single, Repeat, Stop, 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

2 - Powermeter 3314

Set: 192900.006 GHz

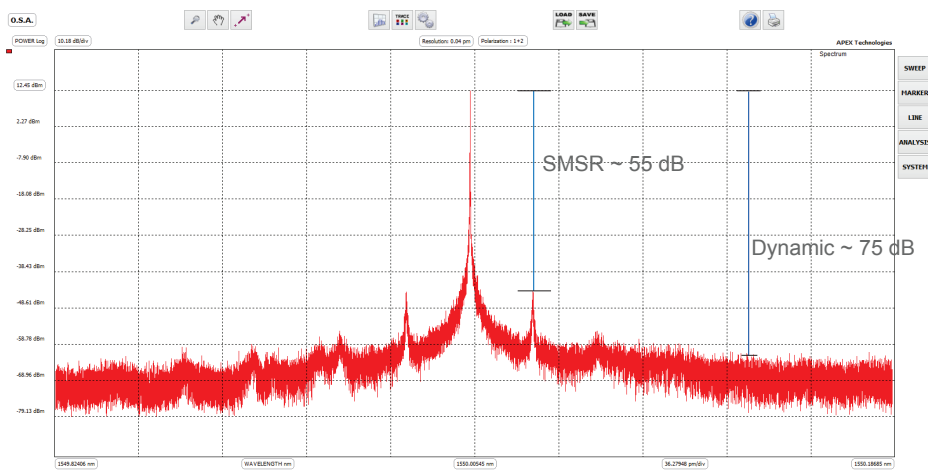
| | | | | | |
|--------|--------|--------|--------|--------|--------|
| 191600 | 192150 | 192700 | 193250 | 193800 | 194350 |
| 191650 | 192200 | 192750 | 193300 | 193850 | 194400 |
| 191700 | 192250 | 192800 | 193350 | 193900 | 194450 |
| 191750 | 192300 | 192850 | 193400 | 193950 | 194500 |
| 191800 | 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)

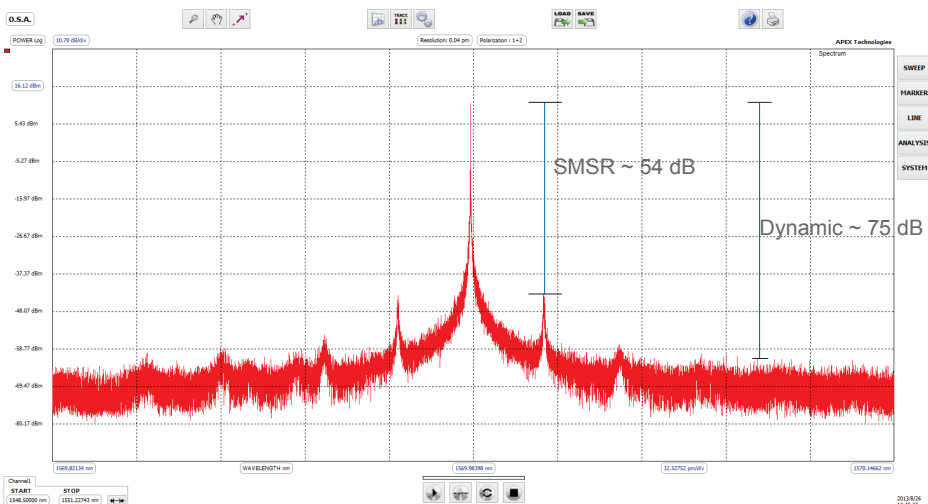
Specifications:

| | 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 μ m | |
| Display range ^(*)2) | -70 to +10dBm | -50 to +30dBm |
| Display range after zeroing ^(*)2) | -80 to +10dBm | -60 to +30dBm |
| Max. permitted level | +10dBm | +30dBm (+33dBm few min) |
| Intrinsic uncertainty ^(*)1) | ± 0.21 dB ($\pm 5\%$) | |
| Overall measurement uncertainty | -80 to +10dBm 980nm ± 0.5 dB ± 0.2 nW 1310~1610nm ± 0.2 dB ± 0.1 nW | -60 to +30dBm (+33dBm few mn) 980nm ± 0.5 dB ± 20 nW 1310~1610nm ± 0.2 dB ± 10 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 μ m | |
| Ambient temperature | Nominal range of use -10° C to $+40^{\circ}$ C ; 40° C to $+70^{\circ}$ C | |

(*1) Under reference conditions: -20dBm (CW), 1310 nm \pm 1nm, 23 $^{\circ}$ C \pm 3K, up to 75% relative humidity, 9 to 50 μ m test fiber with FC connector
(*2) Testing wavelength is 1550nm.

Module number and name display: 1 - Optical Powermeter setup menu

Access to other modules measurements: 2 - T.L.S. 3352 190814.73 GHz

Setup

Buttons: mW, Hold, min/max, Detector 1, Detector 2, Main menu

Detector 1: Optical power: +29.741 dBm Wavelength: 1550 nm
Min: +29.627 dBm 10% Max: +29.802 dBm Reset

Detector 2: Optical power: -58.354 dBm Wavelength: 1310 nm
Min: -59.014 dBm 93% Max: -58.302 dBm Reset

APEX Technologies (www.apex-t.com)

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 ^a (dBm) | From +13 dBm to +22 dBm according to the model | | |
| Input Power Range ^b (dBm) | -10 | 0 | +4 |
| Operating Wavelength range (nm) | 1528 to 1563 nm | | |
| Noise Figure ^c (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 ^a (dBm) | From +13 dBm to +22 dBm according to the model | | |
| Input Power Range ^b (dBm) | -20 | -10 | 0 |
| Operating Wavelength range (nm) | 1528 to 1563 nm | | |
| Noise Figure ^c (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 ^d (dB) | From 20 dB to 40 dB according to the model | | |
| Input Power Range ^b (dBm) | | -30 | |
| Operating Wavelength range (nm) | 1528 to 1563 nm | | |
| Noise Figure ^c (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) P_{in} = 0 dBm
 b) The range of optical input power can be specified.
 c) P_{in} = -6 dBm
 d) P_{in} = -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 |

Module number and name display Manual control Access to other modules measurements Setup

Software features:

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

Attenuation controlled by the powermeter

Variable Optical Attenuator 1

Variable Optical Attenuator 2

Wavelength

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 ¹ | < 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

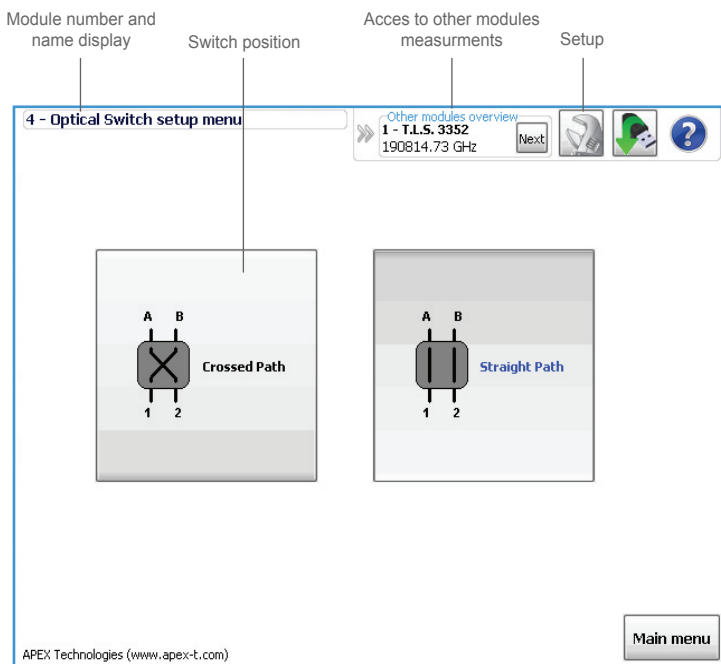
1x2, 2x2, 1x4, 1x8 SWITCHES

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...

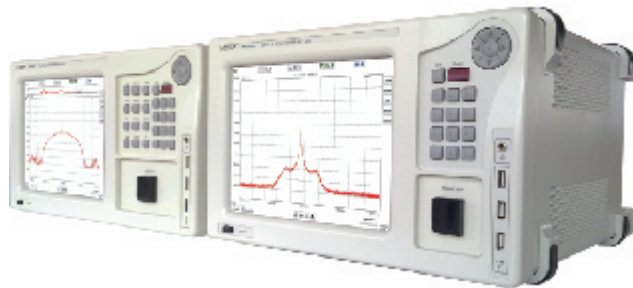
Related products

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.



AP2041B

AP2050A

For any information, feel free to contact us
or your local contact.

Your local contact.

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